Appendix D

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Northeast Recycling and Transfer Station Project

Critical Areas Assessment

FINAL

December 6, 2023

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

Northeast Recycling and Transfer Station Project E00633E19

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Project Manager:	Melissa Wu/Jacobs Engineering Group Inc.
Author:	Eliza Spear/Herrera Environmental Consultants, Inc.
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Jacobs Engineering Group Inc.
1200 112th Avenue Northeast, Suite 500
Bellevue, Washington 98004
United States
T +1.425.453.5000
www.jacobs.com

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3	December 6, 2023	Second Draft/Final Critical Areas Discipline Report	E. Spear	Phil C	Phil C

Contents

Figures

Acronyms and Abbreviations

B-IBI	Benthic Index of Biotic Integrity (B-IBI)
BIPOC	Black, Indigenous, and People of Color
BMP	Best management practice
County	King County
CSWGP	Construction Stormwater General Permit
CWA	Clean Water Act
DOH	Department of Health
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESC	Erosion and sediment control
FEMA	Federal Emergency Management Agency
Herrera	Herrera Environmental Consultants, Inc.
HHW	Household hazardous waste
HPA	Hydraulic Project Approval
ISGP	Industrial Stormwater General Permit
KCC	King County Code
KMC	Kirkland Municipal Code
LOS	Level of Service
MRW	Moderate risk waste
NERTS	Northeast Recycling and Transfer Station
NFIP	National Flood Insurance Program
NPDES	National Pollutant Discharge Elimination System
RTS	Recycling and transfer station
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SCA	Sanitary control areas
SDWA	Safe Drinking Water Act
SPG	Shockey Planning Group
SPPM	Stormwater Pollution Prevention Manual
SWAP	Source Water Assessment Program
SWD	Solid Waste Division
SWDM	Surface Water Design Manual
SWMMWW	Stormwater Management Manual for Western Washington
SWPPS	Stormwater Pollution Prevention and Spill
TSO	Transfer station operations

USACE	U.S. Army Corps of Engineers
VPD	Vehicles per day
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WMC	Woodinville Municipal Code
WRIA	Water Resource Inventory Area
WSDOT	Washington Department of Transportation

EXECUTIVE SUMMARY

PURPOSE AND NEED

The King County Department of Natural Resources and Parks, Solid Waste Division (SWD), operates a system of eight transfer stations, two drop box facilities, and one regional landfill in King County, Washington (the County). The County's 2019 Comprehensive Solid Waste Management Plan (King County 2019), which was adopted by 24 cities and approved by the Washington State Department of Ecology (Ecology), identified the need for a new transfer station to replace the aging Houghton Transfer Station. The almost 60-year-old Houghton Transfer Station is one of the busiest in terms of tonnage and transactions, yet it is undersized and lacks capacity for the type of recycling and moderate risk waste disposal services that are increasingly in demand. The new recycling and transfer station (RTS), which will be called the Northeast Recycling and Transfer Station (NERTS), is proposed to be located in the northeastern part of King County. This document analyzes the impacts to critical areas (wetlands, streams, frequently flooded areas, geologically hazardous areas, and critical aquifer recharge areas) 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 recycling and transfer station would not be sited in northeastern King County. The existing Houghton Transfer Station at 11721 NE 60th Street in Kirkland would continue to be operated.
- Alternative 1 – Current Site: The existing Houghton Transfer Station property at 11724 NE 60th Street in Kirkland. Two options exist at the Alternative 1 project site:
  - Alternative 1A – A facility constructed after the existing transfer station building is closed and demolished
  - Alternative 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 replaced after the new station is open
- Alternative 2 – Woodinville Site: A site composed of six properties in the 15000 block of Woodinville-Redmond Road NE in Woodinville

SUMMARY OF FINDINGS

For all action alternatives, there is potential for pollution during RTS operations, but all action alternatives are expected to cause negligible impacts resulting from their operations. With the implementation of operational source control best management practices (BMPs) as required by King County, it is expected that there would be no cumulative or significant unavoidable adverse impacts to critical areas from all proposed action alternatives and, therefore, additional mitigation measures would not be required.

Under the No Action Alternative, it is assumed that the current Houghton Transfer Station would continue under its current operations and have minimal direct impacts on existing critical areas. No impacts from construction would occur.

Under Alternatives 1A, 1B, and 2, no significant direct construction impacts to existing critical areas are anticipated on or adjacent to the sites. There are no significant indirect construction impacts to critical areas that are anticipated for any of the proposed alternatives. The project design will follow mitigation sequencing requirements to avoid and minimize impacts to critical areas to the greatest extent possible. If impacts are unavoidable, the appropriate mitigation measures will be taken to compensate for any impacts to critical areas.

Transfer station activities and operations for all action alternatives, including the No Action Alternative, would likely contribute incrementally to future impacts on critical areas in the region alongside ongoing development within King County.

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 northeastern King County (the County) to meet the region's growing demand for environmentally responsible waste management services. The new station will replace the aging Houghton Transfer Station in Kirkland, which has been in service since the mid-1960s and is unable to offer the space and functionality to provide the recycling services customers increasingly need and want. This Critical Areas Assessment, prepared in support of an environmental impact statement (EIS) being prepared by the County as required by the Washington State Environmental Policy Act (SEPA), addresses impacts on wetlands, streams, frequently flooded areas, geologically hazardous areas, and critical aquifer recharge areas associated with the No Action Alternative and the proposed action alternatives. These resources will be referred to collectively as 'critical areas' throughout this memorandum. Additional critical areas are not discussed in this memorandum.

This assessment describes the existing critical areas 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 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, with detailed information regarding critical areas. It also will aid the design and construction team by providing specific locations of documented and potential critical areas and buffers at the project sites and on adjacent properties.

1.1 Project Description

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

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 north, east, and west by single family homes and to the south by Bridle Trails State Park. Under the No Action Alternative, the SWD would not site a new station in northeastern King County (Figure 1-2). The SWD would continue to operate the existing Houghton Transfer Station. 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 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 transit trucks and trailers that use the Houghton Transfer Station, 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 160th Street.

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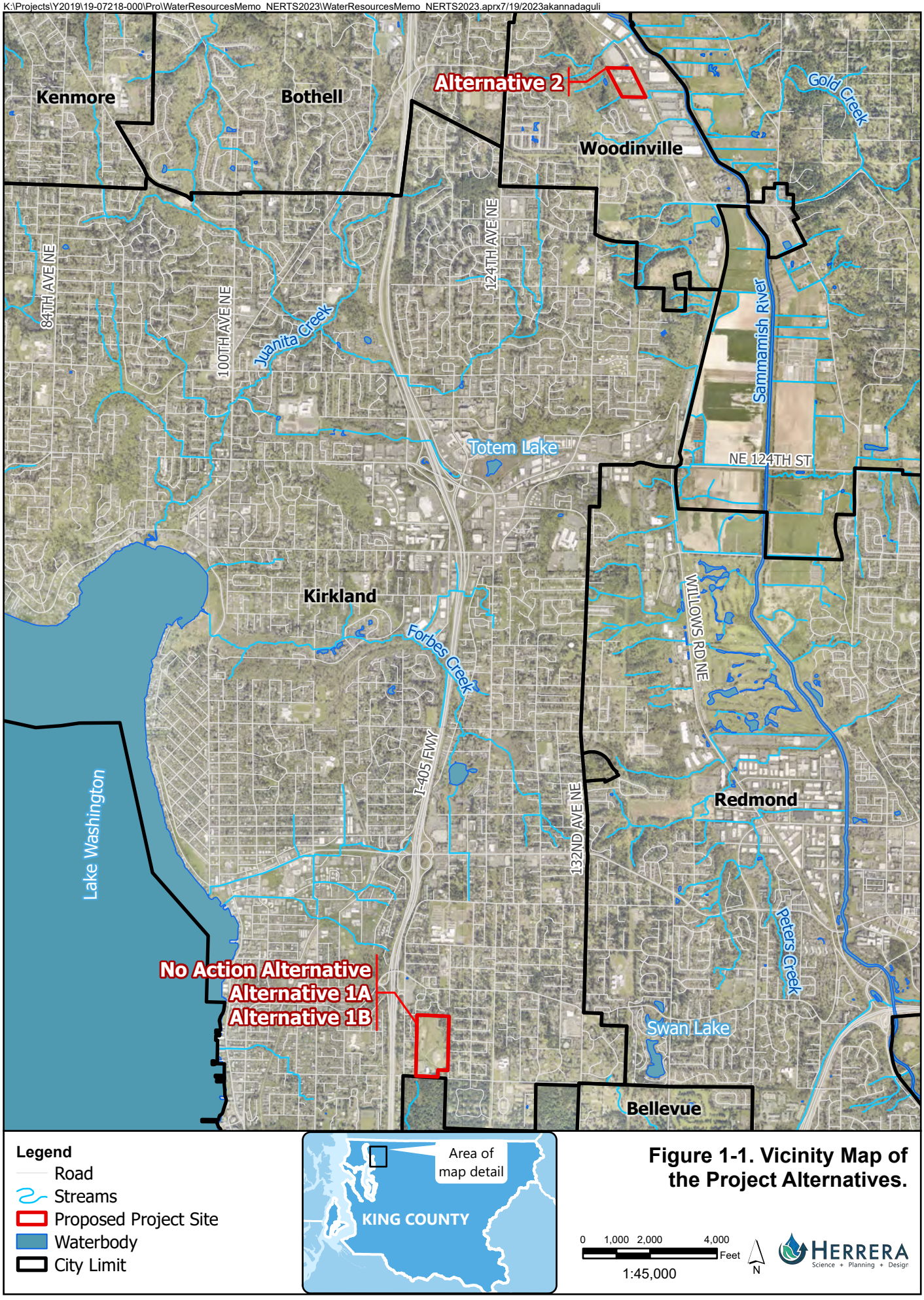

Figure 1-1. Vicinity Map of the Project Alternatives.

SCALE: 1"=120'-0"

0' 60' 120' 240' 480'

N
PLAN

LEGEND

SITE BOUNDARY

Figure 1-2
No Action Alternative

King County Solid Waste Division
Northeast Recycling and Transfer Station

King County

The existing facility is not enclosed, so it does not control noise and odors. In 2022, the Houghton Transfer Station received two odor complaints on SWD's customer service line.

The Houghton Transfer Station 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.

1.2.2 Features Common to All Action Alternatives

The new facility would be built to modern industry 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, thus 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. The new transfer station would 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, and odor control technologies
- Waste compactors
- Recycling and material staging areas
- Administration and staff area
- Station perimeter fence
- Moderate Risk Waste (MRW) collection building (Alternative 2 only)
- A "To Be Determined" building to house additional private recycling or reuse operators or other service providers
- Roadways for customers and SWD vehicles
- Outdoor parking for full and empty waste transfer trailers
- 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. 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 and city building codes. The distance from the main tipping floor 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, fire sprinkler, ventilation, and other systems. The overall height of the new station would be approximately 70 feet above the lowest level. Buildings, parking areas, and roadways at the new transfer station would result in up to four to 8.5 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 facility is anticipated to open for business in 2029 following a construction period of approximately 30 months. 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, thus reducing off-site noise, odor, and dust.
- The facility will provide expanded recycling, accepting source-separated materials from self-haul customers
  - Commingled recyclables (curbside mix of paper, cardboard, tin, aluminum, plastic containers, glass bottles and jars)
  - Cardboard
  - Household sharps
  - 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, depending on the alternative selected, 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.
- A mechanical exhaust ventilation system will be incorporated into the transfer station building for odor and dust control.
- A misting system will be installed in the transfer building for odor and dust control.
- 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, thus reducing emissions.
- The station will be cleaned on a regular basis.

1.2.3 Alternative 1

The site for Alternative 1 is located at 11724 NE 60th Street in Kirkland, at the existing Houghton Transfer Station location. The site is bordered to the north, east, and west by single family homes and to the south by Bridle Trails State Park. Alternative 1 has two options:

- Alternative 1A – a facility constructed after the existing transfer station building is closed and demolished (Figure 1-3)
- Alternative 1B – a facility constructed while the existing transfer station building is open and operating, and which will then be closed and repurposed or 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 “to-be-determined (TBD)” 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. Expanded recycling services would be provided with Alternative 1A.

Alternative 1B retains the existing transfer station building during construction of the new station, and then closes and repurposes or replaces the existing station 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. Expanded recycling services would be provided with Alternative 1B.

The area to the north of the existing transfer station is the site of a closed landfill that is owned and maintained by King County. Both Alternative 1A and Alternative 1B may include removal of some existing waste in the development footprint to accommodate construction of new facilities.

1.2.4 Alternative 2

The site for Alternative 2 is located at 15801 Woodinville-Redmond Road Northeast in Woodinville on parcels 1526059086, 5711600010, 5711600020, 5711600030, 1526059094, and 1526059095. The proposed site is 12.9 acres, with an area of about 8 to 10.9 acres available for development (Figure 1-5). 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 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. Expanded 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

- SITE BOUNDARY
- POTENTIAL SITE DEVELOPMENT AREA
- FUTURE DEVELOPMENT AREAS
- EXAMPLE ENTRANCE / EXIT

Figure 1-3
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

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

Figure 1-4
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

- SITE BOUNDARY
- POTENTIAL SITE DEVELOPMENT AREA
- STANDARD 105-FOOT WETLAND BUFFER
- EXISTING WETLAND AREA
- EXAMPLE ENTRANCE / EXIT

Figure 1-5
Alternative 2

King County Solid Waste Division
Northeast Recycling and Transfer Station

King County

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, and installation of drainage systems. Each of these activities would utilize appropriate construction equipment for the desired function. King County will require the design to minimize soil disturbance as feasible.

2 Regulatory Context

Critical areas are subject to a variety of federal, state, and local regulations that will apply to any future activities planned for the project. Federal laws regulating wetlands and aquatic resources include Sections 404 and 401 of the Clean Water Act (United States Code, Title 33, Chapter 1344 and 1251 [33 USC 1344 and 1251]) and the Navigable Waters Protection Rule (33 CFR Part 328). Washington State laws and programs designed to control the loss of wetland acreage include the State Environmental Policy Act (SEPA) and Section 401 of the Clean Water Act (administered in the State of Washington by the Washington State Department of Ecology [Ecology], as mandated by the Washington State Water Pollution Control Act). In addition, Washington State laws include the state Hydraulic Code (Washington Administrative Code [WAC] 220-110). City of Kirkland and City of Woodinville Municipal Codes specify wetland and stream categories, required buffer widths, development standards, and mitigation requirements for critical areas in their jurisdictions. Federal, state, and county regulations require mitigation for impacts on wetlands and FWHCAs.

2.1 Treaty Rights

Washington Department of Fish and Wildlife (WDFW) coordinates with tribal governments when approving Hydraulic Project Approval (HPA) applications under the 1989 State/Tribal Centennial Accord and the 2012 State/Tribal Relations Act (Chapter 122, Laws of 2012). WDFW consults and cooperates with the Tribes consistent to their mission to protect, preserve, and enhance Washington's environment, and promote the wise management of Washington's land, air, and water for the benefit of current and future generations (WDFW 2023). WDFW administers the HPA program under the state Hydraulic Code (WAC 220-110), which was specifically designed to protect fish life. An HPA is required for projects that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state.

As part of the Clean Water Act Section 404 process described below, the U.S. Army Corps of Engineers (USACE) coordinates with tribal governments when approving nationwide permit applications and coordinates with tribal parties on any comments received as part of the permit approval process.

2.2 Applicable Laws, Plans, and Policies

2.2.1 Federal

2.2.1.1 Clean Water Act Sections 404 and 401

Section 404 of the federal Clean Water Act regulates the placement or removal of soil or other fill, grading, or alteration (hydrologic or vegetative) in waters of the United States, including wetlands and streams (33 USC 1344). The Seattle District of the USACE administers the permitting program under the act. The permits include nationwide (general) permits for projects involving small areas of fill, grading or alteration and individual permits for projects that require larger areas of wetland disturbance. USACE does not regulate wetland buffers.

Section 401 of the Clean Water Act requires that proposed dredge (removal) and fill activities permitted under Section 404 be reviewed and certified to ensure that such activities meet state water quality standards. State 401 certification is administered by Ecology for all Section 404 permits. State 401 certification is granted without the need for a separate permit from Ecology for projects that qualify for a Section 404 nationwide permit, meet specific 401 certification conditions of the nationwide permit, and meet Ecology 401 General Conditions. If that is not the case, an Individual 401 Water Quality Certification permit is required by Ecology.

2.2.1.2 Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act

Section 7 of the Endangered Species Act requires interagency consultation with the National Marine Fisheries Service (NMFS) or US Fish and Wildlife Service (USFWS) for all projects with a federal nexus

to demonstrate that the project will not jeopardize the continued existence of listed species, or destroy or adversely modify critical habitat for listed species. The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires federal agencies to consult with the NMFS on activities that may adversely affect essential fish habitat (EFH). A biological assessment is needed to document potential impacts and mitigation to listed species and critical habitat in the surrounding area.

2.2.2 State

In addition to the references to the WAC below, additional sections that regulate fish and wildlife and related activities include WAC 220-200, 220-300, 220-400, and 220-500. These sections of the WAC are not described in detail in this report, as they do not pertain directly to the regulation of critical areas. The project will be subject to all regulations in Title 220 of the WAC as applicable.

2.2.2.1 State Hydraulic Code (WAC 220-660)

WDFW administers the Hydraulic Project Approval (HPA) program under the state Hydraulic Code (WAC 220-660), which was specifically designed to protect fish life. An HPA is required for projects that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state. Authority is granted to WDFW under RCW Title 77.

WDFW coordinates with tribal governments when approving HPA applications under the 1989 State/Tribal Centennial Accord and the 2012 State/Tribal Relations Act (Chapter 122, Laws of 2012). WDFW consults and cooperates with the Tribes consistent to their mission to protect, preserve, and enhance Washington's environment, and promote the wise management of Washington's land, air, and water for the benefit of current and future generations (Ecology 2023).

2.2.2.2 Growth Management Act and the State Environmental Policy Act

The Growth Management Act (GMA) is comprised of state statues (RCW 36.70A) which require cities and counties to develop a comprehensive plan to manage population growth. The comprehensive planning process (WAC 365-196) includes the prioritization of the environment through a goal which states that planning efforts must "protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water." As part of the GMA, the State Environmental Policy Act (SEPA) outlines a process intended to ensure that environmental impacts are evaluated and disclosed during decision-making by state and local agencies. Environmental review is required for any proposal that involves a government action, as defined in the SEPA Rules (WAC 197 11) and that is neither statutorily (Revised Code of Washington 43.21.c) nor categorically (WAC 197-11-800) exempt from the threshold determination provisions of SEPA.

2.2.2.3 Shoreline Management Act

The Shoreline Management Act (SMA) (Chapter 90.58 RCW) requires local jurisdictions with shorelines to develop and implement Shoreline Master Programs. The SMA is intended "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines." Shoreline jurisdiction includes all marine waters, streams and rivers with greater than 20 cubic feet per second mean annual flow, lakes 20 acres or larger, upland areas called shorelands that extend 200 feet landward from the edge of these waters, biological wetland and river deltas connected to these water bodies, and some or all of the 100-year floodplain, including all wetlands. There is no regulated shoreline within the proposed project alternative activity areas.

2.3 Local Laws, Plans, and Policies

2.3.1 City of Kirkland

The City of Kirkland (Kirkland) regulates critical areas under its jurisdiction including wetlands, streams, minor lakes, fish and wildlife habitat conservation areas (FWHCAs), geologically hazardous areas, and frequently flooded areas (City of Kirkland Zoning Code [KZC] Chapter 85 and Chapter 90). In addition,

KZC Chapters 85 and 90 specify exemptions, development standards, and permitting procedures for proposed modifications to critical areas and associated buffers. Those standards include provisions for mitigation sequencing requirements (e.g., impact avoidance, minimization, and rectification) and providing compensatory mitigation for unavoidable permanent impacts on critical areas.

2.3.1.1 Wetlands

Kirkland regulates wetlands and their buffers (KZC 90.55) within its jurisdiction as critical areas. Wetlands help store and convey flood and storm water, support base stream flow and recharge groundwater, provide erosion control and shoreline protection, improve water quality, provide fish and wildlife habitat, and provide cultural and socioeconomic values. The primary purpose of wetland regulations is to achieve a goal of no net loss of wetland functions, value and acreage, which, where possible, includes enhancing and restoring wetlands. Kirkland rates wetlands according to the Washington State Wetland Rating System for Western Washington: 2014 Update (KZC 90.55; Hruby 2014). Wetlands are rated as Category I, II, III, or IV, according to the level of function they provide and how highly they score on the Ecology wetland rating system. Standard buffer widths defined in KZC 90.55.1 are based on the wetland rating and habitat score.

2.3.1.2 Streams

Streams and their associated buffers provide important fish and wildlife habitat and travel corridors; help maintain water quality; store and convey storm and flood water; recharge groundwater; and serve as areas for recreation, education, scientific study, and aesthetic appreciation. The primary purpose of stream regulations is to avoid damage to stream and riparian corridor functions and, where possible, to enhance and restore streams and riparian areas. Streams are classified according to KZC 90.65.1 and are based on the water typing system described in the Washington Administrative Code (WAC) 222-16-030. This system is based primarily on fish, wildlife, and human use, and consists of four stream types: Type S, F, Np, or Ns. Type S aquatic areas are those surface waters that are inventoried as "Shorelines of the State" under the Shoreline Management Master Program for King County, pursuant to Revised Code of Washington (RCW) Chapter 90.58. Type F streams are those known to be used by fish or meet the physical criteria to be potentially used by fish. Type Np streams are perennially flowing non-fish bearing and Type Ns streams are season flowing non-fish bearing. Stream buffer widths defined in KZC 90.65.1 are based on stream type.

2.3.1.3 Minor Lakes–Forbes Lake and Totem Lake

Kirkland regulates Forbes Lake and Totem Lake as minor lakes according to KZC 90.90. KZC 90.10.3 defines minor lakes as those that provide important fish and wildlife habitat; store and convey storm and flood water, recharge, store, and discharge ground water; and serve as areas for recreation, education, scientific study, and aesthetic appreciation. The primary purpose of minor lake regulations is to avoid impacts to lakes and contiguous stream and wetland areas and, where possible, to enhance and restore minor lakes. The minor lakes are regulated according to the provisions in KZC 90.90. Because the shallow perimeter of minor lakes often meets the definition of a wetland, many uses and activities in and around lakes are regulated under KZC 90.10.55.

2.3.1.4 FWHCAs

Kirkland defines FWHCAs as those areas necessary for maintaining species in suitable habitats within their natural geographic distribution so that isolated subpopulations are not created. These areas include:

- Areas with which state or federally designated endangered, threatened, and sensitive species have a primary association.
- Areas with which species of local importance (those species of local concern designated by the City in KZC 90.95(8) due to their population status or their sensitivity to habitat manipulation) have a primary association.
- Naturally occurring ponds under 20 acres and their submerged aquatic beds that provide fish or wildlife habitat, including those artificial ponds intentionally created from dry areas in order to mitigate impacts to ponds.
- Waters of the state including lakes, rivers, ponds, streams, inland waters, underground waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

The primary purpose of FWHCAs regulations is to protect habitats from impacts of adjacent urban uses by minimizing fragmentation of native habitat, controlling invasive species, maintaining or providing habitat connectivity with vegetated corridors between habitat patches, preserving habitat features including native vegetation, snags and downed wood and providing buffers of adequate width adjacent to the habitat areas. FWHCAs are regulated according to the provisions in KZC 90.65. Fish habitat is protected under the provisions of KZC 90.65. Thus, the provisions in KZC 90.95 do not apply to fish habitat.

2.3.1.5 Geologically Hazardous Areas

Kirkland regulates geologically hazardous areas including erosion hazard areas, landslide hazard areas, and seismic hazard areas, within its jurisdiction as critical areas. Geologically hazardous areas can pose a threat to health and safety if development is not appropriately managed as a condition of permitting construction.

- Erosion hazard areas contain soils which, according to the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) Web Soil Survey (NRCS 2023), may experience severe to very severe erosion hazard. Regulations to control erosion are contained within KMC Title 15.
- Landslide hazard areas are at risk of mass movement due to a combination of geologic, topographic, and hydrologic factors. Kirkland classifies landslide hazard areas as high or moderate.
- Seismic hazard areas are subject to severe risk of earthquake damage as a result of seismically induced ground shaking, slope failure, settlement or soil liquefaction, which typically occurs in areas underlain by cohesionless soils of low density, usually in association with a shallow groundwater table.

Landslide hazard areas and seismic hazard areas are regulated according to the provisions in KZC Chapter 85.

2.3.1.6 Frequently Flooded Areas

Frequently flooded areas are those of special flood hazard that help to store and convey storm and flood water; recharge ground water; provide important riparian habitat for fish and wildlife; protect the functions and values of floodplains; and serve as areas for recreation, education, and scientific study. The primary purpose of frequently flooded areas regulations is to manage potential risks to public safety and damage to public and private property due to flooding, and to protect instream habitat areas. Kirkland uses the Federal Emergency Management Agency (FEMA) maps as a basis for determination of the location of frequently flooded areas. Frequently flooded areas are regulated according to the provisions in KZC 90.100 and Kirkland Municipal Code (KMC) 21.56.

2.3.2 City of Woodinville

The City of Woodinville (Woodinville) regulates wetlands, FWHCAs, geologically sensitive areas, frequently flooded areas, and critical aquifer recharge areas (CARAs) under its jurisdiction (City of Woodinville Municipal Code [WMC] Chapter 21.51). WMC standards include provisions for mitigation sequencing requirements (e.g., impact avoidance, minimization, and rectification) and providing compensatory mitigation for unavoidable permanent impacts on critical areas.

2.3.2.1 Wetlands

Woodinville regulates wetlands and their buffers within its jurisdiction as critical areas (WMC 21.51.300 through WMC 21.51.340). Woodinville rates wetlands according to the Washington State Wetland Rating System for Western Washington: 2014 Update (WMC 21.51.300; Hruby 2014). Wetlands are rated as Category I, II, III, or IV, according to the level of function they provide and how highly they score on the Ecology wetland rating system. Standard buffer widths defined in WMC Table 21.51.310(1) are based on the wetland rating and habitat score.

2.3.2.2 FWHCAs

Woodinville defines FWHCAs as those habitat areas that meet the criteria in WMC 21.51.400 including:

- Areas with which state or federally designated endangered, threatened, and sensitive species have a primary association as described in WMC 21.51.400(A).
- State priority habitat and species as identified by the Washington Department of Fish and Wildlife.
- Habit and species of local importance as identified by Woodinville that due to their population status, or sensitivity to habitat manipulation, warrant protection. A list of designated species of local importance is provided in WMC Table 21.51.40(c)(i).
- Naturally occurring ponds under 20 acres and their submerged aquatic beds that provide fish or wildlife habitat, including those artificial ponds intentionally created from dry areas in order to mitigate impacts to ponds.
- Waters of the state including lakes, rivers, ponds, streams, inland waters, underground waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.
- Areas of rare plant species and high quality ecosystems as identified by the Washington State Department of Natural Resources through the Natural Heritage Program.
- Native growth protection areas (NGPA) and other areas designated by the City.

FWHCAs are regulated according to the provisions in WMC 21.51.400 through 21.51.440.

2.3.2.3 Geologically Sensitive Areas

Woodinville regulates geologically sensitive areas including erosion hazards, landslide hazards, seismic hazards, and other geologic hazards such as mass wasting debris flows, rock falls, and differential settlement as critical areas.

- Erosion hazard areas are identified by the NRCS or a critical areas report as having a severe to very severe erosion potential.
- Landslide hazard areas are susceptible to landslides based on a combination of geologic, topographic, and hydrologic factors. They include areas susceptible because of any combination of bedrock, soil, slope (gradient), slope aspect, structure, hydrology, or other factors. Examples of landslide hazard areas are provided in WMC 21.51.250(b).
- Seismic hazard areas are subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, surface rupture, or soil liquefaction.

Geologically hazardous areas are regulated according to the provisions in WMC 21.51.250 through 21.51.270.

2.3.2.4 Frequently flooded areas

Frequently flooded areas are those areas meeting one or more of the following components: floodplain, flood fringe, and floodways. Frequently flooded areas are identified as special flood hazard areas by Woodinville and by the Federal Insurance Administrator pursuant to WMC Chapter 21.53. Frequently flooded areas are regulated according to WMC Chapter 21.53 and WMC 21.51.350 through 21.51.380.

2.3.2.5 Critical Aquifer Recharge Areas

CARAs are those areas with a critical recharging effect on aquifers used for potable water as described in WAC 365-190-100. Due to soil infiltration conditions of these CARAs, they contribute significantly to the replenishment of ground water, and often have a high potential for contamination of ground water resources (WMC 21.51.200). Identification of CARAs are based on Woodinville's adopted critical aquifer recharge areas map pursuant of WMC 21.51.030 and are regulated according to the provisions in WMC 21.51.200 through 21.51.230.

2.3.3 King County

King County regulates wetlands, aquatic areas (e.g., streams), wildlife habitat conservation areas, wildlife habitat networks, landslide hazard areas, seismic hazard areas, critical aquifer recharge areas and adjacent buffers within its jurisdiction, according to the KCC outlined in Title 21A. The proposed project alternatives are within the jurisdictions of the City of Kirkland and the City of Woodinville, but King County Code is summarized here for reference.

2.3.3.1 Wetlands

King County regulates wetlands and their buffers within its jurisdiction as critical areas (King County Code [KCC] 21A.24.318). In addition, KCC 21A.24.325 specifies exemptions, development standards, and permitting procedures for proposed modifications to critical areas and associated buffers. Those standards include provisions for mitigation sequencing requirements (e.g., impact avoidance, minimization, and rectification) and providing compensatory mitigation for unavoidable permanent impacts on critical areas.

King County rates wetlands according to the Washington State Wetland Rating System for Western Washington: 2014 Update (KCC 21A.24.318; Hruby 2014). Wetlands are rated as Category I, II, III, or IV, according to the level of function they provide and how highly they score on the Ecology wetland rating system. Standard buffer widths defined in KCC Section 21A.24.325 are based on the wetland rating, habitat score and intensity of surrounding land use.

2.3.3.2 Aquatic Areas

Aquatic areas are classified under the Critical Areas chapter of KCC (KCC 21A.24.355). This system is based primarily on fish, wildlife, and human use, and consists of four aquatic area types: Type S, F, N, or O. Type S aquatic areas are those surface waters that are inventoried as “Shorelines of the State” under the Shoreline Management Master Program for King County, pursuant to Revised Code of Washington (RCW) Chapter 90.58.030. Type F aquatic areas and waterbodies are those known to be used by fish, or meet the physical criteria to be potentially used by fish. Fish streams may or may not have flowing water all year, and may be perennial or seasonal. Physical criteria for fish use include stream segments having a defined channel of 2 feet or greater within the bankfull width in Western Washington; and having a gradient of 16 percent or less. Type N aquatic areas have flow year round and may have spatially intermittent dry reaches downstream of perennial flow. Type N aquatic areas do not meet the physical criteria of a Type F aquatic area and have been proven not to contain fish. Type O aquatic areas do not have surface flow during at least some portion of the year, and do not meet the physical criteria of a Type F aquatic area. Buffer widths defined in KCC Section 21A.24.358 are based on the aquatic area type and location.

2.3.3.3 Wildlife Habitat Conservation Areas

Wildlife habitat conservation areas are areas for a species whose habitat the King County Comprehensive Plan requires the county to protect that includes an active breeding site and the area surrounding the breeding site that is necessary to protect breeding activity (KCC 21A.06.1423). KCC 21A.24.382 specifies development standards for wildlife habitat conservation areas, including guidance on allowed alterations and criteria for reductions.

2.3.3.4 Wildlife Habitat Networks

Wildlife habitat networks are the official networks defined and mapped in the King County Comprehensive Plan that link wildlife habitat with critical areas, critical area buffers, priority habitats, trails, parks, open space and other areas that provide for wildlife movement and alleviate habitat fragmentation (KCC 21A.06.1424). KCC 21A.24.386 specifies development standards for wildlife habitat networks, including guidance on allowed alterations.

2.3.3.5 Landslide Hazard Areas

Landslide hazard areas are areas subject to severe risk of landslide. KCC 21A.24.280 specifies development standards for landslide hazard areas.

2.3.3.6 Seismic Hazard Areas

Seismic hazard areas are areas subject to severe risk of earthquake damage from seismically induced settlement or lateral spreading as a result of soil liquefaction in an area underlain by cohesionless soils of low density and usually in association with a shallow groundwater table. KCC 21A.24.290 specifies development standards for seismic hazard areas.

2.3.3.7 Flood Hazard Areas

Flood hazard areas are areas subject to inundation by the base flood or risk from channel migration including, but not limited to, an aquatic area, wetland, or closed depression. KCC 21A.24.226 to KCC 21A.24.275 specifies requirements for flood hazard areas, including development standards and alterations.

2.3.3.8 Critical Aquifer Recharge Areas

CARAs are areas designated on the CARA map adopted by KCC 21A.24.311 that have a high susceptibility to groundwater contamination or areas of medium susceptibility to groundwater contamination that are located within a sole source aquifer or within an area approved in accordance with chapter 246-290 WAC as a wellhead protection area for a municipal or district drinking water system, or an area over a sole source aquifer and located on an island surrounded by saltwater. KCC 21A.24.315 specifies development standards for critical aquifer recharge areas.

3 Methodology

3.1 Data Sources and Collection

A literature and data review of available information on critical areas in the alternative project areas was conducted to identify and characterize potentially affected resources. Sources of information included:

- King County Surface Water Design Manual (SCAP 2020, KCC 18.17)
- Aerial photographs of the study area (Google Earth 2023)
- National Wetlands Inventory (NWI) map of wetland areas in the study area (USFWS 2023)
- King County iMap (King County 2023)
- City of Kirkland GIS interactive web map (Kirkland 2023)
- City of Woodinville Critical Areas Map (Woodinville 2016)
- City of Woodinville Critical Areas Wetlands Map (2021)
- SalmonScape computer mapping system (WDFW 2023a)
- Washington State priority habitat and species (PHS) data (WDFW 2023b)
- Washington State Fish Passage Inventory, Assessment and Prioritization database (WDFW 2023c)
- Washington State Natural Heritage data (WDNR 2023)
- Web soil survey maps for the study area (NRCS 2023)
- King County Comprehensive Plan (King County 2022)

3.2 Selection of the Study Area

The land area within a quarter mile of each of the site boundaries was selected as the study area for review of critical areas that could be impacted by development of the action alternatives (Figure 3-1 and Figure 3-2).

3.3 Analysis of Impacts

The presence of documented critical areas, and the potential for undocumented critical areas were evaluated throughout the study area to identify potential impacts to these resources. The evaluation includes a consideration of permitting implications and mitigation alternatives.

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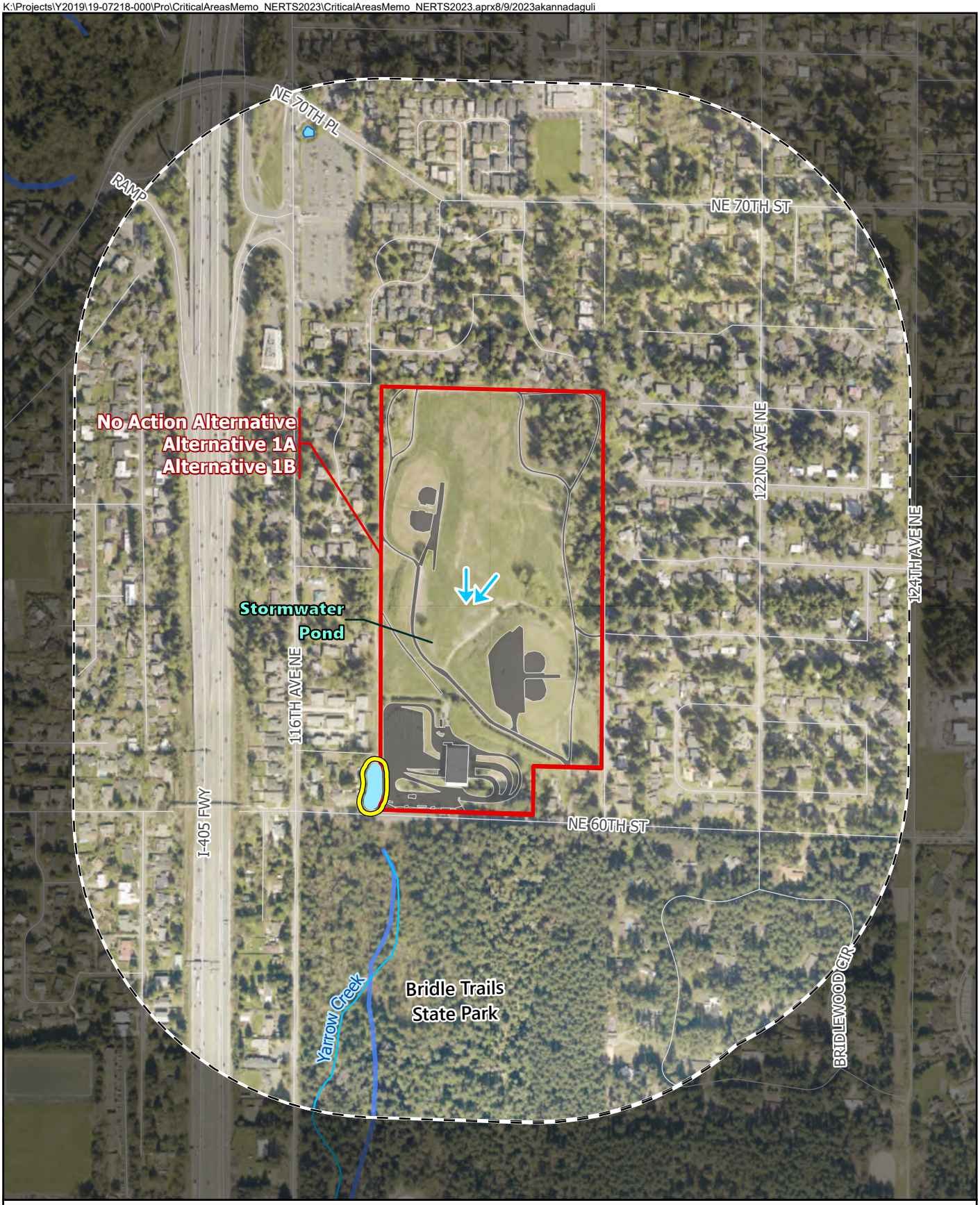

Legend

- Streams
- Approximate groundwater flow direction*
- Road
- Riverine Wetland
- Bioretention Swale
- Existing Impervious Surface
- Proposed Project Site
- 0.25-mi Study Area

*Groundwater flow directions vary: flow in the shallow perched water-bearing zone varies from north to south to northeast to southwest, and flow in the deeper regional aquifer has more consistent flow to the southwest.

Figure 3-1. No Action Alternative, Alternative 1A, and Alternative 1B Project Site Existing Conditions.

N
PLAN

SCALE: 1" = 850'-0"

0 425 850 Feet

King County

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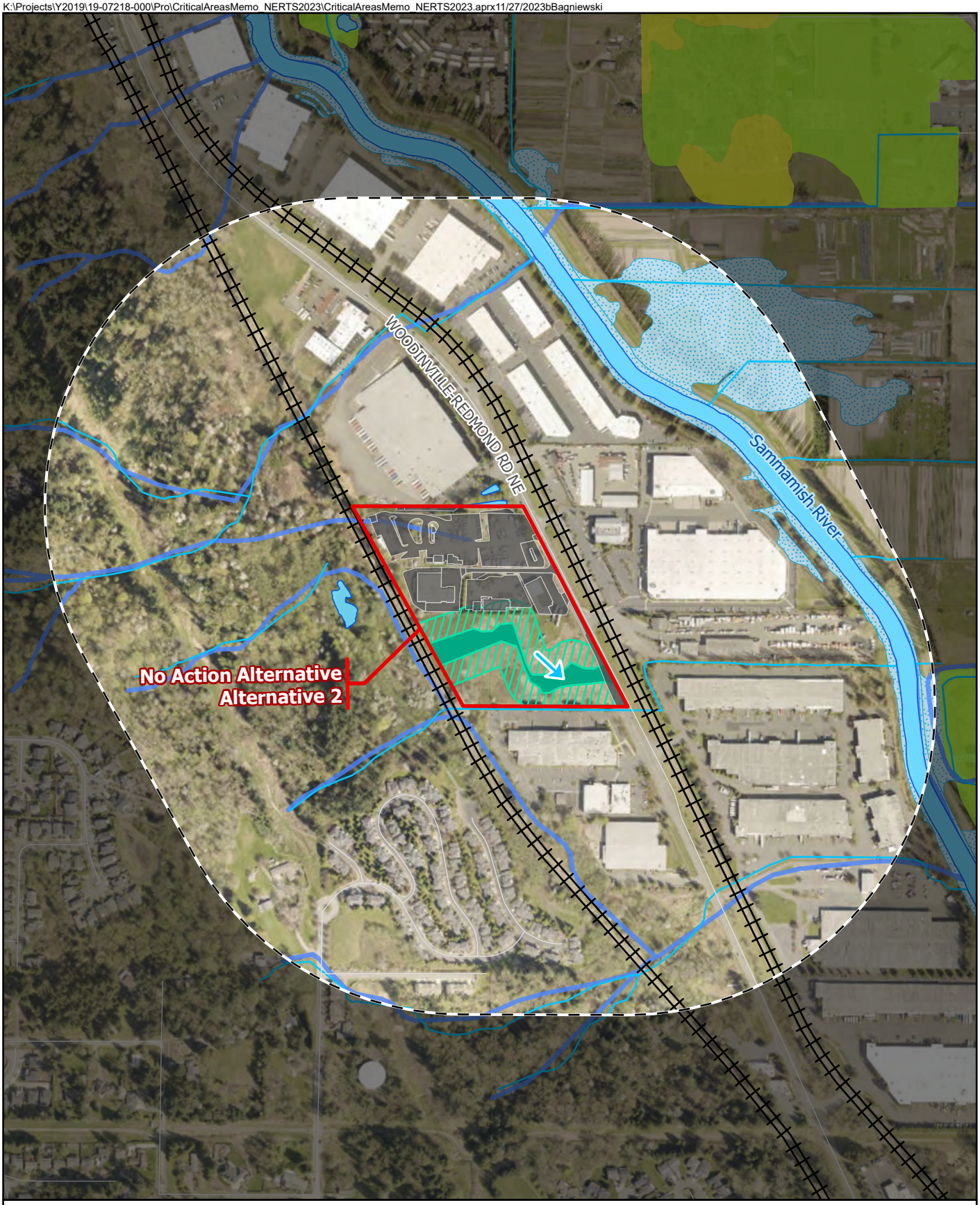

Legend

- Streams
- Approximate groundwater flow direction*
- Road
- Railway
- Waterbody
- FEMA 100-Year Floodplain

NWI Wetland

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine Wetland

Delineated Wetands

- Wetland
- 105ft Wetland Buffer
- Existing Impervious Surface
- Proposed Project Site
- 0.25-mi Study Area

*Groundwater flow directions vary: flow in the shallow perched water-bearing zone varies from north to south to northeast to southwest, and flow in the deeper regional aquifer has more consistent flow to the southwest.

Figure 3-2. No Action Alternative and Alternative 2 Project Site Existing Conditions.

N

PLAN

SCALE: 1" = 850'-0"

0 425 850 Feet

King County

4 Affected Environment

This section identifies areas where the presence of critical areas may have implications for construction and/or operations at each of the project sites. The no action alternative is not included in this section because no changes to existing conditions would occur.

4.1 Alternative 1–Current Site

The site for Alternative 1 is at 11724 Northeast 60th Street in Kirkland (Figure 1-3 and Figure 1-4). The site for Alternative 1 includes a bioswale with a surface water connection to the landfill. As this is a stormwater facility and not a mapped critical area, this feature is not discussed in this document despite its potential to provide habitat benefits. This feature is further discussed in the Water Resources Assessment and the Environmental Impact Statement.

4.1.1 Wetlands

No wetlands are mapped in the study area for Alternative 1. Yarrow Creek may include riverine wetlands, but these wetlands are likely within the stream channel. As a result, this critical area is described in the following subsection.

4.1.2 Yarrow Creek

Bridle Trails State Park is a 489-acre day-use state park located directly to the south of the site across Northeast 60th Street. The park is heavily forested and includes 28 miles of trail that are frequently used by horseback riders and hikers. King County (2023) maps Yarrow Creek in the northwest corner of Bridle Trails State Park, approximately 140 feet south of Northeast 60th Street. The creek flows south for 2.95 miles through Bridle Trails State Park and residential areas in the cities of Bellevue and Kirkland to its outlet at Lake Washington along the northeastern shoreline. The creek historically supported coho salmon (*Oncorhynchus kisutch*) (King County 2023). Kokanee (*O. nerka*) were presumed to use Yarrow Creek based on historical records of a Native American village located near its mouth (King County 2016). According to WDFW fish passage data (WDFW 2023c), Yarrow Creek within Bridle Trails State Park contains the physical criteria to potentially support use by coho, steelhead trout (*O. mykiss*), and resident trout (*O. clarkii*). However, much of the creek downstream of Bridle Trails State Park has been piped to accommodate development in the basin and potential for fish use is very low due to several partial or total fish barriers that limit accessibility (WDFW 2023c). Continued use of existing stormwater management features may be subject to unmitigated discharges to the Kirkland stormwater system, and ultimately, Yarrow Creek.

4.1.3 Minor Lakes

Forbes Lake is approximately 1.3 miles north and Totem Lake is approximately 2.0 miles north of the study area for Alternative 1.

4.1.4 FWHCAs

WDFW maps Bridle Trials State Park as a biodiversity area and corridor terrestrial priority habitat (WDFW 2023b). As described above, the park is on the south side of Northeast 60th Street, directly south of the site for Alternative 1. According to WDFW PHS data (WDFW 2023b), Bridle Trails State Park contains a powerline right-of-way (ROW) that provides a migration area to and from the park. This area is known to provide habitat to several species of birds as well as coyotes, raccoons, and other small mammals. No threatened or endangered species are known to be within this area.

4.1.5 Geologically Hazardous Areas

King County (2023) maps an erosion hazard area in Bridle Trails State Park approximately 440 feet south of the site for Alternative 1 and Kirkland's GIS web map (Kirkland 2023) depicts several areas of high and moderate landslide susceptibility throughout the site. Kirkland also maps an area of high liquefaction

potential in the southwest corner of the site for Alternative 1. An area of medium liquefaction potential is located at the site's eastern boundary (Kirkland 2023).

The Washington Department of Natural Resources (DNR) characterizes the surficial geologic units at the Alternative 1 site as Pleistocene aged continental drift. This classification includes glacial till and advance outwash deposits. Glacial till is a nonsorted mixture of all clast sizes in varying amounts and is generally dense to very dense due to consolidation from glacial overriding. Advance outwash deposits are generally sorted sands and gravels with varying silt content and are deposited from glacial meltwater.

The Pacific Northwest is within a tectonically active zone. Seismic activity related to the Cascadia Subduction Zone has the potential to occur at any time. The DNR's Washington Geologic Information Portal classifies the project area as having very low liquefaction susceptibility. Liquefaction is the temporary loss of cohesion and pore water pressure in soils from ground shaking events such as earthquakes. Soil masses will begin behaving like a liquid and spread laterally, which can cause catastrophic mass wasting events and destruction of infrastructure and property.

The DNR also maps the area as having a NEHRP seismic Site Class C which describes soil conditions as very dense soil and/or soft rock. NEHRP site class ratings reflect soil stiffness or rock quality within 100 feet of the surface. These classifications correlate to seismic response parameters for design. The DNR does not identify landslide deposits in the immediate vicinity of the proposed project site.

4.1.6 Frequently Flooded Areas

No frequently flooded areas are mapped in the study area for Alternative 1.

4.2 Alternative 2–Woodinville

The site for Alternative 2–Woodinville is located at 15801 Woodinville-Redmond Road Northeast in Woodinville on King County tax parcels 1526059086, 5711600010, 5711600020, 5711600030, 1526059094, and 1526059095 (Figure 1-5).

4.2.1 Wetlands

Biologists from Shockey Planning Group (SPG), Inc. delineated one wetland in the study area (Wetland A) on parcels 1526059094 and 1526059095 in 2012 (SPG 2013). Woodinville shows the location and extent of Wetland A, Alternative 2 on its critical areas wetland map (Woodinville 2021). Due to the age of the delineation, the presence, size, and category of the wetland may have changed. Delineations are required to occur within a period of 5 years prior to any permit applications and proposed alterations (WMC 21.51.300(3)(c). Due to the age of this delineation, the project would require a re-delineation of the wetland at the site to obtain permit approvals. SPG rated Wetland A using the 2004 version of the Department of Ecology's *Washington State Wetland Rating System for Western Washington*. The wetland would require a new rating along with the updated delineation using the most up to date rating system for western Washington (Hruby 2004).

SPG found that Wetland A originated from a groundwater seep in the northwest corner of Parcel 1526059094. The groundwater then flowed east across the properties, where it eventually exited the southeast corner of Parcel 1526059095 via a drainage ditch parallel to Woodinville-Redmond Road. This wetland was dominated by a hydrophytic, palustrine emergent plant community which included reed canarygrass (*Phalaris arundinacea*), soft rush (*Juncus effusus*), common velvetgrass (*Holcus lanatus*), and tall buttercup (*Ranunculus acris*). Sitka willow (*Salix sitchensis*), hardhack (*Spiraea douglasii*), and Himalayan blackberry (*Rubus armeniacus*) were also present. Hydric soils were also present and satisfied the criteria for the hydric soil indicator, Sandy Redox. SPG rated Wetland A as a Category IV wetland, which requires a 40-foot buffer width according to current standard buffer widths shown in WMC Table 21.51.310(1)

The NWI (USFWS 2023) maps a freshwater emergent wetland on the eastern bank of the Sammamish River, at the eastern boundary of the study area for Alternative 2. King County (2023) maps a wetland between Woodinville Redmond Road and the western bank of the Sammamish River. However, based on aerial imagery from 2021 (King County 2023), the area mapped as wetland consists of impervious

surfaces, industrial buildings, and associated infrastructure. Alternative 2 Woodinville critical areas map (Woodinville 2016) depicts one wetland approximately 240 feet west of Parcel 5711600010. The critical areas (2016) map also depicts the western extent of a King County mapped stream located approximately 75 feet west of Parcel 1526059095 as wetland (see *FWHCAs* section below).

4.2.2 FWHCAs

The Sammamish River flows in the eastern portion of the study area, approximately 1,000 feet to the east of the proposed project site and provides stream and riparian habitat for wildlife. The Sammamish River is used by a variety of salmonids such as sockeye (*O. nerka*), coho (*O. kisutch*), chinook (*O. tshawytscha*), and kokanee (*O. nerka*) salmon, and steelhead (*O. mykiss*), coastal cutthroat (*O. clarki*), and bull trout (*Salvelinus malma*) (WDFW 2023).

King County (2023) maps one unnamed stream at the southern boundary of the proposed project site for Alternative 2. The stream is depicted as a tributary to the Sammamish River that flows east along the southern boundary of Parcel 1526059095. King County does not classify the mapped stream. Woodinville critical areas map (Woodinville 2016) classifies the western extent of the King County mapped stream as wetland. The mapped wetland is approximately 75 feet west of Parcel 1526059095 and the southwest corner of the study area for Alternative 2. WDFW (2023c) maps an intermittent/ephemeral stream that appears to flow north or south adjacent to the western boundary of the study area for Alternative 2.

King County (2023) and the City of Woodinville (2016) map two additional unnamed streams in the western portion of the study area, west of the proposed project site. The northernmost stream, which includes a small tributary which joins with the main tributary west of the study area, is depicted as a tributary to the Sammamish River that flows east within the northern portion of the study area. King County and Woodinville do not classify this stream. The additional unnamed stream flows west to east in the western portion of the study area, likely infiltrating into the surface west of the proposed project site (King County 2023 and City of Woodinville 2016). No connection to the Sammamish River is mapped for this stream.

Woodinville critical area wetlands map (Woodinville 2021) designates a forested in the western portion of the study area for Alternative 2 as a NGPA. The NGPA constitutes the northern portion of Parcel 3175100000.

4.2.3 Geologically Sensitive Areas

Woodinville (2016) and King County (2023) map the eastern portion of the study area for Alternative 2 as a seismic hazard area. A landslide hazard area is mapped in the western portion of the study area. According to King County (2023) mapping, the landslide hazard area extends into the southeast portion of the study area from the west. Woodinville (2016) and King County (2023) map and erosion hazard area in the western and southern portions of the study area.

DNR maps the surficial geologic units at the Alternative 2 site as Quaternary aged alluvium deposits. Alluvium deposits consist of unconsolidated clay, silt, sand, gravel and cobbles from flooding events of the Sammamish River located to the east of the proposed project site. Previous subsurface explorations and the proximity to the river indicate shallow groundwater conditions are expected at this site.

The DNR's Washington Geologic Information Portal classifies the project area as having low to moderate liquefaction susceptibility. The DNR also maps the area as having a NEHRP seismic Site Class D to E which describes soil conditions as stiff soil to soft clay. The DNR maps shallow alluvial fan deposits and landslide deposits to the southwest and northwest of the project area indicating the potential for mass wasting in the area.

4.2.4 Frequently Flooded Areas

Frequently flooded include floodplains, flood fringe, and floodways as identified on FIRMs and city critical areas maps. No frequently flooded areas are mapped within the study area for Alternative 2. King County (2023) maps the FEMA 100-year floodplain and regulatory floodplain on the east side of the Sammamish River. Woodinville (2016) also maps a frequently flooded area on the east side of the Sammamish River.

4.2.5 Critical Aquifer Recharge Areas

Identification of CARAs are based on Woodinville's adopted critical aquifer recharge areas map. The critical aquifer recharge areas within Woodinville city limits have a medium to high susceptibility to ground water contamination and are not located in a sole source aquifer or wellhead protection area. No critical aquifer recharge areas are mapped in the proposed project site for Alternative 2. King County (2023) maps a CARA on the east side of the Sammamish River.

5 Impacts and Potential Mitigation Measures

This section describes the potential critical area impacts from Alternatives 1 and 2. This section also identifies potential mitigation measures that could avoid, minimize, or reduce the identified impacts below the level of significance.

5.1 No Action Alternative

This section describes Kirkland and Woodinville proposed project sites under the No Action Alternative. Specific details to each proposed project site are discussed below.

5.1.1 Kirkland Proposed Project Site

5.1.1.1 Impacts from Construction

Under the No Action Alternative, no construction activities would occur on the Kirkland proposed project site other than occasional maintenance activities as needed. No direct construction impacts to existing critical areas are anticipated on or adjacent to the site.

Because only minor maintenance and no major construction activities would occur under the No Action Alternative, no indirect impacts to existing critical areas are anticipated on or adjacent to the site.

5.1.1.2 Impacts from Operation

Under the No Action Alternative, the Kirkland proposed project site would remain in operation and may have impacts to Yarrow Creek offsite to the south. Continued use of existing stormwater management features may be subject to unmitigated discharges to the Kirkland stormwater system and ultimately Yarrow Creek. Furthermore, groundwater and stormwater quality may be impacted by spills, leaks, landfill gas, and/or leachate from the existing transfer station on the Kirkland site. It is expected that these direct operational impacts would be negligible since the existing transfer station would continue to comply with standard water quality permits, plans, and manuals.

Under the No Action Alternative, the existing transfer station on the Kirkland site would remain in operation. Operational activities are not anticipated to have indirect impacts to existing critical areas offsite.

5.1.2 Woodinville Proposed Project Site

5.1.2.1 Impacts from Construction

Under the No Action Alternative, no project-related activities would occur on or adjacent to the site. The properties would continue their current uses and current impacts (if any) on critical areas. The properties would be subject to future development proposals, consistent with WMC. Because the Woodinville site is zoned Industrial (Valley Industrial Zone), with Tourist District overlay, a range of potential facilities could be proposed which could seek to alter or impact existing wetlands. Without a specific proposal, future impacts associated with construction are uncertain.

Under the No Action Alternative, no construction activities would occur on the Woodinville proposed project site. No indirect impacts to existing critical areas are anticipated on or adjacent to the site. It is expected that under the No Action Alternative, the critical areas impacts associated with current uses will continue on the northern properties (near the existing industrial facilities). On the southern properties of the site, where wetlands are located, it is expected that these wetlands will continue to function in their current condition.

5.1.2.2 Impacts from Operation

Under the No Action Alternative, the existing construction material vendors (Northwest Utilities, Inc., Appian Construction), appliance suppliers (Kemcor, Inc., Northwest Cascade Bathroom Supply Store), auto restoration (Racecraft), and aircraft processing (ASKO Processing) would remain in operation at the Woodinville proposed project site. There is the potential of these properties changing ownership, land use, or zoning in the future. However, it is expected that there would be minimal direct operational impacts to existing critical areas on or adjacent to the Woodinville proposed project site.

Under the No Action Alternative, the existing construction material vendors (Northwest Utilities, Inc., Appian Construction), appliance suppliers (Kemcor, Inc., Northwest Cascade Bathroom Supply Store), auto restoration (Racecraft), and aircraft processing (ASKO Processing) would remain in operation at the Woodinville proposed project site. There is the potential of these properties changing ownership, land use, or zoning in the future. However, it is expected that there would be minimal indirect operational impacts to existing critical areas on or adjacent to the Woodinville proposed project site.

5.1.3 Mitigation Measures

Under the No Action Alternative, the existing Houghton Transfer Station at the Kirkland site and the industrial facilities at the Woodinville site would remain in operation.

To avoid potential critical areas impacts from ongoing transfer station operations, King County SWD would implement best management and engineering practices during operations and maintenance of existing environmental control systems, including stormwater and surface water systems. No mitigation for geologic impacts will be needed.

5.1.4 Cumulative Impacts

Under the No Action Alternative, the existing Houghton Transfer Station would remain in operation. Since there are no changes to existing operations of the Houghton Transfer Station, no contribution to cumulative impacts to existing critical areas are anticipated on or adjacent to the existing site. Transfer station activities and operations would contribute incrementally to the cumulative overall past, present, and likely future impacts on critical areas in the region due to ongoing development within King County.

5.2 Impacts Common to All Action Alternatives

This section describes the potential impacts and mitigation measures associated with critical areas within the study areas of the proposed project sites that are common to all action alternatives. It assumes that well-proven engineering methods and techniques would be implemented to design, construct, and operate each of the action alternatives and that the appropriate mitigation sequencing procedures would be followed for all relevant critical areas (KCC 21A).

5.2.1 Impacts from Construction

Under all action alternatives, construction activities would occur and require coverage under Ecology's Construction Stormwater General Permit (CSWGP). Minimal construction impacts to existing critical areas are anticipated on or adjacent to the proposed sites. These construction impacts are described more below.

5.2.1.1 Direct Impacts

Only one action alternative has the potential to impact wetlands and streams.

None of the action alternatives are located within or adjacent to minor lakes, FWHCAs (other than streams), frequently flooded areas, or CARAs. As such, no direct construction impacts to these critical areas are anticipated.

5.2.1.1.1 Construction BMPs

Construction effects to critical areas would be minimized by using required sediment and erosion control BMPs to prevent any pollutants from affecting any down-basin critical areas. These sediment and erosion control BMPs are required to comply with the 2021 King County Surface Water Design Manual (SWDM) Core Requirement #5. Core Requirement #5, Construction Stormwater Pollution Prevention (CSWPP), contains both Erosion and Sediment Control (ESC) measures and Stormwater Pollution Prevention and Spill (SWPPS) measures. A list of the 13 ESC measures included in the 2021 King County SWDM are included below:

1. Clearing limits
2. Cover measures
3. Perimeter protection
4. Traffic area stabilization
5. Sediment retention
6. Surface water collection
7. Dewatering control
8. Dust control
9. Flow control
10. Control pollutants (also see SWPPS measures below)
11. Protect existing and proposed flow control BMPs
12. Maintain BMPs
13. Manage the project

These ESC measures must be considered at every County project site, including all of the proposed NERTS action alternatives. Details of ESC standards can be found in the Appendix D of the 2021 King County SWDM (King County Construction Stormwater Pollution Prevention Standards).

Similarly, SWPPS measures must be considered at every County project site, including all of the proposed NERTS action alternatives. Details of SWPPS standards can be found in the Appendix D of the 2021 King County SWDM (King County Construction Stormwater Pollution Prevention Standards). A list of the six SWPPS measures are included below:

1. Follow effective pollutant handling and disposal procedures
2. Provide cover and containment for materials, fuel, and other pollutants
3. Manage the project site to maximize pollutant control and minimize pollutant sources
4. Protect from spills and drips of petroleum products and other pollutants
5. Avoid overapplication or untimely application of chemicals and fertilizers
6. Prevent or treat contamination of stormwater runoff by pH modifying sources

The 2021 King County SPPM also includes construction BMPs for commercial, industrial, agricultural, public, and residential properties with commercial activities. Three construction BMPs relevant to protecting critical areas on all action alternatives include the demolition of buildings and building repair, remodeling, and construction BMPs. With the use of ESC measures, SWPPS standards, and construction BMPs, direct construction impacts are expected to be minimal.

If action alternatives require fill material, they will need to consider the nature of existing soils and whether to use native soil or imported fill material. Onsite soils with high fines content and high plasticity or general fill material will be more conditioned for compaction efforts and difficult to achieve high relative compaction percentage. If native soils of such qualities are desired to reuse as structural fill material will

need to be approved prior to use, to include amendments with additives such as lime or cement-soil mixtures. Often it is more cost effective to use levelling courses of imported granular fill to support structures rather than significant amendment to native soils.

5.2.1.2 Indirect Impacts

For all action alternatives, indirect construction impacts may include construction equipment tracking mud, which could potentially affect wildlife species and habitats and watershed health outside of the study area. By following minimization standards (WMC 21.51.3010(2)) and using dewatering control ESC measures outlined above, indirect construction impacts are expected to be minimal.

5.2.2 Impacts from Operation

5.2.2.1 Direct Impacts

For all action alternatives, there is potential for light and noise disturbance, and surface water and stormwater pollution during routine operations. The increase in impervious surface from all action alternatives has the potential to impact wetlands and streams down-basin from project activities. There is potential for groundwater, surface water, and stormwater pollution during RTS operations. Sources of pollution may include, but are not limited to, the following:

- Refuse-impacted liquids leaking from waste receptacles, transfer trailers, or customer loads.
- Stormwater contact with refuse, dirt, grit, and/or dust derived from refuse handling or from litter.
- Exposure of lubricants, fuels, tire particles, hydrocarbons, heavy metals, and other vehicle-associated pollutants to stormwater as a result of road runoff, leaks, spills, and/or improper handling or storage. Design and operational source control BMPs would be used to minimize these potential direct operational impacts and are described in the *design BMPs section* below.

None of the action alternatives are located within or adjacent to minor lakes, FWHCAs, frequently flooded areas, or CARAs and no direct operational impacts to these areas are anticipated.

5.2.2.2 Indirect Impacts

Current activities at the existing Houghton Transfer Station in Kirkland and the industrial facilities at the Woodinville site have the potential to indirectly impact species and habitats adjacent to the project sites.

Although not an impact caused by the activity, the Pacific Northwest is within a tectonically active zone which has the potential to cause indirect impacts to the proposed alternative sites. In particular, seismic activity related to the Cascadia Subduction Zone has the potential to result in high magnitude earthquakes. Additionally, crustal faults, while generally having lower magnitude in comparison, may be present closer to the project site that could negatively impact proposed facilities.

It is expected that there would be an increase in traffic under all action alternatives. This increase in traffic presents a risk to local wildlife that utilize adjacent FWHCAs, wetlands, and streams. The increase in traffic also has the potential to produce additional light, noise, and surface water runoff, which could carry pollutants to down-gradient habitats.

5.2.3 Mitigation Measures

To avoid potential critical areas impacts from transfer station operations, King County SWD would implement best management and engineering practices during design, construction, and O&M of environmental control systems, including stormwater and surface water systems.

Any excavations of cut slopes or deeper than 4 feet should adhere to sloping and benching requirements of WAC 296-155-66403. Soil types should be assessed by a competent professional to determine maximum allowable slope angles. Soils determined as Site Class E may require deep foundation elements, over-excavation, lime-mixing or vertical drainage installation for construction. For lightly loaded structures, conventional/shallow foundations may suffice, however settlement analyses will be required to ensure predicted long-term settlement is tolerable within structural and utility limits.

Re-use of native soils with fine particle size for fill material will be difficult for construction purposes. Native soils used for structural fill should be approved prior to use and will likely require imported material to achieve structurally stable conditions. Mitigation may include geogrid or geotextile reinforcing in aggregate bases courses, thicker base courses, and thicker pavement sections depending on the traffic demand loading.

The 2021 King County SWDM (King County 2021) provides guidance on project design to avoid and minimize negative impacts to water resources. Both the Cities of Kirkland and Woodinville adopted the SWDM, and design BMPs to provide stormwater treatment and flow control would be implemented under all action alternatives. The most appropriate and effective design BMPs would be selected for each action alternative.

5.2.3.1.1 Operational Source Control BMPs

The Stormwater Pollution Prevention Plan (SWPPP) for Transfer Stations and Recycling Centers Covered Under the industrial stormwater general permit (ISGP) (King County 2020b) includes operational source control BMPs that are used for stormwater pollution prevention across King County's RTSs and would be required for all action alternatives. A list of the seven operational source control BMPs are included below:

1. Pollution Prevention Team
2. Good housekeeping
3. Preventative maintenance
4. Spill prevention and cleanup
5. Employee training
6. Inspections and record keeping
7. Illicit discharges

The 2021 King County SPPM also includes operational source control BMPs for commercial, industrial, agricultural, public, and residential properties with commercial activities. A list of the operational source control BMPs relevant to protecting critical areas on all action alternatives are included below:

- A-1: Required BMPs for all properties with commercial activities
  - Clean and maintain stormwater drainage system
  - Label all storm drain inlets on your property
  - Eliminate illicit connections to the storm drainage system
  - Maintain drainage facilities
- A-2: Outdoor storage of liquid materials in stationary tanks
- A-3: Storage of liquid materials in portable containers
- A-8: Storage of solid waste and food wastes
- A-9: Storage of scrap and recycling materials
- A-10: Treatment, storage, or disposal of dangerous wastes
- A-11: Cleaning or washing of tools and equipment
- A-14: Interior washing operations (including mobile contractors)
- A-15: Washing of buildings, rooftops, and other large surfaces
- A-16: Truck or rail loading and unloading of liquid or solid material
- A-19: Concrete and asphalt production and recycling

- A-26: Landscaping activities, vegetation management, and irrigation
- A-31: Parking lots, driveways, and outside storage areas

With these controls in place, no additional mitigation measures are necessary.

5.2.4 Cumulative Impacts

Transfer station activities and operations would contribute incrementally to the cumulative overall past, present, and likely future impacts on critical areas in the region due to ongoing development within King County. Transfer station activities and operations would likely contribute incrementally to future impacts on critical areas in the region due to ongoing development within King County.

5.2.5 Significant Unavoidable Adverse Impacts

Based upon the analysis performed for this assessment, with mitigation measures described, there would be no significant unavoidable adverse impacts to critical areas because of implementing any of the alternatives.

5.3 Alternative 1

5.3.1 Alternative 1A

Impacts to critical areas under Alternative 1A include the specific impacts listed below, as well as those that are common to all action alternatives as indicated in Section 5.3.

5.3.1.1 Impacts from Construction

No wetland, stream, FWHCAs, or frequently flooded critical areas are mapped at the Alternative 1A location. Because the development footprint is entirely within the existing property, no direct impacts to these critical areas are anticipated. If existing waste areas are disturbed during construction, the appropriate environmental controls and BMPs will be used to contain any contamination in stormwater runoff, thus avoiding any down-basin contamination of critical areas. The handling of hazardous materials and surface waters are described in more detail in those respective discipline reports.

5.3.1.2 Impacts from Operation

No wetland, stream, FWHCAs, or frequently flooded critical areas are mapped at the Alternative 1A location. Because the development footprint is entirely within the existing property, no additional direct impacts to these critical areas are anticipated aside from those included under Section 5.2.

5.3.1.3 Mitigation Measures

Under Alternative 1A, no mitigation measures are necessary because no impacts to wetland, stream, minor lakes, FWHCAs, or frequently flooded critical areas are anticipated.

5.3.1.4 Cumulative Impacts

Transfer station activities and operations would contribute incrementally to the cumulative overall past, present, and likely future impacts on critical areas in the region due to ongoing development within King County. Transfer station activities and operations would likely contribute incrementally to future impacts on critical areas in the region due to ongoing development within King County.

5.3.1.5 Significant Unavoidable Adverse Impacts

Based upon the analysis performed for this discipline report, if proper mitigation sequencing and minimization standards are implemented, there would be no significant unavoidable adverse impacts to critical areas because of implementing Alternative 1A.

5.3.2 Alternative 1B

Impacts to critical areas under Alternative 1B include the specific impacts listed below, as well as those that are common to all action alternatives as indicated in Section 5.3.

5.3.2.1 Impacts from Construction

Under Alternative 1B, no construction impacts to existing critical areas are anticipated within the study area. This includes wetlands, aquatic areas, wildlife habitat conservation areas, wildlife habitat networks, landslide hazard areas, seismic hazard areas, and critical aquifer recharge areas.

5.3.2.2 Impacts from Operation

Under Alternative 1B, no operational impacts to existing critical areas are anticipated within the study area. This includes wetlands, aquatic areas, wildlife habitat conservation areas, wildlife habitat networks, landslide hazard areas, seismic hazard areas, and critical aquifer recharge areas.

5.3.2.3 Mitigation Measures

Mitigation for geologic and seismic hazards for Alternative 1B would be similar to Alternative 1A. Like Alternative 1A, no additional mitigation measures are necessary for Alternative 1B because no impacts to wetland, stream, minor lakes, FWHCA, or frequently flooded critical areas are anticipated.

5.3.2.4 Cumulative Impacts

Transfer station activities and operations would contribute incrementally to the cumulative overall past, present, and likely future impacts on critical areas in the region due to ongoing development within King County.

5.3.2.5 Significant Unavoidable Adverse Impacts

Based upon the analysis performed for this discipline report, if proper mitigation sequencing and minimization standards are implemented, there would be no significant unavoidable adverse impacts to critical areas because of implementing Alternative 1B.

5.4 Alternative 2

5.4.1 Impacts from Construction

Under Alternative 2, no construction impacts, including direct and indirect impacts to critical areas, are anticipated on or adjacent to the proposed site, assuming the project can avoid direct wetland and buffer impacts. If the project uses the appropriate BMPs during construction, no impacts to critical areas are anticipated during construction. The project design will follow mitigation sequencing requirements to avoid and minimize impacts to critical areas to the greatest extent possible. If impacts are unavoidable, the appropriate mitigation measures will be taken to compensate for any impacts to critical areas.

Construction activities are anticipated to be able to avoid the wetland delineated on site in 2012 given avoidance measures and the implementation of BMPs. If temporary impacts are necessary for construction activities, the appropriate mitigation measures will be followed.

5.4.2 Impacts from Operation

Under Alternative 2, no impacts to critical areas are anticipated to result from the operation of the proposed facility, assuming the constructed project complies with requirements for design and operational source control BMPs. The project design will follow mitigation sequencing requirements to avoid and minimize impacts to critical areas to the greatest extent possible. If impacts are unavoidable, the appropriate mitigation measures will be taken to compensate for any impacts to critical areas.

No impacts from operation to aquatic areas, wildlife habitat conservation areas, wildlife habitat networks, landslide hazard areas, seismic hazard areas, or critical aquifer recharge areas are anticipated on or adjacent to the site.

5.4.3 Cumulative Impacts

Transfer station activities and operations under Alternative 2 are not anticipated to contribute significant cumulative impacts on critical areas. Future development within King County would likely contribute incrementally to small cumulative adverse impacts on critical areas.

5.4.4 Significant Unavoidable Adverse Impacts

Based upon the analysis performed for this discipline report, if property mitigation sequencing and minimization standards are implemented, there would be no significant unavoidable adverse impacts to critical areas.

5.4.5 Mitigation Measures

If the project is unable to entirely avoid impacts to the wetland onsite or its buffer, mitigation will be required. Class E soils at the Woodinville site may require deeper foundations such as piles or shafts for support of proposed structures to prevent excessive settlement. Lime-mixing of soils may be required for soil stabilization for re-use of soft, alluvial soils for lightly loaded structures and/or pavement areas. Vertical drains for embankment areas or lightly loaded conventionally founded structures may need to be implemented to hasten consolidation and prevent excessive settlement within a short time frame. Native soils reused as structural fill material will need to be approved prior to use and may not be suitable for fill under structures, requiring imported granular fills.

No other potential mitigation activities for impacts to critical areas are foreseen.

5.4.5.1 Regulatory Mitigation

WMC Chapter 21.51 specifies critical areas, required buffers, development standards, and mitigation requirements for critical areas in Woodinville. When an alteration to a critical area is proposed, such alteration shall be avoided, minimized, rectified, reduced, compensated for, and/or monitored as described in WAC 197-11-768. When feasible, impacts should be mitigated on site (WMC 21.51.120(2)). Woodinville designates a 40-foot buffer for Category IV wetlands. WMC 21.51.340 describes specific mitigation requirements for wetland and wetland buffers.

Temporary disturbances to wetland or buffer vegetation that could result from project construction access routes and staging areas would require compensatory mitigation.

BMPs for reducing dust and runoff will be implemented during construction, as described previously. Disturbances to wetland and upland vegetation would be minimized to the greatest extent feasible. High-visibility fencing placed at the edge of the wetland buffer and around sensitive areas would prevent inadvertent impacts to critical areas.

Any wetland mitigation measures would need to achieve equivalent or greater functions than the impacted wetland, including but not limited to habitat complexity and connectivity, and seasonal hydrological dynamics (KCC 21A.24.340.A). Mitigation efforts would need to be monitored as an ongoing process to ensure mitigation success. Permanent signage and fencing may be required to delineate and protect the wetland and its buffer (KCC 21A.24.160.B). Posting permanent signage and installing fences would protect plantings in natural habitat restoration areas from human activity. Vegetation functions could be improved in upland areas by removing invasive plants and planting native vegetation.

5.5 Comparison of Alternatives

This section compares the impacts and mitigation measures related to existing critical areas across all of the proposed NERTS alternatives. All of the proposed NERTS action alternatives would meet the goals outlined in the King County Clean Water Healthy Habitat Strategic Plan (2020-2025) (King County

2020a). See the Water Resources Assessment for more detail on the King County Clean Water Healthy Habitat Strategic Plan in connection to NERTS.

5.5.1 Comparison of No Action and All Action Alternatives (Alternatives 1A, 1B, and 2)

Unlike all action alternatives, the No Action Alternative would not require construction. It is assumed that the current Houghton Transfer Station would continue under its current operations. A beneficial aspect of all the action alternatives is the retrofitting of existing impervious surfaces with proposed stormwater treatment and flow control facilities. Under the No Action Alternative, these benefits would not occur. Regardless of whether these retrofits occur, it is expected that all the proposed NERTS alternatives would not have cumulative nor significant unavoidable adverse impacts to critical areas and, therefore, mitigation measures would not be required. The project design will follow mitigation sequencing requirements to avoid and minimize impacts to critical areas to the greatest extent possible. If impacts are unavoidable, the appropriate mitigation measures will be taken to compensate for any impacts to critical areas.

5.5.2 Comparison of All Action Alternatives (Alternatives 1A, 1B, and 2)

All action alternatives must comply with the requirements outlined in the 2021 King County SWDM (King County 2021) and applicable critical areas regulations (City of Kirkland and City of Woodinville Critical Areas Code, Clean Water Act, State Hydraulic Code, etc.). Design, construction, and operations BMPs would be used across all action alternations to ensure protection of critical areas. Alternative 2 may result in wetland and/or buffer impacts, which would require mitigation; however, impacts are anticipated to be minor enough to avoid significant unavoidable impacts. Therefore, it is expected that there would be no cumulative nor significant unavoidable adverse impacts to critical areas and, therefore, mitigation measures would not be required. The project design will follow mitigation sequencing requirements to avoid and minimize impacts to critical areas to the greatest extent possible. If impacts are unavoidable, the appropriate mitigation measures will be taken to compensate for any impacts to critical areas.

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Appendix E

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Northeast Recycling and Transfer Station Project

Noise Assessment

Final

November 2023

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

Northeast Recycling and Transfer Station Project E00633E19

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Project Manager:	Melissa Wu/Jacobs Engineering Group Inc.
Author:	Mark Bastasch/Jacobs Engineering Group Inc.
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Jacobs Engineering Group Inc.

1200 112th Avenue Northeast, Suite 500
Bellevue, Washington 98004
United States
T +1.425.453.5000
www.jacobs.com

Document History and Status

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01	08/25/23	Final Noise Assessment	MB	EG	MW
02	11/09/23	Final Noise Assessment	MB	EG	MW

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Figures

Tables

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
L_n	statistical noise level
MRW	moderate risk waste
NERTS	Northeast Recycling and Transfer Station
PPV	peak particle velocity
PWL	sound power level
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, and one regional landfill in King County, Washington (the County). The County's *2019 Comprehensive Solid Waste Management Plan* (King County 2019), which was adopted by 24 cities and approved by the Washington State Department of Ecology (Ecology), identified the need for a new transfer station to replace the aging Houghton Transfer Station. The almost 60-year-old Houghton Transfer Station is one of the busiest in terms of tonnage and transactions, yet it is undersized and lacks capacity for the type of recycling and moderate risk waste disposal services that are increasingly in demand. The new recycling and transfer station, which will be called the Northeast Recycling and Transfer Station (NERTS), is proposed to be located in the northeastern part of King County. 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 recycling and transfer station would not be sited in northeastern King County. The existing Houghton Transfer Station at 11724 NE 60th Street in Kirkland would continue to be operated.
- Alternative 1 – Current Site: The existing Houghton Transfer Station property at 11724 NE 60th Street in Kirkland. Two options exist at the Alternative 1 project site:
  - Alternative 1A – A facility constructed after the existing transfer station building is closed and demolished
  - Alternative 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 replaced after the new station is open
- Alternative 2 – Woodinville Site: A site composed of six properties 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 Transfer Station 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 to 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 Transfer Station canopy.

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 northeastern King County (the County) to meet the region's growing demand for environmentally responsible waste management services. The new station will replace the aging Houghton Transfer Station in Kirkland, which has been in service since the mid-1960s and is unable to offer the space and functionality to provide the recycling services customers increasingly need and want. This Noise Assessment, prepared in support of an environmental impact statement (EIS) being 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 action alternatives and the on-going 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 transfer station (Alternative 1 in Kirkland and Alternative 2 in Woodinville, Washington) (Figure 1-1). This assessment has been assembled to aid in EIS decision-making.

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, fueling station, space for onsite customer queuing, and possible moderate risk waste (MRW) disposal for products from homes and small qualifying businesses.

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 north, east, and west by single family homes and to the south by Bridle Trails State Park. Under the No Action Alternative, the SWD would not site a new station in northeastern King County (Figure 1-2). The SWD would continue to operate the existing Houghton Transfer Station. 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 industry changes. The facility would not be enclosed to control noise and odors. Waste would continue to not be compacted, which would affect the number of transit trucks and trailers that use the Houghton Transfer Station, 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 Transfer Station 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.

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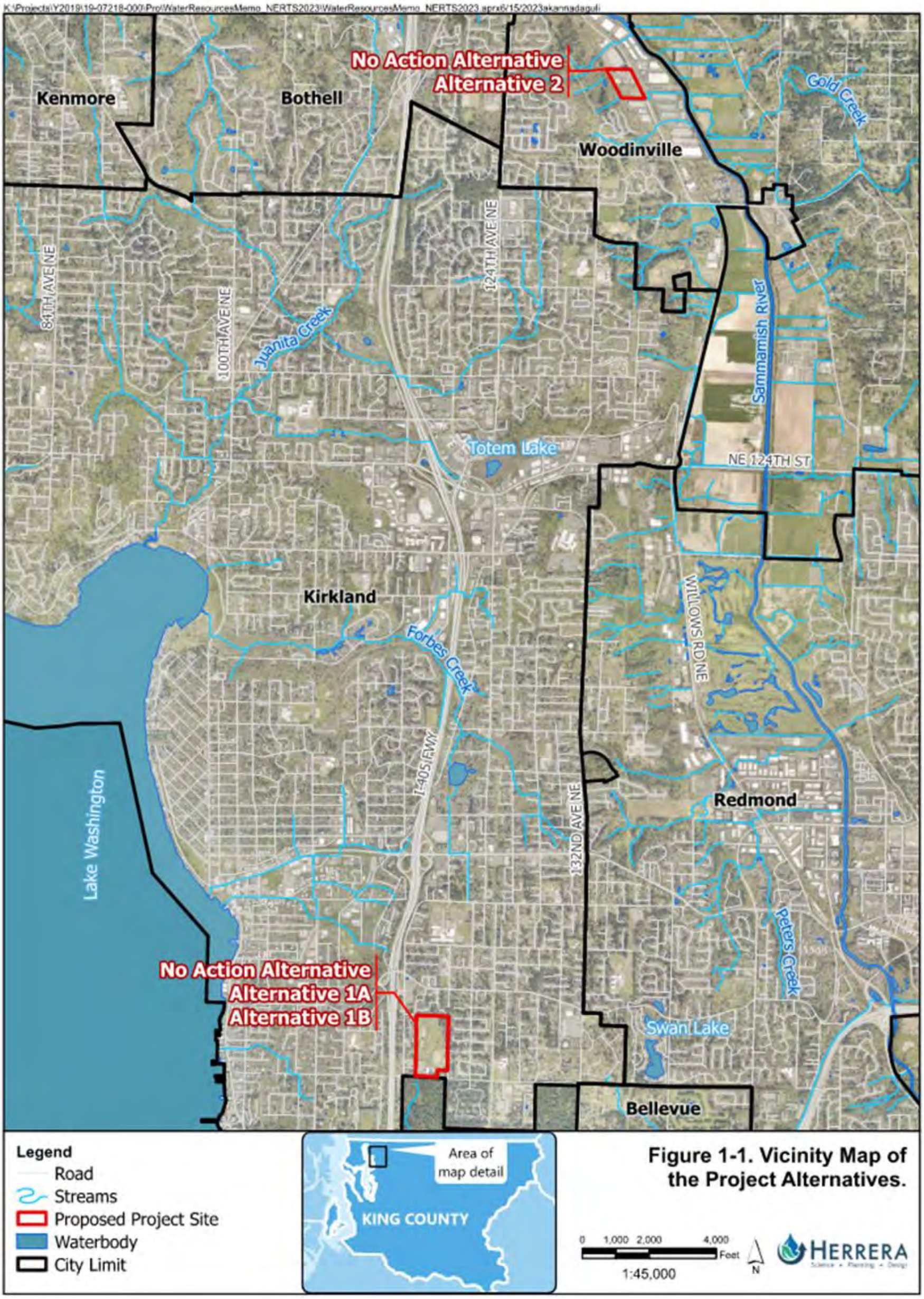


Figure 1-1. Vicinity Map of the Project Alternatives.

SCALE: 1"=120'-0"

0' 60' 120' 240' 480'

N
PLAN

LEGEND

SITE BOUNDARY

Figure 1-2
No Action Alternative

King County Solid Waste Division
Northeast Recycling and Transfer Station

King County

1.2.2. Features Common to All Action Alternatives

The new facility would be built to modern industry 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, thus 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. The new transfer station would 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, and odor control technologies
- Enclosed waste compactors
- Recycling and material staging areas
- Administration and staff area
- Station perimeter fence
- MRW collection building (Alternative 2 only)
- A “To Be Determined (TBD)” building to house additional private recycling or reuse operators or other service providers
- Roadways for customers and SWD vehicles
- Outdoor parking for full and empty waste transfer trailers
- 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. 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 and city building codes. The distance from the main tipping floor 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, fire sprinkler, ventilation, and other systems. The overall height of the new station would be approximately 70 feet above the lowest level. Buildings, parking areas, and roadways at the new transfer station would result in up to 4 to 8.5 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 facility is anticipated to open for business in 2029 following a construction period of approximately 30 months. 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, thus reducing offsite noise, odor, and dust.
- The facility will provide expanded recycling, accepting source-separated materials from self-haul customers
  - Commingled recyclables (curbside mix of paper, cardboard, tin, aluminum, plastic containers, glass bottles and jars)
  - Cardboard
  - Household sharps
  - 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, depending on the alternative selected, 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
- A mechanical exhaust ventilation system will be incorporated into the transfer station building for odor and dust control.
- A misting system will be installed in the transfer building for odor and dust control.
- 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 onsite traffic flows will minimize vehicle queuing, thus reducing emissions.
- The station will be cleaned on a regular basis.

1.2.3. Alternative 1

The site for Alternative 1 is located at 11724 NE 60th Street in Kirkland, at the existing Houghton Transfer Station location. The site is bordered to the north, east, and west by single family homes and to the south by Bridle Trails State Park. Alternative 1 has two options:

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

SCALE: 1"=120'-0"

0' 60' 120' 240' 480'

N
PLAN

LEGEND

- SITE BOUNDARY
- POTENTIAL SITE DEVELOPMENT AREA
- FUTURE DEVELOPMENT AREAS
- EXAMPLE ENTRANCE / EXIT

Figure 1-3
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

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

Figure 1-4
Alternative 1B

King County Solid Waste Division
Northeast Recycling and Transfer Station

King County

Alternative 1A includes removal of the existing transfer station building prior to construction of the new station and inclusion of a TBD 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. Expanded recycling services would be provided with Alternative 1A.

Alternative 1B retains the existing transfer station building during construction of the new station, and then closes and repurposes or replaces the existing station 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. Expanded recycling services would be provided with Alternative 1B.

The area to the north of the existing transfer station is the site of a closed landfill that is owned and maintained by King County. Both Alternative 1A and Alternative 1B may include removal of some existing waste in the development footprint to accommodate construction of new facilities.

1.2.4. Alternative 2

The site for Alternative 2 is located at 15801 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 of about 8 to 10.9 acres available for development (Figure 1-5). 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 Burlington Northern-Santa Fe Railroad rail line, and residential properties. Access to the Woodinville site is from Woodinville-Redmond Road NE. 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. Expanded recycling services would be provided with Alternative 2.

Alternative 2 offers service for collection of MRW, which would be stored in specialized containers onsite. 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 5 gallons), lithium batteries, and alkaline batteries. Individual loads are limited to 50 gallons, and containers greater than 5 gallons are generally not accepted.

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, and installation of drainage systems. Each of these activities would use appropriate construction equipment for the desired function. King County will require the design to minimize soil disturbance as feasible.

SCALE: 1"=120'-0"

0' 60' 120' 240' 480'

N

LEGEND

- SITE BOUNDARY
- POTENTIAL SITE DEVELOPMENT AREA
- STANDARD 105-FOOT WETLAND BUFFER
- EXISTING WETLAND AREA
- EXAMPLE ENTRANCE / EXIT

Figure 1-5
Alternative 2

King County Solid Waste Division
Northeast Recycling and Transfer Station

King County

1.4. Fundamentals of Acoustics and Vibration

An understanding of how noise is defined and measured provides useful background for this sound assessment. Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. There are several different ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. Table 1-1 summarizes the acoustical terms used in this report.

Table 1-1. Definitions of Acoustical Terms

Term	Definition
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient noise level is typically defined by the equivalent noise (L_{eq}) level.
Sound pressure (noise) level in decibels (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-weighted sound pressure (noise) level (dBA)	The sound level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound (noise) levels in this report are A-weighted.
Equivalent noise level (L_{eq})	The average A-weighted noise level, on an equal energy basis, during the measurement period.
Statistical noise level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (1-4 e.g., L_{50} is the level exceeded 50 percent of the time).

Table 1-2 depicts the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

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

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

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial Projects may experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily attributable to the wide variation in individual thresholds of annoyance and habituation to noise.

An understanding of the difference between a sound *pressure* level (or noise level) and a sound *power* level also can be useful. A sound power level (commonly abbreviated as PWL or Lw) is analogous to the wattage of a light bulb; PWL is a measure of the acoustical energy emitted by the source and is, therefore, independent of distance. A sound pressure level is analogous to the brightness or intensity of light experienced at a specific distance from a source and is measured directly with a sound level meter. Sound pressure levels always should be specified with a location or distance from the noise source.

Sound power level data are used in acoustic models to predict sound pressure levels because sound power levels consider the size of the acoustical source and account for the total acoustical energy emitted by the source.

Decibels (dB) cannot be directly added arithmetically (1-10 e.g., 50 dBA plus 50 dBA does not equal 100 dBA). When two sources of equal level are added together, the result will always be 3 dB greater (e.g., 50 dBA plus 50 dBA equals 53 dBA, and 70 dBA plus 70 dBA equals 73 dBA). If the difference between the two sources is 10 dBA, the level (when rounded to the nearest whole dB) will not increase (e.g., 40 dBA plus 50 dBA equals 50 dBA, and 60 dBA plus 70 dBA equals 70 dBA) (Caltrans 2013).

The decrease in sound level caused by distance from any single sound source normally follows the inverse square law; that is, the sound pressure level changes in inverse proportion to the square of the

distance from the sound source. In a large open area with no obstructive or reflective surfaces, it is a general rule that at distances greater than approximately the largest dimension of the noise-emitting surface, the sound pressure level from a single source of sound drops off at a rate of 6 dB with each doubling of the distance from the source. Sound energy is absorbed in the air as a function of temperature, humidity, and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. The drop-off rate will also vary based on terrain conditions and the presence of obstructions in the sound's propagation path. These factors are considered in the development of the acoustical model.

Vibration is the periodic oscillation of a medium or object, which may be directly felt or in some cases heard if the vibration induces rattling. Sources of ground-borne vibrations include natural phenomena (such as earthquakes, volcanic eruptions, sea waves, landslides) or human-made sources (such as explosions, machinery, traffic, trains, and construction equipment). Figure 1-6 illustrates common ground-borne vibration peak particle velocity sources as well as the human and structural response.

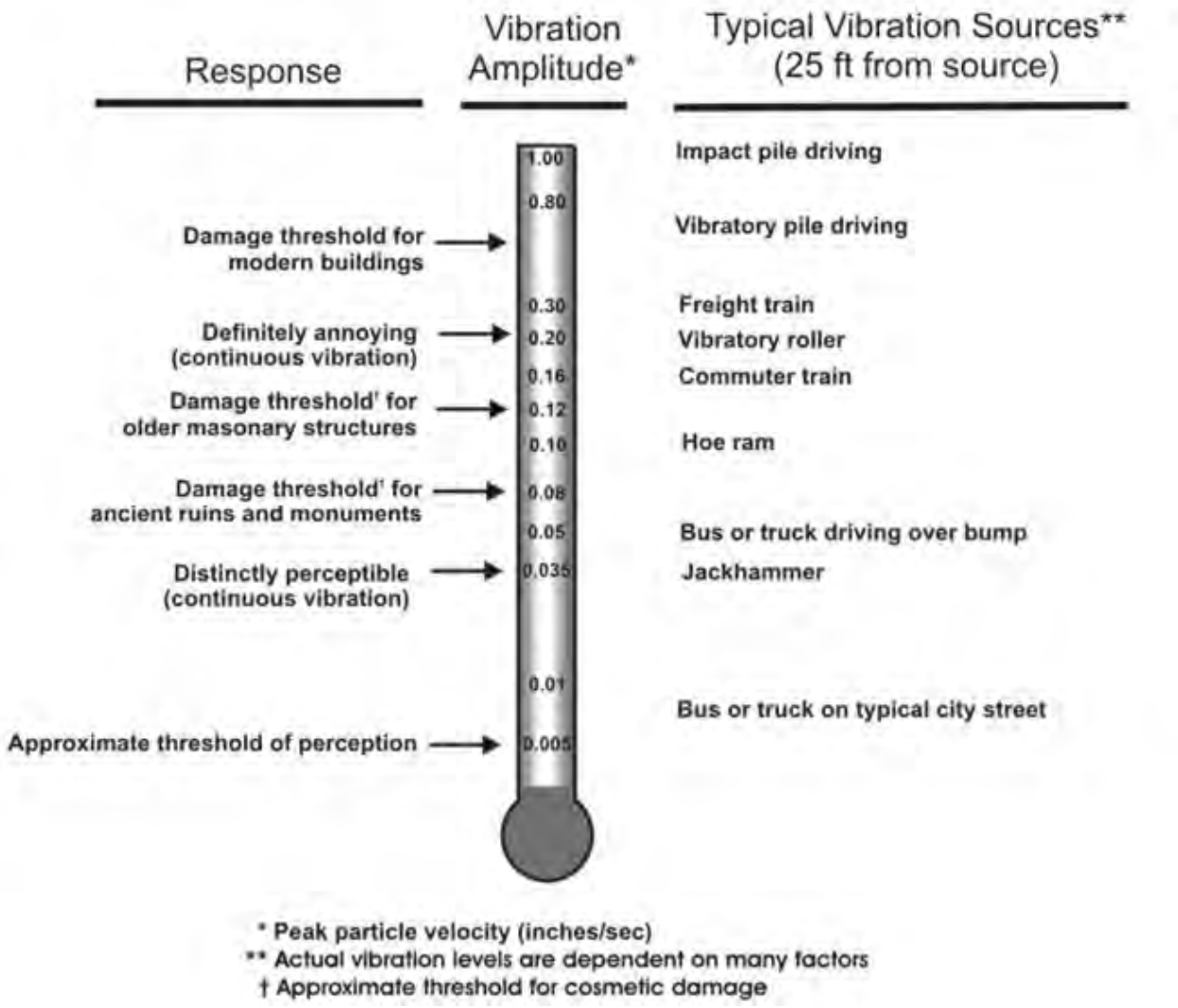
Regulations at the federal, state, regional, and local levels are described in the following sections.

Table 1-2. Typical A-weighted Sound Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1,000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower at 100 feet	— 70 —	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	— 60 —	
		Large business office
Quiet urban daytime	— 50 —	Dishwasher next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: Caltrans 2013; dBA = A-weighted decibel(s)

Figure 1-6. Typical Levels of Ground-borne Vibration



Source:
Wilson, Ihrig & Associates et al. 2012

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 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. -10 p.m.)	Nighttime (10 p.m.–- 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_{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

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 Federal Transit Administration's (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:

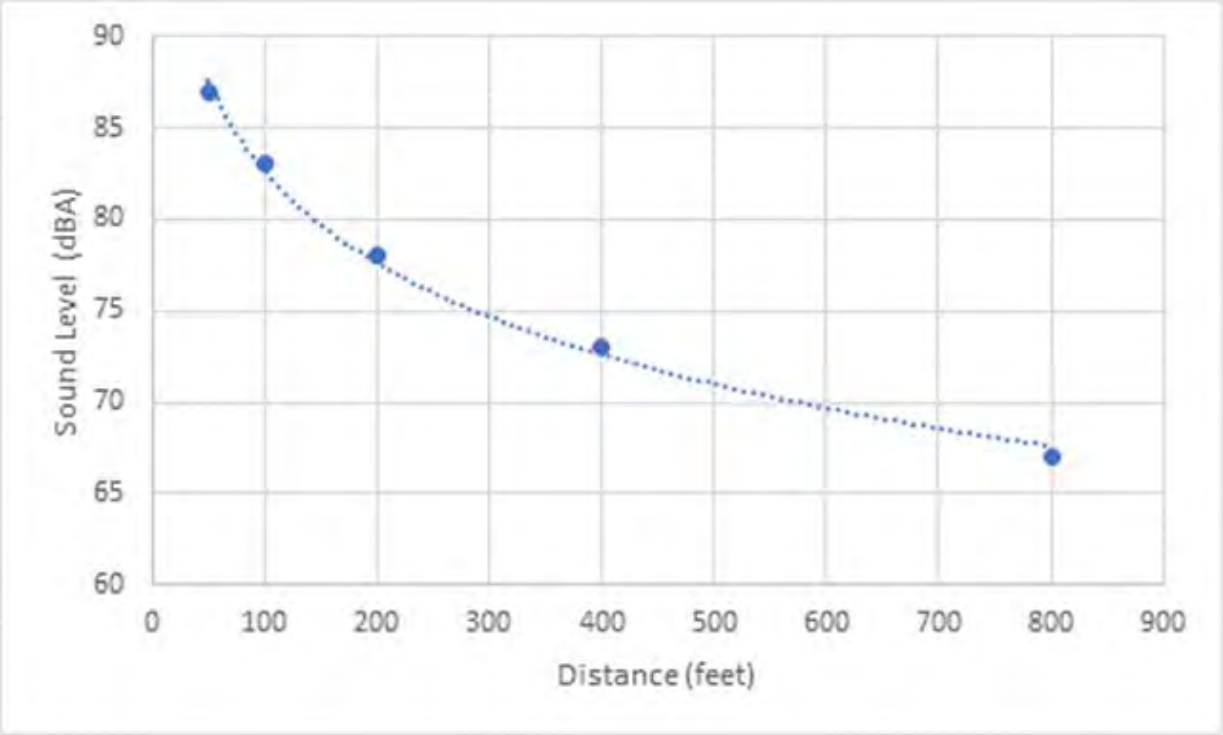
- One piece of equipment generating a reference noise level of 85 dBA at 50 feet at the edge of the construction or work area
- Two pieces of equipment generating 85 dBA reference noise levels located 50 feet farther away from the edge of construction or work area
- Two more pieces of equipment generating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

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 inches per second)	Engineered (Category 2) (0.3 inches per second)	Nonengineered (Category 3) (0.2 inches per second)	Extremely Sensitive (Category 4) (0.12 inches 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

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 inches per second)	Engineered (Category 2) (0.3 inches per second)	Nonengineered (Category 3) (0.2 inches per second)	Extremely Sensitive (Category 4) (0.12 inches per second)
Large bulldozer	0.089	<25	<25	<25	<25
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

4.1.1. Alternative 1

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.

4.1.2. Alternative 2

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

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

	Metric			
	$L_{2.5}$	$L_{8.33}$	L_{25}	L_{eq}
Alternative 2				
M3 (Night)	50	47	45	46
M4 (Day)	58	55	52	52
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}: hourly energy average

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

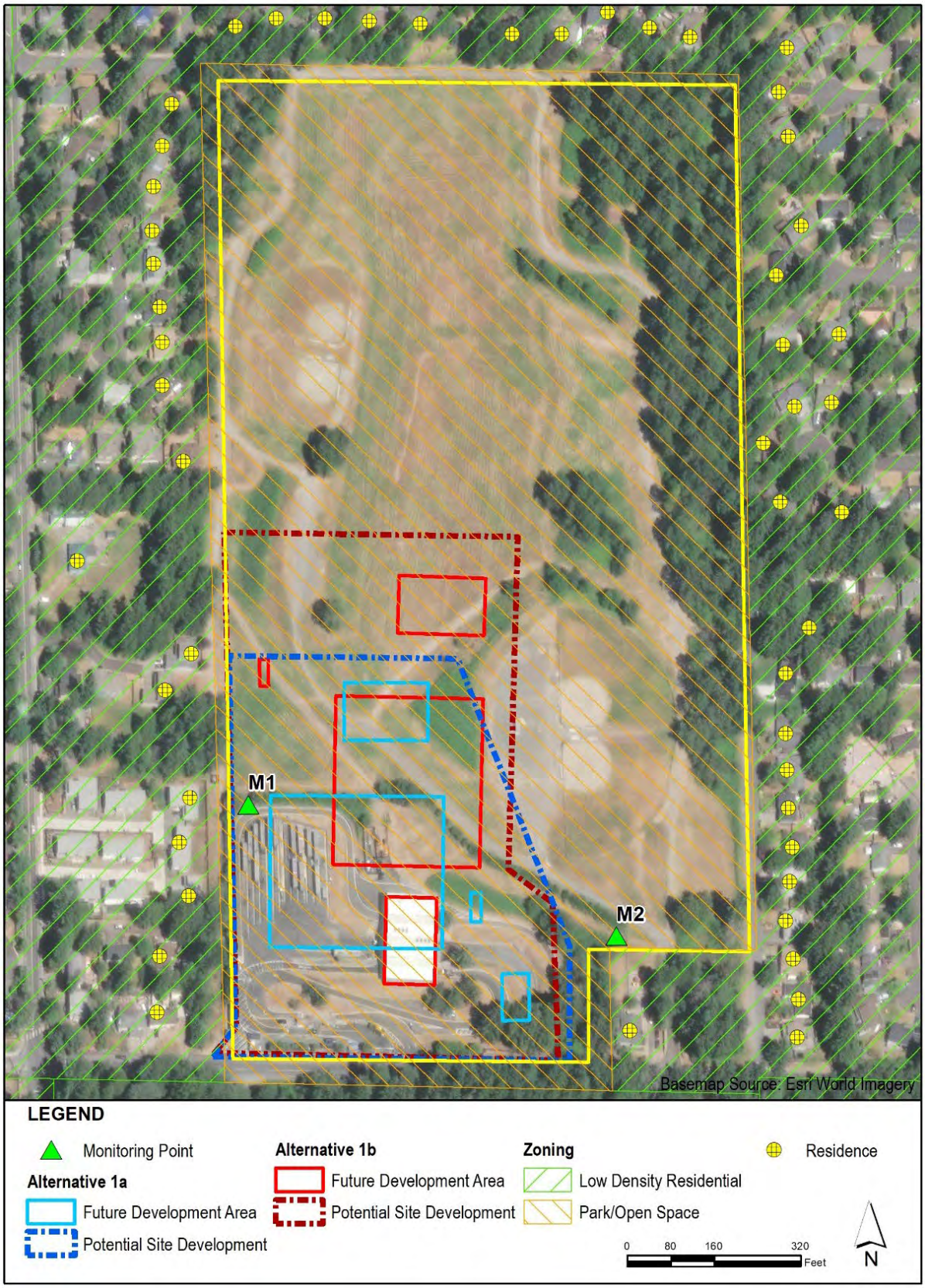
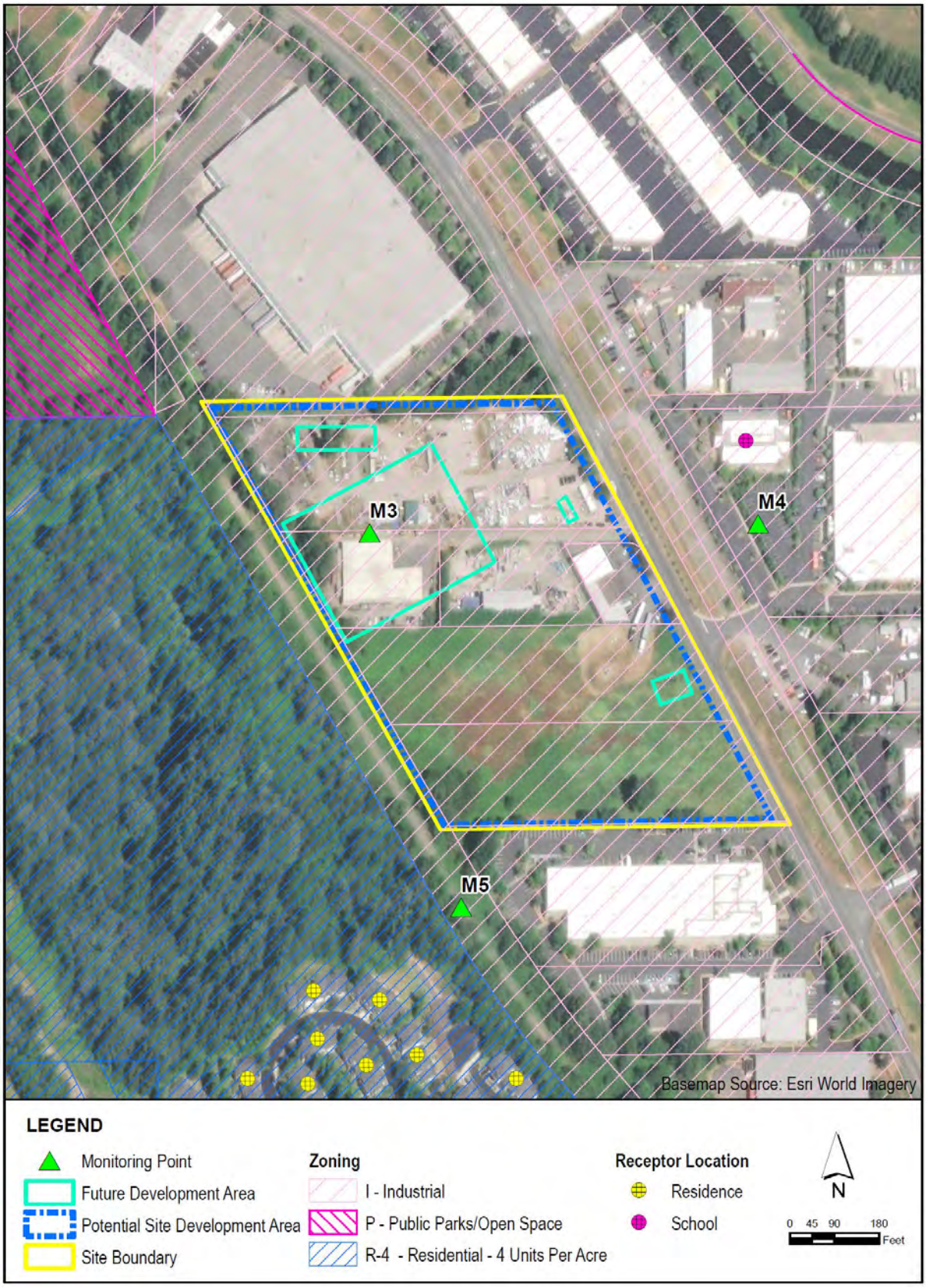


Figure 4-2. Noise Monitoring Locations for Alternative 2



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 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: ANSI 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

Construction

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

Operation

Under the No Action Alternative, ongoing operations at the existing Houghton Station 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. 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 impact 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 5.2.3 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

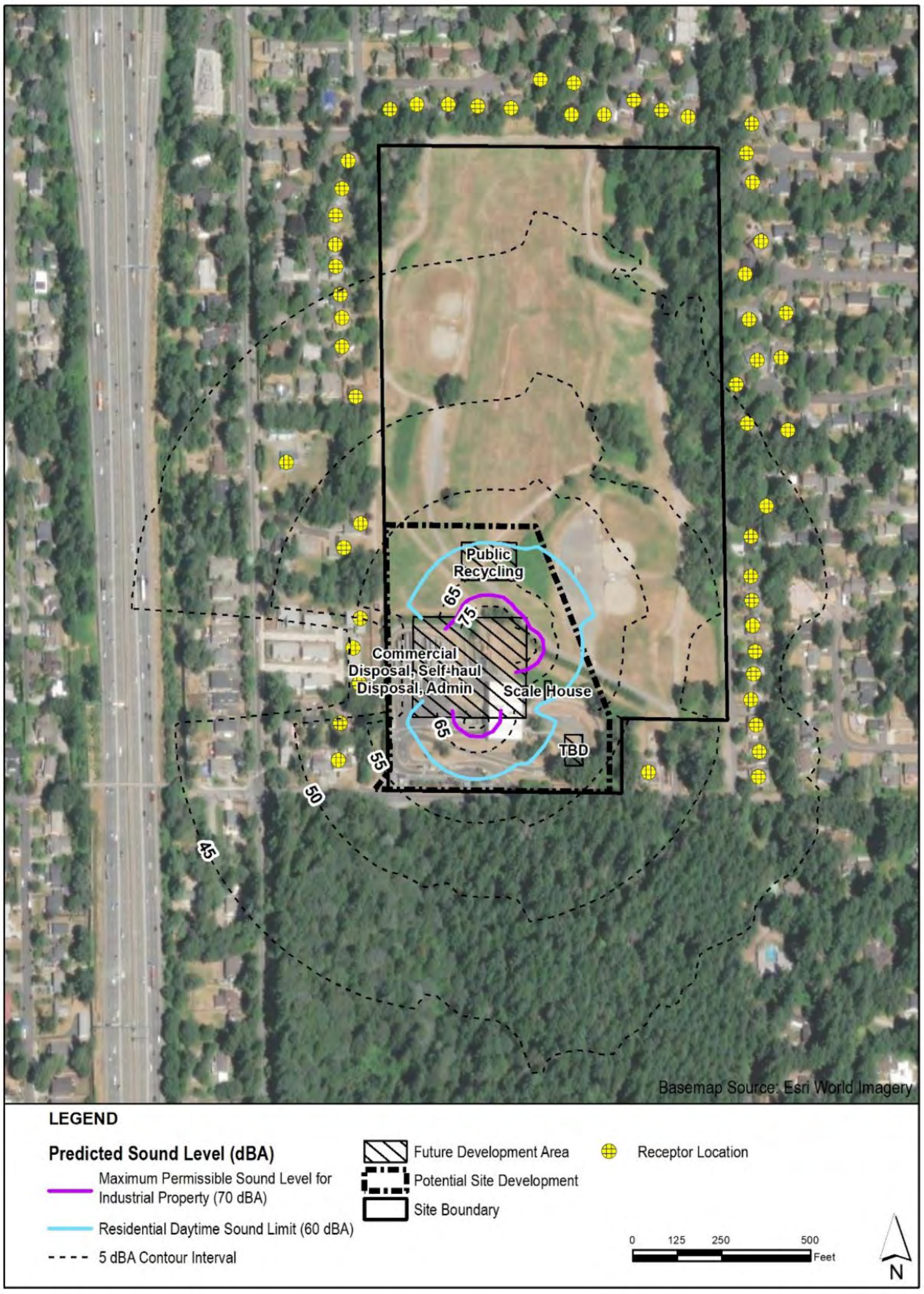


Figure 5-2. Alternative 1B Noise Contours

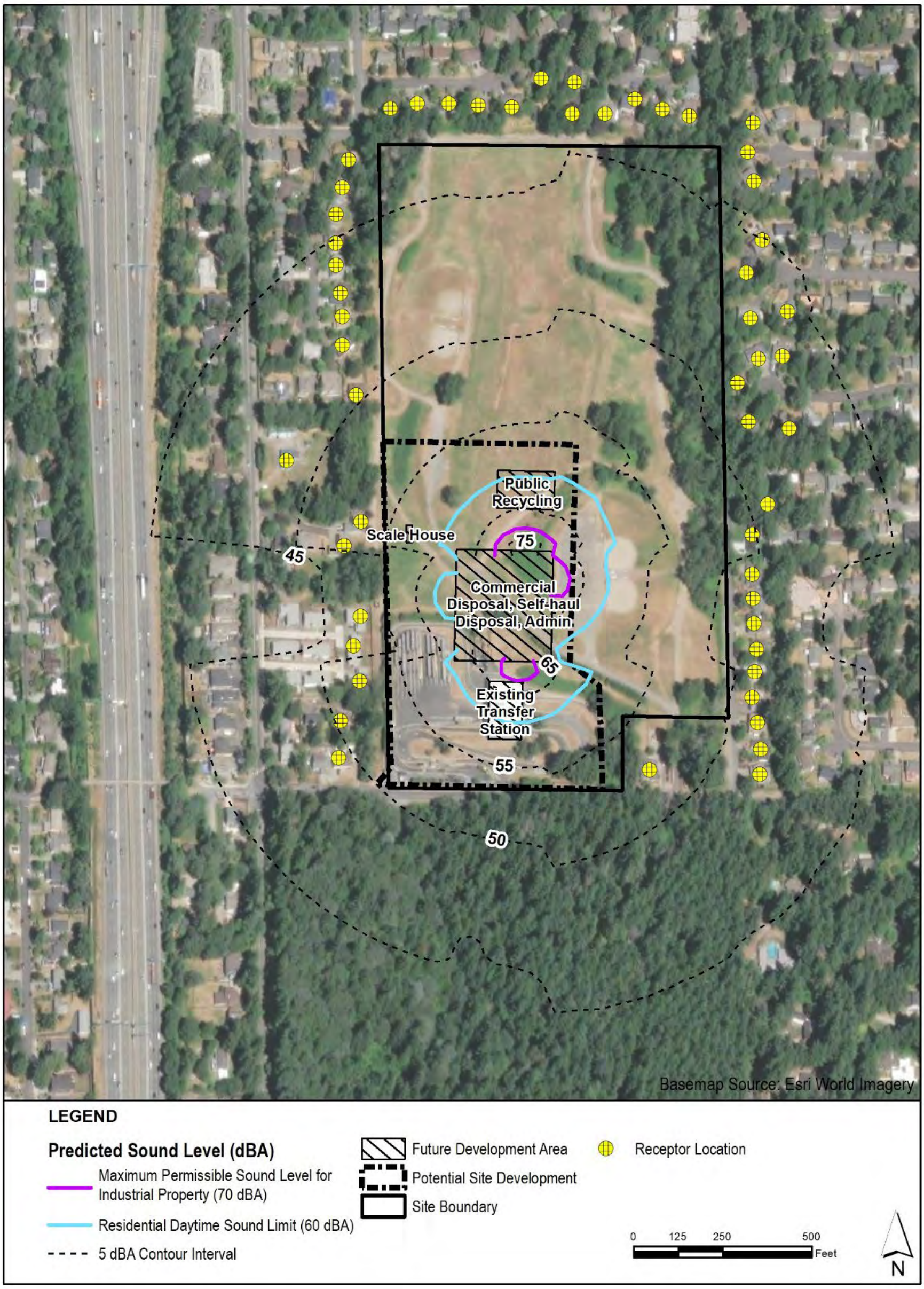
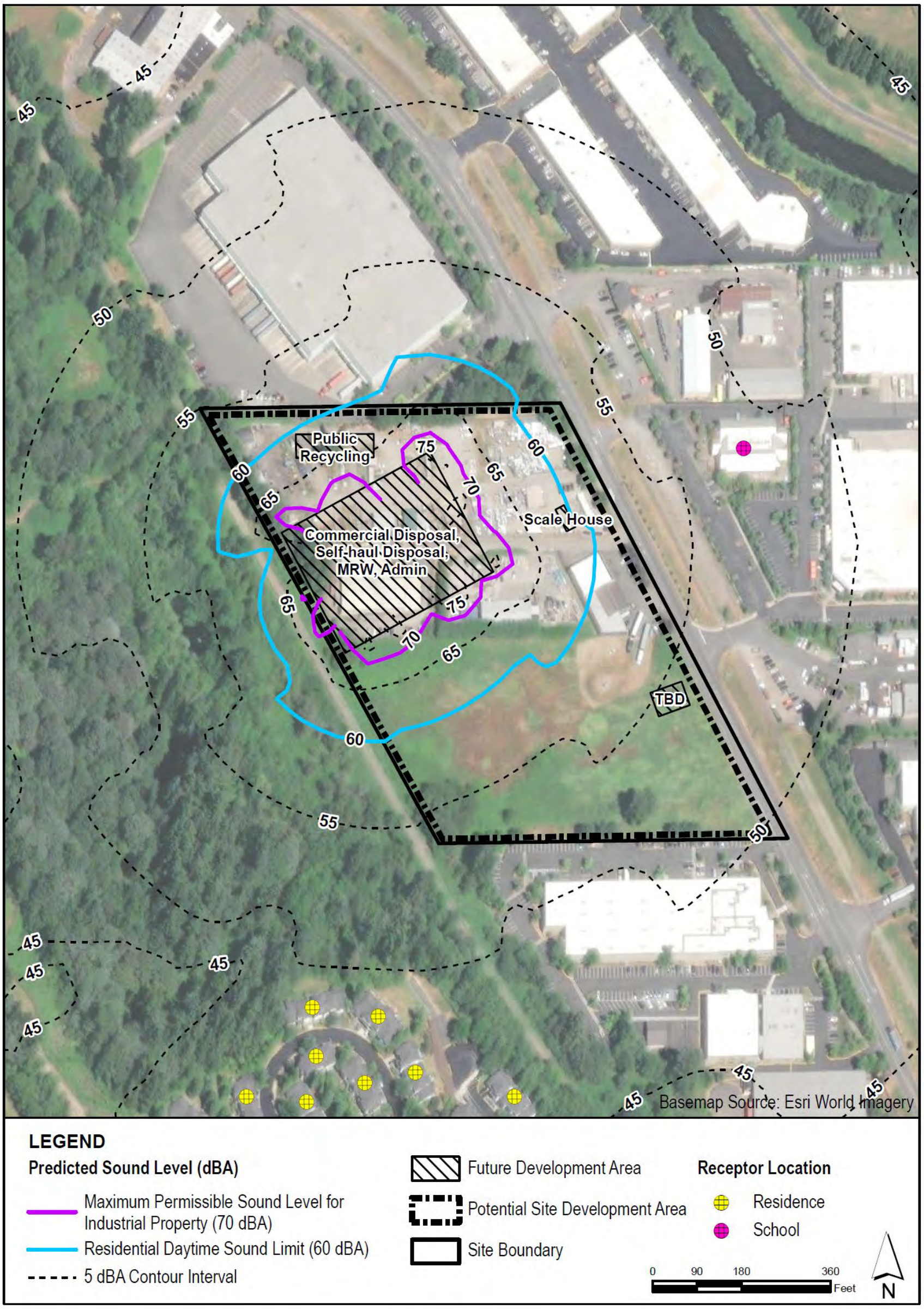


Figure 5-3. Predicted Sound Level for Operations at Alternative 2



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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	