King County
Department of
Natural Resources and Parks
Solid Waste Division

King County Comprehensive Solid Waste Management Plan

Draft Environmental Impact Statement

January 2018

1202 M

DRAFT
ENVIRONMENTAL IMPACT STATEMENT

DRAFT KING COUNTY COMPREHENSIVE SOLID WASTE MANAGEMENT PLAN

Prepared for

King County

King County Department of Natural Resources and Parks
Solid Waste Division
King Street Center
201 South Jackson Street, Suite 701
Seattle, Washington 98104-3855

by

Herrera Environmental Consultants, Inc.
2200 Sixth Avenue, Suite 1100
Seattle, Washington 98121
Telephone: 206.441.9080

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Prepared in compliance with the State Environmental Policy Act, Revised Code of Washington 43.21C as amended, and its implementing rules, Washington Administrative Code 197-11.

FACT SHEET

Nature and Location of Proposal

The King County Department of Natural Resources, Solid Waste Division, proposes to update the 2001 *King County Comprehensive Solid Waste Management Plan* (2001 Plan). Since that plan was adopted, the King County Council had adopted the 2006 *Transfer and Waste Management Plan* (Transfer Plan) (http://your.kingcounty.gov/solidwaste/about/planning/documents-planning.asp#transfer-plan). The Solid Waste Division reviewed and updated the 2001 Plan twice, in 2011 and in 2013, and proposed a number of major policy and program changes. However, those updates were not formally adopted by the King County Council or its partner cities.

This environmental impact statement, or EIS, evaluates and compares the following alternatives for each key component of the solid waste system. The no-action alternative for each component involves maintaining existing facilities, services, and programs for as long as possible.

Sustainable Materials Management

Alternative 1: No Action (maintain existing programs at current levels)

Alternative 2: Implementation of waste prevention and recycling strategies to achieve a 70 percent recycling goal, with county and city emphasis on education, incentives, and limited regulations; and corresponding collection standards

Alternative 3: Implementation of waste prevention and recycling strategies to achieve a 70 percent recycling goal, with county and city emphasis on education, incentives, and moderate regulations; and corresponding collection standards

Alternative 4: Implementation of waste prevention and recycling strategies to achieve a 70 percent recycling goal, with county emphasis on education, incentives, and maximum regulations; city emphasis on education, incentives, and limited regulations; and corresponding collection standards

The Solid Waste Transfer and Processing System

Service Level Improvement Alternatives

Alternative 1: No Action (maintain existing service levels such as existing station hours, recycling services, fees, disposal restrictions, etc.)

Alternative 2: Improve service levels with system-wide standards

Alternative 3: Improve service levels with facility-specific standards

Facility Improvement Alternatives

Alternative 1: No Action (maintain, improve, and develop transfer and processing system as currently planned, including closure of Algona, Houghton, and Renton transfer stations when replacement capacity is available, and development of a new South County Recycling and Transfer Station

Alternative 2: Maintain and improve existing transfer and processing system with or without closure of older transfer stations, with demand management but with no development of new capacity

Alternative 3: Maintain and improve existing transfer and processing system with or without closure of older transfer stations, and develop new capacity

Alternative 4: Create resource recovery centers at existing and new recycling and transfer stations

Landfill Management and Solid Waste Disposal

Alternative 1: No Action – complete Cedar Hills Regional Landfill as currently permitted, then export to an out-of-county landfill

Alternative 2: Further develop Cedar Hills Regional Landfill for landfilling, then export to an out-of-county landfill

Alternative 3: Implement waste-to-energy at Cedar Hills Regional Landfill or another location in King County, with residual municipal solid waste and residual ash sent to Cedar Hills Regional Landfill or exported to an out-of-county landfill

Alternative 4: Implement emerging recovery technologies for mixed municipal solid waste (AD and AMR) with increased private sector role and location, with residual municipal solid waste sent to Cedar Hills Regional Landfill or exported to an out-of-county landfill

Alternative 5: Implement emerging recovery technologies for mixed municipal solid waste (AD and AMR) at Cedar Hills Regional Landfill, with residual municipal solid waste sent to Cedar Hills Regional Landfill or exported to an out-of-county landfill.

Proponent

King County Department of Natural Resources, Solid Waste Division

Date of Implementation

The Solid Waste Division will begin implementing the recommendations in the Comprehensive Solid Waste Management Plan when the Final Comprehensive Solid Waste Management Plan (Final Plan) is adopted

by King County and participating cities and is approved by the Washington State Department of Ecology (Ecology).

Responsible Official and Lead Agency

Pat D. McLaughlin, Division Director
King County Solid Waste Division

Contact Person

Beth Humphreys, Project Manager
King County Solid Waste Division
King Street Center, 201 S. Jackson Street, Suite 701
Seattle, Washington 98104
(206) 477-5264
Beth.Humphreys@kingcounty.gov

Required Permits and Approvals

The Final Plan must be adopted by King County and participating cities and approved by Ecology. Construction of any needed facilities would require appropriate permits and approvals. Those permits and approvals would be a consideration in the environmental review of these facilities once sites are selected and project specifics are known.

Authors

King County Solid Waste Division
Herrera Environmental Consultants, Inc.

Date of Draft EIS Issuance

January 8, 2018

Date Draft EIS Comments Are Due

March 8, 2018. The Division will consider all comments received during the comment period.

Document Availability

The draft Plan and draft EIS are available for review electronically on the project website at: www.kingcounty.gov/solid-waste-comp-plan. Hard copies of these documents are available for review at all King County libraries, and can be obtained for the cost of production by calling 206-477-4466.

To Provide Comments

- Send an email - send comments on the draft EIS to SWD.CompPlan@kingcounty.gov
- Send a letter via U.S. Post – send written comments to: King County Solid Waste Division Attn: Draft Solid Waste Plan draft EIS Comments 201 S. Jackson St., Suite 701 Seattle, WA 98104-3855

- Attend an open house – These are informal events, so drop in anytime to learn more, ask questions, and provide your comments. Accommodations will be provided when requested at least one week in advance of the meeting. Please call 206-477-4466, TTY Relay: 711.

  Three open houses will be held; each will run from 5:30-7:30 p.m.

January 24, 2018	January 30, 2018	February 7, 2018
Kingsgate Library	Kent Senior Center	King County Library Service Center
12315 NE 143rd St.	600 East Smith St.	960 Newport Way NW
Kirkland, WA 98034	Kent, WA 98031	Issaquah, WA 98027

Date of Final EIS Issuance

TBD

Date of Final Action

Adoption of the Final Plan by King County and participating cities and Ecology approval of the Final Plan are expected in 2019.

Subsequent Environmental Review

No subsequent environmental review is expected for the Final Plan. As actions are proposed to implement the Final Plan, the Final EIS will be used to the maximum extent possible to satisfy State Environmental Policy Act, or SEPA, environmental review requirements. However, additional environmental review will likely be needed for some project actions, particularly those involving major capital improvements.

Location of EIS Background Data

Background information and all documents incorporated by reference in this EIS are available for review at the office of the King County Solid Waste Division (see address of contact person, above).

Cost to the Public for Copy of Final EIS

$10.00

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LIST OF ABBREVIATIONS AND ACRONYMS

AD	anaerobic digestion
AMR	advanced materials recovery
ASIL	acceptable source impact level
cfm	cubic feet per minute
dBA	A-weighted decibel
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
HDPE	high-density polyethylene
ILA	interlocal agreement
MMSW	mixed municipal solid waste
O&M	operations and maintenance
PET	polyethylene terephthalate
PHS	Priority Habitats and Species (WDFW)
PM_{10}	particulate matter with diameters generally 10 micrometers and smaller
$PM_{2.5}$	particulate matter with diameters generally 2.5 micrometers and smaller
ppm	parts per million
PSCAA	Puget Sound Clean Air Agency
RCW	Revised Code of Washington
SCREEN3	screening-level air dispersion model (EPA)
SEPA	State Environmental Policy Act
TAPs	toxic air pollutants
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WSDOT	Washington State Department of Transportation

1.0 SUMMARY

1.1 Purpose and Need

The King County Department of Natural Resources, Solid Waste Division, proposes adoption of the Comprehensive Solid Waste Management Plan (the Plan). The overall purpose of the Plan is to develop strategies for managing King County's solid waste over the next 6 years, with consideration of the next 20 years. Specific objectives of the Plan are:

- To respond to recent policy directives of the King County Council relevant to solid waste management.
- To meet customer service needs while minimizing any increase in disposal rates.
- To maximize cost-effective waste prevention, waste reduction, and recycling, while maintaining adequate transfer and disposal capabilities for non-recycled waste.
- To design, operate, and maintain the solid waste system in a manner that protects the environment and conserves energy and natural resources.
- To comply with federal, state, and local regulations governing solid waste management.
- To respond to issues raised by the public, partner cities, unincorporated area councils, the Solid Waste Advisory Committee, the Metropolitan Solid Waste Management Advisory Committee, and the solid waste industry as part of the public involvement process for the Plan.

The need for the Plan is to comply with Washington State requirements for comprehensive solid waste planning under RCW 70.95 and its implementing regulations in Washington Administrative Code (WAC) 173-304 and WAC 173-351. WAC 173-304-011(2) states, in part: "The overall purpose of local comprehensive solid waste planning is to determine the nature and extent of the various solid waste categories and to establish management concepts for their handling, utilization, and disposal consistent with the priorities established in Revised Code of Washington (RCW) 70.95.010 for waste reduction, waste recycling, energy recovery and incineration, and landfill. Each local plan shall be prepared in accordance with RCW 70.95.080, 70.95.090, 70.95.100, and 70.95.110."

Under RCW 70.95.080, cities may choose to either prepare their own plans, or participate in the development of a single plan that covers the incorporated and unincorporated areas of the county. Within King County, 37 cities (all cities in the county except Seattle and Milton) have chosen to participate in the development of a single plan, and have signed Interlocal Agreements (ILAs) with King County that establish King County as the solid waste planning authority. The original ILAs were 40-year agreements that run through 2028. By the end of 2018, all of the cities area expected to sign the Amended and Restated ILAs that are extended through 2040.

WAC 197-11-400(1) states that the purpose of an environmental impact statement (EIS) is to "ensure that SEPA's (State Environmental Policy Act) policies are an integral part of the ongoing programs and actions of state and local government." Because the subject of this EIS is a proposed non-project plan, as

mandated by WAC 197-11-442(2) the level of detail of the analyses is consistent with the broad programmatic issues to be resolved. This EIS identifies potential significant impacts; describes mitigation measures that can be used (and in many cases, are currently used) to avoid such impacts or reduce them below significant levels; and, where possible, draws conclusions about whether there may be any significant unavoidable adverse impacts (that is, significant impacts that cannot or will not be mitigated). Beneficial impacts are also discussed where relevant to the choice among alternatives.

Based on the analyses in the EIS, as well as other relevant information and analyses in the 2019 Plan itself, King County and participating cities will select the facilities, programs, and services to be included in the regional solid waste management system over the next 6 to 20 years. As actions are proposed to implement the Plan, this EIS will be used to the maximum extent possible to satisfy SEPA review requirements. However, it is expected that additional environmental review will be needed for project actions, particularly those involving major capital improvements.

1.2 Alternatives and Impacts

Table S-1. Summary of Alternatives, Impacts, Mitigation Measures, and Significant Unavoidable Adverse Impacts
Sustainable Materials Management (Section 3 of EIS, Chapter 4 of Plan)

Alternative	Impacts, Mitigation Measures, and Significant Unavoidable Adverse Impacts
Alternative 1 (No Action) Maintain existing programs at current levels	Impacts and Mitigation Measures • Maintaining existing recycling levels could result in higher emissions of greenhouse gases compared to Alternative 2, 3, and 4 because fewer materials would be reused, recycled, or composted. • Alternative 1 is expected to result in the least increase in recycled material and associated fuel use for transportation. • Disposal costs to residences and businesses would be higher than Alternatives 2, 3, and 4 due to less waste being diverted. Significant Unavoidable Adverse Impacts • No significant unavoidable adverse impacts are anticipated
Alternative 2 Implementation of waste prevention and recycling strategies to achieve a 70 percent recycling goal, with county and city emphasis on education and incentives, limited regulations; and corresponding collection standards	Impacts and Mitigation Measures • Minor earthwork, and resulting minor earth impacts, could occur if existing facilities need to be modified to handle increased volumes of recycled materials. Earth impacts are likely to be insignificant and no mitigation measures are identified. • Moving toward a 70 percent recycling goal with the associated focus on certain materials and products that remain prevalent in the waste stream, especially organics (yard and food waste), is likely to require some changes in the locations and methods of handling recycled materials. These changes could result in air quality and/or odor impacts • Moving toward a 70 percent recycling goal could result in lower emissions of greenhouse gases because materials that are not landfilled may be reused, recycled, or composted • Increased organics (yard and food waste) collection could cause a need for additional organics processing facilities with potential effects on surface and groundwater, plants and animals and disease vectors. New or existing facilities would need to comply with federal and state requirements, and any other relevant permits, so impacts of those facilities are expected to be controlled and mitigated, as required. • Increased recycling may result in a net increase in truck trips and therefore increase fuel use, especially in areas where recyclables are collected curbside. However, waste reduction and minimization and other incentives, such as bulky waste collection, would tend to reduce traffic trips and, therefore, reduce fuel use • Increased diversion of construction and demolition debris could somewhat reduce health risks by limiting illegal or inappropriate handling of potentially hazardous material such as asbestos and lead-based paint. • Diverting larger quantities of solid waste to recycling and composting facilities could indirectly affect land use over the long term by inducing development of

	new industrial or commercial businesses that recycle, process, or reuse waste materials. • Specific transportation routes may be affected due to materials being diverted from disposal to recycling, composting, or reuse but it is likely that any changes in traffic will be distributed to such an extent that any increases in vehicle trips will not create significant unavoidable impacts. • Additional waste reduction and recycling would also result in lower costs to residents and businesses through the avoidance of disposal costs. • Some increases in city or county administrative costs, which could be passed on to ratepayers, may arise with regulations or programs requiring enforcement. Significant Unavoidable Adverse Impacts • No significant unavoidable adverse impacts are expected
Alternative 3 Implementation of waste prevention and recycling strategies to achieve a 70 percent recycling goal, with county and city emphasis on education, incentives, and moderate regulations; and corresponding collection standards	Impacts and Mitigation Measures • Minor earthwork, and resulting minor earth impacts, could occur if existing facilities need to be modified to handle increased volumes of recycled materials. Earth impacts are likely to be insignificant and no mitigation measures for earth impacts are identified. • Moving toward a 70 percent recycling goal with the associated focus on certain materials and products that remain prevalent in the waste stream, especially organics (yard and food waste), is likely to require some changes in the locations and methods of handling recycled materials. These changes could result in air quality and/or odor impacts. • Moving toward a 70 percent recycling goal could result in lower emissions of greenhouse gases because materials that are not landfilled may be reused, recycled, or composted • Increased organics (yard and food waste) collection could cause a need for additional organics processing facilities with potential effects on surface and groundwater, plants and animals and disease vectors. New or existing facilities would need to comply with federal and state requirements, and any other relevant permits, so impacts of those facilities are expected to be controlled and mitigated, as required. • Increased recycling may result in a net increase in truck trips and therefore increase fuel use, especially in areas where recyclables are collected curbside. However, waste reduction and minimization and other incentives, such as bulky waste collection, would tend to reduce traffic trips and, therefore, reduce fuel use • Increased diversion of construction and demolition debris could somewhat reduce health risks by limiting illegal or inappropriate handling of potentially hazardous material such as asbestos and lead-based paint. • Diverting larger quantities of solid waste to recycling and composting facilities could indirectly affect land use over the long term by inducing development of new industrial or commercial businesses that recycle, process, or reuse waste materials. • Specific transportation routes may be affected due to materials being diverted from disposal to recycling, composting, or reuse but it is likely that any changes in traffic will be distributed to such an extent that any increases in vehicle trips will not create significant unavoidable impacts. • Additional waste reduction and recycling would also result in lower costs to residents and businesses through the avoidance of disposal costs. Cost savings

	are anticipated to be greatest with Alternative 3 compared to Alternatives 2 and 4. • Increases in city or county administrative costs, which could be passed on to ratepayers, may arise with regulations or programs requiring enforcement. The costs are anticipated to be greatest with Alternative 3 compared to Alternatives 2 and 4. Significant Unavoidable Adverse Impacts • No significant unavoidable adverse impacts are expected
Alternative 4 Implementation of waste prevention and recycling strategies to achieve a 70 percent recycling goal, with county emphasis on education, incentives, and maximum regulations, and city emphasis on education and incentives, limited regulations; and corresponding collection standards	Impacts and Mitigation Measures • Minor earthwork, and resulting minor earth impacts, could occur if existing facilities need to be modified to handle increased volumes of recycled materials. Earth impacts are likely to be insignificant and no mitigation measures are identified. • Moving toward a 70 percent recycling goal with the associated focus on certain materials and products that remain prevalent in the waste stream, especially organics (yard and food waste), is likely to require some changes in the locations and methods of handling recycled materials. These changes could result in air quality and/or odor impacts • Moving toward a 70 percent recycling goal could result in lower emissions of greenhouse gases because materials that are not landfilled may be reused, recycled, or composted • Increased organics (yard and food waste) collection could cause a need for additional organics processing facilities with potential effects on surface and groundwater, plants and animals and disease vectors. New or existing facilities would need to comply with federal and state requirements, and any other relevant permits, so impacts of those facilities are expected to be controlled and mitigated, as required. • Increased recycling may result in a net increase in truck trips and therefore increase fuel use, especially in areas where recyclables are collected curbside. However, waste reduction and minimization and other incentives, such as bulky waste collection, would tend to reduce traffic trips and, therefore, reduce fuel use • Increased diversion of construction and demolition debris could somewhat reduce health risks by limiting illegal or inappropriate handling of potentially hazardous material such as asbestos and lead-based paint. • Diverting larger quantities of solid waste to recycling and composting facilities could indirectly affect land use over the long term by inducing development of new industrial or commercial businesses that recycle, process, or reuse waste materials. • Specific transportation routes may be affected due to materials being diverted from disposal to recycling, composting, or reuse but it is likely that any changes in traffic will be distributed to such an extent that any increases in vehicle trips will not create significant unavoidable impacts. • Additional waste reduction and recycling would also result in lower costs to residents and businesses through the avoidance of disposal costs. • Some increases in city or county administrative costs, which could be passed on to ratepayers, may arise with regulations or programs requiring enforcement. Significant Unavoidable Adverse Impacts

	• No significant unavoidable adverse impacts are expected

Table S-2. Summary of Alternatives, Impacts, Mitigation Measures, and Significant Unavoidable Adverse Impacts
Solid Waste Transfer and Processing System (Section 4 of EIS, Chapter 5 of Plan)

Alternative	Impacts, Mitigation Measures, and Significant Unavoidable Adverse Impacts
Service Level Improvements Alternative 1 (No Action) Maintain existing service levels such as existing station hours, recycling services, fees, disposal restrictions, etc.	Impacts and Mitigation Measures • Use of a compactor at the new South County Recycling and Transfer Station would reduce traffic around that station, and between Algona and Cedar Hills Regional Landfill. • With full service facilities distributed throughout much of the system, except the Northeast service area, this alternative minimizes traffic-related impacts of customer trips throughout much of the region. • Recycling services are expected to be generally improved over the existing condition under all alternatives. Significant Unavoidable Adverse Impacts • No significant unavoidable impacts are anticipated.
Alternative 2 Improve service levels with system-wide standards	Impacts and Mitigation Measures • Improved service levels under Alternative 2 could lead to lower emissions of greenhouse gases compared to Alternative 1 if improved service levels lead to lower average vehicle waiting times at transfer stations. • An increase in service levels likely would result in reduction in fuel use compared to Alternative 1, due to reduction in the average vehicle travel distance and time per unit volume or weight of material handled systemwide. • Improvements in service levels under Alternative 2 could marginally improve noise levels in the vicinity of transfer stations compared to Alternative 1 by lowering average vehicle wait times. • With full service facilities distributed throughout much of the system, except the Northeast service area, this alternative minimizes traffic-related impacts of customer trips throughout much of the region. • If hours are reduced at some stations to a standard, the availability of some solid waste services to some residents and businesses could be altered. If station hours are expanded to a standard, residents and businesses would retain the option to use the transfer stations at preferred times. • Recycling services are expected to be generally improved over the existing condition under all alternatives. Significant Unavoidable Adverse Impacts • No significant unavoidable impacts would result from implementation of the level-of-service improvements detailed in the Plan.
Alternative 3	Impacts and Mitigation Measures

Improve service levels with facility-specific standards	• Restricting self-haul and commercial traffic to different transfer stations could lead to some increase in average vehicle travel distance, and that increase could result in higher overall emissions levels under Alternative 3 compared to Alternative 1 or 2. • Improved service levels under Alternative 3 could lead to lower emissions of greenhouse gases compared to Alternative 1 if improved service levels lead to lower average vehicle waiting times at transfer stations. • An increase in service levels likely would result in reduction in fuel use due to reduction in the average vehicle travel distance and time per unit volume or weight of material handled systemwide. However, if self-haul and commercial vehicles are restricted to some stations, this could lead to an overall increase in travel distances and times and a consequent comparative increase in fuel use. • Improvements in service levels under Alternatives 3 could marginally improve noise levels in the vicinity of transfer stations by lowering average vehicle wait times. • With full service facilities distributed throughout much of the system, except the Northeast service area, this alternative minimizes traffic-related impacts of customer trips throughout much of the region. • Recycling services are expected to be generally improved over the existing condition under all alternatives. The addition of mandatory self-haul recycling at some transfer stations may cause the time on site to marginally increase for customers with targeted materials, with a corresponding marginal effect on station queuing. Because the stations potentially affected by the service level change have ample space on site for queuing, it is unlikely that off-site traffic would be affected. • If hours are reduced at some stations, the availability of some solid waste services to some residents and businesses could be altered. If station hours are expanded, residents and businesses would retain the option to use the transfer stations at preferred times. Significant Unavoidable Adverse Impacts • No significant unavoidable impacts would result from implementation of the level-of-service improvements detailed in the Plan.
<u>Facility Improvements</u> Alternative 1 (No Action) Maintain, improve, and develop transfer and processing system as currently planned, including closure of Algona and Renton Transfer Stations when replacement capacity is available, keep Houghton "as-is" indefinitely, and development of new South County Recycling and Transfer Station	Impacts and Mitigation Measures • The lack of increase in the transfer station capacity in the Northeast area under Alternative 1 could increase congestion and waiting times at Houghton, Factoria, Shoreline, and Renton stations, thereby increasing vehicle emissions at those locations and contributing to an incremental decline in air quality. • Short-term impacts on water and aquatic habitats could occur during construction of improved and new transfer stations (all Alternatives), including potential for erosion and sedimentation. Erosion and sedimentation potential could be mitigated by best management practices, including those needed to protect fish species listed under the Endangered Species Act. Design guidelines for stormwater control facilities are much more stringent than when the original transfer stations were constructed and would mitigate for impacts of increased impervious surface areas. • Alternative 1 could result in the reduction of traffic on roads in the vicinity of transfer stations that might be closed (i.e., Renton); Traffic on the roads leading

	to the Algona Transfer Station would continue after development of the South County Recycling and Transfer Station. • Continuing to allow self-haulers and commercial haulers to use the existing Houghton Transfer Station "as-is" indefinitely would extend existing transportation impacts into the future, along with the growth in traffic anticipated from projected increases in disposal and recycling tonnage. • Transportation impacts during construction of a new South County Recycling and Transfer Station would include minor impacts from temporary, localized increases in traffic volumes, temporary lane closures, and roadway wear and tear from heavy construction trucks and construction equipment. Impacts from operation include increased traffic volumes at intersections in the vicinity of the transfer station, at the site access, and along nearby corridors. • Capital costs to increase the overall efficiency and cost-effectiveness of providing solid waste transfer services would cause a relatively small increase in cost to ratepayers for receiving increased services. Significant Unavoidable Adverse Impacts • There could be longer waiting lines and offsite queues at some transfer stations.
Alternative 2 Maintain and improve existing transfer and processing system with or without closure of older transfer stations, with demand management but with no development of new capacity	Impacts and Mitigation Measures • Increasing the efficiency of the overall county transfer and processing system likely would lead to lower fuel use and resulting greenhouse gas emissions systemwide compared to Alternative 1. • Short-term impacts on water and aquatic habitats could occur during construction of improved and new transfer stations (all Alternatives), including potential for erosion and sedimentation. Erosion and sedimentation potential could be mitigated by best management practices, including those needed to protect fish species listed under the Endangered Species Act. Design guidelines for stormwater control facilities are much more stringent than when the original transfer stations were constructed and would mitigate for impacts of increased impervious surface areas. • Construction of improved transfer stations could result in loss of vegetation and wildlife habitat in disturbed areas. Only common and urban species are known to be present at the transfer stations. Landscaping could incorporate vegetation of value to native wildlife. Areas temporarily disturbed by construction could be revegetated with native plants of value to wildlife. • Establishing temporary debris storage sites (Alternatives 2, 3, and 4) could affect human health locally by concentrating large amounts of material, some of which could be hazardous to human health. These impacts can be mitigated through the siting process, and by implementing standard mitigation measures. • Transportation impacts during construction of a new South County Recycling and Transfer Station would be as described for Alternative 1. • Traffic impacts would be similar to those described for Alternative 1 in the vicinity of existing facilities, but would increase around new facilities as commercial truck traffic is directed to the new capacity. • Restrictions on self-haul would primarily change traffic and use patterns at transfer facilities, but would not provide a significant overall reduction in the number of customers. The programs aimed at reducing self-haul traffic would tend to reduce potential delays for commercial haulers compared to Alternative 1. • Other transportation impacts from Alternative 2 would be experienced primarily at the Factoria and Shoreline transfer stations, and, to a lesser degree, the Bow

	Lake Transfer Station. Impacts would consist of a general increase in vehicle miles traveled, minor increases in overall station traffic during both average weekdays and weekend days, but with increased commercial traffic offset by some decreases in self-haul traffic, as compared to Alternative 1. • Capital costs to increase the overall efficiency and cost-effectiveness of providing solid waste transfer services would cause a relatively small increase in cost to ratepayers for receiving increased services. Significant Unavoidable Adverse Impacts • With implementation of mitigation measures, significant unavoidable adverse impacts are unlikely to occur.
Alternative 3 Maintain and improve existing transfer and processing system with or without closure of older transfer stations, and develop new capacity	Impacts and Mitigation Measures • Increasing the efficiency of the overall county transfer and processing system likely would lead to lower fuel use and resulting greenhouse gas emissions greenhouse gas emissions systemwide compared to Alternative 1. • Construction of a new Northeast Recycling and Transfer Station would involve site disturbance and excavation on up to 20 acres. Site work could result in substantial earth impacts. Mitigation for impacts includes selecting sites away from geologically critical areas, using appropriate geotechnical engineering and implementing Best Management Practices during construction. • Construction of a new Northeast Recycling and Transfer Station would increase the potential for temporary fugitive dust impacts during construction. Mitigation measures include regularly sweeping or watering roads, covering or hydroseeding exposed soils, applying soil stabilizers to exposed soil, and minimizing the area of soil disturbance. • The new emissions resulting from construction and operation of a new Northeast Recycling and Transfer Station would probably be about 2,000 metric tons of carbon dioxide equivalent per year over a 50-year lifespan of the facility. This is slightly less than 0.01 percent of the current total greenhouse gas emissions in King County (Stockholm Environment Institute 2012). • Short-term impacts on water and aquatic habitats could occur during construction of improved and new transfer stations (all Alternatives), including potential for erosion and sedimentation. Erosion and sedimentation potential could be mitigated by best management practices, including those needed to protect fish species listed under the Endangered Species Act. Design guidelines for stormwater control facilities are much more stringent than when the original transfer stations were constructed and would mitigate for impacts of increased impervious surface areas. • Construction of improved and new transfer stations would result in loss of vegetation and wildlife habitat in disturbed areas. Only common and urban species are known to be present at the transfer stations. Landscaping could incorporate vegetation of value to native wildlife. Any wetland impacts would be mitigated as required by U.S. Army Corps of Engineers and local permits. Areas temporarily disturbed by construction could be revegetated with native plants of value to wildlife. The proposed improvements and facilities would be constructed and operated in a manner that does not harm fish species listed under the Endangered Species Act or their habitat. • Construction and operation of a new Northeast Recycling and Transfer Station would increase noise levels in the immediate vicinity of the station and also increase noise on surrounding roads as a result of self-haul and commercial

	traffic. Mitigation measures, including the siting process, can typically reduce noise impacts below the level of significance, however detailed noise analysis during future project-specific design would be necessary to determine specific impacts and necessary mitigation measures. • Establishing temporary debris storage sites (Alternatives 2, 3, and 4) could affect human health locally by concentrating large amounts of material, some of which could be hazardous to human health. These impacts can be mitigated through the siting process, and by implementing standard mitigation measures. • Construction of improved and new transfer stations could affect adjacent land uses through minor, localized increases in noise, dust, odors, traffic and emissions. • Transportation impacts during construction of a new South County Recycling and Transfer Station, and the option to construct the new Northeast Recycling and Transfer Station, would be as described for Alternative 1. The site selection process and mitigation measures developed by the county for the selection of sites for the new transfer stations are expected to minimize significant transportation impacts related to the proposed transfer stations. • Capital costs to increase the overall efficiency and cost-effectiveness of providing solid waste transfer services, and the option to construct a new Northeast Recycling and Transfer Station, would be greater than Alternatives 1 and 2 and the options that do not construct a new Northeast station, but would still be a relatively small increase in cost to ratepayers for receiving increased services. Significant Unavoidable Adverse Impacts • With implementation of mitigation measures, significant unavoidable adverse impacts are unlikely to occur.

Alternative 4 Create resource recovery centers at existing and new recycling and transfer stations	Impacts and Mitigation Measures • Increasing the efficiency of the overall county transfer and processing system likely would lead to lower fuel use and resulting greenhouse gas emissions greenhouse gas emissions systemwide compared to Alternative 1. • Enhancing resource recovery at transfer stations is likely to lead to lower greenhouse gas emissions systemwide compared to Alternatives 2 and 3. • Construction of new AD or AMR facilities could involve site disturbance and excavation at new or existing sites. Site work could result in substantial earth impacts. Mitigation for impacts would be the same as for Alternative 3. • Construction of new composting, AD, and AMR facilities would increase the potential for temporary fugitive dust impacts during construction. Mitigation for impacts would be the same as for Alternative 3. • If composting, AD, or AMR facilities are developed at transfer stations, cumulative travel distance and times for materials hauling would likely be reduced compared to Alternative 1 with a corresponding incremental decrease in vehicle emissions and air quality impacts. • Existing and new public or private composting facilities, in King County or elsewhere, could generate odor impacts. Any existing or new composting facility would need to achieve sufficient odor control to meet Clean Air Agency requirements that no air contaminant may be emitted that "unreasonably interferes with enjoyment of life and property." • The limited potential for air quality and odor impacts from AMR facilities can be mitigated by confining the recovery and related handling/storage activities within an enclosed structure. • Short-term impacts on water and aquatic habitats could occur during construction of improved and new transfer stations (all Alternatives), including potential for erosion and sedimentation. Erosion and sedimentation potential could be mitigated by best management practices, including those needed to protect fish species listed under the Endangered Species Act. Design guidelines for stormwater control facilities are much more stringent than when the original transfer stations were constructed and would mitigate for impacts of increased impervious surface areas. • Composting, AD and AMR facilities could require additional land clearing and could temporarily affect water quality during construction, and could require additional impervious surface area. Erosion and sedimentation potential and stormwater impacts could be mitigated by best management practices and stormwater treatment, as stated above. Similar impacts would occur for new private regional composting facilities developed in King County or elsewhere. • Construction of improved and new transfer stations would result in loss of vegetation and wildlife habitat in disturbed areas. Only common and urban species are known to be present at the transfer stations. Landscaping and areas temporarily disturbed by construction could be incorporated with native plants of value to wildlife. • Construction of improved and new transfer stations and AD and AMR facilities could result in loss of vegetation and wildlife habitat in disturbed areas. Only common and urban species are known to be present at the transfer stations. Landscaping could incorporate vegetation of value to native wildlife. Any wetland impacts would be mitigated as required by U.S. Army Corps of Engineers and local permits. Areas temporarily disturbed by construction could be revegetated with native plants of value to wildlife. The proposed improvements and facilities

	would be constructed and operated in a manner that does not harm fish species listed under the Endangered Species Act or their habitat. • Establishing temporary debris storage sites (Alternatives 2, 3, and 4) could affect human health locally by concentrating large amounts of material, some of which could be hazardous to human health. These impacts can be mitigated through the siting process, and by implementing standard mitigation measures. • Construction of improved and new transfer stations could affect adjacent land uses through minor, localized increases in noise, dust, odors, traffic and emissions. • Construction of new facilities could result in the disturbance of cultural resources. Mitigation measures would be implemented during site selection. • Construction of new facilities could result in visual and light and glare impacts. Measures would be taken to reduce or avoid visual impacts. • Composting, AD, and AMR technologies constructed or installed at existing and new transfer facilities would create temporary increases in traffic during construction along with potential road closures. • With a focus on source-separated organics (yard and food waste), total transfer truck trips would increase, with some increased impact on roads in the vicinity of the stations. • Adding AD and AMR technologies to the waste processing system would have a higher cost than Alternatives 2 and 3, with a potential for corresponding impacts on rates. Significant Unavoidable Adverse Impacts • With implementation of mitigation measures, significant unavoidable adverse impacts are unlikely to occur.

Table S-3. Summary of Alternatives, Impacts, Mitigation Measures, and Significant Unavoidable Adverse Impacts
Landfill Management and Solid Waste Disposal (Section 5 of EIS, Chapter 6 of Plan)

Landfill Management and Solid Waste Disposal

Alternative	Impacts, Mitigation Measures, and Significant Unavoidable Adverse Impacts
Alternative 1 (No Action) Complete Cedar Hills Regional Landfill as currently permitted, then export to an out-of-county landfill	Impacts and Mitigation Measures • Because of increased travel distances and times, waste export could result in greater cumulative vehicle emissions and potentially greater long-term air quality impacts than the other alternatives that postpone or avoid waste export. • Landfill gas will continue to be produced at Cedar Hills Regional Landfill for a number of years after the landfill closes. The potential for off-site odors and emissions of air toxics will be mitigated through continued operation of the active landfill gas control system, completion of planned improvements to the system, and placement of final cover over existing and future disposal areas. • Continued conversion of landfill gas to natural gas that would subsequently be used for heating or other energy uses could reduce greenhouse gas emissions by offsetting the potential use of other types of fuel. • Exporting waste to an out-of-county facility is not expected to result in significant impacts on the rail systems or rail service, but overall capacity constraints may increase the need for capacity increases in the relevant rail corridors. This change would occur in 2028 under this alternative. • Disposal of King County's waste at an out-of-county facility would increase traffic at receiving intermodal facilities used in conjunction with transport of waste from the end of rail line to the landfill. Significant Unavoidable Adverse Impacts • No significant unavoidable adverse are anticipated.
Alternative 2 Further develop Cedar Hills Regional Landfill for landfilling, then export to an out-of-county landfill	Impacts and Mitigation Measures • Landfill gas will continue to be produced at Cedar Hills Regional Landfill for a number of years after the landfill closes. The potential for off-site odors and emissions of air toxics will be mitigated through continued operation of the active landfill gas control system, completion of planned improvements to the system, and placement of final cover over existing and future disposal areas. • Continued conversion of landfill gas to natural gas that would subsequently be used for heating or other energy uses could reduce greenhouse gas emissions by offsetting the potential use of other types of fuel. • All Alternatives may add property to the landfill buffer, converting some rural residential land to landfill buffer use, and potentially resulting in displacement of residents. Buffer expansion would likely occur in the east or northeast part of the landfill • Maximizing the development of Cedar Hills Regional Landfill under Alternative 2 (or as options under Alternatives 3 and 4) would alter the visual character of the site and the surrounding area by increasing the elevation and mass of the landfill, and potentially removing mature vegetation in the perimeter buffer. However, any

	visual impacts would be considered a less than significant impact due to the relatively minor decrease in the available viewshed and because surrounding landscape will retain its integrity because the open sky, topography, and existing patterns of land use will remain dominant. • Extending the life of the landfill could result in the potential for moderate noise impacts during operation. Noise attenuation measures would be required to reduce noise levels to within allowable limits. Buffer expansion may also mitigate for noise. • Exporting waste to an out-of-county facility is not expected to result in significant impacts on the rail systems or rail service, but overall capacity constraints may increase the need for capacity increases in the relevant rail corridors. This change would occur in 2040 under this alternative. • Because Alternative 2 extends the life of Cedar Hills Regional Landfill approximately 12 years longer than Alternative 1, traffic impacts associated with operation and construction would continue to affect the primary haul routes to and from the landfill for a longer period than Alternative 1. • Disposal of King County's waste at an out-of-county facility would increase traffic at receiving intermodal facilities used in conjunction with transport of waste from the end of rail line to the landfill. • Because disposal at Cedar Hills Regional Landfill is the lowest cost disposal option for ratepayers, an extension of the life of the landfill would keep rates lower for a longer period by delaying the implementation of waste export. Significant Unavoidable Adverse Impacts • With implementation of available mitigation, no significant unavoidable impacts are likely.
Alternative 3 Implement waste-to-energy at Cedar Hills Regional Landfill or another location in King County, with residual municipal solid waste and residual ash sent to Cedar Hills Regional Landfill or exported to an out-of-county landfill	Impacts and Mitigation Measures • Landfill gas will continue to be produced at Cedar Hills Regional Landfill for a number of years after the landfill closes. The potential for off-site odors and emissions of air toxics will be mitigated through continued operation of the active landfill gas control system, completion of planned improvements to the system, and placement of final cover over existing and future disposal areas. • New centralized disposal-related facilities (for example, a waste-to-energy, AD, or AMR facility) constructed at a previously undeveloped site could involve substantial soil disturbance and excavation, resulting in substantial earth impacts. If available mitigation is implemented, however, significant earth impacts are unlikely to occur. Locating new facilities at Cedar Hills Regional Landfill could minimize earth impacts because the landfill site is already developed and has an existing stormwater system. • Waste-to-energy processes can emit a variety of air pollutants including particulates, metals, acidic gases, carbon monoxide, nitrous oxides, and organic compounds. The facility would be classified as a major source under WAC 173-401, and would be required to obtain and maintain an air operating permit from the Puget Sound Clean Air Agency. The permit would contain requirements related to maximum allowable emissions as well as monitoring, recordkeeping, and reporting. Facilities are required to employ best practices and best available control technologies to maximize the efficiency of combustion and to limit air emissions.

	• Potential impacts of a waste-to-energy facility on groundwater quantity could be mitigated by limiting the amount of groundwater withdrawal, or using a surface water source if one is available. • Any water discharged to surface water from a waste-to-energy facility may require pretreatment or treatment to meet requirements for a permitted discharge under a state waste discharge permit (WAC 173-434). • Development of a waste-to-energy facility at a previously undeveloped site could involve vegetation disturbance. Impacts on wildlife, if any, could be mitigated through phased revegetation of the site with species of value to native wildlife; developing a wildlife management plan; or purchasing land for wildlife habitat protection. • Generation of energy from a waste-to-energy facility would offset energy production from other sources. If those other energy sources are non-renewable natural resources, such as petroleum or coal, there would be a beneficial effect on natural resources. If the energy generated from waste-to-energy or resource recovery offset the need locally for hydropower electricity, the additional available hydropower electricity could be sold to the western U.S. power grid and could offset the use of greenhouse-gas-generating fuels outside of the region. • All Alternatives may add property to the landfill buffer, converting some rural residential land to landfill buffer use, and potentially resulting in displacement of residents. Buffer expansion would likely occur in the east or northeast part of the landfill • Extending the life of the landfill could result in the potential for moderate noise impacts during operation. Noise attenuation measures would be required to reduce noise levels to within allowable limits. Buffer expansion may also mitigate for noise. • A new waste-to-energy facility would have potential noise impacts. Measures could be implemented during site selection, facility design, facility construction and operation to limit noise impacts below the level of significance. • The presence of potentially toxic constituents in ash from a waste-to-energy facility requires that it be carefully collected and managed. • Waste-to-energy facilities can emit a variety of toxic air pollutants (TAPs). WAC 173-460 addresses the control TAPs. For each TAP, this regulation defines an acceptable source impact level, provided as a concentration, and also defines a small quantity emission rate and a *de minimis* emission value, both provided as an emission rate. WAC 173-60 requires review and approval of a notice of construction by the Department of Ecology for a new or modified toxic air pollutant source. With implementation of regulatory requirements significant human health impacts are unlikely to occur from operation of a waste-to-energy facility. • Construction of a waste-to-energy facility at Cedar Hills Regional Landfill or at an alternative site would require modification of the special use permit or a new special use permit and SEPA compliance. A review of compatibility with land use designations would be conducted, and may result in the need for an amendment to allow construction. • Construction of new facilities could result in the disturbance of cultural resources. To minimize the potential for this impact detailed cultural resources assessment and development of mitigation measures would be conducted during site screening and final selection. • A waste-to-energy facility could have visual impacts. Visual impacts would be minimized by prioritizing sites that have limited numbers of visually sensitive land

	uses, allowing for adequate visual buffering, and careful design of structure characteristics. • Exporting waste to an out-of-county facility is not expected to result in significant impacts on the rail systems or rail service, but overall capacity constraints may increase the need for capacity increases in the relevant rail corridors. • Disposal of King County's waste at an out-of-county facility would increase traffic at receiving intermodal facilities used in conjunction with transport of waste from the end of rail line to the landfill. • Potential transportation impacts associated with the construction of an appropriately-sized waste-to-energy facility would occur over a roughly 30- to 36-month period. The site selection process and/or mitigation measures developed by the county for the new facility, should be able to minimize significant transportation impacts. • Because disposal at Cedar Hills Regional Landfill is the lowest cost disposal option for ratepayers, an extension of the life of the landfill would keep rates lower for a longer period by delaying the implementation of waste export. Significant Unavoidable Adverse Impacts • Whenever King County implements waste export, some increase, potentially substantial with full export, in fuel use is likely unavoidable. • With implementation of mitigation measures described above, the visual impacts of new facilities can be limited, although surrounding communities may nonetheless perceive that visual impacts are significant.
Alternative 4 Implement emerging recovery technologies for mixed municipal solid waste (AD and AMR) with increased private sector role and location, with residual municipal solid waste sent to Cedar Hills Regional Landfill or exported to an out-of-county landfill	Impacts and Mitigation Measures • Landfill gas will continue to be produced at Cedar Hills Regional Landfill for a number of years after the landfill closes. The potential for off-site odors and emissions of air toxics will be mitigated through continued operation of the active landfill gas control system, completion of planned improvements to the system, and placement of final cover over existing and future disposal areas. • New centralized disposal-related facilities (for example, a waste-to-energy, AD, or AMR facility) constructed at a previously undeveloped site could involve substantial soil disturbance and excavation, resulting in substantial earth impacts. If available mitigation is implemented, however, significant earth impacts are unlikely to occur. • AD facilities have the potential to generate air quality and odor impacts during the AD process. If available mitigation is implemented, odor impacts can be minimal and not significant. • The limited potential for air quality and odor impacts from AMR facilities can be mitigated by confining the recovery and related handling/storage activities within an enclosed structure. • Development of AD or AMR facilities could result in contamination of water resources from discharge of wastewater or stormwater. Site selection criteria would take into consideration the presence of surface water and wetlands. Stormwater and wastewater would be detained and treated to meet state and King County requirements (King County 2016; WAC 173-201A). • Development of AD or AMR facilities at a previously undeveloped site could involve vegetation disturbance. Impacts on wildlife, if any, could be mitigated through phased revegetation of the site with species of value to native wildlife; developing a wildlife management plan; or purchasing land for wildlife habitat protection.

	• Generation of energy from an AD facility would offset energy production from other sources. If those other energy sources are non-renewable natural resources, such as petroleum or coal, there would be a beneficial effect on natural resources. If the energy generated from waste-to-energy or resource recovery offset the need locally for hydropower electricity, the additional available hydropower electricity could be sold to the western U.S. power grid and could offset the use of greenhouse-gas-generating fuels outside of the region. • A new AD or AMR facility would have potential noise impacts. Measures could be implemented during site selection, facility design, facility construction and operation to limit noise impacts below the level of significance. • Construction of an AD or AMR facility would require compatibility with land use designations, and may result in the need for an amendment to allow construction. • All Alternatives may add property to the landfill buffer, converting some rural residential land to landfill buffer use, and potentially resulting in displacement of residents. Buffer expansion would likely occur in the east or northeast part of the landfill. • Extending the life of the landfill could result in the potential for moderate noise impacts during operation. Noise attenuation measures would be required to reduce noise levels to within allowable limits. Buffer expansion may also mitigate for noise. • Construction of new facilities could result in the disturbance of cultural resources. To minimize the potential for this impact detailed cultural resources assessment and development of mitigation measures would be conducted during site screening and final selection. • AD and AMR facilities could have visual impacts. Visual impacts would be minimized by prioritizing sites that have limited numbers of visually sensitive land uses, allowing for adequate visual buffering, and careful design of structure characteristics. • Exporting waste to an out-of-county facility is not expected to result in significant impacts on the rail systems or rail service, but overall capacity constraints may increase the need for capacity increases in the relevant rail corridors. • Disposal of King County's waste at an out-of-county facility would increase traffic at receiving intermodal facilities used in conjunction with transport of waste from the end of rail line to the landfill. • Potential transportation impacts associated with the construction of an AD or AMR facility would occur over a roughly 30- to 36-month period. The site selection process and/or mitigation measures developed by the county for the new facility, should be able to minimize significant transportation impacts. • Because disposal at Cedar Hills Regional Landfill is the lowest cost disposal option for ratepayers, an extension of the life of the landfill would keep rates lower for a longer period by delaying the implementation of waste export. Significant Unavoidable Adverse Impacts • Whenever King County implements waste export, some increase, potentially substantial with full export, in fuel use is likely unavoidable. • With implementation of mitigation measures described above, the visual impacts of new facilities can be limited, although surrounding communities may nonetheless perceive that visual impacts are significant.
Alternative 5	Impacts and Mitigation Measures

Implement emerging recovery technologies for mixed municipal solid waste (AD and AMR) at the Cedar Hills Regional Landfill, with residual municipal solid waste sent to Cedar Hills Regional Landfill or exported to an out-of-county landfill	• Landfill gas will continue to be produced at Cedar Hills Regional Landfill for a number of years after the landfill closes. The potential for off-site odors and emissions of air toxics will be mitigated through continued operation of the active landfill gas control system, completion of planned improvements to the system, and placement of final cover over existing and future disposal areas. • New centralized disposal-related facilities (for example, a waste-to-energy, AD, or AMR facility) constructed at Cedar Hills Regional Landfill could involve substantial soil disturbance and excavation, However, significant earth impacts are unlikely to occur because the landfill site is already developed and has an existing stormwater system. • AD facilities have the potential to generate air quality and odor impacts during the AD process. If available mitigation is implemented, odor impacts can be minimal and not significant. • The limited potential for air quality and odor impacts from AMR facilities can be mitigated by confining the recovery and related handling/storage activities within an enclosed structure. • Development of AD or AMR facilities could result in contamination of water resources from discharge of wastewater or stormwater. However, significant water resource impacts are unlikely to occur because the landfill site is already developed and has an existing stormwater system. Stormwater and wastewater would be detained and treated to meet state and King County requirements (King County 2016; WAC 173-201A). • Generation of energy from a waste-to-energy facility would offset energy production from other sources. If those other energy sources are non-renewable natural resources, such as petroleum or coal, there would be a beneficial effect on natural resources. If the energy generated from waste-to-energy or resource recovery offset the need locally for hydropower electricity, the additional available hydropower electricity could be sold to the western U.S. power grid and could offset the use of greenhouse-gas-generating fuels outside of the region. • A new AD or AMR facility would have potential noise impacts. Measures could be implemented during facility design, facility construction and operation to limit noise impacts below the level of significance. • All Alternatives may add property to the landfill buffer, converting some rural residential land to landfill buffer use, and potentially resulting in displacement of residents. Buffer expansion would likely occur in the east or northeast part of the landfill. • Extending the life of the landfill could result in the potential for moderate noise impacts during operation. Noise attenuation measures would be required to reduce noise levels to within allowable limits. Buffer expansion may also mitigate for noise. • AD and AMR facilities could have visual impacts. Visual impacts would be minimized by allowing for adequate visual buffering, and careful design of structure characteristics. • Exporting waste to an out-of-county facility is not expected to result in significant impacts on the rail systems or rail service, but overall capacity constraints may increase the need for capacity increases in the relevant rail corridors. • Disposal of King County's waste at an out-of-county facility would increase traffic at receiving intermodal facilities used in conjunction with transport of waste from the end of rail line to the landfill. • Potential transportation impacts associated with the construction of an AD or AMR facility would occur over a roughly 30- to 36-month period, and these impacts

	would occur on the roadways surrounding the Cedar Hills Regional Landfill. Mitigation measures developed by the county for the new facility, including the timing and frequency of construction traffic, should be able to minimize significant transportation impacts. • Because disposal at Cedar Hills Regional Landfill is the lowest cost disposal option for the county, an extension of the life of the landfill would keep rates lower for a longer period by delaying the implementation of waste export. Significant Unavoidable Adverse Impacts • Whenever King County implements waste export, some increase, potentially substantial with full export, in fuel use is likely unavoidable. • With implementation of mitigation measures described above, the visual impacts of new facilities can be limited, although surrounding communities may nonetheless perceive that visual impacts are significant.

2.0 INTRODUCTION

2.1 Objectives of the Proposal

The King County Department of Natural Resources, Solid Waste Division, proposes adoption of the 2019 Comprehensive Solid Waste Management Plan (the Plan). The overall purpose of the Plan is to develop strategies for managing King County's solid waste over the next 6 years, with consideration of the next 20 years. Specific objectives of the Plan are:

- To respond to recent policy directives of the King County Council relevant to solid waste management.
- To meet customer service needs while minimizing any increase in disposal rates.
- To maximize cost-effective waste prevention, waste reduction, and recycling, while maintaining adequate transfer and disposal capabilities for non-recycled waste.
- To design, operate, and maintain the solid waste system in a manner that protects the environment and conserves energy and natural resources.
- To comply with federal, state, and local regulations governing solid waste management.
- To respond to issues raised by the public, partner cities, unincorporated area councils, the Solid Waste Advisory Committee, the Metropolitan Solid Waste Management Advisory Committee, and the solid waste industry as part of the public involvement process for the Plan.

The need for the Plan is to comply with Washington State requirements for comprehensive solid waste planning under RCW 70.95 and its implementing regulations in Washington Administrative Code (WAC) 173-304 and WAC 173-351. WAC 173-304-011(2) states, in part: "The overall purpose of local comprehensive solid waste planning is to determine the nature and extent of the various solid waste categories and to establish management concepts for their handling, utilization, and disposal consistent with the priorities established in Revised Code of Washington (RCW) 70.95.010 for waste reduction, waste recycling, energy recovery and incineration, and landfill. Each local plan shall be prepared in accordance with RCW 70.95.080, 70.95.090, 70.95.100, and 70.95.110."

Under RCW 70.95.080, cities may choose to either prepare their own plans, or participate in the development of a single plan that covers the incorporated and unincorporated areas of the county. Within King County, 37 cities (all cities in the county except Seattle and Milton) have chosen to participate in the development of a single plan, and have signed Interlocal Agreements (ILAs) with King County that establish King County as the solid waste planning authority. The original ILAs were 40-year agreements that run through 2028. By the end of 2018, all of the ILAs are expected to be extended through 2040.

WAC 197-11-400(1) states that the purpose of an environmental impact statement (EIS) is to "ensure that SEPA's (State Environmental Policy Act) policies are an integral part of the ongoing programs and actions of state and local government." Because the subject of this EIS is a proposed non-project plan, as mandated by WAC 197-11-442(2) the level of detail of the analyses is consistent with the broad

programmatic issues to be resolved. This EIS identifies potential significant impacts; describes mitigation measures that can be used (and in many cases, are currently used) to avoid such impacts or reduce them below significant levels; and, where possible, draws conclusions about whether there may be any significant unavoidable adverse impacts (that is, significant impacts that cannot or will not be mitigated). Beneficial impacts are also discussed where relevant to the choice among alternatives.

Based on the analyses in the EIS, as well as other relevant information and analyses in the Plan itself, King County and participating cities will select the facilities, programs, and services to be included in the regional solid waste management system over the next 6 to 20 years. As actions are proposed to implement the Plan, this EIS will be used to the maximum extent possible to satisfy SEPA review requirements. However, it is expected that additional environmental review will be needed for project actions, particularly those involving major capital improvements.

2.2 Background

RCW 70.95 and King County Code Title 10 require that King County prepare, and periodically review and update, a comprehensive solid waste management plan. King County last updated and adopted its solid waste management plan in 2001. In 2005, the Solid Waste Division, in collaboration with the cities, began preparation of the 2006 Solid Waste Transfer and Waste Management Plan (Transfer Plan), as well as preparation of a SEPA EIS that supplemented the 2001 Plan's EIS. The King County Council adopted the Transfer Plan in 2007. The 2001 Plan was reviewed and updated in 2011, along with a SEPA Determination of Non-Significance (DNS), and again in 2013. However, those reviews were not formally adopted by the King County Council or by partner cities.

The 2001 Plan covers the entire county, except for Seattle and Milton (Seattle develops its own plan, and Milton is part of the Pierce County system). The Plan covers the 37 cities that have signed ILAs with King County, including Bothell, approximately half of which is in Snohomish County. King County and the cities work cooperatively to implement the 2001 Plan. Since 2001, the King County Council has considered major policy decisions affecting solid waste management, while significant changes have occurred in the solid waste industry. The factors listed below led to the need for the proposed Plan to incorporate a number of changes and have influenced the range of alternatives analyzed in the Plan:

- A reevaluation of the 2006 Transfer Plan, which may mean changes to the transfer system that were not discussed in the 2001 Plan or the 2011 and 2013 reviews of that plan
- Recommendations from the Solid Waste Division's Sustainable Solid Waste Management Plan (http://your.kingcounty.gov/solidwaste/about/Planning/documents/Sustainable-Solid-Waste-Management-Study-Final-July-2014.pdf) to study options for resource recovery and changes to how the solid waste rate is structured
- Possible policy changes such as instituting mandatory recycling requirements throughout the county, a new 70 percent recycling goal, and new construction and demolition debris recycling and disposal policies

- Consideration of anaerobic digestion (AD), advanced materials recovery (AMR), and other technologies as possible transfer/processing options
- Extending the life of Cedar Hills Regional Landfill by optimizing development of the site for landfilling
- Consideration of waste-to-energy and other alternative conversion technologies as long-term disposal options, in addition to waste export, and partial early export.

Recent changes in the solid waste industry and elsewhere also influenced the range of alternatives evaluated in the Plan. In the last several years, commingled recycling collection has become almost universal and the overall process has become more convenient and efficient. But challenges remain to improve the quality of collected recyclables to ensure markets stay viable. Climate change is changing the long-term trends in average weather patterns, including the frequency, duration, and intensity of wind and snow storms, cold weather and heat waves, drought, and flooding. Consideration of how Solid Waste Division activities and operations might affect reductions in greenhouse gas emissions will be increasingly important as the Solid Waste Division seeks to improve its long-term, positive effects on the environment.

2.3 Public Involvement and Scoping

The Solid Waste Division conducted an extensive public outreach program to solicit input on solid waste management strategies from cities, businesses, and others affected by the solid waste system. Since Plan update efforts began in 2009, the Solid Waste Division has discussed Plan approaches with the cities that are partners with King County in solid waste management planning. Solid waste coordinators, public works and utility managers, and elected officials of the cities have all participated in discussions with Solid Waste Division staff about appropriate roles and responsibilities in the regional solid waste system, and the facilities, services, and programs they believe should be provided over the next 20 years.

The Solid Waste Division has also met with commercial haulers, the Solid Waste Advisory Committee (SWAC), the Metropolitan Solid Waste Management Advisory Committee (MSWMAC), and others in 2016 and 2017. The Plan update was the sole focus of the MSWMAC and SWAC meetings in 2017 – a total of 22 advisory committee meetings.

The official EIS scoping period began with issuance of the determination of significance and scoping notice on June 26, 2017, and ended on July 17, 2017. The scoping process further allowed the public and regulatory agencies to comment on the proposed alternatives, the issues of environmental concern, and how the EIS should address those issues. During the 21-day scoping period, the Solid Waste Division received a total of 16 letters, website comments, and emails.

This Draft EIS, issued on January 8, 2018, begins a 60-day comment period. Agencies, affected tribes, and the public are invited to comment on the contents of this Draft EIS. Comments on alternatives, mitigation measures, probable significant adverse impacts, and required permits or other approvals are welcome. Written comments may be submitted via the internet at:

SWD.CompPlan@kingcounty.gov (please put "DEIS Comments" in the subject line)

or the website at:
http://your.kingcounty.gov/solidwaste/about/planning/comp-plan.asp

or by mail, addressed to:

King County Solid Waste Division
201 S. Jackson Street, Suite 701
Seattle, WA 98104

Attn: Draft Solid Waste Comp Plan draft EIS Comments

2.4 Benefits and Disadvantages of Reserving Implementation

The State Environmental Policy Act (SEPA) Rules require that an EIS evaluate the benefits and disadvantages of reserving for some future time implementation of the proposal, as compared with possible approval at this time. Particular attention is to be given to the potential for foreclosing future options by implementing the proposal. (WAC 197 -11-440)

The only apparent benefit of delaying adoption and implementation of the Comprehensive Solid Waste Management Plan is that it would delay short-term construction impacts and operation impacts associated with improved or new facilities. Disadvantages associated with a substantial delay in implementation include:

- Opportunities to increase the diversion of material from the waste stream by improving existing waste prevention, waste reduction, recycling, and composting programs would be delayed.
- Service levels at SWD transfer stations could decline as population and employment in the area grows, particularly for the Northeast service area.
- There would be less time to prepare for the landfill management and disposal options to be selected by the King County Council, which could increase costs.

Other disadvantages of delaying implementation are discussed in each Section as adverse impacts of the no-action alternative for each component of the solid waste system.

2.5 Organization of this EIS

The remainder of the text of this EIS is divided into three parts, corresponding to different components of the regional solid waste system and different chapters of the Plan:

- Part 3. Sustainable Materials Management (Chapter 4 of Plan)
- Part 4. Solid Waste Transfer and Processing System (Chapter 5 of Plan)
- Part 5. Landfill Management and Solid Waste Disposal (Chapter 6 of Plan)

Each part of this EIS begins with a brief introductory description of the key issues associated with that component of the solid waste system, based on information in the Plan. The introduction is followed by a description of alternatives that were developed to address the key issues, and an analysis of the environmental impacts of alternatives. The analysis of impacts within each part is organized by SEPA element of the environment: Earth; Air (including Odor, Climate); Water; Plants and Animals; Energy and Natural Resources; Environmental Health (including Noise); Land and Shoreline Use (including Aesthetics, Light and Glare, and Historic and Cultural Preservation); Transportation; and Public Services and Utilities. The analyses under Environmental Health focus on human health, and the analyses under Public Services and Utilities focus on the King County solid waste system.

For each component of the solid waste system, this EIS evaluates alternatives that could meet some or all of the objectives defined under Section 2.1, Objectives of the Proposal. The description of alternatives in this EIS, and the analysis of their effect on the solid waste system, generally correspond to the Plan recommendations. In some cases, alternatives consist of possible "scenarios." In addition, a no-action alternative is considered for each system component. A true "no-action" alternative is not a feasible option for the revised plan as a whole. Washington law requires King County to manage its solid waste, and certain actions must be taken during the planning period to fulfill that responsibility. Therefore, the no-action alternative described for each solid waste system component involves generally maintaining King County's existing facilities, services, and programs, recognizing that actions will be necessary in some cases.

A detailed comparison of the impacts of alternatives was developed for this EIS. Because of the importance of this comparison, it is included in its entirety in Section 1.2. To reduce volume, the comparison is not repeated here.

Throughout this EIS, parenthetical references are made to information sources listed in Part 6 of this EIS. If a parenthetical reference is included within a sentence, it refers to that sentence alone. If located at the end of a paragraph outside the last sentence, the reference applies to the entire paragraph.

3.0 SUSTAINABLE MATERIALS MANAGEMENT

3.1 Description of Alternatives

Alternative 1: No Action (maintain existing programs at current levels)

Under Alternative 1, existing waste reduction and recycling programs, and collection services would continue as recommended in the 2001 Plan without substantial changes. Generally, existing collection, waste reduction, recycling, and market development policies would not change. This alternative would rely on the existing combination of waste reduction and recycling programs, education and promotion, incentives, mandates, enforcement, and partnerships that have been established by King County and partner cities with which the county has ILAs. Existing programs would be adjusted to focus on the materials and practices that are most likely to result in increased diversion of materials from landfill disposal. Collection services would continue to focus on the number and type of materials currently processed for reuse, recycling, and composting. Construction and demolition debris, as required by King County Code 10.30, will continue to be taken to a designated privately operated construction and demolition debris recycling and/or transfer facility. Recycling would continue to be included as part of the basic curbside garbage rate for most residents in King County, including unincorporated areas, except Vashon Island, Skykomish, and Snoqualmie Pass.

Alternative 2: Implementation of waste prevention and recycling strategies to achieve a 70 percent recycling goal, with county and city emphasis on education and incentives, limited regulations; and corresponding collection standards

Alternative 2 would continue existing waste reduction and recycling programs, and collection services, improving them with coordinated efforts by King County and ILA cities on education and incentives, limited regulations; and corresponding collection standards to achieve a 70 percent recycling goal, an important milestone on the way to the county's goal of zero waste of resources by 2030. Under this alternative, the Solid Waste Division would: focus on sustainable materials management (the full life cycle of materials: design and manufacture, use, and end-of-life); place increased emphasis on waste reduction; focus on specific waste generators (e.g., multi-family, non-residential, schools) and particular materials or products that remain prevalent in the waste stream (e.g., organics [food waste, food-soiled paper], and construction and demolition debris); collect additional materials curbside, and divert additional materials at transfer stations where space permits; promote voluntary product stewardship strategies for products that contain toxic materials or are difficult and expensive to manage, such as paint and mattresses; offer competitive grants through a Zero-Waste Resources Grant program to fund innovative projects and services that further the waste prevention and recycling goals outlined in the Plan; and help the partner cities improve the efficiency of curbside collection programs.

With Alternative 2, new regulatory requirements would be limited. Instead, Alternative 2 focuses on using existing and planned infrastructure, rates and incentives, and education to achieve the goal of recycling 70 percent of solid waste.

Construction and demolition debris will continue to be taken to a designated privately-operated construction and demolition debris recycling and/or transfer facility. Recycling and organics (yard and food waste) collection would be included as part of the basic curbside garbage rate for all residents in King County, including all unincorporated areas.

Alternative 3: Implementation of waste prevention and recycling strategies to achieve a 70 percent recycling goal, with county and city emphasis on education, incentives, and moderate regulations; and corresponding collection standards

Alternative 3 would continue existing waste reduction and recycling programs, and collection services, improving them with coordinated efforts by King County and ILA cities on education and incentives, moderate regulations, and corresponding collection standards to achieve a 70 percent recycling goal by 2030. All the programs and program improvements described under Alternative 2 would be implemented and additional diversion would be achieved through some local regulatory programs. Such programs could include green building mandates that support the design of buildings and structures that are carbon-neutral, are energy-efficient, and use recycled materials; and voluntary or mandatory product stewardship strategies for products that contain toxic materials or are difficult and expensive to manage, including, but not limited to, paint, carpet, fluorescent bulbs and tubes, mercury thermostats, batteries, unwanted medicine, mattresses, electronics waste, and paper and packaging. Any new requirements and mandates would be enacted with coordination between King County and the cities and would be moderate in scope. Alternative 3 would also use existing and planned infrastructure, rates and incentives, and education to achieve the goal of recycling 70 percent of solid waste. Construction and demolition debris will continue to be taken to a designated privately-operated construction and demolition debris recycling and/or transfer facility. Recycling and organics (yard and food waste) collection would be included as part of the basic curbside garbage rate for all residents in King County, including all unincorporated areas. Every-other-week collection of garbage for single-family residents could also be instituted.

Alternative 4: Implementation of waste prevention and recycling strategies to achieve a 70 percent recycling goal, with county emphasis on education, incentives, and maximum regulations, and city emphasis on education and incentives, limited regulations; and corresponding collection standards

Alternative 4 would continue existing waste reduction and recycling programs, and collection services, improving them with coordinated efforts by King County and ILA cities on education and incentives, but the regulatory efforts by King County and the cities would differ. All the education and incentive programs and program improvements described under Alternative 2 would be implemented by King County and the ILA cities. In Alternative 4, additional waste diversion in unincorporated areas would also be addressed through

county regulations that maximize the effect of any mandates, while, within incorporated areas, additional diversion would be addressed primarily by using existing and planned infrastructure, rates and incentives, and education. Both King County and the cities would implement corresponding collection standards consistent with their waste-related regulations and programs. Recycling and organics (yard and food waste) collection would be included as part of the basic curbside garbage rate for all residents in King County, including all unincorporated areas. Every-other-week collection of garbage for single-family residents could also be instituted. All recyclables and organics (yard and food waste) in the garbage could be banned for all unincorporated areas.

3.2 Affected Environment, Impacts, and Mitigation Measures

The overall recycling rate in King County and partner cities is about 52 percent (in 2014), and recycling rates have changed very little since 2007 (King County 2015b). In general, greater waste reduction and recycling would reduce greenhouse gases, save natural resources and landfill space, and lead to greater protection of the environment. All of the waste prevention, reduction, and recycling alternatives would divert a greater volume of recyclable materials from the waste stream than is currently diverted. It is not known how much unused capacity for processing recyclable materials is available to the region. However, as King County and its partner cities pursue the 70 percent recycling goal and the volume of diverted materials increases, there would be a need for expanded or new regional processing facilities.

On a programmatic level, construction and operation of most recyclables processing facilities would have potential environmental impacts similar to those resulting from construction and operation of transfer stations (see impacts of facility improvement alternatives in Part 4 of this EIS). Additional regional organics (yard and food waste) processing capacity may have a greater potential for impacts on air quality and odor, water, and environmental health than a typical transfer station; and the mitigation measures incorporated into facility design and operation would be different.

3.2.1 Earth

3.2.1.1 Affected Environment

The Puget Sound region, which lies between the Olympic Mountains on the west and the Cascade Mountains on the east, is characterized by a series of parallel plateaus and valleys that trend predominantly north-south in the center of the region. The valleys are occupied by major rivers, lakes, and the marine waters of Puget Sound and its various extensions. This general physiographic pattern is interrupted by several east-west trending features, most notably the Issaquah highlands, a chain of hills extending from the North Bend area west toward Seattle.

Valley floors are flat, whereas the adjacent upland plateaus have moderately rolling topography. Topography tends to be steepest on the sides of major valleys, in the Issaquah highlands, and in the foothills along the west and east edges of the region.

Soils in the Puget Sound region reflect geologically recent glacial and alluvial (river and stream) activity as well as human activity. The original soils in urban areas concentrated in the central Puget Sound area have typically been modified by excavation and filling. River valleys are generally occupied by poorly drained, silty loams that commonly have a substantial organic content. Soils on upland areas between the valleys typically are coarser-grained sandy and gravelly sandy loams, but soils with high organic content do occur locally in these upland areas in depressions and along water bodies. Over extensive areas within the region, low permeability glacial till underlies surficial soils at typical depths of a few feet.

Local jurisdictions within the region have mapped geologically hazardous areas including landslide and erosion-prone areas, some abandoned mining areas, and seismic risk areas. Landslide and erosion-prone areas are associated primarily with steep slopes. Hazardous mining areas that may be subject to surface subsidence are associated primarily with past coal mining that occurred in the area from Newcastle through Renton south to Black Diamond.

The Puget Sound region lies in a seismically active area near the west edge of North America, where the Juan de Fuca tectonic plate is slowly colliding with and subducting underneath the North American tectonic plate. As a result of this tectonic activity, the Puget Sound region is an area of substantial risk from major earthquakes derived from three sources: subduction zone earthquakes off the coast of Washington along the near-surface fault separating the Juan de Fuca and North American tectonic plates, deep-seated (25 to 40 miles beneath the surface) earthquakes below Puget Sound generated by the breakup of the descending Juan de Fuca plate, and shallow earthquakes involving rupture of surface or near-surface faults in the Puget Sound region. Subduction zone earthquakes and shallow earthquakes have the potential to be large and damaging, but appear to be infrequent with return periods estimated to be hundreds of years. In the historic record, deep-seated earthquakes have occurred multiple times per century, but have been only moderately damaging. A heightened hazard from earthquakes in the Puget Sound area occurs in unconsolidated soils which tend to amplify seismic motions. Unconsolidated soils occur over large areas of the major river valleys in the region and in areas of older, un-engineered fill in Seattle, Tacoma, and other urban areas.

3.2.1.2 Impacts and Mitigation Measures

Under Alternatives 2, 3, and 4, minor earthwork, and resulting minor earth impacts, could occur if existing facilities need to be modified to handle increased volumes of recycled materials. The facility modifications could include, for example, replacement of or increases in impervious surface areas. However, such modifications are unlikely to be widespread, and the associated earth impacts are likely to be insignificant. As plan recommendations are implemented in the future, mitigation measures may be proposed if earth impacts are identified during project-specific environmental review. However, due to the lack of significant earth impacts anticipated as a result of this programmatic assessment, no mitigation measures for earth impacts are identified in this EIS.

Under Alternative 1 (No Action), no significant earth impacts would occur.

3.2.1.3 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse earth impacts would occur under any of the alternatives.

3.2.2 Air

3.2.2.1 Affected Environment

Weather in the central Puget Sound region is characterized by sunny, mild days during summer and cloudy, wet days during winter. January is typically the coldest month and July is usually the warmest month, with average temperatures in Seattle of 44.5 degrees Fahrenheit (°F) and 75.1°F, respectively. Average nighttime temperatures range from the lower 30s during winter months to the mid-50s during summer months. Prevailing winds are predominantly from the southwest. Occasional severe winter storms produce strong northerly winds. Peak wind speeds in excess of 40 miles per hour occur primarily between November and March.

In the Puget Sound area, seasonal meteorological conditions, topography, and land uses largely control air quality by enhancing or preventing air pollutant dispersion. Wind prevents pollutants from concentrating, dispersing pollutants to areas of lower concentration. Periods of low wind velocity, however, allow pollutants to concentrate and temperatures to increase, causing chemical reactions between volatile organic compounds and nitrogen oxides, producing smog, the primary component of which is ground-level ozone. These conditions occur primarily during winter months when temperature inversions (i.e., when warmer air blankets cooler air, trapping pollutants) persist for as long as several days, often resulting in exceedance of local, state, and national air quality standards. Stable weather conditions contributing to the build-up of air pollutants can occur at other times of the year.

Air contaminants that may occur at significant levels in urban areas include carbon monoxide, ozone, sulfur dioxide, nitrogen dioxide, and particulate matter. Large confined valleys are known for poor ventilation (due to high ground on both sides of the valley), yet are also desirable locations for industrial development. The combination of these factors often results in high contaminant concentrations.

Cars and trucks produce the majority of carbon monoxide in urban areas. Carbon monoxide levels are typically higher during the winter months, especially during air stagnation periods. Ozone and ground-level ozone, or smog, is formed near the ground when volatile organic compounds and nitrogen oxides react chemically. Ozone can lower resistance to colds and pneumonia and cause irritation to the nose, throat, and lungs. Emissions from motor vehicles, gasoline and paint vapors, aerosol products, and industry all contribute to ozone formation. Traffic and other pollutant sources add to existing smog, increasing pollutant density near pollutant sources. Sulfur dioxide is a colorless gas produced by industrial sites such as smelters, paper mills, power plants and steel manufacturing plants, and can cause a variety of respiratory diseases. Nitrogen dioxide is a poisonous gas formed from high temperature fuel combustion and subsequent atmospheric reactions. Nitrogen dioxide in ambient air has been connected with a range of respiratory diseases (PSCAA 2017).

Two types of fugitive dust or particulate matter are monitored and regulated by federal, state, and local government: total suspended particulates and fine particulate matter (PM_{10} and $PM_{2.5}$). Since 2006, the regional air quality agency, Puget Sound Clean Air Agency, has monitored $PM_{2.5}$ but not PM_{10}. Particulate matter consists of small discrete solid or aerosol particles dispersed in the air. Particulate pollution has been linked to an increased risk of cardiovascular and respiratory problems. Wood smoke, vehicles (particularly those using diesel fuel), and industrial emissions are primary sources of $PM_{2.5}$ (PSCAA 2017).

Odors are distinctive, often unpleasant, smells. Many odors can be linked to specific compounds, termed odoriferous compounds. However, there is no clear quantitative relation between the concentration of odoriferous compounds and the strength of the odors perceived by individuals. A wide variety of sources of potential odors exist in the Puget Sound region and include facilities that handle human-related waste such as wastewater, municipal solid waste, and organics (yard and food waste).

Greenhouse gases include carbon dioxide, methane, and a variety of other gases. Individual greenhouse gases have differing potentials for global warming. For example, methane has a warming potential about 25 times that of the same weight of carbon dioxide. In King County (Stockholm Environment Institute 2012), transportation contributes almost half (~48.7 percent) of total emissions, with road transportation comprising the bulk (~78 percent) of transportation emissions.

Air Quality Regulations

In compliance with the 1990 Clean Air Act Amendments, Washington adopted the Clean Air Washington Act in 1991, which includes ambient air quality standards for criteria air pollutants that are at least as stringent as the federal standards for protection of health and the environment. The Clean Air Washington Act is administered by the Washington State Department of Ecology (Ecology) and, in the central Puget Sound region, the Puget Sound Clean Air Agency (PSCAA).

PSCAA also regulates odorous emissions (through section 9.11 of Regulation I), which prohibits emission of any air contaminant in sufficient quantity, character, or duration to be injurious to human health, property, or plant or animal life. Section 9.11 also requires that odors not interfere with enjoyment of life or property. PSCAA has established an odor complaint system to identify potential odor problems.

Chapter 173-441 WAC established reporting requirements for emissions of greenhouse gases that exceed a threshold in Washington. These reporting requirements are consistent with reporting requirements in the federal greenhouse gas reporting system established in 40 CFR Part 98. Solid waste landfills are included with certain large facilities and transportation fuel suppliers that must report their greenhouse gas emissions to Ecology.

Air quality in the Puget Sound region has generally been improving over the past several decades. However, levels of fine particulate matter have occasionally exceeded PSCAA standards and levels of ozone at several sites in the eastern portion of the Puget Sound region have frequently been measured as near the federal standard (PSCAA 2017).

3.2.2.2 Impacts and Mitigation Measures

The activities proposed under the various alternatives, by themselves, would not have a significant adverse impact on air quality. However, moving toward a 70 percent recycling goal under Alternatives 2, 3, and 4 with the associated focus on certain materials and products that remain prevalent in the waste stream, especially food waste, is likely to require some changes in the locations and methods of handling recycled materials. These changes could result in air quality and/or odor impacts, and are assessed in Sections 4.2.2.2, 4.4.2.2, and 5.2.2.2, which address air quality impacts associated with alternatives related to the solid waste transfer and processing system and landfill management and solid waste disposal.

Depending on the material diverted, moving toward a 70 percent recycling goal could result in lower emissions of greenhouse gases compared to Alternative 1: No Action because materials that are not landfilled may be reused, recycled, or composted.

3.2.2.3 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are anticipated from any of the alternatives.

3.2.3 Water

3.2.3.1 Affected Environment

Incidental amounts of water are used for cleaning and dust control during the process of handling and processing recyclables. Those impacts are assessed in Section 4.4.3, which addresses water quality impacts associated with alternatives related to the solid waste transfer and processing system.

The organics (yard and food waste) composting process requires a more substantial volume of water than recyclables processing, and part of the curing process for compost is typically conducted outdoors, which generates leachate. All of the alternatives include composting, which could lead to discharge of leachate to groundwater or surface waters, thereby affecting water quantity and quality. Therefore, the affected environment for the alternatives for sustainable materials management encompasses groundwater and surface waters in the vicinity of composting facilities.

The primary processor for nearly all yard waste, food scraps, and food-soiled paper collected in King County is Cedar Grove Composting, Inc., which has facilities in Maple Valley and in Everett. Cedar Grove Composting not only processes organic materials (yard and food waste) into compost, it offers collection of food waste to area businesses and sells the finished compost locally. A growing number of cities now offer organics (yard and food waste) collection to businesses through their existing curbside collection contracts. All four alternatives could continue to use Cedar Grove Composting or new facilities that increase regional organics (yard and food waste) processing capacity.

Cedar Grove Composting's Maple Valley facility is near Cedar Hills Regional Landfill, in the Lower Cedar River and Issaquah Creek drainage basins. The Cedar River is approximately one mile southwest of the site, and Issaquah Creek flows past the northeast corner of the site. The site is in an area susceptible to

groundwater contamination, and a portion of the site is in the Issaquah Creek Valley groundwater management area. Stormwater at the Maple Valley facility is treated in a series of aerated ponds. Stormwater is detained and treated to meet state and King County stormwater requirements and state water quality standards (WAC 173-201A). Cedar Grove Composting's Everett facility is on Smith Island within the urban growth boundary of Everett. Smith Island is in the Snohomish River estuary and is part of an extensive delta north of the main channel of the Snohomish River where Union Slough and Steamboat Slough converge before flowing into Puget Sound. Most of the site lies within the current Federal Emergency Management Agency (FEMA) 100-year floodplain. Stormwater at the facility is treated to meet the City of Everett technical requirements (Everett Municipal Code 14.28.060).

Under Alternatives 2, 3, and 4, there would be a need for expanded or additional organics (yard and food waste) processing facilities in King County or elsewhere. The sites of such facilities are unknown. Therefore, it is not possible to describe specific aspects of the environment that may be affected. Any needed facilities may be sited in the Puget Sound region. The general environment of this region is described in Attachment A.

Section 220 of WAC 173-350, Solid Waste Handling Standards, is specifically devoted to composting facilities. Standards related to water are addressed in the following subsections.

3.2.3.2 Impacts and Mitigation Measures

Alternatives 2, 3, and 4 would increase in recycling, including organics (yard and food waste). This section focuses on the potential impacts of additional organics processing facilities in King County or elsewhere, if they are needed, on surface and groundwater, and on mitigation measures that would avoid significant adverse impacts. Continued operation of Cedar Grove Composting or other new or existing facilities would need to comply with federal and state requirements, and any other relevant permits, so impacts of those facilities are expected to be controlled and mitigated, as required.

Because leachate from compost can contain nutrients, heavy metals, and pathogens, there is a potential for contamination of surface water or groundwater. Federal and state regulations incorporate measures to minimize that potential, including locational standards specifying the minimum depth to groundwater at the site, and the minimum distance to downgradient water supplies. (40 CFR 503; WAC 173-350-100; WAC 173-350-220; 90.48 RCW)

To meet federal and state standards, composting facilities typically incorporate leachate collection, treatment, and discharge systems similar to those at a solid waste landfill. The areas underneath compost piles are lined with impervious material and graded to direct leachate to a sanitary sewer drain or to a lined storage pond where the leachate is pretreated prior to discharge to the sanitary sewer system. Surface water runoff and run-on controls are also required to reduce leachate quantities and minimize the potential for leachate contamination of surface water. Leachate quantities can also be reduced by conducting the composting process indoors or under cover to the degree possible and by using bulking agents (such as yard debris, mixed paper, or wood waste) to absorb free liquid in food waste or biosolids.

Discharged leachate would have to meet state waste discharge requirements for discharge to surface waters, or waste discharge standards for discharge to the sewer system. (40 CFR 503; WAC 173-350-100; WAC 173-350-220; 90.48 RCW)

The use of compost after it leaves composting facilities also has the potential to add nutrients or metals to surface and groundwater. Section 3.2.6, Environmental Health, describes regulations for compost quality and use that would mitigate potential effects.

3.2.3.3 Significant Unavoidable Adverse Impacts

Significant adverse impacts would be avoided through compliance with applicable federal and state regulations.

3.2.4 Plants and Animals

3.2.4.1 Affected Environment

Plants and animals that may be affected by any of the alternatives for sustainable materials management include those that occur near composting or recycling facilities. Under Alternatives 2, 3, and 4 there would be a potential need for expanded or additional recycling facilities, which could affect habitat. The affected environment and potential impacts of expanded or additional recycling and transfer facilities are assessed in Section 4.4.4 which addresses impacts on plants and animals associated with alternatives related to the solid waste transfer and processing system.

At present, all compostable materials collected in King County are handled at the Cedar Grove Composting sites in Maple Valley and Everett. Mapping by the Washington Department of Fish and Wildlife (WDFW) shows freshwater wetlands and open water habitats are present near the Cedar Grove Composting site in Maple Valley. A biodiversity corridor is mapped on the site containing habitat for elk, deer, bear, woodpeckers, owls, hawks, herons, and other species. The Cedar River provides migration and breeding habitat for chinook, kokanee, sockeye and coho salmon, steelhead, bull trout, and coastal cutthroat trout (WDFW 2017a).

The Cedar Grove Composting site in Everett is adjacent to several freshwater wetlands and the Snohomish River estuary. Coyote and other small mammals (raccoon, opossum, rats, feral cats) are known to forage on the site. There are bald eagle, peregrine falcon, and osprey nests within a mile of the site, which is in a concentration area for wintering waterfowl. The Snohomish River estuary is used by a number of anadromous salmonids (GeoEngineers 2014).

The sites of new or expanded composting facilities are unknown; therefore, it is not possible to describe specific aspects of the environment that may be affected. Any needed facilities may be sited in the Puget Sound region. The general environment of the region is described in Attachment A.

3.2.4.2 Impacts and Mitigation Measures

Alternatives 2, 3, and 4 would increase recycling, including organics (yard and food waste). Compost can contain heavy metals and physical contaminants that could be harmful to wildlife. For solid waste compost, federal and state regulations specify allowable limits of metals and physical contaminants (40 CFR Part 257; WAC 173-350). Facility compliance with those regulations mitigates potential impacts on plants and animals.

Composting facilities can also attract disease vectors such as rodents, particularly in feedstock storage sites. Because vectors may be attracted by odors, measures to reduce odors are also effective in reducing vector activity. Such measures include mixing and processing feedstocks immediately. Odors and other mitigation for odors are described in the Air sections of this EIS. State law requires that vector reduction measures be taken at composting facilities.

As with any human development, if new or expanded recyclable processing or organics (yard and food waste) composting facilities are sited in undeveloped areas, they would likely result in direct loss of plant and wildlife habitat. The quantity and quality of habitat loss cannot be assessed at this time. Cedar Grove Composting is operating at or near capacity, and has no plans to expand within King County. Recyclable processing facilities operated by Waste Management, Inc., and Republic Services, Inc., are expected to be able to handle the need for additional recyclables processing created by any of the sustainable materials management alternatives.

3.2.4.3 Significant Unavoidable Adverse Impacts

With the mitigation discussed above, there would be no significant impacts on plants and animals associated with expanded or new organics (yard and food waste) composting facilities.

3.2.5 Energy and Natural Resources

3.2.5.1 Affected Environment

The analysis of impacts related to energy and natural resources focuses on the use of petroleum-based fuels in the transport of solid waste and recycled material because the alternatives for sustainable materials management would not have notable impacts on other types of energy or natural resources such as minerals. Petroleum-based fuels result from the processing of crude oil, a non-renewable natural resource. The availability and affordability of petroleum-based fuels during the planning period are uncertain.

3.2.5.2 Impacts and Mitigation Measures

The overall effect on fuel use for transportation of solid waste and recycled materials under the four alternatives is uncertain. As indicated in Section 3.2.8, Transportation, increased recycling may result in a net increase in truck trips, especially in areas where recyclables are collected curbside. At the same time, success of efforts at waste reduction and waste minimization would tend to reduce the number of traffic trips. Alternative 3 is expected to result in the greatest increase in recycled material and associated fuel use

for transportation, while Alternative 1 is expected to result in the least increase in recycled material and associated fuel use for transportation. Under all alternatives, waste reduction and minimization and other incentives, such as bulky waste collection, would tend to reduce traffic trips and, therefore, reduce fuel use.

Overall, Alternative 3 may increase fuel use slightly more than other alternatives, and Alternative 1 may increase fuel use the least; however, the change from existing fuel use over the entire King County solid waste system is highly uncertain under any of the alternatives. In any case, it appears that impacts related to potential increases in fuel use would not be significant under any of the alternatives.

3.2.5.3 Significant Unavoidable Adverse Impacts

Despite the uncertainty regarding impacts of the alternatives on fuel use, no significant unavoidable adverse impacts are expected from any alternative.

3.2.6 Environmental Health

3.2.6.1 Affected Environment

Noise

Noise is described as excessive or unwanted sound. Noise is measured using a weighted logarithmic scale to better approximate how the human ear responds to different sound levels. The unit of noise measurement is the A-weighted decibel, or dBA. Sound levels from different sources combine logarithmically. For example, two noise sources, each producing a sound level of 50 dBA, combine to produce a sound level of 53 dBA. Similarly, a doubling in traffic on a street increases sound levels by about 3 dBA, which is the smallest change in noise level perceptible to the average human ear.

Noise typically fluctuates with time. Common descriptors of noise use an equivalent or energy average sound level. This is a steady-state, A-weighted sound level that contains the same amount of acoustic energy as the actual, time-varying, A-weighted sound level over a specified period of time. For example, a commonly used descriptor is the hourly equivalent sound level (abbreviated as Leq(h)).

Most local jurisdictions establish limits on the levels and durations of noise crossing property boundaries. Allowable maximum sound levels typically depend on the land use zone of the source of the noise and that of the receiving property. Local jurisdictions typically identify a number of noise sources or activities that are exempt from the maximum allowable noise limits. These commonly include sounds created by vehicles traveling on public roads, and sound created by warning devices (such as reverse gear alarms) when not operated continuously for more than brief continuous periods. Also, sounds from construction equipment and blasting are typically exempt from noise limits during daytime hours.

For those activities or sources that are exempt from the local jurisdiction noise limits, federal criteria are useful in evaluating noise impacts. For example, for residential areas, the Washington State Department of Transportation defines a traffic noise impact as a traffic noise level at or exceeding 66 dBA, and defines a substantial increase in noise as an increase in 10 dBA or more between existing and post-project

conditions (WSDOT 2012). In addition, the U.S. Environmental Protection Agency (EPA) has established noise criteria for determining impacts based on sound increases from a proposed action. Under these criteria, an increase of 0 to 5 dBA is considered a "slight" impact; an increase of 5 to 10 dBA is a "significant" impact; and an increase of more than 10 dBA is a "very serious" impact (EPA 1980).

In general, ambient noise levels are highest in urban areas and near roadways, construction sites, and similar noisy locations. Ambient levels in urban areas are typically 60 dBA or higher, while noise levels in rural areas away from particularly noisy locations may be 50 dBA or lower (EPA 1974).

Human Health Risk

Within the context of solid waste management, human health risks may occur through exposure to toxic compounds via water (primarily groundwater) or air contamination or to disease through animal vectors. It is difficult to specifically characterize existing conditions related to human health risks over the entire geographic area covered by the proposed comprehensive plan. In general, the levels of groundwater and air toxics are low throughout the Plan area. Disease transmission can occur through human contact with animals, primarily mammals, birds, and insects.

A variety of local, state, and federal regulations are intended to limit the levels of contaminants in surface and ground waters, and in air. For example, the State of Washington has promulgated standards for both surface (WAC 173-201A) and ground (WAC 173-200) waters as well as a variety of regulations to control negative effects to surface and ground waters from human activities, and the State of Washington has adopted standards (acceptable source impact levels or ASILs) for a variety of toxic air pollutants (TAPs), and has adopted regulations controlling the emissions of TAPs from new sources (WAC 173-460). In addition, state and federal regulations specifically address the design and operation of solid waste facilities (WAC 173-350, Solid Waste Handling Standards; WAC 173-351, Criteria for Municipal Solid Waste Landfills; and WAC 173-304, Minimum Functional Standards for Solid Waste Handling that now applies only to incinerator ash having been otherwise superseded by 173-350 and 173-351). These solid waste regulations control the handling and disposal of solid waste, as well as the collection, conveyance, treatment, and ultimate disposal of the liquid (referred to as leachate) and gas byproducts resulting from waste decomposition. In addition, these regulations include requirements for the control of potential animal disease vectors.

Construction and demolition debris may contain materials that pose a human health risk, in particular, asbestos and lead-based paint. The EPA has promulgated regulations for the safe handling and disposal of asbestos, lead-based paint, and other materials that pose a potential health risk.

3.2.6.2 Impacts and Mitigation Measures

Noise

None of the alternatives is likely to result in a significant change in overall noise levels within King County. However, as described in Section 3.2.8, increases in recycling under Alternatives 2, 3, and 4 are likely to

lead to a re-distribution of vehicle trips, which could lead to higher noise levels along roads carrying the re-distributed volumes. However, these additional trips are unlikely to result in a significant noise impact, because the re-distributed traffic would probably represent a minority of the total traffic on those roads. Typically, a doubling of traffic will result in about a three-decibel increase in noise levels, an increase not normally perceivable.

Human Health

None of the alternatives is likely to result in significant changes to the exposure to health risks in the county. Under Alternatives 2, 3, and 4, increased diversion of construction and demolition debris could somewhat reduce health risks by limiting illegal or inappropriate handling of potentially hazardous material such as asbestos and lead-based paint.

3.2.6.3 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse environmental health impacts are likely under any of the alternatives.

3.2.7 Land and Shoreline Use

3.2.7.1 Affected Environment

The affected environment includes land within unincorporated King County and the partner cities (all cities within the county except Seattle and Milton). Land and shoreline uses in that planning area include a range from rural and low-intensity uses to high-intensity, urban uses. King County and the partner cities all have a variety of plans and implementing ordinances to guide and regulate land uses within their jurisdictions.

3.2.7.2 Impacts and Mitigation Measures

Alternative 1 would have no effect on land use and land use plans in King County and the partner cities. It would not affect shoreline uses or plans.

Under Alternatives 2, 3, and 4, diverting larger quantities of solid waste to recycling and composting facilities could indirectly affect land use over the long term by inducing development of new industrial or commercial businesses that recycle, process, or reuse waste materials. Induced growth in recycling or reuse facilities could increase demand for industrial property but is unlikely to require cities to rezone or annex land to meet the demand. Expansion of existing or development of new composting facilities in King County or elsewhere, could adversely affect nearby land uses by increasing odors. Potential odor impacts and mitigation measures are described in Section 3.2.2, Air. Alternatives 2, 3, and 4 would not affect shoreline uses or plans.

3.2.7.3 Significant Unavoidable Adverse Impacts

Although the alternatives may affect demand for industrial land, none are expected to result in a significant adverse effect on land use or land use planning.

3.2.8 Transportation

3.2.8.1 Affected Environment

King County and the cities affected by the Plan all have both urban street grids and suburban and rural roadways that connect to regional, state, and federal highways serving the county, and the Puget Sound region. In general, the density of the roadway network and the traffic volumes on individual roadways are proportional to the density and intensity of land use in the region, with the highest road densities and traffic volumes occurring in the major urban areas. Portions of major highways in the region sustain traffic volumes in excess of 100,000 vehicles per day, while roadways in the least populated peripheries of the region may experience traffic volumes of several hundred or fewer vehicles per day. Currently, portions of many roadways throughout the central Puget Sound region are inadequate to support the existing traffic demands, and improvements to inadequate roadways may be required before new development can occur.

Changes in sustainable materials management policies and programs, and collection service standards, may alter the traffic patterns, volumes, frequency, and types of traffic trips necessary to transport materials for recycling, reuse, or disposal via the existing street system. Throughout this EIS, self-hauler refers to residential or business customers: 1) who bring loads of mixed municipal solid waste (MMSW) or fee recyclables to county transfer stations, pay a fee at the cashier's booth, and are recorded as transactions, and 2) whose loads consist only of no-fee recyclables and who, therefore, bypass the cashier's booth. For the first, quantitative data are available (counts of recorded transactions); for the second, numbers are estimated. Commercial collection trucks refer to contracted or permitted waste collection vehicles transporting waste to transfer stations for disposal, and to commercial vehicles transporting recyclables from transfer facilities to markets or secondary processing. King County transfer vehicles refer to King County-owned tractor-trailer combinations transporting waste from transfer facilities to Cedar Hills Regional Landfill for disposal.

3.2.8.2 Impacts and Mitigation Measures

A number of studies (Sustainable America 2017; Salinas Valley and CalRecycle 2011) indicate that the more stringent the regulations in effect, the greater the level of diversion to recycling, reuse, and composting. For purposes of a qualitative comparison, recycled material volume under the Plan is anticipated to be greater with Alternative 2 than with Alternative 1; greater with Alternative 4 than with Alternative 2; and greater with Alternative 3 than with Alternative 4.

While the total number of vehicular trips and peak volumes are not expected to change as a result of implementation of the Alternatives, some trips may change from those trips destined for waste disposal to those trips destined for waste recycling, reuse, or composting. As a result, demands on the transportation network (number of vehicular trips and peak volumes) could minimally increase near targeted waste generator types (e.g., multi-family, non-residential, schools); near waste recycling, composting, and reuse facilities; and in areas where particular materials or products remain prevalent in the waste stream (e.g., organics [food waste, food-soiled paper], and construction and demolition debris). Shifting trip patterns

between waste generation points and waste recycling and disposal facilities may also minimally decrease demands on the transportation network (number of vehicular trips and peak volumes) near waste transfer and disposal facilities.

Typically, material collected for recycling is less dense (465 pounds per cubic yard [WRAP 2012]) than MMSW collected for disposal (550 pounds per cubic yard [EPA 2016]), which in turn is less dense than organics (yard and food waste) collected for composting (640 pounds per cubic yard [EPA 2016]. Additional recycling volume collected at less density than MMSW would increase total recycling vehicle truck trips due to increased volume, and displace fewer garbage vehicle truck trips due to the lower density of commingled recyclables. The remaining waste would be collected at a slightly higher density, which would decrease overall garbage truck trips. The net result may be a very slight increase in overall truck trips associated with increased recycling. This may be particularly true in unincorporated areas or within cities where additional materials are collected curbside.

While specific transportation routes that may be affected under implementation of Alternatives 2, 3, and 4 are not known at this time, the minimal transportation impacts that are expected to result may be slightly greater than those anticipated under the No-Action Alternative (Alternative 1), in the same proportion to each Alternative's anticipated increase in recycling. This may be particularly true in unincorporated areas or within cities where more stringent regulations are employed.

Should waste reduction and waste minimization efforts under all Alternatives succeed, a slight decrease in demand on the transportation network could result as fewer materials enter the marketplace and the solid waste system over the life cycle of the product or material, in general. In addition, implementation of other recycling programs and incentives, such as increased bulky waste collection, could reduce self-haul traffic at transfer facilities, in favor of a fewer number of truck trips to collect waste at its source.

3.2.8.3 Significant Unavoidable Adverse Impacts

Since one of the desired outcomes of the sustainable materials management component of the Plan is to increase the volume and type of materials diverted from disposal to recycling, composting, or reuse county-wide, it is likely that any changes in traffic will be distributed to such an extent that any increases in vehicle trips will not create significant unavoidable impacts.

3.2.9 Public Services and Utilities

3.2.9.1 Affected Environment

Modifications to the county's solid waste programs, services, and infrastructure would be unlikely to result in significant adverse impacts on most public services and utilities, including fire and police services; schools, parks, and other recreational facilities; and maintenance, communications, water and stormwater, and sewer services. Modifications to the county's solid waste programs, services, and infrastructure may result in costs for capital improvements and changes in the cost of system operation and maintenance, all of which could affect the rates paid by the system's customers.

The King County Solid Waste Division provides a full range of solid waste services in the region. All municipalities in King County, except Seattle and Milton, are served by the county system. Through contracts with cities and Washington Utilities and Transportation Commission franchises, private companies, or haulers, provide most of the solid waste collection in the county. Enumclaw and Skykomish provide their own solid waste collection.

The county and cities have now completely converted to commingled (single-stream) collection. About 99 percent of single-family customers with curbside garbage collection have access to organics (yard waste and food waste) collection service. Only Vashon Island and the Skykomish and Snoqualmie Pass areas, which house less than 1 percent of the county's residents, do not have this service (Plan).

King County has adopted a goal of "Zero Waste of Resources" by 2030 as a principle designed to eliminate the disposal of materials with economic value. To substantially increase waste reduction and recycling over current levels, a variety of measures identified in the Plan, from voluntary to mandatory, could be taken to improve recycling in the unincorporated areas, within cities, and at transfer stations. In addition, continued improvement in recycling of organics (yard and food waste) could substantially reduce the volumes of material that enter the regional waste stream. A variance to Title 10 of the Code of the King County Board of Health was approved to allow every-other-week collection of organics (yard and food waste) for single- and multi-family residents, as well as every-other-week collection of residential garbage. (Plan, Chapter 4).

3.2.9.2 Impacts and Mitigation Measures

Under all of the alternatives, King County is seeking to increase waste reduction, recycling, and composting toward its ultimate goal of zero-waste of resources. As discussed in Section 3.2.8.2, above, for purposes of a qualitative comparison, recycled material volume and progress toward goals under the Plan is anticipated to be greater with Alternative 2 than with Alternative 1; greater with Alternative 4 than with Alternative 2; and greater with Alternative 3 than with Alternative 4.

All of the alternatives would allow for a higher level of recycling service than Alternative 1, along with the beneficial impacts associated with higher levels of recycling, including reductions in greenhouse gas emissions, resource conservation, energy savings, and cost savings associated with extending the life of Cedar Hills Regional Landfill (see Part 5 of this EIS). Additional waste reduction and recycling would also result in lower costs to residents and businesses through the avoidance of disposal costs. The additional benefits and cost savings would be greatest for Alternative 3 and the least for Alternative 1. Some increases in city or county administrative costs, which could be passed on to ratepayers, may arise with regulations or programs requiring enforcement. The costs are anticipated to be greatest with Alternative 3 and the least for Alternative 1.

Changes in the frequency of collection under all alternatives would not reduce solid waste service compared to Alternative 1, because it would likely be accompanied by changes in curbside cart capacity to accommodate altered volumes of garbage and recyclables.

3.2.9.3 Significant Unavoidable Adverse Impacts

At a programmatic level, no significant unavoidable adverse impacts on public services and utilities are identified.

4.0 THE SOLID WASTE TRANSFER AND PROCESSING SYSTEM

A. Service Level Improvements

4.1 Description of Alternatives for Service Level Improvements

Alternative 1: No Action (maintain existing service levels such as existing station hours, recycling services, fees, disposal restrictions, etc.)

Under Alternative 1, self-haul and commercial customers would continue to be served during all hours of transfer station operation. Hours of operation for each station, and each station's recycling services (see Table 4-1), will be appropriate to the available space and characteristics of the region being served. Stations would be improved to accommodate growth in transactions and to increase the levels of recycling, which differ for each station.

Alternative 2: Improve service levels with system-wide standards

Under Alternative 2, self-haul and commercial customers would continue to be served during all hours of transfer station operation. Hours of operation for each station, including each station's recycling services, would be standardized throughout the system, including both urban and rural facilities. Stations would be improved to accommodate growth in transactions and to increase and standardize recycling accomplished at all facilities.

Alternative 3: Improve service levels with facility-specific standards

Under Alternative 3, self-haul and commercial customers may be served during different hours of transfer station operation, with self-haul service restricted to off-peak hours on weekdays and regular hours on weekends. Hours of operation for each station, including each station's recycling services, would be appropriate to the available space and characteristics of the region being served. To increase recycling, the Solid Waste Division would begin mandatory self-haul recycling requirements at transfer stations where cardboard, metal, yard waste, and clean wood would be banned from disposal at county transfer stations that provide recycling services for those materials.

To manage demand at some stations, strategies may be implemented; including instituting longer hours and peak pricing at one or two stations, but not others, to influence customers to use a station at different hours or use a different station. Self-haul and commercial customers may be restricted at one or more stations, with services potentially split between self-haul-only and commercial-only stations.

4.2 Affected Environment, Impacts, and Mitigation Measures

Table 4-1 shows existing service levels at transfer stations in 2016, based on current county policies and practices. Individual days and hours of operation for each station are based on the Solid Waste Division's usage data and customer trends. Some of the urban stations are open in the early morning or late evening

hours to serve the commercial haulers. Currently, the only days that the entire system is closed are Thanksgiving, Christmas, and New Year's Day.

Table 4-1. Services at King County transfer stations, 2016.

Transfer Station/Type	Recycling Services 2016	Hours 2016
Shoreline (urban)	Standard curbside recyclables, appliances, bicycles and bicycle parts, clean wood, fluorescent bulbs and tubes, scrap metal, textiles, yard waste, flags, plastic film and plastic grocery bags, expanded polystyrene blocks and coolers, and household sharps	Mon-Fri: 7:30 a.m. to 5 p.m. Sat & Sun: 8:30 a.m. to 5:30 p.m.
Factoria (urban)	Standard curbside recyclables, scrap metal, textiles, appliances, clean wood, yard waste, household sharps and moderate risk waste, including recycling of batteries (household, vehicle or marine), fluorescent bulbs and tubes, thermometers and thermostats, propane tanks	Mon-Fri: 6:30 a.m. to 4 p.m. Sat & Sun: 8:30 a.m. to 5:30 p.m.
Houghton (urban)	Standard curbside recyclables, textiles	Mon-Fri: 8 a.m. to 5:30 p.m. Sat-Sun: 8:30 a.m.to- 5:30 p.m.
Bow Lake (urban)	Standard curbside recyclables, appliances, bicycles and bicycle parts, clean wood, scrap metal, yard waste, fluorescent bulbs and tubes, plastic film and plastic grocery bags, expanded polystyrene blocks and coolers, and household sharps	Station hours: Mon-Thurs: 24 hours a day. Fri: 12 a.m. to 11:30 p.m. Sat and Sun: 8:30 a.m. to 5:30 p.m. Recycle area hours: Mon-Fri 6:00 a.m. to 8:00 p.m. Sat and Sun: 8:30 a.m. to 5:30 p.m.
Renton (urban)	Standard curbside recyclables, textiles	Mon-Fri: 7:30 a.m. to 5 p.m. Sat & Sun: 8:30 a.m. to 5:30 p.m.
Algona (urban)	None	Mon-Fri: 7 a.m. to 4:30 p.m. Sat & Sun: 8:30 a.m. to 5:30 p.m.
Cedar Falls (rural)	Standard curbside recyclables, textiles, yard waste	Mon, Wed, Fri, Sat & Sun: 9 a.m. to 5 p.m. (closed Tue & Thu)
Enumclaw (rural)	Standard curbside recyclables, appliances, clean wood, scrap metal, textiles, yard waste, fluorescent tubes and bulbs	Open daily: 9 a.m. to 5 p.m.
Skykomish (rural)	Standard curbside recyclables	Open daily Winter: 8 a.m. to 5 p.m. Summer: 9 a.m. to 6 p.m. (2nd Sunday in March until the 1st Sunday in November)
Vashon (rural)	Standard curbside recyclables, appliances, scrap metal, textiles, yard waste, fluorescent tubes and bulbs, household and business-generated sharps, and construction and demolition debris	Mon, Wed, Fri, Sat & Sun: 9 a.m. to 5 p.m. (closed Tue & Thu)

Notes:

Standard curbside recyclables are glass and plastic containers, tin and aluminum cans, mixed paper, newspaper, and cardboard.

Construction and demolition debris not accepted from dump trucks, dump trailers, flat beds that dump, or roll-off boxes (dump trucks, flat beds and roll-offs accepted at the Vashon station only)

4.2.1 Earth

4.2.1.1 Affected Environment

The affected environment for earth is described in Section 3.2.1. Most existing transfer stations are located primarily in developed areas within the urban growth boundary in the county and occur in a variety of geologic conditions as described in Section 3.2.1. Some transfer stations (e.g. Renton, Algona) are located in valley floors, while others (e.g. Houghton, Bellevue) are located on upland areas between major river valleys. In general, existing transfer stations are located outside of major critical areas related to earth hazards such as steep slopes and landslides, although local, steep slopes may exist at or in the immediate vicinity of some of the sites. Existing rural drop box sites (e.g. Cedar Falls), the Vashon Recycling and Transfer Station, and potential locations for new drop boxes, are located outside of the central urban growth areas of the county, but in a variety of geologic conditions similar to those described in Section 3.2.1.

4.2.1.2 Impacts and Mitigation Measures

Under Alternative 1 (No Action), no significant earth impacts are likely to occur.

Under Alternatives 2 and 3, minor improvements to the existing transfer system may be needed to enhance services or capacity, and these improvements would generally result in minor earth impacts. Overall, earth impacts under Alternatives 2 and 3 would be dispersed at multiple locations and over multiple years, and improvements likely would be limited to existing facility footprints and are likely to be insignificant (would not require major construction permitting). Nonetheless, under either Alternative 2 or 3, as Plan recommendations are implemented in the future, mitigation measures may be proposed if sufficient earth impacts are identified during project-specific environmental review, and applicable permits required for improvements would specify appropriate conditions under which earth impacts would be fully mitigated. However, due to the lack of significant earth impacts anticipated as a result of this programmatic assessment, no specific mitigation measures for earth impacts are identified in this EIS.

4.2.1.3 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse earth impacts would occur under any alternative.

4.2.2 Air

4.2.2.1 Affected Environment

The affected environment for air is described in Section 3.2.2.1, above. The primary air quality concerns related to operations in the transfer and processing system are vehicle emissions associated with the transport of solid waste and odors associated with the handling and temporary storage of solid waste.

4.2.2.2 Impacts and Mitigation Measures

Vehicle emissions from self-haul and commercial traffic contribute to ambient levels of carbon monoxide and ozone. The contribution would be less under Alternatives 2 and 3, compared to Alternative 1, because of improved service levels achieved under Alternatives 2 and 3. Implementation of strategies to manage demand under Alternative 3, and restricting self-haul and commercial customers under Alternative 3 by splitting services between self-haul-only and commercial-only transfer stations could increase overall travel distances and times, thereby increasing vehicle emissions.

The change in regional levels of carbon monoxide or ozone as a consequence of implementing any of the alternatives is unlikely to be significant, because self-haul and commercial traffic to and from transfer stations represents only a small percentage of total traffic in the region. The long-term gradual improvement in vehicle pollution control technology is likely to mitigate vehicle emissions in the future.

None of the alternatives would be likely to result in significant adverse impacts related to greenhouse gases. Improved service levels under Alternative 2 and Alternative 3 could lead to lower emissions of greenhouse gases compared to Alternative 1 if improved service levels lead to lower average vehicle waiting times at transfer stations. Under Alternative 3, restricting self-haul and commercial traffic to different transfer stations could lead to some increase in average vehicle travel distance, and that increase could result in higher overall emissions levels under Alternative 3 compared to Alternative 2.

4.2.2.3 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse air quality impacts would occur under any alternative.

4.2.3 Water

Because the alternatives would maintain (Alternative 1) or modify (Alternatives 2 and 3) service levels, they would not affect water resources. Typically, water resources are affected by changes in land development or operations on a site that affect surface water or groundwater—none of which are proposed by any of the service level improvement alternatives. Therefore, water resources are not addressed in this section.

Facility improvements in the solid waste transfer and processing system could affect water resources. The affected environment and potential impacts are described in Section 4.4.3.

4.2.4 Plants and Animals

Because the alternatives would maintain (Alternative 1) or modify (Alternatives 2 and 3) service levels, they would not affect plants and animals. Typically, plants and animals are affected by changes in land development or operations on a site that has effects on water quality or wildlife habitat, none of which are proposed by any of the alternatives. Therefore, plants and animals are not addressed in this section.

Facility improvements in the solid waste transfer and processing system could affect plants and animals. The affected environment and potential impacts are described in Section 4.4.4.

4.2.5 Energy and Natural Resources

4.2.5.1 Affected Environment

The analysis of impacts in this section focuses on the use of petroleum-based fuels in the transport of solid waste because the alternatives for service level improvements would not have notable impacts on other types of energy or natural resources such as minerals. Petroleum-based fuels result from the processing of crude oil, a non-renewable natural resource. The availability and affordability of petroleum-based fuels during the planning period are uncertain.

4.2.5.2 Impacts and Mitigation Measures

Future fuel use throughout the King County solid waste management system is uncertain under any alternative. In general, impacts on overall fuel use are lowest when cumulative vehicle travel distance and time are minimized within the overall solid waste system, and increases in efficiency of operations so that congestion and waiting times by haulers—both self-haul and commercial—at transfer stations would minimize vehicle waiting times. For this reason, an increase in service levels likely would result in lower impacts related to fuel use, and could even result in an overall benefit if efficiencies achieved are sufficient to result in a reduction in the average vehicle travel distance and time per unit volume or weight of material handled systemwide.

From the perspective described in the preceding paragraph, Alternative 2 likely would result in less negative impact related to fuel use than Alternative1. Under Alternative 3, strategies to manage demand and if self-haul and commercial vehicles are restricted to some stations, could lead to an overall increase in travel distances and times and a consequent comparative increase in fuel use.

Overall, significant adverse impacts related to fuel use are unlikely under any alternative.

4.2.5.3 Significant Unavoidable Adverse Impacts

Significant unavoidable adverse impacts are unlikely to occur.

4.2.6 Environmental Health

4.2.6.1 Affected Environment

The affected environment for environmental health (noise and human health) is described in Section 3.2.6.1, above.

4.2.6.2 Impacts and Mitigation Measures

Noise

The extent and distribution of noise impacts under the various alternatives correspond closely with changes in traffic volumes, travel distances, and travel times brought about by those alternatives; and to a lesser

extent by facility configuration. In general, improvements in service levels under Alternatives 2 and 3 could marginally improve noise levels in the vicinity of transfer stations by lowering average vehicle wait times. Under Alternative 3, splitting self-haul and commercial traffic among different transfer stations could marginally increase average travel distances and times and re-distribute traffic on area roads causing some localized increases in noise levels. However, as described in Section 3.2.6.2, the traffic increases are unlikely to be sufficient to result in a perceivable noise increase.

Human Health

None of the alternatives is likely to result in significant changes to the exposure to health risks in the county. Improved service levels under Alternatives 2 and 3 could marginally provide beneficial impacts to human health by increasing recycling and the safe handling of potentially hazardous materials.

4.2.6.3 Significant Unavoidable Adverse Impacts

None of the alternatives would result in significant unavoidable adverse environment health impacts.

4.2.7 Land and Shoreline Use

4.2.7.1 Affected Environment

Three King County transfer stations (Algona, Houghton, and Renton) were constructed prior to existing zoning and are nonconforming land uses, so any major improvement requires a special land use permit. The Bow Lake, Vashon, and Enumclaw transfer stations, which are newer, operate under special land use permits and are consistent with existing land use plans and zoning. None of the facilities are within a shoreline overlay. Most existing transfer stations are located primarily in developed areas within the urban growth area in the county. Existing rural drop box sites (e.g. Cedar Falls), and the Vashon Recycling and Transfer Station are located outside of the central urban growth areas of the county.

The Algona Transfer Station is on 4.6 acres in the city of Algona. The site is bounded by West Valley Highway on the east and by undeveloped land on the south, west, and north sides. The site and areas to the north and south are zoned for heavy commercial use; properties to the west are designated as open space/critical areas. The facility is about 50 years old.

The site for the new South County Recycling and Transfer Station is at 35101 West Valley Highway South, next to the existing Algona Transfer Station, which it would replace. Construction is planned to begin in 2020 and to last approximately 2 years. The site encompasses 18.9 acres, including nine parcels owned by King County and road rights-of-way. No roads or public uses were ever established on the rights-of-way, which would be vacated through the City of Algona street vacation process. A landscape supply business operates on the north part of the site (King County 2016b). The site is zoned primarily for heavy commercial uses (C-3); steep slopes on the western part of the property are zoned for open space/critical areas (OS-CA). The steep slopes on the west side of the property separate the site from R-1 (urban residential) zoned properties in unincorporated King County to the west. West Valley Highway South and State Route

(SR) 167 separate the site from single-family residences and limited commercial uses to the east. Heavy commercial (C-3) zoning is on the south (currently in use as the Algona Transfer Station) and to the north in Auburn. According to King County (2016b), north of the site is the City of Auburn Vista Pointe Stormwater Facility, and commercial uses are farther north; West Valley Highway South and SR 167 are to the east. Across State Route 167 are single-family residences and limited commercial uses. The existing Algona Transfer Station is located to the south.

The Bow Lake Recycling and Transfer Station is on a 20-acre property in Tukwila. The site is bounded by I-5 on the west, Southcenter Parkway and private property with industrial uses on the east, Orillia Road and undeveloped land to the south, and undeveloped private property to the north. The site and surrounding properties are in the Tukwila Valley South zoning district, which is intended for a mix of high-intensity commercial and industrial uses; heavy industrial uses require a conditional use permit. The facility, which replaced an older transfer station, opened in 2012 and is the busiest transfer station in the King County system. There are no nearby residential uses, and residential uses in the Tukwila Valley South district are allowed only if they are accessory to a permitted use (Tukwila Municipal Code Chapter 18.40).

The Cedar Falls Drop Box is on 7 acres of land next to the closed Cedar Falls Landfill. The Skykomish Drop Box is in Skykomish. Waste from both Drop Box sites is transported in drop boxes to the Houghton Transfer Station. Recyclable materials are separated and distributed for processing, and reusable materials (textiles) are donated to local non-profit organizations.

The Enumclaw Recycling and Transfer Station, which occupies 25 acres next to the closed Enumclaw Landfill, was built in 1993. The city limits of Enumclaw border the east and north sides of the site, which is zoned as a public use. Property to the west and south is zoned for single-family residential and residential mobile home park, respectively. Vegetation screens the facility from view by residences. Land to the north and east, in unincorporated King County, is designated for agricultural and forest resources.

The Factoria Recycling and Transfer station is in Bellevue, north of Interstate 90 and east of Interstate 405. The original transfer station has been replaced with a larger, more modern facility that collects garbage, recyclables, and household hazardous waste. The site and properties to the north and west are zoned light industrial; land to the south and east is zoned for office use. A variety of light industrial and commercial uses are located along the access road to the site (SE 32nd Street). The nearest residential areas, consisting of multi-family developments, are along 139th Avenue SE, approximately 850 feet northeast of the site, and along Richards Road, more than one-quarter mile west of the site—neither area has views of the site.

The Houghton Transfer Station, built in the mid-1960s, is in Kirkland. The 8.4-acre site is zoned as park/open space. The station is bordered on the north by the closed Houghton Landfill, on the south (across NE 60th Street) by a state park, and on the east and west by single-family neighborhoods. King County made improvements in 2011 to improve safety and efficiency at the transfer station, and to reduce impacts on the community; for example, a wooden fence built along the west side acts as a sound barrier,

and a screen wall blocks wind, controls litter, and screens views of station operations. However, Houghton remains an open-sided facility with a roof and no walls.

The Solid Waste Division has not identified sites for replacement capacity in the Northeast service area that could replace the Houghton Transfer Station.

The Renton Transfer Station was built in the mid-1960s. It is on the western portion of a 13-acre property owned by King County and zoned for light industrial uses.

The Shoreline Recycling and Transfer Station was built in 2008 to replace the First Northeast transfer station on the same site. The site encompasses about 13 acres and is bordered by I-5 on the east, the King County Metro Transit North Operating Base on the south, and private residences on the north and west. The site and surrounding parcels are zoned for single-family residential use. The facility receives about 8 percent of the total solid waste at King County transfer stations but nearly half of all the recyclable materials.

The Vashon Recycling and Transfer Station was built in 1999 on 9.4 acres at the north end of the closed Vashon Landfill. It is in a rural area; King County zoning is for low-density residential (one dwelling unit per five acres). Surrounding land is in the same zoning district. Land to the east is undeveloped, and most other surrounding properties are in low-density residential use. The site is screened from view by trees.

The processing of recyclables and organics (yard and food waste) generated in King County is currently handled through the private sector, at industrial facilities in Woodinville, south Seattle, Tacoma, Maple Valley, and Everett. Recyclable construction and demolition materials are handled at designated facilities throughout the Puget Sound region.

4.2.7.2 Impacts and Mitigation Measures

Because the alternatives would maintain (Alternative 1) or modify (Alternatives 2 and 3) service levels, they would not directly affect uses on land or shoreline areas. Typically, direct effects on land and shoreline uses are caused by land development, changes in land use designations (zoning), and changes in land use on a particular site—none of which are proposed by any of the service level alternatives

Changes in land use or operations on a site can indirectly affect nearby land uses through off-site impacts, such as increased noise, odor, dust, and light or glare. Service level improvements that would increase hours of operation would result in increased hours of lighting at facilities. However, impacts of noise, odor, dust, and light and glare are not expected to increase under any of the alternatives because they would continue to be mitigated, as under existing conditions. Indirect impacts can also occur from changes in traffic patterns or volumes. By improving service levels, Alternatives 2 and 3 may reduce traffic congestion at and near the transfer facilities, which may reduce vehicle emissions and noise compared with Alternative 1.

4.2.7.3 Significant Unavoidable Adverse Impacts

None of the service level alternatives would have significant adverse effects on land or shoreline uses.

4.2.8 Transportation

4.2.8.1 Affected Environment

The general affected environment for transportation is described in Section 3.2.8.1.

The final supplemental EIS for the Final 2006 Solid Waste Transfer and Waste Management Plan (King County 2006a) contains a description of the affected environment of the central Puget Sound region in terms of traffic. The area that could be affected by traffic from self-haulers, commercial collection trucks, and King County transfer vehicles extends primarily from the station entrance(s) to the surrounding streets of each station. All of the regional, state, and federal highways in the county that connect to the urban street grids and suburban and rural roadways serving the transfer stations are marginally affected by transfer station traffic.

Table 4-2 shows estimated traffic levels at transfer facilities (transfer stations and drop box facilities) in 2016 and in 2040 under Alternative 1, based on county transaction records and other assumptions explained in the footnotes to the table. Traffic is expressed as one-way trips, into plus out of the facility.

Table 4-2. Estimated average daily traffic at King County transfer stations, 2016 and 2040.

Transfer Station/Type of Traffic	Weekday 2016	Weekend Day 2016	Weekday 2040	Weekend Day 2040
Shoreline				
Commercial Hauler	65	9	94	13
Self-Hauler	500	1,229	749	1,839
King County Transfer	21	14	28	20
Employee/Visitor	22	22	22	22
Total	609	1,274	892	1,894
Factoria				
Commercial Hauler	155	9	273	15
Self-Hauler	322	37	763	1,327
King County Transfer	37	12	64	26
Employee/Visitor	28	28	28	28
Total	542	86	1,129	1,396

Table 4-2 (continued). Estimated average daily traffic at King County transfer stations, 2016 and 2040.

Transfer Station/Type of Traffic	Weekday 2016	Weekend Day 2016	Weekday 2040	Weekend Day 2040
Houghton/Northeast service area				
Commercial Hauler	170	18	244	26
Self-Hauler	502	415	756	627
King County Transfer	54	14	71	21
Employee/Visitor	18	18	18	18
Total	744	465	1,089	692
Bow Lake				
Commercial Hauler	336	24	533	37
Self-Hauler	681	1,567	1,270	3,480
King County Transfer	67	43	105	71
Employee/Visitor	30	30	30	30
Total	1,114	1,664	1,939	3,617
Renton				
Commercial Hauler	70	4		
Self-Hauler	397	1,804		
King County Transfer	23	11		
Employee/Visitor	16	16		
Total	506	1,836		
Algona				
Commercial Hauler	156	11		
Self-Hauler	461	941		
King County Transfer	53	20		
Employee/Visitor	20	20		
Total	690	991		
South County				
Commercial Hauler			224	15
Self-Hauler			714	1,515
King County Transfer			70	28
Employee/Visitor			28	28
Total			1,036	1,587

Table 4-2 (continued). Estimated average daily traffic at King County transfer stations, 2016 and 2040.

Transfer Station/Type of Traffic	Weekday 2016	Weekend Day 2016	Weekday 2040	Weekend Day 2040
Cedar Falls				
Commercial Hauler	8	5	12	7
Self-Hauler	17	1,172	26	1,752
King County Transfer	0	0	0	0
Employee/Visitor	10	10	10	10
Total	36	1,187	48	1,769
Enumclaw				
Commercial Hauler	11	1	16	1
Self-Hauler	220	1,919	372	3,059
King County Transfer	5	6	7	8
Employee/Visitor	14	14	14	14
Total	251	1,940	408	3,082
Skykomish				
Commercial Hauler	0	2	0	3
Self-Hauler	112	414	168	621
King County Transfer	0	0	0	0
Employee/Visitor	10	10	10	10
Total	122	427	179	634
Vashon				
Commercial Hauler	9	1	12	1
Self-Hauler	187	1,490	280	2,230
King County Transfer	3	2	4	3
Employee/Visitor	12	12	12	12
Total	211	1,505	309	2,246
Total King County	4,825	11,374	7,028	16,917
Transfer to Cedar Hills	263	123	349	177

For Commercial Hauler, Self-Hauler, and King County Transfer:

Trips were estimated based on recorded 2016 transactions at transfer stations and are one-way trips (in plus out or transactions X2). Projected 2040 trips were estimated by increasing 2016 disposal trips in proportion to the projected increase in disposed MMSW by 2040, and by increasing 2016 recycling trips in proportion to the projected increase in recycled materials by 2040 (Plan, Figure 3-3).

Under Alternative 1, Algona trips in 2016 are transferred to South County; Renton trips are transferred to Factoria, Bow Lake, South County, and Enumclaw.

For Self-Hauler:

Algona does not currently offer collection of no-fee recyclables.

Self-haulers who bring no-fee recyclables only to the facilities are not included in King County's transaction record. They are estimated here based on King County's 2016 Transfer Station Survey (King County 2016), question 26, which indicates that approximately 42 percent of self-haul trips were for separated recyclables or compostable materials. Those trips were added to the transaction record numbers to arrive at total self-haul trips.

For Employee/Visitor:

Based on actual employee numbers in 2017, plus one trip in and out each day for supervisor, maintenance, vactor truck, and sweeper truck. This number was assumed to remain constant through 2040.

Self-hauling activity constitutes most of the trips at each transfer facility and primarily peaks on weekends and in the late afternoon on weekdays. Commercial hauling activity usually peaks on weekdays, primarily in the early morning and early afternoon. Traffic congestion and longer waiting lines can occur when the hours of use by self-haulers and commercial haulers overlap. The ability of a transfer station's capacity to efficiently handle traffic depends on numerous variables, such as the mix of collection trucks versus self-haulers, available tipping stalls for each, on-site queue capacity for each, and, in some cases, trailer loading ability (in the case of the older stations with no preload compactors). According to the Plan, at some of the urban stations that are operating at or near maximum capacity, the mix of self-haul and commercial customers can cause long traffic queues and crowded conditions on the tipping floor. Traffic queues during those times may also extend into the surrounding streets. Peak traffic times for transfer facilities do not coincide with peak traffic times on the general road network.

The processing of recyclables and organics (yard and food waste) generated in King County is currently handled through the private sector, at industrial facilities in Woodinville, south Seattle, Tacoma, Maple Valley, and Everett. Recyclable construction and demolition materials are handled at designated facilities throughout the Puget Sound region.

4.2.8.2 Impacts and Mitigation Measures

Alternative 1

The Weekday 2040 and Weekend 2040 columns in Table 4-2 represent estimated traffic at King County transfer stations under Alternative 1. It was assumed that all traffic would increase in proportion to the projected increase in disposed MMSW and to projected increases in recycling (Plan, Figure 3-3).

To provide efficient service for commercial haulers while accommodating increasing levels of self-haul traffic, growth in transactions, and to maintain the levels of recycling at each station, the transfer system would undergo expansion under Alternative 1. Algona would be replaced with the new South County Transfer and Recycling Station; Houghton would remain "as-is"; and Renton would be closed. With each of these changes, the overall system would have an increased ability to minimize off-site queuing, and added capacity for full-service recycling. Full-service recycling allows for the ability to remove a wide range of recyclables from the waste stream, including curbside recyclables, organics (yard and food waste), metals, construction and demolition debris, bulky items, and reusables.

Less queuing would result in shorter delays for commercial haulers and generally improved traffic at King County transfer stations.

Added recycling capacity and services at a new transfer station may attract additional self-haulers in those areas where recycling at transfer stations has not been provided in the past, such as Algona, or where it has been provided in limited capacity, such as Renton.

However, even with additional self-haul traffic at new facilities and additional traffic from customers formerly using the closed transfer facilities, overall station service levels would be improved over the existing condition. Alternative 1 includes the use of a compactor (and possibly two to ensure continued service) at the planned South County Recycling and Transfer Station, which will replace Algona Transfer Station, which does not have a compactor. This change would reduce the number of transfer trailer trips generating traffic in the vicinity of Algona, and between the South County service area and Cedar Hills Regional Landfill. Further, with full-service facilities distributed throughout much of the system, except the Northeast service area, this alternative also minimizes the traffic-related impacts of customer trips throughout much of the region, as well as the intensity of impacts on streets neighboring most facilities. Although over time, traffic volumes associated with self-haul and commercial could increase because of increases in population, this alternative would not result in significant adverse impacts on transportation, and the overall impact is likely to be beneficial because of improved service levels.

Alternative 2

Alternative 2 incorporates efforts intended to standardize service levels throughout the system, including all station hours, recycling services, and accommodation of increased transactions. The total number of transfer system trips is unlikely to increase significantly under this alternative, although the distribution and timing of trips may shift somewhat, and some increase in self-haul traffic could occur where station hours are expanded to the standard. At transfer stations where hours are reduced to the standard (if needed), average hourly volumes would increase, while the opposite would occur where station hours were expanded. In general, such changes would not be expected to significantly impact traffic congestion on roads in the vicinity of the stations, although, if new station hours occur during the peak periods of traffic on surrounding streets, expanded station hours under Alternative 2 could add to traffic congestion during those peak hours compared with Alternative 1. This potential impact could be avoided by having the standardized set of station hours exclude peak traffic periods.

Because King County is placing an emphasis on resource recovery at transfer facilities, recycling services are expected to be standardized under Alternative 2 at a higher level than the current condition and similar to Alternative 1. As a result, traffic impacts resulting from recycling services are expected to be similar to Alternative 1, and generally improved over the existing condition.

Alternative 3

Alternative 3 would institute service level changes specific to each facility, based on available space and facility characteristics. Hours of operation at some facilities would be designed to reduce self-haul traffic during peak commercial hours on weekdays. King County evaluated similar scenarios during the Transfer and Waste Management Plan Review and determined that despite effects likely varying from facility to facility, more vehicle traffic during peak afternoon commute hours and potential impacts to neighboring businesses may result (King County 2015a). At the same time, where self-haul traffic is restricted during peak hours, commercial customers would experience reduced wait times at the station and slightly reduced traffic volume in the station vicinity.

The addition of mandatory self-haul recycling at some transfer stations may cause the time on site to marginally increase for customers with targeted materials, with a corresponding marginal effect on station queuing. Because the stations potentially affected by this service level change have ample space on site for queuing, it is unlikely that off-site traffic would be affected. This effect would be similar to those expected under Alternative 1.

4.2.8.3 Significant Unavoidable Adverse Impacts

While some alternatives may result in shifted traffic patterns in the overall transportation network, and slight increases or decreases in traffic in the vicinity of the stations, no significant unavoidable transportation impacts would result from implementation of the level-of-service improvements detailed in the Plan.

4.2.9 Public Services and Utilities

4.2.9.1 Affected Environment

The general affected environment for public services and utilities is described in Section 3.2.9.1.

All standard curbside recyclables (newspaper, mixed paper, cardboard, polyethylene terephthalate [PET] and high-density polyethylene [HDPE] bottles, glass containers, and tin and aluminum cans) are accepted at the county's eight transfer stations, except at the Algona station, where there is no recyclables collection. Separate bins for collecting yard waste are available only at the Shoreline, Bow Lake, Factoria, Enumclaw, Cedar Falls, and Vashon facilities. Additional recyclable materials are collected at transfer stations where facilities exist. Transfer stations in urban growth areas are serviced by utilities, while drop boxes may not be serviced by utilities.

Beginning in January 2016, the Solid Waste Division implemented new regulations for construction and demolition debris recycling and disposal (King County Code 10.30). As with recycling, construction and demolition debris collection and processing is handled primarily by private-sector firms. The Solid Waste Division does not accept construction and demolition waste at its transfer stations or Cedar Hills Regional Landfill, except for incidental amounts. The King County ordinance requires that construction and

demolition waste must be taken to a designated privately-operated construction and demolition debris recycling and/or transfer facility.

4.2.9.2 Impacts and Mitigation Measures

Individual days and hours of operation for each station are based on the Solid Waste Division's usage data and customer trends, including a desire by commercial haulers to operate outside of peak traffic times. In turn, service levels are influenced by the maximum number of vehicles and tonnage that can be efficiently processed through the station each hour, based on the station design and customer mix. To provide an appropriate level of service to the residents and the commercial collectors served by each station, the Solid Waste Division periodically reviews the operating hours and makes adjustments if needed. Recycling services are expected to be improved under Alternative 1, compared to the existing condition, because the addition of the South County Recycling and Transfer Facility would add recycling services to the Algona Transfer Station, in an area where they are not currently provided. The addition of mandatory self-haul recycling at some transfer stations may cause the time on site to marginally increase for customers with targeted materials, with a corresponding marginal effect on station queuing. Because the stations potentially affected by the service level change have ample space on site for queuing, it is unlikely that off-site traffic would be affected. This effect would be similar to those expected under Alternative 1.

Under Alternative 2, hours of operation would be standardized at all facilities. If hours are reduced, that could alter the availability of some solid waste services to some residents and businesses who typically use the stations at times no longer available compared to Alternative 1. Those customers would retain the option of altering station visiting times, using curbside disposal services, or using bulky waste collection services, although, with the latter, often at a higher cost. If station hours are expanded, residents and businesses would retain the option of use of the transfer stations at preferred times.

Alternative 2 would also standardize recycling services across all facilities. Because the county is placing an emphasis on resource recovery at transfer facilities, recycling services are expected to be standardized under Alternative 2 at a higher level than the current condition and similar to Alternative 1. As a result, recycling services are expected to be similar to those under Alternative 1, and generally improved over the existing condition.

Under Alternative 3, hours would be different depending on each station's needs. If hours are reduced or expanded at some facilities to influence customers to either use the stations at different times or to use another station, travel times and station queuing could be affected (see Section 4.2.8 for a description of transportation impacts). However, under both Alternatives 2 and 3, no overall significant decrease in service levels due to changes in hours.is anticipated compared to Alternative 1. Alternative 3 would also adjust recycling services according to facility capacity and customer mix. Again, recycling services are expected to be at a higher level than the current condition and, at a minimum, similar to Alternative 1.

Additional recycling services under Alternatives 2 and 3 may include enhanced staffing at stations and other improvements to station infrastructure (e.g., signage and other information, additional containers) that could add to the Solid Waste Division's cost under those alternatives.

4.2.9.3 Significant Unavoidable Adverse Impacts

At a programmatic level, no significant unavoidable adverse impacts on public services and utilities are identified.

B. Facility Improvements

4.3 Description of Alternatives for Facility Improvements

Alternative 1: No Action (maintain, improve, and develop transfer and processing system as currently planned, including closure of Algona and Renton Transfer Stations when replacement capacity is available, **keep Houghton "as-is" indefinitely,** and development of a new South County Recycling and Transfer Station)

Under Alternative 1 (as well as Alternatives 2, 3, and 4), the current system of transfer stations would be maintained and improved to better serve customers, to accommodate growth in transactions, to increase the level of resource recovery accomplished at facilities, and for maintenance reasons. The approved *2006 Solid Waste Transfer and Waste Management Plan* authorized the Solid Waste Division to completely reconstruct or build newly sited facilities to replace outmoded transfer stations (Houghton and Algona) and to close three stations (Houghton, Algona, and Renton) once adequate replacement capacity is available. However, King County Council Ordinance 18577 and accompanying Motion 14968 in 2017 initiated a further planning effort for transfer capacity in the Northeast service area. At this time, proposed development includes a new South County Recycling and Transfer Station at a site in Algona. The Houghton Transfer Station would be kept "as-is" indefinitely. The rural facilities in the transfer network—the Enumclaw and Vashon transfer stations and the drop boxes at Cedar Falls and Skykomish—would be maintained and improved to provide an appropriate level of disposal and recycling services for the future needs of the areas they serve. All processing for commingled recyclables and organics (yard and food waste) would continue to be done by the private sector.

Alternative 2: Maintain and improve existing transfer and processing system with or without closure of older transfer stations, with demand management but with no development of new capacity

Under all the alternatives, the Solid Waste Division would maintain and improve the system of transfer stations and drop box facilities to better serve customers, to accommodate growth in transactions, to increase the level of resource recovery accomplished at facilities, and for maintenance reasons. Alternative 2 would close the Algona Transfer Station and replace it with the new South County Recycling

and Transfer Station in Algona. The South County station would provide collection of MMSW and comprehensive recyclables collection, and would accommodate self-haulers and commercial haulers.

Alternative 2 would offer the Solid Waste Division two options to meet the overall transfer capacity need in the Northeast service area. Those options are: 1) to allow self-haulers and commercial haulers to continue using the Houghton transfer station "as is" indefinitely, or 2) to allow self-haulers and commercial haulers to use a combination of facilities, potentially including the existing Houghton station and smaller separate facilities (self-haul-only or commercial-only stations). Strategies to manage demand (peak pricing and extended hours) may be implemented at stations if needed to provide capacity. For both options, the Houghton Transfer Station would remain in operation until replacement capacity is available. Alternative 2 also allows the Solid Waste Division the option to retain the Renton Transfer Station for use in some capacity.

Under this alternative, the private sector would continue to process all commingled recyclables and would expand regional processing capacity as needed. In addition, the private sector would continue to process food scraps, compostable paper, and yard waste through composting. Because of existing and anticipated constraints in the regional composting system, the private sector would develop additional composting capacity and/or technology improvements in King County or elsewhere.

To better manage the type of debris that results from relatively common emergencies, such as seasonal flooding and winter storms, as well as major events, such as earthquakes, Alternative 2 would allow the county and cities to establish temporary debris management sites where debris can be stored until it can be sorted for recycling or proper disposal.

Alternative 3: Maintain and improve existing transfer and processing system with or without closure of older transfer stations, and develop new capacity

Under all the alternatives, the Solid Waste Division would maintain and improve the system of transfer stations to better serve customers, to accommodate growth in transactions, to increase the level of resource recovery accomplished at facilities, and for maintenance reasons. Like Alternatives 1 and 2, Alternative 3 would close the Algona Transfer Station and replace it with the new South County Recycling and Transfer Station in Algona. The South County station would provide collection of MMSW and comprehensive recyclables collection, and would accommodate self-haulers and commercial haulers.

Alternative 3 would offer the Solid Waste Division three options to meet the overall transfer capacity need in the Northeast service area. Those options are: 1) to allow self-haulers and commercial haulers to continue using the Houghton transfer station "as is" indefinitely, 2) to site and develop a new Northeast Recycling and Transfer Station; or 3) to allow self-haulers and commercial haulers to use a combination of facilities, including the existing Houghton station and smaller separate facilities (self-haul-only or commercial-only stations). For all three options, the Houghton transfer station would remain in operation until replacement capacity is available.

Like Alternative 2, Alternative 3 allows the Solid Waste Division the option to retain the Renton transfer station for use in some capacity. Also, the private sector would continue to process all commingled recyclables and would expand regional processing capacity as needed. In addition, the private sector would continue to process food scraps, compostable paper, and yard waste through composting. Because of existing and anticipated constraints in the regional composting system, the private sector would develop additional composting capacity and/or technology improvements in King County or elsewhere.

As with the No Action Alternative, the rural facilities in the transfer network will be maintained and improved to provide an appropriate level of disposal and recycling services for the future needs of the areas they serve. Additional drop-box facilities may also be sited in unincorporated areas under Alternative 3 to better serve residents, as necessary.

Like Alternatives 2 and 4, Alternative 3 would allow the county and cities to establish temporary debris management sites where debris can be stored until it can be sorted for recycling or proper disposal.

Alternative 4: Create resource recovery centers at existing and new recycling and transfer stations

Under all the alternatives, the Solid Waste Division would also maintain and improve the system of transfer stations to better serve customers, accommodate growth in transactions, increase the level of resource recovery accomplished at facilities, and for maintenance reasons. With Alternative 4, the Solid Waste Division would install existing or emerging recovery technologies to enhance its resource recovery efforts. Those technologies, including but not limited to AD and AMR, could be sited at appropriate existing and new recycling and transfer stations in the future. Composting or AD systems could be privately or publicly owned and operated and would focus on source-separated organics (yard and food waste) or MMSW. AMR systems could include: 1) both floor sorting of recyclables by division staff and installing some mechanical sorting systems at select facilities (e.g., new stations), or 2) a separate AMR facility owned and operated publicly, privately, or via a public-private partnership.

Like Alternatives 2 and 3, Alternative 4 would allow the county and cities to establish temporary debris management sites where debris can be stored until it can be sorted for recycling or proper disposal.

4.4 Affected Environment, Impacts, and Mitigation Measures

4.4.1 Earth

4.4.1.1 Affected Environment

The affected environment for earth is described in Section 4.2.1.

4.4.1.2 Impacts and Mitigation Measures

Under all alternatives, infrastructure improvements could result in earth impacts, including excavation and disturbance of soil with the potential for soil erosion and changes in local topography. Under Alternatives 2

and 3, infrastructure improvements could include development of one or more temporary debris management sites and one or more new drop boxes. Development of such infrastructure may encounter unstable soils or ground conditions and would require earthwork that would disturb underlying soils with a resulting potential for erosion. At the same time, locational analysis leading to site selection seeks to avoid critical areas requiring extensive earthwork and extensive engineering to handle difficult geologic conditions. Where infrastructure improvements occur within existing facility footprints, or where new minor infrastructure is developed (e.g. new drop box facilities or debris management sites) earth impacts likely would be minor and insignificant.

Entirely new facilities, for example, a new Northeast Recycling and Transfer Station or a separate AMR facility, would involve site disturbance and excavation over a larger site area about 20 acres. Site work at that scale could result in substantial earth impacts, although reasonable mitigation for such impacts is available and could include:

- Implementing a site selection process that identifies sites with a minimal need for construction on steep slopes or geologically critical areas (e.g. steep slopes, landslide hazards, unstable foundation conditions)
- Conducting appropriate geotechnical engineering during design and construction to assure stable long-term foundation and site conditions
- Implementing best management practices during construction to minimize the extent of and duration that disturbed soils are exposed

Alternative 3, which includes the potential for developing a new Northeast Recycling and Transfer Station and regional processing capacity, and Alternative 4, which includes the potential of developing new composting, AD, AMR, or other facilities at existing transfer stations and regional processing capacity, would have a greater potential for earth impacts than Alternatives 1 and 2, which would involve fewer major new infrastructure developments. Overall, though, as Plan recommendations are implemented in the future, mitigation measures may be proposed where earth impacts are identified during project-specific environmental review, and permits required for improvements would specify appropriate conditions under which earth impacts would be fully mitigated.

4.4.1.3 Significant Unavoidable Adverse Impacts

With implementation of available mitigation, no significant unavoidable earth impacts are likely.

4.4.2 Air

4.4.2.1 Affected Environment

Regional air quality conditions are described in Section 4.2.2.

The primary air quality issues associated with transfer and processing facilities are the potential for fugitive dust emissions during construction of improvements or new facilities; vehicle emissions during operation

(primarily carbon monoxide and ozone-producing chemicals); and the potential for odor from solid waste and organics (yard and food waste) handling and storage.

Dust is minimized at county and private transfer stations by such measures as prohibiting dusty loads of solid waste, and spraying waste handling areas with a mist as necessary to suppress dust.

There are currently no significant odor problems at King County or private transfer stations. Although some odors occur, they are minimized and largely confined on site through a number of mitigation measures. These measures include:

- Prohibiting delivery of highly odorous loads of solid waste to transfer stations
- Minimizing storage time of solid waste on site
- Using leak-resistant waste containers
- Regularly washing of waste handling areas and the inside of waste containers.

In addition, at the county's Bow Lake, Enumclaw, Factoria, Shoreline, and Vashon transfer stations, waste handling areas are enclosed.

4.4.2.2 Impacts and Mitigation Measures

Under Alternative 3, the option to construct a new Northeast Recycling and Transfer Station would increase the potential for temporary fugitive dust impacts during construction. Construction of new composting, AD, and AMR facilities under Alternative 4 could also lead to temporary fugitive dust impacts in the vicinity of construction. Under Alternative 2, the construction of new drop boxes and, under Alternatives 2, 3, and 4, the construction of temporary debris management sites could also lead to temporary dust impacts near construction areas. None of the potential temporary impacts due to construction dust are likely to be significant, however, because effective mitigation measures are available and routinely applied during construction. These mitigation measures include:

- Regularly sweep and/or water roads and other dusty surfaces subject to vehicular traffic
- Cover and/or hydro-seed exposed areas of soil
- Apply soil stabilizers to exposed areas of soil
- Minimize the area of soil disturbed at any one time

As noted in Section 4.2.2.2, self-haul and commercial traffic to and from transfer stations represents only a small percentage of total traffic in the region, so that significant changes in regional levels of CO or ozone are unlikely to result from modifications to the transfer and processing system. Nonetheless, the lack of increase in the transfer station capacity in the Northeast area under Alternative 1 and potentially also under some options in Alternatives 2 and 3 could increase congestion and waiting times at Houghton, Factoria, Shoreline, and Renton stations thereby increasing vehicle emissions at those locations and contributing to an incremental decline in air quality. Under Alternative 4, if composting, AD, or AMR facilities are developed

at transfer stations, cumulative travel distance and times for materials hauling would likely be reduced compared to Alternative 1 with a corresponding incremental decrease in vehicle emissions and air quality impacts.

As described in the preceding section, odors currently are not a significant impact at King County transfer stations because of the mitigation measures employed. These measures would continue to be implemented at transfer stations.

Under Alternative 4, the Solid Waste Division could process food scraps, compostable paper, and yard waste through composting at some transfer stations (such as Vashon), as needed. Under Alternative 2, the private sector would continue to process food scraps, compostable paper, and yard waste through composting and develop additional regional composting capacity and/or technology improvements, as needed.

Composting processes are designed to be either anaerobic or aerobic. Composting under anaerobic conditions (the absence of oxygen), including AD, results in the generation of odorous gaseous compounds that include a variety of reduced sulfur compounds (e.g. hydrogen sulfide), fatty acids, aromatic compounds, and amines (derivatives of ammonia) (Ohio 1999). Decomposition of food waste appears to have an especially high potential for odor generation.

Composting under aerobic conditions generates much less odor than anaerobic composting, although anaerobic conditions, with consequent odors, can occur with otherwise aerobic composting if oxygen availability is restricted. For example, aerobic composting where the composting materials are formed into windrows (lines of material) can result in anaerobic conditions in the windrow cores where oxygen availability typically is limited. Also, aerobic windrow composting is commonly done outside of enclosed structures, where, if anaerobic conditions develop in the composting process, odorous compounds can be released into the atmosphere. Both types of composting processes can also generate air quality and odor impacts during handling and storage of organics (yard and food waste) and solid waste.

Because of the potential for odor generation that exists with either AD or aerobic composting, existing and new public or private composting facilities could generate odor impacts. Measures are available, however, that have been successful in limiting odor impacts from composting activities, and these measures include:

- Minimizing the time that material is stored onsite prior to composting
- Conducting composting within enclosed vessels or buildings where odorous compounds can be captured and treated (composting which intentionally uses an anaerobic process typically takes place in enclosed vessels)
- Maintaining a correct nutrient balance (primarily carbon to nitrogen) and temperature in aerobic composting to assure adequate oxygen availability and microorganism activity
- Maintaining appropriate moisture content in aerobic composting sufficient for microorganism survival but not excessively high that oxygen flow is impeded

- For windrow composting, sizing windrows to allow for adequate aeration into the windrow interior and turning windrows at an appropriate rate
- If necessary, in aerobic composting using forced aeration and/or covering windrows with an aerobic biofilter (e.g. yard waste or cured compost)
- If necessary, using chemical catalysts or oxidizers to control odorous compounds
- Conducting monitoring for odorous compounds within and/or along the boundaries of composting facilities and/or in potentially affected communities

In implementing mitigation to control potential odors, any existing or new composting facility would need to achieve sufficient odor control to meet PSCAA's requirement that no air contaminant may be emitted that "unreasonably interferes with enjoyment of life and property."

The limited potential for air quality and odor impacts from AMR facilities can be mitigated by confining the recovery and related handling/storage activities within an enclosed structure.

With implementation of mitigation measures, including best available air pollution and odor control technologies, air quality and odor impacts would not be significant.

Based on calculations performed for the South County Recycling and Transfer Station (King County 2016b), the new emissions resulting from construction and operation of a new Northeast Recycling and Transfer Station under Alternative 3, would probably be about 2,000 metric tons of carbon dioxide equivalent per year over a 50-year lifespan of the facility. This is slightly less than 0.01 percent of the current total greenhouse gas emissions in King County (Stockholm Environment Institute 2012).

Under Alternative 4, although construction and operation of composting facilities, AD facilities, and AMR facilities at transfer stations would result in new greenhouse gas emissions, these facilities also could reduce greenhouse gas emissions relative to landfilling the same material (Stockholm Environment Institute 2012) by avoiding the need to transport materials to more remote composting facilities, Cedar Hills Regional Landfill, a centralized waste-to-energy facility, or an out-of-county landfill; by avoiding virgin manufacture of materials that can be reused or recycled; by offsetting energy demand by converting residual digestion gas to energy. The potential offset in demand would primarily relate to the potential freeing up of regional non-greenhouse-gas-emitting hydropower to offset greenhouse-gas-emitting power sources in the western U.S. grid.

Alternatives 2, 3, and 4, by increasing the efficiency of the overall county transfer and processing system, likely would lead to lower greenhouse gas emissions systemwide compared to Alternative 1: No Action. Alternative 4, by enhancing resource recovery at transfer stations is likely to lead to lower greenhouse gas emissions systemwide compared to Alternatives 2 and 3.

4.4.2.3 Significant Unavoidable Adverse Impacts

With implementation of available mitigation measures, no significant adverse unavoidable air impacts should occur.

4.4.3 Water

Impacts on water resources could occur as a result of replacement of the Houghton and Algona Transfer Stations, construction of a new South County or Northeast Recycling and Transfer Station and possible improvements at private recycling and composting facilities if needed to accept additional recyclables from King County. The improvements are unlikely to result in significant adverse impacts on groundwater, so this section focuses primarily on potential surface water impacts.

Discussion of the types of wetlands, and potential impacts and mitigation measures, is provided in Section 4.4.4, Plants and Animals.

4.4.3.1 Affected Environment

Leachate at all King County and private transfer stations and recycling facilities is directed to the county's sanitary sewer system. At the county's Vashon Recycling and Transfer Stations, where there is no adjacent sewer line, potentially contaminated runoff is collected and transported by tank truck to the sanitary sewer system. At the county's Renton Transfer Station, because it is a lower elevation than the sewer line, potentially contaminated runoff is collected and then pumped into the sanitary sewer line.

The affected environment at each of King County's currently operating and potential recycling and transfer stations is described below. Because sites for replacement capacity in the Northeast service area that could replace the Houghton Transfer Station have not been selected, it is not included in the descriptions below. The site selected for the planned South County Recycling and Transfer Station is next to the Algona Transfer Station.

Algona Transfer Station

King County has selected the site at 35101 West Valley Highway South, next to the existing Algona Transfer Station, as the location for the proposed South County Recycling and Transfer Station that will serve south county residents and businesses. The new facility is expected to begin operations in 2022.

The site for the replacement facility is within an area with high susceptibility for groundwater contamination. The site is next to a critical aquifer recharge area, which is to the west on the steep bluffs (King County 2016b).

Two tributaries to Mill Creek, both known as Algona Creek, are present on the site. A jurisdictional ditch flows north from a wetland adjacent to the Algona Transfer Station and connects to one of the tributaries just east of the site. The wetland is connected to the existing Algona Transfer Station by a culvert. Stormwater is captured in a stormwater pond and a sediment settling pond on the site. A bio-filtration swale lies parallel to West Valley Highway South along the eastern property boundary in the northeastern portion of the site (King County 2016b).

Bow Lake Recycling and Transfer Station

The Bow Lake Recycling and Transfer Station, in Tukwila, was built on the site of the former Bow Lake transfer station. In July 2012, solid waste transfer operations transitioned from the old facility to the current one.

There are no surface water bodies on the site of the Bow Lake Recycling and Transfer Station. A wetland reconnaissance confirmed no wetlands are present on the site or the adjacent WSDOT property. Three streams and several wetlands are located in the vicinity of the site (Adolfson 2004).

Enumclaw Recycling and Transfer Station

No streams or wetlands have been identified on the site of the Enumclaw Recycling and Transfer Station (WDFW. 2017a). A biofiltration swale was built as part of the project. The site is in an area of medium to high susceptibility to groundwater contamination (King County 2017c).

Factoria Recycling and Transfer Station

The Factoria Recycling and Transfer Station, which began operating in 2016, was built on the site of the former Factoria transfer station and contiguous property to the northwest. The combined properties (the site) drain generally northward to unnamed creeks, which are designated 0263 and 0263A by the City of Bellevue. Stream 0263 is the only stream on the site. It conveys water past the site through a culvert under the Puget Sound Energy access road at the east end of SE 30th Street and then into East Creek. East Creek drains into Richards Creek, which empties into Mercer Slough and Lake Washington. Three ditches are located on the site; two of the ditches were considered jurisdictional based on the initial jurisdictional determination by the U.S. Army Corps of Engineers. (HDR 2012).

Stormwater runoff is the only source of water runoff expected at the site. The site plan includes drainage features designed to collect, convey, treat, and detain this runoff. Treatment and detention features include rain gardens, bioretention swales, and a detention vault. After treatment and detention, the stormwater runoff is discharged into the existing conveyance system in SE 30th Street, which discharges into an unnamed tributary to East Creek. (HDR 2012).

Houghton Transfer Station

The 2006 Solid Waste Transfer and Waste Management Plan Solid Waste Division has recommended closing the Houghton Transfer Station, which was built in the 1960s, and building replacement capacity elsewhere in northeast King County. A new large full-service transfer station would take about 8 years to complete—from siting and design to permitting and construction. Several improvements were completed at the Houghton station in 2011. Upgrades were made to the existing sewer pump station, including the installation of a vault to store contaminated storm water that significantly decreases the possibility of overflows during normal and inclement weather. The steep earthen slopes leading into and out of the

tunnel under the transfer building were stabilized to prevent erosion. Improved lighting and pavement striping were also installed (King County 2016d).

Renton Transfer Station

There are no streams or wetlands known on the site of the Renton Transfer Station, which was built in the mid-1960s (WDFW 2017a). The site is susceptible to groundwater contamination and is in a wellhead protection area (King County 2017c). The City of Renton has expressed concern about the potential for groundwater contamination at the Renton Transfer Station, because the station is located near the city's sole source aquifer (King County 1991). Soils at the point of surface water discharge are monitored, and there is currently no evidence of such contamination.

Shoreline Recycling and Transfer Station (formerly First Northeast)

The Shoreline Recycling and Transfer Station was built in 2008 to replace the First Northeast transfer station. It includes a waste transfer building, scale facility, recycling areas, and transfer trailer storage areas. The remainder consists of undeveloped lands, landscaping, and a creek buffer, as well as adjacent stormwater facilities.

A small stream named Thornton Creek crosses the western portion of the Shoreline facility site. Water quality and flows in Thornton Creek are affected by stormwater runoff from upstream areas. Runoff from the transfer station is treated by a stormwater filtration system that releases water to the creek at a rate that prevents erosion and flooding.

Vashon Recycling and Transfer Station

The Vashon Recycling and Transfer Station was constructed in 1999 at the north end of the closed Vashon Landfill. There is an extensive surface water pond and biofiltration system that was installed when the facility was constructed. It is bordered on the other sides by Island Center Forest. There are no known streams or wetlands on the site (WDFW 2017a, 2017b)

4.4.3.2 Impacts and Mitigation Measures

The City of Renton has expressed concern about the potential for groundwater contamination at the Renton Transfer Station because it is near the city's sole source aquifer. Leachate is pumped to a county sanitary sewer line, and there is no evidence that operation of the station has affected the aquifer. Closure of the Renton Transfer Station would eliminate that facility's potential for affecting groundwater.

Short-term impacts would occur during construction of improved and new transfer stations (Alternatives 2, 3 and 4), including potential for erosion and sedimentation. Erosion and sedimentation potential could be mitigated by best management practices, including those needed to protect fish species listed under the Endangered Species Act. Best management practices could include such measures as minimizing areas of exposed soil; hydroseeding or otherwise stabilizing exposed areas where no activity is planned in the near

future; limiting major construction to the dry season; installing stormwater conveyance channels and temporary sedimentation ponds; and placing berms, straw bales, or silt fences to slow down stormwater runoff and trap eroded sediments. Specific requirements for surface water management are described in the King County Surface Water Design Manual (King County 2016a).

Impervious surface areas would increase on the sites of improved or new transfer stations, increasing the volume and rate of stormwater runoff. Specific requirements for surface water management are delineated in the King County Surface Water Design Manual (King County 2016a), as well as in similar state and local regulations. The required stormwater facilities include both a means of peak runoff control (detention pond, tank, or vault) and treatment of stormwater runoff (wet pond, wet vault, or biofiltration swale). Design guidelines for stormwater control facilities are much more stringent than when the original transfer stations were constructed and would mitigate for impacts of increased impervious surface areas.

If composting, AD, and AMR facilities are sited at appropriate existing and new recycling and transfer stations (Alternative 4) . They could require additional land clearing and could temporarily affect water quality during construction, and could require additional impervious surface area. Erosion and sedimentation potential and stormwater impacts could be mitigated by best management practices and stormwater treatment, as stated above. Similar impacts would occur for new private regional composting facilities developed in King County or elsewhere. All sites for improved and new transfer stations include drainage features designed to collect, convey, treat, and detain stormwater runoff.

4.4.3.3 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are expected under any of the alternatives.

4.4.4 Plants and Animals

4.4.4.1 Affected Environment

Impacts on plants and animals could occur as a result of replacement of the Houghton and Algona Transfer Stations, construction of new South County and Northeast Recycling and Transfer Stations, and possible improvements at private recycling or composting facilities, if needed, to accept additional recyclables or organics (yard and food waste). The following sections briefly describe existing vegetative communities and fish habitat, if any, at the site of each transfer station. Because a site has not been selected for replacement capacity in the Northeast service area, it is not included in the descriptions below.

Due to the high level of human activity and previous habitat disturbance and removal, vegetative communities within and near the sites are probably used primarily by wildlife typical of urban and suburban areas. That wildlife includes birds such as robins, towhees, chickadees, woodpeckers, starlings, crows, and hawks; small mammals such as opossums, raccoons, and shrews; and common reptiles and amphibians. No threatened, endangered, or other special-status plant or wildlife species are known to occur, or would be expected to occur, on the sites. (WDFW 2017b; WDNR 2017).

Algona Transfer Station

The proposed South County Recycling and Transfer Station would be built on developed and undeveloped property adjacent to the existing Algona Transfer Station. A former gravel quarry and processing facility occupies part of the proposed site. The quarry bottom is sparsely vegetated with herbaceous weed species, and the quarry walls are vegetated with a variety of grasses and weeds. The remaining developed portion of the site is currently leased by King County to a landscaping supplier. Piles of topsoil, fill soil, pallets of landscape rock, a small office building, a garage, and driveway occupy the non-quarry developed section of the site (King County 2016b).

The undeveloped portion of the site steeply rises immediately from the edge of the developed area into an extensive forest to the south, west, and northwest. The forested greenbelt that extends onto the site is a lowlands conifer-hardwood forest. The forest is dominated by black cottonwood, big-leaf maple, red alder, western red cedar, and red elderberry. This urban greenbelt is mapped by WDFW as a Priority Habitat Biodiversity Area and Corridor (WDFW 2017a) and recognized in the King County Comprehensive Plan Open Space System 2016 Map (King County 2016c).

Wildlife observed at the site during winter/spring 2013 field visits include redwinged blackbird (*Agelaius phoeniceus*), American robin (*Turdus migratorius*), violet-green swallow (*Tachycineta thalassina*), song sparrow (*Melospiza melodia*), American crow (*Corvus brachyrhynchos*), Anna's hummingbird (*Calypte anna*), killdeer (*Charadrius vociferus*), red-tailed hawk (*Buteo jamaicensis*), bullfrog (*Rana catesbeiana*), and Pacific treefrog (*Pseudocris regilla*). Wildlife also observed at the site and in the wooded slopes immediately to the west during winter/spring 2013 field visits include glaucous-winged gull (*Larus glaucescens*), bufflehead (*Bucephala albeola)*, mallard (*Anas platyrhynchos*), black-capped chickadee (*Poecile atricapilla*), American goldfinch (*Carduelis tristis*), golden-crowned kinglet (*Regulus satrapa*), winter wren (*Troglodytes troglodytes*), Steller's jay (*Cyanocitta stelleri*), common raven (*Corvus corax*), bushtit (*Psaltriparus minimus*), dark-eyed junco (*Junco hyemalis*), bald eagle (*Haliaeetus leucocephalus*), and brown creeper (*Certhia americana*) (King County 2016b).

Evidence (e.g. nests, scat, and tracks) was observed during winter/spring 2013 field visits of coyote (C*anis latrans*), black-tailed deer (*Odocoileus hemionus* ssp. *columbianus*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and marsh wren (*Cistothorus palustris*) on the wooded slopes immediately adjacent to the Alternative 2 site (King County 2016b).

No fish were observed on site during field visits in winter/spring 2013 and September 2015, although one of the Algona Creek tributaries and its associated wetland have the potential to support resident and anadromous fish. Fish habitat is currently limited due to the low number and low quality of pool habitats. A fish passage barrier (culvert) occurs in the central portion of the site. Fish access to Algona Creek from Mill Creek may also be currently blocked by one or more culverts, some of which may be fish-passage barriers (King County 2016b). The closest documented occurrence of salmonids (coho salmon) is approximately 4,000 feet downstream. SalmonScape mapping also shows modeled presence of steelhead, Chinook and

coho salmon approximately 4,000 feet downstream, based on stream gradient and lack of downstream anadromous barriers (WDFW 2017b).

Bow Lake Recycling and Transfer Station

The primary vegetation on the Bow Lake facility site is deciduous trees. As the station is within two miles of Sea-Tac International Airport, trees were not planted during recent reconstruction to avoid providing habitat that could harbor birds that could endanger air traffic. Field studies in 1994 identified two small wetlands, classified as forested wetlands, in the western portion of the site, and one larger forested wetland in the southern portion. No fish habitat was identified. (Adolfson 2004)

No threatened or endangered species are known to be on the project site. However, the WDFW database documents the presence of a bald eagle nest located approximately 0.5 mile west of the site, near the north end of Angle Lake. The nest was documented in 1999 but was not active during WDFW surveys conducted in 2001 (Tukwila 2005). The Green River, located about 0.25 mile east of the facility site, provides habitat to numerous fish species, including salmon (fall Chinook, coho, chum, sockeye), steelhead, bull trout, Dolly Varden, and various other species (WDFW 2017a). The Puget Sound Evolutionarily Significant Unit Chinook salmon is federally listed as a threatened species and is a state candidate species (NOAA 2017; WDFW 2017a). The Puget Sound Distinct Population Segment bull trout is listed as a threatened species by the U.S. Fish and Wildlife Service (USFWS) and has been observed in the lower Green River historically, but observations are now rare and generally only include individual specimens (King County 2006b).

Enumclaw Recycling and Transfer Station

No threatened or endangered species are known to be on the project site. However, the WDFW database documents the presence of a regular concentration of elk. The site is within the Green/Cedar River winter elk range (WDFW 2017a).

Factoria Recycling and Transfer Station

A small emergent marsh, a portion of which is classified as a forested wetland, is located in the northern portion of the existing site at the confluence of Creeks 0263 and 0263A (see Section 4.4.3, Water). An upland deciduous tree stand occurs on moderate to steep slopes (less than 40 percent slope) in the western portion of the site. Two small forested wetlands, one associated with a drainage channel and one with Creek 0263A, are located within this wooded area.

One active red-tailed hawk nest was observed in December 2010 in a black cottonwood tree located approximately 40 feet from SE 32nd Street and 220 feet southeast of the scale house. A pair of red-tailed hawks was observed at the nest and in the vicinity of the nest in March and April 2011. The nesting tree is approximately 14 inches in diameter at breast height and is on top of the slope. According to a personal communication with WDFW, as long as nesting and foraging opportunities are available in the project

vicinity, mitigation is not currently required. Based on field reconnaissance, suitable habitat does exist in the project vicinity to afford the red-tailed hawk opportunities for nesting and foraging (HDR 2012).

Within the Factoria Transfer Station site, the lack of defined stream channels and shallow flows on the densely vegetated hillside precludes fish passage. This concurs with the classification of the channel upstream of the culvert under the Puget Sound Energy access road as non-fish bearing by the City of Bellevue (Bellevue 1993), and no salmon species are documented to occur within the project area (WDFW 2017a). Under the state typing system, this section of the stream is classified as Type Np, to indicate that the stream is non-fish bearing and is perennial (HDR 2012).

Houghton Transfer Station

The WDFW database documents the presence of a 600-acre park (Bridle Trails State Park) designated as a biodiversity area and corridor adjoining the Houghton Transfer Station to the south. The Bellevue powerline right-of-way provides a migration corridor to and from this area, which is known to be a home to coyotes, raccoons, other small mammals and many bird species (WDFW 2017a).

Renton Transfer Station

There are no wetlands or priority habitats on the site of the Renton Transfer Station. The WDFW database documents the presence of a wetland containing a freshwater pond east of the transfer station (WDFW 2017a).

Shoreline Recycling and Transfer Station (formerly First Northeast)

Field studies in 1994 identified what appear to be small linear wetlands in the scrub-shrub vegetation associated with Thornton Creek, which crosses the western portion of the site of the Shoreline Recycling and Transfer Station (see Section 4.4.3, Water). Upland vegetation on the site includes plantings of pines, shrubs, and grasses in the vicinity of the transfer building; deciduous trees west of Thornton Creek; and invasive vegetation in other areas of the site. There is no fish habitat in the portion of Thornton Creek on the Shoreline facility site (WDFW 2017b), but salmonids have been observed downstream. (King County 1994)

Vashon Recycling and Transfer Station

There are no wetlands or priority habitats on the site of the Vashon Recycling and Transfer Station (WDFW 2017a).

4.4.4.2 Impacts and Mitigation Measures

Construction of improved and new transfer stations (Alternatives 2, 3 and 4) would result in loss of vegetation and wildlife habitat in disturbed areas. Only common and urban species are known to be present. Landscaping could incorporate vegetation of value to native wildlife. Areas temporarily disturbed by construction could be revegetated with native plants of value to wildlife.

The proposed improvements and facilities would have to be constructed and operated in a manner that does not harm fish species listed under the Endangered Species Act or their habitat. Construction could be timed to avoid periods of salmonid spawning or migration. A permit from the U.S. Army Corps of Engineers and a wetland rating from Ecology will be required if any wetlands are to be filled. If a Corps permit is needed, a biological assessment may have to be prepared. The biological assessment would determine if the proposed improvement has potential to affect downstream habitat for listed species. Depending on the results of the assessment, consultation with the National Marine Fisheries Service may be required to identify measures to mitigate impacts.

Continued operation of the existing solid waste facilities would have no direct or indirect impacts on plants and animals. Leachate and stormwater are and will be managed to protect salmonid habitat downstream of the county's solid waste facilities.

If composting, AD, and AMR facilities are sited at appropriate existing and new recycling and transfer stations (Alternative 4), . As with any improvements, potential impacts on protected species and terrestrial and aquatic habitats would have to be addressed and measures to protect those resources would be identified.

4.4.4.3 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are expected under any of the alternatives.

4.4.5 Energy and Natural Resources

4.4.5.1 Affected Environment

The analysis of impacts in this section focuses on the use of petroleum-based fuels in the transport of solid waste because the alternatives for facility improvements would not have notable impacts on other types of energy or natural resources. Petroleum-based fuels result from the processing of crude oil, a non-renewable natural resource. The availability and affordability of petroleum-based fuels during the planning period are uncertain.

4.4.5.2 Impacts and Mitigation Measures

In general, impacts on overall fuel use are least when cumulative vehicle travel distance and time are minimized within the overall solid waste system. As indicated in Sections 4.2.8 and 4.4.8, Transportation, cumulative vehicle travel distance and time would be minimized by increasing service levels, reducing queuing, increasing the capacity of facilities, by distributing facilities throughout the service area, and by compacting waste before hauling to disposal.

The lack of increase in the transfer station capacity in the Northeast area under Alternative 1 and potentially also under some options in Alternatives 2 and 3 could increase congestion and waiting times at the Houghton, Factoria, Shoreline, and Renton stations, thereby increasing fuel use systemwide in comparison

to the Alternative 3 option to construct a new Northeast Recycling and Transfer Station. Under Alternative 4, if composting, AD. and AMR facilities are developed at transfer stations, cumulative travel distance and times for materials hauling would likely be reduced compared to Alternative 1, with a corresponding decrease in comparative impact.

Because all alternatives would improve systemwide efficiency compared to the existing condition, no significant adverse impact on fuel use would likely occur under any alternative.

4.4.5.3 Significant Unavoidable Adverse Impacts

Significant unavoidable adverse impacts on fuel use are unlikely to occur.

4.4.6 Environmental Health

4.4.6.1 Affected Environment

The affected environment for environmental health (noise and human health) is described in Section 3.2.6.1 above.

4.4.6.2 Impacts and Mitigation Measures

Noise

Construction and operation of a new Northeast Recycling and Transfer Station under Alternative 3 would increase noise levels in the immediate vicinity of the station and also increase noise on surrounding roads as a result of self-haul and commercial traffic. Construction would last about two years. In most local jurisdictions within King County, construction noise is exempt, with the typical exception that the exemption applies only during daylight hours. Construction noise would, in any case, be temporary and typically would not be considered significant.

Continuing to operate the Houghton Transfer Station under Alternative 1, and possible under some options under Alternatives 2 and 3, would extend any existing noise impacts from traffic and facility configuration into the future as long as the station is in similar use. Although noise levels during operation from additional traffic on roads that are already heavily travelled are unlikely to be significant, increases in noise levels in the immediate vicinity of the stations have the potential to be moderate to substantial depending on the proximity of noise-sensitive land uses. For example, the EIS for the new South County Recycling and Transfer Station (King County 2016b) estimated noise increases of up to 6dB during operation under one alternative, which was considered a moderate increase.

Changes in use of existing transfer stations would result in changes in traffic volumes and timing on roads surrounding the stations. Where volumes increase, noise levels would also increase, whereas the converse would take place where volumes decrease for example, if the Houghton station was closed or was limited to self-haul only or commercial only. In general, as described in Section 3.2.6.2, the changes in cumulative noise levels (ambient plus transfer station-related) due to these changes is unlikely to be

significant because changes in traffic volumes are unlikely to be a substantial fraction of the total traffic volumes on these roads. During project-specific design and review, if substantial noise increases resulting in unacceptable impacts are projected to occur, various measures could be incorporated into facility site selection, design, and operation to mitigate potential impacts:

- Select a project site that limits the proximity of noise-sensitive land uses
- Select a project site of sufficient size to allow for adequate buffering from noise-sensitive land uses
- Limit hours of construction to comply with local noise ordinance exemptions
- Limit use of equipment, if needed to meet local noise restrictions during construction
- Employ noise absorption and attenuation design features to reduce off-site sound levels
- Limit on-site equipment idling and the need for back-up alarms through appropriate design of on-site traffic routes
- Use rubber-tired rather than tracked equipment, where possible

Application of mitigation measures can typically reduce noise impacts below the level of significance, however detailed noise analysis during future project-specific design would be necessary to determine specific impacts and necessary mitigation measures.

Locating composting, AD, and AMR activities within enclosed structures, and applying appropriate mitigation measures similar to those listed above, should limit noise impacts from such activities below the level of significance.

Human Health

Establishing temporary debris storage sites (Alternatives 2, 3, and 4) could affect human health locally by concentrating large amounts of material, some of which could be hazardous to human health. These impacts can be mitigated by implementing some standard mitigation measures including:

- Locating sites so that sufficient buffer distance is provided from residences and other potentially health-sensitive land uses
- Covering incoming loads of debris, whenever possible
- Minimizing the time between delivery and eventual disposal of debris
- Implementing a stormwater control system to collect and treat runoff that comes in contact with debris
- If necessary, covering or enclosing potentially hazardous debris during inclement weather to minimize movement of risky material off-site by wind or water

With appropriate mitigation to avoid health impacts local to the debris sites, emergency debris sites could provide some overall beneficial effect on health risk by allowing for proper and safe handling of potentially hazardous debris during emergencies.

Overall, the alternatives, by improving the efficiency of the transfer and processing system would likely result in some marginal reduction in health risks in King County.

4.4.6.3 Significant Unavoidable Adverse Impacts

With the implementation of available mitigation, significant unavoidable adverse noise and human health impacts would be unlikely to occur.

4.4.7 Land and Shoreline Use

4.4.7.1 Affected Environment

The affected environment for land and shoreline use is described in Section 4.2.7.

4.4.7.2 Impacts and Mitigation Measures

Continued operation of the existing solid waste facilities would have no direct impacts on land use, shoreline use, zoning, or land use plans. Potential indirect effects of operations on nearby land uses, such as noise and odors, are described elsewhere in this EIS.

Under the alternatives, the Algona, Houghton, and Renton Transfer Stations would either be closed or would receive minor improvements. Special land use permits would be required only for major improvements, so proposed changes to those three facilities would not require special use permits.

All four alternatives would replace the Algona Transfer Station with a new South County Recycling and Transfer Station, which would result in some construction-related impacts. According to the EIS for the new South County Recycling and Transfer Station (King County 2016b), temporary impacts would occur during construction. Construction activities could affect adjacent land uses through minor, localized increases in noise, dust, odors, traffic and emissions. In addition, existing structures (e.g., administrative building and storage sheds) may be demolished. Permits for construction would be required from the City of Algona. In addition, the land use at the 18.9-acre South County Recycling and Transfer Station site would transition from primarily vacant land with a portion used by a landscape supplier to a recycling and transfer station, but no land use impacts are likely to occur from facility operation. It is anticipated that decommissioning, and possible deconstruction, of the Algona Transfer Station could occur after the new transfer station is operating. Deconstruction would occur in the developed portion of the Algona Transfer Station site, and no land use impacts are expected.

The proposed South County Recycling and Transfer Station would be considered an “essential public facility” for land use permitting and would, therefore, require a conditional use permit in the C-3 (Heavy Commercial) zone. According to the EIS prepared for the replacement facility, the facility would likely meet the conditional use criteria and be permitted. In addition, the new facility would be consistent with Algona’s comprehensive plan. No indirect or cumulative land use impacts are likely to result from replacing the Algona Transfer Station with the South County Recycling and Transfer Station, and no mitigation measures

are required. Neither the existing transfer station nor the proposed facility is within or near a designated shoreline resource, so there would be no effect on shoreline use.

Alternative 3 includes an option to develop a new Northeast Recycling and Transfer Station. King County has not selected a site for the proposed Northeast facility. The Solid Waste Division would go through a process to identify potential suitable sites in the Northeast service area, using the guidelines in King County's Solid Waste Facility Siting Plan. The process would include public involvement and preparation of a separate EIS, which would evaluate potential impacts of the proposed Northeast Recycling and Transfer Station. Selected sites would be consistent with the city or county comprehensive plans.

Alternatives 2 and 3 include an option to allow self-haulers and commercial haulers to use a combination of facilities, including the existing Houghton station and smaller separate facilities (self-haul-only or commercial-only stations). The smaller facilities would likely be sited in accordance with applicable land use regulations and plans, and would be unlikely to adversely affect land or shoreline uses. Similarly, development of new facilities under Alternative 4, such as composting, AD, and AMR would need to comply with applicable land use plans and regulations, so they would be unlikely to impact land or shoreline uses.

To minimize the potential for incompatibility with nearby land uses (off-site impacts), the county's site selection process for new facilities should prioritize sites with sufficient size or in a location to provide adequate separation from sensitive land uses.

Construction of new facilities could result in the disturbance of cultural resources. To minimize the potential for this impact, the following measures could be implemented:

- During the site selection process, to minimize the risk of selecting a site containing significant cultural resources, conduct an increasingly detailed cultural resources assessment during site screening, including on-site investigations of finalist sites
- If necessary, prior to site disturbance at the selected site, conduct further detailed on-site cultural resource investigations and identify, evaluate, and appropriately handle any identified cultural artifacts
- During construction, conduct site monitoring by a competent archaeologist
- If unanticipated cultural artifacts are encountered during construction, cease construction and identify, evaluate, and appropriately handle encountered cultural artifacts prior to re-commencing construction
- Conduct all cultural resource activities in consultation with state and tribal cultural resources entity, as appropriate

Construction of new or expanded facilities has the potential of creating visual quality and light and glare impacts. Such impacts could include blockage of, or intrusion into, important views or the introduction of visually incompatible elements into the visual landscape.

For all new facilities, the following mitigation measures could be considered to reduce or avoid visual impacts:

- During site selection, prioritize sites that have limited numbers of visually sensitive land uses within the site's viewshed.
- During site selection, only consider sites with sufficient size, location, and topography to allow for adequate visual buffering from visually sensitive land uses.
- Minimize the visual incompatibility of new facilities with the adjacent constructed and natural landscape by careful design of structure characteristics (location on the site, minimal and downward-focused lighting, building materials, façade, and bulk/shape).

4.4.7.3 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to land use are expected to occur under any of the four alternatives. If mitigation measures as described above are implemented, significant unavoidable adverse impacts on cultural resources are unlikely to occur. With implementation of mitigation measures described above, adverse visual impacts of new facilities can be limited, and are unlikely to be unavoidably significant.

4.4.8 Transportation

4.4.8.1 Affected Environment

The general affected environment for transportation is described in Section 3.2.8.

Table 4-2 under service-level alternatives shows estimated traffic levels at transfer stations in 2016 and 2040 (under Alternative 1), based on county transaction records and other assumptions explained in the footnotes to the table. There are four types of traffic at transfer stations: self-haulers, commercial haulers, King County transfer trucks, and a small amount of employee/visitor traffic.

4.4.8.2 Impacts and Mitigation Measures

Alternative 1

The final supplemental EIS for the Final 2006 Solid Waste Transfer and Waste Management Plan (King County 2006a) contains a description of the anticipated impacts associated with implementation of the approved 2006 solid waste plan, which is similar to Alternative 1 described in Section 4.3, facility improvement alternatives, in this EIS.

From an overall programmatic perspective, Alternative 1 would result in the reduction of traffic on roads in the vicinity of transfer stations that would be closed (Algona and Renton), and would result in an increase of traffic in the vicinity of new stations (South County). The new transfer station will be sized to accommodate the increase in daily traffic in order to maximize the efficiency of on-site traffic flow and to minimize off-site queues and potential impacts on general traffic conditions in the immediate vicinity. The facility will also be designed to account for the increased traffic associated with the projected increase in disposed tonnage and recycling activities for the 20-year planning horizon.

The closure of the Renton Transfer Station would benefit the road network serving the station by reducing trips associated with transfer station operations. Currently, the number of trips at the Renton Transfer Station is 506 on an average weekday and 1,836 on an average weekend day (Table 4-2). According to surveys conducted during the 2015 review of the 2006 Solid Waste Transfer and Waste Management Plan, if the Renton station were to close, about 47 percent of survey respondents said they would use Factoria instead, 17 percent said they would use Bow Lake, 7 percent said they would use Enumclaw, and about 4 percent said they would use Algona (King County 2015a). As a result, the roads providing access to those stations would experience increases in average weekday trips and average weekend trips at those facilities. Traffic increases at those stations due to the closure of the Renton station would result in increased daily traffic volumes on roads surrounding the stations and short-term increases in waiting times at the stations, and could result in queues that extend off site with some increased congestion in the immediate vicinity of the stations. In general, however, closure of the Renton Transfer Station is not expected to be a significant factor in capacity constraints at other sites, although keeping it open would ease demand on the transfer system (King County 2015a).

Traffic on the roads leading to the Algona Transfer Station (currently, 690 on an average weekday and 991 on an average weekend day [Table 4-2]) would continue after development of the South County Recycling and Transfer Station.

Continuing to allow self-haulers and commercial haulers to use the existing Houghton Transfer Station "as-is" indefinitely would extend existing transportation impacts into the future, along with the growth in traffic anticipated from projected increases in disposal and recycling tonnage. Table 4-3 shows estimated traffic levels at the Houghton facility in 2016 and 2040, based on county transaction records and other assumptions explained in the footnotes to the table. The Weekday 2040 and Weekend 2040 columns in Table 4-3 represent estimated traffic at the Houghton station assuming traffic would increase in proportion to the projected increase in disposed MMSW and to projected increases in recycling (Plan, Figure 3-3). The likely result is increased wait times, off-site queuing, and overall decreased service levels. Increased wait times may cause increases in self-haul or commercial haul traffic at other transfer facilities and increases in vehicle miles traveled.

Table 4-3. Estimated average daily traffic at Houghton Transfer Station, 2016 and 2040.

Type of Traffic	Weekday 2016	Weekday 2040	Weekend Day 2016	Weekend Day 2040
Houghton				
Commercial Hauler	170	244	18	26
Self-Hauler	502	756	415	627
King County Transfer	54	71	14	21
Employee/Visitor	18	18	18	18

Table 4-3. Estimated average daily traffic at Houghton Transfer Station, 2016 and 2040.

Type of Traffic	Weekday 2016	Weekday 2040	Weekend Day 2016	Weekend Day 2040
Total	744	1,089	465	692

Notes:

Estimates based on similar methods as Table 4-2.

Projected 2040 trips were estimated by increasing 2016 disposal trips in proportion to the projected increase in disposed MMSW by 2040, and by increasing 2016 recycling trips in proportion to the projected increase in recycled materials by 2040 (Plan, Figure 3-3).

Impacts during construction of a new South County Recycling and Transfer Station would include minor impacts from temporary, localized increases in traffic volumes (i.e., construction vehicles, workers' vehicles, and deliveries of construction materials), temporary lane closures, and roadway wear and tear from heavy construction trucks and construction equipment (King County 2016a). Impacts from operation include increased traffic volumes at intersections in the vicinity of the transfer station, at the site access, and along nearby corridors. The Weekday 2040 and Weekend 2040 columns in Table 4-4 represent estimated traffic at the proposed South County Recycling and Transfer Station based on the expanded capacity of the facility and assuming traffic would increase in proportion to the projected increase in disposed MMSW and to projected increases in recycling (Plan, Figure 3-3).

Table 4-4. Estimated average daily traffic at Algona Transfer Station (2016) and South County Recycling and Transfer Station (2040).

Type of Traffic	Weekday 2016	Weekday 2040	Weekend Day 2016	Weekend Day 2040
Algona				
Commercial Hauler	156	224	11	15
Self-Hauler	461	714	941	1,515
King County Transfer	53	70	20	28
Employee/Visitor	20	28	20	28
Total	690	1,036	991	1,587

Notes:

Estimates based on similar methods as Table 4-2.

Projected 2040 trips were estimated by increasing 2016 disposal trips in proportion to the projected increase in disposed MMSW by 2040, and by increasing 2016 recycling trips in proportion to the projected increase in recycled materials by 2040 (Plan, Figure 3-3).

No actions under Alternative 1 would result in any change in the transportation impacts associated with the Vashon and Enumclaw Transfer Stations, or the Cedar Falls and Skykomish Drop Boxes.

Alternative 2

Alternative 2 would close the Algona Transfer Station and replace it with the proposed South County Recycling and Transfer Station in Algona. The potential transportation impacts associated with the closure of the Algona station and the construction and operation of the South County Recycling and Transfer Station are described under Alternative 1.

Compared to Alternative 1, Alternative 2 includes an additional option to allow self-haulers and commercial haulers to use a combination of facilities, including the existing Houghton Transfer Station and smaller separate facilities (self-haul-only or commercial-only stations). Strategies to manage demand may also be implemented at stations to reduce the number of customers using the transfer system or a particular transfer station, or to improve site capacity. Strategies could include:

- Extending operating hours
- Incentive/peak pricing
- Providing wait time information (video feed using existing cameras)
- Mandatory curbside garbage collection
- Lower cost curbside bulky waste collection
- Higher minimum fees
- Lower regional direct fee to encourage haulers to use their own transfer stations
- Banning materials from disposal and recycling
- Adding scales and/or queueing lanes
- Adding stalls/ increase the tip floor capacity
- Providing unloading assistance.

With the combination of facilities and strategies under Alternative 2, overall potential transportation impacts associated with the Houghton Transfer Station would be equal to or less than those of Alternative 1. Option 2 of Alternative 2 would eliminate either commercial truck trips or self-haul trips that would occur at the Houghton station under Alternative 1 (approximately 170 weekday trips and 18 weekend day trips, or approximately 502 weekday trips and 415 weekend day trips, respectively; Table 4-3). However, the commercial truck trips or self-haul trips eliminated at the Houghton station would still occur at a separate commercial- or self-haul only facility at an unknown location. Impacts on streets neighboring that separate facility would be greater than those of Alternative 1. If the Houghton Transfer Station were to change to self-haul only, the potential transportation impacts that would occur at the Houghton station on weekend days, when most residential self-hauling takes place, would continue under Alternative 2, although to a lesser degree than under Alternative 1. In either case, anticipated impacts would increase through time as self-haul trips increase in proportion to expected disposal and recycling tonnage increases through 2040.

According to the 2015 Solid Waste Transfer and Waste Management Plan review (King County 2015a), while restrictions on self-haul might encourage some customers to sign up for curbside collection, the vast

majority of self-haulers are not disposing of regular household waste. Restrictions on self-haul would primarily change traffic and use patterns at transfer facilities, but would not provide a significant overall reduction in the number of customers. The programs aimed at reducing self-haul traffic would tend to reduce potential delays for commercial haulers compared to Alternative 1.

The potential transportation impacts from Alternative 2 associated with the other parts of the transfer system vary by facility, but would be experienced primarily at the Factoria and Shoreline transfer stations, and, to a lesser degree, the Bow Lake Transfer Station. Impacts would consist of a general increase in vehicle miles traveled, minor increases in overall station traffic during both average weekdays and weekend days, but with increased commercial traffic offset by some decreases in self-haul traffic, as compared to Alternative 1.

Under Alternative 2, potential transportation impacts resulting from the closure of the Algona and Renton Transfer Stations would occur as described for Alternative 1. If the Renton station were to remain open, the surrounding road network would continue to experience the existing trips associated with transfer station operations. The Weekday 2040 and Weekend 2040 columns in Table 4-5 represent estimated traffic at the Renton Transfer Station, assuming traffic would increase in proportion to the projected increase in disposed MMSW and to projected increases in recycling (Plan, Figure 3-3). With the Renton Transfer Station open, increases at the other stations due to the closure of the Renton station, described under Alternative 1, would not occur under Alternative 2.

Table 4-5. Estimated average daily traffic at Renton Transfer Station, 2016 and 2040.

Type of Traffic	Weekday 2016	Weekday 2040	Weekend Day 2016	Weekend Day 2040
Renton				
Commercial Hauler	70	101	4	5
Self-Hauler	397	600	1,804	2,707
King County Transfer	23	33	11	16
Employee/Visitor	16	16	16	16
Total	506	750	1,836	2,745

Notes:

Estimates based on similar methods as Table 4-2.

Projected 2040 trips were estimated by increasing 2016 disposal trips in proportion to the projected increase in disposed MMSW by 2040, and by increasing 2016 recycling trips in proportion to the projected increase in recycled materials by 2040 (Plan, Figure 3-3).

According to King County's review of the 2006 Solid Waste Transfer and Waste Management Plan, the Renton, Algona, and Enumclaw Transfer Stations do not share a customer base with the Northeast service area, and traffic in the vicinity of those facilities would not be directly affected by strategies to manage demand in the Northeast.

Transportation impacts associated with collection of commingled recyclables, food scraps, compostable paper, and yard waste and transport to private recyclable processing and composting facilities and from those facilities to end-markets or secondary processing would be similar to Alternative 1. Traffic impacts on streets surrounding those facilities would increase in proportion to the increase in recycling and organics (yard and food waste) tonnage. If new facilities are constructed to provide added processing capacity, private operators would be required to document anticipated transportation impacts associated with the selected site and construction and operation of the facility. Generally, under Alternative 2, traffic impacts would be similar to those described for Alternative 1 in the vicinity of existing facilities, but, as under Alternative 1, would increase around new facilities as commercial truck traffic is directed to the new capacity.

Alternatives 2, 3, and 4 would also allow the county and cities to establish temporary debris management sites where debris from emergencies could be stored for subsequent sorting and recycling or proper disposal. Although sites for such facilities have not been selected, potential impacts include those due to temporary increases in construction traffic, potential road closures during construction, and temporary traffic increases on roadways in the vicinity of the debris site during their operation. Implementation of measures similar to those described above for new drop box facilities would minimize transportation impacts.

Alternative 3

Alternative 3, like Alternatives 1 and 2, would close the Algona Transfer Station and replace it with the proposed South County Recycling and Transfer Station in Algona. The potential transportation impacts associated with the closure of the Algona station and the construction and operation of the South County Recycling and Transfer Station under Alternative 3 are described under Alternative 1.

As under Alternative 2, Alternative 3 provides two options for providing transfer and recycling capacity to serve the Northeast county service area, including allowing self-haulers and commercial haulers to continue using the Houghton transfer station “as is” indefinitely; and to allow self-haulers and commercial haulers to use a combination of facilities, including the existing Houghton station and smaller separate facilities (self-haul-only, commercial-only, or combination stations). The potential transportation impacts associated with keeping the Houghton station “as-is” are discussed under Alternative 1, and those associated with using a combination of facilities are described under Alternative 2.

In addition, a third option considered under Alternative 3 is to site and develop a new Northeast Recycling and Transfer Station. Although a site has not been selected, potential transportation impacts associated with the construction and operation of a full-service Northeast Recycling and Transfer Station would be similar to those generally described above for the planned South County Recycling and Transfer Station. With any new facility developments, additional construction truck traffic of unknown volume may occur to transport excess excavated soil to Cedar Hills Regional Landfill. With a new Northeast Recycling and Transfer Station, traffic at the Houghton Transfer Station (currently 744 on an average weekday and 465 on

an average weekend day [Table 4-2]) would likely be transferred to the roadways providing access to the Northeast Recycling and Transfer Station. However, the location of this facility and the roads that could be affected are currently unknown. The site selection process and mitigation measures developed by the county for the selection of sites for the new transfer stations are expected to minimize significant transportation impacts related to the proposed South County and Northeast Recycling and Transfer Stations.

Like Alternative 2, Alternative 3 allows the Solid Waste Division the option to retain the Renton Transfer Station in some capacity. The impacts in the vicinity of the Renton station, open or closed, would be similar to those described under Alternative 2.

New drop-box facilities may also be sited in unincorporated areas and existing drop-box facilities may be closed under Alternative 3 to better serve residents, as necessary. Although sites for new facilities have not been selected, potential impacts include temporary impacts during construction resulting from temporary increases in traffic volumes near the construction site and potential temporary road closures, and long-term operation impacts resulting from increased traffic volumes on roadways in the vicinity of the facilities. Conducting a site selection process that prioritized sites with adequate nearby road capacity and, if necessary, providing road improvements in the vicinity of selected sites would minimize significant transportation impacts. Traffic impacts from self-haul and commercial truck trips to and from any new facilities would transfer from existing or closed facilities to the area surrounding the new facilities. Overall system trips would not increase due to the new or closed facilities, and total vehicle miles may increase or decrease depending on the location of drop-box sites. All trips would be expected to increase in proportion to the increase in disposal and recycling tonnage.

Impacts from the establishment of temporary debris management sites under Alternative 3 would be similar to those of Alternative 2.

Alternative 4

Under Alternative 4, composting, AD, and AMR technologies constructed or installed at existing and new transfer facilities would create transportation impacts associated with construction. As with construction of new transfer facilities, impacts would include temporary increases in traffic during construction along with potential road closures.

As conceived for co-location at new or existing transfer facilities, composting, AD, and AMR technologies would be scaled according to the transfer station service area. With AMR, no additional commercial or self-haul trips are anticipated from within the service area or from other areas. With AMR technologies, recovery of recyclables from waste brought to technology-equipped facilities is anticipated to be greater than the level expected under Alternative 1. As a result, transfer trailer traffic between the facility and Cedar Hills Regional Landfill is expected to decrease under Alternative 4 compared to all other alternatives, including Alternative 1. However, truck trips necessary to bring recovered recyclables to end-markets or to secondary processors would increase, and, because some of the materials would be at a lower density than

compacted waste, the net result could be a slight increase in the overall number of truck trips. The locations of secondary processors and end-markets are unknown at this time, so overall changes in distance to these locations compared to Cedar Hills Regional Landfill is also unknown. Compared to Alternative 1 and the other alternatives, overall impacts are anticipated to be marginal when taken in the context of the overall traffic levels and conditions on roadways throughout King County.

With AD technologies, recovery of energy and useable residuals can occur from MMSW or from source-separated organics (yard and food waste). If AD technologies focus on organics (mostly food waste) in MMSW brought to technology-equipped facilities, no additional commercial or self-haul trips are anticipated from within the service area, or from other areas. Transfer trailer traffic between the facility and Cedar Hills Regional Landfill is expected to decrease under Alternative 4 focused on organics in MMSW, compared to all other alternatives, including Alternative 1. However, truck trips necessary to bring residuals (if usable) to end-markets or to secondary processors would increase, but the net result would be a net decrease in truck trips because the volume of residuals would be less than the volume of pre-processed feedstocks. If composting or AD technologies focus on source-separated organics (yard and food waste) to be brought to technology-equipped facilities, additional commercial or self-haul trips are anticipated from within the service area compared with Alternative 1, since those trips currently and under Alternative 1 would typically go to private facilities. Transfer trailer traffic between the facility and Cedar Hills Regional Landfill is expected to remain the same under Alternative 4 focused on source-separated organics (yard and food waste), compared to all other alternatives, including Alternative 1. However, truck trips necessary to bring products or residuals to end-markets, to secondary processors, or to disposal would increase. As a result, with a focus on source-separated organics (yard and food waste), total transfer truck trips would increase, with some increased impact on roads in the vicinity of the stations.

As with AMR, the locations of secondary processors and end-markets for composting and AD products or residuals are unknown at this time, so overall changes in distance to these locations compared to Cedar Hills Regional Landfill is also unknown. Compared to Alternative 1 and the other alternatives, overall impacts are anticipated to be marginal when taken in the context of the overall traffic levels and conditions on roadways throughout King County.

Impacts from the establishment of temporary debris management sites under Alternative 4 would be similar to those of Alternatives 2 and 3.

4.4.8.3 Significant Unavoidable Adverse Impacts

At a programmatic level, with careful site selection of new facilities that prioritizes sites with adequate capacity of the surrounding road network and, if necessary, with provision of road improvements if insufficient road capacity exists, no significant unavoidable adverse transportation impacts would occur.

4.4.9 Public Services and Utilities

4.4.9.1 Affected Environment

The general affected environment for public services and utilities is described in Section 3.2.9.

All standard curbside recyclables (newspaper, mixed paper, cardboard, PET and HDPE bottles, glass containers, and tin and aluminum cans) are accepted at the county's eight transfer stations, except at the Algona Transfer Station, where there is no recyclables collection. Separate bins for collecting yard waste are available only at the Shoreline, Bow Lake, Factoria, Enumclaw, Cedar Falls, and Vashon facilities. Additional recyclable materials are collected at transfer stations where facilities exist.

Beginning in January 2016, the Solid Waste Division implemented new regulations for construction and demolition debris recycling and disposal (King County Code 10.30). As with recycling, construction and demolition debris collection and processing is handled primarily by private-sector firms. The Solid Waste Division does not accept construction and demolition waste at its transfer stations or Cedar Hills Regional Landfill, except for incidental amounts. The King County ordinance requires that construction and demolition waste must be taken to a designated privately-operated construction and demolition debris recycling and/or transfer facility.

4.4.9.2 Impacts and Mitigation Measures

Under any of the alternatives, new capital costs would be incurred to maintain and improve the transfer station system. Table 4-6 shows estimated cost information for components of the transfer system alternatives.

Table 4-6. Estimated cost information for transfer system alternative components

Component	Capital Cost ($ M)
South County	$120-$140
Northeast County	$130-$160
Houghton Station "as-is"	N/A
New small facilities in Northeast	$70-$80 (per facility)
Anaerobic digestion at transfer station	$22 (per facility)
AMR at transfer station	$28 (per facility)

Notes:

South County, Northeast County costs from the Plan and King County 2014

Houghton "as is" would require some capital costs to upgrade the access to the station and other minor capital projects. The specific projects have not been determined, however, so cost estimates have not been completed.

AMR costs from King County 2017a

Anaerobic digestion costs from HDR 2017a, Scenario 3A

Assumptions:

Combination of facilities in Northeast costs assume approximately 50% of South County costs, plus or minus 15%, and assumes existing Houghton station is used to provide capacity for self-haulers

All costs in 2017 dollars without escalation.

Alternative 1, considering the estimated remaining capital cost for construction of the proposed South County facility, is the lowest cost alternative. The South County facility would add waste compaction, transfer capacity, additional recycling services, and traffic-reducing configurations, as well as high standards of sustainability. These facility attributes add to the overall efficiency and cost-effectiveness of providing solid waste transfer services, and the benefits that accrue from increased recycling. The incremental cost to ratepayers for receiving increased service levels is relatively small.

Under Alternative 2, the combination that keeps the existing Houghton Transfer Station "as is" would save on capital costs and would have the same cost as Alternative 1. The Alternative 2 combination that leaves the Existing Houghton Transfer Station "as-is" and adds a self-haul or commercial only facility has more capital costs than Alternative 1. The Alternative 2 combination that adds two new facilities one for self-haul only and one for commercial only has the highest capital expense.

Under Alternative 3, the combination that keeps the existing Houghton Transfer Station "as is" would save on capital costs and would have the same cost as Alternative 1. The Alternative 3 combination that leaves the Existing Houghton Transfer Station "as-is" and adds a self-haul or commercial only facility has more capital costs than Alternative 1. The Alternative 3 combination that adds two new facilities one for self-haul only and one for commercial only or builds a Northeast County facility has the highest capital expense. The added expense to the average residential curbside customer's monthly bill under the most expensive capital option is estimated to be less than $1 per month.

Under Alternative 4, additional capital cost for construction of a mid-sized MMSW AD system at a transfer station and/or an AMR facility would be additional capital costs for all Alternatives.

From a capital expense only perspective, Alternative 1 is the least cost alternative. The most expensive alternatives, from a capital expense only perspective, are the combinations of Alternatives 2 and 3 that add the South County facility plus one or two more new facilities. The addition of Alternative 4 to any alternative increases the capital costs, with the potential for corresponding impacts on rates.

4.4.9.3 Significant Unavoidable Adverse Impacts

At a programmatic level, no significant unavoidable adverse impacts on public services and utilities are identified.

5.0 LANDFILL MANAGEMENT AND SOLID WASTE DISPOSAL

5.1 Description of Alternatives

Alternative 1: No Action – complete Cedar Hills Regional Landfill as currently permitted, then export to an out-of-county landfill

Alternative 1 would continue the currently planned development of Area 8 at Cedar Hills Regional Landfill to the currently permitted height of 800 feet, which is expected to provide landfill capacity for King County's waste until 2028. Ongoing efforts by the Solid Waste Division to enhance operational efficiencies; increase waste densities; reduce the amount of soil and rock buried in the landfill, and increase diversion of waste to reuse, recycling and composting may allow the landfill to be operated longer. Once the permitted airspace at the landfill is exhausted, King County would contract with a railroad operator to transport the waste and with an existing out-of-county landfill for final disposal. Alternative 1 assumes that the Solid Waste Division would continue to operate its transfer stations, but would modify them to prepare MMSW for railroad shipping containers and to short-haul waste from the transfer stations to local private facilities for rail transport to a landfill outside King County.

King County would conduct an open bidding process to select one or more waste export contractors, so the location of waste disposal is not currently known. For purposes of the analysis in this EIS, it is assumed that the county's MMSW would be exported to one or more of the existing landfills in the northwest: Republic's Roosevelt Regional Landfill in Klickitat County, Washington; Waste Connections, Inc.'s Finley Buttes Landfill in Morrow County, Oregon; Waste Management, Inc.'s Columbia Ridge Landfill in Gilliam County, Oregon; and Idaho Waste System's Simco Road Regional Landfill in Elmore County, Idaho. It is possible that other landfills within or outside Washington State would become available by the time King County seeks waste export proposals.

The Solid Waste Division would continue to use high-efficiency collection systems at the landfill to deliver landfill gas to the Bio-Energy Washington facility, provide for the disposal of special wastes, manage illegal dumping and litter, manage the disposal of debris following a disaster, and manage and monitor closed landfills according to state requirements and for beneficial use and protection of the public.

Alternative 2: Further develop Cedar Hills Regional Landfill for landfilling, then export to an out-of-county landfill

Alternative 2 would maximize the capacity of Cedar Hills Regional Landfill with a goal of providing disposal services until at least 2040. Features of this alternative include: development of new cells at the landfill; modification of the permit to increase the height of the landfill to approximately 830 feet; relocation of some division facilities currently in the landfill areas targeted for waste disposal; installation of state-of-the-art environmental control systems, liners, and covers at the landfill; and continued use of high-efficiency collection systems at the landfill to deliver landfill gas to the Bio-Energy Washington facility. Consistent with

long-standing practice, new development would be financed through rate revenues managed in the landfill reserve fund. Once the permitted airspace at the landfill is exhausted, King County would export waste to an out-of-county landfill for disposal as in Alternative 1.

Under Alternative 2, the Solid Waste Division would continue to: operate its transfer stations; short-haul waste from the transfer stations to local private facilities for rail transport to a landfill outside King County; provide for the disposal of special wastes; manage illegal dumping and litter; manage the disposal of debris following a disaster; and manage and monitor closed landfills according to state requirements and for beneficial use and protection of the public.

Alternative 3: Implement waste-to-energy at Cedar Hills Regional Landfill or another location in King County, with residual municipal solid waste and residual ash sent to Cedar Hills Regional Landfill or exported to an out-of-county landfill

Alternative 3 would offer the Solid Waste Division two options for operating Cedar Hills Regional Landfill prior to implementing a long-term disposal method. Those options are: 1) to operate the landfill until the currently permitted capacity is used by 2028, or, 2) to maximize the landfill to provide disposal services until at least 2040 (as described for Alternative 2). Once the landfill no longer accepts MMSW, the Solid Waste Division would direct all of King County's disposed waste to a thermal technology facility (generally referred to as a waste-to-energy or conversion technology facility, and including mass burn, gasification, plasma arc gasification, pyrolysis, or other technologies) constructed at the landfill or at another, as yet unknown, location within King County.

Thermal technology facilities generally include a tipping floor, some pre-combustion screening of non-processable materials, an infeed hopper, combustion chamber, energy production, ash or residual collection, metals recovery, and emissions scrubbing systems. Currently, the most viable technology for King County is mass burn (King County 2017b). This scenario assumes a single mass burn plant sized at 4,000 tons per day on 40 acres[1]. Ash or residual produced, and non-processable and bypass waste, would either be disposed at Cedar Hills Regional Landfill or transported to an out-of-county landfill for disposal. Disposal of ash at Cedar Hills Regional Landfill would require construction of a new ash monofill to meet the disposal requirements for that material.

Option 1 assumes that the landfill site would allow the Solid Waste Division to r construct a thermal technology facility and an ash monofill, and to retain enough permitted airspace for disposal of residual waste for an unknown period of time, followed by export. Option 2 assumes that, if Cedar Hills Regional Landfill is chosen as the site for the thermal technology facility, the landfill site would allow the Solid Waste

[1] Approximately 20 acres at the Cedar Hills Regional Landfill within the landfill footprint do not contain, or are not planned to contain, refuse – unless the Further Develop Cedar Hills option is selected. Any development of thermal technology facilities at that site would necessarily have to locate some portion of the operation on top of refuse. It is assumed appropriate structural, geotechnical, and civil engineering would allow such development to occur.

Division to construct that facility and would export ash and non-processable and bypass waste to an out-of-county landfill for disposal as in Alternative 1.

Under Alternative 3, the Solid Waste Division would continue to: operate the transfer stations; short-haul waste from the transfer stations to the thermal technology facility; use high-efficiency collection systems at the landfill to deliver landfill gas to the Bio-Energy Washington facility as long as feasible; provide for the disposal of special wastes; manage illegal dumping and litter; manage the disposal of debris following a disaster; and manage and monitor closed landfills according to state requirements and for beneficial use and protection of the public.

Alternative 4: Implement emerging recovery technologies for mixed municipal solid waste (AD and AMR) with increased private sector role and location, with residual municipal solid waste sent to Cedar Hills Regional Landfill or exported to an out-of-county landfill

Under Alternative 4, the Solid Waste Division would implement emerging recovery technologies to enhance its resource recovery efforts alongside waste export (Alternative 1), maximizing Cedar Hills Regional Landfill (Alternative 2), or a thermal technology facility (Alternative 3). The recovery technologies, including AD and AMR, would be sited, owned, and operated by the private sector at such time in the future that their track record demonstrates their ability to reliably handle the amount and types of waste in the King County system. AD systems would focus on source-separated organics (yard and food waste) or organics (mostly food waste) within MMSW at new or existing private facilities. AMR systems would include both floor sorting of recyclables and installation of some mechanical sorting systems at new or existing private facilities. The use of AD or AMR will maximize material recovery and minimize the tonnage required to be transported and disposed in a landfill.

As with Alternative 3, ash or residual produced, and non-processable and bypass waste, would either be disposed at Cedar Hills Regional Landfill or transported to an out-of-county landfill for disposal. Alternative 4 makes similar assumptions as Alternative 3 as to the remaining and needed capacities, and the timing of the cessation of landfilling, at Cedar Hills Regional Landfill.

Under Alternative 4, the Solid Waste Division would continue to: operate all of its transfer stations; short-haul waste from the transfer stations to local private facilities for processing; use high-efficiency collection systems at the landfill to deliver landfill gas to the Bio-Energy Washington facility as long as feasible; provide for the disposal of special wastes; manage illegal dumping and litter; manage the disposal of debris following a disaster; and manage and monitor closed landfills according to state requirements and for beneficial use and protection of the public.

Alternative 5: Implement emerging recovery technologies for mixed municipal solid waste (AD and AMR) at Cedar Hills Regional Landfill, with residual municipal solid waste sent to Cedar Hills Regional Landfill or exported to an out-of-county landfill

Under Alternative 5, the Solid Waste Division would implement emerging recovery technologies to enhance its resource recovery efforts alongside waste export (Alternative 1) or a thermal technology facility (Alternative 3). Under Alternative 5, AD and AMR systems could be sited at Cedar Hills Regional Landfill only if the site is not maximized for landfilling. The recovery technologies, including AD and AMR, would be sited at the landfill and would be owned and operated by King County at such time in the future that their track record demonstrates the technologies' ability to reliably handle the amount and types of waste in the King County system.

As with Alternative 3, ash or residual produced, and non-processable and bypass waste, would either be disposed at Cedar Hills Regional Landfill or transported to an out-of-county landfill for disposal. Alternative 4 makes similar assumptions as Alternative 3 as to the remaining and needed capacities, and the timing of the cessation of landfilling, at Cedar Hills Regional Landfill.

Alternative 5 assumes that the Solid Waste Division would continue to: operate all of its transfer stations; short-haul waste from the transfer stations to Cedar Hills Regional Landfill for processing; use high-efficiency collection systems at the landfill to deliver landfill gas to the Bio-Energy Washington facility as long as feasible; provide for the disposal of special wastes; manage illegal dumping and litter; manage the disposal of debris following a disaster; and manage and monitor closed landfills according to state requirements and for beneficial use and protection of the public.

5.2 Affected Environment, Impacts, and Mitigation Measures

5.2.1 Earth

5.2.1.1 Affected Environment

The general affected environment for earth is described in Section 3.2.1.1.

The following description of the affected earth environment of Cedar Hills Regional Landfill is extracted from Chapter 3, Earth, in the Final EIS for Cedar Hills Regional Landfill, 2010 Site Development Plan. Geologic evaluations of the Cedar Hills Regional Landfill site and its vicinity have identified a complex history of sediments deposited by rivers, lakes, and glaciers over bedrock. The landfill site is characterized by rolling topography, with pre-development elevations ranging from a high of about 650 feet above sea level along the western boundary to a low of slightly less than 350 feet above sea level at the northwestern corner. Past landfilling activities have raised the elevation in the central part of the site to about 780 to 800 feet above sea level. The land surface slopes down in all directions from the landfill site. Localized steep slopes on the landfill site are associated with landfill activities and are all engineered for stability.

The landfill site is underlain by sediments that predate the most recent regional glaciation (Vashon glaciation) that occurred approximately 19,000 to 14,000 years before present, sediments associated with the Vashon glaciation, and sediments that postdate the Vashon glaciation. Pre-Vashon sediments include highly consolidated coarse- to fine-grained soils. Vashon-age sediments include a highly compacted, typically cement-like, predominantly silty sand material with some gravel and other large material (Vashon till) and a primarily silty sand, sand, and to gravel material (advance outwash) that is also highly compacted but typically less cement-like than the Vashon till. Sediments younger than the Vashon till and advance outwash are mostly topsoil and fill materials associated with landfill development. (King County 2010)

5.2.1.2 Impacts and Mitigation Measures

Disposal of King County's MMSW at Cedar Hills Regional Landfill under any alternative would substantially alter the topography of the site. That topographic alteration would be greatest if the life of the Cedar Hills Regional Landfill were maximized and the permitted height of the landfill was raised about 30 feet above the currently permitted height of 800 feet (Alternatives 2 and 3). Alteration of topography is typically not considered a significant earth impact.

Because the Puget Sound basin is an area of substantial seismic risk, the design of any disposal–related facility in King County, including future disposal areas at Cedar Hills Regional Landfill, would have to incorporate measures to ensure that the facility could withstand anticipated earthquakes. Such design measures are standard engineering practice in the region. Out-of-county landfills in Washington, Oregon, and Idaho that could receive waste from King County are located in areas subject to lower seismic risk compared to King County, but, in any case, those landfills would need to incorporate design measures sufficient to withstand expected earthquakes.

New centralized disposal-related facilities (for example, a waste-to-energy, AD, or AMR facility) constructed at a previously undeveloped site could involve substantial soil disturbance and excavation. The site area involved in construction could be more than 20 acres; 40 acres for a waste-to-energy facility. Site work at that scale could result in substantial earth impacts, although reasonable mitigation for these impacts is available and could include:

- Implementing a site selection process that identifies sites with a minimal need for construction on steep slopes or geologically critical areas (e.g. steep slopes, landslide hazards, unstable foundation conditions).
- Conducting appropriate geotechnical engineering during design and construction to assure stable long-term foundation and site conditions.
- Implementing best management practices during construction to minimize the extent of and duration that disturbed soils are exposed and to handle construction-related runoff.

Locating new facilities at Cedar Hills Regional Landfill could minimize earth impacts because the landfill site is already developed and has an existing stormwater system. On the other hand, if an existing on-landfill facility or existing landfilled waste is used in conjunction with new facilities, or needs to be relocated to

accommodate the new facilities, earth impacts could result. If available mitigation is implemented, however, significant earth impacts are unlikely to occur.

5.2.1.3 Significant Unavoidable Adverse Impacts

With implementation of available mitigation, no significant unavoidable earth impacts are likely.

5.2.2 Air

5.2.2.1 Affected Environment

Regional air quality conditions are described in Section 3.2.2.

The primary air quality issues at a disposal facility such as Cedar Hills Regional Landfill are the potential for odor and for emissions of "air toxics" (chemical compounds that are known or suspected of causing adverse human health effects at high enough concentrations and with long enough exposure times). Potential impacts also include fugitive dust emissions during waste transport at the site, landfilling, and landfill cell construction. Landfills under consideration in this EIS (Cedar Hills Regional Landfill and various landfills in Washington, Oregon, and Idaho that could accept exported waste from King County) are in rural areas where air quality is typically good and emissions from landfill-related vehicles and equipment would not be expected to cause a significant impact on air quality.

Landfill gas is produced at MMSW landfills from the decomposition of solid waste. Landfill gas consists primarily of methane and carbon dioxide, which are odorless and nontoxic, as well as trace levels of odorous and toxic constituents. At Cedar Hills Regional Landfill and existing private landfills that could accept exported waste from King County, landfill gas is controlled through an active landfill gas control system. This system creates a vacuum within the solid waste, withdraws landfill gas, and directs it either to the Bio-Energy Washington facility for conversion into natural gas pipeline-quality gas, or to high-temperature flares that burn the methane and destroy 98 percent or more of the trace odorous and toxic compounds. Federal and state regulations set strict operational criteria for landfill gas control systems and require systematic monitoring to assure that criteria are met. If those criteria are not met, changes must be made to the landfill gas control system on a specified schedule until the criteria are met (40 CFR Part 60, Subpart Cc; WAC 173-351). Of the landfill gas that is generated at Cedar Hills Regional Landfill, approximately 5 percent is flared and 95 percent is directed to the Bio-Energy Washington facility.

The Solid Waste Division has occasionally received complaints about odor from operations at Cedar Hills Regional Landfill. Mitigation in these situations has included refining operations and design of the source area. Odor at solid waste facilities is regulated by the Puget Sound Clean Air Agency Regulation I and the Code of the King County Board of Health Title 10. These regulations prohibit odor that interferes with health and enjoyment of life or property, beyond the facility boundary.

Landfill-related non-transportation emissions are estimated at about 0.8 percent of total emissions. Carbon storage in landfills is greater than emissions released from landfills, so that landfills are a net emission sink.

This, however, does not include a consideration of potential reuse, recycling, or composting of some of the landfilled material, which could lead to substantial reductions in net emissions.

5.2.2.2 Impacts and Mitigation Measures

Construction of new facilities under any of the alternatives could temporarily generate fugitive dust impacts. None of these potential temporary impacts due to construction dust are likely to be significant, however, because, as described in Section 4.4.2.2, effective mitigation measures are available and routinely applied during construction.

Under all alternatives, landfill gas will continue to be produced at Cedar Hills Regional Landfill for a number of years after the landfill closes (probably 30 years or more). The potential for off-site odors and emissions of air toxics will be mitigated through continued operation of the active landfill gas control system, completion of planned improvements to the system, and placement of final cover over existing and future disposal areas. In addition, as required by federal and state regulations, the Solid Waste Division will regularly monitor surface emissions, and make any necessary changes in the landfill gas control system to meet required operational criteria. Aggressive dust control measures, including the phased application of final cover, will minimize the potential for fugitive dust at Cedar Hills Regional Landfill during the remaining years of landfill operation.

Waste-to-energy processes can emit a variety of air pollutants including:

- Particulates
- Metals (for example, cadmium in association with particulates and mercury as a vapor)
- Acidic gases
- Carbon monoxide and nitrous oxides
- Organic compounds resulting from incomplete combustion, including dioxins, furans, and other potentially toxic compounds

The air emissions from a waste-to-energy facility sufficiently sized to handle the county's MMSW is regulated under federal standards of performance for large municipal waste combustors found in 40 CFR 60 Subpart Eb. The facility would be classified as a major source under WAC 173-401, and would be required to obtain and maintain an air operating permit from the Puget Sound Clean Air Agency. The permit would contain requirements related to maximum allowable emissions as well as monitoring, recordkeeping, and reporting. Facilities are required to employ best practices and best available control technologies to maximize the efficiency of combustion and to limit air emissions. Best practices typically include (NRC 2000):

- Screening incoming wastes to reduce noncombustible waste
- Maintaining a consistent thermal input rate by mixing and homogenizing waste prior to injection

- Optimizing temperature and oxygen and carbon monoxide concentrations during furnace operations
- Assuring that a maximum gas flow rate limit is not exceeded to ensure adequate residence time of waste in the combustion chamber
- Regular monitoring of emission-control equipment to ensure proper operation
- Proper periodic training and certification of plant operators

Various technologies for waste-to-energy conversion have been employed worldwide, primarily in North America, Europe, and Asia. Several technologies with proven commercial track records exceeding several decades (e.g. mass burn and refuse derived fuel) have demonstrated the ability of best available control technologies to achieve facility compliance with air quality regulations (King County 2017b). As an example, the Spokane Regional Solid Waste System has operated a mass burn waste-to-energy facility with a capacity up to 800 tons per day since 1991. The monitoring and permit renewal record indicates overall compliance of the facility with air quality standards, although occasional exceedances of standards have occurred. In the decade prior to the most recent renewal of the Spokane facility's operating permit in 2013, the facility had one notice issued for temporary violation of an emission limit (mercury in June 2010) and several excess emission events that were deemed unavoidable by the regulating agency (Spokane Regional Clean Air Authority). The record from the Spokane and other waste-to-energy facilities using technologies with a proven commercial track record indicates that they can be operated with no significant air quality impacts. More uncertainty exists for technologies that have not been in place commercially for an extended period. Nonetheless, any waste-to-energy facility constructed in the county could not operate without appropriate air quality permits requiring a clear demonstration that best available technology would be employed to adequately treat air emissions.

As described in Section 4.4.2.2, AD facilities have the potential to generate air quality and odor impacts during the AD process. Mitigation measures to control odors are also described in Section 4.4.2.2 and, if available mitigation is implemented, odor impacts can be minimal and not significant.

The limited potential for air quality and odor impacts from AMR facilities can be mitigated by confining the recovery and related handling/storage activities within an enclosed structure.

Because of increased travel distances and times, waste export could result in greater cumulative vehicle emissions and potentially greater air impacts than handling waste within King County. The extent of those impacts would depend on the location of the out-of-county disposal site, assuming export by rail. In any case, the air quality impacts are likely to be insignificant because the out-of-county disposal location would probably be in a rural area of eastern Washington, eastern Oregon, or Idaho and the majority of the transportation route would be through areas that have excellent ambient air quality and the transportation involved would probably represent a small percentage of total traffic (all modes) in those areas.

Based on the foregoing discussion, Alternative 1 could result in greater long-term air quality impacts than the other alternatives that postpone or avoid waste export. However, due to regulatory requirements and

with the implementation of readily available mitigation, none of the alternatives should result in significant long-term air or odor impacts. It is likely that some temporary, localized air quality or odor impacts could occur under any of the alternatives. Consistent monitoring and efficient responsiveness on the part of King County and other responsible parties should minimize those temporary impacts if they occur.

Construction and operation of new landfill cells at Cedar Hills Regional Landfill, a new centralized waste-to-energy facility, or centralized resource recovery facilities would result in new greenhouse gas emissions from manufacture of construction materials, transportation of construction materials and workers, and transportation of employees during operation. The magnitude of these emissions is uncertain but unlikely to be a significant fraction of total county greenhouse gas emissions, and unlikely to be greater than the yearly greenhouse gas emissions generated by waste export.

Gas generated at the landfill is captured and sold to a plant at the landfill that processes the biogas into pipeline-quality natural gas. Continued conversion of landfill gas to natural gas that would subsequently be used for heating or other energy uses could reduce greenhouse gas emissions by offsetting the potential use of other types of fuel. The amount of greenhouse gas emissions per BTU generated is less for natural gas than for petroleum products, the various types of coal, and many of the biomass (e.g. agricultural byproducts) and fossil-fuel derived (e.g. fuel gas) fuels (EPA 2014). Also, although the use of biogas may only locally offset the use of hydropower electricity (which does not generate greenhouse gas), the freed-up hydropower could be sold to the western power grid and help to offset use of greenhouse-gas-generating fuels outside of the region.

A 2017 evaluation of disposal technologies by the Solid Waste Division calculated the effect on in-county greenhouse gas emissions (using the EPA's waste reduction model and using a gas recovery rate at Cedar Hills Regional Landfill of 98 percent, based on estimates of the landfill's actual capture rate) from landfilling at Cedar Hills Regional Landfill that has been developed further with and without AMR, from full waste export with and without waste-to-energy (mass burn technology), and with and without advanced materials recovery. The Solid Waste Division's calculations, coupled with calculations of greenhouse gas from rail transport of exported waste (King County 2006a) yielded the results shown in Table 5-1 (net negative emissions are shown in parentheses).

Table 5-1. Greenhouse Gas Emissions at Cedar Hills Regional Landfill, 2028.

Scenario	Metric Tons CO_2e in 2028
Further Develop Cedar Hills Regional Landfill	(114,000)
Further Develop Cedar Hills plus AMR facility	(476,000)
Full waste export after Cedar Hills Area 8 is filled	(66,000)
Full waste export after Cedar Hills Area 8 is filled plus AMR facility	(373,000)
Mass burn after Cedar Hills Area 8 is filled	12,000-125,000
Mass burn after Cedar Hills Area 8 is filled plus AMR facility	(382,000)

Source: King County 2017a; King County 2006a

Notes: Emission estimates calculated using the EPA's Waste Reduction Model (WARM) for each scenario in the base year, 2028

Net negative emissions are shown in parentheses.

CO_2e = carbon dioxide equivalent

5.2.2.3 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse air or odor impacts would occur under any alternative.

5.2.3 Water

5.2.3.1 Affected Environment

Cedar Hills Regional Landfill lies within the drainage basins of Issaquah Creek to the north and east (approximately 0.25 mile from the landfill), and the Cedar River to the southwest (approximately 1 mile from the landfill). Groundwater is present in two geologic units beneath the Cedar Hills Regional Landfill site. The uppermost unit consists of multiple discontinuous perched saturated zones (local unconfined flow systems) that occur within 30 feet of the ground surface. The underlying unit is unconfined and is a regional aquifer used for drinking water supplies. The regional aquifer occurs at a depth of approximately 300 feet or more below the ground surface, and is separated by at least 150 feet of unsaturated soils from the local flow systems. Three water conveyance systems drain to McDonald Creek, also known as Mason Creek, north of the landfill site (King County 2010). As described in Chapter 2 of the Solid Waste Management Plan, water at the landfill is separated into two categories for treatment. They are: 1) clean stormwater, and 2) contaminated stormwater, which includes leachate and other water that has potentially come into contact with garbage. Leachate is produced when water percolates through the garbage; it is collected in pipes within the landfill and diverted to lined on-site ponds. In the ponds, the leachate is aerated as a preliminary treatment before being sent to the King County South Wastewater Treatment Plant in Renton. The bottom liner and clay barrier beneath the landfill prevent leachate from seeping into the soil or groundwater. Stormwater that runs off the surface of active landfill areas is also potentially contaminated. It is collected in lined ponds before moving on to the treatment system. Clean stormwater is diverted to detention or siltation ponds to control flow and remove sediment, and is then discharged to surface water off site.

In all landfill disposal areas constructed after promulgation of WAC 173-304 in 1985, an impermeable landfill liner composed of high-density polyethylene (HDPE) is incorporated. A study of the chemical half-life characteristics of HDPE landfill liners (Koerner et al. 2005) predicted that the effective lifetime of an HDPE liner subjected to a temperature of 68ºF would be 449 years, on average. All proposed landfill areas to be constructed will have the HDPE liner system and will meet the protective criteria in WAC 173-351 (King County 2010).

Three of the existing private landfills that may receive solid waste under Alternatives 1 and 2—Republic's Roosevelt Regional Landfill; Waste Management, Inc.'s Columbia Ridge Landfill; and Waste Connections, Inc.'s Finley Buttes Landfill—are in the Columbia River basin in eastern Washington and Oregon. This area has an arid climate with less than 10 inches of annual precipitation. Idaho Waste System's Simco Road Regional Landfill is southeast of Boise, Idaho, and is also in arid climate with an average of 12 inches of annual precipitation.

Rail haul routes between King County and existing private landfills pass over and along numerous rivers and streams, and near water supply wells. Operation of intermodal and offloading facilities have a low potential for significantly affecting water resources, and are not addressed in this section.

5.2.3.2 Impacts and Mitigation Measures

In general, the potential for a disposal facility to affect surface or groundwater is mitigated through compliance with federal, state, and local regulations, including the National Pollutant Discharge Elimination System (NPDES) regulations, which require preparation of a stormwater pollution prevention plan; state criteria for MMSW landfills and incinerators (WAC 173-351 and WAC 173-304)); the 2016 King County Surface Water Design Manual and other similar state and local regulations; state waste discharge regulations; and federal rules for fish species listed under the Endangered Species Act.

Leachate will continue to be produced in relatively large volumes while Cedar Hills Regional Landfill is open. Leachate volumes will gradually diminish after operations cease and the last phase of final cover is applied. The leachate and surface water management systems at the landfill have prevented significant leachate contamination of surface water and groundwater and are expected to continue to do so.

Alternatives 1 and 2 (and options under Alternatives 3, 4, and 5) would export waste to an out-of-county landfill once Cedar Hills Regional Landfill is closed. Compared to Cedar Hills Regional Landfill, the volumes of leachate produced, per ton of waste, are lower at the landfills in eastern Washington, Oregon, and Idaho, because of their dry climate. Stormwater volumes are also lower. Systems to manage leachate and stormwater would be required at any landfill to which King County would export waste, Therefore, contamination of water resources from leachate or stormwater would be unlikely.

During construction of a waste-to-energy facility (Alternative 3), there would be a short-term potential for erosion and sedimentation when soils are exposed. In addition, impervious surfaces on the site would increase, resulting in long-term increases in the volume and potentially the peak rate of stormwater runoff. These potential impacts would be mitigated through best management practices included in the stormwater

pollution prevention plan for the facility, incorporating drainage facilities consistent with the King County Surface Water Design Manual (King County 2016a), and complying with other applicable, drainage-related regulations.

Impacts of a waste to energy facility on water resources depends on the design of the facility and available technology. Some information sources indicate that recent mass burn facilities have been designed to be zero discharge facilities, using recirculated and reclaimed water (King County 2017b); others indicate water is used and discharged to the environment (Denison and Rusten 1990). For purposes of this EIS, a conservative analysis assumes that water would be used and discharged. Boilers and scrubbers may produce contaminated liquid effluents. In addition, water may be used to cool ash as it exits the combustion chamber to allow safe handling and transport. Because that water comes into contact with ash, excess water not absorbed by the ash may contain very high levels of salts and heavy metals dissolved from the ash (Denison and Rusten 1990). State regulations require water used in the combustion process to be either reused, discharged to surface waters under an NPDES permit, or discharged to ground water or a municipal sewer system under a state waste discharge permit (WAC 173-434). Discharge from a waste-to-energy facility may require pretreatment or treatment to meet requirements for a permitted discharge.

Operating waste-to-energy facilities may also require large quantities of water for the boilers. For a facility of the size that King County would likely need (4,000 tons per day), average water needs would be approximately 725 gallons per minute with some technologies (Gardoni 2015). If the water source is a groundwater aquifer, there is a potential for depleting the aquifer if water withdrawal exceeds recharge. A site-specific evaluation of aquifer characteristics would be needed to assess the level of impact to ground water resources. Potential impacts of a waste-to-energy facility on groundwater quantity could be mitigated by limiting the amount of groundwater withdrawal, or using a surface water source if one is available.

Development of AD or AMR facilities (Alternatives 4 and 5) could result in contamination of water resources from discharge of wastewater or stormwater. Site selection criteria would take into consideration the presence of surface water and wetlands. Stormwater and wastewater would be detained and treated to meet state and King County requirements (King County 2016; WAC 173-201A).

5.2.3.3 Significant Unavoidable Adverse Impacts

5.2.4 Plants and Animals

5.2.4.1 Affected Environment

To obtain information about plants and animals at Cedar Hills Regional Landfill, the EIS for Cedar Hills Regional Landfill (King County 2010) was reviewed in addition to data received from the USFWS, WDFW Priority Habitats and Species (PHS), and Washington State Department of Natural Resources (WDNR) Natural Heritage Program.

Upland vegetation communities in the 1,000-foot buffer of the landfill include deciduous forest, mixed coniferous and deciduous forest, and shrubs and grass. The USFWS (2012) identifies one threatened plant (golden paintbrush [*Castilleja levisecta*]) and three plant species of concern (white-top aster [*Aster curtus*], stalked moonwort [*Botrychium pedunculosum*], and tall bugbane [*Cimicifuga elata*]) as occurring in King County; however, none of these plants are known to occur on the site (WDNR 2017). Additionally, no rare plants or rare plant communities are known to occur on the site (WDNR 2017).

Deciduous forest in the western and southern buffers consists primarily of red alder (*Alnus rubra*) and salmonberry (*Rubus spectabilis*) with a scattering of big leaf maple (*Acer macrophyllum*). Mixed coniferous and deciduous forest in the buffer consists of Douglas-fir (*Pseudotsuga menziesii*), scattered western hemlock (*Tsuga heterophylla*), and red alder in the canopy, with an understory of Oregon grape (*Mahonia nervosa*), salal (*Gaultheria shallon*), sword fern (*Polystichum munitum*), and Robert geranium (*Geranium robertianum*). The shrub and grass community in the western and eastern buffers includes salmonberry, evergreen blackberry (*Rubus ursinus*), Himalayan blackberry (*Rubus armeniacus*), snowberry (*Symphoricarpos albus*), red elderberry (*Sambucus racemosa*), salal, Oregon grape, Robert geranium, sword fern, bracken fern (*Pteridium aquilinum*), and grasses. The shrub and grass community in the southern portion of the western buffer, within the Bonneville Power Administration transmission line corridor, includes Scotch broom (*Cytisus scoparius*), salmonberry, Himalayan blackberry, evergreen blackberry, common tansy (*Tanacetum vulgare*), salal, Oregon grape, bracken fern, and grasses (King County 2010).

Wetlands

In late 2000 and early 2001, biologists in the Ecological Services Unit of the King County Department of Natural Resources and Parks, Water and Land Resources Division, visited Cedar Hills Regional Landfill to determine the presence of wetlands in the project area. Based on field investigations, Ecological Services Unit biologists identified and delineated 18 wetlands on the 920-acre landfill site. (King County 2010)

Wildlife

Existing environmental documents for Cedar Hills Regional Landfill and data received from online databases (USFWS 2017; WDFW 2017b) were reviewed to determine the presence of threatened, endangered, candidate wildlife species or species of concern in the project area. Site visits were also conducted in August and September 2008 as part of research conducted for the Cedar Hills Regional Landfill EIS (King County 2010).

USFWS identifies several wildlife species occurring in King County that are listed as threatened under the Endangered Species Act. However, not one of the species is documented to occur at Cedar Hills Regional Landfill (WDFW 2017a; WDFW 2017b), likely because suitable habitat is not available.

Additionally, the WDFW identifies numerous species of concern that may occur within King County and the project area. Of those species, one state species of concern (bald eagle) has been observed at or near

Cedar Hills Regional Landfill. Bald eagles visit the landfill each year. In May 2007, more than 20 bald eagles were observed at or near the landfill (Grant, personal communication, 2008). Eagles observed at the site may be from a nearby nest or may be eagles from elsewhere in the region flying over the landfill.

King County has operated a bird control program at Cedar Hills Regional Landfill for many years. The bird control program has historically relied on a variety of methods to deter and harass birds to protect human health. The program has evolved by adjusting methods and activities to increase effectiveness, and has decreased bird landings and feedings by more than 90 percent since peak historical observations (King County 2008). King County continues to refine methods to increase the program's effectiveness and has worked with the U.S. Department of Agriculture (USDA) Wildlife Service to implement its Integrated Gull Management Program (King County 2010).

The current gull management program consists of active harassment reinforced with lethal control. Active harassment includes the use of vehicles, sirens, and lights; chasing the birds on foot; pyrotechnics; and shooting (not to kill). Non-lethal harassment methods are given preference over lethal control (killing); however, when birds no longer respond to harassment methods, they are shot. Lethal control is generally reserved for situations when enough birds are present to make the shooting effective reinforcement. Lethal control is supplemented by using dead bird effigies to deter birds from landing at Cedar Hills Regional Landfill. In 2006, the USDA Wildlife Service harassment program at the Cedar Hills Regional Landfill was increased from a part-time activity to a full-time effort (King County 2010).

The WDFW database indicates a biodiversity corridor along the west edge of the landfill. The corridor connects the Cedar River biodiversity area to the Squak Mountain biodiversity area. It contains a variety of habitats that meet the needs of a wide range of native wildlife including elk, deer, cougar, bear, salmonids, woodpeckers, owls, hawks, and herons (WDFW 2017a). Wildlife using the landfill buffer areas currently coexist with noise and human activity associated with landfill operations (King County 1998). Except for some birds, wildlife use of the landfill area itself is minimal during active landfill operations. Closed landfill areas are planted with grass, which has relatively low value for wildlife habitat.

5.2.4.2 Impacts and Mitigation Measures

Alternatives 2, 3, 4, and 5 could maximize capacity of the Cedar Hills Regional Landfill within the confines of the special use permit. These alternatives could also allow King County to acquire additional land to add to the buffer in the northeast corner of the site, therefore wetlands and other vegetation communities in this buffer area, and any wildlife using the buffer could be affected. Wildlife using the buffers currently coexist with noise and human activity associated with landfill operations (King County 1998). As noted above, wildlife use of the landfill area itself will likely remain low until the landfill closes. When operations cease, and the last remaining disturbed areas are revegetated with native species (revegetation will be phased), wildlife use of the site may increase.

Large numbers of birds are attracted to the landfill site, particularly gulls during nonbreeding season. The Division's bird control program is described in in Section 5.2.4.1. Bird use of the site will diminish after the

landfill closes. If the county starts exporting waste to an out-of-county landfill, King County's MMSW would contribute to attracting scavenger birds such as gulls and crows to that landfill site, requiring bird control measures.

Development of a waste-to-energy facility or centralized disposal-related facilities (AD or AMR facility) within the existing permitted footprint of the landfill would result in loss of future landfilled areas planted with grass. Final siting within the permitted landfill footprint could take into consideration the presence of wetlands and any critical habitat, particularly habitat that supports endangered or threatened species. Impacts on wildlife, if any, could be mitigated through phased revegetation of the site with species of value to native wildlife; developing a wildlife management plan; or purchasing land for wildlife habitat protection.

Development of a waste-to-energy facility or centralized disposal-related facilities (AD or AMR facility) at a previously undeveloped site could involve substantial soil disturbance and excavation - as much as approximately 40 acres. As with development of any waste-related facility, site selection criteria could take into consideration the presence of wetlands and any critical habitat, particularly habitat that supports endangered or threatened species. Impacts on wildlife, if any, could be mitigated through phased revegetation of the site with species of value to native wildlife; developing a wildlife management plan; or purchasing land for wildlife habitat protection.

5.2.4.3 Significant Unavoidable Adverse Impacts

5.2.5 Energy and Natural Resources

5.2.5.1 Affected Environment

This section focuses primarily on fuel used to transport King County's solid waste to disposal sites. Petroleum-based fuels result from the processing of crude oil, a non-renewable natural resource. The availability and affordability of petroleum-based fuels during the planning period are uncertain.

The Bio-Energy Washington facility at Cedar Hills Regional Landfill converts landfill gas to pipeline-quality natural gas. High-efficiency collection systems collect and deliver landfill gas to the facility, which generates revenue for the Solid Waste Division. At the Bio-Energy Facility, the landfill gas is refined to remove non-methane constituents, which are burned in a flare, and the refined gas, which is purified methane, is compressed and then conveyed into the regional natural gas pipeline for distribution to end users.

5.2.5.2 Impacts and Mitigation Measures

Waste export would result in greater fuel use than in-county disposal, so, for example, Alternative 1 (waste export after landfill closure in about 2028) would result in greater fuel use over the long-term than Alternative 2 (waste export after landfill closure in 2040 or after). In general, the longer that waste export is postponed (for example, by retaining disposal in-county for a longer period) and the less material that requires export once waste export does take place (for example, exporting residual ash from a centralized waste-to-energy facility rather than exporting compacted MMSW from a centralized inter-modal location),

the less the overall fuel use systemwide. However, the actual fuel use systemwide in the future is uncertain and heavily influenced by the specific location and distribution of disposal-related facilities (Cedar Hills Regional Landfill, potential waste-to-energy facility, potential multi-modal export facility, potential centralized AD and/or centralized AMR facility). In general, if disposal-related facilities can be sited near each other, less fuel would be used for transporting materials between facilities.

Under Alternatives 3, 4, and 5, generation of energy from a waste-to-energy facility or from resource recovery would offset energy production from other sources. If those other energy sources are non-renewable natural resources, such as petroleum or coal, there would be a beneficial effect on natural resources. If the energy generated from waste-to-energy or resource recovery offset the need locally for hydropower electricity, the additional available hydropower electricity could be sold to the western U.S. power grid and could offset the use of greenhouse-gas-generating fuels outside of the region.

5.2.5.3 Significant Unavoidable Adverse Impacts

Whenever King County implements waste export, some increase, potentially substantial with full export, in fuel use is likely unavoidable.

5.2.6 Environmental Health

5.2.6.1 Affected Environment

Noise

The general affected environment for noise is described in Section 3.2.6.

There are a host of noise sources that are active at the Cedar Hills Regional Landfill, and any landfill may receive King County's waste. Noise sources range from small to large diesel-powered equipment to the industrial operations associated with the landfill's flares, and (at Cedar Hills Regional Landfill only) the BioEnergy of Washington facility. Some of the diesel-powered equipment is operated for local, short term construction projects and some is used for handling of the incoming waste.

As described in Section 5.2.4.1, gull management at the Cedar Hills Landfill consists primarily of active harassment including the use of vehicles and sirens; chasing the birds on foot; pyrotechnics; and shooting (not to kill). These management activities would continue in the future while the landfill is in operation and would generate periodic noise detectable at neighboring properties.

Analysis in the EIS for the 2010 site development plan for Cedar Hills Regional Landfill (King County 2010) concluded that, with implementation of mitigation measures, no significant unavoidable noise or vibration impacts would occur under any of the alternatives considered at that time for future development at the landfill.

Human Health

The affected environment for human health is described in Section 3.2.6. Prevention of potential human health risks is at the heart of landfill siting, design, and operation. Generally, exposure to health risks at a landfill may occur via water or air contamination or animal vectors. King County implements best management and engineering practices in designing, operating, and maintaining environmental control systems at the landfill, including the landfill gas, leachate, stormwater, and surface water management systems.

Analysis in the EIS for the 2010 site development plan for Cedar Hills Regional Landfill (King County 2010) concluded that, with continued implementation of these practices, no significant unavoidable human health impacts were occurring or would occur under any of the alternatives considered at that time for future development at the landfill.

5.2.6.2 Impacts and Mitigation Measures

Noise

Operation and development of Cedar Hills Regional Landfill as currently permitted would not result in significant adverse noise impacts (King County 2010). Extending the life of the landfill could result in the potential for moderate noise impacts during operation depending on the specific nature and height of operations that would take place near the inner edge of the landfill site's 1,000-foot perimeter buffer. Noise analysis conducted for the 2010 EIS on the landfill's site development plan estimated that noise levels at the eastern boundary of the landfill under some scenarios would slightly exceed allowable noise levels. A similar situation could arise under Alternative 2, possibly Alternative 3, and possibly Alternative 4 if the life of the landfill is maximized. If this potential impact were anticipated, noise attenuation measures would be required to reduce noise levels to within allowable limits. All Alternatives may add property to the landfill buffer. Buffer expansion would likely occur in the east or northeast part of the landfill. This may also mitigate for noise.

Waste export would lead to additional truck traffic between transfer stations and an in-county intermodal facility and additional traffic (probably train traffic) along transportation routes between King County and the out-of-county landfill. The additional truck and train traffic is unlikely to lead to substantial changes in noise levels along established, heavily used traffic routes (see Section 3.2.8.1) where the new waste-haul trips would be substantially less than background traffic. Moderate to substantial increases in noise from truck traffic concentrating in the immediate vicinity of the intermodal facility and from the additional waste transfer activities at the facility, however, are more likely to occur. If the intermodal facility is located in an industrial area with existing rail activity and high ambient noise, noise impacts probably would not be significant. However, if noise impacts in the vicinity of the facility are potentially significant, measures to limit noise impacts could include:

- Selecting an intermodal location with no nearby noise-sensitive land uses

- Enclosing or shielding waste unloading and loading activities
- Minimizing equipment idling
- Limiting or avoiding nighttime waste-hauling and facility operations

The out-of-county disposal landfill would probably be an existing facility located in a rural area where existing noise levels are comparatively low and noise-sensitive land uses are at a low density. Additional activity at the landfill resulting from receipt of King County's waste would contribute to operational noise, although this would be unlikely to result in a significant noise impact. One of the existing out-of-county landfills (Roosevelt Regional Landfill in Klickitat County) that is a potential disposal site for exported waste has an intermodal facility along the Columbia River where waste is unloaded from trains and loaded onto trucks for transfer to the landfill. The additional truck traffic would contribute to noise levels along the haul route.

A new waste-to-energy, AD, or AMR facility would have potential noise impacts similar to those discussed for a new Northeast Recycling and Transfer Station in Section 4.4.6.2. Measures similar to those described in Section 4.4.6.2 could be implemented during site selection, facility design, facility construction and operation to limit noise impacts below the level of significance.

Human Health

Future development of Cedar Hills Regional Landfill under any of the alternatives would include implementation of landfill gas, leachate, stormwater, and surface water management systems in any newly constructed areas, and continued operation of these systems in existing areas. Therefore, no significant adverse health impacts would be expected from continued operation of Cedar Hills Regional Landfill under any of the alternatives.

Facilities that combust solid waste to create energy generate residual gases and incombustible solids (ash). The residual ash consists of particles removed from the residual gas (fly ash) as well as the ash remaining in the combustion chamber (bottom ash). Ash constitutes up to one-quarter by weight of the waste that is processed, and contains various constituents, with the most abundant being silica, calcium, and iron, but also including various trace metals, such as lead, cadmium, and zinc (NRC 2000). Residual ash can be disposed in landfills specially designed to receive incinerator ash or processed for metal recovery. In areas outside Washington, residual ash can be processed for reuse, for example, as roadbed material. In Washington, Chapter 173-306 WAC, Special Incinerator Ash Management Standards, requires the ash generated must be disposed in a properly constructed ash monofill. The presence of potentially toxic constituents in ash requires that it be carefully collected and managed. Measures available to safely handle and process waste-to-energy facility ash include:

- Storing ash on the facility site only in sealed containers or enclosed structures having adequate air and water pollution control to prevent unintended releases to the atmosphere, surface water, or ground water

- Minimizing the time that ash is stored on the facility site
- Transporting ash only in sealed containers to prevent unintended releases
- Regular ash sampling, monitoring of environmental systems, and recordkeeping

As described in Section 5.2.2, waste-to-energy processes can emit a variety of air pollutants including:

- Particulates
- Metals (for example, arsenic, chromium, and lead in association with particulates and mercury as a vapor)
- Acidic gases
- Carbon monoxide and nitrous oxides
- Organic compounds resulting from incomplete combustion, including dioxins, furans, and other potentially toxic compounds

WAC 173-460 addresses the control of 389 chemicals that are referred to as toxic air pollutants (TAPs). For each TAP, this regulation defines an acceptable source impact level (ASIL), provided as a concentration, and also defines a small quantity emission rate and a *de minimis* emission value, both provided as an emission rate. WAC 173-60 requires review and approval of a notice of construction by the Department of Ecology for a new or modified toxic air pollutant source. WAC 173-460-070 states that "A notice of construction application must demonstrate that the increase in emissions of toxic air pollutants from the new or modified emissions units at the source are sufficiently low to protect human health and safety from potential carcinogenic and/or other toxic effects." WAC 173-460-040 states that "The permitting authority ... must ensure that:

a) The new or modified emissions units use tBACT [best available technology] for emissions control ...; and

b) The new or modified emissions units comply with WAC 173-460-070 ..."

With the implementation of regulatory requirements described above and the implementation of available measures to safely handle, process, and dispose of incinerator ash, significant human health impacts are unlikely to occur from operation of a waste-to-energy facility.

With implementation of mitigation measures similar to those discussed in sections 4.4.2.2 and 4.4.6.2, significant human health impacts are unlikely to occur from operation of a centralized AD or AMR facility.

5.2.6.3 Significant Unavoidable Adverse Impacts

With implementation of available mitigation measures, significant unavoidable adverse noise and human health impacts are unlikely to occur.

5.2.7 Land and Shoreline Use

5.2.7.1 Affected Environment

Cedar Hills Regional Landfill is located on a 920-acre site outside the urban growth boundary in eastern unincorporated King County. It is at 16645 228th Avenue SE, off Cedar Grove Road, about 3 miles north of Maple Valley, 6 miles east of Renton, and 4 miles south of Issaquah. The landfill site is zoned RA-10 (rural area; one dwelling unit per 10 acres). Use of the landfill site for landfilling is allowed under a special use permit granted by King County in 1960, which requires that a 1,000-foot buffer around the perimeter of the site be maintained in its natural state. Moderate- to low-density single-family developments are located west, north, and east of the landfill in areas designated RA-2.5 and RA-5 (both designations are rural area, one dwelling unit per five acres). Nonresidential land uses, which are primarily to the south of the landfill on land designated for mineral uses include the Queen City Farms Superfund Site[2]; the Cedar Grove Composting facility; Stoneway Concrete, a surface mining operation; and Pacific Topsoils, a private composting facility. A Bonneville Power Administration easement (700 feet wide, containing five electrical transmission lines) crosses the southern portion of the site from east to west. A smaller electrical transmission line easement crosses north to south through the eastern buffer. In addition, a Williams natural gas pipeline easement (75 feet wide, containing two pipelines) parallels the Bonneville Power easement within the southern buffer (King County 2010).

Cedar Hills Regional Landfill is visible from surrounding areas; however, most potential views of the landfill are obscured by topography, off-site vegetation, and the vegetated, 1,000-foot-wide, landfill buffer. A large portion of the landfill can be clearly seen from two locations: 1) a residential area approximately 1 mile to the east, and 2) an industrial area to the south. Other views of the landfill are partial or screened views through vegetation or views in which the landfill summit appears in the distance as a grass-covered ridgeline rising just above the trees; where active landfill operations are occurring, views may also include earthmoving equipment and soil. Some individual residents may have clearer views of the landfill from their properties. Many residences are on higher ground than the landfill, but views from hillside homes tend to be screened by the tree canopy, especially from late spring to late fall when deciduous trees are fully leafed out. (Osborn Pacific Group 2017)

The existing private landfills in eastern Washington, Oregon, and Idaho (Simcoe Road Landfill in Elmore County) are in rural areas largely used for agricultural crops and cattle grazing. Very few residences are near the landfills. Roosevelt Landfill in Klickitat County, Washington is about 4 miles northeast of Roosevelt (population 156); a few residences are about 2 miles from the site. Finley Buttes Landfill is approximately 12 miles south of Boardman (population 3,220) in Morrow County, Oregon. Columbia Ridge Landfill in Gilliam County, Oregon, is about 5 miles south of Arlington (population 586); one residence is about 1,000

[2] Most of the contamination on the 324-acre Queen City Farms site has been cleaned up or been contained. Monitoring is ongoing. A backup plan is being implemented to address remaining groundwater contamination. The backup plan extracts contaminated water from wells, puts it through a treatment system, and moves it to an on-site gravel pit (EPA 2017).

feet southeast of the site. Simco Regional Landfill is about 3 miles northwest of the rural community of Cleft and 10 miles northwest of Mountain Home, Idaho (population 14,206). (US Census 2010)

Cedar Hills Regional Landfill operates under a special use permit issued by King County on September 12, 1960. The permit has no specified expiration date. That approval allowed development and operation of a "sanitary landfill" on the present landfill property, subject to four conditions:

1. A 1,000-foot buffer strip surrounding the entire site will be left in its natural state for the protection of the surrounding properties. There will be no sanitary operations in this strip other than access. The only specific allowed development in the permit for the buffer is a road.
2. Access will be from Cedar Grove Road over a new right of way entering the property from approximately the southeast corner.
3. The operation is to be a true sanitary landfill. Not an open garbage dump.
4. There will be no burning of garbage.

An alternative that would require either addition of property to the active landfill area, "sanitary operations in (the buffer) strip other than access," or "burning of garbage" potentially including a waste to energy facility, would necessitate either an amendment to the existing special use permit or approval of a new special use permit. In addition, any decision to expand the landfill vertically or horizontally, or to otherwise substantially modify the existing operations plan at Cedar Hills Regional Landfill would trigger SEPA review.

5.2.7.2 Impacts and Mitigation Measures

Alternative 1 would have no direct effects on land or shoreline use because waste would be disposed of within the permitted footprint of existing (or future) landfills. Landfill operators, including King County, will be responsible for operating their facilities in compliance with permits and relevant regulations. Changes in zoning would not be required, and King County would not need to acquire land or obtain permits for future landfill expansion or development.

Maximizing the development of Cedar Hills Regional Landfill under Alternative 2 (or as options under Alternatives 3 and 4) would alter the visual character of the site and the surrounding area by increasing the elevation and mass of the landfill, and potentially removing mature vegetation in the perimeter buffer. However, any visual impacts would be considered a less than significant impact due to the relatively minor decrease in the available view shed and because surrounding landscape will retain its integrity because the open sky, topography, and existing patterns of land use will remain dominant.

Under Alternatives 1, 2, and 3, and options for Alternatives 4 and 5, waste would be exported to an out-of-county landfill, which would be selected in the future. The operator of King County's selected out-of-county landfill will be responsible for obtaining necessary permits for landfill expansion or development, as needed, which would require compliance with land use regulations and plans in effect at the time. Indirect effects of future landfill expansion and development would be disclosed and addressed through the SEPA and permitting processes.

Alternative 2 and, potentially, Alternatives 3, 4, and 5 would include modification of the solid waste handling permit to increase the height of the landfill to approximately 830 feet, which would require SEPA review.

Alternative 3 also includes options to construct a thermal technology facility (i.e., waste-to-energy) at Cedar Hills Regional Landfill, which would require modification of the special use permit or a new special use permit and SEPA compliance. Because King County's Comprehensive Plan policy F-228 for essential public facilities states facilities that directly serve the public beyond their general vicinity are discouraged from locating in the Rural Area and Natural Resource Lands, a review of compatibility with land use designations would also be conducted, and may result in the need for an amendment to allow construction. Another option under Alternative 3 would allow the Solid Waste Division to construct a thermal technology facility at a different site in King County; doing so would require a separate special use permit and SEPA compliance.

Alternative 4 would use emerging recovery technologies along with thermal technology, waste export, or maximizing Cedar Hills Regional Landfill. Under the alternative, the recovery technologies would be permitted, sited, constructed, owned, and operated by the private sector, so the private operators would be responsible for any necessary permits and SEPA compliance. As with Alternative 3, a review of compatibility with land use designations under the King County Comprehensive Plan would also be conducted, and may result in the need for an amendment to allow construction.

To minimize the potential for incompatibility with nearby land uses (off-site impacts), the county would work with the private owner and operator to develop a site selection process that would prioritize sites with sufficient size or in a location to provide adequate separation from sensitive land uses, and to be consistent with local land use zoning and the city or county comprehensive Plan.

Under Alternative 5, King County would use emerging recovery technologies along with thermal technology, waste export, or maximizing Cedar Hills Regional Landfill at the Cedar Hills site. Any of the non-sanitary landfilling options would not be allowed under the existing special use permit, and King County would need to modify the permit or obtain a new permit, which would require SEPA review.

Alternatives 2 through 5 may affect land use in King County if property is added to the landfill site. Expansion would likely occur in the east or northeast part of the landfill. The direct effect would be converting some rural residential land to landfill buffer use. Based on existing development, some residences could be displaced by expansion of the landfill property.

Construction of new facilities could result in the disturbance of cultural resources. To minimize the potential for this impact, the following measures could be implemented:

- During the site selection process, to minimize the risk of selecting a site containing significant cultural resources, conduct an increasingly detailed cultural resources assessment during site screening, including on-site investigations of finalist sites

- If necessary, prior to site disturbance at the selected site, conduct further detailed on-site cultural resource investigations and identify, evaluate, and appropriately handle any identified cultural artifacts
- Have a competent archaeologist monitor the site during construction
- If unanticipated cultural artifacts are encountered during construction, cease construction and identify, evaluate, and appropriately handle encountered cultural artifacts prior to re-commencing construction
- Conduct all cultural resource activities in consultation with state and tribal cultural resources entities, as appropriate.

The potential for impacting cultural resources is comparatively low on the existing Cedar Hills Regional Landfill site because the site has been previously surveyed for cultural resources and has been heavily disturbed as a result of past landfilling activities.

The height and size of an emissions stack for a waste to energy facility would depend on the process technology, site meteorology, topography of the site and its surroundings, and land uses in the facility's viewshed. At this programmatic stage, the net result of such considerations has considerable uncertainty regarding potential visual impacts, but visual impacts may be perceived as significant at some sites.

For all new facilities, the following mitigation measures could be considered to reduce or avoid visual impacts:

- During site selection, prioritize sites that have limited numbers of visually sensitive land uses within the site's viewshed
- During site selection, only consider sites with sufficient size, location, and topography to allow for adequate visual buffering from visually sensitive land uses
- Minimize the visual incompatibility of new facilities with the adjacent constructed and natural landscape by careful design of structure characteristics (location on its site, façade, and bulk/shape)

5.2.7.3 Significant Unavoidable Adverse Impacts

None of the alternatives are expected to result in significant, unavoidable, adverse land use impacts. If mitigation measures as described above are implemented, significant unavoidable adverse impacts to cultural resources are unlikely to occur. With implementation of mitigation measures described above, the visual impacts of new facilities can be limited, although surrounding communities may nonetheless perceive that visual impacts are significant.

5.2.8 Transportation

5.2.8.1 Affected Environment

The general affected environment for transportation is described in Section 3.2.8.

The roadway network that serves Cedar Hills Regional Landfill includes county, local, and arterial roadways, and the state arterial highway (SR 169 Maple Valley Highway), which provide the main connection to the regional freeway system at Interstate 405. SR 169 from I-405 is the primary truck route for hauling waste from the transfer stations throughout King County to Cedar Hills Regional Landfill. A secondary truck route for the waste trucks is via SR 169 from the south. All Solid Waste Division trucks hauling solid waste travel to the landfill along Cedar Grove Road from SR 169.

Daily traffic at Cedar Hills Regional Landfill consists of two general categories of vehicle trips: waste truckload trips and support traffic trips (made up of employee, visitor, vendor and contractor trips). Table 5-2 shows the average weekday traffic at Cedar Hills Regional Landfill in 2016, 2028, and 2040, based on King County transaction records. Trips are one-way trips (in plus out). The forecasted truckloads of solid waste are the same for all alternatives.

Table 5-2. Estimated average daily traffic at Cedar Hills Regional Landfill, 2016, 2028, and 2040.

Type of Traffic	Weekday 2016	Weekday 2028	Weekday 2040	Weekend Day 2016	Weekend Day 2028	Weekend Day 2040
King County Transfer	263	312	344	123	146	161
Employee, Visitor, Vendors, and Contractors						
Prior to closure	590	590	364	424	428	273
With 2028 closure	590	78	78	424	58	58
With 2040 closure	590	364	78	424	273	58
Total						
Prior to closure	853	902	708	547	574	434
With 2028 closure	853	390	78	547	58	58
With 2040 closure	853	676	78	547	273	58

Notes:

Estimates based on similar methods as used for Table 4-2.

Projected 2028 and 2040 trips were estimated by increasing 2016 disposal trips in proportion to the projected increase in disposed MMSW by 2028 and 2040, and by increasing 2016 recycling trips in proportion to the projected increase in recycled materials by 2028 and 2040 (Plan, Figure 3-3).

Current traffic levels at existing private intermodal yards, offloading facilities, and out-of-county landfills are not known.

5.2.8.2 Impacts and Mitigation Measures

Alternative 1

Under Alternative 1 (no-action alternative), Cedar Hills Regional Landfill would close in approximately 2028, and waste export would begin, a change that would affect the traffic and operational conditions associated

with the landfill. Waste export is the county's current long-term disposal policy, as stated in the adopted (2001) Comprehensive Solid Waste Management Plan (2001 Plan). The Plan allows the choice of waste export, maximizing Cedar Hills Regional Landfill, or waste-to-energy.

Table 5-2 shows the estimated average weekday traffic at the Cedar Hills Regional Landfill in 2028 under all of the landfill management and solid waste disposal alternatives, based on King County's projected disposal tonnage, representing the expected population growth, a conservative estimate of 57 percent recycling and with the expected change in tons per truckload resulting from the full implementation of waste compaction at SWD transfer stations. Trips are one-way trips (in plus out).

Based on the data in Table 5-2, average weekday traffic to and from the Cedar Hills Landfill in 2028 would be approximately 49 trips per day greater than in 2016. The increase is primarily due to increases in commercial hauler traffic resulting from projected increases in disposed MMSW (Plan, Figure 3-3). Weekend day traffic is substantially lower than weekday traffic, but is also projected to increase somewhat between 2016 and 2028 for the same reasons.

Under Alternative 1, two new disposal areas would be constructed. Area 8 is currently under construction and the Southeast Area would be initiated in 2026. During construction of each cell, which typically takes one to two construction seasons (May through September), approximately 400 trips per day would be added, due to construction workers coming to and from the site, as well as deliveries of construction materials and equipment (King County 2010). To avoid potential congestion, construction traffic could be scheduled so as not to coincide with peak periods of operational traffic. Landfill-related traffic would not be expected to significantly affect the level-of-service of intersections along haul routes, although continued operation of the landfill could contribute to the physical deterioration of roadway surfaces on haul routes.

Employee trips in 2028 prior to closure are expected to be similar to those in 2016. After closure in 2028, King County employee and contractor trips associated with maintenance activities would continue to take place, and Bio-Energy Washington employees would also continue to travel to the site. However, the trips associated with active landfilling operations would be reduced, and employee, visitor, vendor, and contractor trips would drop from 590 to an estimated 78 average weekday trips and from 424 to an estimated 58 average weekend day trips after closure.

In 2016, SWD staff evaluated transportation modes for waste export and determined that rail is more efficient than trucking and barging when considering travel time, equipment requirements, payload, and capital costs. There are several regional landfills available by rail with over 580 million tons of combined capacity, which is sufficient to handle the county's waste through at least 2048 (King County 2017a).

After the Cedar Hills Regional Landfill closes, all the MMSW now disposed of at that landfill would be transported instead by transfer trailer to an intermodal facility, then most likely by rail to an existing out-of-county landfill for final disposal. The result would be a reduction in traffic on haul routes to the landfill and a commensurate increase in truck trips on roads leading to the intermodal facility(ies). In 2028, it would require approximately 156 transfer trailer loads (312 trips) on an average weekday, and approximately

73 transfer trailer loads (146 trips) on an average weekend day, to transport all the solid waste that now enters the Cedar Hills Regional Landfill to the one or more local intermodal facilities, to be shipped by rail. Future intermodal facilities to be contracted by King County are unknown, although facilities likely to be used for rail transport include those located in south Seattle or south of Seattle in the vicinity of the existing BNSF Railway Company (BNSF) and Union Pacific Railroad tracks. Roads in the vicinity of the intermodal facility would be traveled by the redistributed transfer truck traffic.

King County's 2007 Solid Waste Transfer and Waste Management Plan EIS estimated that rail transport would add up to four trains per week (eight train trips) on either the BNSF or Union Pacific rail systems, both of which serve (all of the potential out-of-county landfills. Both the Union Pacific and the BNSF lines are well traveled routes that have relatively high existing rail traffic. The WSDOT 2014 State Rail Plan indicates that by 2028 some parts of the rail system necessary for solid waste transport between King County and regional landfills in Washington, Oregon, or Idaho may exceed capacity (King County 2017). However, while the addition of four new trains per week associated with long-haul transport of King County waste is not expected to result in significant impacts on the rail systems or rail service, overall capacity constraints may increase the need for capacity increases in the relevant rail corridors.

Traffic-generating activities associated with out-of-county disposal also include disposal operations at that landfill. Disposal of King County's waste would increase traffic at receiving intermodal facilities used in conjunction with transport of waste from the end of rail line to the landfill. Those operations could add 156 transfer trailer loads (312 trips) on an average weekday, and approximately 73 transfer trailer loads (146 trips) in 2028 on an average weekend day on local roads that provide access to the out-of-county landfill. In general, whether the incremental traffic increase associated with disposal of the county's waste is significant would depend on background traffic levels in 2028 and beyond. If significant traffic impacts appear likely at a particular disposal location, the county could reduce its contribution to those traffic levels by contracting with more than one out-of-county landfill.

Alternative 2

Under Alternative 2, Cedar Hills Regional Landfill would close in approximately 2040, and waste export would begin, a change that like Alternative 1, would also affect the traffic and operational conditions associated with the landfill, but in 2040 rather than in 2028.

Table 5-2 shows the estimated average weekday traffic at Cedar Hills Regional Landfill in 2040 under Alternative 2, based on King County's projected disposal tonnage, with the same assumptions described in Alternative 1. Because Alternative 2 extends the life of Cedar Hills Regional Landfill approximately 12 years longer than Alternative 1, traffic impacts associated with operation and construction would continue to affect the primary haul routes to and from the landfill for a longer period than Alternative 1. Waste hauling traffic trips would grow in proportion to the growth in disposed waste. Between 2028 and 2040, an estimated additional 32 average daily weekday trips and 15 average daily weekend day trips would take place compared to the levels in 2028 under Alternative 1.

Under Alternative 2, additional construction would take place to add the additional airspace capacity necessary to accept waste into 2040, beyond the construction scheduled for Alternative 1. The overall capacity increase would be constructed over several cell construction periods over many years, and an increase in construction-related trips would occur temporarily during those periods, but for a greater number of construction periods over a longer time when compared to Alternative 1. To extend the life of Cedar Hills Regional Landfill beyond 2028 and into 2040, it is expected that development of the southeast corner of the landfill would take place, which would require relocation of several facilities and functions from the landfill site, all of which contribute to the site traffic. As a result, employee, visitor, vendor, and contractor trips in 2040 are expected to be less to those under Alternative 1, prior to closure as shown in Table 5-2. After closure in 2040, King County employee and contractor trips associated with maintenance activities would continue to take place, and Bio-Energy Washington employees would also continue to travel to the site. However, the trips associated with active landfilling operations would be reduced, and employee, visitor, vendor, and contractor trips would drop from 364 to an estimated 78 average weekday trips and from 273 to an estimated 58 average weekend day trips after closure. The drop in site traffic in 2040 is similar to Alternative 1 in 2028, but takes place 12 years later.

Under Alternative 2, once closure of Cedar Hills Regional Landfill takes place in 2040, export of waste by rail to an out-of-county landfill would take place, with similar transportation impacts as described for Alternative 1 in 2040. Under Alternative 2, the transportation impacts would not occur until 2040, whereas, under Alternative 1, they would start in 2028. Under both alternatives in 2040, it would require approximately 172 transfer trailer loads (342 trips) on an average weekday, and approximately 80 transfer trailer loads (161 trips) on an average weekend day, to transport all the solid waste that would enter Cedar Hills Regional Landfill to the one or more local intermodal facilities, to be shipped by rail. Similar traffic impacts are expected on rail service from King County and on roadways near out-of-county landfills under Alternative 2 in 2040 compared to Alternative 1 in 2040. Like the anticipated impacts to rail, traffic impacts in the vicinity of out-of-county landfills would occur in 2040 under Alternative 2, but in 2028 under Alternative 1.

Alternative 3

With Alternative 3, landfilling would occur at Cedar Hills Regional Landfill until 2028 or 2040, with associated transportation impacts as described for Alternative 1 and Alternative 2, respectively.

The major difference between Alternative 3 and Alternatives 1 and 2 is that, when the landfill closes, the Solid Waste Division would direct all of King County's disposed waste to a thermal technology facility (generally referred to as a waste-to-energy, and including mass burn, gasification, plasma arc gasification, pyrolysis, or other technologies) constructed at the landfill site or at another, as yet unknown, location within King County. Residual or unprocessable and ash waste would be disposed at Cedar Hills Regional Landfill or transported to an out-of-county landfill. As noted, currently the most viable technology for King County is mass burn (King County 2017b).

Potential transportation impacts associated with the construction of an appropriately-sized waste-to-energy facility (3,200 to 4,800 tons per day) would occur over a roughly 30- to 36-month period (King County 2017b). Like any industrial facility, construction impacts include impacts from temporary, localized increases in traffic volumes (i.e., construction vehicles and workers; deliveries of construction materials), temporary lane closures, and roadway wear and tear from heavy construction trucks and construction equipment (King County 2016a). The timing and location of construction-related impacts depend on the start of facility operation in 2028 or 2040, and on the ultimate location of the facility at Cedar Hills Regional Landfill or an unknown King County location. The number of truck trips associated with construction is unknown. However, the site selection process and/or mitigation measures developed by the county for the new facility, should be able to minimize significant transportation impacts. In addition, with any new facility developments identified in Section 4, additional construction truck traffic of unknown volume may occur to transport excess excavated soil between new facilities and Cedar Hills Regional Landfill. If Alternative 3 were implemented, project-specific SEPA documentation would be prepared in the future by the Solid Waste Division to evaluate specific transportation impacts of the new facility.

Traffic impacts associated with transportation of waste from Solid Waste Division transfer stations to a waste-to-energy facility would be similar to those described under Alternatives 1 and 2, depending on the start of facility operation in 2028 or 2040, and as shown in Table 5-2. Depending on the ultimate location of the facility, transfer trailer traffic impacts associated with its operation would affect the primary haul routes to and from Cedar Hills Regional Landfill or could affect the areas surrounding an unknown King County location.

Employee, visitor, vendor, and contractor trips under Alternative 3 in 2028 and 2040 are expected to be about double those under Alternative 1 or 2, after closure as shown in Table 5-2. After closure in 2028 or 2040, King County estimates at least 60 to 70 full-time employment positions throughout the life of a typical waste-to-energy facility. The employee vehicle trips (assuming two people per vehicle) are expected to total 60 to 70 vehicle trips per day on average. For a facility at the Cedar Hills Regional Landfill site, those vehicle trips would be in addition to the employee and contractor trips associated with maintenance activities and the Bio-Energy Washington employees traveling to the site. Total employee trips are expected to total 138 to 148 vehicle trips per day at the landfill site and 60 to 70 vehicle trips at an unknown King County site, a larger or equal number of trips compared to Alternative 1.

King County estimates that the quantity of bypass/non-processable waste in need of landfill disposal for a plant designed to minimize bypass waste would be an average of about 60,000 to 80,000 tons per year over the 20- to 50-year life of the facility (King County 2017b). That amount of waste would require approximately 2,400 to 3,200 truckloads per year, or approximately 13 to 18 transfer truck trips per day. In addition, King County estimates that ash residue remaining after combustion is approximately 25 percent of the processed weight. Between 2028 and 2040, average quantities of ash residue would be approximately 825 tons per day, or 66 transfer truck trips per day. Combined, bypass/non-processable waste and ash residue would require approximately 79 to 84 transfer trailer trips per day. For disposal at Cedar Hills Regional Landfill, all truck trips would occur on site with no off-site traffic impacts from disposal of residuals.

Once capacity at Cedar Hills is exhausted, truck trips to convey residuals to area intermodal facilities for waste export would add traffic volumes to area roads, but at lower volumes than waste export under Alternatives 1 and 2.

Alternative 4

Alternative 4 includes the use of AD and AMR at centralized private facilities to maximize material recovery and minimize the tonnage required to be transported and disposed via the methods described in Alternatives 1, 2, and 3. The AD and AMR systems considered under Alternative 4 are the same technologies discussed in Part 4 of this EIS under Alternative 4, but each would be constructed at one new or existing private site and scaled to process all of the King County disposed waste stream.

Potential transportation impacts associated with the construction of an AMR or AD facility would be similar to those described under Alternative 3, but at the unknown location of the facility.

No site has been identified for an AMR facility in King County. However, a site configured to process the entire King County waste stream in 2028 or 2040 would have to accommodate all of the King County solid waste system's transfer vehicles shown in Table 5-2, at a weekday average of 312 vehicle trips and a weekend day average of 146 vehicle trips in 2028, and a weekday average of 344 vehicle trips and a weekend day average of 161 vehicle trips in 2040. The traffic impacts would be concentrated on the roadways leading to and from the site, with the severity of the impact depending on the specific roadways to be used and the background traffic. This number of vehicle trips is the same number of transfer vehicle trips anticipated for the roadways around Cedar Hills Regional Landfill, an out-of-county landfill, or a thermal technology facility as described under Alternatives 1, 2, and 3. AMR facility employee, visitor, vendor and contractor vehicle trips would add to this total.

Additionally under Alternative 4, because an AMR facility recovers only a fraction of the waste it processes, additional transfer truck trips would take place for the transport of residual waste to Cedar Hills Regional Landfill, a thermal technology facility, or an out-of-county landfill, and for transport of recovered recyclables to secondary processors or end-markets. King County has estimated that an AMR facility in 2028 would recover approximately 193,500 tons of recyclable material, as shown in Table 5-3, requiring an additional 72 average daily transfer trips from the AMR facility to secondary processors or end-markets. Residual waste after processing, approximately 912,000 tons in 2028, would require approximately 232 average daily trips from the AMR facility to and from Cedar Hills Regional Landfill, a thermal technology facility, or to and from area intermodal facilities and the roads surrounding out-of-county landfills.

Alternative 4 would result in fewer traffic impacts than Alternatives 1, 2, and 3 on the roadways leading to and from Cedar Hills Regional Landfill, a thermal technology facility, and the intermodal facilities and out-of-county landfills because a fraction of the waste stream would be diverted to recycling. However, the traffic anticipated for the roadways leading to and from the AMR facility (unknown site) would be greater under Alternative 4 than under Alternatives 1 and 2, where no diversion takes place, and about equal to the traffic impacts associated with a thermal technology facility (unknown site) under Alternative 3. The locations of

secondary processors and end-markets are unknown at this time, so overall impacts from transport to these locations are unknown.

For the use of AD technologies on King County's MMSW stream, King County has found that technological constraints may require pre-processing of MMSW prior to the digestion process (King County 2017b). Therefore, this analysis assumes co-location of AMR and AD technologies at one new or existing private site and scaled to process all of the King County disposed waste stream. If AD technology were coupled with the AMR facility described above to focus on MMSW, of the estimated 1,104,594 tons of waste destined for disposal in 2028, approximately 193,500 tons (17.5 percent) would be diverted to recycling or composting, and the remainder, 911,094 tons, would be sent to the AD facility for digestion. With a diversion/digestion rate of approximately 19 percent (HDR 2015), approximately 738,000 tons would require disposal.

Table 5-3. Projected material recovered by AMR facility and estimated average daily traffic in 2028.

Material	Tons Recovered	Transport Density (tons/cubic yard)	Average Annual Trips	Average Daily Trips
Dimensional Lumber	39,900	0.08450	4,722	30
Mixed Paper (general)	28,900	0.50000 *	578	4
Mixed Plastics	25,000	0.30000 *	833	5
Yard Trimmings	24,300	0.12500	1,944	12
Corrugated Containers	21,600	0.55000 *	393	3
Mixed Metals	16,000	0.11250	1,422	9
Carpet	7,300	0.32500 *	225	1
Mixed Organics (yard and food waste)	6,900	0.20000	345	2
Drywall	5,900	0.23350	253	2
PET	5,600	0.30000 *	187	1
Steel Cans	3,700	0.50000 *	74	0
HDPE	3,300	0.32500 *	102	1
Personal Computers	2,300	0.17700	130	1
Aluminum Cans	2,300	0.25000 *	92	1
Tires	500	0.24000	21	0
Total	193,500		11,319	72

* Baled

Notes:

Transport Density Source: EPA 2016

Annual trips assume 100-cubic-yard transfer trailer

Daily trips assume 313 transport days per year (Monday through Saturday)

Based on the above tonnage, King County solid waste system's transfer vehicles would result in traffic impacts at the private site similar to those anticipated for the roadways around Cedar Hills Regional Landfill, an out-of-county landfill, or a thermal technology facility as described under Alternatives 1, 2, and 3. As above, AMR and AD facility employee, visitor, vendor and contractor vehicle trips would add to this total. Also as above, additional transfer truck trips would transport residual waste to Cedar Hills Regional Landfill, a thermal technology facility, or an out-of-county landfill, and transport recovered recyclables to secondary processors or end-markets. The approximately 193,500 tons of recyclable material, as shown in Table 5-3, would require an additional 72 average daily transfer trips from the AMR facility to secondary processors or end-markets. Residual waste after AD processing, approximately 738,000 tons in 2028, would require approximately 189 average daily trips from the AMR/AD facility to and from Cedar Hills Regional Landfill, a thermal technology facility, or to and from area intermodal facilities and the roads surrounding out-of-county landfills. Traffic impacts would be similar for an AD/AMR facility as those described above for an AMR-only facility.

Alternative 5

Alternative 5 is similar to Alternative 4, but with the use of AD and AMR at Cedar Hills Regional Landfill site starting in 2028 instead of at an unknown new or existing private site.

Potential transportation impacts associated with the construction of an AMR or AD facility at Cedar Hills Regional Landfill would be similar to those described for Alternative 3.

Under Alternative 5, transfer trailers would transport waste to Cedar Hills Regional Landfill through 2028 for landfilling, and thereafter for processing through AD and AMR facilities. Traffic impacts associated with transfer vehicle trips at Cedar Hills Regional Landfill under Alternative 5 would be similar to those described for Alternatives 1, 2, and 3 (if thermal technologies are sited at the landfill) through 2028, because all disposed waste would be transported to the same location. After 2028, traffic impacts associated with transfer vehicle trips at Cedar Hills Regional Landfill under Alternative 5 would be greater than those described for Alternative 1, but the same as those described for Alternatives 2 and 3 (if thermal technologies are sited at the landfill) through 2040.

Like Alternative 3, Alternative 5 would require transfer trailers to transport ash, non-processable and bypass waste, and residuals from AD to Cedar Hills Regional Landfill or to an out-of-county landfill. Impacts associated with these trips under Alternative 5, similar to those discussed under Alternative 4, would occur on the roads surrounding Cedar Hills Regional Landfill and/or the area's intermodal facilities and out-of-county landfill, but at significantly less impact than under Alternative 1, as shown in Table 4-2.

5.2.8.3 Significant Unavoidable Adverse Impacts

At a programmatic level, with careful site selection of new facilities that prioritizes sites with adequate capacity of the surrounding road network and, if necessary, with provision of road improvements if insufficient road capacity exists, no significant unavoidable adverse transportation impacts are identified.

5.2.9 Public Services and Utilities

5.2.9.1 Affected Environment

The general affected environment for public services and utilities is described in Section 3.2.9.

With permitted capacity at Cedar Hills Regional Landfill predicted to be used by 2028, new long-term disposal options are required. When the landfill reaches capacity and closes, the county will no longer own or operate a disposal facility. King County Ordinance 14236 prevents the county from developing a replacement landfill either in King County or in another county.

5.2.9.2 Impacts and Mitigation Measures

Changes to how and where long-term disposal occurs under all alternatives would not reduce solid waste service, because King County is committed to meet its obligations under its ILAs with partner cities to provide disposal services through 2040.

Under any of the alternatives, new capital costs would be incurred to provide long-term disposal services. Table 5-4 shows estimated cost information for disposal system alternative components.

Table 5-4. Estimated cost information for disposal system alternative components.

Disposal Alternative Component	Capital Cost ($ M)
Waste export	$5-$7
Further Develop Cedar Hills Regional Landfill	$240-$270
Waste-to-energy facility	$1,100-$1,400
Emerging recovery technologies	$190 (AMR) $34 (AD)

Notes:

Waste export costs; Further Develop Cedar Hills Regional Landfill costs; waste-to-energy costs from draft Plan

AMR costs from King County 2017a

Anaerobic digestion costs from HDR 2017a, Scenario 3B

Assumptions:

Capital costs are inclusive of individual costs for each system component.

All costs in 2017 dollars without escalation.

Cedar Hills Regional Landfill is expected to reach capacity in 2028 under Alternative 1. All of the alternatives incorporate options for providing long-term disposal services.

The estimated total capital costs of the various alternatives differ substantially, with additional variation depending on whether Cedar Hills Regional Landfill is closed in 2028 or 2040. Because debt and interest payments are considered during customer rate-setting, in general, increased capital requirements funded through either rate-funded methods or bonds would increase pressure to raise rates, even with additional recycling. Alternatively, increased economic growth and population would increase generation and decrease pressure to raise rates for alternatives that use capital to build capacity

Because disposal at Cedar Hills Regional Landfill is the lowest capital cost disposal option for ratepayers, and is not bond funded, an extension of the life of the landfill would keep rates lower for a longer period by delaying the implementation of waste export. Over the long term, after capital costs are paid, the comparative cost of the alternatives is determined by their operating costs, which also differ similarly to capital costs. From the long-term perspective[3], Alternative 2 is the least cost alternative and similar to Alternative 1. Alternative 3 is the highest cost alternative. The addition of Alternatives 4 and 5 add capital and operating expenses that are likely to have a rate impact.

5.2.9.3 Significant Unavoidable Adverse Impacts

At a programmatic level, no significant unavoidable adverse impacts on public services and utilities are identified.

[3] Long term is 2017 to 2040

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Federal Agencies
National Oceanic and Atmospheric Administration (NOAA) Fisheries
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency

Tribes
Muckleshoot Indian Tribe
Puyallup Tribe of Indians
Snoqualmie Indian Tribe
Suquamish Tribe
Tulalip Tribes of Washington

State of Washington
Department of Agriculture
Department of Ecology
Department of Transportation, Northwest Region
Washington Utilities and Transportation Commission

Regional Agencies
Puget Sound Clean Air Agency
Puget Sound Regional Council

King County
Dow Constantine, Executive

County Council
Rod Dembowski, District 1
Larry Gossett, District 2
Kathy Lambert, District 3
Jeanne Kohl-Welles, District 4
Dave Upthegrove, District 5
Claudia Balducci, District 6
Pete von Reichbauer, District 7
Joe McDermott, District 8
Reagan Dunn, District 9
King County Council Auditors Office

Department of Community and Human Services
Department of Executive Services
Department of Natural Resources and Parks
Department of Permitting and Environmental Review
Department of Transportation
Public Health—Seattle and King County

Local Jurisdictions
City of Algona
City of Auburn
City of Bellevue
Town of Beaux Arts Village
City of Black Diamond
City of Bothell
City of Burien
City of Carnation
City of Clyde Hill
City of Covington
City of Des Moines
City of Duvall
City of Enumclaw:
City of Federal Way
Town of Hunts Point
City of Issaquah
City of Kenmore
City of Kent
City of Kirkland
City of Lake Forest Park
City of Maple Valley
City of Medina
City of Mercer Island
City of Newcastle
City of Normandy Park
City of North Bend
City of Pacific
City of Redmond
City of Renton
City of Sammamish
City of SeaTac
City of Seattle
City of Shoreline
City of Skykomish
City of Snoqualmie
City of Tukwila

City of Woodinville
City of Yarrow Point
Pierce County
Snohomish County

Advisory Committees
Metropolitan Solid Waste Management
Advisory Committee
Solid Waste Advisory Committee

Community Groups
Community Service Areas
Sound Cities Association

Garbage Haulers
Recology CleanScapes, Inc.
Republic Services, Inc.
Waste Connections, Inc.
Waste Management, Inc.

Local Libraries
King County Library System

Attachment A

1.0 Environment of the Puget Sound Region

1.0 Environment of the Puget Sound Region

1.1 Earth

The Puget Sound region, which is located between the Olympic Mountains on the west and the Cascade Mountains on the east, is characterized by a series of parallel plateaus and valleys that trend predominantly north-south in the center of the region. The valleys are occupied by major rivers, lakes, and the marine waters of Puget Sound and its various extensions. This general physiographic pattern is interrupted by several east-west trending features, most notably the Issaquah highlands, a chain of hills extending from the North Bend area west toward Seattle. Valley floors are flat. Upland plateaus have moderately rolling topography. Topography tends to be steepest on the sides of major valleys, in the Issaquah highlands, and in the foothills along the west and east edges of the region.

Soils in the Puget Sound region reflect geologically recent glacial and alluvial (river and stream) activity as well as human activity. The original soils in urban areas concentrated in the central Puget Sound area have typically been modified by excavation and filling. River valleys are generally occupied by poorly drained, silty loams that commonly have a substantial organic content. Soils on upland areas between the valleys typically are coarser-grained sandy and gravelly sandy loams, but soils with high organic content do occur locally in depressions and along water bodies. Over extensive areas within the region, low permeability glacial till underlies surficial soils at typical depths of a few feet.

Local jurisdictions within the region have mapped geologically hazardous areas including landslide and erosion-prone areas, some abandoned mining areas, and seismic risk areas. Landslide and erosion-prone areas are associated primarily with steep slopes. Hazardous mining areas that may be subject to surface subsidence are associated primarily with past coal mining that occurred in the area from Newcastle through Renton and south to Black Diamond.

The Puget Sound region is an area of substantial risk from major earthquakes. The primary hazards from earthquakes in the Puget Sound area are liquefaction of unconsolidated soils which diminishes the ground's capacity to support structures and landslides triggered by ground shaking. A high liquefaction potential is associated with saturated alluvial soils which occur over large areas of the major river valleys in the region and with areas of older fill in Seattle, Tacoma, and other urban areas.

1.2 Air Quality and Odor

Weather in the central Puget Sound region is characterized by sunny, mild days during summer and cloudy, wet days during winter. January is typically the coldest month and July is usually the warmest

month, with average temperatures in Seattle of 44.5°F and 75.1°F, respectively. Average nighttime temperatures range from the lower 30s during winter months to the mid-50s during summer months. Prevailing winds in are generally from the southwest. Occasional severe winter storms produce strong northerly winds. Peak wind speeds in excess of 40 miles per hour tend to occur between November and March.

In the Puget Sound region, air quality is largely determined by the weather patterns that circulate air throughout the region, and these in turn are influenced by topography. The air moves and disperses airborne chemicals that are emitted from a variety of human and natural sources, both from within and outside the region. Periods of stagnation occur primarily in the summer and winter allowing air pollutants to build up.

Air contaminants that may occur at significant levels in urban areas include carbon monoxide, ozone, sulfur dioxide, nitrogen dioxide, and particulate matter. Large confined valleys are known for poor ventilation (due to high ground on either side of the valley), yet are also desirable locations for industrial development. The combination of these factors often results in high contaminant concentrations.

Cars and trucks produce approximately 90 percent of carbon monoxide in urban areas. Carbon monoxide levels are typically higher during the winter months, especially during air stagnation periods. Ozone and ground-level ozone, or smog, is formed near the ground when volatile organic compounds and nitrogen oxides react chemically. Ozone can lower resistance to colds and pneumonia and cause irritation to the nose, throat, and lungs. Emissions from motor vehicles, gasoline and paint vapors, aerosol products, and industry all contribute to ozone formation. Traffic and other pollutant sources add to existing smog, increasing pollutant density near pollutant sources. Sulfur dioxide is a colorless gas produced by industrial sites such as smelters, paper mills, power plants and steel manufacturing plants, and can cause a variety of respiratory diseases. Nitrogen dioxide is a poisonous gas formed from high temperature fuel combustion and subsequent atmospheric reactions. Nitrogen dioxide in ambient air has been connected with a range of respiratory diseases (PSCAA 2016).

Two types of fugitive dust or particulate matter are monitored and regulated by federal, state, and local government: total suspended particulates and fine particulate matter (PM10 and PM2.5). The Puget Sound Clear Air Agency (PSCAA) (the Agency) ceased direct PM10 monitoring in 2006. The Agency monitors PM2.5 using a variety of methods to ensure quality and consistency. Fine particles are emitted directly from a variety of sources, including wood burning (both outside, and in wood stoves and fireplaces), vehicles (particularly diesel engines) and industry. They also form when gases from some of these same sources react in the atmosphere.

Greenhouse gases include carbon dioxide, methane, and a variety of other gases. Individual greenhouse gases have differing potentials for global warming. For example, methane has a warming potential about 25 times that of the same weight of carbon dioxide. In King County (Stockholm Environment Institute 2012), transportation contributes almost half (~48.7%) of total emissions, with road transportation comprising the bulk (~78%) of transportation emissions.

1.3 Air Quality Regulations

In compliance with the 1990 Clean Air Act Amendments, Washington state adopted the Clean Air Washington Act in 1991, which includes ambient air quality standards for criteria air pollutants that are at least as stringent as the federal standards for protection of health and the environment. The Clean Air Washington Act is administered by the Washington Department of Ecology and, in the central Puget Sound region, the Puget Sound Clean Air Agency (PSCAA).

PSCAA regulates odorous emissions (through section 9.11 of Regulation I), which prohibits emission of any air contaminant in sufficient quantity, character, or duration to be injurious to human health, property, or plant or animal life. Section 9.11 also requires that odors not interfere with enjoyment of life or property.

EPA established the air quality index (AQI) as a simplified index for communicating daily air quality for forecasts and near real-time information. People can use this information to plan their daily activities. The AQI indicates how clean or polluted air is and what associated health effects might be a concern. It focuses on health effects that may be experienced within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide and nitrogen dioxide (PSCAA 2016).

Most days in the Puget Sound region are in the "Good" category, but local meteorological conditions, along with polluting sources, cause levels to rise into "Moderate" or above on some days. PM2.5 generally determines the AQI in the Puget Sound area on days considered unhealthy for sensitive groups. While fine particle levels met EPA's health-based standard of 35 micrograms per cubic meter in 2016 in King County, levels exceeded the Agency's more stringent local PM2.5 health goal of 25 micrograms per cubic meter (PSCAA 2016).

Chapter 173-441 WAC established reporting requirements for emissions of greenhouse gases that exceed a threshold in Washington. These reporting requirements are consistent with reporting requirements in the federal greenhouse gas reporting system established in 40 CFR Part 98. Solid waste landfills are included with certain large facilities and transportation fuel suppliers that must report their greenhouse gas emissions to Washington Department of Ecology.

1.4 Water

1.4.1.1 Surface Water

The east side of the central Puget Sound watershed (Snohomish, King, and Pierce counties) includes five major drainage basins. These are: 1) the Stillaquamish drainage basin; 2) the Snohomish-Snoqualmie drainage basin; 3) the Cedar River-Lake Washington drainage basin; 4) the Green River basin; and 5) the White-Puyallup drainage basin. In addition, numerous small drainages along the saltwater margins in the westernmost portions of Snohomish and King Counties are grouped together as Puget Sound drainages.

Surface water runoff during storm events carries toxics from their source into Puget Sound rivers and streams. Ecology measured toxics in streams during storms and in baseflow. Baseflow is the river flow

before it rains. Together, storm flows and baseflow represent the largest contributor of contaminants into Puget Sound waters. Contaminants are more prevalent and found at higher levels during storm flows than during non-storm conditions in rivers and streams that drain into the Sound. Compared with stormwater from other land use types, urban stormwater contains higher levels and more frequent detections of chemicals. Streams and rivers may actually be more sensitive to stormwater impacts than Puget Sound because they are closer to sources and support sensitive life stages of organisms (Ecology 2011).

The state of Washington classifies surface waters of the state as part of its promulgation of water quality standards (Washington Administrative Code [WAC] chapter 173-201A). The freshwater classifications are based on support of aquatic life, recreation, water supply, and miscellaneous uses. Most rivers and streams in the region fully support these uses. Notable exceptions are the Lower Duwamish Waterway and portions of the Puyallup River and tributaries (WAC 173-201A). Marine water classifications are based on support of aquatic life, shellfish harvesting, recreational uses, and miscellaneous uses. Portions of Puget Sound fully support these uses. However, there are many areas, particularly near urbanized shorelines, that are considered impaired for one or more of these uses (WAC 173-201A, Ecology 2017).

1.4.1.2 Groundwater

Groundwater is used as potable water supply for about 30 percent of King County's population. Municipal supply wells are located in many cities and in unincorporated King County. Additional groundwater usage comes from irrigation wells, which can be used for both agricultural and landscape purposes (King County 2017).

Groundwater is recharged by water infiltrating into the soil. Surface recharge of ground water is most significant in areas of porous soils, particularly large river and stream valley floors underlain by porous alluvial deposits. In addition, although much of the upland drift plains in the central Puget Sound area are underlain by relatively impermeable till, significant portions of the upland areas are underlain by more porous soils (e.g., Everett soils formed in outwash sands and gravels), and therefore these are significant recharge areas.

King County's Department of Natural Resources and Parks conducted groundwater monitoring from 2001 to 2004. The study identified localized problems, including elevated levels of nitrate, naturally elevated levels of arsenic, and seawater intrusion. Overall, the study concluded that water quality is generally at least as good as the designated maximum contaminant level (King County 2005).

1.5 Plants and Animals

Native habitats within the central Puget Sound region include coniferous and broadleaf forests, lakes and streams, wetlands, and marine waters. Development has modified or supplanted portions of these originally continuous native habitats, in particular, forests and wetlands, and, in the more developed areas, created a mosaic of habitat fragments. These habitat fragments are interspersed with areas having limited or no vegetation. In general, the degree of development and the associated degree of habitat modification increases from the more rural east and west edges of the region toward the more urbanized center adjacent to Puget Sound. Wildlife distribution reflects habitat patterns with wildlife less tolerant of humans

confined primarily to the more rural portions of the region and native and exotic wildlife more tolerant of humans dominating the more urbanized areas.

An array of policies and regulations related to habitat preservation and the avoidance of impact are in place at the local, state, and federal level. These policies and regulations limit the extent of impacts allowed to some habitats, e.g. wetlands and streams, while requiring mitigation for those impacts that are allowed. Other policies and regulations target specific animal and plant species. For example, the federal Endangered Species Act (ESA) provides protection to several plant and animal species, including Chinook salmon, steelhead, and bull trout that occur in the region. ESA provisions require a showing of limited or no impact to protected species before a development can proceed.

1.6 Noise

Most local jurisdictions establish limits on the levels and durations of noise crossing property boundaries. Allowable maximum sound levels typically depend on the land use zone of the source of the noise and that of the receiving property. Local jurisdictions typically identify a number of noise sources or activities that are exempt from the maximum allowable noise limits. These commonly include sounds created by vehicles traveling on public roads, and sound created by warning devices (such as reverse gear alarms) when not operated continuously for more than brief continuous periods. Also, sounds from construction equipment and blasting are typically exempt from noise limits during daytime hours.

King County recently adopted a new noise ordinance in the King County Code (KCC), effective May 2015. These criteria are defined in KCC Title 12, Chapter 12.86 (KCC 12.86)

For sound sources located within unincorporated King County, the maximum permissible sound levels are shown in Table A-1.

Table A-1. King County Maximum Permissible Sound Levels.

Sound Source District	Receiving Property District			
	Rural	Residential	Commercial	Industrial
Rural	49 dB(A)	52 dB(A)	55 dB(A)	57 dB(A)
Residential	52 dB(A)	55 dB(A)	57 dB(A)	60 dB(A)
Commercial	55 dB(A)	57 dB(A)	60 dB(A)	65 dB(A)
Industrial	57 dB(A)	60 dB(A)	65 dB(A)	70 dB(A)

Source: KCC 12.86

1.7 Land Use

The intensity and density of land uses within the central Puget Sound region is generally lowest toward the east and west peripheries and highest toward the center along Puget Sound where the major cities are located. The region's urban growth area, designated pursuant to the state Growth Management Act, overlies the central, more urbanized north-south spine of the region. Within this area, a mosaic of interlocking urban areas typically includes residential uses and a variety of nonresidential uses, including major commercial and industrial centers. To the west and east of this regional spine, in the less densely

populated areas, suburban and rural residential, resource, and open space lands separate scattered urban centers. Local comprehensive plan designations and zoning generally reflect these underlying land use patterns.

1.8 Transportation

The roadway network in the central Puget Sound region includes several major limited-access highways (e.g., Interstates 5, 405, and 90 as well as several state routes), local two- to multi-lane arterial roadways, and local, typically two-lane, distribution roads and streets. The density of the roadway network and the traffic volumes on individual roadways generally parallel the density and intensity of land use in the region, with the highest road densities and traffic volumes occurring in the major urban areas. Portions of major highways in the region sustain traffic volumes in excess of 100,000 vehicles per day, while roadways in the least populated peripheries of the region may experience traffic volumes of several hundred or fewer vehicles per day.

Under the state Growth Management Act concurrency requirement, local jurisdictions in the region must assure that adequate roadways, and other transportation facilities, are available to meet the requirements of new development. The specific thresholds for determining roadway adequacy vary somewhat from jurisdiction to jurisdiction, but generally reflect considerations of roadway capacity, traffic volumes, and safety. Currently, portions of many roadways throughout the central Puget Sound region are inadequate to support the traffic demands placed on them, and improvements of inadequate roadways may be required before new development can occur.

1.9 Public Services and Utilities

Puget Sound Energy and Seattle City Light provide electrical service in King County. Puget Sound Energy provides natural gas. Water supply is provided either by municipal agencies or independent water districts; in areas not served by either of these providers, ground water is the primary water source. Municipal agencies or sewer districts provide wastewater collection. The King County Department of Natural Resources, Wastewater Treatment Division, provides transport and treatment of wastewater in much of King County, although some rural areas still rely on septic systems. The King County Department of Natural Resources, Solid Waste Division, provides a full range of solid waste services in the region. Drainage collection and drainage is provided by municipal agencies in incorporated areas and usually by King County in unincorporated areas. Telecommunications and fiber-optic services are probably the fastest growing utility in King County and are provided by numerous private companies.

Fire protection and emergency medical services are either provided by municipal fire departments or by various King County fire districts. Law enforcement is provided by municipal agencies in incorporated parts of the county or by the King County Sheriff in unincorporated areas.

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King County

Department of
Natural Resources and Parks
Solid Waste Division