

# Transfer Plan Review Part 2

## Draft Report

Prepared in accordance with Council Motion 14145



**King County**

Department of  
Natural Resources and Parks  
**Solid Waste Division**

<i>Waste</i> <b>Prevention</b>	<i>Resource</i> <b>Recovery</b>	<i>Waste</i> <b>Disposal</b>
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March 2015



# Solid Waste Division

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## Acronyms, Abbreviations, and Common Terms

<b>Cedar Hills</b>	Cedar Hills Regional Landfill
<b>division</b>	King County Solid Waste Division
<b>HHW</b>	Household Hazardous Waste
<b>ILA</b>	Interlocal Agreement
<b>LOS</b>	Level of service; a grade that can be used to assess capacity and operational performance
<b>MSWMAC</b>	Metropolitan Solid Waste Management Advisory Committee
<b>NERTS</b>	Northeast Recycling and Transfer Station
<b>self-haul or self-hauler</b>	Anyone who brings garbage, recyclables, and/or yard waste to a transfer facility except a commercial collection company
<b>SEPA</b>	State Environmental Policy Act
<b>service performance indicators</b>	Indicate potential service issues and need for further evaluation: <ul style="list-style-type: none"><li>• Service times for commercial customers of 16 minutes or less</li><li>• Service times for self-haul customers of 30 minutes or less</li><li>• Inbound queuing and potential impacts to off-station roadways and/or driveways</li></ul>
<b>service time</b>	Time customers spend on-site measured from the inbound scale to the outbound scale
<b>SWAC</b>	Solid Waste Advisory Committee
<b>Transfer Plan</b>	The adopted 2006 <a href="#">Solid Waste Transfer and Waste Management Plan</a>
<b>TSO</b>	Transfer Station Operator

## Executive Summary

### Purpose

This draft report has been prepared in response to [Council Motion 14145](#). It presents analysis of operational, policy, and capital strategies to provide transfer service to the northeast portion of King County including the pros and cons of constructing a new transfer station compared to implementing demand management strategies, and analysis of the potential closure of the Renton Transfer Station. The goal of the proposed strategies is to minimize customer wait time and avoid over- or under-utilization of transfer stations.

### Summary of Findings

The region has multiple options for managing the forecasted growth in transactional demand in the northeast service area. Three alternatives that would not build a Northeast Recycling and Transfer Station were carefully analyzed to confirm the viability of the solutions and compare them to the adopted plan, which calls for a new station to be constructed. These options combine policy decisions, capital investments, and operational changes.

The alternatives vary in terms of cost and complexity. Additionally, future constraints at each transfer station will vary, so demand strategies for each station also vary.

Building on analysis that was completed in 2013, and in response to the scope outlined in [Council Motion 14145](#), four concepts for providing service were analyzed. The general concept descriptions are:

Concept 0 (Baseline)	<ul style="list-style-type: none"><li>• No Northeast Recycling and Transfer Station</li><li>• Does not direct commercial haulers</li><li>• No self-haul restrictions</li></ul>
Concept 1 (E1*)	<ul style="list-style-type: none"><li>• No Northeast Recycling and Transfer Station</li><li>• Direct commercial haulers to use certain transfer stations so that transfer system use is more evenly balanced and in particular so that use of Shoreline is increased commercial haulers</li></ul>
Concept 2 (E2*)	<ul style="list-style-type: none"><li>• No Northeast Recycling and Transfer Station</li><li>• Restrict the hours that self-haulers can use Factoria and extend Factoria operating hours so that self-haulers are encouraged to use the extended hours or to use alternative transfer stations during the restricted hours</li></ul>
Concept 3 (adopted Transfer Plan)	<ul style="list-style-type: none"><li>• Build a Northeast Recycling and Transfer Station</li></ul>

*\*Reflect E1 and E2 as referenced in Council Motion 14145.*

Variation in recycling rate assumptions could have a measurable effect on overall tonnage rates. For instance, a ten percent lower recycling rate by 2030 would equate to an approximate 33 percent increase in tonnage. While this sensitivity will be important to monitor, it is not expected to have a substantial effect on transactional volume, which is the major focus of this review.

City participation in our regional system affects both tonnage and transactions. If the five cities that have not signed an amended interlocal agreement reconsider and sign an agreement that extends through 2040, the division would expect to receive an additional 50,000 tons more per year. This is estimated to equate to an eight percent increase in transactional volume. However, it is important to note that even if they do not sign the extended agreement, this issue would not begin to affect operations until July 2028 when the current agreement expires. If these cities extend their agreements, tonnage will reach record levels again before 2040.

***Alternatives to Building a New Station are Viable***

The concepts were supplemented with mitigation strategies to assess viable options for managing transactional demand and minimizing customer wait times. The following table lists mitigation strategies that were analyzed.

<b>A Range of Mitigation Strategies Were Analyzed to Smooth Demand and Increase Site Capacity</b>	
• Additional inbound/outbound scales	• Mandatory curbside collection
• Additional onsite queuing areas	• Lower cost curbside bulky collection service
• Additional stalls for increased tip floor capacity	• Material bans (wood and yard waste)
• Extended operating hours	• Lower regional direct fee
• Additional staffing for unloading assistance	• Incentive/peak hour pricing model
• Provide on-line wait time information	• Higher minimum fee
• Do not provide household hazardous waste service at Factoria	

Capital solutions such as the addition of scales or operational changes to extend operating hours would help manage increased traffic volumes. Policy changes such as mandated collection or material bans would help to reduce transactional demand, but would also require that the county and cities pass ordinances and amend collection contracts.

Under any of the concepts and strategies, the Renton and South County transfer stations are not expected to experience constraints that require mitigation. Bow Lake was designed to accommodate additional scales and onsite queuing space and would require such enhancements regardless of the chosen approach. The Houghton Transfer Station was not modeled because it is assumed to be closed by 2023.

While additional approaches are detailed in the body of this report, the following tables summarize what appear to be the most effective approaches for minimizing customer wait times and providing for more optimal utilization of the transfer system network. Each table focuses on one of the four basic concepts for Factoria and Shoreline and highlights the impacts, mitigation, and costs for that concept.

<b>Concept 0:</b>	<b>No Northeast Recycling and Transfer Station, does not direct commercial haulers, no self-haul restrictions (Baseline)</b>
<b>Site</b>	<b>Summary of Peak Hour Conditions</b>
<b>Factoria</b>	<p><u>Impacts</u></p> <ul style="list-style-type: none"> <li>• Substantial queuing of vehicles impacting driveways and the intersection of SE 32nd St/Richards Rd</li> <li>• Scale-to-scale time would triple for self-haulers and double for commercial haulers.</li> <li>• The total wait time for all customers would increase dramatically due to off-site queuing</li> <li>• Additional vehicle traffic during p.m. peak commute hours</li> <li>• Shift of vehicle traffic in the region and increased vehicle miles travelled</li> <li>• Bellevue has indicated the Conditional Use Permit may be subject to modification</li> </ul> <p><u>Most Effective Mitigation Strategies</u></p> <ul style="list-style-type: none"> <li>• Implement King County ordinance to add peak pricing and to change hours</li> <li>• Extend weekday closing time from 4 p.m. to 10 p.m. and weekend from 5:30 p.m. to 8 p.m.</li> </ul> <p><u>Costs</u></p> <ul style="list-style-type: none"> <li>• Annual operating costs increase ~\$1.5 million</li> <li>• Annual revenue increase ~\$2.3 million</li> </ul>
<b>Shoreline</b>	<p><u>Impacts</u></p> <ul style="list-style-type: none"> <li>• Scale-to-scale time would nearly double for self-haul and commercial customers</li> </ul> <p><u>Most Effective Mitigation Strategies</u></p> <ul style="list-style-type: none"> <li>• Add staff for the commercial tipping floor</li> <li>• Add an outbound scale</li> </ul> <p><u>Costs</u></p> <ul style="list-style-type: none"> <li>• Annual operating costs increase ~\$70,000</li> <li>• Capital cost ~1.7 million</li> </ul>

<b>Concept 1:</b>	<b>Direct commercial haulers, no Northeast Recycling and Transfer Station (E1*)</b>
<b>Site</b>	<b>Summary of Peak Hour Conditions</b>
<b>Factoria</b>	<p><u>Impacts</u></p> <ul style="list-style-type: none"> <li>• Substantial queuing of vehicles impacting driveways and the intersection of SE 32nd St/Richards Rd</li> <li>• Scale-to-scale time would triple for self-haulers and double for commercial haulers</li> <li>• The total wait time for all customers would increase dramatically due to off-site queuing</li> <li>• Additional vehicle traffic during p.m. peak commute hours</li> <li>• Shift of vehicle traffic in the region and increased vehicle miles travelled</li> <li>• Bellevue has indicated the Conditional Use Permit may be subject to modification</li> </ul> <p><u>Most Effective Mitigation Strategies</u></p> <ul style="list-style-type: none"> <li>• Implement King County ordinance to add peak pricing and to change hours</li> <li>• Extend weekday closing time from 4 p.m. to 10 p.m. and weekend from 5:30 p.m. to 8 p.m.</li> </ul> <p><u>Costs</u></p> <ul style="list-style-type: none"> <li>• Annual operating costs increase ~\$1.5 million</li> <li>• Annual revenue increase ~\$2.3 million</li> </ul>
<b>Shoreline</b>	<p><u>Impacts</u></p> <ul style="list-style-type: none"> <li>• Moderate queuing of vehicles impacting the intersection of Meridian Ave N/N 165<sup>th</sup> St</li> <li>• Scale-to-scale time would double for all customers because commercial haulers are directed to Shoreline to balance the system</li> </ul> <p><u>Most Effective Mitigation Strategies</u></p> <ul style="list-style-type: none"> <li>• Add staff for the commercial tipping floor</li> <li>• Add an outbound scale</li> </ul> <p><u>Costs</u></p> <ul style="list-style-type: none"> <li>• Annual operating cost increase ~\$340,000</li> <li>• Capital cost ~\$1.7 million</li> </ul>

*\*Reflects E1 as referenced in Council Motion 14145*

<b>Concept 2:</b>	<b>Restrict self-haul, no Northeast Recycling and Transfer Station (E2*)</b> <i>(note that this Concept assumes extended hours at Factoria)</i>
<b>Site</b>	<b>Summary of Peak Hour Conditions</b>
<b>Factoria</b>	<p><u>Impacts</u></p> <ul style="list-style-type: none"> <li>• Substantial queuing of vehicles impacting driveways and the intersection of SE 32nd St/Richards Rd</li> <li>• Scale-to-scale time would more than double for self-haulers and significantly increase for commercial haulers</li> <li>• The total wait time for all customers would increase dramatically due to off-site queuing</li> <li>• Additional traffic during p.m. peak commute hours</li> <li>• Shift of vehicle traffic in the region and increased vehicle miles travelled</li> <li>• Minor increase in commercial haul traffic and decrease in self-haul traffic</li> <li>• Bellevue has indicated the Conditional Use Permit may be subject to modification</li> </ul> <p><u>Most Effective Mitigation Strategies</u></p> <ul style="list-style-type: none"> <li>• Ban yard/wood waste</li> <li>• Implement mandatory collection</li> <li>• Introduce low cost curbside bulky waste collection</li> </ul> <p><u>Costs</u></p> <ul style="list-style-type: none"> <li>• Annual operating costs increase ~\$1.5 million</li> <li>• Options to provide yard/wood waste service range from providing a drop box somewhere in the service area at a capital cost of approximately \$18.5 million and an operating cost of about \$600,000 annually, to allowing the material to flow to other transfer facilities and private service providers which would have minimal direct costs, but could result in revenue loss</li> </ul>
<b>Shoreline</b>	<p><u>Impacts</u></p> <ul style="list-style-type: none"> <li>• Scale-to-scale time would double for all customers</li> </ul> <p><u>Most Effective Mitigation Strategies</u></p> <ul style="list-style-type: none"> <li>• Add staff for the commercial tipping floor</li> <li>• Add an outbound scale</li> </ul> <p><u>Costs</u></p> <ul style="list-style-type: none"> <li>• Annual operating cost increase ~\$340,000</li> <li>• Capital cost ~\$1.7 million</li> </ul>

*\*Reflects E2 as referenced in Council Motion 14145*

<b>Concept 3:</b>	<b>Build a Northeast Recycling and Transfer Station</b>
<b>Site</b>	<b>Summary of Peak Hour Conditions</b>
<b>Factoria</b>	<u>Impacts</u> <ul style="list-style-type: none"> <li>Scale-to-scale time for self-haul customers would increase moderately</li> </ul> <u>Most Effective Mitigation Strategies</u> <ul style="list-style-type: none"> <li>None recommended</li> </ul> <u>Costs</u> <ul style="list-style-type: none"> <li>None</li> </ul>
<b>Shoreline</b>	<u>Impacts</u> <ul style="list-style-type: none"> <li>None</li> </ul> <u>Most Effective Mitigation Strategies</u> <ul style="list-style-type: none"> <li>None required</li> </ul> <u>Costs</u> <ul style="list-style-type: none"> <li>None</li> </ul>
<b>Northeast</b>	<u>Impacts</u> <ul style="list-style-type: none"> <li>None conditions of concern</li> </ul> <u>Most Effective Mitigation Strategies</u> <ul style="list-style-type: none"> <li>None required</li> </ul> <u>Costs</u> <ul style="list-style-type: none"> <li>Capital cost ~\$97 million (inflated)</li> </ul>

## Next Steps

Based upon the data and the analysis the division has done to date, it appears that there are viable alternatives to building a new Northeast Recycling and Transfer Station even when the Houghton Transfer Station is closed (no later than 2023). These alternatives are not without impacts, however, and they require the support and potential policy actions from our City partners. The alternatives require a variety of other actions and decisions that must be taken in order to mitigate the impacts on other transfer stations.

During this recent study, several significant questions have been raised by County Council members, our City partners, other stakeholders, and staff about the future of our solid waste system. These questions highlight the importance of looking at the system as a whole, and not just the transfer stations, in order to address the future of the solid waste system.

1. How can the investment in the Cedar Hills Regional Landfill be maximized by increasing its capacity through design and operational strategies?
2. How can the region significantly increase its waste prevention and recycling rates to achieve our environmental goals and eliminate resources from being buried in a landfill?
3. How can we, King County, our City partners, and the private sector, provide excellent customer service at the curb and at the transfer stations consistent with our values to be good environmental stewards and neighbors?
4. What is the best approach to ensuring the revenues collected will cover the expenses of the solid waste system?

The following summarizes the next steps;

- Review this draft report with City partners and other stakeholders through briefings and advisory meeting discussions and reflect these discussions in the final report.

- Assess the potential impacts should Bellevue, Clyde Hill, Hunts Point, Medina, and Yarrow Point choose to extend their contract with King County to 2040, and reflect these findings in the final report.
- Transmit a final report to the County Council by June 30, 2015.
- Continue the Comprehensive Solid Waste Management Plan (Comp Plan) development process with City partners and other stakeholders to reflect the findings and recommendations of the final Transfer Plan Review report. A draft Comp Plan is expected to be ready for review in early 2017.

## Introduction

In King County, the transfer system serves a population of about 1.4 million residents and numerous businesses ranging across 2,000 square miles from rural and remote to densely urban and suburban.

This review is focused on the urban transfer system and one central question in particular: *How do we serve the northeast area?* Impacts of closing the Renton Transfer Station are also addressed.

There are options for providing service – from capital investments to policy changes to operational strategies. This draft report provides information so that these options can be compared. Then, with feedback from stakeholders, a final report will be prepared with a recommended course of action.

## Purpose of Review

In 2013, in collaboration with its stakeholders, the King County Solid Waste Division (division) conducted a comprehensive review of the [Solid Waste Transfer and Waste Management Plan](#) (Transfer Plan). One of the recommendations of that report was to continue to evaluate the best capital and operational approaches to provide service to the northeast county. This report addresses that recommendation, along with other analysis specified in [Council Motion 14145](#):

By March 31, 2015, the division shall transmit a draft report to the Council, followed by a final report by June 30, 2015, prepared in collaboration with stakeholders, on strategies to manage transactions at transfer stations, as well as other operational and capital strategies such as increased use of underutilized transfer stations.

- The report shall address the management of transfer station transactions through the use of strategies intended to avoid excessive user wait times resulting from overutilization of individual stations.
- The report shall analyze options E1 and E2 in the Transfer Plan Review Report.
- The report shall also analyze the effect of the potential closure of the Renton Transfer Station on the self-haul service needs of residents currently served by the Renton Transfer Station, with particular attention to the accessibility and convenience provided to current transfer station clients by the Renton station, compared with drive time and potential waits associated with alternative transfer station options.
- The report shall analyze options for self-haul service for residents currently served by the Renton Transfer Station in the event of a closure of the station.

The report also addresses recommendations of the [Transfer Plan Review Final Report \(Revised and Amended June 2014\)](#):

In collaboration with stakeholders, continue to evaluate a mix of capital facilities and operational approaches to address system needs over time, including implementation of operational approaches such as transaction demand management strategies that would provide service for the northeast county without building an additional transfer station; compare trade-offs and benefits with the Transfer Plan.

Questions and concerns expressed by cities and other stakeholders during the review process are also addressed in the report.

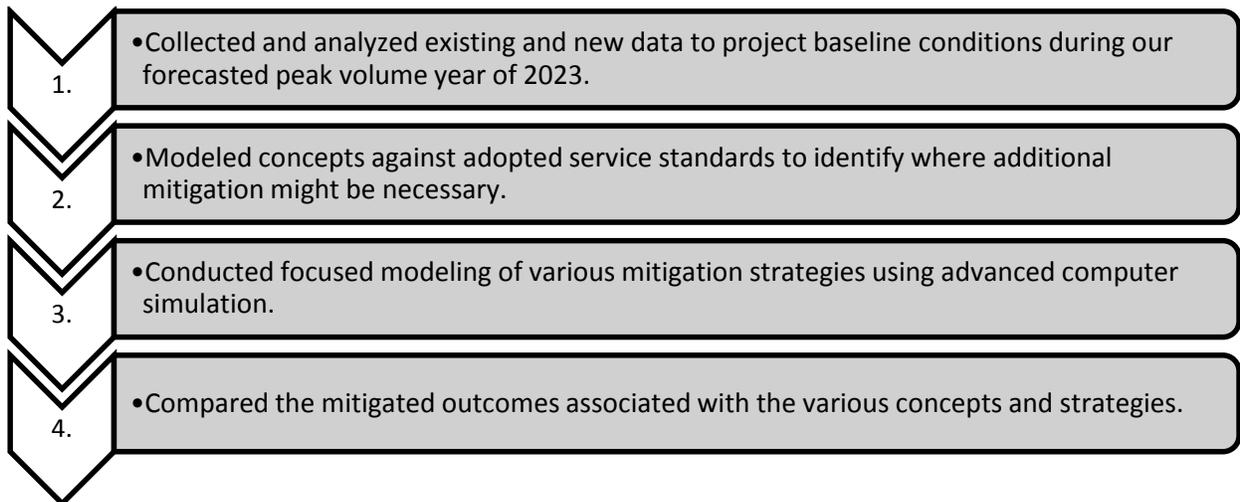
This second review of the Transfer Plan will inform the revision of the comprehensive solid waste management plan update.

## Process

A team of consultants collected and analyzed the data that led to the findings presented in this report. An advisory committee composed of members of the Metropolitan Solid Waste Management Advisory Committee and the Solid Waste Advisory Committee provided feedback and advice to the Solid Waste Division throughout the review. Workshops provided a larger group of stakeholders with updates and helped to identify outstanding questions and concerns. Surveys of transfer station self-haulers and commercial haulers were also conducted.

The data collection and analysis process was composed of four key steps to ensure a thorough review of regional solutions.

### Data Collection and Analysis Process



## Key Assumptions

Key assumptions informed by [Council Motion 14145](#), as well as previous review in 2013, include:

1. The review focused on the northeast service area and the Renton Transfer Station.
2. All concepts assumed that the Houghton Transfer Station would close sometime before 2023.
3. Each concept was analyzed both with the Renton Transfer Station open and with it closed.
4. Factoria was modeled based on the design of the station currently under construction.
5. Analysis focused on 2023 because that year represents the forecasted peak for system tonnage, so any potential service problems could be identified and mitigation applied under a worst case scenario.
6. A 70 percent recycling rate would be achieved in 2030.
7. The City of Bellevue, along with four of the five Point Cities – Clyde Hill, Hunts Point, Medina, and Yarrow Point – will leave the system in July 2028.
8. Concept 3, Build a Northeast Recycling and Transfer Station, was included because it is in the adopted Transfer Plan and provides a useful comparison to the other concepts.

## 2006 Transfer and Waste Management Plan

In 2004, the King County Council adopted [Ordinance 14971](#), which prioritized evaluation of the urban transfer station network as an integral part of the analysis for the next comprehensive solid waste management plan, and established a process for collaborative participation by the cities in solid waste planning. Along with division staff, the Solid Waste Advisory Committee (SWAC), Metropolitan Solid Waste Management Advisory Committee (MSWMAC), and an Interjurisdictional Technical Staff Group comprised of staff from cities and from the King County Council, analyzed the solid waste system and issued the [Solid Waste Transfer and Waste Management Plan](#), which provides recommendations for upgrading the urban transfer station system; methods for extending the lifespan of Cedar Hills; and options for preparing the landfill for eventual closure.

At the conclusion of the process, both SWAC and MSWMAC recommended the plan to the King County Executive and the County Council.

Before final approval of the Transfer Plan, the County Council requested an independent, [third-party review](#) of the Transfer Plan, which was conducted by the firm Gershman, Brickner & Bratton, Inc. (GBB). GBB fully supported the primary objectives of the plan: to modernize the transfer station system and maximize the lifespan of the Cedar Hills landfill. The County Council unanimously approved the Transfer Plan in December 2007.

### Transfer Plan Review Part 1

At the direction of the King County Council, the division began the Transfer Plan review in 2013. The report for that review was provided to Council on March 3, 2014. Council amended the report in May 2014 and directed that additional review be done. The report recommended the following:

- Proceed with a new Factoria Recycling and Transfer Station in 2014.
- Continue the siting process for a South County Recycling and Transfer Station.
- Continue to evaluate a mix of capital facilities and operational approaches to address system needs over time, including implementation of operational approaches such as transaction demand management strategies that would provide service for the northeast county without building an additional transfer station; compare trade-offs and benefits with the Transfer Plan.
- Revise the 2006 Solid Waste Transfer and Waste Management Plan and the pending Comprehensive Solid Waste Management Plan to address the transfer station network to include among the new or upgraded urban Recycling and Transfer Stations: Bow Lake, Factoria, Shoreline, and a new South King County Recycling and Transfer Station.
- Revise the 2006 Solid Waste Transfer and Waste Management Plan and the pending Solid Waste Comprehensive Plan to acknowledge continuing system attention to potential capital needs over time that may include capital projects such as recycling facilities, CDL facilities, a new northeast recycling and transfer station, or other capital projects as potential future facilities to retain flexibility in the system.

As of March 2015, the division has completed construction of the Bow Lake Recycling and Transfer Station, begun construction of a new Factoria Recycling and Transfer Station, and is in the process of siting a new South County Recycling and Transfer Station to replace the Algona Transfer Station.

## South County Service Area

Although it is an integral part of our urban transfer system, the south county service area, currently served by the Algona Transfer Station, is not significantly impacted by decisions regarding the north part of the county. The Transfer Plan Review Part 1 concluded that a new South County Recycling and Transfer Station would be necessary to replace the aging Algona Transfer Station. The Bow Lake Recycling and Transfer Station is not sufficient to serve the south county service area, even if the Renton Transfer Station were to remain open. For more information see the [Transfer Plan Review Final Report](#).

Council [Motion 14145](#) specifically directed additional review of the northeast and Renton service area needs. Decisions made for the northeast service area, currently served by the Houghton Transfer Station, will have little or no impact on the south county service area as there is virtually no overlap in the customer base. There is minimal overlap between the Renton and south county service areas. Tables showing what percentage of the loads delivered to each urban transfer station come from which city, for both self-haul and commercial-haul can be found in Appendix H. Additionally, in a recent survey of transfer station customers (see Appendix B), less than four percent of Renton Transfer Station self-haulers said that they would use the Algona Transfer Station if the Renton station were to close. That represents about a two percent increase in transactions in the south county service area or about 6 to 7 customers per day.

## Transfer Plan Review Part 2

In July 2014, following council adoption of [Motion 14145](#), the division began the process to undertake further review of the Transfer Plan. Through the advisory committees – MSWMAC and SWAC – and a special Transfer Plan Review committee, the division benefited from diverse participation and views to ensure the effectiveness of this study. In addition to the committee meetings, the division held two workshops to reach out to a broader audience. To foster awareness of the study as it progressed, information was distributed and posted on the division’s website. As with the previous review, the process began with outreach to stakeholders and adoption of guiding principles.

### Guiding principles

In collaboration with its stakeholders, the division adopted the following principles to guide the transfer plan review process:

- Participants in the King County solid waste system will have access to efficient and reliable regional transfer services at rates as low as reasonably possible, consistent with sound financial and environmental stewardship.
- Future system facilities will be designed to provide flexibility to accommodate changes in growth, anticipated future customer needs, and future waste disposal, conversion, and recycling options and technologies.
- The system will comply with all applicable local, state, and federal regulations.
- The system will support the following long-term goals:
  1. Extend the life of the Cedar Hills Regional Landfill through 2040
  2. Achieve Zero Waste of Resources by 2030
  3. Achieve 70 percent recycling by 2030
  4. Provide stable, competitive rates

## 5. Environmental excellence

- This review will be conducted in a transparent and collaborative manner between King County and its stakeholders.

### **Stakeholder Engagement**

To assist with the Transfer Plan review, an advisory committee composed of MSWMAC and SWAC members met in August, September, and October to review demand management strategies, the effect of Renton closure, and other topics responsive to the Council motion. Workshops in November and February provided a larger group of stakeholders with updates and helped to identify outstanding questions and concerns. Transfer Plan Review advisory committee members, links to the meeting and workshop information, and stakeholder comments can be found in Appendix F.

In addition, an online survey focused on Houghton, Factoria, and Renton Transfer Station self-haulers was conducted from mid-November to early January. The purpose of the survey was to provide the division with additional data related to customer origin and type, types of waste disposed, reasons for using the stations, and curbside garbage subscription levels in order to better understand how and why self-haulers use the stations. Questions included how frequently self-haulers take loads to the stations, what materials they bring, how transfer system use would change if Houghton or Renton closed, and what the most important transfer station features or elements are and customer willingness to pay for a new Northeast Recycling and Transfer System. For more detailed information see Appendix B.

Information was also requested from the commercial haulers to assess how potential changes to the transfer system might affect the haulers and their customers. Division staff sent a list of questions to each of the commercial haulers and also met with representatives from Waste Management, Republic and Recology Cleanscapes to discuss the information. Questions that were discussed include: potential routing and cost impacts if Houghton and Renton closed; potential routing and cost impacts if haulers were directed to use specific transfer stations; facility operating hours; potential use of private transfer stations to haul directly to Cedar Hills (regional direct); and bulky waste collection. For more detailed information see Appendix C.

### **Consultant Roles and Expertise**

The division contracted with a team of consultants to provide data collection and analysis. AECOM (formerly URS) provided project management oversight of the team which included Transpo Group, and The Greenbusch Group.

All three firms have expertise in environmental and impact analysis on commercial and industrial facilities, including transfer stations, as a core portion of their business. Some of their specific project experience includes: design and construction management of the Seattle South Transfer Station; SWD Intermodal Facility Siting Study; Snohomish County Transfer Station Master Planning; Bow Lake Transfer Station Master Plan, Advanced Traffic Management System, and Noise Analysis and Compliance; First Avenue Transfer Station traffic impact analysis; and Waterfront Streetcar Maintenance Facility Siting Study and Design. All of these projects involved environmental review, permitting strategies, cost analysis and scheduling. The team was supported by IDAX, using video technology to monitor and calculate service times and vehicle queuing at key locations at the stations.

The division was further supported by Cascadia Consulting Group, which developed an online customer survey to provide more information about self-haul use of transfer stations. Specific projects that Cascadia has completed include on-site customer surveys at Seattle and King County solid and hazardous waste collection facilities; a web-based survey of participants in King County's Business

Hazardous Waste pilot project; an industry-wide “recycling best management practices” survey for the federal Airport Cooperative Research Program; and various targeted research efforts for the cities of Seattle, Olympia, and Bellingham.

## Data Collection

To accomplish the goals of this review, the consultant team collected data on weekdays and Saturdays at the Shoreline, Houghton, Factoria, Renton, and Bow Lake stations to understand the existing conditions and operations of each facility (Appendix A). Table 1 contains more detailed information about the collected data and the roles and responsibilities for collection and analysis.

Data collected included:

Traffic counts – First, consultants placed tube counters at each station for a number of days in September 2014 to determine the weekday and Saturday three-hour peak period for each station. 24-hour tube counts were conducted over a two-week period at the approaches to each station.

Service time counts – Next, consultants returned to the site during the station’s 3-hour peak period. Each vehicle entering the site was tracked through license plate identification to measure delay and service times for various activities on-site. The processing times at the entry scale, exit scale, self-haul tipping floor area, and commercial tipping floor area were collected at each site. In addition, the processing time for the recycling area, household waste, and yard waste areas were measured at the transfer stations where that service is provided.

Video – Simultaneous with the service time counts, video was taken to document the traffic volumes at key locations as well as the vehicle type such as automobile, pickup trucks, trailers, and commercial hauler trucks.

Customer origin/destination surveys – At the same time the service time counts were taken, customers were asked the origin of their trip to understand the distribution of customers using the station. This is useful information to consider when looking at the potential future closure of stations (i.e., Houghton, Renton) or analyzing a potential shift in station operations (i.e., redirecting commercial haulers or restricting self-haul).

Off-site traffic analysis – Traffic counts were collected at key intersections surrounding each station during each station’s respective weekday and Saturday station peak-hour period. This information was used to assess the impacts to the off-site intersections based on the site traffic anticipated under each of the concepts. The off-site analysis was conducted using Synchro<sup>i</sup> software, a program used to evaluate the capacity of intersections. Synchro is used by all the cities in which the stations are located. Synchro provides a level of service (LOS) grade that can be used to assess overall intersection capacity and operational performance. (Attachment B to Appendix A, LOS Definitions, provides a more detailed explanation of intersection LOS criteria.)

Noise monitoring – Concurrent with the tube and service time counts, noise measurements were taken to understand noise levels at the boundary of the station properties and to identify noise levels of vehicle types using the station. Noise measurements were taken at Bow Lake, Renton, and Shoreline; for Factoria, 2012 noise measurements were used.

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<sup>i</sup> Synchro, Trafficware, version 8.0

**Table 1: Data Collection Roles and Responsibilities**

<b>Data Collection Element</b>	<b>Description</b>	<b>Applicable Sites</b>	<b>Data Collection</b>	<b>Analysis</b>
<b>Site Access Volumes</b>	24-hour volumes at the site ingress and egress points. Collected via video or tubes – focus on daily counts and peak hour volumes for a 2-week period.	Renton, Factoria, Shoreline, Houghton, Bow Lake	Idax	Transpo Group
<b>Site Ingress /Egress Queuing</b>	Record inbound/outbound queuing levels for 2-week period - video.	Renton, Factoria, Shoreline, Houghton, Bow Lake	Idax	Transpo Group
<b>Internal Queuing</b>	Record queuing levels at internal material transfer points – video or observations.	Renton, Factoria, Shoreline, Houghton, Bow Lake	Transpo Group/ Idax/ AECOM	Transpo Group
<b>Internal Trip Patterns</b>	Document the number and percentage of shared trips between multiple material transfers (i.e. garbage only vs. garbage and recycling).	Renton, Factoria, Shoreline, Houghton, Bow Lake	Transpo Group/ AECOM	Transpo Group
<b>Vehicle Duration/ Travel Time On-site</b>	Recording of entry and exit times of vehicles on-site via observation.	Renton, Factoria, Shoreline, Houghton, Bow Lake	Transpo Group/ AECOM	Transpo Group
<b>Customer Trip Origin</b>	Identify customer origins via intercept surveys – recorded on paper or electronic format at the point of intercept.	Renton, Factoria, Shoreline, Houghton, Bow Lake	Transpo Group/ AECOM	Transpo Group
<b>Off-site Turning Movement Counts</b>	Peak-hour traffic volumes collected at off-site study intersection locations.	Renton, Factoria, Shoreline, Houghton, Bow Lake	Idax	Transpo Group
<b>Customer Processing Rates</b>	Identify processing rates at key points, including entry, exit, tipping floor, and household hazardous waste (HHW) or recycling areas.	Renton, Factoria, Shoreline, Houghton, Bow Lake	Transpo Group/ AECOM	Transpo Group
<b>Haul Weight per Vehicle</b>	Average haul weights per vehicle for the different uses will be observed at noted.	Renton, Factoria, Shoreline, Houghton, Bow Lake	King County	Transpo Group
<b>Waste Stream Forecasts</b>	Waste stream forecasts reflecting with and without the Renton Transfer Station.	Renton, Factoria, Shoreline, Houghton, Bow Lake	King County	Transpo Group

## Process Used to Forecast and Analyze Data

Using data from several sources, the consultant team developed a robust model to analyze site conditions at the selected transfer stations. Tonnage data is a necessary input to the model, but the number of transactions at the stations determines how well traffic flows at a given site. Data from the cashiering system that collects daily transaction and tonnage information, and data that was collected on-site on both weekdays and weekends were all used to develop the model.

### *Tonnage forecast and assumptions*

Population and other demographic data from the Puget Sound Regional Council and local economic forecasting firm of Dick Conway and Associates are used as a basis for the tonnage forecast. Key demographic data used includes population growth, employment, household size, and per capita income. Other assumptions in the forecast include:

- A 70 percent recycling rate is achieved in 2030
- The City of Bellevue, along with four of the five Point Cities – Clyde Hill, Hunts Point, Medina, and Yarrow Point – will leave the system in July 2028

These assumptions are discussed in more detail below.

Population growth, higher per capita income, and increased employment are directly correlated with an increase in consumption and waste generation. In King County, population is expected to grow at a steady rate of about one percent per year and employment is expected to increase at an annual rate of about 1.8 percent over the forecast period. Per capita income is also expected to grow by about two percent a year (adjusted for inflation). Household size is expected to decrease from an average of about 2.6 persons per household to 2.4 persons per household; a decrease in household size tends to increase waste generation per capita.

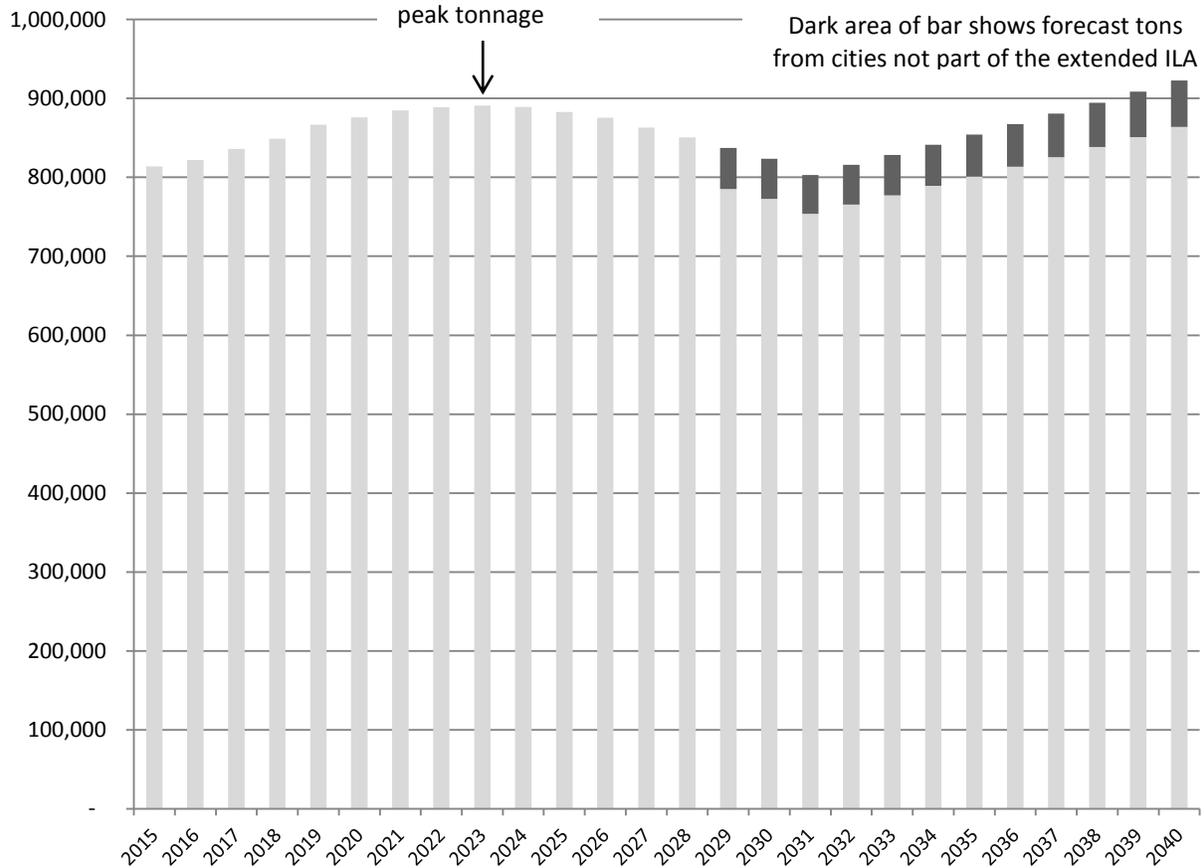
By 2031, based on current recycling goals being considered by the cities and the county for the update of the Comprehensive Solid Waste Management Plan, the division is forecasting that 70 percent of all waste generated will be recycled. The division projects that the gains in recycling will be gradual – about one percent a year. The increased curbside collection of recyclable materials – single, multi-family, and non-residential – will somewhat reduce commercial tons and transactions at transfer stations. The forecast also projects that self-haulers will recycle about 35 percent of the waste brought to the transfer stations – reducing total disposed, but with little or no effect on transactions since the material will still be received and handled at the recycling and transfer stations.

King County currently has Solid Waste Interlocal Agreements with thirty-seven cities in King County. These agreements establish the respective responsibilities of the parties in the solid waste management system including guaranteeing that waste produced in the cities will be directed to the King County solid waste system. Thirty-two cities have signed ILAs which are in effect through 2040 and five cities – Bellevue and four Point Cities – have ILAs which are in effect through June 2028.

The tonnage forecast projects that the peak year for garbage disposed (about 900,000 tons) will be 2023. At that time, Bellevue and the four Point Cities will still be part of the County's solid waste system. After July 2028, if Bellevue and the four Point Cities have not signed the Amended and Restated Interlocal Agreement and are not a part of the system, the cities' contracted haulers will need to take the garbage collected from these cities to their own transfer stations and will not use the County transfer system. Since Bellevue and the four Point Cities generate approximately eight percent of the commercial tonnage, the system would see a commensurate drop in tonnage, as shown in Figure 1.

If Bellevue self-haulers did not use the Factoria Recycling and Transfer Station there would be an approximate 35 percent reduction in transactions; however, this would not occur until July 2028.

**Figure 1: Forecast of Garbage Disposed 2015-2040**



**Garbage Forecast Sensitivity**

Any forecast is sensitive to changes in the factors that were used to develop the forecast. Three important factors that influence the garbage forecast add degrees of uncertainty – the proposed vs. actual recycling rate, the number of cities that are participating in the system, and the economy. The recycling rate is the most sensitive in terms of deviation from the forecasted tonnage numbers, followed by the numbers of cities participating in the regional system, and economic conditions.

**Recycling rate:** The current forecast assumes that the recycling rate will increase by one percent per year. A total of approximately 1.7 million tons of waste is generated (recycled and disposed) by households and business each year. A one percentage point deviation in the recycling rate has an almost three times larger effect than the one percent deviation in job growth. If a 60 percent recycling rate is reached, rather than 70 percent, by 2031 it would increase disposal by about 250,000 tons in that year (+33 percent). The recycling rate has remained relatively flat for the past several years, but the county and the cities are working together to plan how to achieve the 70 percent recycling rate.

**Cities participating in the County’s solid waste system:** Currently, Bellevue and the four Point Cities have not signed the Amended and Restated ILA, so will not be a part of the system after 2028. The planning assumptions for the forecast were based on this scenario for the long term planning horizon. If those cities reconsider and sign the ILA, the division would expect to receive an additional 50,000 tons more per year.

**Economic factors:** If growth in employment exceeds the forecast then additional garbage would be created. An estimated 2,300 tons of garbage could be expected for every 5,000 jobs exceeding the forecast. In the short run, the margin of error is rather small. A one percent increase in employment causes garbage disposed to go up by about 3,200 tons (which equals about one percent of all the garbage generated by the non-residential sector). From 2012 to 2013 the region experienced a 3.6 percent growth rate in employment, which amounted to an additional 11,500 tons of garbage.

**Site Traffic – Trip Generation Methodology**

A multi-step process was utilized to estimate the peak hour trip generation for each site based on annual tonnage forecasts (see Figure 2). The process used to develop the peak hour trip generation forecasts is illustrated below.

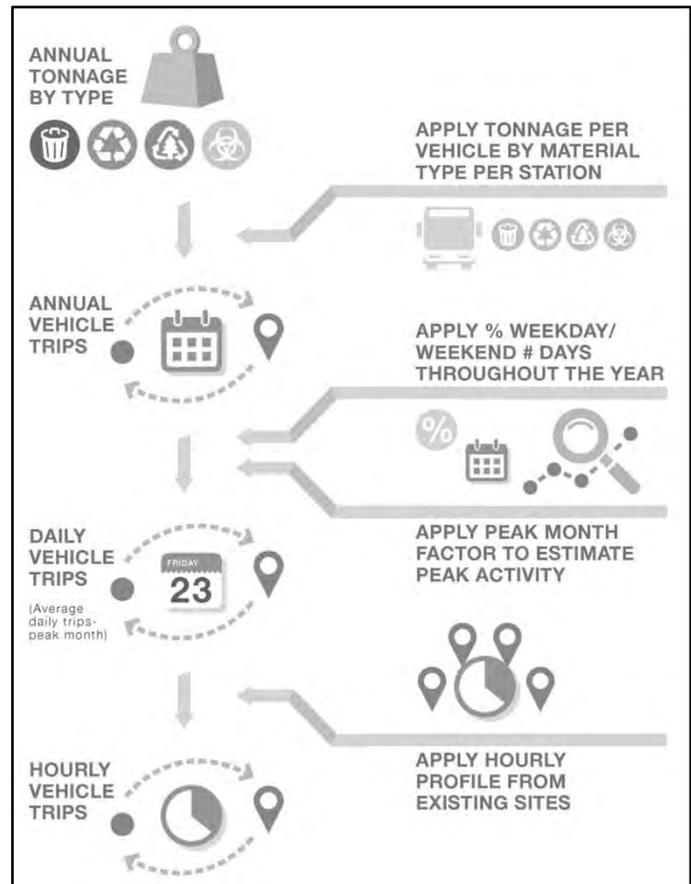
In general, the forecasts consider the following:

- Annual tonnage by type (i.e., garbage, recycle, yard waste, HHW)
- Average load (in tons) per vehicle for all material
- Weekday/weekend allocation
- Peak month and seasonal variations
- Weekday and weekend hourly distribution of traffic by customer type (commercial haul, self-haul, transfer trailers, and recycling)

**Analysis period**

The traffic analysis focuses primarily on 2023 because that year represents the forecasted peak for system tonnage and therefore the year that capacity issues might arise. Given the range of customers that utilize the transfer stations, from the commercial-haulers to the general public, both the weekday and Saturday peak periods were analyzed. The specific peak hours vary at each station and as such were identified through comprehensive hourly counts taken over a multiple-week period. Details for each station are presented in the individual station assessment sections in Appendix A.

**Figure 2: Trip Generation Methodology**



This analysis used a 90th percentile peak hour demand factor. This factor means that 10 percent of the time the demand is greater, but the demand can be considerably less. The 90th percentile is used to help to account for the seasonal variations of the facilities. It also helps to ensure that traffic volumes do

not exceed the station capacity and impact adjacent city streets on a regular basis. Furthermore, the division designs the facilities for the 90th percentile demand, so it is appropriate that the traffic analysis apply a similar standard. Peak demand factors are typically used in the industry as it provides a reasonable worst-case of peak conditions. For more detailed information about how the 90th percentile was calculated, see Appendix A, page 6.

Trip generation estimates prepared for each station and each concept considered the local factors such as tonnage per vehicle and hourly distribution patterns to estimate peak-hour activity. The detailed description of the calculation factors are provided for each station in the station assessment section in Appendix A.

### **On-Site Traffic Analysis**

The internal traffic flow at the transfer stations is a complex transportation network with multiple service points and circulation needs. This includes the inbound process at the scale house, the primary tipping floor, additional material recycling and disposal stations, and the outbound operations at the scale house. This interconnected system is further complicated by the presence of commercial and self-haul traffic that utilize different areas of the tipping floor and, depending on the station, potentially separate scales.

The on-site evaluation of each station used VISSIM, a microscopic traffic simulation model. Using this model, a transfer station can be analyzed as one connected network including all circulation roadways, scale house operations, tipping floor access and capacity, and activity for other materials such as yard waste, recycling, or household hazardous waste. In addition, the VISSIM model includes the multiple vehicle types observed at each station.

Before the VISSIM model was used for any analysis of existing and forecast conditions, a comprehensive calibration process was completed for each weekday and Saturday peak period model. The existing conditions in the model were calibrated to match conditions as they were observed in the field at each station. Existing operational information was collected during the weekday and Saturday peak 3-hour periods. Each vehicle entering the stations during this time was tracked by license plate to measure delay and service times for various activities on-site. The processing times at the entry scale, exit scale, self-haul tipping floor area, and commercial tipping floor area were recorded.

**PTV Vissim** is a microscopic multi-modal [traffic flow simulation](#) software package developed by [PTV Planung Transport Verkehr AG](#) in [Karlsruhe, Germany](#). The name is derived from "Verkehr In Städten - **SIM**ulationsmodell" (German for "Traffic in cities - simulation model"). VISSIM was first developed in 1992 and is today a global [market leader](#). (Wikipedia)

In addition, the processing time for the recycling area, household hazardous waste, and yard waste areas were measured at the transfer stations where that service is provided. Default values in the VISSIM model such as vehicle travel speeds and dwell times at the various areas at the stations were modified from the default values in the model to match the observed data. The scope of the extensive data collection at each station is reviewed in more detail in the station assessment section in Appendix A.

### **Benchmarks**

As part of the Transfer Plan review process, the division looked at how other nearby transfer systems compare to the King County system. Information was gathered primarily from four other nearby systems – the City of Seattle, Snohomish County, Pierce County, and Kitsap County.

The King County transfer system (comprised of six urban and two rural transfer stations and two rural drop boxes) serves a population of about 1.4 million, about half a million more than Snohomish County

and about double the population of the City of Seattle. It serves an area of about 2,000 square miles, which is about the same as Snohomish County. In 2013, the King County system handled about 786,000 tons of garbage, which is almost 90 percent of what was handled by all of the other systems combined. In contrast, the King County system handles far less separated organics than the City of Seattle or Pierce County, largely because, unlike King County, those systems transfer organics collected at the curb through their facilities. The King County system handles almost as many transactions as the City of Seattle, Snohomish County, and Kitsap County systems combined. Most of those transactions are generated by self-haul customers; the City of Seattle and Snohomish County report similar percentages of self-haul. Table 2 includes the details of the transfer systems in King, Snohomish, Kitsap, and Pierce counties and the City of Seattle.

**Table 2: Regional Benchmarks**

	<b>King Co</b>	<b>City of Seattle</b>	<b>Snohomish Co</b>	<b>Pierce Co</b>	<b>Kitsap Co</b>
<b>Population</b>	1,385,000	659,000 (2014)	746,000	820,000	230,000
<b>Area Served</b>	2,050 sq. mi.	82 sq. mi.	2,087 sq. mi.	1,669 sq. mi.	395 sq. mi.
<b>Transfer Station Garbage Tons</b>	786,072	247,271	412,445	56,913	178,081
<b>Organics Tons</b>	7,577	72,946	9,324	36,711	349
<b>Transactions</b>	707,255	264,857	335,047	not available	122,722
<b>Percentage Self-Haul Transactions</b>	85 percent	85 percent	80 percent	not available	not available
<b>Transfer Facilities</b>	8 transfer stations and 2 drop boxes	2 transfer stations	3 transfer stations and 3 drop boxes	3 transfer stations and 2 drop boxes	1 transfer station and 3 drop boxes
<b>Garbage Per Ton Fee<sup>ii</sup></b>	\$129.40	\$145	\$108.78	\$144.97	\$70.45
<b>Recycling Rate</b>	53%	56%	45%	not available	42%

*All data is for 2013 unless otherwise noted.*

The other jurisdictions were also asked about the average time that customers spend at their facilities – inbound scale to outbound scale. The City of Seattle reported an average time on-site at the South Transfer Station of about 7 and a half minutes for commercial haulers and about 13 minutes for self-haulers. Pierce County estimated an average of about 18 minutes on-site during the week and a weekend peak average closer to 30 minutes. At Kitsap County’s Olympic View Transfer Station the average is about 16 minutes. In the King County system, the average time on-site varies between transfer stations. Table 3 shows the 2014 average minutes on-site at King County’s transfer stations.

<sup>ii</sup> 2015 per ton fee; includes state refuse tax, and for King County and the City of Seattle includes a moderate risk waste surcharge.

**Table 3: 2014 Average Minutes On-site  
(Inbound Scale to Outbound Scale)**

	Weekday		Weekend	
	Commercial	Self-Haul	Commercial	Self-Haul
<b>Algona</b>	13	13	12	11
<b>Bow Lake</b>	8	14	9	13
<b>Enumclaw</b>	9	12	6	12
<b>Factoria</b>	14	14	12	12
<b>Houghton</b>	11	13	11	11
<b>Renton</b>	10	11	12	10
<b>Shoreline</b>	9	14	15	13
<b>Vashon</b>	8	10	4	10

Jurisdictions were also asked about how long customers wait before entering the site. Snohomish County had information from a 2012 customer survey – according to customers, the average wait was just over 1 minute, with about 62 percent reporting no wait, and only 3 percent reporting a wait of 10 minutes or longer; 15 minutes was the longest reported wait time. Pierce County estimated that the longest wait time at the largest transfer station is usually less than 2 minutes, although it can be up to 10 minutes during the busiest times, and wait times for smaller sites and yard waste tend to be longer. Information about wait time was not available from the City of Seattle or Kitsap County. The division does not collect data on how long customers wait before they enter the station. Customer complaints about wait times are rare. Queue lengths at King County stations are discussed in more detail later in this report.

Another aspect that was explored was the use of tare weights or radio-frequency identification (RFID) for commercial haulers and other customers with charge accounts. Tare weights are not widely used. Both the City of Seattle and Snohomish County use RFID for commercial haulers and the City of Seattle uses RFID for some other large account customers as well. Use of RFID could be implemented at facilities to help to improve efficiency and service to commercial haulers; however there would be little or no effect on transfer station capacity because this improvement would not address the projected constraints at the stations.

For more detailed benchmark information, see Appendix E.

## Study Elements

To address the Council motion, the division looked at data in several different ways, testing combinations of concepts and demand management strategies for their effect on capacity and other aspects of the transfer system. Three different concepts that would not build a Northeast Recycling and Transfer Station were created and compared to one concept that did build a new Northeast Recycling and Transfer Station.

Using the developed model, the consultants identified constraints for each concept at each transfer station. Next, the team identified potential strategies to mitigate the constraints. Of the strategies

identified, those most likely to be effective were modeled. The strategies and solutions selected varied by site, depending on the issue that needed to be solved.

## Capacity

This review focused on the transactional capacity at the transfer stations. Transactional capacity (also called trip, customer, or vehicle capacity) refers to the ability of a particular transfer station to process the number of customers using the station, without causing excessive service times or off-site queues that block driveways or roadways. Factors that might affect capacity include:

- Property size and layout, e.g., distance from gate to scale house and from scale house to tipping building
- Station size and layout, e.g., number of stalls and flexibility to reconfigure
- Operating method, e.g., direct dump vs. pit or flat floor
- Peak demand times, e.g., Saturday in July vs. Wednesday in February
- Hours of operation
- Time it takes customers to use the site, e.g., time spent on the scale, time spent unloading waste or recycling, and time spent moving from one point to another

## Concept Descriptions

Four concepts were developed to address the Council motion.

- Concept 0 – No Northeast, does not direct commercial haulers, no self-haul restrictions
- Concept 1 – Direct commercial haulers, no Northeast (E1\*)
- Concept 2 – Restrict self-haul, no Northeast (E2\*)
- Concept 3 – Build Northeast

*\*Reflect E1 and E2 as referenced in Council Motion 14145*

All of the concepts assume that the Houghton Transfer Station will close by 2023. In addition, each concept was analyzed both with the Renton Transfer Station open and with it closed. The division included Concept 3, Build Northeast, because it is called for in the adopted Transfer Plan and is useful as a comparison to the other concepts.

**Concept 0:** This concept assumes that a new Northeast Recycling and Transfer Station would not be built. It is used as the baseline concept to identify issues in the system. It assumes current customer use patterns. It does not direct commercial haulers to use any particular stations nor are there any self-haul restrictions. Operating hours remain similar to the current hours and HHW and recycling are available at Factoria.

**Concept 1:** Concept 1 directs commercial haulers to specific stations to more evenly balance use across the system (see Table 4). This concept is adapted from Alternative E1 from the *Transfer Plan Review Report*. Concept 1 differs from E1 in that it does not assume extended hours, additional scales, or a queuing lane except as potential mitigation strategies. E1 also assumed that Renton would remain open, while Concept 1 was analyzed with Renton open and closed. Concept 1 would require a council ordinance to restrict commercial hauler use of Factoria and to direct them to alternate stations. This concept assumes that operating hours would be similar to current operating hours and that HHW and recycling would be available at Factoria.

**Table 4: Concept 1: Direct commercial haulers**

cities/surrounding areas directed to Factoria	cities/surrounding areas directed to Shoreline	cities/surrounding areas directed to Renton	cities/surrounding areas directed to Bow Lake
<b>a) <u>Without Renton</u></b>			
Beaux Arts, Bellevue, Carnation, Clyde Hill, Hunts Point, Issaquah, Medina, Newcastle, North Bend, Redmond, Sammamish, Snoqualmie, Yarrow Point	Bothell, Duvall, Kenmore, Kirkland, Lake Forest Park, Shoreline, Woodinville	n/a – Renton closed or not accepting commercial	Mercer Island, Renton
<b>b) <u>With Renton</u></b>			
Beaux Arts, Bellevue, Carnation, Clyde Hill, Hunts Point, Medina, Mercer Island, Redmond, Sammamish, Yarrow Point	Bothell, Duvall, Kenmore, Kirkland, Lake Forest Park, Shoreline, Woodinville	Issaquah, Newcastle, North Bend, Renton, Snoqualmie	

*Note: Cities/surrounding areas not shown in the table would not be directed to a specific transfer station.*

**Concept 2:** This concept would restrict self-haul use at Factoria during peak commercial hours – 6 a.m. to 3 p.m. It is adapted from Alternative E2 from the *Transfer Plan Review Report*. Concept 2 differs from E2 in that it restricts self-haul use until 3 p.m. instead of 4 p.m., it assumes that recycling would be available, and it assumes HHW service, additional scales, or a queueing lane except as potential mitigation strategies. E2 also assumed that Renton would remain open, while Concept 2 was analyzed with Renton open and closed. To make this possible, the King County council would need to approve an ordinance that restricts self-haul use. Like E2, Concept 2 assumes extended Factoria hours of 6 a.m. to 10 p.m. weekdays and 8 a.m. to 8 p.m. on weekends.

**Concept 3:** This is the only concept that assumes a new Northeast Recycling and Transfer Station would be built to serve the area currently served by the Houghton Transfer Station. For analysis purposes, the division considered locations near the end of State Route 520 and in the Totem Lake area. It assumes that a new Northeast station would be of a similar size, design, and operation as the new Factoria station and that the operating hours would be similar to the operating hours of the existing Houghton Transfer Station.

**Overview of Strategies**

This review analyzed a variety of mitigation strategies that manage transfer station transactions – individually and in concert with each other – to determine what impact they might have on use of the transfer system. Goals included more evenly balancing use of transfer stations across the system and avoidance of excessive user wait times and queue lengths.

Concepts 1 and 2 both have demand management strategies built into the concept.

- Concept 1 directs commercial haulers to use certain transfer stations so that transfer system use is more evenly balanced and in particular so that use of Shoreline is increased.

- Concept 2 restricts the hours that self-haulers can use Factoria and also extends the hours so that self-haulers are encouraged to use the extended hours or to use alternative transfer stations during the restricted hours.

Additional mitigation strategies analyzed fall into two general categories: those that reduce the number of customers using a particular transfer station or the transfer system in general and those that increase the number of customers that can be served at a station. Operational, policy, and capital strategies were considered. All demand management strategies identified during the Transfer Plan Review Part 1 are included in the current review.

The key demand management strategies that reduce the number of customers using the transfer system or a particular transfer station that were analyzed include:

- Extend operating hours
- Incentive/peak pricing
- Provide wait time information (video feed using existing cameras)
- Mandatory curbside garbage collection
- Lower cost curbside bulky waste collection
- Higher minimum fee
- Lower regional direct fee to encourage haulers to use their own transfer stations
- Do not provide HHW service at Factoria, provide at separate location elsewhere in service area
- Ban materials from disposal and recycling

Strategies that improve site capacity that were considered include:

- Add scales and/or queueing lanes
- Add stalls/ increase the tip floor capacity
- Provide unloading assistance

The effectiveness of each strategy, or a combination of strategies, varies from station to station. A more thorough description of the strategies follows:

**Extend operating hours:** The intended effect of extending hours is to encourage self-haulers to use the station at times other than the peak operating hours. Concept 2 includes the extended hours of 6 a.m. to 10 p.m. on weekdays and 8 a.m. to 8 p.m. on Saturdays and Sundays at Factoria. Extended hours were considered for Factoria under other concepts as well.

Impacts of this strategy include more vehicle traffic during peak afternoon commute hours and potential impacts to neighboring businesses. Changing the hours would require approval of an ordinance by the King County council. In addition, a new environmental review would be needed to analyze the effects of the increased traffic during the afternoon commute hours.

**Incentive/peak pricing:** This strategy, in conjunction with extended operating hours, would encourage self-haulers to use the transfer station during hours when the station is not as busy. Price elasticity research indicates that a fifty percent price increase during peak hours would cause about a fifteen percent drop in transactions during those hours, thus moving transactions to other transfer stations or to off-peak hours. Depending on the concept, the division could expect to realize a revenue increase of about \$700,000 to \$2.2 million (in 2023) from this strategy. Potential issues with this strategy include

fee equity, potential adverse impacts on low income customers and small business owners, customer dissatisfaction, and potential increases in illegal dumping.

**Provide wait time information:** Cameras located at the scale house could provide information to customers that are going to make a trip to the transfer station. The cameras could provide views of the entrance to the station and at points within the station so that the customer could decide whether to delay their trip to a time when that station is not as busy. The division could make use of cameras that may already be in place to show a photo that is frequently refreshed on the Solid Waste Division website. Costs associated with this option would be minimal. Some other transfer facilities and other high-traffic services provide this type of information via their websites; however, none could provide any information about how it had affected traffic volumes.

**Mandatory curbside garbage collection:** This strategy would require that all residents subscribe to curbside garbage collection. Estimates of the impact this strategy would have on reducing trips to the transfer station vary by station and are based on information provided by self-haul customers.

**Table 5: Estimated percentage reduction in self-haul transactions if mandatory garbage collection**

Algona	Bow Lake	Factoria	Houghton	Renton	Shoreline
10.6%	14.9%	6.5%	1.4%	11.6%	16.6%

For this strategy to be effective, it would require the County and all of the cities that do not currently have mandatory collection to pass ordinances. At this time, residents in 24 of the 37 cities in the solid waste system and the unincorporated area are not required to have curbside garbage collection. Issues with this strategy include possible dissatisfaction due to reduction in choice, difficulty with serving some properties with curbside collection, and potential impacts on low income residents.

**Lower cost bulky item collection:** Because a high percentage of what self-haulers are bringing to the transfer station are bulky wastes that do not fit into a curbside garbage can, a strategy that was analyzed is lower cost curbside bulky item collection. Many cities currently have a rate in their contracts for bulky waste pick-up, but the rate is high enough that it is not widely used. Costs range from a low of just over \$20 up to about \$100 with a median cost of about \$50 to \$65 per item. In an online survey of self-haulers, a majority of respondents said that they would be willing to pay for curbside bulky waste pick-up if it was priced at \$25 per item (\$35 for refrigerators/freezers). The reduction in trips varies by station, but overall it is estimated that this strategy would have only a small impact. The cities and haulers would be primarily responsible for changing their contracts to institute a lower bulky waste item collection rate.

**Higher minimum fee:** This strategy considers what the effect raising the minimum fee would have on self-hauler use of the transfer stations. Since garbage disposal is necessary, the price elasticity tends to be lower in comparison to other goods and services. The minimum fee was increased 100 percent (doubled) to model the effect. Model results indicate that if the fee is doubled system wide, there would be an estimated 7.5 percent decrease in overall transactions. If the fee were doubled at the Factoria Recycling and Transfer Station only, there would be an estimated 20 percent reduction in transactions at Factoria. Depending on whether the fee was doubled system-wide or just at Factoria, there would be a revenue increase of about \$10 to 15 million (assuming a minimum fee of \$55 in 2023). Issues with this strategy include fee equity, potential adverse impacts on low income customers and small business owners, customer dissatisfaction, and potential increases in illegal dumping.

**Lower regional direct fee:** The Regional Direct Fee (RDF) is a discounted fee charged to commercial collection companies that bring solid waste to Cedar Hills in large transfer trailers via their own transfer

stations and processing facilities. The current RDF is \$103.50, which is about 14 percent less than the Basic Fee. Prior to 2003, the RDF was about 28 percent lower than the Basic Fee. When the RDF was lower, about 25 percent of solid waste was brought directly to Cedar Hills. Currently, only about 1 percent comes directly to Cedar Hills. However, lowering the RDF would have little to no effect in the northeast or Factoria service areas because, according to the commercial haulers, any waste diverted from the transfer stations would be from the Bow Lake, Algona, and Renton transfer stations. Additionally, at this time there is not sufficient private transfer capacity available.

**No HHW service at Factoria:** This strategy would remove transactions from Factoria and allow the space to be used for vehicle queuing. If HHW service is not provided at the station, however, it will need to be provided elsewhere. Building a new, fixed facility, would entail a siting process, SEPA process for the new facility, and permits including land use and building permits. The estimated cost for a separate HHW facility is about \$9 million. Issues with this strategy include finding a suitable site in the urban service area, potential increases in improper disposal, and a decrease in services available at the transfer station. HHW collection service could be provided by the Wastemobile instead, but finding adequate sites may be challenging.

**Ban materials:** This strategy would ban the disposal or recycling of yard waste and clean wood waste at Factoria (for both self-haul and commercial customers). Banning these materials would remove an estimated one-third of materials from the transfer station. If not accepted at Factoria, these materials would need to be taken to other King County transfer stations or to private sector facilities. Another solution would be to site a drop box to accept yard waste and wood waste. The estimated cost to site and build a drop box facility is about \$18.5 million. To support recycling goals, if this strategy is selected, it is recommended that a disposal ban on these materials be implemented system-wide. This effort would also require monitoring and enforcement to be effective. Issues with banning yard waste and wood waste include a decrease in service at the transfer stations, potential revenue loss, siting a new drop box facility, and a potential increase in illegal dumping.

**Additional scales/lanes:** Adding scales and/or queuing lanes addresses specific site constraints. For instance, where the model indicates that there is a queue waiting to exit the site then an additional outbound scale was considered. Additional queuing space does not shorten wait time, but could help mitigate off-site impacts. Capital costs for scales and queuing lanes range from about \$1 to 2 million. New permits would be needed including a possible SEPA process.

**Increase tip floor capacity:** Tip floor capacity could be increased by making operational changes or by banning materials. Operational changes were considered under all of the concepts including reconfiguring the tipping floor to maximize the number of vehicles and assuming that there would be no resource recovery from mixed loads. Material bans were considered as a mitigation strategy for Factoria – if there were no disposal or recycling of yard and wood waste, it would free up space on the tipping floor.

**Unloading assistance:** Adding staff on the tipping floor to assist customers with unloading would reduce self-haul time on the tipping floor by an estimated 25 percent, reducing overall time on-site and allowing more customers to be served each hour. For this strategy to be effective, it would require a large increase in staffing resulting in high additional operational costs – about \$4 million in 2023 (equal to about \$4.50 per ton). Some additional staff facilities to accommodate the larger staff would also be needed with a cost of about \$1 million.

## Resource Recovery and Recycling Goals and Assumptions

The division periodically conducts waste characterization studies at the transfer stations to assess the material make-up of the waste stream. These studies show that up to 78 percent of the waste that is landfilled could be recycled. Many loads arrive with large amounts of recyclable cardboard, metals, and clean wood which all have readily available markets. To help increase our overall recycling rate and put these valuable materials back into the economy, the division launched a pilot resource recovery program in 2014. This entails dumping material-rich loads on the tipping floor and picking through to reclaim the recyclable materials. In addition to the goal of increasing recycling, recovering recyclable materials from the waste stream reduces greenhouse gas emissions, conserves resources, and extends the life of the landfill.

In order to recover recyclable materials from the waste stream at the transfer stations, space on the tipping floor must be used. All concepts, except Concept 3, assumed that all floor space at the Factoria Recycling and Transfer Station would be needed for customer unloading and processing of garbage, resulting in limited space for resource recovery. Resource recovery would continue at the Shoreline and Bow Lake facilities. Under Concepts 1 and 2, resource recovery at Shoreline would experience some constraints during peak hours. These limitations would result in an overall reduction in the recycling rate potential of about one and one-half percent.

## Methodology for Evaluating Concept and Strategy Packages

The following section provides a summary of the methodology used to evaluate the concepts and demand management strategies. For more detailed information, see Appendix A.

As a starting point to assess when conditions may exceed expectations for the modeled concepts, key performance indicators were identified to measure against. These measures focus on the individual operations of the station as well as the experience of the station users, and define the station constraints and inform the identification of potential station improvements. The service performance indicators used for preliminary analysis were selected from the adopted Transfer Plan. The primary performance indicators are:

- Service times for commercial customers of 16 minutes or less<sup>iii</sup>
- Service times for self-haul customers of 30 minutes or less<sup>iv</sup>
- Inbound queuing and potential impacts to off-station roadways and/or driveways

In addition to these primary performance measures, the internal queuing at either the tipping floor or outbound scale was considered due to its potential impact to overall station operations.

Figure 3 was used as a preliminary screening tool only to identify potential areas of concern. If one or more of the indicators was exceeded, the concept and site received a “minus” illustrating that additional evaluation was needed (as reflected in the Tier 2 Screening). The degree to which any given concept exceeded an expectation varies and thus this information was only used to identify where more mitigation may be appropriate. More detailed information is provided for each site and concept.

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<sup>iii</sup> Measured scale-to-scale consistent with service time indicators identified in the 2006 Solid Waste Transfer and Waste Management Plan

<sup>iv</sup> Measured scale-to-scale consistent with service time indicators identified in the 2006 Solid Waste Transfer and Waste Management Plan

**Figure 3: Preliminary Screening to Determine Concepts/Sites That May Require Additional Mitigation Strategies (2023 Conditions)**

SITE WITH RENTON								
WEEKDAY				SITE	SATURDAY			
CONCEPT 0	CONCEPT 1	CONCEPT 2	CONCEPT 3		CONCEPT 0	CONCEPT 1	CONCEPT 2	CONCEPT 3
+	+	+	+	RENTON	+	+	+	+
+	+	-	+	SHORELINE	-	-	-	+
-	-	-	+	FACTORIA	-	-	-	+
-	-	-	-	BOWLAKE	-	-	-	-

SITE WITHOUT RENTON								
WEEKDAY				SITE	SATURDAY			
CONCEPT 0	CONCEPT 1	CONCEPT 2	CONCEPT 3		CONCEPT 0	CONCEPT 1	CONCEPT 2	CONCEPT 3
-	-	-	-	RENTON	-	-	-	-
+	-	-	+	SHORELINE	-	-	-	+
-	-	-	-	FACTORIA	-	-	-	+
-	-	-	-	BOWLAKE	-	-	-	-

+ Station is forecast to operate as defined based on KC service time standards and queue lengths (2006 Solid Waste Transfer and Waste Management Plan).  
- Station is forecast to exceed KC service time standards and queue lengths.

**Summary of Constraints**

VISSIM modeling identified operating constraints at the Shoreline, Factoria, and Bow Lake stations. No constraints were identified at the Renton Transfer Station under any of the concepts. Keeping Renton open did not significantly change constraints identified at Shoreline, Factoria, or Bow Lake.

**Shoreline**

**Commercial tipping floor:** The primary constraint identified at Shoreline is the commercial-haul tipping floor which is constrained by the number of stalls and the dwell time of vehicles on the tipping floor itself.

**Outbound scale:** Another constraint is the outbound scale. The model shows queues at the outbound scale extending back to the commercial tipping floor during the Saturday peak-hour resulting in longer commercial-haul service times. If capacity of the commercial tipping floor were increased by decreasing on-floor dwell times or increasing stalls, the outbound scale would become a more notable constraint.

**Factoria**

**Self-haul tipping floor:** The primary constraint at Factoria is the self-haul tipping floor. The self-haul tipping floor is constrained by the number of stalls and the dwell time of vehicles on the tipping floor itself. The self-haul tipping floor cannot accommodate all of the self-haul vehicles within the peak-hour.

**Outbound scale:** Another constraint of the station is the outbound scale. Although not an issue at the rate vehicles are processed on the tipping floor; if the tipping floor capacity is increased (by decreasing on-floor dwell times or increasing stalls) the outbound scale would become a constraint.

**On-station queue storage:** Based on the long queues that the model predicts, there is not enough room to accommodate the high volumes of vehicles anticipated during the peak hours. This results in queues that extend off-station, blocking adjacent businesses along SE 32nd Street and extending onto Richards Road.

### ***Bow Lake***

**Inbound scale capacity:** Capacity constraints exist at the inbound scale resulting in vehicle queues that extend back to and onto Orillia Road. The service time results are affected by the capacity of the inbound scale. Despite the variance in weekday and Saturday vehicle demands, the on-station service times are approximately the same. This indicates that the inbound scale is operating at its maximum capacity and lacks the capacity to accommodate the forecasted demand. The Bow Lake Recycling and Transfer Station is designed to accommodate additional scales as they become necessary.

**Outbound scale capacity:** Due to the capacity restriction on the inbound scale, the analysis of the unmitigated concepts does not identify capacity constraints on the outbound scale. However, if the inbound scale capacity is increased, the capacity of the existing outbound scale was identified as a constraint, because on-site queuing would extend from the outbound scale house into the self-haul tipping floor area, as well as self-haul and commercial-haul service times increase.

### **Tier 1/Tier 2 Screening**

In order to efficiently evaluate a wide range of strategies for all concepts and stations, a screening process was employed. The consultants and the division used a two-tiered (Tier 1/Tier 2) process to identify the potentially most effective strategies for concepts that did not meet the station capacity indicators shown in Figure 3 above.

The Tier 1 screening analyzed the reduction in transactions (inbound vehicle trips) that would result from implementing the various demand management strategies. This screening also considered environmental and other factors such as noise and air quality, cost implications, economic and social justice, and regulatory requirements. Each strategy was analyzed individually, at each station, under each concept (see Attachment F of Appendix A for more detail). The resulting peak-hour station traffic volumes were compared to the estimated station capacity to identify the potential benefits of the strategy.

For second, or Tier 2 screening, the most promising strategies from Tier 1 were combined with the detailed VISSIM model developed for each station. Those strategies that had the most positive effect in reducing the number of inbound vehicle trips and also made sense from an operational or regulatory point of view were combined. Based on a review of the individual strategies and the assessments prepared for the Tier 1 screening, the following combinations were identified for detailed Tier 2 evaluation and modeling.

### **Shoreline**

Strategy combinations were identified based on the results of the Tier 1 screening process. The Tier 2 screening process included the testing of the strategy combinations using VISSIM. The effectiveness of the strategies was tested for the without-Renton scenario as that time period represents the period with

the highest peak-hour demand for the stations. Various strategy combinations were applied for Concepts 0 to 2. See Appendix A for detailed tables for all concepts.

The following combinations were identified for detailed evaluation:

Concept 0:

- Combination A1 (Saturday only) – add one Transfer Station Operator(TSO) on commercial floor
- Combination A2 (Saturday only) – add one TSO on commercial floor with added outbound scale
- Combination B (Saturday only) – add one TSO on commercial floor + mandatory curbside collection

Concept 1:

- Combination A1 (weekday & Saturday) – add one TSO on commercial floor
- Combination A2 (weekday & Saturday) – add one TSO on commercial floor with added outbound scale
- Combination B (weekday & Saturday) – add one TSO on commercial floor + mandatory curbside collection

Concept 2:

- Combination A1 (weekday & Saturday) – add one TSO on commercial floor
- Combination A2 (weekday & Saturday) – add one TSO on commercial floor with added outbound scale
- Combination B (weekday & Saturday) – add one TSO on commercial floor + mandatory curbside collection

Concept 3:

- No modeling necessary

## **Results**

The results of the combinations tested on the concepts and demand management strategies are shown and discussed below.

### **Concept 0**

Combinations A and B were tested on Concept 0 without-Renton traffic volumes as the without-Renton traffic volumes are higher, modeling the worst-case scenarios. Only the Saturday peak hours were evaluated under Concept 0 as the weekday peak hours under Concept 0 already met the adopted service time and queue values.

Concept 0 with the addition of Combinations A2 or B, meet both the adopted service time and queue values. Concept 0, with Combination A1, exceeds the adopted indicator commercial-haul service time value by approximately 4 minutes.

### **Concept 1**

Concept 1 with Combinations A and B were evaluated for the without-Renton conditions. Results show that Concept 1 along with any strategy combination meets the weekday service time and threshold queues, but only Concept 1 with Combination A2 meet the Saturday adopted service time value.

### **Concept 2**

The modeled results show that only Concept 2 along with Combination A2 meets the adopted service time and queue values for both weekday and Saturday. Concept 2 with Combination B meets the adopted service time and queue values during the Saturday peak conditions. Concept 2 with

Combination A1 does not meet the adopted service time value for either the weekday or Saturday peak periods.

### Concept 3

Concept 3 is within the adopted travel time and threshold inbound queue values, and as such, no additional demand management strategies were modeled.

**Table 6: Summary of Demand Management Strategies Applied to Shoreline**

Shoreline	Cost Estimate	Environment	Service (service time and queue <sup>i</sup> )	Other
<b>Concept 0 Combination A A1 – Add 1 TSO on commercial floor (weekend only) A2 – Add 1 TSO on commercial floor (weekend only) + outbound scale</b>	<ul style="list-style-type: none"> <li>• ~\$70,000 increase in SWD operating cost (A1 and A2)</li> <li>• ~\$1.7 million capital cost (A2)</li> <li>• ~\$0.24 increase in per ton tip fee (A2)</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced queuing and associated air quality impacts (A2)</li> </ul>	<ul style="list-style-type: none"> <li>• Weekend self-haul service time 29 min., commercial service time 20 min. (A1)</li> <li>• Weekend self-haul service time 17 min., commercial service time 12 min. (A2)</li> <li>• Weekend inbound queue 4 vehicles (A1 and A2)</li> </ul> <p><i>Note that weekday for Concept 0 does not require mitigation so weekday times were not modeled.</i></p>	<ul style="list-style-type: none"> <li>• Permit needed (A2)</li> </ul>
<b>Concept 0 Combination B Add 1 TSO on commercial floor (weekend only) + mandatory curbside collection</b>	<ul style="list-style-type: none"> <li>• ~\$70,000 increase in SWD operating cost</li> </ul>	<ul style="list-style-type: none"> <li>• Minor increase in commercial haul traffic and decrease in self-haul traffic</li> </ul>	<ul style="list-style-type: none"> <li>• Weekend self-haul service time 22 min., commercial service time 15 min.</li> <li>• Weekend inbound queue 4 vehicles</li> </ul> <p><i>Note that weekday for Concept 0 does not require mitigation so weekday times were not modeled.</i></p>	<ul style="list-style-type: none"> <li>• Mandatory collection requires Cities and County to pass ordinances</li> <li>• Mandatory collection issues include reduction in citizen choice, some properties not easily served by curbside, and potential adverse impact on low income residents</li> </ul>
<b>Concept 1 Combination A A1 – Add 1 TSO on commercial floor (weekdays and weekend) A2 – Add 1 TSO on commercial</b>	<ul style="list-style-type: none"> <li>• ~\$340,000 increase in SWD operating cost (A1 and A2)</li> <li>• ~\$1.7 million capital cost (A2)</li> <li>• ~\$0.54 increase in per ton tip fee (A2)</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced queuing and associated air quality impacts (A2)</li> </ul>	<ul style="list-style-type: none"> <li>• Weekday self-haul service time 20 min., commercial service time 15 min. (A1)</li> <li>• Weekday self-haul service time 17 min., commercial service time 13 min. (A2)</li> <li>• Weekend self-haul service time 37 min., commercial service</li> </ul>	<ul style="list-style-type: none"> <li>• Permit needed for additional scale (A2)</li> </ul>

Shoreline	Cost Estimate	Environment	Service (service time and queue <sup>i</sup> )	Other
<b>floor (weekdays and weekend) + outbound scale</b>			time 22 min. (A1) <ul style="list-style-type: none"> <li>Weekend self-haul service time 17 min., commercial service time 12 min. (A2)</li> <li>Weekday inbound queue 3 vehicles (A1 and A2)</li> <li>Weekend inbound queue 6 to 7 vehicles (A1 and A2)</li> </ul>	
<b>Concept 1 Combination B Add 1 TSO on commercial floor (weekdays and weekend) + mandatory curbside collection</b>	<ul style="list-style-type: none"> <li>~\$340,000 increase in SWD operating cost</li> <li>~\$0.38 increase in per ton tip fee</li> </ul>	<ul style="list-style-type: none"> <li>Reduced queuing and associated air quality impacts</li> <li>Minor increase in commercial haul traffic and decrease in self-haul traffic</li> </ul>	<ul style="list-style-type: none"> <li>Weekday self-haul service time 19 min., commercial service time 15 min.</li> <li>Weekend self-haul service time 27 min., commercial service time 20 min.</li> <li>Weekday inbound queue 3 vehicles</li> <li>Weekend inbound queue 5 vehicles</li> </ul>	<ul style="list-style-type: none"> <li>Mandatory collection requires Cities and County to pass ordinances</li> <li>Mandatory collection issues include reduction in citizen choice, some properties not easily served by curbside, and potential adverse impact on low income residents</li> </ul>
<b>Concept 2 Combination A A1 – Add 1 TSO on commercial floor (weekdays and weekend) A2 – Add 1 TSO on commercial floor (weekdays and weekend) + outbound scale</b>	<ul style="list-style-type: none"> <li>~\$340,000 increase in SWD operating cost (A1 and A2)</li> <li>~\$1.7 million capital cost (A2)</li> <li>~\$0.54 increase in per ton tip fee (A2)</li> </ul>	<ul style="list-style-type: none"> <li>Reduced queuing and associated air quality impacts (A2)</li> </ul>	<ul style="list-style-type: none"> <li>Weekday self-haul service time 38 min., commercial service time 23 min. (A1)</li> <li>Weekday self-haul service time 19 min., commercial service time 13 min. (A2)</li> <li>Weekend self-haul service time 29 min., commercial service time 20 min. (A1)</li> <li>Weekend self-haul service time 17 min., commercial service time 12 min. (A2)</li> <li>Weekday inbound queue 8 to 11 vehicles (A1 and A2)</li> <li>Weekend inbound queue 4 vehicles (A1 and A2)</li> </ul>	<ul style="list-style-type: none"> <li>Permit needed for additional scale (A2)</li> </ul>

Shoreline	Cost Estimate	Environment	Service (service time and queue <sup>1</sup> )	Other
<b>Concept 2 Combination B Add 1 TSO on commercial floor (weekdays and weekend) + mandatory curbside collection</b>	<ul style="list-style-type: none"> <li>• ~\$340,000 increase in SWD operating cost</li> <li>• ~\$0.38 increase in per ton tip fee</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced queuing and associated air quality impacts</li> <li>• Minor increase in commercial haul traffic and decrease in self-haul traffic</li> </ul>	<ul style="list-style-type: none"> <li>• Weekday self-haul service time 28 min., commercial service time 21 min.</li> <li>• Weekend self-haul service time 22 min., commercial service time 15 min.</li> <li>• Weekday inbound queue 5 vehicles</li> <li>• Weekend inbound queue 4 vehicles</li> </ul>	<ul style="list-style-type: none"> <li>• Mandatory collection requires Cities and County to pass ordinances</li> <li>• Mandatory collection issues include reduction in citizen choice, some properties not easily served by curbside, and potential adverse impact on low income residents</li> </ul>

**Concept 3 not modeled – no mitigation required**

<sup>1</sup> Shoreline queue length information: intersection of Meridian Ave N / N 165th St located approximately 15 vehicles from the scale

**Summary**

Increases in station traffic range from 44 to 76 vehicles per hour between the different concepts during the weekday peak period under with-Renton conditions and range from 44 to 96 vehicles per hour during the weekday peak period under the without-Renton conditions. During the Saturday peak period, peak demand volumes range from 67 to 86 vehicles per hour under with-Renton conditions and range from 67 to 92 vehicles per hour under without-Renton conditions.

- Analysis of on-site operations showed operational issues at the commercial-haul tipping floor and the outbound scale resulting in commercial-haul service times exceeding the adopted service time value primarily during the Saturday peak periods.
  - Three demand management strategy combinations were analyzed to improve on-site operations under Concepts 0 to 2 without-Renton conditions, both during the weekday and Saturday peak periods. Combination A2 (add a TSO on the commercial tipping floor and additional outbound scale) under Concepts 0 to 2 meets both the adopted weekday and Saturday service time and queue threshold values. The other combinations under the without-Renton conditions exceed either the adopted service time or the queue threshold values.
- The mitigated time on-site for commercial haulers, depending on the concept and time of week, would range from about 12 to 22 minutes. For self-haulers, the mitigated wait times on-site would range from about 17 to 38 minutes. The existing time on-site for commercial haulers is between 12 and 13 minutes and for self-haulers it is about 17 to 18 minutes.
- The mitigated queue length for customers waiting to get into the station ranges from about 3 vehicles up to about 46 vehicles. The existing queue ranges from 1 to 2 vehicles.
- Evaluation of off-station intersections showed minimal increases in traffic for Concept 2. Concept 2 represented the highest peak demand thus represents a more conservative analysis when considering the impacts to the other concepts and the greatest impact to the off-station intersections.

## Factoria

Strategy combinations were identified based on the results of the Tier 1 screening process. Reductions in peak hour demand from applying the strategies range up to about 34 percent. Specific strategies examined at the Factoria station and the estimated reductions assumed include:

- Extend operating hours, 4 percent reduction
- Lower cost curbside bulky waste collection, 3.4 percent reduction
- Mandatory curbside garbage collection, 4 percent reduction
- Incentive/peak pricing, 15 percent reduction
- Higher minimum fee at Factoria only, 20 percent reduction
- No HHW service, 3 percent reduction
- Ban yard waste and wood waste from disposal and recycling, 34 percent reduction

In addition to the demand strategies noted above, potential physical station improvements were identified to address the operational constraints. These improvements considered the addition of increased staffing, the addition of an outbound scale, and added internal vehicle queueing.

The Tier 2 screening process included the testing of the strategy combinations using VISSIM. The effectiveness of the strategies was tested for the without-Renton scenario as that represents the period with the highest peak-hour demand. Various strategy combinations were applied for Concept 0 and Concept 2. Modeling was not conducted for Concept 1 as the demand is similar to Concept 0. No VISSIM modeling was conducted for Concept 3 because analysis showed it met most of the adopted service time and queue threshold values. See Appendix A for detailed tables for all concepts.

The following combinations were identified for detailed evaluation:

### Concept 0:

- Combination A (weekday & Saturday) – extended hours + incentive/peak pricing
- Combination B (weekday & Saturday) – increase staffing (decrease dwell time) + higher minimum fee
- Combination C (weekday & Saturday) – banned materials + mandatory curbside collection + lower cost curbside bulky waste collection

### Concept 1:

- No modeling necessary (Concept 1 is similar to Concept 0, results of Concept 0 analysis will apply)

### Concept 2:

- Combination C (weekday & Saturday) – banned materials + mandatory curbside collection + lower cost curbside bulky waste collection
- Combination D (weekday & Saturday) – added internal queuing (expanded entry lane and repurpose of HHW area) + HHW banned

### Concept 3:

- No modeling was necessary because analysis showed that the concept met most of the adopted service time and queue threshold values.

## Results

The results of the combinations tested on the concepts and demand management strategies are shown and discussed below.

### Concept 0

Concept 0 with combination C2 is the only package that meets the adopted service time values, and falls within the threshold of vehicle queues for both the weekdays and Saturday peak periods. While the improvements identified in Combination B reflect improvements in service times and queues relative to Concept 0, the resulting values do not meet the adopted service time and queue threshold values.

### Concept 1

No strategy combinations were tested for Concept 1 as peak-hour demand is similar to forecasts for Concept 0. Future operations for Concept 1 under the scenarios tested would be similar.

### Concept 2

Concept 2 with Combination C meets the adopted travel time and queue threshold values for both weekdays and Saturday. Concept 2 with Combination D exceeds the adopted self-haul service time value. Due to the additional on-site queue storage, the queues that were previously off-site are now mostly accommodated on-site, greatly increasing the service times.

### Concept 3

No combinations were modeled for Concept 3 as the service times and queues meet the adopted values under all scenarios with the exception of the self-haul service times exceeding the adopted value under the weekday peak period. During this period, on-site service times are anticipated to exceed the adopted values by approximately 8 minutes. Based on the results from the Concept 0 evaluation, the application of the strategy combinations tested would likely result in a decrease in service times, improving these conditions.

**Table 7: Summary of Demand Management Strategies Applied to Factoria**

Factoria	Cost Estimate	Environment	Service (service time and queue <sup>ii</sup> )	Other
<b>Concept 0 Combination A Extend hours, peak pricing</b>	<ul style="list-style-type: none"> <li>• ~\$1.5 million increase in SWD operating cost</li> <li>• ~\$2.3 million revenue increase</li> <li>• Net per ton tip fee decrease ~\$0.50</li> </ul>	<ul style="list-style-type: none"> <li>• Additional vehicle traffic during p.m. peak commute hours</li> <li>• Noise code limits lower in evening</li> <li>• New SEPA needed for extended hours</li> <li>• Potential increase in illegal dumping</li> </ul>	<ul style="list-style-type: none"> <li>• Weekday self-haul service time 38 min., commercial service time 12 min.</li> <li>• Weekend self-haul service time 41 min., commercial service time 20 min.</li> <li>• Weekday and weekend inbound queue 3 to 6 vehicles</li> </ul>	<ul style="list-style-type: none"> <li>• KC rate ordinance to implement peak price</li> <li>• KC process to change hours</li> <li>• Impact from noise and traffic on neighboring residents and businesses during extended hours</li> <li>• Issues include fee equity (transfer station fees would be higher in northeast area than other areas of the county), potential adverse impacts on low income customers and small business owners, and customer dissatisfaction due to higher cost</li> <li>• More issues may be identified during SEPA process</li> </ul>

Factoria	Cost Estimate	Environment	Service (service time and queue <sup>ii</sup> )	Other
<b>Concept 0 Combination B B1 – Unloading assistance, higher minimum fee B2 – Unloading assistance, higher minimum fee, additional outbound scale</b>	<ul style="list-style-type: none"> <li>• ~\$4 million increase in SWD operating cost</li> <li>• ~\$1 to 2 million capital cost</li> <li>• ~\$15.4 million revenue increase</li> <li>• Net per ton tip fee decrease ~\$7.50</li> </ul>	<ul style="list-style-type: none"> <li>• Shifts vehicle traffic in the region resulting in increased vehicle miles travelled</li> <li>• Potential increase in illegal dumping</li> </ul>	<ul style="list-style-type: none"> <li>• Weekday self-haul service time 51 to 52 min., commercial service time 12 to 16 min. (B1 and B2)</li> <li>• Weekend self-haul service time 50 min., commercial service time 29 min. (B1)</li> <li>• Weekend self-haul service time 29 min., commercial service time 16 min. (B2)</li> <li>• Weekday inbound queue 35 to 39 vehicles, blocks driveways of neighboring businesses (B1 and B2)</li> <li>• Weekend inbound queue 48 vehicles, blocks driveways of neighboring businesses (B1)</li> <li>• Weekend inbound queue 11 vehicles (B2)</li> </ul>	<ul style="list-style-type: none"> <li>• King County rate ordinance to double minimum fee at Factoria</li> <li>• Issues include fee equity (transfer station fees would be higher in northeast area than other areas of the county), potential adverse impacts on low income customers and small business owners, and customer dissatisfaction due to higher cost</li> </ul>
<b>Concept 0 Combination C C1 – Ban yard/wood waste, mandatory collection, curbside bulky waste collection C2 – Ban yard/wood waste, mandatory collection, curbside bulky waste collection, additional</b>	<p>Site and build yard/wood waste drop box</p> <ul style="list-style-type: none"> <li>• ~\$600,000 increase in SWD operating cost</li> <li>• ~\$18.5 million capital cost</li> <li>• ~\$2.30 increase in per ton tip fee</li> </ul> <p>Yard/wood waste goes elsewhere</p> <ul style="list-style-type: none"> <li>• No added cost to SWD</li> <li>• ~\$1.40</li> </ul>	<ul style="list-style-type: none"> <li>• Siting process needed if build a drop box to handle yard/wood waste</li> <li>• Shifting vehicle traffic in the region resulting in increased vehicle miles travelled</li> <li>• Potential increase in illegal dumping</li> <li>• Minor increase in commercial haul traffic and</li> </ul>	<ul style="list-style-type: none"> <li>• Weekday self-haul service time 23 to 25 min., commercial service time 11 to 13 min. (C1 and C2)</li> <li>• Weekend self-haul service time 32 min., commercial service time 20 min. (C1)</li> <li>• Weekend self-haul service time 23 min., commercial service time 15 min. (C2)</li> <li>• Weekday inbound queue 2 to 3 vehicles (C1 and C2)</li> <li>• Weekend inbound</li> </ul>	<ul style="list-style-type: none"> <li>• King County process to implement material ban; ban would require monitoring and enforcement (not included in costs)</li> <li>• Potential customer dissatisfaction and adverse impacts to small businesses</li> <li>• Permits needed if siting/building new drop box</li> <li>• Mandatory collection would require Cities and County to pass ordinances</li> <li>• Mandatory collection issues include reduction in citizen choice, some properties not easily served by curbside, and adverse impact on low income residents</li> </ul>

Factoria	Cost Estimate	Environment	Service (service time and queue <sup>ii</sup> )	Other
<b>outbound scale</b>	<p>increase in per ton tip fee due to revenue loss</p> <p>Additional outbound scale</p> <ul style="list-style-type: none"> <li>• ~\$1 million capital cost</li> </ul>	decrease in self-haul traffic	queue 4 to 5 vehicles (C1 and C2)	<ul style="list-style-type: none"> <li>• Cities and haulers would be primarily responsible for determining a system that would lower bulky waste collection cost; lower cost would make service more accessible</li> <li>• Additional outbound scale would require permit</li> <li>• More issues may be identified during SEPA/permitting process</li> </ul>

**Concept 1 not modeled due to similarity of peak hour demand with Concept 0 – same strategies could be applied with similar results**

<p><b>Concept 2</b></p> <p><b>Combination C</b></p> <p><b>Ban yard/wood waste, mandatory collection, curbside bulky waste collection</b></p>	<p>Extended operating hours</p> <ul style="list-style-type: none"> <li>• ~\$1.5 million increase in SWD operating cost</li> <li>• ~\$2.00 increase in per ton tip fee</li> </ul> <p>Site and build yard/wood waste drop box</p> <ul style="list-style-type: none"> <li>• ~\$600,000 increase in SWD operating cost</li> <li>• ~\$18.5 million capital cost</li> <li>• ~\$2.30 increase in per ton tip fee</li> </ul> <p>Yard/wood waste goes elsewhere</p> <ul style="list-style-type: none"> <li>• No added cost to SWD</li> <li>• ~\$1.40 increase in per ton tip fee due to revenue loss</li> </ul>	<ul style="list-style-type: none"> <li>• Additional vehicle traffic during p.m. peak commute hours</li> <li>• Noise code limits lower in evening</li> <li>• New SEPA needed for extended hours</li> <li>• SEPA needed if site/build new drop box</li> <li>• Shift of vehicle traffic in the region and increased vehicle miles travelled</li> <li>• Potential increase in illegal dumping</li> <li>• Minor increase in commercial haul traffic and decrease in self-haul traffic</li> </ul>	<ul style="list-style-type: none"> <li>• Weekday self-haul service time 23 min., commercial service time 12 min.</li> <li>• Weekend self-haul service time 22 min., commercial service time 15 min.</li> <li>• Weekday and weekend inbound queue 2 to 3 vehicles</li> </ul>	<ul style="list-style-type: none"> <li>• KC process to change hours</li> <li>• Impact from noise and traffic on neighboring residents and businesses during extended hours</li> <li>• King County process to implement material ban; band would require monitoring and enforcement (not included in costs)</li> <li>• Issues include customer dissatisfaction and adverse impacts to small businesses</li> <li>• Permits needed if site/build new drop box</li> <li>• Mandatory collection would require Cities and County to pass ordinances</li> <li>• Mandatory collection issues include reduction in citizen choice, some properties not easily served by curbside, and adverse impact on low income residents</li> <li>• Cities and haulers would be primarily responsible for determining a system that would lower bulky waste collection cost; lower cost would make service more accessible</li> <li>• More issues may be identified during SEPA/permitting process</li> </ul>
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Factoria	Cost Estimate	Environment	Service (service time and queue <sup>ii</sup> )	Other
<p><b>Concept 2*</b> <b>Combination D</b> <b>Added internal queuing (expanded entry lane and repurpose of HHW area), second inbound lane along SE 32nd St, and no HHW service</b></p> <p><i>*Concept 2 includes extended hours at Factoria: 6 a.m. to 10 p.m. on weekdays and 8 a.m. to 8 p.m. on weekends</i></p>	<p>Extended operating hours</p> <ul style="list-style-type: none"> <li>• ~\$1.5 million increase in SWD operating cost</li> <li>• ~\$2.00 increase in per ton tip fee</li> </ul> <p>Queuing improvements</p> <ul style="list-style-type: none"> <li>• ~\$2.4 million capital cost</li> <li>• ~\$0.20 increase in per ton tip fee</li> </ul> <p>Site/build separate HHW facility</p> <ul style="list-style-type: none"> <li>• ~\$9.1 million capital cost</li> <li>• ~\$0.80 increase in per ton tip fee</li> </ul>	<ul style="list-style-type: none"> <li>• Additional vehicle traffic during p.m. peak commute hours</li> <li>• Noise code limits lower in evening</li> <li>• New SEPA needed for extended hours</li> <li>• Permits and SEPA for expanded entry and queuing</li> <li>• Permits and SEPA for inbound lane on SE 32nd – proximity to stream</li> <li>• Reduced impact on local streets and neighbors</li> <li>• Some reduction in traffic at Factoria</li> <li>• Some shift of vehicle traffic in the region and increase in vehicle miles travelled</li> <li>• Siting for new HHW facility</li> </ul>	<ul style="list-style-type: none"> <li>• Weekday self-haul service time 30 min., commercial service time 13 min.</li> <li>• Weekend self-haul service time 1 hour, 6 min., commercial service time 22 min.</li> <li>• Weekday and weekend inbound queue 3 to 7 vehicles</li> </ul> <p><i>Note that service time (scale-to-scale) increases for this combination is because the queue is moved on site.</i></p>	<ul style="list-style-type: none"> <li>• KC process to change hours</li> <li>• Impact from noise and traffic on neighboring residents and businesses during extended hours</li> <li>• Siting process and permits needed for new HHW facility</li> <li>• Issues include customer dissatisfaction and potential increase in improper disposal</li> <li>• More issues may be identified during SEPA/permitting process</li> </ul>

**Concept 3 not modeled because analysis showed that the concept met most of the adopted service time and queue threshold values.**

<sup>ii</sup> Factoria queue length information: first driveway located approximately 10 vehicles from the scale; Richards Road intersection located approximately 60 vehicles from scale

### Summary

- Between the different concepts, increases in station traffic range from 55 to 113 vehicles per hour during the weekday peak period under with-Renton conditions, and range from 69 to 127 vehicles per hour during the weekday peak period under the without-Renton conditions. During the Saturday

peak period, peak demand volumes range from 74 to 152 vehicles per hour under with-Renton conditions, and range from 91 to 168 vehicles per hour under without-Renton conditions.

- Analysis of on-site operations showed that moving vehicles through the self-haul tipping floor was the constraint at Factoria, so that vehicles would wait to enter the tipping, resulting in queues extending off-site, beyond the queue thresholds, as well as service times exceeding the adopted values under Concepts 0 to 2 for the weekday and/or Saturday peak conditions.
  - Seven combinations were analyzed to improve on-site operations under Concepts 0 and 2 without-Renton conditions, both during the weekday and Saturday peak periods. Combinations C1 and C2 (banned materials, mandatory curbside collection, lower cost curbside bulky waste collection, and as part of Combination C2 only, an additional outbound scale) under Concepts 0 and 2, respectively, meet both the weekday and Saturday adopted service time and queue threshold values. The other combinations under the without-Renton conditions exceed either the adopted service time or the queue threshold values.
- The mitigated time on-site for commercial haulers, depending on the concept and time of week, would range from about 11 to 29 minutes. For self-haulers, the mitigated wait times on-site would range from about 22 to 52 minutes. The existing time on-site for commercial haulers is between 11 and 15 minutes and for self-haulers it is about 22 to 23 minutes.
- The mitigated queue length for customers waiting to get into the station ranges from about 2 vehicles up to about 48 vehicles. The existing queue is about 1 vehicle.
- Evaluation of off-station intersections showed minimal traffic increases for Concept 0. Concept 0 represented the highest peak demand and represents a more conservative analysis when considering the impacts to the other concepts and the greatest impact to the off-station intersections.

## **Bow Lake**

Strategy combinations were identified based on the results of the Tier 1 screening process. The Tier 2 screening process included the testing of the strategy combinations using VISSIM. The effectiveness of the strategies was tested for the without-Renton scenario as that time period representing the period with the highest peak-hour demand for the stations. See Appendix A for detailed tables for all concepts.

The following combinations were identified for detailed evaluation:

Concept 0:

- Combination A – additional inbound scale
- Combination B1 – additional inbound scale and additional outbound scale
- Combination B2 – additional inbound scale, additional outbound scale, and outbound queue pocket (on-station)

Due to similar peak-hour demands for the concepts, the Tier 2 evaluation utilizing VISSIM applied the following strategy combinations to Concept 0 (weekday and Saturday) only.

## **Results**

The results of the combinations tested on the concepts and demand management strategies are shown and discussed below.

### **Concept 0**

Concept 0 with the addition of Combination B2 meets the adopted service times for the Saturday peak demand, but exceeds the adopted service time targets for the weekday period. The commercial-haul

times exceed the adopted service time value by 1-minute and the self-haul times exceed the adopted service time value by 5 minutes. Relative to the existing service times, Combination B2 results in the most similar performance levels.

Although the self-haul service times with Combination B2 appear to be worse on the weekday compared with Concept 0 by itself, the queues are reduced by 95 vehicles. As noted previously, the unmitigated service times for Concept 0 are skewed due to the forecasted queueing and the metering effect of the inbound scale house. The inbound vehicle queues for the weekday and Saturday conditions are well under the threshold, with a maximum queue length of six vehicles.

### Concepts 1, 2, and 3

Peak-hour demands for all scenarios are similar between Concept 0 and Concepts 1, 2, and 3. As such, no VISSIM modeling was conducted for Concepts 1, 2, and 3.

**Table 8: Summary of Demand Management Strategies Applied to Bow Lake**

Bow Lake	Cost Estimate <sup>iii</sup>	Environment	Service (service time <sup>iv</sup> and queue <sup>v</sup> )	Other
<b>Concept 0 Combination A</b>  <b>Additional inbound scale</b>	<ul style="list-style-type: none"> <li>• ~\$270,000 increase in SWD operating cost</li> <li>• ~\$1.2 million capital cost</li> <li>• ~\$0.40 increase in per ton tip fee</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced queuing and associated air quality impacts</li> <li>• Reduced impact on local streets</li> </ul>	<ul style="list-style-type: none"> <li>• Weekday self-haul service time 57 min., commercial service time 45 min.</li> <li>• Weekend self-haul service time 1 hour 10 min., commercial service time 52 min.</li> <li>• Weekday inbound queue 4 vehicles</li> <li>• Weekend inbound queue 52 vehicles</li> </ul>	<ul style="list-style-type: none"> <li>• More issues may be identified during SEPA/permitting process</li> </ul>
<b>Concept 0 Combination B</b>  <b>B1 – Additional inbound scale, additional outbound scale</b>  <b>B2 – Additional inbound scale, additional outbound</b>	<ul style="list-style-type: none"> <li>• ~\$270,000 increase in SWD operating cost</li> <li>• ~\$2.1 million capital cost (B1)</li> <li>• ~\$2.9 million capital cost (B2)</li> <li>• ~\$0.55 increase in per ton tip fee (B2)</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced queuing and associated air quality impacts</li> <li>• Reduced impact on local streets</li> </ul>	<ul style="list-style-type: none"> <li>• Weekday self-haul service time 45 min., commercial service time 31 min. (B1)</li> <li>• Weekday self-haul service time 35 min., commercial service time 17 min. (B2)</li> <li>• Weekend self-haul service time 36 min., commercial service time 26 min. (B1)</li> <li>• Weekend self-haul service time 28 min., commercial service time 13 min. (B2)</li> </ul>	<ul style="list-style-type: none"> <li>• More issues may be identified during SEPA/permitting process</li> </ul>

Bow Lake	Cost Estimate <sup>iii</sup>	Environment	Service (service time <sup>iv</sup> and queue <sup>v</sup> )	Other
scale, outbound queue pocket			<ul style="list-style-type: none"> <li>• Weekday inbound queue 3 vehicles (B1 and B2)</li> <li>• Weekend inbound queue 6 to 7 vehicles (B1 and B2)</li> </ul>	
<b>Concepts 1, 2, and 3 not modeled due to similarity of peak hour demand with Concept 0 – same strategies could be applied with similar results</b>				

<sup>iii</sup> Cost estimates for operating cost and per ton tip fee are for 2023; capital costs are total project cost inflated

<sup>iv</sup> Service time is defined as time on site (scale-to-scale) and does not include time spent in queue offsite

<sup>v</sup> Bow Lake queue length information: intersection of S 188th St / Orillia Rd S located approximately 32 vehicles from the scale

### Summary

- Increases in station traffic range from 85 to 88 vehicles per hour between the different concepts during the weekday peak period under with-Renton conditions and range from 110 to 118 vehicles per hour during the weekday peak period under the without-Renton conditions. During the Saturday peak period, peak demand volumes range from 110 to 111 vehicles per hour under with-Renton conditions and range from 140 to 152 vehicles per hour under without-Renton conditions.
- Analysis of on-site operations showed operational issues at the inbound scales, resulting in queues extending beyond the adopted inbound queue thresholds.
  - Three combinations were analyzed to improve on-site operations under Concept 0 without-Renton conditions, both during the weekday and Saturday peak periods. Combination B2 (an additional inbound and outbound scale and outbound queue storage pocket) meets the Saturday adopted service time and queue threshold values as well as being near the adopted service time values and meeting the queue threshold values on the weekdays. The other combinations under the without-Renton conditions exceed either the adopted service times or the queue threshold values.
- The mitigated time on-site for commercial haulers, depending on the concept and time of week, would range from about 13 to 52 minutes. For self-haulers, the mitigated wait times on-site would range from about 28 minutes up to about an hour and ten minutes. The existing time on-site for commercial haulers is about 13 minutes and for self-haulers it is between 26 and 27 minutes.
- The mitigated queue length for customers waiting to get into the station ranges from about 3 up to about 52 vehicles. The existing queue is about 2 to 3 vehicles.
- Evaluation of off-station intersections showed minimal increases in traffic for Concept 0 relative to without-project conditions. Concept 0 represented the highest peak demand, and thus represents a more conservative analysis when considering the impacts to the other concepts and the greatest impact to the off-station intersections.

## Concept 3

Concept 3 is the only concept which would build a new Northeast Recycling and Transfer Station (NERTS) to replace the Houghton Transfer Station.

### Service

At Factoria, during peak weekday hours, self-haul service times would exceed the adopted service time value of 30 minutes or less, but would be within the standard for commercial. Saturday service times would be within standard for self-haul and commercial. Off-site queues would not impact local businesses or streets (see Tables 9 and 10 for more information).

**Table 9: Factoria Without Renton Weekday**

	Peak Hour Demand (inbound trips)	Service Times <sup>2</sup> in minutes		Inbound Queue <sup>3</sup>
		Self-Haul	Commercial	
Existing <sup>1</sup>	36	23:00	11:00	1
Concept 3 (2023)	71	38:00	12:00	2

**Table 10: Factoria Without Renton Saturday**

	Peak Hour Demand (inbound trips)	Service Times <sup>2</sup> in minutes		Inbound Queue <sup>3</sup>
		Self-Haul	Commercial	
Existing <sup>1</sup>	46	22:00	15:00	1
Concept 3 (2023)	93	25:00	15:00	3

1. Existing conditions reflects the configuration of the planned station and 2014 volumes observed.
2. Measured scale-to-scale.
3. First driveway located approximately 10 vehicles from the scale. Richards Road intersection located approximately 60 vehicles from scale.

### Cost

The cost of a new Northeast Recycling and Transfer Station is estimated at about \$97 million.

- The average cost (2015-2040) per ton to build NERTS would be about \$7 per ton
- Would add about \$5 per year to the average single-family household curbside collection cost (median 2015-2040)

In the online customer survey conducted from mid-November 2014 to early January 2015, Houghton users were asked about their willingness to pay higher fees to replace the Houghton Transfer Station with a new nearby facility. Randomly, survey participants were asked if they would be willing to pay \$8 or \$15 more per ton. While more would be willing to pay the lower increase, overall about 75 percent said they would be willing to pay the higher fee, 10 percent said they weren't sure, and about 15 percent said they would not be willing. While only Houghton users, who would be the primary beneficiaries of a new station, were asked, capital costs are spread across all system users. See Appendix B for more detailed customer survey information.

## Environment

Building a Northeast Recycling and Transfer Station may not substantially change the number of vehicle trips in the region, but would reduce the driving distance of customers and haulers and would reduce overall fuel consumption and greenhouse gas emissions. In addition, extended wait times and therefore idling vehicles at stations can result in localized effects to air quality. Providing an additional station would reduce wait times and the potential for localized air quality effects at Factoria and Shoreline.

## Renton

The current Transfer Plan calls for the Renton Transfer Station to close when replacement capacity is available. The [2013 Draft Comprehensive Solid Waste Management Plan](#) recommends reserving the option to retain the Renton station until new urban transfer facilities have been sited and impact of the closure has been fully evaluated. The City of Renton has affirmed that it wants the station closed in 2018. The review process considered how closing the Renton Transfer Station would affect the transfer system under each concept. And as specified in [Council Motion 14145](#) the division evaluated the following:

- The effect of the potential closure of the Renton Transfer Station on the self-haul service needs of residents currently served by the Renton Transfer Station, with particular attention to the accessibility and convenience provided to current transfer station clients by the Renton station, compared with drive time and potential waits associated with alternative transfer station options.
- Options for self-haul service for residents currently served by the Renton Transfer Station in the event of a closure of the station.

## Service

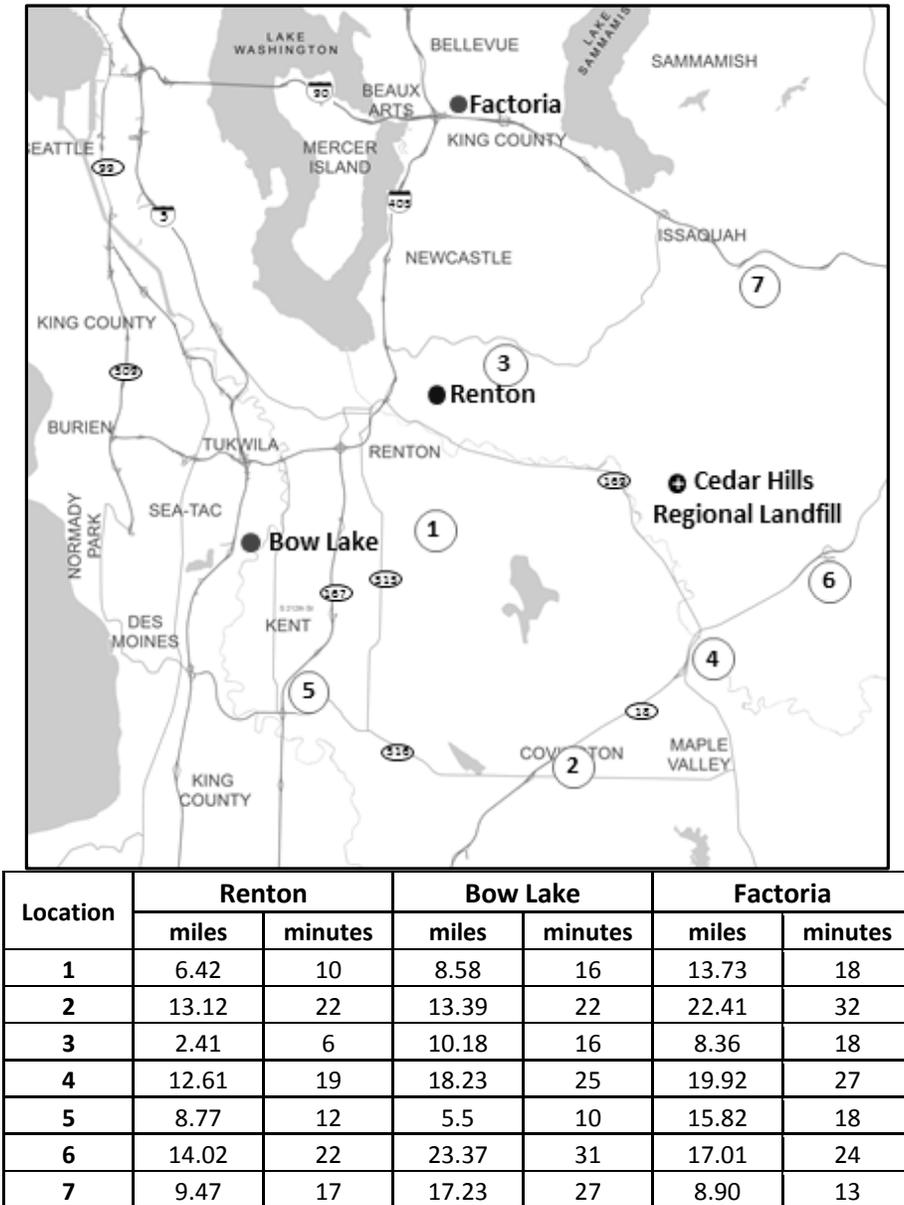
Under all concepts, if the Renton Transfer Station were to remain open, the station would not experience any service time or queueing issues. Renton would continue to provide garbage service and recycling service as space allows. Under the current configuration, space is not available to provide separate yard waste collection.

## Alternatives to the Renton Transfer Station

Over 97 percent of Renton Transfer Station self-haul customers who participated in the recent online customer survey said that they were satisfied with the current transfer station – 80 percent were very satisfied.

The vast majority of survey respondents, over 90 percent, said that geographic location was the most important factor in choosing a transfer station. While many self-haulers that use the Renton transfer Station are geographically located at a nearly equal distance to Factoria or Bow Lake there may be differences in travel time or experience that make Renton more desirable for the customers that use the station. Figure 4 shows the travel times to the Renton, Bow Lake, and Factoria stations. The locations were chosen based on trip origin information from Renton Transfer Station self-haulers. Travel times could be longer in traffic.

**Figure 4: Drive Distances and Times**



If Renton were to close, about 47 percent of survey respondents said they would use Factoria instead, 17 percent would use Bow Lake, 7 percent would use Enumclaw, and about 4 percent said they would use Algona. However, less than 5 percent said they would be satisfied with these options and over 70 percent said they would be very dissatisfied. Were Renton to close, customers making use of other stations would experience queues and service times associated with whichever Concept and mitigation strategies are chosen.

**Cost**

The cost to repair and retain the Renton Transfer Station would be about \$2 million. The added cost, capital and operating, to retain Renton would be about \$1.60 per ton in 2023. The advantage Renton has from a cost perspective is its close proximity to Cedar Hills thus relatively low hauling cost despite lacking a compactor.

## Environment

Keeping Renton open would not have any significant impacts from a traffic or noise perspective. Shorter driving distances for customers and for division trucks traveling to the Cedar Hills landfill would reduce overall fuel consumption and greenhouse gas emissions.

## Summary

- Under all modeled concepts, Renton does not experience any constraints
- It has some effect on how other stations function, but the impact is not enough to be a deciding factor in whether or not to keep it open
- If the station were to close, current users would primarily use Factoria and Bow Lake

## Conclusion

This review determined that there are multiple options available to the region for managing transactional demand in the transfer stations. The impacts varied by station, therefore the solutions are also different at each station.

This review revealed that the Shoreline Recycling and Transfer Station would experience some constraints if a Northeast Recycling and Transfer Station were not built. These constraints could be mitigated by a combination of adding some staff, mandatory curbside collection, and adding an outbound scale:

- The capital cost of adding an outbound scale would be about \$1.7 million; the operational cost of adding staff would range from about \$70,000 to \$340,000 annually depending on the concept
- Permits would be needed for the capital improvements

This review also determined that closing the Houghton Transfer Station and not building a Northeast Recycling and Transfer Station would, if unmitigated, result in on-site service times at Factoria for commercial haulers of up to 22 minutes and for self-haul customers of over an hour. In addition, substantial off-site queuing with weekday queues of up to about 130 vehicles and Saturday queues over 180 could occur; queues of this length would extend well beyond the intersection of SE 32nd Street and Richards Road. However, mitigation strategies could reduce both service times and queue lengths to acceptable levels. Potential strategies analyzed for Factoria include extending hours, adding peak pricing, adding staff to help with unloading vehicles, banning yard and wood waste from both disposal and recycling, not providing HHW service at this site (service would be provided at a yet to be determined location somewhere in the area), adding internal queuing space, improving curbside bulky collection service, and mandatory curbside collection. The mitigation strategies with the most impact would require combinations of strategies including the following:

- Extending operating hours and implement peak pricing
  - Extending hours would increase operating costs, but the cost could be covered by peak pricing
    - Extending hours would likely mean additional environmental review and a new operating permit from the City of Bellevue
    - Potential issues related to peak pricing include fee equity, potential adverse impacts on low income customers and small business owners, and customer dissatisfaction
- Banning yard and wood waste from both disposal and recycling along with mandatory curbside collection and less-expensive curbside bulky collection service; this combination could be implemented with or without extended operating hours and could be further enhanced by adding a second outbound scale

- Banning yard and wood waste from both disposal and recycling would require other options for this material
  - Options range from providing a drop box somewhere in the service area at a capital cost of approximately \$18.5 million and an operating cost of about \$600,000 annually, to allowing the material to flow to other transfer facilities and private service providers which would have minimal direct costs, but could result in revenue loss
- Implementing mandatory garbage collection and less-expensive options for curbside collection of bulky items, in combination with other mitigation strategies; independently these actions would likely have a relatively small effect on demand at the station
  - Cities and the County would need to pass ordinances requiring that everybody pay for the service; potential issues include reduction in citizen choice and dissatisfaction, some properties are not easily served by curbside, and potential adverse impact on low-income residents
  - Establishing a system that would lower bulky waste collection cost; lower cost would make service more accessible to low- and middle-income households; cities and haulers would be primary parties responsible for implementation

At Bow Lake, the review identified that constraints related to the inbound and outbound scale capacity will exist in the future under all scenarios. These constraints were anticipated during station design, so the scale complex was designed to accommodate additional scales when they become necessary:

- Adding inbound and outbound scale capacity along with outbound queue improvements would mitigate constraints under all concepts
  - The capital cost of the improvements would be about \$2.9 million; the operational cost would be about \$270,000 annually
  - Permits would be needed for the capital improvements

In general, whether or not the Renton Transfer Station closes is not a significant factor in capacity constraints at other sites, although keeping it open would ease demand on the transfer system. However, customers of that station have expressed clearly that they value both the geographic location of the station and the service that it provides.

## Next steps

Based upon the data and the analysis the division has done to date, it appears that there are viable alternatives to building a new Northeast Recycling and Transfer Station even when the Houghton Transfer Station is closed (no later than 2023). These alternatives are not without impacts, however, and they require the support and potential policy actions from our City partners. The alternatives require a variety of other actions and decisions that must be taken in order to mitigate the impacts on other transfer stations.

During this recent study, several significant questions have been raised by County Council members, our City partners, other stakeholder, and staff about the future of our solid waste system. These questions highlight the importance of looking at the system as a whole, and not just the transfer stations, in order to address the future of the solid waste system.

1. How can the investment in the Cedar Hills Regional Landfill be maximized by increasing its capacity through design and operational strategies?
2. How can the region significantly increase its waste prevention and recycling rates to achieve our environmental goals and eliminate resources from being buried in a landfill?

3. How can we, King County, our City partners, and the private sector, provide excellent customer service at the curb and at the transfer stations consistent with our values to be good environmental stewards and neighbors?
4. What is the best approach to ensuring the revenues collected will cover the expenses of the solid waste system?

The following summarizes the next steps;

- Review this draft report with City partners and other stakeholders through briefings and advisory meeting discussions and reflect these discussions in the final report.
- Assess the potential impacts should Bellevue, Clyde Hill, Hunts Point, Medina, and Yarrow Point choose to extend their contract with King County to 2040, and reflect these findings in the final report.
- Transmit a final report to the County Council by June 30, 2015.
- Continue the Comprehensive Solid Waste Management Plan (Comp Plan) development process with City partners and other stakeholders to reflect the findings and recommendations of the final Transfer Plan Review report. A draft Comp Plan is expected to be ready for review in early 2017.

## Appendices

- A. [URS/Transpo Report](#)
  - B. [Online Customer Survey](#)
  - C. [Hauler Survey](#)
  - D. [Maps](#)
  - E. [Benchmark Information](#)
  - F. [Stakeholder Engagement](#)
  - G. [Supporting Documents](#)
  - H. [Load Origin – Urban Transfer Stations](#)
-