7 Solid Waste Transfer, Processing, Disposal, and Emergency Management

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Chapter 7 Solid Waste Transfer, Processing, Disposal, and Emergency Management

Overview

After collecting solid waste solid waste from commercial, residential, and self-haul customers, Seattle Public Utilities (SPU) manages the complex operations of or contracts with a network of facilities for the transfer, processing, and disposal of this waste. These post-collection services and operations represent the final steps in ensuring all City-collected waste—recoverable recyclables, compostable food and yard waste, landfilled materials, and hazardous materials—are handled properly and end up at their appropriate destination.

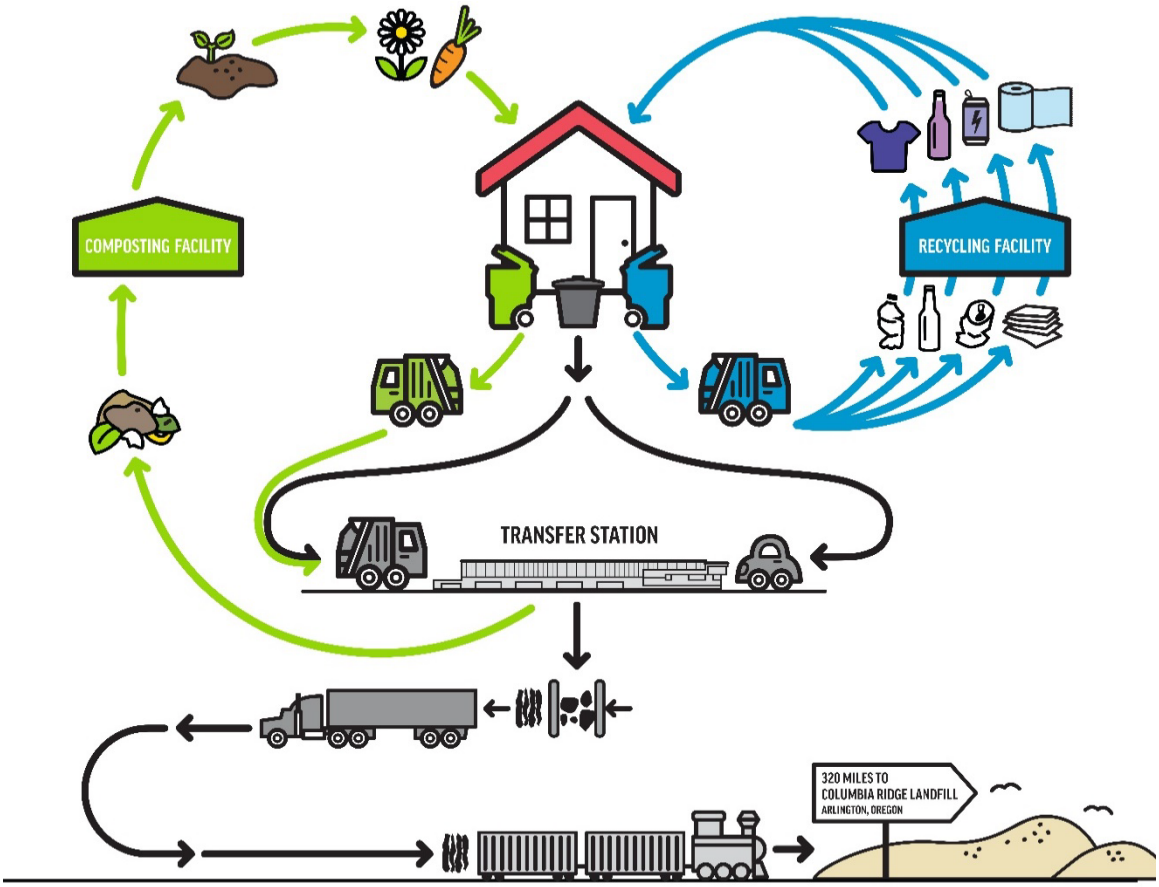
This chapter covers post-collection operations and facilities related to the **transfer, processing,** and **disposal** of Seattle's solid waste. It also describes Seattle's **emergency management** planning to ensure solid waste services continue even in times of crisis. Major components of solid waste handling operations discussed in this chapter include:

- **Transfer.** Seattle owns and operates two transfer stations, which consolidate collected solid waste before transporting materials to their next destination, such as to processors or a landfill.
- **Processing.** At this stage, recycling processors sort collected recyclables at the material recovery facility, and organics processors compost food and yard waste. Processors send materials to brokers and markets.
- **Disposal**. Materials collected as garbage and residual materials from processing that cannot be recycled or composted are disposed. Once garbage is consolidated at the transfer stations in shipping containers, those shipping containers are transported via trailer trucks to the rail head where they are loaded onto rail cars for transport to landfill. Although Seattle disposes garbage out of state, SPU maintains historic City-owned landfills that are inactive disposal sites.

- **Emergency management.** SPU has developed emergency management plans to continue to provide collection, transfer, and disposal of disaster debris and other waste in case natural disasters, civil disturbances, or other unexpected events occur that disrupt normal solid waste operations.

Figure 7.1 shows the solid waste system, including collection, from the perspective of residential customers.

Figure 7.1 Seattle Solid Waste System



Source: Seattle Public Utilities

A network of public and private service providers and facilities transfer, process, and landfill waste generated in Seattle. Table 7.1 lists the facilities in Seattle's solid waste system that handle residential, commercial, and self-haul waste. Facilities that handle construction and demolition (C&D) debris for salvage and reuse, source-separated recycling, mixed recycling, and transfer are listed in Chapter 8, *Construction and Demolition Debris*.

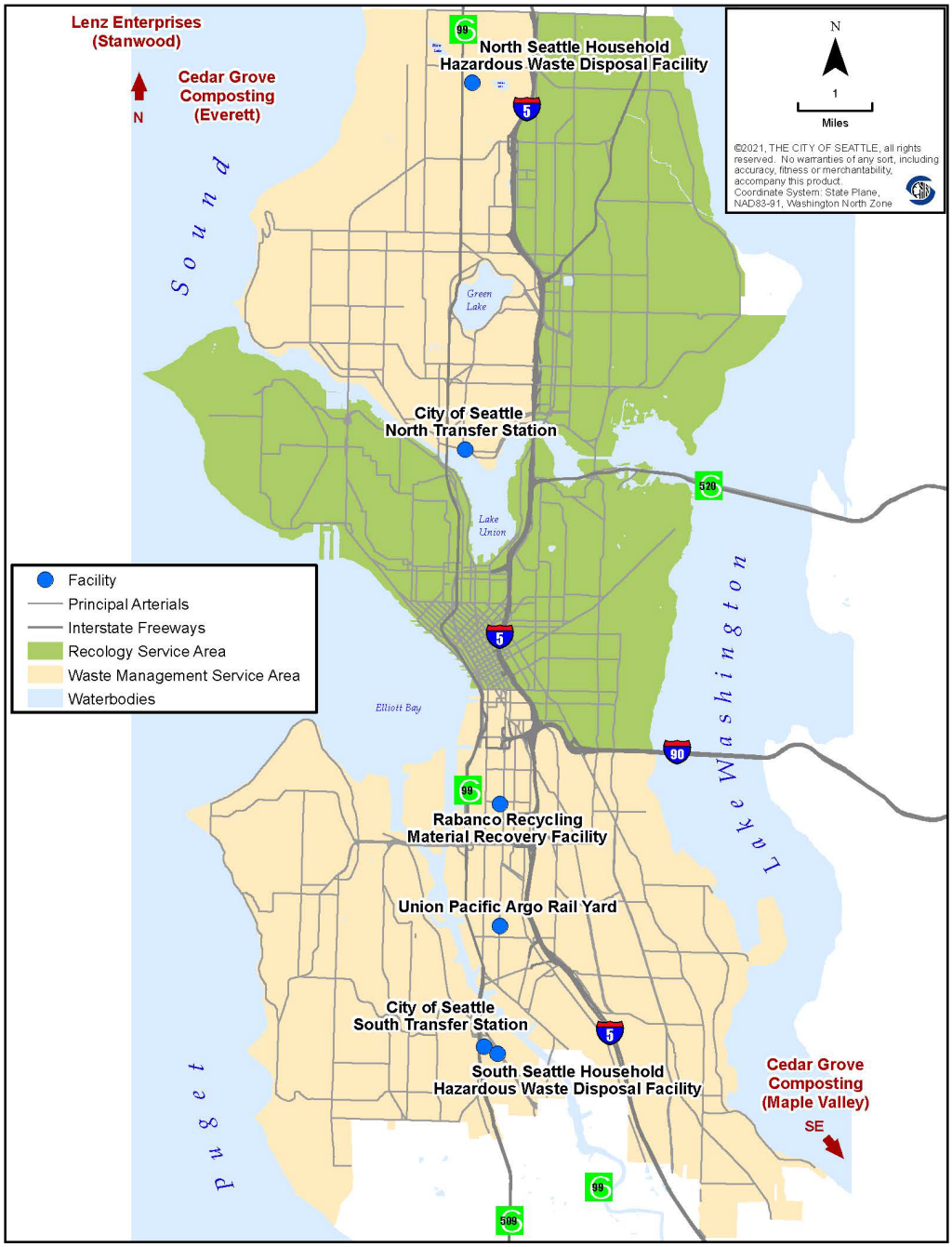
Table 7.1 Solid Waste Transfer, Processing, and Disposal Facilities Serving Seattle

OPERATOR	FACILITY/LOCATION	TYPE
City-Owned Permitted Facilities in Seattle		
SPU	North Transfer Station 1350 N 34th St	▪ City-contracted residential garbage and food and yard waste collection transfer ▪ City-contracted commercial garbage and food and yard collection transfer ▪ Self-haul garbage, yard and wood waste, recycling, and reuse
SPU	South Transfer Station 130 S Kenyon St	▪ City-contracted residential garbage and food and yard waste collection transfer ▪ City-contracted commercial garbage and food and yard waste collection transfer ▪ Self-haul garbage, yard and wood waste, and recycling
Privately-Owned Permitted Facilities in Seattle		
Recology	Materials Recovery Facility 4401 E Marginal Way S	▪ Recycling processing
Republic Services	Rabanco Recycling Material Recovery Facility 2733 3rd Ave S	▪ Recycling processing ▪ Intermodal transfer of C&D debris to long-haul disposal
Seadrunar	Seadrunar Recycling 28 S Brandon St	▪ Recycling processing
Waste Connections	Northwest Container Services Intermodal Facility 635 S Edmunds St	▪ Intermodal transfer of C&D debris to long-haul disposal
Waste Management, Inc.	Alaska Reload Facility 70 S Alaska St	▪ Contaminated soil transfer

OPERATOR	FACILITY/LOCATION	TYPE
Waste Management, Inc.	Eastmont Transfer Station 7201 W Marginal Way	▪ Some garbage transfer ▪ Some food and yard waste transfer ▪ C&D debris transfer
Waste Management, Inc.	Biomedical Waste Facility 149 SW Kenyon St	▪ Biomedical treatment
Union Pacific Railroad (used by Waste Management, Inc.)	Argo Rail Yard 402 S Dawson St	▪ Intermodal transfer of garbage and C&D debris to long-haul disposal
Privately-Owned Permitted Facilities Outside Seattle		
Cedar Grove	Cedar Grove Everett 3620 36th Pl NE Everett, WA Cedar Grove Maple Valley 7825 Cedar Grove Rd SE Maple Valley, WA	▪ Food and yard waste composting
Lenz Enterprises	Compost Facility 5210 WA-532 Stanwood, WA	▪ Food and yard waste composting
Waste Connections	Finley Buttes Landfill 73221 Bombing Range Rd Boardman, OR	▪ C&D landfill disposal
Waste Management, Inc.	Columbia Ridge Regional Landfill 18177 Cedar Springs Lane Arlington, OR	▪ Landfill disposal
Republic Services	Roosevelt Landfill 500 Roosevelt Grade Road Roosevelt, WA	▪ C&D landfill disposal

The locations of the key Seattle-owned or -contracted facilities appear in Figure 7.2. Other facilities important to regional jurisdictions or privately-operated recycling handlers in the local area are not shown.

Figure 7.2 Seattle Solid Waste Facilities



Source: Seattle Public Utilities.

North and South Transfer Stations

City-contracted collectors take the garbage and food and yard waste that they collect to one of two City-owned transfer stations. They take residential recyclables to a City-contracted processor, where materials are sorted, separated, and prepared for sale. Occasionally, garbage and yard waste are transferred at contracted transfer facilities.

The recycling and transfer facilities consolidate collected solid waste materials and prepare them for transport to their next destination. The recycling and transfer stations were originally built in the 1960s when the Seattle started landfilling its waste outside city limits at the Kent Highlands and Midway landfills. Before that time, waste was disposed of in landfills within the city limits without requiring transfer. By the early 1960s, landfill space within Seattle ran out, indicating the need for a large out-of-town landfill. Collection trucks could not travel that far efficiently, so Seattle began to use transfer stations to consolidate garbage into larger loads for transport to the landfill. Seattle's transfer stations also provide drop-off services for self-haul customers.

Seattle's transfer stations were renamed "recycling and disposal stations" in the 1990s, reflecting a new emphasis on their role in recycling in addition to transferring waste for disposal. At that time, their names changed to the North Recycling and Disposal Station (NRDS) and the South Recycling and Disposal Station (SRDS), but they have since been renamed to North Transfer Station (NTS) and South Transfer Station (STS). See Figure 7.2 on page 7.7 for the locations of Seattle's solid waste facilities.

The original facilities have both been replaced and renamed since the *2011 Solid Waste Plan Revision*. Seattle completed the first phase of the SRDS-to-STS replacement in 2013. The NRDS-to-NTS replacement was completed in 2016. These replacement projects increased the capacity and material handling ability of each facility and incorporated plans to minimize customer wait time, enhance control of noise and air emissions, and expand recovery by providing recycling and reuse areas separate from disposal areas.

To provide comparable services at both facilities, the *2011 Solid Waste Plan Revision* included a second phase work on the SRDS-to-STS replacement, which was known as the South Recycling Center. The South Recycling Center phase has been postponed to allow for a more holistic evaluation of needs and opportunities in South Seattle. The current scope of the project (now called South Transfer Station 2 or STS2) is limited to the remediation of the South Park Landfill required under a consent decree with the Department of Ecology, minimal operational improvements, and a path along 5th Avenue to mitigate the street vacation at STS.

The South Transfer Station (Source: SPU Image Library)

Distributing transfer station capacity between the north and south ends of Seattle improves collection efficiency and creates convenient access for self-haul customers. While the two-station system helps spread solid waste transfer activity across geographic areas, balancing neighborhood impacts, such as noise and increased traffic, and comparable levels of service between two facilities remains an ongoing planning issue.

Station Operations

Seattle's transfer stations have performed the same basic functions since they were first built: receive waste, consolidate them into loads, and send them to their next destination. SPU staff keep materials moving through to processing or disposal by performing the following jobs:

- **Scale operators** weigh vehicles as appropriate and collect payment from self-haul customers. To the extent possible, they also screen incoming loads for unacceptable materials and compliance with Washington State secured load laws (detailed below).
- **Floor staff** direct vehicles and keep operational areas clean and safe. They also watch for unacceptable materials.
- **Equipment operators** handle material movement on the floor and into compactors for loading.

- **Maintenance laborers** operate compactors to load solid waste into intermodal containers and prepare trailers for shipment.
- **Administrative employees** ensure personnel and other resources are allocated appropriately. They also generally ensure that other staff have what they need to safely do their jobs.

Seattle's transfer stations are open and available 362 days per year from 8 a.m. to 5:30 p.m. to self-haul and commercial customers. Transfer stations serve a wide variety of vehicles and customers, and they receive a variety of garbage, recyclables, and food and yard waste. All garbage and food and yard waste are loaded into containers during each workday and hauled to their next destination. Garbage is compacted and loaded into shipping containers. Food and yard waste are loaded into open-top trailers.

North Transfer Station entrance (Source: SPU Image Library)

In addition to consolidating waste from Seattle's contracted collectors (discussed in Chapter 6, *Solid Waste, Handling, Collection, and Removal*), transfer stations also accept materials unsuitable for curbside collection. Residents with large items or excess quantities of waste can bring these materials to the stations for recycling or disposal. The stations also serve businesses that choose to self-haul their waste and recyclable materials.

Self-haul accounts for a relatively small portion of the approximately 420,000 tons handled at the transfer stations each year. Collection trucks made up 16% of the trips to the transfer

stations and drop-off 75% of the tonnage due to their large vehicle size. Table 7.2 (contracted collectors) and Table 7.3 show the number of trips (single visits) and tons of material transferred through NTS and STS.

Table 7.2 Transfer Services for Garbage and Food and Yard Waste from City-Contracted Collectors at NTS and STS in 2020

	NTS		STS		TOTAL	
Waste Type	Trips	Tons	Trips	Tons	Trips	Tons
Garbage	8,044	47,623	31,734	166,454	39,778	214,077
Food and yard waste	1,990	14,604	11,831	86,873	13,821	101,477
Totals	**10,034**	**62,227**	**43,565**	**253,327**	**53,599**	**315,554**

Table 7.3 Self-Haul Service Provided by NTS and STS in 2020

SELF-HAUL	NTS		STS		TOTAL	
Waste Type	Trips	Tons	Trips	Tons	Trips	Tons
Garbage	105,739	37,198	120,890	57,900	226,629	95,098
Yard waste	10,042	2,060	16,968	4,691	27,010	6,751
Wood waste	633	201	671	405	1,304	606
Other recycling	4,057	1441	13,837	1015	17,894	2,456
Totals	**120,471**	**40,900**	**152,366**	**64,011**	**272,837**	**104,911**

One of the primary challenges at the transfer stations is managing the number of self-haul customers. Individual self-haul trips require more staff resources per trip for scale transactions and assistance on the tipping floor, and these customers take longer to unload than commercial trucks. Although handling a high volume of customers with small loads is relatively costly, providing convenient self-haul services for residents and commercial customers is an important SPU objective.

One challenge to optimizing transfer station operations is gathering data on (1) who is using transfer stations, (2) why they use the transfer stations, and (3) what they need from these facilities to better serve them. Lack of customer data limits SPU's ability to evaluate both the equity of services provided to customers across Seattle and the quality of service overall. Transfer station operations are informed by waste characterization study data (see Chapter 3, *Seattle Waste Data and Trends,* for more information), but these types of studies provide limited insight into behavior and attitudes around transfer station use.

Prohibited Materials

To keep unacceptable wastes out of the garbage and recycling streams, Seattle's transfer station employees monitor loads for prohibited wastes. These include wastes that are "hazardous," "dangerous," or otherwise require special handling for safe and efficient disposal. Signage at the scale houses and throughout the stations informs customers of prohibited wastes. Workers monitor all loads and deny access to vehicles carrying prohibited wastes. If a prohibited material does enter the facility, employees ensure the material is appropriately managed. Seattle's transfer stations collect many of these waste that are prohibited from disposal, such as used oil, lead-acid batteries, tires, and large metal appliances, for recycling. Materials accepted and prohibited at City-owned transfer stations are listed in Chapter 6, *Solid Waste Handling Collection and Removal*. The process for designating materials for recycling is described in Chapter 5, *Recycling and Composting Policy and Markets*.

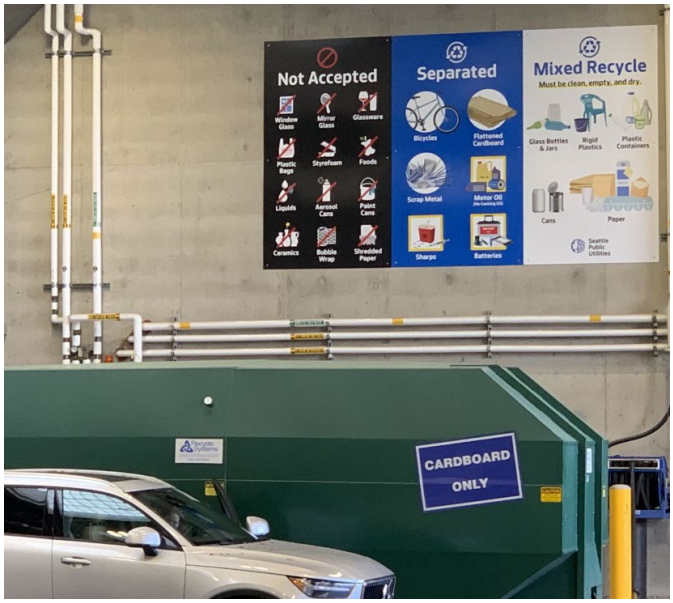
Secure Load Requirement

SPU also enforces secure load requirements at the transfer stations. Roughly 40% of the litter on Washington State highways comes from unsecured loads or from vehicle loads that are not tied, covered, or properly confined.[1] In addition to creating litter issues, road debris causes about 400 accidents on Washington State highways every year. To reduce litter and road debris, State and City laws require vehicle operators to secure loads to prevent spillage while the vehicle is moving (Revised Code of Washington § 46.61.655 and Seattle Municipal Code 21.36.450).[2][3] All SPU and private transfer stations charge vehicle operators an additional fee for unsecured loads.

[1] Washington Department of Ecology, "Litter Laws," Accessed August 25, 2019, https://ecology.wa.gov/Waste-Toxics/Solid-waste-litter/Litter/Litter-laws
[2] https://app.leg.wa.gov/rcw/default.aspx?cite=46.61.655
[3] https://library.municode.com/wa/seattle/codes/municipal_code/226077?nodeId=TIT21UT_SUBTITLE_IIISOWA_CH21.36SOWACO

Transfer Operations

All materials received by Seattle's two transfer stations are loaded into transfer containers and hauled to their next destination. SPU owns and operates a fleet of trucks and trailers to haul



Compactor and signage at the North Transfer Station (Source: SPU Image Library)

materials away from its two transfer stations. SPU loads garbage into sealed 40-foot intermodal containers (owned by Waste Management, Inc.) and transports them by truck to the Union Pacific Argo Rail Yard. From there, full containers are placed on a train and an empty container is returned to the transfer station. SPU transports food and yard waste and compostable materials by truck to contracted processors (Cedar Grove and Lenz Enterprises, as of 2021). Other materials are also transported by truck to recycling facilities in the local area.

Station and Transfer Performance

SPU regularly monitors the performance of transfer stations operations, including compliance with applicable health and safety regulations. SPU tracks the following information to keep transfer station operations running efficiently and safely:

- **Customer turnaround time.** Turnaround time measures the number of minutes elapsed from the time collection trucks cross the inbound scales to the time they cross the outbound scales. To keep the flow of traffic in and out of the transfer stations moving efficiently, SPU has a goal to keep the turnaround time per vehicle at or below 15 minutes.
- **Removing all waste from facilities each day.** Waste sitting in tipping areas overnight can release odors into surrounding neighborhoods, especially in summer. SPU strives to empty the tipping areas at the end of each day, at least 90% of the time.
- **Satisfactory inspections by public health inspectors.** As the regulatory agency for solid waste handling facilities, Public Health—Seattle & King County regularly inspects City-owned transfer stations. SPU strives for 100% satisfactory ratings 100% of the time.

As discussed in the recommendations in Chapter 2, *Maximizing and Measuring Impact: Moving Upstream Beyond the Recycling Rate*, SPU may also consider additional metrics and performance measures in support of key goal areas of operational excellence, safety, cost-effectiveness, and environmental impact, such as those related to:

- Industry-standard safety metrics for workers and the public
- Environmental and neighborhood impacts of transfer station activity
- Equitable access to and use of transfer station services

Recycling and Compost Processing

After collection and transfer, recoverable materials are processed as the first step to becoming new products. In this chapter, processing refers to sorting recyclables at a material recovery facility (commonly called a "MRF") into individual material types and composting yard and food waste into a soil amendment. After materials are processed, they go to private enterprises for additional processing or to commodity markets. Seattle contracts with three processors for materials collected by the City's contracted collectors from primarily residential customers:

1. Rabanco Recycling Material Recovery Facility in Seattle, Washington processes all recyclables collected through Seattle's collection contracts
2. Lenz Enterprises in Stanwood, Washington processes about 70% of food and yard waste collected through Seattle's collection contracts
3. Cedar Grove in Everett, Washington processes about 30% of food and yard waste collected through Seattle's collection contracts

This section details what happens to recyclable and compostable materials after they are collected from customers across the city. For now, SPU plans to continue its current processing approach. SPU regularly reviews customer rates and researches new methods, technologies, reporting requirements, or other elements that could improve processing in the future.

Recyclables Collected by City-Contracted Collectors

Seattle currently contracts with Republic Services to sort and bale recyclables collected under City collection contracts representing all residential recycling and a small amount of commercial recycling at the Rabanco Recycling Material Recovery Facility. The current contract began June 29, 2015, and is guaranteed through March 2024. Seattle has the option of extending the

contract to 2027.[4] SPU will review future processing alternatives before those deadlines, with enough time to pursue the chosen contracting approach.

The contractor is responsible for processing and marketing all recyclables collected under City contracts with provisions related to:

- Hours open to City-contracted collection trucks
- Collection truck in-and-out (turnaround) time
- Capacity to receive, process, and store a week's worth of materials for one week
- Limits on residuals, which is garbage that remains after recyclables are sorted
- Transportation of material to markets
- Reporting requirements
- Recycling market risk sharing
- Backup recycling facility in the event of a temporary shut down
- Conditions for employees, such as permanent jobs, living wages, benefits

More than 40 people work at the 80,000-square-foot material recovery facility. Seattle's processing contract requires prevailing and living wages and benefits for all staff and positions supporting Seattle's contracted services. This means that processing and disposal contractors must ensure that all recycling sort staff are full-time employees with living wages and full benefits. All new contract procurement efforts include a review of worker wages and benefits.

Seattle's recycling processing contract with Republic Services also has performance standards and penalties for non-performance. SPU monitors Republic Services' reporting for accuracy, assesses penalties as needed, and maintains open communication with contractors to identify problems early and work out solutions. At the same time, the current contracts lack reporting requirements for key information that could support responsible recycling: contamination rates in recycling delivered to Republic Services, quality of outgoing bales of recyclable materials, and final-end markets (past the first material broker) for baled recyclables from Seattle.

The recycling collected by Seattle's contractors becomes their property upon collection. Recyclables generated by Seattle customers then become the processor's property when the collectors deliver it to the City-contracted processing facility. SPU pays its contracted recycling processor monthly, at a set price per ton, to process the materials. The actual amount paid to the processor each month depends on tonnage volume and commodities prices for the processed materials. The contract sets a base price for the various commodities, and SPU bears 100% of the risk (positive or negative) of market price changes for recyclables. If market prices

[4] https://www.seattle.gov/Documents/Departments/SPU/Documents/SPUAWRecyclingProcessingContract.pdf

are higher, SPU receives a "credit" (savings) on the processing bill. If market prices are lower, the processing bill increases (an extra cost paid to the processor).

Recology collection truck delivering recyclables to the Recology Materials Recovery Facility (Source: Pat Kaufman)

Seattle's processing contract does not allow the processor to dispose of recyclable materials without SPU's explicit permission. Even during the 2008 recession when commodities prices dipped significantly, all of Seattle's recyclable materials went to market, meaning none were landfilled. Seattle's recyclables also continued to go to market after China restricted imports of mixed plastics (resin numbers 3-7) and mixed paper starting at the end of 2018. Other jurisdictions in the region were not as well-positioned as Seattle to weather the impacts of China National Sword, with some cities temporarily authorizing landfill disposal of mixed paper that could not be placed on the market. Seattle continues to benefit from its access to both domestic and foreign markets, but the reduced tolerance of commodity markets for contamination poses challenges.

Seattle's capacity for processing recyclables is currently adequate, although growth in population and diversion programs may exceed capacity in the future. Local recycling capacity expanded in Seattle in 2014 when Recology built a material recovery facility south of downtown Seattle. Recology's facility processes some privately collected commercial recyclables from Seattle.

Privately Collected Recyclables

Most commercial customers contract with third-party or private haulers for recycling collection and processing. Per state and federal law, businesses and non-profits have multiple options for collection of their recycling and composting. They can choose whether to use Seattle's contracted commercial collectors or any third-party private hauler.

Private haulers collect both mixed and source-separated materials and deliver them to a variety of processors. Depending on the quantity and type of materials recycled, commercial customers may receive revenue, have free collection, or pay a fee for recycling. Recycling usually costs less than disposal.

Privately collected recyclables may include the materials accepted in SPU's recycling collection program as well as additional materials. To monitor open market commercial recycling, Seattle has required private recyclers to report annually on materials collected, material sources, and delivery destinations since 1997. Tracking weight-based recycling rates for the commercial sector provides one indicator of how well the private market is serving commercial waste generators.

The annual reporting and licensing requirement (Seattle Municipal Code 6.250.080) for private commercial and C&D recycling and reuse haulers requires these companies to report on all materials collected, processed, or hauled for recycling in Seattle.[5][6] SPU uses the data from the reports to calculate the recycling rates for commercial and C&D sectors. Calculating the recycling rates for these sectors based on recyclers' annual reports is complex because one material could be handled by several different companies between the generator and the final destination. To ensure it has reliable data for the annual *Waste Prevention & Recycling Report*, SPU spends a significant amount of time identifying and removing the resultant "double counting."

[5] See Annual Recycling and Reuse Report and Recycler License for additional details.
[6] https://library.municode.com/wa/seattle/codes/municipal_code?nodeId=TIT6BURE_SUBTITLE_IVNELICO_CH6.250COPRREMA

Food and Yard Waste Composting

The City contracts for processing of food scraps and yard debris with Lenz Enterprises in Stanwood and Cedar Grove Composting, Inc., in Everett and Maple Valley.[7] With its processors located nearby in Western Washington, Seattle is compliant with the state's apple maggot quarantine (see Appendix I, *Washington State Department of Agriculture Compliance Letter*).[8]

Current organics processing under these contracts includes yard waste, food scraps, compostable paper, and other approved food packaging. The City's food and yard waste processing contracts require companies to process material delivered by Seattle's contracted collectors into a marketable product, such as soil amendments. Except for contaminants such as plastic bags, processors are prohibited from disposing material at a landfill or incinerator. Unlike with recyclables processing contracts, the organic contractors bear all responsibility, costs, profit (or loss), and risk for marketing end products. Other contract provisions relate to:

- Compliance with all applicable ordinances, zoning, and regulations (health and air)
- Hours open to City trucks and City collection contract trucks
- Handling and disposal of contaminated waste
- Pilot tests of new processing methods or services
- Education and informational materials on food waste for commercial customers
- Reporting
- Primary processing facilities and back-up facilities in the event of a temporary shutdown

As with the recycling processing contract, SPU's contracts for compost processing have performance standards and penalties for non-performance. SPU monitors the performance of food and yard waste processors by regularly reviewing contractor reports for accuracy and maintaining open communication with contractors and local regulators to identify problems early and create solutions.

Once delivered to the processing facilities, grinders shred the material and conveyors move it to areas specifically built for aerating the material in the first stage of composting. Blowers control air flow and manage odors while naturally occurring microbes break down the material. At later stages in the process, the material finishes composting in piles in a different area of the facility. At the end, the material is screened, tested, and blended into a mix for bags or bulk use.

[7] http://www.seattle.gov/utilities/about/contracts

[8] In its review of the preliminary draft of the *2022 Plan Update*, the Washington State Department of Agriculture did not find any conflicting compliance issues related to the state's apple maggot quarantine (Washington Administrative Code, Chapter 16-470).

Current contracted processors have been able to receive and process the quantity of material outlined in their contracts with Seattle. For the longer term, regional stakeholders recognize that the regional and local capacity for processing food and yard waste will need to expand to handle increased recovery. SPU will monitor processing capacity and market development activities.

Long-Haul and Disposal of Garbage

By law, the City of Seattle has authority to decide where and how to manage all of Seattle's solid waste that is not recycled or composted. This legal authority is commonly called "flow control." Seattle has arranged for and committed to transporting disposed waste via train to landfill for burial. Seattle contracts with Waste Management of Washington (Waste Management, Inc.) to haul garbage by rail and dispose of it at Columbia Ridge Landfill in Gilliam County, Oregon, an arid region east of the Cascade Mountains.[9]

Seattle has had a contract for rail haul and disposal with Waste Management, Inc. since the Columbia Ridge Landfill opened. The City most recently amended the contract for the fourth time in 2017. The current contract expires in 2028 and includes a City opt-out option in 2024. The long-haul rail and disposal contract has clear performance standards and penalties for non-performance and contains provisions related to:

- A partnership incentive for transporting waste from other local jurisdictions on the same train as SPU waste
- Open hours for the rail yard hours to receive full containers
- Container storage capacity (two days)
- Truck turn-around time
- Container data and reporting (number of containers available, storage availability, location, and transfer station of origin)
- Truck scales and intermodal lift trucks
- Unacceptable containers (leaky, containing prohibited waste)
- Backup receiving facility (intermodal rail yard), which is Terminal 18 at the Port of Seattle on Harbor Island, Seattle
- Alternate rail lines
- Locomotives and double-stack rail cars
- Landfill design and operations that meets Washington and Oregon standards
- A screening program at the landfill for unacceptable wastes

[9] http://www.seattle.gov/utilities/about/contracts

- Incremental landfill closure and post-closure care
- Management plan for wastes that require special handling, including asbestos, construction and demolition debris, and contaminated soils

Columbia Ridge Landfill (Source: Waste Management)

Once the City compacts material collected as garbage at the North and South Transfer Stations into shipping containers, it is then hauled to and loaded onto trains stationed at the Argo Rail Yard in the industrial area south of downtown Seattle. Trains leave Argo Rail Yard six times a week, stacked two-containers high. Trains hauling Seattle's waste unload the containers at an intermodal rail siding on the landfill site, and tractors haul the containers to the active landfill area to be emptied.

Columbia Ridge Landfill has a gas-to-electricity system that produces 12.8 MW of electricity—enough to power 12,500 homes—from captured landfill gas.[10] Seattle has the right to purchase

[10] Waste Management, Inc., "Columbia Ridge Landfill & Green Energy Plant," Accessed October 2021, http://wmnorthwest.com/landfill/pdf/columbiaridge.pdf.

energy produced by this system. The landfill site began operating in 1990 and is permitted and regulated by the Oregon Department of Environmental Quality.

Seattle's capacity for transport and disposal of garbage is adequate. The Columbia Ridge Landfill projects that it will be able to receive material beyond the current contract's guaranteed 2028 end date. As of this writing, the landfill has approximately 143 years of permitted capacity left: it receives about 2.7 million tons of waste per year and had approximately 329 million tons of remaining permitted air space.[11] Municipal solid waste landfills in Washington State also have remaining permitted capacity for disposal, if Seattle needs to use an alternative location. As of 2015, Ecology estimated that the 14 municipal solid waste landfills operating at that time had about 60 years of capacity remaining.[12] Rail haul capacity to transport material to the Columbia Ridge Landfill has not been an issue to date. The contract provides for alternative transportation if rail lines become temporarily unavailable.

Managing Historic Landfills

Until the 1960s, the City of Seattle disposed of its solid waste at various landfills within city limits (see Figure 7.3). Between 1966 and 1986, Seattle operated two major landfills south of Seattle: Midway and Kent Highlands. The Midway Landfill accepted garbage until October of 1983, and Kent Highlands Landfill accepted garbage through 1986.

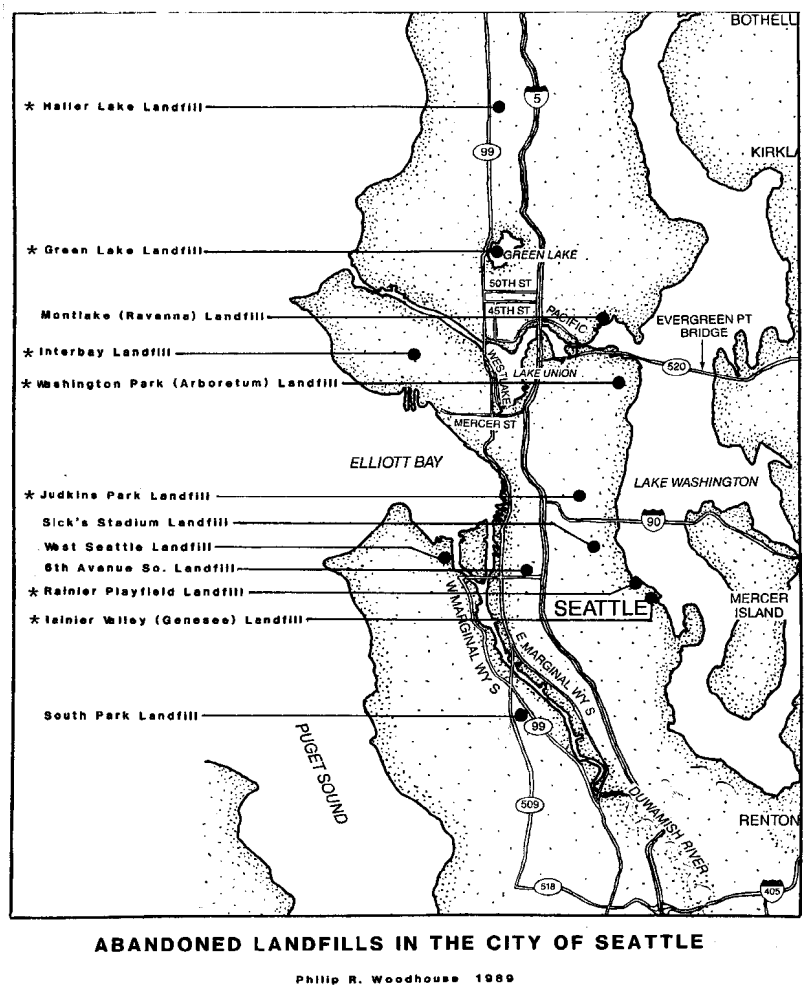
Between 1986 and 1991, Seattle took its solid waste for disposal to King County's Cedar Hills Landfill. Since 1991, Seattle has shipped its solid waste by rail to Oregon's Columbia Ridge Landfill.

Once they stopped accepting waste, the Midway and Kent Highlands landfills went through the process of environmental closure. During the 1980s, Midway and Kent Highlands landfills were designated as Superfund sites by the EPA, with cleanup supervised by Ecology. A superfund site is land that has been contaminated by hazardous waste and is a candidate for cleanup because it poses a risk to human health and/or the environment. Seattle completed cleanup through legally binding agreements with Ecology at Midway in 1991 and at Kent Highlands in 1995. SPU continues to monitor these landfills per agreements with Ecology. In 2015, SPU sold surplus property adjacent to the Kent Highlands Landfill to a private developer.

[11] Waste Management, Inc., "Columbia Ridge Landfill & Green Energy Plant," Accessed October 2021, (https://www.wmnorthwest.com/landfill/columbiaridge.htm.
[12] Washington State Department of Ecology, "Solid Waste in Washington State – 24th Annual Status Report," 2017, https://fortress.wa.gov/ecy/publications/documents/1707007.pdf.

In addition to Midway and Kent Highlands, Seattle has 12 other historic landfills. An assessment in 1984 by Public Health—Seattle & King County concluded that no further action was needed at five of the historic landfills (Green Lake, Judkins Park, the Arboretum, Rainier Playfield, and Sick's Stadium). Actions recommended for seven other sites (Interbay, Genessee, Montlake, Haller Lake, West Seattle, South Park, and 6th Avenue South) have been implemented or are underway. In 2019, SPU signed a consent decree that details the cleanup elements required for the South Park Landfill.

Figure 7.3 Historic Landfill Sites in Seattle



Source: City of Seattle Archives

Monitoring Historic Landfills

Ecology formally tracks the performance of landfill closure programs for Midway, Kent Highlands, and the South Park landfills on a five-year review cycle. SPU conducts ongoing monitoring of these landfills related to:

- Compliance with landfill gas requirements, tracked quarterly at all three landfills
- Groundwater quality testing around the perimeter of each landfill

SPU staff monitor the Kent Highlands and Midway historic landfill sites and facilities in accordance with regulatory requirements and to the satisfaction of adjacent communities. Monitoring requirements include:

- Inspect the gas extraction and flare system to ensure proper operation cover and perimeter security are intact and perform general maintenance as needed
- Perform surface water quality testing
- Conduct groundwater sampling and reporting to ensure the test wells are functioning properly
- Ensure leachate discharge to the sanitary sewer meets permit limitations
- Perform pump maintenance for groundwater, surface water, and leachate

SPU staff conduct gas monitoring at Midway Landfill, 2015 (Source: Jeff Neuner)

At the Interbay and Genessee historic landfills, SPU crews operate and maintain gas control systems and monitor and evaluate methane levels along site perimeters. Public Health—Seattle & King County monitors performance at the other historic Seattle landfills. SPU responds to problems at historic in-city landfills on a case-by-case basis.

Consistent with the *2011 Solid Waste Plan Revision*, Seattle's *2022 Solid Waste Plan Update* contains no proposal to locate solid waste disposal facilities in Seattle and, therefore, also does not present an analysis of potential sites that would otherwise be required by law.

South Park Landfill Cleanup

Work is underway to clean up the South Park Landfill, where Seattle is a potentially liable party—meaning the City is a party that potentially contributed to contamination at a Superfund site. Seattle and potentially liable parties recently completed a nine-year formal process to characterize the South Park Landfill (site of the old Seattle South Transfer Station) under an agreed order with Ecology. The landfill is a formal cleanup site under Ecology's Model Toxic Controls Act program. Completed documents include the *South Park Landfill Remedial Investigation/Feasibility Study and Cleanup Action Plan*.[13] In 2019, a consent decree was filed that governs the cleanup of the South Park Landfill. The cleanup of the City-owned portion of the landfill (11 acres) is part of the South Transfer Station 2 (STS2) project. Final cleanup requirements adopted within the 2019 consent decree include the following:[14]

- Constructing a landfill cap to prevent (1) human contact with the landfill and (2) rain and stormwater from reaching landfill waste
- Installing landfill gas and surface water control systems
- Restricting future land use activities to (1) minimize potential exposure to contamination and (2) maintain effectiveness of cleanup actions
- Establishing groundwater and landfill gas monitoring

Midway Landfill Redevelopment

Several new efforts are underway to use the Midway Landfill site for transportation projects. The Washington State Department of Transportation (WSDOT) will add two lanes to U.S. Interstate 5 (I-5) that has required removing waste and modifying the landfill cover. Sound Transit is constructing the Link light rail extension to Federal Way that crosses the Midway Landfill near I-5, which may require removing additional waste for an elevated light rail track. Waste removal, backfilling, and replacing the landfill capping liner began in July 2020 and was completed in 2021. Some additional work continues in 2022.

[13] Washington State Department of Ecology, "Document Repository for South Park Landfill," Accessed August 25, 2019, https://apps.ecology.wa.gov/gsp/CleanupSiteDocuments.aspx?csid=1324.
[14] Washington State Department of Ecology, "South Park Landfill," Accessed August 25, 2019, https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=1324.

Midway Landfill waste removal project, which will restore remedial action components and provide space to add two lanes to Interstate 5 and build the Federal Way Link Light Rail Guideway (Source: Jeff Neuner and Kiewit Corporation)

Recommendation

SPU makes one recommendation regarding the management of the City's historic landfills.

Rec 27. Continue to explore opportunities for adaptive reuse of historic landfills, including opportunities to control costs at closed landfills and to bring the land into productive use

SPU will continue to manage closed landfills properly and explore opportunities for adaptive reuse of historic landfills. Examples include:

- Properly closing the City-owned portion of the South Park Landfill under the requirements in the *South Park Landfill Consent Decree* and redeveloping the site
- Expanding efforts on secondary uses of the Midway Landfill, including potential siting of the Sound Transit Operations and Maintenance Facility South at Midway
- Evaluating opportunities for property sales and site development at Midway and Kent Highlands historic landfills
- Completing additional studies and evaluations as directed by Ecology at Kent Highlands, Midway, and South Park historic landfills

The ongoing work and exploration of adaptive, secondary beneficial uses for closed landfills is funded and underway for the duration of the current planning period.

The next section describes how Seattle prepares for emergencies that could disrupt its complex system for managing solid waste.

Emergency Management

As a center of manufacturing, technology, trade, and tourism in the Pacific Rim, Seattle is vulnerable to both natural and human-caused hazards. The city's geography, built environment, and population put it at risk for catastrophic events including earthquakes, pandemics, and terrorism. Because of these hazards, Seattle maintains a well-developed, integrated emergency management system that considers all hazards in a central planning structure. The following all-hazards emergency response plans are relevant to Seattle's solid waste system:

- *Emergency Operations Plan* (SPU)
- *Continuity of Operations Plan* (SPU)
- *Disaster Debris Management Plan* (City of Seattle)

SPU's Solid Waste Utility also responds to incidents and events that do not require activating emergency response plans but do require a special response, such as:

- Parades, marches, or demonstrations that require special collection of dumpsters and carts (in coordination with the City Emergency Operations Center and Seattle Police Department)
- Severe weather that affects City-managed collection and transfer station schedules, like ice and snow or extreme heat
- Fires and hazardous releases in transfer stations and household hazardous waste sites

SPU Emergency Operations and Continuity of Operations Plans

The *Emergency Operations Plan* (EOP) and *Continuity of Operations Plan* (COOP) complement each other to ensure SPU can provide essential functions and services during and after emergencies. The EOP describes how SPU will respond to emergencies and restore infrastructure and systems, while the COOP describes how SPU will continue essential functions under a broad range of circumstances.

- **EOP**: Completed in 2019, the EOP contains information on how SPU will respond to potential events, crises, or disasters that could involve SPU staff, facilities, or operations.
- **COOP:** Revised in 2018, the COOP describes how critical functions, including solid waste, will be maintained in a significant emergency. The COOP outlines steps to maintain SPU's critical services, restore them to pre-established recovery time objectives, and sustain them for up to 30 days. The COOP also provides for continuity of management and decision-making if

senior and technical personnel are unavailable. SPU used the COOP in 2020 to develop the response to the COVID-19 pandemic.

City of Seattle Disaster Debris Management Plan

Last updated in 2018, the City of Seattle's *Disaster Debris Management Plan* sets guidelines for debris removal and processing after a debris-generating disaster. SPU recognizes the importance of maintaining public health and safety by planning for efficient removal of debris caused by disasters. The plan describes the City's responsibilities, procedures, and resources available after an emergency or disaster that over-taxes the normal solid waste system. The plan is designed to eliminate threats to life, public health, and safety and to ensure social and economic recovery of the affected community. The *Disaster Debris Management Plan* ensures that SPU and Seattle can:

- Address debris generated from residential or public properties in a timely manner after a debris-generating event
- Institute a plan to address debris generated on commercial and private property after a significant debris-generating event
- Ensure that vegetative debris, recyclable debris, and prohibited materials are diverted from landfilling after a debris-generating event
- Maintain clear and concise documentation of activities eligible for Federal Emergency Management Agency (FEMA) reimbursement under the Public Assistance Grant Program during response and recovery phases

SPU renewed standby contracts in 2020 for disaster debris management consultants and debris collectors. The following sections provide more detail about the disaster plan, including solid waste collection, impacts on facilities, and recycling.

Scope of Disaster Debris Management Plan

When activating the *Disaster Debris Management Plan*, SPU will follow two key sections: (1) Concept of Operations, and (2) Recovery. The Concept of Operations section lays out the planning and assumptions that would guide debris removal for specific disasters. After Seattle meets life safety needs, removal efforts would then occur in the recovery phase of an emergency. Two contracts support the *Disaster Debris Management Plan*: one for disaster debris collection and disposal, and one for debris monitoring and collection of FEMA records.

Solid Waste Collection and Emergencies

While increased volumes of solid waste may occur after a disaster, SPU will handle that waste through its existing contractors and steps outlined in the COOP. As a result, the *Disaster Debris Management Plan* does not separately plan for solid waste collection.

Current contracts for residential, commercial, and self-haul waste collection, transfer, and disposal require minimum levels of services despite unplanned events. For example, when Union Pacific Railroad shut down its rail lines, Waste Management, Inc. trucked solid waste containers to Seattle. Although solid waste services may stop during the initial response phase of a major disaster, SPU may also be able to provide these services, potentially at a reduced level, during the later extended response and recovery phases. SPU will use all available solid waste handling resources to provide the maximum achievable level of solid waste service during the recovery phase of a major disaster. During lower impact events, such as a severe windstorm, SPU may use normal solid waste resources to handle additional materials such as vegetative debris during the recovery period.

Local Solid Waste Facilities Capacity Impacts

Waste management activities also occur in the city outside of Seattle's collection contracts. These activities include private food and yard waste and recycling collection in the commercial sector, C&D collection and transfer, and recycling processing. Such activities are outside the scope of the *Disaster Debris Management Plan*. These materials are, however, transferred or recycled at local transfer and composting facilities. The capacity at these facilities is limited. If a disaster generates additional material through these private systems, SPU's ability to use the facilities may be impaired. Therefore, Seattle will rely on temporary debris storage and reduction sites to stage, reduce, and haul away debris.

Debris Diversion and Recycling

A secondary goal of the *Disaster Debris Management Plan* is to evaluate and maximize material recycling or diversion for beneficial use. Recycling facility options for recoverable disaster debris include Cedar Grove Composting, Lenz Enterprises, Renton Concrete, and Seattle Iron and Metal.