Regional Transfer Capacity Analysis

April 2004

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INTRODUCTION

Transfer stations located within the region are a critical component of Metro's disposal system because all the solid waste landfills serving the Metro region are located outside Metro's boundaries. The landfill that provides the majority of the region's disposal need is located 150 miles to the east. Transfer stations allow commercial haulers and the public to deliver their waste to a facility within the region for reloading and cost effective transportation to distant disposal sites.

This analysis is intended to address the question of how much capacity the region's solid waste facilities have to accept and load waste for transport to disposal sites serving the region. The focus of the study is on the estimated capacity to transfer "wet" or putrescible waste. Therefore, analysis is limited to those facilities that are permitted to accept wet waste. The study is based on the current level of development of each facility, including fixed equipment. The analysis also includes an estimate of the future need for solid waste transfer capacity, based on Metro's solid waste tonnage forecasts.

Key Findings:

- The current capacity of the six transfer facilities authorized by Metro to accept wet waste from the region is estimated to be 2.06 million tons per year.

- These six facilities received approximately 963,000 tons of wet and dry solid waste during 2003.

- The region's transfer capacity for wet waste currently exceeds the needed capacity by approximately 1.1 million tons per year.

- By 2015, deliveries of solid waste to the facilities in the region are expected to increase to about 1.56 million tons per year. Transfer stations serving the region are expected to handle 1.22 million tons of waste and will still have 841,000 tons of unused capacity.

- Future policy decisions could change the region's wet waste transfer capacity. For example, a requirement that all dry waste be processed prior to disposal could reduce wet waste transfer capacity by utilizing a significant portion of the wet waste capacity.

THE METRO REGION SOLID WASTE SYSTEM

Metro estimates that the total of wet and dry solid waste generated within the Metro district and ultimately disposed is approximately 1.2 million tons per year[1]. The solid waste system in the region that collects this waste is composed of many interdependent parts - collection, recycling and processing, transfer, transport and disposal, as well as many waste reduction activities. The subject of this report - what capacity do solid waste facilities have to transfer the putrescible or "wet" part of the waste stream to landfills - is best understood as part of this overall system.

Within our region, private haulers provide solid waste collection services for businesses and households. Individuals and businesses are generally allowed to haul their own waste if they choose. Individuals and businesses "self-haul" approximately 10% of the total tonnage delivered to facilities. With the significant exception of the City of Portland's commercial sector, local governments franchise the collection territories and set the rates for both residential and commercial solid waste haulers. Regardless of the method of collection, waste can be transported directly to a disposal facility or sent through intermediate steps such as processing and transfer facilities.

***Waste Flow*:** Seventy eight percent or about 963,000 tons of wet and dry solid waste from the region, destined for disposal, is delivered to the six transfer stations located within the Metro district. Wet waste received at these transfer stations is loaded or compacted for long distance transport to any of a number of out-of-district landfills. The non-putrescible or "dry waste" received at these facilities is generally processed to recover materials and the residual is shipped to an out-of-district landfill.

Three of these transfer facilities are intended to serve the region: Metro Central, Metro South, and Forest Grove. These regional transfer stations are authorized by Metro to accept unlimited amounts of wet and dry waste.

The three other transfer facilities are franchised to serve local areas: Pride Recycling, Willamette Resources and Recycle America. These local transfer stations are authorized by Metro to accept limited amounts of wet waste.

Most of the remaining 270,000 tons of solid waste from the region is dry waste that is delivered to processing facilities or limited purpose landfills. Finally, a small volume of wet waste is taken to facilities located outside the Metro boundary under non-system licenses.

Five processing facilities in the region, Aloha Garbage, East County Recycling, Wastech, Inc., Rivergate and KB Recycling, have been licensed by Metro for the recovery of recyclable or otherwise reusable material from mixed-dry waste.

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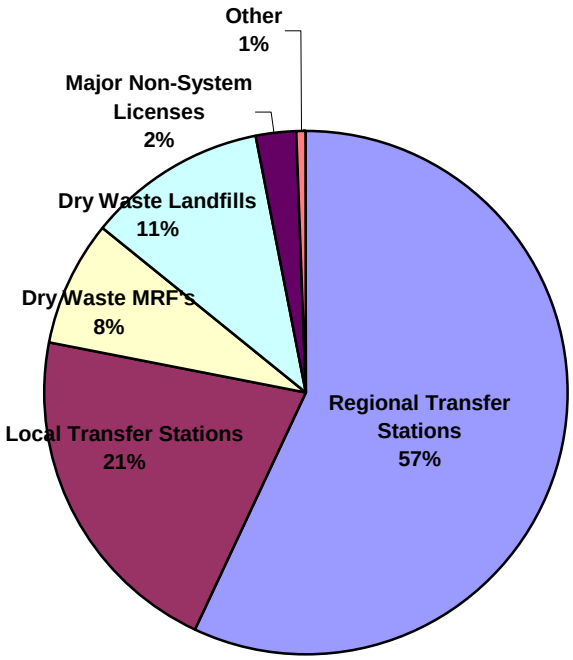
[1] Excludes materials subject to a special waste permit from the DEQ for disposal.

Two limited-purpose landfills, Hillsboro and Lakeside Reclamation, are located close to the Metro region but outside the Metro boundary.

The following pie chart identifies the percentage of the waste, both wet and dry, delivered to these various facility types.

Figure 1 Percentage of Delivered Waste



***Factors Determining Transfer Capacity**:* To calculate and compare the transfer capacity of the various facilities within the region, some basic rules or standards by which to make those comparisons must be developed. It should be noted that there are no uniformly accepted standards for determining the capacity of a transfer station. The approach taken in this study is to calculate a "transfer capacity" for each facility that reflects a reasonable operating level for that facility. The study makes explicit assumptions about what "reasonable" means (e.g. number of hours of operation per year) and looks at specific constraints (e.g. storage space) that might impact transfer capacity. One should not infer that the transfer capacity, as determined by this study, represents the maximum operating level for any of the facilities. Changing how a facility operates or how waste is delivered to the facility could significantly change the amount of waste that could be handled. This report does attempt to define a “reasonable” capacity given a consistent set of operational assumptions.

The capacity of transfer stations depends primarily on three factors:

1. Receiving: Rate that waste can be unloaded from collection vehicles. This rate depends both on the number of stalls for unloading waste and the amount of maneuvering required to position a collection vehicle for dumping.
2. Load-out: Rate that waste can be loaded into transfer vehicles. Various methods are used for loading transfer trailers. These vary from dumping directly into the trailer to the use of large pre-load compactors. The load-out rate depends on both the method and load size.
3. Storage: Amount of space available to stage waste for later loading into transfer vehicles. Waste is generally not delivered to a transfer station at a uniform rate throughout the day. Storage space permits a station to handle peak delivery rates that exceed the rate that transfer vehicles can be loaded. Storage also increases the reliability of the facility by mitigating the impacts of equipment failures or other problems.

For this study, daily peak delivery rates have been estimated and the unloading capacity and storage volume required to handle the peaks will be computed. Where the facility does not have sufficient storage or reception capacity for the peak period, the rated capacity has been reduced to match the available capacity.

Transfer capacity has been estimated for all waste received at these facilities. Wet waste transfer capacity has been determined by deducting the tonnage of dry waste handled at each facility from the facilities calculated capacity. Although the amount of dry waste processed can impact the wet waste transfer capacity[2], determining the dry waste capacity is a complex problem beyond the scope of this study[3].

Assumptions: This study's estimates of transfer station capacity are based on the following assumptions:

1. Status quo facility: The facility is considered as it was in April 2004. The analysis presumes no additional capital investment to modify the facility or its fixed equipment.
2. Operating hours: Since most commercially hauled waste is delivered on weekdays, the capacity of the facilities is based on a five day per week operation. The rated capacity of the station is also based on a 12-hour operating day for both acceptance of waste and loading of waste.[4]

[2] Two important factors are: (a) the same equipment used to handle wet waste is typically used to load out dry-waste residue; and (b) Metro requires that dry waste be processed to meet a minimum recovery rate.

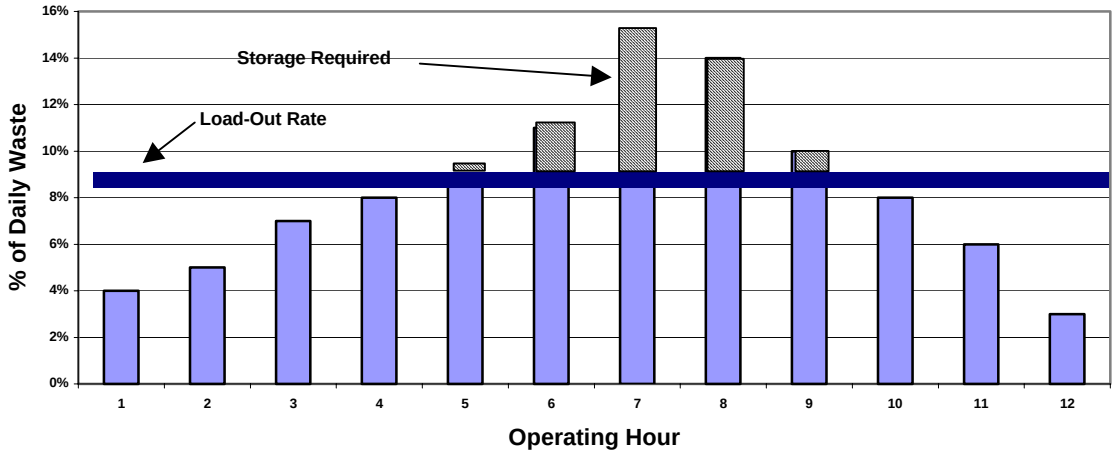
[3] For example, there are a variety of changes such as adding work shifts or rescheduling deliveries of waste that could be made in operating procedures to accommodate more dry waste.

3. Sufficient equipment: Station operators are assumed to have access to sufficient rolling stock, such as transfer vehicles and wheeled loaders, to operate the facility at its estimated capacity.

4. Load-out method: The estimated capacity is based on the primary means of loading wet waste into transfer trailers. Other means of loading the waste that are available due to the design of the facility will be considered as back-up in the event of failure of the primary means of load out. For example, the capacity of a facility that normally uses a compactor to load waste, but also has the ability to top-load the waste, is based on the capacity of the compactor.

5. Waste deliveries: Facilities receive waste in the same patterns and with the same load sizes as observed for commercial waste delivered to Metro facilities. Figure 2 shows the delivery distribution used for this study.

Figure 2
Transfer Capacity Analysis
Waste Deliveries and Storage



6. Average and peak loads: Storage capacity for average waste flows will be provided without impacting other operations, such as dry-waste processing. The previous figure graphically depicts how storage needs are determined. Storage capacity to accommodate peak waste flows must be provided within the facility, but other operations within the facility may be impaired under peak loads.

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[4] The 12 operating hours for the load-out operation may not be coincident with the receiving operation. Some operators choose to leave some waste on the floor overnight and begin load-out prior to opening for business, while others choose to begin loading some time after opening for business and clearing the floor after waste acceptance is over for the day. The timing of load out is normally based on ensuring that the waste can be delivered to the disposal facility during its operating hours

7. Load-out capacity: The manufacturer's rated capacity for pre-load compactors is used. Top loading rates are based on the specific method of loading used at the facility.
8. Regulatory requirements: If there are tonnage limitations imposed by local land use restrictions or permit requirements, they are considered as limits on the capacity of the facility. However, Metro's limitation on wet waste tonnage is considered in this analysis.

The following table shows the basic design criteria used for this analysis.

Capacity Analysis Basic Design Criteria	
Average Load Size (tons)	5.5
Loads per stall Hour	7
Peak Hour (% of daily total)	15%
Peak Day (% of average day)	125%
Uncompacted Transfer Load (tons)	25
Compacted Transfer Loads (tons)	30
Storage Density (lbs/cyd)	600
Normal Operating Day (hours)	12

Capacity Analysis Basic Design Criteria (Cont.)	
Load-Out Rates:	
Direct Dump (loads/hour)	3.5
Top Load with Front End Loader (loads/hour)	3
Compactors:	
SSI 4500 SPH (tons/hour)	100
SSI 2500 (tons/hour)	65

***Capacity Supply Analysis*:** Metro owns or franchises six solid waste transfer facilities in the Metro region. These facilities are:

1. Forest Grove Transfer Station;
2. Metro Central Transfer Station;
3. Metro South Transfer Station;
4. Pride Recycling;
5. Recycle America Recovery Facility (Troutdale Transfer Station); and,
6. Willamette Resources, Inc.

The following is a facility-by-facility summary of the key elements that impact the transfer capacity of the facility. The aggregate capacity of these six facilities represents the region's wet waste transfer supply.

FOREST GROVE TRANSFER STATION

Forest Grove Transfer Station (FGTS is located near the southwest edge of the City of Forest Grove and has been in operation since 1985. A subsidiary of Waste Management owns and operates the facility. The facility is located on a site of slightly over six acres and the transfer building has a floor area of about 5,000 square feet. The FGTS is thus the smallest transfer station in the region. This facility is franchised as a regional transfer station and therefore has no caps placed on the amount of wet or dry waste that it can accept.

The FGTS is a direct dump facility where waste is normally dumped directly from collection vehicles into top-load trailers. The transfer building is currently configured to allow two collection vehicles to dump at the same time. A stationary grapple is used to tamp the waste in the trailer to maximize the load. The station is designed for transfer trailers to enter the lower level of the station from the west and to exit to the east. This minimizes the maneuvering required for transfer trailers.

The majority of the waste handled at this facility arrives in commercial collection vehicles. A small amount of public self-haul is also accepted. Most self-haul loads are dumped into large drop boxes near the front of the station to avoid conflicts with the commercial vehicles.

As is typical of a direct-dump facility, the FGTS has virtually no on-site storage capacity. Therefore, using the criteria established for this study, the facility's capacity is limited to the amount of waste that can be handled in the peak hours. The estimated dumping rate for this facility, with two dumping stalls, is 78.5 tons per hour and the estimated load-out rate is 87.5 tons per hour.

Based simply on the lesser of these rates, the transfer capacity of the station could be as much as 249,000 tons per year. However, analysis of peak load periods at the facility and the fact that there is no on-site storage results in an estimated capacity of 135,000 tons per year based on the design criteria and assumptions established for this report.

METRO CENTRAL TRANSFER STATION

Located in northwest Portland, the Metro Central Transfer Station is the region's largest solid waste handling facility. Metro Central has about 180,000 square feet of tipping area under its roof. The site is slightly over 10 acres in size. Metro Central began transfer operations in 1991. The facility was initially constructed as a steel mill in the early 1920's. Metro Central is a regional transfer station and has no cap on the amount of waste that it is allowed to accept.

Metro Central is a flat-floor transfer station that uses pre-load compactors to load the transfer vehicles. The facility has two SSI 4500 SPH, single-bale compactors, and one SSI 2500, double-bale compactor. The model 2500 compactor is near the end of its useful life and is used for reserve capacity in the event one of the primary compactors is out of service.

Based on the load-out capacity of the facility's two compactors and the design criteria and assumptions established for this report, the capacity of Metro Central is 624,000 tons per year. Approximately 10 dumping spots are required to support this level of activity. The facility has substantially more dumping spaces than needed to handle the waste that can be managed by the compactors. Sufficient storage is available to handle both peak hours and peak days without adversely affecting station operations.

METRO SOUTH TRANSFER STATION

Metro South Transfer Station is located at the intersection of Washington Street and Highway 213 in Oregon City. The facility is located on a 9.6-acre parcel of land, zoned for industrial use. Metro South is a regional transfer station and has no cap on the amount of waste it can accept.

Transfer operations take place in two structures on the site. Commercial collection vehicles are unloaded in a 31,000 square foot pit-type transfer building that was constructed in 1983. Transfer trailers are loaded using two SSI 4500 SPH pre-load compactors.

Public self-haul customers are handled in a separate 25,000 square foot building where the waste is top loaded into transfer trailers. These trailers are then dumped into the pit in the main building. The public unloading area can be used to handle commercial solid waste if the compactors are not available.

The two compactors give the station a nominal load-out capacity of 624,000 tons per year. The station has substantially more receiving capacity than needed to handle this volume of waste. However, operational experience at this facility has shown that transfer operations, both receiving and load-out, are adversely impacted when the volume of waste in the pit exceeds 500 tons. Based on this factor, the estimated station capacity was determined by limiting the available storage on peak days to 500 tons. This results in an effective station capacity of 525,000 tons per year.

PRIDE RECYCLING

Pride Recycling is a privately owned and operated transfer facility along the Tualatin-Sherwood Highway in Washington County. The 25,000 square foot transfer building is located on an 8.85-acre site. The facility is authorized by Metro to accept up to 68,250 tons per year of wet waste and an unlimited amount of dry waste as long as minimum recovery requirements are met. The operations of Pride Disposal Company, a related solid waste collection company are headquartered on this site.

Wet waste is brought into the upper level of the facility that is located on the west side. Dry waste is tipped on the lower level where it is sent across a picking line for recovery. Solid waste destined for disposal is then top-loaded into transfer trailers using front-end loaders. The facility has multiple front-end loaders to provide back-up capacity if one of the front-end loaders fails.

The facility operator indicates that three trailers or more can be loaded every operating hour. At an average load of 25 tons, this equates to a load-out capability of 234,000 tons per year. The facility has sufficient dumping area and storage volume to accommodate this tonnage level.

TROUTDALE TRANSFER STATION

The Troutdale Transfer Station is a solid waste facility operated by Waste Management on East Wind Drive a short distance from I-84 in Troutdale. The 58,000 square foot facility is located on 4.8 acres of land. This facility opened in 1997 as Recycle America, a dry waste material recovery facility. Permission to handle wet waste was granted in 1999, and the facility is currently authorized by Metro to accept up to 65,000 tons per year of wet waste plus an unlimited amount of dry waste as long as minimum recovery requirements are met.

A pre-load compactor is the primary means for loading waste into transfer vehicles. The design of the facility also permits top loading of transfer trailers. This capability is used for dry waste and in emergency situations for wet waste. When trailers are top loaded with wet waste, they are diverted to an alternate landfill since Metro requires all waste going up the Columbia River Gorge to be in fully enclosed trailers.

The compactor used at this facility is an SSI 4500 SPH and has the capability of loading 100 tons of waste per hour. This equates to a load-out capacity of 312,000 tons per year. The receiving capacity of the station is substantially in excess of the load-out capacity and sufficient storage is available to handle both peak hours and peak day loads.

WILLAMETTE RESOURCES, INC. (WRI)

Wilsonville is the home of the WRI transfer and recycling facility. The facility opened in 1995 as a material recovery facility. WRI is a subsidiary of Allied Waste Industries which owns and operates this facility. The facility also serves as the headquarters for the company's collection operations in the area. Permission to handle wet waste was granted in 1999, and the facility is currently authorized by Metro to accept up to 65,000 tons per year of wet waste plus an unlimited amount of dry waste.

WRI utilizes a two-bale preload compactor to load waste into transfer vehicles. Transfer vehicles can also be top loaded at this facility. The compactor is a SSI 2500 with a rated capacity of 65 tons per hour. Based on load-out capacity, and the design criteria and assumptions of this report, the facility can handle about 203,000 tons per year. When this facility was sited, the City of Wilsonville established a tonnage limit of 196,000 tons per year as a condition of approval. Based on this limitation the current capacity of the facility is 196,000 tons per year.

CAPACITY SUMMARY

The region's current total transfer capacity is approximately 2.06 million tons based on the criteria described earlier in this report. The facilities authorized to receive both wet and dry waste, handled approximately 963,000 tons of solid waste during 2003. Therefore, the system has approximately 1.1 million tons of wet waste transfer capacity in excess of current needs.

The following table summarizes the results of the foregoing analysis. The table shows the estimated capacity for each facility and the limiting factor for each facility.

Transfer Capacity Summary

Mixed-Waste Facilities	***Capacity*** *Tons/Year*	***2003*** *Limiting Factor**
Metro Central	624,000	Load-Out Rate
Metro South	560,000	Storage Capacity
Forest Grove	135,000	Storage/Receiving Capacity
Pride Disposal	234,000	Load-Out Rate
Recycle America	312,000	Load-Out Rate
Willamette Resources	196,000	Local Land-use Limit
Total	***2,061,000***	

REGIONAL TRANSFER CAPACITY NEEDS

Based on an estimated transfer capacity of 2.06 million tons, the six facilities in the above table have approximately 1.1 million tons of unused transfer capacity available for handling waste. These facilities are the only ones in the Metro region authorized to accept wet waste. The unused waste transfer capacity of the facilities is approximately one and one-half times the current wet waste deliveries.

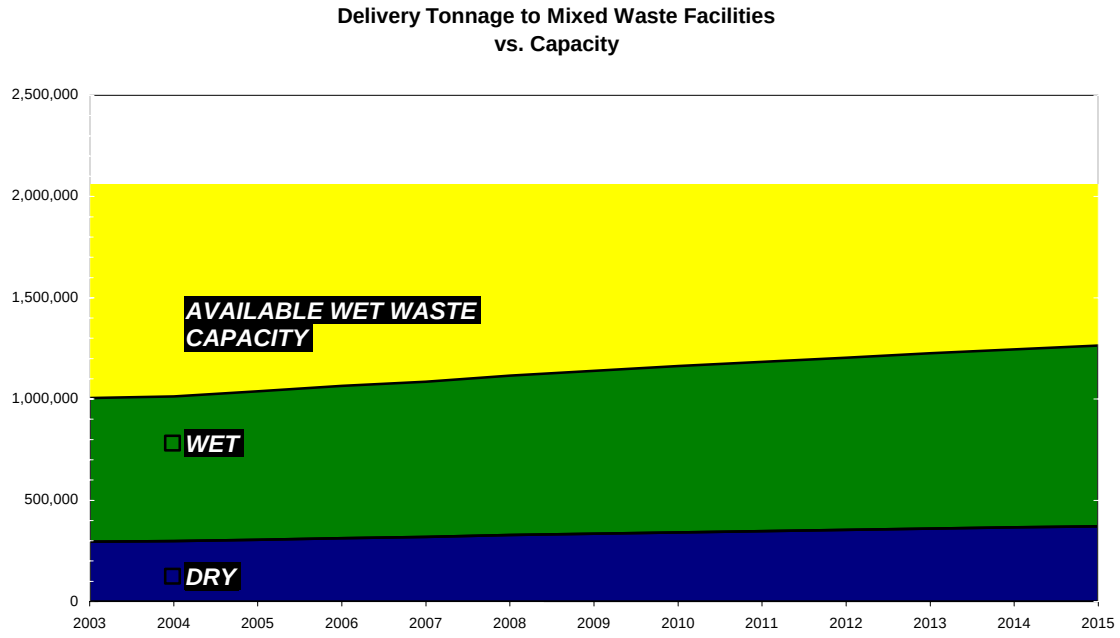
To forecast the region's wet waste transfer capacity need, it was assumed that the region's six transfer stations would continue to receive the same proportion of the region's waste as they did in 2003. Due to facility limitations, individual facilities may not be able to handle this large an increase. However, this assumption is reasonable when the stations are considered in the aggregate.

These assumptions are conservative, since it is likely that less dry waste will be sent to the mixed-waste facilities in the future. There were three dry waste only facilities (Aloha Garbage, KB Recycling and Rivergate) that were in the start-up phases of operation last year or operated for only part of the year. These facilities would be expected to take a larger portion of the region's waste in the future. The following table compares waste deliveries in 2003 to anticipated deliveries in 2015.

Solid Waste Deliveries to Regional Facilities

	2003	***2015***
Total Delivery Tonnage	**1,232,000**	**1,556,000**
Deliveries to Dry Waste Facilities	234,000	291,000
Wet Waste Delivered to Non-System Facilities	35,000	45,000
Delivery Tonnage to Transfer Stations (wet & dry)	963,000	1,220,000
Transfer Station Capacity	*2,061,000*	*2,061,000*
Unused Wet Waste Transfer Capacity	**1,098,000**	**841,000**

The volume of waste needing to be transferred to remote disposal sites is expected to increase over time. It is estimated that total deliveries of waste to facilities serving the region will be 1.56 million tons by 2015, or about 27 percent over current levels. Based on the assumptions discussed above, it is anticipated that the region's transfer facilities will receive about 1.22 million tons of solid waste, reducing the system's unused wet waste transfer capacity to 841,000 tons. The regional need for transfer capacity is shown graphically in Figure 3



It should be noted that the estimates of available capacity shown above do not reflect the impact of potential policy changes to the system. For example, if the volume of dry waste delivered to the mixed-waste facilities in the region increases significantly due to a policy requirement that all dry waste be processed for material recovery, the available wet waste transfer capacity will be reduced. Processing of dry waste requires significantly more space and resources than wet waste transfer at these facilities. The potential impact of significant increases in dry waste deliveries to the mixed-waste facilities is outside the scope of this study, since equipment and space requirements to handle dry waste can vary significantly depending on the recovery techniques employed at each facility.

SUMMARY AND CONCLUSIONS

The Metro Region's solid waste transfer capacity was estimated using uniform criteria for each of the six facilities in the region authorized to handle both wet and dry waste. The total transfer capacity is estimated to be 2.06 million tons per year. The facilities evaluated currently handle about 291,000 tons of dry waste, leaving 1.77 million tons of capacity available for transferring wet waste. During 2003, 710,000 tons of wet waste was generated in the region. Therefore, the unused transfer capacity is about 1.06 million

tons. The total available wet waste transfer capacity is about 250 percent of the amount of wet waste generated.

Forecasts of future waste deliveries were used to determine the available wet waste transfer capacity in 2015. It is estimated that, with no additional investment in new facilities, the available wet waste transfer capacity will still be almost twice the generation rate.

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Metro Central Transfer Station

0 Scale in Feet 500

Metro South Transfer Station

Forest Grove Transfer Station

0 Scale in Feet 500

Pride Recycling

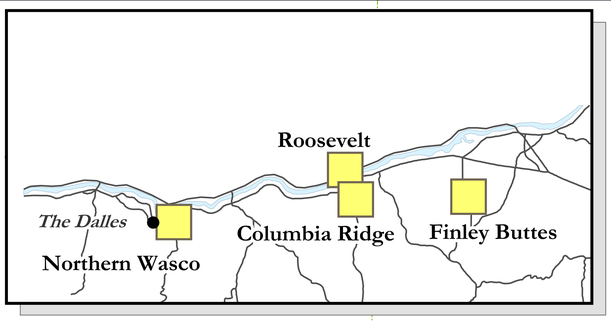
Troutdale Transfer Station (Recycle America)

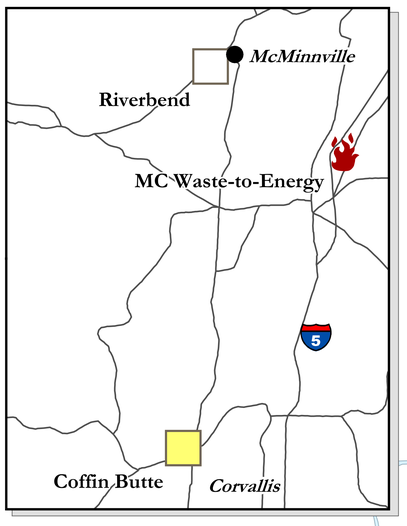
0 Scale in Feet 500

Willamette Resources

Regional Solid Waste Facilities

Facilities Receiving Waste from the Public and Private Haulers





Vancouver Central
WestVan
Metro Central
Metro South
Forest Grove
Hillsboro Landfill
Lakeside Reclamation
Banks Recycling
Nature's Needs
Northwest Environmental & Recycling
Landscape Products & Supply
Best Buy In Town
Hillsboro Garbage Reload
Far West /Hillsboro
Aloha Garbage Reload
TDR
American Compost
Rivergate Reclamation
Pacific Land Clearing III
Wastech
RB Recycling
Universal Wood
Portland Leaf
PRT 1
GreenWay Recycling
PRT 3
Weyerhaeuser
Far West/Beaverton
Far West/SE
GenTech
Oregon Recycling Systems
Far West/NE
East County Recycling
Allwood Recyclers
Troutdale Transfer Station
Twelve-Mile Reload
Red Barn
Gresham Sanitary Reload
Pacific Land Clearing & Recycling I
Smurfit
PRT 2
McFarlanes
K B Recycling
Knez Building Material
Clackamas Compost Products
S P Newsprint
Minsingers Floral Nursery
Pacific Land Clearing & Recycling II
Grimms
Pride Recycling
S & H Logging Reload
River Cities
Willamette Resources

LEGEND

Landfills
- Limited Purpose Designated
- General Purpose Designated
- Non-Designated

Other Disposal
- Waste-to-Energy

Transfer Stations
- Designated
- Non-Designated

Local Transfer Stations & Mixed Waste Recovery
- Local Transfer Station
- Material Recovery Facility

Reload Facilities
- Reload Regulated
- Reload Unregulated

Recycling Facilities
- Clean Material Recovery Facility (source-separated only)
- Drop Center
- Petroleum Contaminated Soil
- Roofing/Wood/C&D
- Tires
- Yard Debris Processor
- Yard Debris Reload

Boundaries
- Transfer Station Service Areas
- Metro Boundary
- Hauler Boundaries

Hauler Franchise Ownerships
- Allied
- B & B Leasing Group
- KB Recycling
- Portland Disposal
- Pride
- Waste Connections
- Waste Management

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METRO

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