

CHAPTER 8

LANDFILLING

This chapter describes the existing disposal system for mixed municipal waste for the three separately managed disposal systems in Pierce County - Pierce County/Cities and Towns; Tacoma/Ruston; and Fort Lewis/McChord Air Force Base. It also identifies future landfill disposal needs and alternatives and provides criteria to be used in the evaluation and selection of alternatives for implementation.

8.1 Landfill Requirements and Goals

Definitions: The following definitions are used throughout this chapter:

Municipal Solid Waste (MSW) Landfill: A landfill used for the disposal of a combination of commercial and residential waste generated within urban, suburban, and rural areas. MSW landfills constructed after 1985 and prior to 1991 were regulated under the requirements of WAC Chapter 173-304. New landfill cells receiving MSW waste after October, 1991 are regulated under WAC Chapter 173-351.

Demolition Waste Landfill: A landfill used to dispose of demolition waste which is defined as largely inert solid waste resulting from the demolition or razing of buildings, roads, and other man-made structures.

Inert Waste Landfill: A landfill used to dispose of inert waste which is defined as non-combustible, non-dangerous solid wastes that are likely to retain their physical and chemical structure under expected conditions of disposal, including resistance to biological attack and chemical attack from acid rainwater.

Ash Landfill: A landfill used for the disposal of incinerator ash that is classified as non-hazardous as defined by federal and applicable state regulations. Disposal of incinerator ash is regulated under Washington State Special Incinerator Regulations (WAC 173-306).

Limited Purpose Landfill: A landfill used for the permanent disposal of one or more specific type of waste of limited, known, and consistent composition such as an ash monofill, a landspreading disposal facility, problem waste landfill, or any facility other than those permitted for the disposal of woodwaste, garbage, inert waste or demolition waste. In the Pierce County development regulations these are titled "Special Waste Landfills."

Landfill disposal is a necessary part of any integrated management system providing for any of the following:

- the major disposal method for municipal solid waste in a region,
- disposal for municipal solid waste that cannot be recycled,
- disposal for bypass waste that cannot be reduced or recycled through other processing methods such as municipal solid waste composting, or
- disposal of incinerator ash from waste-to-energy facilities.

In order to preserve landfill capacity, volume reduction is commonly used in association with landfill facilities. Volume reduction can be achieved through mechanical means such as use of mobile compaction equipment and mechanical waste balers. Mobile compactors are large, heavy-wheeled or tracked vehicles which run over the waste as it is placed in thin layers on the working face of a landfill. Non-compacted municipal solid waste density is on the order of 400 - 600 pounds per cubic yard, which can be increased to 1500 pounds per cubic yard or greater using mobile compactors.

Waste baling is a much less common method of volume reduction, used only in relatively few locations. A waste baler is a stationary piece of equipment into which waste is loaded on a batch basis and compressed into a bale. The bale is then loaded on a truck and transported to the disposal area. Volume reduction from waste baling is similar to mobile compactors.

Another volume reduction technique is incineration, which results in an ash residue differing in both physical, and to a certain extent, chemical characteristics from the original waste. Depending on the composition of the waste and the incineration process employed, volume reduction can range from 50% to 90%.

Goals: Pierce County and the SWAC established the following landfilling goals:

Goal: To provide a strategy that will ensure adequate disposal capacity through the planning period. The strategy should promote efficient use of landfill capacity and minimize disposal costs consistent with the protection of human health and the environment.

Goal: To provide for maximum protection of human health and the environment and support cleanup activities for facilities with existing environmental problems.

Summary of actions taken: The 1989/92 Plan contained a number of recommendations related to landfill disposal and related issues, which provided the context for earlier County actions. The goals and recommendations of the 1989/92 Plan are included in Appendix D. In summary form, these recommendations stated that:

- Private efforts to site, develop, and operate a regional MSW landfill serving the entire county should be encouraged.
- If there was a lack of capacity in Pierce County and if out-of-county options were cost effective, the County should contract for use of a MSW landfill sited out-of-county.
- The County should begin a public siting process for a MSW landfill.
- The County could elect to develop a county-owned MSW landfill in Pierce County or delay development based on alternative costs.
- The County should study alternative technologies determined to be worth consideration within the solid waste management system. The study was to include gathering performance and cost data to provide a basis for future decision making.
- The County should close the Purdy Landfill.
- The County should site an inert and demolition landfill.

To fulfill these recommendations, the County closed the Purdy Landfill and studied the costs of a number of alternative technologies. After comparing these costs to the cost of landfill disposal, the County Council chose landfilling as the main disposal method, coupled with the development of a County-owned yardwaste composting facility. (More detailed discussions about the comparison studies and yardwaste composting facility are in Chapters 1, 4, and 6.)

Also, to fulfill the recommendations, the County began a landfill siting study to determine the feasibility of developing a County-owned landfill in Pierce County. The County also negotiated a contract to accommodate disposal at an out-of-county landfill to extend the life of the existing

landfill and then to provide for disposal when the landfill reached capacity.

Meanwhile a private company, Land Recovery Inc. (LRI), began the public process to site a private MSW landfill in Pierce County.

These actions are discussed in more detail in the following sections of this chapter.

The County did not pursue the development of an inert and demolition landfill because the private sector developed sufficient capacity to recycle and dispose of these materials, as discussed in Chapter 9.

State regulations:

Priorities: In RCW 70.95, the Washington State Legislature established waste management priorities. These priorities identify that landfilling of separated waste is preferred over disposal of mixed waste. This means that the State's priorities focus on reducing the generation of waste, removing recyclables, as much as possible, and resource recovery through incineration before landfilling of mixed municipal waste. Consistent with this policy, Pierce County has established an approach and programs to implement cost-effective source separation recycling. These programs are discussed in Chapter 4 of this Plan.

Environmental requirements: The regulatory requirements for solid waste management are established by the Minimum Functional Standards for Solid Waste Handling (MFS), WAC 173-304.

The State's regulations governing the design and operation of municipal solid waste landfills were revised in 1993 by WAC 173-351, Criteria for Municipal Solid Waste Landfills. These revised regulations supersede the landfill requirements for MSW landfills which were in the Minimum Functional Standards (WAC 173-304, MFS). However, the requirements for other types of

landfills which are in the MFS are still applicable. The new WAC 173-351 revisions are based on federal requirements to conform with the U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), Solid Waste Disposal Facility Criteria (40 CFR, Parts 257 and 258), and on generally accepted engineering practice.

The overall intent of the regulations for municipal solid waste landfills is to prevent and mitigate surface and groundwater contamination, air pollution, and other environmental impacts from the development and operation of landfills. The design and operation criteria contained in WAC 173-351 are intended to provide environmental mitigation as are the location siting criteria discussed in Chapter 2, and include the following:

- Location restrictions, which identify state and federal criteria for airport safety, flood plains, wetlands, fault areas, seismic impact zones, and unstable areas. The standards also include state locational standards to protect groundwater.
- Operating criteria for hazardous waste exclusions, cover requirements, vector control, explosive gas control, surface water requirements, liquids restrictions, and record keeping and reporting requirements.
- Plan of Operation, which establishes how the facility is to be operated in order to meet operating criteria.
- Design requirements for liners placed below the waste, and other environmental control features.
- Groundwater monitoring requirements including sampling and testing methods, and parameters and statistical analysis standards.
- Hydrogeologic report requirements.

- Closure/post closure requirements, including post closure period and requirements for closure design.
- Financial assurance requirements including financing mechanisms and reserve accounts.
- Permit requirements.

At a minimum, demolition, inert, woodwaste and limited-purpose landfills must be designed and operated in accordance with WAC 173-304, which is, in many respects, similar to WAC 173-351, but with some specific differences related to the facilities.

Demolition and inert waste landfill standards differ from those in WAC 173-351 in that there are no locational restrictions; except for unstable slope areas; no requirements for liner and leachate collection, less strict closure requirements, and no post-closure care.

Woodwaste landfill standards are similar to those for inert and demolition waste, except that locational standards related to proximity of surface water and down gradient drinking water wells and certain requirements for groundwater monitoring and leachate collection apply.

Limited purpose landfills must meet, at a minimum, the requirements for facility design, closure and post-closure, performance standards, financial assurance, and groundwater monitoring identified in WAC 173-304.

Incinerator ash, which meets requirements to be classified as “Special Incinerator Ash” based on comprehensive testing and statistical analysis may be disposed of in ash monofills, provided that the monofill is constructed and operated in accordance with the Washington Special Incinerator Ash Regulation (WAC 173-306).

Gas management: The state requirements for design, operation, and monitoring for municipal solid waste landfills include

standards for management of gas. Landfill gas is generated during the slow decomposition of waste in a landfill.

Although many factors influence the quality and quantity of gas generated at a landfill, landfill gas contains roughly 50% methane, 40% carbon dioxide, and smaller percentages of other hazardous and non-hazardous gasses. When considering energy production from landfill gas, methane is the valuable part of the mixture while the other gasses are either acceptable (but generally not valuable) or contaminants. Landfill gas can be purified and sold as natural gas or can be used on-site (with varying degrees of cleaning) to generate electricity. The feasibility of electricity generation depends on the quantity and quality of the gas produced, the market for electricity, and the location of the landfill.

Ongoing deregulation of the electric utility industry may offer additional opportunities for landfill gas electricity generation by providing a broader market (and higher prices) for electricity generated at landfill sites. As part of their deregulation programs, some states are considering requirements that utilities purchase a minimum percentage of their power from renewable sources including solid waste. Deregulation may also encourage electricity generation from landfill gas by opening markets for “green” power in which other utilities or energy users would pay a premium for energy produced from renewable sources. Capturing gas for energy reuse would need to comply with the State’s standards.

Reclamation: It is possible existing landfills can be “mined” or “reclaimed” by removing material from the landfill and processing it through screens, magnets, air classifiers, and other equipment. The State’s permitting process and the requirements for allowing landfill reclamation are not specified in the WAC’s. These procedures would need to be determined if any reclamation of closed

facilities were proposed. Environmental concerns would revolve around maintaining the integrity of the liner and monitoring systems required for closure. Landfill mining offers the following advantages:

- can recover marketable materials (recyclables and soil or soil amendment) or allow a portion of the mined materials to be burned for energy recovery;
- can extend the useful life of the landfill (by allowing new wastes to be landfilled in the area that was mined) and thereby reduce the area required for landfill closure; and
- remove contaminants of environmental concern from the landfill to reduce the potential for future pollution and associated liability.

The health and safety of workers performing the landfill mining is of particular concern due to the potential for encountering hazardous materials, the presence of combustible gasses, and the potential for trench collapse. While landfill mining is technically feasible, economic feasibility varies according to many local conditions such as the composition of waste buried in the landfill and the value of the space occupied by the existing waste. Landfill mining is not a common practice, and has not been practiced on a commercial scale in the Northwest, although changes in market conditions may make it economically favorable in the future. The State's process and requirements for allowing landfill reclamation are not specified in the WAC's.

Permitting processes: For landfills to be developed, they must complete both the solid waste permitting (WAC 173-351 or WAC 173-304) and land use permitting processes. The solid waste permitting process is administered by the Tacoma-Pierce County Health Department. Permit applications for landfills must show evidence of compliance with SEPA rules and include plans, reports,

and other supporting information required in WAC 173-304 or WAC 173-351. A public comment period is required for MSW landfills under WAC 173-351. No formal public comment period is required for permits issued under WAC 173-304.

Following receipt of the application, the Health Department reviews the application and makes a determination as to whether or not the proposed facility meets all applicable laws and regulations, conforms with the most recently adopted solid waste management plan, and complies with all zoning requirements.

After reviewing all information in the public record, the Health Department either issues or denies the permit, which is then sent to the Washington Department of Ecology. Ecology reviews permits issued and may appeal the permit as set forth in RCW 70.95.

In addition to the Solid Waste Permit process, landfill facilities must obtain the appropriate land use permits. The land use permit process, whether the facility is allowed outright or is required to have a public hearing process, provides for integration of the environmental review analyses needed for the solid waste permit process. This reduces duplication, allowing for reports, analyses, and mitigations that are standard requirements of the Solid Waste Permit to also be used for environmental review and decision making during the land use permit review. One of the standards of approval used by the Health Department in review of Solid Waste Permit applications is a demonstration that the disposal facility complies with all zoning requirements. The land use permit process must be completed before the Health Department can complete the Solid Waste Permit process. (More detailed information about land use permits are provided in Chapter 2 and Chapter 10.)

Closure/post-closure: An MSW landfill cannot simply be "closed" when it stops

accepting new waste. Federal and state regulations require that, after a landfill stops accepting waste, a final cover be placed over the waste to complete “closure” of the landfill and that the landfill owner be responsible for at least 30 years of “post-closure” care which includes operating and maintaining the systems designed to control the environmental impact of the landfill, such as leachate collection and treatment systems, landfill gas collection and treatment systems, surface water controls, groundwater monitoring systems, and the final cover system. The final cover system typically includes layers of soil to achieve the desirable terrain features (with slopes that promote drainage off the top), a plastic liner, two feet of low-permeability soil, a layer of soil to promote growth of vegetation, and vegetation (such as native grasses).

Closure and post-closure costs are a significant portion of an MSW landfill’s overall costs, and these costs are typically incurred after revenues obtained from tipping fees on incoming waste have stopped. Federal and state laws require landfill owners to set aside funds during the active life of a landfill to cover closure and post-closure costs, and to demonstrate that these funds are adequate to pay closure and post-closure costs. Therefore, a portion of the tipping fee paid during the active life of a landfill goes toward reserves to fund closure and post-closure.

Corrective action costs are also required to have a financial assurance component. In Washington, this part of the Financial Assurance requirements can be implemented using a Financial Test mechanism. For some municipalities, a bond rating mechanism can be used. The City of Tacoma uses this method to comply with the Corrective Action Financial Assurance requirements.

The closure standards for other landfills under WAC 173-304 are less stringent and are only applicable to limited purpose and

woodwaste landfills, surface impoundments, and landspreading disposal facilities. The closure standards for these facilities include final grading, soil placement and planting in accordance with an approved closure plan. Closure for limited purpose landfills requires a cap meeting specific permeability requirements. Woodwaste landfills must be closed with a compacted soil cap, but there is no specific permeability requirement. There are no post-closure care requirements for inert or demolition landfills.

In its role as the lead governmental agency in solid waste management planning and enforcement, the County may be viewed as a potentially liable party for any problems resulting from the handling and disposal of solid waste. If any landfill that receives waste from Pierce County causes environmental or other damage, the County may be held liable because it is often difficult to determine what other parties are responsible and the County may be viewed as the “deep pocket of last resort”. In addition, cities in the county also have potential liability. Like the County, they have financial resources that could be tapped in the event that other potentially responsible parties cannot be identified or lack such resources.

Research into this subject has revealed an uncomfortable irony. Neither legislatures nor courts have clearly addressed the nature and extent of governmental liability in an era when the U.S. Supreme Court has stripped from those local governments much of their ability to mandate use of specific disposal sites through flow control. Thus, as long as Pierce County or the cities enter into any sort of contract for waste handling, liability is an issue of concern; but government agencies may want to explore opportunities for reducing exposure.

Of particular concern is the liability associated with past, present, and future disposal activities. The Hidden Valley landfill, for example, has been identified as a

Superfund site. However, this does not necessarily mean that costly cleanup of the site will be required. The current status of the cleanup requirements for Hidden Valley and the Tacoma Landfills are discussed in section 8.3, about existing conditions.

Regardless of whether or not the County utilizes an in-county or long-haul disposal option, the County may remain at least partially liable for problems arising out of the disposal of municipal solid waste generated in Pierce County.

8.2 Economic Studies

Since 1989, at the direction of the Plan's recommendations and the County Council, the Solid Waste Division has completed a number of studies comparing the costs of solid waste handling and disposal alternatives. This section summarizes the various economic analyses completed or analyzed by the Division.

Unless otherwise noted, all costs are presented on a per ton basis and are the costs for the specific processing or disposal option calculated at the time the study was first reported. Not included are the costs of ancillary facilities or programs such as recycling programs, transfer stations, or administrative fees collected to operate the County's solid waste management system.

The information in this section complements the following sections, which explain the existing systems for management of the Pierce County solid waste stream.

1987 - 1990 Waste-to-Energy: The County commissioned a Waste-To-Energy Report that included a review of current technologies, institutional and legal arrangements, and procurement and financial options. Based on its findings, the County proceeded to consider the viability of incineration through a negotiated contract

which identified disposal costs and annual average capital and operating costs. The contract terms stated that Pierce County waste could be processed at a waste-to-energy facility for a cost of **\$51.00 per ton**. The Council decided not to proceed with the ordinance that would have authorized the Executive to sign the contract.

1991 Mixed municipal solid waste

composting: The 1989 Plan recommended a policy to "pursue development of information gathering for alternative processing technologies in order to provide performance and economic data roughly comparable to the waste-to-energy project." To that end, the Pierce County Utilities Department commissioned the *1990 Report on Alternative Solid Waste Processing Technologies*. Following up on that report in 1991, the County issued a Request for Proposal (RFP) for mixed municipal solid waste (MMSW) composting systems. The composting RFP included two alternatives, one for 300 tons per day and one for 1000 tons per day. The County received no response to the second alternative which would have made composting the primary method of waste handling. The County did receive a bid of **\$39.00 per ton** to compost approximately 1/3 of the waste stream. Wastes not composted would have been long-hauled or landfilled locally.

1991 Long-haul: The County also solicited bids from private sector providers to ship Pierce County's waste to landfills east of the Cascade Range. The RFPs for long-haul (at that time known as "waste export") asked for bids for a short-term strategy and for a long-term strategy which would include development of transfer stations and permanent intermodal facilities. The low bids ranged from **\$40.50 to \$43 per ton**. The higher-end rate represented a long-term strategy that would have included the construction of a transfer station through

which waste could be containerized and shipped to a remote landfill by rail.

1991 Contract renegotiation: In January, Pierce County renegotiated its landfill disposal contract with Land Recovery, Inc. for use of the Hidden Valley Landfill. Landfill disposal in the newer portions of Hidden Valley (which were then being developed to be in compliance with the applicable *Minimum Functional Standards*) at a cost of **\$19.93 per ton.**

1991 Comparison of alternatives: After completion of the RFP processes and with the results of the negotiated waste-to-energy contact, the Utilities Department reported to the County Executive about the advantages, disadvantages, costs per ton, and environmental compliance issues of all options. Based on these comparisons, the County Council adopted Ordinance #91-126 signifying that the County would pursue the lowest-cost alternative, in-county landfilling. Waste export to an out-of-county disposal site was identified as a back-up alternative if siting of an in-county landfill, either public or private, was not completed, or if waste export became more cost competitive.

1994 Landfill Siting Study - Phase I As part of Phase I of the *Pierce County Landfill Siting Study*, the consulting firm Parametrix estimated the costs of planning, permitting, land acquisition, construction, and operation of a landfill within Pierce County. With project costs ranging from \$466 million to \$596 million, Parametrix determined that per ton costs could range from **\$33.30 to \$49.50 per ton.** These estimated costs and fees included the cost of hauling waste from a transfer station located in the vicinity of the Hidden Valley Landfill to an in-county landfill located 16 to 22 miles away.

1994 Chase Economic Analysis: Following Phase I of the *Landfill Siting Study*, the County obtained the services of consultant

Robert Chase to develop a model to estimate the economic impacts of developing and operating a landfill in Pierce County. His analysis looked not only at the impacts of local firms engaged in the landfill process, but the economic effect caused by workers spending a portion of their earnings on goods and services produced or supplied by Pierce County firms. He estimated creation of up to 483 jobs and an economic impact of \$30 million county-wide during initial construction, and creation of 259 jobs and an economic impact of \$22.7 million during the initial years the landfill is open. He concluded that “a new County landfill will support hundreds of jobs and millions in wages. If the County decides on the long-haul alternative, these jobs and wages would, in effect, be exported out of the county.”

1995 304th Street Landfill: During 1995, Land Recovery, Inc. (LRI) completed its application for a conditional land use permit from Pierce County for its proposed 304th Street Landfill. LRI included an Economic Analyses as Appendix A to its State Environmental Policy Act (SEPA) documentation. The Solid Waste Division reviewed and commented upon Appendix A as to the appropriateness of the assumptions and calculations included, primarily that LRI could recoup its investment in site acquisition, planning, permitting, and environmental compliance with a fee of **\$20 to \$25 per ton.** By means of comparison, the same analysis indicated that Pierce County was then paying **\$43.36 per ton** (the 1991 bid price, explained above, increased by 6.8% to account for inflation) for long-haul services. In January 1996, the Pierce County Hearings Examiner, in granting LRI the conditional use permit it sought for the 304th Street Landfill, concluded that Appendix A to the SEPA documents “represents a reasonable estimate of the cost of in-county landfilling and two long-haul options.” In making this finding, the

Examiner rejected analysis of project opponents' expert witnesses.

1995 Landfill Siting Study Phase II: Phase II identified specific locations in south Pierce County which appeared feasible for landfill development. The consultant, Parametrix, developed landfill models for each site and refined the Phase I economic analysis. For the three sites which appeared most suitable from an environmental standpoint, total development costs ranged from \$290 million to \$366 million. Disposal fees necessary to recoup this investment could range from **\$29.60 to \$33.61 per ton**. As was the case for Phase I, these fees included transportation services to the remote landfill sites.

1997 3rd Contract Addendum: Pierce County negotiated a Third Addendum to its landfill disposal agreement with LRI in July. The fees charged by LRI for handling Pierce County's waste were revised to include **\$37.99 per ton** for the transportation and disposal of waste at the Roosevelt Regional Landfill in Klickitat County. Prior to this renegotiation, the fee was **\$45.84 per ton** (effective 1/1/97, the 1991 bid price increased by 12.9% to account for inflation). These fees are calculated from the "back door of the transfer stations." Costs associated with transporting waste from local transfer stations to the intermodal facility are included in the stated fee. (The 1998 Waste Handling Agreement used the long-haul rates negotiated as part of the 1997 3rd Addendum. Adjustments were made for inflation, but there were no substantive changes.)

1997 Other long-haul rates: In addition to Pierce County, in the Central Puget Sound region Snohomish County and the City of Seattle also long-haul municipal solid waste. Effective April 1997, Seattle paid its contractor, Waste Management, \$41.57 per ton. As of October 1991, Snohomish

County paid Rabanco/Regional Disposal Company \$42.27 per ton. Unlike Pierce County's long-haul fees which are calculated from the transfer station, Snohomish County's and Seattle's are calculated from the "front door" of each jurisdiction's intermodal facility, thus costs associated with transporting waste to the intermodal facility are included in neither Snohomish County's nor Seattle's rates.

8.3 Existing Facilities and Systems

8.3.1 Pierce County/cities and towns

Existing system:

Hidden Valley Landfill: Since 1967 the Hidden Valley Landfill served as a primary disposal facility for the County's system. Now closed, the landfill site is owned and operated by Land Recovery Inc. (LRI). The landfill was operated and is closed in accordance with applicable standards and includes leachate collection, gas monitoring and collection systems, and groundwater monitoring.

The closed landfill site also serves as the location for other solid waste management related facilities including a transfer station, recycling facility, in-vessel composting facility, and an enclosed composting facility.

Consistent with the County's goal in the 1989/92 Plan to expand the landfill according to all state regulations, the Hidden Valley Landfill was expanded by constructing a cell which met the requirements in place at the time it was constructed, WAC 173-304. In addition, old portions of the landfill were capped in accordance with applicable regulations.

The Hidden Valley Landfill is listed on the National Priorities List (NPL or "Superfund")

list) due to groundwater contamination. Ecology has determined that this groundwater contamination is emanating from the older, unlined portion of the landfill. After the new cell was built, waste was placed in areas of the landfill equipped with liners intended to isolate the waste and associated leachate from groundwater. Based on responses provided by Ecology in the June 1997 Responsiveness Summary, Ecology is not aware of any health-based cleanup standard being exceeded in neighboring drinking water. Ecology further states that a groundwater extraction and treatment program is not a likely remedial alternative for the site and that cleanup activities will likely include covering the landfill, expanding the groundwater monitoring network around the landfill, conducting a detailed well canvass in the vicinity of the landfill, providing an alternative water supply to individuals whose water supply is found to be impacted by the landfill, and conducting quarterly groundwater monitoring.

The landfill was closed at the end of 1998 using a cover approved as meeting the State's standards, gas control, and surface water control system. The site remains open for waste transfer and composting activities.

Long-haul to the Roosevelt Regional Landfill: The County receives disposal service from LRI under an agreement first executed in 1977. The agreement originally provided for in-county landfill disposal only, but was amended in 1994 to allow for transport and disposal of a portion of the waste to the Roosevelt Regional Landfill in Klickitat County. LRI contracts with the owner of the landfill for disposal services.

The agreement with LRI was modified in 1998. This revised agreement extends the long-haul agreement through 2011, and deletes County waste guarantees and eliminates commitments regarding in-county

landfills. It does provide that the County direct what waste it does control to the LRI disposal system and, in return, receives assurance of set rates for the term of the agreement. However, if an in-county landfill becomes available, the agreement allows the County to use that landfill at a rate to be determined later.

The Roosevelt Landfill is located in a remote area of Klickitat County in South Central Washington. The landfill has a theoretical capacity of 120 million-tons based on available site area. The actual allowable waste disposal is currently limited to two million tons per year by the conditional use permit issued by Klickitat County.

The landfill is designed to meet all current solid waste landfill regulations, including the MFS and WAC 173-351.

Closed facilities - Purdy and McNeil Island: The MSW landfills at Purdy and McNeil Island stopped accepting solid waste in November, 1989. These facilities were closed under the MFS (WAC 173-304) provisions in effect at the time which included capping of the waste fill area and monitoring groundwater. The closure constructions were completed in 1990 at the Purdy Landfill and in 1991 at the McNeil Island site.

Both sites have shown impacts to groundwater and downgradient contamination has been detected. At this time the level of contamination is not sufficient to warrant any cleanup action and, in fact, contamination levels have shown a reduction since the landfill closures were completed with the construction of landfill caps.

Abandoned and pre-MFS closed sites: A number of both public and private disposal sites in the county ceased operation prior to implementation of the MFS in 1985. These sites vary considerably in terms of the types

of material disposed and how they were closed.

The Health Department monitors these sites for presence of off-site contamination. In 1993 the Health Department conducted a study of these sites -- *Closed Landfill Study April, 1993* -- which assessed the conditions at these sites.

The study identified 21 (including Purdy and McNeil Island) municipal garbage disposal sites and three private demolition waste sites. Preliminary investigations determined that of 24 sites, 19 needed further investigation including a combination of surface and groundwater sampling, periodic methane monitoring, and routine inspections to monitor for illegal dumping. No immediate health concerns were detected at any of the sites. This study is currently being updated.

Land Recovery Landfill: In the 1980's, Land Recovery Inc. (LRI) began the siting and permitting process for a landfill located near the intersection of 304th Street and Meridian in south Pierce County. This process involved conducting extensive site investigations, environmental review by local, state and federal agencies, and many adjudicative proceedings.

Consistent with the policies of the 1989 Solid Waste Plan, the Pierce County Hearings Examiner granted a Conditional Use Permit in January 1996. The Tacoma-Pierce County Health Department, with Department of Ecology concurrence, issued the Solid Waste Permit in February 1996.

LRI and its affiliated company, Resource Investments, Inc. (RII), also filed an application with the Army Corps of Engineers for a permit from the Corps. In July 1998, the U.S. 9th Circuit Court of Appeals reversed a lower court's ruling and held that the project was exempt from the regulation by the Corps.

After the court's decision, LRI obtained the remaining permits and began construction. The landfill at 304th Street opened on December 13, 1999.

County Landfill Siting Study: Consistent with the 1989 Plan's recommendation of conducting a public process for siting of a landfill to serve Pierce County, the County initiated a landfill siting study in 1993, which was to have five phases. The Siting Study was not completed. *Phase I: Countywide Screening* was completed in 1994 and is described in more detail in Chapter 2. It established the basic landfill parameters that would be used for the siting of a County-owned landfill. It developed countywide screening criteria based on regulatory requirements and engineering considerations, and applied these criteria comprehensively throughout the County without consideration of specific sites.

Phase II: Site Specific Screening: Based on the results from the Phase I Study, the County identified and evaluated potential landfill sites under Phase II. In 1995, a focused evaluation was applied to four potential sites using a weighted scoring of 26 criteria covering site characteristics/ engineering, groundwater protection/ hydrology, natural environment and land use. The evaluation included new aerial photography, topographic mapping, visual flyover, site drilling, wetlands identification, priority habitat identification, and conceptual design to determine site capacity, grading, and access. The study also included an economic evaluation of the four sites which included environmental review, permitting, construction, operations, closure, and post-closure care.

SWAC recommendations: The SWAC conducted an extensive review of the Phase II Study which included review of consultant reports, receiving public comments at two special meetings and at regular SWAC

meetings, and conducting a work session to discuss options. In September 1996, the SWAC made the following recommendations related to the Phase II Study:

- The Pierce County Council should direct, authorize, and appropriate adequate funds to the Pierce County Solid Waste Division to proceed with the Landfill Siting into a Phase IIB: a study of the permitability of the three top-ranked sites identified in the Phase II Study; and
- Until the results of Phase IIB have been reviewed and analyzed, Pierce County should not proceed with Phase III: a detailed Environmental Impact Statement (EIS) for a limited number of sites.

The purposes of conducting a Phase IIB study prior to initiation of the Phase III EIS process are to:

- further differentiate among the preferred sites;
- identify whether the sites pose unusual challenges to the permitting process; and
- develop information which may serve as the basis for undertaking an EIS for a single preferred site, rather than two, to reduce overall cost.

Status: The County Council did not take any action on the SWAC's recommendation. Due to the length of time since completion of the initial evaluation in 1995, some aspects of the Study may now be out-of-date in regards to land uses, land availability, and siting regulations.

8.3.2 Tacoma/Ruston

Existing system: The City of Tacoma disposal system includes landfilling, waste processing, and incineration. Until 1979 the City relied primarily on landfill disposal at

the Tacoma Landfill. In 1979 the City constructed a resource recovery facility producing a refuse derived fuel (RDF) which was intended to be sold as fuel to local energy producers. Lack of demand for the RDF caused the facility to be used only on an intermittent basis.

In 1991, the City of Tacoma Light Division completed renovations to and put the Hylebos Stream Plant No. 2 into commercial operation. This facility burns a combination of coal, woodwaste and RDF in two fluidized bed combustors. Since that time, the resource recovery facility has been operating on a regular basis providing up to 300 tons per day of RDF to the steam plant. The City has recently been evaluating the operation of the steam plant to improve its cost effectiveness in order to provide a more competitive energy production cost. This evaluation includes consideration of alternative RDF use, price options, and alternative fuels.

City of Tacoma Landfill: The Tacoma Landfill is located within the city limits at 3510 South Mullen Street and began operation in 1960. The current site size is approximately 246 acres; of this area 105 acres have not been used for disposal and 110 acres have been closed in accordance with a consent decree negotiated between EPA, Ecology, and the City. An additional 31 acres are an active landfill and was constructed to meet MFS (WAC 173-304) standards. As of January 1997, the active portion of the landfill had a remaining capacity of less than 325,000 tons of solid waste.

The Tacoma Landfill was added to EPA's National Priorities List (NPL) of sites requiring further investigation and cleanup in 1983 as part of the "Commencement Bay South Tacoma Channel" site. The landfill has been the subject of investigation and significant cleanup work under EPA and

Ecology authorities since 1986. These investigations showed that the landfill was causing contamination of area groundwater with volatile organic compounds and was generating landfill gas that could be dangerous to the surrounding community. In 1988, EPA and Ecology proceeded to negotiate with the City about cleanup actions resulting in the Consent Decree.

The Consent Decree includes actions that would: reduce the production of leachate; eliminate off-site gas migration; prevent further migration of the contaminated groundwater plume and reduce the concentration of contaminants within the plume, and monitoring of groundwater, surface water, subsurface gas, and air emissions. It also includes provisions for alternative water supply to any residents deprived of their domestic water supply and the establishment of institutional controls to promote and support the cleanup action.

In 1998, the Tacoma Landfill was granted an extension to continue landfilling until 2004. Under the Consent Decree, the City of Tacoma may request two additional five-year extensions. Approval of the two additional extensions, if granted, would allow the landfill to remain open until 2014.

Long-haul: Tacoma contracts directly with LRI for the long-haul of solid waste. Tacoma currently disposes of approximately 350 tons per day through the LRI contract. In the past, the waste was taken from the Tacoma Landfill transfer site to the intermodal facility in the Tacoma tideflats where it was loaded onto trains for shipment. Recently, waste disposed through the LRI contract is hauled directly to the 304th Landfill.

Ash management: Ash from the Steam Plant No. 2 has tested as non-hazardous. Of 11,890 tons produced in 1996, only 1,455 tons were disposed out-of-county. The other

10,435 tons were used for road and soil stabilization, manufacturing of cement, and for hazardous and chemical waste stabilization.

8.3.3 Fort Lewis/McChord AFB

Existing system: Solid waste generated in the Fort Lewis/McChord system is managed independently under the *Final Solid Waste Management Plan for the Fort Lewis Military Reservation*, dated August 25, 1995. Fort Lewis and McChord AFB handle wastes generated on the military reservations. Until 1997 all solid wastes were disposed at the Fort Lewis Landfill. Demolition and inert waste landfills located at McChord and at the Fort Lewis Landfill property were also available.

In 1985 Fort Lewis began construction of a waste-to-energy facility which was intended to process most of the municipal solid waste generated from the two bases. The project was halted in 1987 and then completed in 1996. However, the facility was unable to meet air quality permit standards and will not be reopened.

Fort Lewis Landfill: The Fort Lewis Landfill consists of six waste cells which have been developed over a number of years. Cells 1 through 4 were closed with a final cover in 1990. Cell 5 was designed in accordance with the Minimum Functional Standards. The cover system was designed to RCRA-Subtitle D standards as a result of a variance request. The request was because of inadequate building materials used in the construction of the bottom liner. Cell 5 reached capacity in 1994 and was closed in 1995. Cell 6 was designed to meet Washington State Minimum Functional Standards. Cell 6 is 99% full and being kept open as a backup transfer point and as an opportunity to study the impact of leaving it uncovered on decomposition and improvement of leachate.

A seventh cell was proposed for the landfill; however, attempts to permit Cell 7 have been unsuccessful. The primary environmental concern is related to the sole source aquifer designation for the area. A

proposal to construct an incinerator-ash disposal cell has also been abandoned for the same reason.

Closure of the demolition waste cell at the Landfill began in 1996 and was completed in 1997. The demolition landfill cap consists of a flexible membrane liner with landfill gas collection system, which is much more elaborate than state requirements. Additionally, Fort Lewis has opened an inert waste landfill cell for asphalt and concrete disposal.

McChord Air Force Base demolition fill: McChord operates a landfill permitted as a demolition fill. The demolition fill is nearing capacity with remaining useful life estimated to be one to two years.

McChord inert waste fill: In 1998, the base obtained a Solid Waste Permit for an inert waste landfill. The landfill will have a capacity of approximately 500,000 cubic yards and occupy approximately 3 acres.

Long-haul: Because the waste-to-energy facility could not meet emission requirements, Fort Lewis built a transfer station in 1999 to facilitate long-haul of most of its waste off base. As of January 2000, Fort Lewis' longhaul contractor is Waste Management which hauls MSW to the landfill in Arlington, Oregon.

Table 8-1 Pierce County Other Landfills¹ August 1997		
Facility (Owner) & Location	Facility Type	1996 Tonnage
Foran Inert Waste Landfill (Jim Foran Company) 1635 Marine View Drive Tacoma	Inert Waste Landfill	Asphalt – 4,982 yards Concrete – 4,935 yards Mix-Inert – 8,413 yards Mud – 7,824 yards Mud Soup – 4,496 yards Dirt - 22,868 yards
Tyler Street Inert Landfill (William Dickson Company) 4925 Tyler Street Tacoma	Inert Waste Landfill	Concrete – 13,544 yards Asphalt – 8,843 yards Glass – 2,140 yards Dirt – 22,243 yards
Waller Road Inert Waste Landfill (William Dickson Company) 48th Street East and Waller Road Tacoma	Inert Waste Landfill	Concrete – 16,355 yards Asphalt – 6,427 yards Glass – 2,848 yards Dirt – 13,399 yards

¹ These facilities are all privately owned and operators provide service on a county wide basis. Additional discussion of these facilities, and other facilities that handle special wastes, is provided in Chapter 9.

8.3.4 Other Types of Landfills

Certain disposal facilities in the county serve special needs related to specific waste types and are available for use on a county wide basis. As shown in Table 8-1, there are currently three private inert waste landfills permitted in the County which fall into this category. Additional information about other types of waste landfills is provided in Chapter 9. There are currently no limited-purpose landfills permitted in the County. However, WAC 173-304 and the Pierce County Development Regulations allow for development and permitting of limited-purpose landfills by private industry, should the need arise.

8.4 Needs

Long term disposal capacity for MSW: As discussed in Chapter 3, the County maintains long term solid waste forecasts (1998-2020) for the entire Pierce County geographic area and for Pierce County's system. These projections are based on historical waste disposal data and current projections for future population growth. Using these forecasts, projections were developed for future disposal needs through the term of the current long-haul agreement between Pierce County and LRI and through a 20-year planning period. The forecasts represent long-term needs but do not include projections of short-term or seasonal patterns.

Table 8-2 shows the range of projected needs for disposal capacity for municipal solid waste for the entire county and the Pierce County system.

The 20-year disposal needs for the Pierce County system are projected to range from 9.9 to 10.9 million tons. The 20-year projection of waste disposal capacity needs for the entire county range from 14.9 to 15.9 million tons. The disposal needs projected through the term of the existing long-haul agreement (2011) for the Pierce County system range from 6.0 to 6.5 million tons.

Short-term MSW disposal needs: The short-term disposal needs in Pierce County depend not only on the total waste requiring disposal, but also on the status of current and projected disposal options particularly as it relates to facilities scheduled to be closed or facilities scheduled to go into operation in the near future.

Pierce County/Cities and Towns: After a number of years of uncertainty regarding how the short-term disposal needs of the County system were to be met, this issue was resolved. Under the contract with LRI, the County is assured of disposal capacity either in an in-county landfill or through long-haul through the year 2011. In the event that an

in-county landfill begins operation before 2011, the agreement allows for use of that facility.

Tacoma system: The City of Tacoma intends to keep its landfill open and to continue to have available long-haul disposal through the Contractor. The City is also reviewing operation and design alternatives for the production of RDF. If the RDF production is increased or decreased in the future, the amount of waste currently landfilled will decrease or increase proportionally.

The City plans to fill the Central Area of the Tacoma Landfill to the maximum grade allowed by its permit. As of January 1, 1997, the Landfill had a remaining permitted capacity of approximately 325,000 tons. At a planned disposal rate of approximately 20,000 tpy, the maximum capacity would be reached by the end of 2014. If the City can not demonstrate to the regulatory agencies that it can meet the requirements of the Consent Decree the agencies will not grant the necessary extensions and the Landfill will need to close by the end of 1999. In 1998, the City was granted the first of three possible 5 year extensions, allowing the landfill to remain in operation until 2004.

The City has no plans for a new City-owned replacement landfill at this time. To reduce the amount of waste going to the Central Area, or when the Central Area is full, all landfill waste would be made into RDF, long-hauled under either the City's current or a re-procured long-haul contract or disposed in a new in-county landfill.

Ash management is the responsibility of the Steam Plant operators, which operates Steam Plant No. 2. Recycling and re-use of the ash is conducted as a regular part of plant operation and no needs for ash disposal from this facility have been identified. Ash disposal is the lowest priority in the Solid Waste Utility Division's ash management hierarchy and utilized as a last resort.

Table 8-2 Projected Long-Term Disposal Needs ¹		
	Pierce County/Cities and Towns²	Countywide³
2000 to 2020	9,819,142 to 10,855,651 tons	14,808,866 to 15,915,511 tons

¹ Based on annual waste stream projections detailed in tables 3-13 and 3-14.

² Does not include Tacoma/Ruston and Fort Lewis/McChord Air Force Base.

³ “Countywide” includes the military bases and the Tacoma/Ruston system.

Fort Lewis/McChord AFB: Disposal capacity for the military bases will be provided through a combination of use of the existing facility and by long-haul.

Needs for other types of landfills: At this time there does not appear to be any identified need for other types of landfills, such as inert waste, woodwaste, demolition, or any other limited purpose landfill. As discussed in Chapter 9, there are many recycling and disposal opportunities offered by private businesses in Pierce County to handle these materials. As discussed in Chapter 3, there has been a substantial decrease in the amount of these materials in the municipal waste stream and it appears that industry is recycling, reusing, or reducing the amount of materials in this category. However, these facilities are dependent upon the ebbs and flows of the recycling marketplace or the evolution of Pierce County’s industrial base and more facilities may be needed in the future. Zoning regulations in Pierce County’s zoning code allow an industry wishing to permit a limited purpose landfill to site such a facility. Permitting for these facilities is summarized in Chapter 2 and discussed in more detail in Chapter 10.

Other issues to consider: Other regulatory changes were passed in early 1999 which add to the landfill siting standards that apply to facilities not yet constructed, 100 acres in

size, and 100 feet in height. It is not yet certain how these changes would impact the siting of all types of new landfills both for the short and long term, nor how the changes will impact solid waste disposal economics in the state.

There are three other issues that need to be considered when evaluating either in-county or long-haul alternatives. The following briefly summarizes them. How they impact the in-county or long-haul alternatives is discussed in the next section of the chapter.

Flow control: Flow control refers to the ability of local government to control the delivery of waste generated within a given potential geographic area to a specific facility, thereby providing the ability to guarantee delivery of waste. This issue is discussed in detail in chapters 5 and 7.

After a number of years of legal review and consideration of legislative actions to resolve the issue, it appears very unlikely that flow control will ever again be available to local government, unless said local government is a market participant (as in *Smithtown and Babylon*). Essentially this means that local government becomes a market participant along with the private sector in providing municipal solid waste disposal services.

Interlocal agreements: Under Washington State law cities and towns have the option to develop their own solid waste management plans. Typically, as is the case in Pierce

County, cities and towns agree to cooperate through interlocal agreements in the planning and funding of solid waste management programs.

Potential long-term effects of waste reduction and recycling on disposal capacity: Waste generation quantities are influenced by a number of factors such as population growth, levels of employment, personal income and the cost of disposal. The waste reduction and recycling rate, which in turn directly affects the quantity of waste requiring disposal, is also influenced by similar factors. It is not possible to precisely predict total future waste reduction and recycling quantities. The County's high disposal capacity projection assumes a 50% recycling rate. The high range assumptions provide leeway for planning if the recycling rate falls below the current level, population grows faster than projected, or a boom in the economy generates more waste. (This is discussed in more detail in Chapter 3 Waste Analysis.)

Some of the factors which should be addressed when considering disposal alternatives include:

- the relative cost of disposal versus recycling programs could drive either more or less recycling;
- the future markets for specific recyclable materials will affect both the type and quantity of materials removed from the waste stream;
- as discussed in Chapter 3, based on the conclusions of the Waste Audit Study there are currently certain materials such as CDL and paper which present a greater potential for recovery and could reduce overall disposal needs; and
- if certain disposal alternatives reduce the availability of funds to support County education programs, the overall waste

reduction and recycling levels could suffer.

If, however, there were to be a large drop in recycling rates, it would increase the need for disposal capacity. It would be very unlikely that this would occur suddenly; it would most likely be a long-term trend. The annual updates of disposal and recycling quantities can be used to detect any trend towards a significant reduction in recycling rates or significant increases in disposal rates.

8.5 Alternatives

8.5.1. Pierce County/Cities and Towns

The needs and alternatives for the Pierce County system relate primarily to the relative role played by in-county landfilling and long-haul for municipal solid waste, and to other special needs such as management of closed disposal sites.

In-county landfill: The County is currently conducting a long-term planning process for handling municipal waste, which could result in in-county landfilling or a system that relies primarily on either long-haul or some combination of the two. When considering in-county landfilling, in addition to siting considerations previously discussed, several ownership options are available:

- **COUNTY-OWNED:** Under this option, the County would implement the siting decisions resulting from completion of the landfill siting study previously described. Ownership of a site would obligate the County to take the lead in final siting, environmental review, permitting, financing, and construction. Public ownership would not preclude contracting with the private sector for operation of the facility.
- **PRIVATELY-OWNED 304TH STREET:** Under this option, the 304th Street Landfill would serve as the principal

disposal site and the County would continue a contractual relationship with LRI for disposal services.

- **OTHER MUNICIPALLY-OWNED:** Under this option, it is assumed that some or all of the cities and towns who are currently participating in the Plan would form their own solid waste management entity and take the lead in developing a publicly-owned landfill in Pierce County. This could possibly involve taking over the County's siting study; however, there would likely be significant legal, administrative, and procedural issues which would need to be worked out, the possibility of which are unknown at this time. No proposals have been made.
- **OTHER PRIVATELY-OWNED:** Under this option, it was assumed that the 304th Street Landfill would not be developed and another privately-owned landfill could be developed at a site other than 304th Street. There have been no specific proposals.

Flow control: A long-term, reliable waste disposal stream is important to the viability of options available for an in-county landfill. A lack of flow control may result in higher overall rates to users if fixed costs or contractual obligations cannot be met. This is probably more critical with a publicly-developed site or publicly-contracted site unaffiliated with waste hauling companies because the County will be directly responsible for covering debt service and other fixed costs or complying with contract requirements.

Interlocal agreements: The development of a County-owned landfill may require long-term interlocal agreements related to the financing and operation of such a facility. Whether or not these agreements can be reached (in total or in part) will be a fundamental factor in determining not only whether an in-county landfill is feasible, but

also which of the in-county options available would be preferred.

Potential long-term effects of waste reduction and recycling on disposal capacity: The in-county landfill options under consideration (304th Street Landfill or a County-owned facility) would have adequate capacity to adapt to changes that may occur in waste reduction and recycling programs and recovery rates. Based on current estimates, the overall disposal cost for an in-county landfill is lower than long-haul and, therefore, would provide somewhat less economic incentive to increase diversion rates.

On the other hand, waste reduction and recycling programs are treated as integral components of Pierce County's solid waste management system. The portion of the costs associated with those programs not collected directly from users (the directly-billed costs for subscribing to curbside, yardwaste, multi-family, or non-residential recycling programs) are funded through a component of solid waste tipping fees.

If the choice of a more expensive long-term disposal option (e.g., long-haul alternatives) leads to any diminishing in the number of tons of waste entering local disposal sites, there may be less revenue available to fund the centralized public outreach and education programs which have been crucial to achieving Pierce County's current diversion rates.

It remains an unknown whether higher disposal rates and the associated economic impetus to recycling is enough, or whether successful recycling programs need a constant base of education and information to continue successfully.

Long-haul alternatives: The County is currently under contract through 2011 with LRI for disposal. Waste has been hauled to the Roosevelt Regional Landfill. Shortly after the opening of the 304th Street Landfill,

County waste was sent to the new facility. If the County elects to continue long-haul after 2011 there are currently available other potential alternatives to the Roosevelt facility. The present status of the other options is summarized in Table 8.6. The future use of these facilities will need to consider financial, environmental and other factors that exist at the time.

Some of the regional landfills listed in Table 8-3 serve as backup disposal sites for others in case one of the landfills is unable to accept waste.

Seattle, Snohomish County, Lewis County, and several other smaller counties in Washington presently ship waste via rail to the regional landfills. Portland's regional government sends its waste via truck to one of the regional landfills. While both systems are reliably serving long-haul transportation needs, there are many factors which differentiate rail and truck hauling, including:

- *Scale:* Rail transportation is generally cost-efficient only on a large scale due to the high fixed costs of rail infrastructure, the work involved in assembling rail cars into trains, intermodal handling (truck to rail and vice versa) at one or both ends of the rail haul, and the fact that moving a 60-car train is much more cost-efficient than moving a 10-car train. Truck hauling, on the other hand, is easily scaled to whatever size is needed, and a relatively constant incremental cost is incurred for each additional truckload shipped. Because large-scale waste-by-rail is an established means of transporting waste to landfills in the Puget Sound region, the incremental cost for a new jurisdiction to add additional rail cars to the existing trains can be quite low.
- *Energy consumption and air emissions:* Rail transportation is more energy efficient and produces fewer air emissions than truck shipping.

- *Industry attitudes:* The railroad industry and trucking industry have markedly different histories that affect how they do business today. Railroads tend to be more bureaucratic, and are traditionally not geared for time-critical deliveries. The trucking industry is more entrepreneurial and can generally achieve the fastest door-to-door service. Each train contains many containers of waste, and the late arrival of a single train may delay operations at the landfill or transfer station. With trucking, each truckload may develop a problem or be late, but it is less likely that a single problem would cause *every* truck to be delayed, because trucks can be relatively easily re-routed around a problem, and more tractors/drivers can be brought in on relatively short notice.
- *Future capacity limitations:* Freight and passenger train use of the rail lines connecting Pierce County with the regional landfills is growing, and some believe it is unlikely that additional rail lines would be constructed. As rail line demand increases and reaches capacity, the cost of rail hauling will likely increase. These increased costs could make long-haul by rail less economical in 2011 than is reflected in today's contracts. Highway usage is subject to similar trends of increased usage with a limited capacity, but many believe that highway capacity will be increased in the future to keep pace with demand.
- *Backup methods:* Alternate transportation methods or routes are necessary when heavy rains, snow, flooding, or other factors interrupt deliveries. The rail-haul programs can use alternate but parallel rail routes (for example, there are two lines connecting Pierce County to the Portland area and running up the Columbia Gorge), alternate rail routes (running over the

Cascades to Spokane, and then to the regional landfills), or truck transportation over a variety of routes. Truck transportation can use alternate routes and additional tractors/drivers to help when necessary. Sometimes a single event could incapacitate both the primary and backup methods, leading to the need for short-term storage at transfer stations and/or long-haul vehicles, and for

- *Unit capacity.* A rail-haul system with direct rail access to the landfill site and direct rail access to the transportation site does not have to limit per-container weights to road-legal values. Waste-by-rail systems with this advantage can achieve even greater economies of scale due to reduced handling requirements.

disposal at backup landfills (locally, or at other regional landfills which are not affected by the transportation disruption).

Facility Name and Location	Ownership	Status	Access	Capacity
Adams County Landfill, Adams County, WA	Waste Management, Inc.	Construction not yet started. Land use and Solid Waste permit issued but under appeal. (Ownership changes in 1998 may reduce the possibility of this landfill being built.)	Truck and Rail	90 million tons.
Columbia Ridge Landfill, Gilliam County, OR	Waste Management, Inc.	Presently permitted and operated as a regional landfill accepting waste from many locations	Rail (using intermodal yard on facility site) and truck	123 million tons starting in 1990; approx. 8.5 million tons already consumed; remaining capacity approx. 72 years at 1.4 million tons per year
Finley Buttes Landfill, Morrow County, OR	Waste Connections	Presently permitted and operated as a regional landfill.	Truck; potential for rail, but intermodal yard would be minimum 10 miles away.	40 million tons starting in 1990
Roosevelt Regional Landfill, Klickitat County, WA	Regional Disposal Company (Allied Waste)	Presently permitted and operated as a regional landfill accepting waste from many locations	Rail (using intermodal yard in Roosevelt, several miles from landfill) and truck	120 million tons starting in 1991 (3 million tons per year over 40 years); received approx. 1.8 million tons in 1995
North Wasco County Landfill, The Dalles, OR	Waste Connections.	Presently permitted and operated as a relatively small landfill; Oregon DEQ permit application in progress for significant expansion	Truck	2.8 million tons at current facility; pending expansion permit would increase to 24 million tons
Cedar Hills Landfill King County, WA	King County	A publicly owned and operated landfill serving the King County, WA area (excluding Seattle).	Truck	30 million tons based on current plan of operations.

Flow control: The County's risk in undertaking its own long-haul program outside the contract with the haulers is heightened with the loss of flow control. Without the ability to commit waste to a County-initiated long-haul program, the County would probably not be able to receive competitive pricing for the long-haul services, and the haulers who do control the waste might choose more economical options within Pierce County or nearby. These other options, which could include general purpose MSW landfills, limited-purpose landfills, or recycling, would serve to further increase the unit costs of a County-initiated long-haul program. There may be less of an impact to disposal using the long-haul disposal alternative than if the County were required to support a fixed cost with a declining revenue base such as with development of an in-county landfill. Transfer costs, on the other hand, include a significant portion of fixed costs and, therefore, a reduction in total waste delivered would cause the per ton rate to increase.

Loss of system revenue due to a reduction in waste disposal would reduce the financial support to county-wide education programs unless rates were raised to support them

Interlocal agreements: Long-haul contracts typically obligate a solid waste management agency to commit a portion of the waste stream in a solid waste management area. The commitment is usually in the form of dedicating municipal solid waste, which is not recycled or otherwise diverted from the waste stream. If Pierce County were to proceed with long-haul for the 20-year period, the interlocal agreements with cities and towns would be advantageous in the negotiation of a favorable long-haul agreement.

Potential effects of waste reduction and recycling: Changes in waste reduction and recycling programs or other factors affecting

the quantity of waste diverted from the disposal waste stream would likely not impact the long-haul disposal options in terms of availability of required disposal capacity or the unit disposal cost (\$/ton).

Managing closed landfills: Current closure standards for landfills are intended to isolate municipal solid waste over a long period of time in order to minimize environmental impacts. In the future, it may be desirable to "mine" the materials or add gas/energy recovery to closed landfills, should markets and other conditions warrant.

There are currently no specific regulations or permit requirements for landfill mining, and if such an action was proposed, the Health Department would need to develop specific criteria under which to review such an action and get concurrence from Ecology. Landfill mining could potentially cause significant air quality impacts which would likely require SEPA review.

Landfill gas/energy recovery would require a Notice of Construction from the Puget Sound Air Pollution Control Authority. In addition, certain WAC 304-351 requirements would apply which would require review by the Health Department.

8.5.2 Tacoma/Ruston

The Tacoma Solid Waste Utility plans to continue recycling, composting, and landfilling. Due to changes in the recycling programs, the amount of wastes diverted to recycling and composting will change. In addition, the production process for RDF is currently under review and the amount of waste processed into RDF will also change. Implementation of these changes is scheduled for 2000 and 2001.

The Utility plans to keep the landfill open as long as permitted and to use it as part of its integrated waste management system. This will include by-pass for the Resource

Recovery Facility, backup for production of RDF due to maintenance and repair of the Resource Recovery Facility or Steam Plant No. 2, and for interruptions in long-haul services. The Utility's primary and alternative plans for future use of each disposal method are discussed in the following paragraphs.

Tacoma Landfill: The City plans to fill the Central Area of the Tacoma Landfill to the maximum grade allowed by its permit. In 1998, the Tacoma Landfill was granted an extension to continue landfilling until 2004. Under the Consent Decree, the City of Tacoma may request two additional five-year extensions. Approval of the two additional extensions, if granted, would allow the landfill to remain open until 2014. The City also plans to review and implement feasible options that would increase the amount of waste that can be disposed in the Central Area. Different options would include operational, design, and permitting changes that would increase the usable capacity of the Central Area. When the Central Area is full or if the additional time extensions are not granted, all wastes currently disposed in the Tacoma Landfill will be made into RDF or transshipped to an offsite landfill.

Use of private landfills: The City currently has a contract with LRI for long-haul disposal and for in-county disposal. The following is a brief review of two potential future disposal sites the City may use:

Roosevelt Regional Landfill: When the City's present contract with LRI for transportation and disposal of waste expires on December 31, 1999, the Tacoma Solid Waste Utility may request new bids for long-haul waste disposal services.

304th Street Landfill: The City may elect to use the 304th Street Landfill to reduce the amount of waste going to the Central Area or for some or all of its long term landfill

disposal needs. Disposal at the 304th Street Landfill can be accomplished using the existing contract or under a new re-procured contract.

8.5.3 Fort Lewis/McChord Air Force Base

Management of solid waste in the Fort Lewis/McChord AFB system is established by the *Solid Waste Management Plan for the Fort Lewis Military Reservation*, which was most recently updated in 1995. Because the incinerator was not able to meet emission requirements, Fort Lewis will rely on landfilling and is updating its Plan.

8.5.4 Joint Opportunities

Given the similarity of needs between the three waste management systems, joint efforts may present a cost-effective approach to dealing with independent system needs.

- Jointly develop and fund a publicly developed, in-county landfill,
- Fort Lewis/McChord could join the County's disposal agreement,
- Blend disposal contracts of all three systems,
- Cities may join together to develop their own disposal system.

8.6 Evaluation Criteria

Table 8-4 summarizes technical, environmental, and economic criteria to use in the evaluation of landfilling alternatives. The applicability, weighting, or particular emphasis will depend on the specific situation such as whether or not the proponent for siting an in-county landfill is a private sector applicant or the public sector and whether or not the facility is to handle MSW or other material. The criteria are fully described in the following.

Technical criteria

Permitting the likelihood that the alternative will be able to obtain the necessary permits to allow for construction and long-term operation.

Timing: The ability of the project to be brought on-line within a time frame consistent with the overall project objectives.

Capacity and size: Whether or not the alternative is of sufficient capacity and size to provide long-term service (generally considered to be 20 years or more for MSW disposal facilities).

Environmental criteria

Site characteristics: The degree to which site characteristics prevent or mitigate impacts to earth, air, and water resources.

Groundwater protection/hydrology: The degree to which subsurface conditions will prevent or mitigate impacts to groundwater resources in the area.

Land use: The compliance with applicable land use codes and regulations and compatibility with adjacent land uses.

Specific impacts: The degree to which operation of the facility results in impacts from noise and odor or other impacts.

Status of state legislation: Whether or not impending legislation could impact project feasibility related to economics, permitting, development time, or other factors critical for project success.

Economic criteria

Initial capital costs: The cost of developing the project including preplanning, design/construction of facilities, and mitigation costs.

Life-cycle costs: The total cost of disposal over the life of the disposal facility, or the planning period (typically the useful life plus post closure period), including project financing, operation, maintenance, renewals and replacement, and closure and post-closure costs and waste transportation.

Economic development: The extent to which the facility will contribute to economic development in Pierce County.

Other issues to consider

Back-up disposal capacity: The ability of an alternative to provide back-up disposal capacity in the event of emergency or other conditions, which disrupt the transportation of waste or make the disposal site unavailable for use.

Landbanking: The advantages and potential disadvantages of completing part or all of siting process on a specific parcel of land, and purchasing that land with the intent of “landbanking” for future use.

Long-term long-haul rates: The ability to assure that rates for long-haul will remain stable for the long-term and be subject only to escalation from general economic conditions (e.g., inflation, fuel prices) as opposed to rates which might rise sharply due to lack of cost competition or other factors.

A summary comparison of municipal solid landfill disposal alternatives is provided in Table 8.5.

Table 8-4 Evaluation Criteria—Solid Waste Disposal	
Technical Criteria	Related Questions and Issues
1. Capability to obtain required permits	<ul style="list-style-type: none"> • Are wetlands involved that could trigger a Corps of Engineers individual permit? ¹ • Can permitting requirements be clearly defined? • If privately developed, does the proposer have a track record in permitting similar facilities? • Have the project needs and objectives been clearly defined? • Has the site been selected based on criteria required under state law and consistent with the SWM plan?
2. Ability to bring project on line to meet project objectives	<ul style="list-style-type: none"> • Would significant delay be a fatal flaw to the project and, if so, how likely is a delay? • Has sufficient up-front planning been conducted so that a realistic schedule can be developed? • Do future phases of the project present possible serious schedule delays?
3. Adequate capacity and size	<ul style="list-style-type: none"> • Does the project provide for long-term disposal needs (20 years or more)? • Is the site of adequate size to accommodate support facilities (operations buildings, maintenance facility, gas and leachate collection, etc.) that may be required in the future? • Is all land for full facility development under current ownership of project developer (public or private)?
Environmental Criteria	
1. Site Characteristics	<ul style="list-style-type: none"> • Does site allow for adequate buffers and set backs? • Can aesthetic impacts be mitigated or required by land use and solid waste permits?
2. Groundwater Protection	<ul style="list-style-type: none"> • Have sufficient hydrogeologic studies been conducted to define subsurface conditions? • Do the subsurface conditions provide mitigation for potential leaks in liner systems?
3. Land use	<ul style="list-style-type: none"> • Does the facility comply with relevant zoning/comprehensive plan requirements? • Is the facility compatible with adjacent land uses?
4. Specific Impacts	<ul style="list-style-type: none"> • What is the affect of vehicle traffic to the facility on local traffic congestion? • Do operating equipment and procedures provide adequate control of noise? • What are the critical noise and odor receptors in the area and under what conditions are impacts most critical?
5. Status of State Legislation	<ul style="list-style-type: none"> • Is there any pending legislation which would significantly increase costs or technical requirements for the facility? • If contracting with the private sector can the County protect itself from changes in law?
Economic Criteria	
1. Initial Capital Costs	<ul style="list-style-type: none"> • Are initial capital costs difficult to estimate and subject to large variation? • Are all initial costs included such as equipment purchase, financing costs, site investigations?
2. Life Cycle Costs	<ul style="list-style-type: none"> • What is the relative life cycle cost of the alternatives? • Are operating costs difficult to estimate or subject to large variations? • Is the project particularly sensitive to economic factors such as operating cost escalation, and power rates? • Are later phases of the project undefined for which it is difficult to prepare accurate cost estimates? • How do flow control issues affect likely waste deliveries and project revenue? • Can long term rate stability be achieved; i.e. can the County achieve protection from large rate increases in the future?
3. Local Economic Development	<ul style="list-style-type: none"> • To what extent does the project contribute to economic development in Pierce County?

¹ A wetlands permit from the Corps may not be a pertinent issue if the decision of the 9th Circuit Court of Appeals on the 304th Street Landfill proposal stands.

Table 8-5 Summary Overview of Alternatives for Landfill Disposal of Municipal Solid Waste					
	Existing and Active Alternatives			Unknown proponents but identified possibilities	Alternatives for future contract decisions in 2011 for backup capacity
	Long-Haul	In-County		In-County	Other Long-haul
	Roosevelt Regional Landfill	304th St. Landfill	County-Owned	Other facility either municipally-owned or privately-owned	Other regional landfills Adams, Columbia Ridge, Finley Buttes, North Wasco, Cedar Hills
Technical					
Capability to obtain required permits	Permits in place for currently-operating landfill <ul style="list-style-type: none"> Needs clearly defined and consistent with goals and recommendations of Plan. 	Permitting complete <ul style="list-style-type: none"> Project needs clearly defined and consistent with the goals and recommendations of the Plan. Land use permits and permits from Health Department and Ecology obtained. 	Siting Study not completed <ul style="list-style-type: none"> Site selection not completed; preliminary selection process based on state law. Changes to state law made in 1999 must be evaluated. Necessity for wetlands permit to be identified in next phases. Permit requirements known, SEPA review yet to be conducted; permit conditions will depend upon results of SEPA review. County has sited other controversial facilities but not sited a landfill. Project needs and objectives clearly defined and consistent with goals and recommendations of Plan. 	No specific projects proposed. Capability to obtain permits unknown. <ul style="list-style-type: none"> Facilities would be in compliance with goals and objectives of Plan. 	Permits in place for currently operating landfills: Adams County, Columbia Ridge, Finley Buttes, North Wasco, Cedar Hills <ul style="list-style-type: none"> Sites consistent with Washington, Oregon, or Federal criteria therefore consistent with Plan. Tonnage disposal needs estimated for years 2012-2020. Other future needs not specifically identified. Need for backup capacity not specifically identified. Permits issued for Adams County Landfill are currently under appeal and scheduled to go before the Pollution Controls Hearing Board.

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Technical					
Ability to bring project on line to meet project objectives.	Landfill developed and operating	Project built <ul style="list-style-type: none"> • Project needs and objectives clearly stated. 	Initial steps need to be updated; evaluation of “permitability” yet to be completed. <ul style="list-style-type: none"> • Project needs and objectives clearly stated. • Project objectives remain achievable even with future delays because of interim long-haul disposal agreement. 	No specific projects proposed.	Landfills which are already operating can likely meet estimated disposal needs, provided that the required expansions are constructed.
Adequate site capacity and size.	Yes. Operating facility provides capacity for 20+ years	Yes. Site provides space for 20+ years <ul style="list-style-type: none"> • Site is under control of developer applicant. 	Yes. Candidate sites provide sufficient space for 20+ years <ul style="list-style-type: none"> • County does not own sites, but could use eminent domain authority, if necessary. County has identified sites with a minimum number of owners to make acquisition easier. 	No specific projects proposed.	Yes. At this time it is anticipated that operating facilities can provide 20+ years of capacity. Available capacity may change in future.

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Environmental Criteria					
Site characteristics mitigations.	Permits for facility identify necessary mitigations.	Mitigations required for land use and solid waste permits have been identified and permits approved.	Candidate sites appear to have suitable characteristics, but siting study is not complete. <ul style="list-style-type: none"> • Permit and SEPA review yet to be conducted; permit conditions will depend upon results of SEPA review. • Conceptual site plans include buffers/setbacks at least twice those require by regulation. • Compatibility with adjacent land use to be determined through permit review process. 	No specific projects proposed	Permits for operating facilities identify necessary mitigations.
Groundwater protection.	Permit from Klickitat County Health Department and Ecology approved the facility as meeting required conditions to protect groundwater.	Permits from Health Department and Ecology approved project as meeting required conditions to protect groundwater. <ul style="list-style-type: none"> • Hydrologic studies completed. 	Siting study not completed. <ul style="list-style-type: none"> • Limited data on subsurface conditions indicates that candidate site conditions are favorable; detailed investigations necessary. 	No specific projects proposed.	Permits from jurisdictional Health Departments the Washington Dept. of Ecology, or the Oregon Dept. of Environmental Quality (DEQ) approved the facilities as meeting required conditions to protect groundwater.

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Environmental					
Land Use	Landfill determined by Hearing Examiner to be compatible with zoning and adjacent land uses with mitigation	Landfill determined by Hearing Examiner to be compatible with zoning and adjacent land uses with mitigation.	Candidate sites proposed in areas zoned to allow landfills, but study is not complete. <ul style="list-style-type: none"> Sites would require a public hearing review process for a Public Facility Permit. Compatibility with adjacent land use to be determined. 	No specific projects proposed.	Facilities are in compliance with applicable zoning and are compatible with adjacent lands uses.
Economic Criteria					
Cost	Disposal services are under contract through 2011. <ul style="list-style-type: none"> Disposal rate of \$37.99 per ton in 1997 \$. Costs \$539 million based on haul of 14.2 million tons at a rate of \$37.99 per ton in 1997 \$. Future price increases limited to less than CPI. Flow control issue will not affect County costs. 	A great deal of information available to accurately develop cost estimates and disposal costs. <ul style="list-style-type: none"> Disposal rate proposed to range from \$20 to \$25 per ton in 1997 \$. Costs range from \$185 million to \$255 million less than long-haul of 14.2 million tons (1997 \$). Partial common ownership between LRI and haulers controlling waste flowing to private, in-county facility. 	Significant unknowns; more variability associated with cost estimated until site selected and additional evaluations are conducted. <ul style="list-style-type: none"> Preliminary estimates indicate costs in the range of \$29 to \$34 per ton. Unanticipated cost increases more likely due to preliminary nature of estimate. Costs range from \$62 million to \$127 million less than long-haul of 14.2 million tons. Waste deliveries can be controlled by setting attractive tipping fee; other revenue sources may be required if costs exceed tipping fee revenues. 	No specific projects proposed. Costs unavailable.	Current disposal contracts provide reasonable estimates of range of costs for future contracts. <ul style="list-style-type: none"> More sensitive to long-term uncontrollable cost escalations related to transportation of waste (labor, fuel, capacity or rail or road transportation routes). Flow control issues will likely not affect County costs for landfills in eastern Washington or Oregon. King County requires higher rates for waste coming from other out-of-county jurisdictions to the Cedar Hills Landfill.

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	Roosevelt Regional Landfill	304th St. Landfill	County-Owned	Other facility either municipally-owned or privately-owned	Other regional landfills Adams, Columbia Ridge, Finley Buttes, North Wasco, Cedar Hills
Economic development	<p>Less local employment; funds flow out-of-county.</p> <ul style="list-style-type: none"> • Provides fewer local employment opportunities; more funds flow out of community compared to in-county alternatives. 	<p>Local employment; reinvestment of local funds.</p> <ul style="list-style-type: none"> • Provides local employment for local reinvestment of project costs, but does not bring in new dollars to community (project costs paid with local funds). • Property tax revenues could be substantial due to private ownership. 	<p>Local employment; reinvestment of local funds.</p> <ul style="list-style-type: none"> • Provides local employment for local reinvestment of project costs, but does not bring in new dollars to community (project costs paid with local funds). 	<p>No specific projects proposed.</p>	<p>Less local employment; funds flow out-of-county.</p> <ul style="list-style-type: none"> • Provides fewer local employment opportunities; more funds flow out of community compared to in-county alternatives.

8.7 Recommendations

Out-of-County disposal

#8-1 If there is a lack of landfill capacity in Pierce County for solid waste generated in the Pierce County solid waste management system in the future or if the County determines by resolution that out-of-county disposal options are cost effective, then the County may contract for the use of an out-of-county landfill.

Public siting process

#8-2 County government should maintain Phase I of the Pierce County Landfill Siting Study in a current status by revising the “Composite Map of Exclusionary Areas for Countywide Screening” as the exclusionary criteria change. These revisions should be made in conjunction with updates to the Solid Waste Management Plan.

Permits and decision-making related to Municipal Solid Waste Disposal

#8-3 When the Tacoma-Pierce County Health Department and the Pierce County Department of Planning and Land Services review permit applications to site, develop, and operate new MSW landfills, or to expand existing MSW landfills in Pierce County or whenever Pierce County is considering decisions to contract for MSW disposal, the agencies must include in the decision-making process an evaluation of:

- Effect on public health and safety;
- Protection of the environment, including aquifers and waters of the State;
- Pierce County’s waste generation habits and trends with an assurance that options are adequate for meeting Pierce County’s waste generation needs;
- Competition for disposal services;
- Meeting potential emergency needs should a primary disposal site suddenly become unavailable; and
- The costs of using various alternatives which will be analyzed and verified through the use of publicly available data published by other government organizations, formal requests for proposals, qualifications or information (RFP, RFQ, or RFI), or through another method as recommended by the Solid Waste Advisory Committee.

The Solid Waste Division shall have primary responsibility for the evaluation, but will work with the Department of Planning and Land Services, the Tacoma-Pierce County Health Department and the applicant to minimize duplication of effort.

#8-4 MSW landfill expansions within unincorporated Pierce County shall undergo a permitting process with adequate public notice and opportunity for public comment. Expansions shall be required to meet the regulations in effect at the time of expansion and to protect public health and safety and the environment. Expansions shall be prohibited for any landfill that is in violation of existing surface water or groundwater standards.

Reserve disposal capacity

- #8-5** The County shall require, to the extent allowed by law, private MSW disposal companies located within unincorporated Pierce County to reserve existing disposal capacity to handle MSW generated within the Pierce County solid waste management systems. When negotiating disposal contracts with any such facility owner/operator, the County shall propose terms which:
- Reserve adequate disposal capacity to serve the Pierce County solid waste disposal system as projected in the ‘County-wide’ column of Table 8-2, ‘Projected Long Term Disposal Needs;’
 - Require the mutual agreement of the contracting parties before the contractor can bring in waste from outside the County solid waste management system.
- #8-6** No municipal solid waste landfill located within unincorporated Pierce County shall accept waste from outside the Pierce County solid waste management systems without addressing the impacts of that action. The impacts under the facility’s conditional use permit shall be reviewed by the Pierce County Hearing Examiner. The impacts under the facility’s solid waste handling permit shall be reviewed by the Tacoma-Pierce County Health Department. These reviews shall be conducted as a public process and follow the applicable laws and regulations governing the conditional use permit and the solid waste handling permit processes. The results of the review shall be reported at a Pierce County Council meeting.
- #8-7** While this Plan recognizes and describes the complex authorities and regulation of waste disposal, nothing in the Plan specifically authorizes or specifically prohibits the importation of solid waste from outside the County solid waste management systems to MSW landfills located in unincorporated Pierce County.

Public Process

- #8-8** Before approving the acceptance of municipal solid waste from outside the Pierce County solid waste management systems or before approving a substantial change in the design or operation of a municipal solid waste landfill within unincorporated Pierce County, the TPCHD shall give the public notice of the issue and provide the public an opportunity to be heard.

Tacoma Landfill improvements

- #8-9** Continued landfill improvements at the City of Tacoma Landfill are recommended. The City should continue to evaluate all available options to obtain additional landfill space.

Tacoma Disposal Needs – Long Haul and In-County

- #8-10** To reduce the amount of waste going to the Tacoma landfill, and when the Tacoma landfill reaches its capacity, the City may implement long-haul disposal or use the 304th Street Landfill for some or all of its disposal needs.