

2006 Kitsap County Organic Waste Management Study

Prepared for the
Kitsap County Public Works Department
Solid Waste Division

**Cascadia Consulting Group
LARK Environmental**

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Executive Summary

The goal of the Kitsap County Solid Waste Division (SWD) is to provide its citizens with an organic waste management system that is convenient and reliable, and maximizes diversion within the constraints of economics. The SWD hired Cascadia Consulting Group, Inc. to develop an organic waste management plan to help them achieve this goal.

This project had seven primary steps, as follows:

1. Inventory organic waste generated in Kitsap County.
2. Inventory existing processing facilities and collection infrastructure in Kitsap and north Mason Counties.
3. Identify the need for additional processing facilities, collection infrastructure, or market development.
4. Generate a list of options to meet the identified needs.
5. Conduct stakeholder meetings to solicit input and feedback from industry representatives.
6. Evaluate these options based on a set of objective criteria.
7. Develop a set of recommendations for management of organic waste in Kitsap County.

The SWD identified the following organic waste streams as priorities for this analysis:

- **Landclearing debris**, or the stumps, brush, dirt, rocks and other debris generated when land is cleared for development.
- **Urban wood waste**, defined as clean wood waste, pallets and crates, and contaminated wood from demolition projects.
- **Yard waste**, such as leaves, grass, brush, and other debris generated from regular yard maintenance or small landscaping projects.
- **Food waste**, including both pre- and post-consumer food waste, and other compostable materials commonly found in residential garbage such as pizza boxes or food-soiled paper.
- **Biosolids**, which are the reusable, solid products of wastewater treatment plants.

After estimating organic waste generation in Kitsap County and inventorying existing infrastructure in Kitsap County and north Mason County, the consultant team identified a number of key issues to address in this plan.

Table ES-1: Key Issues to Address

Waste Stream	Issues
Landclearing Debris	1. Current processing capacity may not be sufficient to handle the amount generated annually.
	2. Stakeholders desire additional collection capacity in the north and central sections of the county.
	3. Markets are cyclical and currently quite poor.

Waste Stream	Issues
Urban Wood Waste	1. Source separation of clean wood waste does not appear to be the norm among contractors.
	2. No collection facilities for clean wood waste exist in the north and central sections of Kitsap County.
Yard Waste	1. Although most residents manage their yard waste on-site or recycle it (Gilmore Group, 2001), a small amount of yard waste is still disposed as garbage.
	2. Illegal dumping of yard waste is a problem (Brower, 2005)
	3. Significant percentages of Kitsap County residents do not know that drop-off facilities (34%) and curbside collection (21%) are available to them (Gilmore Group, 2001).
Food Waste	1. With the exception of planned private processing capacity, there is no system in place to recycle food wastes.
Biosolids	1. Wastewater treatment plant operators would like less costly, local ways to manage biosolids.

The consultant team developed a comprehensive set of options to address these issues, and held two stakeholder meetings to collect input from the business and regulatory community on them. We then evaluated the options against ten criteria, as follows:

1. Technical feasibility
2. Stakeholder support
3. Cost
4. Effectiveness
5. Ability to use existing infrastructure to implement the option
6. Expansion potential
7. Compliance with existing regulations
8. Local solution (including Kitsap, Mason, and Pierce counties)
9. Suitable sites exist for developing new infrastructure
10. Convenience

This analysis resulted in the following action plan, which presents steps that the consultant team believes the SWD should undertake immediately, in the near term, and over the long term.

Immediate Recommendations

The consultant team believes the SWD should undertake the following actions no later than December 2006.

Overall

1. Serve as advocates in the permitting process for entrepreneurs who want to start new organics-management facilities, and convene a process to examine ways to streamline the permitting process.

Landclearing Debris

2. Develop and adopt best management practices for using landclearing debris on-site.
3. If a private company indicates a firm commitment to establish a new collection site for landclearing debris and clean wood waste in the north and/or central areas, monitor their progress through 2006.

Urban Wood Waste

4. If a private sector company indicates a firm commitment to establish a new collection site for urban wood waste in the north and/or central areas, monitor their progress through 2006.
5. Continue to educate contractors about the Built Green and LEED programs.
6. Continue to increase demand for green buildings through promotion to residents and businesses, in conjunction with the Home Builders Association.

Yard Waste

7. Survey residents and businesses, including landscapers, to determine current yard-waste behaviors, what they would like in a system, and what is needed to convince more of them to sign up for curbside yard waste collection.
8. Using the information gathered from the survey recommended in Recommendation 7, adjust existing programs or develop new ones to encourage more residents to compost at home and/or sign up for curbside collection service.

Food Waste

9. Require the certificated hauler to co-collect food waste with yard waste curbside service.
10. Conduct a brief survey of grocery stores and restaurants to discover what incentives would be most effective at encouraging them to source-separate food waste for composting. Incentives could include technical assistance, training staff, or subsidies of recycling bins.

Biosolids

11. Encourage treatment plants to contract with local facilities to compost biosolids or produce Class A biosolids.
12. Educate the public about the benefits and safety of composted biosolids and Class A by-products.

Other Waste

13. Join the Department of Ecology's work group to develop new regulations and management options for managing street waste solids and vector waste. If the committee is already full, the SWD should track its efforts and encourage the Association of Washington Counties to do the same.

Near Term Recommendations

The SWD should act upon these recommendations between 2007 and 2010.

Overall

14. Continue to serve as advocates in the permitting process, and continue to encourage regulatory agencies to find ways to streamline the permitting process while maintaining the current level of environmental and public health protection.
15. Encourage the Kitsap County Department of Community Development to adopt soil quality standards that call for amending soil in new developments with organic matter.

Landclearing Debris

16. Educate contractors about best management practices for using landclearing debris on site.
17. If collection sites are not in process by the end of 2006, seek a public-private partnership for opening them.
18. If the Puget Sound Clean Air Agency establishes a landclearing burn ban in Kitsap County and the private sector cannot process all of the landclearing debris generated in the county, commission a feasibility study to examine the potential for a waste-to-energy plant and/or a study of alternative value-added markets for landclearing debris, perhaps in conjunction with the Washington State University Energy Program. In the meantime, use landclearing debris to reclaim gravel pits.

Urban Wood Waste

19. If the private sector has not begun work on collection sites for clean wood in the central and north areas of the county by the end of 2006, seek a public-private partnership for opening them.

Yard Waste

20. Fix public access to the Silverdale drop-box facility's yard waste containers.
21. Develop best management practices for yard waste handling in the landscaping industry.
22. Expand home-composting programs to include sales of yard and food waste composting bins.

Food Waste

23. Based upon the brief survey of commercial and institutional generators, develop and implement an incentive program to encourage these generators to source-separate food waste.
24. Encourage local cities to contract to co-collect food waste with curbside yard waste.

25. Offer incentives to commercial and institutional generators to recycle food waste.

Biosolids

26. Continue to educate the public about the benefits and safety of composted biosolids and Class A by-products.

Other Waste

27. Coordinate with the Kitsap County Conservation District's efforts to help farmers reduce and properly manage animal waste.

28. Coordinate with Mason County to encourage Kitsap County farmers to send manure to the Mason County Conservation District's anaerobic digester.

29. Work with tribal hatcheries and fisheries to encourage the use of best management practices for fish mortalities.

30. Depending upon the new regulations governing the disposal of street waste solids and vector wastes, seek ways to reuse or recycle these materials.

Long Term Recommendations

The SWD should implement these options over the long term.

Overall

31. Continue to serve as advocates in the permitting process, and continue to encourage regulatory agencies to find ways to streamline the permitting process while maintaining the current level of environmental and public health protection.

Landclearing Debris

32. Continue to educate contractors about best management practices for using landclearing debris on site.

33. If the private sector still is not processing all landclearing debris, act on the recommendations of the feasibility study and/or the study of ways to create additional value-added markets for landclearing debris. If necessary, continue to use landclearing debris to reclaim gravel pits.

Urban Wood Waste

34. Continue to educate contractors about the Built Green and LEED programs.

35. Continue to increase demand for green buildings through promotion to residents and businesses, in conjunction with the Home Builders Association.

Yard Waste

36. Ban disposal of yard waste at the curb, at drop-box facilities, and at Olympic View Transfer Station (OVTS).

Food Waste

37. Continue to educate residents and businesses about the proper way to recycle food waste.
38. Continue to offer incentives to businesses to source-separate food waste.

Biosolids

39. Continue to educate residents and businesses about the benefits and safety of composted biosolids and Class A by-products.

Other Waste

40. Continue to support the Kitsap County Conservation District's efforts to help farmers reduce and properly manage wastes.
41. Continue to provide technical assistance and information to the fish industry, as needed.

This action plan identifies concrete steps that the SWD can take to improve organics management in Kitsap County. The consultant team believes that implementation of these recommendations will enhance the scope and reliability of organic waste management in Kitsap County within the constraints of economics.

1 Background

The Kitsap County Solid Waste Division (SWD) offers a comprehensive waste reduction, recycling, and disposal program to its citizens and businesses. The SWD has established convenient and effective solid waste and recycling systems for common household recyclables such as mixed paper, cardboard, scrap metal, appliances, and glass, plastic and metal food and beverage containers. The SWD has also identified ways for its citizens to recycle materials such as certain construction and demolition debris, electronics, and a variety of household hazardous materials, such as paint, cleaners, automotive products, batteries, and fluorescent light bulbs.

The SWD and each city in Kitsap County have directed their recycling hauler to provide curbside yard waste collection service within the permanent residential burn bans boundaries. The SWD and the City of Bainbridge Island operate drop-box facilities to collect yard debris. Additionally, the SWD holds periodic Yard Waste Amnesty events to collect yard debris from residents and introduce them to local businesses that recycle yard waste. To accompany these efforts, Kitsap County conducts several education programs, including a Master Composter training and two-hour home composting classes, operates four compost demonstration sites, and distributes information on other waste-saving practices, such as mulch mowing.

The private sector contributes greatly to the management of organic waste in Kitsap County. A wide variety of firms offer chipping services for yard and landclearing debris, compost organic waste into topsoil or compost products, and market recycled organic debris as landscape products or hog fuel.

Other organic waste from Kitsap County are also managed for beneficial use. Biosolids from City and County wastewater treatment plants have been put to beneficial use for many years in forestry and agricultural applications. Kitsap County also promotes the use of chipper services for landclearing or other woody debris.

These programs represent great successes in managing organic waste streams effectively. However, a number of factors indicate that additional effort is needed. These include the following:

- The Puget Sound Clean Air Agency plans to extend the ban on burning landclearing debris to unincorporated Kitsap County, removing one primary means of managing this material.
- Other organic waste such as food waste and clean wood waste are mostly disposed rather than reused or recycled.
- A number of private-sector operations that handle organic waste in Kitsap County have stopped accepting landclearing debris and/or wood wastes, making the current system somewhat unreliable and frustrating for users.
- Although all biosolids produced in the County are beneficially used, wastewater treatment plant operators are interested in additional options for managing biosolids.
- Stakeholders indicate that the number and cost of permits and the regulatory environment makes siting and operating organics management facilities time-consuming and expensive.

2 Project Purpose and Overview

The SWD's ultimate goal is to ensure that a convenient, reliable, and efficient system is available to its citizens, and to maximize the recovery of organic waste within economic constraints. The purpose of this project was to evaluate the current organic waste management system in Kitsap County and recommend ways that the County can ensure a system that meets the current and future needs of the community and the County's obligation to manage wastes under State law. This project had seven primary steps, as follows:

1. Inventory organic waste generated in Kitsap County.
2. Inventory existing processing facilities and collection infrastructure in Kitsap and north Mason Counties.
3. Identify the need for additional processing facilities, collection infrastructure, or market development.
4. Generate a list of options to meet the identified needs.
5. Conduct stakeholder meetings to solicit input and feedback from industry representatives.
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- **Yard waste**, such as leaves, grass, brush, and other debris generated from regular yard maintenance or small landscaping projects.
- **Food waste**, including both pre- and post-consumer food waste, and other compostable materials commonly found in residential garbage such as pizza boxes or food-soiled paper.
- **Biosolids**, which are the reusable, solid products of wastewater treatment plants.

This report presents the results of this work. Section 3 presents estimates of organic waste generation in Kitsap County, while Section 4 describes the current organic waste management system and presents an analysis of this information as a set of key findings. Section 5 presents the evaluation criteria and list of options developed to address problems and opportunities in the current system, and describes the evaluation of each option. Section 6 presents recommendations.

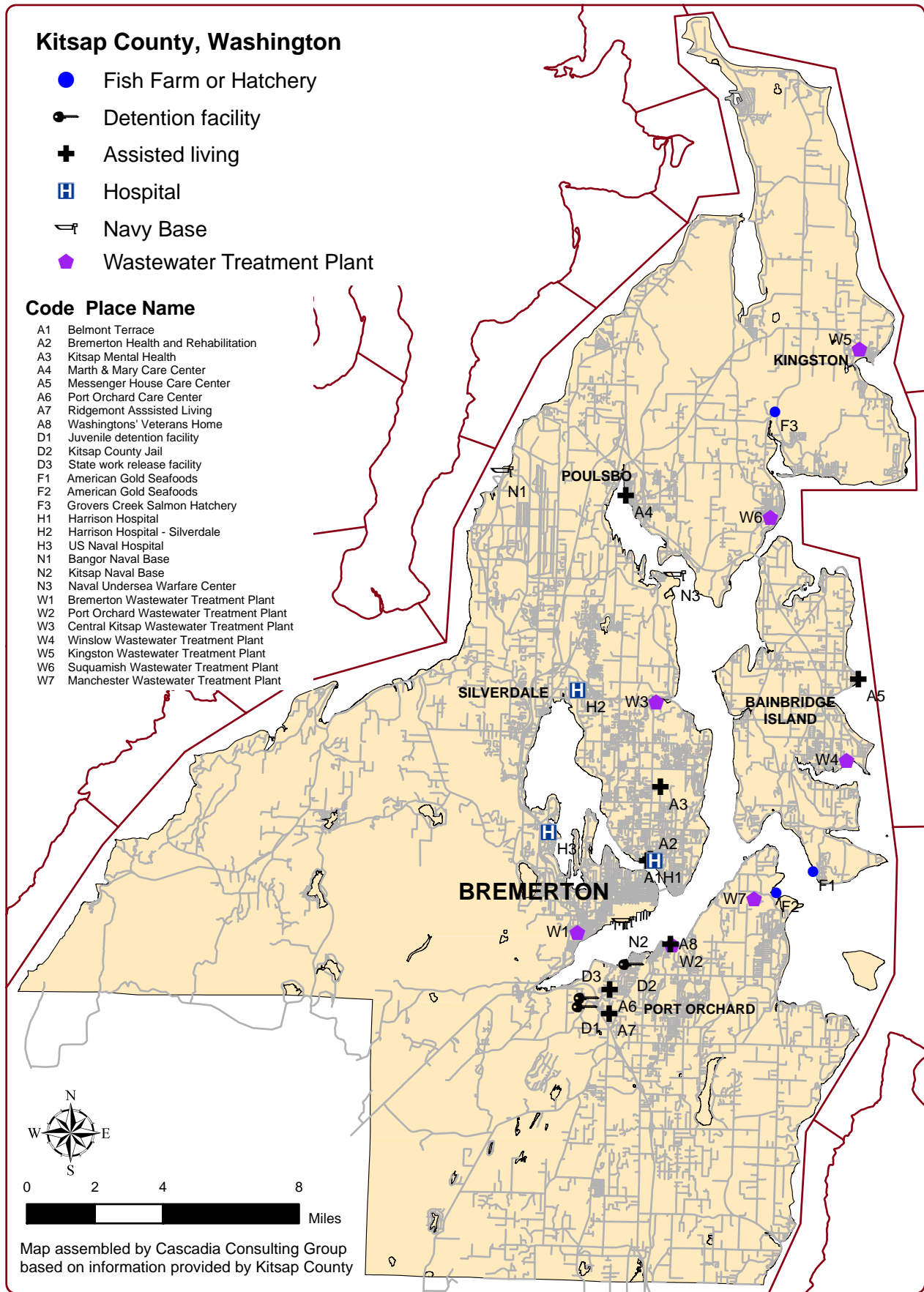
3 Estimated Organic Material Generation

Before recommending ways to expand and enhance organics management, it is necessary to estimate how much of this waste is generated annually. However, the SWD was interested in understanding not only how much of each type of organic waste is generated in Kitsap County, but also what institutions generate the majority of these wastes. Using publicly available databases of employment statistics, web searches, the phone book, and discussions with the SWD, the consultant team identified a list of major generators of organic waste in Kitsap County. Figure 1 shows the locations of many of these generators in Kitsap County.

We then used a variety of methods to estimate the amount of each type of organic waste that each generator type produces in one year. Because very little primary data exists about quantities of organic waste in Kitsap County, for most generators and types of organic waste the consultant team modeled generation based on studies performed in other areas, interviews with industry representatives, and publicly available data. These methods are described briefly below; for additional detail, please refer to Appendix A.

- For **grocery stores, schools, restaurants, and wholesalers** of nondurable goods, the consultant team used the 2002 Economic Census to determine the number of employees in each industry group. For each group, we multiplied the number of employees by the per-employee disposal figure reported in the *1999 Statewide Waste Characterization Study: Results and Final Report*, published by the California Integrated Waste Management Board (CIWMB, 1999). This calculation produced an estimate of the total amount of material disposed in Kitsap County by each industry group. A waste composition profile specific to each industry group was then found in the CIWMB report, and the composition profile was applied to the total tons estimated to be disposed, to produce an estimated itemization of organic materials disposed by each industry group.
- For **correctional facilities, assisted living facilities, and hospitals**, the consultant team first determined the number of beds in each facility through interviews with facility representatives or published data. We then applied the disposal quantities per bed and composition profiles established through sampling wastes from dormitories studied as part of the *University of Washington Waste Characterization Study* (Cascadia Consulting Group, Inc., 2004a).
- For **military wastes**, the consultant team first obtained an estimate of total waste disposed from the SWD. Discussions with military personnel allowed us to divide this tonnage into residential and non-residential estimates. The consultant team used data from military cafeterias on Whidbey Island to estimate food waste from common dining areas, and modeled the military residential and non-residential waste streams using composition profiles from the *Thurston County Waste Composition Study* (Green Solutions and Skumatz Economic Research Associates, 2000).
- For **residential self-haul, commercial self-haul, and commercially hauled residential waste**, the consultant team obtained disposal estimates from the SWD. We then applied composition profiles from the *Thurston County Waste Composition Study* (Green Solutions and Skumatz Economic Research Associates, 2000) to estimate disposal of each type of organic waste.

Figure 1: Select Organic Waste Generators



- For **landclearing debris**, the consultant team interviewed all known processors of landclearing debris to determine how much of this material is recycled each year, although not all processors were willing to share this information with us. Contractors and developers say that burning, not recycling, is the primary means of handling this material. It is not possible with current data to determine a reasonable estimate of the amount of landclearing debris managed on-site. Therefore, this number is an underestimate, as described in Appendix A. Appendix H presents a summary of these interviews.
- For **biosolids**, the consultant team interviewed representatives of each wastewater treatment plant in Kitsap County.
- For **fish wastes**, the consultant team interviewed a representative of the major commercial fishery operation in the county. The Suquamish Tribe hatchery did not respond to repeated requests for information.
- For the **Kitsap County Fair** compost pile, the SWD provided the dimensions of the pad and the estimated height of the pile that is formed by the conclusion of the fair. The consultant team calculated the number of cubic yards in the pile, and applied an estimated density of 143 pounds per cubic yard derived from a 2004 study for San Bernardino County, California, entitled *Recoverable Material Waste Characterization Study: Self-hauled and Loose Roll-off Box Waste* (Cascadia Consulting Group, Inc., 2004c).
- The consultant team relied on interviews with representatives of private composting and chipping operations, and the 2004 Washington Department of Ecology Annual Recycling Survey for estimates of **recovered wastes** in Kitsap County.

Table 1 presents the amount of organic waste disposed in Kitsap County, by major generator type.

Table 1: Estimated Quantities of Organic Waste Disposed in Kitsap County Annually

DISPOSAL Sector	Total Tons	Organic Tons					Total tons of organic waste per sector
	Total tons in municipal solid waste stream	Food	Yard Waste	Compostable Paper ¹	Urban Wood	Fisheries	
Grocery stores	5,464	2,186	82	137			2,404
Schools	1,864	378	503	112			994
Restaurants	16,926	9,479	34	372			9,885
Wholesale Nondurable	413	93	31	26			149
Correctional facilities	211	71	1	45	0		117
Assisted Living	550	186	2	118			305
Military - common dining	612	612					612
Military - residential	5,742	804	241	356	52		1,453
Military - nonresidential	6,266	101	86	108	1,776		2,070
Hospitals	1,114	423		202			625
Self-hauled residential waste	35,810	6,034	1,608	665	3,416		11,723
Self-hauled commercial waste	37,166	598	509	641	10,533		12,281
Commercially hauled residential waste	52,076	11,592	1,963	3,260	437		17,253
Total Disposed	164,214	32,557	5,060	6,041	16,214	0	59,871

¹ Compostable Paper includes paper towels, paper plates, waxed paper, tissues, and other papers that were soiled with food during use (e.g., pizza box inserts).

Table 2 shows the amount of organic waste recovered in Kitsap County, according to a variety of sources as described above.

Table 2: Estimated Quantities of Organic Waste Recovered in Kitsap County Annually

RECOVERY	Food	Landclearing	Yard Waste	Biosolids	Compostable Paper ¹	Urban Wood	Fisheries
Biosolids				10,000			
Fisheries							455
County fair pad (1380 cy)			99				
Materials recovered through local processors	0	60,000	25,000	0	0	15,000	0
Recovered materials reported to Ecology	223	7,245	7,380			2,062	
Wood to Energy reported to Ecology						1,023	
Total Recovered	223	67,245	32,479	10,000	0	18,085	455

¹ Compostable Paper includes paper towels, paper plates, waxed paper, tissues, and other papers that were soiled with food during use (e.g., pizza box inserts).

For most waste streams, the total generation of organic waste equals the sum of the amounts of waste disposed, recovered, burned, and home composted. Table 3 shows the estimated amounts

of organic waste generated in Kitsap County annually; however, reliable data about the amount of waste burned and home composted is not available.

Table 3: Estimated Total Generation of Organic Waste in Kitsap County Annually

GENERATION	Food	Landclearing	Yard Waste	Biosolids ¹	Compostable Paper ²	Urban Wood	Fisheries
Disposal	32,557	N/A	5,060	0	6,041	16,214	N/A
Recovery	223	67,245	32,479	10,000	0	18,085	455
Burned ³	N/A	50,000 to 310,000	N/A	--	N/A	N/A	N/A
Home Composted	N/A	N/A	N/A	--	N/A	N/A	N/A
Total Generation	32,780	120,000 to 380,000	37,539	10,000	6,041	34,299	455

¹ Burning and home composting are not appropriate management methods for biosolids.

² Compostable Paper includes paper towels, paper plates, waxed paper, tissues, and other papers that were soiled with food during use (e.g., pizza box inserts).

³ Reliable information is not available for the amount of waste burned or home composted in Kitsap County.

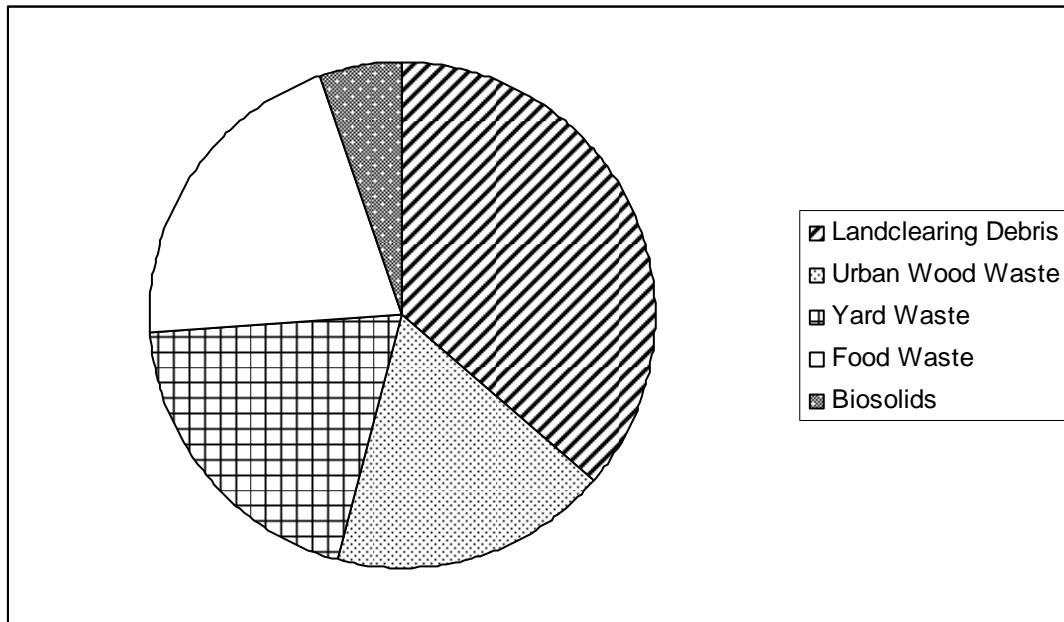
Although Table 3 presents the consultant team’s best estimate of generation of organic waste in Kitsap County, these estimates significantly underestimate the generation of three important waste streams: landclearing debris, yard waste, and wood waste.

- As mentioned above, contractors and developers report that the primary means of managing **landclearing debris** are to burn it or stockpile it on-site. Therefore, it is possible that the majority of this waste never goes to the transfer station or to a processor, where it could be captured in this study.
- Similarly, because lot sizes in Kitsap County tend to be large, many residents burn, compost, or pile up **yard waste** on their property, thereby by-passing the system.
- Stakeholders report that the two primary methods of managing **wood waste** are to burn it or dispose of it in the landfill. This analysis captures the wood sent to the landfill but not the amount of wood burned annually.

Therefore, the estimates presented in Table 3 for landclearing debris, yard waste, and wood waste are best treated as the minimum amount generated annually. Appendix A discusses estimates of landclearing debris generation from two other studies and the consultant team’s analysis of permit data in Kitsap County. These estimates vary widely – from 120,000 tons to 380,000 tons – and it is not possible with current data to determine a reasonable estimate of landclearing debris generated and managed on-site.

Figure 2 shows how the individual waste streams combine to create the overall organic waste stream in Kitsap County.

Figure 2: Estimated Composition of the Organics Waste Stream in Kitsap County



The consultant team derived the following key findings from this exercise:

- Significant gaps in waste generation data exist, including the amounts of organic waste burned and home-composted annually in Kitsap County.
- **Nearly 40,000 tons of food waste and compostable paper¹** are discarded in Kitsap County annually.
- **At least 70,000 tons of landclearing debris are processed annually**
- An additional 50,000 to 310,000 tons of landclearing debris are generated and burned on-site.
- **Public and private yard waste programs are working.** About six times as much yard waste is recovered as disposed.
- **Approximately 10,000 tons of biosolids** are available for composting or other management methods.
- **About 16,000 tons of wood wastes are disposed** as garbage annually.

¹ Compostable Paper includes paper towels, paper plates, waxed paper, tissues, and other papers that were soiled with food during use (e.g., pizza box inserts).

4 Current Infrastructure

The second step in the consultant team's work to understand the current organic waste management system in Kitsap County was to inventory the infrastructure available to handle each waste stream of interest. The SWD directed that the infrastructure analysis include north Mason County as well as Kitsap County. The consultant team obtained this information in a variety of ways, including the following:

- Interviews with a variety of key players in Kitsap County, Mason County, and around western Washington;
- Analysis of data from the SWD; and
- Input from a meeting held on August 10, 2005 to solicit suggestions from stakeholders for enhancing the organic-waste management system in Kitsap County. Appendix B contains a summary of the feedback gathered at this meeting and a list of attendees.

This section of the report presents the results of this analysis. It begins with an overview of the current organic waste management system in Kitsap County, followed by a more detailed analysis of each major organic waste stream.

4.1 Overview

This section summarizes the overall organic waste management system in Kitsap County.

4.1.1 Generation

Residents and businesses in Kitsap County generate a substantial amount of organic waste annually. Table 3 presents detailed generation estimates for the organic waste streams of interest to this study. To summarize, the approximate generation for each waste stream is as follows:

- Landclearing debris: 120,000 to 380,000 tons (at least 70,000 tons processed)
- Urban wood waste: 34,000 tons
- Yard waste: 38,000 tons
- Food waste and compostable paper: 40,000 tons
- Biosolids: 10,000 tons

It is important to note that an unknown amount of urban wood waste is burned rather than disposed or recycled. Residents and businesses manage an additional unknown amount of yard waste on-site, through burning or composting. Therefore, the generation estimates used in this study are underestimates.

4.1.2 Collection

Collection systems for most waste streams are fairly well established. The County operates a system of drop boxes to collect yard waste, and the WUTC-certificated hauler offers curbside yard waste collection to households within the permanent burn ban boundaries of the unincorporated county. Private sector operations accept landclearing debris, clean wood, and yard waste for recycling on-site, while other companies offer mobile chipping services for these

wastes. However, stakeholders desire additional collection capacity for landclearing debris and urban wood waste in the north and central sections of the county. There is no system in place to collect food waste. Wastewater treatment plants in the county produce biosolids from wastewater collected through the sewer system. Figure 3 shows the locations of current and potential drop-off sites for organic waste in Kitsap County and north Mason County.

As Table 2 shows, the approximate amount of each waste stream recovered for recycling is as follows:

- Landclearing debris: at least 70,000 tons
- Urban wood waste: 18,000 tons
- Yard waste: 33, 000 tons
- Food waste and compostable paper: 200 tons
- Biosolids: 10,000 tons

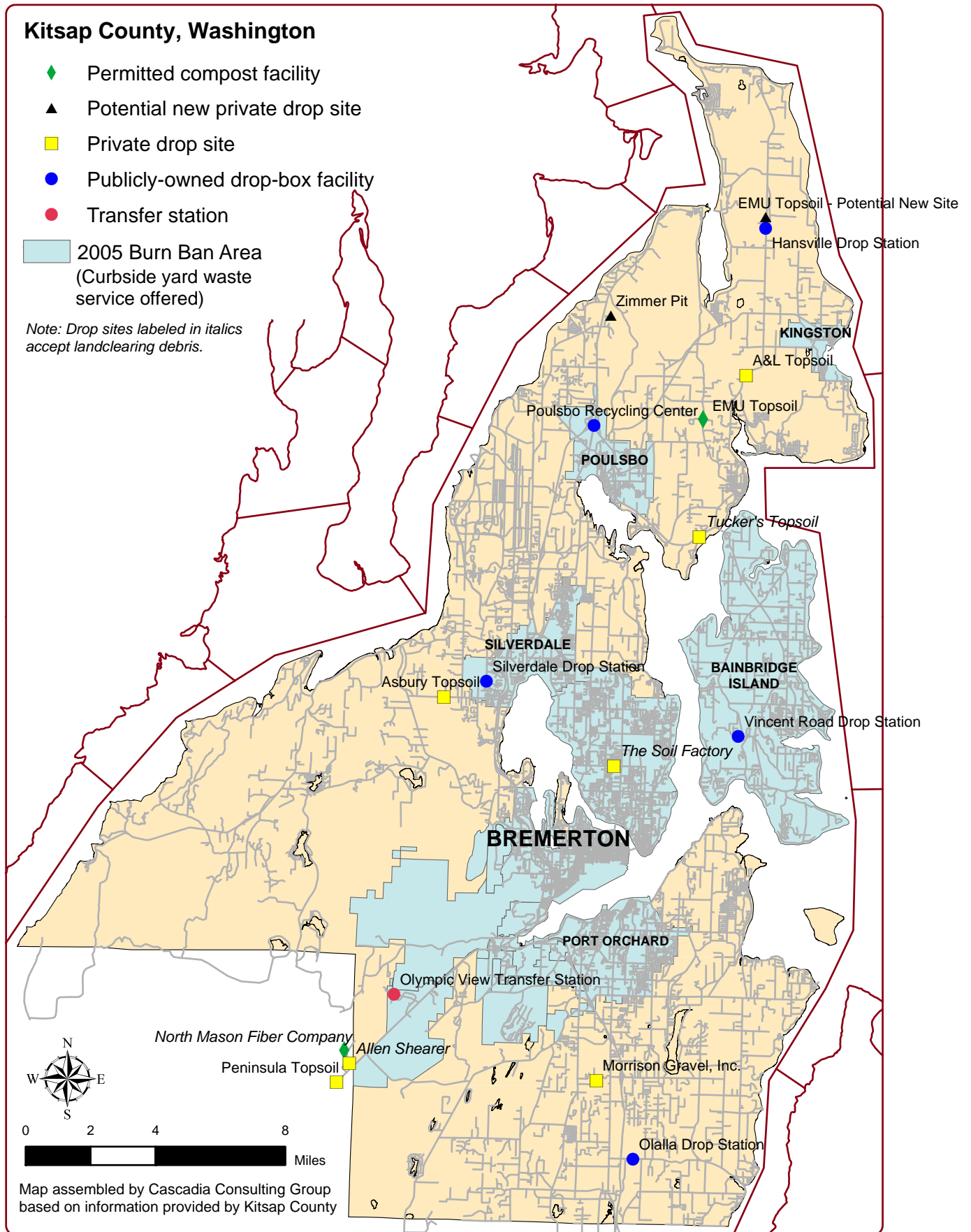
4.1.3 Transportation

A sizable fleet of trucks transports organic waste in Kitsap County. Most of the private chippers and compost operations own trucks capable of transporting organic debris. In our survey of processors, operators reported a total of eleven trucks ranging in capacity from 4 cubic yards to 13 cubic yards. Owners of hauling companies reported eight trucks ranging in capacity from 20 cubic yards to 75 cubic yards. (However, it is important to note that not all processors and hauling companies participated in our survey.) A detailed list of private-sector operations, hauling companies, and their equipment, including trucks, is in Appendix C.

Solid waste companies and public entities also operate trucks in Kitsap County. Waste Management, Inc. provides garbage and recycling service in unincorporated Kitsap County under the authority of the Washington Utilities and Transportation Commission (WUTC). The Cities of Bremerton and Port Orchard also contract with Waste Management, Inc. to provide these services. The City of Poulsbo Department of Public Works collects garbage in that city, and Bainbridge Disposal collects garbage and recycling on Bainbridge Island under WUTC authority and recycling in Poulsbo under contract. The Navy uses a fleet of trucks to self-haul its garbage and recyclables. The capacity of these fleets is as follows:

- Waste Management, Inc: five 8-ton trucks, and five 16-ton trucks (Bickle, 2005)
- Poulsbo Department of Public Works: four 25-cubic yard trucks (Poulsbo Public Works, 2005)
- Bainbridge Disposal: four 20-ton trucks (Dressel, 2005a)
- U.S. Navy (Bremerton): five 10-ton roll-off trucks, and two 8-ton packer trucks (Lacey, 2005)
- U.S. Navy (Bangor): two 10-ton roll-off trucks, and two 8-ton packer trucks (Lacey, 2005)

Figure 3: Current or Potential Drop Sites for Organic Debris



4.1.4 Processing

A fairly large number of private operations chip organic waste in Kitsap County and north Mason County, and several of these also compost organic waste. North Mason Fiber is the largest processor of organic waste in Kitsap and north Mason Counties; its planned future capacity is discussed below. The consultant team interviewed most processors in Kitsap and north Mason Counties, although not all provided capacity figures. The total annual processing capacities of the firms who gave us data, *with the exception of North Mason Fiber*, are as follows:

- Landclearing debris: 40,000 tons
- Urban wood: N/A
- Yard waste: 2,000 tons
- Food waste: 0 tons
- Biosolids: 0 tons

These figures include current and estimated future capacity, where firms provided that information.

At the stakeholder meeting held October 5, 2005, Bob Dressel of North Mason Fiber announced he is partnering with Cedar Grove Composting to install a Gore composting system that is permitted to compost up to 80,000 tons of food waste, biosolids, and yard waste. The system could handle all 40,000 tons of food waste and compostable paper generated in the county if it were source-separated, and all 10,000 tons of biosolids generated in the county.² Mr. Dressel projects that the Gore system will be operating beginning March 1, 2006.

In a conversation with the consultant team on October 7, 2005, Mr. Dressel indicated that his facility easily could accept up to 250,000 tons of landclearing debris annually for processing. Currently, North Mason Fiber processes about 25,000 tons of landclearing debris annually. The company could make this order-of-magnitude shift easily because the site is already paved, they have adequate equipment, and they already have stormwater management systems and appropriate permits in place. Mr. Dressel expects that the firm would compost or sell this material as hog fuel. The consultant team's estimates of landclearing debris generation range from 120,000 to 380,000 tons. If the true number is closer to the lower figure than the higher one, North Mason Fiber could handle most or all of the landclearing debris generated in the county. His firm also could chip 50,000 tons of clean wood waste into hog fuel (Dressel, 2005b).

With the new Gore system added to the existing private processing capacity and the potential for North Mason Fiber to process most or all of the landclearing debris generated, there is enough capacity to process all major organic waste streams generated in Kitsap County, as Table 4 shows.

² Please note that North Mason Fiber cannot accept undigested biosolids. The facility can accept biosolids in cake form (Dressel, 2006).

Table 4: Comparison of Estimated Generation to Estimated Processing Capacity for Organic Waste Streams

Waste Stream	Estimated Generation	Estimated Processing Capacity	Difference (Processing Capacity – Generation)
Landclearing Debris	120,000 to 380,000 tons	290,000 tons	170,000 tons to -90,000 tons
Urban Wood Waste	35,000 tons	50,000 tons	15,000 tons
Yard Waste	38,000 tons	42,000 tons	4,000 tons
Food Waste	40,000 tons	40,000 tons	0 tons
Biosolids	10,000 tons	10,000 tons	0 tons

Therefore, the consultant team believes it is not necessary for the SWD to develop new processing capacity at this time. However, the SWD should monitor the private sector’s ability to process all landclearing debris in the event that true generation exceeds processing capacity.

4.1.5 Markets

Markets are strong for all waste streams except landclearing debris.

4.1.6 Summary of Key Findings

The consultant team identified the following key findings from this analysis:

- Landclearing debris is the largest organic waste stream of interest in this study.
- Kitsap County residents and businesses have achieved an 87% recycling rate for yard waste already.³ All biosolids collected through the wastewater treatment system are recycled also. However, the remaining waste streams present opportunities for improvement.
- Collection systems for yard waste and biosolids are in place. Additional collection capacity in the north and central areas for landclearing debris and urban wood waste is desirable. There is no system in place to collect food waste.
- Transportation for all waste streams appears to be sufficient.
- Processing capacity for all waste streams is likely sufficient. However, the county should monitor the private sector’s capacity to process landclearing debris to determine whether true generation exceeds processing capacity.
- Markets are strong for all waste streams except landclearing debris.

³ Recycling rate calculated as follows: (amount recovered)/(amount recovered)+(amount disposed)

4.2 Landclearing Debris

Landclearing debris is comprised of stumps, brush, leaves, dirt, rocks, and other organic material produced when land is cleared for development. This waste stream is of particular concern, because the Puget Sound Clean Air Agency has announced that it plans to implement a burn ban on landclearing debris throughout the Puget Sound region, including Kitsap County. Such a ban would remove a primary means of managing landclearing debris in the county.

4.2.1 Generation

Good data about the amount of landclearing debris generated does not exist, and it is a difficult waste stream to estimate. Actual data are limited, and the waste stream itself is highly variable. As discussed above, the consultant team estimates that a minimum of 70,000 tons is processed in the county annually. Estimates of the amount of debris that is generated range from 120,000 to 380,000 tons. (Please see Appendix A for a discussion of these estimates.)

Contractors and developers are the primary generators of this waste stream, as they clear land to make way for single-family, multi-family, and commercial development, and the infrastructure needed to access it. According to the Kitsap County Department of Community Development, an average of 2,800 acres of land was cleared each year in the county between 2001 and 2004. In 2004, about 26 percent of these permits were in the north end, 15 percent were in the central area, and 60 percent were in the south end of the county.

4.2.2 Collection

Collection capacity in the north and central areas of the county is limited. The County does not collect landclearing debris at drop-box facilities due to size limitations and potential for container damage. Drop-box facility staff directs contractors and residents to bring stumps to private companies. Drop-box facilities do accept brush for recycling.

Appendix C contains a list of companies, organized by geographical location, that accept landclearing debris for recycling, their estimated current and future capacities, and their existing equipment. As the appendix shows, all but one private drop-off location for landclearing debris are in the southern end of the county or in northern Mason County.

At the August 10, 2005 and October 5, 2005 stakeholder meetings, stakeholders expressed a desire for additional collection capacity in the north and central areas of Kitsap County. The consultant team has learned that at least one firm plans to establish collection sites in the north and central areas to help meet this demand. Each site will have an annual capacity of up to 75,000 tons.

4.2.3 Processing

Most landclearing debris in the county is burned, chipped into hog fuel, or used on-site for erosion control or slope stabilization. A variety of companies provides mobile chipping services, offers chippers for rent, or accepts landclearing debris for processing. Of those that accept debris for processing, some accept all types of landclearing debris, but others are selective because of the current difficulty marketing this material. Generally, the selective firms prefer landclearing debris composed primarily of hardwoods because the mills prefer these chips. Proper disposal of the dirt and rocks that often accompany landclearing debris is also a problem for processors.

Existing processing capacity may be sufficient to manage all the landclearing debris generated in Kitsap County annually. Processors currently process at least 70,000 tons of

landclearing debris annually, but could accept up to 290,000 tons. The consultant team's estimates of landclearing debris generation range from 120,000 to 380,000 tons. If the true number is closer to the lower figure than the higher one, the potential processing capacity may be great enough to handle generation.

Appendix C contains a list of landclearing debris processors, their current and future capacities, and their equipment lists.

4.2.4 Markets

Markets for landclearing debris are cyclical, related to the building cycle, and currently poor. During building booms, sawmills turn out generous amounts of chipped clean wood for use as hog fuel. The mills that burn hog fuel prefer material made of clean wood over hog fuel made from landclearing debris, because clean wood has a higher BTU value. During downturns in the building cycle, sawmills produce less chipped wood, and mills buy hog fuel made from landclearing debris.

Currently, the market for hog fuel made from landclearing debris is depressed because of the building boom. Chipped landclearing debris also can be used as a landscape product or composted with a high nitrogen source, but this type of composting is relatively uncommon.

Many mobile chipping services leave chipped landclearing debris on-site, where contractors use it for temporary erosion control or site stabilization.

4.2.5 Summary of Key Findings

Based on this analysis, the consultant team identified the following key findings about the landclearing debris management system in Kitsap County:

- A minimum of 70,000 tons of landclearing debris is processed in Kitsap County annually. Estimates of the amount of landclearing debris that is stockpiled or burned vary between 120,000 and 380,000 tons annually. It is not possible with current data to specify this number more exactly.
- Stakeholders expressed a strong desire for additional collection capacity in the north and central areas of the county. At least one private firm plans to establish collection sites in the north and central areas, with a combined annual capacity of up to about 150,000 tons.
- Existing processors could handle at least 290,000 tons of landclearing debris annually.
- Markets for landclearing debris are cyclical but are currently quite poor, and will remain so until the building boom is over.

4.3 Urban Wood Waste

Urban wood waste includes clean wood from construction projects, pallets and crates, and contaminated wood from demolition projects.

4.3.1 Generation

As Table 3 shows, the consultant team estimates that **at least 35,000 tons of urban wood wastes are generated in Kitsap County annually.** Contractors and the Navy are the major generators of this wood waste.

Few contractors recycle wood wastes for job sites. Attendees of the August 10, 2005 meeting reported that encouraging contractors to source-separate their clean wood and recycle it would be challenging, and would depend upon making a business case for doing so.

4.3.2 Collection

Collection capacity in the north end and central area of the county is limited. Currently, Waste Management operates a 40 cubic-yard drop-box facility to collect clean wood at the Olympic View Transfer Station (OVTS). When the box is full, Waste Management hauls the wood to North Mason Fiber. None of the other County-operated drop-off facilities accept clean wood; instead, customers are encouraged to haul their wood to North Mason Fiber. To the consultant team's knowledge, only Allen Shearer Trucking and Landscape Supplies and North Mason Fiber accept clean wood from the public, and both of these facilities are in north Mason County. As a result, all public drop-off facilities for clean wood are in the south end of Kitsap County, or the north end of Mason County.

4.3.3 Processing

About half the wood waste generated annually is recovered and processed locally. North Mason Fiber currently processes about 12,000 to 15,000 tons of wood waste annually, and plans to be able to process up to 50,000 tons in the future. The Navy, Bainbridge Island Disposal, Waste Management, and the public bring this waste to the facility. Clean wood waste is chipped into hog fuel and sold to local and regional mills. Allen Shearer Trucking and Landscape Supplies processes an unknown amount of wood waste.

4.3.4 Markets

Markets are currently very strong for clean wood waste. The regional building boom means that supplies of chipped clean wood are plentiful, and paper mills are buying only chipped clean wood to fuel their boilers. Therefore, it is easy for processors to sell chipped clean wood to paper mills as hog fuel.

4.3.5 Summary of Key Findings

Based upon this analysis, the consultant team identified the following key findings about the management of wood waste in Kitsap County:

- Source separation of clean wood waste is not the norm among contractors.
- No collection facilities for wood waste exist in the north and central sections of Kitsap County.
- Sufficient processing capacity (up to 50,000 tons) exists to handle the amount of clean wood waste generated.
- Markets for chipped clean wood currently are strong.

4.4 Yard Waste

Yard waste includes leaves, grass, clippings, prunings, and other debris created during regular yard maintenance or occasional small landscaping projects.

4.4.1 Generation

Kitsap County residents and businesses recycle far more yard waste than they dispose.

Table 1 and Table 2 show that while approximately 5,000 tons of yard waste are disposed annually, an additional 33,000 tons are recycled, for a recycling rate of 87 percent. These figures indicate that residents and businesses are aware of the recycling opportunities available to them and are using them.

Many residents manage yard waste on-site rather than through the existing infrastructure.

According to the Kitsap County Air Quality Survey (Gilmore Group, 2001), 50 percent of respondents said they composted their yard waste, 22 percent dumped it on private property, 4 percent mulched or chipped it, and 26 percent burned it. To help residents manage yard waste, the County provides information about home composting, grasscycling, and classes available to County residents on its website.

4.4.2 Collection

Collection infrastructure for yard waste is fairly comprehensive. In 2001, the Puget Sound Clean Air Agency implemented a burn ban on yard waste in all urban-growth areas of Kitsap County. As a result, curbside collection of yard waste is available in all burn ban areas in the County, including the cities of Bainbridge Island, Poulsbo, Bremerton, and Port Orchard, and a small portion of unincorporated Kitsap County. However, participation in the programs is low except on Bainbridge Island and in Poulsbo and Bremerton. Part of the reason for the low participation may be a lack of knowledge about the service: in the Gilmore Group (2001) survey, 21 percent of households in the burn ban area did not know that curbside collection was available to them.

The County operates a number of drop-box facilities where residents can bring yard waste:

- Hansville Drop-Box Facility
- Olalla Drop-Box Facility
- Silverdale Drop-Box Facility
- Olympic View Transfer Station

These drop-box facilities are well publicized and conveniently located throughout the county. However, the Gilmore Group (2001) survey showed that 34 percent of respondents did not know that a drop-box facility for yard waste was nearby. Also, the Silverdale drop-box facility has a narrow ramp that users must walk up to dispose their yard waste. This ramp may discourage residents from using the box.

In addition, the County runs Yard Waste Amnesty days in the spring and fall. Although residents can drop off yard waste free-of-charge at these events, their primary purpose is to acquaint residents with the private yard-waste services available to them year-round. The County also provides information about private chipping services on its web site.

Residents are not willing to pay much, if anything, to manage yard wastes. Feedback from stakeholders and experience with current programs support this statement. Many residents preferred to wait in long lines at Yard Waste Amnesty Days to drop off their yard waste for free,

rather than drive an additional 10 minutes and drop off their yard waste for \$5-\$10 per truckload at North Mason Fiber. Low participation rates in curbside collection of yard waste, particularly in the unincorporated areas of Kitsap County, indicate that residents perceive the annual cost of \$81-\$96 as too high. The Kitsap County Air Quality Survey (Gilmore Group, 2001) also showed that 32 percent of those who don't use the curbside recycling service where it is available think the cost is too high.

4.4.3 Processing

Ample processing capacity for yard waste is in place. As with landclearing debris, quite a few private firms in Kitsap County provide chipping services to the public, whether by renting the chipper itself to the customer or bringing mobile equipment to the customer's site. Other companies allow residents to drop off yard debris at their sites. Appendix C contains a list of current yard waste processors, their current and future capacities, and their equipment lists.

Despite the availability of chipping services and drop-box facilities, illegal dumping of yard waste remains a problem in Kitsap County. In May of 2005, the Kitsap County Health District sent a letter to commercial landscapers to alert them that the District had received a large number of complaints of illegal dumping among landscapers in 2004 (Brower, 2005). The letter also warned that if the dumping did not cease, the District would require yard waste haulers to obtain a permit.

4.4.4 Markets

Markets for products made from yard waste are currently strong. Depending on its composition, processors turn yard waste into compost or mulch, which can be used as a landscaping product. Markets for both products are strong currently; in fact, at least one company that sells compost imports it from King County for sale in Kitsap County.

4.4.5 Summary of Key Findings

Based on the foregoing, the consultant team identified the following key findings about current yard waste management in Kitsap County:

- The current yard waste management system in Kitsap County is fairly convenient, stable, and reliable. A variety of collection options are available to residents and businesses, and plenty of processing capacity exists in Kitsap County and north Mason County to handle the generation of yard waste at current rates. Markets are strong for composted yard waste.
- However, residents and businesses do not necessarily use the system. Residents are not willing to pay much, if anything, to manage their yard wastes, and significant percentages of respondents did not know that drop-box facilities and/or curbside collection are available to them (Gilmore Group, 2001). Illegal dumping of yard waste is a problem (Brower, 2005).
- The Gilmore Group survey (2001) contains valuable information about residents' knowledge of the yard-waste system and yard-waste management practices, but it is now five years old. It also does not include responses from businesses.
- Markets for products made from yard waste are currently strong.

4.5 Food Waste

Food waste includes both pre- and post-consumer food waste, and other compostable materials commonly found in residential garbage. Pre-consumer food waste comes from wholesalers, restaurants and grocery stores, while post-consumer food waste generally comes from homes and restaurants. Other compostable materials include items such as food-soiled paper and pizza boxes.

4.5.1 Generation

Residents and businesses in Kitsap County generate approximately 40,000 tons of food waste and compostable paper annually, as Table 3 shows.

4.5.2 Collection and Processing

Currently, there is no system in place to collect or process food waste from residents or businesses in Kitsap County. However, one private composting facility has been permitted to compost up to 40,000 tons of food waste and compostable paper.

At the stakeholder meeting held October 5, 2005, attendees were enthusiastic about the possibility of diverting food waste from disposal.

4.5.3 Markets

Food waste can be processed into compost, for which **markets are strong**, as discussed above under yard waste.

4.5.4 Summary of Key Findings

- Approximately 40,000 tons of food wastes are generated in Kitsap County annually.
- However, no system is in place to collect and process these wastes.
- Markets for products made from food waste are strong.

4.6 Biosolids

Biosolids are the solid, reusable byproducts of wastewater treatment plants.

4.6.1 Generation

Eight wastewater treatment plants operate in Kitsap County, and produce approximately 10,000 wet tons (or about 2,000 dry tons) of biosolids annually (Table 3). Table 5 lists the eight wastewater treatment plants, their operators (Brotzel, 2006), and their approximate annual generation of biosolids. As growth continues in Kitsap County, the amount of biosolids should continue to grow as well. It is also important to note that many homes in unincorporated Kitsap County are on septic systems, not the sewer system, so this number is an underestimate of the true amount of biosolids generated in Kitsap County. However, this estimate captures the amount of biosolids that are available for recycling.

Table 5: Annual Generation of Biosolids at Wastewater Treatment Plants in Kitsap County

Wastewater Treatment Plant (WWTP) Name	Operator	Dry Tons Biosolids Per Year	Wet Tons Biosolids Per Year
Bremerton WWTP	City of Bremerton	720	4368
Central Kitsap WWTP	Kitsap County Dept. of Public Works, Wastewater Treatment Division	855	3773
Fort Ward WWTP	Kitsap County Sewer District #7	Sent to Bremerton WWTP	Sent to Bremerton WWTP
Kingston WWTP	Kitsap County Dept. of Public Works, Wastewater Treatment Division	Sent to Central Kitsap WWTP	Sent to Central Kitsap WWTP
Manchester WWTP	Kitsap County Dept. of Public Works, Wastewater Treatment Division	Sent to Central Kitsap WWTP	Sent to Central Kitsap WWTP
Suquamish WWTP	Kitsap County Dept. of Public Works, Wastewater Treatment Division	Sent to Central Kitsap WWTP	Sent to Central Kitsap WWTP
Port Orchard WWTP	City of Port Orchard	266	1240
Winslow WWTP	Bainbridge Island Public Works	103	515

4.6.2 Collection

The sewer system is the primary means of collecting these wastes. Three plants – Suquamish, Manchester, and Kingston – transport undigested biosolids to the Central Kitsap Wastewater Treatment Plant for processing. Another, Fort Ward, sends its undigested biosolids to the Bremerton plant for processing.

4.6.3 Processing

Wastewater treatment plants in Kitsap County process biosolids to the standards required by law. The Central Kitsap Plant anaerobically digests and dewateres its biosolids, producing a Class B by-product, and has contracted with a private firm to compost them. The Bremerton and Winslow plants apply most of their digested solids in dewatered form to forestlands. The Winslow plant currently is investigating dewatering their solids and sending them offsite for composting. The Port Orchard plant pays a fee to send its biosolids to Fire Mountain, a farm in Clark County that spreads them on pastureland (Hunt, 2005), but is in the process of upgrading its system to produce Class A byproducts which can be sold to consumers.

4.6.4 Markets

Markets for biosolids are stable, but plant representatives are interested in expanding their options. Markets for biosolids include land application and composting. Representatives of the treatment plants report that their markets are stable, but they would like less costly, local options.

4.6.5 Summary of Key Findings

Based on the foregoing, the consultant team identified the following key finding about biosolids management:

- All biosolids produced in Kitsap County currently are recycled, through composting or silvicultural or agricultural land application.
- The current system for biosolids collection and processing is stable, but plant operators are interested in new options.

4.7 Key Issues to Address

The SWD's goal is to ensure that a convenient, reliable, and efficient system is in place to recycle the maximum amount of organic waste possible, within the constraints of economics and stakeholder support. With that goal in mind, the consultant team analyzed the current situation to identify key issues to address for each waste stream, as follows:

4.7.1 Landclearing Debris

- Although current processing capacity is probably sufficient to handle the amount of material generated, the possibility remains that generation exceeds current processing capacity.
- Stakeholders desire additional collection capacity in the north and central sections of the county.
- Markets are cyclical and currently quite poor.

4.7.2 Urban Wood

- Source separation of clean wood waste is not the norm among contractors.
- No collection facilities for wood waste exist in the north and central sections of Kitsap County.

4.7.3 Yard Waste

- Although most residents manage their yard waste on-site or recycle it (Gilmore Group, 2001) a small amount of yard waste is still disposed as garbage.
- Illegal dumping of yard waste is a problem (Brower, 2005).
- Significant percentages of Kitsap County residents do not know that drop-off facilities (34%) or curbside collection (21%) are available to them (Gilmore Group, 2001).

4.7.4 Food Wastes

- With the exception of planned private processing capacity, there is no system in place to collect or recycle food wastes.

4.7.5 Biosolids

- Wastewater treatment plant operators would like less costly, local ways to manage biosolids.

5 Options

Using input from stakeholders at the August 10, 2005, stakeholder meeting, experience elsewhere in Washington State and the Pacific Northwest, and professional judgment, the consultant team identified a number of options to address the key issues for each waste stream. Because the goal of this study is to recommend ways that the SWD can ensure that a convenient and reliable system to manage organic waste takes shape in Kitsap County, the options focus on actions that might be appropriate for the county government to pursue or encourage others to pursue. Many of these options also would be appropriate for cities to pursue. The consultant team considered the following types of strategies available to the SWD and local cities:

- Educating the public, industry, and other government agencies;
- Establishing curbside collection or adding drop-boxes to existing facilities ;
- Building, owning, and operating collection or processing facilities;
- Partnering with the private sector to establish and/or operate facilities;
- Creating financial incentives;
- Regulating activities;
- Providing technical assistance to the private sector, including working with other government agencies to help relieve the perceived burden of obtaining permits to operate facilities; and
- Doing nothing.

The consultant team then evaluated these options using the following list of criteria. All criteria were ranked using a high, medium, and low scale:

1. **Technical feasibility.** An option was considered highly feasible if the techniques and/or technology needed to implement it are proven in Kitsap County or other places with similar demographic and geographic characteristics. If techniques are new, the option was considered moderately feasible. If techniques are troublesome or unproven, the option received a low ranking.
2. **Stakeholder support.** A high ranking was given to options that received strong stakeholder support at the two stakeholder meetings were considered highly feasible. A medium ranking was given to options that received some support at the stakeholder meetings. A low ranking was given to options that have encountered significant stakeholder resistance in Kitsap County or elsewhere.
3. **Cost.** A high ranking indicates high cost, a medium rank indicates medium cost, and a low rank indicates a low cost. All costs are relative to each other.
4. **Effectiveness.** Options that have the potential to divert most or all of the organic waste generated, and that are consistent with the 1999 Kitsap County Comprehensive Solid Waste Management Plan, were considered highly effective. Options that could divert a significant proportion of the generated waste and are consistent with the County's goals were considered effective. Options that do not divert significant amounts of waste and/or are inconsistent with the County's goals received a low ranking.
5. **Ability to use existing infrastructure.** If sufficient infrastructure already exists to implement the option, then it received a high ranking. If existing infrastructure would need to

be expanded somewhat, but in a reasonable fashion, the option received a medium ranking. If there is no existing infrastructure to implement the option, it received a low ranking.

6. **Potential for expansion.** If an option would be easy to expand, it received a high ranking. If expanding the option would require a medium level of investment, it received a medium ranking. If expanding the option would be difficult or impossible, it received a low ranking.
7. **Compliance with existing regulations.** If existing regulations allow the option, then it was ranked high. If current regulations do not allow the option, it was given a low rank. Only options that were legal were considered further.
8. **Local solution.** If all of the means necessary to implement an option are located within Kitsap County and north Mason County, it received a high ranking. If the necessary means are in Mason or Pierce counties, the option received a medium ranking. If the necessary means are outside of these counties, the option received a low ranking.

The consultant team used the following two additional criteria for evaluating options that specify development of infrastructure:

9. **Existence of suitable properties available for development.** If the County already controls property that is suitable for an option, or a private operator with a suitable site has indicated interest in partnering with the County, the option received a high ranking. If suitable properties exist within the county, it received a medium ranking. If no suitable properties exist, it received a low ranking.
10. **Convenience.** Kitsap County is interested in ensuring that convenient infrastructure for organics management exists in each of three sections of the county: north, central, and south. The south end already is well served. If the site(s) proposed for an option provides convenient access to infrastructure in the north and central sections of the county, it received a high ranking. If the site adds infrastructure to an area of the county that already is well served, it received a low ranking.

Table 6 summarizes the criteria and ranking system used in this study.

Table 6: Summary of Evaluation Criteria and Ranking System

Criterion	High Ranking	Medium Ranking	Low Ranking
Technical Feasibility	The techniques and/or technology needed to implement the option are proven in Kitsap County or other similar places	The techniques and/or technology needed to implement the option are new	The techniques and/or technology needed to implement the option are troublesome or unproven
Stakeholder Support	The option received strong stakeholder support at the two meetings	The option received some stakeholder support at the two meetings	The option encountered significant stakeholder resistance in Kitsap County or elsewhere
Relative Cost	High cost relative to other options	Medium cost relative to other options	Low cost relative to other options

Criterion	High Ranking	Medium Ranking	Low Ranking
Effectiveness	The option has the ability to divert most or all of the organic waste generated, and is consistent with the 1999 Kitsap County Comprehensive Solid Waste Management Plan	The option could divert a significant amount of the organic waste generated, and is consistent with the County's goals	The option would not divert a significant amount of waste, and/or is inconsistent with the County's goals
Ability to use Existing Infrastructure	Sufficient infrastructure already exists to implement the option	Existing infrastructure would need to be expanded somewhat, in a reasonable fashion	Infrastructure does not exist to implement the option
Potential for Expansion	The option is easy to expand	The option requires a medium level of investment to expand	The option is difficult or impossible to expand
Compliance with Existing Regulations	The option is consistent with all existing regulations	N/A	The option is not consistent with all existing regulations
Local Solution	All means necessary to implement the option are available within Kitsap and north Mason Counties	All means necessary to implement the option are available within Mason and Pierce Counties	All means necessary to implement the option are not available within these counties
Existence of Suitable Properties	County controls a suitable site, or a private operator who has indicated an interest in partnering with the County controls a suitable site	Suitable sites exist within the county	No suitable sites exist
Convenience	Site would provide convenient access to infrastructure in the north <i>and</i> central sections of the county	Site would provide convenient access to infrastructure in the north <i>or</i> central sections of the county	Site would not provide convenient access to infrastructure in the north and central sections of the county

The consultant team used a combination of data and analysis, interviews with key stakeholders, two stakeholder meetings, and professional judgment to evaluate these options. On August 10, 2005, the SWD hosted a meeting for key industry stakeholders to collect input on the consultant team's initial list of draft options to address organics management in Kitsap County. The stakeholders participated willingly and provided a wealth of feedback. The consultant team summarized this input into the following overarching themes:

- Use incentives rather than regulations to achieve goals.
- Contract or partner with the private sector to establish infrastructure.
- Facilitate the establishment of infrastructure by working with private contractors and various jurisdiction and agencies.
- Education is necessary for successful organics waste management. Target audiences include public agency project managers, contractors, landscapers, and the public, depending on the waste stream and the issue.
- The combination of regulations at the local, state, and federal levels means that obtaining permits is an expensive and burdensome process that limits new entries into the processing market. The private sector would like help reducing this burden.
- Economics are the key. Management must be economically sound. Making the business case for organics recycling to contractors and landscapers is essential.

A full summary of the August 10, 2005, stakeholder meeting is in Appendix B of this report.

The SWD hosted a second stakeholder meeting on October 5, 2005, to collect input on revised draft options (please see Appendix B for a list of the revised draft options). Stakeholders used dots – green ones for options they liked, and red ones for options they didn’t like – to express their opinions on the revised draft options. A summary of the October 5, 2005, meeting is in Appendix B of this report. The consultant team summarized this input as follows:

- **Landclearing Debris Options:** With their dots, stakeholders indicated strong support for establishing collection sites for landclearing debris, as long as the private sector plays a role in doing so. They also indicated support for developing and adopting best management practices, and some support for using landclearing debris to reclaim mines. Stakeholders also rejected the notion that the County should play no role in managing landclearing debris.
- **Yard Waste Options:** Stakeholders supported all options – including the ban on disposal – except the creation of a neighborhood chipping service and the County playing no role. Support was particularly strong for adding a drop box at Poulsbo Recycling Center, surveying residents and businesses about attitudes and behaviors, and promoting existing services (including private ones).
- **Urban Wood Waste Options:** As with landclearing debris, stakeholders supported establishing collection sites for wood waste, so long as the private sector plays a role. They did not support banning wood waste from disposal, subsidizing recycling fees for wood waste, adding a surcharge to the tip fee at OVTS for loads that are mainly wood, or the County playing no role. They did support working with the HBA to promote the Built Green and LEED programs, and the business case for recycling wood waste.
- **Food Waste Options:** Stakeholders were enthusiastic about most options for this waste stream, except the County playing no role.
- **Biosolids Options:** Stakeholders indicated strong support for encouraging wastewater treatment plants to contract with private composting operations, and educating the public about the benefits of composted biosolids. They did not support encouraging plants to compost on-site or the County playing no role. Opinions were mixed on providing biosolids for gravel pit reclamation.
- **Cross-Cutting Issues:** Stakeholders strongly support County involvement in obtaining permits or facilitating a process to streamline the permitting process for composting

facilities. They also indicated strong support for continuing to promote the use of compost and adopting soil quality standards.

The input received at these two meetings was crucial to the consultant team's understanding of the stakeholder support criterion described above.

The Kitsap County Department of Information Services Geographic Information System (GIS) staff performed an analysis of parcels in Kitsap County to determine whether suitable sites were available for several different types of infrastructure, including collection sites for landclearing and wood waste, an anaerobic digester, a bio-fuels plant, and a waste-to-energy plant. The GIS staff used the following criteria to identify these sites:

- Zoned industrial, or zoned rural protection or rural residential if the site is adjacent to an industrial site.
- At least fifteen acres in size.

This section of the report describes the options that the consultant team developed to expand and improve organic waste management in Kitsap County, and shows the results of the team's evaluation of these options. The presentation of options begins with integrated options that address more than one waste stream. A discussion of options focused on individual waste streams follows. Below the description of each option is a discussion of the consultant team's evaluation of it and a corresponding table summarizing the evaluation results. Only options that complied with existing regulations were considered.

5.1 Integrated Options

These options address more than one organic waste stream.

5.1.1 Improve Markets for Compost

Processing turns a number of organic waste streams into compost, including yard waste, food waste, and biosolids. Although markets for compost currently are strong, the SWD could act in a number of ways to ensure they remain so.

Integrated Option 1: Play no role.

The SWD could do nothing to promote the benefits and use of compost.

Evaluation

Although this option costs little, it has low stakeholder support and does little to strengthen markets for compost.

Integrated Option 2: Continue to promote the use of compost.

The SWD could continue its promotion efforts through advertising, brochures, and other public education and outreach efforts. The SWD could also work with other agencies and non-profits to develop public outreach efforts that link the use of compost products to other environmental issues, such as salmon recovery.

Evaluation

Strong markets for compost are a key component of ensuring organics recycling: if there's a market for it, the private sector will provide it. Promoting the use of compost to residents and businesses is a logical way for the SWD to help strengthen markets: the cost is relatively low, the infrastructure is in place, and stakeholders support such education efforts.

Integrated Option 3: Adopt soil quality standards.

The Kitsap County Department of Community Development (DCD) could adopt soil quality standards that call for using organic matter such as compost to amend soil in new developments, like King County has done through zoning code KCC 21A.16.085 (Appendix E). If the County adopts this option, the SWD and/or DCD also should encourage all governments that operate in Kitsap County to adopt similar standards.

Evaluation

The stakeholders at the October 5, 2005 meeting strongly supported adopting soil quality standards. This option is highly feasible— King County's code provides a model for Kitsap County – and would require significant amounts of compost, generating a strong market. However, it is important to note that although adopting soil standards likely would not be very expensive for the DCD, it may be expensive for the building industry to implement (Castle, 2005).

5.1.2 Facilitate the Establishment of Private Processing Facilities

Integrated Option 4: Play no role.

The SWD could do nothing to help smooth the path of entrepreneurs seeking to open new organic waste management facilities with the proper permits.

Evaluation

Although this option costs nothing, stakeholders do not support it. This option also would not be effective at encouraging the development of new processing capacity.

Integrated Option 5: Provide technical assistance with obtaining permits.

Provide technical assistance to private operators in obtaining permits, and facilitate a process with other agencies to attempt to find ways to reduce the number and cost of permits needed to establish a compost facility while preserving protection of human health and the environment. One of the key themes heard at the August 10, 2005 stakeholder meeting was that the industry perceives the number and cost of permits to be burdensome, and that this burden prevents some operators from entering the business. Appendix D contains a list of the permits that are required, and that may be required depending on site characteristics, to operate an organic waste management facility in Kitsap County.

Evaluation

Assisting entrepreneurs with the permit process and serving as advocates in the permitting process would have several benefits for organic waste management and the SWD. It would generate a tremendous amount of goodwill for the SWD, and also might encourage more

businesses to operate with permits. This option could expand the SWD’s options when seeking partners for events such as the Yard Waste Amnesty Days. Perhaps most importantly, however, increasing processing capacity in the county would help divert organic waste from disposal, and depending upon the level of effort necessary, the SWD could accomplish this task at relatively low cost.

Table 7 summarizes the consultant team’s evaluation of the integrated options.

Table 7: Summary of Evaluation of Integrated Options

Option	Technical Feasibility	Stakeholder Support	Cost	Effectiveness	Existing Infrastructure	Expansion Potential	Local	Suitable Sites	Convenience
Improve Compost Markets									
1. Play no role	H	L	L	L	N/A	N/A	N/A	N/A	N/A
2. Promote the use of compost.	H	H	L	M	H	H	H	N/A	N/A
3. Adopt soil quality standards	H	H	L	H	H	L	H	N/A	N/A
Facilitate Private Operations									
4. Play no role.	H	L	L	L	N/A	N/A	N/A	N/A	N/A
5. Facilitate permit process.	H	H	L	M	H	H	H	N/A	N/A

5.2 Landclearing Debris

This waste stream represents the most pressing organic waste management problem facing Kitsap County, for the following reasons:

- The landclearing burn ban that the Puget Sound Clean Air Agency has proposed will remove the primary means of managing this material.
- Stakeholders would like additional collection capacity in the north and central areas of the county.
- Potential processing capacity likely is sufficient to handle the amount of landclearing debris generated. However, since the generation estimates range so widely, it is possible that the capacity is not sufficient.
- Markets for chipped landclearing debris are cyclical and are currently poor.

The consultant team identified the following options for ways that the SWD could act to address these problems.

5.2.1 Reduce Generation

Although it is not possible with current data to estimate with accuracy and confidence the amount of landclearing debris that is managed on-site, it is likely that the true amount is quite large. Potential processing capacity is also quite large, but a chance still remains that generation exceeds

processing capacity. Therefore, the County could work with contractors and developers – the primary generators of this material – to reduce its generation in the first place. The consultant team identified two major ways that the County might affect generation of landclearing debris.

Landclearing Debris Option 1: Play no role.

Doing so would mean that no public effort would be focused on reducing the amount of landclearing debris that requires off-site management and eventual market. However, it is possible that the cost of hauling and paying for processing of landclearing debris once the burn ban is in effect might induce contractors to reduce generation.

Evaluation

This option costs little, stakeholder support is low and choosing this option would do little to affect generation.

Landclearing Debris Option 2: Reduce the amount of land cleared per parcel.

For example, the County could adopt a 65/35/10 standard, in which 65 percent of a new development must remain in native vegetation, 35 percent may be cleared, and no more than 10 percent may be impervious surfaces such as driveways or roofs. Although this standard was developed for stormwater management, it also could reduce the amount of landclearing debris produced. These regulations could use incentives to encourage compliance, such as moving a project to the head of the permit line.

Evaluation

Requiring developers to reduce the amount of land cleared per parcel is technically feasible – King County’s new Critical Areas Ordinance does just that. However, this policy is extremely unpopular in King County, and stakeholder feedback at the August 10, 2005 meeting indicates that it is not likely to be any more popular in Kitsap County. While exercising this option would cost the County relatively little, it may be expensive for the building industry to implement in terms of lost logging revenues. This option would, however, be effective at reducing the amount of land cleared, and would be feasible with existing infrastructure.

Landclearing Debris Option 3: Develop and adopt best management practices for managing landclearing debris onsite.

Although this option technically would not reduce generation, it would reduce the amount of landclearing debris that needs to be processed and marketed. It also provides contractors and developers with solutions to their landclearing debris problems that do not require hauling the debris offsite and paying for its management.

The new Kingston High School is an example of a development project in which all recyclable organic materials were used on-site. Landclearing debris was stockpiled and turned into topsoil, or chipped and used as mulch for trails and landscaped areas.⁴ Since these practices may be better suited for commercial, subdivision, or multi-family projects rather than single-family residences, work on this option should include investigation of possible practices for use in residential developments. One additional benefit of this option is that some of the best

⁴ For additional information about the specifications used at Kingston High School, please contact Ms. Kas Kinkead with Cascade Design Cooperative at 206-628-9133.

management practices may overlap with those for stormwater management, addressing two potential problems at once.

Discussions with the Kitsap County Department of Community Development (DCD) reveal that the 1996 Kitsap County Design Manual already includes best management practices for using chipped woody debris for erosion control and mulching, on page 3B-8 (Rowe-Hornbaker, 2005).

These new best management practices could be implemented through new regulations or voluntarily with the use of incentives such as recognition programs. The cost-savings of using material on-site rather than hauling it away and paying for processing may be enough of an incentive in itself, once contractors understand the methods.

The best management practices should be required for all Kitsap County government projects at a minimum, and ideally be applied to all development projects in the county. The County could require contractors to file a plan for managing landclearing debris on-site with their permit application, or post a performance bond.

Evaluation

Stakeholders at the October 5, 2005 meeting showed strong support for this option, which could divert a significant amount of material from disposal or burning. The consultant team estimates that as much as half of the material generated could be used on-site. This option would require no new infrastructure, and the Department of Community Development should be able to work on this task at relatively low cost. The new Kingston High School shows that landclearing debris can be used on-site in Kitsap County, at least for institutional developments. Because it may be more difficult to use this material on-site in residential and small developments, the consultant team gave this option a medium ranking for technical feasibility.

5.2.2 Improve Collection Infrastructure

Currently, few facilities exist in the north and central sections of the county to collect landclearing debris. At the August 10, 2005 and October 5, 2005 stakeholder meetings, attendees agreed that the lack of collection infrastructure in these areas is a problem. The consultant team identified the following options for expanding infrastructure in these areas:

Landclearing Debris Option 4: Play no role.

To the consultant team's knowledge, at least one private firm plans to open collection sites for landclearing debris in the north and central areas.

Evaluation

Given the private sector's interest in establishing collection infrastructure, it may be most cost-effective for the SWD to do nothing. This option is relatively low cost, and feasible.

Landclearing Debris Option 5: Facilitate the establishment of a collection site in the north end.

The SWD could ensure that a collection site is established in the north end in one of the following ways:

- a. Own and operate the site.
- b. Enter into a public-private partnership to jointly operate a site.

- c. Facilitate the establishment of a private permitted facility on private land in the north end.

Evaluation

All of these options are feasible, legal, and local, but stakeholders at the October 5, 2005 meeting supported the establishment of a private site and a public-private partnership. They did not support the development of a publicly owned site. A collection site in the north end could help divert a significant amount of landclearing debris from disposal: according to the Department of Community Development's database, approximately a quarter of Site Development Activity Permits issued in 2004 were in the north end. Of the three ownership options, a well-run and properly permitted private operation would be most cost-effective for the SWD. The County could offer to assist the private operator with obtaining permits to facilitate this process.

The County owns land at Hansville, so this option received a high ranking for the suitable site criterion. However, SWD staff believes that this may not be a good option for more collection capacity in the immediate future (Peters, 2005a). The consultant team is aware of at least one private operator located in the north end that is interested in opening a drop-off site, and may be interested in partnering with the SWD to do so. Therefore, the public-private partnership and private ownership options received medium rankings for the suitable site criterion. All of the ownership options would add convenient infrastructure in the north end, so all were ranked high for convenience.

Landclearing Debris Option 6: Facilitate the establishment of a collection site in the central section of the county.

The SWD could help establish a central collection site in one of the following ways:

- a. Own and operate the site.
- b. Enter into a public-private partnership to jointly operate a site.
- c. Facilitate the establishment of a private permitted facility on private land in the central area.

Evaluation

The consultant team's evaluation of this option is similar to that of Landclearing Debris Option 5. It is important to note, however, that only about 15 percent of Site Development Activity Permits issued in 2004 were in the central area, according to the Department of Community Development's database. However, the consultant team believes that convenient access to infrastructure is a key component of encouraging proper recycling of landclearing debris, so this option remains an important one.

The County owns land at Silverdale and Poulsbo, and SWD staff believes that the Silverdale site is a good option for more collection capacity (Peters, 2005a), so this option received a high ranking for the suitable site criterion. The consultant team is aware of at least one private firm located in the central area that is interested in opening a drop-off site, and may be interested in partnering with the SWD to do so. Therefore, the public-private partnership and private ownership options received medium rankings for the suitable site criterion. All of the ownership options would add convenient infrastructure in the central area, so all were ranked high for convenience.

5.2.3 Process Landclearing Debris

Existing processing capacity in Kitsap County and north Mason County (280,000 tons) may be great enough to handle the amount of landclearing debris that is generated annually (120,000 to 380,000 tons). As discussed in Section 4.1.4, the consultant team believes it is not necessary for the SWD to develop new processing capacity at this time.

5.2.4 Strengthen Markets

Perhaps the most challenging aspect of managing landclearing debris is that markets for the material are cyclical and currently are poor. To encourage more private involvement in managing landclearing debris, the SWD could act to help strengthen markets for this material or even provide a new market, as follows:

Landclearing Debris Option 7: Play no role.

The County should not attempt to influence markets for processed landclearing debris.

Evaluation

The lack of markets for landclearing debris is one of the major problems associated with this waste stream. Although the SWD could play no role, doing so would have no effect on diverting this waste stream from disposal. In addition, stakeholders did not support this option at the October 5, 2005 stakeholder meeting.

Landclearing Debris Option 8: Use landclearing debris with or without biosolids to reclaim gravel pits.

Kitsap County Public Works owns and operates four sand and gravel pits and one rock mine that, once mined out, must be reclaimed. One option for using landclearing debris is to apply a layer of chipped debris and a layer of biosolids to the gravel pit and for use as a cover material. The area could then be hydroseeded to begin the revegetation process. Over time, this option would transform the gravel pits from a pit to wildlife habitat.

This option could use a significant amount of landclearing debris in the short-term. A 6-inch application of landclearing debris over the 315 acres of gravel pit that the County owns (Duerr, 2005) would use about 252,000 cubic yards of material, or about 95,000 tons (at 750 pounds per cubic yard). Landclearing debris could be reapplied during the soil formation process to accelerate soil development, using an additional 95,000 tons of material.

The Washington State Department of Natural Resources (WDNR) oversees gravel pit reclamation. To operate a gravel pit, the owner must file a mine reclamation plan with the state. Conversations with WDNR staff (Bromley, 2005) indicate that they are enthusiastic about the potential for using landclearing debris for gravel pit reclamation, although they did voice concerns about long-term settlement and wicking of water. WDNR also publishes a document called Best Management Practices for Reclaiming Surface Mines in Washington and Oregon (Norman et al., 1997) that stresses the value of soil development (page 3.10) and explains how to manufacture soil (page 4.6). These sources indicate that using processed landclearing debris as a component in the mine reclamation plan would be acceptable to the regulatory community.

Using biosolids in conjunction with landclearing debris would result in a richer soil product but may complicate the permitting process. Each site where biosolids are applied requires a permit under WAC 173-308. The Biosolids Coordinator for the Ecology Northwest Regional Office suggests that the wastewater treatment plant's permit should be used as the basis for obtaining

site-specific permits (Sharp, 2005). However, if the SWD wanted the option of using biosolids from several sources on its gravel pits, it might be more efficient for the County to apply for its own permit covering all of the gravel pits.

Approximately 20 additional gravel pits are privately owned and operated in Kitsap County, suggesting that this potential market for landclearing debris could be quite large and continue for quite some time if all operators agreed to the idea. The Port of Port Orchard also owns three gravel pits that total 157 acres, and may be interested in pursuing this approach for reclamation. Alternatively, once the County's own gravel pits were reclaimed, it could work with neighboring counties to accept Kitsap County's debris for reclaiming any publicly owned gravel pits there.

Evaluation

The option of using landclearing debris to reclaim gravel pits received a medium ranking for technical feasibility because it has not been done, although the techniques are in place to do so. Stakeholders generally seemed supportive. The regulatory community also supports this option – it is legal and the regulators were cautiously optimistic that it could work. If this option were implemented at all of the gravel pits that Kitsap County owns and operates, it could absorb up to 190,000 tons of material. This cost of this option is relatively high because of the need to purchase the equipment necessary to grind and spread the material, and to provide staff to operate the site.

Landclearing Debris Option 9: Require all development projects to use landclearing debris on-site.

As discussed earlier, using processed landclearing materials on-site will reduce the amount of this material that needs outside markets. Also, some re-development projects may not generate landclearing debris, and project managers may purchase chipped landclearing debris if required to use some on-site.

Evaluation

Requiring contractors to use landclearing debris on-site received a medium ranking for technical feasibility because while the new Kingston High School has demonstrated that institutional developments can use all landclearing debris on-site, the extent to which residential developments can use material on-site is not known. Stakeholders at the August 10, 2005 meeting expressed a dislike of additional regulations, so stakeholder support for this option would be low. However, requiring contractors to use material on-site would divert a significant amount of debris. An alternative might be to specify the use of material on-site in contracts, rather by regulation, on commercial and institutional sites.

Landclearing Debris Option 10: Educate contractors and public-agency project managers about using landclearing debris on-site.

The SWD could work with the Fire Department and Districts, the Home Builders Association, and other partners to develop and conduct a series of brief presentations at industry meetings to educate contractors about best management practices for using landclearing debris on-site. The workshops also should target public agency staff that are likely to manage public construction projects. This type of education is critical to increase understanding and acceptance of best management practices, and the likelihood that they will be implemented.

The Home Builders Association of Kitsap County (HBA) has received an Ecology grant to develop low-impact development standards and a low-impact development design manual for Kitsap County. The HBA's goal is to convince Kitsap County and the incorporated cities in the county to adopt these standards. The HBA also plans to train regulators and building-industry professionals to use and interpret the standards (Castle, 2005). The SWD could encourage the HBA to include best management practices for using landclearing debris on-site in these standards, if appropriate, and to highlight these practices in their planned training sessions.

Evaluation

Continuing to work with partners to educate contractors and public agency staff about best management practices is highly feasible. Stakeholder support for this option was high, and the cost of this option is relatively low.

Landclearing Debris Option 11: Invest in technology to turn landclearing debris into bio-based fuels.

Researchers have developed ways to turn cellulose fiber – including landclearing debris – into liquid fuels (chiefly ethanol), methane, and hydrogen. The process that appears most promising at this point is converting the cellulose to ethanol using various biological processes involving enzymes and bacteria. Several small demonstration facilities are up and running around North America, and Washington State University has contributed to research on the topic. The SWD could construct a facility to turn landclearing debris into ethanol, thereby ensuring another market for this material.

Evaluation

Facilities that turn landclearing debris into bio-based fuels are still experimental, and costs start at about \$80 million for a facility that would produce 20 million gallons of ethanol and consume between 250,000 and 400,000 bone-dry tons of landclearing debris annually. Capital costs for smaller facilities, in terms of dollars per gallon produced, are even higher (Kerstetter and Kim Lyons, 2001). However, such a facility would use most or all of the landclearing debris produced in Kitsap County. Stakeholders at the August 10, 2005 meeting were supportive of this option.

The County owns at least two parcels in the north end that would be suitable for such a facility. Therefore, this option received high rankings for both the suitable site and convenience criteria.

Landclearing Debris Option 12: Investigate the possibility of constructing a facility to turn landclearing debris into electricity.

One way to establish a good market for landclearing debris is to use it to fuel a waste-to-energy plant. If enough feedstock exists to create 500 kilowatt-hours of energy, Puget Sound Energy may be interested in partnering with Kitsap County to establish such a facility. Landclearing debris meets the definition of a “qualified alternative energy source” under RCW 19.090.29A. As such, a facility to burn it may qualify for additional funding help through Puget Sound Energy (Richardson, 2005). The SWD could conduct a feasibility study to examine the amount of energy that could be produced from landclearing debris, the capital and operating costs of such a facility, and the financing options available. As part of this study, the SWD should solicit partners, such as Jefferson County, Mason County, Grays Harbor County, Pierce County, and perhaps King County.

Evaluation

Similarly, partnering with Puget Sound Energy to build a facility to turn landclearing debris into electricity would use most or all of the landclearing debris produced in the county. Such a plant would create a steady market for this material and may be particularly attractive in light of rising fuel costs. Stakeholders were supportive of this type of option at the August 10, 2005 meeting. The SWD could commission a feasibility study that could set the stage for building such a plant. Because the County owns at least two parcels in the north end that could be suitable for such a site, this option received high rankings for both the suitable site and the convenience criteria.

Table 8 summarizes the consultant team’s evaluation of options to address landclearing debris.

Table 8: Summary of Evaluation of Landclearing Debris Options

Option	Technical Feasibility	Stakeholder Support	Cost	Effectiveness	Existing Infrastructure	Expansion Potential	Local	Suitable Sites	Convenience
Reduce Generation									
1. Play no role.	H	L	L	L	N/A	N/A	N/A	N/A	N/A
2. Reduce amount of land cleared per parcel.	H	L	L	H	H	L	H	N/A	N/A
3. Develop and promote best management practices.	M	H	M	H	H	H	H	N/A	N/A
Improve Collection Infrastructure									
4. Play no role.	H	L	L	L	N/A	N/A	N/A	N/A	N/A
5. Establish collection site in north end.									
(a) County owns and operates	H	L	H	M	L	M	H	H	H
(b) Public-private partnership	H	M	M	M	M	M	H	H	H
(c) Private site	H	H	L	M	H	M	H	H	H
6. Establish collection site in central area.									
(a) County owns and operates	H	L	H	M	M	M	H	H	H
(b) Public-private partnership	H	M	M	M	M	M	H	H	H
(c) Private site	H	H	L	M	H	M	H	H	H

Option	Technical Feasibility	Stakeholder Support	Cost	Effectiveness	Existing Infrastructure	Expansion Potential	Local	Suitable Sites	Convenience
Strengthen Markets									
7. Play no role.	H	L	L	L	N/A	N/A	N/A	N/A	N/A
8. Use landclearing debris to reclaim gravel pits.	M	M	M	M	M	H	H	H	H
9. Require on-site use of landclearing debris.	M	L	L	M	H	L	H	N/A	N/A
10. Educate contractors about best management practices.	H	H	L	M	H	H	H	N/A	N/A
11. Turn landclearing debris into bio-based fuels.	L	H	H	H	L	M	H	H	H
12. Investigate waste-to-energy plant.	H	H	L	H	L	H	H	H	H

5.3 Urban Wood

As discussed above in Section 4.7.2, the consultant team identified two primary issues with the management of urban wood that could be addressed:

- Source separation of clean wood waste is not the norm among contractors.
- No collection facilities for wood waste exist in the north and central sections of Kitsap County.

The consultant team identified several options for addressing these issues, as described below.

5.3.1 Establish Business Case for Recycling

Urban Wood Waste Option 1: Play no role.

The SWD could do nothing to help improve and promote the business case for recycling clean wood.

Evaluation

Although the SWD could play no role, doing so would not increase the amount of clean wood diverted from disposal or outdoor burning.

Urban Wood Waste Option 2: Educate contractors about the business case for recycling construction and demolition debris, particularly clean wood.

These presentations should include information about the Built Green program, the LEED program, and the demand for green buildings in Kitsap County. Work with the Home Builders Association and the Built Green program to present this information at regular gatherings of contractors and developers. Materials for this presentation should include a current list of recyclers who accept clean wood, and the Open Line contact number and weblink to check for updated information.

Currently, the tip fee per ton to recycle wood waste is over \$30 less than the tip fee to dispose of it as garbage, providing a possible financial benefit. Surveys indicate that consumers want homes built to green standards: in a survey at the Puget Sound Energy Built Green Idea Home in Issaquah Highlands in 2004, consumers stated that certification in the Built Green program was the sixth most important environmental feature to them, and that a premium of \$20,000 for green features was not a barrier in the \$560,000 price range (Master Builders Association of King and Snohomish Counties, 2005). Recycling construction waste is one component of the Built Green program in Kitsap County.

Evaluation

Providing contractors with information about recognition programs such as Built Green and LEED, the recycling services available to them, and ways to determine whether recycling is cost-effective for them may help to increase the amount of clean wood that is recycled. The consultant team gave this option a medium ranking for effectiveness because the effectiveness of education programs is difficult to evaluate, and therefore it is challenging to gauge how effective such education might be. A representative of the Home Builders Association remarked that “contractors will listen when they’re ready to listen” (Castle, 2005).

Urban Wood Waste Option 3: Ban disposal of clean wood waste.

Because the SWD owns and operates its transfer station, it could refuse to accept clean wood waste for disposal. Transfer station staff could visually inspect loads to determine whether they contain clean wood. Banning disposal would transform the cost of recycling wood waste into a cost of doing business for all contractors, thereby leveling the playing field. Most likely, contractors would pass these costs on to consumers. However, it is possible that banning disposal might simply lead to more burning of wood waste, which may soon be illegal.

Evaluation

Banning the disposal of wood waste is moderately feasible: other counties have banned some materials from disposal, such as King County’s ban on the disposal of electronics. To the consultant team’s knowledge none has banned wood waste from disposal. Stakeholders at the October 5, 2005 meeting did not support this option, but it likely would be highly effective at keeping wood waste out of the landfill. However, as mentioned above, this option might encourage burning of wood waste, which may soon be illegal. The SWD could accomplish this option using existing infrastructure and staff, and it is legal for the SWD to ban items from disposal.

Urban Wood Waste Option 4: Subsidize recycling fees.

Alternatively, the SWD could subsidize the costs of recycling clean wood waste. For example, Waste Management charges the following fees for 20 and 30 cubic yard containers (Pawlak, 2005):

- Daily rental: \$2.30/day
- One-time delivery charge: \$78
- Hauling: \$104.10/haul
- Mileage: \$3.15/mile one way, if disposal site is over 5 miles away.

The SWD could cover some of these costs, such as the one-time delivery charge, to help make recycling more cost-effective for contractors.

Evaluation

To the consultant team's knowledge, jurisdictions have not provided outright subsidies for recycling, so this option received a low ranking for feasibility. Stakeholder support for this option also was low at the October 5, 2005 meeting. However, such a subsidy could convince some contractors to recycle, thus diverting some wood waste from disposal. If the program were successful, the SWD could expand it easily given enough funding, and it could be implemented with existing infrastructure and staff.

Urban Wood Waste Option 5: Add a surcharge to the tip fee for loads that are mostly clean wood.

Transfer station staff could visually inspect loads, and apply the surcharge to loads that appear to be more than 10 percent clean wood waste. Such a surcharge would improve the cost-effectiveness of recycling clean wood waste.

Evaluation

Similarly, to the consultant team's knowledge, no jurisdictions have added surcharges to the tip fees for certain materials. The State of California is considering doing so for mixed construction and demolition debris, but has not yet done so. Therefore, the option received a low ranking for technical feasibility. Stakeholder support for this option at the October 5, 2005 meeting was also low. The financial cost of adding a surcharge to the tip fee would be relatively low, and this option likely would be at least moderately effective at diverting clean wood waste from disposal. However, it could also increase illegal dumping of wood waste. If the program were successful, the SWD could consider expanding it to other materials.

Urban Wood Waste Option 6: Survey contractors to determine current practices and what is necessary to increase recycling of clean wood waste.

Stakeholders at the August 10, 2005 meeting disagreed about the prevalence of wood recycling in Kitsap County. A brief survey of contractors would provide insight into what contractors currently are doing with wood waste, and if they are not recycling, to find out why not. The survey also should include questions about barriers to recycling and contractors' ideas of ways to overcome those barriers.

Evaluation

Currently, little is known about what contractors are doing with their wood waste, and if they are not recycling, how to encourage them to do so. Survey techniques are well proven, and stakeholders at the October 5, 2005 meeting were supportive of a similar option for yard waste. The SWD could commission an effective survey for less than \$25,000, and the information gleaned from it could help the SWD develop effective programs for encouraging recycling. This option could be expanded easily, is legal, and would be a local solution.

5.3.2 Improve Collection Infrastructure

Urban Wood Waste Option 7: Play no role.

At least one private firm plans to establish a collection site for wood waste in the north end and central area of the County.

Evaluation

In this case, playing no role may be the most effective option. To the consultant team's knowledge, at least one reputable private firm plans to establish collection sites for clean wood waste in the north and central areas of the county. Because these sites would operate as a transfer station, their capacity is limited only by the frequency of hauling. This option is also relatively low cost, enjoys considerable stakeholder support, and is legal.

Urban Wood Waste Option 8: Facilitate the establishment of a collection site in the north end.

The SWD could play a role in establishing a collection site in the north end in one of the following ways:

- a. Own and operate the site.
- b. Enter into a public-private partnership to jointly operate a site.
- c. Facilitate the establishment of a private permitted facility on private land in the north end.

Evaluation

As with landclearing debris, collection sites for wood waste have strong stakeholder support, particularly if they are privately owned and operated or if the SWD enters into a public-private partnership to operate them. Establishing sites is highly feasible, and by reducing the travel time and distance necessary to haul clean wood to a recycler, encourage more contractors to recycle clean wood. According to the Department of Community Development's database, approximately 26 percent of Site Development Activity Permits issued in 2004 were in the north end of the county. These collection sites would be legal, local, and easy to expand through more frequent hauling. A private site would be most cost-effective for the SWD, which could assist the private operator with obtaining permits.

The County owns land at Hansville, so this option received a high ranking for the suitable site criterion. However, SWD staff believes that this may not be a good option for more collection capacity in the immediate future (Peters, 2005a). The consultant team is aware of at least one private operator located in the north end that is interested in opening a drop-off site, and may be interested in partnering with the SWD to do so. Therefore, the public-private partnership and

private ownership options received medium rankings for the suitable site criterion. All of the ownership options would add convenient infrastructure in the north end, so all were ranked high for convenience.

Urban Wood Waste Option 9: Facilitate the establishment of a collection site in the central section of the county.

The SWD could ensure that a central collection site is established in one of the following ways:

- a. Own and operate the site.
- b. Enter into a public-private partnership to jointly operate a site.
- c. Facilitate the establishment of a private permitted facility on private land in the central area.

Evaluation

The consultant team’s evaluation of this option is identical to that for Urban Wood Waste Option 8. However, it is important to note that only about 15 percent of Site Development Activity Permits issued in 2004 were in the central area of the county, according to the Department of Community Development’s database. Even so, having convenient access to recycling infrastructure is a key component of encouraging contractors to recycle, so a collection site in the central section of the county is still a worthwhile idea.

The County owns land at Silverdale and Poulsbo, and SWD staff believes that the Silverdale site is a good option for more collection capacity (Peters, 2005a), so this option received a high ranking for the suitable site criterion. The consultant team is aware of at least one private firm located in the central end that is interested in opening a drop-off site, and may be interested in partnering with the SWD to do so. Therefore, the public-private partnership and private ownership options received medium rankings for the suitable site criterion. All of the ownership options would add convenient infrastructure in the central area, so all were ranked high for convenience.

Table 9 summarizes the consultant team’s evaluation of the options to address urban wood waste.

Table 9: Summary of Evaluation of Urban Wood Waste Options

Option	Technical Feasibility	Stakeholder Support	Cost	Effective-ness	Existing Infra-structure	Expansion Potential	Local	Suitable Sites	Convenience
Establish Business Case for Recycling									
1. Play no role.	H	L	L	L	N/A	N/A	N/A	N/A	N/A
2. Educate contractors about the business case for recycling.	H	H	L	M	H	H	H	N/A	N/A
3. Ban disposal of clean wood waste.	M	L	L	H	H	L	H	N/A	N/A
4. Subsidize recycling fees.	L	L	L	M	H	H	H	N/A	N/A

Option	Technical Feasibility	Stakeholder Support	Cost	Effectiveness	Existing Infrastructure	Expansion Potential	Local	Suitable Sites	Convenience
5. Add a surcharge to tip fees for loads that are mostly clean wood.	L	L	L	M	H	H	H	N/A	N/A
6. Survey contractors.	H	H	L	M	H	H	H	N/A	N/A
Improve Collection Infrastructure									
7. Play no role.	H	L	L	L	N/A	N/A	N/A	N/A	N/A
8. Establish collection site in north end.									
(a) County owns and operates	H	L	H	M	M	H	H	L	H
(b) Public-private partnership	H	M	M	M	M	H	H	M	H
(c) Private site	H	H	L	M	H	H	H	M	H
9. Establish collection site in central area.									
(a) County owns and operates	H	L	H	M	M	H	H	H	H
(b) Public-private partnership	H	M	M	M	M	H	H	M	H
(c) Private site	H	H	L	M	H	H	H	M	H

5.4 Yard Waste

The existing infrastructure for yard waste collection and recycling is convenient and stable, and markets for products made from processed yard waste are strong. The consultant team estimates that only 5,000 tons of yard wastes are disposed annually at OVTS, yielding an 86.5 percent recycling rate.⁵ However, the consultant team did identify three issues of concern for this waste stream, as follows:

- Although most residents manage their yard waste on-site or recycle it (Gilmore Group, 2001) a small amount of yard waste is still disposed as garbage.
- Illegal dumping of yard waste is a problem (Brower, 2005).

⁵ (32,479 tons of yard waste recovered) / (37,539 tons of yard waste generated) = 86.5%

- Significant percentages of Kitsap County residents do not know that drop-off facilities (34%) or curbside collection (21%) are available to them (Gilmore Group, 2001).

The consultant team identified several ways that the County could act to make the existing system more attractive to residents and reduce illegal dumping. These options are described below.

5.4.1 Attract Customers

Yard Waste Option 1: Play no additional role.

The current public system is satisfactory, and many private firms collect yard waste for recycling. The SWD already provides a suite of programs and services related to yard waste, such as free information and classes on home composting, a directory of yard waste composters and chippers, and Yard Waste Amnesty Days.

Evaluation

This option would not be effective at reducing illegal dumping or getting the estimated 5,000 tons of yard waste out of the landfill.

Yard Waste Option 2: Hold compost bin sales.

The County currently provides information on how to compost at home on its website, and offers free 2-hour composting classes through its Master Composter program. The County could expand this program to include provision of free or low-cost compost bins, and/or increased promotion of home composting.

Evaluation

Expanding home-composting education programs could help divert yard waste from disposal, and perhaps increase the likelihood that yard waste is managed properly. Other jurisdictions, such as Seattle, have distributed free or low-cost compost bins to their citizens for years, and surveys show that the majority of those who buy bins are new to composting, indicating that these sales are effective at encouraging people to begin composting (Cascadia Consulting Group, Inc., 2002). Bin sales, with accompanying education about composting methods, likely would be a relatively moderate cost.

Yard Waste Option 3: Ban the disposal of yard waste.

The County could refuse to accept yard waste for disposal at OVTS. Because people generally are law-abiding, a ban may go far toward getting the last 5,000 tons of yard waste out of the garbage and back into beneficial use.

Evaluation

Because most citizens are law-abiding, banning disposal of yard waste would be very effective at diverting yard waste from disposal. The SWD could implement the ban itself at relatively low cost, and the stakeholders at the October 5, 2005 meeting were mostly supportive of this option. Existing infrastructure is sufficient, the option is legal, and it is a local solution. However, enacting an ordinance to implement this option is likely to meet with citizen opposition, and may force the County to offer curbside collection to all Kitsap County residences, which would be prohibitively expensive. There is not much potential for expanding the option, since a ban is a comprehensive measure.

Yard Waste Option 4: Improve access to the existing yard waste drop-box facility at Silverdale.

The Silverdale box requires customers to walk up a narrow ramp, which discourages people from using it. In 2004, customers dropped only eight tons of yard waste in the Silverdale drop box, compared to 405 tons at Hansville and 355 tons at Olalla (Kitsap County Public Works Solid Waste Division, 2004). The consultant team believes that the SWD could use a concept is similar to the current configuration at the Hansville Drop-Off Facility.

Evaluation

This option is highly feasible, and it is possible that making these changes would increase collection at Silverdale to levels closer to those at the other drop boxes, making this a moderately effective option. The option does require a significant investment in existing infrastructure, but is legal and local. Its expansion potential is high.

Yard Waste Option 5: Add a container for yard waste debris at the Poulsbo Recycling Center.

Although the County currently offers collection services in the very north end at Hansville and in the central area at Silverdale, adding a box at Poulsbo would increase convenience for Poulsbo customers and those in the north-central end of the county. It would also mean that all County drop-box facilities accept yard wastes, thereby reducing possible confusion (and frustration) among users.

Evaluation

This option is highly feasible, and stakeholders at the October 5, 2005 meeting indicated strong support for it. However, Bainbridge Disposal runs a successful curbside collection program for yard waste within Poulsbo city limits, so this box might not collect much yard waste. SWD staff estimate that adding a box would cost approximately \$70,000 per year plus an estimated \$200,000 in engineering costs, earning this option a medium relative cost ranking (Peters, 2005b). The option is legal and local, but requires investment in infrastructure. The potential for expanding the option through increased frequency of hauling is high.

Yard Waste Option 6: Contract with a private entity to provide a container on private property.

If the County preferred not to use the space at the Poulsbo Recycling Center to add a yard waste container, it could contract with a private firm to offer a collection site elsewhere in the Poulsbo area.

Evaluation

This option is feasible, and stakeholders at both meetings were generally supportive of options that involve the private sector. Because of the partnership, the cost to the SWD would be less than providing a recycling container itself, but still relatively high. This option could be expanded, and is both legal and local.

Yard Waste Option 7: Hold numerous Yard Waste Amnesty events each year.

The response to these events suggests that citizens like them. To assuage concerns that the County's activities may interfere with private enterprise, the SWD could work with a variety of private firms in turn to offer this service, so long as the firms have the proper permits and can process the material into a marketable product. The private firms would benefit from the advertising, and the public would understand that private yard-waste services are available year-round.

Evaluation

The SWD has demonstrated that these events are highly feasible, and stakeholders support them strongly. These events are relatively inexpensive, particularly since North Mason Fiber has donated the cost of processing. These events collect an average of 85 tons of materials, including yard waste.⁶ This option could be implemented with existing infrastructure, could be expanded easily, and is both legal and local.

Yard Waste Option 8: Create a neighborhood chipping program.

This service would consist of the SWD hiring a private chipping service to chip yard waste for "free" in specific neighborhoods. The County could establish this as a regular annual (subsidized) program, or offer it as a one-time event and give the private chipping service the opportunity to offer to return periodically.

Evaluation

Such a program certainly is feasible. However, stakeholder support for this option at the October 5, 2005 stakeholder meeting was low, and in the consultant team's judgment, the program is unlikely to divert significant amounts of yard waste. The program is likely relatively inexpensive, is legal and local, could be expanded easily, and could be implemented with existing infrastructure.

Yard Waste Option 9: Survey residents and businesses.

In 2001, the Gilmore Group surveyed residents about their management of yard waste. The objective of this survey would be to update the Gilmore Group (2001) survey, determine how businesses currently manage yard wastes, and what programs or incentives might encourage residents and businesses them to compost or use the existing system. This survey could include questions about whether residents compost at home, how much residents are willing to pay for yard-waste management, what types of services they like and find convenient, their awareness of year-round yard-waste services, and why they do or do not use them. The survey could ask all businesses how they manage their yard waste (if any), and ask businesses that are likely to generate significant amounts of yard waste, such as golf courses, whether they are willing to compost on-site.

Evaluation

Survey techniques are well proven in Kitsap County and elsewhere, and stakeholder support for this option was high. Depending on how the survey is administered, it could be done at relatively low cost. For example, the SWD could survey all participants at Yard Waste Amnesty Days

⁶ [(63 tons at 10/16/04 event)+(139.12 tons at 5/14/05 event)+(73.5 tons at 10/2/04 event)+(64 tons at 4/2/05 event)]/4 = 84.9 tons

while they are waiting in line, using a form that could be scanned electronically to reduce interpretation costs. Although the survey should be effective at informing the SWD's program development, it would not divert any yard waste from disposal in itself. It could easily be expanded or repeated, and it is legal and local.

5.4.2 Reduce Illegal Dumping

Yard Waste Option 10: Play no role.

The SWD could do nothing. If illegal dumping continues, the Health District may require that landscapers acquire permits. This process may encourage some landscapers to change their ways.

Evaluation

This option is not likely to be effective at reducing illegal dumping. However, it is a relatively low cost and legal option (health districts investigate illegal dumping incidents, according to RCW 70.95.240).

Yard Waste Option 11: Conduct outreach to landscaping companies.

The SWD could reach out to the landscaping community, perhaps in conjunction with the Health District, to find out about companies' current practices and disseminate information about where to recycle yard wastes or how to compost yard wastes on-site. The SWD could start with a survey that seeks to identify current practices, perceived barriers to recycling, and ways to overcome these barriers. If landscapers indicate interest, the SWD could hold workshops about on-site composting, or undertake other follow-up activities suggested by the survey findings.

Evaluation

The technical feasibility of this option is high, and depending on the survey design, the option could be implemented at relatively low cost. Stakeholders at the October 5, 2005 stakeholder meeting supported other survey options, and likely would not oppose such a survey. Although a survey itself would do nothing to divert yard waste from disposal or illegal dumping, the findings that result could help the SWD target programs effectively. This option does not require infrastructure, is legal, and would be a local solution.

Yard Waste Option 12: Create a hauling service for large loads of yard waste.

The SWD could work with private chipping and/or composting services to remove and recycle large loads of yard debris from residential properties. The private operators might provide dumpsters, or simply bring a dump truck and/or grinder to the site and remove the load.

Evaluation

The feasibility of this option is high, but stakeholder support for similar options at the October 5, 2005 meeting was low. The cost is likely to be relatively low, but the program is not likely to divert significant amounts of yard waste from disposal or illegal dumping. However, the program could be easily expanded, it is legal, and it would be a local solution.

Table 10 summarizes the consultant team's evaluation of the yard waste options.

Table 10: Summary of Evaluation of Yard Waste Options

Option	Technical Feasibility	Stakeholder Support	Cost	Effectiveness	Existing Infrastructure	Expansion Potential	Local	Suitable Sites	Convenience
Attract Customers									
1. Play no role.	H	L	L	L	N/A	N/A	N/A	N/A	N/A
2. Hold compost bin sales.	H	M	M	M	H	H	H	N/A	N/A
3. Ban disposal.	H	M	L	H	H	L	H	N/A	N/A
4. Improve Silverdale access.	H	M	H	M	M	H	H	H	H
5. Add drop box at Poulsbo Recycling Center.	H	H	M	L	M	H	H	H	H
6. Contract with private entity to provide box.	H	H	H	M	M	M	H	M	H
7. Hold numerous Yard Waste Amnesty events.	H	H	L	L	H	H	H	N/A	N/A
8. Create neighborhood chipping program.	H	L	L	L	H	H	H	N/A	N/A
9. Survey residents and businesses.	H	H	L	N/A	N/A	H	H	N/A	N/A
Reduce Illegal Dumping									
10. Play no role.	H	L	L	L	N/A	N/A	H	N/A	N/A
11. Conduct outreach to landscaping companies.	H	M	L	L	N/A	H	H	N/A	N/A
12. Create a hauling service.	H	L	L	L	H	H	H	N/A	N/A

5.5 Food Waste

Nearly all food waste in Kitsap County is disposed through regular garbage service. Although this management method does not pose a problem per se, it conflicts with the SWD goal of maximizing organics recovery within the constraints of economics. As mentioned above, North Mason Fiber plans to operate a system capable of composting up to 40,000 tons of food waste and compostable paper. Therefore, the consultant team developed several options for ways the SWD could encourage the establishment of a food waste collection system, as described below.

5.5.1 Establish Collection Infrastructure

Food Waste Option 1: Play no role.

The SWD, or each City, should not establish food waste collection programs.

Evaluation

While this option is legal and costs nothing, it also does nothing to divert food waste from disposal.

Food Waste Option 2: Require the certificated hauler to include residential food waste in curbside yard waste collection service.

Waste Management is the certificated hauler for unincorporated Kitsap County, and offers curbside collection of yard waste in the unincorporated urban growth area. The WUTC requires certificated haulers to comply with the local Comprehensive Solid Waste Management Plan (RCW 81.77.030), so the SWD would need to amend its plan to effect this change. Although participation in the yard waste collection program is low (about 5 percent), adding food waste to the service would cost very little outside of the education necessary to reduce contamination. Stakeholders at the October 5, 2005, meeting were optimistic about this option, commenting that providing households on septic systems with another method of recycling food waste might attract more customers to the curbside program.

Evaluation

This option is highly feasible – Seattle’s new program is a good example – and would cost little to implement, aside from the education necessary to ensure a successful program. The collection infrastructure to implement it already exists, and North Mason Fiber plans to construct a Gore system to process food waste by March 1, 2006. This option is legal and local.

However, it is unlikely that much food waste will be collected: only 2,000 households participate in Waste Management’s curbside yard waste program (Bickle, 2005). According to studies of Seattle’s waste composition, an average household produces about 0.22 tons of food waste per year (Cascadia Consulting Group, Inc. and Sky Valley Associates, 2003). Therefore, at current participation levels, this option would divert at most 440 tons of food waste from disposal. If all 40,000 households eligible for the program (Bickle, 2005) signed up and participated fully, the program could divert 8,800 tons per year. The program could be expanded if new customers are willing to sign up for curbside collection, improving the program’s cost-effectiveness.

Food Waste Option 3: Provide incentives to commercial or institutional generators to recycle food waste.

The SWD could provide generators such as grocery stores, restaurants, schools, and hospitals with technical assistance and staff training, or subsidize the cost of having collection bins on-site. The SWD should work with each generator to determine what incentives would be most effective.

Evaluation

This option is highly feasible, and stakeholders at the October 5, 2005 stakeholder meeting supported it strongly. Depending upon the incentives chosen and participation rates, the program is likely to be of relatively moderate cost. This option has the potential to divert significant

amounts of food waste from disposal: commercial and institutional generators produce about half of the food waste disposed in the county. The option is legal, local, and could be expanded easily if it is successful. The infrastructure for processing the food waste collected through this program should be in place by March 1, 2006.

Food Waste Option 4: Encourage cities to adopt the same policies.

Diverting large quantities of food waste from disposal will require recycling options to be available in the incorporated areas of the county as well. The steps each city would need to take to co-collect food waste with yard waste depend upon the current system in each city. The cities of Bremerton and Port Orchard contract with Waste Management for residential recycling service; these cities would need to amend their contracts to implement this policy. Similarly, the City of Poulsbo contracts with Bainbridge Disposal to provide curbside recycling service; Poulsbo would need to amend this contract. The WUTC regulates garbage and recycling on Bainbridge Island, and Bainbridge Disposal holds the certificate. Each city could offer incentives to commercial and institutional generators without needing to amend contracts.

Evaluation

This option certainly is feasible, and had strong stakeholder support. It would not cost much for the SWD to implement or increase costs for curbside collection, and is the key to diverting large amounts of food waste from disposal, since many residents and businesses are in the incorporated areas. This option is both legal and local.

Table 11 summarizes the consultant team’s evaluation of the food waste options.

Table 11: Summary of the Evaluation of Food Waste Options

Option	Technical Feasibility	Stakeholder Support	Cost	Effective-ness	Existing Infra-structure	Expansion Potential	Local	Suitable Sites	Convenience
Establish Collection Infrastructure									
1. Play no role.	H	L	L	L	N/A	N/A	N/A	N/A	N/A
2. Require hauler to co-collect food waste with yard waste.	H	H	L	L	H	H	H	N/A	N/A
3. Provide incentives to commercial generators.	H	H	M	M	H	H	H	N/A	N/A
4. Encourage cities to adopt the same policies.	H	H	L	H	N/A	N/A	H	N/A	N/A

5.6 Biosolids

Although current biosolids management programs are stable, wastewater treatment plant operators report that they would like to expand their options. Also, while the SWD does not have direct control over biosolids management, the SWD or local cities could work with wastewater treatment plant operators to help develop new programs. Therefore, the consultant team identified ways that the SWD and cities could facilitate biosolids composting, as described below.

5.6.1 Foster Biosolids Processing

Biosolids Option 1: Play no role.

The SWD or any local city should not be involved in biosolids composting.

Evaluation

While this option is legal and costs nothing, it also does nothing to enhance recycling of biosolids.

Biosolids Option 2: Encourage wastewater treatment plants to expand their options.

The SWD, in partnership with local cities, could provide wastewater treatment plant operators with information about a variety of local options that would enhance recycling of biosolids.

These options include the following:

- a. Produce Class A by-products.
- b. Provide biosolids for gravel pit reclamation. This option is described in Section 5.2.4.
- c. Compost on-site.
- d. Contract with private operators to compost biosolids. Facilities that compost biosolids require a permit under WAC 173-308. North Mason Fiber has obtained such a permit (Dressel, 2005b).

Evaluation

a. Producing Class A by-products is highly feasible; in fact, the Port Orchard plant is pursuing this option now (Maynard, 2005). Stakeholders expressed some support for this idea at the October 5, 2005 meeting. According to John Poppe of the Port Orchard plant, upgrading his facility will cost roughly \$100,000 in 2005 (Poppe, 2005). Although all plants recycle their biosolids now, this option would also be quite effective at recycling biosolids locally. This option is legal and local, and could be expanded to the other wastewater treatment plants in the county.

b. Providing biosolids for gravel-pit reclamation is moderately feasible: to the consultant team's knowledge, it has not yet been done in Washington. Stakeholder support for this option was low. The primary cost of this option would be transporting the material. One plant operator said that transportation costs for biosolids are around \$18 per ton (Hunt, 2005), so if all 10,000 tons were transported the cost would be \$180,000, falling in the relatively high cost category. This option would use existing infrastructure and could be expanded to include private pits. It is a legal and local solution.

c. Composting on-site is technically feasible. However, when plant operators were asked if they had space to compost on-site, only the Bremerton plant operator thought it would be feasible given space requirements and odor issues (Biconin, 2005). Therefore, this option is not likely to

be universally effective. Because the Bremerton facility would need to be covered, the cost is likely to be relatively high.

d. Entering into contracts with private operators to compost biosolids is highly feasible, and enjoyed considerable stakeholder support at the October 5, 2005 meeting. To the consultant team’s knowledge, North Mason Fiber is the only private composting facility in Mason and Kitsap Counties with a permit to compost biosolids. North Mason Fiber would charge approximately \$50 per dry ton of biosolids, for a total cost of approximately \$84,000 to process all but Port Orchard’s biosolids, since Port Orchard will be producing a Class A by-product shortly (Dressel, 2005a). This option is legal and local and could be expanded to all but the Port Orchard plant.

5.6.2 Improve Markets for Composted Biosolids

Biosolids Option 3: Play no role.

The SWD and local cities should not be involved in promoting markets for composted biosolids.

Evaluation

While this option is legal and low-cost, it is not particularly effective at enhancing markets for composted biosolids.

Biosolids Option 4: Educate consumers about compost made from biosolids.

Although consumers are enthusiastic about compost in general, they may hesitate to use compost made from human waste. The SWD could develop and disseminate educational materials that assuage these worries and increase acceptance of composted biosolids.

Evaluation

This option is feasible, and stakeholders at the October 5, 2005 meeting expressed strong support for it. The cost of such promotion can be low, and although its effectiveness is difficult to gauge, it is likely to help strengthen markets. This option would use existing infrastructure, is legal and local, and could be expanded easily with enough funding.

Table 12 summarizes the consultant team’s evaluation of the biosolids options.

Table 12: Summary of Evaluation of Biosolids Options

Option	Technical Feasibility	Stakeholder Support	Cost	Effective-ness	Existing Infra-structure	Expansion Potential	Local	Suitable Sites	Convenience
Foster Biosolids Processing									
1. Play no role.	H	L	L	L	N/A	N/A	N/A	N/A	N/A
2. Encourage treatment plants to:									
(a) Produce Class-A by-products	H	M	L	H	M	H	H	N/A	N/A

Option	Technical Feasibility	Stakeholder Support	Cost	Effective-ness	Existing Infra-structure	Expansion Potential	Local	Suitable Sites	Convenience
(b) Use biosolids to reclaim gravel pits.	M	L	H	H	M	H	H	H	H
(c) Compost on-site.	H	L	H	L	L	M	H	L	H
(d) Contract with private composters	H	H	M	H	H	H	H	N/A	N/A
Improve Markets for Composted Biosolids									
3. Play no role.	H	L	L	L	N/A	N/A	N/A	N/A	N/A
4. Educate the public about composted biosolids.	H	H	L	M	H	H	H	N/A	N/A

5.7 Other Waste

The consultant team also developed options for improving the management of three additional waste streams of interest to the SWD: agricultural waste, fisheries waste, and street waste solids and vector waste. Street waste solids are ditch spoils and road sweepings, while vector waste come from catch basins and storm drains.⁷

Although agriculture in Kitsap County is limited to hobby farms, proper management of agricultural waste is essential for maintaining and improving water quality. Tribal and commercial fisheries operations generate hundreds of tons of fish carcasses annually. If not disposed properly, these carcasses can exacerbate water quality problems. Currently, the major commercial generator in Kitsap County sends its fish waste to a company in Pacific County that processes the fish into fertilizer, but tribal fisheries often leave fish carcasses to decompose along Hood Canal and other waterways. Street waste solids and vector waste are expensive to handle and difficult to recycle because they are contaminated with motor oil, gas, and diesel. Currently, many local governments collect and dispose of it.

The consultant team identified a number of ways that the SWD could act to address these issues, as described below.

5.7.1 Foster Processing of Agricultural Waste

Agricultural Waste Option 1: Play no role.

The SWD should not be involved in promoting or developing processing capacity for agricultural waste locally.

Evaluation

Although this option does not cost much and is legal, it also is not very effective at increasing the proper processing of agricultural waste.

⁷ Please see the Department of Ecology's fact sheet, *Focus on Street Wastes Versus Vector Waste*, for an in-depth discussion of the difference between street wastes and vector wastes. This document can be found on-line at <http://www.ecy.wa.gov/pubs/0204032.pdf>.

Agricultural Waste Option 2: Coordinate with the Kitsap County Conservation District.

The Kitsap County Conservation District works with farmers to create farm plans to reduce and manage their wastes. This coordination could include bolstering the District's efforts to encourage farmers to compost on site, or fostering cooperative composting between farms with compatible feedstocks as regulations allow.

Evaluation

This option is highly feasible, and is likely to be quite effective because the Conservation District already has established relationships with local farmers. Because this option would leverage the efforts of the Conservation District, it is likely to generate good results at low cost. It is also legal, local, and easily expandable.

Agricultural Waste Option 3: Contract with the Mason County Conservation District.

The Mason County Conservation District is studying the feasibility of building an anaerobic digester to manage agricultural waste, and plans to issue an RFP soon to construct the facility. District staff expects the facility to begin operating in the summer of 2006, and to accept agricultural waste, fish waste, and food waste from a local prison (Kirby, 2005). The SWD could establish an agreement with the Mason County Conservation District to allow farmers to haul their agricultural waste to the anaerobic digester.

Evaluation

This option is feasible. If farmers are amenable, this option could recycle significant amounts of agricultural wastes. However, its cost depends upon the agreement reached with the Mason County Conservation District, and it is questionable whether hobby farmers will transport waste to Mason County. This option would use infrastructure that is not yet built, earning it a low rank for this criterion. The new digester will be in Shelton, in central Mason County, earning it a medium ranking for the local criterion.

Agricultural Waste Option 4: Construct an anaerobic digester.

Alternatively, the SWD could construct an anaerobic digester to turn agricultural waste into energy in Kitsap County. The SWD could contract with farmers to ensure a steady stream of feedstock for the facility.

Evaluation

Although the Mason County Conservation District is demonstrating that building an anaerobic digester is quite feasible, they are also demonstrating that it's expensive: the feasibility study cost \$10,000 and the system itself will cost somewhere between \$500,000 and \$1.2 million, depending on its size and its capacity to generate power (Gieger, 2005). However, a digester would be quite effective at recycling manures and fish wastes, and would be both legal and local. By definition, this option would not use existing infrastructure.

Agricultural Waste Option 5: Establish a public-private partnership to construct an anaerobic digester.

The SWD could seek a private partner with the objective of building an anaerobic digester, or provide incentives to a private enterprise to build one.

Evaluation

This option would reduce the cost of building an anaerobic digester, but probably by not more than half. In all other criteria this option is identical to Agricultural Wastes Option 4.

5.7.2 Encourage Processing of Fisheries Waste

Fisheries Waste Option 1: Play no role.

The SWD should not play a role in encouraging proper management of fish wastes.

Evaluation

This option would not reduce improper management of fish carcasses. It is, however, legal and costs nothing.

Fisheries Waste Option 2: Offer technical assistance to fisheries managers.

The SWD could provide information about various management methods to commercial and tribal generators. The SWD could provide information about the following:

- a. Composting fish carcasses on-site or at an established permitted facility, such as North Mason Fiber.
- b. Sending fish wastes to the anaerobic digester in Mason County.
- c. Hauling their wastes to other end markets. One example is Zeotech, in Raymond, Washington, which processes fish into fertilizer.

Evaluation

This option certainly is feasible, and could be accomplished at low cost. The consultant team gave this option a medium effectiveness rating: private fish farms are already handling their fish wastes responsibly, and the tribal hatchery did not respond to requests for information. This option could be implemented using existing infrastructure, it is legal and local, and it could easily be expanded if the tribes are interested.

5.7.3 Processing Options for Street Waste Solids and Vector Waste

Currently, street waste solids are sent directly to the OVTS in Kitsap County for disposal. Vector waste goes first to the decant facility, where liquids are removed, before following the same path.

The Department of Ecology is putting together an advisory group, led by Cullen Stephenson, to develop new regulations for handling these materials. This group is still in the formative stages (Navetski, 2005). The SWD should not develop new ways to handle these wastes until this group

finishes its work and new regulations are adopted.⁸ The Association of Washington Cities is also working on this issue (Probart, 2005), and the Association of Washington Counties should be encouraged to do so as well (Navetski, 2005).

Street Waste Solids and Vector Waste Option 1: Play no role.

The SWD should bide its time and wait until new regulations are adopted before addressing street waste solids and vector wastes.

Evaluation

This option is free and does not require the investment of any staff time. However, it does not grant the SWD the opportunity to help shape the new regulations.

Street Waste Solids and Vector Waste Option 2: Join the Department of Ecology’s Advisory Group.

The SWD or local cities could request to participate in the Department of Ecology’s advisory group working to develop new regulations for handling street waste solids and vector waste. Doing so would afford the SWD the opportunity to shape these regulations.

Evaluation

This option is highly feasible and low cost, and it would give the SWD (or a local city) the opportunity to influence the new standards. The option could be implemented with existing staff. It is legal but not local, and could be expanded.

Table 13 summarizes the consultant team’s evaluation of the options to address agricultural waste, fisheries waste, and street waste solids and vector waste.

Table 13: Summary of Evaluation of Other Waste Options

Option	Technical Feasibility	Stakeholder Support	Cost	Effectiveness	Existing Infrastructure	Expansion Potential	Local	Suitable Sites	Convenience
Agricultural Waste									
1. Play no role.	H	N/A	L	L	N/A	N/A	N/A	N/A	N/A
2. Coordinate with the Kitsap County Conservation District.	H	N/A	L	H	H	H	H	N/A	N/A
3. Contract with Mason County to send wastes to their anaerobic digester.	H	N/A	N/A	L	L	H	M	N/A	N/A
4. Build an anaerobic digester.	H	N/A	H	H	L	H	H	H	H

⁸ The Snohomish County Road Maintenance Division commissioned a study in 1997 to examine ways to reuse these wastes. The findings from this study are in Appendix E.

Option	Technical Feasibility	Stakeholder Support	Cost	Effectiveness	Existing Infrastructure	Expansion Potential	Local	Suitable Sites	Convenience
5. Use a public-private partnership to build an anaerobic digester.	H	N/A	H	H	L	H	H	H	H
Fisheries Waste									
1. Play no role.	H	N/A	L	L	N/A	N/A	N/A	N/A	N/A
2. Provide information about and technical assistance with alternative management methods.	H	N/A	L	M	H	H	H	N/A	N/A
Street Waste Solids and Vector Waste									
1. Play no role.	H	N/A	L	L	N/A	N/A	N/A	N/A	N/A
2. Join Ecology's advisory group.	H	N/A	L	M	H	M	L	N/A	N/A

6 Recommendations

The Kitsap County Solid Waste Division seeks to maximize recycling of organic matter within the constraints of economics, and to ensure that a convenient and reliable recycling system is available to its citizens. Based upon the foregoing evaluation of options, the consultant team developed a set of immediate, near term, and long term recommendations to help the SWD achieve this goal. It is important to note that all of these recommendations are in addition to the SWD's current successful programs and services that address organic waste.

Immediate Recommendations

The consultant team believes the SWD should undertake the following actions no later than December 2006.

Overall

1. Serve as advocates in the permitting process for entrepreneurs who want to start new organics-management facilities, and convene a process to examine ways to streamline the permitting process.

Landclearing Debris

2. Develop and adopt best management practices for using landclearing debris on-site.

3. If a private company indicates a firm commitment to establish a new collection site for landclearing debris and clean wood waste in the north and/or central areas, monitor their progress through 2006.

Urban Wood Waste

4. If a private sector company indicates a firm commitment to establish a new collection site for urban wood waste in the north and/or central areas, monitor their progress through 2006.
5. Continue to educate contractors about the Built Green and LEED programs.
6. Continue to increase demand for green buildings through promotion to residents and businesses, in conjunction with the Home Builders Association.

Yard Waste

7. Survey residents and businesses, including landscapers, to determine current yard-waste behaviors, what they would like in a system, and what is needed to convince more of them to sign up for curbside yard waste collection.
8. Using the information gathered from the survey recommended in Recommendation 7, adjust existing programs or develop new ones to encourage more residents to compost at home and/or sign up for curbside collection service.

Food Waste

9. Require the certificated hauler to co-collect food waste with yard waste curbside service.
10. Conduct a brief survey of grocery stores and restaurants to discover what incentives would be most effective at encouraging them to source-separate food waste for composting. Incentives could include technical assistance, training staff, or subsidies of recycling bins.

Biosolids

11. Encourage treatment plants to contract with local facilities to compost biosolids or produce Class A biosolids.
12. Educate the public about the benefits and safety of composted biosolids and Class A by-products.

Other Waste

13. Join the Department of Ecology's work group to develop new regulations and management options for managing street waste solids and vector waste. If the committee is already full, the SWD should track its efforts and encourage the Association of Washington Counties to do the same.

Near Term Recommendations

The SWD should act upon these recommendations between 2007 and 2010.

Overall

14. Continue to serve as advocates in the permitting process, and continue to encourage regulatory agencies to find ways to streamline the permitting process while maintaining the current level of environmental and public health protection.
15. Encourage the Kitsap County Department of Community Development to adopt soil quality standards that call for amending soil in new developments with organic matter.

Landclearing Debris

16. Educate contractors about best management practices for using landclearing debris on site.
17. If collection sites are not in process by the end of 2006, seek a public-private partnership for opening them.
18. If the Puget Sound Clean Air Agency establishes a landclearing burn ban in Kitsap County and the private sector cannot process all of the landclearing debris generated in the county, commission a feasibility study to examine the potential for a waste-to-energy plant and/or a study of alternative value-added markets for landclearing debris, perhaps in conjunction with the Washington State University Energy Program. In the meantime, use landclearing debris to reclaim gravel pits.

Urban Wood Waste

19. If the private sector has not begun work on collection sites for clean wood in the central and north areas of the county by the end of 2006, seek a public-private partnership for opening them.

Yard Waste

20. Fix public access to the Silverdale drop-box facility's yard waste containers.
21. Develop best management practices for yard waste handling in the landscaping industry.
22. Expand home-composting programs to include sales of yard and food waste composting bins.

Food Waste

23. Based upon the brief survey of commercial and institutional generators, develop and implement an incentive program to encourage these generators to source-separate food waste.
24. Encourage local cities to contract to co-collect food waste with curbside yard waste.
25. Offer incentives to commercial and institutional generators to recycle food waste.

Biosolids

26. Continue to educate the public about the benefits and safety of composted biosolids and Class A by-products.

Other Waste

27. Coordinate with the Kitsap County Conservation District's efforts to help farmers reduce and properly manage animal waste.

28. Coordinate with Mason County to encourage Kitsap County farmers to send manure to the Mason County Conservation District's anaerobic digester.
29. Work with tribal hatcheries and fisheries to encourage the use of best management practices for fish mortalities.
30. Depending upon the new regulations governing the disposal of street waste solids and vector wastes, seek ways to reuse or recycle these materials.

Long Term Recommendations

The SWD should implement these options over the long term.

Overall

31. Continue to serve as advocates in the permitting process, and continue to encourage regulatory agencies to find ways to streamline the permitting process while maintaining the current level of environmental and public health protection.

Landclearing Debris

32. Continue to educate contractors about best management practices for using landclearing debris on site.
33. If the private sector still is not processing all landclearing debris, act on the recommendations of the feasibility study and/or the study of ways to create additional value-added markets for landclearing debris. If necessary, continue to use landclearing debris to reclaim gravel pits.

Urban Wood Waste

34. Continue to educate contractors about the Built Green and LEED programs.
35. Continue to increase demand for green buildings through promotion to residents and businesses, in conjunction with the Home Builders Association.

Yard Waste

36. Ban disposal of yard waste at the curb, at drop-box facilities, and at OVTS.

Food Waste

37. Continue to educate residents and businesses about the proper way to recycle food waste.
38. Continue to offer incentives to businesses to source-separate food waste.

Biosolids

39. Continue to educate residents and businesses about the benefits and safety of composted biosolids and Class A by-products.

Other Waste

40. Continue to support the Kitsap County Conservation District's efforts to help farmers reduce and properly manage wastes.

41. Continue to provide technical assistance and information to the fish industry, as needed.

This action plan identifies concrete steps that the SWD can take to improve organics management in Kitsap County, while recognizing the importance of the private sector's role and the influence of market forces on human behavior. The consultant team believes that this suite of recommendations will allow the SWD to enhance the scope and reliability of organic waste management in Kitsap County within the constraints of economics.

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Appendix A: Generation Calculations

One of the primary tasks of this project was to estimate the generation of the following organics waste streams in Kitsap County:

- **Landclearing debris**, or the stumps, brush, dirt, rocks, and other debris generated when land is cleared for development.
- **Urban wood waste**, defined as clean wood waste, pallets and crates, and contaminated wood from demolition projects.
- **Yard waste**, such as leaves, grass, brush, and other debris generated from regular yard maintenance or small landscaping projects.
- **Food waste**, including both pre- and post-consumer food waste, and other compostable materials commonly found in residential garbage such as pizza boxes or soiled paper.
- **Biosolids**, which are the products of wastewater treatment plants.

Because waste composition data does not exist for Kitsap County, the consultant team modeled generation of these waste streams using studies performed elsewhere, interviews with industry players, and disposal data from the SWD. This appendix describes in more detail how the models for each generator type and waste stream were constructed.

For **grocery stores, schools, restaurants, and wholesalers** of nondurable goods, estimates of disposed organic materials were derived in the following way. The number of employees in each industry group in Kitsap County was found by consulting the 2002 Economic Census, which is accessible at www.census.gov/econ/census02. For each group, the number of employees was multiplied by the per-employee disposal figure that is reported in the *1999 Statewide Waste Characterization Study: Results and Final Report*, published by the California Integrated Waste Management Board (CIWMB, 1999). This produced an estimate of the total amount of material that is disposed in Kitsap County by each industry group. A composition profile specific to each industry group was then found in the CIWMB report, and the composition profile was applied to the total tons estimated to be disposed, in order to produce an estimated itemization of organic materials that are disposed by each industry group. The employment, tonnage, and composition figures are as follows:

Table 14: Grocery Stores, Schools, Restaurants, and Wholesalers

	Employees	Disposed tons per employee per year	Pct. food	Pct. yard waste	Pct. compostable paper
Grocery stores	1,884	2.9	40.0%	1.5%	2.5%
Schools	2,330*	0.8	20.3%	27.0%	6.0%
Restaurants	5,460	3.1	56.0%	0.2%	2.2%
Wholesale nondurable	459	0.9	22.4%	7.5%	6.2%

* This estimate counts teachers, but not other employees such as administrators or janitors.

For **correctional facilities** and assisted living facilities, estimates of disposed organic materials were derived as follows. The number of beds (340) in correctional facilities in the county was found in data published by the Washington Association of Sheriffs and Police Chiefs

(www.waspc.org/jails/JailStats/2004/Counties/Kitsap.html), and the number of beds in **assisted living facilities** was found through a process of contacting individual facilities. Disposal quantities per bed and composition profiles were obtained from dormitories studied as part of the *University of Washington Waste Characterization Study*, published February 2004 (Cascadia Consulting Group, 2004a). The number of residents, tonnage, and composition figures are as follows:

Table 15: Correctional and Assisted Living Facilities

	Avg. # of residents	Disposed tons per resident per year	Pct. food	Pct. yard waste	Pct. compostable paper	Pct. urban wood
Correctional facilities	340	0.62	33.8%	0.3%	21.4%	0.1%
Assisted living	887					

For **hospitals**, estimates of disposed organic materials were derived in the following way. The number of beds in the U.S. Naval Hospital and the branches of Harrison Hospital was found, through a process of contacting the hospitals, to be 297. This number was multiplied by the disposed quantity per bed, found as part of the *University of Washington Waste Characterization Study* (Cascadia Consulting Group, 2004a). The composition profile that was used in order to model hospital disposal is shown below.

Table 16: Hospitals

	Beds	Disposed tons per bed per year	Pct. food	Pct. yard waste	Pct. compostable paper
Hospitals	297	3.75	38.0%	0.0%	18.1%

Disposal estimates for waste from military sources, residential self-hauled waste, commercial self-hauled waste, and commercially hauled waste were derived from the following figures, which were developed in close consultation with the Kitsap County Department of Public Works, SWD.

Table 17: Military, Commercial and Residential Self-Haul, and Commercially Hauled Waste in 2004.

	Residential	Non-residential	Totals
Residential self-haul	35,810		35,810
Commercially hauled to transfer station	52,076	62,353	114,429
<i>from Bremerton¹</i>	4,151	5,156	9,307
<i>from Port Orchard</i>	10,403	11,135	21,538
<i>from Poulsbo</i>	2,730	4,387	7,117
<i>from Bainbridge Island (projected)</i>	3,652	4,374	8,026
<i>from unincorporated (projected)</i>	29,518	35,357	64,875
<i>North Mason Garbage (Belfair)</i>	1,623	1,943	3,566
Commercial self-haul (non-Navy)		37,166	37,166
MSW from U.S. Navy facilities	6354	6266	12,620
Totals			200,025

¹ Bremerton data is for September to December 2004 only.

Waste disposal from **military facilities** was estimated based on data from a variety of sources. As described above, the annual tons of waste sent to the transfer station from military sources were reported to be 12,620 tons. Based on a conversation with John Lacy of the Bremerton Naval Base, this figure was further divided into 6,354 tons from military residential sources and 6,266 tons from military nonresidential sources.

Based on data from the cafeterias at the naval station on Whidbey Island, 0.017 tons of divertible food waste is produced per resident from cafeterias. This figure applied to the population of the naval facilities in Kitsap County yields 612 tons of divertible food waste produced annually from cafeterias.

The military residential waste composition model was based on the profile of single-family residential waste in Thurston County, as reported in the *2000 Thurston County Waste Composition Study* (Green Solutions and Skumatz Economic Research Associates, 2000). From those figures, the portion of all disposed paper that is compostable was estimated to be 23.6%, based on data from the King County Monitoring Program's *2002-2003 Waste Characterization Study and Customer Surveys* (Cascadia Consulting Group, 2004b). The resulting composition profile was applied to the figure of 6,354 tons of disposed waste from military residential sources. The estimate of 612 tons of food waste from cafeterias was then subtracted from the results to yield a composition profile for the residential sector of the military facilities not including any cafeterias.

The military nonresidential waste composition model was based on the composition profile for self-hauled non-residential waste, as reported in the *2000 Thurston County Waste Composition Study* (Green Solutions and Skumatz Economic Research Associates, 2000) applied to the figure of 6,266 tons of military nonresidential waste.

Waste from **residential self-haulers** was modeled based on the composition profile for residential self-hauled waste presented in the *2000 Thurston County Waste Composition Study* (Green Solutions and Skumatz Economic Research Associates, 2000), applied to the estimated 35,810 tons of residential self-hauled waste disposed annually in Kitsap County.

Similarly, waste from **commercial self-haulers** was modeled based on the composition profile for nonresidential self-hauled waste, reported in the Thurston County study (Green Solutions and Skumatz Economic Research Associates, 2000), applied to the estimated 37,166 tons of commercial self-hauled waste that is disposed annually in Kitsap County.

The estimates for **commercially hauled residential waste** were based on the composition profile for single-family residential waste, shown in the Thurston County study, applied to the estimated 52,076 tons of commercially hauled residential waste in Kitsap County. It is important to note that because the City of Bremerton switched haulers in September 2004, the data for the City of Bremerton is for September to December only (Boening, 2005).

The estimate of 1,944 dry tons of **biosolids** from wastewater treatment plants was calculated based on the following reports from facilities.

Table 18: Dry Tons of Biosolids

Facility	Annual Dry Tons
Bremerton Wastewater Treatment	720

Facility	Annual Dry Tons
Winslow wastewater treatment plant (Bainbridge Island)	103
Central Kitsap Wastewater Treatment Plant	855
Port Orchard	266

Biosolids from the Kingston, Manchester, and Suquamish wastewater treatment plants are taken to the Central Kitsap facility for processing, and biosolids from the Fort Ward plant are taken to the Bremerton facility for processing.

The estimate of 10,000 wet tons of biosolids was based on the following reports from the plants.

Table 19: Wet Tons of Biosolids

Facility	Annual Wet Tons
Bremerton Wastewater Treatment	4368
Central Kitsap Wastewater Treatment Plant	3773
Port Orchard	1240

The Winslow Wastewater Treatment Plant did not report wet tons. However, for the other three plants, the average reported wet tons were 5 times as great as the reported dry tons, so the consultant team multiplied Winslow’s dry tonnage by five for an estimated 515 wet tons.

The estimate of 455 tons of recovered **fish by-products** comes from a report to consultant Peter Moon by American Gold Sea Foods (Moon, 2005b). The Suquamish Tribe did not respond to repeated requests for information about the amount of fish wastes produced annually at their hatchery and through their fisheries activities.

The estimate of 99 tons of yard waste that is placed on the **composting pad at the county fair** was derived based on an estimated density of 143 pounds per cubic yard, multiplied by the reported 1,380 cubic yards of material placed on the pad. The density figure was calculated for material consisting of prunings and yard trimmings as part of the 2004 study for San Bernardino County, California, entitled *Recoverable Material Waste Characterization Study: Self-hauled and Loose Roll-off Box Waste* (Cascadia Consulting Group, 2004c).

Other estimates of disposed or recovered material that were developed for this study relied directly on reports from North Mason Fiber and on the 2004 Recycling Survey conducted by the Washington State Department of Ecology.

Landclearing Debris

This section describes the consultant team’s efforts to model the landclearing debris waste stream presented in Table 1. To provide a minimum estimate of the size of this waste stream, the consultant team interviewed representatives of six known processors of landclearing debris. The team then examined ways to estimate the amount of landclearing debris that is generated but left on-site or burned. We learned from this analysis that **good data about the amount of landclearing debris generated does not exist, and it is a difficult waste stream to estimate.** Actual data are limited, sampling was outside the scope of this study, and few good models exist for extrapolating from what data there are. The results of our efforts are described below.

Recovered Landclearing Debris

Approximately 70,000 tons of landclearing debris are processed in Kitsap County annually.

To estimate the amount of landclearing debris that is recovered annually, the consultant team interviewed representatives of the following known processors of landclearing debris: Allen Shearer Trucking and Landscape Supplies, Asbury Topsoil, Morrison Gravel, North Mason Fiber, Peninsula Topsoil, and The Soil Factory. Combined, these representatives estimated that they process a total of 60,000 tons of landclearing debris per year. Adding the amount of recovered landclearing debris reported to the Department of Ecology yields a total estimate of approximately 70,000 tons processed.

The interviewed firms represent a fraction of those that provide some sort of processing of landclearing debris to Kitsap County customers. Therefore, this estimate of 70,000 tons processed is an underestimate. However, the amounts of debris processed vary considerably by processor, and many of the other firms provide chippers only, so it is not possible to extrapolate from the data to obtain a total amount processed.

Landclearing Debris Left On-Site or Burned

Estimates of the amount of landclearing debris left on-site or burned vary widely, from 120,000 tons per year to 380,000 tons per year. At the August 10, 2005 meeting, stakeholders indicated that most generators burn or stockpile their landclearing debris, rather than transporting it to a processor. However, no data exists on the amounts of debris that are managed this way. Estimating the amount of landclearing debris that is stockpiled or burned is a difficult and highly uncertain exercise, for the following reasons:

- Landclearing debris is a highly variable material. A ton of landclearing debris could be mostly stumps, or mostly brush, or mostly dirt and rocks, or a mixture of these. As a result, it is difficult to estimate the amount of landclearing debris generated per acre, whether by volume or by weight.
- Furthermore, the weight of landclearing debris varies seasonally because of the amount of water present in the woody portion. One recycler estimates that a cubic yard of landclearing debris might weigh 350 pounds in summer but 750 pounds in winter.
- Landclearing professionals do not agree on a “good” number to use for estimating the amount of debris generated per acre. One processor estimates that an acre generates 95 tons of debris, a second estimates 175 tons, and a third estimates 280-380 tons.

To estimate this portion of the waste stream, the consultant team analyzed two studies performed by other parties and performed an analysis of permit data. These analyses are described below.

As part of its deliberations when considering a burn ban, the Puget Sound Clean Air Agency (Clean Air) estimated that approximately 120,000 tons of landclearing debris are burned each year in Kitsap County using the following method (Agyei, 2005):

- From a local landclearer, Clean Air obtained an estimate of 95 tons of landclearing debris generated per acre cleared.
- Clean Air learned that 636 burn permits were issued in Kitsap County in 2002.
- Clean Air assumed that each burn permit represented 2 acres of cleared land.

In 2005, the Washington Department of Ecology and Washington State University released a draft report that estimates the amount of biomass generated in each county in Washington annually. Although the draft report estimates that Kitsap County produces 5,109 dry tons of landclearing debris each year, the consultant team obtained revised figures directly from the

researchers (Frear, 2005). The updated version of the report will indicate that Kitsap County generates 96,672 dry tons of landclearing debris annually. To arrive at this figure, the WSU researchers multiplied Clean Air's figure of 120,000 wet tons by 80 percent to get dry tons.

Lastly, the consultant team undertook its own analysis of the generation of landclearing debris based on the amount of land cleared in the county annually. From the Department of Community Development, we obtained information about the number of permits for site development issued annually between 1999 and 2004. According to DCD, these types of permits are the ones most likely to generate landclearing debris. Table 20 presents this information.

Table 20: Number of Site Development Permits Issued in Kitsap County, 1998-2004

TYPE_CODE	1998	1999	2000	2001	2002	2003	2004
Commercial/MF/LU ¹	12	8	14	39	52	71	52
Single-family residences	33	57	45	57	53	57	64
Grading	52	46	23	51	76	44	46
Land Subdivision	11	6	6	7	38	15	48
Right of Way Use & Improvement					2	23	78
Total	108	117	88	154	221	210	288

¹MF means multi-family, and LU means land use

Right of Way Use & Improvement permits were new in 2002, but have increased in number significantly since then. We also obtained the number of acres associated with these permits. Table 21 presents this information.

Table 21: Acres Permitted for Site Development in Kitsap County, 1998-2004

TYPE_CODE	1998	1999	2000	2001	2002	2003	2004
Commercial/MF/LU ¹	26	29	23	1798	2950	2518	1425
Single-family residences	72	160	162	141	258	289	261
Grading	235	1289	1304	442	372	256	192
Land Subdivision	2		2	0	103	65	70
Right of Way Use & Improvement					3	11	46
Total	335	1477	1492	2381	3685	3139	1994

¹MF means multi-family, and LU means land use

However, not all permits issued listed the number of acres planned for development. Table 22 shows the percentage of permits each year that did list the acreage.

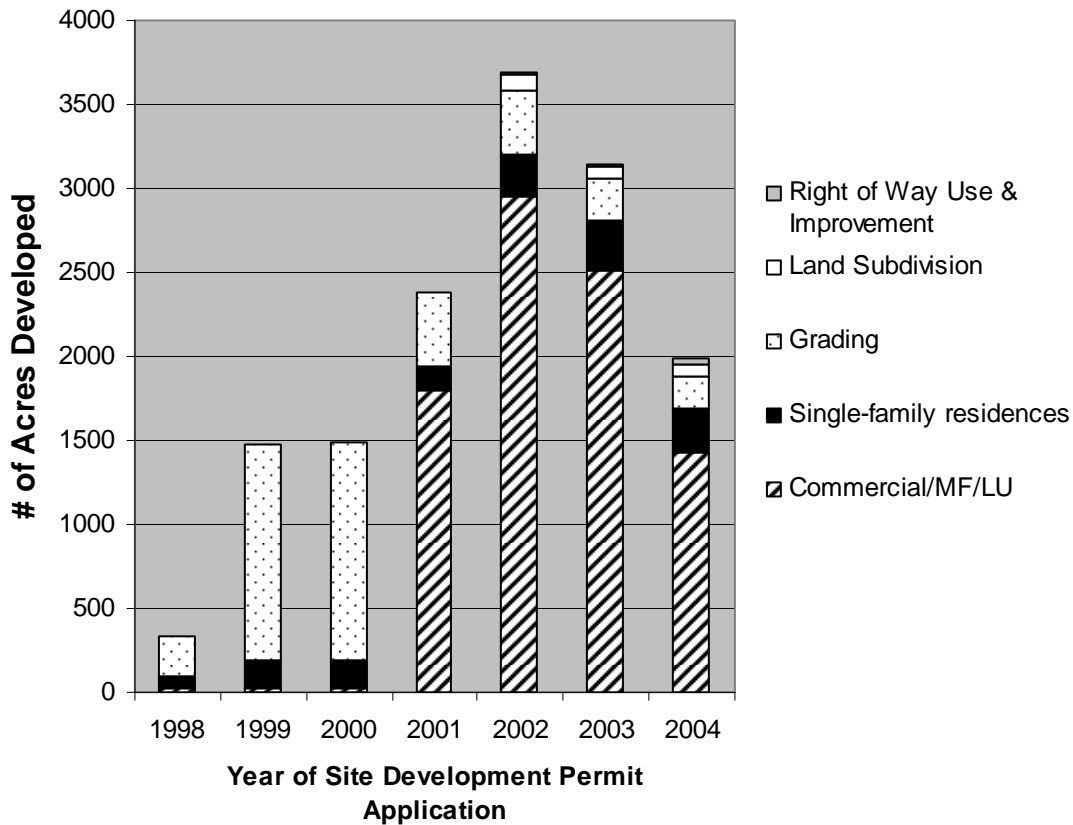
Table 22: Percentage of Permits by Land Use Type that Provided Acreage Data, 1998-2004

TYPE_CODE	1998	1999	2000	2001	2002	2003	2004
Commercial/MF/LU ¹	75%	63%	79%	77%	56%	86%	98%
Single-family residences	88%	88%	93%	89%	91%	95%	100%
Grading	81%	96%	100%	76%	91%	86%	98%
Land Subdivision	18%		17%	14%	32%	40%	44%
Right of Way Use & Improvement					100%	70%	96%
Average	65%	82%	72%	64%	74%	75%	87%

¹MF means multi-family, and LU means land use

Figure 4 illustrates the number of acres developed for each type of site development permit from 1998 to 2004. Note that the number of acres developed for commercial and multi-family land uses increased greatly between 2000 and 2001, and remained high through 2004.

Figure 4: Acres Permitted for Development, by Land Use Type, 1998-2004



According to these data, an average of 2800 acres of land was cleared annually between 2001 and 2004 for all development types. Interviews with industry representatives yielded the following figures to use in estimating how much landclearing debris was generated from those 2800 acres:

- Measurement of piles of chipped landclearing debris at Fort Lewis, Washington, indicates that one acre of land generates between 240 and 360 cubic yards of chipped debris (Moon, 2005b).
- A processor reports that the weight of a cubic yard of chipped landclearing debris can vary greatly throughout the year, depending upon the amount of water in the chips. He estimates that a cubic yard might weigh 350 pounds in summer but 750 pounds in winter, and cautions that these numbers are difficult to define given the large variation inherent in landclearing debris.

The consultant team used these figures to create high, medium, and low estimates of landclearing debris generation in tons per year, as follows:

- High: 380,000 tons [(2800 acres X 360 cubic yards X 750 pounds)/2000 pounds per ton]

- Medium: 210,000 tons [(2800 acres X 300 cubic yards X 500 pounds)/2000 pounds per ton]
- Low: 120,000 tons [(2800 acres X 240 cubic yards X 350 pounds)/2000 pounds per ton]

It is important to note that this analysis is highly sensitive to the values assigned to the variables of cubic yards per acre and pounds per cubic yard. Although these values are the best estimates the consultant team could find, they are still highly uncertain. Therefore, the resulting tonnage figures should be treated with caution.

Given that the range of estimates from the consultant team's efforts, the WSU study, and the Clean Air analysis is 120,000 tons to 380,000 tons, and the waste stream itself is so highly variable, it was not possible for the consultant team to identify one number as a likely estimate of annual landclearing debris generation. Further study focusing on determining a reasonable estimate of the amount of landclearing debris generated per acre for different development types or different land cover types is necessary to establish an estimate that can be used with confidence.

Appendix B: Stakeholder Meeting Summaries

Kitsap County Organics Management Plan Stakeholder Meeting Summary

Wednesday August 10th, 2005

9:30am – 11:30am

Background and Meeting Purpose

Kitsap County SWD hired Cascadia Consulting Group to develop an organics management plan for the county. The purpose of the plan is to recommend the best role for the county government in managing organic materials such as landclearing debris, yard debris, and food waste. The first four steps in the project have been completed, as follows:

1. Inventory organic waste generated in Kitsap County.
2. Inventory existing processing facilities and collection infrastructure.
3. Identify the need for additional processing facilities or collection infrastructure.
4. Generate a list of options to meet the identified need for additional processing facilities or collection infrastructure.

The purpose of the August 10th stakeholder meeting was to obtain input on the initial list of options for managing landclearing debris, yard waste, and wood waste. The consultant team also provided stakeholders with input forms to collect ideas about ways to manage food waste, biosolids, and other wastes such as agricultural wastes and fish carcasses.

For each waste stream covered in the meeting, the facilitator summarized the key management issues and asked the stakeholders for their opinions on a variety of options to address them. The options covered generation, collection, processing, and marketing for each waste stream. The facilitator also asked for additional ideas, and whether stakeholders believed the County should play no role.

Overarching Themes

Several themes seemed common to stakeholder opinions about each waste stream, as follows:

- Use incentives rather than regulations to achieve goals.
- Contract or partner with the private sector to establish infrastructure.
- Facilitate the establishment of infrastructure by working with private contractors and various jurisdiction and agencies.
- Education is necessary for successful organics waste management. Target audiences include public agency project managers, contractors, landscapers, and the public, depending on the waste stream and the issue.
- The combination of regulations at the local, state, and federal levels means that obtaining permits is an expensive and burdensome process that limits new entries into the processing market. The private sector would like help reducing this burden.

- Economics are the key. Management must be economically sound, and making the business case for organics recycling to contractors and landscapers is essential.

The remainder of this document summarizes key points that arose in the meeting for each major waste stream discussed. A list of attendees is appended.

Landclearing Debris

Landclearing debris is defined as stumps, brush, leaves, and other material left when land is cleared. The Puget Sound Clean Air Agency plans to extend the ban on burning landclearing debris to all of the unincorporated county, removing a major means of managing this material.

Generation: Stakeholders prefer the use of incentives over regulations to encourage on-site management of material. Educating contractors and project managers is essential to increasing acceptance of on-site management. Enforcing the proper use of material on-site is difficult but necessary.

Collection: Additional collection capacity is needed in the north and central sections of the county. Stakeholders preferred that the county contract with a private firm or enter into a public-private partnership to establish this infrastructure, or let the private sector provide this service.

Processing: Contract with a private firm or enter into a public-private partnership to generate more processing capacity if needed. Permits are a major burden: stakeholders would like technical assistance with obtaining permits, or for the Solid Waste Division to facilitate a process with other permitting agencies to reduce this burden and simplify the process.

Markets: The stakeholders were interested in having the county pursue new technologies for re-use of organic waste, such as bio-based fuels. They also supported the development of a waste-to-energy facility to incinerate organic waste. In addition, stakeholders emphasized the importance of education in setting up new markets for organic waste. Education will help overcome resistance to using recycled organics in the public and private sector projects. County agencies and project managers need to be educated on the benefits of using reused products, the cheaper costs associated with reused products, and the safety of recycled products. Stakeholders felt that landscapers could compost on-site, if education about correct composting practices were available and they had the proper permits.

Yard Waste

Yard waste is defined as leaves, grass, pruning wastes, and other debris created during regular yard maintenance or small landscaping projects. Substantial processing capacity already exists in the county, but illegal dumping remains a problem.

Generation: Some stakeholders feel that the county needs to reduce the generation of yard waste, while others believe that yard waste is a good feedstock for private composting facilities. Some stakeholders mentioned that landscapers need to be educated to prevent illegal dumping. Put incentives into place for contractors who use compost at their job sites.

Collection: Stakeholders felt that the feasibility of extending curbside collection to the entire county depends on the economics, and some doubted whether enough customers would sign up to support the program. Stakeholders supported adding a drop-box facility in Poulsbo. Some stakeholders were concerned that County activities compete with the private sector, and agreed that treating Yard Waste Amnesty Days as a way to educate consumers and raise awareness of the private collection sites that are available to the public was a good compromise.

Processing: Stakeholders suggested looking at neighboring communities and trying to duplicate their successful operations. Again, stakeholders preferred that the county facilitate private company efforts to provide this service or enter into a public-private partnership with companies in the private sector to process yard waste.

Markets: Educating landscapers about the benefits of composting yard waste and creating incentives will increase participation. Working with permitting agencies and construction companies to create incentives for low impact developments will create markets for composted yard waste. In order for these markets to open the permit process needs to be expedited.

Urban Wood Waste

Urban wood waste is clean wood from construction sites, pallets and crates, or contaminated wood which has been painted, glued, or treated with a substance. Currently, clean wood is sent to North Mason Fiber, burned illegally, or land filled.

Generation: Education needs to be targeted to the contractors that are building in Kitsap County. Programs such as Built Green and LEED can facilitate incentive and recognition programs. Highlighting housing developments in the county that have been built sustainably will help educate and promote awareness, and provide an incentive to contractors to recycle,

Collection: Drop boxes are needed in central locations around the county. Incentives should be put into place for contractors to sort their wood waste from other waste in order to increase participation. Stakeholders disagreed on whether the current difference in tip fees at OVTS and North Mason Fiber are sufficient to offer a financial incentive to source-separate clean wood. Making the business case for recycling is essential.

Processing: Stakeholders felt that the county has low tonnage rates of wood waste and it would not be economical to pay people to sort the clean wood from the contaminated wood in order to recycle the waste at a dump site. Stakeholders preferred that private companies pick up the wood waste at the drop-off sites and process the waste.

Markets: Stakeholders supported providing incentives to manufacturers who use wood waste as feedstock to open a plant in Kitsap County. One stakeholder mentioned that a furniture plant is being built in Port Angeles, and could serve as a market for clean wood waste.

List of Attendees

Stakeholders

Business	Contact Name
A & L Topsoil	Randy Bynum
A &L Topsoil	Karla Bynum
Asbury Topsoil	Keith Asbury
Bainbridge Disposal	Don Palmer
Bainbridge Disposal	David Stanley
Brush B Gone	Mark Murphy
Cedar Bay Homes	Rick Courson

Business	Contact Name
Emu Topsoil	Ron Phillips
HBA of Kitsap County	Elizabeth Scott
O'Brien & Co.	Katherine Morgan
KC Facilities, Parks and Recreation	Bev Reeves
KC Facilities, Parks and Recreation	Brian Hauschel
KC Health District	Newton Morgan
North Kitsap Fire & Rescue	Paul Nichol
North Mason Fiber	Bob Dressel
Peninsula Topsoil	Steve Johnson
Maki Loading and Hauling	Rod Maki
Scott's Tree Service	Scott Parr
South Kitsap Fire & Rescue	Greg Rogers
Central Kitsap Fire & Rescue	Roy Lusk
Waste Management	Terry Bickel
Zimmer Construction	Carl Zimmer
Central Kitsap Fire & Rescue	Roger Nordlander

Observers

Agency	Contact Name
Puget Sound Clean Air Agency	Robert Booher
Kitsap County Solid Waste Division	Michelle Miller
Kitsap County Solid Waste Division	Gretchen Olsen
Kitsap County Solid Waste Division	Dave Peters

Consultant Team

Business	Contact Name
Cascadia Consulting Group	Ryan Barba
Cascadia Consulting Group	Laura Blackmore

Kitsap County Organics Management Plan

Stakeholder Meeting Summary

Wednesday, October 5th, 2005

9:30am – 12:30am

Background and Meeting Purpose

Kitsap County SWD hired Cascadia Consulting Group to develop an organic waste management plan for the county. The purpose of the plan is to recommend the best role for the county government in managing organic materials such as landclearing debris, yard debris, and food waste. The first five steps in the project have been completed, as follows:

1. Inventory organic waste generated in Kitsap County.
2. Inventory existing processing facilities and collection infrastructure.
3. Identify the need for additional processing facilities or collection infrastructure.
4. Generate a list of options to meet the identified need for additional processing facilities or collection infrastructure.
5. Conduct a stakeholder meeting to gather input on draft options.

The consultant team is in the process of evaluating the draft options and has produced revised draft options. The purpose of the October 5, 2005, stakeholder meeting was to obtain input on the revised draft options for managing organic waste. For each waste stream, the facilitator summarized the key management issues and reviewed the revised draft list of options to address them, asking for input along the way. At the conclusion of the presentation, stakeholders used green and red dots to indicate support for or dislike of the revised draft options. This document summarizes stakeholder comments and the results of the dot exercise. A list of attendees is appended.

Input on Revised Draft Options

Before this section of the meeting began, Bob Dressel of North Mason Fiber announced that he is starting a new company with Cedar Grove Composting, and installing a Gore system with a capacity of 40,000 tons. The system is permitted up to 80,000 tons, and could be expanded to 120,000 tons with new permits. With the new system, planned to open March 1, 2006, the company will accept food waste and biosolids in addition to the wood waste, landclearing debris, and yard waste they already accept.

Landclearing Debris Options

Art Castle of the Homebuilders Association noted that while Ecology is considering reducing stormwater detention pond sizes for developments that amend soils with organic matter, they are doing so for compost, not chipped landclearing debris. Art recommended the Puget Sound Action Team's LID Technical Manual as a resource.

Yard Waste Options

Terry Bickel of Waste Management stated that he thinks the consultant team's estimate of 5,000 tons of yard waste disposed as garbage is too large. He also asked that the consultant team find out whether any other areas under UTC regulation have banned yard waste from disposal.

One stakeholder commented that people don't know the burn ban may be coming. She thought that the survey mentioned in yard waste option 8 (Table 23) could be a good way to alert people to this change.

Urban Wood Waste Options

Terry noted that because wood waste is a commercial material, the UTC has no authority to manage it or in this case, ban it from disposal. The facilitator responded that because the County owns the transfer station, they can refuse to accept wood waste for disposal. Terry also feels that subsidizing recycling fees for yard waste is not effective in the long run, and is simply robbing Peter to pay Paul.

Other stakeholders commented that contractors just want to be able to recycle or dispose of wood waste close by, especially given rising fuel costs, and that there is some value in achieving preferable outcomes through incentives.

Food Waste Options

Stakeholders discussed the option of co-collecting food waste with residential curbside yard waste in the unincorporated urban growth area. They agreed that providing rural households, especially those on septic systems, with another option for managing food waste is a good idea, and may even encourage some people to sign up for yard waste collection.

Commercial food waste collection was a trickier issue for stakeholders. They think collection must be weekly, given odor and aesthetic issues, and the inefficiency of trucking food waste is a problem. However, stakeholders agreed that the option should not be thrown out just because there are some obstacles along the way.

Other Options

Stakeholders had no comments on the biosolids and cross-cutting options.

Dot Exercise

The facilitator then asked the stakeholders to record their opinions on the revised draft options using a dot exercise. Each stakeholder was given 12 green dots and four red dots, and asked to use green dots to indicate options they liked, and red dots to indicate which options they didn't like. The facilitator asked that stakeholders use only one dot per option, no matter how strong their feelings were about the option.

Once the dot exercise was complete, the consultant team tabulated the results and reviewed them with the stakeholders. Table 23 presents the results of the dot exercise.

Table 23: Results of Dot Exercise

Option	Sub-Option	Green Dots	Red Dots
Landclearing Debris			
1. Develop and adopt best management practices for using material on-site.		8	0
2. Establish collection sites in the north and central areas of the county.		3	0
	a. County owns and operates	0	5
	b. Public-private partnership	5	0
	c. Private operation	9	0
3. Use landclearing debris and biosolids to reclaim old gravel pits.		3	0
4. Play no role.		0	3
Yard Waste			
1. Ban disposal of yard waste		4	1
2. Continue backyard composting education programs		2	0
3. Promote existing services		5	0
4. Fix access to Silverdale drop box		3	0
5. Add a drop box at Poulsbo recycling center		6	0
6. Educate small generators about on-site composting and private sector options		2	0
7. Create a neighborhood chipping service		0	5
8. Survey residents and businesses to determine attitudes and behaviors		5	0
9. Play no role		0	1
Urban Wood Waste			
1. Establish collection sites in the north and central areas of the county.		4	0
	a. County owns and operates	0	6
	b. Public-private partnership	4	0
	c. Private operation	8	0
2. Ban disposal of clean wood waste		0	4

Option	Sub-Option	Green Dots	Red Dots
3. Subsidize recycling fees for clean wood waste.		0	2
4. Add a surcharge to tip fees for loads that are mainly wood waste		1	3
5. Work with HBA to promote Built Green and LEED programs, and business case for recycling		6	0
6. Play no role		0	2
Food Waste			
1. Continue to educate residents about home composting		4	0
2. Mandate co-collection of food waste with yard waste curbside collection in the unincorporated urban growth area		6	5
3. Provide incentives to commercial generators to recycle food waste		8	0
4. Encourage cities to adopt the same policies		6	0
5. Play no role		0	1
Biosolids			
1. Encourage treatment plants to:			
	a. Produce Class A by-products	3	0
	b. Provide biosolids for gravel pit reclamation	1	2
	c. Compost on-site	1	4
	d. Contract with private compost operations	10	0
2. Educate public about benefits of composted biosolids		7	0
3. Play no role		0	1
Cross-cutting Issues			
1. Provide technical assistance with obtaining permits		11	0
2. Continue to promote the use of compost		6	0
3. Adopt soil quality standards that require the use of organic material to amend soils, for both public and private projects		8	0

Option	Sub-Option	Green Dots	Red Dots
4. Play no role		0	0

Summary of Dot Exercise

Landclearing Debris Options

With their dots, stakeholders indicated strong support for establishing collection sites for landclearing debris, as long as the private sector plays a role in doing so. They also indicated support for developing and adopting best management practices, and some support for using landclearing debris to reclaim gravel pits. Interestingly, stakeholders also rejected the notion that the County should play no role in managing landclearing debris.

Yard Waste Options

Stakeholders supported all options – including the ban on disposal – except the creation of a neighborhood chipping service and the County playing no role. Support was particularly strong for adding a drop box at Poulsbo Recycling Center, surveying residents and businesses about attitudes and behaviors, and promoting existing services (including private ones).

Urban Wood Waste Options

As with landclearing debris, stakeholders supported establishing collection sites for wood waste, so long as the private sector plays a role. They do not support banning wood waste from disposal, subsidizing recycling fees for wood waste, adding a surcharge to the tip fee at OVTS for loads that are mainly wood, or the County playing no role. They do support working with the HBA to promote the Built Green and LEED programs, and the business case for recycling wood waste.

Food Waste Options

Stakeholders were enthusiastic about most options for this waste stream, except the County playing no role. The facilitator asked for comments about why opinion seemed split on the co-collection of food waste with curbside yard waste. Stakeholders responded that if the word “mandate” were removed from the option, they would be happy with it.

Biosolids Options

Stakeholders indicated strong support for encouraging wastewater treatment plants to contract with private composting operations, and educating the public about the benefits of composted biosolids. They do not support encouraging plants to compost on-site or the County playing no role. Opinions were mixed on providing biosolids for gravel pit reclamation. One stakeholder commented that composting biosolids with other materials at private compost operations may reduce the public’s psychological barriers to using composted biosolids.

Cross-Cutting Issues

Stakeholders strongly support County involvement in obtaining permits or facilitating a process to streamline the permitting process for composting facilities. They also indicated strong support for continuing to promote the use of compost and adopting soil quality standards.

List of Attendees

Stakeholders

Business	Contact Name
A & L Topsoil	Randy Bynum
A &L Topsoil	Karla Bynum
Asbury Topsoil	Keith Asbury
Emu Topsoil	Ron Phillips
KC Facilities, Parks and Recreation	Bev Reeves
KC Facilities, Parks and Recreation	Brian Hauschel
North Mason Fiber	Bob Dressel
Maki Loading and Hauling	Rod Maki
Waste Management	Terry Bickel
Zimmer Construction	Carl Zimmer
Home Builders Association	Art Castle
Peninsula Topsoil	Jason Johnson
KC Health District	Jan Brower
South Kitsap Fire and Rescue	Shawn Shepherd

Observers

Agency	Contact Name
Puget Sound Clean Air Agency	Robert Booher
Kitsap County Solid Waste Division	Michelle Miller
Kitsap County Solid Waste Division	Gretchen Olsen
Kitsap County Solid Waste Division	Dave Peters

Consultant Team

Business	Contact Name
Cascadia Consulting Group	Laura Blackmore
Cascadia Consulting Group	Susan Evans

Appendix C: Organics Processors and Private Hauling Companies

As part of our work to inventory existing organics-management infrastructure in Kitsap County and north Mason County, the consultant team contacted all known processors of organic waste in these areas. We also interviewed owners of companies that rent processing equipment to contractors or homeowners. To develop this list, we consulted the Kitsap County website, the Internet, and other processors. Even so, it is unlikely that this list is exhaustive.

To evaluate transportation infrastructure, the consultant team interviewed owners of 50-yard end dump trucks who haul organic waste to the Olympic View Transfer Station, Tucker’s Topsoil, and North Mason Fiber. Again, while this list is useful, it is unlikely to be exhaustive.

Equipment Rental

The following companies rent organics management equipment in Kitsap County and north Mason County. The table below is organized geographically, and provides a list of the equipment each company has available. The South designation includes north Mason County.

Table 24: Companies that Rent Organics-Management Equipment

Company Name	Available Equipment	District
Bainbridge Rental	Excavator: 1 (8,000 lb) ; Tractor: 1 (6,000 lb); Caterpillar Loaders: 2 (6,000 lb); Chippers: 2 (6-inch) power-feed	North
Star Rentals and Sales	Excavators, bulldozers, 6-inch chippers, backhoes, bobcats	South
United Rentals	excavators, bulldozers, backhoes, Full list of products at http://www.ur.com/index.php/equipment/rental/browse/?category=Earth moving&page=2	South
Advanced Rentals and Sales	Backhoes: 5 large (17,000 lb), 7 small (7,000 lb) ; Excavators: 7 small (15,000 lb), 4 large (30,000 lb); Bulldozers: 4 (17,000 lb)	North and Central
Premier Rentals	brush cutters, excavators, bulldozes, mulchers, bobcats, chippers	North and South

Processors

Table 25 below lists the organic-waste processors in Kitsap and north Mason Counties and their responses to the consultant team's questions about materials processed, current and future capacity, trucking capacity, and available equipment. Many processors gave us capacity information in terms other than tons per year; for accuracy's sake we have provided that information in the table. The consultant team used conversion factors of 500 pounds per cubic yard for landclearing debris, and 143 pounds per cubic yard for yard waste, to transform these numbers into tons. The table is organized geographically. The South designation includes north Mason County.

Table 25: Processors of Landclearing Debris, Woody Debris, and Yard Waste in Kitsap County and North Mason County

Company Name	Materials Processed	Present Capacity	Translates to Tons/Year	Future Capacity	Translates to Tons/Year	Trucking Capacity	Available Equipment	District
C&A Tree Services*								North
Cleaver Construction		10 truck loads/week	1,690	Maxed out, to increase would need another excavator		10-13 cubic yard truck	Large Grinder	North
EMU Topsoil	Yard waste	3,056 cubic yards	220	Could accept 1,000 cubic yards/month more	1,000		1 (300 HP) horizontal grinder	North
Ernie Duran*								North
Northwest Tree Service	Tree trimming and tree removal						Chipper	North and South
Outback Hauling*								North
Tucker's Topsoil*	Stumps, brush, yard waste, sod/dirt							North
Whitehead Landscaping Design*								North

* Did not respond to consultant team's survey
 Kitsap County Organic Waste Management Study
 Cascadia Consulting Group, Inc.

Company Name	Materials Processed	Present Capacity	Translates to Tons/Year	Future Capacity	Translates to Tons/Year	Trucking Capacity	Available Equipment	District
Williams Wood Recycling*								North
Scott's Tree Service	Tree trimming and tree removal. They chip and haul their chips to Suyematsu farms (9229 NE J Road Bainbridge Island) where they are composted.					12 yd chipper truck, 8yd truck	1 small excavator 12-inch drum chipper HD8 duratec grinder	Central, North, and South
Darrel Emmel's Tree Service	Tree trimming and tree removal	10 truck loads/week in busy season, average 3-5 cubic yards/load	488	Have vacant property for storing chips but prefer not to do so.		4 trucks with 31-cubic yard capacity total	1 (24-inch) chipper, 2 (12-inch) chippers	Central and North
Asbury Topsoil*								Central
Anglada Chipping*								Central
Brush-B-Gone*								Central
Pacific West Tree Services*								Central

* Did not respond to consultant team's survey
Kitsap County Organic Waste Management Study
Cascadia Consulting Group, Inc.

Company Name	Materials Processed	Present Capacity	Translates to Tons/Year	Future Capacity	Translates to Tons/Year	Trucking Capacity	Available Equipment	District
Allen Shearer Trucking and Landscape Supplies	Landclearing debris	30,000 tons	30,000					South
Arborist Tree Professionals	Landclearing debris, no stumps	12-15 cubic yards/week	195			6-yd dump truck	Chipper	South
Briggs Tree Service	Landclearing debris, no stumps	30 cubic yards/week	390	Willing to increase		2 10-cubic yard dump trucks	12-inch Chipper	South
Dan's Chipping Service	Yard waste and woody debris (mobile service)	4 truck loads/week spring-fall	156	Could do about 2 more truck loads/week	190	4-cubic yard truck	6-inch chipper	South
Morrison Gravel		560 tons	560					South
North Mason Fiber	Yard waste, landclearing debris, wood waste	Landclearing debris	25,000	250,000	250,000		4 12-cy front-end loaders, 3 processing excavators, 3 screens, 1 1,000 HP processor (grinder or hog), miscellaneous support equipment (fans, shop, water truck)	South
		Yard waste	24,000	40,000	40,000			
		Wood waste	15,000	50,000	50,000			
		Food waste	0	40,000	40,000			
		Biosolids	0	10,000	10,000			

* Did not respond to consultant team's survey
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Company Name	Materials Processed	Present Capacity	Translates to Tons/Year	Future Capacity	Translates to Tons/Year	Trucking Capacity	Available Equipment	District
Peninsula Topsoil*								South
Puget Sound Tree Co.	Tree trimming and tree removal	1,000 cubic yards per year		250 cubic yards more per year	300		16-inch chipper	South
The Soil Factory	Tree trimming, tree removal, stumps, wood waste. He stockpiles and rents equipment to process.	50-100 cubic yards per week		300-400 more cubic yards per week	6500	15 yd truck, most people drop waste off to him		Central

* Did not respond to the consultant team's survey

Transportation

The table below lists the companies that haul organic waste to the Olympic View Transfer Station, Tucker's Topsoil, and North Mason Fiber in 50-cubic-yard end-dump trucks. Where possible, it also shows the materials that these companies typically haul.

Table 26: Companies that Transport Organic Waste in 50 Cubic-Yard End-Dump Trucks

Company	Phone	Trucks	Materials Hauled
MJ Trucking & Contracting	(360) 779-2855	1 50-cubic-yard dump truck	Brush and stumps
Sound Excavation	(360) 373-1613	1 65 cubic-yard truck	Wood waste
Olympic Trucking	(360) 275-6774	1- 65 cubic-yard end-dump and 1- 75 cubic-yard end-dump truck	Trees and stumps
Allen Shearer	(360) 275-3465	1- 50 cubic-yard rear-end dump truck	Stumps and brush
Bobby Pierce*	(253) 691-2576		
Don Boehme	(360) 871-1571	1- 50 cubic-yard end-dump truck	Brush, stumps, and demolition materials
Bedrock	(253)851-5896	1 50-yard end dump	Brush and stumps
5-Ball	(253) 531-6100	1 end dump (receptionist did not know the size)	
RV Associates	(888) 876-9737	1- 55 cubic-yard end-dump truck	Stumps and building debris
B & C Trucking	(253) 857-5717	70 and 80 cubic-yard side dumps	
Sound Construction	(360) 871-5469	1 20 cubic-yard end-dump truck	Demolition debris and yard waste
Stan Palmer Construction	(360) 340-0613	60 cubic-yard end dump, 30-ton side dump, 3 -32-ton truck-and-pups	
Zephyr	(360) 275-2861	3 24-cubic yard truck-and-pups	

* Did not respond to the consultant team's survey

Appendix D: Permits Needed to Operate an Organic Waste Management Facility in Kitsap County

To provide some insight into Integrated Option 5: Provide technical assistance with obtaining permits, the consultant team compiled a list of the permits that are required, or may be required depending on site characteristics, to operate an organic waste management facility in Kitsap County. We gathered this information from interviews with Kitsap County Department of Community Development staff (Smith, 2005), other consultants who assist private operators with permits (Morgan, 2005), and supplementary research into the Kitsap County Code.

Table 27 presents the results of these efforts. It is important to note that Kitsap County encourages private operators to attend a pre-application meeting prior to embarking on obtaining permits. At this meeting, the operator will discuss the proposed project with a variety of regulatory agencies with the goal of making the permit process as efficient as possible.

Table 27: List of Permits Needed to Operate an Organic Waste Management Facility in Kitsap County

Permit Name	Responsible Agency	Citation	Notes
Required Permits			
SEPA Checklist	Department of Community Development (DCD)	Kitsap County Code 18.04.110	
Site Plan Review	DCD	Kitsap County Code Chapter 17.410	
Site Development Activity Permit (SDAP)	DCD	Kitsap County Code Chapter 12.10.030	
Erosion and Sediment Control Plan	DCD	Kitsap County Code 12.10.110	Part of the SDAP.
Sign Permit	DCD	Kitsap County Code 17.45.010	
Building Permit	DCD	Kitsap County Code 14.04.265	
Certificate of Transportation	Kitsap County Department of	Kitsap County Code 20.04.030	

Permit Name	Responsible Agency	Citation	Notes
Concurrency	Public Works		
Solid Waste Handling Facility Operating Permit	Kitsap County Health District	Revised Code of Washington 70.95.180	
Notice of Construction	Puget Sound Clean Air Agency	Article 6 of Regulation I, http://www.pscleanair.org/businfo/formsprocedures.shtml#notice	
Fire Code Operational Permit	Kitsap County Fire Marshal	Kitsap County Code 14.04.710 references International Fire Code Section 105.6	
Fire Code Construction Permit	Kitsap County Fire Marshal	Kitsap County Code 14.04.720 references International Fire Code Section 105.7	
Permits That May Be Required, Depending on Site Characteristics			
Septic System	Kitsap County Health District	Revised Code of Washington 70.05.072	Needed if the parcel is not on sewer line
Conditional Use Permit	DCD	Kitsap County Code 17.420	Needed if the parcel is in a Interim Rural Forest, Rural Residential, or Rural Protection zone
Off-Site Drainage Analysis	DCD	Kitsap County Code 12.10.010	Needed if site is a major development (KCC 12.08). Part of the SDAP.
Geotechnical Analysis	DCD	Kitsap County Code 12.10.080	Needed if grading or construction of retention, detention, or other stormwater facilities is proposed within two hundred feet of slopes steeper than 30%, or where the director deems the construction would pose a potential hazard due to proximity to a slope. Part of the SDAP.
Soils Analysis	DCD	Kitsap County	Needed if the project is a major

Permit Name	Responsible Agency	Citation	Notes
		Code 12.10.090	development (KCC 12.08), if the soils underlying the site have not been mapped, where existing soil maps of the site are inconsistent, or where the director deems the existing soils maps are not of sufficient resolution to allow proper engineering analysis. Part of the SDAP.
Timber Permit	DCD	Kitsap County Code 18.16.060	Needed if the land is undeveloped and forested
Hydrogeological report	DCD	Kitsap County Code 19.700	Needed if the parcel is in an Aquifer Recharge Zone of Concern
Road Approach Permit	DCD	Kitsap County Code 11.22.070	Needed if the site does not already have a driveway to a public road.
Permit to Work on the Right-of-Way	DCD	Kitsap County Code 11.22.070	Needed if construction includes utilities work in a County right-of-way
Right of Way Use Permit	DCD	Kitsap County Code 11.36.050	Needed if work is to take place in an unused County right-of-way
Forest Practices Application	Washington Department of Ecology	Chapter 76-09 RCW	Needed if the land is undeveloped and forested
National Pollution Discharge Elimination System Notice of Construction	Washington Department of Ecology	Chapter 173-220 WAC	Needed if over five acres are disturbed
Industrial Waste Discharge Permit	Washington Department of Ecology	Chapter 90.48.555 RCW and Chapter 173-216 WAC	Needed if the facility is on a sewer line
Hydraulic Project Approval	Washington Department of Fish & Wildlife	Chapter 77.55 RCW,	Needed if the facility will affect state waters
Notice of Proposed Construction or Alteration, FAA Form 7460-1	Federal Aviation Administration	49 CFR part 77	Needed if the facility is within five statute miles of a runway end

Appendix E: King County Code

This appendix reproduces the language found in King County Code 21A.16.085, which calls for the use of organic materials to amend soils in all developments in the county. This section also establishes soil quality standards for all new developments.

21A.16.085 Landscaping - General standards for all landscape areas. All new landscape areas proposed for a development shall be subject to the following provisions:

- A. Berms shall not exceed a slope of two horizontal feet to one vertical foot (2:1).
- B. All new turf areas, except all-weather, sand-based athletic fields shall:
 - 1. Be augmented with a two-inch layer of organic material cultivated a minimum of six inches deep, or
 - 2. Have an organic content of five percent or more to a depth of six inches as shown in a soil sample analysis. The soil analysis shall include:
 - a. Determination of soil texture, indicating percentage of organic matter,
 - b. An approximated soil infiltration rate (either measured or derived from soil/texture /infiltration rate tables). A range of infiltration rates shall be noted where appropriate, and
 - c. Measure pH value.
- C. Except as specifically outlined for turf areas in subsection B, the organic content of soils in any landscape area shall be as necessary to provide adequate nutrient and moisture-retention levels for the establishment of plantings.
- D. Landscape areas, except turf or areas of established groundcover, shall be covered with at least two inches of mulch to minimize evaporation.
- E. Plants having similar water use characteristics shall be grouped together in distinct hydrozones.
- F. Plant selection shall consider adaptability to climatic, geologic, and topographical conditions of the site. Preservation of existing vegetation is encouraged. (Ord. 11210 § 9, 1994).

Appendix F: Street Waste Solids and Vector Waste Options

In 1997, the Snohomish County Road Maintenance Division commissioned a study of alternate ways to handle street waste solids and vector wastes. The study recommended five alternatives for dealing with these wastes. Ultimately, Snohomish County did not implement any of these alternatives because they were more expensive than using the material as daily cover at their landfill (Skiver, 2005). A brief description of the recommendations and associated costs are listed below:

- 1) **Haul street wastes to existing aggregate wash plants** equipped with wood removal equipment, and blend these materials with daily process materials for use as aggregate in concrete. To accomplish this, it would be necessary to resolve regulatory issues with the Jurisdictional Health Districts and Ecology regarding: 1) blending street waste solids with bank run materials to facilitate separation; and 2) wash water quality.
- 2) Seek an interested party to **develop a dedicated processing site** for the street waste solids. A centralized processing facility could be set up at one of the sites currently permitted to take construction and land clearing debris. To warrant the capitalization expense, multiple generators would have to contract with a possible receiver as no single source has enough material to create a large enough income stream.
- 3) Individual generators could **purchase equipment to process street waste** for re-use at their facility. Because of the relatively small quantities produced by each jurisdiction, small production rates would work and therefore small, less expensive equipment would be required. Since the equipment would not have to be mobile, its cost could be further reduced.
- 4) Seek an interested party to **develop a mobile processing plant**. This option would reduce handling and hauling costs and leave sand and aggregate product for re-use by the waste generator.
- 5) The generator could screen the street waste solids, and the **screened material could be hauled to an asphalt plant retro-fitted to burn hydrocarbons**. All the pre-screened street waste solids could be processed at an asphalt plant, although at significantly higher cost.

Table 28: Summary of Cost Estimates from Land Technologies et al. (1997)

Alternative Description	Low cost/ton \$	High cost/ton \$
Existing Aggregate Wash Plant and Concrete Batch Plant	5	45
Dedicated Private Receiving and Processing Site	25	60
Dedicated Generator Processing Site	17	25
Mobile Private Processing Equipment	25	50
Existing Asphalt Plant to Burn Organics and Hydrocarbons	45	75