SCS ENGINEERS

Final Interim Report

Solid Waste Management for Southside Hampton Roads Planning Horizon 2018-2047

Presented to:

HAMPTON ROADS PLANNING DISTRICT COMMISSION

The Regional Building
723 Woodlake Drive
Chesapeake, Virginia 23302
(757) 420-8300

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November 13, 2008
File No. 02207104.00

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This document was produced through financial support from the Hampton Roads Planning District Commission and its eight-member local governments associated with this study.

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Appendix A City and County Meeting Questionnaire
Appendix B WTE Facility Capital Budget FY 2009
Appendix C Pro Forma Model Worksheets

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EXECUTIVE SUMMARY

PURPOSE AND SCOPE OF STUDY

SCS Engineers (SCS) was retained by the Hampton Roads Planning District Commission (HRPDC) to evaluate technical and institutional alternatives and recommend an approach for managing solid waste in the South Hampton Roads Region (Region) after the intergovernmental agreements (Agreements) between the Southeastern Public Service Authority (SPSA) and their member communities expire in January 2018. The governmental entities involved in the HRPDC study include the cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach, and the counties of Isle of Wight and Southampton. These communities are collectively referred to as "the Region" throughout this report.

This study is intended to provide information and analysis to the current SPSA member communities to aid in their decision as to whether they should continue to cooperate together to manage the Region's solid waste or pursue an alternative course of action. The study is primarily forward looking, considering solid waste management approaches for the Region post-2018 that best fit the current and anticipated regulatory, institutional, facility, financial, market, and legal drivers and constraints, which differ significantly from when Agreements with SPSA were originally established in 1983 and 1984.

While conducting this study, SCS evaluated existing solid waste management programs, facilities, and operations in the Region. In addition, future solid waste technology and facility needs for a 30-year planning horizon (2018-2047) were assessed; various institutional and cooperative models for managing solid waste were considered; economic analyses were performed, and meetings with the Chief Administrative Officers (CAOs) from the member communities and private solid waste companies and interests were held to discuss the results, conclusions, and recommendations of the study.

ASSUMED 2018 CONDITIONS

The following conditions have been assumed for 2018.

- **In-Region Disposal Capacity**. Additional landfill disposal capacity will need to be developed prior to 2018 (See Sections 2.0 and 3.0) either through siting, permitting, and constructing a new Regional Landfill or through contracted disposal services at an out-of-region landfill. SPSA's existing Regional Landfill in Suffolk is expected to have reached its permitted capacity, and the facility has limited expansion potential. The City of Virginia Beach's Landfill No. 2 will have approximately five years of remaining capacity within its current permitted area assuming all of the City's solid waste is disposed in the landfill beginning in 2018. Future expansion is possible at this site, although the encroachment of surrounding developments may constrain future expansion.

- **Out-of-Region Disposal Capacity**. Several privately owned and operated municipal solid waste and construction and demolition debris landfills are located in Eastern

Virginia that could provide disposal capacity for the Region. These facilities currently service in-state and out-of-state cities and counties, and numerous independent commercial clients. Waste is transported to these facilities via long-haul transfer trailers, barge, rail, and other collection vehicles (e.g., packer trucks, roll-offs, self-haul).

SCS evaluated the location and short-term and long-term disposal capacities of eleven of these facilities which are permitted to accept of municipal solid waste (See Section 6.0). Assuming existing disposal rates continue at these facilities, and the Region's solid waste is added beginning in 2018; the existing permitted and projected capacities of these facilities could be consumed by the years 2024 and 2040, respectively (See Section 6, Table 59). This conceptual analysis does not consider the timing of when the additional unpermitted disposal capacity would be available, but reinforces the need for the Region to site and develop its own long-term disposal capacity, although these private facilities could provide disposal capacity if needed during the planning period.

- **Transfer Station Network**. The transfer station network is adequate to meet the Region's needs assuming any necessary upgrades and maintenance are performed on a routine basis (See Sections 2.0 and 3.0).

- **Waste-to-Energy**. The existing Refuse Derived Fuel Waste-to-Energy Facility (RDF WTE Facility) can be maintained and upgraded to serve the Region for the 30-year planning period, and either be owned and operated by the existing or a newly formed Regional Authority, or by a private company. The private ownership and operation scenario was not evaluated in this study because confidential negotiations are ongoing for the potential sale of SPSA's RDF WTE Facility (See Section 5.0). Resource recovery through use of the existing RDF WTE Facility can be an important long-term component of the Region's solid waste system since it will enable the Region to minimize construction and operational costs for the Regional Landfill and allows this landfill asset to last longer. Although inclusion of this facility in the system slightly increases the overall costs of the system, it provides a hedge against the potential significant impacts of escalating fuel prices.

- **Construction and Demolition Debris**. Sufficient privately-owned and operated disposal capacity for construction and demolition debris will exist in the Region and not require additional Regionally-owned and operated facilities. (See Section 2.0).

- **Solid Waste Quantities.** Assuming certain demographic projections, in 2018, the Region is projected to generate approximately 1,6000,000 tons per year of solid waste from municipal and commercial sources (inclusive of yard waste), the Navy, and construction and demolition debris. This waste will likely be processed or disposed at a combination of publicly and privately owned solid waste management facilities. Disposal capacity of between 17 to 43 million tons of solid waste will be required during the 30-year planning period depending on the solid waste strategies employed (not including yard waste, construction and demolition debris, and certain portions of

the waste stream that are diverted to other disposal facilities in the Region) (See Section 3.0).

- **Feasible Technologies.** No new viable technologies for the near term were identified that could be cost-effectively employed to substantially change the way solid waste is managed in the Region in 2018, although various biological, chemical, biochemical conversion technologies were considered. The primary feasible solid waste management strategies to implement during the planning period include recycling, waste-to-energy, and landfilling, in that order (See Section 3.0)

- **Recycling.** Residential recycling services will need to be provided for the Region members, with the exception of the City of Virginia Beach, which operates its own system. Programs and facilities for managing yard waste, household hazardous waste, white goods, tires, and other special wastes will need to be developed.

FUNDAMENTAL VALUES EXPRESSED BY MEMBER COMMUNITIES

A critical element of this study was coordination with the Chief Administrative Officers from the local governments. SCS initially meet individually with each of the CAO's and their technical and/or administrative staff to discuss their expectations regarding this study and their perspectives regarding solid waste management in the Region now and in the future. These meetings were held to identify the perceived current strengths and weaknesses of the current solid waste management system, its governance, scope of services provided, financial structure, and operations. In addition, a series of five facilitation meetings were scheduled and held with the CAO's or their staff to discuss the project, interim and preliminary findings, conclusions, and recommendations (See Section 1.0).

SCS was especially interested in identifying key factors, values, and criteria (e.g., cost versus services, cost versus environmental protection and conservation) that each community would apply when deciding on how to manage its solid waste in the future, and where changes were needed to establish a better solid waste management system in the future. The results of these discussions with the CAOs and their respective staffs are summarized below:

- **Future Decision Drivers.** Half the community members interviewed indicated that they believe that cost will be the primary factor governing their community's decisions regarding future solid waste management plans, while the other half indicated that they would prefer a broad range of services at a "fair" or "reasonable" cost, and that costs be reported in a transparent manner.

- **Importance of Environmental Factors.** Everyone indicated that environmental factors are important, but most said that cost considerations likely will govern decisions.

- **Support for Recycling.** Conceptually all support recycling; however, practical cost considerations have limited certain programs.

- **Energy and Climate Change Issues.** Energy and climate change issues are not considered major factors in decision process, although they are a consideration.

- **Importance of a Comprehensive Solid Waste Management System**

  Most indicated support for a comprehensive solid waste management system. Some questioned whether waste-to-energy should be pursued in the future.

- **Acceptance of Out-of-Region Waste.** All indicated some reluctance toward accepting out-of-state waste, especially if landfill capacity is significantly reduced for disposal of Region's waste. Two communities were somewhat supportive if out-of-state waste goes to WTE to meet capacity needs.

- **Support for Flow Control**

  Six communities have voted support for flow control. Two communities have not taken action on the issue, but the issue is under consideration.

- **Support for a New Regional Landfill.** Most were uncertain about siting a new landfill in the Region, although all recognize that disposal capacity is important. Southampton was frequently identified as the most logical location for a new regional facility given land availability. Suffolk is not necessarily opposed to continuing to host regional landfill in the future.

- **Regional Cooperation.** All think regional cooperation makes sense, but with qualifications (e.g., “reasonable” costs, comprehensive services, acceptable governance and management structure). One comment was made that it does not make sense to cooperate for cooperation sake; there needs to be compelling financial, operational, and environmental reasons why cooperation is beneficial to all parties.

- **Suggestions for Future Cooperation**

  - Seven of the eight communities felt that the political structure of the SPSA board has its limitations given complex technical, environmental and financial issues facing SPSA. The general sense from the interviews was that political decisions have been made in the past that were not in the best interest of the Region. One example given was the almost yearly decision in the past to not significantly raise disposal rates to fully cover operational expenses because of the political pressures to keep rates down. The result was that additional debt was encumbered to meet operational expenses, which is one of the factors that have led to the current tip fee of $104 per ton.

  - One felt the current SPSA voting structure was reasonable and served Region well over the years.

  - Several felt more strategic planning was needed as well as better presentations of alternatives.

- Several felt that a different management structure was needed.
- All felt that debt must be managed differently in the future. The approach of deferring payment of principal for political expediency or borrowing to cover normal operating expenses is viewed as a poor management practice and should be disallowed under any new regional organization.
- A desire was expressed by several for more transparency in SPSA's decision making process.
- Several felt that SPSA needed to be more proactive and less reactive.
- Some felt that any new cooperative organization needed to have proportional representation on the governing board either as a function of population or waste delivered to the system. Others felt that the current Board representation of one vote per member did not need to be changed.
- Potential cooperative arrangement between smaller communities might make some sense, if an overall regional solution is not achieved.
- One suggested that a fixed value of the host fee for community "hosting" the new regional landfill be calculated upfront so that all parties understand the value of the "deal" and it is not continually renegotiated, as some feel it is now.
- Several expressed the desire that no special deals be cut, although there was a general realization that some give and take will likely be needed to accommodate and compensate a community hosting a new regional landfill, if such is sited and developed.

MISSION

SPSA's stated mission is to dispose of waste, and to accomplish this by disposing of waste in an environmentally-sensitive manner, minimizing damage for current and future generations and reusing waste whenever possible, turning it into a useful product. Its vision is to be the regional choice for full-service solid waste management. If the Region wishes to implement a comprehensive, integrated solid waste management system through SPSA or a new regional organization, the mission, vision, and funding approach of the organization should be integrated so they do not work at cross purposes, and the members should work together, versus independently, to accomplish the mission and vision through the organization. In addition, the fundamental services that the member communities wish to have a regional authority provide, versus what they wish to self provide will need to be decided. The advantages and disadvantages of various funding approaches and public, private, and quasi public/private ownership and contracting arrangements for providing various solid waste services are discussed in Sections 4.0 and 6.0 of the report.

If all members of the Region decide to cooperate beyond 2018, consideration should be given to bringing the ownership and control for all disposal assets currently owned and operated by the member communities (i.e., City of Virginia Beach Landfill No. 2 and City of Portsmouth LCID

Landfill) under the regional solid waste authority. Although the cost of transferring ownership of these assets is not specifically addressed in this report, this approach would allow for the maximum utilization of these resources by the Region and likely would reduce overall system costs (e.g., transportation costs). If such an approach were adopted, any future inter-local agreements would need to include conditional use approval for the various elements of the solid waste systems that may be implemented at the sites so that the host community would not be able to use the conditional use or site development approval process as a future negotiating tactic to delay or obstruct the intended use of the site for whatever reason.

ALTERNATIVES ANALYSIS

Section 5.0 presents the cooperative scenarios developed and evaluated for this study. The following cooperative scenarios were evaluated:

- **Scenario A.** This scenario assumes that all eight communities continue to cooperate on a consolidated basis to provide municipal recycling services and municipally and commercially collected solid waste disposal services for the Region. This scenario models a system similar to the current SPSA system, and assumes that all commercial waste would be delivered to the system. The major difference in the cost structure is that by 2018, the outstanding debt on the RDF WTE Facility will have been retired. The scenario considers the options of siting and developing a new Regional Landfill, operating the system with or without a WTE facility, contracting for disposal in an out-of-region landfill, expanding the WTE capacity, and totally replacing the existing RDF WTE with a 3,000 ton per day mass burn WTE Facility. This is the only scenario where expanded WTE capacity is evaluated.

- **Scenario B.** This scenario assumes that all eight communities cooperate on a consolidated basis to provide municipal recycling services and municipally collected solid waste disposal services only. In this scenario, commercial solid waste would be collected and disposed by private solid waste companies at private facilities. The CAO's requested that this scenario be evaluated to consider the cost implications if there is a reversal in the most recent flow control decision, which now provides government entities more control on the collection and disposal of solid waste in their region. As with Scenario A, this scenario considers the options of siting and developing a new Regional Landfill, operating the system with or without the RDF WTE Facility, and contracting for disposal in an out-of-region landfill.

- **Scenario C.** This scenario assumes that all eight communities independently provide for recycling and solid waste disposal services. This is basically the "everyone does their own thing" scenario. It assumes that the City of Virginia Beach will use its landfill until it reaches its current permitted capacity, and then would contract out for disposal in an out-of-region landfill. The remaining Cities and Counties in the Region would contract out for disposal in an out-of-region landfill. Under this scenario, the assumption is made that the RDF WTE Facility would be decommissioned. This scenario will need to be reevaluated once the terms of the proposals to sell the RDF WTE are disclosed. This scenario also assumes that

commercial solid waste would be delivered and managed by the respective City/County systems.

- **Scenario D.** This scenario assumes that the City of Franklin, Isle of Wight County, and Southampton County align (note: referred to as Rural Communities in the Pro Forma Model) on a consolidated basis to provide recycling services and commercially and municipally collected solid waste disposal services; and the Cities of Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach align (note: referred to as Urban Communities in the Pro Forma Model) on a consolidated basis to provide the same services. For the Rural Communities, the assumption is made that disposal services would be contracted out, but the transfer stations would be operated by the aligned parties. For the Urban Communities, this scenario considers the options of siting and developing a new Regional Landfill, operating the system with or without the RDF WTE Facility, and contracting for disposal in an out-of-region landfill. This scenario also assumes that commercial solid waste would be delivered and managed by the respective City/County systems.

- **Scenario E.** This scenario assumes that the City of Virginia Beach independently provides for municipal recycling and municipally and commercially collected solid waste disposal services; and the other communities align on a consolidated basis to provide recycling and municipally and commercially collected solid waste disposal services. This scenario is similar to Scenario D, except that the City of Virginia Beach's waste stream is removed from the system. This scenario also assumes that commercial solid waste would be delivered and managed by the respective City/County systems.

A Pro Forma Model was developed to evaluate and compare the scenarios, taking into account operating expenses including personnel, equipment, capital, debt, transportation, and proposed host fees, and offsetting revenues associated with the operation of the existing RDF WTE Facility or a new Mass Burn WTE Facility. The results of the pro forma analyses are presented on a net present value (NPV) basis for comparison purposes. A "system rate" is also calculated and represents the total operating costs divided by the total waste managed, including recyclables and yard waste. The system rate basis should not be confused or compared to a landfill tip fee, since the system rate includes other cost factors that are not directly related to disposal.

For Scenario C, the costs for each community were estimated to independently manage their own solid waste program, assuming each would have its own solid waste staff, operate its own transfer station(s), contract for disposal (with the exception of the City of Virginia Beach initially), and manage recycling and other special wastes. SPSA maintains separate budgets for each transfer station in the region, and the respective transfer stations costs were allocated to each community accordingly. For the City of Virginia Beach, SCS assumed that the City would operate its own landfill until its currently permitted capacity is consumed.

Exhibit 1 and Exhibit 2 present the results of the pro forma analysis, sorted by Net Present Value (NPV), over the 30-year planning period. Exhibit 1 presents the results as a function of the 2008 and 2018 NPV of the series of costs over the 30-year planning period and as a normalized function of the NPV divided by the total solid waste managed during the planning period.

Exhibit 2 presents a series of summary bar charts for comparison purposes. The following general conclusions were reached as a result of the scenario evaluations:

- Siting a new landfill in the Region appears to be a significant factor in potentially reducing the overall costs to manage the Region's solid waste. The scenarios that assumed that a new landfill would be sited in the Region resulted in lower NPV costs compared to the scenarios that assumed the Region's solid waste would be transferred to and disposed of at an out-of-region landfill.

  - The Regional Landfill-only scenarios, with no WTE facilities, where it is assumed that a new landfill is sited and developed in the Region, resulted in the lowest NPV costs of all the scenarios.

  - For all the scenarios evaluated, transporting and disposing of the Region's waste at an out-of-region landfill resulted in significantly higher NPV costs compared to the scenarios that assumed a new Regional Landfill would be developed.

- If the Region elects to contract out for disposal (i.e., a new Regional Landfill is not sited), operating the system with the WTE RDF would be less expensive because of the substantial volume reduction that is achieved, resulting in fewer tons being transported and disposed.

  - For the scenarios that assumed a new landfill would be sited and developed in the Region, continuing the operation of the RDF WTE Facility resulted in 5 to 8 percent higher NPV costs compared to operating the system without the RDF WTE Facility.

  - For Scenarios A, B, and D, where it was assumed that solid waste would be disposed in an out-of-region landfill, 5 to 8 percent lower NPV costs resulted with the operation of the RDF WTE Facility, primarily due to the reduction in solid waste volumes requiring transport and disposal. For Scenario E, which assumes the City of Virginia Beach decides to manage its own solid waste system and the other members cooperate, thereby removing a significant portion of the waste stream from the regional system, the trend reverses and operating the WTE RDF resulted in 6 percent higher NPV costs.

- SCS evaluated the sensitivity of the pro forma analysis results by varying the assumed transportation rates, consumer price index (inflation) fuel adjustment escalation factors, the location and distance of a proposed new Regional Landfill, and the assumed tip fee for disposal in an out-of-region landfill. The results of this sensitivity analysis are presented in Section 5, Table 57 and indicate the following:

- The further a new regional landfill is located away from SPSA's current landfill, the more cost competitive the WTE and contracting-out disposal scenarios become.

- The contracting-out for disposal scenarios become more cost effective if significant discounts on a contracted tip fee can be negotiated, and a lower cost per ton-mile transfer rate is realized.

- Reducing the escalation factors generally favors the WTE scenarios, but the relative NPV ranking of the scenarios generally remains the same.

INSTITUTIONAL ANALYSIS AND RECOMMENDATIONS

SCS developed, screened, and analyzed alternative institutional models for regional solid waste management, including public, private or combination systems (See Section 4.0). This task included interviewing the CAO's of the Region to receive input on their ideas about potential alternatives for long-term management of the Region's solid waste, review of SPSA's organization and governance, a survey of other comparable solid waste authorities and organizations to document the institutional structure, services provided, unique challenges, and cost structures employed elsewhere. For the purposes of this project, SCS evaluated the following institutional models to identify the required organizational structure, staffing, cooperative agreements needed, and advantages and disadvantages of each:

- A new fully integrated, publicly owned and operated facility managed by a new regional authority.

- A fully integrated, publicly owned and operated facility managed by SPSA or some modified version of SPSA.

- A public/private partnership managed by a regional authority (SPSA or a new authority).

- Each municipality independently manages its own solid waste stream and develops contracts for collection, processing, and disposal services.

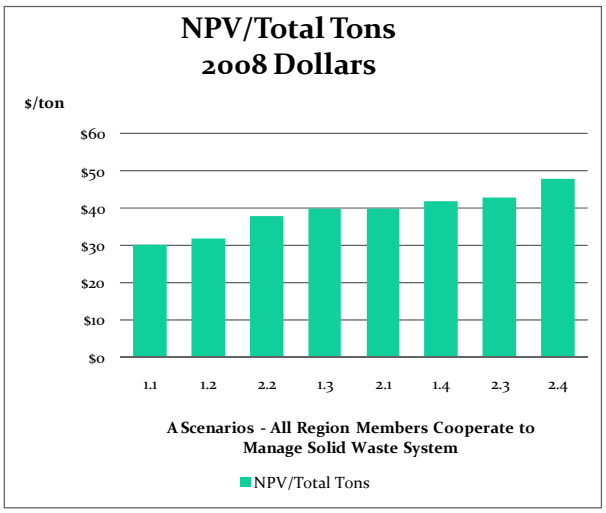
- Select municipalities agree to cooperate together to manage their solid waste and develop contracts for collection, processing, and disposal services.

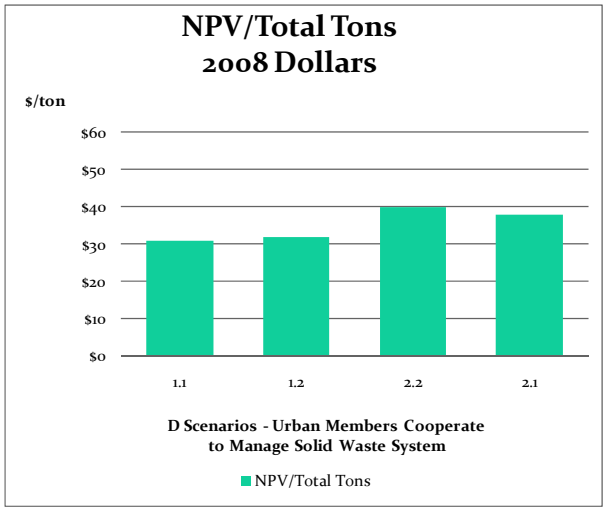
For the South Hampton Roads area, SPSA currently serves as the regional agency responsible for developing and implementing the regional solid waste plan for the eight participating cities and counties, and the Commonwealth has recognized the Region as a unit when evaluating the achievement of the various goals and objectives of its solid waste regulations. The Region's solid waste plan recognizes the division or responsibilities between SPSA, its regional members, and private enterprises for solid waste collection, recycling, transfer, resource recovery, and disposal.

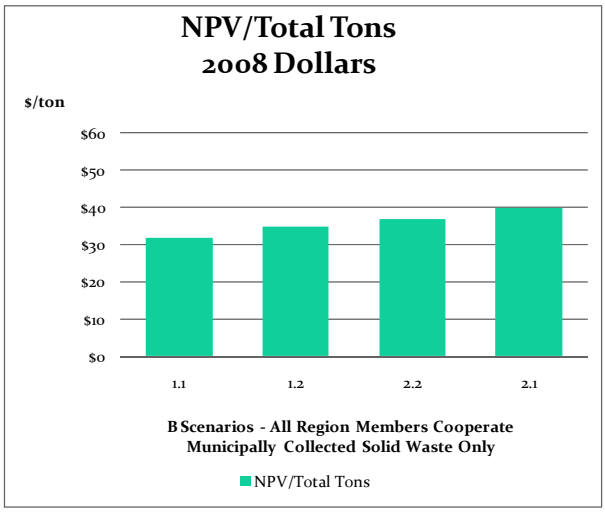
Exhibit 1. Summary Pro Forma Model Analysis
Sorted by NPV (Lowest to Highest)
Hampton Roads Planning District Commission
Solid Waste Study

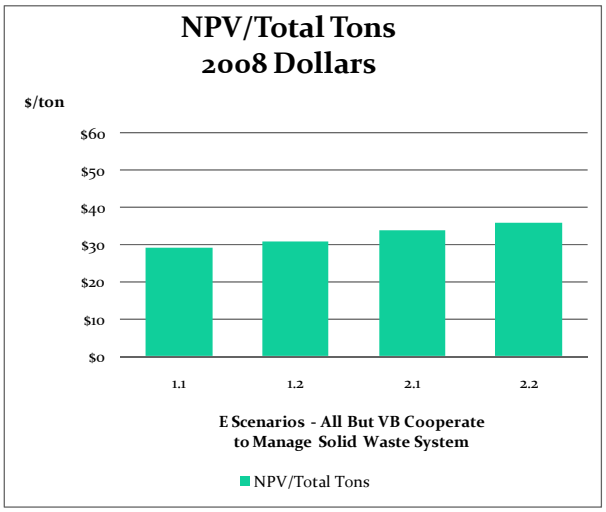
	Scenarios	NPV ($1000)2018 Dollars	NPV ($1000) 2008 Dollars	Total Tons 2018-2047	NPV/Total Tons 2008 Dollars ($/ton)	Estimated NPV Municipal Only 2008 Dollars	Municipal Tonnage 2018-2047	NPV/Muni Tons 2008 Dollars ($/ton)	First Year System Rate 2008 Dollars ($/ton)	First Year System Rate ($/ton) 2018 Dollars
A	**Communities Cooperate - All Waste**									
	1.1 New Regional Landfill, No WTE (All waste landfilled)	2,416,017	$1,483,225	49,370,050	$30	$781,149	21,297,990	$37	$43	$70
	1.2 New Regional Landfill, Maintain RDF WTE	2,564,812	$1,574,572	49,370,050	$32	$829,257	21,297,990	$39	$45	$73
	2.2 Contract Out Disposal, Maintain RDF WTE Facility	3,072,091	$1,885,997	49,370,050	$38	$993,271	21,297,990	$47	$48	$79
	1.3 New Regional Landfill, Maintain RDF WTE, New 2000 tpd WTE Facility	3,248,389	$1,994,229	49,370,050	$40	$1,050,272	21,297,990	$49	$67	$109
	2.1 Contract Out Disposal, No WTE	3,255,465	$1,998,573	49,370,050	$40	$1,052,560	21,297,990	$49	$52	$84
	1.4 New Regional Landfill, New 3000 tpd WTE Facility, Close RDF WTE	3,405,834	$2,090,887	49,370,050	$42	$1,101,178	21,297,990	$52	$75	$122
	2.3 Contract Out Disposal, Maintain RDF WTE Facility, New 2000 tpd WTE Facility	3,498,004	$2,147,471	49,370,050	$43	$1,130,978	21,297,990	$53	$68	$110
	2.4 Contract Out Disposal, New 3000 tpd WTE Facility	3,863,757	$2,372,012	49,370,050	$48	$1,249,234	21,297,990	$59	$79	$128
B	**Communiites Cooperate - Only Muncipal Waste**									
	1.1 New Regional Landfill, No WTE (All waste to Landfill)	1,319,069	$809,794	25,120,990	$32	$426,488	21,297,990	$20	$43	$70
	1.2 New Regional Landfill, Maintain RDF WTE Facility	1,431,201	$878,633	25,120,990	$35	$462,743	21,297,990	$22	$43	$70
	2.2 Contract Out Disposal, Maintain RDF WTE Facility	1,517,246	$931,457	25,120,990	$37	$490,563	21,297,990	$23	$48	$79
	2.1 Contract Out Disposal, No WTE	1,638,249	$1,005,743	25,120,990	$40	$529,687	21,297,990	$25	$52	$84
C	**Communities Go Separate Ways**									
	3.1 Contract Disposal of All Waste, with Exception of Virginia Beach									
	Chesapeake	564,920	$346,812	10,177,530	$34	$156,066	5,548,831	$28	$42	$68
	Franklin	35,772	$21,961	434,598	$51	$9,882	252,006	$39	$64	$105
	Isle of Wight	112,119	$68,832	1,929,978	$36	$30,974	1,115,163	$28	$47	$76
	Norfolk	541,022	$332,141	8,932,306	$37	$149,463	4,432,982	$34	$47	$76
	Portsmouth	237,462	$145,781	4,165,019	$35	$65,601	1,918,641	$34	$43	$70
	Southampton	77,519	$47,590	852,459	$56	$21,416	464,452	$46	$74	$120
	Suffolk	310,684	$190,733	6,562,844	$29	$85,830	4,031,667	$21	$36	$59
	Virginia Beach	1,019,348	$625,791	18,136,561	$35	$281,606	9,178,493	$31	$22	$36
D	**Various Cooperative Arrangements**									
	1.1 Rural Members Contract: Urban Members New Regional Landfill, No WTE									
	Rural, Contract Out Disposal	163,128	$100,146	3,157,584	$32	$45,066	1,831,621	$25	$41	$66
	Urban, New Regional landfill, No WTE	2,305,407	$1,415,320	46,170,166	$31	$636,894	23,306,514	$27	$44	$72
	1.2 Rural Members Contract: Urban Members New Regional Landfill, RDF WTE									
	Rural, Contract Out Disposal	163,128	$100,146	3,157,584	$32	$45,066	1,831,621	$25	$41	$66
	Urban, New Regional landfill, RDF WTE	2,416,794	$1,483,702	46,170,166	$32	$667,666	23,306,514	$29	$48	$79
	2.1 Rural Members Contract: Urban Members Contract									
	Rural, Contract Out Disposal	163,128	$100,146	3,157,584	$32	$45,066	1,831,621	$25	$41	$66
	Urban, No RDF WTE, Contract Out Disposal	3,006,809	$1,845,920	46,170,166	$40	$830,664	23,306,514	$36	$50	$82
	2.2 Rural Members Contract: Urban Members Contract									
	Rural, Contract Out Disposal	163,128	$100,146	3,157,584	$32	$45,066	1,831,621	$25	$41	$66
	Urban, RDF WTE, Contract Out Disposal	2,870,358	$1,762,151	46,170,166	$38	$792,968	23,306,514	$34	$48	$79
E	**Virginia Beach Manages Own Waste, Other Communities Align**									
	1.1 Other Communities New Regional Landfill , No WTE	1,553,623	$953,790	33,037,723	$29	$429,206	17,763,742	$24	$585,544	$953,790
	1.2 Other Communities New Regional Landfill, RDF WTE	1,660,658	$1,019,500	33,037,723	$31	$458,775	17,763,742	$26	$625,885	$1,019,500
	2.1 Other Communities Contract Disposal, No WTE	1,825,933	$1,120,964	33,037,723	$34	$504,434	17,763,742	$28	$688,175	$1,120,964
	2.2 Other Communities Contract Disposal, RDF WTE	1,932,344	$1,186,291	33,037,723	$36	$533,831	17,763,742	$30	$728,280	$1,186,291

Mjunicipal only allocation assumes municipal waste is 49% of total waste stream
Conversion Factor, PV of future value 10 years into future = 0.69391









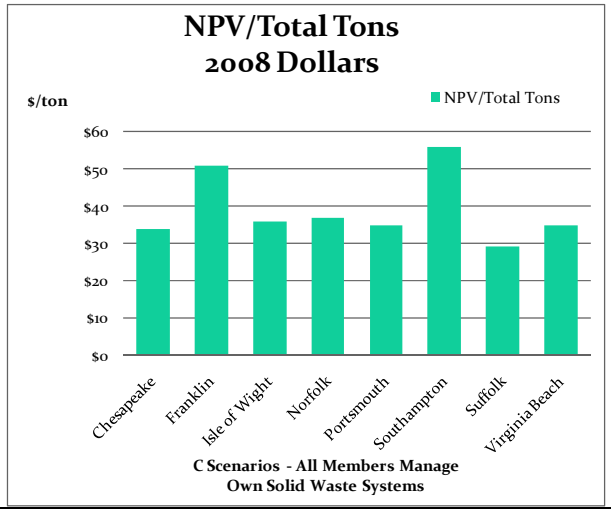
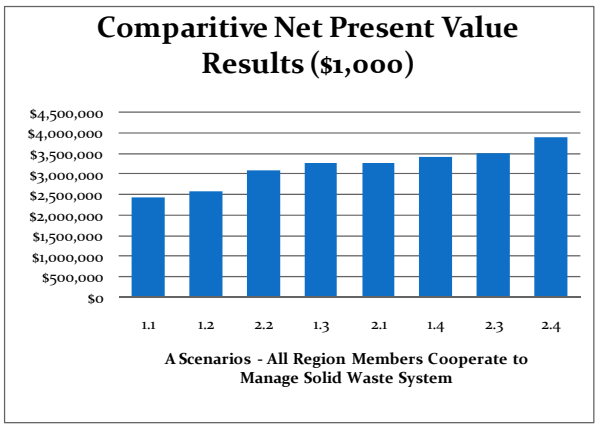
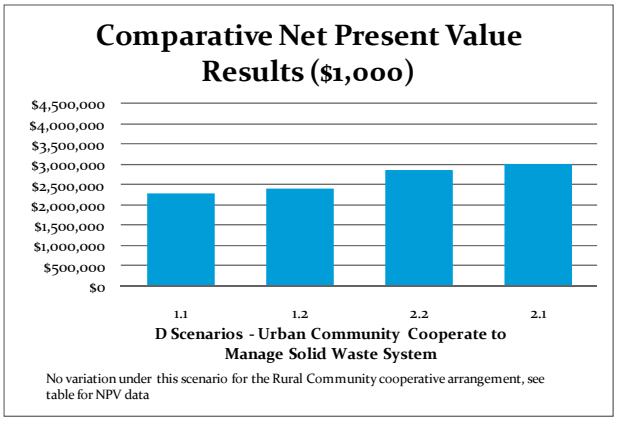
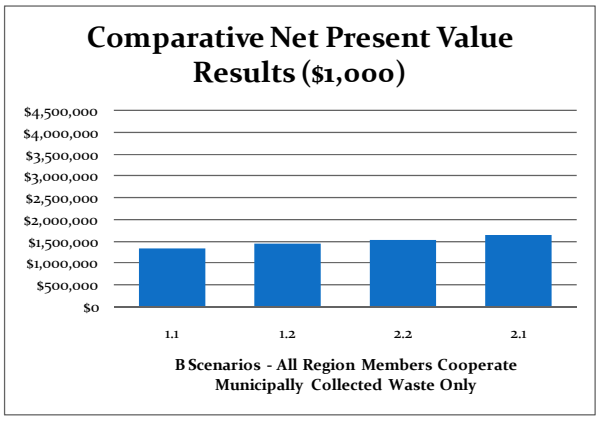
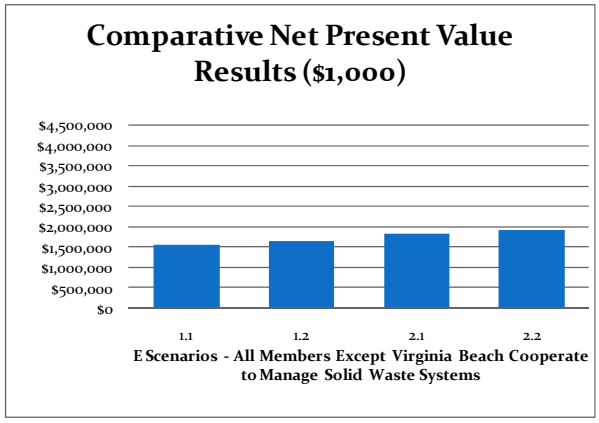


Exhibit 2. Pro Forma Model Results Scenario Comparisons









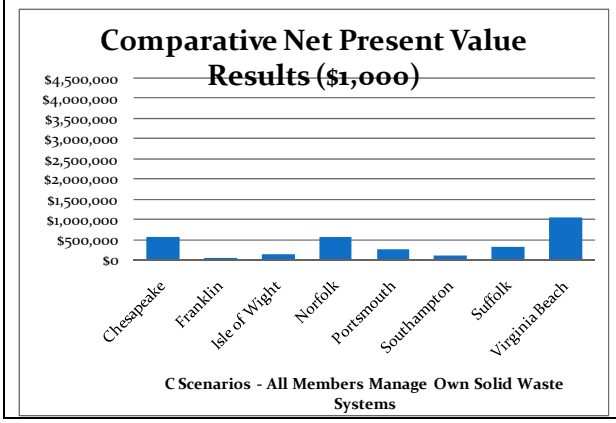


Exhibit 2 (continued)

Significant changes to the current plan and organization and function of SPSA will be required if the RDF WTE or Regional Landfill facilities are sold, if flow control is not implemented in the Region, or if the current members of SPSA do not agree to cooperate together after 2018. Administratively, if the agreements between the member communities and SPSA are not renewed or replaced after 2018, each will be responsible for developing and implementing integrated solid waste plans for their respective communities that meet the Virginia Waste Management Board's requirements.

If the Region elects to continue cooperating to manage its solid waste, SCS recommends that SPSA continue to function, with modifications, for the following reasons:

- SPSA is a well-established authority that manages municipal solid waste for the South Hampton Roads Region.

- Future cooperation of SPSA's member communities may allow for more efficient development and operation of the various solid waste facilities needed to recycle, transfer, process, convert, and dispose of the Region's solid waste as a result of economies of scale, , regardless of whether the Regional Authority handles municipally collected waste only or provides services for commercially collected solid waste as well. The cost implications or regional cooperation are more fully evaluated in Section 5.0 of this report.

- The personnel, facility, and organizational infrastructure exists to support its continued operation into the future with appropriate modifications as recommended.

- The shortcomings of SPSA's current structure and management that have been expressed by the member communities are resolvable.

- As demonstrated by other solid waste authorities operating around the country, an organization like SPSA can be operated and administered in a cost-effective manner to serve the solid waste needs of its member communities either through development of facilities and operations owned and operated by the Authority or through contracted services.

- Concerns regarding SPSA's current debt management and the ability of the Authority to obtain future financing exist with some members. Deciding to maintain SPSA after 2018 may allow the authority to obtain financing in order to construct new facilities or upgrade existing solid waste facilities.

- The SPSA member communities have substantial capital invested in waste-to-energy facilities, recycling facilities, a regional landfill, transfer stations, rolling stock, administration buildings, maintenance facilities, and other support facilities. Many of these facilities will have not reached their useful life by 2018 and could serve the Region well into the future. Many of these support facilities (e.g., transfer stations) will be needed to support the safe and efficient transport of solid waste, regardless of how it is processed and ultimately disposed. The maximum utility of these capital investments should be sought.

- The current members of SPSA will have joint obligations beyond 2018 (e.g., closure and post-closure care of the regional landfill); therefore, some degree of future cooperation will continue.

- For the Region as a whole, including municipal, institutional, and commercial sectors, Regional cooperation could provide significant reduction in costs through the siting of a new Regional Landfill. This significant cost-control advantage would be lost if the Region does not cooperate. Retaining the ability to cost-effectively site a new Regional Landfill would be useful factor in negotiating beneficial terms for short or long-term transportation and disposal contracts for the waste streams that are under the direct control of the regional governments.

- Regional cooperation would make it easier to achieve the integrated solid waste management requirements and goals of the Virginia Waste Management Board. The size, organization, and responsibilities of the Regional Authority would depend on the assets it would be required to manage (e.g., landfill, transfer station, or RDF WTE facilities), and the services requested by its members (e.g., collection, recycling, yard waste, household hazardous wastes).

- Maintaining a Regional Authority to provide for transfer, recycling, and disposal services is a logical approach to managing the Region's solid waste either through development of facilities and operations owned and operated by the Authority or through contracted services.

At a minimum, Chesapeake, Franklin, Isle of Wight, Norfolk, Suffolk, Portsmouth, and Southampton County likely will not have their own municipal solid waste landfills; therefore, these communities will need to contract for or otherwise provide for transportation and disposal of municipally collected waste, and assure that a reasonable plan is in place to manage commercially collected solid waste. In the short term and potentially in the long-term, the City of Virginia Beach has capacity to dispose of municipally collected waste in its Landfill No. 2 and has indicated that it would rely on the private sector for residential recycling services and for the collection and disposal of commercially collected waste in out-of-region disposal facilities. Therefore, if the City of Virginia Beach elected to manage its own waste, Chesapeake, Franklin, Isle of Wight, Norfolk, Suffolk, Portsmouth, and Southampton County could still realize the above mentioned advantages of regional cooperation through leveraging their buying power, siting a new landfill, or maintaining the leverage of potentially siting a new Regional Landfill Facility in the event that contracted disposal costs become too high.

Finally, a minor procedural issue embodied in the Virginia Water and Waste Authorities Act also supports continuation of SPSA versus development of a new authority. For a new authority to form, member localities and the new authority will be required to make the determination under § 15.2-5121 of the Act (four findings) that formation of the new authority will not result in displacement of private companies. SPSA currently is exempt from this requirement.

The future organizational structure and size of SPSA will be dependent on whether it continues to operate the RDF WTE Facility and a Regional Landfill. If the RDF WTE Facility is sold, substantial changes in the organization will result in terms of its responsibilities and the number

of administrative, technical, operational, and support personnel employed by SPSA. Likewise, if a new Regional Landfill is not sited and operated by SPSA, similar changes would occur. SPSA would most likely then operate similar to the Virginia Peninsula Public Services Authority (VPPSA), which serves its communities by contracting for various recycling, transfer, and disposal services, and consideration could be given to merging SPSA's operations with VPPSA.

The report presents the recommended changes to SPSA's administrative and governance structures (namely, the number of members on the Board of Directors and their respective qualifications), debt management, and mission assuming it maintains its autonomy. SCS recommends that high-level collaboration and representation by all affected jurisdictions within SPSA regarding management structure occur both before and after the use and support agreements expire or are renewed.

SYSTEM FUNDING

The following funding approaches were considered to support a Regional solid waste system:

- Tip Fee
- Waste Generation Fee
- Pay-As-You-Throw (PAYT)
- General Fund Tax (Ad Valorem)

The advantages and disadvantages of each were evaluated the body of the report.

SCS recommends that the Region consider implementing a residential only or a combined residential/commercial waste generator fee system (commonly referred to as a special assessment) to fund the solid waste system in lieu of the current tip fee-based system. We understand that this approach has been considered in the past by the Region, but that a consensus agreement has never been reached. A waste generator fee system more fairly allocates system costs based on the mission and objectives that have been established by the Region for managing its solid waste. It provides a reliable funding source, which has multiple benefits including positive cash flow, improved bonding capacity and ratings, and lower financing costs. A system funded by a waste generation fee would better support the mission of a comprehensive Regional solid waste management approach, such that the focus would be more on doing the right thing rather than figuring out a way to increase waste flows to support the system costs. This approach has been successfully implemented elsewhere.

SPSA currently establishes the tip fee for the year, based on the quantity of waste delivered, and each member then calculates what their respective charges will be for their residential customers and distributes those estimated charges through their respective ad valorem tax systems. The current approach only covers the residential customers that receive municipal collection services. Commercial customers pay the tip fee directly to SPSA through their collection contractors. The tip fee funding approach, which has waste disposed as the denominator, can result in actions that can be at cross purposes with resource conservation and recovery (e.g., recycling), because if waste is diverted from the system, revenues are reduced, and so the focus is on securing and increasing waste flow into the system versus resource conservation and recovery.

A system funded by a waste generation fee would better support the mission of a comprehensive Regional solid waste management approach, such that the focus would be more on doing the right thing rather than figuring out a way to increase waste flows to support the system costs. This approach has been successfully implemented elsewhere as discussed in Section 4.0. SCS recommends that further evaluation of this funding approach be studied to assess the feasibility of implementing it in the Region.

NEXT STEPS

The recommendations outlined in this report will require a series of political, administrative, and technical actions by the Region. The following action plan is proposed to facilitate the transition from the existing use and service agreements to a set of new agreements. A schedule outlining the basic elements of the action plan is presented in Section 6, Figure 15.

- **Secure Future Disposal Capacity.** As indicated above, the development of a new Regional Landfill is important to reducing overall costs for disposal in the Region. The implementation schedule demonstrates that meeting a January 2018 deadline for siting, designing, permitting, and constructing a new Regional Landfill will be difficult. However, conservative assumptions were used throughout to provide time for regulatory review and public involvement, which can be more or less depending on specific circumstances. The conclusion is that time is of the essence.

  - SPSA should aggressively evaluate all potential expansion alternatives for the existing Regional Landfill to extend the capacity and life expectancy of the facility beyond 2018.

  - The Region, through SPSA, should immediately conduct a siting study to identify whether a suitable site can be found in the Region to site a new regional landfill. The study should build off the previous siting studies that have been conducted. SCS understands that the SPSA Board has already approved moving forward with this task. SCS recommends that it proceed on an expedited basis. Siting, acquiring, permitting, and constructing a new facility can take up to ten years to complete.

  - At the same time that a siting study is being conducted, the Region should continue to discuss with the private sector whether they can provide long-term disposal capacity for the Region on a cost-effective basis. One option to consider would be issuing a request for proposals for the private sector to site and develop a new regional landfill, with the provision that the successful proposer would be given the life of site operational contract. This approach was successfully used by the City of Jacksonville, Florida in the 1990s. In this case, three private companies competed to permit a new facility. The City ultimately selected one company which they felt identified the most advantageous site, and the company proceeded with permitting, design, and construction. The successful company was successful was given a life-of-site contract to operate the facility.

- **CAO , City, and County Government Actions**

  - Develop consensus of findings and conclusions of the HRPDC study by the CAOs.

  - Present the findings and conclusions of the study to the respective member City Councils and County Supervisors.

  - Hold public meetings to present findings and recommendations to the community at large. (Note: The presentations to the City Councils and County Commissions may serve this function).

  - If consensus of findings and conclusions from study is to form a new or reconstituted Regional Authority, legal counsel should be sought to develop the necessary legal framework to address the institutional and management recommendations presented in this report. This would include the development of new use and service agreements, and any necessary supplemental agreements to address special circumstances with a respect to location of any new solid waste facilities and respective potential host fees.

  - Hold meetings with the CAOs to reach agreement on the basic framework of a new or reconstituted Regional Authority.

  - Present use and service agreements to the respective County and City governing bodies.

- **Fate of the RDF WTE Facility**. The results of this study should be re-evaluated if SPSA decides to sell the RDF WTE Facility or any other key disposal assets.

- **Existing Facility Condition and Use Beyond 2018.** SCS understands that SPSA is conducting an internal study assessing the condition and use of its existing transfer station network and the landfill. SCS also recommends that a similar study be done for the RDF WTE Facility (assuming SPSA retains ownership and operation) to identify specific action items that should be implemented to upgrade the facilities so that they can continue to serve the Region during the 30-year planning horizon.

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

SCS Engineers (SCS) was retained by the Hampton Roads Planning District Commission (HRPDC) to evaluate technical and institutional alternatives and recommend an approach for managing solid waste in the South Hampton Roads Region (Region) after the intergovernmental agreements with the Southeastern Public Service Authority (SPSA) expire in January 2018. The governmental entities involved in the HRPDC study include the cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach, and the counties of Isle of Wight and Southampton. These communities are referred to as "the Region" throughout this report.

This study is intended to provide information and analysis to HRPDC member communities to aid in their decision as to whether they should continue to cooperate together to manage the Region's solid waste or pursue an alternative course of action. The study is primarily forward looking, considering solid waste management approaches for the Region post-2018 that best fit the current and anticipated regulatory, institutional, facility, financial, market, and legal drivers and constraints, which differ significantly from when the inter-local agreements with SPSA were originally established in 1983 and 1984.

In conducting this study, SCS performed the following tasks:

- Task 1 – Review Existing South Hampton Roads Regional Solid Waste Management Systems
- Task 2 – Evaluate Future Solid Waste Technology and Facility Needs for 2018 to 2047
- Task 3 – Evaluate Institutional Models for Solid Waste Management
- Task 4 – Coordinate With Chief Administrative Officers (CAOs)

The methods and results of each of these tasks are summarized within the body of this report. Analyses and recommendations are provided for the following:

- Technologies that will provide a stable, reliable, environmentally responsible and cost effective means for managing waste in the Region.
- Public/Private cooperation needed to cost-effectively manage solid waste disposal needs for a 30-year planning period (following 2018).
- Institutional models that will effectively serve the Region and balance financial, technological and administrative factors.
- Key tasks to be accomplished and a schedule for implementation.
- Pre-2018 recommendations.

This report has been issued as a "draft" pending a decision by the SPSA Board of Directors that may significantly affect the results of the analyses performed in this study, as well as the findings and conclusions. Specifically, the decision is whether to sell the Refused Derived Fuel (RDF) facility and the Steam Power Plant (SPP) to a private entity. Once this decision has been made by the SPSA Board of Directors (expected by mid 2009), the report will be finalized.

1.2 REPORT ORGANIZATION

Following this introductory section, which includes an overview of the coordination activities with the Region, the report is organized as follows:

2.0 Existing South Hampton Roads Regional Solid Waste Management System. This section presents an overview of the current solid waste management systems in the Region, including SPSA's facilities, operations and services, solid waste operations handled separately by the member communities, and solid waste private processing and disposal facilities. Solid waste projections and demographic information used throughout our analysis also is presented.

3.0 Future Solid Waste Technology and Facility Needs. This section presents the federal and state regulatory framework for managing solid waste, and reviews and assesses the applicability of alternative technologies for collecting, recycling, processing, and disposing solid waste in the Region, including associated capital and operational cost requirements, advantages and disadvantages of each, and operational status and performance history of the various technologies.

4.0 Alternative Institutional Models. This section presents an evaluation of the current institutional organization structure for managing solid waste in the Region (i.e., SPSA), a review and evaluation of solid waste institutional models used elsewhere in the United States, an assessment of alternative institutional models, and a recommended institutional approach if the HRPDC communities elect to manage solid waste cooperatively on a regional basis following the expiration of the inter-local agreements in 2018.

5.0 Pro Forma Analysis. This section presents the system alternatives that were developed for more detailed evaluation. The Pro forma Model projects the capital and operational costs for the alternatives, and provides a basis for comparing alternatives and making policy decisions.

6.0 Findings and Recommendations. This section presents a summary of the key findings and recommendations resulting from this study.

7.0 References. This section lists the references cited in this report.

1.3 COORDINATION WITH MEMBER COMMUNITIES AND CHIEF ADMINISTRATIVE OFFICERS

A critical element of this study was coordination with the Chief Administrative Officers from the local governments. SCS initially meet individually with each of the CAO's and their technical

and/or administrative staff to discuss their expectations regarding this study and their perspectives regarding solid waste management in the Region now and in the future. These meetings were held to identify the perceived current strengths and weaknesses of the current solid waste management system, its governance, scope of services provided, financial structure, and operations. In addition, a series of five facilitation meetings were scheduled and held with the CAO's or their staff to discuss the project, interim and preliminary findings, conclusions, and recommendations. Table 1 presents a list of the participants in the facilitation process.

Table 1. Chief Administrative Officers and Facilitation Participants

Jurisdiction/Participants	Title	CAO Meetings	Initial Interviews
Chesapeake			
Mary Ann Saunders	Assistant City Manager	♦	♦
Jan Proctor	Deputy City Attorney	♦	♦
David Thompson	Solid Waste Administrator		♦
Franklin			
Bucky Taylor	City Manager (former)	♦	
Lin Darden	General Services Superintendent		♦
Chad Edwards	Deputy Director of Public Works		♦
Paul Saunders			♦
Andy Rose	Director of Finance		♦
Russell Pace	Director of Public Works		♦
Isle of Wight County			
Douglas Caskey	County Administrator	♦	♦
Wayne Roundtree	General Services	♦	♦
Norfolk			
Stanley Stein	Assistant City Manager	♦	♦
John Keifer	Director of Public Works		♦
Portsmouth			
Ken Chandler	City Manager	♦	
Judy Duffy	Asst. Director, Dept of Public Works	♦	♦
Joe Grillo	Management Analyst		♦
Bill McGlaughon	Director of General Services		♦
Louis Lukas			♦
Southampton County			
Mike Johnson	County Administrator	♦	♦
Suffolk			
Selena Coffee-Glenn	City Manager	♦	
Eric Nielsen	Director of Public Works	♦	♦
Wesley King	Asst. Director of Public Works		♦
Virginia Beach			
Jim Spore	City Manager	♦	
John Barnes	Waste Mgt. Administrator	♦	♦
SPSA			
Bucky Taylor	Executive Director (new)	♦	
John Hadfield	Executive Director (retired)	♦	♦
Louie Jordan	Deputy Executive Director	♦	♦
HRPDC			
Art Collins	Executive Director (retired)	♦	
Dwight Farmer	Executive Director (new)	♦	
John Carlock	Deputy Executive Director	♦	

1.3.1 Initial Meetings with Cities and Counties

SCS met separately with representatives from each City and County (See Table 1) in February and March of 2008 to better understand their perspectives and general views about solid waste management. SCS was especially interested in identifying key factors, values, and criteria (e.g., cost versus service, cost versus environmental protection and conservation) that each community will apply when deciding on how to manage its solid waste in the future. A comprehensive questionnaire was developed and used during these meetings to guide the discussions. The questionnaire addressed a variety of topics including:

- Will cost, service, or other factors drive the decision making process regarding solid waste management?
- How "green" are people willing to be even if it costs more?
- Views of current SPSA operation and governance.
- Suggestions for future cooperative arrangements.
- What are the deal breakers (e.g., governance, cost, service)?
- Perspectives on continued or expanded resource recovery?
- Perspectives on the future of landfilling in the Region.

The survey questionnaire is presented in Appendix A. A compilation of the survey findings is provided below:

- **Future Decision Drivers**
  - Half those interviewed said that bottom line cost will likely drive decisions.
  - The other half interviewed said that they are looking for reasonable, transparent, and fair cost structure.
  - One indicated that they wanted a broad range of services at a fair cost.
- **Importance of Environmental Factors.** Everyone indicated that environmental factors are important, but most said that cost considerations likely will govern decisions.
- **Support for Recycling.** Conceptually all support recycling; however, practical cost considerations have limited certain programs.
- **Energy and Climate Change Issues.** Energy and climate change issues are not considered major factors in decision process, although a consideration.
- **Importance of a Comprehensive Solid Waste Management System**

- Most indicated support for a comprehensive solid waste management system.
- Some questioned whether waste- to-energy should be pursued in the future.

- **Acceptance of Out-of-Region Waste.** All indicated some reluctance toward accepting out-of-state waste, especially if landfill capacity is significantly reduced for disposal of Region's waste. Two communities were somewhat supportive if out-of-state waste goes to WTE to meet capacity needs.

- **Support for Flow Control**

  - Six communities have voted support for flow control.
  - Two communities have not taken action on the issue, but under consideration.

- **Support for a New Regional Landfill**

  - Most were uncertain about siting a new landfill in the Region, although all recognize that disposal capacity is important.

  - Southampton was frequently identified as the most logical location for a new regional facility given land availability.

  - Suffolk is not necessarily opposed to continuing to host regional landfill in the future.

- **Regional Cooperation.** All think regional cooperation makes sense, but with qualifications (e.g., “reasonable” costs, comprehensive services, acceptable governance and management structure). One comment was made that it does not make sense to cooperate for cooperation sake; there needs to be compelling financial, operational, and environmental reasons why cooperation is beneficial to all parties.

- **Suggestions for Future Cooperation**

  - Seven of the eight communities felt that the political structure of the SPSA board has its limitations given complex technical, environmental and financial issues facing SPSA. The general sense from the interviews was that political decisions have been made in the past that were not in the best interest of the Region. One example given was the almost yearly decision in the past to not significantly raise disposal rates to fully cover operational expenses because of the political pressures to keep rates down. The result was that additional debt was encumbered to meet operational expenses, which is one of the factors that have led to the current tip fee of $104 per ton.

  - One felt the current SPSA voting structure was reasonable and served Region well over the years.

  - Several felt more strategic planning was needed and better presentation of alternatives.

- Several felt that a different management structure was needed.
- All felt that debt must be managed differently in the future. The approach of deferring payment of principal for political expediency or borrowing to cover normal operating expenses is viewed as a poor management practice and should be disallowed under any new regional organization.
- A desire was expressed by several for more transparency in SPSA's decision making process.
- Several felt that SPSA needed to be more proactive and less reactive.
- Some felt that any new cooperative organization needed to have proportional representation on the governing board either as a function of population or waste delivered to the system.
- Others felt that the current Board representation of one vote per member did not need to be changed.
- Potential cooperative arrangement between smaller communities might make some sense, if overall regional solution is not achieved.
- One suggested that a fixed value of the host fee for community "hosting" the new regional landfill be calculated upfront so that all parties understand the value of the "deal" and it is not continually renegotiated, as some feel it is now.
- Several expressed the desire that no special deals be cut, although there was a general realization that some give and take will likely be needed to accommodate and compensate a community hosting a new regional landfill, if such is sited and developed.

1.3.2 CAO Facilitation Meetings

The objectives, goals, and accomplishments from each meeting are summarized below:

1.3.2.1 Session 1 – Working Together, Defining Values and Goals for 2018 and Beyond

The objectives of the first session, which was held on March 20, 2008, were to assess parameters for developing a unified vision and approach for managing solid waste in the Region post 2018. The following goals were established for this session:

- Identify common goals for regional solid waste management.
- Identify common values and needs.
- Identify challenge such as political, financial, or institutional issues affecting cooperation.

- Identify potential organizational structures to address future goals, values, and challenges

Several highlights from the first session are provided below.

- **Focus of Study.** As an introduction to this first meeting, Art Collins emphasized that SCS's study would not be on SPSA specific issues, but rather on what the best technical, institutional, and financial solution for the Region is after 2018.

- **Historical Perspective on Establishment of the Waste-to-Energy Facility.** Art Collins noted that having a waste-to-energy plant was one of the factors the Base Realignment and Closure (BRAC) commission considered during its studies. The Waste-to-Energy facility was a favorable factor to keeping bases open.

- **Public versus Private Ownership and Operations**. The City of Virginia Beach wanted to make sure the public versus private ownership and operation issue is addressed in the institutional analysis.

- **Special Assessment for Funding Solid Waste System**. The idea of a special assessment to fund the solid waste system was discussed in lieu of a tip fee based revenue structure. There seemed to be some interest in this approach for SPSA or another future regional authority.

- **Sale of Waste-to-Energy Facility**. SPSA expects to receive offers for the RDF WTE Facility. The final deal will most likely depend on the Region making certain commitments to deliver waste to the facility. The former HRDPC Executive Director, Art Collins, said that if the RDF WTE facility is sold, SCS would incorporate it into our study, but that the focus of our efforts on the SCS work would not be on SPSA specific issues.

- **Process.** Art Collins asked who would be the persons or group to "make the deals" with the member communities. The question whether it should be the politicians or staff. The general consensus was that the technical staff and Chief Administrative Officers would work through the draft of any agreements for presentation to the politicians for consideration.

- **Institutional Models.** The Hampton Roads Sanitation District (HRSD) model was discussed as a potential approach for a managing solid waste in the Region after 2018. The group was unsure whether they were in favor of a Governor appointed board. Art Collins was not convinced that the HRSD model would work today for managing solid waste in the Region. One person mentioned the idea of an elected board, but most of the group didn't think anyone would volunteer to be on the ballot.

- **Study Horizon**. SCS was directed to use a 30-year planning horizon (2018-2047) for the study.

- **Out-of-Region Disposal Capacity**. During the discussion on out-of-region disposal resources, SPSA recommended that SCS evaluate the remaining disposal capacity of the out-of-region landfills, which SCS indicated it was doing.

- **Municipal Only Option**. In light of flow control issues and implications to a regional system, SCS was asked to include in its alternatives evaluation the "municipal only" option. This option would evaluate a solid waste management alternative for the Region which includes only municipally collected solid waste (about 50 percent of the current waste stream), with the assumption that the commercial sector would have to find solutions for management of its own waste streams.

- **Break-out Sessions**: The CAO's and their supporting staff participated in facilitated discussion on identifying regional values and common goals for solid waste management in the Region, as well as discussing organization and institutional issues. Many of the same issues that were discussed during our interviews with each of the study members were discussed during the breakout session. Values such as accountability, fairness, transparency in decision making, debt management, and more qualified members on the board were discussed.

1.3.2.2 Session 2 –Is It All About Land?

The objectives of Session 2, which was held on May 22, 2008, were to review the long-term disposal requirements of the Region including the disposal capacity needed for the 30-year planning horizon and total land requirements for a regional integrated solid waste management facility, identify existing and potential disposal resources in and out of the Region, and identify feasible technologies for managing the Region's waste. An update of the institutional analysis task was also presented.

Several highlights of the second session are summarized below:

- **Institutional Analysis**. SCS presented its preliminary survey results of twelve regional authorities and county solid waste organizations, which included a comparison of the membership, governance and administration structure, board composition, scope of operations, services provided, and approach to debt management. The session participants were especially interested in the how other authorities and county organizations set up their respective boards (political, appointed or elected), whether any boards have minimum required qualifications to serve, how decisions are made and votes apportioned, how debt is managed, the range of services provided, the approach being taken to flow control, and any site specific factors that influence the way things are organized or services provided. They were interested whether a set of "best practices" employed by the organizations could be developed.

- **Waste-to-Energy.**

  - The viability of the existing Refuse Derived Fuel (RDF) WTE facility was discussed. SPSA indicated that the current RDF facility is expected to have a

service life well into the future, assuming ongoing maintenance and periodic upgrades, and would be a resource to the Region post-2018, regardless of who owns and operates the facility.

- The option of constructing a new mass burn WTE was discussed. A new mass burn WTE facility would be more efficient than the current RDF WTE process. There is sufficient waste in the Region to potentially support a new 3,000-ton per day facility in conjunction with the existing RDF WTE facility.

- **Conversion Technologies.** SCS presented an overview of various thermal, biological, and bio-chemical conversion technologies that are either being used or tested throughout United States and elsewhere, and discussed the feasibility of implementing these technologies in the Region. The review included technologies involving incineration, gasification (i.e., plasma arc), pyrolysis, autoclave, anaerobic and aerobic digestion, and hydrolysis technologies. Where information was available, estimated capital and operation and maintenance costs were presented. The status of each of these technologies also was presented. The discussion also addressed the fact that implementation of WTE will reduce the land requirements for a new regional landfill. Viable current technologies discussed included mass burn, composting, organic conversion and bioreactor landfills. Mass Burn WTE is the most proven and reliable technology with facilities constructed and operational at the scale that would be needed for the Region.

- **Cooperative Scenarios Being Evaluated.** SCS presented a preliminary matrix of the alternatives it planned to evaluate as a part of the study. The alternatives included the following cooperative arrangements:

  - All eight communities cooperate in a manner similar to today, including managing municipally collected and commercial waste streams. Disposal would be accomplished either through expansion of the existing regional landfill (if feasible), siting and developing a new regional landfill, and/or contracting out disposal. The disposal requirements and costs would be calculated with and without WTE.

  - All eight communities cooperate to manage only municipally collected solid waste.

  - All eight communities go their separate ways.

  - Alternative cooperative associations between the current SPSA members.

- **Solid Waste Projections and Landfill Disposal Needs.** Solid waste disposal projections for each community for 30-year planning horizon (2018-2048) were presented. An estimate of the land required to support a regional landfill for the planning horizon, with and without WTE, was presented. Meeting participants requested a sensitivity analyses on assumptions (e.g., transportation costs). It was also requested that the population projections developed by the HRPDC be used for

the planning study. These projections differ somewhat from projections prepared by the Commonwealth.

- **Alternatives for Providing Disposal Capacity for the Region.** The alternatives discussed included expanding the current regional landfill, siting a new regional landfill, and contracting out for disposal. The location and feasibility of transporting the Region's waste to various private landfill facilities in Virginia was discussed. Projected transportation and disposal costs for the out-of-region option were presented.

- **Summary of Session 2 Presentation and Discussions**

  - There are successful institutional models that appear to address most of the organizational concerns that have been expressed, including board makeup, board member qualifications, service models, debt management, system administration, and financial structure.

  - The existing WTE facility could provide substantial value to the Region after 2018, including volume reduction, renewable energy, especially considering the historical debt obligations will be paid off by 2018.

  - Other reliable technologies could be employed in the Region, including mass burn WTE, composting, organics diversion, bioreactor landfill, and increased recycling of municipal solid waste and construction and demolition debris.

  - Approximately 55 million tons of solid waste (73 to 84 million cubic yards), including residential, commercial, and Navy wastes, as well as sludge, construction and demolition debris, and waste soil, is projected to require disposal over the period 2018-2047. Preliminary estimates suggest a new regional facility would need to be approximately 500 to 1,300 acres in size, with a landfill disposal footprint of between approximately 200 and 400 acres.

1.3.2.3 Session 3 – Whose Sandbox Will We Play In? Overview of Institutional Alternatives

The objectives of Session 3, which was held on July 18, 2008, were to review the results of SCS's institutional analysis, summarize the shortlist of alternative technologies and institutional alternatives being evaluated, and identify the feasible approaches for structuring a future cooperative arrangement. SCS presented a draft of the Institutional Analysis section of the study report. A draft implementation schedule for period leading up to 2018 was presented. The implementation schedule included the technical, regulatory, and governmental tasks for siting a new landfill, upgrading transfer stations, siting and permitting a new WTE facility, and contracting out disposal.

Several highlights of the third session are summarized below:

- **Landfill Requirements.** SCS presented further refinement on its estimates of the disposal capacity and land area required for a regional facility for the 30-year

planning horizon. These projected requirements were compared with the available and potential future projected capacities of the existing regional landfill facility, a potential new regional landfill, and private landfills in the eastern Virginia, considering no WTE, status quo with the current RDF facility, and maximizing WTE (i.e., constructing another mass burn WTE). The 30-year disposal capacity required was estimated to range from 17.0 to 43.7 million tons, with total land area required ranging from approximately 500 to 1,300 acres, and a landfill disposal footprint ranging from approximately 200 to 400 acres. SCS presented a very conceptual estimate of an optimistic future expansion scenario at the existing regional landfill This expansion scenario considered the possible development of an expansion cell on property immediately adjacent to the existing regional landfill (the Nahra Property). Most of the site appears to be wetlands, but there appears to be several areas where new cells could be constructed. SCS estimated that, depending on site conditions, wetland determinations, wetlands mitigation, and other site constraints, the adjacent property could potentially provide between 4.2 to 11.6 million tons of expansion potential. SCS concluded that expanding the current regional landfill could only provide 7 to 49 percent of the long-term disposal requirements of the Region over the 30-year planning horizon depending on the alternative considered. It is understood that expansion of the landfill is also possible on other parcels currently owned by SPSA (e.g., the Kirk property and the so call "pipeline wedge"), but that to date, these expansion options have not been deemed feasible. It is also understood that although no formal studies have been performed, SPSA continues to investigate these options.

- **Implementation Schedule**. The schedule presented by SCS suggested that if the Region is to have a new landfill and solid waste management facility functional by 2018 that the siting, design, and permitting process should begin as soon as practical. SPSA indicated that it is in the preliminary stages of initiating a siting study based on its Board approval in April 2008.

- **Economies of Scale**. SCS presented data demonstrating the value of economies of scale, benchmarking SPSA's current operation against other authorities and counties that were included in the institutional analysis. Currently the $104 per ton tip fee charged by SPSA is an outlier on the curve compared to other similar sized operations; however, after flow control becomes effective in February 1, 2009, the resulting projected $80 per ton tip fee will be closure, although still higher than, other similar sized solid waste operations.

- **Debt Structure**. The debt structure of seven other regional solid waste authorities and county solid waste operations was compared against SPSA. SPSA and the Solid Waste Authority of Palm Beach County carry a debt service which is approximately 39 to 40 percent of their respective operational budgets. The other authorities and counties surveyed had debt ranging from 0 to 29 percent of their respective solid waste operational budgets.

- **Preliminary Findings**. SCS presented a series of preliminary findings regarding potential benefits of regional cooperation and utilization of existing assets, a

suggested organizational and governance structure, board composition, debt management, and board composition and qualifications to address concerns that have been expressed regarding the current institutional model.

1.3.2.4 Session 4 – A Brave New World

The objective of Session 4, which was held on August 21, 2008, was to review SCS's working draft report presenting the analysis, findings and recommendations resulting from the study, with specific focus on the pro forma analysis of the alternatives evaluated, the preliminary study recommendations, and identification of additional analysis to support better support or communicate the analysis presented in the draft report. The goals of the session were:

- Present and review the preliminary draft study report.
- Review the pro forma analysis and receive comment on the fundamental model assumptions and inputs.
- Review preliminary findings and conclusions of study.

The pro forma development, assumptions and methodology were discussed, as well as the scenarios evaluated. The preliminary results and conclusions were also presented and discussed.

1.3.2.5 Session 5 – Pro Forma Analysis

The objective of Session 5, which was held on September 25, 2008, was to review the details of the revised pro forma analysis and discuss comments on SCS's working draft report, which had been submitted to the HRPDC on August 18, 2008, and presented to the Chief Administrative Officers during Session 4 on August 21, 2008. Significant refinements to the model had been made after the presentation of the draft report in August, and the structure of and assumptions used in the pro forma model were presented and discussed. During this meeting, the Chief Administrative Officers decided that SCS's should finalize its report to the HRPDC taking into account comments received but label it a "Final Interim Report". This direction was provided because further refinement of the pro forma analysis and report will be needed if SPSA's Board of Directors elects to sell the Refuse Derived Fuel Waste-to-Energy Facility (RDF WTE Facility).

1.3.2.6 Session 6 – Review Draft Final Report

The objective of Session 6, which was held on October 30, 2008, was to review the Draft Final Report that was submitted to the HRPDC for review on October 24, 2008. The Executive Summary, Pro Forma Analysis, Findings and Recommendations were reviewed, and additional comments received regarding finalizing the report. The decision was made to issue the report as a "Final Interim Report", recognizing that decisions regarding the sale of RDF WTE Facility and other key SPSA assets may significantly affect the results of the study.

1.4 COORDINATION WITH THE PRIVATE SECTOR

During the course of the study, SCS and the HRPDC solicited input from the private sector. Three meetings were held with interested solid waste companies to discuss the scope of the study, present preliminary findings, and solicit input into the evaluation process. The companies that participated in these meetings included Bay Disposal (Mr. Emmett Moore), Allied Waste Systems (Mr. Tad Phillips), Waste Industries (Mr. Rodney Rosebrough), Waste Management (Rob Clendenin), and the Rubin Communications Group (Joel Rubin). These companies expressed appreciation for having their perspectives considered.

Public/Private partnerships are an important part of Region's current solid waste infrastructure. The private sector can and does provide municipal, commercial, and industrial collection, transfer, recycling, construction and demolition debris processing and disposal, and commercial solid waste disposal services; however, most of the Region's disposal is provided through SPSA's RDF WTE and regional landfill facilities. The private solid waste companies are interested in expanding their role to provide comprehensive disposal services to the Region. The major question from the private sector has been whether a new publicly-owned and operated landfill will be sited and developed in the future, or whether this service will be contracted out. To address this issue, SCS has requested specific input from Allied Waste Services, Waste Industries, and Waste Management regarding the remaining and projected future disposal capacity of their landfills that could service the Region. This information is discussed in more detail in Section 2. SCS also requested input on the tip fees that would be charged at these facilities to dispose of the Region's waste; however, the companies were reluctant to provide this information for competitive reasons, but indicated that they would be willing to negotiate a favorable tip fee if the Region were to commit to a long-term contract. As such, for the purpose of the alternatives analysis presented in Section 5, SCS used a discounted tip fee rate from the most recent tip fee quotations from Waste Management and Allied Waste Services that were submitted to SPSA in response to a public procurement process in 2007.

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2.0 EXISTING SOUTH HAMPTON ROADS REGIONAL SOLID WASTE MANAGEMENT SYSTEM

Historically, solid waste generated in the South Hampton Roads Region was managed by individual communities. Communities typically collected the single family residential waste within their individual boundaries and either disposed of the waste within its boundaries or transported the waste to a neighboring jurisdiction for disposal. Many communities were facing a growing challenge of how to effectively manage their waste.

In 1973, the local communities created the Southeastern Water Authority of Virginia to act as a regional water supply system. In 1976, the authority's responsibilities were expanded to include implementation of a regional solid waste disposal system and it was renamed as the Southeastern Public Service Authority (SPSA).

2.1 SOUTHEASTERN PUBLIC SERVICE AUTHORITY

The following is a general overview of SPSA including its mission, structure, and services provided.

2.1.1 Mission and Responsibilities

In 1995, SPSA adopted a Vision, Mission and Values statement to give the organization a direction and a plan to provide for future needs. Simply stated, SPSA's mission is to dispose of waste in an environmentally-sensitive manner, minimizing damage for current and future generations and reusing waste whenever possible, turning it into a useful product. The authority's vision is to be the regional choice for full service solid waste management.

The authority's goals are:

- Maintain and enhance customer service focus
- Operate efficiently and effectively
- Maintain a culture where employees are motivated and productive
- Continue to be fiscally responsible
- Maintain and enhance trust and confidence in the organization

2.1.2 Interlocal Agreements

The members of SPSA are the cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach and the counties of Isle of Wight and Southampton. All eight of the member cities and counties have entered into Agreements for Use and Support of a Solid Waste Disposal System with SPSA. Each community agrees to deliver to SPSA at least 95 percent of all disposable solid waste generated within, collected by, or otherwise under the control of the contracting community. In turn, SPSA agrees to dispose of the waste delivered to SPSA by the contracting community. SPSA has an Ash and Process Residue Agreement with the City of Virginia Beach for disposal of ash generated by the RDF WTE Facility.

For seven of the members, the use and support agreements became effective on January 22, 1985, the date on which SPSA's landfill began accepting solid waste. The use and support agreement for the City of Virginia Beach became effective on the date fixed under a contract with the U.S. Navy that began in 1984 as the start-up date of the RDF WTE Facility. Under the Navy Contract, RDF produced at the RDF WTE Facility was to be provided to the Navy to produce steam and electricity at the U.S. Navy's power plant.

The use and support agreements will remain in effect until January 2018.

2.1.3 Institutional Structure

The authority is governed by a board of directors consisting of eight representatives, and an alternate representative, appointed by each of the member cities and counties. The representatives chosen by the member cities and counties typically are elected officials. Technical support is provided to the board of directors by the Intergovernmental Coordinating Committee (ICC). The ICC is a standing committee comprised generally of public works officials from the SPSA member communities.

An Executive Director oversees the financing, construction, operation and maintenance of SPSA's solid waste management system. Daily operations are managed by SPSA staff.

2.1.4 Governing Legislation

SPSA is a public body politic and corporate that was formed in 1973 pursuant to the Virginia Water and Waste Authorities Act (formerly the Water and Sewers Authorities Act). This legislation (Section 15.2-5100 et seq. of the Code of Virginia) allows counties, cities, or towns to jointly form a "public service authority" to provide water, sewer, water and sewer, stormwater control, and garbage and refuse collection and disposal services.

2.1.5 Services Provided and Wastes Managed

Solid waste generated in the Region is managed through a combination of services and service providers. A summary of waste and recyclable collection practices by SPSA and its members is provided in Table 2. Generally, municipal solid waste is collected by local governments and private haulers and is either taken to a SPSA transfer station, to SPSA's RDF facility (Portsmouth), or to the Regional Landfill (Suffolk) for disposal. At the current time, approximately half of the ash generated from the RDF facility is sent to the landfill owned by Virginia Beach. SPSA also operates regional programs for white goods recycling, household hazardous waste, tire processing, used oil collection, yard waste composting, battery recycling, business recycling, and a variety of educational programs.

2.1.6 Flow Control

The SPSA system was built under the assumption that SPSA members could control the flow of both residential and commercial solid waste generated within their borders and that adequate waste flows would create sufficient revenues to finance construction and maintenance of the system. In 1994, the U.S. Supreme Court ruled (Carbone case) that flow control was unconstitutional. After this decision, SPSA's commercial waste flows significantly decreased. In

an attempt to regain lost waste flows, SPSA negotiated contracts with private haulers, both in and outside of the Region, which included a reduced tipping fee.

In 2007, the Court reversed its decision (United Haulers case) to allow localities to direct waste to a publicly-owned facility. As a result, the cities of Norfolk, Chesapeake, Portsmouth, and Franklin, and Isle of Wight and Southampton counties passed ordinances requiring delivery of waste to SPSA facilities beginning in January 2009.

Table 2. Solid Waste Services

Service	Chesapeake	Franklin	Norfolk	Portsmouth
Solid Waste Residential Collection	The city provides weekly, automated collection using 96- or 64-gallon containers.	The city provides weekly collection using 90-gallon containers.	The city provides weekly, automated service using 90-gallon containers.	The city provides weekly collection services.
Solid Waste Commercial Collection	Not provided.	The city provides collection services for small commercial generators.	The city provides collection services for businesses located in the Central Business District (CBD) every other day. Businesses located outside the CBD receive one weekly collection.	Not provided.
Solid Waste Transfer	SPSA operates the Chesapeake transfer station located on Greenbrier Parkway (500 ton per day).	SPSA operates the Franklin transfer station (150 ton per day) that is located within Southampton County. This station also serves a portion of Southampton and Isle of Wight counties.	SPSA operates the Norfolk transfer station (1,300 ton per day).	Waste is taken directly to the SPSA RDF facility.
Yard Waste Collection	City provides separate collection of yard waste using clear plastic bags on a weekly basis.	City provides collection services using a green 90-gallon cart on a weekly basis.	Yard waste is collected weekly by the City. Residents may use either a 30-gallon container or clear plastic bags.	Yard waste is collected by the City in clear plastic bags from the curb (placed next to MSW).
Recyclables Collection	SPSA provides curbside recycling services for the city every other week using an 18-gallon bin. SPSA also operates two drop off facilities.	Franklin, through SPSA, offers automated recycling using a 95-gallon cart.	The city collects recyclables twice a week from businesses located in the CBD. Curbside collection of recyclables is provided by SPSA every other week using a 95-gallon cart. SPSA also operates two drop off sites within the city.	SPSA operates seven recycling drop off locations for the city.

Table 2(Continued)

Service	Suffolk	Virginia Beach	Isle of Wight	Southampton
Solid Waste Residential Collection	The city provides weekly automated and manual collection from single-family homes.	The city provides weekly automated collection from single-family homes using 90-gallon containers. Townhouse areas may use 32-gallon containers or plastic bags.	The county provides weekly collection through a franchised hauler (for a fee) for those residents requesting the service. As an alternative, the county operates eight full-service manned convenience centers for self-hauled waste.	The county operates 14 sites for residents to self haul waste.
Solid Waste Commercial Collection	Not provided.	Not provided.	Not provided.	Not provided.
Solid Waste Transfer	SPSA operates a transfer station (500 tons per day) that is located adjacent to the regional landfill.	SPSA operates the Landstown transfer station (1,300 tons per day) and the Oceana transfer station (500 tons per day).	SPSA operates the Isle of Wight transfer station (150 tons per day).	In addition to the Franklin transfer station, SPSA operates two other transfer stations at Ivor and Boykins.
Yard Waste Collection	The City offers curb-side yard waste collection upon request (limited to residential dwellings).	The City provides weekly collection of yard waste either stacked or in clear plastic bags. The City also offers a yard waste container rental program for larger quantities of yard waste.	The County does not provide curb-side collection of yard waste, but does provide containers for residents to dispose of yard waste at each of its eight convenience centers..	The County does not offer curb-side yard waste collection. Yard waste is accepted at the County's 16 refuse collection sites.
Recyclables Collection	The city, through SPSA, offers drop-off only recycling for its residents. Thirteen drop-off facilities are located throughout the city.	Virginia Beach provides residents with automated curbside collection (non-SPSA) using 95-gallon carts on an every-other-week basis.	SPSA operates drop-off only recycling sites for the county that are located at the convenience centers and the transfer station. The town of Smithfield, through SPSA, offers bi-weekly curbside recycling to all single-family homes, duplexes, and townhouses.	The county provides 18-gallon bin recycling for residents of Courtland, Newsoms, and Boykins (SPSA service). Drop-off facilities are located at six of the county's mini-transfer stations.

2.1.7 Current Planning Initiatives

2.1.7.1 Cell VII Expansion

The status of the Regional Landfill's Cell VII expansion is discussed in Section 2.9.1.1.3.

2.1.7.2 Future Landfill Siting

The SPSA Board recently (April 2008) passed a resolution that authorized SPSA Staff to "take necessary steps to identify a site within SPSA's service territory and begin the local approval process for a new publicly-owned regional landfill at the site." The resolution was produced and recommended to the Board (through the Executive Director) by the Business Advisory Council.

2.1.7.3 Transfer Station Upgrades

SPSA is currently performing an assessment of the condition of all of the transfer stations, the results of which are not complete. However, the Annual Survey and Report as of February 29, 2008 (RW Beck) contains a description of the nine transfer stations within the Authority's network as well as anticipated upgrades to each facility. A total of 951,000 tons of waste was delivered to the transfer station network in FY 2007. Below is a brief description of each transfer station as well as anticipated major upgrades. Figure 1 shows the location of each SPSA transfer station. A brief description of each transfer station is provided below:

- **Norfolk Transfer Station.** The Norfolk Transfer with a design capacity of 1,300 tons per day (tpd), is the busiest station in the solid waste system. The capability of loading three trailers at a time is incorporated into the facility design. The facility accepts waste Monday through Saturday and a half-day on Sunday. The station is generally in a good state of repair. Expansion of the parking lot is under consideration. In subsequent years, the Authority plans to replace the second in-bound scale, repair sections of the damaged/rusted building siding and pressure wash and paint the siding and upgrade the tipping floor lighting. In addition, the Authority is planning a three-phase tipping floor resurfacing to occur over the next three fiscal years.

- **Landstown Transfer Station.** The Landstown Transfer Station is the largest facility based on design capacity (1,500 tons per day) of the solid waste management system stations. The facility contains three hoppers for loading, similar to the Norfolk Transfer Station. The facility is in good condition. Improvements planned for subsequent years include resurfacing the entire tipping floor, repairing damage to the top of the concrete hopper walls by capping them with welded metal armor plating, replacing all water hoses and reels and installing lights behind the tipping walls for safety. The Annual Survey and Report also stated that Authority plans to replace the inbound and outbound pit scales.

- **Oceana Transfer Station.** The Oceana Transfer Station has one hopper for transfer trailer loading. The Authority had planned in FY 2008 to undertake a $2.5 million rebuild to replace the transfer station; expanding the tipping floor for increased temporary storage capacity and installing a pedestal crane for waste compaction. However, due to the financial situation confronting the Authority, the station rebuild has been postponed indefinitely.

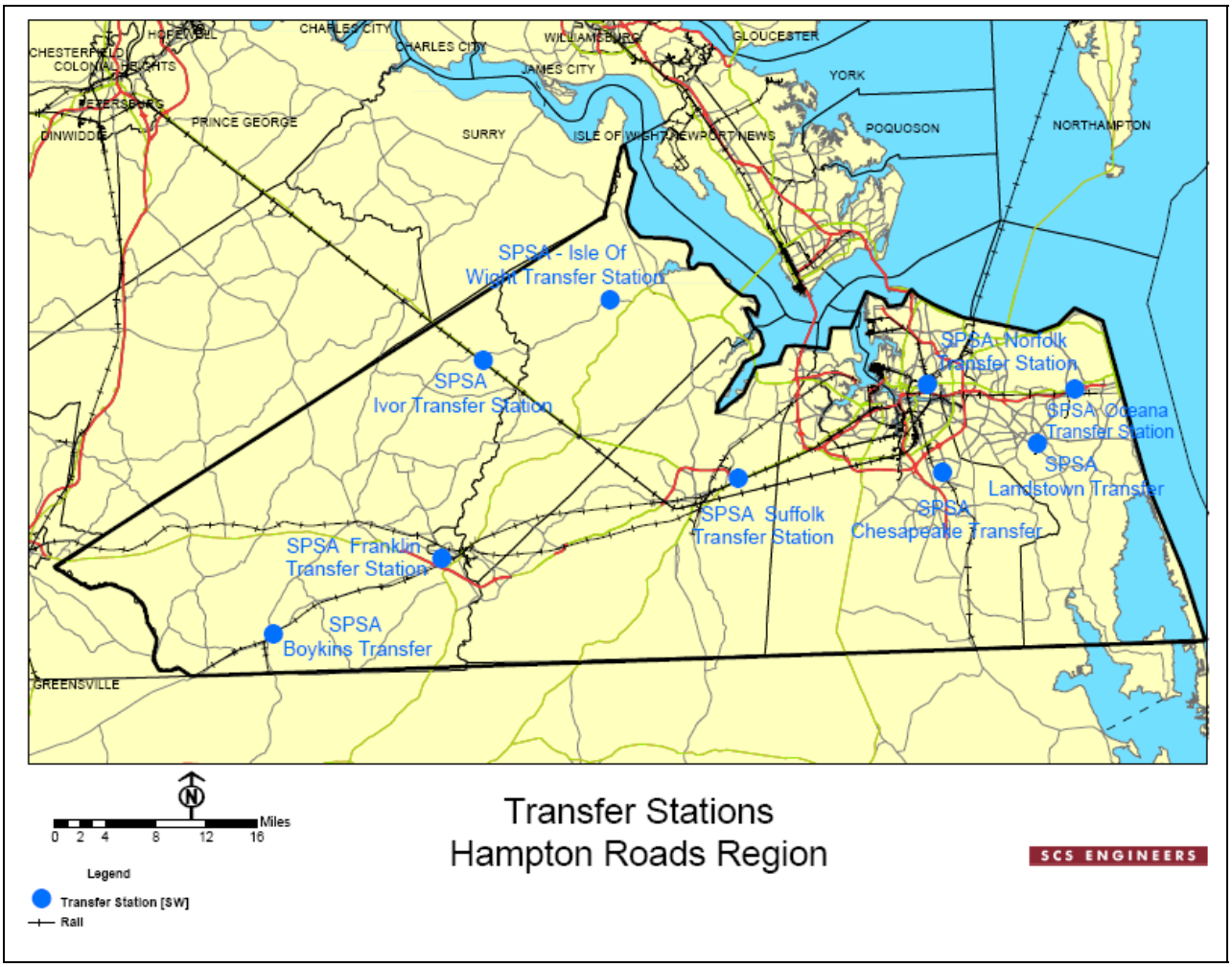

Figure 1. SPSA Transfer Station Location Map

- **Chesapeake Transfer Station**. The Chesapeake Transfer Station operates with one hopper for transfer trailer loading. The Authority is planning to repair pavement and install the trailer pads in the near future. The Authority is also planning to resurface the tipping floor and repair rusted sections of the transfer station roof. A station overhaul had been planned for FY2004 to increase storage capacity. However, as a result of a change in operating procedures, this project has been delayed. The City of Chesapeake is apparently interested in the Authority building a new transfer station as part of a relocation of its existing facilities.

- **The Franklin Transfer Station.** The Franklin Transfer Station is operated by three personnel, including a full time driver to assist with drop and hook. Resurfacing of the tipping floor has been approved but not yet scheduled. Some building improvements planned for previous years have not been completed. As of the date of the Annual Survey and Report, a new at-grade scale had been delivered to the site and was awaiting installation.

- **Isle of Wight Transfer Station.** The Isle of Wight Transfer Station uses a front-end loader to lift waste into transfer vehicles. No major capital improvements to the facility are planned in the near future.

- **Suffolk Transfer Station.** The Suffolk Transfer Station is located at the Regional Landfill to allow diversion of waste from the Landfill to the RDF WTE Facility. Operation of the facility began in April 2005. No major capital improvements to the facility are planned in the near future.

- **Ivor Transfer Station.** The Ivor Transfer Station is primarily used for self-hauled disposal. Southampton County collection vehicles are also permitted to use the facility. No major capital improvements to the facility are planned in the next five years.

- **Boykins Transfer Station.** The Boykins Transfer Station is similar to the Ivor facility. The Annual Survey and Report does not mention any planned capital improvements.

Table 3 summarizes relevant information on each transfer station.

Table 3. SPSA Transfer Station Background Information

Transfer Station Name	Design Capacityu (tpd)	Average Daily Throughput FY 2007 (tpd)	Operating Schedule (days/week)	Total Throughput FY 2007 (tons)	Percent of Total (%)
Chesapeake	Info Pending	556	5.5	159,168	16.7%
Franklin	Info Pending	98	5.5	28,018	2.9%
IOW	Info Pending	126	5.5	36,115	3.8%
Norfolk	1300	855	6.5	288,699	30.4%
Boykins	Info Pending	6.6	3.0	1,027	0.1%
Ivor	30	8.2	3.0	1,278	0.1%
Suffolk	Info Pending	228	5.5	65,290	6.9%
Landstown	1500	876	5.5	251,373	26.4%
Oceana	500	420	5.5	120,213	12.6%
Totals				951,181	100%

In addition to the above existing waste transfer facilities, it is understood that the Authority is currently siting two additional transfer stations within the City of Suffolk. It is also understood that the construction of the facilities is a requirement of a Special Use Permit between the City

and SPSA, which is a requirement of the state permit process for the current expansion of the Regional Landfill (Cell VII).

An evaluation should be made of the current transfer station network to determine the overall condition of the facilities and to determine if the capacity and design of the system will accommodate the projected waste delivery rates (including separation of the yard waste stream) during the 30-year planning horizon. In addition, the transfer station network should be evaluated to determine if the transfer stations are located to minimize hauling costs.

2.1.7.4 Sale of Waste-to-Energy Facility

In late 2007, SPSA advertised that it would entertain unsolicited proposals from qualified interested parties under the guidelines adopted by the SPSA Board and the Public/Private Education Act (passed by the Virginia General Assembly in 2002), for the sale of the RDF and WTE facilities. SCS understands that four organizations submitted proposals in response to the advertisement and that in September 2008, the Board selected two for more detailed review and the beginning of contract negotiations. The two proposals were selected based on recommendations by an independent consortium of investment, public finance, and engineering consultants. Upon determination of the proposal with the most favorable terms, a comparison will be made with the results of an analysis that assumes SPSA would continue to own and operate these facilities. A decision is expected in early 2009. It should be noted that the U.S. Navy has to approve the sale of WTE facility.

2.1.7.5 Yard Waste Management

SPSA's current and planned handling and disposal of the Region's yard waste is discussed in Section 2.5.

2.1.8 System Financial and Tip Fee Structure

The SPSA Board of Directors recently implemented a revised tipping fee schedule for various classifications of waste disposal. The revised rates became effective July 1, 2008. The major tipping fee categories are shown in the Table 4.

Table 4. SPSA Tip Fee Structure

Waste delivered to all disposal points	Rate per ton
Municipal solid waste (delivered by any SPSA member jurisdiction with the exception of the Cities of Virginia Beach and Suffolk)	$104
Commercial solid waste (delivered by any non-SPSA entity)	$60
U. S. Navy Waste	$28.58
Contract Commercial processable waste delivered to SPSA (except Regional LF)	$28.58
Out of SPSA Service Area Processable waste delivered to SPSA's RDF WTE Facility	$40
Water Treatment Plant Sludge from any	$46

Table 4. SPSA Tip Fee Structure

Waste delivered to all disposal points	Rate per ton
member community	
CDD waste delivered to the Regional LF	$30
Yard waste (see section 2.1.7.5)	$39

During the January 23, 2008 SPSA Board of Directors meeting, a representative of RW Beck, a consulting firm retained by SPSA, presented several options for the structure of future Regional Landfill tipping fees. The options were based on different assumptions regarding enactment of flow control by member communities. One option assumed that all member communities chose to adopt flow control with the exception of the cities of Virginia Beach and Suffolk. Under this scenario, the municipal tipping fee would be reduced to approximately $80, along with an escalation of the commercial tipping fee to the same amount. Because all member communities have adopted flow control with the exception of the cities of Virginia Beach and Suffolk, the Board chose to implement this option which will become effective in January 2008.

2.2 DEMOGRAPHICS OF REGION

In 2007, the member jurisdictions of SPSA had an estimated total population of 1,127,790 with an average population density of 563 people per square mile (see Table 5, data from HRPDC, 2007). In 2007, the largest city in the Region was Virginia Beach with over 38 percent of the population. Norfolk is the second most populated, but the city has the highest population density in the Region.

Historic population figures are shown in Table 6. Following a period of rapid growth in the mid-1980's, the Region's rate of population has shown signs of slowing. Overall, the Region has experienced 28 percent growth from 1970 to 2007. However, some jurisdictions experienced a decline in population during this same period

From 2007 to 2034, the Region is expected to grow more than 20 percent to total more than 1,415,100 people. This equates to an average annual growth rate of slightly less than one percent or approximately 8,500 people per year. Long-term population trends for each jurisdiction are shown in Figure 2. Individually, the projected growth rate for each jurisdiction is provided in Table 7. Suffolk and Isle of Wight are projected to experience the greatest increase in total population (on a percentage basis). The population growth rate is significant for planning purposes since the amount of waste generated increases as population increases. The demographic projections presented above were obtained from the Hampton Roads Planning District Commission (HRPDC), who routinely prepares long-range forecasts for the Hampton Roads Region based on U.S. Census and other data sources. The Virginia Employment Commission (VEC) also prepares demographic projections for the state. A comparison of the projections prepared by the two organizations is presented in Table 8. While there are significant differences between projections for several individual jurisdictions (i.e., Virginia Beach, Isle of Wight, and Southampton), overall projected growth for the Region by the year 2030 is similar.

Projections about population growth, regional employment, and number of households can help define what kinds and amounts of waste the Region will generate. A brief summary of projections for other key planning variables is presented here:

- Employment: Is expected to increase at an average annual rate of about 0.62 percent through 2034, resulting in an overall increase of just over 20 percent, which reflects the growth of job opportunities (see Table 9). With the exception of Portsmouth, employment is projected to increase in each community. Suffolk is projected to experience the greatest growth in employment followed by Isle of Wight and Southampton counties. Employment is an important forecasting variable because growth reflects an increase in economic activity, which in turn leads to increased consumption and waste generation.

- Households: The number of households in the Region is expected to increase by about 26 percent through 2034 at an average annual rate of 0.78 percent (see Table 10). Suffolk is projected to experience the greatest growth (66 percent) followed by Isle of Wight county. Generally, each home, regardless of the number of residents, contributes a certain amount of waste such as junk mail and yard waste.

The Average Annual Change (2000 – 2034) values shown above were used to predict the residential municipal solid waste flow volumes (Section 3.8.2) for each community during the study planning period.

2.3 COLLECTION SYSTEMS

2.3.1.1 Municipal Solid Waste

2.3.1.1.1 Municipal Collection

The following summary of municipal solid waste collection methods was obtained primarily from the Region's current solid waste management plan (Draft Amendment 4 and Draft Amendment 5) and through conversations with the various member community solid waste management staff. Solid waste is collected from residents in the Region primarily by the members. Below is a summary of each member's MSW collection services to its citizens.

City of Chesapeake. The City's Department of Public Works, Division of Waste Management collects residential solid waste once per week from over 60,000 households. Approximately 117,000 tons of MSW is collected annually and delivered to SPSA via the Chesapeake Transfer Station (70 percent of total waste), the RDF WTE Facility (20 percent) or to the Suffolk Transfer Station/Regional Landfill (10 percent). The City supplies residents with 96-gallon solid waste containers. Residents are able to dispose of waste at the Chesapeake Transfer Station or any other SPSA facility free of charge.

City of Franklin. The City's Department of Public Works offers MSW collection for 3,300 residential and small commercial vendors on a weekly basis. Each customer is given a black 90-gallon sold waste receptacle. At total of 4,600 tons of waste is projected to be delivered to SPSA in 2008 via the Franklin Transfer Station.

Table 5. SPSA 2007 Population Statistics

Jurisdiction	2007 Population	Land Area (square miles)	Population Density (persons per square mile)
Virginia Beach	433,032	248	1,746
Norfolk	235,986	54	4,370
Chesapeake	216,568	340	637
Portsmouth	98,542	33	2,986
Suffolk	81,208	400	203
Isle of Wight	33,611	316	106
Southampton	18,335	600	31
Franklin	8,501	8	1,063
Total	1,125,783	1,999	563

Table 6. SPSA Population 1970 - 2007

Jurisdiction	Year					
	1970	1980	1990	2000	2007	Growth (1970–2007)
Chesapeake	89,580	114,486	151,982	199,184	216,568	55.0%
Franklin	6,880	7,308	7,864	8,346	8,501	17.6%
Norfolk	307,951	266,979	261,250	234,403	235,986	-31.4%
Portsmouth	110,963	104,577	103,910	100,565	98,542	-10.3%
Suffolk	45,024	47,621	52,143	63,677	81,208	29.3%
Virginia Beach	172,106	262,199	393,089	425,257	433,032	59.5%
Isle of Wight	18,285	21,603	25,053	29,728	33,611	38.5%
Southampton	18,582	18,731	17,550	17,482	18,335	-6.3%
Total	769,371	843,504	1,012,841	1,078,642	1,125,783	28.6%

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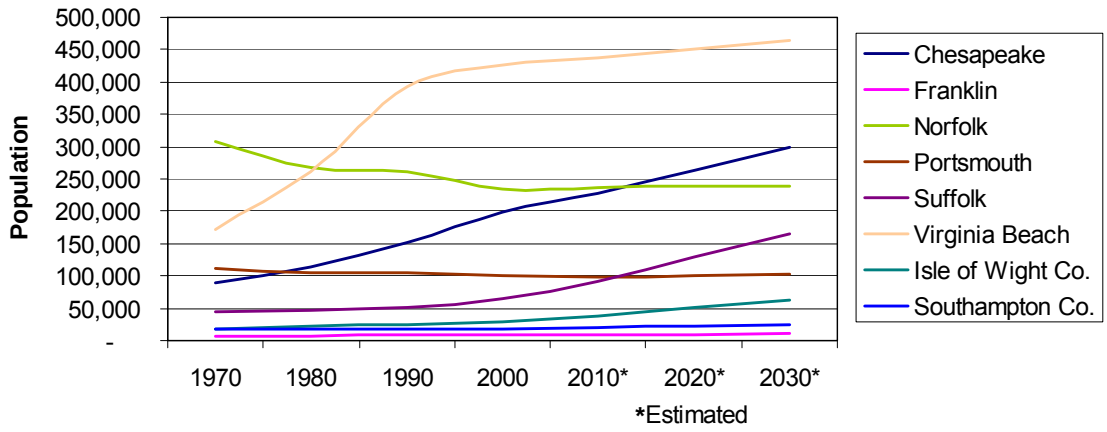


Figure 2. SPSA Projected Population Growth Trends

Table 7. SPSA Estimated Population Growth by Community

Jurisdiction	2034 Estimated Population	Total Growth	Average Annual Growth Rate
Chesapeake	313,600	30.9%	1.15%
Franklin	11,300	24.8%	0.92%
Norfolk	240,400	1.8%	0.07%
Portsmouth	104,500	5.7%	0.21%
Suffolk	180,600	55.0%	2.04%
Virginia Beach	469,200	7.7%	0.29%
Isle of Wight	68,600	51.0%	1.89%
Southampton	26,900	31.8%	1.18%
Total	1,415,100	20.4%	0.76%

Table 8. Comparison of Population Growth Projections

Jurisdiction	HRPDC Projections			VEC Projections		
	2010	2020	2030	2010	2020	2030
Chesapeake	227,349	263,287	299,225	236,683	272,381	308,736
Franklin	8,812	9,849	10,885	8,809	9,348	9,930
Norfolk	236,476	238,111	239,746	236,338	237,448	238,927
Portsmouth	99,204	101,411	103,617	99,919	100,429	101,071
Suffolk	92,252	129,063	165,875	93,830	122,482	151,427
Virginia Beach	437,051	450,446	463,842	447,836	470,288	493,095
Isle of Wight	37,499	50,458	63,416	37,067	44,083	51,629
Southampton	19,287	22,459	25,631	17,507	17,604	17,795
Total	1,157,929	1,265,084	1,372,238	1,177989	1,274,063	1,372,610

Table 9. SPSA Employment Projections, 2000 - 2034

Jurisdiction	Year						
	1970	1980	1990	2000	2034	Percent Growth (2000-2034)	Average Annual Change (2000 – 2034)
Chesapeake	22,566	32,288	62,605	102,765	159,600	35.6%	1.05%
Franklin	3,397	4,091	4,685	5,560	6,400	13.1%	0.39%
Norfolk	211,278	230,199	259,481	225,319	229,100	1.7%	0.05%
Portsmouth	48,087	53,996	58,979	52,831	50,300	-5.0%	-0.15%
Suffolk	18,055	19,692	20,660	26,273	81,700	67.8%	2.00%
Virginia Beach	66,246	111,607	187,249	236,446	276,100	14.4%	0.42%
Isle of Wight	9,301	11,880	12,133	16,134	36,100	55.3%	1.63%
Southampton	6,124	5,927	5,461	6,026	9,800	38.5%	1.13%
Total	385,054	469,680	611,253	671,354	849,100	20.9%	0.62%

Table 10. SPSA Household Projections, 2000 - 2034

Jurisdiction	Year						
	1970	1980	1990	2000	2034	Percent Growth (2000-2034)	Average Annual Change (2000 – 2034)
Chesapeake	25,178	36,362	52,024	69,900	114,600	39.0%	1.15%
Franklin	2,113	2,591	3,011	3,384	4,800	29.5%	0.87%
Norfolk	86,607	74,955	79,518	86,210	92,100	6.4%	0.19%
Portsmouth	34,470	36,796	38,706	38,170	40,000	4.6%	0.13%
Suffolk	13,116	15,726	18,518	23,283	69,400	66.5%	1.95%
Virginia Beach	45,085	85,097	135,365	154,455	176,800	12.6%	0.37%
Isle of Wight	5,028	7,050	9,031	11,319	27,200	58.4%	1.72%
Southampton	4,915	5,774	6,004	6,279	10,300	39.0%	1.15%
Total	216,512	264,351	342,177	393,000	535,200	26.6%	0.78%

Isle of Wight County. The County operates five residential drop-off centers which are open seven day per week. Approximately 11,000 County households participate in the local solid waste programs. The Isle of Wight Transfer Station is also available for residential waste disposal. Approximately 20,600 tons of MSW is projected to be delivered to SPSA in 2008 via the Isle of Wight Transfer Station (85 percent of total waste) and the Franklin Transfer Station (15 percent). Curbside collection can be provided to County residents for a fee by a franchised commercial hauler.

City of Norfolk. The City Department of Public Works, Waste Management Division collects approximately 87,900 tons (projected in 2008) of MSW from approximately 75,000 households and some businesses within the City and delivers it to SPSA via the Norfolk Transfer Station. The City issues 90-gallon containers to residents of single-family homes, and curb-side collection is provided once per week. Waste collection in Norfolk's central business district takes place each Monday, Wednesday and Friday evening.

City of Portsmouth. The City's Department of Public Works collects MSW from approximately 32,000 households on a weekly basis. Approximately 55,000 tons of MSW is projected to be delivered to SPSA in 2008 via the RDF WTE Facility.

Southampton County. The County provides residents with 16 convenience waste drop off centers from which waste is delivered to SPSA via the Franklin Transfer Station (88 percent of total waste), the Ivor Transfer Station (6 percent) and the Boykins Transfer Station (6 percent). Residents can also deliver their waste directly to any of the SPSA transfer stations. Approximately 9,800 tons of MSW is projected to be delivered to SPSA in 2008.

City of Suffolk. The City Department of Public Works provides weekly residential waste collection for approximately 20,000 single-family homes within the City. Approximately 64,000

tons of waste is projected to be delivered from the City to SPSA via the Regional Landfill or the Suffolk Transfer Station.

City of Virginia Beach. The City provides 90-gallon waste containers and weekly curbside collection for approximately 122,000 households within the City. Approximately 147,000 tons of waste is projected to be delivered from the City to SPSA in 2008 via the Landstown and Oceana Transfer Stations.

2.3.1.1.2 Private Collection

Private firms play a significant role in the Region with regard to waste collection and disposal. While the SPSA member communities are the primary collectors of MSW from single-family residents in the Region (with the exception of the more rural areas in Southampton and Isle of Wight Counties), private firms are the primary collectors of MSW from multi-family and commercial developments. MSW is delivered by the private firms to SPSA under prearranged agreements and to their own disposal facilities outside the Region. Firms that play a significant role in the collection of MSW in the Region include Waste Management, Waste Industries and Bay Disposal.

The role of private firms in the collection, recycling and disposal of CDD waste is discussed in Section 2.6.2.

The private sector is also the primary supplier of Regulated Medical Waste (RMW) collection, treatment and disposal in the Region. There are three active RMW stream sterilizers in the Region. Permitted facilities are operated by ODU (Norfolk), Maryview Hospital-Bon Secours (Portsmouth) and Norfolk Public Health – Laboratories Bureau (Norfolk). With the closure of the American Waste Industries incinerator, there are currently no permitted RMW incinerators in the Region. There are currently no permitted RMW transfer stations in the Region, although there is a facility proposed to be located in Suffolk (American Transportation Systems).

2.3.1.1.3 Transfer Stations

A summary of the current SPSA transfer station network is contained in Section 2.1.7.3. No other facilities that are defined as transfer stations by the VDEQ are permitted and active in the Region.

2.3.1.2 Yard Waste

Yard waste generated in the Region is generally collected by the SPSA member communities and delivered to SPSA via the Virginia Beach Landfill No. 2, or the Chesapeake, Norfolk or Landstown transfer stations. The following is a summary of what each community provides as far as yard waste collection services to its residents.

City of Chesapeake. Yard waste is collected by the City's Department of Public Works, Division of Waste Management on a weekly basis. The City's web site states that larger tree limbs and yard trimmings will be collected when placed at curbside in a stack not exceeding 4

feet by 4 feet by 4 feet. Limbs and yard trimmings must be cut to lengths of four feet or less with a diameter of no more than 6 inches.

City of Franklin. Yard waste (leaf, limb, and lawn waste) is collected by the City's Department of Public Works Management on a weekly basis. Each customer is given a green 90-gallon yard waste cart for this purpose. The City's web site states that if all of a household's yard waste will not fit in the container, it may be placed in piles at the Right of Way for city collection. Piles may not exceed 4 feet by 4 feet by 8 feet in size and must be separated by type.

IOW. The County does not provide curb-side collection of yard waste, but does provide containers for residents to dispose of yard waste at each of its eight convenience centers.

Norfolk. Yard waste in amounts up to 20 clear plastic bags, 20 bundles or 3 cubic yards (if scheduled) per household is collected on a weekly basis. Limbs and branches must be tied in bundles no longer than 4 feet long and no longer than 18 inches in diameter.

City of Portsmouth. Yard Waste (grass, weeds, etc.) is collected by the City. The waste must be placed at the curb (next to MSW containers) in clear plastic bags weighing no more than 25 pounds each. There is no limit to how many bags can be disposed of.

Southampton County. The County does not offer curb side yard waste collection. Yard waste is accepted at the County's 16 refuse collection sites. Limbs that are longer than 6 feet and greater than 6 inches in diameter are not accepted.

City of Suffolk. The City offers curb-side yard waste collection upon request (limited to residential dwellings and limited to 12 collections per calendar year, with no more than two per any 30 day period). Any yard debris or limbs must be placed in a pile no larger than 6 feet by 6 feet by 6 feet (8 cubic yards) and only one pile may be placed to the road for pick up. Bags of yard debris should be placed outside the can and not weigh more than 50 pounds a bag.

City of Virginia Beach. Collects yard waste from households on a weekly basis. The City's website says that additional tree limbs must be no larger than 6 inches in diameter and stacked no larger than 4 feet by 4 feet by 4 feet. A minimum of one pile will be collected on each on each collection day. Smaller debris must be put in clear plastic bags (a maximum of 25 with a weight limit of 25 pounds each will be collected). For larger amounts of yard debris, roll-off containers are available (for a fee) on a first come first serve basis.

2.3.1.3 Commercial

Waste generated by commercial entities in the Region are generally collected by private firms and delivered to SPSA or to the firm's own disposal facilities. A discussion on the role of private firms with regard to commercial waste collection is contained in Section 2.3.1.2.

2.3.1.4 C&DD

Handling and disposal of construction and demolition debris waste is primarily performed by private disposal companies and haulers. The current methods of CDD handling and disposal in Region are discussed in Section 2.6.2.

2.4 RECYCLING

2.4.1 SPSA Services and Member Participation

2.4.1.1 Curbside Recycling and Drop-Off Centers

SPSA offers curbside recycling service to approximately 135,000 homes in the cities of Norfolk, Chesapeake, Franklin and Smithfield, as well as Southampton County. SPSA's programs include both 18-gallon bin recycling for $1.47 per home per month as well as 95-gallon, single stream automated recycling for $3.47 per home per month. Curbside service is offered on an every-other-week schedule. SPSA also operates 39 drop-off recycling centers. SPSA charges $107.00 per container per pick up.

The following materials are currently collected as part of the curbside and drop-off programs:

- Clear, brown and green glass, bottles and jars
- All plastic bottles
- Newsprint, magazines, catalogues, and corrugated cardboard
- Aluminum cans, pie tins and foil
- Steel cans

Member communities have opted for the following SPSA services:

- Chesapeake provides 18-gallon bin recycling for its residents.
- Franklin offers automated recycling using a 95-gallon cart.
- Norfolk has elected to transition to automated recycling using a 95-gallon cart.
- Isle of Wight County maintains drop-off only recycling sites for their residents and the Town of Smithfield currently uses the 18-gallon bin service.
- The City of Portsmouth offers drop-off only recycling for its residents (7 locations).
- Southampton County provides 18-gallon bin recycling for its residents of Courtland, Newsoms, and Boykins.
- The City of Suffolk offers drop-off only recycling for its residents (13 locations).

2.4.1.2 Business/Multi-Family Recycling

SPSA provides recycling collection services businesses and multi-family units. SPSA uses 95-gallon, semi-automated containers at a base rate $11.83 per cart per month. However, discounts are available for additional carts.

2.4.2 Recycling Revenues

Tidewater Fibre Corporation, located in Chesapeake, has been the sole contractor for recyclable materials collection since the inception of the recycling program. SPSA delivers all of the materials collected in the curbside programs, as well as from the drop-off recycling centers. SPSA receives revenues from Tidewater Fibre for its recyclables, which are based on market prices. A summary of the annual revenues received are provided in Table 11.

Table 11. Fiscal Year Revenue Summaries

Fiscal Year	Recyclables Revenue
2002-03	$127,951
2003-04	$165,450
2004-05	$193,084
2005-06	$132,853
2006-07	$204,667

Source: *Recycling Department Summary*, SPSA, October 15, 2007.

2.4.3 Independent Municipal Services

The City of Virginia Beach offers and manages its own automated recycling program and drop-off locations. Curbside collection occurs every other week and the following items are accepted:

- Paper
- Glass (clear, green, and brown)
- Plastic bottles
- Metals (aluminum, steel/tin food and beverage cans)

The City estimates that it has a 65 percent household participation rate for the recycling program and collects more than 35,000 tons of recyclables a year. The City has a contract with Tidewater Fibre for the curbside program.

2.4.4 Staffing

2.4.5 Performance

The following provides an overview of the Virginia recycling requirements and the recycling rates achieved by the Region's recycling programs.

2.4.5.1 Virginia Requirements for Solid Waste Management Planning, Recycling, and Annual Reporting

In 1989, the Virginia General Assembly adopted legislation that laid the foundation for solid waste management planning, requiring that solid waste management plans be developed at the local or regional level. After July 1, 2007 no permit for a new sanitary landfill, incinerator, or waste-to-energy facility or for an expansion of an existing sanitary landfill, incinerator, or waste-to-energy facility will be issued until the solid waste planning unit within which the facility is

located has an approved solid waste management plan. Regulations governing the development and submittal of solid waste management plans are provided in 9 VAC 20-130-10 et seq.

This legislation also established recycling rates for communities. The established rates were: 10 percent by 1991, 15 percent by 1993, and 25 percent by 1995. Each county, city, town, or regional authority was required by the legislation to establish recycling programs that would meet these goals.

Legislation introduced in 2006 provided for a two-tiered recycling mandate: 15 percent or 25 percent. The recycling rate that must be achieved by a community is dependent upon two factors: population density and unemployment rates. Localities or regions (called Solid Waste Planning Units or SWPUs) with population densities less than 100 persons per square mile or with an unemployment rate 50 percent higher than the statewide average are required to meet the 15 percent mandated recycling level, all others are required to continue to meet the 25 percent recycling mandated level.

The regulations for solid waste management plans require that the plan describe how the mandated recycling rate will be met or exceeded. Additionally, Section 9VAC 20-130-165 D requires that every city, county, town, or SWPU submit the data and calculations to document the recycling rate for the preceding calendar year to the Department of Environmental Quality.

Virginia uses the following formula for calculating the recycling rate:

Recycling Rate = (PRMs + Credits) ÷ (PRMs + Credits + MSW Disposed)

Where:

- **"Principal recyclable materials (PRMs)"** means paper, metal, plastic, glass, commingled yard waste, wood, textiles, tires, used oil, used oil filters, used antifreeze, batteries, electronics, or material as may be approved by the director.

- **"Municipal solid waste (MSW)"** means waste that is normally composed of residential, commercial, and institutional solid waste and residues derived from the combustion of these wastes. MSW generated equals the sum of PRMs recycled and MSW disposed. (MSW disposed equals the amount of MSW delivered to landfills, transfer stations, incineration and waste-to-energy facilities).

  - "Residential waste" means any waste material, including garbage, trash and refuse, derived from households. Households include single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds and day-use recreation areas. Residential wastes do not include sanitary waste in septic tanks (septage) that is regulated by other state agencies.

  - "Commercial waste" means all solid waste generated by establishments engaged in business operations other than manufacturing or construction. This category includes, but is not limited to, solid waste resulting from the operation of stores, markets, office buildings, restaurants and shopping centers.

- "Institutional waste" means all solid waste emanating from institutions such as hospitals, nursing homes, orphanages, and public or private schools. It can include regulated medical waste from health care facilities and research facilities that must be managed as a regulated medical waste.

- **Credits** may be added to the recycling formula, provided that the aggregate of the credits does not exceed five percentage points of the annual municipal solid waste recycling rate achieved for each solid waste planning unit:

  - A credit of one ton for each ton of any non-municipal solid waste material that is recycled (e.g., industrial waste, construction and demolition debris).

  - A credit of one ton for each ton of any solid waste material that is reused.

  - A credit of one ton for each ton of recycling residue disposed in a landfill. "Recycling residue" means the (i) nonmetallic substances, including but not limited to plastic, rubber, and insulation, which remain after a shredder has separated for purposes of recycling the ferrous and nonferrous metal from a motor vehicle, appliance, or other discarded metallic item, and (ii) organic waste remaining after removal of metals, glass, plastics and paper which are to be recycled as part of a resource recovery process for municipal solid waste resulting in the production of a refuse derived fuel.

  - A credit of two percentage points of the minimum recycling rate mandated for the solid waste planning unit for a source reduction program that is implemented within the solid waste planning unit. "Source reduction" means any action that reduces or eliminates the generation of waste at the source, usually within a process. Source reduction measures include process modifications, feedstock substitutions, improvements in feedstock purity, improvements in housekeeping and management practices, increases in the efficiency of machinery, and recycling within a process. Source reduction minimizes the material that must be managed by waste disposal or nondisposal options by creating less waste. "Source reduction" is also called "waste prevention," "waste minimization," or "waste reduction."

  - A credit of one ton for each inoperable vehicle for which a locality receives reimbursement from the Virginia Department of Motor Vehicles under §46.2-1407 of the Code of Virginia.

If the SWPU's annual recycling rate falls below the minimum rate, the SWPU is required to submit a recycling action plan (RAP), or it its approved solid waste management plan may be revoked. The RAP must identify specific elements of the recycling program that will be changed or improved in order for the SWPU to reach its recycling rate. The RAP requires both a commitment by the SWPU to provide resources necessary to improve its program, as well as a timeline for achieving the program elements. The RAP must be adopted by the administrative governmental board(s) for all localities covered by the Solid Waste Management Plan, and then approved by DEQ. Regular reporting on the progress made on the RAP elements is required.

2.4.5.2 Historic Recycling Rates

Beginning with calendar year 2001, Virginia required that all SWPUs submit annual recycling rate reports. The state uses these reports to establish a statewide recycling rate. A comparison of the statewide recycling rate and the recycling rate achieved by SPSA since 2001 is provided in Figure 3. SPSA has consistently exceeded the state's requirement of 25 percent. In calendar year 2006, SPSA achieved a recycling rate of 55 percent.

SPSA recently compiled the regional recycling quantities as required by the Virginia Department of Environmental Quality. These quantities are presented in Table 12. In sum, more than 617,000 tons of recyclable material were managed within the Region through SPSA, municipal, and private
programs.

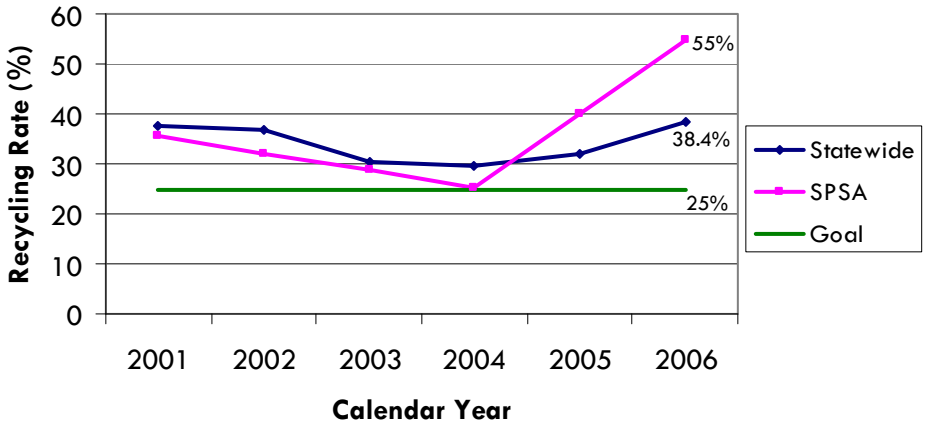


Figure 3. Comparison of Recycling Rates

Table 12. Materials Recycled – Calendar Year 2007

Material	Tons	Material	Tons
Metals		***Miscellaneous***	
Aluminum	8,263.64	Glass Containers	2,323.92
Ferrous/Tin/Steel	126,371.60	Cloth/Textiles	2,379.21
Non-Ferrous	6,301.10	Yard Waste	29,604.32
Auto Bodies	617.20	Used Oil	3,020.61
Appliances	3,526.00	Used Oil Filters	150.20
Paper		Electronics	1.11
Newsprint	16,746.19	Wood Chips	18.50
Cardboard	34,371.79	Construction Rubble	60,087.00
Office/Computer	6,814.95	Tires	6,815.00
Other	29,244.50	Concrete	9,804.00
Plastic		Asphalt	59,321.00
Bottles	2,790.63	Batteries	2,687.39
Scrap Plastic	811.63	Ash	173,469.00
Other		Sand Blast Grit	30,230.00
Antifreeze	345.91	Large Tree Stumps	50.00

Table 12. Materials Recycled – Calendar Year 2007

Material	Tons	Material	Tons
Solvents	36.81	Other	68.04
Toner Cartridges	3.00		
Cooking Grease	944.50		
Photo Cameras	0.04		
Photo Film	1.40		
Fluorescent Light Bulbs	1.56		
Total 617,221.74			

The recycling quantities were apportioned to the SPSA member communities and a jurisdiction recycling rate was estimated. This information is presented in Table 13.

Table 13. Estimated Recycling for SPSA Members

Jurisdiction	Regional Recycling				Estimated Waste Generation (tons)***	Recycling Rate
	SPSA Recycling Programs* (tons)**	Known Private Recycling (tons)	Other Regional Recycling (tons)**	Recycling Total (tons)		
Chesapeake	17,118		50,166	67,285	271,592	25%
Franklin	683		2,002	2,685	9,814	27%
Isle of Wight	2,695		7,898	10,593	38,004	28%
Norfolk	17,782	21,327	52,112	91,221	383,866	24%
Portsmouth	7,868		23,058	30,926	151,334	20%
Southampton	1,383		4,052	5,434	25,415	21%
Suffolk	6,292	2,319	18,440	27,051	131,793	21%
Virginia Beach		109,476	99,082	208,558	785,381	27%

* Excluding ash.
** Apportioned on a per-capita basis.
*** FY 2008 estimates.

2.5 YARD WASTE MANAGEMENT

2.5.1 Previous Initiatives

Household chores such as raking leaves, mowing grass and trimming trees and shrubs generates the majority of yard waste, which has accounted for approximately 20 percent of solid waste collected in the Region (from SPSA Yard Waste Recycling flyer). The Annual Survey and Report (as of February 29, 2008) states that the Authority received 73,497 tons of yard waste during the FY ending June 30, 2007. This was a small decrease from the previous year.

SPSA has operated facilities where yard waste collected by member communities (see Section 2.3.1.2) was handled, mulched and composed. The end product of this activity has been a source of revenue for the Authority through the sales of mulch and compost (marketed as Nature's Blend). According to the Annual Survey and Report, the Authority sold 16,745 cubic yards of

mulch and 24,500 cubic yards of compost in the FY ending June 30, 2007. Yard waste was transported by SPSA from member collection points to the yard waste management facility at the Regional Landfill. A smaller facility existed at the Virginia Beach Landfill No. 2.

Operations conducted at the Regional landfill and Landfill No. 2 were consolidated on a section of Landfill No. 2 known as Phases 2B and 3. However, this facility was closed in 2007 to address Landfill No. 2 neighbor complaints of excess odors from the facility.

2.5.2 Current Status

The majority of yard waste generated in the Region is currently collected by the SPSA member communities (as discussed in Section 2.3.1.2). It is then transported to the Regional Landfill in Suffolk for disposal in Cell VI. SCS understands that some woody waste is currently mulched at the SPSA facility located at Virginia Beach Landfill No. 2. The stated tipping fee is $39 per ton. The tipping fee for clean, processed wood chips delivered to Virginia Beach Landfill No. 2 is $5 per ton.

The SPSA staff intends to assess the yard waste needs of the Region and make recommendations to the Board as to the most efficient yard waste collection and disposal methods. It is anticipated that the goal of the study will be development of a system that includes composting and mulching of yard waste.

2.6 C&DD MANAGEMENT

2.6.1 SPSA

SPSA currently accepts CDD material at the Regional Landfill for disposal in Cell VI. Approximately 120,000 tons of CDD material was disposed at the Regional Landfill in FY 2008 at a tipping fee of $22/ton. The newly established tipping fee for CDD is $30/ton (effective July 1, 2008). Since member communities generally do not collect CDD from residents, individuals can take CDD waste to a SPSA facility (transfer station or Regional Landfill) free of charge.

2.6.2 Privates

The majority of CDD handled and disposed of in the Region is collected by the private sector (from the RSWMP Amend 4). The active permitted private CDD only disposal facilities in the South Hampton Region are shown in the Table 14.

There are two CDD-only disposal facilities in the Region with capacity that could extend into the current study planning period (2018 – 2047). The City of Portsmouth's landfill is intended for disposal of city produced CDD material only. The proposed Centerville Turnpike CDD Landfill is anticipated to have an estimated 3,300,000 tons of capacity and 17.7 years of life (personal communication with the facility manager, Jimmy Sisson) and is anticipated to be the only active CDD only disposal facility for the foreseeable future in the Region. The Centerville Turnpike Landfill is anticipated to receive waste starting in January 2009.

The Elbow Road CDD landfill on Centerville Turnpike in Chesapeake has a permitted expansion, although there are no plans to construct the expansion area, according to the site owner (personnel communication with facility owner, Warren Thrasher). The expansion has a reported capacity of approximately 1.6 million cubic yards with an estimated life of 13 years (assuming a waste disposal rate of 125,000 cubic yards per year). The expansion area would cover a total area of 20.7 acres (15.3 acres plus 5.3 acres of piggback).

Table 14. Active CDD and Industrial Landfills In Region

Landfill	Facility Type	Total Remaining Permitted Capacity (Tons)	Waste Disposed (Tons)	Remaining Reported Permitted Life (Years)
City of Portsmouth Craney Island Landfill	CDD	878,000*	46,000*	18*
Higgerson Buchanan Landfill	CDD	92,800*	93,800*	1*
Centerville Turnpike CDD Landfill	CDD	3,300,000**	0**	18**
John C. Holland Enterprises Landfill	Industrial	12,893,000*	289,000*	62*

* From Solid Waste Managed in Virginia During Calendar Year 2007 (VDEQ June 2008)
** Personal communication from facility Manger

Landfills that are permitted for other types of waste (either MSW or Industrial) may also accept CDD, although a CDD only disposal facility would most likely have a lower tipping fee, and therefore disposal of CDD in a MSW or Industrial landfill would not be considered cost effective since CDD waste would be replacing MSW or Industrial waste air space. Non-CDD only permitted landfills that may accept CDD waste include the SPSA Regional Landfill (MSW) as noted above, the City of Virginia Beach Landfill No. 2 (MSW) and the Holland Landfill (Industrial). According to the VDEQ (Solid Waste Managed in Virginia During Calendar Year 2007), the Holland Landfill has over 12 million tons of capacity with an reported remaining life of more than 60 years, which extends through the study planning period.

Active and permitted Material Recovery Facilities (MRFs) that recycle and otherwise handle CDD in the Region are; Waste Industries on Cook Blvd. in Chesapeake, Bay Disposal on East Indian River Road in Norfolk, Waterway Marine Terminal on Precon Drive in Chesapeake, United Disposal on Wellman Street in Norfolk and Meeks Disposal Corporation on Cavalier Boulevard in Chesapeake.

According to DEQ records, Waterways Recycling currently processes approximately 50,000 tons of CDD material annually (calendar year 2007 data), at least some of it from out of the Region. According to the facility manager, the facility has the capacity to handle up to 700,000 tons annually, with a recycling rate of 92 percent. The remaining 8 percent of the material will be disposed in the SPSA Regional Landfill, although it is anticipated that the facility will dispose of non-recyclable material in the soon to be open Centerville Turnpike Landfill.

2.7 HOUSEHOLD HAZARDOUS WASTE

The current SPSA household hazardous waste management program consists of collection centers at the Regional Landfill, Virginia Beach Landfill No. 2, the RDF WTE Facility and the Chesapeake, Franklin, Isle of Wight, Landstown and Norfolk transfer stations. The service is for residential use only. SPSA staff operate the centers, in addition to several transfer station operators that have been trained to operate the program. The Authority has a contract with a private firm to remove and properly treat the waste (RW Beck, 2008).

The Virginia Beach Landfill No. 2 and Regional Landfill drop off centers are open full-time, Monday through Saturday. The remaining six centers are open based upon a monthly recurring schedule. Residents from all member communities may bring unwanted waste to any of the household hazardous waste centers to be disposed of free of charge. Disposal is limited to five gallons of liquid or 75 pounds of solid waste per visit. While citizens from any of SPSA's member communities may go the Virginia Beach Landfill No. 2 to dispose of their household hazardous waste, only Virginia Beach residents are allowed to use the Virginia Beach Landfill to dispose of their household garbage. The Virginia Beach Landfill will not allow residents of other communities on their property with mixed loads of hazardous and solid waste. Proof of residency is required to dispose of your household garbage at the Virginia Beach Landfill. Residents can still bring their used oil to any transfer station to deposit it in the used oil containers.

2.8 WASTE-T-ENERGY

SPSA defines its waste-to-energy system to include the Refuse Derived Fuel (RDF) Plant and the Power Plant (Figure 4), which it owns and has operated since 1988. The following sections briefly describe the design of these two facilities, historic and recent operational performance, contractual commitments for the sale of steam and electricity, and any long-term issues after 2018.

2.8.1 RDF WTE Facility

The RDF WTE Facility processes municipal solid waste from the member communities by utilizing an integrated system of equipment to process these wastes into a consistent four-inch particle size fuel, which is then conveyed and burned in the Power Plant. Modifications to the initial design have been made to the RDF WTE Facility over the years to improve performance and reduce operating costs. The following paragraphs briefly describe the design and operational performance of this facility.

2.8.1.1 Design

Solid waste is delivered to the RDF WTE Facility where the waste is dumped onto the enclosed tipping floor, which is roughly 1.3 acres in size. Non-processible items such as tires, mattresses, carpets, appliances, and propane tanks are segregated for separate disposal. The balance of the waste flow is then fed by front-end loaders to one of three operational processing lines using metal pan and rubber conveyors. These range from 24 to 84 inch in width and from 31 to 580 feet long.

These conveyors move the waste to a primary trommel, which is a drum about 12 feet in diameter. The original design for the Plant used spikes within the trammel to rip open bags to free waste. Modifications to the Plant have since blanked the screens in the trammel and material now flows from the trammel to the shredder without sifting out the smaller materials.

Figure 4. SPSA RDF and Power Plant

The initially processed waste is next conveyed to a vertical hammer mill shredder, which is powered by a 1,250 horsepower motor. This shredder reduces the incoming waste into four inch sized materials at a rate of approximately 80 tons per hour using 28 swinging steel hammers, positioned down nine tiers of vertical axle, which is rotating at 600 RPM. The shredder is enclosed in a containment building, which is equipped with explosion vents, flame and heat detectors, a dust collection system, and water deluge system for additional safety protection.

Magnetic separators are located at the outlet of the shredding unit. These machines use a revolving belt magnet to recover ferrous metal before the RDF is then conveyed to the Power Plant.

2.8.1.2 Operations and Maintenance

The RDF WTE Facility is designed to process waste 24 hours per day, seven days a week, if necessary. However, under current operating procedures, the RDF WTE Facility processes solid waste on Monday through Saturday with one of two processing lines using two of three shifts of workers (total of 68 approved positions for calendar year 2007). This operating schedule is adequate for SPSA to clear the tipping floor of solid waste.

Table 15 and Table 16 provide a summary of production data and quality of the RDF fuel for the last six calendar years. During calendar year 2007, the RDF WTE Facility processed 605,532 tons of solid waste, and produced approximately 540,451 tons of RDF. On a calendar year basis, 2007 was slightly lower than the 2005 and 2006 levels, and slightly better than the 2004 and 2003 levels in terms of solid waste processed.

Table 15. Production Data for RDF WTE Facility (Calendar Year)

Item	Fiscal Year					
	2002	2003	2004	2005	2006	2007
RDF Yield	91.3%	88.5%	88.5%	90.5%	88.9%	89.3%
RDF Delivered	614,821	491,188	581,125	649,065	583,549	540,451
Rejects to Landfill(1)	101,186	63,489	63,787	55,123	57,862	52,371
Ferrous Processed	16,151	11,813	11,584	12,743	13,040	12,218
Total Municipal Solid Waste Processed	673,245	555,102	593,047	662,335	656,683	605,532
Total Municipal Solid Waste Received(3)	737,642	617,609	656,834	717,459	780,817	747,267

(1) For 2001 through 2002, includes non-processible waste and process residue. Removal of process residue discontinued in 2003.
(2) The authority ceased recovering aluminum from the waste stream in 2002.
(3) Total MSW received includes the MSW processed and the MSW diverted. The diverted amounts typically go directly to the landfill.
(4) Source: R. W. Beck, 2007

Table 16. Results of RDF Analysis

Category	Fiscal Year				
	2003	2004	2005	2006	2007
Percent by Weight, Less than 4 inches	89.97	89.44	90.1	91.7	93.2
Percent by Weight, Less than 1 inch	49.06	48.58	52.2	56.7	34.8
Density, lbs. cu. ft.	7.11	6.01	8.1	8.5	4.5
Percent Moisture	31.99	28.43	28.5	30.9	31.8
Percent Ash	11.41	11.14	11.2	12.9	14.6
Higher Heating Value, BTU/lb	5,048	5,449	5,078	4,653	5,023

Source: R.W. Beck, 2007

Preventive maintenance and repairs are performed on the RDF WTE Facility during all shifts. Major maintenance work on the process lines is normally conducted during the day shift with major housekeeping and cleaning performed on the weekends.

SPSA employs an independent engineer (RW Beck) to monitor the performance of the RDF WTE Facility who provides an annual evaluation for the agency's bondholders. The most recent annual report indicated that the RDF WTE Facility appears to be properly maintained and operated. Based on R.W. Beck's review of the operating data, the amount of downtime for the RDF WTE Facility during 2007 was reported to be approximately 10.7 percent, which was

slightly less than the downtime for 2006. The reasons for the downtime included typical items for similar RDF WTE facilities:

- Shredder hammer failures.
- Miscellaneous jams/plugs
- Fire alarms
- Belt tears.
- Various control faults.

This report indicated that SPSA continues to implement a variety of plant upgrades to improve the recovery and handling efficiency of the Plant. During the last few years, SPSA implemented the following capital improvement projects:

- Installed a new motor control center.
- Completed an upgrade to the fire detection system.
- Completed the replacement of the A, B. and C shedder tables.
- Completed PLC Network upgrade.
- Installation of a odor control system
- HVAC upgrade.
- Rebuild the shredder installation area.

2.8.2 Power Plant

The Power plant incinerates approximately 2,000 tons of RDF fuel per day, operating 24 hours per day, 365 days per year to meet the Navy's steam needs, as well as producing electric power. Currently, SPSA has established 91 approved positions at the Power Plant. The following paragraphs briefly describe the operating deign for the Power Plant and discuss operating performance.

2.8.2.1 Design

The RDF produced by the RDF WTE Facility is transported to the Power Plant using two conveyors, each over 1,000 feet long (under Victory Boulevard and the other rising steeply over Elm Avenue). The RDF is conveyed to a 4,000 ton capacity storage pit. RDF is retrieved from the pit by an overhead crane. Air swept feeders distribute the RDF on the traveling grates of the four boilers. Each boiler burns about 25 tons of RDF per hour with furnace temperatures exceeding 1,800 degrees F.

The Power Plant employs state-of-the art air pollution control technologies to meet stringent air emission requirements. The Power Plant utilizes spray dryer absorbers where lime slurry is injected to chemically reduce sulfur dioxides from the flue gases. The flue gas stream is then passed through fabric filter, bag houses to remove particulate mater and other compounds before passing through the stack.

The hot flue gases leaving each boiler are used to heat water in water tubes surrounding the boiler. The energy that is recovered enables the Plant to produce steam at 750 degrees F ands 700 psig, which is then exported by the Plant at 150 psig and about 385 degrees F. The Plant produces 150 psig superheated steam to the Norfolk Naval Shipyard. Three turbine generators are also used to produce upwards of 20,000 kilowatts of electricity for sale.

2.8.2.2 Operations and Maintenance

The Power Plant has been in commercial service for well over 20 years, and was originally operated by the Navy before SPSA took over operations in May 1990. Since that time, SPSA has undertaken a number of major modifications to achieve more stringent air emissions regulations and to improve performance and reliability:

- Installation of new bottom and fly ash systems.
- RDF feed system changes.
- Distributed control systems.
- Change-out of rotary valves on the fly ash removal systems.
- Application of a protective weld overlay in the boilers.

According to annual reported prepared by SPSA's consulting engineers, R.W. Beck, each of these modifications have contributed to increased RDF consumption over the years. However, the facility continues to have limitations on the amount of RDF being burned due to problems with the reliability of the boilers due primarily to tube leaks and bottom ash removal systems failures.

Table 17 provides historical information on RDF WTE Facility consumption over the most recent five years. Table 18, shown below, summarizes performance/production data for the same period. As shown, it appears that the Facility provided the Navy with approximately 63.2 percent of the electricity used at the Shipyard, while also providing the entire electrical load for the RDF WTE Facility. SPSA also sold almost 12,158 MWh to Virginia Power. Notwithstanding the plant operating issues discussed above, the annual report on the Facility's operating performance, which was conducted by R.W. Beck, concluded that the Facility appears to be well maintained and operated. With continuing efficiencies and reliability improvements at the Facility, they opined that the outlook for long-term technical viability of the Facility was good.

2.8.3 Contracts

2.8.3.1 Navy Contract

On July 24, 1984, SPSA and the Navy entered into an agreement with the Department of the Navy regarding the sale of steam and electricity from the operation of the Power Plant, which at that time was operated by Navy personnel. Since that time, there have been a series of several amendments to this original contract. The most significant change in this contract and modification of this contract was executed by the parties on July 1, 1999. This amendment transferred the ownership of the Power Plant from the Navy to SPSA. The following are major provisions of this amendment:

Table 17. Consumption of RDF by Power Plant (Tons)

Month	RDF Delivered By Fiscal Year				
	2003	2004	2005	2006	2007
January	48,028	45,618	53,548	52,371	44,700
February	44,016	41,984	48,702	48,527	36,313
March	50,972	49,684	57,149	43,003	44,597
April	48,352	53,202	59,352	47,889	38,717
May	53,421	49,763	59,177	59,910	42,023
June	25,050(1)	55,787	60,425	60,806	45,047
July	31,253(1)		64,823	51,122	51,851
August	33,301(1)	50,631	59,424	49,220	53,761
September	18,244	37,790	55,700	30,727	41,906
October	50,190	43,020	46,905	43,025	52,112
November	47,804	44,408	58,857	49,823	45,938
December	40,558	53,692	57,728	52,267	48,401
Total	491,189(1)	229,541	683,795	590,696	545,366
Monthly Average	40,932	48,427	56,815	49,058	45,447

(1) The Authority operated at a reduced level as the result of a fire on the RDF conveyor.
(2) Source: R.W. Beck, 2007

Table 18. Power Plant Production Summary

Item	Fiscal Year				
	2003	2004	2005	2006	2007
RDF Received, Tons	491,189	581,125	649,065	588,693	540,451
RDF Fired, Tons	491,189	581,125	649,065	588,693	540,451
Coal fired, Tons	5	0	0	0	0
Oil Fired, Gals	311,827	363,092	207,677	388,553	358,367
Boiler Availability, %	78.2	79.0	86.9	81.5	74.5
Steam Production, Klbs	3,296,447	3,626,114	4,009,104	3,609,025	3,359,155
Steam Sent to NNSY, Klbs	644,572	619,701	558,709	561,755	607,024
Percent of NNSY load, %	NA	75	90.8	72.5	63.2
Electricity Generation, MWhs	243,341	260,871	296,108	248,880	237,248
Electricity to RDF, MWhs	9,988	11,476	12,406	11,065	11,833
Electricity Used-SPP, MWhs	52,168	56,030	69,986	62,396	59,801
Power sold to VA Power, MWhs	NA	32,000	72,219	29,281	12,158

Source: R.W. Beck, 2007

- SPSA is permitted to sell steam or other services to other customers.
- SPSA shall install and place into service a back-up boiler system which will be capable of proving no less than 100,000 pounds of steam per hour.
- The Navy agrees to consume all electricity produced by the Power Plant up to the demand of the connected stations loads.
- The Navy shall provide SPSA the use of Navy-owned electrical distribution system for the purpose of delivering electrical power to third parties.
- The Navy shall purchase no more than 1,000,000,000 pounds of steam per year ("Maximum Steam Purchase") without SPSA's prior consent.
- The Navy's peak steam demand shall not exceed 320,000 pounds of steam per hour without the prior consent of SPSA.
- The Navy shall take delivery from SPSA of all steam per hour without the prior consent of SPSA.
- The Navy shall take delivery from SPSA of all steam required to meet its steam loads.
- The Navy shall have the right to terminate the Navy Contract without cause. In such an event, the Navy shall satisfy with the Trustee for SPSA's Bonds all of the Debt Service Requirement as of the effective date of termination and in addition shall pay to SPSA normal convenience termination costs. The amount to satisfy with the Trustee all of the Debt Service Requirement shall not exceed $98,500,000 or the amount of the Debt Service Requirement plus termination costs, whichever is less.
- If the Navy terminates the Navy Contract and pays the Debt Service Requirement, SPSA shall transfer ownership of the Power Plant back to the Navy.
- The Navy's monthly payment for steam service is the sum of the following:
  - Fixed Steam Payment + Variable Steam Payment where
    - Fixed Steam Payment = $385,700 x Escalation Factor
    - Variable Steam Payment = Variable Rate x (Ending Steam Meter Reading – Beginning Steam Reading)
  - Variable Rate = $1.50 x Escalation Factor

In addition to these 1999 modifications of the Navy Contract, the Navy also executed a Quitclaim Deed; a Grant of Easement, which provides SPSA the right to use the site of the Power Plant for a 50-year period; and a second Grant of Easement by the Navy to SPSA with 50-years of access to the site of the RDF WTE Facility.

2.8.3.2 Electricity Sales Agreement

On July 1, 1999, SPSA executed an Agreement for the Sale of Electrical Output to the Virginia Electric and Power Company (the "Electricity Sales Agreement"). The Electricity Sales Agreement establishes the terms and conditions which SPSA sells power to Dominion Virginia Power ("Virginia Power"). This agreement has the following major conditions:

- Virginia Power will purchase from SPSA all of the electrical output generated by the Power Plant that is not delivered to and used by the Navy.
- Virginia Power is not obligated to make any capacity payments for the power purchases.
- The term of the Electricity Sales Agreement shall be one year. The Agreement shall automatically be renewed for successive one-year periods unless written notice of intention to terminate is given by either party.
- The Power Plant will have a nameplate rating of 60,000 kW.
- Payment rates shall be determined with the most recent filing of Schedule 19 as filed by Virginia Power with the State Corporation Commission of Virginia.

In October 2006, SPSA and Virginia Power executed the Amendment and Restatement of the Agreement for the Sale of Electrical Output to Virginia Electric and Power Company (the "Amended Power Sales Agreement"). This amendment addressed the following provisions for the pricing of power sold by SPSA:

- As of October 1, 2006, SPSA no longer sells electrical output to the Navy, although it continues to physically deliver the power to the Navy on behalf of Virginia Power. Virginia Power will sell the electrical output previously sold from the RDF WTE Facility of the Navy.
- SPSA will sell electrical output in two different products: "Product One" and "Product Two"
- Product One is defined as the amount of electric energy delivered by SPSA to the Navy less: (a) any amounts redelivered from the Navy to SPSA for SPSA's use; and (b) the amount of Product Two.
- Product Two is defined as that electrical output SPSA delivers into the transmission system pursuant to the Interconnect Agreement between SPSA and Virginia Power.
- The payment rates are as follows:
  - Product One: $0.0405/ kWh
  - Product Two: The Pennsylvania Jersey Maryland ("PJM") hourly local marginal price ("LMP") for the respective modes, multiplied by a factor of 0.98

- Virginia Power is not obligated to make any payment for capacity for Product One and Product Two.

- SPSA will retain the rights to any "Green Credits" which are associated with renewable energy credits.

In August 2008, SPSA and Virginia Power executed an additional Amendment and Restatement for the Sale of electrical Output to Virginia Electric and Power Company (the "Third Amendment"). The Third Amendment provided for payment for electricity at a rate of $0.067/kWh.

2.8.4 Long Term Viability of RDF and Power Plants - Post-2018

Typical of most U.S. waste-to-energy facilities built in the late 1980s, SPSA's plants have reached an age where long-term wear and tear has taken a toll on equipment, systems, and structures. In some cases, the original equipment is obsolete and not being supported by the original vendors. These issues collectively result in increases in maintenance costs and diligence by plant operators to achieve original design standards.

In light of these issues, a condition assessment report was conducted for SPSA during 2007 and 2008 by HDR Engineering, Inc. (HDR) to evaluate both the RDF and Power Plants. This in-depth study assessed key operations, maintenance, and budgeting systems at both facilities (Table 19). The report concluded that substantial investments in repairs and replacements will be required in order to restore operational reliability to industry norms, provide for safe working environment, increased waste flow throughput, and energy revenues. A five- year capital improvement plan was developed to resolve these issues (Table 20). The detailed capital budget is presented in Appendix B. As shown, these budget line items were segregated into five general categories:

- Items related to plant and personnel safety.
- Items related to facility environmental compliance.
- Items required to improve facility performance.
- Items related to aesthetics, end of life, or facility obsolescence
- New systems, equipment or enhancements

Estimates were then made of remaining life of the equipment before replacement and budget needs for equipment replacements.

Table 19. Condition Assessment of RDF and Power Plants

Facility	Assessment
RDF Processing Facility	Reasonable shape overall. Recent upgrades to control systems and control room displays are a major improvement. Housekeeping of the RDF Plant can benefit from improvement. The Plant is in need of an overall pressure washing, painting, and general maintenance and repair.
Power Plant	Turbine building areas are in good overall condition. Lighting replacements in the basement areas should be accelerated. Steam and water leaks should be reduced.

Table 19. Condition Assessment of RDF and Power Plants

Facility	Assessment
	Water treatment building and equipment are in excellent condition.
	The auxiliary boiler area is in serviceable condition, but attention to the drains, steam leaks and traps should be improved.
	The boiler house is in poor condition overall, with pervasive corrosion of ash areas in particular representing an operational threat. Accumulations of dust and ash pervade all upper boiler levels.
	The air pollution control areas are in reasonable condition.
	Lime handling and storage areas are in very poor condition. An emphasis should be placed on repairs of the sump in the lime handling building with daily wash downs to remove accumulated lime deposits throughout the areas.
	Exterior ash handling/loadout area is in poor condition with ash/water spillage pervasive throughout the area, as well as extensive corrosion.
	Major portions of the bottom ash handling system within the boiler building are in very poor condition.
	The RDF pit area is in reasonable condition, although some parts of the structure should be evaluated for potential reinforcement or rehabilitation.
	The maintenance warehouse is in excellent condition.
	The control, room has benefitted from prior upgrades.
	Employees areas in both the administration building as well as in the boiler building are in reasonable condition
	Electrical areas are in good condition.
	Exterior portions of the boiler house, turbine areas and air pollution control areas are in need of an overall pressure washing
	The Programmable Controller (PLC) network is obsolete.

Source: HDR, 2008

Table 20. RDF and WTE Power Plant Capital Budget Projections

Facility	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
RDF	$2,899,000	$2,995,000	$2,230,400	$2,180,000	$2,240,000
WTE Power Plant	$7,283,000	$5,386,900	$4,846,600	$7,231,000	$5,504,500
SPP Total	$10,182,000	$8,381,900	$7,077,000	$9,411,000	$7,744,500

Source: HDR Engineering, 2008

2.9 DISPOSAL FACILITIES

2.9.1 Regional Disposal Facilities

2.9.1.1 SPSA Landfill

The SPSA Regional Landfill is located on 833 acres within the City of Suffolk near the intersection of US Route 13/58/460 and the US Route 58/460 Bypass. SPSA began disposing of waste in the Landfill in January 1985. Of the 833 acres, 188 acres are currently permitted landfill area (Cells I through VI). The facility is open 24 hours per day to process waste collected during business hours. Residents and businesses can bring their non-hazardous and commercial waste, including CDD, bulky and approved industrial process, to the Landfill Monday through Saturday during specified business hours.

The Landfill receives MSW directly from the SPSA transfer stations and some non-processable waste from the RDF WTE Facility. As an incentive for providing a site for the Regional Landfill, the City of Suffolk and its residents are allowed to dispose of wastes free of charge. Leachate is pumped directly to the Hampton Roads Sanitation District for treatment. During the period from January to December 2007 approximately 1,600,000 cubic yards (1,200,000 tons) was disposed in the Landfill. (SPSA, 2008; RW Beck, 2008).

2.9.1.1.1 Capacity

The Landfill was originally designed to contain four disposal cells (Cells I through IV), which are currently undergoing the closure process. The capacity of Cells I through IV is 12,200,000 cubic yards (9,400,000 tons). In 1998, Cell V opened and provided the Landfill with an additional 6,100,000 cubic yards (4,700,000 tons) of capacity, extending the life of the Landfill through 2005. With the addition of Cell V, a final height of 205 feet above mean sea level can be achieved. A sixth landfill cell (Cell VI) opened in 2006. Located to the west of Cell V, Cell VI has a capacity of 8,900,000 cubic yards (6,800,000 tons) (SPSA, 2008).

2.9.1.1.2 Estimated Site Life

The total permitted capacity (Cells I through VI) of the Regional Landfill is 27,200,000 cubic yards (20,900,000 tons) which is expected to be expended by June 2012 (RW Beck, 2008).

2.9.1.1.3 Expansion Potential

SPSA is currently in the process of permitting an additional landfill cell (Cell VII) which, if approved, is expected to extend the life of the Landfill until 2018. The new cell will have an approximate 50-acre footprint with 10,000,000 cubic yards of capacity. It is anticipated by SPSA staff that this expansion of the Landfill will be approved by the VDEQ and the first phase constructed by the time that Cell VI is at capacity. SPSA staff has also developed contingency plans in the event that Cell VII is not ready to accept waste when Cell VI is at capacity.

Amendment 5 of the Regional Solid Waste Management Plan indicates that the “wedge” between Cells I through IV and Cells V and VI could provide approximately 3.2 million cubic yards of additional capacity, with an estimated additional 2.2 years of landfill life. This potential

expansion is complicated by the existence of a natural gas pipeline and associated right-of-way that exists between these groups of cells. The pipeline and right-of-way would need to be diverted around the Landfill if this area were to be used for additional landfill capacity.

A potential expansion area exists to the south and west of the Cells VI and VII, adjacent to the intersection of the US Route 58/460 Bypass and Nansemond Parkway. The 211-acre parcel is owned by Mr. Ralph Nahra, and contains a significant amount of wetlands according to the results of a preliminary delineation by Stokes Environmental Associates, Ltd. (Stokes 2006). The results indicated that of the 211 acres, 163 acres (77 percent) are considered wetlands which are subject to regulation by the U. S. Army Corps of Engineers under section 404 of the clean water act.

In correspondence dated June 15, 2007, Stokes Environmental Associates indicated that of the 211-acre parcel, two sections, a 24-area "Triangle Area" and a 44-acre "Borrow Pit Area," both of which are located on the southern section of Nahra Property, may be suitable for construction of landfill cells. The two areas are separated by a "bald cypress swamp" which may be problematic to mitigate (difficult to obtain a permit from the U. S. Army Corps of Engineers). In additional correspondence (dated September 21, 2007), Stokes indicated that from 4 to 7 acres of wetlands would require mitigation should these two areas of the Nahra property be used for landfilling.

In correspondence dated October 25, 2007, the VDEQ indicated that since the Nahra property is proposed for use as an expansion area for the Landfill (since it is "contiguous to existing landfill and the new cells, proposed to be constructed, are contiguous to the existing cells"), the provisions of section 10.1-1408.5 of the Code of Virginia are applicable. The provisions state that the VDEQ may issue a permit to construct a landfill in a wetlands area if the construction is considered an expansion rather than a new landfill.

Initial analysis indicates that the two areas on the Nahra Property could potentially provide from 5.5 million to 15 million cubic yards of capacity. The actual capacity would depend on whether certain variances could be obtained from Virginia's solid waste setback regulations (e.g., potential expansion area is within the 1,000-foot setback line from US 58/460), wetlands assessment, and other siting restrictions found in 9VAC20-80-250(A). The 15 million cubic yard expansion potential assumes a configuration that "piggybacks" onto the existing Regional Landfill. It also assumes that the bald cypress swamp can be mitigated. These potential expansion areas are shown in Figure 5.

Another potential expansion area exists on property adjacent to the Regional Landfill and currently owned by SPSA (the "Kirk" property). Similar to the Nahra property, SCS understands that this property contains wetlands that would require permitting by the U. S. Army Corps of Engineers as well as mitigation. SCS is not aware of any formal studies that examine the potential disposal capacity on this property, although it is understood that SPSA continues to examine the feasibility of expansion in this area, as well as in the pipeline wedge.

2.9.1.2 Virginia Beach Landfill

The Virginia Beach Landfill No. 2 (also known as Mount Trashmore 2) is a 353-acre facility in the western portion of the City. The current landfill area footprint is 104 acres. Waste generated within the City by Virginia Beach residents can be delivered in privately owned vehicles to the Landfill free of charge. (SPSA, 2008). In fiscal year 2008, approximately 56,000 tons of waste was disposed in the Landfill (RW Beck, 2008).

Pursuant to the terms of the Ash Disposal Agreement between SPSA and the City, SPSA is required to pay the operating costs of the Landfill in return for the option to dispose of up to 300,000 tons per year of ash from the RDF WTE Facility. SPSA had not been exercising this option but started to dispose of at least a portion of the ash generated at the RDF WTE Facility in the Landfill starting in June 2008.

2.9.1.2.1 Capacity

According to the Updated Topographic Survey and Capacity Evaluation for Landfill No. 2 (Malcolm Pirnie, July 2, 2007), the estimated remaining disposal capacity for currently permitted areas (Phases 1, 2A and 4) of the Landfill is 4.13 million cubic yards. (or approximately 2.7 million tons assuming a waste density of 1,300 pounds per cubic yard). The City's Landfill disposes ash from SPSA's RDF WTE Facility and self-hauled MSW from City residents.

2.9.1.2.2 Estimated Site Life

The City has concluded that as currently permitted, Landfill No. 2 provides sufficient capacity to dispose of its own solid waste through 2022 (Malcolm Pirnie, 2007), assuming a waste escalation rate of 2 percent (SCS estimated escalation rates for waste flow into the Landfill are somewhat lower). This also assumes that Landfill No. 2 will accept all City of Virginia Beach MSW after their contract with SPSA expires in 2018.

2.9.1.2.3 Expansion Potential

The City has identified several expansion alternatives within its current property and onto adjacent properties not owned by the City which could provide up to 43.8 million cubic yards of disposal capacity (28.5 million tons at an effective density of 1,300 pounds per cubic yard). This additional disposal capacity could serve the City's disposal needs well beyond the 30-year planning horizon of this study.

The July 2, 2007 Malcolm Pirnie capacity evaluation also contained the estimated disposal capacity for currently unpermitted areas (Phases 2B and 3, site of the former SPSA compost facility). According to the report, this area could accommodate as much as 8.1 million cubic yards (equivalent to approximately 5.3 million tons) of waste. The facility's Borrow Area/Pond 2 located adjacent to and within the facility's north property boundary represents approximately 9 million cubic yards of airspace (equivalent to 5.9 million ton of capacity). However, if the areas stated were developed, it is estimated that the life of the landfill could be extended to 2035 (again, assuming a 2 percent waste escalation rate and that Landfill No. 2 will accept all City MSW after their contract with SPSA expires in 2018).

The evaluation states that all of the projected airspace/disposal capacity estimates are contingent on successfully permitting these areas and as such are speculative inasmuch as their utilization is dependent on regulatory approvals. The City estimates that they would need to invest between $50.3 to $74 million, which is equivalent to $8.5 to $13.3 per ton on a lifecycle basis to, to purchase additional properties and implement "primary measures" to abate and/or mitigate potential nuisance impacts to achieve this expansion potential (Malcolm Pirnie, 2008). Secondary measures may also be considered to further mitigate nuisance impacts, with additional costs of $2.6 to $4.8 per ton. [Note: Current effective densities measured by the City of Virginia Beach have averaged 900 pounds per cubic yard, compared to the 1,300 pounds per cubic yard assumed herein for discussion purposes. There are reasons specific to the City's current operations that explain the relatively low in-place densities. Also, this in-place density differs from what SPSA's current operational in-place density of 1,540 pounds per cubic yard is).

Recent studies conducted by Malcolm Pirnie (Final Interim Report Preliminary Assessment of Urban Landfill Development, City of Virginia Beach Landfill No. 2, June 2008) state that "existing and projected future urban encroachment represents significant potential constraints and limitations to facility development and operations." The study concluded that measures could be taken to effectively abate and/or mitigate potential nuisance impacts on surrounding land use.

2.9.1.3 Portsmouth CDD Landfill

The City of Portsmouth owns and operates a permitted (permit No. SWP041) construction demolition and debris (CDD) landfill. The Landfill is in the northern portion of the City and is known as the Craney Island Landfill. The facility accepts CDD generated within the City only. It is reported that the City currently disposes of 47,000 cubic yards (or 15,000 tons) of CDD waste in the Landfill per year.

2.9.1.3.1 Capacity

The City reports that the Landfill has a remaining capacity of 3,250,000 cubic yards, or 878,000 tons.

2.9.1.3.2 Estimated Site Life

As reported by the City, approximately 50 percent of the designed air space of the Landfill is available. The life expectancy of the facility is 40 years assuming the City's current rate of disposal.

2.9.1.3.3 Expansion Potential

The City has no plans at this time to expand the Landfill.

2.9.1.4 Private CDD

Private CDD handling and disposal facilities in the Region are discussed in Section 2.6.2 of this report.

Figure 5. Potential Expansion Areas Adjacent to the SPSA Regional Landfill

2.9.2 Out of Region Disposal Facilities

Potential out of Region (eastern Virginia) disposal facilities are listed in Table 21. The table summarizes the reported estimated total remaining permitted capacity, remaining reported permitted life, total projected remaining capacity and total projected life of each facility. As indicated, the total remaining permitted capacity and life of each facility were obtained from VDEQ's published annual report on solid waste management in Virginia (for calendar year 2007). The data in VDEQ's report was provided by the facility owners. The total projected remaining capacity and life of each facility were provided directly to SCS from the facility owners, and represents their estimate of the currently permitted and potential future capacity of their facilities. These numbers are highly dependent on state and local regulatory conditions at the time future expansion areas are permitted and constructed.

2.9.2.1 Location and Status

Figure 6 shows the locations of most of the private disposal facilities listed in Table 21 along with the approximate distance from the approximate center of the South Hampton Roads Region (intersection of I-264 and I-64).

2.9.2.2 Capacity

As shown on Table 21, not all the private disposal facilities in eastern Virginia will have sufficient capacity needed to accommodate the Region's waste flow through the study planning period. The facilities with the greatest long term (total projected) capacity are Cumberland, Brunswick Waste Management Facility and Atlantic Waste Disposal.

2.9.2.3 Haul Distance

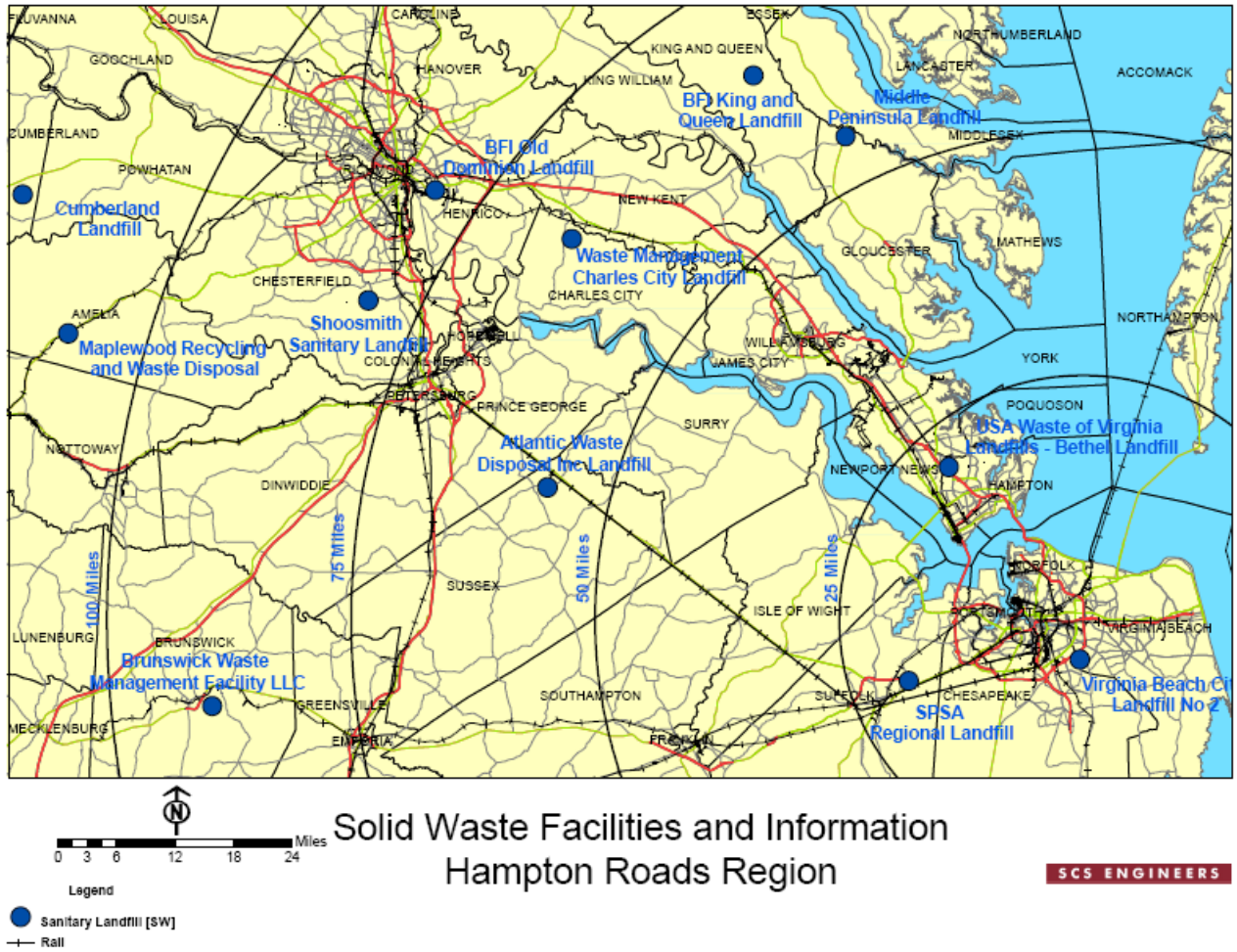
Table 22 shows the hauling distance from each transfer station (and the RDF/Power Plant) in the SPSA network to each private waste disposal facility in eastern Virginia.

2.9.2.4 Rail Access

Several of the out-region landfills listed in Table 21 and Table 22 have rail access and transfer capabilities for servicing New York, Maryland, and other out-of-state communities (Atlantic Waste, King George, Brunswick).

2.10 PREVIOUS SITING STUDIES

Numerous studies have been performed since the early 1980s to determine the feasibility of potential sites of landfills for the South Hampton Roads Region. The first known (by SCS) study was performed in 1982. This study established criteria for development of the current Regional Landfill in Suffolk (chosen from two other sites which were also located in Suffolk) as a disposal location for "non-processable" solid waste, or waste that could not be accepted in the soon to be operational RDF/Power Plant. This waste included "construction debris, tree stumps, and other material having no present value as energy or recovery materials." The site would also be used as an "alternate disposal site in the event of the failure of the RDF/Power Plant and interim disposal needs for general municipal waste originating from the member communities."



Note: Figure does not show King George Landfill, located near Fredericksburg, Virginia

Figure 6. Landfill Facilities in Eastern Virginia

Table 21. Out of Region Landfill Facilities

Landfill	Total Remaining Permitted Capacity* (Tons)	Waste Disposed* (Tons)	Remaining Reported Permitted Life* (Years)	Total Projected Remaining Capacity** (Tons)	Total Projected Life** (Years)
Atlantic Waste Disposal - Sussex Co. (Waste Management)	44,500,000	2,670,000	33.54	66,440,000	50
BFI King and Queen Landfill (Allied Waste)	11,700,000	1,100,000	19.2	same	same
BFI Old Dominion Landfill (Allied Waste)	1,150,000	860,000	2.3	7,500,000	7
Brunswick Waste Management Facility	12,200,000	1,100,000	17	75,000,000	50
King George Sanitary Landfill (Waste Management)	13,600,000	1,190,000	20.1	23,900,000	20
Maplewood Recycling and Disposal (Waste Management)	18,500,000	464,000	81.4	32,600,000	81
Middle Peninsula (Waste Management)	18,800,000	531,000	60.2	18,800,000	61
Bethel Landfill (Waste Management)	25,200,000	433,000	104	44,000,000	104
Charles City Landfill (Waste Management)	15,300,000	538,000	31.9	40,700,000	85
Cumberland (Allied Waste)	NA	NA	NA	80,000,000	30
Shoosmith Sanitary Landfill	4,500,000	559,000	8	NA	NA

* From Solid Waste Managed in Virginia During Calendar Year 2007 (VDEQ, June 2008)
**From facility owners
NA - information not available

Table 22. Potential Out-of-Region Long Haul Transportation Distance (From Current SPSA Transfer Stations)

	Distance, Miles (One Way)											
Transfer Station	**SPSA Regional Landfill**	**ATL Waste Disposal, Sussex County**	**WM Charles City County Landfill**	**Cumberland Landfill**	**WM Maplewood Landfill**	**WM Middle Peninsula Landfill**	**WM King George Landfill**	**BFI King & Queen Landfill**	**BFI Old Dominion Landfill**	**Brunswick Waste Management Facility**	**WM Bethel Landfill**	**Shoesmith Sanitary Landfill**
Landstown	27	73	89	155	139	70	144	82	99	107	34	104
Oceanna	29	74	89	155	145	70	144	82	100	109	34	106
Norfolk	17	63	78	145	129	59	133	71	88	98	23	94
Franklin	30	42	72	118	104	96	146	109	77	53	60	67
Isle of Wight	25	34	64	116	101	58	140	71	72	76	23	65
Suffolk	0	46	85	128	12	65	152	78	95	81	29	77
Boykins	44	45	76	120	107	109	149	117	96	52	73	71
Ivor	25	21	52	102	89	72	127	85	60	64	36	53
Chesapeake	20	65	88	148	132	68	142	81	98	100	32	97
RDF Transfer - Portsmouth	13	59	87	141	125	68	142	80	98	94	31	90

Following the establishment of the current Regional Landfill, the Authority apparently realized that additional landfill capacity would be needed to address the Region's increasing waste disposal requirements. At the time, expansion of the current Regional Landfill was not deemed to be feasible because of wetlands issues. Therefore, SPSA commissioned two studies be performed by Environmental Engineering & Technology, Inc., one on an existing industrial landfill in Suffolk (the Holland Landfill) and the second on three "greenfield" sites in Isle of Wight County. The study on the Holland Landfill concluded that the facility should not be considered as a site for disposal of MSW, but may be of value to the Region for disposal of industrial waste. The study on the Isle of Wight sites identified one of the three sites, located in the north central section of the County, to the north of Highway 620, as "the most suitable for landfill development." Both of these studies were dated October 1988.

The next available reviewed by SCS study was also performed by Environmental Engineering & Technology, Inc. and was dated 1990. The study stated that, again, expansion of the Regional Landfill was deemed not feasible at the time because of wetlands issues. The study involved the evaluation of 21 potential landfill sites located in the Region that were identified in an earlier in the 1990 study. The selection criteria for the 1987 study included land use compatibility, traffic, natural screening, zoning, configuration, ownership, utilities, wetland impact and economic factors.

In the 1990 study, the 21 potential landfill sites were evaluated and ranked. The evaluation included a "two to three hour limited access survey of each site." This involved a "review of existing soils surveys and topographic maps, and detailed evaluation of existing infrared aerial photographs and true color perspective aerial photographs." Extensive site visits were not performed. Since the wetland regulatory process was deemed to be an important part of the study, and particularly in the South Hampton Roads Region, an additional level of effort was expended for evaluation of "natural environmental impacts." Transportation costs were also included as an evaluation criteria. The sites that were studied were located in Suffolk (3), Southampton County (15), Isle of Wight County (1), and Chesapeake (2). The site in Isle of Wight County evaluated in this study was not the same site evaluated in the 1988 study.

Subsequent work known to SCS performed to develop additional waste disposal capacity for the Region includes a series of studies, all performed by Environmental Engineering & Technology, Inc. and dated May 1991, on individual sites. One of the sites was located outside the Region, in Camden County, North Carolina. The other studies were performed on sites located in Isle of Wight County and Chesapeake (the same locations that were deemed "feasible" for possible landfill sites in the 1990 study). The fourth study involved an evaluation of the expansion of the Regional Landfill onto land adjacent to and northeast of the existing (at the time) facility. None of these studies resulted in any definite conclusions or recommendations but rather provided summaries of the background and description of the sites, conceptual site designs, anticipated permitting requirements and an estimate of costs.

The results of the 1990 study indicated that of the 21 sites evaluated, four sites remained "feasible as possible landfill sites." These sites were located in Suffolk, Southampton County, Isle of Wight County and Chesapeake. SCS performed a cursory review of the four top ranked sites and found that of the four, two were unavailable due to local government opposition to building a landfill in their community (this would be an issue to some degree with all the sites),

another contained current and planned residential development, and the fourth also contained residential development but not to the degree of the third site.

A report entitled "Big Bethel Landfill - Potential Acquisition and Preliminary Valuation" was produced by Kaufman & Canoles Consulting (dated March 2003). The report contained a number of preliminary valuations developed under a number of scenarios and outlined potential "next steps" that would need to be taken if SPSA choose to pursue purchasing the facility. The report did not contain any conclusions or recommendations.

More recently (April 2007) the Authority conducted an analysis on "landfill options." Included in the analysis was waste disposal at several existing facilities, expansion of the Regional Landfill and the siting of a new landfill in the western section of Southampton County (west of Drewryville and north of State Route 58). The specifics of the proposed west Southampton County site are unknown to SCS. Analyses results indicated that expansion of the Regional Landfill was the most cost effective (according to a presentation given to the SPSA Executive Committee). Apparently this option was implemented through the permitting of Cell VII which is ongoing.

2.10.1 Outlying Landing Field (OLF) Siting Implications to Future Landfill Siting Initiatives

Recent developments concerning the Navy's Outlying Landing Field (OLF) potentially proposed for Southampton County (two of the three OLF sites proposed for Virginia are on parts of the County) may affect the siting of a new regional landfill in the area. Because of opposition to the OLF, citizens in this area of Virginia have developed organized approaches to presenting arguments against such large scale projects. In April of this year, the Virginian-Pilot newspaper reported that over 650 people met in Southampton High School's auditorium to hear advice from an attorney from a Washington-based law firm who was hired by the local government. A similar effort may be expected in response to siting a new Regional Landfill.

2.11 HRPDC STUDY MEMBER SOLID WASTE BUDGETS

This section provides an overview of the budgets and funding mechanisms established by the member communities to pay for management of solid waste. The solid waste management services offered by each community were discussed earlier in this document.

2.11.1 City of Chesapeake

The Waste Management Division of the Public Works Department provides refuse collection services for over 60,000 residences in the city. Over 100,000 tons of refuse is collected annually. The City allocates monies from the General Fund to cover the costs of this service. The FY 2008-2009 budget totals $23,560,592 ($10,665,552 for solid waste collection and $12,895,040 for solid waste disposal).

2.11.2 City of Franklin

The City uses General Fund revenues to pay for the costs of solid waste collection and disposal. Revenues to the General Fund (FY 2008-2009) include charges for solid waste collection in the amount of $1,134,565. These charges are paid by homeowners and businesses on the monthly utility bill and are currently $32.00 per month for a single-family home or $30.00 per month for a business using one container or $38.00 for a business using two containers. The City's current budget for solid waste totals $1,156,018.

2.11.3 City of Norfolk

The Waste Management Division collects approximately 120,000 tons of refuse annually from 75,000 residences and businesses. The City charges a daily rate of $0.55 for single-family homes (approximately $16.50/month), which is included in the Hampton Roads Utility Billing Service statement. The daily rate for businesses in the Central Business District is $3.01 per container. The City uses the General Fund to pay for services. The FY 2009 approved budget includes $19,748,393 for waste collection and $215,113 for clean community recycling.

2.11.4 City of Portsmouth

The City charges a refuse collection fee of $32.00 per month per dwelling unit on the public utilities bill. The City has established a separate Waste Management Fund to pay for the costs of service. The FY 2009 adopted budget includes revenues and expenditures of $13,280,850 (of which $12,587,500 are charges for service).

2.11.5 City of Suffolk

The City uses General Fund revenues to pay for the costs of solid waste collection and disposal. The City's budget for refuse collection for FY 2008-2009 totals $3,761,619.

2.11.6 Virginia Beach

The City collects more than 200,000 tons of waste and 35,000 tons of recyclables (through a contract with Tidewater Fiber Corporation) per year. The City's operations are funded through the General Fund with FY 2008-2009 budgets totaling $11,504,455 for waste collection, $12,481,690 for waste disposal, and $5,171,549 for recycling.

2.11.7 Isle of Wight County

In fiscal year 2007, Isle of Wight County disposed of 20,388 tons of waste. The County uses its General Fund to pay for refuse collection and disposal services. For FY 2009, the County has budgeted $992,324 for refuse collection and $2,012,210 for refuse disposal.

2.11.8 Southampton County

Southampton County uses the General Fund to cover costs for refuse collection and disposal services. The County's approved 2007-2008 budget included $677,555 for waste removal and $1,152,860 for refuse disposal.

3.0 FUTURE SOLID WASTE TECHNOLOGY AND FACILITY NEEDS

This section addresses the following factors affecting the future of solid waste management in the Region:

- **Regulatory Requirements.** Identifies state and federal regulatory requirements and initiatives that have relevance to solid waste management now and in the future.

- **Technolology.** Discusses various thermal, biological, and bio-chemical technologies that are either fully implemented or in various stages of demonstration for managing solid waste. Estimated capital and operation and maintenance costs are presented. The status of the various technologies are discussed, and the applicability to the Region considered.

- **Facility Needs.** Various facilities will be needed to support the Region's solid waste system regardless of who owns and operates them. The facilities for collecting, transferring, recycling, processing, and disposing of solid waste for the planning horizon are discussed. Criteria for facility sizing are presented, and issues relative to these facilities identified.

3.1 REGULATORY REQUIREMENTS

Pertinent legal and regulatory requirements that affect implementation of Region's solid waste management programs are discussed below. These include federal and state laws and regulations that direct solid waste facility design and operation and policies developed to establish a waste management hierarchy.

3.1.1 State Requirements

Solid and hazardous wastes in Virginia are regulated by the Virginia Department of Environmental Quality (DEQ), the Virginia Waste Management Board and the U.S. Environmental Protection Agency. They administer programs created by the federal Resource Conservation and Recovery Act, Comprehensive Environmental Response Compensation and Liability Act, commonly called Superfund, and the Virginia Waste Management Act.

3.1.1.1 Virginia Waste Management Act

The Virginia Waste Management Act charges the Director of DEQ with issuing permits to applicants for the management of solid and hazardous wastes. DEQ administers regulations established by the Virginia Waste Management Board and reviews permit applications for completeness and conformance with facility standards and financial assurance requirements. All Virginia localities are required, under the Solid Waste Management Planning Regulations, to identify the strategies they will follow on the management of their solid wastes to include items such as facility siting, long-term (20-year) use, and alternative programs such as materials recycling and composting.

3.1.1.2 Regulatory Requirements

The following presents a summary of key regulations found in the Virginia Administrative Code (9 VAC 20) regarding solid waste (9 VAC 20) and Virginia Water Protection (VWP) permits.

3.1.1.2.1 9 VAC 20 Chapter 70 - Financial Assurance Regulations for Solid Waste Disposal, Transfer, and Treatment facilities

These regulations are intended to assure that owners and operators of permitted or unpermitted waste management facilities identified in 9VAC20-70-50 A are financially responsible for the closure, post-closure care and corrective action at their facilities. This chapter establishes standards and procedures for financial assurance to be used in the issuance and continuation of permits to construct, operate, modify, close, or provide post-closure care and to be used in the performance of corrective actions or in formulation of enforcement documents issued by the department.

3.1.1.2.2 9 VAC 20 Chapter 30 - Technical Assistance Fund Administrative Procedure

The Code of Virginia (Section 10.1-1433 et seq.) makes funds available from the technical assistance fund to the governing body of a host community. This chapter establishes procedures for obtaining funds and guidelines for their use.

3.1.1.2.3 9 VAC 20 Chapter 80 - Solid Waste Management Regulations

The Virginia Solid Waste Management Regulations set standards for the siting, design, construction, operation, closure and post-closure care of solid waste management facilities. The types of facilities described in the regulations include sanitary landfills, industrial waste landfills, and construction/demolition/debris landfills, transfer stations, composting facilities for other than yard waste, mass burn incinerators, materials recovery facilities, waste storage piles and other facilities of a similar nature. The standards in Virginia for sanitary landfills comply with RCRA Subtitle D.

Certain categories of facilities regulated under the provisions of the Virginia Waste Management Act are deemed to have a permit if their owners or operators meet specific regulatory requirements based on the particular type of facility. For these facilities, the permitting process is greatly simplified and permit application fees are not assessed. The owners or operators of the following waste facilities may elect the "permit-by-rule" process or apply for a regular permit in order to have the permit in the event a permit is needed in advance of construction or operation:

- Publicly owned wastewater treatment works that accept hazardous wastes for treatment.
- Solid waste transfer stations.
- Materials and energy recovery facilities.
- Yard waste composting facilities.

3.1.1.2.4 9 VAC 20 Chapter 85 - Coal Combustion By-Product Regulations

The Regulations Governing Management of Coal Combustion By-Products provide for the use, reuse or reclamation of coal combustion by-products and establish appropriate standards for siting, design, construction and operation. The regulations provide reasonable exemptions from the permitting requirements and from certain substantive facility requirements in order to promote the development of resource conservation and resource recovery systems.

3.1.1.2.5 9 VAC 20 Chapter 90 - Solid Waste Management Permit Action Fees

In its 2004 session, the General Assembly authorized the collection of annual fees from solid waste management facilities (SWMFs). The Virginia Waste Management Board has approved final regulations assessing annual fees, 9 VAC 20-90, which became effective July 1, 2004. The regulations call for the payment of solid waste annual fees no later than October 1st of each year for activities in the preceding calendar year (CY), with certain exceptions.

3.1.1.2.6 9 VAC 20 Chapter 101 - Vegetative Waste Management and Yard Waste Composting Regulations

The Vegetative Waste Management and Yard Waste Composting Regulations allow composting of leaves, grass, brush and other collected material, and the management of other vegetative wastes. All applicants for solid waste permits must obtain certification of conformity with local ordinances and zoning before an application is considered complete. Private applicants must also furnish financial assurance that their facilities can be closed and cared for properly.

3.1.1.2.7 9 VAC 20 Chapter 120 - Regulated Medical Waste Management Regulations

The Virginia Regulated Medical Waste Management Regulations set standards for the storage, transportation and treatment of regulated medical waste. Regulated medical waste may be stored, steam sterilized, incinerated or treated by an acceptable alternative mechanism, in a facility permitted under the regulations (commercial medical waste transporters register by DEQ).

3.1.1.2.8 9 VAC 20 Chapter 130 - Solid Waste Planning and Recycling Regulations

The purpose of these regulations is to establish:

- Minimum requirements for solid waste management planning and recycling; promote local and regional planning that provides for environmentally sound and compatible solid waste management with the most effective and efficient use of available resources;.

- Procedures and rules for designation of regional boundaries for solid waste management plans.

- State, local government, regional or area served by the plan responsible for meeting and maintaining the minimum recycling rates.

- Requirements for withholding issuance of permits for solid waste management facility.

3.1.1.2.9 9 VAC 20 Chapter 140 - Regulations for the Certification of Recycling Machinery and Equipment for Tax Exemption Purposes

These regulations establish the procedure for certification of recycling machinery and equipment. Such certification allows the purchaser of such machinery and equipment to apply for an exemption from personal property taxes as authorized by the local taxing authority.

3.1.1.2.10 9 VAC 20 Chapter 150 - Waste Tire End User Reimbursement Regulation

The following uses of waste tire materials are eligible for the reimbursement from the Waste Tire Trust Fund:

- Civil engineering applications, which utilize waste tire materials as a substitute for soil, sand, or aggregate in a construction project such as land or surface applications, road bed base and embankments; fill material for construction projects; and daily cover and other substitutions at a permitted solid waste facility.

- Burning of waste tire materials for energy recovery.

- Pyrolysis.

- Products made from waste tire materials such as molded rubber products, rubberized asphalt, soil amendments, playground and horse arena surfacing materials, mulches, mats, sealers, etc.

3.1.1.2.11 9 VAC 20 Chapter 170 - Transportation of Solid and Medical Wastes on State Waters

The Virginia Waste Management Board adopted final regulations governing transportation of solid and medical wastes on state waters. This regulatory action sets forth guidelines for the permitting (permit-by-rule) of the facilities off-loading solid wastes and regulated medical wastes from a ship, barge or other vessel transporting such wastes upon the navigable waters of the Commonwealth. The regulations include contains standards for design and operation of both loading and off-loading facilities, but loading facilities are not required to have a permit. A schedule of permit fees is included and procedures for submitting the fees.

The regulations prescribed specific siting, design/construction, and operational standards for the loading and off-loading facilities. They contain specific requirements for containers including a performance standard, testing requirements, a manifest system, and stacking restrictions in the loading and off-loading areas.

The regulations establish a financial responsibility requirement for the owners and operators of vessels. They establish a fee system to be paid by vessel owners or operators and collected by off-loading facility owners or operators and remitted to the department.

3.1.1.2.12 9 VAC 20 Chapter 200 – Mercury Switch Regulations

These regulations establish standards and procedures for the removal of mercury switches from end-of-life vehicles demolished in the Commonwealth. The regulations also provide for the storage, shipping, recycling, or disposal of mercury switches removed from vehicles.

3.1.1.2.13 9VAC 25 Chapter 210-50 - Prohibitions and Requirements for VWP Permits.

Legislation was approved on July 1, 2005 that affected landfill siting and wetland impacts. New landfills or expansion of existing landfill may involve wetland/stream impacts and all such projects will need to be evaluated to determine whether they satisfy the solid waste siting criteria and the VWP requirement to demonstrate avoidance and minimization.

Section 50 of Chapter 210 does not allow issuance of a VWP permit where the proposed activity or the terms or conditions of the VWP permit do not comply with state law or regulations including but not limited to §10.1-1408.5 of the Code of Virginia.

Section 10.1-1408.5 (special provisions regarding wetlands) was revised and now states:

> A. The Director shall not issue any solid waste permit for a new municipal solid waste landfill or the expansion of a municipal solid waste landfill that would be sited in a wetland, provided that this subsection shall not apply to subsection B or the (i) expansion of an existing municipal solid waste landfill located in the City of Danville or the City of Suffolk when the owner or operator of the landfill is an authority created pursuant to § 15.2-5102 that has applied for a permit under § 404 of the federal Clean Water Act prior to January 1, 1989, and the owner or operator has received a permit under § 404 of the federal Clean Water Act and the Virginia Water Resources and Wetlands Protection Program, Article 2.2 (§ 62.1-44.15:20 et seq.) of Chapter 3.1 of Title 62.1, or (ii) construction of a new municipal solid waste landfill in Mecklenburg County and provided that the municipal solid waste landfills covered under clauses (i) and (ii) have complied with all other applicable federal and state environmental laws and regulations. It is expressly understood that while the provisions of this section provide an exemption to the general siting prohibition contained herein; it is not the intent in so doing to express an opinion on whether or not the project should receive the necessary environmental and regulatory permits to proceed. For the purposes of this section, the term "expansion of a municipal solid waste landfill" shall include the siting and construction of new cells or the expansion of existing cells at the same location.
>
> B. The Director may issue a solid waste permit for the expansion of a municipal solid waste landfill located in a wetland only if the following conditions are met: (i) the proposed landfill site is at least 100 feet from any surface water body and at least one mile from any tidal wetland; (ii) the Director determines, based upon the existing condition of the wetland system, including, but not limited to, sedimentation, toxicity, acidification, nitrification, vegetation, and proximity to existing permitted waste disposal areas, roads or other structures, that the

construction or restoration of a wetland system in another location in accordance with a Virginia Water Protection Permit approved by the State Water Control Board would provide higher quality wetlands; and (iii) the permit requires a minimum two-to-one wetlands mitigation ratio. This subsection shall not apply to the exemptions provided in clauses (i) and (ii) of subsection A.

C. Ground water monitoring shall be conducted at least quarterly by the owner or operator of any existing solid waste management landfill, accepting municipal solid waste, that was constructed on a wetland, has a potential hydrologic connection to such a wetland in the event of an escape of liquids from the facility, or is within a mile of such a wetland, unless the Director determines that less frequent monitoring is necessary. This provision shall not limit the authority of the Board or the Director to require that monitoring be conducted more frequently than quarterly. If the landfill is one that accepts only ash, ground water monitoring shall be conducted semiannually, unless more frequent monitoring is required by the Board or the Director. All results shall be reported to the Department.

D. This section shall not apply to landfills which impact less than two acres of non-tidal wetlands.

E. For purposes of this section, "wetland" means any tidal wetland or non-tidal wetland contiguous to any tidal wetland or surface water body.

F. There shall be no additional exemptions granted from this section unless (i) the proponent has submitted to the Department an assessment of the potential impact to wetlands, the need for the exemption, and the alternatives considered and (ii) the Department has made the information available for public review for at least 60 days prior to the first day of the next Regular Session of the General Assembly.

These requirements are not consistent with the landfill siting requirements of the solid waste regulations. DEQ recognizes the overlapping jurisdiction of the water and waste programs and has issued guidance to coordinate the review activities of the two programs.

3.1.2 Federal Requirements

Federal laws governing solid waste fall into the categories of waste management (Resource Conservation and Recovery Act), clean air (Clean Air Act), clean water (Clean Water Act), and environmental clean-up (Comprehensive Environmental Response, Compensation, and Liability Act). These federal statutes authorize federal agencies, primarily the EPA, to promulgate implementing regulations. Each of these major laws and their implementing regulations are discussed below.

3.1.2.1 Resource Conservation and Recovery Act

The federal government's role in solid waste management originated in 1965 with the passage of the Solid Waste Disposal Act. The federal role was expanded in 1976 with the promulgation of the Resource Conservation and Recovery Act (RCRA). RCRA set national goals for:

- Protecting human health and the environmental from the potential hazards of waste disposal.
- Conserving energy and natural resources.
- Reducing the amount of wastes generated.
- Ensuring that wastes are managed in an environmentally sound manner.

To achieve these goals, RCRA is divided into four distinct yet interrelated programs. Subtitle C (hazardous waste) and Subtitle D (solid, primarily nonhazardous waste) sets the framework for the federal government's waste management programs. RCRA also regulates underground storage tanks under Subtitle I and medical waste under Subtitle J.

With respect to solid waste management, RCRA encourages states to develop comprehensive plans to manage nonhazardous industrial solid waste and municipal solid waste, sets criteria for municipal solid waste landfills and other waste disposal facilities, and prohibits the open dumping of solid waste by requiring disposal to be in sanitary landfills. The RCRA regulations implementing the solid waste requirements of Subtitle D are contained in Title 40 of the Code of Federal Regulations (CFR) Parts 239 through 259 and are summarized below.

3.1.2.1.1 Part 239—Requirements for State Permit Program Determination of Adequacy

This part specifies the requirements that state permit programs must meet to be determined adequate by the EPA under RCRA and the procedures EPA will follow in determining the adequacy of state Subtitle D permit programs or other systems of prior approval and conditions required to be adopted and implemented by states under RCRA.

3.1.2.1.2 Part 240—Guidelines for the Thermal Processing of Solid Wastes

These guidelines are mandatory only for Federal agencies. They are recommended for State, interstate, regional, and local government agencies for use in their activities.

These guidelines are applicable to thermal processing facilities designed to process or which are processing 50 tons or more per day of municipal-type solid wastes.

The guidelines include requirements that delineate minimum levels of performance required of any solid waste thermal processing operation. They also recommend procedures to suggest preferred methods by which the objectives of the requirements can be realized. The recommended procedures are based on the practice of incineration at large facilities (50 tons per day or more) processing municipal solid waste. If techniques other than the recommended procedures are used or wastes other than municipal wastes are processed, it is the obligation of

the facility's owner and operator to demonstrate to that the techniques employed will satisfy the requirements.

Thermal processing residue must be disposed of in an environmentally acceptable manner. Where a land disposal facility is employed, it must be in accordance with the Environmental Protection Agency's Guidelines for the Land Disposal of Solid Wastes for both residues from the thermal processing operation and those non-hazardous wastes which cannot be thermally processed for reasons of health, safety, or technological limitation.

3.1.2.1.3 Part 243—Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste

The guidelines apply to the collection of residential, commercial, and institutional solid wastes and street wastes. They are mandatory for Federal agencies and must be implemented in those situations where the Federal agency is able to exercise direct managerial control over the collection system through operation of the system or by contracting for collection service. Where non-Federal collection systems are utilized, service contracts should require conformance with the guidelines requirements unless service meeting such requirements is not reasonably available. It is left to the head of the responsible agency to decide how the requirements of the guidelines will be met. These guidelines are recommended to State, interstate, regional, and local governments for use in their activities.

3.1.2.1.4 Part 246—Source Separation for Materials Recovery Guidelines

These guidelines are applicable to the source separation of residential, commercial, and institutional solid wastes generated by Federal agencies. These guidelines require source separation of:

- High-grade paper generated by office facilities of over 100 office workers.
- Used newspapers at facilities in which more than 500 families reside.
- Corrugated containers at commercial establishments generating 10 or more tons of waste corrugated containers per month.

3.1.2.1.5 Part 247—Comprehensive Procurement Guidelines for Products Containing Recovered Materials

These guidelines designate items that are or can be made with recovered materials and whose procurement by procuring agencies will carry out the objectives of section 6002 of RCRA. EPA's recommended practices with respect to the procurement of specific designated items are found in the companion Recovered Materials Advisory Notice(s).

3.1.2.1.6 Part 257—Criteria for Classification of Solid Waste Disposal Facilities and Practices

The criteria were adopted for determining which solid waste disposal facilities and practices posed a reasonable probability of adverse effects on health or the environment. Facilities failing

to satisfy the criteria were considered open dumps, which are prohibited under RCRA, and were required to close.

3.1.2.1.7 Part 258—Criteria for Municipal Solid Waste Landfills

The purpose of this part is to establish minimum national criteria under the RCRA for the design, operation, and closure of municipal solid waste landfills. The regulations include groundwater monitoring requirements, siting restrictions, design criteria, and provisions for corrective action and post-closure maintenance. The regulations took effect in 1993 and Missouri has adopted these criteria as part of the state's solid waste management regulations.

3.1.2.2 Clean Water Act

The Federal Water Pollution Control Act, as amended in 1977, became commonly known as the Clean Water Act (CWA). The CSW established the basic structure for regulating discharges of pollutants into the waters of the United States. It gave EPA the authority to implement pollution control programs such as setting wastewater standards for industry. The CWA also continued requirements to set water quality standards for all contaminants in surface waters. The CWA made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions. It also funded the construction of sewage treatment plants under the construction grants program and recognized the need for planning to address the critical problems posed by nonpoint source pollution. The primary CWA programs affecting solid waste management include:

- National Pollutant Discharge Elimination System (NPDES) permit program that covers point sources of pollution discharging into a surface waterbody. Point sources, which include solid waste landfills and other facilities, must obtain a discharge permit from the proper authority (usually a state, sometimes EPA, a tribe, or a territory). These permits set limits on the amount of various pollutants that a source can discharge in a given time.

- Section 401 of the CWA requires that before a federal agency can issue a license or permit for construction or other activity, it must have received from the state in which the affected activity would take place a written certification that the activity will not cause or contribute to a violation of relevant state water quality standards. Downstream states whose water quality standard might be exceeded as a result of federal approval of the activity can also play a role in the 401 process.

- Section 404 that regulates the placement of dredged or fill materials into wetlands and other Waters of the United States.

3.1.2.3 Clean Air Act

The Clean Air Act (CAA) is a federal law that allows EPA to set limits on certain air pollutants. The CAA also gives EPA the authority to limit emissions of air pollutants coming from sources like chemical plants, utilities, and steel mills. Individual states or tribes may have stronger air pollution laws, but they may not have less stringent pollution limits than those set by EPA.

States have to develop State Implementation Plans (SIPs) that outline how each state will control air pollution under the CAA. A SIP is a collection of the regulations, programs and policies that a state will use to clean up and monitor polluted areas. The states must involve the public and industries through hearings and opportunities to comment on the development of each state plan.

Air pollution emissions from municipal solid waste landfills are regulated by various federal regulations promulgated to implement the CAA including:

- Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills [Title 40 CFR Part 60, Subpart Cc];
- New Source Performance Standards (NSPS) for MSW Landfills [Title 40 CFR Part 60 Subpart WWW]; and
- Rules governing the Adoption and Submittal of State plans for Designated Facilities [Title 40 CFR Part 60, Subpart B].

The NSPS apply to new landfills, whereas the Emission Guidelines pertain to existing landfills. States must develop State plans as part of the implementation process for the Emission Guidelines for existing landfills in their State.

The regulations require large landfills that emit landfill gas in excess of 50 megagrams (Mg) per year to control emissions. In general, controlling emissions involves drilling collection wells into the landfill and routing the gas to a suitable energy recovery system or combustion device. Specifically, the regulations require new and existing landfills designed to hold 2.5 million Mg of waste or more to install gas collection systems or prove that the landfill emits less than 50 Mg per year of non-methane organic compounds.

The regulations provide the owner or operator of a landfill with a tier system for determining if controls will be required. If the owner or operator initially calculates the emissions to be above the 50 Mg per year threshold by using default parameters provided in the regulation, the tier system provides the opportunity to conduct sampling and determine site specific values to prove that emissions are below the emission threshold and that controls are not required.

The CAA regulations play a significant role in the design and operation of waste-to-energy facilities.

3.1.2.4 Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA:

- Establishes prohibitions and requirements concerning closed and abandoned hazardous waste sites (including old landfills);

- Provides for liability of persons responsible for releases of hazardous waste at these sites; and

- Establishes a trust fund to provide for cleanup when no responsible party could be identified.

3.1.3 Solid Waste Management Hierarchy

The Virginia Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency have developed policies that rank the most environmentally sound strategies for management of solid waste. These policies are known as the "solid waste management hierarchy" (see Figure 7):

- **First, Reduce.** Efforts to prevent the creation of waste should precede other waste management options that deal with the waste after it is generated, as in recycling. The underlying thought is that solid waste that is not produced does not require management.

- **Second, Reuse, Recycle, Compost.** The next level includes reuse, recycling and composting. These techniques have the potential to divert large amounts of waste from disposal and turn them into valuable products. Through these techniques, waste materials can potentially go through several cycles of use, conserving raw materials and energy in the process.

- **Third, Energy Recovery.** This level of the hierarchy also uses waste as a resource, but essentially the material can only be used once. The highest use becomes energy production.

- **Fourth, Disposal.** After the first three levels of the hierarchy are maximized, there may be residual solid waste left to manage. This material must be disposed of in an environmentally safe manner, through incineration or landfilling at a permitted facility.

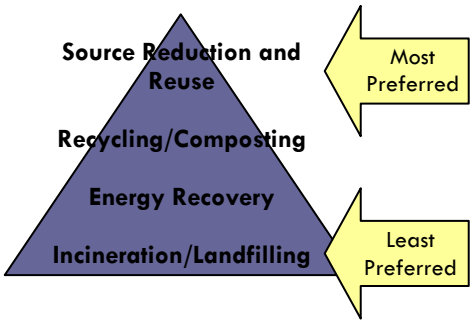


Figure 7. Waste Management Hierarchy

3.2 COLLECTION AND TRANSFER

3.2.1 Unique Transportation Factors of South Hampton Roads Area

Transportation congestion is a major issue in the Region. The collection, transfer, and disposal of solid waste make extensive use of the road transportation network. Transportation to and from the Region is controlled in large part by the various tunnels and bridges that connect to the West and North. The HRPDC has focused much effort over the last several years to facilitate approaches to solving the Region's most vexing transportation problems, and these problems are not easy to solve. According to studies conducted by the HRPDC, travel growth has outpaced roadway capacity improvements in the Region (HRPDC, 2006). The Hampton Roads Bridge Tunnel (HRBT) and the Downtown Tunnel are major system constraints, and congestion is routinely evident on all the Region's interstates, affecting the movement of people, goods and services. The constraints imposed by the Region's roadway network affect the planning, siting, implementation, and operation of the Region's solid waste system in the following ways.

- **Collection Efficiency.** Solid waste is collected by public and private operations in the Region. Traffic congestion affects the efficiency of these collections operations. Travel time from collection routes to transfer stations, the Regional Landfill, or the RDF WTE facility are extended during congestion periods, which means that the per day collection rate of each collection vehicle is reduced, more collection vehicles are needed to service collection routes, and overall operational cost are increased.

- **Collection and Transfer Scheduling.** Collection routes and transfer station operations are routinely scheduled to avoid peak congestion periods; however, this is not always practical, and these operations are negatively affected during congestion periods.

- **Location of Facilities.** The Region's current solid waste system is transportation intensive. The Region's transfer station, landfill, and RDF WTE facilities are the primary delivery points for solid waste disposal involving a significant number of collection and transfer vehicles. The capacity of the road networks to and from these facilities and any future facilities is an important consideration. For example, when Waste Industries was attempting to site and permit the 10,000 tons per day Black Bear Landfill just south of the City of Chesapeake in Camden, North Carolina, one of the major factors the City cited for opposing the facility was the inadequacy of the roadway network to support the anticipated construction and collection vehicle traffic.

3.2.2 Truck Transportation

All solid waste in the Region is collected and transferred by public or private collection vehicles and equipment. Currently, no solid waste is transported to or from the Region by rail or barge, although previous proposals for barging in out-of-state waste has been considered, but ultimately rejected for various political reasons.

3.2.3 Rail Haul of Solid Waste

3.2.3.1 Introduction

Rail haul of municipal solid waste has been occurring successfully in the U.S. and Europe for decades. The majority of U.S. systems are in the northeastern and northwestern parts of the country. There also are a few systems serving Ohio and New Mexico. Rail haul distances for solid waste vary. They can be as short as 20 miles and longer than 200 miles. Rail transport includes interstate and intrastate transfer. Municipalities have had as little as 30 tons per day and more than 2,500 tons per day of waste transported on a single train.

Rail haul could be used to transport waste to a privately-owned landfill within the state or in another state, or to a new publicly-owned regional facility. Like most commodities, the cost of rail haul will be lower, on a per ton basis, when shipping larger volumes which would help in offsetting the Region's capital and operational costs for the additional infrastructure necessary to conduct rail haul.

3.2.3.2 Advantages and Disadvantages

3.2.3.2.1 Advantages

Rail hauls major advantages include the following aspects:

- Eliminates the use of transfer trailers that currently take waste from the transfer stations and transport it to the landfill and a concurrent significant savings in O&M costs to the Region.
- Reduces traffic impacts to the roads and helps to improve local air quality by reducing emissions.

3.2.3.2.2 Disadvantages

The main disadvantage to rail haul include the following aspects:

- The Region may have to acquire new property and construct and operate a new transfer station and associated rail siding (described in the section following).
- Waste shipments have to be kept on strict timetables and can only be moved at designated times. Missing this window would mean the waste shipment may have to remain at the transfer station which could lead to back-ups of waste on the tipping floor.
- Additional rail cars may be necessary to have available for incoming waste storage in the case where a shipment is delayed for whatever reason.

3.2.3.3 Facilities and Equipment

The major facilities and equipment involved in rail haul vary depending on where and how the waste is linked to the rail system, but may include the following:

- Rail Cars
- Waste Transfer Stations or Tran-Loading Stations (at waste source(s) and at the Landfill)

Typically, the main rail line is owned and operated by one of the major regional railroads. The railroads provide the trackage and locomotives to transport the waste. The other main components, rail cars, track sidings, and transfer stations are typically constructed and owned and/or leased by the waste generator.

3.2.3.3.1 Rail Cars

Unless a municipality has a compelling reason to own rail cars it may make more financial sense to lease rail cars. There are dozens of leasing companies in the U.S. specializing in providing rail haul logistics and rail car leasing programs.

Several companies such as Rail Logistics, LC, Texas Railcar Leasing, and Chicago Freight Car Leasing specialize in rail car leasing and likely could provide cars for hauling solid waste. Some companies such as Waste Management, Inc. and TransLoad America Inc. provide rail haul services and equipment, but also are active in landfill ownership.

To get a sense of average rail car solid waste hauling capacity, intermodal containers, depending on size, can hold 30 tons each and gondola cars more than 100 tons each. Intermodal containers can be double-stacked on a flat rail car.

3.2.3.3.2 Car Leasing

There are typically several types of leases available that are structured to suit the customer's requirements. These include;

- Full Service Operating – Lessor owns railcars and is responsible for all maintenance from the wheels down. Lessee responsible for everything from wheels up. The Lessee's payment to the lessor includes all maintenance, taxes, and insurance. The client expenses the monthly lease payment.
- Net Operating – Lessor owns the railcar and is responsible for maintenance of entire car. The Lessee expenses the monthly lease payment.
- Capital Lease - The risks and rewards of railcar ownership are transferred to the Lessee over of the lease term. Often, the lease contains a fixed price purchase option at lease end. Leases are typically categorized as capital leases when the lease term is

equal to 75% or more of the estimated economic life of the asset, or the present value of the lease payments is equal to or exceeds 90% of the fair market value.

- Sale Lease Back – Lessor buys the cars from the Lessee and leases them back to Lessee. This arrangement immediately increases cash flow for the Lessee.

3.2.3.4 Waste Transloading Stations

On the operations side, rail haul is fairly straight forward. Refuse trucks collect and deliver waste to a central transfer facility. There, the refuse is loaded into a transfer vehicle - either a specially designed rail car or an intermodal container designed to contain odor and moisture. If loaded in rail cars, this facility is normally located at the rail side or is served directly by a spur track.

Intermodal containers can be trucked from a traditional transfer station, outfitted to load intermodal containers, to an intermodal rail yard where they're off-loaded with overhead cranes onto flat cars designed to hold multiple stacked containers. These flat cars may be joined to another train or assembled into a single train routed to the disposal destination.

At the landfill disposal site, the containers are removed (sometimes inside a semi-closed building), placed onto specially designed trucks and trailers, and transported to the landfill face where they are tipped either by the trailer chassis or by a large tipping unit. Finally, the empty containers are reloaded onto flat cars and returned to the point of origin to repeat the process over and over again.

PHOTO: ROANOKE VALLEY RESOURCE AUTHORITY

If the refuse is transported in a gondola rail car, unloading differs only slightly: a special tipper usually inverts the en-tire car. The refuse is reloaded into a transfer truck and moved to the landfill site for disposal.

Transloading stations not adjacent to a rail facility would likely have development costs similar to a traditional transfer station, however there are supplemental costs associated with mechanized waste compaction systems. Transfer station unit construction costs in the 2,500 tons per day range and up, not including the site cost, could start at $20,000 per ton of capacity.

Intermodal transfer yards, presumed to serve an existing rail siding, do not necessarily require a special building like the transfer station, however, a dedicated facility serving a few thousand tons per day could cover dozens of acres and require extensive coordination to integrate efficiently with the trackage system, may require facilities and space for extra locomotive

movements and track, require traveling straddle cranes and adequate maneuvering space for staging the incoming vehicles and active loading of rail cars.

The following photographs show some waste handling facilities described earlier including an intermodal transfer yard (top for Montgomery County, MD, second from top, a typical large-scale intermodal transfer yard), third from top, a typical dual-stack intermodal car train and, bottom photo, the gondola car waste tipping station at the Roanoke Valley waste-to-energy plant.

For the Region situation the additional facilities to construct would likely include those described below. The facilities will vary depending on if gondola cars or intermodal containers are used to hold the waste in transport:

3.2.3.4.1 Use of Intermodal Containers

- A waste transfer station and compactor close to a suitable main rail line.
- A track siding from the main rail line to the transfer station
- A scale
- Trailers to hold the intermodal containers
- Tractors to pull the intermodal containers to the siding
- Overhead crane at the main line to move the containers onto flatbed rail cars.

3.2.3.4.2 Use of Gondola Cars

The primary difference from intermodal is that the cars are loaded on the rail siding directly at the transfer station. The extra trailers, tractors, and overhead crane are not needed.

3.2.3.5 Cost Information

SCS contacted various communities that use rail hail to transport solid waste for disposal. The communities contacted are listed in Table 23, along with information on quantities of solid waste transported and the reported $/ton cost for the rail transport service. Reported rail transport costs range from $25 to $30 per ton.

3.2.3.6 Conclusions

At $25 to $30 per ton, rail transport could be competitive with truck transport depending on the ultimate destination of the solid waste. The rail transport scenario can be further evaluated once a new disposal facility is sited of selected.

Table 23. Rail Hauling of Solid Waste Survey Results

Name / Contact	Tonnage (daily, weekly or annual)	Approximate Haul Distance (miles)	Landfill Name	Railroad Shipping Cost ($ per ton)	Landfill Tipping Fee ($ per ton)	Transfer Station Fee ($ per ton)	Total Disposal Cost ($ per ton)
Montgomery County, MD 240-777-6410	600 tpd	200	Brunswick County LF,VA (ash)	$25 to $30	$20 to $30		$45 to $60
Montgomery County, MD 240-777-6410	2500 tdp	20	Montgomery County RRF (garbage)	$3 to $4	NA	NA	NA
Roanoke Valley Resource Authority	500 tpd, M-F	33	Smith Gap LF, VA	$4.06	$10.45	$4.84	$19.36
				Note: Cost is $871 per railcar (10-12 railcars per cay) up to 1800 railcars, then $672 per railcar. Project cost was $33M, cost allocation of $871/railcar is 21 % for transporatation costs, 25 % for Transfer Station costs, and 54 % for landfill costs.			
New York City DOS (The Bronx Express)		400	Maplewood LF, Amelia, VA (WMI)				
South Napa Waste Management Authority / Trent Cave (707) 257-9292			Roosevelt LF, WA (Allied)				
Seattle Public Utility / Henry Freeman (206-733-9147)		320	Columbia Ridge Landfill, Arlington, OR	$20.00	$23.00	NA	$43.00

Table 23. Rail Hauling of Solid Waste Survey Results

Name / Contact	Tonnage (daily, weekly or annual)	Approximate Haul Distance (miles)	Landfill Name	Railroad Shipping Cost ($ per ton)	Landfill Tipping Fee ($ per ton)	Transfer Station Fee ($ per ton)	Total Disposal Cost ($ per ton)
				Waste Management Inc. owns and maintains the intermodal containers. The landfill is also owned by Waste Management Inc. Union Pacific Railroad owns the railcars that the intermodal containers are loaded on. Union Pacific also loads and unloads the containers on the train (included in the $20/ton cost).			
King County, WA - Kevin Keirnan 206-296-4419							
Snohomish County, WA, Deanna Carvith, Sr Planner,425-388-3425	2000 tpd	360	Roosevelt LF, WA	$27.28	$19.90	NA	$47.18
				Price adjusted annually by CPI and other factors. Shipping price adjusted quarterly based on bale weight (less money for higher weight in each railcar - requires less cars. Used to pay $30.27/ton but now can get close to 30 tons per bale (per rail car) so price is reduced to $27.28.			
Somerset County, NJ			Lee County LF, SC				
Salt Lake City, UT			ECDC LF, UT (Allied)				

3.3 RECYCLING

The following sections address the future recycling needs of the Region with respect to conventional recycling, electronic wastes, commercial recycling, and organics.

3.3.1 Conventional MSW Recycling

The required recycling rates and tonnages were estimated using the waste flow diagram developed for the year 2018. Assuming that population densities do not change in the interim, all jurisdictions, with the exception of Southampton County, will be required to achieve a 25 percent recycling rate. Because its population density is less than 100 persons per square mile, Southampton County will be required to achieve a 15 percent recycling rate. For purposes of these projections, it was assumed that none of the jurisdictions would experience an unemployment rate 50 percent higher than the statewide average.

In 2018, each jurisdiction would be required to recycle (through both public and private programs) the following tonnages to achieve the mandated recycling rate:

- Chesapeake: 79,036 tons
- Franklin: 2,758 tons
- Isle of Wight: 10,604 tons
- Norfolk: 113,209 tons
- Portsmouth: 46,579 tons
- Southampton: 4,092 tons
- Suffolk: 40,519 tons
- Virginia Beach: 223,142 tons

The supporting information to develop these tonnages is presented in Table 24.

3.3.2 E-Waste

The past decade has seen swift growth in the manufacture and sale of consumer electronic products. Advances in technology have led to better, smaller, cheaper products. Industry analysts give every indication that the trend toward rapid introduction of new electronic products will continue.

As the production and use of electronic products continues to grow, the challenge of recovery and disposal is becoming significant. Computer monitors and older TV picture tubes contain an average of four pounds of lead and require special handling at the end of their lives. In addition to lead, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc, and brominated flame retardants (USEPA). Another serious concern associated with end-of-life management is the export of electronic scrap to developing countries that may lack adequate worker safety and environmental standards.

Table 24. Required Recycling Rates and Tonnages - 2018

Jurisdiction	2018 Projected Municipal Waste Disposed (tons) (1)	Percentage of Commercial Waste (2)	2018 Projected Commercial Waste Disposed (Delivered to SPSA) (tons)	2018 Projected Commercial Waste Disposed (non-SPSA Disposed) (tons) (3)	2018 Projected Total Waste Disposed (tons)	2006 Persons per Square Mile (4)	Current Mandated Recycling Rate (%) (5)	2018 Required Recycling (tons)	Projected 2018 Waste Generation (Municipal and Commercial) with minimum recycling
Chesapeake	128,912	15.2%	108,195	-	237,107	634	25	79,036	316,142
Franklin	5,008	0.5%	3,267	-	8,275	1,038	25	2,758	11,033
Isle of Wight	22,625	1.3%	9,187	-	31,812	105	25	10,604	42,416
Norfolk	96,664	34.2%	242,963	-	339,627	4,372	25	113,209	452,836
Portsmouth	78,776	8.6%	60,961	-	139,737	2,992	25	46,579	186,316
Southampton	10,723	1.8%	12,465	-	23,188	30	15	4,092	27,280
Suffolk	73,591	3.8%	26,862	21,105	121,558	199	25	40,519	162,077
Virginia Beach	230,540	34.6%	245,776	193,110	669,427	1,748	25	223,142	892,569
Total SPSA	646,839		709,675	214,216	1,570,730		25	523,577	2,094,306

(1) From SCS waste flow diagram.
(2) Commercial waste estimated at 709,675 tons (waste flow diagram). Percentages assigned to individual jurisdictions based on SCS 2000 study.
(3) Assumes 44% of commercial waste is non-SPSA disposal for jurisdictions without flow control ordinance – from SCS 2000 study.
(4) Hampton Roads PDC, Hampton Roads Data Book, May 2007.
(5) Virginia mandatory recycling rate is based on jurisdiction population density: 25% for greater than 100 persons per square mile, 15% for fewer than 100 persons per square mile.

While end-of-life electronics (end-of-life electronic products are either obsolete for their intended purpose or no longer useful by the current user and lacks any significant market value as an operational unit. Definition used by the Institute of Scrap Recycling Industries, Inc.) currently comprise only a small amount of the municipal waste stream, that percentage is expected to grow dramatically in the next few years (estimated to be 1.2% of waste generated in 2006 per USEPA, 2006). The average life span of a personal computer is currently about 2-3 years. Electronics that break often are not repaired due to the relatively low price of replacement equipment. When the equipment breaks or becomes obsolete, it is commonly discarded.

In 2009, Federal Communications Commission rules will require TV broadcasters to abandon traditional analog broadcasts in favor of digital signals. This change means that most televisions in use today won't work unless owners purchase converter boxes to receive digital broadcasts or connect their TVs to a cable or satellite service. It is anticipated that declining prices on digital televisions will entice consumers to purchase new digital televisions and discard older analog versions.

SPSA accepts cell phones for recycling through its Household Hazardous Waste Collection facilities. SPSA does not have an established program for the collection and recycling/disposal of computers and other electronics at this time and relies on other programs and vendors to provide this service. SPSA continues to investigate the feasibility of collection programs for computers and other electronics and in the interim will continue to rely on other existing programs.

Although not a specific focus of this planning study, electronics recycling services should be provided to the Region through its solid waste management system.

3.3.3 Commercial

Commercial waste is derived from businesses, shopping centers, government buildings, schools, colleges, hospitals, retirement homes, other institutions, restaurants, office buildings, and a variety of other sources. Recovery of commercial sector recyclable materials generally is currently controlled by the private sector. Typically, individual commercial establishments contract directly with local haulers for the collection of their recyclable materials.

Most cities across the country identified as providing commercial recyclable materials collection provide collection to small or mid-size establishments. The reason for this is that these smaller establishments do not generate the quantities necessary to attract private sector collection. The cities provide the service (typically at a cost to the city) in order to increase diversion rates which are often mandated at the state or local level.

SPSA offers a business recycling service to collected standard office paper, which includes white and colored paper, computer printouts, and unwanted mail. SPSA also accepts the following co-mingled material:

- Aluminum cans/foil/pie tins
- Glass bottles or jars (green, brown or clear)
- Plastic bottles #1 and #2 (soda, juice and milk containers)
- Steel/tin cans

The cost of the service is $11.83 per month to service the first cart, with discounts for additional carts. Service is provided every other week using 95-gallon carts.

Again, while not specifically part of this planning study, it is recommended that SPSA continue to provide commercial recycling services to those establishments that are not served by the private sector.

3.3.4 Separate Organics Management

3.3.4.1 Current Program

Programs for collecting and composting yard waste have been implemented in the Region and some local businesses are managing food waste through alternative means; however, food, vegetative and wood waste, and soiled paper can still comprise a significant part of the waste stream collected for disposal. The recovery of these materials offers a significant diversion potential and the technology exists to recycle these materials.

In 2005, almost 12 percent of the total municipal solid waste generated in American households was food scraps and less than three percent was recovered. Generally, residential food waste is managed through two systems: the solid waste collection system and/or the wastewater treatment system. Residents not using in-house disposals (grinders) place food waste with residential trash,

which is collected curbside collection trucks. Residents using in-house food disposals may still place a portion of their food waste curbside for trash collection.

3.3.4.2 Other Jurisdictions

Although food waste represents a large portion of the residential solid waste disposed, the diversion potential of this material is limited by participation rates. Anecdotal information suggests that residential participation in food waste collection programs is significantly below corresponding recycling participation rates. Low participation rates result in lower quantities of materials being diverted than anticipated from waste composition studies. Lessons learned in other jurisdictions are discussed below.

StopWaste.Org, a public agency combining the Alameda County, California Waste Management Authority and the Alameda County Source Reduction and Recycling Board, supports residential food waste collection by supplying implementation grants to member cities. Fifteen jurisdictions have implemented or are in the process of implementing residential food waste collection programs. These programs combine food waste and soiled paper products with weekly yard waste collection.

Due to the commingling of the food waste and yard waste, monitoring the amount of food waste diverted can be difficult. Any additional diversion realized from the addition of food waste to an existing yard waste collection program is obscured by natural variances in the yard waste quantities.

StopWaste.Org successfully monitors their programs by “lid flipping” in the field to estimate participation and waste diversion rates. The semi-mature programs (two to three years old) have a participation rate of about 20 percent. Officials have observed that if a resident does not have yard waste to place at the curb, then the food and soiled paper waste is also absent.

Measurement studies have found between 8 and 14 pounds food and soiled paper waste per set out. According to StopWaste.Org staff, the median amount is ten pounds per set out. It is also reported that adding the food and soiled paper waste to an existing weekly yard waste collection program does not nominally increase collection costs.

The Agency’s member cities use 64-gallon and/or 96-gallon wheeled carts to collect the mixed stream with automated trucks. More densely populated areas use the smaller carts; suburban areas with larger lawns use the larger containers.

One member city, Fremont, California, added food and soiled paper waste to their existing yard waste collection program in 2003. A private hauler, servicing 46,500 single-family households, co-collects the food/yard waste and recyclable materials with split body trucks. Of those residents setting out food/yard waste collection carts, 25 percent participate in the food waste program. Seventy-five percent of the carts contain yard waste only.

Fremont has a three cart residential system; a gray cart for recyclable materials, a green cart for food and yard waste, and a dark blue cart for trash. The cost for collecting all three containers is embedded in the cost of trash collection based on a pay-as-you-throw fee structure.

Residents choose from four trash service levels: a 20-gallon container for $23.61 per month, a 32-gallon container for $24.10 per month, a 64-gallon container for $26.35 per month, or a 96-gallon container for $38.69 per month Residents can purchase extra 32-gallon bags for $5.97 per bag.

Another program model is the collection of food and soiled paper separately from yard waste. This type of program is not as common as the combined systems due to the increased cost of labor and equipment for a separate collection system.

One program of this type was identified. Wayzata, Minnesota, a small town located in Hennepin County, about 12 miles from Minneapolis, has collected residential food waste since 2003 (in addition to food waste, soiled paper products, floral trimmings, houseplants, dryer lint, and vacuum bags are also accepted). The disadvantage of this type of program is the high cost to collect and transport a small amount of material. However, the monitoring of participation rates and diversion amounts is easier then programs where food waste is commingled with yard waste.

The weekly set-out rate during a two-year pilot study in Wayzata ranged from 24 to 29 percent. Weekly set-out rate indicates how many households set out their material on a given week. The quarterly participation was estimated at 50 percent. In other words, during that time period, 50 percent of the households participated at least once in the food waste collection program.

Data gathered during the pilot study showed that residents placed, on average, 11.6 pounds per household per month food waste at the curb for collection (2.9 pounds per household per week). This average was calculated by dividing the total tons collected by the total number of households (participating and non-participating).

Assuming a 29 percent participation rate (the high end of the weekly setout rate) and the average pounds per household shown above (2.9 pounds per household), then the quantity per *participating* household equals 10 pounds per household per week. This is the same quantity estimated by StopWaste.Org.

A 2005 financial analysis estimated the cost of the weekly food waste service at $2.56 per household per month for collection only. On a per ton basis, the collection cost equaled $409 per ton (USEPA, 2005). Residents pay $5.30 per month for recycling and food waste collection. This mandatory fee is included in the monthly trash rates shown below.

The town's 3,941 residents have a pay-as-you-throw fee structure in place for trash collection. For weekly service, the monthly household fee structure is $14.20 for a 30-gallon container, $20.20 for a 60-gallon container, and $25.95 for a 90-gallon container. Residents can purchase extra stickers for $2.50 each. Each sticker buys the equivalent of a 30-gallon container.

3.3.4.3 Supplemental Residential Food Waste Collection Experience

A 2004 survey of Alameda County residents with established food waste collection programs found that the most common food items recycled included fruit and vegetables scraps, leftovers, meat scraps, cheese products, and eggshells. Items also recycled but at lower levels included coffee grounds, pizza boxes, paper food containers and wrappers, and paper beverage cartons.

Of those surveyed, 26 percent reported always participating, 44 percent sometimes participate, and 30 percent never participate. The reasons given for not participating are listed in Table 25 below.

Additional residential food waste collection program observations include:

- Some programs have seen a decline in participation after the initial start. The cause is unclear.
- Participation rates are lower than rates for other recyclable materials.

Table 25. Reasons for Non-Participation

Reasons for Non-Participation	Percent Responding
Inconvenient	30%
Odor/smell	23%
Rodents/flies/bugs	16%
Composting it	11%
Not clean	11%
Not enough yard waste	10%
Giving food scraps to pets	6%
Put food scraps in garbage disposal	6%
Don't have enough information	4%
Waste cart is too small	2%
Other	2%
Don't know	10%

"Residential Food Scrap Program Survey Results." Alameda County Waste Management Authority. The Evans McDonough Co. July 2004 http://www.stopwaste.org/docs/foodscrap-survey.pdf

- Lack of storage space and cleaning the kitchen and curbside containers are deterrents.
- Participation rates increase during the spring and summer months when yard waste volumes increase.
- If a resident does not have yard waste in a given week, no food waste is put out at the curb.
- There is reluctance to use the large curbside container exclusively for small amounts of food waste.
- The lack of a consistent supply of yard waste in the collection container is a deterrent.

- Yard waste in the curbside container to mix with food waste keeps the container cleaner and reduces the food waste odors (a natural liner).
- Both participants and non-participants are concerned about odor particularly during hot summer months.
- There is a public perception that the program is unnecessary because of little food waste compared to other materials collected for recycling.
- There is an unwillingness to spend the time and effort to separate another material out of the household trash.

3.3.4.4 Implementation

The inherent characteristics that make food waste difficult to manage include a high moisture content, rapid rate of decomposition, potential to generate unpleasant odors, and vector attraction. The problems created by these characteristics must be recognized and addressed in any municipal food waste collection program. The “ick” factor must be overcome.

The addition of soiled paper provides an absorbent material for free liquids, which helps to control odors. Residents could be encouraged to wrap their food waste in newspaper or use approved compostable liners to contain free liquids. Since non-compostable plastic bags are unacceptable for the composting process, the Region would need to designate approved liners and provide purchase outlets.

Promotional materials prior to startup and ongoing reminders are critical to the success of a food waste collection program. Education as to how the collected food waste will be used and how it fits into the context of the recycling ethic will improve participation.

It is important that residents understand which paper products belong with the food waste collection and which belong with the recyclables collection so that there is not a reduction in the quantity of paper collected for recycling.

Additional issues for the Region to consider when implementing residential food waste collection include:

- Communication with the composting facility to ensure that the program meets facility requirements should occur at the beginning of the process.
- Consider a pilot program before Region-wide roll-out.
- Realize that areas with a high level of garbage disposal use may have less food waste.
- Participation rates will be lower than recyclable collection rates.
- Participation will fluctuate, which could create employee scheduling and route planning problems.

3.5 CONVERSION TECHNOLOGIES

3.5.1 Introduction

For the purpose of this report, SCS has divided the processes for disposal of municipal solid waste into two main categories:

- Alternative Conversion Technologies
- Conventional Technology

Alternative conversion technologies can be defined as:

- Alternatives to landfills and standard combustion-based WTE plants
- Potential to produce by-products and chemicals that could be useful
- Compatible with municipal recycling activities
- Potential for less environmental impact

A conventional technology basically means a sanitary landfill or a combustion-based WTE plant. This part of the report will focus on discussing the alternative technologies, the conventional technologies are discussed elsewhere in this report.

3.5.2 Alternative Conversion Technologies

The alternative conversion technologies are numerous and can be grouped many ways, but for this discussion, the most appropriate would be into three major processes that include:

- Thermal
- Biological
- Bio-Chemical

Within these groups are many methods and technologies that have been developed to try and extract different benefits from the processed waste stream including;

- Gases for power production or feedstock for vehicular fuels
- Basic chemicals for use as a raw feedstock
- Compost / soil amendments
- Slag for use an alternative building material

Some, but not all of the alternative conversion technologies have been gaining interest in the last several years in the waste management industry. Most of the technologies were initially introduced back in the early 70's when the first "energy crisis" swept the U.S., alternative sources of energy were in demand and many of the basic solid waste incinerators of the day were looked at as obsolete, polluting dinosaurs. Eventually most all of the alternative thermal plants were shutdown (mostly pyrolysis plants), because they generally were not reliable and the energy economics changed. And, as incinerators were overhauled into full-fledged WTE plants with

more sophisticated air pollution controls, and the era of cheap landfills flourished, this effectively killed all of the commercial conversion projects.

The primary reasons for the return of these technologies are for basically the same reasons as in the 70's. Some regions of the country are looking for technologies that potentially have a reduced environmental impact, can provide alternative sources of energy at a competitive cost and have potentially useful by-products.

A brief description of the main technologies in each of the three groups is presented herein with discussion as to potential relevancy to the Region, benefits, estimated costs, and potential disadvantages.

3.5.2.1 Thermal

The thermal technologies are based on taking the solid waste and processing it under moderate to very high temperatures in a closed reactor vessel, sometimes under pressure and with or without the introduction of air or steam. Depending on the particular process, traditional recyclables may be removed at the front end of the process or during the process stages. The predominant processes are pyrolysis-gasification and autoclaving.

3.5.2.1.1 Pyrolysis - Gasification

In a pyrolysis process air is excluded from the reactor vessel and results in the waste decomposing into certain gases (methane, carbon dioxide, and carbon monoxide), liquid (oils/tar) and solid materials (char). The proportions are determined by operating temperature, pressure, oxygen content, and other conditions. Because there is little to no air or oxygen, the waste does not combust as it breaks down (there are no flames).

When the amount of air in the process is less than that required to support combustion, but greater than in a pyrolysis process, the process is termed *gasification*. This process is typically used to achieve a different balance of the gaseous by-products, mainly the production of a hydrogen (H)-rich gas with smaller quantities of carbon monoxide (CO), methane (CH_4) and carbon dioxide (CO_2). The refined gas, primarily H and CO is termed *syngas* and has many direct applications such as powering a turbine to produce electricity and potentially for use as a feedstock to produce alternative vehicular fuel (ethanol), or other chemical compounds. Most of these processes require an external heat source under normal operating conditions. This is usually hot, clean air that captures heat from the downstream gas combustion process.

A basic gasification process is shown in Figure 8. Gasification processes have attracted much interest because the process is inherently more efficient than a combustion-based process, the syngas is a relatively clean energy source and the plant may generate less troublesome air emissions overall.

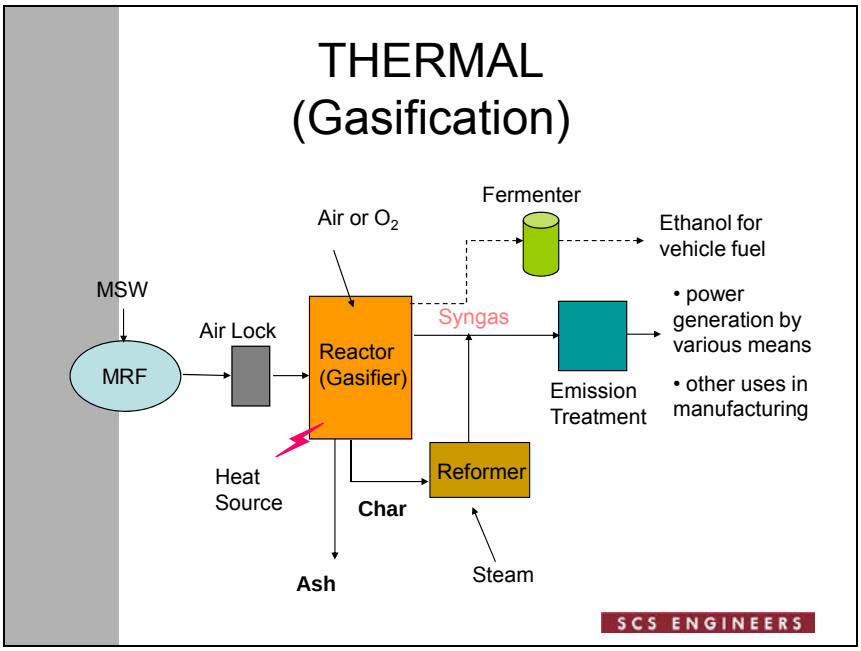


Figure 8. Basic Gasification Process

A relatively recent development for solid waste conversion using the gasification process, that employs a unique heating source, is known as a plasma arc converter. Although there are many variations, a typical plasma arc converter uses an array of plasma torches to generate temperatures in the reactor of more than 5,000 degrees centigrade. This extremely high temperature, coupled with a gasification environment has shown potential in small laboratory test units to achieve a very high efficiency in decomposing the organic fraction of the waste to *syngas*, while generating a slag material from the inert fraction. The slag has potential for use as a substitute ingredient in potentially many building materials, including concrete structural elements (wall panels and blocks, etc.) and asphalt.

A plasma is an ionized gas that results when a basic gas, such as nitrogen or air is passed through an electrical arc struck between two electrodes. The electrodes are constructed into a torch that directs the plasma arc. The intense heat created by the arc can be used to treat many materials, including MSW. Plasma arcs were commercialized in the metallurgical industry where the high temperatures produced in the reactor vessel (potentially up to 10,000 degrees centigrade) are used to create special alloys. Some of the electric power generated by the plant is siphoned off to power the torches. The basic plasma arc process is shown in Figure 9.

3.5.2.1.2 Autoclave

The basic autoclave process has been in commercial use for decades, primarily in the medical field for sterilizing instruments, some manufacturing uses and in the sterilizing of medical wastes. In an autoclave process for solid waste, mixed MSW is fed into a reactor vessel where it is subjected to heat, pressure and agitation. The reactor conditions cause the organic fraction of the waste (i.e., food scraps, fiber/paper products and vegetation) to break down into a pulp-like

substance that potentially has reuse applications depending on the degree of post-processing selected.

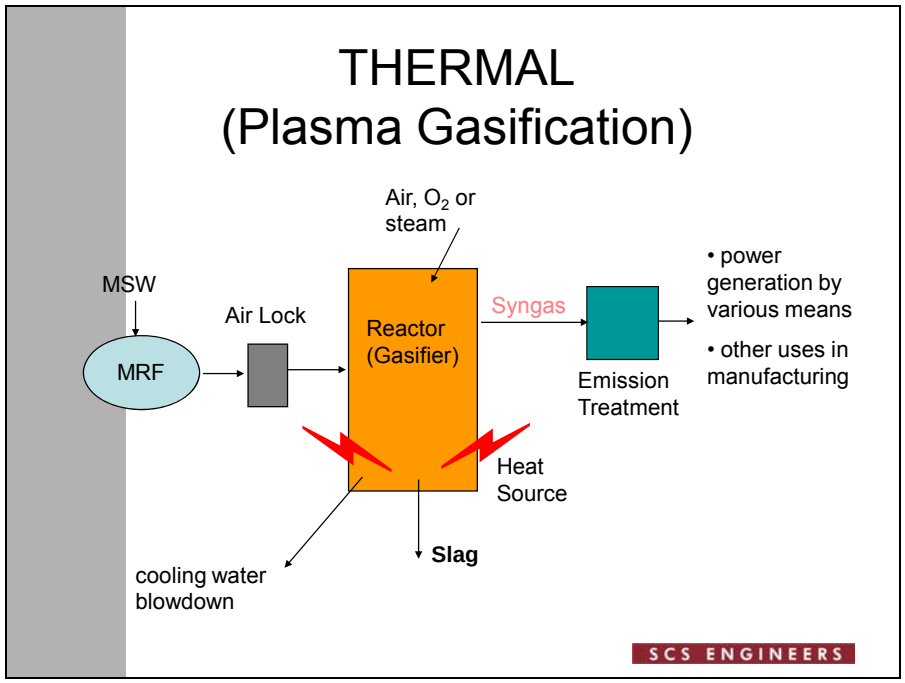


Figure 9. Basic Plasma Gasification Process

The pulp has been demonstrated with a few systems to be a useful soil conditioner and also is being tested for use as feedstock for the production of ethanol, an alternative vehicle fuel and in the production of a refuse-derived fuel (RDF) for combustion in power plants.

The process also claims to provide a higher quality recyclable product. Plastic recyclable materials are softened and occupy less volume downstream. Product labels on glass, plastics and metals are totally removed and these materials also are cleaned and sterilized.

A basic autoclave process is shown in Figure 10.

3.5.2.1.3 Anaerobic Process

The anaerobic process is also used to treat other organic wastes than MSW, and that is where it is used the most. The same anaerobic process is used to digest sewage sludge (biosolids – produced from treated sanitary sewage), yard vegetation, agricultural wastes (both animal and plant) and some industrial waste sludge. The number of plants processing these material numbers in the thousands worldwide.

A basic anaerobic process is shown in Figure 11.

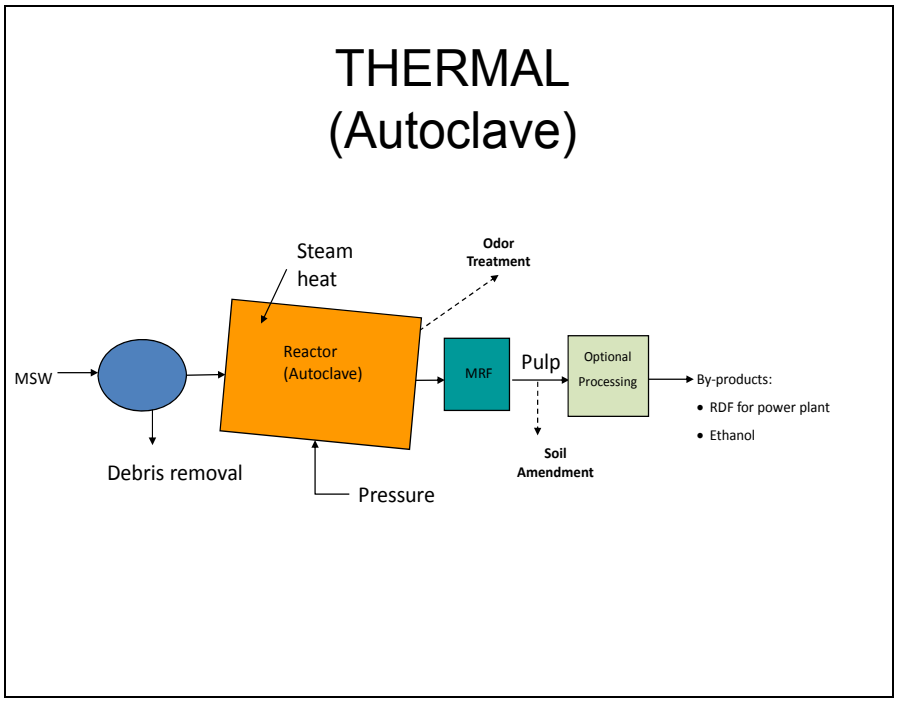


Figure 10. Basic Autoclave Process

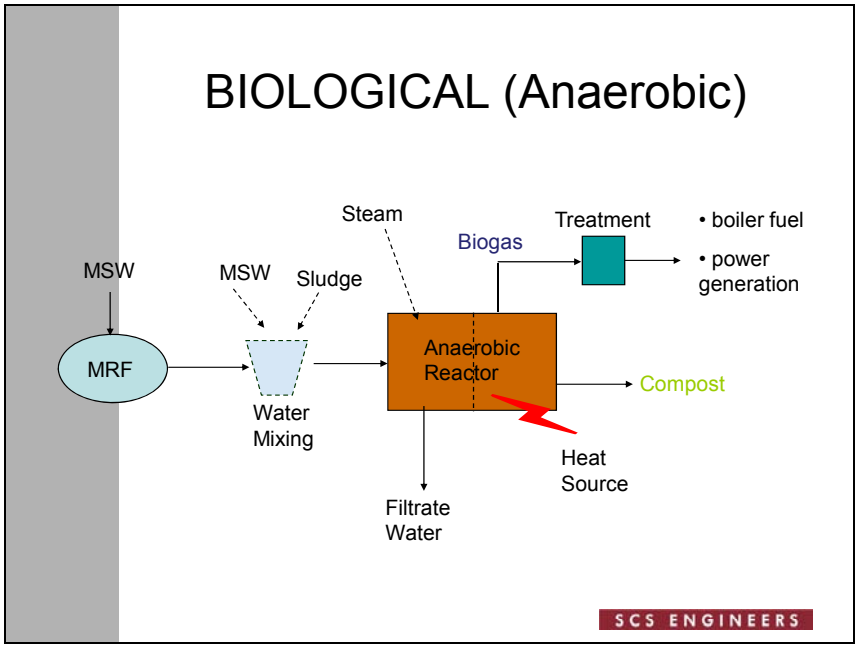


Figure 11. Basic Anaerobic Process

The aerobic process relies on a continuous supply of air to be mixed in with the waste material. Again, the waste is ground up into pieces. Recyclable materials are removed before this process. In a typical plant the waste was ground up and formed on an outdoor pad into long piles called windrows. The windrows would be agitated a few times per week to allow all parts of the pile to

be exposed to air. The agitation and aerating process can also be conducted in a vessel into which air is forced. The aerobic environment supports a different, but also common microorganism that, like the anaerobic process, feeds on the organic fraction of the waste. The waste is converted to by-products that include CO_2, water vapor and compost. Typically a site had to be located in a rural area, otherwise the odors from the process could become a nuisance.

3.5.2.2 Bio-Chemical

The bio-chemical process is based on breaking down the cellulosic part of the organic fraction of the waste stream. This would include certain foods (vegetables, fruits), paper products and yard vegetation. Biosolids can also be added as a waste material. All other materials in the waste stream should be removed prior to the process.

In the process, following drying and shredding of the waste, the prepared waste stream is mixed with water and sulfuric acid in a closed reactor vessel. This causes a reaction that in conjunction with common bacteria already in the waste, breaks down the material into sugar compounds and a by-product known as lignin. There are some companies that are testing natural enzymes, instead of the strong acid chemical, to initiate this reaction.

The resulting sugar compounds and water are sent to a fermentation unit where yeast is added. The yeast react with the sugars to convert them to alcohol. The alcohol mixture is then heated and distilled to remove the solids. The resulting distilled alcohol (grain alcohol or ethanol) can be used as fuel. The lignin by-product is sent to a gasifier where it is used to produce heat for the drying process or can potentially be further processed for use as a fuel substitute in power plants..

A basic bio-chemical process is shown in Figure 12.

3.5.3 Status of Alternative Conversion Facilities

3.5.3.1 Survey of Existing / Known Facilities

A summary of alternative conversion projects and their status is presented in Table 26. The types and total number of technologies that populate that table are broken down as follows in the following table. Some additional explanation and discussion of the status of the various technologies is provided below.

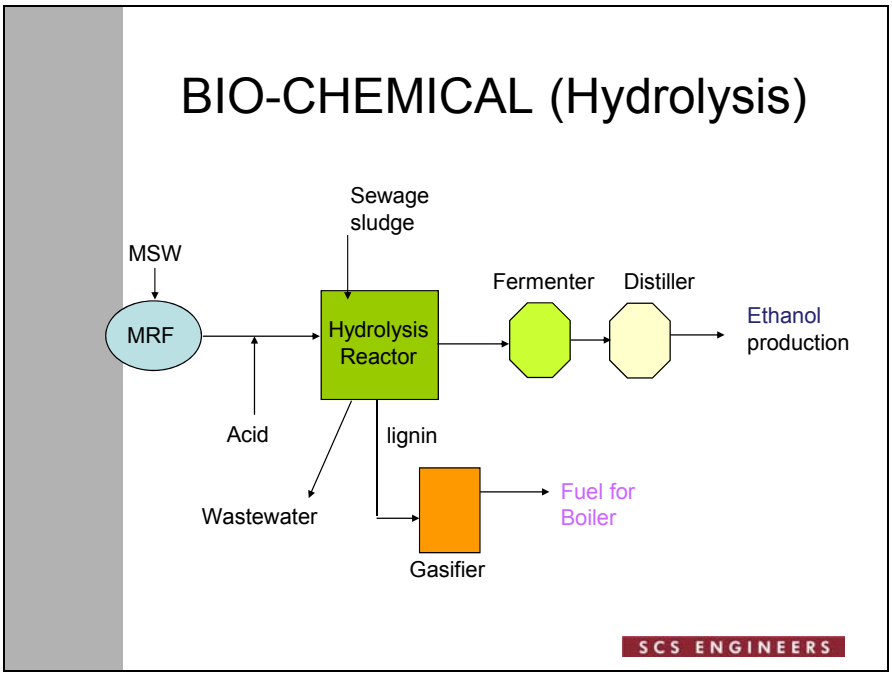


Figure 12. Basic Bio-Chemical Process

3.5.3.2 Biochemical

The following table lists number and type of biochemical facilities in the country.

Technology / Process	Number of Facilities *
Thermal	13
Biological	3
Bio-chemical	2

* Limited to U.S. mainland

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3.5.3.3 Biological

3.5.3.3.1 Aerobic Facilities

In the U.S. the aerobic process is used to compost vegetation, biosolids and agricultural wastes (plant and animal) because it is a relatively "low tech" operation. In some areas the compost was in demand by the public as a soil conditioner. However, most operations were never able to develop sustainable markets for sale of the compost, mostly due to the relatively cheap price for synthetic fertilizer. The lack of a market for compost to generate revenue to help offset operating costs, problems with odors and contaminated runoff at some facilities, and more than a few well-publicized operational failures in parts of the U.S. (attempting to process MSW), have led to a significant decline in the use of this process, on a large scale anyway.

There were only a few plants that attempted to process MSW. Currently, there are no known aerobic facilities processing MSW in the U.S.

Table 26. Recent North American Activity

Location	Technology / Material	Status
BlueFire Ethanol, Southern CA (various)	Acid Digestion / sorted MSW, wood wastes	Planning, permitting
Edom Hill, CA	Anaerobic Digestion / MSW	Permitting/ Delayed
L.A. County, CA	Anaerobic digestion, Gasification, TDP / MSW	RFP for Pilot Plant "competition"
University of California, Davis, CA	Anaerobic Digestion / Food Scraps	Operational / 10 TPD
Salinas Valley Solid Waste Authority	Autoclave / MSW	Construction / 700 TPD
Masada Resources Group, Middletown. NY	Chemical Digestion / MSW	Delayed / 500 TPD?
Santa Barbara County, CA	Evaluated 3 technologies	Delayed
Logite International, Bingham County, ID	Gasification / MSW	Groundbreaking / 100 TPD
BRI Energy, Fayetteville, AR	Gasification / MSW	Operational / 1.3 TPD
Gainesville Regional Utility, FL	Incineration of Biomass, MSW, wood wastes, tires	Proposal Evaluation
St. Lucie County, FL	Plasma Arc / MSW	Financing / Delayed ?
Plasco Energy Group / Ottowa, Canada	Plasma Arc / MSW	Operational / Shakedown/ 85 TPD
Plasco Energy Group / Ottowa, Canada	Plasma Arc / MSW	Planning / 400 TPD
City of Tallahassee, FL	Plasma Arc / MSW	Negotiation w/vendor
Koochiching Economic Development Authority, MN	Plasma Arc / MSW	Planning Grant
Sun Energy Group, LLC New Orleans	Plasma Arc / MSW	Planning
Aitken County, MN	Plasma Arc / MSW	Planning Grant
Levy County, FL	Plasma Arc / MSW	Mobile demonstration from vendor
IES, Romoland ,CA	Pyrolysis / MSW	Operational / 30 TPD

3.5.3.3.2 Anaerobic Facilities

In Europe, the anaerobic process has been used successfully to process MSW. There are at least a dozen plants total, in countries including Germany, Sweden, Italy, France, Finland, Belgium and Austria. The size of these plants reportedly range from 3,000 tons per year (TPY) to 182,000 TPY. Converted to a daily capacity, and assuming a 6-day per week processing schedule, these capacities range from 10 tons per day to 580 tons per day.

There are no known anaerobic plants processing a typical mixed MSW stream in the U.S. Currently, there are 2 or 3 anaerobic plants in the U.S. slated to process MSW. They are all in the planning and permitting stages. There is one pilot plant in southern California, that is successfully processing about 10 tons per day of left-over foods from restaurants and businesses into methane that is used to produce power.

3.5.3.4 Thermal

By a wide margin the largest amount of activity is with the thermal technologies, and that is dominated by the plasma arc conversion process. This is mainly due to their potential for large power production and overall reduced air emissions.

Until this year there were only two thermal plants in operation processing MSW, both very small test units based on the pyrolysis-gasification process. These units may not have been operated on a continuous basis. The largest unit had a design capacity of 30 tons per day.

In late spring of 2008, the first full-scale plasma arc converter processing MSW went on-line in North America. The Plasco Energy Group operates an 85 tons per day unit in Ottawa Canada at the Trail Road Landfill. This unit is operating for 2 years in a test mode with significant oversight of the Canadian regulatory authorities to prove the technology.

3.5.4 Minimum Processing Capacity

If a new plant based on an alternative conversion technology were to be planned to replace the existing WTE plant, such a facility would need to have a capacity of at least 2,000 tons per day. It is likely that the new facility would consist of multiple, smaller capacity modules, on the order of 400 to 700 tons per day or, several smaller facilities located in different areas, and in both cases providing an aggregate capacity of 2,000 tons per day.

There are no known alternative conversion process plants currently operating in the U.S. that have anywhere near that capacity. Only one, currently under construction for the Salinas Valley Solid Waste Authority, CA may approach 800 tons per day. There also is a facility planned for St. Lucie County, FL that was originally conceived a few years ago to have a capacity of 3,000 tons per day, but has since been scaled back in planning discussions to 1,000 tons per day.

The lack of an operational track record for large-scale alternative conversion technologies and for that matter, of any size for some of the specific technologies, suggests to SCS that an alternative conversion technology plant should more likely be planned initially as a small pilot-plant. A pilot plant, in SCS' opinion, based on proven laboratory and mini-pilot scale

technology, would be no more than about 100 tons per day with the potential for scale-up should the technology be proven at the pilot stage.

The point here being that the time frame to scale up from around 100 tons per day to a 500 to 700 tons per day module could take many years, based on SCS' experience.

3.5.5 Readiness for Commercial Operations

Some, but not all of the alternative conversion technologies are ready for commercial operation. Table 27 summarizes the main processes discussed herein and whether, in SCS's opinion, they are ready for commercial operation on a scale necessary to serve the Region.

Table 27. Summary of Main Processes

Process	Pre-Processing	By-Product	Primary Product	Pilot Plant Readiness	Commercial Readiness
Pyrolysis	High	Ash	Syngas/ Oil	Yes	No
Gasification	Med.	Ash/Slag	Syngas/ Char	Yes	No
Autoclave	Low	None/ Recyclables	Pulp	Yes	Yes
Anaerobic Digestion	Med./High	Filtrate Water	Biogas/ Compost	Yes	Yes
Hydrolysis	High	Waste Water/ Ash	Ethanol	Yes	No
Aerobic Digestion	Med./High	None	Compost	Yes	Yes
Plasma Gasification	Claims Low/High	Slag	Syngas	Yes	No

3.5.6 Comparison of Alternative Technologies to a WTE Facility

3.5.6.1 Benefits and Disadvantages

All of the alternative waste conversion technologies have some potential benefits and disadvantages. These should be carefully weighed against the benefits and disadvantages of a conventional WTE plant and/or sanitary landfill in the decision-making process. The over-riding aspect of all of the alternative technologies is that they are relatively new and thus do not have a "track record" from which one can derive hard conclusions related to actual, proven benefits and disadvantages. So, SCS can only postulate what the actual benefits and disadvantages and economics might be, based on assessing the information available from vendors, some very small-scale pilot plant facilities that may have operated intermittently, and these technologies that are processing waste streams other than a normal mixed municipal solid waste.

Table 28 summarizes the advantages and disadvantages of the alternative technologies and the WTE technology. In an overall sense the following conclusions, in addition to the comments in the table, can be made about the viability of the technologies:

- Biological (anaerobic): Commercial scale proven at smaller capacities (i.e., 200 to 300 tons per day) in Europe. Developing a consistent market for the compost by-product is a major challenge and affects the operating economics. Only a few small scale plants are currently planned in the U.S.

- Thermal: Generally unproven at a commercial scale. One small pilot facility (85 tons per day) is operating in Canada. A complex process that must be optimized to provide the desired high-quality synfuel. There is a lot of planning activity going on and in the next 5 years there will likely be some operational plants with appropriate capacity operational plants.

- Bio-Chemical: Unproven at a commercial scale. A few plants have been planned, but have been delayed. Tied to the dynamic market for ethanol and competition with many other processes that do not use MSW.

3.5.6.2 Capital and Operating Costs

Due to the relatively recent development of the alternative conversion technologies, there are few, if any, full-scale operational plants in the U.S. Thus, there are not reliable figures readily available for capital and operating costs.

Two large, relatively recent studies were conducted as part of a detailed review of alternative waste conversion technologies in the U.S. The study which is on-going, were sponsored by Los Angeles County California, as continuation of that region's program initiated in 2003 to further address the regions acute problems with energy pricing and availability, air quality, traffic congestion and reliance on landfills that had limited useful life. The study originally screened 27 technologies in the initial phase (2005) and reduced the list to five "finalists" technologies in the 2007 report. The finalists are planning to build small-scale demonstration plants to prove the technology.

Although there have been other large alternative technology screening / evaluation studies conducted (i.e., New York City, 2004), the LA County studies seem to have the most detailed information on projected U.S.-based plant costs and economics.

Table 29 summarizes the project economics for biological and thermal alternative conversion technologies that were developed as part of the LA County study in 2007. These were for the five demonstration plants to be developed in southern California only. The study indicated that the costs and economic summaries were provided by the technology vendors, using some pricing assumptions for specific items provided by the planning committee. The consultant retained by LA County had an independent review of the costs and economics provided by the vendors conducted and concluded that the figures provided were, in general, reasonable estimates that matched with the independent assessment's conclusions.

Table 28. Advantages and Drawbacks to Waste Processing Technologies

Process	Advantages	Drawbacks
Thermal – Pyrolysis / Gasification	Potential for high power production, high conversion	Untested, possibly high O&M costs, ash disposal
Thermal – Autoclave	Provide higher quality recyclables	Lack of market for compost
Biological – Aerobic	Proven, "low" tech. Emissions less of a concern.	Some odor. Lack of market for compost, low conversion
Biological – Anaerobic	Low emissions, low odor	Lack of market for compost
Plasma Gasification	Potential for high power production, high conversion	Untested, possibly high O&M costs, safety concerns, slag market (?)
Bio-Chemical (Hydrolysis)	Fuel production, biosolids processing	Untested, treats only cellulosic part of waste
WTE Plant	Proven large-scale technology	Large volumes of unusable ash, costly air emission control systems

Table 29. Summary of Project Economics for Thermal and Biological Conversion Technologies[1]

Technology	[2]Annual Throughput (TPY)	Projected Design Capacity (TPD)	Capital Cost ($)	Capital Cost Per ton ($/ton)	[3]O&M Costs ($)	Total Costs ($)	Estimated Annual Revenue ($)	Estimated Net Costs ($)	Calculated Tipping Fee ($/ton)	Tipping fee Variation ($/ton)	Adjusted tipping Fee ($/ton)
Biological (Anaerobic)	100,000	300	21,000,000	70,000	4,900,000	8,170,000	3,000,000	5,170,000	52	6	58
Thermal (autoclave)	51,100	200	35,000,000	175,000	9,000,000	13,100,000	8,400,000	4,700,000	92	0	92
Thermal (Pyrolysis Gasification)	80,000	242	30,140,000	125,000	5,580,000	7,740,000	3,280,000	4,460,000	56	2	58
Thermal (Gasification)	97,000	312	75,200,000	241,000	11,000,000	20,700,000	8,000,000	12,700,000	131	1	132
Thermal (Gasification)	138,000	413	56,600,000	137,000	8,260,000	14,200,000	6,300,000	7,900,000	57	12	69

[1]Excerpted and Summarized from the L.A. County, California Conversion Technology Evaluation Report, Phase II Assessment, dated October 2007.
[2]Tons per year (TPY), demonstration plant only.
[3]1st year costs only, does not include annual debt service.

LA County considered a tipping fee in the range of $50 to $70 per ton, to be competitive with the tipping fees charged by the large regional landfills serving the area. Table 29 indicates that two of the four thermal technologies and one anaerobic technology, provided costs that indicated the plant could offer a tipping fee in the $50 to $70 per ton range.

Table 30 compiles costs from the 2005 and previously discussed 2007 LA County studies. The middle column are tipping fees summarized from the economic projections rendered in the 2005 study, which had similar, but not exactly the same pricing and cost assumptions as in the 2007 follow-on study. Tipping fees in the 2005 study ranged from $61 to $197 per ton for the eight vendors. Two plants were in the $50 to $70 per ton range while six were higher than that. The tipping fees from Table 29 are provided as a comparison in the last column of Table 30.

The difference in tipping fees from 2005 to 2007 probably reflects some differences in the pricing assumptions in individual studies including; proposed plant capacities were larger in 2007 and purchase price range for power produced were different. It may also be assumed that the market conditions for the development of these plants from 2005 to 2007 probably became a little more favorable as basic energy costs in the U.S. continued escalating.

On the other hand, conventional WTE plant technology, having been in existence for decades and hundreds of plants operating in the U.S. and abroad, have better cost information, although a completely new WTE plant has not been constructed in the U.S. in more than 10 years.

Figure 13 presents a visual summary comparison of the tipping fees estimated for the alternative conversion technologies in the LA County studies and the tipping fees for operating WTE plants. The graph shows that the appropriate “average” tipping fee for a WTE plant is about $60 per ton. The estimated “low” and “high” range is estimated to be from about $35 to $80 per ton, respectively.

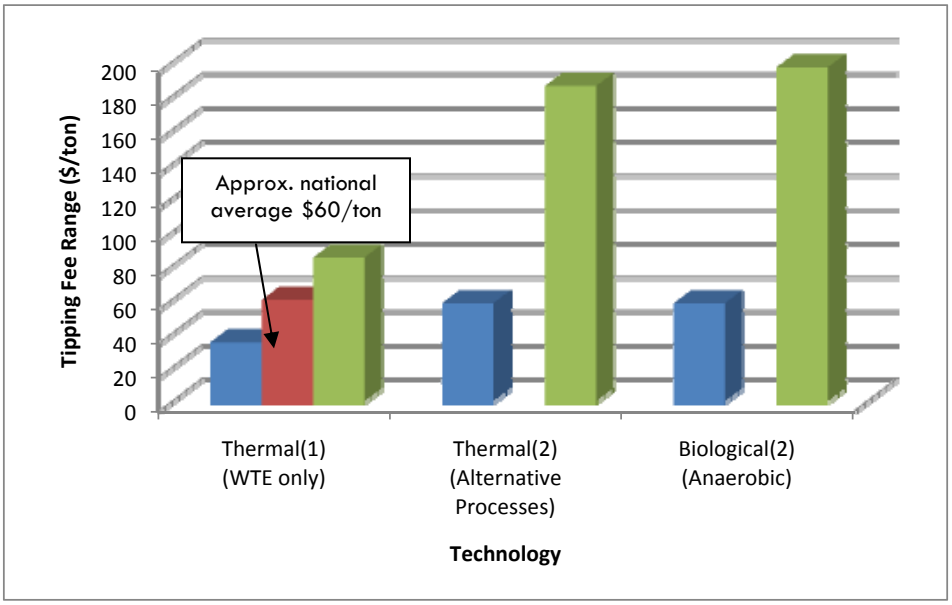
The tipping fee ranges for alternative technologies, taken from Table 29 and Table 30 are provided as a crude comparison to the WTE tipping fee. A much large range of tipping fee, from low to high is evident. These plots reflect the normal uncertainties and risks at the time of the studies, that the vendors experienced, which would not be unusual for technology that is still in the development or pilot plant stages. Most WTE plants in the U.S. have a capacity anywhere from 500 to about 4,000 tons per day and this affords them a valuable “economy of scale” over the much smaller proposed alternative technologies.

Such a large range of tipping fees for alternative technologies may not actually be the case if a study were done today. Projected tipping fees are a function of many regional cost factors, including

- Power Production / Quality & Quantity of Syngas,
- Air Emissions & Treatment,
- Market for By-Products,
- Downtime / Equipment Reliability,
- Pre-processing Requirements (need a MRF?, etc.),
- Operator Experience,

- Financial Contributions by Vendor,
- Ancillary Costs (transmission line, etc.); and
- Contractual Obligations.

However in SCS's opinion, these summary costs suggest that tipping fee ranges are likely to be somewhat higher than a WTE plant, until enough of the plants are operating and hard costs are generated to validate that they can operate at a tipping fee comparable to a WTE plant.



(1)Existing operating plants.
(2) Proposed demonstration, small-scale plants only. (8 plants total)

Legend
Low end
High end

Figure 13. Summary of Tipping Fee Range for Technologies

Table 30. Summary of Economic Data[1]

Technology	[2]Projected Design Capacity (TPD)	[1]Calculated Tipping Fee ($/ton)	[3]Calculated Tipping Fee ($/ton)
Biological (Anaerobic)	100	93	58
Biological (Anaerobic)	100	67	--
Biological (Anaerobic)	100	197	--
Thermal (Autoclave)	--	--	92
Thermal (Plasma-Arc)	100	172	--
Thermal (Gasification)	150	61	58
Thermal (Gasification)	300	186	132
Thermal (Pyrolysis-Gasification)	100	129	60

[1]Excerpted and Summarized from the L.A. County, California Conversion Technology Evaluation Report, Phase I Assessment, dated August 2005.
[2]Tons per year (TPY), demonstration plant only.
[3]Tipping Fee from Table 29, based on Phase II Study in October 2007. Some different pricing assumptions from August 2005 account for most of the difference in tipping fees.

3.5.7 Recommended Disposal Technology

SCS does not foresee any of the current alternative conversion technologies as being a total, or even a significant partial replacement for other options based around use of traditional landfilling and WTE plants. SCS does not advocate relying primarily on technology that has yet to be proven on a commercial scale and potentially putting the operation of a regional system at significant operational risk.

Should one or more of the technologies come on-line in the U.S. and generate a few years of positive operating history and competitive costs, then that technology may have an application in the Region.

There may be some compelling reasons and benefits for the Commission to consider investigating further the alternative technologies, and even possibly cooperating on developing a small-scale pilot plant. These include;

- Regionally integrating other proven technologies and reducing reliance on the availability of any one technology
- Meeting a potential market need, as might be the case for a high-quality compost product produced by one of the technologies
- The potential that future "local" landfill space may not be available at any cost.

SCS's recommendation as it relates to alternative technologies is that the Region should consider conducting a focused program to identify a suitable technology and location for a demonstration, pilot plant that would meet demonstrated or forecasted needs in the Region. The Region should in the meantime, continue to optimize its existing RDF WTE facility.

As stated previously (in Section 2.0), SPSA does not currently have a facility dedicated to the handling and processing of the Region's yard waste, although it is understood that this issue will be addressed in the near future. An optimum system for the planning period of this study would include a facility similar to the yard waste mulching and composting facility that was located at the Virginia Beach Landfill No. 2. The facility would be located so that transportation costs are minimized. Multiple facilities, or satellites of a larger facility, could also minimize hauling costs.

3.6 YARD WASTE

The Region does not currently have a facility dedicated to the handling and processing yard waste, although it is understood that this issue will be addressed in the near future and some mulching of yard waste is performed by SPSA at the Virginia Beach Landfill No. 2. An optimum system for the planning period of this study would include a facility similar to the former yard waste mulching and composting facility that was located at the Virginia Beach Landfill No. 2. The facility would be located so that transportation costs are minimized. Multiple facilities or satellites of a larger facility could also minimize hauling costs, especially for the more rural areas of the Region.

Yard waste processing would include mulching and composting. The end product of these processes would be a potential source of revenue (as it has been). The facility, or facilities, would be compatible with the area in which they were located. Odors may be mitigated, if needed, through the use of thermal in-vessel systems (autoclave or anaerobic digester). Anaerobic processes produce biogas which can be used for power production.

3.7 CONSTRUCTION AND DEMOLITION DEBRIS

3.7.1 Regulatory Initiatives in Virginia

Although no new initiatives from the Commonwealth appear to be eminent, the DEQ would like to promote the recycling of CDD. Such an initiative may include some type of credits for disposing of CDD waste at facilities that incorporate recycling.

3.7.2 CDD Processing and Recycling

With increasing costs for disposal and the value of recycled commodities from CDD (e.g., wood, metals, brick, clean fill), CDD recycling is increasing in the Region. The current CDD recycling facilities in the Region are discussed in Section 2. SCS anticipates that the private sector will effectively provide for CDD recycling during the projected 30-year planning horizon of this study.

3.7.3 CDD Disposal

As discussed in Section 2, several CDD and Industrial Landfills that accept CDD are located in the Region. In addition, CDD is accepted at the Regional Landfill. SCS anticipates that if a new regional landfill is located further from the urban areas than the current Regional Landfill in Suffolk that more CDD will likely be diverted for recycling or disposal at the private CDD and Industrial landfills.

3.8 FUTURE FACILITY NEEDS

This section presents the method and results of analyses performed to determine the requirements of a future regional and/or municipal dedicated landfill should the Region decide to pursue this option as a way to obtain sufficient waste disposal during the planning period (2018 to 2047). The analysis described here includes an estimate of the amount of land needed for the regional waste disposal facility and a projection on the amount of waste that will be required to be disposed during the planning period.

3.8.1 Waste Capacity Estimating Approach

To estimate the required land requirements of a potential future regional disposal facility, SCS obtained the physical characteristics of the SPSA Regional Landfill from the primary design engineering firm (HDR Engineering). The basic assumption of this analysis is that any new regional landfill will have the approximate development potential as the Regional Landfill.

The various factors used to determine potential requirements of a future regional landfill were developed as follows:

- Land Area - The SPSA Regional Landfill has a total land area of 833 acres. The net, total waste footprint of Cells I through VII is approximately 238 acres (this assumes that Cell VII will be permitted and constructed). The area of the facility not used for landfill footprint is used for office space and operations, buffers, perimeter access roads, drainage swales, storm water retention ponds, etc. The balance of the land at the facility is wetlands that, due to regulatory issues, cannot be developed.

- Waste Volume – The total estimated volume of waste for Cells I through VI at closure, including daily or intermediate cover and internal access roads is 37.2 million cubic yards.

- In order to take an undeveloped parcel and portion the area for waste disposal, roads, drainage, stormwater, retention areas, etc. (with an allowance for wetlands), several assumptions are made to simplify the estimates.

- Assuming an average in-place long-term waste density of 0.77 tons per cubic yards (tcy), the total capacity of the Regional Landfill is 28.6 million tons (37.2 million cubic yards x 0.77 tons per cubic yards).

- The ratio of total acreage to in-place volume for the Landfill is 29.1 acres per million tons capacity (833 acres/28.6 million tons).

- The ratio of landfill footprint acreage to in-place volume for the current Regional Landfill is 8.3 acres per million tons capacity (238 acres/28.6 million tons).

The above factors were used to estimate the total amount of land and landfill footprint that would be needed for a new regional landfill. Using the above values, the solid waste disposal area ratio of 0.28 acres of landfill footprint to total facility area was calculated. Table 31 summarizes the landfill development factors.

Table 31. Summary of Landfill Development Factors

Total Solid Waste Disposal Capacity	29.1 acres per million ton
Footprint Solid Waste Disposal Capacity	8.3 acres per million ton
Solid Waste Disposal Area Ratio	0.28 acres waste footprint per gross acre

Using the values in Table 31, the land requirements for a new regional solid waste facility were estimated as discussed in Section 5.0.

3.8.2 Waste Flow Projections

In order to estimate the total volume of waste that will require disposal during the planning period, projections were made starting with the estimated waste flow volumes for individual waste streams (residential and nonresidential) for 2008 (RW Beck, 2008). The individual waste stream volumes were escalated through the end of the planning period at rates that vary with each waste category. Residential waste flow was escalated annually at rates that correspond to projected population increases (see Section 2.2). In addition to waste streams handled by SPSA, the waste disposed in the landfills owned and operated by the cities of Virginia Beach and Portsmouth (Landfill No. 2 and Craney Island Landfill) were included. Non-municipal waste flow streams were escalated based primarily on historical data. When historical data indicated a negative, or declining waste flow, as a conservative assumption, a slightly increasing waste generation rate was assumed.

Table 32 summarizes the individual waste flow streams and their projected accumulated volumes through the planning period.

Table 32. Projected Solid Waste Quantities for Planning Period (Not Including Yard Waste)

Waste Flow Stream	Waste Growth Escalation Rate (%/year)	Projected Waste Flow in 2008 (tons)	Projected Waste Volume Through the Planning Period (tons)	Percentage of Total (%)
Chesapeake	1.15	117,000	4,668,000	8.2
Franklin	.92	4,600	173,000	.3
Isle of Wight	1.89	20,600	991,000	1.7
Norfolk	.07	87,900	2,683,000	4.7
Norfolk Sludge	2.82	15,000	915,000	1.6
Portsmouth (to SPSA)	.21	55,000	1,737,000	3.1
Portsmouth (to City Landfill)	.21	15,000	474,000	.8
Southampton	1.18	9,800	394,000	.7
Suffolk	1.5	64,000	2,788,000	4.9
Virginia Beach (to SPSA)	.07	147,000	4,486,000	7.9
Virginia Beach (to Landfill No. 2)	.07	56,000	1,709,000	3.0
Commercial	1	594,000	22,824,000	40.2
Navy	.5	42,000	1,425,000	2.5
CDD	1.5	120,000	5,228,000	9.2
Other/Out of Area	1.5	145,000	6,317,000	11.1

Section 5.0 presents and evaluates various cooperative scenarios and the projected waste flows and disposal requirement for each. As an example, based on the data presented in the Table 32, the total volume that will need to be disposed during the planning period is 56.8 million tons (not including yard waste). SCS evaluated the total facility land requirements for a new regional

landfill assuming the above development factors and waste projections. Table 33 presents the estimated facility sizing for three scenarios

- **No WTE**. All solid waste is disposed in the landfill and the WTE facility is retired.
- **Maintain Operation of RDF WTE Facility**. The WTE facility is kept operational, and the ash, bypass, and excess waste is landfilled.
- **Maximize WTE.** A new 2,000-ton per day mass burn WTE facility is constructed, complimenting the existing RDF WTE facility, and the ash, bypass, and excess waste from these facilities is landfilled.

As can be seen, maintaining the existing WTE facility or increasing the utilization of WTE in the Region, significantly reduces the projected land area needed for a new regional landfill facility.

Table 33. Landfill Facility Sizing Estimates Planning Horizon 2018-2047

Scenario	Total To Be Landfilled (Million Tons)	Est. Land Required (acres)
No WTE	43.8	1,300
Maintain RDF WTE	30.8	900
Maximize WTE	17.0	500

3.8.3 Recycling Rates

For the purpose of this study, SCS assumed that recycling rates would continue to comply with or exceed the minimum 25 percent recycling rate mandated by the Commonwealth.

3.8.4 Resource Recovery

Resource recovery is discussed in Section 5.0.

4.0 ALTERNATIVE INSTITUTIONAL MODELS

SCS developed, screened, and analyzed alternative institutional models for regional solid waste management, including public, private or combination systems. This task included interviewing the CAO's of the Region to receive input on their ideas about potential alternatives for long-term management of the Region's solid waste, review of SPSA's organization and governance, a survey of other comparable solid waste authorities and organizations to document the institutional structure, services provided, unique challenges, and cost structures employed elsewhere. For the purposes of this project, SCS assumed the following institutional models would be evaluated to identify the required organizational structure, staffing, cooperative agreements needed, and advantages and disadvantages of each:

- A new fully integrated, publicly owned and operated facility managed by a new regional authority.
- A fully integrated, publicly owned and operated facility managed by SPSA or some modified version of SPSA.
- A public/private partnership managed by a regional authority (SPSA or a new authority).
- Each municipality independently manages its own solid waste stream and develops contracts for collection, processing, and disposal services.
- Select municipalities agree to cooperate together to manage their solid waste and develop contracts for collection, processing, and disposal services.

This section presents the results of these evaluations.

4.1 OVERVIEW OF SOUTHEASTERN PUBLIC SERVICE AUTHORITY

The Southeastern Public Service Authority (SPSA) was created in 1973 pursuant to the Virginia Water and Waste Authorities Act (Section 15.2-5100 et seq. of the Code of Virginia). One of the purposes of the Authority, as stated in its Articles of Incorporation, is to acquire, finance, construct, operate and maintain a garbage and refuse collection and disposal system.

The members of SPSA are the Cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach and the Counties of Isle of Wight and Southampton. All eight of the member cities and counties have entered into Agreements for Use and Support of a Solid Waste Disposal System with SPSA. Each community agrees to deliver to SPSA at least 95 percent of all disposable solid waste generated within, collected by, or otherwise under the control of the contracting community. Each of the members are assessed a per ton tipping fee (with the exception of the City of Suffolk), as established under fee schedules imposed by SPSA. The Ash and Process Residue Agreement with the City of Virginia Beach sets a cap on the tipping fees paid by the City.

For seven of the members, the use and support agreements became effective on January 22, 1985, the date on which SPSA's landfill began accepting solid waste. The use and support agreement for the City of Virginia Beach became effective on the date fixed under a contract with the U.S. Navy that began in 1984 as the start-up date of a Refuse Derived Fuel (RDF) plant. Under the Navy Contract, RDF produced at the RDF WTE Facility was to be provided to the Navy to produce steam and electricity at the U.S. Navy's power plant.

The use and support agreements will remain in effect until January 2018. At that time each city and county member will have the option of renewing or renegotiating agreements with SPSA, although these decisions will likely be made well before that time.

4.2 REVIEW OF INSITUTIONAL SOLID WASTE MANAGEMENT MODELS USED ELSEWHERE

As part of this planning process, many discussions were held with community member staff. A common topic during these discussions was the structure of SPSA and how it will affect regional cooperation after 2018 when the use and support agreements expire. While some members think the current structure is adequate and has served the Region well, most believe that a new structure is needed given the complex technical, environmental, and financial issues facing SPSA.

It is important to acknowledge that decisions regarding the future management structure of SPSA will be made by each member jurisdiction's elected officials and will not be resolved in this planning process. The purpose of this planning process is to provide a forum for discussions among elected officials. With this purpose in mind, information on management structures used by other solid waste authorities and organizations was gathered and a possible management structure for SPSA is presented as a basis for future discussion. Careful evaluations of all management structures should be conducted in an open, transparent atmosphere to clearly identify the benefits, responsibilities, shortcomings, and commitments of each option.

4.2.1 Systems Evaluated

The purpose of this section is to compare the management structure used by SPSA to the management structure used by select solid waste authorities and organizations across the county. The solid waste authorities and departments evaluated include:

- Central Virginia Waste Management Authority
- Connecticut Resource Recovery Authority
- Delaware Solid Waste Authority
- Environmental Cooperative of Maine
- Fairfax County Department of Public Works
- Lancaster County Solid Waste Authority
- Sanitation Districts of Los Angeles County
- Northeast Maryland Waste Disposal Authority
- Solid Waste Authority of Palm Beach County
- Pinellas County Department of Solid Waste Operations

- Portland Metro
- Virginia Peninsulas Public Service Authority

The authorities and organizations were chosen because they represent a wide variety of systems in terms of population represented, governance, solid waste services offered, type of facilities used, and facility ownership and operation. While one of the organizations studied was initially formed to provide recycling services needed within the region; most of the authorities studied were formed for the purpose of uniting various independent solid waste management programs to provide for a single, integrated system to serve an entire region.

4.2.2 Scope of Evaluation

Organization comparisons looked at differences between:

- Membership
- Governance
- Day-to-day administration
- Operations
- Debt management

The results of the evaluation for each authority and organization are presented in Table 34. A general overview of the evaluation is provided below.

4.2.2.1 Membership

Most had membership representing both cities and counties; membership ranged from five jurisdictions to more than 118. One authority is responsible for representing the entire state. The population represented ranged from 240,000 to over 5 million.

4.2.2.2 Governance

All of the organizations had some form of governing board, either county supervisors or commissioners in the case of county departments or a board of directors representing member jurisdictions. Board of directors' membership among the organizations evaluated ranged from seven to 29, with the average more in the range of seven to nine members. Smaller organizations tend to have board representation from all members; while larger organizations do not have representation of all members on the board. Many boards have more than one representative for larger jurisdictions. The majority of board members are appointed by member jurisdictions; few are elected specifically for the position. The qualifications of board members vary among organizations; some rely solely on primary decision makers from participating jurisdictions (i.e., elected officials), other boards use a mix of elected officials and non-political members (e.g., city administrator, high-level department staff, and knowledgeable citizens) with a range of experience and skills. All of the organizations are established under some form of state legislation and typically operate under member agreements.

Table 34. Solid Waste Authorities/Organizations

	Central Virginia Waste Management Authority	Connecticut Resource Recovery Authority	Delaware Solid Waste Authority	Environmental Cooperative of Maine (ecomaine)
Members				
Number of Cities/Counties/Other	8 counties, 4 cities, 1 town	118 towns/cities	state	21 member municipalities, 7 associate members
Population	~1 million	~2.4 million	~865,000	~240,000
Governance				
Governing Board	Board of Directors	Board of Directors	Board of Directors	Board of Directors
Board Constitution	18 members; determined by population of member jurisdiction. Appointed by member jurisdictions. Membership includes elected officials, jurisdiction staff, and citizens.	11 members; Connecticut General Statutes establishes the officials responsible for appointing directors and the qualifications for each director	7 members; appointed by Governor	29 members; appointed by member municipalities. Except for 4 cities (which are allowed more than 1 representative), each member municipality appoints 1 member. Associate members not represented.
Voting Members	Board of Directors, 1 vote per member	Board of Directors, 1 vote per member. Ad Hoc Board Members (8 additional members) have authority to vote only on certain matters	Board of Directors, 1 vote per member	Board of Directors, 1 vote per member. Executive Committee comprised of 9 board members; decision-making authority for specified tasks
Governing Document(s)	Political subdivision of the state. Authority By-Laws; service contracts	Established and governed by state statute	Established and governed by state statute	Nonprofit corporation under Maine statute. Agreements with member communities. Associate members sign 20-year contracts.
Other Functions	None	None	None	None
Day-to-Day Administration				
Executive Director	Appointed by Authority Board of Directors	Appointed by Chairperson of the Board of Directors	Appointed by Board of Directors	Appointed by Board of Directors
Staff	13 authority staff	By statute, staff cannot exceed 70 personnel		

Table 34. Solid Waste Authorities/Organizations

	Central Virginia Waste Management Authority	Connecticut Resource Recovery Authority	Delaware Solid Waste Authority	Environmental Cooperative of Maine (ecomaine)
Funding	Members pay CVWMA for contracted services used. All members pay a per capita annual assessment for administration.	Authority has no taxing power. Uses a general fund for central administration. Enterprise fund for disposal systems based on tip fees, electrical revenues, investments.	Primary revenue sources include tipping fees, recycling revenue, and landfill gas royalties.	Tipping fees. Members pay assessments if tip fees are not adequate to cover contractual obligations.
Operations				
Services	Contracts for trash and recyclables collection on behalf of interested members. Also operates drop-off collection containers for recyclables	The Authority is comprised of four comprehensive solid waste disposal systems.	Recycling, transfer, and disposal services. Collection services provided through licensed haulers.	Recyclables processing and waste-to-energy.
Facilities	None	4 waste-to-energy facilities, transfer stations, landfills for ash disposal	Operates transfer stations (3), recyclables management, and disposal facilities (3 landfills)	Single-stream material recovery facility and waste-to-energy facility
Ownership/Operation	Contracted services are provided by the private sector	Waste-to-energy facilities are operated by private companies. CRRA for other services.	Mostly DSWA with some private contracts (transfer stations and recyclables drop-offs)	ecomaine
Flow Control	No	No; uses economic flow control	Municipally collected waste by regulation must be sent to a DSWA facility	
Debt Management				
Debt	None	Yes	None. Uses reserve funds	Yes
Bondholder		CRRA		ecomaine

Table 34. Solid Waste Authorities/Organizations

	Central Virginia Waste Management Authority	Connecticut Resource Recovery Authority	Delaware Solid Waste Authority	Environmental Cooperative of Maine (ecomaine)
Repayment System		Revenues. Some construction bonds require repayment by the contractor for the facility and not the authority.		Revenues

Table 34. Solid Waste Authorities/Organizations

	Fairfax County, Virginia	Lancaster County Solid Waste Management Authority	Sanitation Districts of Los Angeles County	Northeast Maryland Waste Disposal Authority
Members				
Number of Cities/Counties/Other	County, 3 cities, 2 towns	County, 60 municipalities	County, 78 cities	8 counties
Population	~1 million	~495,000	~5.3 million	~3.7 million
Governance				
Governing Board	Fairfax County Board of Supervisors	Board of Directors	A partnership of 24 independent special districts that work with one central, administrative staff	Board of Directors
Board Constitution	Elected officials	9 members; appointed by Lancaster County Board of County Commissioners	Each sanitation district has a Board of Directors consisting of the mayor of each city within the district and the chair of the board of supervisors for unincorporated territory.	9 members; eight are appointed by the Governor respresenting member jurisdictions; one serves ex officio (Director of Maryland Environmental Service)
Voting Members	Board of Supervisors	Board of Directors, 1 vote per member	Board of Directors, 1 vote per member	Board of Directors, 1 vote per member
Governing Document(s)	Code of Virginia and county ordinances	County-Authority agreement (Municipal Waste Management Agreement), intermunicipal agreements	Special districts. The 24 districts work cooperatively under a joint Administration Agreement. Joint Powers agreements for separate authorities to own waste-to-energy facilities.	State legislation
Other Functions	None	None	Wastewater treatment	None
Day-to-Day Administration				
Executive Director	No	Appointed by Board of	No. Administrative staff	Appointed by Board of

Table 34. Solid Waste Authorities/Organizations

	Fairfax County, Virginia	Lancaster County Solid Waste Management Authority	Sanitation Districts of Los Angeles County	Northeast Maryland Waste Disposal Authority
		Directors	led jointly by Chief Engineer and General Manager	Directors with approval of the Governor
Staff	Fairfax County Department of Public Works; 33 administrative, 289 operations	79 total staff	Administrative staff organized into 8 departments	~ 10 administrative staff
Funding	Annual fee on real estate tax bill for collection services. General fund for other operations offset by revenues from electricity sales.	Enterprise system; financed primarily by tipping fees and sale of electricity; no tax support	Each sanitation district pays a proportionate share of joint administrative costs. Funding through user fees and other revenues	Self supporting; receives minor appropriations from members
Operations				
Services	Limited refuse and leaf collection services, waste-to-energy and ash disposal	Disposal services and household hazardous waste collection	Recyclables processing, waste-to-energy and landfilling	Disposal, waste-to-energy. Ash sent to various landfills.
Facilities	Transfer station, waste-to-energy facility	Transfer station, waste-to-energy facility, landfill, household hazardous waste facility	Material recovery facilities, transfer stations, waste-to-energy, landfills	Waste-to-energy
Ownership/Operation	Public; waste-to-energy facility operated under private contract	Facilities are owned and operated by LCSWMA; waste-to-energy facility operated under private contract	A mixture of authority and public ownership for landfills; authority operated. Separate authority/public ownership agreements for waste-to-energy facilities (Southeast Resource Recovery Facility Authority and Commerce Refuse-to-Energy Authority);	Authority owns 2 facilities; 1 is privately owned. All operated under private contract.

Table 34. Solid Waste Authorities/Organizations

	Fairfax County, Virginia	Lancaster County Solid Waste Management Authority	Sanitation Districts of Los Angeles County	Northeast Maryland Waste Disposal Authority
			authority/private operation.	
Flow Control	No. Uses several mechanisms to obtain waste flows: • Agreement with Prince William County to exchange yard waste generated in Fairfax County for Prince William County MSW; • Agreement with the District of Columbia to deliver waste to the E/RRF (this agreement may not be extended beyond its current expiration); • Contracts with haulers operating in Fairfax County to deliver all waste collected in the county in exchange for a reduced disposal price; • A spot market program to attract local, but out-of-county, MSW to the E/RRF.	Yes/No. By regulation, all waste must be delivered to an LCSWMA facility or to a facility located outside of Pennsylvania. Also, delivery is secured via 5-year agreements between LCSWMA and private waste haulers. A rebate on the tipping fee is available to any hauler that agrees to deliver to LCSWMA all waste generated in Lancaster County that is in the control of the hauler.	No.	No.
Debt Management				
Debt	Yes	Yes	Yes	
Bondholder	Fairfax County	LCSWMA	Commerce Refuse-to-Energy Authority	
Repayment System	General Fund	Revenues	Revenues	

Table 34. Solid Waste Authorities/Organizations

	Solid Waste Authority of Palm Beach County	Pinellas County, Florida	Portland Metro	Virginia Peninsulas Public Service Authority
Members				
Number of Cities/Counties/Other	County, 38 municipalities	County, 24 cities	3 counties, 25 cities	7 counties, 3 cities, 3 towns
Population	~1.4 million	~950,000	~1.4 million	
Governance				
Governing Board	Solid Waste Authority Governing Board	Pinellas County Board of Commissioners	Metro Council	Board of Directors
Board Constitution	7 members; County Commissioners of Palm Beach County	7 members, elected officials	7 members, elected Councilors	10 members representing counties and cities; appointed by city council or county board of supervisors. Typical membership is county administrator, city manager, director of public works, city engineer.
Voting Members	Board of Directors, 1 vote per member	Board of Commissioners, 1 vote per member	Metro Councilors, 1 vote per member	Board of Directors, 1 vote per member
Governing Document(s)	Dependent Special District created by Florida Legislature; Special Act	Florida law, county ordinances	Home rule charter approved by voters	Political subdivision of the state. Service agreements between authority and members
Other Functions	None	None	Urban growth, transportation planning, zoo, conventions, performing arts	None
Day-to-Day Administration				
Executive Director	Appointed by Authority Governing Board	No	Chief Executive Officer appointed by Council President	Appointed by Board of Directors

Table 34. Solid Waste Authorities/Organizations

	Solid Waste Authority of Palm Beach County	Pinellas County, Florida	Portland Metro	Virginia Peninsulas Public Service Authority
Staff	439 staff (9 executive, 170 administrative, 260 operations)	Department of Solid Waste Operations, Pinellas County Utilities	106 Metro staff involved with waste management	VPPSA staff (includes 1 executive, 6 administrative, additional operations staff)
Funding	Funded through a system of user fees. Primary funding mechanism is the non-ad valorem special assessment (not value based) included on the annual property tax bill of all Palm Beach County property owners. Additional revenue sources include tipping fees, electric sales, recycling revenue, and interest income.	Enterprise system funded through user fees, recycling revenues, electricity sales, and investments	Uses an enterprise system. Solid waste program funded primarily by user fees, Metro's excise tax, and franchising and licensing fees. A system fee is assessed and collected on each ton of waste generated within the Region to pay for services that benefit the Region. An excise tax on solid waste disposal is used to pay for the many other, non-solid waste related services that Metro. Eight landfills serving the Region have entered into Designated Facility Agreements with Metro and agree to collect user fees and excise taxes on behalf of Metro.	Members pay for services they elect to use.
Operations				
Services	Recycling and solid waste disposal	Disposal, yard waste processing, recycling drop off	Recycling and disposal. Local governments are responsible for waste and recycling collection.	Collection and disposal.

Table 34. Solid Waste Authorities/Organizations

	Solid Waste Authority of Palm Beach County	Pinellas County, Florida	Portland Metro	Virginia Peninsulas Public Service Authority
Facilities	Material recovery facilities, transfer stations, waste-to-energy	Waste-to-energy, landfill, mulching facility	Transfer stations (uses private landfills).	Drop off recycling, compost facility
Ownership/Operation	Publicly owned (SWA) with one MRF and waste-to-energy facility privately operated	Publicly owned; waste-to-energy facility privately operated	Transfer stations are owned and operated by Metro	Services provided through private contracts.
Flow Control	Yes, granted authority by Florida law and Special Act that creates the Authority. Authority uses both financial and contractual mechanisms. Residential and governmental properties prepay for disposal, haulers must use SWA facilities to receive credits. Franchises awarded in unincorporated areas contractually require delivery to SWA facilities. Uses the commercial assessment to increase/decrease tipping fees to capture commercial waste.	Yes, granted by Florida law, embodied in county code.	Yes. By ordinance, Metro has designated facilities that must be used for transfer, disposal, and other processing.	No.
Debt Management				
Debt	Yes	No. Last bond paid in 2006. Recent projects paid for with reserve money.		No.
Bondholder	SWA			
Repayment System	Revenues			

4.2.2.3 Day-to-Day Administration

All of the authorities typically operate under an executive director that is appointed by the board and serves at the pleasure of the board. Administrative functions are typically conducted by authority staff. Funding for operations typically is through an enterprise system with tipping fees, recycling revenue, electrical revenues, landfill gas royalties, and investment income as primary revenue sources. Some organizations use other mechanisms for supplemental funding including non-ad valorem assessments and excise taxes.

4.2.2.4 Operations

Most of the organizations evaluated operate transfer stations, waste-to-energy facilities, and landfills. Some operate recyclables processing facilities. Few are responsible for solid waste collection; leaving that responsibility to member jurisdictions or private haulers. Organization responsibilities for operations vary, but generally most organizations use a mix of authority-operated facilities and contracted operations. Generally, waste-to-energy facilities are owned by authorities but operated under contract with private companies. Approximately half of the organizations evaluated had flow control. Those organizations that do not have flow control rely on some form of economic measures to obtain waste flows (e.g., contractual mechanisms, commercial assessments).

4.2.2.5 Debt

Most of the organizations carry some form of debt, usually a mix of revenue bonds and loans. Revenue sources for repayment of debt included tipping fees, electrical revenue, recycling revenue, and/or interest income.

4.3 ALTERNATIVE INSTITUTIONAL MODELS FOR REGION

Alternative institutional models for solid waste management were developed and evaluated for the Region. The models evaluated include:

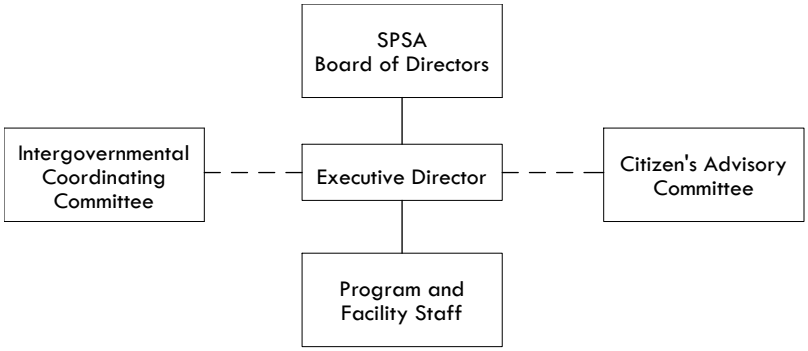
- A fully, integrated, publicly-owned and operated transfer and disposal system managed by SPSA or some modified version of SPSA.
- A fully, integrated, publicly-owned and operated transfer and disposal system managed by a new regional authority (established with all or some existing member jurisdictions of SPSA, jurisdictions not currently members of SPSA, or resulting from a merger with another existing regional authority).
- A public/private partnership managed by a regional authority (SPSA or a new authority).
- Each municipality independently manages its own solid waste stream and develops contracts for collection, processing, and disposal services.
- Select municipalities agree to cooperate together to manage their solid waste and develop contracts for collection, processing, and disposal services.

For each model presented, the required organizational structure, staffing, and cooperative agreements needed are discussed.

4.3.1 A New System Managed by SPSA

4.3.1.1 Administrative Structure

This alternative continues to use the current administrative structure of SPSA. Currently, SPSA is governed by a board of directors consisting of eight representatives, and an alternate representative, appointed by each of the member cities and counties. An Executive Director oversees the financing, construction, operation and maintenance of SPSA's solid waste management system.



The Intergovernmental Coordinating Committee (ICC) is a standing committee comprised generally of public works officials from the SPSA member communities. The purpose of the ICC is to provide technical support to the board of directors. A Citizens Advisory Committee on Waste Management for Portsmouth and SPSA serves as an advisory body to SPSA and the City of Portsmouth regarding environmental quality, enhancing communications and creating a more beneficial partner relationship among SPSA, the Cradock community and the city of Portsmouth.

Under this alternative, SPSA will continue to have the authority to approve annual operating budgets and capital improvements; establish rates and fees for facilities; and acquire funding to provide for construction, operation, and maintenance of facilities.

4.3.1.2 Staffing

Daily operations continue to be managed by SPSA program and facility staff. Total staff needed continues to be approximately 500 personnel.

4.3.1.3 Facilities

Existing and new facilities will continue to be owned and managed by SPSA.

4.3.1.4 Cooperative Agreements

As discussed earlier, the use and support agreements negotiated by SPSA will remain in effect until January 2018. The agreements will need to be renegotiated to make this alternative viable. With the new agreements, SPSA will be responsible for transfer and disposal of waste generated in the Region, while the member jurisdictions will be responsible for collection and delivering waste to SPSA designated facilities.

4.3.2 A New System Managed by a New Regional Authority

This alternative assumes that a new regional authority will be created in accordance with the requirements of the Virginia Water and Waste Authorities Act (Section 15.2-5100 et seq. of the Code of Virginia). This new authority could include some or all of SPSA's existing members, additional jurisdictions that are not currently members, or could result out of a merger with another existing regional authority.

4.3.2.1 Legal Requirements

Counties, cities, or towns may jointly establish authorities or special districts for the provision of services and facilities. Authorities may be established by action of the local governing bodies without further authorization from the State. Section 15.2-5102 of the Code of Virginia allows for the formation of a "public service authority" to provide water, sewer, water and sewer, stormwater control, and garbage and refuse collection and disposal services.

Requirements for the formation of a public service authority include:

- The name of the authority shall contain the word "authority."
- The authority shall be a public body politic and corporate.
- The ordinance, resolution or agreement creating the authority cannot be adopted or approved until a public hearing has been held. The ordinance, agreement or resolution creating an authority must include articles of incorporation which set forth:
  - The name of the authority and address of its principal office.
  - The name of each participating locality and the names, addresses and terms of office of the first members of the board of the authority.
  - The purposes for which the authority is being created and, to the extent that the governing body of the locality determines to be practicable, preliminary estimates of capital costs, proposals for any specific projects to be undertaken by the authority, and preliminary estimates of initial rates for services of such projects as certified by responsible engineers.
  - If there is more than one participating locality, the number of board members who shall exercise the powers of the authority and the number from each participating locality.

After adoption or approval of an ordinance, resolution or agreement creating an authority, the governing bodies of the participating localities must file the authority's articles of incorporation with the State Corporation Commission. The State Corporation Commission will issue a certificate of incorporation or charter to the authority if it finds that:

- The articles of incorporation conform to law; and

- The estimated costs and rates for services of the proposed projects are fair and equitable, and have been advertised under § 15.2-5104 of the Code of Virginia.

After issuance of the certificate or charter, the authority is deemed to have been lawfully and properly created and established and authorized to exercise its powers.

According to the requirements of the Act, authorities generally have the following powers and may:

- Exist for a term of 50 years as a corporation or longer by resolution of its members (SPSA by legislation is not limited to a 50-year term).
- Adopt, amend or repeal bylaws, rules and regulations necessary to conduct business.
- Adopt an official seal.
- Maintain an office.
- Sue and be sued.
- Acquire, purchase, lease, construct, reconstruct, improve, extend, operate and maintain any waste system within, outside, or partly within and partly outside one or more of the localities which created the authority; acquire by gift, purchase or the exercise of the right of eminent domain lands or rights in land in connection therewith, within, outside, or partly within and partly outside one or more of the localities which created the authority; and sell, lease as lessor, transfer or dispose of all or any part of any property, real, personal or mixed, or interest therein, acquired by it.
- Issue revenue bonds and borrow funds.
- Combine any waste system as a single system for the purpose of operation and financing.
- Fix, charge and collect rates, fees and charges for the use of or for the services furnished by or for the benefit from any system operated by the authority.
- Enter into contracts with the federal government, the Commonwealth, the District of Columbia or any adjoining state or any agency, any unit or any person. Such contracts may provide for or relate to the furnishing of services and facilities for any waste system.
- Contract with the federal government, the Commonwealth, the District of Columbia, any adjoining state, any person, any locality or any public authority or unit thereof, on such terms as the authority deems proper, for the construction, operation or use of any project which is located partly or wholly outside the Commonwealth.

- Enter upon, use, occupy, and dig up any street, road, highway or private or public lands in connection with the acquisition, construction or improvement, maintenance or operation of a stormwater control system or water or waste system.

For authorities forming after 1983, one of the following four findings must be made by both the authority and the member's governing body, in order to operate or contract for the operation of a refuse collection and disposal system (§15.2-5121 of the Code of Virginia):

- That privately owned and operated refuse collection and disposal services are not available on a voluntary basis by contract or otherwise,
- That the use of such privately owned services has substantially endangered the public health or has resulted in substantial public nuisance,
- That the privately owned refuse collection and disposal service is not able to perform the service in a reasonable and cost-efficient manner, **or**
- That operation by such authority or the contract for such operation, in spite of any potential anti-competitive effect, is important in order to provide for the development and/or operation of a regional system of refuse collection and disposal for two or more units.

This requirement is intended to prevent displacement of private companies.

4.3.2.2 Administrative Structures

The new regional authority could continue to be structured as SPSA or use an alternative administrative structure.

Section 15.2-5113 of the Code of Virginia establishes requirements for authority board membership, which would apply to a new authority. Generally:

- There must be one member from each participating locality and not less than a total of five members.
- The board members of an authority must be selected in the manner and for the terms provided by the agreement or ordinance or resolution or concurrent ordinances or resolutions creating the authority.
- One or more members of the governing body of a locality may be appointed board members of the authority.
- No board member can be appointed for a term of more than four years.
- Board members hold office until their successors have been appointed and may succeed themselves.

- The board members of the authority can elect a chairman from one of their number, and must elect a secretary and treasurer who need not be members. The offices of secretary and treasurer may be combined.

- Alternate board members may also be selected. Such alternates must be selected in the same manner and must have the same qualifications as the board members except that an alternate for an elected board member need not be an elected official.

- The board members may appoint a chief administrative or executive officer who shall serve at the pleasure of the board members.

The following presents four alternative administrative structures, as used by other regional solid waste authorities, which could be used by the new regional authority.

4.3.2.3 Administrative Structure Based on Population of Members

Currently, each SPSA member city and county is entitled to one member on the Board of Directors, regardless of the size of the jurisdiction. As an alternative, the board structure of a new regional authority could reflect jurisdiction population. This approach was used by the Central Virginia Waste Management Authority (CVWMA). The CVWMA represents 13 member jurisdictions. The formation of the CVWMA board provides for representation from each of the 13 member jurisdictions on the basis of population, resulting in an 18-member board. Member jurisdictions with a population of up to 50,000 are represented by one voting member, 50,001 to 100,000 are represented by two voting members and 100,001 and above are represented by three voting members on the CVWMA Board of Directors.[1]

Applying the approach used by CVWMA to a new regional authority, would result in a 17-member board, representing the eight jurisdictions as shown in Table 35.

Table 35. Membership Based on Population Level

Community	Current Number of Representatives	2006 Population*	Board Membership Based on Population: to 50,000 = 1, 50,001 to 100,000 = 2, 100,001+ = 3
Chesapeake	1	220,560	3
Franklin	1	8,800	1
Isle of Wight County	1	34,723	1
Norfolk	1	229,112	3
Portsmouth	1	101,377	3
Southampton County	1	17,814	1
Suffolk	1	81,071	2

1 Due to population growth in the region, CVWMA currently is in the process of amending its bylaws to adjust the population basis used for determining the number of Board members in an effort to keep the membership and makeup of the Board intact. The population levels will be increased to 75,000/150,000/150,000+.

Table 35. Membership Based on Population Level

Community	Current Number of Representatives	2006 Population*	Board Membership Based on Population: to 50,000 = 1, 50,001 to 100,000 = 2, 100,001+ = 3
Virginia Beach	1	435,619	3
	8	1,129,076	17

*Population from U.S. Census Bureau, www.census.gov

Taking the same approach, but modifying it based on the percentage of the total SPSA population that each jurisdiction represents, results in a smaller 12-member board as shown in Table 36.

Under either scenario, the members representing each jurisdiction would be appointed by the jurisdiction.

4.3.2.4 Ad Hoc Board Members

The Connecticut Resource Recovery Authority (CRRA) uses ad hoc members on its Board of Directors. The CRRA is comprised of four comprehensive solid waste disposal systems, each of which has a unique legal, contractual, and financial and operational structure: Mid-Connecticut, Bridgeport, Wallingford, and Southeast. The Governor, Senate, and House of Representatives appoint members to the CRRA Board of Directors, but the Governor also appoints eight ad hoc board members, two representing each disposal system, at least half of whom are high-ranking municipal officials. Ad hoc members are empowered to vote solely on matters pertaining to the projects they represent.

Each of the current SPSA member jurisdictions has at least one facility (transfer station, RDF, landfill, or yard waste composting) within its borders as shown in Table 37. Use of ad hoc members, in addition to the current board structure used by SPSA, will allow jurisdictions represented by the new regional authority to have an additional vote regarding decisions affecting local facilities.

Table 36. Membership Based on Proportion of Population

Community	Current Number of Representatives	2006 Population*	% of Total Population	Board Membership Based on Proportion of Total Population: to 10% = 1, 11% to 29% = 2, 30%+ = 3
Chesapeake	1	220,560	20%	2
Franklin	1	8,800	1%	1
Isle of Wight County	1	34,723	3%	1
Norfolk	1	229,112	20%	2
Portsmouth	1	101,377	9%	1
Southampton County	1	17,814	2%	1
Suffolk	1	81,071	7%	1
Virginia Beach	1	435,619	39%	3
	8	1,129,076	100%	12

*Population from U.S. Census Bureau, www.census.gov

Table 37. Location of SPSA Facilities

Location	SPSA Facilities
Chesapeake	Transfer Station
Franklin	Transfer Station
Isle of Wight County	Transfer Station
Norfolk	Transfer Station
Portsmouth	RDF Facility
Southampton County	Transfer Stations (2)
Suffolk	Landfill/Transfer Station
Virginia Beach	Yard Waste Composting Facility/Transfer Stations (2)

4.3.2.5 At-Large Members from Districts

This approach is used by Portland Metro. The Metro Council members are elected by voters. The President is elected region wide and Councilors are elected by district every four years in nonpartisan races. Metro's six council districts are geographically compact and of equal population (within 2.5 percent of 217,000, the average district size).

This approach also is used by ecomaine in creating an Executive Committee. The ecomaine board consists of 29 members. Nine board members comprise the Executive Committee that was created to streamline decision-making for specified tasks. The ecomaine region is divided into five districts. One member from each district plus two from Portland, one from Scarborough, and one from South Portland are appointed to the Executive Committee.

In addition to the current board structure, the SPSA Region could be divided into districts. Each district could be represented by an at-large member with high-level experience in municipal or corporate finance or business or industry. At-large members could be appointed by agreement of member jurisdictions within the district.

4.3.2.6 Executive Advisory Committee

Advisory committees are often used by jurisdictions that are responsible for managing their own solid waste systems. For example, Pinellas County, Florida, uses a Technical Management Committee, or TMC. The TMC meets periodically to advise Pinellas County on issues that affect the operation of the solid waste system.[2]

The Technical Management Committee consists of 13 members. Two members are appointed by the Board of County Commissioners; two members are appointed by the city commission of St. Petersburg; one member is appointed by and for each of the respective city commissions for Clearwater, Dunedin, Largo, Pinellas Park, St. Petersburg Beach, and Tarpon Springs. Three additional members are appointed by combined city commissions of smaller jurisdictions. Each appointed member of the committee is a qualified professional person having experience in the field of solid waste collection and disposal, utility management, health, public administration, engineering, accounting, economics, auditing, or environmental resources. The committee is structured, however, so that no field of specialization has more than three members on the committee. The committee determines the fields of specialization that are available to fill any vacancy.

An executive advisory committee could function in an advisory capacity to the Board of a new regional authority.

4.3.2.7 Staffing

Daily operations will continue to be managed by program and facility staff of the new regional authority under the direction of an Executive Director. Total staff needed continues to be approximately 500 personnel.

4.3.2.8 Facilities

Existing and new facilities will be owned and managed by the new regional authority.

4.3.2.9 Cooperative Agreements

Agreements will need to be negotiated between member jurisdictions and the new regional authority. Under the new agreements, the regional authority will continue to be responsible for transfer and disposal of waste generated in the Region, while the member jurisdictions will be responsible for collection and delivering waste to designated facilities.

2 Pinellas County consists of 25 governmental bodies: one each for the 24 municipalities and one for the unincorporated area.

4.3.3 A Public/Private Partnership Managed by a Regional Authority

4.3.3.1 Administrative Structure

The regional authority will still be managed by an Executive Board using either the current SPSA structure or a new structure for a new regional authority. Operations will continue to be managed by an Executive Director appointed by the board. The authority will require the ability to contract with private firms for operation of authority-owned facilities.

4.3.3.2 Staffing

Daily operations will continue to be managed by program staff of the new regional authority. Total staff needed by the regional authority will be significantly reduced (fewer than 25).

4.3.3.3 Facilities

Existing and new facilities will be owned by the new regional authority but operated by private companies under contract to the authority.

4.3.3.4 Cooperative Agreements

This alternative also requires that cooperative agreement be negotiated between member jurisdictions and the regional authority. Under the agreements, the regional authority will continue to be responsible for transfer and disposal of waste generated in the Region, while the member jurisdictions will be responsible for collection and delivering waste to designated facilities.

4.3.4 Independent Systems

Under this alternative, each jurisdiction independently manages its own solid waste stream and may own its own disposal facility or transfer station or develops contracts for transfer and disposal services.

4.3.4.1 Administrative Structure

The administrative structure will be dependent upon the type of jurisdiction (i.e. city council for cities, Board of Supervisors for unincorporated county). The jurisdiction would be required to hire staff to administer the program and operate facilities. The jurisdiction will be responsible for developing budgets; acquiring funding; negotiating contracts; and constructing, operating, and maintaining facilities owned/operated by the jurisdiction.

4.3.4.2 Staffing

Number and qualifications of staff required by each jurisdiction will be dependent upon the type of programs offered and the number and type of facilities owned/operated by the jurisdiction. Additional staffing needs for each jurisdiction (in addition to staff currently used for refuse collection) could include:

- Contract administration: 7 total (recycling/composting, disposal, general administrative, clerk).
- Transfer station operations: 8 total (manager, scale house attendants, equipment operators, drivers, clerk).
- Yard waste composting: 5 total (manager, attendants, equipment operators, clerk).
- Landfill: 18 total (manager, engineer, accountant, equipment operators, scale house attendants, office/administrative).

4.3.4.3 Facilities

Existing facilities will be owned/operated by the jurisdictions in which they are located.

4.3.4.4 Cooperative Agreements

A city with its own disposal facility could contract with other cities or the counties through agreements or other formal mechanisms to secure delivery of solid waste to its disposal facility. Jurisdictions without disposal facilities can contract with other jurisdictions or private companies for disposal services. Cities, counties, and towns are given statutory authority contract with another locality to provide such services (Code of Virginia Section 15.2-928) or contract with others (profit or nonprofit) for refuse pickup and disposal services in its respective jurisdiction (Code of Virginia Section 15.2-930).

4.3.5 Cooperative Systems

Select jurisdictions could agree to cooperate together to manage their solid waste and develop contracts for collection, processing, and disposal services.

4.3.5.1 Administrative Structure

The administrative structure will be dependent upon the type of jurisdiction (i.e. city council for cities, Board of Supervisors for unincorporated county) and will be dependent upon the formal partnering agreement. Depending on the agreements, either all or one of the jurisdictions would be required to hire staff to administer the program and operate facilities. The jurisdictions will be responsible for developing budgets; acquiring funding; negotiating contracts; and constructing, operating, and maintaining facilities owned/operated by the partnering jurisdictions.

4.3.5.2 Staffing

Number and qualifications of staff required by each jurisdiction will be dependent upon the number and type of facilities owned/operated by the partnering jurisdictions.

4.3.5.3 Facilities

Existing facilities will be owned/operated by the partnering jurisdictions. Jurisdictions without facilities will be required to acquire facilities for contract for services.

4.3.5.4 Cooperative Agreements

Agreements will be necessary to establish contracts with private companies for services or for ownership and management of facilities jointly owned by participating jurisdictions.

Section 15.2-1300 of the Code of Virginia allows political subdivisions to enter into agreements with one another for joint action. Generally, each political subdivision that is to be party to such an agreement must first have the authority to exercise the task independently. So long as each political subdivision has the authority to exercise the power independently, they may jointly conduct such activities.

Sections 15.2-927 through 15.2-939 of the Code of Virginia (General Powers of Local Governments) establish the powers of localities (i.e., city, county, or town) with respect to solid waste management. Generally, cities, counties, or towns may:

- Collect and dispose of garbage and charge and collect compensation for such services.
- Require any person to separate solid waste for collection and recycling.
- Provide and operate solid waste management facilities.
- Contract with any person for garbage and refuse pickup and disposal services in its locality and to enter into contracts relating to waste disposal facilities which recover energy or materials from garbage, trash and refuse.
- Limit the use of solid waste depositories or receptacles, owned or maintained by the locality, to the disposal of garbage and other solid waste originating from within the boundaries of such locality.
- Regulate the siting of solid waste management facilities within its boundaries.

Since the member communities are granted statutory authority to individually manage solid waste, they may enter into joint agreements to jointly perform services or contract for provision of services.

Joint agreements must be approved by an ordinance and are required by Section 15.2-1300(C) of the Code of Virginia to specify the following:

- Duration of the agreement.
- Purpose of the agreement.
- The manner of financing the joint undertaking and of establishing and maintaining a budget.

- The permissible method or methods to be employed in accomplishing the partial or complete termination of the agreement and for disposing of property upon such partial or complete termination.

- All other necessary and proper matters.

In addition to the requirements above, agreements may contain the following:

- Provision for an administrator or a joint board responsible for administering the undertaking. The precise organization, composition, term, powers and duties of any administrator or joint board must be specified.

- The manner of acquiring, holding (including how title to such property shall be held) and disposing of real and personal property used in the undertaking.

- How issues of liability will be dealt with and the types, amounts and coverages of insurance.

Finally, joint agreements do not relieve any political subdivision of any obligation or responsibility imposed upon it by law and political subdivisions may appropriate funds and may sell, lease, give, or otherwise supply the administrator or joint board created to operate the undertaking with such property, personnel or services as may be within its legal power to furnish.

4.4 RECOMMENDED INSTITUTIONAL MODEL FOR REGION

If the Region elects to continue cooperating to manage its solid waste, SCS recommends that SPSA continue to function, with modifications, for the following reasons:

- SPSA is a well-established authority that manages municipal solid waste for the South Hampton Roads Region.

- Future cooperation of SPSA's member communities may allow for more efficient development and operation of the various solid waste facilities needed to recycle, transfer, process, convert, and dispose of the Region's solid waste as a result of economies of scale, , regardless of whether the Regional Authority handles municipally collected waste only or provides services for commercially collected solid waste as well. The cost implications or regional cooperation are more fully evaluated in Section 5.0 of this report.

- The personnel, facility, and organizational infrastructure exists to support its continued operation into the future with appropriate modifications as recommended.

- The shortcomings of SPSA's current structure and management that have been expressed by the member communities are resolvable.

- As demonstrated by other solid waste authorities operating around the country, an organization like SPSA can be operated and administered in a cost-effective manner to serve the solid waste needs of its member communities either through development of facilities and operations owned and operated by the Authority or through contracted services.

- Concerns regarding SPSA's current debt management and the ability of the Authority to obtain future financing exist with some members. Deciding to maintain SPSA after 2018 may allow the authority to obtain financing in order to construct new facilities or upgrade existing solid waste facilities.

- The SPSA member communities have substantial capital invested in waste-to-energy facilities, recycling facilities, a regional landfill, transfer stations, rolling stock, administration buildings, maintenance facilities, and other support facilities. Many of these facilities will have not reached their useful life by 2018 and could serve the Region well into the future. Many of these support facilities (e.g., transfer stations) will be needed to support the safe and efficient transport of solid waste, regardless of how it is processed and ultimately disposed. The maximum utility of these capital investments should be sought.

- The current members of SPSA will have joint obligations beyond 2018 (e.g., closure and post-closure care of the regional landfill); therefore, some degree of future cooperation will continue.

- For the Region as a whole, including municipal, institutional, and commercial sectors, Regional cooperation could provide significant reduction in costs through the siting of a new Regional Landfill. This significant cost-control advantage would be lost if the Region does not cooperate. Retaining the ability to cost-effectively site a new Regional Landfill would be useful factor in negotiating beneficial terms for short or long-term transportation and disposal contracts for the waste streams that are under the direct control of the regional governments.

- Regional cooperation would make it easier to achieve the integrated solid waste management requirements and goals of the Virginia Waste Management Board. The size, organization, and responsibilities of the Regional Authority would depend on the assets it would be required to manage (e.g., landfill, transfer station, or RDF WTE facilities), and the services requested by its members (e.g., collection, recycling, yard waste, household hazardous wastes).

- Maintaining a Regional Authority to provide for transfer, recycling, and disposal services is a logical approach to managing the Region's solid waste either through development of facilities and operations owned and operated by the Authority or through contracted services.

Finally, a minor procedural issue embodied in the Virginia Water and Waste Authorities Act also supports continuation of SPSA versus development of a new authority. For a new authority to form, member localities and the new authority will be required to make the determination under

§ 15.2-5121 of the Act (four findings) that formation of the new authority will not result in displacement of private companies. SPSA currently is exempt from this requirement.

The future organizational structure and size of SPSA will be dependent on whether it continues to operate the RDF WTE Facility and a Regional Landfill. If the RDF WTE Facility is sold, substantial changes in the organization will result in terms of its responsibilities and the number of administrative, technical, operational, and support personnel employed by SPSA. Likewise, if a new Regional Landfill is not sited and operated by SPSA, similar changes would occur. SPSA would most likely then operate similar to the Virginia Peninsula Public Services Authority (VPPSA), which serves its communities by contracting for various recycling, transfer, and disposal services, and consideration could be given to merging SPSA's operations with VPPSA.

This section presents the recommended changes to SPSA's administrative and governance structures (namely, the number of members on the Board of Directors and their respective qualifications), debt management, and mission assuming it maintains its autonomy. SCS recommends that high-level collaboration and representation by all affected jurisdictions within SPSA regarding management structure occur both before and after the use and support agreements expire or are renewed.

4.4.1 Recommended Administrative Structure

4.4.1.1 Number of Board Members

Currently, each SPSA member city and county is entitled to one member on the Board of Directors, regardless of the size of the jurisdiction. It is recommended that the board structure of SPSA be revised to provide for proportional representation that reflects the fiscal and solid waste contribution of its members. This can be accomplished by using jurisdiction population as a basis. Under this structure, each member's governing body would appoint Board members according to their proportionate share of population. This approach is taken by many other solid waste authorities and creates a more representative Board of Directors.

As illustrated earlier, jurisdictions can be represented either as a function of proportion of total population (e.g., 10%/ 20%/30%) or based on a designated population levels (e.g., 50,000/100,000/100,000+ residents). This approach, if applied properly, should prevent any member jurisdiction from being assigned a disproportionate amount of Board representation. A separate factor that should be considered in determining representation is that of overall Board size. Ultimately, the Board should be large enough to represent the Region fairly, but should also result in a Board that is small enough to engage in active discussion and make timely decisions.

Currently, SPSA's Board of Directors consists of eight members. Several alternative representation models and their associated Board sizes are presented in Table 38. The smallest Board possible, using the options presented in the table, consists of 12 members. With 12 members, Chesapeake and Norfolk are each represented by two members, Virginia Beach is represented by three members, and the remaining cities/counties are each represented by one member. Under several of the options, future population growth in Portsmouth could make the city eligible for additional representation.

4.4.1.2 Board Member Qualifications

Currently, SPSA's Board of Directors is comprised of elected officials appointed by the member jurisdictions. Again, based on earlier discussions with SPSA membership, many believe that politicians do not have the experience base necessary to make decisions regarding complex solid waste management issues and that decisions may ultimately be made on the basis of future "electability." If political appointees are not considered appropriate Board Members, the following question needs to be answered: What are the professional and technical backgrounds and the skill sets needed by Board Members to understand SPSA and execute its responsibilities?

SPSA's overall mission is to acquire, finance, construct, operate, and maintain a refuse collection and disposal system. Board expertise in finance and business management may be valuable backgrounds in general. However, SPSA's Board may also benefit from members with technical experience in the energy field, waste management, engineering, or planning. Other useful skill sets involve leadership, communication, consensus building, and strategic planning.

4.4.2 Process for Changing the Administrative

Restructuring SPSA will possibly require the redevelopment of the authority's original articles of incorporation, public hearings for recommended changes, re-filing the revised articles of incorporation with the State Corporation Commission, and developing new use and support agreements. Legal advice should be sought on this issue.

Table 38. SPSA Board Membership Options

Community	2006 Population*	Board Membership Based on Proportion of Total Population		Board Membership Based on Population			
		% of Total Population	10% = 1, 11% to 29% = 2, 30%+ = 3	50,000 = 1, 50,001 to 100,000 = 2, 100,001+ = 3	75,000 = 1, 75,001 to 125,000 = 2, 125,001+ = 3	100,000 = 1, 100,001 to 200,000 = 2, 200,001+ = 3	150,000 = 1, 150,001 to 300,000 = 2, 300,001+ = 3
Chesapeake	220,560	20%	2	3	3	3	2
Franklin	8,800	1%	1	1	1	1	1
Isle of Wight County	34,723	3%	1	1	1	1	1
Norfolk	229,112	20%	2	3	3	3	2
Portsmouth	101,377	9%	1	3	2	2	1
Southampton County	17,814	2%	1	1	1	1	1
Suffolk	81,071	7%	1	2	2	1	1
Virginia Beach	435,619	39%	3	3	3	3	3
Total	1,129,076	100%	12	17	16	15	12

*Population from U.S. Census Bureau, www.census.gov

4.4.3 What Should the Future Use and Support Agreements for SPSA Look Like?

The current Use and Support Agreements executed with each jurisdiction, as well as the Agreement for Disposal of Ash and Process Residues with the City of Virginia Beach have been compiled in a spreadsheet and provided to the HRPDC under separate. This format allows for the easy review and comparison of each contract provision, where they are the same between jurisdictions and where they differ. The most significant differences deal with the City of Virginia Beach and the City of Suffolk, both of which have special provisions relating to either their existing landfill (City of Virginia Beach), the siting and operation of the new regional landfill (City of Suffolk), the disposal of ash from the waste-to-energy facility (City of Virginia Beach), and fee structure (City of Suffolk and Virginia Beach). Similar inter-local agreements will need to be prepared and executed before 2018 if the jurisdictions agree to cooperate to manage solid waste in the Region.

4.4.4 Debt Management

One of the major issues facing SPSA is its debt management. Debt payments have been deferred in the past and additional debt incurred to cover operational expenses in order to keep tip fees low. This approach has led to the current debt load the Authority carries with a relative short period of time to pay it off before the current Use and Support Agreements with SPSA expire. Policies should be established that prohibit this approach to debt management from being used.

4.4.5 Communication and Transparency of Operations

SPSA currently uses Board Meetings, press releases, special committees, and the internet to receive and distribute input to and from the community. These approaches should continue and will foster transparency of operations.

4.4.6 System Funding

Much of the current difficulty facing SPSA at this time can be linked to the current tip-fee funding approach that is employed. SPSA currently establishes the tip fee for the year, based on the quantity of waste delivered, and each member then calculates what their respective charges will be for their residential customers and distributes those estimated charges through their respective tax systems. The current approach only covers the residential customers that receive municipal collection services. Commercial customers pay the tip fee directly to SPSA through their collection contractors. The tip fee funding approach, which has waste disposed as the denominator, can result in actions that can be at cross purposes with resource conservation and recovery (e.g., recycling), because if waste is diverted from the system, revenues are reduced, and so the focus is on securing and increasing waste flow into the system versus resource conservation and recovery.

The following options are available for funding the solid waste operations of the Region:

- Tip Fee
- Waste Generation Fee
- Pay-As-You-Throw (PAYT)

- General Fund Tax (Ad Valorem)

A description of each of these funding approaches and the advantages and disadvantages of each are discussed below.

4.4.6.1 Tip Fee

A tip fee funding approach allocates system costs to the total waste stream delivered to the system. For publicly-owned and operated systems, the tip fee may include system charges that are not directly related to the disposal function. There is no universally accepted approach to what should be included and what should be excluded, which makes comparison of tip fees between public operations difficult, and can lead to erroneous conclusions when a tip fee from a public operation is compared against that of a private landfill operation, which typically has a singular function. The tip fee approach has the following advantages and disadvantages:

- Advantages
  - Simple to understand.
  - Used extensively throughout the United States.
  - Perceived as a use charge.
- Disadvantages
  - Sometimes unclear what is built into the per unit charge.
  - Customers may be paying for services they do not receive.
  - Can produce actions that are contrary to the goals of waste prevention and recycling in the Region because doing so would reduce revenues needed to support system operations.
  - Less secure funding source, which can negatively impact cash flow and bond ratings, thus increasing financing costs.

4.4.6.2 Solid Waste Generation Fee

A solid waste generation fee is a charge assessed on real property because that property, or the owner of the property, derives a defined benefit. A waste generation fee can be applied to all single-family residential, multi-family residential, commercial, and institutional properties, or to a subset of these. In a waste generator fee system (sometimes referred to as a special assessment), residential and commercial customers are charged for system use based on solid waste generation and services provided (Roy F. Weston, et al, 1995). This funding approach gained momentum in response to the 1994 Supreme Court Ruling in C&A Carbone versus the Town of Clarkstown, New York, which dealt with issues of flow control.

This approach has been implemented in Prince William County, Virginia and elsewhere in the United States as discussed earlier in this section. A waste generator fee system would allocate

system costs based on the mission and objectives that would be established by the Region for managing its solid waste, and is capable of funding the fixed and variable costs of the system.

A specific or special assessment must provide a special benefit to the property assessed. Taxes may be levied for the general benefit of the residents and the property, while a waste generation fee must be tied directly to the property assessed.

- Advantages
  - Better support the mission of a comprehensive Regional solid waste management approach, such that the focus would be more on doing the right thing rather than figuring out a way to increase waste flows to support the system costs.
  - Reliable source of revenue because not a function of the quantity of waste received.
  - Depending how structured, can be used to lower tip fees for commercial sector at or below market.
  - Equitable distribution of costs to all waste generating customers. Larger waste generators pay a higher fee than smaller waste generators.
  - Can use existing property tax collection billing and collections systems in the Region.
  - Been implemented and proven elsewhere in Virginia (e.g., Prince William County) and elsewhere in the United States.
  - Provides for economic flow control.
  - More positive view by bond markets because of secured revenue source, which tends to lower financing costs.
- Disadvantages
  - More complex to administer in that unit generation rates for residential and commercial entities need to be developed (assuming commercial is included) and reviewed on a periodic basis.
  - Additional administrative costs.
  - Perceived by some as another tax, where in fact it is a user fee based system based on defined benefits.
  - Provides for economic flow control (from a governmental perspective it is an advantage, but from a private perspective it is generally viewed as a disadvantage).

Implementing a waste generation fee requires confirming the legal basis for implementing such a program, defining the benefit to property owners, determining the costs of services and improvements, allocating costs to system users, and collecting the fee (Roy F. Weston, et al, 1995).

4.4.6.3 Pay-As-You-Throw (PAYT)

Pay as you throw (PAYT) is a unit-based pricing system that is being used by some communities to increase recycling and reduce reliance on landfilling and waste-to-energy options. PAYT essentially puts a price tag on each container of waste that is disposed, whether Residents pay directly for waste disposal services and have a financial incentive to reduce their waste through recycling, composting, and source reduction. Most programs require residents to purchase special bags, stickers, wheeled carts, or trash barrels for their waste (Massachusetts Department of Environmental Protection, 2004). Massachusetts for example has over 120 communities that use the PAYT system. The PAYT approach has the following advantages and disadvantages.

- Advantages
  - Some contend that such a system is fairer in that residents pay only for the solid waste they generate. If a person generates less, they pay less. If they generate more, they pay more. This is true only if there are no fixed costs or assets that must be funded through the fee.
  - Increased recycling, composting, and waste reduction because more of the waste is diverted to these programs through financial incentives. The US EPA, estimates that communities can expect a 25 percent to 45 percent reduction in waste being disposed as residents change their purchasing and waste disposal habits. The Massachusetts Department of Environmental Protection reports that municipalities with unit-based pricing programs have shown an average 0.37 tons per capita disposed by residents in comparison with municipalities without unit-based pricing programs, which shown an average 0.42 tons per capita disposed (Massachusetts Department of Environmental Protection, 2004).
  - Reduced need for and size of new landfills and extend the life of existing landfills through waste reduction and diversion.
- Disadvantages
  - Increased potential for roadside litter because some will prefer to throw their waste along the roadside instead of buying special bags.
  - Like the tip fee, less reliable funding approach and there would likely still be a need for supplemental funding through taxes or additional user fees to support the system. However, PAYT programs have been developed to address this challenge through the use of hybrid systems which include a flat fee and a unit-based fee. The flat fee provides revenue stability to a municipal program and

ensures that the fixed costs of trash collection are covered. The additional unit-based fee provides financial incentive for residents to recycle and compost more.

- Increased administrative functions to develop, administer, and police.

Implementing a PAYT program would be a significant departure from the status quo in the Region. It would require confirming the legal basis for implementing such a program, designing the pricing system, developing a public education program, establishing enforcement procedures and policies, and developing an accounting system.

4.4.6.4 Ad Valorem (property) Tax

An ad valorem tax or special purpose tax can be used to fund solid waste management. Local governments commonly have statutory limits on the amount of ad valorem taxes, the amount those taxes can be increased annually, or the millage rate used to determine the ad valorem taxes. This approach is used by the Region communities to allocate all or a portion of the costs for solid waste collection and disposal. The advantages and disadvantages of this approach are summarized below:

- Advantages
  - Well established system for funding public services.
  - Well established billing and collection systems.
  - Secure funding source.
- Disadvantages
  - Use of an ad valorem tax or special purpose tax to fund solid waste management may require reductions in other services provided by the local governments.
  - Reduces ability of local government to clearly define and explain the cost of integrated solid waste management.
  - No direct correlation between individual behavior (i.e., waste generation) and costs.

This approach is currently employed throughout the Region; therefore, no significant change would be needed to continue its use.

4.4.6.5 Recommended Funding Approach

SCS recommends that the Region consider implementing a residential only or a combined residential/commercial waste generator fee system (commonly referred to as a special assessment) to fund the solid waste system in lieu of the current tip fee-based system. We understand that this approach has been considered in the past by the Region, but that a consensus agreement on its efficacy has never been reached. A waste generator fee system more fairly

allocates system costs based on the mission and objectives that have been established by the Region for managing its solid waste. It provides a reliable funding source, which has multiple benefits including positive cash flow, improved bonding capacity and ratings, and lower financing costs. A system funded by a waste generation fee would better support the mission of a comprehensive Regional solid waste management approach, such that the focus would be more on doing the right thing rather than figuring out a way to increase waste flows to support the system costs. This approach has been successfully implemented elsewhere as discussed earlier in this section.

4.4.7 Mission

SPSA's stated mission is to dispose of waste, and to accomplish this by disposing of waste in an environmentally-sensitive manner, minimizing damage for current and future generations and reusing waste whenever possible, turning it into a useful product. Its vision is to be the regional choice for full-service solid waste management. If the Region wishes to implement a comprehensive, integrated solid waste management system through SPSA, SPSA's mission, vision, and funding approach (as described above) should be integrated so they do not work at cross purposes, and the members should work together, versus independently, to accomplish the mission and vision through the organization.

5.0 PRO FORMA ANALYSIS

5.1 PRO FORMA MODEL PURPOSE, DEVELOPMENT, AND METHODOLOGY

This section presents SCS's economic analysis of alternative scenarios for managing solid waste in the Region during the 30-year planning period following the expiration of the Agreements the member communities have with SPSA (2018-2047). SCS developed a Pro Forma Model specifically for this study to provide preliminary, planning-level cost estimates which can be used to evaluate alternative cooperative strategies for managing solid waste in the Region.

The Pro Forma Model is a spreadsheet program that projects annual costs to construct, operate, administer, and maintain the Region's waste-to-energy, landfill, transfer station, and recycling programs and facilities, and provides a means for comparing alternative operational, institutional, and facility scenarios. One of the purposes of the pro forma analysis is to assess whether significant value (i.e., cost savings) can be realized in the Region by continuing to manage solid waste disposal in a cooperative manner or whether it is more cost-effective for each community to manage its own solid waste system, or in combination with a smaller number of communities in the Region. The model addresses major capital and operational costs to operate a solid waste system under various cooperative scenarios, as described in more detail below.

The model is fairly complex in that there are eight communities involved in the system, eight different accounting approaches for allocating costs to residents, differing levels of recycling participation, two member communities that own their own landfills, and six of the eight communities that have enacted flow control ordinances that are scheduled to take effect in early 2009. Various assumptions are made regarding yearly solid waste quantities, demographic information, escalation factors for waste growth and costs, administration costs, transportation costs, landfill and waste-to-energy development costs, future cell development and landfill sequencing, closure and post-closure care, and availability of out of regional disposal capacity.

The Pro Forma Model provides a method to compare and evaluate future strategies as assumptions change. Two major elements of the Region's current solid waste system are the RDF WTE facility and the Regional Landfill. Certain assumptions regarding the continuation of the existing RDF WTE Facility and the siting and operation of a new Regional Landfill are made, but current negotiations regarding the potential sale of the RDF WTE Facility and the future location of a landfill could materially affect the results of the pro forma analysis and comparison of alternatives. If SPSA's Board elects to sell the RDF WTE Facility, the Pro Forma Model could be used at that time to assess the impacts of the decision on the Region. However, the details of the proposals that have been submitted to SPSA were not disclosed to SCS prior to completion of this Report due to the sensitivity of ongoing negotiations. The CAO's recognize the decision on the fate of the RDF WTE Facility is a major issue and recommended during their September 2008 meeting that the Pro Forma Model should be updated once the details of the proposals are made public.

Sensitivity analyses were developed to discern differences within the scenarios evaluated. The costs of various programs and disposal options were estimated using published information on

the Region's existing solid waste system, SCS's experience on other similar projects, input from the private solid waste industry, other published information, and planning-level cost estimates prepared by SCS. The scenarios evaluated and key assumptions are detailed in Sections 5.2. The detailed model runs for the scenarios evaluated are presented in Appendix C.

5.2 ALTERNATIVE SOLID WASTE MANAGEMENT SCENARIOS

The following cooperative scenarios were evaluated:

- **Scenario A.** This scenario assumes that all eight communities continue to cooperate on a consolidated basis to provide municipal recycling services and municipally and commercially collected solid waste disposal services for the Region. This scenario models a system similar to the current SPSA system, and assumes that all commercial waste would be delivered to the system. The major difference in the cost structure is that by 2018, the outstanding debt on the RDF WTE Facility will have been retired. The scenario considers the options of siting and developing a new Regional Landfill, operating the system with or without a WTE facility, contracting for disposal in an out-of-region landfill, expanding the WTE capacity, and totally replacing the existing RDF WTE with a 3,000 ton per day mass burn WTE Facility. This is the only scenario where expanded WTE capacity is evaluated.

- **Scenario B.** This scenario assumes that all eight communities cooperate on a consolidated basis to provide municipal recycling services and municipally collected solid waste disposal services only. In this scenario, commercial solid waste would be collected and disposed by private solid waste companies at private facilities. The CAO's requested that this scenario be evaluated to consider the cost implications if there is a reversal in the most recent flow control decision, which now provides government entities more control on the collection and disposal of solid waste in their region. As with Scenario A, this scenario considers the options of siting and developing a new Regional Landfill, operating the system with our without the RDF WTE Facility, and contracting for disposal in an out-of-region landfill.

- **Scenario C.** This scenario assumes that all eight communities independently provide for recycling and solid waste disposal services. This is basically the "everyone does their own thing" scenario. It assumes that the City of Virginia Beach will use its landfill until it reaches its current permitted capacity, and then would contract out for disposal in an out-of-region landfill. The remaining Cities and Counties in the Region would contract out for disposal in an out-of-region landfill. Under this scenario, the assumption is made that the RDF WTE Facility would be decommissioned. This scenario will need to be reevaluated once the terms of the proposals to sell the RDF WTE are disclosed. This scenario also assumes that commercial solid waste would be delivered and managed by the respective City/County systems.

- **Scenario D.** This scenario assumes that the City of Franklin, Isle of Wight County, and Southampton County align (note: referred to as Rural Communities in the Pro Forma Model) on a consolidated basis to provide recycling services and

commercially and municipally collected solid waste disposal services; and the Cities of Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach align (note: referred to as Urban Communities in the Pro Forma Model) on a consolidated basis to provide the same services. For the Rural Communities, the assumption is made that disposal services would be contracted out, but the transfer stations would be operated by the aligned parties. For the Urban Communities, this scenario considers the options of siting and developing a new Regional Landfill, operating the system with or without the RDF WTE Facility, and contracting for disposal in an out-of-region landfill This scenario also assumes that commercial solid waste would be delivered and managed by the respective City/County systems.

- **Scenario E.** This scenario assumes that the City of Virginia Beach independently provides for municipal recycling and municipally and commercially collected solid waste disposal services; and the other communities align on a consolidated basis to provide recycling and municipally and commercially collected solid waste disposal services. This scenario is similar to Scenario D, except that the City of Virginia Beach's waste stream is removed from the system. This scenario also assumes that commercial solid waste would be delivered and managed by the respective City/County systems.

A matrix illustrating the major elements of each Scenario is presented in Table 39.

For each strategy, the Pro Forma Model projects operating expenses, including personnel, equipment, capital, debt, transportation, and proposed host fees, and offsetting revenues associated with the operation of the existing RDF WTE Facility or a new Mass Burn WTE Facility. The results of the pro forma analyses are presented on a net present value (NPV) basis for comparison purposes. A "system rate" is also calculated and represents the total operating costs divided by the total waste managed, including recyclables and yard waste. The system rate basis should not be confused or compared to a landfill tip fee, since the system rate includes other cost factors that are not directly related to disposal.

For Scenario C, the costs for each community were estimated to independently manage their own solid waste program, assuming each would have its own solid waste staff, operate its own transfer station(s), contract for disposal (with the exception of the City of Virginia Beach initially), and manage recycling and other special wastes. SPSA maintains separate budgets for each transfer station in the region, and the respective transfer stations costs were allocated to each community accordingly. For the City of Virginia Beach, SCS assumed that the City would operate its own landfill until its currently permitted capacity is consumed. Furthermore, the landfill costs for the City of Virginia Beach under Scenario C1.1 do not include costs for new cell development, closure, or post-closure care.

5.3 BASIC ASSUMPTIONS AND ELEMENTS OF PRO FORMA MODEL

A list of major assumptions regarding escalators, interest rates, out of area tip fees, transportation costs, and other cost elements is presented in Table 40. These assumptions are used throughout

Table 39. Pro Forma Model Scenarios Evaluated

Scenario	Alignment	Disposal	Disposal Options				Resource Recovery			
			New Regional LF	Contract Out	VB LF	Ports-mouth CCD	RDF WTE	New 2000 tpd Mass Burn	New 3000 tpd Mass Burn	No
A1.1	All eight communities cooperate	New Regional Landfill	♦		♦	♦	♦			♦
A1.2	All eight communities cooperate	New Regional Landfill	♦		♦	♦	♦			
A1.3	All eight communities cooperate	New Regional Landfill	♦		♦	♦	♦	♦		
A1.4	All eight communities cooperate	New Regional Landfill	♦		♦	♦			♦	
A2.1	All eight communities cooperate	Contract out disposal		♦		♦	♦			♦
A.2.2	All eight communities cooperate	Contract out disposal		♦		♦	♦			
A2.3	All eight communities cooperate	Contract out disposal		♦		♦	♦	♦		
A2.4	All eight communities cooperate	Contract out disposal		♦		♦			♦	
B1.1	All eight communities cooperate to manage municipally collected MSW	New Regional Landfill	♦		♦	♦				♦
B1.2	All eight communities cooperate to manage municipally collected MSW	New Regional Landfill	♦		♦	♦	♦			
B2.1	All eight communities cooperate to manage municipally collected MSW	Contract out disposal		♦	♦	♦				♦
B2.2	All eight communities cooperate to manage municipally collected MSW	Contract out disposal		♦	♦	♦	♦			
C.1.1	All eight communities go separate ways	Contract out disposal - all waste		♦	♦	♦				♦
D1.1	IOW, Franklin, Southampton Align-VB, Norfolk, Portsmouth, Chesapeake, Suffolk Align	Rural members contract for disposal, New Regional Landfill	♦	♦		♦				♦
D1.2	IOW, Franklin, Southampton Align-VB, Norfolk, Portsmouth, Chesapeake, Suffolk Align	Rural members contract for disposal, New Regional Landfill	♦	♦	♦	♦	♦			
D2.1	IOW, Franklin, Southampton Align-VB, Norfolk, Portsmouth, Chesapeake, Suffolk Align	Rural members contract for disposal, Urban members contract for disposal		♦		♦				♦
D2.2	IOW, Franklin, Southampton Align-VB, Norfolk, Portsmouth, Chesapeake, Suffolk Align	Rural members contract for disposal, Urban members contract for disposal		♦		♦	♦			

Table 39. Pro Forma Model Scenarios Evaluated

Scenario	Alignment	Disposal	Disposal Options				Resource Recovery			
			New Regional LF	Contract Out	VB LF	Ports-mouth CCD	RDF WTE	New 2000 tpd Mass Burn	New 3000 tpd Mass Burn	No
E1.1	VB manages own waste, others align	VB runs own landfill until capacity expended, then contracts out for disposal, other communities site new Landfill.	♦		♦	♦				♦
E1.2	VB manages own waste, others align	VB runs own landfill until capacity expended, then contracts out for disposal, other communities site new Landfill.	♦		♦	♦	♦			
E2.1	VB manages own waste, others align	VB runs own landfill until capacity expended, then contracts out for disposal, other communities contract out disposal.		♦	♦	♦				♦
E2.2	VB manages own waste, others align	VB runs own landfill until capacity expended, then contracts out for disposal, other communities contract out disposal.		♦	♦	♦	♦			

the Pro Forma Model and can be adjusted relatively easily for sensitivity analysis. For example, the Consumer Price Index (CPI), out of area tip fee, and transportation distance to a new regional or out of area private disposal facility can be adjusted. Other key assumptions regarding waste projections, recycling projections, landfill and waste-to-energy capital costs and debt assumptions, transportation costs, and out of area disposal costs are presented below.

5.3.1 Waste Quantity Projections

The solid waste quantities presented in Section 3.8.2 were used to estimate waste quantities for the 30-year planning period. The SPSA projected 2008 solid waste quantities were escalated through the planning period by the estimated average annual population growth rates for each City and County for the municipally collected waste, and by the historical growth rates for commercial waste, yard, Navy, construction and demolition debris, and other waste categories. Table 41 shows the projected solid waste quantities for the first ten years of the planning horizon (2018–2027). Although SPSA does not keep records on the breakdown of commercial waste by City and County, SCS allocated the commercial waste to each HRPDC member community as a function of population as shown in Table 42. The commercial solid waste allocation is used in the evaluation of Scenarios B, C, D, and E.

5.3.2 Construction and Demolition Debris Waste Projections

For the purpose of the pro forma analysis, SCS assumed that C&D waste would be collected, processed and disposed of by private companies and not managed in a new Regional solid waste system/facility.

5.3.3 Yard Waste Projections

Table 43 presents the yard waste projections for the first ten years of the planning period (2018-2027). As indicated in Section 2.1.7.5, the SPSA currently does not have a comprehensive yard waste management program following the closure of the processing facility at the Virginia Beach Landfill No. 2. For the purpose of this pro forma analysis, SCS assumes that yard waste will be processed and recycled for beneficial purposes rather than being landfilled.

5.3.4 Recycling Projections

Recycling projections are presented in See Table 44. The projections are based on data provided by SPSA and the City of Virginia Beach and projected throughout the planning period based on population growth. SPSA provides recycling services to all but the City of Virginia Beach, which manages its own curbside recycling program. The projections assume that recycling rates will continue throughout the Region at rates similar to today. The first ten years of the thirty year projections are provided for demonstration purposes. The recycling rates are escalated as a function of the projected population growth for each City and County in the Region.

Table 40. Overall Assumptions Worksheet

Model Parameters	Assumption	Source/Basis
Miscellaneous		
Base Year	2008	
Planning Period	2018 - 2047	
Waste Flow		SCS Projections based on input from SPSA and member communities
Consumer Price Index (inflation rate)	4.0%	Assumed
Fuel Escalation	4.0%	Assumed
Interest Earnings (Of System Revenues)	6.0%	Assumed
Debt Financing Rate	6.0%	Assumed
Length of Bond Issue, WTE	20	Assumed
PV Discount Rate	5.0%	Assumed
Waste Management Alternatives		
Long Haul Transportation	Transfer truck, see Transportation Cost Worksheet	
Long Haul Disposal Location	WM Atlantic Waste	Assumed for costing purposes
Distance to WM Atlantic Waste Landfill from Current Landfill, miles	50	Calculated from Google Maps
Average Tip Fee Bid to SPSA for Out of Area Disposal	25.50	SPSA Proposals, 2007 ranged $25-$28/ton
Discount on Tip Fee	75%	Assumed based on conversation with waste industry representatives
Out of Area Disposal, Tip Fee, 2008 Dollars	$19.00	Discounted for Volume based on discussions with waste companies
Tipping Fee By Year, $/ton	See OOA Disposal Cost Worksheet	Based on SPSA bids received in Fall 2007 and escalated per CPI
Transfer Station Operations, $/ton	See SPSA Administrative Costs and Recycling and TS Worksheet	
2008 Diesel Fuel Cost, $/gallon	$3.50	Assumed 2008 pricing, then escalated. Energy Information Administration website indicates diesel fuel prices have varied widely over the last year ranging from $3.00 to $4.80 per gallon, with significant fluctuations up and down.
Transport Costs	See Transportation Cost Worksheet	First Tee Bids for SPSA waste transfer
WTE		
RDF (Processes First 615,000 Tons)		

Table 40. Overall Assumptions Worksheet

Model Parameters	Assumption	Source/Basis
Availability of Existing Units	85.0%	RW Beck Report
RDF Production (Tons)	615,000	Two of three lines in operation, two shifts per day (Average RDF processed 2002-2007)
Annual Operating and Maintenance Costs	$20,248,756	Average of SPSA 2007 and 2008 Budget
Annual Capital Improvements	$8,674,033	Average of SPSA 2007 and 2008 Budget; HDR Report
Steam Sales	$7,110,000	SPSA 2009 Budget
Electricity Sales	$10,600,000	SPSA 2009 Budget
Non Ferrous Recovery Sales	$250,000	SPSA 2009 Budget
Ferrous Recovery Sales	$550,000	SPSA 2009 Budget
Mass Burn (Second Plant)		
Size, tons per day, Scenario A1.3 & 2.3	2,000	Assumption
Size, tons per day, Scenario A1.4 & 2.4	3,000	Assumption
Technology	Scrubber Baghouse, Low NOx, SNCR system, flue gas recirculation, carbon injection, urea injection	
Availability of New Unit	90.0%	Assumption
Processing rate, tons per year, 2000 tpd	657,000	Calculated
Processing rate, tons per year, 3000 tpd	985,500	Calculated
Capital Cost	$250,000 per ton of installed capacity	SCS Engineers survey of WTE vendors
Land	0.0%	Sited on SPSA land adjacent to RDF Plant
Net Energy Production	550 kwh/ton Assuming Higher Heating Value of 5,200 Btu/hour	SCS Engineers estimate
New Mass Burn Ferrous Recovery Sales	See Mass Burn WTE Plant Costs Worksheet	
Ash Production (Of Incoming Waste Stream)	30.0%	
Energy Revenues from Electricity, 2009 Assumed $/kWh	$0.05225	Similar rate SPSA received from AEP and Dominion Power
Energy Revenues from Electricity, Renegotiated 2008 $/kWh	$0.06700	Newly negotiated rate, email from L. Jordan, SPSA
WTE Host Fee, $/ton	$1.00	Can be varied.
Regional Landfill		
Distance from current landfill to assumed new regional landfill, miles	25	SCS Engineers estimate
Size (Acres)	Varies By Scenario	

Table 40. Overall Assumptions Worksheet

Model Parameters	Assumption	Source/Basis
Total Solid Waste Disposal Capacity, Acres per Million Tons	29.1	Based on current SPSA Regional Landfill
Footprint Solid Waste Disposal Capacity, Acres per Million Tons	8.3	Based on current SPSA Regional Landfill
Solid Waste Disposal Area Ratio, Waste Footprint/Gross Area	0.28	Based on current SPSA Regional Landfill
Cost of Land, $/acre	$5,000	MLS Listings of available land in Southhampton, VA
In-place density, lbs/cubic yard	1,300	Assumed for analysis purposes
Apply Host Fee?	Yes	
Landfill Host Fee, $/ton	$3.00	SCS Engineers estimate
Cell Development Cost, $/acre	$348,000	SCS Engineers estimate
Operating and Maintenance Costs, $/ton	$5	Based on SPSA Benchmark Study and discussions with L. Jordan (with slight modification)
Closure Costs, $/acre	$180,000	SCS Engineers estimate
Post Closure Care	See Post Closure Care Costs Worksheet	
City of Virginia Beach Landfill Operations, $/ton	15	Assumed to include capital, equipment, and personnel costs. City of Virginia Beach is currently evaluating costs.

Table 41. HRPDC Member Community Solid Waste Projections

Waste Source	Disposal To	Basis for Projection	Waste Growth (%)	Project Waste Tonnage, Tons/Year									
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Chesapeake	Total Waste to SPSA	Population Projections	1.15%	131,170	132,680	134,210	135,750	137,310	138,890	140,490	142,100	143,740	145,390
Franklin	Total Waste to SPSA	Population Projections	0.92%	5,040	5,090	5,130	5,180	5,230	5,280	5,330	5,370	5,420	5,470
IOW	Total Waste to SPSA	Population Projections	1.89%	24,840	25,310	25,790	26,280	26,770	27,280	27,800	28,320	28,860	29,400
Norfolk	Total Waste to SPSA	Population Projections	0.07%	88,520	88,580	88,640	88,700	88,770	88,830	88,890	88,950	89,010	89,080
Norfolk Sludge	Total Waste to SPSA	Historical quantities	2.82%	19,810	20,370	20,940	21,530	22,140	22,760	23,410	24,070	24,750	25,440
Norfolk Total	Total Waste to SPSA			108,330	108,950	109,580	110,230	110,910	111,590	112,300	113,020	113,760	114,520
Portsmouth SPSA	Total Waste to SPSA	Population Projections	0.21%	56,170	56,280	56,400	56,520	56,640	56,760	56,880	57,000	57,120	57,240
Portsmouth LF	Total Waste to Ports LF	Population Projections	0.21%	15,320	15,350	15,380	15,410	15,450	15,480	15,510	15,540	15,580	15,610
Portsmouth Total	Total Waste from Portsmouth			71,490	71,630	71,780	71,930	72,090	72,240	72,390	72,540	72,700	72,850
Southampton	Total Waste to SPSA	Population Projections	1.18%	11,020	11,150	11,280	11,410	11,550	11,690	11,820	11,960	12,100	12,250
Suffolk	Total Waste to SPSA	Population Projections	2.04%	78,320	79,920	81,550	83,210	84,910	86,640	88,410	90,210	92,060	93,930
Virginia Beach SPSA	Total Waste to SPSA	Population Projections	0.29%	151,320	151,760	152,200	152,640	153,080	153,530	153,970	154,420	154,870	155,310
Virginia Beach LF	Total Waste to VB LF	Population Projections	0.29%	57,650	57,810	57,980	58,150	58,320	58,490	58,660	58,830	59,000	59,170
Virginia Beach Tot	Total Waste from VB			208,970	209,570	210,180	210,790	211,400	212,020	212,630	213,250	213,870	214,480
Commercial	Total Waste to SPSA	Historical quantities	1.00%	656,150	662,710	669,330	676,030	682,790	689,620	696,510	703,480	710,510	717,620
Navy	Total Waste to SPSA	Historical quantities	0.50%	44,150	44,370	44,590	44,810	45,040	45,260	45,490	45,720	45,950	46,170
CDD	Total Waste to SPSA	Historical quantities	1.50%	139,260	141,350	143,470	145,630	147,810	150,030	152,280	154,560	156,880	159,230
Other/OOA	Total Waste to SPSA	Historical quantities	1.50%	33,660	34,160	34,670	35,190	35,720	36,260	36,800	37,350	37,910	38,480
Yard Waste		Historical quantities		83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
	Total Waste			1,595,400	1,610,890	1,626,560	1,641,440	1,657,530	1,673,800	1,690,250	1,706,880	1,723,760	1,740,790
	Total Minus Yard Waste			1,512,400	1,526,890	1,541,560	1,556,440	1,571,530	1,586,800	1,602,250	1,617,880	1,633,760	1,649,790
	Total Minus Yard Waste, Portsmouth LF, VB LF, Other/OAA, and CDD			1,324,160	1,336,030	1,348,040	1,360,210	1,372,550	1,385,030	1,397,660	1,410,430	1,423,390	1,436,470

Table 42. Commercial Solid Waste Distribution By Community (2008)

Community		Muni Waste Only (tons/year)	% of Total	Comm. (Tons/Year) 594,000	Allocated Commercial (tons/year)
Chesapeake		117,000	20.28%	120,462	237,463
Franklin		4,600	0.80%	4,752	9,352
Isle of Wight		20,600	3.57%	21,206	41,806
Norfolk		102,900	17.84%	105,970	208,870
Portsmouth		55,000	9.53%	56,608	111,608
Southampton		9,800	1.70%	10,098	19,898
Suffolk		64,000	11.09%	65,875	129,875
Virginia Beach		203,000	35.19%	209,029	412,029
Navy		42,000			
	Subtotal, without Navy	576,900		594,000	
Navy Distributions (From SPSA)					
Norfolk	30%	30%	Norfolk	30%	
Portsmouth	5%	5%	Portsmouth	5%	
Virginia Beach - LT	35%		Virginia Beach	65%	
Virginia Beach - OC	30%	65%			

Table 43. Yard Waste Projections

Yard Waste	Plan Year		1	2	3	4	5	6	7	8	9	10
	Escalation Year		10	11	12	13	14	15	16	17	18	19
	Escalation Rate	Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Total Yard Waste	1%		83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
Chesapeake	1%		11,000	11,000	11,000	11,000	11,000	12,000	12,000	12,000	12,000	12,000
Franklin	1%		2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Isle of Wight	1%		1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Norfolk	1%		13,000	13,000	13,000	13,000	13,000	13,000	13,000	14,000	14,000	14,000
Portsmouth	1%											
Southampton	1%		1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Suffolk	1%		17,000	18,000	18,000	18,000	18,000	18,000	18,000	19,000	19,000	19,000
Virginia Beach	1%		39,000	39,000	40,000	40,000	40,000	41,000	41,000	42,000	42,000	42,000
Note:	Escalation based on growth rate for the last three fiscal years (2006 to 2008)											
All Communities (minus Portsmouth)	Scenario A and B		83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
Rural Communities	Scenario D		4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Urban Communities	Scenario D		80,000	81,000	82,000	82,000	82,000	84,000	84,000	87,000	87,000	87,000
All - Virginia Beach	Scenario E		44,000	45,000	45,000	45,000	46,000	46,000	47,000	47,000	48,000	49,000
All-Virginia Beach-Rural			40,000	41,000	41,000	41,000	42,000	42,000	43,000	43,000	44,000	45,000
Virginia Beach			39,000	39,000	40,000	40,000	40,000	41,000	41,000	42,000	42,000	42,000

Note: Escalation based on growth rate for the last three fiscal years (2006 to 2008). Data for yard waste for Suffolk was not available. The quantities projected above for Suffolk are based on the difference between the total yard waste in the Region minus the quantities provided by the other Cities or Counties; therefore, this figure may not truly represent Suffolk's contribution to the yard waste in the Region. Projections assume that yard waste from Portsmouth will continue to be disposed in the City's land clearing and inert debris landfill.

Table 44. Recycling Projections, Status Quo

Community	Population	Scenarios	Year Growth Rate	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Chesapeake	220,560		1.15%	14,001	14,162	14,325	14,490	14,656	14,825	14,995	15,168	15,342	15,519
Franklin	8,800		0.92%	546	551	556	561	566	572	577	582	588	593
Isle of Wight	34,723		1.89%	2,371	2,416	2,461	2,508	2,555	2,604	2,653	2,703	2,754	2,806
Norfolk	229,112		0.07%	13,064	13,073	13,082	13,091	13,100	13,109	13,119	13,128	13,137	13,146
Portsmouth	101,377		0.21%	5,862	5,874	5,886	5,899	5,911	5,924	5,936	5,948	5,961	5,973
Southampton	17,814		1.18%	1,134	1,148	1,161	1,175	1,189	1,203	1,217	1,231	1,246	1,260
Suffolk	81,071		2.04%	5,618	5,732	5,849	5,968	6,090	6,214	6,341	6,471	6,603	6,737
Virginia Beach	435,619		0.29%	41,175	41,295	41,414	41,535	41,655	41,776	41,897	42,018	42,140	42,262
Totals	1,129,076	Scenario A and B		83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
All Minus VB	693,457	Scenario E		42,600	43,000	43,300	43,700	44,100	44,500	44,800	45,200	45,600	46,000
Rural Communities		Scenario D Rural		4,100	4,100	4,200	4,200	4,300	4,400	4,400	4,500	4,600	4,700
Urban Communities		Scenario D Urban		79,700	80,100	80,600	81,000	81,400	81,800	82,300	82,700	83,200	83,600

Recycling projections include curbside collection only. For example, the City of Virginia Beach reports recycling in 2007-2008 in excess of 109,000 tons, of which approximately 40,000 tons were associated with its curbside recycling program, the balance consisting of asphalt, concrete, and other recyclable materials.

5.3.5 New Regional Landfill Site Development, Cell Construction, and Closure Capital Costs and Post-Closure Care

5.3.5.1 New Regional Landfill Location and Size

As discussed in Section 2.9.1.1.3, the expansion potential at the existing Regional Landfill in Suffolk has not been confirmed; therefore, for the purpose of the pro forma analysis, SCS assumes that the existing Regional Landfill will have reached its capacity by 2018 and that a new Regional Landfill will need to be developed to provide sufficient disposal capacity for the 30-year planning period. SCS also assumes for the purpose of estimating transportation costs that the new Regional Landfill will be located 25 miles further to the west of the existing Regional Landfill, and that the City of Virginia Beach's landfill will no longer be used for disposal of ash residuals. This is a conservative assumption, because if the City of Virginia Beach's landfill is still available to the Region for disposal of ash residuals, the overall disposal costs will be reduced.

The factors used to estimate the total facility and landfill footprint areas for each scenario are discussed in 3.8.1. The estimated landfill area requirements for each scenario is a function of the estimated total quantity of waste requiring disposal during the planning period. Table 45 presents a summary of the estimated disposal capacity required in terms of million tons for each Scenario, and the estimated total facility and landfill footprint areas required.

5.3.5.2 Capital Cost Allocations

The major capital expenses for the landfill include predevelopment, cell development, and cell closure construction. SCS prepared estimates for these major cost elements for a new Regional Landfill associated with each Scenario where appropriate. The pre-development costs include the following major cost categories:

Predevelopment Costs
- Land Purchase,
- Site Selection Study,
- Site Feasibility Study
- Boundary and Topographic Survey
- Hydrogeologic Investigation
- Engineering
- Legal
- Permiting
- Buildings and Infrastructure
  - Roads
  - Buildings/Scalehouse/Maintenance,
  - Utilities
- Contingency (10%)

An example predevelopment cost estimate for Scenario A1.1, which assumes that all the waste from the Region would be disposed in the new Regional Landfill and the RDF WTE would not be operational, is presented in Table 46. To simplify capital funding for the pro forma analysis,:

Table 45. Total Waste Disposal Facility and Landfill Footprint Sizing Estimates

Scenario	Alignment	Disposal	Required 30-yr LF Capacity (Million Tons)		Required Acreage (Acres)	Required Footprint (Acres)
			New Regional LF	Contracted	New Regional LF	New Regional LF
A1.1	All eight communities cooperate	New Regional Landfill	43.7		1,272	363
A1.2	All eight communities cooperate	New Regional Landfill	30.8		896	256
A1.3	All eight communities cooperate	New Regional Landfill	17.0		500	140
A1.4	All eight communities cooperate	New Regional Landfill		43.7		
A2.1	All eight communities cooperate	Contract out disposal		30.8		
A.2.2	All eight communities cooperate	Contract out disposal		17.0		
A2.3	All eight communities cooperate	Contract out disposal				
A2.4	All eight communities cooperate	Contract out disposal				
B1.1	All eight communities cooperate to manage municipally collected MSW	New Regional Landfill	20.9		5700	160
B1.2	All eight communities cooperate to manage municipally collected MSW	New Regional Landfill	8.0		200	60
B2.1	All eight communities cooperate to manage municipally collected MSW	Contract out disposal		20.9		
B2.2	All eight communities cooperate to manage municipally collected MSW	Contract out disposal		8.0		
C.1.1	All eight communities go separate ways	Contract out disposal - all waste		45.5		
D1.1	IOW, Franklin, Southampton Align-VB, Norfolk, Portsmouth, Chesapeake, Suffolk Align	Rural members contract for disposal, New Regional Landfill	40.8	2.9	1,187	339
D1.2	IOW, Franklin, Southampton Align-VB, Norfolk, Portsmouth, Chesapeake, Suffolk Align	Rural members contract for disposal, New Regional Landfill	27.9	2.9	812	232
D2.1	IOW, Franklin, Southampton Align-VB, Norfolk, Portsmouth, Chesapeake, Suffolk Align	Rural members contract for disposal, Urban members contract for disposal		43.7		
D2.2	IOW, Franklin, Southampton Align-VB, Norfolk, Portsmouth, Chesapeake, Suffolk Align	Rural members contract for disposal, Urban members contract for disposal		30.8		

Table 45. Total Waste Disposal Facility and Landfill Footprint Sizing Estimates

Scenario	Alignment	Disposal	Required 30-yr LF Capacity (Million Tons)		Required Acreage (Acres)	Required Footprint (Acres)
			New Regional LF	Contracted	New Regional LF	New Regional LF
E1.1	VB manages own waste, others align	VB runs own landfill until capacity expended, then contracts out for disposal, other communities site new Landfill.	30.0		880	250
E1.2	VB manages own waste, others align	VB runs own landfill until capacity expended, then contracts out for disposal, other communities site new Landfill.	17.1		500	140
E2.1	VB manages own waste, others align	VB runs own landfill until capacity expended, then contracts out for disposal, other communities contract out disposal.		30.0		
E2.2	VB manages own waste, others align	VB runs own landfill until capacity expended, then contracts out for disposal, other communities contract out disposal.		17.1		

SCS assumed that new disposal cells would be constructed approximately 5 years throughout the 30-year planning horizon, and that closure of the subsequent cell would commence the year following the next cell construction. The assumed $/acre for new cell construction and closure construction costs are presented in Table 40. All costs were escalated per the assumed CPI.

An annual operational capital cost was estimated based upon the required cash flow needs resulting from the pre-development, new cell construction, and closure activities throughout the 30-year planning period. A capital cost fund balance was developed and an annual operational cost calculated such that the fund balance would be close to zero (on the positive side) upon closure of the last disposal cell, and assuming interest payment or earnings on the capital fund balance. An example of the capital cost fund for Scenario A1.1 is presented in Table 47.

5.3.5.3 Post-Closure Care Costs

The post-closure care costs were estimated, escalated, and allocated for a 30-year period following closure of the new Regional Landfill. For the purpose of the pro forma analysis, a post-closure care fund was developed and an annual post-closure care contribution estimated to provide sufficient funds to pay for the 30-year post-closure care during the active life of the landfill. The 2008 post-closure care estimate is provided in Table 48.

5.3.6 Landfill Operating Costs

A new Regional Landfill will have annual operating costs such as personnel costs, equipment operation and maintenance costs, consulting and professional services costs, and miscellaneous operating costs (e.g., groundwater sampling, groundwater laboratory analysis, and leachate disposal) similar to the current Regional Landfill in Suffolk. SCS assumed an operational cost (equipment, labor, and materials) of $5 per ton for the new Regional Landfill. SPSA conducted a benchmark study in 2003, which indicated that its equipment and labor costs to operate the landfill were $2.75 per ton (R. W. Beck, 2003). They also compared its operation against other operations with incoming disposal rates of 245 to 5,800 tpd. Operational costs were reported to range from $2.75 to $8.35 per ton. SCS also reviewed a recent draft benchmarking study prepared for SWANA's Applied Research Foundation (ARF). The ARF study reported average operational costs of $10.79 per ton for facilities receiving between 500 and 3,500 tons per day, with a standard deviation of $7.02 per ton (SWANA Applied Research Foundation, 2008). For the purpose of the pro forma analysis, SCS assumed an operational cost of $5 per ton (2008 dollars). This variable can be easily changed in the model for sensitivity analysis purposes. For Scenario E, SCS assumed that the City of Virginia Beach could operate its landfill, including capital for cell expansion, closure, and post-closure for $15 per ton (2008 dollars).

5.3.7 Transportation Costs

5.3.7.1 Transfer Costs

Additional costs will be incurred transporting waste to a new Regional Landfill or to a private out-of-area landfill. These additional costs were included in the Pro Forma Model. As indicated in Section 5.3.5, SCS assumed the New Regional Landfill would be located 25 miles further to the west of the existing Regional Landfill, which would increase the roundtrip travel distance from the SPSA transfer stations by 50 miles. For the out-of-area landfill disposal scenarios, SCS

Table 46. Predevelopment Cost Estimate, Scenario A1.1

Predevelopment Costs	2008	2018
Landfill Property, acres	1,280	
Landfill Footprint, acres	360	
Cell Construction, acres/5 years	60	
Capacity Required, tons	43,743,000	
Land Price, $/acre	$5,000	$ 8,000
Land Purchase, $	$6,400,000	$ 10,240,000
Site Selection Study, $	$ 500,000	$ 741,000
Site Feasibility Study, $	$250,000	$371,000
Boundary and Topographic Survey, $	$100,000	$149,000
Hydrogeologic Investigation, $	$500,000	$741,000
Engineering, $	$ 1,000,000	$1,481,000
Legal, $	$500,000	$741,000
Permiting, $	$300,000	$445,000
Buildings and Infrastructure		
Roads, $	$ 3,000,000	$ 4,441,000
Buildings/Scalehouse/Maintenance, $	$ 5,000,000	$ 7,402,000
Utilities, $	$ 2,000,000	$ 2,961,000
Contingency 10%, $	$1,955,000	$ 2,971,000
Subtotal, Pre-development Costs, $	$21,505,000	$32,684,000

Table 47. :Landfill Capital Cost Fund Balance Analysis

Plan Year		1	2	3	4	5	6	7	8	9	10
Escalation Year	2008	10	11	12	13	14	15	16	17	18	19
Year		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Withdrawal		$(63,592,000)	$-	$-	$-	$(36,157,000)	$(19,450,000)	$-	$-	$-	$(43,991,000)
Balance for Interest Est.		$(63,592,000)	$(49,050,520)	$(33,636,551)	$(17,297,744)	$(36,135,609)	$(39,396,745)	$(23,403,550)	$(6,450,763)	$11,519,191	$(13,423,658)
Interest Expense		$(3,815,520)	$(2,943,031)	$(2,018,193)	$(1,037,865)	$(2,168,137)	$(2,363,805)	$(1,404,213)	$(387,046)	$691,151	$(805,419)
Capital Payment		$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000
Balance End of Year		$(49,050,520)	$(33,636,551)	$(17,297,744)	$21,391	$(19,946,745)	$(23,403,550)	$(6,450,763)	$11,519,191	$30,567,342	$4,127,923
Plan Year		11	12	13	14	15	16	17	18	19	20
Escalation Year		20	21	22	23	24	25	26	27	28	29
Year		2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Withdrawal		$(23,664,000)	$-	$-	$-	$(53,522,000)	$(28,791,000)	$-	$-	$-	$(65,117,000)
Balance for Interest Est.		$(19,536,077)	$(2,351,242)	$15,864,684	$35,173,565	$2,118,979	$(8,187,882)	$9,677,845	$28,615,515	$48,689,446	$4,850,813
Interest Expense		$(1,172,165)	$(141,074)	$951,881	$2,110,414	$127,139	$(491,273)	$580,671	$1,716,931	$2,921,367	$291,049
Capital Payment		$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000
Balance End of Year		$(2,351,242)	$15,864,684	$35,173,565	$55,640,979	$20,603,118	$9,677,845	$28,615,515	$48,689,446	$69,967,813	$23,498,862
Plan Year	21	22	23	24	25	26	27	28	29	30	31
Escalation Year	30	31	32	33	34	35	36	37	38	39	40
Year	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
Withdrawal	$(35,029,000)	$-	$-	$-	$(79,225,000)	$(42,618,000)	$-	$-	$-	$-	$(51,851,000)
Balance for Interest Est.	$(11,530,138)	$6,135,053	$24,860,157	$44,708,766	$(13,476,708)	$(38,546,310)	$(22,502,089)	$(5,495,214)	$12,532,073	$31,640,997	$45,457
Interest Expense	$(691,808)	$368,103	$1,491,609	$2,682,526	$(808,602)	$(2,312,779)	$(1,350,125)	$(329,713)	$751,924	$1,898,460	$2,727
Capital Payment	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	$18,357,000	
Balance End of Year	$6,135,053	$24,860,157	$44,708,766	$65,748,292	$4,071,690	$(22,502,089)	$(5,495,214)	$12,532,073	$31,640,997	$51,896,457	$48,184

Goal in estimating the annual capital payment required over the 30-year planning period is to have a positive, but near zero fund balance at the end of the closure of the last cell of the New Regional Landfill.

Table 48. Post-Closure Care Cost Estimate (2008$)

Item			Quantity	Unit	Unit Cost		Cost ($/year)
Inspection				Lump sum			35,000
Maintenance				Lump sum			100,000
Leachate Disposal			10,000	gpd x	$0.05	/gallon	183,000
Groundwater Sampling				Lump sum			50,000
Groundwater Analysis	16	well points	2	times / year	$1,200	/sample	38,000
Maintenance of Environmental Facilities				Lump sum			25,000
Contingency				Lump sum			43,000
LFG (assume LFGE Energy Project Pays for System)							0
						Subtotal	474,000

assumed the private disposal facility would be Waste Management's Atlantic Waste, which is located in Sussex County approximately 50 miles from the existing Regional Landfill. There are others potential private facilities that could be considered (e.g., Bethel Landfill in Newport News), but transportation issues associated with the Hampton Roads Bridge Tunnel would make this a less viable alternative. Roundtrip travel distances would be increased by 100 miles to transfer waste to this facility. Reference to Waste Management's disposal facility in no way implies a commitment to this facility by the HRPDC or its members. The facility was chosen for cost estimating purposes only.

SCS reviewed the 2007 hauling contract SPSA has with First Tee to transfer solid waste within the Region. First Tee is paid a base fee $ per roundtrip-mile fee, which is adjusted for inflation. A additional fuel adjustment charge of $0.0025 per every cent change in the cost of diesel fuel above or below a base rate of $2.50 per gallon also is applied. Assuming a 24-ton load per transfer vehicle, the average base transfer rate from all the transfer stations is approximately $0.12/ton-roundtrip mile (See Table 49). Assuming a $3.50/gallon diesel fuel cost, the total transportation rate would be approximately in would be $0.133 per ton-roundtrip mile (2008 Dollars). This appears to be a conservative approximation of transportation costs in the solid waste industry for long-haul transport. Fuel prices are difficult to predict at this time due to the relative uncertainty in the oil markets worldwide. For example prices for oil in 2008 have varied from a high of approximately $150 per barrel to a low of $75 per barrel, and the reported prices for diesel fuel have varied from nearly $3.00 per gallon just over $4.80 per gallon, with wide fluctuations up and down over the last year (Department of Energy, Energy Information Administration, 2008). The transportation cost element of the overall cost of disposing of solid waste could be highly variable, and a continued significant cost element of any solid waste program, regardless of whether a new Regional Landfill is sited or waste is transferred to an out of area landfill. For the purposes of the pro forma analysis, SCS assumed fuel prices would escalate at the CPI; however, this assumption can be adjusted for sensitivity analysis purposes.

5.3.7.2 Transportation Distances

The estimated additional travel distances to a new Regional Landfill from each transfer station are presented in Table 50. These distances are used primarily for Scenario C, which estimates costs associated with each HRPDC member community managing its own solid waste program

5.3.8 Out of Region Disposal Fees

In the fall of 2007, SPSA solicited and received bids from private vendors to provide long-term landfill disposal capacity. Reported tip fees ranged from $25.50 to $28 per ton. SCS and the HRPDC also met several times during the course of this study with private waste management companies that provide collection and disposal services throughout the Region. During these meetings, industry representatives indicated that a tip fee significantly less than the $25.50 per ton rate could be negotiated assuming the Region were willing to make a long-term commitment. The industry representatives would not confirm a specific tip fee rate; however, several indicated that an assumed tip fee rate between $18 to $20 per ton would be reasonable. In the Pro Forma Model, a tip fee of $19 per ton was assumed (2008 dollars), which represents a 25 percent discount from the lowest bids received by SPSA in 2007. This rate was escalated throughout the planning period per the CPI.

Table 49. Transportation Costs Assumptions

From-To	$/Trip ($2007)	Trip Length RT Miles	Base Rate ($/ton-RT-mi)	Fuel Adjustment ($/RT)	Fuel Adjustment ($/ton-RT mile)	Adjusted Roundtrip Rate ($)	Base $/ton-mi	Adjusted ($/ton-RT mile)
SPP-RLF	91.95	32	$0.120	8.00	0.01	$99.950	$0.120	$0.130
SPP-VBLFII	145.32	46	$0.132	11.50	0.01	$156.820	$0.132	$0.142
RDF-RLF	97.11	32	$0.126	8.00	0.01	$105.110	$0.126	$0.137
CTS-RLF	111.43	41	$0.113	10.25	0.01	$121.680	$0.113	$0.124
CTS-RDF	94.84	30	$0.132	7.50	0.01	$102.340	$0.132	$0.142
NSO-FLF	136.44	49	$0.116	12.25	0.01	$148.690	$0.116	$0.126
NTS-RDF	73.16	18	$0.169	4.50	0.01	$77.660	$0.169	$0.180
NTS-RLF	131.01	46	$0.119	11.50	0.01	$142.510	$0.119	$0.129
OTS-RDF	111.24	38	$0.122	9.50	0.01	$120.740	$0.122	$0.132
OTS-RLF	150.21	58	$0.108	14.50	0.01	$164.710	$0.108	$0.118
LTS-RDF	103.39	36	$0.120	9.00	0.01	$112.390	$0.120	$0.130
LTS-RLF	141.2	56	$0.105	14.00	0.01	$155.200	$0.105	$0.116
IOWTS-RDF	210	92	$0.095	23.00	0.01	$233.000	$0.095	$0.106
IOWTS-RLF	150	58	$0.108	14.50	0.01	$164.500	$0.108	$0.118
FTS-RDF	210	92	$0.095	23.00	0.01	$233.000	$0.095	$0.106
FTS-RLF	150	60	$0.104	15.00	0.01	$165.000	$0.104	$0.115
Averages	131.7	49.0	$0.1177	12.25	0.01	$143.9563	$0.1177	$0.1281
Adjusted to 2008			$0.122					

Table 50. Projected Out-of-Region Transportation Distances

Transfer Station	Distance (One Way Miles)				
	SPSA Regional LF	ATL Waste Disposal, Sussex County	Conceptual New Regional Landfill	Additional One-Way Distance to Conceptual New Regional Landfill	Additional On-Way Distance to ATL Waste Disposal
Chesapeake	20	65	39	19	45
Franklin	30	42	21	-9	12
Isle of Wight	25	34	14	-11	9
Norfolk	17	63	43	26	46
RDF Transfer - Portsmouth	13	59	43	30	46
Southampton - Boykins	44	45	22	-22	1
Southampton - Ivor	25	21	5	-20	-4
Suffolk	0	46	26	26	46
VB - Landstown	27	73	53	26	46
VB - Oceana	29	74	54	25	45

5.3.9 SPSA Budget Costs

SPSA currently operates an integrated solid waste management system, which includes the Regional Landfill, the RDF and Power Plant, nine transfer stations, curbside and drop-off recycling programs, management of a household hazardous waste, and a tire shredding program (Table 51). Development of these programs and facilities has occurred over the past 20 years, paid for by funding received through bond proceeds and tipping fees. Member governments rely on many, if not all, of these services provided by SPSA to provide services in turn to their residents, businesses, and ratepayers. If these functions would cease to exist, the communities would be forced to increase their individual budgets, or add additional staff members to manage these functions, or rely on private vendors to provide these SPSA-provided services, or consider reductions in service levels to the public.

The Pro Forma Model assumes that these services are an essential of an integrated solid waste management system for the Region whether they were run by a centralized agency (e.g., SPSA), a successor solid waste management agency, or were provided by each individual community, or agencies made up of alignments of various communities. To develop a "proxy price" for these services, SCS reviewed existing SPSA annual operating and capital improvement budgets. SCS then escalated the costs for these programs to the planning period and then allocated the costs of these centralized programs based on the projected solid waste tonnage provided by each community or alignment of communities in the operating scenarios more fully described in the paragraphs below. Where appropriate, SPSA 2008 budget costs were used as inputs into the Pro Forma Model to estimate environmental management, administration, transfer station, recycling, and waste-to-energy costs for the cooperative scenarios evaluated. Table 51 presents the SPSA budget assumptions used in the pro forma analysis. More detail on the assumptions used to estimate the resource recovery costs is discussed below.

5.3.10 Waste-to-Energy

5.3.10.1 Existing SPSA RDF WTE Facility

Since 1988 SPSA has operated the RDF Facility and Power Plant (referred to in this report as the RDF WTE Facility). The later facility was acquired from the U.S. Navy in 1999 and receives RDF fuel for combustion and generates steam and electricity. New air emissions control equipment has been installed to meet new stringent air emissions regulations, which were promulgated by the U.S. Environmental Protection Agency in response to the Federal Clean Air Act.

An independent bondholder's report of both facilities is completed annually by an engineering consultant engaged by SPSA pursuant to its Bond Indenture. Our reviews of the last five years of reports prepared by R.W. Beck indicate that the RDF plant appears to be properly maintained and operated requiring only continued emphasis on housekeeping programs within the building and typical restoration efforts. The quantity of RDF fuel that is produced appears to be sufficient to allow the RDF WTE Facility to meet the steam needs of the Navy and enable SPSA to sell electricity on the grid.

As noted by R.W. Beck, boiler reliability of the RDF WTE Facility continues to be the limiting factor with respect to RDF consumption and the waste processing capability of the resource recovery system. SPSA continues to make numerous modifications to the RDF WTE Facility to improve performance to enable it to operate close to its anticipated annual capacity factor. Our review of R.W. Beck's annual reports, a review of a 2008 condition assessment report by HDR, discussions with the SPSA Plant Operator, and knowledge of the resource recovery industry, suggests that this current budgeted capital cost of renewals and replacements will need to continue at a high level for many years. However, there is nothing to suggest in the specific SPSA operating record and similar experiences with other resource recovery facilities, that the RDF WTE Facility could not continue to provide the member communities with continued disposal capacity into the foreseeable future.

Table 51. SPSA Operational Costs

Administration

Categories	Accounting	Executive Offices	Human Resources	Purchasing	Regional Office Building	Public Relations	Information Technology	Scalehouse Operations
Salaries	293,334	598,271	443,013	144,461	0	145,505	416,439	346,150
Employee Benefits	86,240	141,819	139,286	33,277	0	42,217	116,870	130,584
Contractual Services	127,500	680,000	103,586	0	78,656	850	461,989	25,750
Materials and Supplies	5,000	51,900	7,715	2,575	4,500	7,000	2,800	5,650
Other Operating Expenses	66,725	161,665	77,406	13,475	120,941	18,875	327,979	51,384
Capital Costs	4,900	6,000	0	0	0	0	20,000	0
Subtotal	**$583,699**	**$1,639,655**	**$771,006**	**$193,788**	**$204,097**	**$214,447**	**$1,346,077**	**$559,518**
TOTAL	**$5,512,287**							

Environmental Management

Categories	Environmental Management	Safety	Household Hazardous Waste	VB White Goods Program	Suffolk White Goods Program
Salaries	392,809	196,402	141,344	53,810	32,201
Employee Benefits	119,229	50,551	44,183	28,740	12,378
Contractual Services	295,757	7,820	118,270	1,500	1,850
Materials and Supplies	16,970	1,200	2,600	2,150	1,650
Other Operating Expenses	31,603	27,998	46,285	14,447	12,835
Capital Costs	3,571	0	0	0	0
Subtotal	**$859,939**	**$283,971**	**$352,682**	**$100,647**	**$60,914**
TOTAL	**$1,658,153**				

Operations

Central Facilities	Administration	Regional Landfill	Fleet Maintenance	Facilities Maintenance	Tire Processing	Transportation
Categories						
Salaries	346,658	1,115,817	1,310,011	385,929	105,957	3,188,456
Employee Benefits	100,503	438,367	450,310	146,520	40,760	1,163,225
Contractual Services	5,000	96,000	26,000	35,800	6,800	239,500
Materials and Supplies	2,200	28,000	37,400	2,400	1,700	6,600
Other Operating Expenses	18,061	1,026,910	133,600	57,341	62,646	3,063,259
Capital Costs	27,350	4,831,960	71,667	38,290	37,400	2,307,730
Subtotal	**$499,772**	**$7,537,054**	**$2,028,988**	**$666,280**	**$255,263**	**$9,968,770**
TOTAL	**$20,956,127**					

Table 51. SPSA Operational Costs

Transfer Stations

Categories	Norfolk	Chesapeake	Franklin	Ivor	Boykins	Isle of Wight	Oceana	Landstown	Suffolk
Salaries	1,071,193	275,788	130,129	0	0	159,739	500,462	1,072,136	185,591
Employee Benefits	395,539	106,618	59,703	0	0	59,488	180,619	384,643	64,006
Contractual Services	10,217	603,327	201,627	0	2,600	271,827	6,108	10,042	2,500
Materials and Supplies	1,500	800	1,450	1,000	1,000	1,100	530	1,100	1,000
Other Operating Expenses	1,077,704	220,154	82,069	14,945	12,807	92,465	440,863	981,872	108,021
Capital Costs	211,143	241,433	30,386	0	0	38,471	72,243	112,167	93,671
Subtotal	$2,767,296	$1,448,120	$505,364	$15,945	$16,407	$623,090	$1,200,825	$2,561,960	$454,789
	28.84%	15.09%	5.27%	0.17%	0.17%	6.49%	12.52%	26.70%	4.74%
TOTAL	**$9,593,797**								

Recycling

Categories	Recycling Colllctions	Recycling Administration	Yard Waste Management	Grounds Maintenance	Drop Off Collections	Business Recycling Operations
Salaries	916,913	171,128	620,769	0	230,314	0
Employee Benefits	342,399	50,322	239,713	0	83,262	0
Contractual Services	24,500	7,702	20,434	0	5,000	0
Materials and Supplies	33,500	21,600	169,553	0	0	0
Other Operating Expenses	505,353	33,698	533,805	0	156,446	0
Capital Costs	0	26,000	509,600	0	53,670	0
Subtotal	**$1,822,665**	**$310,450**	**$2,093,874**	**$0**	**$528,692**	**$0**
TOTAL	**$4,755,681**					
Virginia Beach Recycling(2008)	**$5,200,000**	(Source: City of Virginia Beach)				

Waste-To-Energy

Categories	WTE RDF Plant	RDF Tipping Floor	WTE Power Plant
Salaries	2,464,776	1,065,393	3,995,584
Employee Benefits	890,038	383,273	1,231,261
Contractual Services	522,600	21,108	2,909,000
Materials and Supplies	74,000	6,500	1,147,800
Other Operating Expenses	2,549,161	1,037,127	5,779,775
Capital Costs	1,628,500	640,000	7,247,533
Subtotal	$8,129,075	$3,153,401	$22,310,953
TOTAL	**$33,593,429**		

Source: SPSA, *FY2008 Annual Budgets, General Operating and Five-Year Capital*

As such, the Pro Forma Model has been constructed with the assumption that the RDF WTE Facility could continue to provide disposal capacity over the planning horizon. Our review of the available operating data suggests that the system could consistently provide upwards of 615,000 tons of solid waste disposal capacity per year. For financial modeling purposes, the annual operating and five-year capital improvements budgets were then scrutinized by SCS to develop estimates of annual operating costs, capital improvements, and operating revenues that could be realized.

5.3.10.2 New Mass Burn Waste-to-Energy Facilities

From the late 1980s to about 1995, there was a major upswing in the implementation of waste-to-energy facilities in the United States with nearly 100 plants sited, designed, and operated by local governments and private vendors. Issues of flow control, increasing costs of environmental compliance, tax financing, and concerns about the toxicity of ash residues from such facilities resulting in a near collapse of this industry in the mid 1990s. Since that time, many waste-to-energy companies have exited the marketplace (e.g., American Re-Fuel, Foster Wheeler, General Electric, and Westinghouse) due to the lack of development activity. Consequently, the expertise and available cost information for "greenfield" waste-to-energy projects have been significantly reduced, although in recent years there have been many existing plants that have been expanded.

For the purposes of this study, SCS contacted vendors and operators of waste-to-energy facilities to obtain updated cost data and information for capital and operating costs for a new mass-burn facility. SCS is of the opinion that these data provide a reliable basis for projecting the costs of a new waste-to-energy facility for the Hampton Roads Region, absent preparing a detailed cost estimate for this facility, which is beyond the scope of this study. The following assumptions were utilized to prepare pro forma projections for the study:

- **Energy Production**. The new plant would provide a net generation of approximately 586 kWh per ton of waste processed, assuming solid waste with a higher heating value (HHV) of approximately 5,200 Btu/per pound.

- **Plant Availability of Processing Capacity**. Annual plant availability, tons per year (TPY), is assumed to be 90 percent, which is comparable with normal waste-to-energy operating experiences with new plants. For projection purposes, an annual processing capacity of 985,500 TPY at 3,000 tons per day of installed capacity ws utilized.

- **Ash Residue Generation**. Thirty (30) percent of the incoming municipal solid waste steam (on the basis of weight). This bottom ash residue from combustion and fly ash residue from the air emissions control devices will require disposal in a landfill.

- **Ferrous and Non Ferrous Recovery**

  - Estimated ferrous recovery of 0.026% incoming municipal solid waste
  - Estimated non ferrous recovery of 0.00076% of incoming ferrous recovery

- **Capital Cost**. The estimated capital cost assumes the construction of a complete plant up to the typical switchyard interconnection with the electric purchaser. The plant is assumed to consist of multiple boilers (three) for added system redundancy. The SCS estimate consists of the following major design elements:

  - Boiler – low NO_x unit, selective non catalytic reduction system (SNCR), flue gas recirculation, carbon injection, urea injection

  - Air Emissions Control System – scrubber baghouse configuration

  - Storage Bunker – three days waste storage in an enclosed pit and receiving tipping building

  - Soft costs such as development, spare parts, permitting, emission offsets, if needed, profit, and contingency

  - $200,000 per ton of installed capacity (2008 dollars) with total capital costs of $400,000 for a 2,000 tons per day plant and $600,000,000 for 3,000 tons per day plant

- **Electricity Revenues.** For estimates of energy revenues, SCS assumed a combined capacity and energy payment of $0.06700 per kWh (2008), escalated annually by the assumed inflation rate. This estimate is similar to the current agreement between SPSA and Virginia Electric and Power Company.

- **Operations and Maintenance (O&M) Expenses.** The O&M expenses assume costs for labor, administration, operator profit, parts and supplies, typical renewable and replacements, electricity, fuel (propane and natural gas), and normal passthroughs such as chemicals (pebbled lime, dolomitic lime, urea, ammonia, activated carbon, insurance, testing, and utilities (potable and reclaimed water, wastewater). SCS assumed that the communities would pay for ash disposal at the new Regional Landfill, or out-of-region Landfill at the projected tipping fees.

- **Siting Considerations**. For initial projection purposes, SCS assumed that the proposed waste-to-energy facility would be located adjacent to the SPSA RDF facility to take advantage of available acreage, electric interconnection, water, wastewater, and natural gas supplies, and the local road network for cost effective garbage truck queuing.

- **Schedule.** For projection purposes, SCS assumed the following implementation schedule:

  - Three years to obtain permits, conduct procurement process, and obtain financing
  - Three years to construct and acceptance test the facility.

5.3.11 Host Fees

Imposition of solid waste facility host fees is another method used by solid waste agencies across the country to fund the operations of their systems. In most cases a host fee is imposed on other member governments in a regional system to reimburse the hosting community for a solid waste facility (e.g., landfill, transfer station, waste-to-energy plant) as a means of ensuring that the local hosting community is compensated for the increased costs and impacts to their community from the location of a solid waste management facility. These costs can include road maintenance, emergency services, and lower property tax revenues. Surveys indicate that most host communities typically incorporate this revenue into the General Fund to be used for projects and programs related to general government.

The existing SPSA funding system allows the City of Suffolk to receive zero tipping fees for the waste they dispose in the SPSA system. There has been some disagreement about the appropriateness and operation of this funding methodology. For modeling purposes, SCS has included two separate host fees, one for the new Regional Landfill and the other for the existing or new resource recovery facility in Portsmouth. SCS assumed a landfill host fee of $3.00 per ton and a resource recovery host fee of $1.00 per ton. The landfill host fee was assigned a larger value than the resource recovery host fee to reflect the area impact of a landfill compared to a resource recovery facility (potentially thousands of acres versus tens of acres). The host fee would be imposed on all member governments for the solid waste delivered to the Regional Landfill or the resource recovery facility.

5.3.12 System Rate

The Pro Forma Model includes a line item labeled “System Rate”. The System Rate represents the total costs of the solid waste system included in the Pro Forma Model (costs minus any revenues) divided by the total waste managed in the system. The total waste managed includes solid waste, yard waste, and recyclables. The System Rate should not be confused with a tip fee, since it contains certain cost elements that may not be included in a typical landfill tip fee calculation such as yard waste management and recycling which may be paid for separately by the member communities. The System Rate provides a financial measure to compare alternatives.

5.3.13 Net Present Value

Net present value (NPV) is the current value of one or more future cash payments and offsetting revenues discounted at an assumed interest rate. A NPV analysis is a useful tool in evaluating alternatives involving complex cash flows. For the Pro Forma Model, the NPV is calculated for the 30-year planning period for each scenario to allow for comparisons. The assumed interest rate used in the NPV calculation is presented in Table 40.

5.3.14 Financing Costs

5.3.14.1 Landfill Development and Capital Construction

As presented in Section 5.3.5.2, the development of a new Regional Landfill will involve substantial predevelopment, cell development, and closure construction costs, which will need to

be financed during the planning period. New cell construction is assumed to occur every five years, followed by sequential closure of the previously filled area. A capital fund was included in the Pro Forma Model to estimate and allocate a uniform annual cost to fund the capital requirements for landfill development and construction.

5.3.14.2 Resource Recovery Facility Capital Improvements and New Construction

The projected capital improvements for the existing RDF WTE Facility are included in the annual operating budget for the facility (See Table 51). However, for the development of new waste-to-energy facility, SCS assumed that the construction will be bonded over a 20-year period. The assumed interest rate for the bond is listed in Table 40.

5.4 PRO FORMA MODEL STRUCTURE

Two example outputs from the Pro Forma Model are presented in Table 52 and Table 53 to illustrate the layout of the model and how the specific cost and revenue elements are organized. Scenarios A1.1 and A2.2 were selected for demonstration purposes because they illustrate the flexibility of the model to evaluate differing processing and disposal options, the inclusion or exclusion of host fees, and other nuances of the model. Only the first 10-years of the 30-year projections are presented for illustrative purposes.

5.5 PRO FORMA ANALYSIS RESULTS

The detailed outputs for the pro forma analysis for Scenarios A through E are presented in Appendix C. The summary NPV costs from the pro forma analysis for all the scenarios are presented in Table 54 and Table 55. Table 55 contains supplemental analysis, presenting the results as a function of the 2008 and 2018 NPV values and as a normalized function of the NPV divided by the total solid waste managed during the 30-year period. The results are also sorted by NPV (lowest to the highest). An estimated allocation of the NPV costs for the municipalities is also presented in Table 55 and further refined for the 1.1 scenarios by individual municipality in Table 56. A lower NPV represents a lower cost scenario. The analysis was only done for 1.1 scenarios, which represented the lowest NPV cost of all the scenarios considered. This comparison was developed in an attempt to illustrate the cost impacts of SPSA member communities cooperating post-2018 versus not cooperating.

Figure 14 provides a series of bar charts presenting the pro forma model results comparisons for each scenario. Scenarios A, B, D, and E assume varying degrees of cooperation and alignment between the Region members. Scenario C assumes that all the member communities independently manage their own solid waste systems, including recycling, transfer stations, and disposal. The following general conclusions can be made from theses summary analysis tables.

Table 52. Pro Forma Model Sample Output, Scenario A1.1
All Communities Cooperate, No Waste-to-Energy Facilities

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	33,842	35,195	36,602	38,068	39,590	41,172	42,820	44,533	46,315	48,165
Solid Waste Administration	8,160	8,486	8,825	9,178	9,545	9,927	10,324	10,737	11,167	11,614
Regulatory Compliance	2,454	2,553	2,655	2,761	2,871	2,986	3,106	3,230	3,359	3,493
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	5,852	6,782	6,876	6,972	7,954	8,064	8,177	9,211	9,339	10,415
Site Develop, New Cell, Closure	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	3,800	3,835	3,870	3,906	3,943	3,980	4,017	4,055	4,093	4,132
Additional Transportation Costs	13,242	13,971	14,725	15,533	16,368	17,251	18,183	19,159	20,180	21,254
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$100,977**	**$105,030**	**$108,387**	**$111,883**	**$116,396**	**$120,190**	**$124,171**	**$129,214**	**$133,517**	**$138,944**
NET ANNUAL SYSTEM COSTS ($000)	**$100,977**	**$105,030**	**$108,387**	**$111,883**	**$116,396**	**$120,190**	**$124,171**	**$129,214**	**$133,517**	**$138,944**
SYSTEM RATE ($/TON-MANAGED)	**$70**	**$73**	**$74**	**$76**	**$78**	**$80**	**$82**	**$85**	**$87**	**$89**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$2,416,017**									

Table 53. Pro Forma Model Sample Output, Scenario A2.2
All Communities Cooperate, Existing RDF WTE Facility, Contract Out Disposal

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)										
Ash Residue										
Solid Waste Processed by Mass Burn Facility										
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	836,010	847,720	859,560	871,560	883,730	896,040	908,500	921,100	933,890	946,800
SYSTEM OPERATING REVENUES ($000)										
Electricity/Steam Revenues/Metals										
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302
Mass Burn Plant										
Interest Income	1,910	1,986	2,066	2,148	2,234	2,324	2,416	2,513	2,614	2,718
Total System Operating Revenues	**$33,739**	**$35,088**	**$36,492**	**$37,951**	**$39,469**	**$41,049**	**$42,689**	**$44,397**	**$46,174**	**$48,020**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	31,961	33,239	34,569	35,952	37,390	38,885	40,441	42,058	43,741	45,490
Solid Waste Administration	8,160	8,486	8,825	9,178	9,545	9,927	10,324	10,737	11,167	11,614
Regulatory Compliance	1,182	1,229	1,278	1,329	1,382	1,438	1,495	1,555	1,617	1,682
WTE Facility Operating and Maintenance Expenses										
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776
Mass Burn Facility										
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	17,482	18,532	19,623	20,794	22,012	23,305	24,674	26,113	27,626	29,221
Out of Region Disposal Costs	23,408	24,584	25,787	27,890	29,163	30,465	32,706	34,081	35,488	37,872
Total System Operating Expenses	**$147,270**	**$153,719**	**$160,424**	**$168,269**	**$175,514**	**$183,056**	**$191,829**	**$199,995**	**$208,481**	**$218,251**
ANNUAL DEBT SERVICE ($000)										
Principal										
Interest										
Total Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NET ANNUAL SYSTEM COSTS ($000)	**$113,531**	**$118,631**	**$123,932**	**$130,318**	**$136,045**	**$142,007**	**$149,140**	**$155,598**	**$162,308**	**$170,231**
SYSTEM RATE ($/TON-MANAGED)	**$79**	**$82**	**$85**	**$89**	**$92**	**$95**	**$99**	**$102**	**$105**	**$109**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$3,072,091**									

Table 54. Summary of Pro Forma Model Analysis Hampton Roads Planning District Commission Solid Waste Study

	Scenarios	NPV ($1000) 2018 Dollars	NPV ($1000) 2008 Dollars
A	**Communities Cooperate - All Waste**		
	1.1 New Regional Landfill, No WTE (All waste landfilled)	2,416,017	1,483,225
	1.2 New Regional Landfill, Maintain RDF WTE	2,564,812	1,574,572
	1.3 New Regional Landfill, Maintain RDF WTE, New 2000 tpd WTE Facility	3,248,389	1,994,229
	1.4 New Regional Landfill, New 3000 tpd WTE Facility, Close RDF WTE	3,405,834	2,090,887
	2.1 Contract Out Disposal, No WTE	3,255,465	1,998,573
	2.2 Contract Out Disposal, Maintain RDF WTE Facility	3,072,091	1,885,997
	2.3 Contract Out Disposal, Maintain RDF WTE Facility, New 2000 tpd WTE Facility	3,498,004	2,147,471
	2.4 Contract Out Disposal, New 3000 tpd WTE Facility	3,863,757	2,372,012
B	**Communiites Cooperate - Only Muncipal Waste**		-
	1.1 New Regional Landfill, No WTE (All waste to Landfill)	1,319,069	809,794
	1.2 New Regional Landfill, Maintain RDF WTE Facility	1,431,201	878,633
	2.1 Contract Out Disposal, No WTE	1,638,249	1,005,743
	2.2 Contract Out Disposal, Maintain RDF WTE Facility	1,517,246	931,457
C	**Communities Go Separate Ways**		
	3.1 Contract Disposal of All Waste, with Exception of Virginia Beach		
	Chesapeake	564,920	346,812
	Franklin	35,772	21,961
	Isle of Wight	112,119	68,832
	Norfolk	541,022	332,141
	Portsmouth	237,462	145,781
	Southampton	77,519	47,590
	Suffolk	310,684	190,733
	Virginia Beach	1,052,176	645,945
D	**Various Cooperative Arrangements**		
	1.1 Rural Members Contract: Urban Members New Regional Landfill, No WTE		
	Rural, Contract Out Disposal	163,128	100,146
	Urban, New Regional landfill, No WTE	2,305,407	1,415,320
	1.2 Rural Members Contract: Urban Members New Regional Landfill, RDF WTE		
	Rural, Contract Out Disposal	163,128	100,146
	Urban, New Regional landfill, RDF WTE	2,416,794	1,483,702
	2.1 Rural Members Contract: Urban Members Contract		
	Rural, Contract Out Disposal	163,128	100,146
	Urban, No RDF WTE, Contract Out Disposal	3,006,809	1,845,920
	2.2 Rural Members Contract: Urban Members Contract		
	Rural, Contract Out Disposal	163,128	100,146
	Urban, RDF WTE, Contract Out Disposal	2,870,358	1,762,151
E	**Virginia Beach Manages Own Waste, Other Communities Align**		
	1.1 Other Communities New Regional Landfill , No WTE	1,553,623	953,790
	1.2 Other Communities New Regional Landfill, RDF WTE	1,660,658	1,019,500
	2.1 Other Communities Contract Disposal, No WTE	1,825,933	1,120,964
	2.2 Other Communities Contract Disposal, RDF WTE	1,932,344	1,186,291

Rural = City of Franklin, Isle of Wight and Southampton Counties
Urban = Cities of Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach

Table 55. Summary Pro Forma Model Analysis Sorted by NPV (Lowest to Highest) Hampton Roads Planning District Commission Solid Waste Study

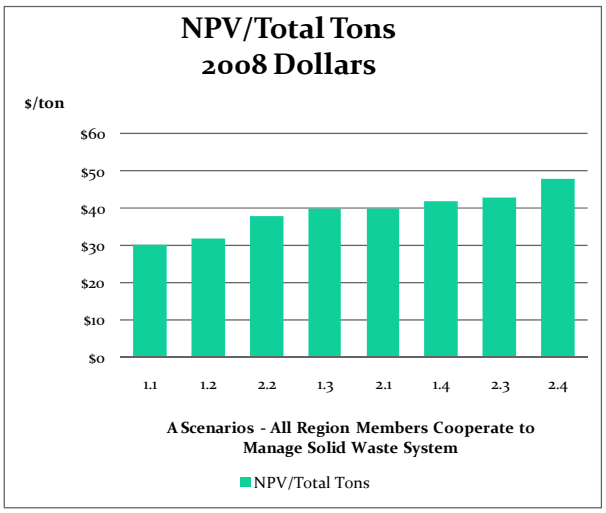
	Scenarios	NPV ($1000)2018 Dollars	NPV ($1000) 2008 Dollars	Total Tons 2018-2047	NPV/Total Tons 2008 Dollars ($/ton)	Estimated NPV Municipal Only 2008 Dollars	Municipal Tonnage 2018-2047	NPV/Muni Tons 2008 Dollars ($/ton)	First Year System Rate 2008 Dollars ($/ton)	First Year System Rate ($/ton) 2018 Dollars
A	**Communities Cooperate - All Waste**									
	1.1 New Regional Landfill, No WTE (All waste landfilled)	2,416,017	$1,483,225	49,370,050	$30	$781,149	21,297,990	$37	$43	$70
	1.2 New Regional Landfill, Maintain RDF WTE	2,564,812	$1,574,572	49,370,050	$32	$829,257	21,297,990	$39	$45	$73
	2.2 Contract Out Disposal, Maintain RDF WTE Facility	3,072,091	$1,885,997	49,370,050	$38	$993,271	21,297,990	$47	$48	$79
	1.3 New Regional Landfill, Maintain RDF WTE, New 2000 tpd WTE Facility	3,248,389	$1,994,229	49,370,050	$40	$1,050,272	21,297,990	$49	$67	$109
	2.1 Contract Out Disposal, No WTE	3,255,465	$1,998,573	49,370,050	$40	$1,052,560	21,297,990	$49	$52	$84
	1.4 New Regional Landfill, New 3000 tpd WTE Facility, Close RDF WTE	3,405,834	$2,090,887	49,370,050	$42	$1,101,178	21,297,990	$52	$75	$122
	2.3 Contract Out Disposal, Maintain RDF WTE Facility, New 2000 tpd WTE Facility	3,498,004	$2,147,471	49,370,050	$43	$1,130,978	21,297,990	$53	$68	$110
	2.4 Contract Out Disposal, New 3000 tpd WTE Facility	3,863,757	$2,372,012	49,370,050	$48	$1,249,234	21,297,990	$59	$79	$128
B	**Communiites Cooperate - Only Muncipal Waste**									
	1.1 New Regional Landfill, No WTE (All waste to Landfill)	1,319,069	$809,794	25,120,990	$32	$426,488	21,297,990	$20	$43	$70
	1.2 New Regional Landfill, Maintain RDF WTE Facility	1,431,201	$878,633	25,120,990	$35	$462,743	21,297,990	$22	$43	$70
	2.2 Contract Out Disposal, Maintain RDF WTE Facility	1,517,246	$931,457	25,120,990	$37	$490,563	21,297,990	$23	$48	$79
	2.1 Contract Out Disposal, No WTE	1,638,249	$1,005,743	25,120,990	$40	$529,687	21,297,990	$25	$52	$84
C	**Communities Go Separate Ways**									
	3.1 Contract Disposal of All Waste, with Exception of Virginia Beach									
	Chesapeake	564,920	$346,812	10,177,530	$34	$156,066	5,548,831	$28	$42	$68
	Franklin	35,772	$21,961	434,598	$51	$9,882	252,006	$39	$64	$105
	Isle of Wight	112,119	$68,832	1,929,978	$36	$30,974	1,115,163	$28	$47	$76
	Norfolk	541,022	$332,141	8,932,306	$37	$149,463	4,432,982	$34	$47	$76
	Portsmouth	237,462	$145,781	4,165,019	$35	$65,601	1,918,641	$34	$43	$70
	Southampton	77,519	$47,590	852,459	$56	$21,416	464,452	$46	$74	$120
	Suffolk	310,684	$190,733	6,562,844	$29	$85,830	4,031,667	$21	$36	$59
	Virginia Beach	1,019,348	$625,791	18,136,561	$35	$281,606	9,178,493	$31	$22	$36
D	**Various Cooperative Arrangements**									
	1.1 Rural Members Contract: Urban Members New Regional Landfill, No WTE									
	Rural, Contract Out Disposal	163,128	$100,146	3,157,584	$32	$45,066	1,831,621	$25	$41	$66
	Urban, New Regional landfill, No WTE	2,305,407	$1,415,320	46,170,166	$31	$636,894	23,306,514	$27	$44	$72
	1.2 Rural Members Contract: Urban Members New Regional Landfill, RDF WTE									
	Rural, Contract Out Disposal	163,128	$100,146	3,157,584	$32	$45,066	1,831,621	$25	$41	$66
	Urban, New Regional landfill, RDF WTE	2,416,794	$1,483,702	46,170,166	$32	$667,666	23,306,514	$29	$48	$79
	2.1 Rural Members Contract: Urban Members Contract									
	Rural, Contract Out Disposal	163,128	$100,146	3,157,584	$32	$45,066	1,831,621	$25	$41	$66
	Urban, No RDF WTE, Contract Out Disposal	3,006,809	$1,845,920	46,170,166	$40	$830,664	23,306,514	$36	$50	$82
	2.2 Rural Members Contract: Urban Members Contract									
	Rural, Contract Out Disposal	163,128	$100,146	3,157,584	$32	$45,066	1,831,621	$25	$41	$66
	Urban, RDF WTE, Contract Out Disposal	2,870,358	$1,762,151	46,170,166	$38	$792,968	23,306,514	$34	$48	$79
E	**Virginia Beach Manages Own Waste, Other Communities Align**									
	1.1 Other Communities New Regional Landfill , No WTE	1,553,623	$953,790	33,037,723	$29	$429,206	17,763,742	$24	$585,544	$953,790
	1.2 Other Communities New Regional Landfill, RDF WTE	1,660,658	$1,019,500	33,037,723	$31	$458,775	17,763,742	$26	$625,885	$1,019,500
	2.1 Other Communities Contract Disposal, No WTE	1,825,933	$1,120,964	33,037,723	$34	$504,434	17,763,742	$28	$688,175	$1,120,964
	2.2 Other Communities Contract Disposal, RDF WTE	1,932,344	$1,186,291	33,037,723	$36	$533,831	17,763,742	$30	$728,280	$1,186,291

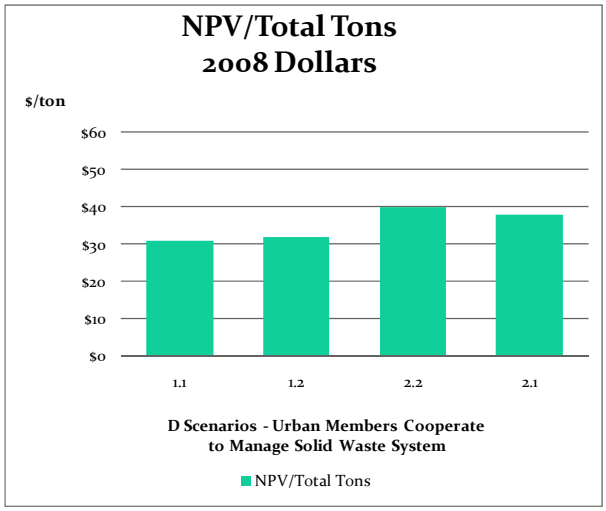
Table 56. Comparison of Scenarios By Municipally Collected Solid Waste

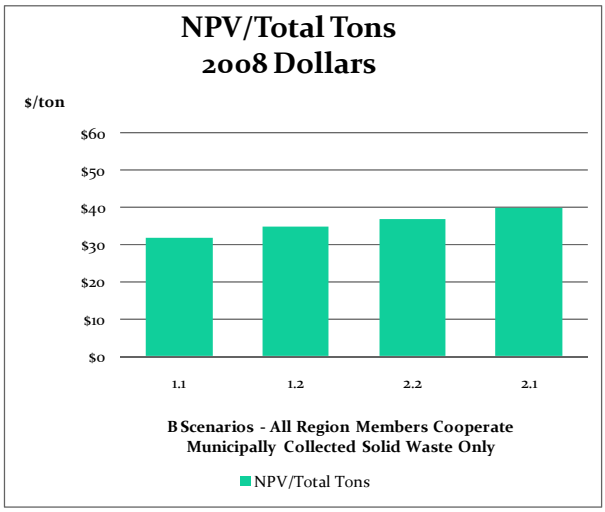
Jurisdiction	Scenarios NPV ($1,000) 2008 Dollars				
	A1.1	B1.1	C1.1	D1.1	E1.1
Chesapeake	$ 160,224	$ 160,609	$ 156,066	$ 163,111	$ 159,940
Franklin	$ 7,327	$ 6,886	$ 9,882	$ 7,893	$ 7,313
Isle of Wight	$ 31,856	$ 30,265	$ 30,974	$ 34,506	$ 31,770
Norfolk	$ 128,870	$ 141,502	$ 149,464	$ 131,164	$ 128,665
Portsmouth	$ 56,213	$ 66,193	$ 65,601	$ 57,206	$ 56,149
Southampton	$ 13,419	$ 13,458	$ 21,415	$ 14,487	$ 13,502
Suffolk	$ 115,095	$ 102,827	$ 85,830	$ 117,169	$ 114,768
Virginia Beach	$ 268,145	$ 288,056	$ 290,676	$ 219,181	

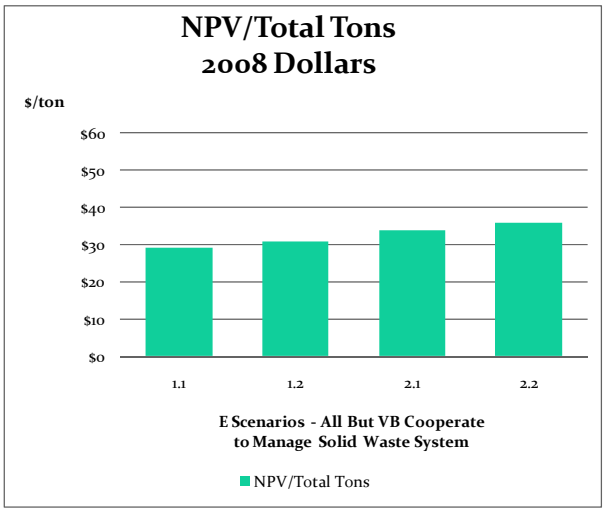
Jurisdiction	Scenarios NPV/Total Muni Tons (2008 Dollars) $/ton				
	A1.1	B1.1	C1.1	D1.1	E1.1
Chesapeake	29	29	28	29	29
Franklin	29	27	39	31	29
Isle of Wight	29	27	28	31	28
Norfolk	29	32	34	30	29
Portsmouth	29	34	34	30	29
Southampton	29	29	46	31	29
Suffolk	29	26	21	29	28
Virginia Beach	29	31	32	24	

Note: Derived by allocating costs between commercial and municipal tonnage and by jurisdiction for each scenario.









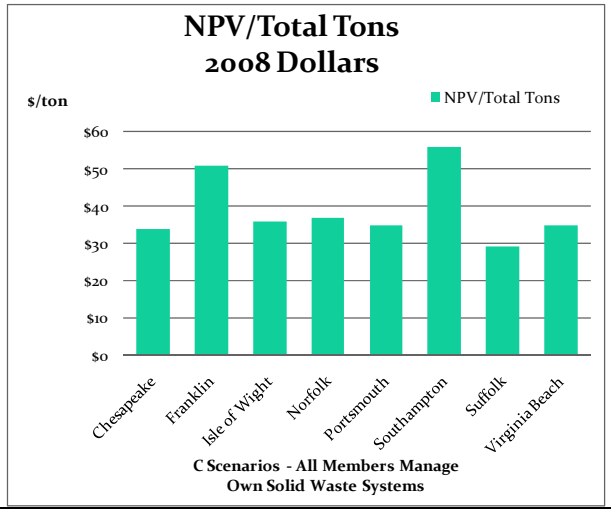
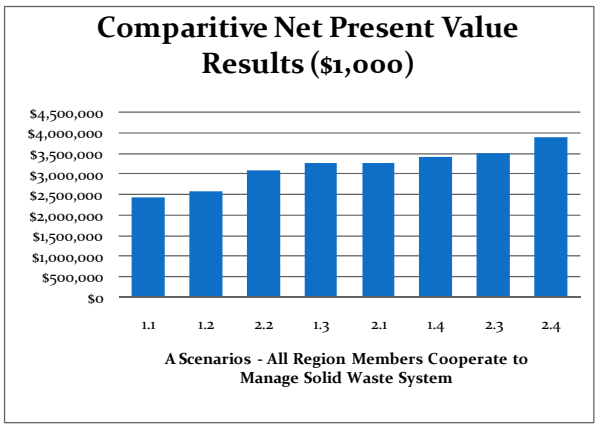
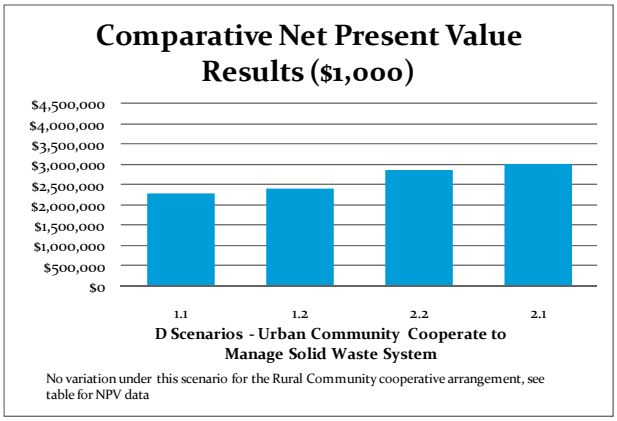
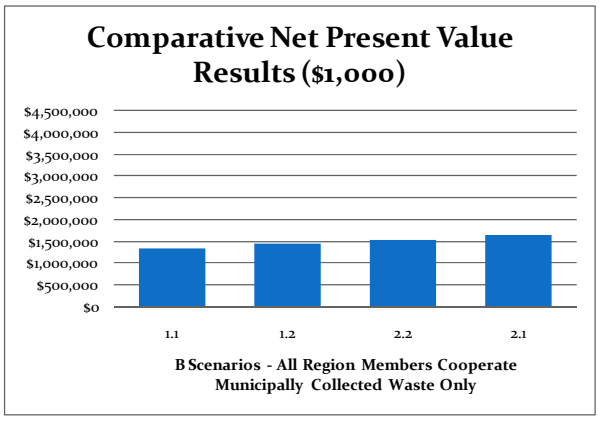
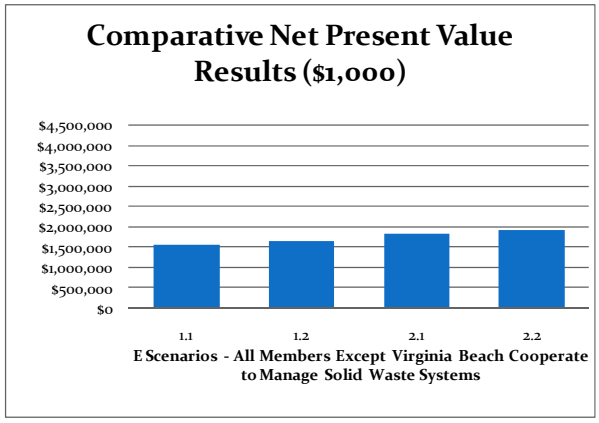


Figure 14. Pro Forma Model Results Scenario Comparisons









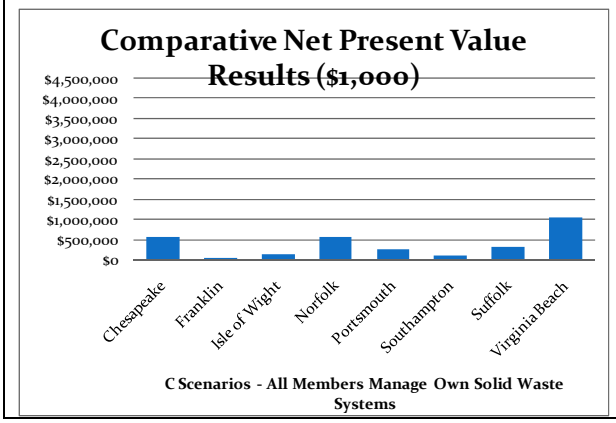


Figure 14 (continued)

- Siting a new landfill in the Region appears to be a significant factor in potentially reducing the overall costs to manage the Region's solid waste. The scenarios that assumed that a new landfill would be sited in the Region resulted in lower NPV costs compared to the scenarios that assumed the Region's solid waste would be transferred to and disposed of at an out-of-region landfill.

  - The Regional Landfill-only scenarios, with no WTE facilities (A1.1, A2.1, B1.1, B2.1, D1.1, D1.2, E1.1, E2.1), where it is assumed that a new landfill is sited and developed in the Region, resulted in the lowest NPV costs of all the scenarios.

  - For all the scenarios evaluated, transporting and disposing of the Region's waste at an out-of-region landfill resulted in significantly higher NPV costs compared to the scenarios that assumed a new Regional Landfill would be developed. For example, Scenario A2.2 (contract out with no WTE) was estimated to have NPV costs 35 percent higher than Scenario A2.1 (new Regional Landfill, with no WTE).

- If the Region elects to contract out the disposal (i.e., a new Regional Landfill is not sited), operating the system with the WTE RDF will be less expensive because of the substantial volume reduction that is achieved, resulting in fewer tons being transported and disposed.

  - For the scenarios that assumed a new landfill would be sited and developed in the Region, continuing the operation of the RDF WTE Facility resulted in 4 to 8 percent higher NPV costs compared to operating the system without the RDF WTE Facility.

  - For Scenarios A, B, and D, where it was assumed that solid waste would be disposed in an out-of-region landfill, 5 to 8 percent lower NPV costs resulted with the operation of the RDF WTE Facility, primarily due to the reduction in solid waste volumes requiring transport and disposal. For Scenario E, which assumes the City of Virginia Beach decides to manage its own solid waste system and the other member cooperate, thereby removing a significant portion of the waste stream from the regional system, the trend reverses and operating the WTE RDF resulted in 8 percent higher NPV costs.

- The alternatives which considered expanding or upgrading WTE capacity resulted in the highest NPV costs; therefore, expanded WTE alternatives were not considered in the subsequent alternatives developed under Scenarios B through E.

- Cooperating appears to provide value in reducing the overall projected solid waste system costs to each community, although in the early years, some of the communities could realize some savings, especially Virginia Beach.

  - Comparing Scenario C1.1 to Scenario A1.1 (Each community independently managing its solid waste system versus cooperating together) suggests that cooperating together to site a new Regional Landfill will result in a lower long

term NPV cost for each community, although it appears that several communities could realize reduced costs during the first several years of the study period.

- The City of Virginia Beach could realize substantial savings during the first five years of the planning period, after which SCS assumed the City's landfill will have reached capacity and its waste transferred to and disposed at an out-of-region landfill, significantly increasing disposal costs for the balance of the planning period.

5.6 SENSITIVITY ANALYSIS

SCS evaluated the sensitivity of the pro forma analysis results for the following key variables:

- **Transportation Rate.** The base analysis used the cost per ton-mile rate and escalation factors that are in the contract SPSA has with First Tee to transfer solid waste between the Region's various transfer stations and the landfill and RDF WTE facility. SCS obtained information from one of the private solid waste haulers that suggested a $0.02 per ton-mile reduction in the transfer rate could be achieved based on recent bids they had received. The sensitivity analysis evaluated the pro forma model results assuming the lower transfer rate.

- **Location of New Regional Landfill.** The base analysis assumed the new Regional Landfill would be located 25 miles to the west of the existing Regional Landfill in Suffolk. The sensitivity analysis evaluated the pro forma model results assuming the distance is increased to 50 miles, which would be the same distance assumed for the Atlantic Waste Landfill under the contracting out scenarios.

- **CPI and Fuel Escalation Factors.** The base analysis assumed an annual 4 percent consumer price index and fuel adjustment increase. The sensitivity analysis evaluated the pro forma model results varying these factors independently between 2 and 4 percent.

- **Out of Area Tip Fee.** The base analysis assumed a 75 percent discount on the tip fees that were submitted through bids to SPSA in the fall of 2007 ($19 per ton). The pro forma model results were evaluated assuming a further discount to 50 percent ($13 per ton).

The results of this sensitivity analysis are presented in Table 57 for Scenarios A, B and E. This table is relatively busy and requires careful review to understand the nuances of the sensitivity analysis. The results have been color coded in the table to visually mark the relative change in position of each scenario evaluated, in terms of NPV, from lowest NPV to highest NPV. The following observations are offered regarding the results of the sensitivity analysis:

Table 57. Pro Forma Model Results, Sensitivity Analysis

Variables		Transfer Rate, 2008, $/ton-mile	0.1328	0.1305	0.1305	0.1328	0.1305	0.1328	0.1328	0.1305	0.1	0.1	0.1	0.1	0.1	0.1
		New Regional Landfill Location, miles	25	25	25	50	50	25	50	50	25	50	50	50	50	50
		CPI, %	4%	2%	2%	4%	2%	4%	4%	2%	4%	4%	2%	2%	2%	4%
		Fuel Escalation Rate, %	4%	4%	2%	4%	4%	4%	4%	2%	4%	4%	4%	2%	2%	4%
		Out-of-Area Tip Fee, $/ton	19.00	19.00	19.00	19.00	19.00	13.00	13.00	19.00	19.00	19.00	19.00	19.00	13.00	13.00
			Base Case													
	Scenarios	WTE	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)	NPV ($1000)
A	**Communities Cooperate - All Waste**															
1.1	New Regional Landfill, No WTE (All waste landfilled)	No WTE	2,415,928	1,687,817	1,651,757	2,812,607	1,959,560	2,415,928	2,812,607	1,887,439	2,356,017	2,692,785	1,891,801	1,819,681	1,819,681	2,692,785
1.2	New Regional Landfill, Maintain RDF WTE	WTE	2,564,750	1,746,448	1,721,029	2,842,125	1,935,793	2,564,750	2,842,125	1,884,956	2,522,888	2,758,401	1,888,693	1,837,856	1,837,856	2,758,401
1.3	New Regional Landfill, Maintain RDF WTE, New 2000 tpd WTE Facility	WTE Expanded	3,248,355	2,218,677	2,204,437	3,400,034	2,321,104	3,248,355	3,400,034	2,292,625	3,225,515	3,354,353	2,295,814	2,267,335	2,267,335	3,354,353
1.4	New Regional Landfill, New 3000 tpd WTE Facility, Close RDF WTE		3,405,787	2,362,418	2,343,129	3,613,865	2,503,736	3,405,787	3,613,865	2,465,158	3,374,417	3,551,125	2,468,706	2,430,128	2,430,128	3,551,125
2.1	Contract Out Disposal, No WTE	No WTE	3,255,288	2,108,841	2,036,721	3,255,288	2,108,841	2,932,665	2,932,665	2,036,721	3,135,466	3,135,466	2,041,082	1,968,962	1,764,447	2,812,843
2.2	Contract Out Disposal, Maintain RDF WTE Facility	WTE	3,071,967	1,982,770	1,931,932	3,071,967	1,982,770	2,846,495	2,846,495	1,931,932	2,988,242	2,988,242	1,935,669	1,884,831	1,742,708	2,762,770
2.3	Contract Out Disposal, Maintain RDF WTE Facility, New 2000 tpd WTE Facility	WTE Expanded	3,497,935	2,321,980	2,293,502	3,497,935	2,321,980	3,374,869	3,374,869	2,293,502	3,452,254	3,452,254	2,296,689	2,268,211	2,191,975	3,329,188
2.4	Contract Out Disposal, New 3000 tpd WTE Facility		3,863,663	2,592,590	2,554,012	3,863,663	2,592,590	3,694,698	3,694,698	2,554,012	3,800,923	3,800,923	2,557,560	2,518,982	2,413,335	3,631,958
B	**Communiites Cooperate - Only Muncipal Waste**															
1.1	New Regional Landfill, No WTE (All waste to Landfill)	No WTE	1,323,487	918,236	902,168	1,500,269	1,039,346	1,323,487	1,500,269	1,007,210	1,296,787	1,446,869	1,009,146	977,010	977,010	1,446,869
1.2	New Regional Landfill, Maintain RDF WTE Facility	WTE	1,439,765	954,956	949,255	1,500,611	996,085	1,439,765	1,500,611	984,687	1,430,601	1,482,283	985,922	974,523	974,523	1,482,283
2.1	Contract Out Disposal, No WTE	No WTE	1,638,170	1,059,625	1,027,490	1,638,170	1,059,625	1,494,391	1,494,391	1,027,490	1,584,772	1,584,772	1,029,425	997,288	906,135	1,440,992
2.2	Contract Out Disposal, Maintain RDF WTE Facility	WTE	1,517,218	974,250	962,851	1,517,218	974,250	1,467,862	1,467,862	962,851	1,498,890	1,498,890	964,086	952,687	922,046	1,449,534
E	**Virginia Beach Manages Own Waste, Other Communities Align**															
1.1	Other Communities New Regional Landfill , No WTE	No WTE	1,553,561	1,095,845	1,071,027	1,825,904	1,282,206	1,553,561	1,825,904	1,232,566	1,512,440	1,743,658	1,235,773	1,186,133	1,186,133	1,743,658
1.2	Other Communities New Regional Landfill, RDF WTE	WTE	1,660,622	1,125,074	1,110,898	1,813,660	1,229,041	1,660,622	1,813,660	1,200,681	1,637,550	1,767,515	1,203,262	1,174,906	1,174,906	1,767,515
2.1	Other Communities Contract Disposal, No WTE	No WTE	1,825,810	1,185,275	1,135,636	1,825,810	1,185,275	1,604,356	1,604,356	1,135,636	1,743,564	1,743,564	1,138,843	1,089,203	949,064	1,522,110
2.2	Other Communities Contract Disposal, RDF WTE	WTE	1,932,274	1,243,955	1,215,245	1,932,274	1,243,955	1,806,710	1,806,710	1,215,245	1,885,652	1,885,652	1,217,942	1,189,235	1,110,795	1,760,088

NPV in 2018 Dollars

Ranking of Scenarios by NPV

Lowest

- The further to the west a new regional landfill is located away from SPSA's current landfill, the more cost competitive the WTE and contracting-out disposal scenarios become.

- The contracting-out for disposal scenarios become more cost effective if significant discounts on a contracted tip fee can be negotiated, and a lower cost per ton-mile transfer rate is realized.

- Reducing the escalation factors generally favors the WTE scenarios, but the relative NPV rankings of the scenarios generally remain the same.

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6.0 FINDINGS AND RECOMMENDATIONS

6.1 FINDINGS

6.1.1 Waste Disposal Capacity Required

Three disposal scenarios were developed for the Region: 1) all solid waste is to be landfilled, 2) status quo (i.e., maintain the existing WTE facility, and landfill residuals, bypass, and excess solid waste), and 3) maximize WTE (i.e., construct a new 2,000-ton per day mass burn facility, maintain the existing RDF WTE facility, and landfill residuals, bypass, and excess solid waste). SCS also considered various disposal requirements for alternative cooperative arrangements.

All Region Members (Scenario A)			
Scenario	Required Disposal Capacity		
	Million CY*	Million Tons	Volume Reduction
All Landfilled	56.8	43.7	
Operate RDF WTE	39.7	30.8	30%
Maximize WTE	21.8	17.0	62%

Region Members with Exception of Virginia Beach (Scenario E)			
Scenario	Required Disposal Capacity		
	Million CY*	Million Tons	Volume Reduction
All Landfilled	39	30	
Operate RDF WTE	21.9	16.9	44%
This scenario was developed to mirror the City of Virginia Beach's 2007 evaluation of its long-term planning efforts independent of the Region.			

Municipal Only for All Region Members (Scenario B)			
Scenario	Required Disposal Capacity		
	Million CY*	Million Tons	Volume Reduction
All Landfilled	27.1	20.9	
Operate RDF WTE	10.4	8	62%
This scenario was developed based on concerns regarding the uncertainty of flow control, and assumes commercial waste would be handled by the private sector through private transfer stations and out-of-region landfills.			

*Assumed in-place waste density of 1,540 pounds per cubic yard

Depending on the scenario evaluated, operating the Region's solid waste system with waste-to-energy capabilities can reduce disposal requirements by 30 to 62 percent.

6.1.2 Remaining Disposal Capacity of SPSA's Regional Landfill and City of Virginia Beach Landfill No. 2

The publicly owned and operated municipal solid waste disposal facilities in the Region are SPSA's Regional Landfill in Suffolk and the City of Virginia Beach's Landfill No. 2. As of 2018, the SPSA regional landfill is expected to have reached capacity, and the City of Virginia Beach estimates that it will have approximately 2.5 million cubic yards (1.6 million tons, at 1,300 pounds per cubic yard or 1.9 million tons at 1,540 pounds per cubic yard) of remaining capacity under its current permit. As discussed in Section 2.9, additional studies are needed to verify the expansion alternatives at SPSA's current site. The City of Virginia Beach has evaluated the expansion potential of Landfill No. 2 and concluded the landfill has sufficient capacity to dispose of the City's waste from 2018 through 2022 under its current permit, and that there are several expansion alternatives that could provide disposal capacity well beyond the 2018-2047 planning period (Malcolm Pirnie, 2007).

Table 58 summarizes the remaining permitted and anticipated future capacity of the Regional Landfill and Landfill No. 2. This table demonstrates that the existing permitted disposal capacity in the Region is not sufficient to handle the Region's 30-year disposal needs under all but the maximize WTE scenario. There potentially could be sufficient capacity if most of the waste in the Region was processed through a WTE facility and that SPSA and the City of Virginia Beach were successful in expanding their respective landfills; however, expanding these two facilities will pose substantial challenges, and the future potential capacity referenced below is speculative until such time as regulatory approval is given. In any case, the City's landfill could be a valuable disposal resource for the Region in the future, especially if the RDF WTE Facility is maintained.

6.1.3 Out-of-Region Disposal Capacity

Several privately owned and operated municipal solid waste and construction and demolition debris landfills are located in Eastern Virginia that could provide disposal capacity for the Region. These facilities currently service in-state and out-of-state cities and counties, and numerous independent commercial clients. Waste is transported to these facilities via long-haul transfer trailers, barge, rail, and other collection vehicles (e.g., packer trucks, roll-offs, self-haul).

SCS evaluated the location and short-term and long-term disposal capacities of eleven of these facilities which are permitted to dispose of municipal solid waste. The combined current remaining disposal capacity of these eleven facilities is over 165 million tons. Discussions with the various companies that own and operate these facilities suggest that future unpermitted remaining capacity (existing permitted plus future anticipated disposal capacity) is close to 389 million tons. In 2007, approximately 9.5 million tons of solid waste was disposed in these facilities (VDEQ, June 2008). Assuming existing disposal rates continue and escalate per Scenario A and the Region's solid waste is added to these disposal figures beginning in 2018; the existing permitted and future capacity of these facilities could be consumed by the years 2024 and 2040, respectively (See Table 59). This conceptual analysis does not consider the timing of when the additional unpermitted disposal capacity would be available, but reinforces the need for the Region to site and develop its own long-term disposal capacity, although these private

Table 58. Disposal Capacity Analysis for Region (SPSA Regional Landfill and the City of Virginia Beach)

Item	Remaining Projected Permitted Disposal Capacity as of 2018		Potential Future Un-Permitted Capacity		Total Potential Capacity in Region	
	Million CY	Million Tons	Million CY	Million Tons	Million CY	Million Tons
SPSA Regional LF						
Nahra Property	0	0	15	11.6	15	11.6
Pipeline Wedge Fill			3.2	2.5	3.2	2.5
Kirk Property			?	?	?	?
City of Virginia Beach Landfill No. 2						
Permitted Capacity	2.5	1.9			2.5	1.9
Potential Capacity Optimize Existing Property	2.5	1.9	17.1	11.1	19.6	13
Potential Ultimate Capacity With Purchase of Adjacent Properties	2.5	1.9	43.8	28.5	46.3	30.4
Totals						
SPSA Permitted + VB Currently Permitted	2.5	1.9	15	11.6	2.5	1.9
SPSA Potential + VB Optimize Existing Property Capacity	2.5	1.9	32.1	22.7	37.8	27.1
SPSA Potential + VB Utlimate Capacity with Purchase of Adjacent Properties	2.5	1.9	58.8	40.1	76.3	53.6
Needed Capacity (See Notes 1 and 2) (See Scenario A, Section 5.0)						
Status Quo	40	30.8			40	30.8
All Landfilled	56.8	43.7			56.8	43.7
Maximize WTE	22.1	17.0			22.1	17
Surplus/Deficiency (SPSA + VB Permited)						
Status Quo					-37.5	-28.9
All Landfilled					-54.3	-41.8
Maximize WTE					-19.6	-15.1
Surplus/Defiency (SPSA Potential+ VB Optimize Existing Property Expansion)						
Status Quo					-2.2	-3.7
All Landfilled					-19	-16.6
Maximize WTE					54.2	36.6
Surplus/Defiency (SPSA Potential+ VB Optimize Existing Property Exp)						
Status Quo					36.3	22.8
All Landfilled					19.5	9.9
Maximize WTE					54.2	36.6

Notes

1. Assumes Effective In-Place Density for capacity conversions of 1,540 pounds per cubic yard for SPSA landfill, and 1,300 pounds per cubic yard for VB Landfill
2. Does not include yard waste, assume this is managed separately and is not landfilled, but includes City of VB or Portsmouth LCID not managed by SPSA.
3. Potential unpermitted disposal capacity cannot be relied on until site investigations and regulatory approvals are obtained. These values are presented for conceptual planning purposes.

Table 59. Estimated Existing and Projected Remaining Disposal Capacity at Private Landfill Facilities in Eastern Virginia

Year	Other Waste Disposed in Private Landfills (1) (Tons/Year)	Region Waste Disposal Projections All Waste (2) (Tons/Year)	Total Waste Disposed (Tons/Year)	Existing Capacity (3) (Tons)	Projected Future Capacity (4) (Tons)
2008	9,539,450		9,539,450	165,450,000	388,940,000
2009	9,635,000		9,635,000	155,910,550	379,400,550
2010	9,731,000		9,731,000	146,275,550	369,765,550
2011	9,828,000		9,828,000	136,544,550	360,034,550
2012	9,926,000		9,926,000	126,716,550	350,206,550
2013	10,025,000		10,025,000	116,790,550	340,280,550
2014	10,125,000		10,125,000	106,765,550	330,255,550
2015	10,226,000		10,226,000	96,640,550	320,130,550
2016	10,328,000		10,328,000	86,414,550	309,904,550
2017	10,431,000		10,431,000	76,086,550	299,576,550
2018	10,535,000	1,266,510	11,801,510	65,655,550	289,145,550
2019	10,640,000	1,278,220	11,918,220	55,120,550	277,344,040
2020	10,746,000	1,290,060	12,036,060	44,480,550	265,425,820
2021	10,853,000	1,302,060	12,155,060	33,734,550	253,389,760
2022	10,962,000	1,314,230	12,276,230	22,881,550	241,234,700
2023	11,072,000	1,326,540	12,398,540	11,919,550	228,958,470
2024	11,183,000	1,339,000	12,522,000	847,550	216,559,930
2025	11,295,000	1,351,600	12,646,600	(10,335,450)	204,037,930
2026	11,408,000	1,364,390	12,772,390	(21,630,450)	191,391,330
2027	11,522,000	1,377,300	12,899,300	(33,038,450)	178,618,940
2028	11,637,000	1,390,410	13,027,410	(44,560,450)	165,719,640
2029	11,753,000	1,403,670	13,156,670	(56,197,450)	152,692,230
2030	11,871,000	1,417,100	13,288,100	(67,950,450)	139,535,560
2031	11,990,000	1,430,720	13,420,720	(79,821,450)	126,247,460
2032	12,110,000	1,444,480	13,554,480	(91,811,450)	112,826,740
2033	12,231,000	1,458,420	13,689,420	(103,921,450)	99,272,260
2034	12,353,000	1,472,560	13,825,560	(116,152,450)	85,582,840
2035	12,477,000	1,486,860	13,963,860	(128,505,450)	71,757,280
2036	12,602,000	1,501,370	14,103,370	(140,982,450)	57,793,420
2037	12,728,000	1,516,050	14,244,050	(153,584,450)	43,690,050
2038	12,855,000	1,530,910	14,385,910	(166,312,450)	29,446,000
2039	12,984,000	1,545,990	14,529,990	(179,167,450)	15,060,090
2040	13,114,000	1,561,230	14,675,230	(192,151,450)	530,100
2041	13,245,000	1,576,680	14,821,680	(205,265,450)	(14,145,130)

Notes:

1. Based on VDEQ June 2008 report on 2007 disposal rates at landfills in the state, escalated 1 percent per year
2. Project disposal rates for Region, assuming all waste disposed at out-of-region landfills. (Scenario A)
3. Permitted disposal capacity remaining for 2008 as reported to VDEQ. Figures represent available capacity at the beginning of the listed year.
4. Total projected remaining capacity for 2008, plus estimates of future site capacity based on representations from private companies that own and operate these facilities. Figures represent projected remaining disposal capacity at beginning of listed year.

facilities could provide disposal capacity if needed during the planning period. Transporting and disposing in out-of-region landfill facilities will result in higher costs for disposal compared to siting and operating a new landfill in the Region.

6.1.4 Waste-to-Energy

The existing RDF WTE Facility is an important asset for the Region, and more so after 2018, when the existing bonds will have been defeased. Operating the Region's solid waste system with the RDF WTE Facility is more costly than the landfill-only scenarios evaluated in Section 5.0; however, the facility does provide significant volume reduction of the waste thus reducing landfill requirements, and provides energy recovery from the waste, reducing the Region's dependence on non-renewable fossil fuel resources. This volume reduction would provide substantial value were the Region to decide to dispose of its waste in an out-of-region landfill facility, due to the significant reduction in transportation costs compared to transferring waste unprocessed. SPSA has continued to upgrade the operations of these facilities through implementation of a significant capital improvement budget. It is likely, therefore, that the RDF WTE Facility can be operated to provide long-term disposal capacity for the Region well into the future. A facility life extension study should be undertaken to evaluate long-term capital replacement costs.

6.1.5 Transfer Stations

SCS's analysis did not specifically evaluate whether the existing transfer station network is optimally configured, or what improvements would be needed to meet future waste quantity deliveries. The analysis assumed that a transfer station network will be required, that the existing network is currently functional and that the transfer stations will be maintained and upgraded as necessary to meet system demands, regardless of how other regional solid waste system components are configured.

6.1.6 Role of the Private Sector

The private sector is capable of providing many, if not all, of the basic services associated with solid waste management, including collection, transfer, recycling, resource recovery, special waste management, and disposal. In fact, the private sector currently provides many of these services within the Region. In the past, many governmental entities have elected to self-perform many solid waste management functions because it allowed them to retain full control of the level of services provided and to make adjustments easier without having to renegotiate contracts with various vendors each time a change was made. Some have also argued that government provided services can be more reliable and cost-effective; however, there is sufficient evidence throughout the country that the government and private sectors can reliably and cost-effectively provide these services.

The role of the private sector in providing solid waste management services in the Region after 2018 will be dependent in large part on the decision of whether the Region will cooperate again to own and/or operate the Transfer Station network, a Regional Landfill, the RDF WTE Facility, and other supporting facilities. Contracted operations have the following advantages and disadvantages:

- Advantages
  - Service levels are defined by contract and costs are relatively predictable based on contract terms, which is helpful for budgeting purposes.
  - Services typically awarded through periodic competitive bid process, which allows for review and adjustment of services desired and provides strong competitive incentive to responding firms to provide services in the most cost-effective manner.
  - Reduces number of government employees and associated labor, equipment, and overhead costs.
  - Perception that services are provided in a more business-like, efficient, and cost-effective manner with a higher degree of accountability.
  - Facility locations (e.g., transfer stations) typically are more optimally located independent of jurisdictional boundaries.
  - Less interference from the political process.
  - More responsive to changing market conditions.
- Disadvantages
  - Perceived loss of control by public entities.
  - May be more costly than publically provided services due to the private sector having to pay taxes on various goods and services and make a profit. Various benchmark studies have been conducted that demonstrate publically-owned and operated landfills can operate at costs that are comparable to those of private operations.
  - Not as responsive to needs of community (i.e., just doing what is in the contract).
  - Higher potential for litigation to resolve contract disputes.

The private sector will most likely continue to provide collection and recycling services throughout the Region, both for the commercial sector and for publically contracted collection services. In addition, various private MSW disposal facilities located out-of-region will likely continue to receive commercial wastes, unless strict flow control is enforced. Private disposal capacity should be considered by the Region if transportation and disposal costs can be shown to be the same or lower than that of transporting waste to a new disposal facility sited within the Region. Another role private firms may play is assistance with siting, permitting, constructing and operating a new municipal owned landfill in the Region. The approach has been successfully implemented by other regions through the issuance of request for proposals for such services.

6.1.7 CDD Disposal

The private waste haulers and disposal facility owners currently play an important role in the collection, handling and disposal of CDD waste. Significant permitted capacity exists in the Holland Landfill and the soon to be open Centerville Road Landfill for CDD disposal. In addition, private material recovery facilities such as the Waterways Recycling facility report that they can achieve a CDD recycle rate of over 90 percent. Because of the location of these facilities hauling costs are minimized. Therefore, the Region appears to be well served by the private firms with respect to CDD recycling and disposal.

6.1.8 Yard Waste

Recently, the Region has had difficulty with its yard waste management program. A comprehensive regional processing facility was constructed by SPSA in 2005 at Virginia Beach's Landfill No. 2, but was closed in 2007 following opposition from surrounding residents and the City of Virginia Beach after persistent nuisance complaints and public health concerns. Most of the yard waste in the Region currently is being landfilled. Collection systems are in place throughout most of the Region to collect yard waste separately. It can be readily processed and recycled for beneficial use either as compost, wood chips, soil amendment, or other beneficial uses. A regional facility may be appropriate for the urban areas within the Region (Chesapeake, Norfolk, Suffolk, Portsmouth, and Virginia Beach), but an alternative approach may be appropriate for the more rural areas (City of Franklin and Isle of Wight and Southampton Counties).

6.1.9 Rail Haul

Rail haul may be a viable option in the future for transport of solid waste to a new regional or private disposal facility. The viability of this transport option should be made once a new disposal facility is selected so that the specifics of the rail network, transloading, and transfer station facilities can be assessed. In addition, if the a new landfill is unable to be sited in the Region, rail haul would likely be a significant component of the transfer system, since it could potentially allow for the more cost-effective transport of solid waste to facilities more remotely located.

6.1.10 Alternatives Analysis

SCS analyzed a variety of solid waste management options for disposing of the balance of non-recycled, municipal solid waste in the Region in the planning period (2018-2047) after the expiration of the Region's agreements with SPSA. Based on a review of the major management options, as discussed elsewhere in the Report, SCS constructed a Pro Forma Model to calculate preliminary, planning-level costs which can be used to evaluate future solid waste policies strategies for the Region. The Pro Forma Model was built as a tool that can be used to evaluate future strategies as more detailed information becomes available. Sensitivity analyses were then developed to discern differences within these various management subsets. The costs of various programs and disposal options were estimated using existing data from SPSA programs, prices and escalation factors typical of the solid waste industry, and planning-level cost estimates prepared by SCS. Table 54, Table 55, Table 56, and Table 57 summarize the results of these analyses.

These data indicate the following major conclusions:

- Siting a new landfill in the Region is critical to minimizing the overall costs of solid waste management.

- Resource recovery through use of the existing RDF WTE Facility is an important long-term component of the Region's solid waste system since it will enable the Region to minimize construction and operational costs for the Regional Landfill and allows this landfill asset to last longer. Although inclusion of this facility in the system slightly increases the overall costs of the system, it provides a hedge against the potential significant impacts of escalating fuel prices.

- The alternatives which considered expanding or upgrading WTE capacity resulted in the highest costs; therefore, SCS does not recommend the Region consider significantly expanding or constructing a new WTE facility to replace the existing facility.

- The results of the pro forma modeling analysis projects that the disposal of solid waste at an out-of-region landfill would result in the higher costs for the Region; however, the sensitivity analysis did show that contracting out for disposal could be a lower cost solution if significantly lower transportation costs are achieved and a new Regional Landfill is sited at a distance comparable to that of Waste Management's Atlantic Waste Landfill in Sussex County.

- The modeling results indicate that the option with the least costs for the Region is for all of the communities to cooperate on an integrated solid waste management solution. The various community alignments (rural, urban, and without Virginia Beach) analyzed indicate that overall tipping fees would be significantly higher for the individual communities in each respective alignment since there would be less waste tonnage in each particular alignment to fund needed solid waste management, regulatory, and administrative costs for a modern integrated solid waste program.

6.1.11 Regional Management of Solid Waste

For the South Hampton Roads area, SPSA currently serves as the regional agency responsible for developing and implementing the regional solid waste plan for the eight participating cities and counties, and the Commonwealth has recognized the Region as a unit when evaluating the achievement of the various goals and objectives of its solid waste regulations. The Region's solid waste plan recognizes the division or responsibilities between SPSA, its regional members, and private enterprises for solid waste collection, recycling, transfer, resource recovery, and disposal. Significant changes to the current plan and organization and function of SPSA will be required if the RDF WTE or Regional Landfill facilities are sold, if flow control is not implemented in the Region, or if the current members of SPSA do not agree to cooperate together after 2018. Administratively, if the agreements between the member communities and SPSA are not renewed or replaced after 2018, each will be responsible for developing and implementing integrated solid waste plans for their respective communities that meet the Virginia Waste Management Board's requirements.

9VAC20-130-30 and § 10.1-1411 of the Code of Virginia indicate that it is the policy of the Virginia Waste Management Board to require each region designated pursuant to 9VAC20-130-180 through 9VAC20-130-220, as well as each city, county and town not part of such a region, to develop and implement a comprehensive and integrated solid waste management plan in accordance with the Virginia Waste Management Board's regulations that, at a minimum, consider and address all components of the following hierarchy in order or preference and priority:

1. Source reduction
2. Reuse
3. Recycling
4. Resource recovery (waste-to-energy)
5. Incineration
6. Landfilling

9VAC20-130-10 defines an integrated waste management plan as "a governmental plan that considers all elements of waste management during generation, collection, transportation, treatment, storage, disposal, and litter control and selects the appropriate methods of providing necessary control and services for effective and efficient management of all wastes. An "integrated waste management plan" must provide for source reduction, reuse and recycling within the jurisdiction and the proper funding and management of waste management programs."

The Virginia Waste Management Board realizes that various approaches may be taken to achieving the goals and objectives of the Commonwealth's solid waste regulations taking into account urban concentrations, geographic conditions, markets, transportation factors, and other factors. The purpose of the Virginia Waste Management Board's regulations is to:

- Establish minimum requirements for solid waste management planning and recycling for protection of the public health, public safety, the environment, and natural resources throughout the Commonwealth; promote local and regional planning that provides for environmentally sound and compatible solid waste management with the most effective and efficient use of available resources;
- Establish procedures and rules for designation of regional boundaries for solid waste management plans;
- Establish state, local government, regional or area served by the plan responsible for meeting and maintaining the minimum recycling rates;
- Establish the requirement in compliance with the Virginia Waste Management Act, §§ 10.1-1411 and 10.1-1408.1 D 1 (vi) of the Code of Virginia, for withholding issuance of permits for solid waste management facility; and

- Provide for reasonable variance and exemptions.

The following institutional/organizational alternatives were considered as a means to provide comprehensive and integrated solid waste services for the Region. The advantages and disadvantages of each are summarized below:

1. **A Regional Authority** (like SPSA). For this alternative, a Regional Authority would be tasked with implementing a comprehensive and integrated solid waste management plan for the Region members. The various functions and services relating to an integrated solid waste system could be accomplished through contract or be self-performed by the Authority. The advantages and disadvantages of this alternative are summarized below:

   - Advantages

     - Provides more flexibility and capability with respect to siting, financing, and operating various functions of the system (e.g., landfill, transfer stations, and resource recovery facilities).

     - Consolidates planning and administrative efforts into one agency versus multiple agencies.

     - Benefits from economies of scale relative to facility sizing and operation.

     - Significant potential to reduce long-term disposal costs by siting a new regional landfill.

     - Increases ability to site a new regional landfill in closer proximity to major population areas in terms of financial resources and land availability.

     - Ability to leverage buying power for various services, including collection, transportation, and disposal.

     - Better able to meet recycling goals as a Region than if each member must account for performance independently.

   - Disadvantages

     - Perceived loss of autonomy by the Region members.

     - Reduces flexibility and ability to react to future changes in market conditions and technology.

     - Increases organizational and governance complexity.

     - Increases likelihood of political interference negatively affecting the implementation of the Authority's mission.

- Current funding approach through tip fees works at cross purposes of stated objectives of current solid waste plan, especially with respect to waste reduction and recycling, which take revenue away from the system.

2. **Counties and Cities Independently Manage Solid Waste Systems.** For this alternative, the cities and Counties would be responsible for developing and implementing their own comprehensive and integrated solid waste management plans. The advantages and disadvantages of this alternative are summarized below:

- Advantages

  - Maximizes autonomy and control for cities and counties.

  - Increases ability to react quickly to market conditions and technology relating to collection, transfer, recycling, processing, and disposal.

  - Simplifies governance and organizational structure.

  - Simplifies accounting and distribution of costs to system users.

  - Streamlines decision making process, because fewer players are involved in decisions.

  - Potential reduction in costs, at least in the short term for certain members of the Region due to either ability to internalize disposal (e.g., Virginia Beach) or proximity of member communities to private landfill facilities (Franklin, Isle of Wight, and Southampton).

- Disadvantages

  - Depending on land availability, most of Region's communities may be geographically or politically constrained from siting a new disposal facility within jurisdictional boundaries. This would result in increased, if not exclusive reliance for most of the Region on contracted disposal services and less control of costs. Analysis suggests this will significantly increase long-term costs for the Region.

  - Cannot take advantage of the economies of scale that are available with Regional cooperation.

  - Cities and Counties would likely have to add administrative, technical, and contract staff to manage their independent integrated solid waste system, resulting in potential increases in administrative and operational costs for recycling, yard waste management, household hazardous waste management, and disposal.

6.2 RECOMMENDATIONS

6.2.1 Future Regional Authority

For the Region as a whole, including municipal, institutional, and commercial sectors, Regional cooperation could provide significant reduction in costs through the siting of a new Regional Landfill. This significant cost-control advantage would be lost if the Region does not cooperate. Retaining the ability to cost-effectively site a new Regional Landfill would be useful factor in negotiating beneficial terms for short or long-term transportation and disposal contracts for the waste streams that are under the direct control of the regional governments. In addition, Regional cooperation would make it easier to achieve the integrated solid waste management requirements and goals of the Virginia Waste Management Board. The size, organization, and responsibilities of the Regional Authority would depend on the assets it would be required to manage (e.g., landfill, transfer station, or RDF WTE facilities), and the services requested by its members (e.g., collection, recycling, yard waste, household hazardous wastes).

Future cooperation of the Region's members will allow for more efficient development and operation of the large-scale solid waste facilities needed to recycle, transfer, process, convert, and dispose of the Region's solid waste as a result of economies of scale, regardless of whether the Regional Authority handles municipally collected waste only or provides services for commercially collected solid waste as well. Maintaining a Regional Authority to provide for transfer, recycling, and disposal services is a logical approach to managing the Region's solid waste either through development of facilities and operations owned and operated by the Authority or through contracted services.

At a minimum, Chesapeake, Franklin, Isle of Wight, Norfolk, Suffolk, Portsmouth, and Southampton will not have their own municipal solid waste landfills; therefore, these communities will need to contract for or otherwise provide for transportation and disposal of municipally collected waste, and assure that a reasonable plan is in place to manage commercially collected solid waste. In the short term and potentially in the long-term, the City of Virginia Beach has capacity to dispose of municipally collected waste in its Landfill No. 2 and has indicated that it would rely on the private sector for residential recycling services and for the collection and disposal of commercially collected waste in out-of-region disposal facilities. Therefore, if the City of Virginia Beach elected to manage its own waste, Chesapeake, Franklin, Isle of Wight, Norfolk, Suffolk, Portsmouth, and Southampton could still realize the above mentioned advantages of regional cooperation through leveraging their buying power, siting a new landfill, or maintaining the leverage of potentially siting a new Regional Landfill Facility in the event that contracted disposal costs become too high.

6.2.2 Governance

SPSA is an established authority that manages municipal solid waste for the Region. If the Region agrees to cooperate together in the future, the following changes to the governance, board make up, and financial management of a future regional authority should be considered to address concerns that have been expressed:

- **Proportional Representation**. A change in the governance model should be made to reflect proportional representation. This approach better reflects fiscal and solid waste contributions of its members; however, the proportional representation should be structured such that no one member can on its own control the direction of the regional authority, otherwise future cooperation is unlikely. SPSA members are divided regarding the effectiveness of the current governance model. Several members have indicated that the current governance model of one vote per member will not be acceptable to their communities on a going forward basis after 2018. However, others believe the current governance model has served the Region well over the years and should be continued.

- **Board Membership.** The regional authority board members should, in general, not be political appointees, but rather individuals with specific qualifications or expertise in business, engineering, environmental, legal, finance, construction, or solid waste disciplines. This will address consensus opinion that political factors have unduly influenced certain decisions made by the current and past boards and will allow for the more independent governing of the Authority to achieve its stated mission without undue political interference.

- **Debt Management.** Concerns regarding debt management by SPSA exist with some members. Full debt payments should not be deferred in response to political pressures to keep system rates low, as has been the case in the past. Debt should be paid and accounted for during the useful life of an asset. Existing debt obligations could likely be refinanced if the Region's members were to renegotiate their respective agreements with SPSA or its successor organization prior to 2018, although SPSA's current financial plan is to defease its debt by 2018.

- **Facility and System Ownership.** If all members of the Region decide to cooperate beyond 2018, consideration should be given to bringing the ownership and control for all disposal assets currently owned and operated by the member communities (i.e., City of Virginia Beach Landfill No. 2 and City of Portsmouth LCID Landfill) under the regional solid waste authority. Although the cost of transferring ownership of these assets is not specifically addressed in this report, this approach would allow for the maximum utilization of these resources by the Region and likely would reduce overall system costs (e.g., transportation costs). If such an approach were adopted, any future inter-local agreements would need to include conditional use approval for the various elements of the solid waste systems that may be implemented at the sites so that the host community would not be able to use the conditional use or site development approval process as a future negotiating tactic to delay or obstruct the intended use of the site for whatever reason.

6.2.3 Utilization of Existing Facilities

The Region, through SPSA, has substantial capital invested in waste-to-energy facilities, recycling facilities, regional landfill, transfer stations, rolling stock, administration buildings, maintenance facilities, and other support facilities. Many of these facilities will have not reached their useful life by 2018 and could serve the Region well into the future. Many of these support

facilities, e.g., transfer stations, will be needed to support the safe and efficient transport of solid waste, regardless of how it is processed and ultimately disposed. The maximum utility of these capital investments should be sought.

6.2.4 New Regional Landfill

The Region should immediately pursue siting a new regional landfill to provide sufficient disposal capacity for the future. The siting, acquiring, designing, permitting, and constructing a new regional landfill could take up to 10 years. The landfill can be publicly owned and operated, publicly owned and privately operated, or developed as a public/private partnership.

6.2.5 Host Fee

The community hosting the landfill or the RDF WTE should be paid a "host fee", which should be determined and agreed to upfront. A "host fee" provides recognition of the impacts that a landfill or WTE facility can have on a community. Virginia Code §10.1-1413.1B provides that facility owners may provide "an accounting of the facility's economic benefits to the locality where the facility is located including the value of disposal and recycling facilities provided to the locality at no cost or reduced costs, direct employment associated with the facility, and other economic benefits resulting from the facility during the preceding calendar year." There is no exact science to establishing the dollar value of the host fee, but there has been precedence for such fees in Virginia and elsewhere. For example, in 2007 host fees paid to various communities in Virginia which "host" large waste management facilities which receive significant out-of-state wastes ranged from $445,000 (Bethel Landfill to Hampton) to over $8 million (Atlantic Waste Disposal to Sussex County) (Solid Waste Managed in Virginia, 2007). The current approach which provides "free disposal" for Suffolk has proved to be difficult to manage, and is considered by some members to not be equitable.

6.2.6 Waste-to-Energy

Since 1988 SPSA has operated the RDF WTE Facility. The Power Plant portion of the facility was acquired from the U.S. Navy in 1999 and receives RDF fuel for combustion and generates steam and electricity. New air emissions control equipment has been installed to meet new stringent air emissions regulations, which were promulgated by the U.S. Environmental Protection Agency in response to the Federal Clean Air Act.

An independent bondholder's report of both facilities is completed annually by an engineering consultant engaged by SPSA pursuant to its Bond Indenture. Our reviews of the last five years of reports prepared by R.W. Beck indicate that the RDF plant appears to be properly maintained and operated requiring only continued emphasis on housekeeping programs within the building and typical restoration efforts. The quantity of RDF fuel that is produced appears to be sufficient to allow the Power Plant to meet the steam needs of the Navy and enable SPSA to sell electricity on the grid.

As noted by R.W. Beck, boiler reliability of the Power Plant continues to be the limiting factor with respect to RDF consumption and the waste processing capability of the resource recovery system. SPSA continues to make numerous modifications to the Power Plant to improve performance to enable it to operate close to its anticipated annual capacity factor. Our review of

the R.W. Beck's annual reports, a review of a 2008 condition assessment report by HDR, discussions with the SPSA Plant Operator, and knowledge of the resource recovery industry, suggests that this current budgeted capital cost of renewals and replacements will need to continue at a high level for many years. However, there is nothing to suggest in the specific SPSA operating record and similar experiences with other resource recovery facilities, that the RDF and Power Plant could not continue to provide the member communities with continued disposal capacity into the foreseeable future.

From the late 1980s to about 1995, there was a major upswing in the implementation of waste-to-energy facilities in the United States with nearly 100 plants sited, designed, and operated by local governments and private vendors. Issues of flow control, increasing costs of environmental compliance, tax financing, and concerns about the toxicity of ash residues from such facilities resulting in a near collapse of this industry in the mid 1990s. Since that time, many waste-to-energy companies have exited the marketplace (e.g., American Re-Fuel, Foster Wheeler, General Electric, and Westinghouse) due to the lack of development activity. Consequently, the expertise and available cost information for "greenfield" waste-to-energy projects have been significantly reduced, although in recent years there have been many existing plants that have been expanded.

For the purposes of this study, SCS contacted vendors and operators of waste-to-energy facilities to obtain updated cost data and information for capital and operating costs for a new 2,000 to 3,000 ton per day mass-burn facility. SCS is of the opinion that these data provide a reliable basis for projecting the costs of a new waste-to-energy facility for the Hampton Roads Region, absent preparing a detailed cost estimate for this facility, which is beyond the scope of this study.

We understand that SPSA is currently considering the potential sale of the RDF WTE Facility in order to reduce the Authority's debt burden. The sale of the RDF WTE Facility would significantly affect the financial analyses presented in this report; therefore, the analyses presented in Section 5.0 will need to be reassessed if the decision is made to sell the facility. If the facility is not sold, SCS recommends that the communities engage the services of a consulting engineer to conduct a life extension study to confirm this assumption and develop long-term projections of operating and capital requirements.

6.2.7 Transfer Stations

An evaluation should be made of the current transfer station network to assess the overall condition of the facilities, identify what modifications and upgrades are necessary to keep the facilities functional post-2018, and if the capacity and design of the system will accommodate expected waste projections (including separation of the yard waste stream) during the planning period. In addition, the transfer station network should be evaluated to assess if the transfer stations are optimally located to minimize hauling costs, and whether certain transfer stations should be decommissioned or new ones located.

6.2.8 Yard Waste Management

From a policy perspective, SCS recommends that a regional facility be sited and constructed to serve the Region now, and be available after 2018. The facility should be located as close as

practical to the centroids of generation, which is one of the primary reasons the facility at Landfill No. 2 was constructed. However, an alternative approach may be more appropriate for City of Franklin, and Isle of Wight and Southampton Counties due to the relatively small volumes of yard waste that are produced from these communities, and the transportation costs for delivering this waste stream to a regional facility.

6.2.9 Recycling

The Region, through SPSA and independently by the City of Virginia Beach, currently exceeds the 25 percent recycling rate mandated by the State through its existing programs and programs implemented by the private sector. However, individual communities may have a difficult time reaching this rate after 2018 if SPSA no longer exists. Other programs for e-waste, commercial recycling, and organics diversion should be evaluated for future implementation. SCS recommends that achieving or exceeding the state-mandated recycling goal be a fundamental goal of the Region in the future. SCS understands that there is not a single program that can be uniformly and cost-effectively applied to the entire Region, and that the programs will need to be developed to take into account varying demographics and geographic characteristics of the Region.

6.2.10 System Funding

SCS recommends that the Region consider implementing a residential only or a combined residential/commercial waste generator fee system (commonly referred to as a special assessment) to fund the solid waste system in lieu of the current tip fee-based system. We understand that this approach has been considered in the past by the Region, but that a consensus agreement on the approach has never been reached. A waste generator fee system more fairly allocates system costs based on the mission and objectives that have been established by the Region for managing its solid waste. It provides a reliable funding source, which has multiple benefits including positive cash flow, improved bonding capacity and ratings, and lower financing costs. A system funded by a waste generation fee would better support the mission of a comprehensive Regional solid waste management approach, such that the focus would be more on doing the right thing rather than figuring out a way to increase waste flows to support the system costs. This approach has been successfully implemented elsewhere as discussed earlier in Section 4.0.

SPSA currently establishes the tip fee for the year, based on the quantity of waste delivered, and each member then calculates what their respective charges will be for their residential customers and distributes those estimated charges through their respective ad valorem tax systems. The current approach only covers the residential customers that receive municipal collection services. Commercial customers pay the tip fee directly to SPSA through their collection contractors. The tip fee funding approach, which has waste disposed as the denominator, can result in actions that can be at cross purposes with resource conservation and recovery (e.g., recycling), because if waste is diverted from the system, revenues are reduced, and so the focus is on securing and increasing waste flow into the system versus resource conservation and recovery.

A system funded by a waste generation fee would better support the mission of a comprehensive Regional solid waste management approach, such that the focus would be more on doing the

right thing rather than figuring out a way to increase waste flows to support the system costs. SCS recommends that further evaluation of this funding approach be studied to assess the feasibility of implementing it in the Region.

6.2.11 Implementation Schedule

The recommendations outlined above will require a series of political, administrative, and technical actions by the Region. The following action plan is proposed to facilitate the transition from the existing use and service agreements to a set of new agreements. A schedule outlining the basic elements of the action plan is presented in Figure 15 (at the end of this section). The implementation schedule shown in Figure 15 shows a completion date for a new Regional Landfill beyond the January 2018 date when the current SPSA agreements expire. However, conservative assumptions were used throughout to provide time for regulatory review and public involvement, which can be more or less depending on specific circumstances. The conclusion is that time is of the essence.

- **CAO , City, and County Government Actions**
  - Develop consensus of findings and conclusions of the HRPDC study by the CAOs.
  - Present the findings and conclusions of the study to the respective member City Councils and County Supervisors.
  - Hold public meetings to present findings and recommendations to the community at large. (Note: The presentations to the City Councils and County Commissions may serve this function).
  - If consensus of findings and conclusions from study is to form a new or reconstituted Regional Authority, legal counsel should be sought to develop the necessary legal framework to address the institutional and management recommendations presented in this report. This would include the development of new use and service agreements, and any necessary supplemental agreements to address special circumstances with a respect to location of any new solid waste facilities and respective potential host fees.
  - Hold meetings with the CAOs to reach agreement on the basic framework of a new or reconstituted Regional Authority.
  - Present use and service agreements to the respective County and City governing bodies.
- **Secure Future Disposal Capacity**
  - The Region, through SPSA, should immediately conduct a siting study to identify whether a suitable site can be found in the Region to site a new regional landfill. The study should build off the previous siting studies that have been conducted. SCS understands that the SPSA Board has already approved moving forward with

this task. SCS recommends that it proceed on an expedited basis. Siting, acquiring, permitting, and constructing a new facility can take up to ten years to complete.

- At the same time that a siting study is being conducted, the Region should continue to discuss with the private sector whether they can provide long-term disposal capacity for the Region on a cost-effective basis. One option to consider would be issuing a request for proposals for the private sector to site and develop a new regional landfill, with the provision that the successful proposer would be given the life of site operational contract. This approach was successfully used by the City of Jacksonville, Florida in the 1990s. In this case, three private companies competed to permit a new facility. The City ultimately selected one company which they felt identified the most advantageous site, and the company proceeded with permitting, design, and construction. The successful company was successful was given a life-of-site contract to operate the facility.

- **Existing Facility Conditions and Use Beyond 2018.** SCS understands that SPSA is conducting an internal study assessing the condition and use of its existing transfer station network and the landfill. SCS also recommends that a similar study be done for the RDF WTE Facility (assuming SPSA retains ownership and operation) to identify specific action items that should be implemented to upgrade the facilities so that they can continue to serve the Region during the 30-year planning horizon.

ID	Task Name	Duration	Start	Finish
1	Submit Solid Waste Study to HRPDC	0 days	Fri 11/14/08	Fri 11/14/08
2	**Decide on Approach**	**1020 days**	**Mon 11/17/08**	**Fri 10/12/12**
3	Develop consensus on findings and recommendations by CAOs	3 mons	Mon 11/17/08	Fri 2/6/09
4	Presentations to City and County Councils and Commissions	3 mons	Mon 11/17/08	Fri 2/6/09
5	Develop framework for new regional cooperation	24 mons	Mon 2/9/09	Fri 12/10/10
6	Modify interlocal agreements	24 mons	Mon 12/13/10	Fri 10/12/12
7	**Evaluate System Funding Approaches**	12 mons	Mon 2/9/09	Fri 1/8/10
8	**Landfill Development**	**3270 days**	**Mon 11/17/08**	**Fri 5/28/21**
9	**Landfill Siting**	**1150 days**	**Mon 11/17/08**	**Fri 4/12/13**
10	**Consultant selection**	**90 days**	**Mon 11/17/08**	**Fri 3/20/09**
17	**Siting study**	12 mons	Mon 3/23/09	Fri 2/19/10
18	**Public hearings**	12 mons	Mon 2/22/10	Fri 1/21/11
19	**Preliminary site investigations**	6 mons	Mon 1/24/11	Fri 7/8/11
20	**Final site selection**	3 mons	Mon 7/11/11	Fri 9/30/11
21	**Zoning determination and approval**	2 mons	Mon 10/3/11	Fri 11/25/11
22	**Purchase land**	12 mons	Mon 11/28/11	Fri 10/26/12
23	**Modify regional solid waste plan**	6 mons	Mon 10/29/12	Fri 4/12/13
24	**Detailed site investigations**	**340 days**	**Mon 10/29/12**	**Fri 2/14/14**
31	**Facility Permit Designs**	**240 days**	**Mon 3/14/16**	**Fri 2/10/17**
44	**Permitting**	**1420 days**	**Mon 2/17/14**	**Fri 7/26/19**
45	**Part A Permit Application**	**540 days**	**Mon 2/17/14**	**Fri 3/11/16**
56	**Part B Permit Application**	**460 days**	**Mon 2/13/17**	**Fri 11/16/18**
68	**Wetlands Permit**	**260 days**	**Mon 3/13/17**	**Fri 3/9/18**
82	**Title V Air Permit**	**180 days**	**Mon 11/19/18**	**Fri 7/26/19**
93	**Facility Final Design and Bid Documents**	**220 days**	**Mon 11/19/18**	**Fri 9/20/19**
100	**Construction**	**440 days**	**Fri 9/20/19**	**Fri 5/28/21**
108	**Transfer Station Development**	**940 days**	**Mon 10/15/12**	**Fri 5/20/16**
109	**System Evaluation Study**	**240 days**	**Mon 10/15/12**	**Fri 9/13/13**
121	**New Transfer Station Development**	**700 days**	**Mon 9/16/13**	**Fri 5/20/16**
147	**Rehabilitation of Existing Transfer Stations**	**620 days**	**Mon 9/16/13**	**Fri 1/29/16**
148	**Design and Permitting**	**300 days**	**Mon 9/16/13**	**Fri 11/7/14**
161	**Bid Documents**	**380 days**	**Mon 9/16/13**	**Fri 2/27/15**
171	**Construction**	12 mons	Mon 3/2/15	Fri 1/29/16
172	**Waste to Energy Development**	**1760 days**	**Mon 10/15/12**	**Fri 7/12/19**
173	**WTE Facility Evaluation Study**	**240 days**	**Mon 10/15/12**	**Fri 9/13/13**
185	**Facility Upgrades**	**400 days**	**Mon 9/16/13**	**Fri 3/27/15**
197	**New Waste to Energy Facility Development (Conceptual)**	**1520 days**	**Mon 9/16/13**	**Fri 7/12/19**
247	**Local Site Development Approval**	**1510 days**	**Mon 4/28/14**	**Fri 2/7/20**
248	**Landfill and Support Facilities**	**120 days**	**Mon 8/26/19**	**Fri 2/7/20**
255	**Transfer Station**	**120 days**	**Mon 4/28/14**	**Fri 10/10/14**
262	**Waste to Energy Facility**	**120 days**	**Mon 7/18/16**	**Fri 12/30/16**

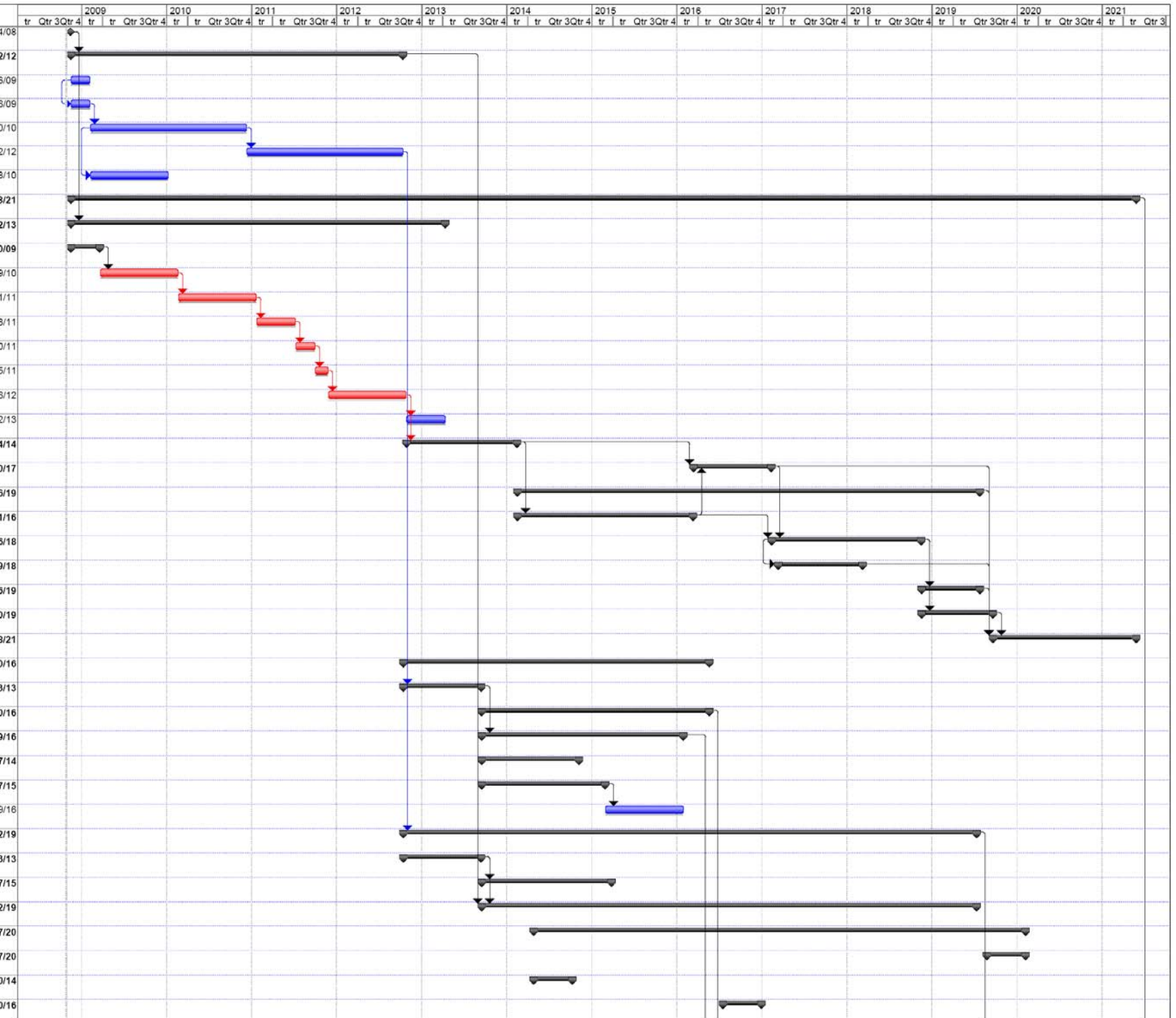

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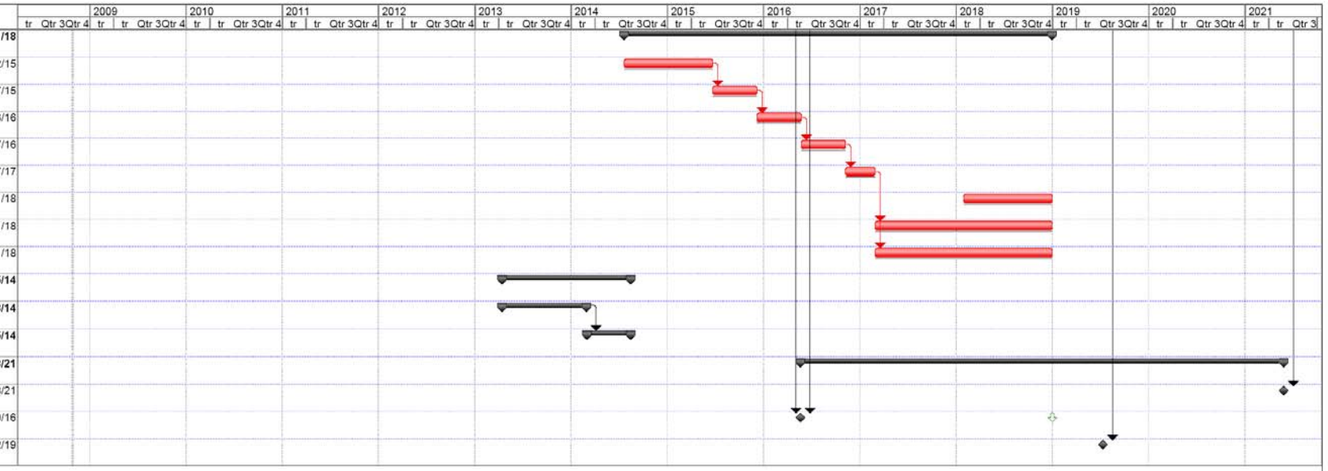
Figure 15. Implementation Schedule

ID	Task Name	Duration	Start	Finish
269	**Privatize Solid Waste System Operations**	**1160 days**	**Tue 7/22/14**	**Mon 12/31/18**
270	Prepare RFP for solid wase system management	12 mons	Tue 7/22/14	Mon 6/22/15
271	Vendors prepare and submit responses to RFP	6 mons	Tue 6/23/15	Mon 12/7/15
272	Vendor interviews	6 mons	Tue 12/8/15	Mon 5/23/16
273	Interlocal deliberations	6 mons	Tue 5/24/16	Mon 11/7/16
274	Select vendor(s)	4 mons	Tue 11/8/16	Mon 2/27/17
275	Reorganize SPSA	12 mons	Tue 1/30/18	Mon 12/31/18
276	Design, permit and construct new transfer stations	24 mons	Tue 2/28/17	Mon 12/31/18
277	Design, permit, and construct rail transfer facility	24 mons	Tue 2/28/17	Mon 12/31/18
278	**Project Financing**	**350 days**	**Mon 4/15/13**	**Fri 8/15/14**
279	**Prepare engineering feasibility/bond reports**	**230 days**	**Mon 4/15/13**	**Fri 2/28/14**
283	**Issue Bonds**	**120 days**	**Mon 3/3/14**	**Fri 8/15/14**
287	**Facilities Operational**	**1310 days**	**Fri 5/20/16**	**Fri 5/28/21**
288	Landfill	0 days	Fri 5/28/21	Fri 5/28/21
289	Transfer Station	0 days	Fri 5/20/16	Fri 5/20/16
290	WTE	0 days	Fri 7/12/19	Fri 7/12/19



Project: HRPDC System Implementatio
Date: Sat 10/25/08

Task | Critical Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Critical Task | Rolled Up Milestone | Rolled Up Progress | Split | External Tasks | Project Summary | Group By SummTask | Critical Task

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Figure 15. Implementation Schedule

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Appendix A
City and County Meeting Questionnaire

Questionnaire
HRPDC Study

The goal of the interviews with the City and County representatives is to identify the key values of each of the HRPDC member communities. The questions are designed so that we have a common frame of reference in looking at their responses. Generally, the questions will look at identifying their values for the solid waste system and the importance of the values to their evaluation of and decisions on the eventual recommendations. Being able to convert these to some objective measure is also important.

Key issues/values that will be explored include the following:

1. Tipping Fee/Bottom Line?

2. What will drive the political decision making process? Tip fee, bottom line, environmental concerns?

3. Level of environmental concern;

   - How "green" are you?

   - How import is recycling to you?

4. What is the importance of a comprehensive system - cradle to grave; landfill, WTE, recycling, HW, mulch/compost, landfill gas, etc.?

5. What is the importance of regional cooperation?

6. How do you feel about flow control – with or without SPSA?

7. What is your view of "out of state" waste?

8. Energy and climate change issues, are these important considerations in your decision making process?

9. What are some of the unique resources or considerations for your locality?

10. Governance issues relating to regional cooperation.

    - What is your view of the current structure?

    - What would you do differently and why?

    - It is now one vote per member. What is your perspective on a going forward basis? Will you support proportional voting? Do you think proportional voting has merit?

11. Has your locality begun contingency planning for what happens after 2018 in the event a regional solution is not structured?

12. Disposal;

    - Do you think the Region should site and operate a new landfill?

    - Are you familiar with the previous siting studies? Do you think they are still valid, or do you think a new study will be required?

    - Where do you think the next landfill should be located?

    - What is your opinion of the Black Bear Landfill?

Appendix B
WTE Facility Capital Budget FY 2009

PROJECT DESCRIPTION	LIFE	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	CATEGORY
WTE RDF Plant							
Convert T 1lb Conveyor	15	880,000					Performance
Dust Collector Replacement (Ph2)	10	250,000					Environmental
Tennant Street Sweeper #13-85 Replace	6	160,000					Vehicle
Forktruck #1373, Daewoo DS30, Replace	8	38,000					Vehicle
Exterior Building Renovations (Ph2)	20	500,000					Aesthetics
Quick Opening Door for NP tunnel (1 lane)	10	121,000					Environmental
Tipping Floor Resurface (Ph 2)	3	950,000					Repair/End of Life
Convert T1a to Conveyor	15		880,000				Performance
Convert T1c to Conveyor	15		880,000				Performance
Upgrade M2 Magnets	5		400,000				Performance
Dust Collector Replacement (Ph 3)	10		260,000				Environmental
Forktruck #1374, Komatsu FD40, Replace	6		40,000				End of Life
Exterior building renovations (ph 3)	20		250,000				Aesthetics
Replace C32 Belt	4		145,000				Repair/End of Life
HVAC Maint Office & Lab	10		100,000				
Maintenance Truck #13-27, Replace	8		40,000				
Dust Collector Replacement (Ph 4)	10			270,000			
Exterior Building Renovations (Ph 4)	20			100,000			
Replace C33 Belt	4			150,000			Performance
Resurface Aisles in Production Area	10			750,000			Performance – Re-evaluate Estimated
Skidsteer #13-69, Replace	6			30,200			
Skidsteer #13-70, Replace	6			30,200			
Tipping Floor Resurface, (Ph 1a)	3			900,000			Performance
Exterior Building Renovations (Ph 5)	20				200,000		
Replace Cooling Towers	15				165,000		Performance
Fire & Service Water Header Replacement	10				300,000		Safety
Install Vacuum System @ C32-33 Transfer Building	8				195,000		Performance
Tipping Floor Resurface, (Ph 2a)	3				930,000		Performance

PROJECT DESCRIPTION	LIFE	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	CATEGORY
B-Line Shredder, Overhaul	6				390,000		Performance
C-Line Shredder, Overhaul	6					405,000	Performance
A-Line Shredder, Overhaul	6					405,000	Performance
Picking Crane C1a, Replace	5					230,000	Performance
Pave Parking Lot & Outbound Roadway	10					350,000	End of Life
MCC & Switchgear, Replace	10					850,000	Performance
RDF TOTAL		**$2,899,000**	**$2,995,000**	**$2,230,400**	**$2,180,000**	**$2,240,000**	
WTE Power Plant							
Primary Superheaters Blr 2, Install	4	290,000					Performance
PSH, SSH & FWW, Blr #3,1, Install	4	550,000					Performance
Secondary Superheaters, Blr 1, Install	4	300,000					Performance
Generation Bank, Blr 3, Install	7	532,000					Performance
Generation Bank & FWWH, Blr 4, Prov & Install	7	825,000					Performance
WW Panels (16), Inconel, & FWWH, Blr #1, Replace	10	1,008,000					Performance
WW Panels (16), Inconel, & FWWH, Blr #2, Prov & Install	10	1,282,000					Performance
Fume Tight Front Walls, Blr's 1-4, Provide & Install	5	324,000					Safety/Environmental
Upgrade OFA System, First Boiler	10		680,000				Environmental
East Ash Conveyor, Replace	10	745,000					Performance
West Ash Conveyor, Replace	10		675,000				Performance
Refurbish Truck Loadout Conv & Gallery	15	450,000					Safety
Transfer Conveyor #A&C, Replace	15	565,000					Performance
Transfer Conveyor #B&D, Replace	15		587,600				Performance
Fabric Filter Double Dump Valve Refurbishments	15	550,000	550,000				8 New double Dump Valves; Refurbish
FF Transfer Conveyors, 1st Two Blrs, Replace	15	200,000					Performance
FF Transfer Conveyor, 2nd Two Blrs, Replace	15		206,000				Performance
TAH Flyash Trsf Conv 1st Two Blrs, Replace	15	210,000					Performance
TAH Flyash Trsf Conv 2nd Two Blrs, Replace	15		216,000				Performance
SDA Flyash Trsf Conv (Blr 2 only), Replace	15	122,000					Performance
SDA Flyash Trsf Conv (Blr 4 only),	15		126,000				Performance

PROJECT DESCRIPTION	LIFE	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	CATEGORY
Replace							
Replace Air Compressor, (Ph 2)	20	206,000					Performance
PLC Network Upgrades, Phase 2	10	0	600,000				Defer to FY2010
HVAC renovation (Phase 2)	15		400,000				Safety/Environmental – Defer 1 year
Compressed Air Piping Replace	9	150,000					Performance
Isolation Valve Actuators, Replace	10	100,000	402,000	403,000			Critical Valves in 2009; Remainder Split
Exterior Lighting @Coals Slab for Ash Handling	10	120,000					Safety
Security System	10			175,000			Deferred to FY2011
Wiring Upgrades for Fire Detection System	105	75,000					Safety
Cathodic Protection system for Circ Water		30,000					Performance
Filter System for circulating Water	53						System Upgrade – Defer Indefinitely
Skidsteer, Bobcat #1371	3	15,000					Vehicle
Barrel tipper	10	9,000					Safety
Forklift #1336, Clark 8000#	8	37,000	241,300				Vehicle
Forklift #1363, Nissan JC40LF	425	21,000					Vehicle
Ash Trailers, 4 each, Replace	10	232,000		251,000	261,000	271,500	Vehicle
Steam Coil Air Heater/Condensate Reclaim	5	159,000					Performance
Install Catwalk on Inside West side RDF Pit	10	50,000					Safety/Performance
Install Conv Under APC's	10			75,000			Defer until 2011
Install Ash Collection/Pump Station OS Blr Bldg	5	75,000					Safety
Paint Stacks & Bldg Exterior, (Ph 1-3)							Defer Indefinitely
Provide Mobile Power Broom		23,000					Environmental
FY10							
Secondary Superheaters, Blr 2, Provide & Install	4		525,000				Performance
PSH & SSH, Blr #4 Provide & Install	4		936,000				Performance
Screen tubes, Blr 1, Provide	8		64,000				Performance
Water Wall Panels (12) Blr 3, Provide	11		443,000				Performance
WW Panels (12) & Inconel Blr #3, Install	10		622,000				Performance

PROJECT DESCRIPTION	LIFE	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	CATEGORY
Upgrade OFA system, Second Boiler	10			700,000			Pending Performance Evaluation of First
							Boiler
HVAC Renovation (Phase 3)	15			220,000			Defer until 2011
Boiler Bldg First Floor Structural Renovation	10	700,000					Safety
Slope Wall RDF Storage Pit, Renovate	7	227,000	614,000				Safety/Structural Integrity
Roof Replacement	20			600,000			Repair Only
Forklift #1375 Cat GP30, Replace	6		40,000				Vehicle
Payloader #1648, Cat Replace	5		400,000				Vehicle
Turbine Generator Controls Phase 1, Replace	15			530,000			Obsolescence – deferred until 2011
TG Exciter Phase 1, Replace	15			200,000			Obsolescence – deferred until 2011
Stake Body Truck #2-34, Ford Replace	10		54,000				
FY11							
Primary Super	5			192,000			Performance
Primary Superheaters Blr 2, provide	5			192,000			Performance
Secondary Superheaters Blr 1, Provide	5			204,000			Performance
Screen tubes, Blr 1, Install	7			217,000			Performance
Screen tubes, Blr 2, Provide	8			67,000			Performance
Screen tubes, Blr 3, Provide	8			67,000			Performance
Screentubes, Blr 4, Provide	8			70,000			Performance
Primary Superheaters Blr 3, Provide	5			199,000			Performance
Secondary Superheaters Blr 3, Provide	5			211,000			Performance
Upgrade OFG System, 3rd Blr	10				720,000		Defer
Tubular Air Heater, Blr 1, repair	4			120,000			Performance
Tubular Air Heater, Blr 2, Repair	4			120,000			Performance
Yardog #422, Replace	4			121,000			Vehicle
Turbine Generator controls Phase 2, Replace	15				450,000		Defer
TG Exciter Phase 2, Replace	15				200,000		Defer
Economizer tube, Replace	10			500,000			Further Eval Needed
5KV Switchgear Replace	20			750,000			Defer
Steam Dump condenser	20				1,910,000		Defer – New system
Replace Lime Slakers	10			618,000			Defer

PROJECT DESCRIPTION	LIFE	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	CATEGORY
Install Restroom for HEO's	10			80,000			Defer
Install Catwalk on Outside East RDF Pit	10			50,000			Further Eval Needed
Spare ID Fan Motor, Provide	10			145,000			Further Eval Needed
FY12							
Primary Superheaters Blr 1, Install	4				334,000		Performance
Primary Superheaters Blr 2, Install	4				334,000		Performance
Secondary Superheaters Blr 1, Install	4				349,000		Performance
Screen tubes, Blr 2, Install	7				225,000		Performance
Screen tubes, Blr 3, Install	7				225,000		Performance
Tubular air heater, Blr 3 Repair	4				126,000		Performance
Tubular Air Heaters, Blr 4 Repair	4				126,000		Performance
Yardog #425, Replace	4				124,000		Vehicle
Economizer Tube, Replace	10				500,000		Further Eval Needed
Exterior Pipe chase Steel Refurbishment	15				80,000		Further Eval Needed
Diesel Generator Overhaul	5				230,000		Further Eval Needed
Atomizers, Replace	10				842,000	842,000	Evaluate Refurbishment Options
Motor Control Centers, Replace (Phase 1)	20					825,000	Defer
Dirty Water Modifications, Filter Installation	15				250,000		New system
Pickup Truck, dodge Replace	5				25,000		Vehicle
BFWP upgrades	10				500,000		Further Eval Needed
TG #3, Seven year Inspection	7				1,600,000		Budget Amount is High – Re-evaluate
Upgrade OFA System, 4th Blr	10					720,000	Defer
FY13							
Secondary Superheaters, Blr 2, Provide	5					218,000	Performance
Primary & Secondary Superheaters Blr 3, Install	4					639,000	Performance
Primary & Secondary Superheaters Blr 4, Provide	4					426,00	Performance
Screen tubes, Blr 4 Install	8					232,000	Performance
Forklift #1386 Cat	6					43,000	Vehicle
Skidsteer TG #2, Seven Year Inspection	5					18,000	Vehicle
TG #2, Seven Year Inspection	7					1,600,000	Budget Amount is High – Re-evaluate
TG #1, Seven year Inspection	7					1,600,000	Can we defer another

PROJECT DESCRIPTION	LIFE	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	CATEGORY
							year?
Vacuum Truck #1384, Sterling, Replace	7					310,000	Vehicle
	SPP Total	**$10,182,000**	**$8,381,900**	**$7,077,000**	**$9,411,000**	**$7,744,500**	

Appendix C
Pro Forma Model Worksheets

Solid Wate Management in Southside Hampton Roads - Projected Operatign Resutys
Assumptions for Proforma Models

Model Parameters	Assumption	Source/Basis
Miscellaneous		
Base Year	2008	
Planning Period	2018 - 2047	
Waste Flow		SCS Projections based on input from SPSA and member communities
Consumer Price Index (inflation rate)	4.0%	Assumed
Fuel Escalation	4.0%	Assumed
Interest Earnings (Of System Revenues)	6.0%	
Debt Financing Rate	6.0%	Assumed
Length of Bond Issue, WTE	20	Assumed
PV Discount Rate	5.0%	Assumed
Waste Management Alternatives		
Long Haul Transportation	Transfer truck, see Transportation Cost	
Long Haul Disposal Location	WM Atlantic Waste	Assumed for costing purposes
Distance to WM Atlantic Waste Landfill from Current	50	Calculated from Google Maps
Average Tip Fee Bid to SPSA for Out of Area Disposal	25.50	SPSA Proposals, 2007 ranged $25-$28/ton
Discount on Tip Fee	75%	Assumed based on conversation with waste industry representatives
Out of Area Disposal, Tip Fee, 2008 Dollars	$19.00	Discounted for Volume based on discussions with waste companies
Tipping Fee By Year, $/ton	See OOA Disposal Cost Worksheet	Based on SPSA bids received in Fall 2007 and escalated per CPI
Transfer Station Operations, $/ton	See SPSA Administrative Costs and Recycling and TS Worksheet	
2008 Diesel Fuel Cost, $/gallon	$3.50	Assumed 2008 pricing, then escalated
Transport Costs	See Transportation Cost Worksheet	First Tee Bids for SPSA waste transfer
WTE		
RDF (Processes First 615,000 Tons)		
Availability of Existing Units	85.0%	RW Beck Report
RDF Production (Tons)	615,000	Two of three lines in operation, two shifts per day (Average RDF processed 2002-2007)
Annual Operating and Maintenance Costs	$20,248,756	Average of SPSA 2007 and 2008 Budget
Annual Capital Improvements	$8,674,033	Average of SPSA 2007 and 2008 Budget; HDR Report
Steam Sales	$7,110,000	SPSA 2009 Budget
Electricity Sales	$10,600,000	SPSA 2009 Budget
Non Ferrous Recovery Sales	$250,000	SPSA 2009 Budget
Ferrous Recovery Sales	$550,000	SPSA 2009 Budget
Mass Burn (Second Plant)		
Size, tons per day, Scenario A1.3 & 2.3	2,000	Assumption
Size, tons per day, Scenario A1.4 & 2.4	3,000	Assumption
Technology	Scrubber Baghouse, Low NOx, SNCR system, flue gas recirculation, carbon	
Availability of New Unit	90.0%	Assumption
Processing rate, tons per year, 2000 tpd	657,000	Calculated
Processing rate, tons per year, 3000 tpd	985,500	Calculated
Capital Cost	$250,000 per ton of installed capacity	SCS Engineers survey of WTE vendors
Land	0.0%	Sited on SPSA land adjacent to RDF Plant
Net Energy Production	550 kwh/ton Assuming Higher Heating Value of 5,200 Btu/hour	
New Mass Burn Ferrous Recovery Sales	See Mass Burn WTE Plant Costs Worksheet	
Ash Production (Of Incoming Waste Stream)	30.0%	
Old Energy Revenues from Electricity, 2009 Assumed $/kWh	$0.05225	Similar rate SPSA received from AEP and Dominion Power
New Energy Revenues from Electricity, Renegotiated 2008 $/kWh	$0.06700	Newly negotiated rate, email from L. Jordan, SPSA
WTE Host Fee, $/ton	$1.00	Can be varied.

Solid Wate Management in Southside Hampton Roads - Projected Operatign Resutys
Assumptions for Proforma Models

Model Parameters	Assumption	Source/Basis
Regional Landfill		
Distance from current landfill to assumed new regional landfill, miles	25	SCS Engineers estimate
Size (Acres)	Varies By Scenario	
Total Solid Waste Disposal Capacity, Acres per Million Tons	29.1	Based on current SPSA Regional Landfill
Footprint Solid Waste Disposal Capacity, Acres per Million Tons	8.3	Based on current SPSA Regional Landfill
Solid Waste Disposal Area Ratio, Waste Footprint/Gross Area	0.28	Based on current SPSA Regional Landfill
Cost of Land, $/acre	$5,000	MLS Listings of available land in Southhampton, VA
In-place density, lbs/cubic yard	1,540	
Apply Host Fee?	Yes	
Landfill Host Fee, $/ton	$3.00	SCS Engineers estimate
Cell Development Cost, $/acre	$348,000	SCS Engineers estimate
Operating and Maintenance Costs, $/ton	$5	Based on SPSA Benchmark Study and discussions with L. Jordan (with slight modification)
Closure Costs, $/acre	$180,000	SCS Engineers estimate
Post Closure Care	See Post Closure Care Costs Worksheet	
Landfill Ops, City of Virginia Beach Op Costs (All In), $/ton	$15	Assumed, Virginia Beach still studying

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.1 - All Communities Cooperate - New Regional Landfill, No Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	33,842	35,195	36,602	38,068	39,590	41,172	42,820	44,533	46,315	48,165
Solid Waste Administration	8,160	8,486	8,825	9,178	9,545	9,927	10,324	10,737	11,167	11,614
Regulatory Compliance	2,454	2,553	2,655	2,761	2,871	2,986	3,106	3,230	3,359	3,493
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	5,852	6,782	6,876	6,972	7,954	8,064	8,177	9,211	9,339	10,415
Site Develop, New Cell, Closure	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	3,800	3,835	3,870	3,906	3,943	3,980	4,017	4,055	4,093	4,132
Additional Transportation Costs	13,242	13,971	14,725	15,533	16,368	17,251	18,183	19,159	20,180	21,254
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$100,977**	**$105,030**	**$108,387**	**$111,883**	**$116,396**	**$120,190**	**$124,171**	**$129,214**	**$133,517**	**$138,944**
NET ANNUAL SYSTEM COSTS ($000)	**$100,977**	**$105,030**	**$108,387**	**$111,883**	**$116,396**	**$120,190**	**$124,171**	**$129,214**	**$133,517**	**$138,944**
SYSTEM RATE ($/TON-MANAGED)	**$70**	**$73**	**$74**	**$76**	**$78**	**$80**	**$82**	**$85**	**$87**	**$89**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$2,416,017**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.1 - All Communities Cooperate - New Regional Landfill, No Resource Recovery

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,390,410	1,403,670	1,417,100	1,430,720	1,444,480	1,458,420	1,472,560	1,486,860	1,501,370	1,516,050
Recyclables Managed	88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
Yard Waste Managed	92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	1,390,410	1,403,670	1,417,100	1,430,720	1,444,480	1,458,420	1,472,560	1,486,860	1,501,370	1,516,050
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
Transfer Station Operations	50,095	52,097	54,181	56,348	58,602	60,946	63,385	65,917	68,556	71,298
Solid Waste Administration	12,078	12,561	13,064	13,586	14,130	14,695	15,283	15,894	16,530	17,191
Regulatory Compliance	3,633	3,779	3,930	4,087	4,250	4,420	4,597	4,781	4,972	5,171
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	10,559	10,705	11,839	12,003	13,182	13,363	14,589	14,789	16,063	17,369
Site Develop, New Cell, Closure	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	4,171	4,211	4,251	4,292	4,333	4,375	4,418	4,461	4,504	4,548
Additional Transportation Costs	22,396	23,588	24,836	26,157	27,531	28,989	30,511	32,121	33,813	35,590
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$143,646**	**$148,510**	**$154,582**	**$159,906**	**$166,426**	**$172,218**	**$179,287**	**$185,559**	**$193,173**	**$201,116**
NET ANNUAL SYSTEM COSTS ($000)	**$143,646**	**$148,510**	**$154,582**	**$159,906**	**$166,426**	**$172,218**	**$179,287**	**$185,559**	**$193,173**	**$201,116**
SYSTEM RATE ($/TON-MANAGED)	**$91**	**$94**	**$97**	**$99**	**$102**	**$105**	**$108**	**$111**	**$114**	**$118**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.1 - All Communities Cooperate - New Regional Landfill, No Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,530,910	1,545,990	1,561,230	1,576,680	1,592,380	1,608,250	1,624,330	1,640,640	1,657,120	1,673,870
Recyclables Managed	94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
Yard Waste Managed	101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	1,530,910	1,545,990	1,561,230	1,576,680	1,592,380	1,608,250	1,624,330	1,640,640	1,657,120	1,673,870
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
Transfer Station Operations	74,151	77,116	80,202	83,409	86,745	90,216	93,826	97,578	101,482	105,538
Solid Waste Administration	17,879	18,594	19,337	20,111	20,915	21,752	22,622	23,527	24,468	25,447
Regulatory Compliance	5,378	5,593	5,817	6,050	6,292	6,543	6,805	7,077	7,360	7,655
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	17,607	15,827	20,353	20,631	22,076	23,555	25,070	25,413	26,986	28,598
Site Develop, New Cell, Closure	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357	18,357
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	4,593	4,638	4,684	4,730	4,777	4,825	4,873	4,922	4,971	5,022
Additional Transportation Costs	37,453	39,421	41,480	43,649	45,932	48,321	50,845	53,500	56,287	59,212
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$208,244**	**$213,660**	**$225,683**	**$233,789**	**$243,400**	**$253,393**	**$263,798**	**$273,382**	**$284,635**	**$296,338**
NET ANNUAL SYSTEM COSTS ($000)	**$208,244**	**$213,660**	**$225,683**	**$233,789**	**$243,400**	**$253,393**	**$263,798**	**$273,382**	**$284,635**	**$296,338**
SYSTEM RATE ($/TON-MANAGED)	**$121**	**$123**	**$128**	**$132**	**$136**	**$140**	**$144**	**$148**	**$153**	**$157**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.2 - All Communities Cooperate - New Regional Landfill, Existing RDF Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)										
Ash Residue										
Solid Waste Processed by Mass Burn Facility										
Regional Landfill (Tons)	836,010	847,720	859,560	871,560	883,730	896,040	908,500	921,100	933,890	946,800
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	1,910	1,986	2,066	2,148	2,234	2,324	2,416	2,513	2,614	2,718
Total System Operating Revenues	**$33,739**	**$35,088**	**$36,492**	**$37,951**	**$39,469**	**$41,049**	**$42,689**	**$44,397**	**$46,174**	**$48,020**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	31,961	33,239	34,569	35,952	37,390	38,885	40,441	42,058	43,741	45,490
Solid Waste Administration	8,160	8,486	8,825	9,178	9,545	9,927	10,324	10,737	11,167	11,614
Regulatory Compliance	2,454	2,553	2,655	2,761	2,871	2,986	3,106	3,230	3,359	3,493
WTE Facility Operating and Maintenance Expenses										
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	5,852	6,782	6,876	6,972	7,954	8,064	8,177	9,211	9,339	10,415
Site Develop, New Cell, Closure	13,586	13,586	13,586	13,586	13,586	13,586	13,586	13,586	13,586	13,586
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	2,508	2,543	2,579	2,615	2,651	2,688	2,726	2,763	2,802	2,840
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportion Costs	8,741	9,266	9,812	10,397	11,006	11,652	12,337	13,057	13,813	14,611
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$138,873**	**$144,637**	**$149,777**	**$155,120**	**$161,559**	**$167,357**	**$173,419**	**$180,626**	**$187,183**	**$194,955**
NET ANNUAL SYSTEM COSTS ($000)	**$105,134**	**$109,549**	**$113,286**	**$117,169**	**$122,090**	**$126,309**	**$130,730**	**$136,229**	**$141,009**	**$146,934**
SYSTEM RATE ($/TON-MANAGED)	**$73**	**$76**	**$78**	**$80**	**$82**	**$84**	**$86**	**$89**	**$91**	**$94**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$2,564,812**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.2 - All Communities Cooperate - New Regional Landfill, Existing RDF Resource Recovery

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,390,410	1,403,670	1,417,100	1,430,720	1,444,480	1,458,420	1,472,560	1,486,860	1,501,370	1,516,050
Recyclables Managed	88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
Yard Waste Managed	92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)										
Ash Residue										
Solid Waste Processed by Mass Burn Facility										
Regional Landfill (Tons)	959,910	973,170	986,600	1,000,220	1,013,980	1,027,920	1,042,060	1,056,360	1,070,870	1,085,550
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	47,114	48,999	50,959	52,997	55,117	57,322	59,615	61,999	64,479	67,058
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	2,827	2,940	3,058	3,180	3,307	3,439	3,577	3,720	3,869	4,023
Total System Operating Revenues	**$49,941**	**$51,939**	**$54,017**	**$56,177**	**$58,424**	**$60,761**	**$63,192**	**$65,719**	**$68,348**	**$71,081**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
Transfer Station Operations	47,310	49,202	51,170	53,217	55,346	57,560	59,862	62,256	64,747	67,337
Solid Waste Administration	12,078	12,561	13,064	13,586	14,130	14,695	15,283	15,894	16,530	17,191
Regulatory Compliance	3,633	3,779	3,930	4,087	4,250	4,420	4,597	4,781	4,972	5,171
WTE Facility Operating and Maintenance Expense										
RDF Facility	73,607	76,552	79,614	82,798	86,110	89,555	93,137	96,862	100,737	104,766
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	10,559	10,705	11,839	12,003	13,182	13,363	14,589	14,789	16,063	17,369
Site Develop, New Cell, Closure	13,586	13,586	13,586	13,586	13,586	13,586	13,586	13,586	13,586	13,586
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	2,880	2,920	2,960	3,001	3,042	3,084	3,126	3,169	3,213	3,257
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportion Costs	15,462	16,353	17,291	18,287	19,326	20,432	21,591	22,821	24,118	25,484
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$202,087**	**$209,485**	**$218,193**	**$226,256**	**$235,628**	**$244,382**	**$254,534**	**$264,013**	**$274,958**	**$286,367**
NET ANNUAL SYSTEM COSTS ($000)	**$152,146**	**$157,547**	**$164,176**	**$170,079**	**$177,204**	**$183,621**	**$191,342**	**$198,294**	**$206,610**	**$215,286**
SYSTEM RATE ($/TON-MANAGED)	**$97**	**$99**	**$103**	**$105**	**$109**	**$112**	**$115**	**$118**	**$122**	**$126**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.2 - All Communities Cooperate - New Regional Landfill, Existing RDF Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,530,910	1,545,990	1,561,230	1,576,680	1,592,380	1,608,250	1,624,330	1,640,640	1,657,120	1,673,870
Recyclables Managed	94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
Yard Waste Managed	101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	0	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)										
Ash Residue										
Solid Waste Processed by Mass Burn Facility										
Regional Landfill (Tons)	1,100,410	930,990	1,130,730	1,146,180	1,161,880	1,177,750	1,193,830	1,210,140	1,226,620	1,243,370
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	69,741	72,530	75,431	78,449	81,587	84,850	88,244	91,774	95,445	99,263
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	4,184	4,352	4,526	4,707	4,895	5,091	5,295	5,506	5,727	5,956
Total System Operating Revenues	**$73,925**	**$76,882**	**$79,957**	**$83,156**	**$86,482**	**$89,941**	**$93,539**	**$97,280**	**$101,172**	**$105,219**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
Transfer Station Operations	70,030	72,831	75,744	78,774	81,925	85,202	88,610	92,155	95,841	99,675
Solid Waste Administration	17,879	18,594	19,337	20,111	20,915	21,752	22,622	23,527	24,468	25,447
Regulatory Compliance	5,378	5,593	5,817	6,050	6,292	6,543	6,805	7,077	7,360	7,655
WTE Facility Operating and Maintenance Expense										
RDF Facility	108,957	113,315	117,848	122,562	127,464	132,563	137,865	143,380	149,115	155,080
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	17,607	15,827	20,353	20,631	22,076	23,555	25,070	25,413	26,986	28,598
Site Develop, New Cell, Closure	13,586	13,586	13,586	13,586	13,586	13,586	13,586	13,586	13,586	13,586
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	3,301	2,793	3,392	3,439	3,486	3,533	3,581	3,630	3,680	3,730
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportion Costs	26,921	23,739	30,042	31,731	33,514	35,386	37,369	39,462	41,664	43,984
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$297,101**	**$301,007**	**$322,188**	**$334,351**	**$348,180**	**$362,559**	**$377,524**	**$391,853**	**$408,039**	**$424,878**
NET ANNUAL SYSTEM COSTS ($000)	**$223,175**	**$224,125**	**$242,231**	**$251,195**	**$261,698**	**$272,618**	**$283,986**	**$294,572**	**$306,867**	**$319,659**
SYSTEM RATE ($/TON-MANAGED)	**$129**	**$129**	**$138**	**$141**	**$146**	**$150**	**$155**	**$159**	**$164**	**$170**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.3 - All Communities Cooperate -New Regional Landfill, Existing RDF Plus New 2000 tpd Mass Burn Resource Recovery

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Ash Residue	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100
Solid Waste Processed by Mass Burn Facility	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000
Regional Landfill (Tons)	379,953	387,820	399,660	411,660	423,830	436,140	448,600	461,200	473,990	486,900
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302
Mass Burn Plant	43,346	45,079	46,883	48,758	50,708	52,737	54,846	57,040	59,321	61,694
Interest Income	4,510	4,691	4,879	5,074	5,277	5,488	5,707	5,935	6,173	6,420
Total System Operating Revenues	**$79,685**	**$82,872**	**$86,187**	**$89,635**	**$93,220**	**$96,949**	**$100,826**	**$104,859**	**$109,054**	**$113,416**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	31,961	33,239	34,569	35,952	37,390	38,885	40,441	42,058	43,741	45,490
Solid Waste Administration	8,160	8,486	8,825	9,178	9,545	9,927	10,324	10,737	11,167	11,614
Regulatory Compliance	2,454	2,553	2,655	2,761	2,871	2,986	3,106	3,230	3,359	3,493
WTE Facility Operating and Maintenance Expenses										
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776
Mass Burn Facility	59,838	62,231	64,720	67,309	70,002	72,802	75,714	78,742	81,892	85,168
Landfill Operating and Maintenance Expenses	2,660	3,103	3,197	3,293	3,814	3,925	4,037	4,612	4,740	5,356
Site Develop, New Cell, Closure	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	1,140	1,163	1,199	1,235	1,271	1,308	1,346	1,384	1,422	1,461
WTE Host Fee	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272
Additional Transportation Costs	3,973	4,239	4,562	4,911	5,278	5,672	6,092	6,538	7,011	7,514
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$184,456**	**$191,856**	**$199,262**	**$206,958**	**$215,388**	**$223,734**	**$232,442**	**$241,946**	**$251,368**	**$261,661**
ANNUAL DEBT SERVICE ($000)										
Principal	16,096	17,062	18,086	19,171	20,321	21,540	22,833	24,203	25,655	27,194
Interest	35,526	34,560	33,536	32,451	31,301	30,082	28,789	27,419	25,967	24,428
Total Debt Service	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622
NET ANNUAL SYSTEM COSTS ($000)	**$156,393**	**$160,606**	**$164,697**	**$168,946**	**$173,790**	**$178,407**	**$183,238**	**$188,708**	**$193,935**	**$199,867**
SYSTEM RATE ($/TON-MANAGED)	**$109**	**$111**	**$113**	**$115**	**$117**	**$119**	**$121**	**$124**	**$126**	**$128**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$3,248,389**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.3 - All Communities Cooperate -New Regional Landfill, Existing RDF Plus New 2000 tpd Mass Burn Resource Recovery

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,390,410	1,403,670	1,417,100	1,430,720	1,444,480	1,458,420	1,472,560	1,486,860	1,501,370	1,516,050
Recyclables Managed	88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
Yard Waste Managed	92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Ash Residue	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100
Solid Waste Processed by Mass Burn Facility	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000
Regional Landfill (Tons)	500,010	513,270	526,700	540,320	554,080	568,020	582,160	596,460	610,970	625,650
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	47,114	48,999	50,959	52,997	55,117	57,322	59,615	61,999	64,479	67,058
Mass Burn Plant	64,162	66,729	69,398	72,174	75,061	78,063	81,186	84,433	87,810	91,323
Interest Income	6,677	6,944	7,221	7,510	7,811	8,123	8,448	8,786	9,137	9,503
Total System Operating Revenues	**$117,953**	**$122,671**	**$127,578**	**$132,681**	**$137,988**	**$143,508**	**$149,249**	**$155,218**	**$161,427**	**$167,884**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
Transfer Station Operations	47,310	49,202	51,170	53,217	55,346	57,560	59,862	62,256	64,747	67,337
Solid Waste Administration	12,078	12,561	13,064	13,586	14,130	14,695	15,283	15,894	16,530	17,191
Regulatory Compliance	3,633	3,779	3,930	4,087	4,250	4,420	4,597	4,781	4,972	5,171
WTE Facility Operating and Maintenance Expenses										
RDF Facility	73,607	76,552	79,614	82,798	86,110	89,555	93,137	96,862	100,737	104,766
Mass Burn Facility	88,574	92,117	95,802	99,634	103,620	107,764	112,075	116,558	121,220	126,069
Landfill Operating and Maintenance Expenses	5,500	5,646	6,320	6,484	7,203	7,384	8,150	8,350	9,165	10,010
Site Develop, New Cell, Closure	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	1,500	1,540	1,580	1,621	1,662	1,704	1,746	1,789	1,833	1,877
WTE Host Fee	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272
Additional Transportation Costs	8,054	8,625	9,231	9,879	10,561	11,291	12,062	12,885	13,760	14,687
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$271,888**	**$282,510**	**$294,110**	**$305,656**	**$318,197**	**$330,720**	**$344,335**	**$357,890**	**$372,616**	**$387,975**
ANNUAL DEBT SERVICE ($000)										
Principal	28,826	30,555	32,388	34,332	36,392	38,575	40,890	43,343	45,943	48,700
Interest	22,796	21,067	19,234	17,290	15,230	13,047	10,732	8,279	5,679	2,922
Total Debt Service	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622
NET ANNUAL SYSTEM COSTS ($000)	**$205,557**	**$211,460**	**$218,154**	**$224,597**	**$231,831**	**$238,834**	**$246,708**	**$254,295**	**$262,812**	**$271,713**
SYSTEM RATE ($/TON-MANAGED)	**$131**	**$133**	**$136**	**$139**	**$142**	**$145**	**$148**	**$152**	**$155**	**$159**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.3 - All Communities Cooperate -New Regional Landfill, Existing RDF Plus New 2000 tpd Mass Burn Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,530,910	1,545,990	1,561,230	1,576,680	1,592,380	1,608,250	1,624,330	1,640,640	1,657,120	1,673,870
Recyclables Managed	94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
Yard Waste Managed	101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	0	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Ash Residue	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100
Solid Waste Processed by Mass Burn Facility	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000
Regional Landfill (Tons)	640,510	471,090	670,830	686,280	701,980	717,850	733,930	750,240	766,720	783,470
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	69,741	72,530	75,431	78,449	81,587	84,850	88,244	91,774	95,445	99,263
Mass Burn Plant	94,976	98,775	102,726	106,835	111,108	115,552	120,174	124,981	129,981	135,180
Interest Income	9,883	10,278	10,689	11,117	11,562	12,024	12,505	13,005	13,526	14,067
Total System Operating Revenues	**$174,600**	**$181,583**	**$188,846**	**$196,401**	**$204,257**	**$212,426**	**$220,924**	**$229,761**	**$238,951**	**$248,509**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
Transfer Station Operations	70,030	72,831	75,744	78,774	81,925	85,202	88,610	92,155	95,841	99,675
Solid Waste Administration	17,879	18,594	19,337	20,111	20,915	21,752	22,622	23,527	24,468	25,447
Regulatory Compliance	5,378	5,593	5,817	6,050	6,292	6,543	6,805	7,077	7,360	7,655
WTE Facility Operating and Maintenance Expenses										
RDF Facility	108,957	113,315	117,848	122,562	127,464	132,563	137,865	143,380	149,115	155,080
Mass Burn Facility	131,112	136,356	141,810	147,483	153,382	159,518	165,898	172,534	179,436	186,613
Landfill Operating and Maintenance Expenses	10,248	11,145	12,075	12,353	13,338	14,357	15,413	15,755	16,868	18,020
Site Develop, New Cell, Closure	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	1,922	1,413	2,012	2,059	2,106	2,154	2,202	2,251	2,300	2,350
WTE Host Fee	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272
Additional Transportation Costs	15,670	12,012	17,823	18,999	20,248	21,568	22,974	24,465	26,043	27,715
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$403,298**	**$414,648**	**$437,195**	**$454,518**	**$473,252**	**$492,756**	**$513,064**	**$533,427**	**$555,430**	**$578,338**
ANNUAL DEBT SERVICE ($000)										
Principal	0	0	0	0	0	0	0	0	0	0
Interest	0	0	0	0	0	0	0	0	0	0
Total Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NET ANNUAL SYSTEM COSTS ($000)	**$228,698**	**$233,065**	**$248,350**	**$258,118**	**$268,995**	**$280,330**	**$292,141**	**$303,666**	**$316,478**	**$329,829**
SYSTEM RATE ($/TON-MANAGED)	**$132**	**$134**	**$141**	**$145**	**$150**	**$155**	**$160**	**$164**	**$170**	**$175**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.4 - All Communities Cooperate -New Regional Landfill, New 3000 tpd Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)										
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility (3000 tpd)										
Plant Availability (TPD)	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
Ash Residue	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650
Solid Waste Processed by Mass Burn Facility	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500
Regional Landfill (Tons)	576,660	588,370	600,210	612,210	624,380	636,690	649,150	661,750	674,540	687,450
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant										
Mass Burn Plant	65,018	67,619	70,324	73,137	76,062	79,105	82,269	85,560	88,982	92,541
Interest Income	3,901	4,057	4,219	4,388	4,564	4,746	4,936	5,134	5,339	5,552
Total System Operating Revenues	**$68,920**	**$71,676**	**$74,543**	**$77,525**	**$80,626**	**$83,851**	**$87,205**	**$90,693**	**$94,321**	**$98,094**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	31,961	33,239	34,569	35,952	37,390	38,885	40,441	42,058	43,741	45,490
Solid Waste Administration	8,160	8,486	8,825	9,178	9,545	9,927	10,324	10,737	11,167	11,614
Regulatory Compliance	2,454	2,553	2,655	2,761	2,871	2,986	3,106	3,230	3,359	3,493
WTE Facility Operating and Maintenance Expenses										
RDF Facility										
Mass Burn Facility	89,757	93,347	97,081	100,964	105,002	109,203	113,571	118,114	122,838	127,752
Landfill Operating and Maintenance Expenses	2,660	3,103	3,197	3,293	3,814	3,925	4,037	4,612	4,740	5,356
Site Develop, New Cell, Closure	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	1,730	1,765	1,801	1,837	1,873	1,910	1,947	1,985	2,024	2,062
WTE Host Fee	986	986	986	986	986	986	986	986	986	986
Additional Transportation Costs	6,029	6,431	6,851	7,303	7,776	8,280	8,815	9,380	9,977	10,608
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$167,009**	**$173,764**	**$180,444**	**$187,385**	**$195,028**	**$202,558**	**$210,417**	**$219,038**	**$227,541**	**$236,879**
ANNUAL DEBT SERVICE ($000)										
Principal	24,144	25,593	27,128	28,756	30,481	32,310	34,249	36,304	38,482	40,791
Interest	53,289	51,840	50,305	48,677	46,952	45,123	43,184	41,129	38,951	36,642
Total Debt Service	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433
NET ANNUAL SYSTEM COSTS ($000)	**$175,523**	**$179,521**	**$183,334**	**$187,293**	**$191,835**	**$196,140**	**$200,645**	**$205,778**	**$210,653**	**$216,218**
SYSTEM RATE ($/TON-MANAGED)	**$122**	**$124**	**$126**	**$127**	**$129**	**$131**	**$133**	**$135**	**$137**	**$139**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$3,405,834**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.4 - All Communities Cooperate -New Regional Landfill, New 3000 tpd Resource Recovery

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
1,390,410	1,403,670	1,417,100	1,430,720	1,444,480	1,458,420	1,472,560	1,486,860	1,501,370	1,516,050
88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650
985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500
700,560	713,820	727,250	740,870	754,630	768,570	782,710	797,010	811,520	826,200
0	0	0	0	0	0	0	0	0	0
96,243	100,093	104,097	108,260	112,591	117,095	121,778	126,649	131,715	136,984
5,775	6,006	6,246	6,496	6,755	7,026	7,307	7,599	7,903	8,219
$102,018	**$106,098**	**$110,342**	**$114,756**	**$119,346**	**$124,120**	**$129,085**	**$134,248**	**$139,618**	**$145,203**
21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
47,310	49,202	51,170	53,217	55,346	57,560	59,862	62,256	64,747	67,337
12,078	12,561	13,064	13,586	14,130	14,695	15,283	15,894	16,530	17,191
3,633	3,779	3,930	4,087	4,250	4,420	4,597	4,781	4,972	5,171
132,862	138,176	143,703	149,451	155,429	161,646	168,112	174,837	181,830	189,104
5,500	5,646	6,320	6,484	7,203	7,384	8,150	8,350	9,165	10,010
8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003
534	534	534	534	534	534	534	534	534	534
2,102	2,141	2,182	2,223	2,264	2,306	2,348	2,391	2,435	2,479
986	986	986	986	986	986	986	986	986	986
11,284	11,995	12,746	13,545	14,383	15,277	16,218	17,218	18,277	19,395
0	0	0	0	0	0	0	0	0	0
$246,115	**$255,701**	**$266,227**	**$276,657**	**$288,034**	**$299,349**	**$311,706**	**$323,955**	**$337,322**	**$351,267**
43,238	45,833	48,583	51,497	54,587	57,863	61,334	65,014	68,915	73,050
34,195	31,600	28,850	25,936	22,846	19,570	16,099	12,419	8,518	4,383
$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433
$221,530	**$227,036**	**$233,318**	**$239,334**	**$246,121**	**$252,662**	**$260,054**	**$267,140**	**$275,136**	**$283,497**
$141	**$143**	**$146**	**$148**	**$151**	**$153**	**$156**	**$159**	**$162**	**$166**

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A1.4 - All Communities Cooperate -New Regional Landfill, New 3000 tpd Resource Recovery

2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
1,530,910	1,545,990	1,561,230	1,576,680	1,592,380	1,608,250	1,624,330	1,640,640	1,657,120	1,673,870
94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650
985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500
841,060	856,140	871,380	886,830	902,530	918,400	934,480	950,790	967,270	984,020
0	0	0	0	0	0	0	0	0	0
142,463	148,162	154,088	160,252	166,662	173,328	180,262	187,472	194,971	202,770
8,548	8,890	9,245	9,615	10,000	10,400	10,816	11,248	11,698	12,166
$151,011	**$157,052**	**$163,334**	**$169,867**	**$176,662**	**$183,728**	**$191,077**	**$198,720**	**$206,669**	**$214,936**
32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
70,030	72,831	75,744	78,774	81,925	85,202	88,610	92,155	95,841	99,675
17,879	18,594	19,337	20,111	20,915	21,752	22,622	23,527	24,468	25,447
5,378	5,593	5,817	6,050	6,292	6,543	6,805	7,077	7,360	7,655
196,668	204,534	212,716	221,224	230,073	239,276	248,847	258,801	269,153	279,919
10,248	11,145	12,075	12,353	13,338	14,357	15,413	15,755	16,868	18,020
8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003
534	534	534	534	534	534	534	534	534	534
2,523	2,568	2,614	2,660	2,708	2,755	2,803	2,852	2,902	2,952
986	986	986	986	986	986	986	986	986	986
20,576	21,831	23,151	24,551	26,033	27,594	29,251	31,004	32,855	34,809
0	0	0	0	0	0	0	0	0	0
$365,118	**$380,198**	**$395,897**	**$411,564**	**$428,579**	**$446,291**	**$464,741**	**$483,168**	**$503,159**	**$523,974**
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
$214,107	**$223,146**	**$232,564**	**$241,697**	**$251,918**	**$262,563**	**$273,663**	**$284,448**	**$296,490**	**$309,038**
$124	**$128**	**$132**	**$136**	**$140**	**$145**	**$150**	**$154**	**$159**	**$164**

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.1 - All Communities Cooperate - Contract Out Disposal, No Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
SOLID WASTE QUANTITIES (Tons)											
Processible Waste Managed	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300	1,390,410
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300	88,800
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000	92,000
RDF/Navy Boiler Facility											
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility											
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300	1,390,410
SYSTEM OPERATING REVENUES ($000)											
Electricity Revenues											
RDF Plant	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)											
System Operating and Maintenance Expenses											
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981	21,823
Transfer Station Operations	33,842	35,195	36,602	38,068	39,590	41,172	42,820	44,533	46,315	48,165	50,095
Solid Waste Administration	8,160	8,486	8,825	9,178	9,545	9,927	10,324	10,737	11,167	11,614	12,078
Regulatory Compliance	1,182	1,229	1,278	1,329	1,382	1,438	1,495	1,555	1,617	1,682	1,749
WTE Facility Operating and Maintenance Expenses											
RDF Facility	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	26,485	27,942	29,451	31,066	32,735	34,501	36,366	38,318	40,360	42,507	44,793
Out of Region Disposal Costs	35,462	37,068	38,702	41,666	43,370	45,102	48,204	50,009	51,847	55,092	58,397
Total System Operating Expenses	**$119,867**	**$125,238**	**$130,801**	**$137,882**	**$143,856**	**$150,060**	**$157,863**	**$164,551**	**$171,479**	**$180,041**	**$188,935**
NET ANNUAL SYSTEM COSTS ($000)	**$119,867**	**$125,238**	**$130,801**	**$137,882**	**$143,856**	**$150,060**	**$157,863**	**$164,551**	**$171,479**	**$180,041**	**$188,935**
SYSTEM RATE ($/TON-MANAGED)	**$84**	**$87**	**$90**	**$94**	**$97**	**$100**	**$104**	**$108**	**$111**	**$116**	**$120**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$3,255,465**										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.1 - All Communities Cooperate - Contract Out Disposal, No Resource Recovery

Year Ending December	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**
SOLID WASTE QUANTITIES (Tons)											
Processible Waste Managed	1,403,670	1,417,100	1,430,720	1,444,480	1,458,420	1,472,560	1,486,860	1,501,370	1,516,050	1,530,910	1,545,990
Recyclables Managed	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900	94,500	95,200
Yard Waste Managed	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000	101,000	102,000
RDF/Navy Boiler Facility											
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility											
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	1,403,670	1,417,100	1,430,720	1,444,480	1,458,420	1,472,560	1,486,860	1,501,370	1,516,050	1,530,910	1,545,990
SYSTEM OPERATING REVENUES ($000)											
Electricity Revenues											
RDF Plant	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)											
System Operating and Maintenance Expenses											
Recycling Operations	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058	32,294	33,580
Transfer Station Operations	52,097	54,181	56,348	58,602	60,946	63,385	65,917	68,556	71,298	74,151	77,116
Solid Waste Administration	12,561	13,064	13,586	14,130	14,695	15,283	15,894	16,530	17,191	17,879	18,594
Regulatory Compliance	1,819	1,892	1,967	2,046	2,128	2,213	2,302	2,394	2,489	2,589	2,692
WTE Facility Operating and Maintenance Expense											
RDF Facility	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	47,175	49,671	52,315	55,063	57,979	61,023	64,242	67,627	71,180	74,906	78,842
Out of Region Disposal Costs	60,358	63,770	67,244	70,780	74,379	78,046	81,777	85,578	89,447	94,916	98,943
Total System Operating Expenses	**$196,689**	**$206,168**	**$216,002**	**$226,127**	**$236,666**	**$247,563**	**$258,838**	**$270,529**	**$282,663**	**$296,734**	**$309,767**
NET ANNUAL SYSTEM COSTS ($000)	**$196,689**	**$206,168**	**$216,002**	**$226,127**	**$236,666**	**$247,563**	**$258,838**	**$270,529**	**$282,663**	**$296,734**	**$309,767**
SYSTEM RATE ($/TON-MANAGED)	**$124**	**$129**	**$134**	**$139**	**$144**	**$149**	**$154**	**$160**	**$165**	**$172**	**$178**
NPV @ DISCOUNT RATE OF 5% ($1000)											

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.1 - All Communities Cooperate - Contract Out Disposal, No Resource Recovery

Year Ending December	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)								
Processible Waste Managed	1,561,230	1,576,680	1,592,380	1,608,250	1,624,330	1,640,640	1,657,120	1,673,870
Recyclables Managed	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
Yard Waste Managed	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
RDF/Navy Boiler Facility								
Plant Availability (TPD)	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0
Mass Burn Facility								
Plant Availability (TPD)	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	1,561,230	1,576,680	1,592,380	1,608,250	1,624,330	1,640,640	1,657,120	1,673,870
SYSTEM OPERATING REVENUES ($000)								
Electricity Revenues								
RDF Plant	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)								
System Operating and Maintenance Expenses								
Recycling Operations	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
Transfer Station Operations	80,202	83,409	86,745	90,216	93,826	97,578	101,482	105,538
Solid Waste Administration	19,337	20,111	20,915	21,752	22,622	23,527	24,468	25,447
Regulatory Compliance	2,800	2,912	3,029	3,150	3,276	3,407	3,543	3,685
WTE Facility Operating and Maintenance Expense								
RDF Facility	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0
Additional Transportation Costs	82,960	87,297	91,863	96,642	101,690	107,000	112,574	118,425
Out of Region Disposal Costs	104,602	108,791	114,651	120,619	126,698	132,892	139,198	147,301
Total System Operating Expenses	**$324,821**	**$338,839**	**$354,977**	**$371,669**	**$388,978**	**$406,878**	**$425,455**	**$446,371**
NET ANNUAL SYSTEM COSTS ($000)	**$324,821**	**$338,839**	**$354,977**	**$371,669**	**$388,978**	**$406,878**	**$425,455**	**$446,371**
SYSTEM RATE ($/TON-MANAGED)	**$185**	**$191**	**$198**	**$205**	**$213**	**$220**	**$228**	**$237**
NPV @ DISCOUNT RATE OF 5% ($1000)								

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.2 - All Communities Cooperate - Contract Out Disposal, Existing RDF Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)										
Ash Residue										
Solid Waste Processed by Mass Burn Facility										
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	836,010	847,720	859,560	871,560	883,730	896,040	908,500	921,100	933,890	946,800
SYSTEM OPERATING REVENUES ($000)										
Electricity/Steam Revenues/Metals										
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302
Mass Burn Plant										
Interest Income	1,910	1,986	2,066	2,148	2,234	2,324	2,416	2,513	2,614	2,718
Total System Operating Revenues	**$33,739**	**$35,088**	**$36,492**	**$37,951**	**$39,469**	**$41,049**	**$42,689**	**$44,397**	**$46,174**	**$48,020**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	31,961	33,239	34,569	35,952	37,390	38,885	40,441	42,058	43,741	45,490
Solid Waste Administration	8,160	8,486	8,825	9,178	9,545	9,927	10,324	10,737	11,167	11,614
Regulatory Compliance	1,182	1,229	1,278	1,329	1,382	1,438	1,495	1,555	1,617	1,682
WTE Facility Operating and Maintenance Expenses										
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776
Mass Burn Facility										
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	17,482	18,532	19,623	20,794	22,012	23,305	24,674	26,113	27,626	29,221
Out of Region Disposal Costs	23,408	24,584	25,787	27,890	29,163	30,465	32,706	34,081	35,488	37,872
Total System Operating Expenses	**$147,270**	**$153,719**	**$160,424**	**$168,269**	**$175,514**	**$183,056**	**$191,829**	**$199,995**	**$208,481**	**$218,251**
ANNUAL DEBT SERVICE ($000)										
Principal										
Interest										
Total Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NET ANNUAL SYSTEM COSTS ($000)	**$113,531**	**$118,631**	**$123,932**	**$130,318**	**$136,045**	**$142,007**	**$149,140**	**$155,598**	**$162,308**	**$170,231**
SYSTEM RATE ($/TON-MANAGED)	**$79**	**$82**	**$85**	**$89**	**$92**	**$95**	**$99**	**$102**	**$105**	**$109**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$3,072,091**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.2 - All Communities Cooperate - Contract Out Disposal, Existing RDF Resource Recovery

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,390,410	1,403,670	1,417,100	1,430,720	1,444,480	1,458,420	1,472,560	1,486,860	1,501,370	1,516,050
Recyclables Managed	88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
Yard Waste Managed	92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)										
Ash Residue										
Solid Waste Processed by Mass Burn Facility										
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	959,910	973,170	986,600	1,000,220	1,013,980	1,027,920	1,042,060	1,056,360	1,070,870	1,085,550
SYSTEM OPERATING REVENUES ($000)										
Electricity/Steam Revenues/Metals										
RDF Plant	47,114	48,999	50,959	52,997	55,117	57,322	59,615	61,999	64,479	67,058
Mass Burn Plant										
Interest Income	2,827	2,940	3,058	3,180	3,307	3,439	3,577	3,720	3,869	4,023
Total System Operating Revenues	**$49,941**	**$51,939**	**$54,017**	**$56,177**	**$58,424**	**$60,761**	**$63,192**	**$65,719**	**$68,348**	**$71,081**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
Transfer Station Operations	47,310	49,202	51,170	53,217	55,346	57,560	59,862	62,256	64,747	67,337
Solid Waste Administration	12,078	12,561	13,064	13,586	14,130	14,695	15,283	15,894	16,530	17,191
Regulatory Compliance	1,749	1,819	1,892	1,967	2,046	2,128	2,213	2,302	2,394	2,489
WTE Facility Operating and Maintenance Expense										
RDF Facility	73,607	76,552	79,614	82,798	86,110	89,555	93,137	96,862	100,737	104,766
Mass Burn Facility										
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	30,924	32,707	34,582	36,573	38,652	40,865	43,183	45,641	48,236	50,967
Out of Region Disposal Costs	40,316	41,846	44,397	47,010	49,685	52,424	55,229	58,100	61,040	64,047
Total System Operating Expenses	**$228,422**	**$237,982**	**$248,925**	**$260,309**	**$272,090**	**$284,380**	**$297,136**	**$310,376**	**$324,142**	**$338,470**
ANNUAL DEBT SERVICE ($000)										
Principal										
Interest										
Total Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NET ANNUAL SYSTEM COSTS ($000)	**$178,481**	**$186,043**	**$194,908**	**$204,132**	**$213,666**	**$223,619**	**$233,944**	**$244,657**	**$255,794**	**$267,388**
SYSTEM RATE ($/TON-MANAGED)	**$114**	**$117**	**$122**	**$126**	**$131**	**$136**	**$141**	**$146**	**$151**	**$156**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.2 - All Communities Cooperate - Contract Out Disposal, Existing RDF Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,530,910	1,545,990	1,561,230	1,576,680	1,592,380	1,608,250	1,624,330	1,640,640	1,657,120	1,673,870
Recyclables Managed	94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
Yard Waste Managed	101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	0	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)										
Ash Residue										
Solid Waste Processed by Mass Burn Facility										
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	1,100,410	930,990	1,130,730	1,146,180	1,161,880	1,177,750	1,193,830	1,210,140	1,226,620	1,243,370
SYSTEM OPERATING REVENUES ($000)										
Electricity/Steam Revenues/Metals										
RDF Plant	69,741	72,530	75,431	78,449	81,587	84,850	88,244	91,774	95,445	99,263
Mass Burn Plant										
Interest Income	4,184	4,352	4,526	4,707	4,895	5,091	5,295	5,506	5,727	5,956
Total System Operating Revenues	**$73,925**	**$76,882**	**$79,957**	**$83,156**	**$86,482**	**$89,941**	**$93,539**	**$97,280**	**$101,172**	**$105,219**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
Transfer Station Operations	70,030	72,831	75,744	78,774	81,925	85,202	88,610	92,155	95,841	99,675
Solid Waste Administration	17,879	18,594	19,337	20,111	20,915	21,752	22,622	23,527	24,468	25,447
Regulatory Compliance	2,589	2,692	2,800	2,912	3,029	3,150	3,276	3,407	3,543	3,685
WTE Facility Operating and Maintenance Expense										
RDF Facility	108,957	113,315	117,848	122,562	127,464	132,563	137,865	143,380	149,115	155,080
Mass Burn Facility										
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	53,842	47,479	60,084	63,462	67,028	70,772	74,739	78,923	83,328	87,967
Out of Region Disposal Costs	68,225	59,583	75,759	79,086	83,655	88,331	93,119	98,021	103,036	109,417
Total System Operating Expenses	**$354,431**	**$348,689**	**$387,108**	**$403,842**	**$422,405**	**$441,675**	**$461,713**	**$482,503**	**$504,136**	**$527,861**
ANNUAL DEBT SERVICE ($000)										
Principal										
Interest										
Total Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NET ANNUAL SYSTEM COSTS ($000)	**$280,505**	**$271,807**	**$307,151**	**$320,686**	**$335,923**	**$351,734**	**$368,174**	**$385,223**	**$402,964**	**$422,642**
SYSTEM RATE ($/TON-MANAGED)	**$162**	**$156**	**$175**	**$180**	**$187**	**$194**	**$201**	**$208**	**$216**	**$224**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.3 - All Communities Cooperate - Contract Out Disposal, Existing RDF and New 2000 tpd Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Ash Residue	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100
Solid Waste Processed by Mass Burn Facility	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	379,953	387,820	399,660	411,660	423,830	436,140	448,600	461,200	473,990	486,900
SYSTEM OPERATING REVENUES ($000)										
Electricity/Steam Revenues/Metals										
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302
Mass Burn Plant	43,346	45,079	46,883	48,758	50,708	52,737	54,846	57,040	59,321	61,694
Interest Income	4,510	4,691	4,879	5,074	5,277	5,488	5,707	5,935	6,173	6,420
Total System Operating Revenues	**$79,685**	**$82,872**	**$86,187**	**$89,635**	**$93,220**	**$96,949**	**$100,826**	**$104,859**	**$109,054**	**$113,416**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	31,961	33,239	34,569	35,952	37,390	38,885	40,441	42,058	43,741	45,490
Solid Waste Administration	8,160	8,486	8,825	9,178	9,545	9,927	10,324	10,737	11,167	11,614
Regulatory Compliance	1,182	1,229	1,278	1,329	1,382	1,438	1,495	1,555	1,617	1,682
WTE Facility Operating and Maintenance Expenses										
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776
Mass Burn Facility	59,838	62,231	64,720	67,309	70,002	72,802	75,714	78,742	81,892	85,168
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272
Additional Transportation Costs	7,945	8,478	9,124	9,822	10,557	11,343	12,184	13,075	14,021	15,027
Out of Region Disposal Costs	10,639	11,247	11,990	13,173	13,986	14,829	16,150	17,064	18,012	19,476
Total System Operating Expenses	**$185,458**	**$193,216**	**$201,505**	**$210,546**	**$219,541**	**$228,916**	**$239,154**	**$249,340**	**$259,949**	**$271,486**
ANNUAL DEBT SERVICE ($000)										
Principal	16,096	17,062	18,086	19,171	20,321	21,540	22,833	24,203	25,655	27,194
Interest	35,526	34,560	33,536	32,451	31,301	30,082	28,789	27,419	25,967	24,428
Total Debt Service	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622
NET ANNUAL SYSTEM COSTS ($000)	**$157,395**	**$161,966**	**$166,940**	**$172,533**	**$177,944**	**$183,589**	**$189,949**	**$196,103**	**$202,517**	**$209,692**
SYSTEM RATE ($/TON-MANAGED)	**$110**	**$112**	**$114**	**$117**	**$120**	**$122**	**$125**	**$128**	**$131**	**$135**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$3,498,004**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.3 - All Communities Cooperate - Contract Out Disposal, Existing RDF and New 2000 tpd Resource Recovery

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,390,410	1,403,670	1,417,100	1,430,720	1,444,480	1,458,420	1,472,560	1,486,860	1,501,370	1,516,050
Recyclables Managed	88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
Yard Waste Managed	92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Ash Residue	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100
Solid Waste Processed by Mass Burn Facility	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	500,010	513,270	526,700	540,320	554,080	568,020	582,160	596,460	610,970	625,650
SYSTEM OPERATING REVENUES ($000)										
Electricity/Steam Revenues/Metals										
RDF Plant	47,114	48,999	50,959	52,997	55,117	57,322	59,615	61,999	64,479	67,058
Mass Burn Plant	64,162	66,729	69,398	72,174	75,061	78,063	81,186	84,433	87,810	91,323
Interest Income	6,677	6,944	7,221	7,510	7,811	8,123	8,448	8,786	9,137	9,503
Total System Operating Revenues	**$117,953**	**$122,671**	**$127,578**	**$132,681**	**$137,988**	**$143,508**	**$149,249**	**$155,218**	**$161,427**	**$167,884**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
Transfer Station Operations	47,310	49,202	51,170	53,217	55,346	57,560	59,862	62,256	64,747	67,337
Solid Waste Administration	12,078	12,561	13,064	13,586	14,130	14,695	15,283	15,894	16,530	17,191
Regulatory Compliance	1,749	1,819	1,892	1,967	2,046	2,128	2,213	2,302	2,394	2,489
WTE Facility Operating and Maintenance Expens										
RDF Facility	73,607	76,552	79,614	82,798	86,110	89,555	93,137	96,862	100,737	104,766
Mass Burn Facility	88,574	92,117	95,802	99,634	103,620	107,764	112,075	116,558	121,220	126,069
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272
Additional Transportation Costs	16,108	17,250	18,461	19,757	21,121	22,581	24,125	25,771	27,520	29,375
Out of Region Disposal Costs	21,000	22,071	23,702	25,395	27,150	28,969	30,854	32,805	34,825	36,913
Total System Operating Expenses	**$283,521**	**$295,523**	**$308,567**	**$322,168**	**$336,301**	**$351,062**	**$366,435**	**$382,427**	**$399,089**	**$416,470**
ANNUAL DEBT SERVICE ($000)										
Principal	28,826	30,555	32,388	34,332	36,392	38,575	40,890	43,343	45,943	48,700
Interest	22,796	21,067	19,234	17,290	15,230	13,047	10,732	8,279	5,679	2,922
Total Debt Service	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622	$51,622
NET ANNUAL SYSTEM COSTS ($000)	**$217,191**	**$224,474**	**$232,611**	**$241,109**	**$249,935**	**$259,176**	**$268,809**	**$278,831**	**$289,284**	**$300,208**
SYSTEM RATE ($/TON-MANAGED)	**$138**	**$142**	**$145**	**$149**	**$153**	**$157**	**$162**	**$166**	**$171**	**$176**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.3 - All Communities Cooperate - Contract Out Disposal, Existing RDF and New 2000 tpd Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,530,910	1,545,990	1,561,230	1,576,680	1,592,380	1,608,250	1,624,330	1,640,640	1,657,120	1,673,870
Recyclables Managed	94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
Yard Waste Managed	101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	0	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Ash Residue	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100	197,100
Solid Waste Processed by Mass Burn Facility	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000	657,000
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	640,510	471,090	670,830	686,280	701,980	717,850	733,930	750,240	766,720	783,470
SYSTEM OPERATING REVENUES ($000)										
Electricity/Steam Revenues/Metals										
RDF Plant	69,741	72,530	75,431	78,449	81,587	84,850	88,244	91,774	95,445	99,263
Mass Burn Plant	94,976	98,775	102,726	106,835	111,108	115,552	120,174	124,981	129,981	135,180
Interest Income	9,883	10,278	10,689	11,117	11,562	12,024	12,505	13,005	13,526	14,067
Total System Operating Revenues	**$174,600**	**$181,583**	**$188,846**	**$196,401**	**$204,257**	**$212,426**	**$220,924**	**$229,761**	**$238,951**	**$248,509**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
Transfer Station Operations	70,030	72,831	75,744	78,774	81,925	85,202	88,610	92,155	95,841	99,675
Solid Waste Administration	17,879	18,594	19,337	20,111	20,915	21,752	22,622	23,527	24,468	25,447
Regulatory Compliance	2,589	2,692	2,800	2,912	3,029	3,150	3,276	3,407	3,543	3,685
WTE Facility Operating and Maintenance Expense										
RDF Facility	108,957	113,315	117,848	122,562	127,464	132,563	137,865	143,380	149,115	155,080
Mass Burn Facility	131,112	136,356	141,810	147,483	153,382	159,518	165,898	172,534	179,436	186,613
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272	1,272
Additional Transportation Costs	31,339	24,025	35,646	37,998	40,497	43,137	45,947	48,929	52,086	55,430
Out of Region Disposal Costs	39,712	30,150	44,946	47,353	50,543	53,839	57,247	60,769	64,404	68,945
Total System Operating Expenses	**$435,183**	**$432,815**	**$474,323**	**$494,784**	**$516,800**	**$539,723**	**$563,604**	**$588,448**	**$614,355**	**$642,123**
ANNUAL DEBT SERVICE ($000)										
Principal	0	0	0	0	0	0	0	0	0	0
Interest	0	0	0	0	0	0	0	0	0	0
Total Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NET ANNUAL SYSTEM COSTS ($000)	**$260,584**	**$251,232**	**$285,478**	**$298,384**	**$312,543**	**$327,296**	**$342,680**	**$358,687**	**$375,404**	**$393,613**
SYSTEM RATE ($/TON-MANAGED)	**$170**	**$163**	**$183**	**$189**	**$196**	**$204**	**$211**	**$219**	**$227**	**$235**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.4 - All Communities Cooperate to Manage Municipally Collected MSW, Contract Out Disposal, New 3000 tpd Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,266,510	1,278,220	1,290,060	1,302,060	1,314,230	1,326,540	1,339,000	1,351,600	1,364,390	1,377,300
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)										
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility (3000 tpd)										
Plant Availability (TPD)	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
Ash Residue	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650
Solid Waste Processed by Mass Burn Facility	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500
Regional Landfill (Tons)	576,660	588,370	600,210	612,210	624,380	636,690	649,150	661,750	674,540	687,450
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant										
Mass Burn Plant	65,018	67,619	70,324	73,137	76,062	79,105	82,269	85,560	88,982	92,541
Interest Income	3,901	4,057	4,219	4,388	4,564	4,746	4,936	5,134	5,339	5,552
Total System Operating Revenues	**$68,920**	**$71,676**	**$74,543**	**$77,525**	**$80,626**	**$83,851**	**$87,205**	**$90,693**	**$94,321**	**$98,094**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	31,961	33,239	34,569	35,952	37,390	38,885	40,441	42,058	43,741	45,490
Solid Waste Administration	8,160	8,486	8,825	9,178	9,545	9,927	10,324	10,737	11,167	11,614
Regulatory Compliance	2,454	2,553	2,655	2,761	2,871	2,986	3,106	3,230	3,359	3,493
WTE Facility Operating and Maintenance Expenses										
RDF Facility										
Mass Burn Facility	89,757	93,347	97,081	100,964	105,002	109,203	113,571	118,114	122,838	127,752
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Site Develop, New Cell, Closure	0	0	0	0	0	0	0	0	0	0
Post-Closure Care Escrow	0	0	0	0	0	0	0	0	0	0
Landfill Host Fee	0	0	0	0	0	0	0	0	0	0
WTE Host Fee										
Additional Transportation Costs	12,059	12,862	13,702	14,607	15,552	16,559	17,630	18,761	19,954	21,217
Out of Region Disposal Costs	16,146	17,063	18,006	19,591	20,605	21,647	23,369	24,485	25,633	27,498
Total System Operating Expenses	**$175,273**	**$182,868**	**$190,781**	**$199,627**	**$208,199**	**$217,128**	**$227,095**	**$236,784**	**$246,865**	**$258,045**
ANNUAL DEBT SERVICE ($000)										
Principal	24,144	25,593	27,128	28,756	30,481	32,310	34,249	36,304	38,482	40,791
Interest	53,289	51,840	50,305	48,677	46,952	45,123	43,184	41,129	38,951	36,642
Total Debt Service	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433
NET ANNUAL SYSTEM COSTS ($000)	**$183,787**	**$188,624**	**$193,671**	**$199,535**	**$205,006**	**$210,710**	**$217,323**	**$223,523**	**$229,977**	**$237,384**
SYSTEM RATE ($/TON-MANAGED)	**$128**	**$130**	**$133**	**$136**	**$138**	**$140**	**$144**	**$146**	**$149**	**$153**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$3,863,757**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.4 - All Communities Cooperate to Manage Municipally Collected MSW, Contract Out Disposal, New 3000 tpd Resource Recovery

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
1,390,410	1,403,670	1,417,100	1,430,720	1,444,480	1,458,420	1,472,560	1,486,860	1,501,370	1,516,050
88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650
985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500
700,560	713,820	727,250	740,870	754,630	768,570	782,710	797,010	811,520	826,200
0	0	0	0	0	0	0	0	0	0
96,243	100,093	104,097	108,260	112,591	117,095	121,778	126,649	131,715	136,984
5,775	6,006	6,246	6,496	6,755	7,026	7,307	7,599	7,903	8,219
$102,018	**$106,098**	**$110,342**	**$114,756**	**$119,346**	**$124,120**	**$129,085**	**$134,248**	**$139,618**	**$145,203**
21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
47,310	49,202	51,170	53,217	55,346	57,560	59,862	62,256	64,747	67,337
12,078	12,561	13,064	13,586	14,130	14,695	15,283	15,894	16,530	17,191
3,633	3,779	3,930	4,087	4,250	4,420	4,597	4,781	4,972	5,171
132,862	138,176	143,703	149,451	155,429	161,646	168,112	174,837	181,830	189,104
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
22,569	23,990	25,491	27,090	28,766	30,554	32,436	34,436	36,554	38,791
29,424	30,694	32,726	34,821	36,977	39,197	41,484	43,836	46,257	48,746
$269,698	**$281,081**	**$293,675**	**$306,794**	**$320,405**	**$334,611**	**$349,387**	**$364,746**	**$380,733**	**$397,397**
43,238	45,833	48,583	51,497	54,587	57,863	61,334	65,014	68,915	73,050
34,195	31,600	28,850	25,936	22,846	19,570	16,099	12,419	8,518	4,383
$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433	$77,433
$245,114	**$252,416**	**$260,765**	**$269,471**	**$278,491**	**$287,924**	**$297,735**	**$307,930**	**$318,548**	**$329,627**
$156	**$159**	**$163**	**$167**	**$171**	**$175**	**$179**	**$184**	**$188**	**$193**

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario A2.4 - All Communities Cooperate to Manage Municipally Collected MSW, Contract Out Disposal, New 3000 tpd Resource Recovery

2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
1,530,910	1,545,990	1,561,230	1,576,680	1,592,380	1,608,250	1,624,330	1,640,640	1,657,120	1,673,870
94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650	295,650
985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500	985,500
841,060	856,140	871,380	886,830	902,530	918,400	934,480	950,790	967,270	984,020
0	0	0	0	0	0	0	0	0	0
142,463	148,162	154,088	160,252	166,662	173,328	180,262	187,472	194,971	202,770
8,548	8,890	9,245	9,615	10,000	10,400	10,816	11,248	11,698	12,166
$151,011	**$157,052**	**$163,334**	**$169,867**	**$176,662**	**$183,728**	**$191,077**	**$198,720**	**$206,669**	**$214,936**
32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
70,030	72,831	75,744	78,774	81,925	85,202	88,610	92,155	95,841	99,675
17,879	18,594	19,337	20,111	20,915	21,752	22,622	23,527	24,468	25,447
5,378	5,593	5,817	6,050	6,292	6,543	6,805	7,077	7,360	7,655
196,668	204,534	212,716	221,224	230,073	239,276	248,847	258,801	269,153	279,919
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
41,152	43,661	46,303	49,102	52,066	55,188	58,502	62,009	65,710	69,619
52,146	54,793	58,382	61,191	64,982	68,880	72,889	77,014	81,251	86,594
$415,546	**$433,586**	**$453,220**	**$472,771**	**$494,026**	**$516,131**	**$539,143**	**$563,058**	**$587,973**	**$614,883**
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
$264,535	**$276,535**	**$289,887**	**$302,904**	**$317,365**	**$332,403**	**$348,066**	**$364,337**	**$381,303**	**$399,947**
$153	**$159**	**$165**	**$170**	**$177**	**$183**	**$190**	**$197**	**$204**	**$212**

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B1.1 - All Communities Cooperate to Manage Municipally Collected MSW - New Regional Landfill, No Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	566,210	571,140	576,140	581,220	586,400	591,660	597,000	602,400	607,930	613,510
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	566,210	571,140	576,140	581,220	586,400	591,660	597,000	602,400	607,930	613,510
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	14,382	14,958	15,556	16,178	16,825	17,498	18,198	18,926	19,683	20,471
Solid Waste Administration	3,672	3,819	3,971	4,130	4,295	4,467	4,646	4,832	5,025	5,226
Regulatory Compliance	1,105	1,149	1,195	1,242	1,292	1,344	1,398	1,453	1,512	1,572
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	3,963	4,569	4,609	4,650	5,278	5,325	5,373	6,024	6,079	6,749
Site Develop, New Cell, Closure	9,115	9,115	9,115	9,115	9,115	9,115	9,115	9,115	9,115	9,115
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	1,699	1,713	1,728	1,744	1,759	1,775	1,791	1,807	1,824	1,841
Additional Transportation Costs	5,920	6,243	6,576	6,934	7,303	7,694	8,107	8,539	8,992	9,467
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$55,125**	**$57,416**	**$59,227**	**$61,102**	**$63,636**	**$65,672**	**$67,815**	**$70,629**	**$72,937**	**$75,956**
NET ANNUAL SYSTEM COSTS ($000)	**$55,125**	**$57,416**	**$59,227**	**$61,102**	**$63,636**	**$65,672**	**$67,815**	**$70,629**	**$72,937**	**$75,956**
SYSTEM RATE ($/TON-MANAGED)	**$75**	**$78**	**$79**	**$81**	**$84**	**$86**	**$88**	**$91**	**$93**	**$96**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$1,319,069**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B1.1 - All Communities Cooperate to Manage Municipally Collected MSW - New Regional Landfill, No Resource Recovery

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	619,210	624,990	630,870	636,860	642,920	649,080	655,360	661,730	668,230	674,810
Recyclables Managed	88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
Yard Waste Managed	92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	619,210	624,990	630,870	636,860	642,920	649,080	655,360	661,730	668,230	674,810
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
Transfer Station Operations	21,289	22,141	23,027	23,948	24,906	25,902	26,938	28,015	29,136	30,301
Solid Waste Administration	5,435	5,653	5,879	6,114	6,358	6,613	6,877	7,152	7,438	7,736
Regulatory Compliance	1,635	1,700	1,768	1,839	1,913	1,989	2,069	2,151	2,238	2,327
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	6,811	6,875	7,570	7,642	8,358	8,438	9,175	9,264	10,023	10,797
Site Develop, New Cell, Closure	9,115	9,115	9,115	9,115	9,115	9,115	9,115	9,115	9,115	9,115
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	1,858	1,875	1,893	1,911	1,929	1,947	1,966	1,985	2,005	2,024
Additional Transportation Costs	9,974	10,502	11,056	11,644	12,254	12,902	13,579	14,295	15,050	15,841
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$78,474**	**$81,074**	**$84,433**	**$87,288**	**$90,873**	**$93,978**	**$97,866**	**$101,218**	**$105,382**	**$109,733**
NET ANNUAL SYSTEM COSTS ($000)	**$78,474**	**$81,074**	**$84,433**	**$87,288**	**$90,873**	**$93,978**	**$97,866**	**$101,218**	**$105,382**	**$109,733**
SYSTEM RATE ($/TON-MANAGED)	**$98**	**$101**	**$104**	**$106**	**$110**	**$112**	**$116**	**$119**	**$122**	**$126**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B1.1 - All Communities Cooperate to Manage Municipally Collected MSW - New Regional Landfill, No Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	681,510	688,340	695,250	702,290	709,490	716,780	724,190	731,750	739,400	747,220
Recyclables Managed	94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
Yard Waste Managed	101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	681,510	688,340	695,250	702,290	709,490	716,780	724,190	731,750	739,400	747,220
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
Transfer Station Operations	31,513	32,774	34,085	35,448	36,866	38,341	39,875	41,470	43,128	44,854
Solid Waste Administration	8,045	8,367	8,702	9,050	9,412	9,788	10,180	10,587	11,011	11,451
Regulatory Compliance	2,420	2,517	2,618	2,722	2,831	2,944	3,062	3,185	3,312	3,445
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	10,904	11,702	12,515	12,641	13,480	14,336	15,208	15,367	16,267	17,186
Site Develop, New Cell, Closure	9,115	9,115	9,115	9,115	9,115	9,115	9,115	9,115	9,115	9,115
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	2,045	2,065	2,086	2,107	2,128	2,150	2,173	2,195	2,218	2,242
Additional Transportation Costs	16,673	17,552	18,472	19,442	20,465	21,536	22,669	23,862	25,115	26,433
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$113,543**	**$118,206**	**$123,046**	**$127,378**	**$132,604**	**$138,035**	**$143,682**	**$148,789**	**$154,890**	**$161,234**
NET ANNUAL SYSTEM COSTS ($000)	**$113,543**	**$118,206**	**$123,046**	**$127,378**	**$132,604**	**$138,035**	**$143,682**	**$148,789**	**$154,890**	**$161,234**
SYSTEM RATE ($/TON-MANAGED)	**$129**	**$133**	**$138**	**$141**	**$145**	**$150**	**$155**	**$158**	**$163**	**$168**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B1.2 - All Communities Cooperate to Manage Municipally Collected MSW, New Regional Landfill, Existing RDF Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	566,210	571,140	576,140	581,220	586,400	591,660	597,000	602,400	607,930	613,510
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	169,863	171,342	172,842	174,366	175,920	177,498	179,100	180,720	182,379	184,053
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	169,863	171,342	172,842	174,366	175,920	177,498	179,100	180,720	182,379	184,053
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	1,910	1,986	2,066	2,148	2,234	2,324	2,416	2,513	2,614	2,718
Total System Operating Revenues	**$33,739**	**$35,088**	**$36,492**	**$37,951**	**$39,469**	**$41,049**	**$42,689**	**$44,397**	**$46,174**	**$48,020**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	14,382	14,958	15,556	16,178	16,825	17,498	18,198	18,926	19,683	20,471
Solid Waste Administration	3,672	3,819	3,971	4,130	4,295	4,467	4,646	4,832	5,025	5,226
Regulatory Compliance	1,105	1,149	1,195	1,242	1,292	1,344	1,398	1,453	1,512	1,572
WTE Facility Operating and Maintenance Expenses										
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	1,189	1,371	1,383	1,395	1,583	1,597	1,612	1,807	1,824	2,025
Site Develop, New Cell, Closure	4,348	4,348	4,348	4,348	4,348	4,348	4,348	4,348	4,348	4,348
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	510	514	519	523	528	532	537	542	547	552
WTE Host Fee										
Additional Transportation Costs	1,776	1,873	1,973	2,080	2,191	2,308	2,432	2,562	2,697	2,840
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$91,977**	**$95,599**	**$99,206**	**$102,941**	**$107,004**	**$111,048**	**$115,278**	**$119,840**	**$124,398**	**$129,324**
NET ANNUAL SYSTEM COSTS ($000)	**$58,239**	**$60,510**	**$62,714**	**$64,990**	**$67,534**	**$70,000**	**$72,589**	**$75,443**	**$78,224**	**$81,304**
SYSTEM RATE ($/TON-MANAGED)	**$79**	**$82**	**$84**	**$86**	**$89**	**$92**	**$94**	**$97**	**$100**	**$103**
NPV @ DISCOUNT RATE OF 5% ($1000)	$1,431,201									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B1.2 - All Communities Cooperate to Manage Municipally Collected MSW, New Regional Landfill, Existing RDF Resource Recovery

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	619,210	624,990	630,870	636,860	642,920	649,080	655,360	661,730	668,230	674,810
Recyclables Managed	88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
Yard Waste Managed	92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	188,710	194,490	200,370	206,360	212,420	218,580	224,860	231,230	237,730	244,310
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	47,114	48,999	50,959	52,997	55,117	57,322	59,615	61,999	64,479	67,058
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	2,827	2,940	3,058	3,180	3,307	3,439	3,577	3,720	3,869	4,023
Total System Operating Revenues	**$49,941**	**$51,939**	**$54,017**	**$56,177**	**$58,424**	**$60,761**	**$63,192**	**$65,719**	**$68,348**	**$71,081**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
Transfer Station Operations	21,289	22,141	23,027	23,948	24,906	25,902	26,938	28,015	29,136	30,301
Solid Waste Administration	5,435	5,653	5,879	6,114	6,358	6,613	6,877	7,152	7,438	7,736
Regulatory Compliance	1,635	1,700	1,768	1,839	1,913	1,989	2,069	2,151	2,238	2,327
WTE Facility Operating and Maintenance Expenses										
RDF Facility	73,607	76,552	79,614	82,798	86,110	89,555	93,137	96,862	100,737	104,766
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	2,076	2,139	2,404	2,476	2,761	2,842	3,148	3,237	3,566	3,909
Site Develop, New Cell, Closure	4,348	4,348	4,348	4,348	4,348	4,348	4,348	4,348	4,348	4,348
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	566	583	601	619	637	656	675	694	713	733
WTE Host Fee										
Additional Transportation Costs	3,040	3,268	3,512	3,773	4,049	4,345	4,659	4,995	5,354	5,735
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$134,353**	**$139,596**	**$145,277**	**$150,990**	**$157,122**	**$163,322**	**$169,998**	**$176,695**	**$183,908**	**$191,447**
NET ANNUAL SYSTEM COSTS ($000)	**$84,412**	**$87,658**	**$91,261**	**$94,813**	**$98,698**	**$102,561**	**$106,806**	**$110,976**	**$115,560**	**$120,366**
SYSTEM RATE ($/TON-MANAGED)	**$106**	**$109**	**$112**	**$115**	**$119**	**$123**	**$126**	**$130**	**$134**	**$139**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B1.2 - All Communities Cooperate to Manage Municipally Collected MSW, New Regional Landfill, Existing RDF Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	681,510	688,340	695,250	702,290	709,490	716,780	724,190	731,750	739,400	747,220
Recyclables Managed	94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
Yard Waste Managed	101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	251,010	257,840	264,750	271,790	278,990	286,280	293,690	301,250	308,900	316,720
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	69,741	72,530	75,431	78,449	81,587	84,850	88,244	91,774	95,445	99,263
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	4,184	4,352	4,526	4,707	4,895	5,091	5,295	5,506	5,727	5,956
Total System Operating Revenues	**$73,925**	**$76,882**	**$79,957**	**$83,156**	**$86,482**	**$89,941**	**$93,539**	**$97,280**	**$101,172**	**$105,219**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
Transfer Station Operations	31,513	32,774	34,085	35,448	36,866	38,341	39,875	41,470	43,128	44,854
Solid Waste Administration	8,045	8,367	8,702	9,050	9,412	9,788	10,180	10,587	11,011	11,451
Regulatory Compliance	2,420	2,517	2,618	2,722	2,831	2,944	3,062	3,185	3,312	3,445
WTE Facility Operating and Maintenance Expenses										
RDF Facility	108,957	113,315	117,848	122,562	127,464	132,563	137,865	143,380	149,115	155,080
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	4,016	4,383	4,766	4,892	5,301	5,726	6,167	6,326	6,796	7,285
Site Develop, New Cell, Closure	4,348	4,348	4,348	4,348	4,348	4,348	4,348	4,348	4,348	4,348
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	753	774	794	815	837	859	881	904	927	950
WTE Host Fee										
Additional Transportation Costs	6,141	6,575	7,034	7,524	8,047	8,601	9,193	9,824	10,492	11,204
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$199,022**	**$207,167**	**$215,648**	**$224,214**	**$233,413**	**$242,994**	**$252,971**	**$263,032**	**$273,853**	**$285,126**
NET ANNUAL SYSTEM COSTS ($000)	**$125,096**	**$130,285**	**$135,691**	**$141,058**	**$146,931**	**$153,053**	**$159,433**	**$165,752**	**$172,681**	**$179,907**
SYSTEM RATE ($/TON-MANAGED)	**$143**	**$147**	**$152**	**$156**	**$161**	**$166**	**$172**	**$177**	**$182**	**$188**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B2.1 - All Communities Cooperate to Manage Municipally Colelcted MSW - Contract Out Disposal, No Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	566,210	571,140	576,140	581,220	586,400	591,660	597,000	602,400	607,930	613,510
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	566,210	571,140	576,140	581,220	586,400	591,660	597,000	602,400	607,930	613,510
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	14,382	14,958	15,556	16,178	16,825	17,498	18,198	18,926	19,683	20,471
Solid Waste Administration	3,672	3,819	3,971	4,130	4,295	4,467	4,646	4,832	5,025	5,226
Regulatory Compliance	532	553	575	598	622	647	673	700	728	757
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	11,840	12,485	13,153	13,867	14,606	15,388	16,214	17,078	17,983	18,935
Out of Region Disposal Costs	15,854	16,563	17,284	18,599	19,351	20,116	21,492	22,289	23,101	24,540
Total System Operating Expenses	**$61,016**	**$63,695**	**$66,483**	**$69,947**	**$72,934**	**$76,037**	**$79,877**	**$83,224**	**$86,695**	**$90,910**
NET ANNUAL SYSTEM COSTS ($000)	**$61,016**	**$63,695**	**$66,483**	**$69,947**	**$72,934**	**$76,037**	**$79,877**	**$83,224**	**$86,695**	**$90,910**
SYSTEM RATE ($/TON-MANAGED)	**$83**	**$86**	**$89**	**$93**	**$96**	**$99**	**$104**	**$107**	**$110**	**$115**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$1,638,249**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B2.1 - All Communities Cooperate to Manage Municipally Colelcted MSW - Contract Out Disposal, No Resource Recovery

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	619,210	624,990	630,870	636,860	642,920	649,080	655,360	661,730	668,230	674,810
Recyclables Managed	88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
Yard Waste Managed	92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	619,210	624,990	630,870	636,860	642,920	649,080	655,360	661,730	668,230	674,810
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
Transfer Station Operations	21,289	22,141	23,027	23,948	24,906	25,902	26,938	28,015	29,136	30,301
Solid Waste Administration	5,435	5,653	5,879	6,114	6,358	6,613	6,877	7,152	7,438	7,736
Regulatory Compliance	787	819	851	885	921	958	996	1,036	1,077	1,120
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	19,948	21,005	22,113	23,287	24,508	25,804	27,158	28,591	30,099	31,683
Out of Region Disposal Costs	26,007	26,875	28,389	29,932	31,503	33,103	34,734	36,395	38,089	39,814
Total System Operating Expenses	**$95,289**	**$99,171**	**$103,849**	**$108,708**	**$113,703**	**$118,919**	**$124,317**	**$129,896**	**$135,683**	**$141,712**
NET ANNUAL SYSTEM COSTS ($000)	**$95,289**	**$99,171**	**$103,849**	**$108,708**	**$113,703**	**$118,919**	**$124,317**	**$129,896**	**$135,683**	**$141,712**
SYSTEM RATE ($/TON-MANAGED)	**$119**	**$123**	**$128**	**$132**	**$137**	**$142**	**$147**	**$152**	**$158**	**$163**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B2.1 - All Communities Cooperate to Manage Municipally Colelcted MSW - Contract Out Disposal, No Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	681,510	688,340	695,250	702,290	709,490	716,780	724,190	731,750	739,400	747,220
Recyclables Managed	94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
Yard Waste Managed	101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	681,510	688,340	695,250	702,290	709,490	716,780	724,190	731,750	739,400	747,220
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
Transfer Station Operations	31,513	32,774	34,085	35,448	36,866	38,341	39,875	41,470	43,128	44,854
Solid Waste Administration	8,045	8,367	8,702	9,050	9,412	9,788	10,180	10,587	11,011	11,451
Regulatory Compliance	1,165	1,212	1,260	1,310	1,363	1,417	1,474	1,533	1,594	1,658
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	33,345	35,104	36,944	38,884	40,930	43,072	45,337	47,724	50,230	52,865
Out of Region Disposal Costs	42,254	44,054	46,582	48,458	51,083	53,759	56,487	59,272	62,110	65,755
Total System Operating Expenses	**$148,616**	**$155,091**	**$162,493**	**$169,469**	**$177,428**	**$185,667**	**$194,219**	**$203,060**	**$212,263**	**$222,559**
NET ANNUAL SYSTEM COSTS ($000)	**$148,616**	**$155,091**	**$162,493**	**$169,469**	**$177,428**	**$185,667**	**$194,219**	**$203,060**	**$212,263**	**$222,559**
SYSTEM RATE ($/TON-MANAGED)	**$169**	**$175**	**$182**	**$188**	**$195**	**$202**	**$209**	**$216**	**$224**	**$232**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B2.2 - All Communities Cooperate to Manage Municipally Collected MSW, Contract Out Disposal, Existing RDF Resource Recovery

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	566,210	571,140	576,140	581,220	586,400	591,660	597,000	602,400	607,930	613,510
Recyclables Managed	83,800	84,300	84,700	85,200	85,700	86,200	86,700	87,200	87,800	88,300
Yard Waste Managed	83,000	84,000	85,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	169,863	171,342	172,842	174,366	175,920	177,498	179,100	180,720	182,379	184,053
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	169,863	171,342	172,842	174,366	175,920	177,498	179,100	180,720	182,379	184,053
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	1,910	1,986	2,066	2,148	2,234	2,324	2,416	2,513	2,614	2,718
Total System Operating Revenues	**$33,739**	**$35,088**	**$36,492**	**$37,951**	**$39,469**	**$41,049**	**$42,689**	**$44,397**	**$46,174**	**$48,020**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,736	15,318	15,943	16,575	17,234	17,920	18,654	19,399	20,174	20,981
Transfer Station Operations	14,382	14,958	15,556	16,178	16,825	17,498	18,198	18,926	19,683	20,471
Solid Waste Administration	3,672	3,819	3,971	4,130	4,295	4,467	4,646	4,832	5,025	5,226
Regulatory Compliance	532	553	575	598	622	647	673	700	728	757
WTE Facility Operating and Maintenance Expenses										
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	3,552	3,746	3,946	4,160	4,382	4,616	4,864	5,123	5,395	5,680
Out of Region Disposal Costs	4,756	4,969	5,185	5,580	5,805	6,035	6,448	6,687	6,930	7,362
Total System Operating Expenses	**$91,972**	**$95,693**	**$99,576**	**$103,772**	**$107,952**	**$112,298**	**$117,018**	**$121,718**	**$126,605**	**$131,868**
NET ANNUAL SYSTEM COSTS ($000)	**$58,233**	**$60,605**	**$63,084**	**$65,821**	**$68,483**	**$71,250**	**$74,328**	**$77,321**	**$80,431**	**$83,848**
SYSTEM RATE ($/TON-MANAGED)	**$79**	**$82**	**$85**	**$88**	**$90**	**$93**	**$96**	**$99**	**$102**	**$106**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$1,517,246**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B2.2 - All Communities Cooperate to Manage Municipally Collected MSW, Contract Out Disposal, Existing RDF Resource Recovery

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	619,210	624,990	630,870	636,860	642,920	649,080	655,360	661,730	668,230	674,810
Recyclables Managed	88,800	89,400	89,900	90,500	91,000	91,600	92,200	92,800	93,300	93,900
Yard Waste Managed	92,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	188,710	194,490	200,370	206,360	212,420	218,580	224,860	231,230	237,730	244,310
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	47,114	48,999	50,959	52,997	55,117	57,322	59,615	61,999	64,479	67,058
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	2,827	2,940	3,058	3,180	3,307	3,439	3,577	3,720	3,869	4,023
Total System Operating Revenues	**$49,941**	**$51,939**	**$54,017**	**$56,177**	**$58,424**	**$60,761**	**$63,192**	**$65,719**	**$68,348**	**$71,081**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	21,823	22,679	23,591	24,542	25,507	26,539	27,614	28,706	29,844	31,058
Transfer Station Operations	21,289	22,141	23,027	23,948	24,906	25,902	26,938	28,015	29,136	30,301
Solid Waste Administration	5,435	5,653	5,879	6,114	6,358	6,613	6,877	7,152	7,438	7,736
Regulatory Compliance	787	819	851	885	921	958	996	1,036	1,077	1,120
WTE Facility Operating and Maintenance Expens										
RDF Facility	73,607	76,552	79,614	82,798	86,110	89,555	93,137	96,862	100,737	104,766
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	6,079	6,536	7,023	7,546	8,097	8,690	9,318	9,991	10,708	11,471
Out of Region Disposal Costs	7,926	8,363	9,017	9,699	10,409	11,148	11,918	12,718	13,551	14,414
Total System Operating Expenses	**$137,562**	**$143,357**	**$149,616**	**$156,147**	**$162,923**	**$170,019**	**$177,412**	**$185,096**	**$193,106**	**$201,482**
NET ANNUAL SYSTEM COSTS ($000)	**$87,621**	**$91,418**	**$95,599**	**$99,970**	**$104,499**	**$109,257**	**$114,221**	**$119,377**	**$124,758**	**$130,400**
SYSTEM RATE ($/TON-MANAGED)	**$110**	**$113**	**$117**	**$122**	**$126**	**$131**	**$135**	**$140**	**$145**	**$150**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario B2.2 - All Communities Cooperate to Manage Municipally Collected MSW, Contract Out Disposal, Existing RDF Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	681,510	688,340	695,250	702,290	709,490	716,780	724,190	731,750	739,400	747,220
Recyclables Managed	94,500	95,200	95,800	96,400	97,000	97,700	98,300	99,000	99,600	100,300
Yard Waste Managed	101,000	102,000	103,000	104,000	105,000	106,000	107,000	108,000	109,000	111,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	251,010	257,840	264,750	271,790	278,990	286,280	293,690	301,250	308,900	316,720
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	69,741	72,530	75,431	78,449	81,587	84,850	88,244	91,774	95,445	99,263
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	4,184	4,352	4,526	4,707	4,895	5,091	5,295	5,506	5,727	5,956
Total System Operating Revenues	**$73,925**	**$76,882**	**$79,957**	**$83,156**	**$86,482**	**$89,941**	**$93,539**	**$97,280**	**$101,172**	**$105,219**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	32,294	33,580	34,920	36,319	37,773	39,290	40,867	42,475	44,190	45,976
Transfer Station Operations	31,513	32,774	34,085	35,448	36,866	38,341	39,875	41,470	43,128	44,854
Solid Waste Administration	8,045	8,367	8,702	9,050	9,412	9,788	10,180	10,587	11,011	11,451
Regulatory Compliance	1,165	1,212	1,260	1,310	1,363	1,417	1,474	1,533	1,594	1,658
WTE Facility Operating and Maintenance Expens										
RDF Facility	108,957	113,315	117,848	122,562	127,464	132,563	137,865	143,380	149,115	155,080
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	12,282	13,149	14,068	15,048	16,095	17,203	18,386	19,647	20,985	22,408
Out of Region Disposal Costs	15,563	16,502	17,738	18,754	20,087	21,471	22,908	24,401	25,948	27,871
Total System Operating Expenses	**$210,434**	**$219,514**	**$229,236**	**$239,105**	**$249,676**	**$260,688**	**$272,170**	**$284,108**	**$296,586**	**$309,912**
NET ANNUAL SYSTEM COSTS ($000)	**$136,509**	**$142,632**	**$149,279**	**$155,950**	**$163,193**	**$170,747**	**$178,631**	**$186,827**	**$195,414**	**$204,694**
SYSTEM RATE ($/TON-MANAGED)	**$156**	**$161**	**$167**	**$173**	**$179**	**$185**	**$192**	**$199**	**$206**	**$214**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
CHESAPEAKE										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	264,237	267,078	269,950	272,849	275,780	278,745	281,742	284,766	287,831	290,923
Recyclables Managed	14,001	14,162	14,325	14,490	14,656	14,825	14,995	15,168	15,342	15,519
Yard Waste Managed	11,000	11,000	11,000	11,000	11,000	12,000	12,000	12,000	12,000	12,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	264,237	267,078	269,950	272,849	275,780	278,745	281,742	284,766	287,831	290,923
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	2,314	2,411	2,519	2,626	2,737	2,853	2,981	3,109	3,241	3,380
Transfer Station Operations	2,144	2,229	2,318	2,411	2,508	2,608	2,712	2,821	2,934	3,051
Solid Waste Administration	666	693	720	749	779	810	843	877	912	948
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	7,183	7,590	8,012	8,463	8,930	9,425	9,947	10,495	11,069	11,672
Out of Region Disposal Costs	7,399	7,745	8,099	8,731	9,101	9,477	10,143	10,536	10,938	11,637
Total System Operating Expenses	**$19,706**	**$20,668**	**$21,667**	**$22,980**	**$24,055**	**$25,173**	**$26,626**	**$27,838**	**$29,093**	**$30,688**
NET ANNUAL SYSTEM COSTS ($000)	**$19,706**	**$20,668**	**$21,667**	**$22,980**	**$24,055**	**$25,173**	**$26,626**	**$27,838**	**$29,093**	**$30,688**
SYSTEM RATE ($/TON-MANAGED)	**$68**	**$71**	**$73**	**$77**	**$80**	**$82**	**$86**	**$89**	**$92**	**$96**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$564,920**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
CHESAPEAKE										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	294,047	297,208	300,402	303,641	306,906	310,205	313,540	316,912	320,318	323,760
Recyclables Managed	15,697	15,878	16,060	16,245	16,432	16,621	16,812	17,005	17,201	17,399
Yard Waste Managed	12,000	12,000	12,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	294,047	297,208	300,402	303,641	306,906	310,205	313,540	316,912	320,318	323,760
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	3,525	3,669	3,827	3,992	4,156	4,336	4,524	4,711	4,906	5,120
Transfer Station Operations	3,173	3,300	3,432	3,569	3,712	3,860	4,015	4,175	4,342	4,516
Solid Waste Administration	986	1,025	1,066	1,109	1,153	1,200	1,248	1,298	1,349	1,403
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	12,315	12,985	13,688	14,434	15,209	16,032	16,891	17,800	18,757	19,761
Out of Region Disposal Costs	12,350	12,780	13,518	14,271	15,038	15,820	16,618	17,430	18,258	19,102
Total System Operating Expenses	**$32,349**	**$33,759**	**$35,531**	**$37,375**	**$39,268**	**$41,248**	**$43,296**	**$45,414**	**$47,612**	**$49,902**
NET ANNUAL SYSTEM COSTS ($000)	**$32,349**	**$33,759**	**$35,531**	**$37,375**	**$39,268**	**$41,248**	**$43,296**	**$45,414**	**$47,612**	**$49,902**
SYSTEM RATE ($/TON-MANAGED)	**$101**	**$104**	**$108**	**$112**	**$117**	**$121**	**$126**	**$131**	**$136**	**$141**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
CHESAPEAKE										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	327,246	330,760	334,319	337,916	341,549	345,228	348,946	352,699	356,489	360,328
Recyclables Managed	17,599	17,801	18,006	18,213	18,422	18,634	18,848	19,065	19,284	19,506
Yard Waste Managed	13,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	15,000	15,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	327,246	330,760	334,319	337,916	341,549	345,228	348,946	352,699	356,489	360,328
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	5,333	5,556	5,788	6,031	6,284	6,549	6,825	7,100	7,401	7,716
Transfer Station Operations	4,697	4,885	5,080	5,283	5,495	5,714	5,943	6,181	6,428	6,685
Solid Waste Administration	1,460	1,518	1,579	1,642	1,707	1,776	1,847	1,921	1,997	2,077
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	20,815	21,929	23,094	24,323	25,615	26,969	28,399	29,903	31,483	33,141
Out of Region Disposal Costs	20,289	21,169	22,399	23,316	24,592	25,892	27,218	28,569	29,945	31,709
Total System Operating Expenses	**$52,594**	**$55,056**	**$57,941**	**$60,595**	**$63,692**	**$66,900**	**$70,232**	**$73,674**	**$77,254**	**$81,328**
NET ANNUAL SYSTEM COSTS ($000)	**$52,594**	**$55,056**	**$57,941**	**$60,595**	**$63,692**	**$66,900**	**$70,232**	**$73,674**	**$77,254**	**$81,328**
SYSTEM RATE ($/TON-MANAGED)	**$147**	**$152**	**$158**	**$164**	**$170**	**$177**	**$184**	**$191**	**$198**	**$206**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
FRANKLIN										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	10,289	10,392	10,485	10,588	10,692	10,797	10,902	10,998	11,104	11,211
Recyclables Managed	546	551	556	561	566	572	577	582	588	593
Yard Waste Managed	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	10,289	10,392	10,485	10,588	10,692	10,797	10,902	10,998	11,104	11,211
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	90	94	98	102	106	110	115	119	124	129
Transfer Station Operations	239	249	259	269	280	291	303	315	327	341
Solid Waste Administration	555	577	600	624	649	675	702	730	760	790
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	181	191	201	212	224	236	249	262	276	291
Out of Region Disposal Costs	288	301	315	339	353	367	392	407	422	448
Total System Operating Expenses	**$1,353**	**$1,412**	**$1,472**	**$1,546**	**$1,611**	**$1,679**	**$1,761**	**$1,832**	**$1,909**	**$1,999**
NET ANNUAL SYSTEM COSTS ($000)	**$1,353**	**$1,412**	**$1,472**	**$1,546**	**$1,611**	**$1,679**	**$1,761**	**$1,832**	**$1,909**	**$1,999**
SYSTEM RATE ($/TON-MANAGED)	**$105**	**$109**	**$113**	**$118**	**$122**	**$126**	**$131**	**$135**	**$139**	**$145**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$35,772**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
FRANKLIN										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	11,318	11,436	11,545	11,654	11,764	11,874	11,995	12,107	12,219	12,342
Recyclables Managed	598	604	609	615	621	626	632	638	644	650
Yard Waste Managed	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	11,318	11,436	11,545	11,654	11,764	11,874	11,995	12,107	12,219	12,342
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	134	140	145	151	157	163	170	177	184	191
Transfer Station Operations	354	368	383	398	414	431	448	466	484	504
Solid Waste Administration	822	855	889	924	961	1,000	1,040	1,081	1,125	1,169
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	306	323	340	358	377	397	418	439	462	487
Out of Region Disposal Costs	475	492	520	548	576	606	636	666	696	728
Total System Operating Expenses	**$2,092**	**$2,178**	**$2,276**	**$2,379**	**$2,485**	**$2,596**	**$2,711**	**$2,829**	**$2,952**	**$3,079**
NET ANNUAL SYSTEM COSTS ($000)	**$2,092**	**$2,178**	**$2,276**	**$2,379**	**$2,485**	**$2,596**	**$2,711**	**$2,829**	**$2,952**	**$3,079**
SYSTEM RATE ($/TON-MANAGED)	**$150**	**$155**	**$161**	**$167**	**$173**	**$179**	**$185**	**$192**	**$199**	**$205**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
FRANKLIN										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	12,455	12,579	12,704	12,819	12,945	13,072	13,199	13,327	13,446	13,575
Recyclables Managed	656	662	668	674	680	687	693	699	706	712
Yard Waste Managed	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	12,455	12,579	12,704	12,819	12,945	13,072	13,199	13,327	13,446	13,575
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	199	207	215	223	232	241	251	260	271	282
Transfer Station Operations	524	545	567	590	613	638	663	690	717	746
Solid Waste Administration	1,216	1,265	1,316	1,368	1,423	1,480	1,539	1,601	1,665	1,731
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	512	539	567	596	627	660	694	730	767	807
Out of Region Disposal Costs	772	805	851	885	932	980	1,030	1,079	1,129	1,195
Total System Operating Expenses	**$3,223**	**$3,361**	**$3,516**	**$3,661**	**$3,828**	**$3,999**	**$4,177**	**$4,360**	**$4,550**	**$4,760**
NET ANNUAL SYSTEM COSTS ($000)	**$3,223**	**$3,361**	**$3,516**	**$3,661**	**$3,828**	**$3,999**	**$4,177**	**$4,360**	**$4,550**	**$4,760**
SYSTEM RATE ($/TON-MANAGED)	**$213**	**$221**	**$229**	**$236**	**$245**	**$254**	**$263**	**$272**	**$282**	**$292**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
ISLE OF WIGHT										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	48,265	48,969	49,685	50,414	51,146	51,899	52,665	53,434	54,225	55,019
Recyclables Managed	2,371	2,416	2,461	2,508	2,555	2,604	2,653	2,703	2,754	2,806
Yard Waste Managed	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	48,265	48,969	49,685	50,414	51,146	51,899	52,665	53,434	54,225	55,019
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	392	411	433	454	477	501	527	554	582	611
Transfer Station Operations	922	959	998	1,037	1,079	1,122	1,167	1,214	1,262	1,313
Solid Waste Administration	555	577	600	624	649	675	702	730	760	790
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	686	728	771	818	866	918	973	1,030	1,091	1,155
Out of Region Disposal Costs	1,351	1,420	1,491	1,613	1,688	1,765	1,896	1,977	2,061	2,201
Total System Operating Expenses	**$3,907**	**$4,095**	**$4,293**	**$4,546**	**$4,759**	**$4,980**	**$5,265**	**$5,505**	**$5,755**	**$6,069**
NET ANNUAL SYSTEM COSTS ($000)	**$3,907**	**$4,095**	**$4,293**	**$4,546**	**$4,759**	**$4,980**	**$5,265**	**$5,505**	**$5,755**	**$6,069**
SYSTEM RATE ($/TON-MANAGED)	**$76**	**$78**	**$81**	**$84**	**$87**	**$90**	**$93**	**$96**	**$99**	**$103**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$112,119**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
ISLE OF WIGHT										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	55,835	56,654	57,495	58,349	59,216	60,095	60,987	61,892	62,819	63,759
Recyclables Managed	2,859	2,913	2,968	3,024	3,081	3,140	3,199	3,259	3,321	3,384
Yard Waste Managed	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	55,835	56,654	57,495	58,349	59,216	60,095	60,987	61,892	62,819	63,759
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	642	673	707	743	779	819	861	903	947	996
Transfer Station Operations	1,365	1,420	1,477	1,536	1,597	1,661	1,727	1,797	1,868	1,943
Solid Waste Administration	822	855	889	924	961	1,000	1,040	1,081	1,125	1,169
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	1,223	1,295	1,370	1,451	1,535	1,625	1,719	1,818	1,924	2,036
Out of Region Disposal Costs	2,345	2,436	2,587	2,742	2,902	3,065	3,232	3,404	3,581	3,762
Total System Operating Expenses	**$6,397**	**$6,679**	**$7,031**	**$7,396**	**$7,774**	**$8,169**	**$8,579**	**$9,003**	**$9,445**	**$9,905**
NET ANNUAL SYSTEM COSTS ($000)	**$6,397**	**$6,679**	**$7,031**	**$7,396**	**$7,774**	**$8,169**	**$8,579**	**$9,003**	**$9,445**	**$9,905**
SYSTEM RATE ($/TON-MANAGED)	**$107**	**$110**	**$114**	**$119**	**$123**	**$127**	**$132**	**$136**	**$141**	**$145**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
ISLE OF WIGHT										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	64,712	65,678	66,657	67,658	68,683	69,710	70,761	71,824	72,910	74,020
Recyclables Managed	3,448	3,513	3,579	3,647	3,716	3,786	3,858	3,931	4,005	4,081
Yard Waste Managed	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	64,712	65,678	66,657	67,658	68,683	69,710	70,761	71,824	72,910	74,020
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	1,045	1,096	1,150	1,208	1,268	1,331	1,397	1,464	1,537	1,614
Transfer Station Operations	2,021	2,102	2,186	2,273	2,364	2,459	2,557	2,659	2,766	2,876
Solid Waste Administration	1,216	1,265	1,316	1,368	1,423	1,480	1,539	1,601	1,665	1,731
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	2,153	2,278	2,409	2,547	2,694	2,848	3,012	3,185	3,368	3,561
Out of Region Disposal Costs	4,012	4,203	4,466	4,668	4,945	5,228	5,519	5,818	6,124	6,514
Total System Operating Expenses	**$10,447**	**$10,944**	**$11,527**	**$12,065**	**$12,694**	**$13,347**	**$14,025**	**$14,727**	**$15,461**	**$16,296**
NET ANNUAL SYSTEM COSTS ($000)	**$10,447**	**$10,944**	**$11,527**	**$12,065**	**$12,694**	**$13,347**	**$14,025**	**$14,727**	**$15,461**	**$16,296**
SYSTEM RATE ($/TON-MANAGED)	**$151**	**$156**	**$162**	**$167**	**$173**	**$179**	**$185**	**$192**	**$198**	**$206**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
NORFOLK										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	238,632	240,488	242,365	244,277	246,232	248,196	250,204	252,237	254,300	256,394
Recyclables Managed	13,064	13,073	13,082	13,091	13,100	13,109	13,119	13,128	13,137	13,146
Yard Waste Managed	13,000	13,000	13,000	13,000	13,000	13,000	13,000	14,000	14,000	14,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	238,632	240,488	242,365	244,277	246,232	248,196	250,204	252,237	254,300	256,394
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	2,159	2,226	2,300	2,372	2,446	2,523	2,608	2,691	2,776	2,863
Transfer Station Operations	4,096	4,160	4,327	4,500	4,680	4,867	5,062	5,264	5,475	5,694
Solid Waste Administration	776	807	839	872	907	944	981	1,021	1,062	1,104
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	6,288	6,624	6,972	7,343	7,728	8,134	8,562	9,010	9,478	9,970
Out of Region Disposal Costs	6,682	6,974	7,271	7,817	8,126	8,439	9,007	9,333	9,663	10,256
Total System Operating Expenses	**$20,000**	**$20,791**	**$21,709**	**$22,904**	**$23,887**	**$24,906**	**$26,220**	**$27,319**	**$28,455**	**$29,887**
NET ANNUAL SYSTEM COSTS ($000)	**$20,000**	**$20,791**	**$21,709**	**$22,904**	**$23,887**	**$24,906**	**$26,220**	**$27,319**	**$28,455**	**$29,887**
SYSTEM RATE ($/TON-MANAGED)	**$76**	**$78**	**$81**	**$85**	**$88**	**$91**	**$95**	**$98**	**$101**	**$105**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$541,022**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
NORFOLK										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	258,526	260,688	262,883	265,123	267,385	269,682	272,023	274,406	276,824	279,280
Recyclables Managed	13,155	13,165	13,174	13,183	13,192	13,201	13,211	13,220	13,229	13,238
Yard Waste Managed	14,000	14,000	14,000	14,000	14,000	15,000	15,000	15,000	15,000	15,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	258,526	260,688	262,883	265,123	267,385	269,682	272,023	274,406	276,824	279,280
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	2,954	3,042	3,139	3,239	3,336	3,444	3,555	3,662	3,773	3,896
Transfer Station Operations	5,922	6,158	6,405	6,661	6,927	7,205	7,493	7,792	8,104	8,428
Solid Waste Administration	1,148	1,194	1,242	1,292	1,343	1,397	1,453	1,511	1,571	1,634
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	10,494	11,039	11,610	12,215	12,843	13,509	14,204	14,939	15,711	16,522
Out of Region Disposal Costs	10,858	11,210	11,830	12,461	13,102	13,754	14,417	15,092	15,779	16,478
Total System Operating Expenses	**$31,376**	**$32,643**	**$34,226**	**$35,868**	**$37,551**	**$39,308**	**$41,122**	**$42,996**	**$44,938**	**$46,957**
NET ANNUAL SYSTEM COSTS ($000)	**$31,376**	**$32,643**	**$34,226**	**$35,868**	**$37,551**	**$39,308**	**$41,122**	**$42,996**	**$44,938**	**$46,957**
SYSTEM RATE ($/TON-MANAGED)	**$110**	**$113**	**$118**	**$123**	**$127**	**$132**	**$137**	**$142**	**$147**	**$153**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
NORFOLK										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	281,775	284,316	286,892	289,512	292,188	294,899	297,657	300,468	303,324	306,218
Recyclables Managed	13,248	13,257	13,266	13,276	13,285	13,294	13,303	13,313	13,322	13,331
Yard Waste Managed	15,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	17,000	17,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	281,775	284,316	286,892	289,512	292,188	294,899	297,657	300,468	303,324	306,218
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	4,015	4,137	4,264	4,396	4,532	4,672	4,817	4,958	5,113	5,273
Transfer Station Operations	8,765	9,116	9,481	9,860	10,254	10,664	11,091	11,535	11,996	12,476
Solid Waste Administration	1,700	1,768	1,838	1,912	1,988	2,068	2,150	2,236	2,326	2,419
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	17,371	18,269	19,208	20,197	21,239	22,328	23,480	24,691	25,963	27,298
Out of Region Disposal Costs	17,470	18,196	19,222	19,976	21,038	22,117	23,217	24,338	25,479	26,947
Total System Operating Expenses	**$49,321**	**$51,487**	**$54,013**	**$56,342**	**$59,050**	**$61,850**	**$64,755**	**$67,758**	**$70,877**	**$74,413**
NET ANNUAL SYSTEM COSTS ($000)	**$49,321**	**$51,487**	**$54,013**	**$56,342**	**$59,050**	**$61,850**	**$64,755**	**$67,758**	**$70,877**	**$74,413**
SYSTEM RATE ($/TON-MANAGED)	**$159**	**$164**	**$171**	**$177**	**$184**	**$191**	**$198**	**$205**	**$212**	**$221**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
PORTSMOUTH										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	120,909	121,655	122,417	123,186	123,962	124,744	125,532	126,328	127,129	127,938
Recyclables Managed	5,862	5,874	5,886	5,899	5,911	5,924	5,936	5,948	5,961	5,973
Yard Waste Managed	?	?	?	?	?	?	?	?	?	?
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	120,909	121,655	122,417	123,186	123,962	124,744	125,532	126,328	127,129	127,938
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	969	1,000	1,035	1,069	1,104	1,140	1,180	1,219	1,259	1,301
Transfer Station Operations	835	869	904	939	977	1,016	1,057	1,099	1,143	1,189
Solid Waste Administration	656	682	709	738	767	798	830	863	897	933
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	2,984	3,138	3,298	3,468	3,643	3,828	4,023	4,226	4,438	4,659
Out of Region Disposal Costs	3,385	3,528	3,672	3,942	4,091	4,241	4,519	4,674	4,831	5,118
Total System Operating Expenses	**$8,829**	**$9,217**	**$9,618**	**$10,156**	**$10,582**	**$11,024**	**$11,609**	**$12,081**	**$12,567**	**$13,200**
NET ANNUAL SYSTEM COSTS ($000)	**$8,829**	**$9,217**	**$9,618**	**$10,156**	**$10,582**	**$11,024**	**$11,609**	**$12,081**	**$12,567**	**$13,200**
SYSTEM RATE ($/TON-MANAGED)	**$70**	**$72**	**$75**	**$79**	**$81**	**$84**	**$88**	**$91**	**$94**	**$99**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$237,462**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
PORTSMOUTH										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	128,753	129,575	130,405	131,241	132,084	132,935	133,793	134,668	135,541	136,421
Recyclables Managed	5,986	5,999	6,011	6,024	6,036	6,049	6,062	6,075	6,087	6,100
Yard Waste Managed	?	?	?	?	?	?	?	?	?	?
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	128,753	129,575	130,405	131,241	132,084	132,935	133,793	134,668	135,541	136,421
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	1,344	1,386	1,432	1,480	1,527	1,578	1,631	1,683	1,736	1,795
Transfer Station Operations	1,236	1,286	1,338	1,391	1,446	1,504	1,564	1,627	1,692	1,760
Solid Waste Administration	971	1,009	1,050	1,092	1,136	1,181	1,228	1,277	1,328	1,382
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	4,894	5,139	5,394	5,663	5,941	6,236	6,542	6,866	7,204	7,558
Out of Region Disposal Costs	5,408	5,572	5,868	6,168	6,472	6,780	7,091	7,407	7,726	8,049
Total System Operating Expenses	**$13,853**	**$14,391**	**$15,081**	**$15,794**	**$16,522**	**$17,279**	**$18,056**	**$18,860**	**$19,685**	**$20,543**
NET ANNUAL SYSTEM COSTS ($000)	**$13,853**	**$14,391**	**$15,081**	**$15,794**	**$16,522**	**$17,279**	**$18,056**	**$18,860**	**$19,685**	**$20,543**
SYSTEM RATE ($/TON-MANAGED)	**$103**	**$106**	**$111**	**$115**	**$120**	**$124**	**$129**	**$134**	**$139**	**$144**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
PORTSMOUTH										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	137,308	138,213	139,116	140,027	140,955	141,882	142,817	143,769	144,719	145,689
Recyclables Managed	6,113	6,126	6,139	6,151	6,164	6,177	6,190	6,203	6,216	6,229
Yard Waste Managed	?	?	?	?	?	?	?	?	?	?
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	137,308	138,213	139,116	140,027	140,955	141,882	142,817	143,769	144,719	145,689
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	1,852	1,912	1,973	2,037	2,103	2,171	2,241	2,310	2,386	2,464
Transfer Station Operations	1,830	1,904	1,980	2,059	2,141	2,227	2,316	2,408	2,505	2,605
Solid Waste Administration	1,437	1,494	1,554	1,616	1,681	1,748	1,818	1,891	1,966	2,045
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	7,928	8,317	8,723	9,149	9,595	10,060	10,550	11,064	11,601	12,163
Out of Region Disposal Costs	8,513	8,846	9,321	9,662	10,149	10,641	11,140	11,645	12,156	12,821
Total System Operating Expenses	**$21,560**	**$22,473**	**$23,550**	**$24,522**	**$25,669**	**$26,847**	**$28,064**	**$29,318**	**$30,614**	**$32,097**
NET ANNUAL SYSTEM COSTS ($000)	**$21,560**	**$22,473**	**$23,550**	**$24,522**	**$25,669**	**$26,847**	**$28,064**	**$29,318**	**$30,614**	**$32,097**
SYSTEM RATE ($/TON-MANAGED)	**$150**	**$156**	**$162**	**$168**	**$174**	**$181**	**$188**	**$195**	**$203**	**$211**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
SOUTHAMPTON										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	22,175	22,416	22,659	22,903	23,157	23,414	23,661	23,919	24,179	24,450
Recyclables Managed	1,134	1,148	1,161	1,175	1,189	1,203	1,217	1,231	1,246	1,260
Yard Waste Managed	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	22,175	22,416	22,659	22,903	23,157	23,414	23,661	23,919	24,179	24,450
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	187	195	204	213	222	232	242	252	263	274
Transfer Station Operations	1,255	1,304	1,356	1,410	1,467	1,526	1,586	1,650	1,716	1,785
Solid Waste Administration	555	577	600	624	649	675	702	730	760	790
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	306	323	341	361	381	402	424	448	472	498
Out of Region Disposal Costs	621	650	680	733	764	796	852	885	919	978
Total System Operating Expenses	**$2,924**	**$3,050**	**$3,181**	**$3,341**	**$3,483**	**$3,631**	**$3,806**	**$3,964**	**$4,130**	**$4,325**
NET ANNUAL SYSTEM COSTS ($000)	**$2,924**	**$3,050**	**$3,181**	**$3,341**	**$3,483**	**$3,631**	**$3,806**	**$3,964**	**$4,130**	**$4,325**
SYSTEM RATE ($/TON-MANAGED)	**$120**	**$124**	**$128**	**$133**	**$137**	**$142**	**$147**	**$152**	**$156**	**$162**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$77,519**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
SOUTHAMPTON										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	24,711	24,985	25,259	25,535	25,812	26,090	26,369	26,660	26,952	27,246
Recyclables Managed	1,275	1,290	1,306	1,321	1,337	1,352	1,368	1,384	1,401	1,417
Yard Waste Managed	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	24,711	24,985	25,259	25,535	25,812	26,090	26,369	26,660	26,952	27,246
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	286	298	311	325	338	353	368	383	400	417
Transfer Station Operations	1,856	1,930	2,007	2,088	2,171	2,258	2,348	2,442	2,540	2,642
Solid Waste Administration	822	855	889	924	961	1,000	1,040	1,081	1,125	1,169
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	525	554	584	616	649	685	721	760	801	844
Out of Region Disposal Costs	1,038	1,074	1,137	1,200	1,265	1,331	1,398	1,466	1,536	1,608
Total System Operating Expenses	**$4,528**	**$4,712**	**$4,928**	**$5,153**	**$5,384**	**$5,626**	**$5,875**	**$6,132**	**$6,403**	**$6,680**
NET ANNUAL SYSTEM COSTS ($000)	**$4,528**	**$4,712**	**$4,928**	**$5,153**	**$5,384**	**$5,626**	**$5,875**	**$6,132**	**$6,403**	**$6,680**
SYSTEM RATE ($/TON-MANAGED)	**$168**	**$173**	**$179**	**$185**	**$191**	**$198**	**$204**	**$211**	**$218**	**$225**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
SOUTHAMPTON										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	27,541	27,847	28,144	28,453	28,763	29,085	29,398	29,722	30,038	30,376
Recyclables Managed	1,434	1,451	1,468	1,485	1,503	1,521	1,539	1,557	1,575	1,594
Yard Waste Managed	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	27,541	27,847	28,144	28,453	28,763	29,085	29,398	29,722	30,038	30,376
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	435	453	472	492	513	535	557	580	605	631
Transfer Station Operations	2,748	2,858	2,972	3,091	3,213	3,343	3,478	3,616	3,761	3,909
Solid Waste Administration	1,216	1,265	1,316	1,368	1,423	1,480	1,539	1,601	1,665	1,731
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	889	937	987	1,040	1,095	1,154	1,215	1,279	1,347	1,418
Out of Region Disposal Costs	1,708	1,782	1,886	1,963	2,071	2,181	2,293	2,408	2,523	2,673
Total System Operating Expenses	**$6,995**	**$7,295**	**$7,633**	**$7,954**	**$8,315**	**$8,693**	**$9,081**	**$9,484**	**$9,901**	**$10,363**
NET ANNUAL SYSTEM COSTS ($000)	**$6,995**	**$7,295**	**$7,633**	**$7,954**	**$8,315**	**$8,693**	**$9,081**	**$9,484**	**$9,901**	**$10,363**
SYSTEM RATE ($/TON-MANAGED)	**$233**	**$241**	**$249**	**$257**	**$266**	**$275**	**$284**	**$294**	**$304**	**$314**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
SUFFOLK										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	151,087	153,415	155,779	158,182	160,631	163,119	165,653	168,226	170,856	173,514
Recyclables Managed	5,618	5,732	5,849	5,968	6,090	6,214	6,341	6,471	6,603	6,737
Yard Waste Managed	17,000	18,000	18,000	18,000	18,000	18,000	18,000	19,000	19,000	19,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	151,087	153,415	155,779	158,182	160,631	163,119	165,653	168,226	170,856	173,514
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	928	976	1,029	1,081	1,137	1,196	1,261	1,326	1,395	1,467
Transfer Station Operations	1,515	1,576	1,639	1,704	1,772	1,843	1,917	1,994	2,073	2,156
Solid Waste Administration	713	742	772	803	835	868	903	939	976	1,016
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	2,907	3,085	3,272	3,472	3,681	3,903	4,139	4,388	4,650	4,927
Out of Region Disposal Costs	4,230	4,449	4,673	5,062	5,301	5,546	5,964	6,224	6,493	6,941
Total System Operating Expenses	**$10,293**	**$10,828**	**$11,385**	**$12,122**	**$12,726**	**$13,356**	**$14,184**	**$14,871**	**$15,587**	**$16,507**
NET ANNUAL SYSTEM COSTS ($000)	**$10,293**	**$10,828**	**$11,385**	**$12,122**	**$12,726**	**$13,356**	**$14,184**	**$14,871**	**$15,587**	**$16,507**
SYSTEM RATE ($/TON-MANAGED)	**$59**	**$61**	**$63**	**$67**	**$69**	**$71**	**$75**	**$77**	**$79**	**$83**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$310,684**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
SUFFOLK										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	176,229	178,983	181,795	184,655	187,553	190,509	193,524	196,578	199,700	202,860
Recyclables Managed	6,875	7,015	7,158	7,304	7,453	7,605	7,760	7,918	8,080	8,245
Yard Waste Managed	19,000	19,000	20,000	20,000	20,000	20,000	20,000	21,000	21,000	21,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	176,229	178,983	181,795	184,655	187,553	190,509	193,524	196,578	199,700	202,860
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	1,544	1,621	1,706	1,795	1,885	1,984	2,088	2,193	2,305	2,426
Transfer Station Operations	2,243	2,332	2,426	2,523	2,624	2,729	2,838	2,951	3,069	3,192
Solid Waste Administration	1,056	1,098	1,142	1,188	1,236	1,285	1,336	1,390	1,445	1,503
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	5,223	5,534	5,862	6,212	6,577	6,968	7,378	7,814	8,276	8,763
Out of Region Disposal Costs	7,402	7,696	8,181	8,679	9,190	9,716	10,257	10,812	11,383	11,969
Total System Operating Expenses	**$17,468**	**$18,281**	**$19,317**	**$20,397**	**$21,512**	**$22,682**	**$23,897**	**$25,160**	**$26,478**	**$27,853**
NET ANNUAL SYSTEM COSTS ($000)	**$17,468**	**$18,281**	**$19,317**	**$20,397**	**$21,512**	**$22,682**	**$23,897**	**$25,160**	**$26,478**	**$27,853**
SYSTEM RATE ($/TON-MANAGED)	**$86**	**$89**	**$92**	**$96**	**$100**	**$104**	**$108**	**$112**	**$116**	**$120**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
SUFFOLK										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	206,089	209,367	212,703	216,099	219,564	223,078	226,662	230,304	234,016	237,787
Recyclables Managed	8,413	8,585	8,760	8,939	9,121	9,307	9,497	9,691	9,888	10,090
Yard Waste Managed	21,000	21,000	22,000	22,000	22,000	22,000	23,000	23,000	23,000	23,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	206,089	209,367	212,703	216,099	219,564	223,078	226,662	230,304	234,016	237,787
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	2,549	2,679	2,816	2,960	3,111	3,271	3,439	3,609	3,795	3,991
Transfer Station Operations	3,320	3,453	3,591	3,734	3,884	4,039	4,201	4,369	4,543	4,725
Solid Waste Administration	1,563	1,626	1,691	1,759	1,829	1,902	1,978	2,057	2,140	2,225
Regulatory Compliance	0	0	0	0	0	0	0	0	0	0
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	9,277	9,823	10,398	11,008	11,653	12,333	13,055	13,818	14,626	15,477
Out of Region Disposal Costs	12,778	13,399	14,251	14,911	15,809	16,731	17,680	18,655	19,657	20,925
Total System Operating Expenses	**$29,487**	**$30,980**	**$32,747**	**$34,372**	**$36,286**	**$38,276**	**$40,353**	**$42,508**	**$44,761**	**$47,343**
NET ANNUAL SYSTEM COSTS ($000)	**$29,487**	**$30,980**	**$32,747**	**$34,372**	**$36,286**	**$38,276**	**$40,353**	**$42,508**	**$44,761**	**$47,343**
SYSTEM RATE ($/TON-MANAGED)	**$125**	**$130**	**$135**	**$139**	**$145**	**$150**	**$156**	**$162**	**$168**	**$175**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
VIRGINIA BEACH (does not include closure and post-closure care costs for City Landfill)										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	468,567	471,618	474,701	477,811	480,950	484,116	487,300	490,523	493,766	497,021
Recyclables Managed	41,175	41,295	41,414	41,535	41,655	41,776	41,897	42,018	42,140	42,262
Yard Waste Managed	39,000	39,000	40,000	40,000	40,000	41,000	41,000	42,000	42,000	42,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
City Landfill	468,567	471,618	474,701	477,811	480,950	0	0	0	0	0
Contract Out Disposal (Tons)	0	0	0	0	0	484,116	487,300	490,523	493,766	497,021
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	7,697	8,005	8,325	8,658	9,005	9,365	9,740	10,129	10,534	10,956
Transfer Station Operations	5,570	5,793	6,025	6,265	6,515	6,777	7,048	7,329	7,623	7,928
Solid Waste Administration	776	807	839	872	907	944	981	1,021	1,062	1,104
Regulatory Compliance	2,364	2,459	2,557	2,660	2,766					
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	10,404	10,891	11,400	11,934	12,493	0	0	0	0	0
Additional Transportation Costs	0	0	0	0	0	18,383	19,323	20,303	21,325	22,396
Out of Region Disposal Costs	0	0	0	0	0	16,460	17,543	18,149	18,763	19,881
Total System Operating Expenses	**$26,811**	**$27,955**	**$29,146**	**$30,389**	**$31,686**	**$51,929**	**$54,635**	**$56,931**	**$59,307**	**$62,265**
NET ANNUAL SYSTEM COSTS ($000)	**$26,811**	**$27,955**	**$29,146**	**$30,389**	**$31,686**	**$51,929**	**$54,635**	**$56,931**	**$59,307**	**$62,265**
SYSTEM RATE ($/TON-MANAGED)	**$49**	**$51**	**$52**	**$54**	**$56**	**$92**	**$96**	**$99**	**$103**	**$107**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$1,052,176**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
VIRGINIA BEACH (does not include closu										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	500,330	503,651	506,996	510,383	513,791	517,230	520,708	524,187	527,727	531,292
Recyclables Managed	42,385	42,508	42,631	42,755	42,879	43,003	43,128	43,253	43,378	43,504
Yard Waste Managed	43,000	43,000	44,000	44,000	45,000	45,000	46,000	46,000	46,000	47,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
City Landfill	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	500,330	503,651	506,996	510,383	513,791	517,230	520,708	524,187	527,727	531,292
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	11,394	11,850	12,324	12,817	13,329	13,862	14,417	14,994	15,593	16,217
Transfer Station Operations	8,245	8,574	8,918	9,275	9,645	10,031	10,432	10,849	11,284	11,735
Solid Waste Administration	1,148	1,194	1,242	1,292	1,343	1,397	1,453	1,511	1,571	1,634
Regulatory Compliance										
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	23,533	24,713	25,945	27,247	28,595	30,021	31,504	33,066	34,705	36,419
Out of Region Disposal Costs	21,014	21,657	22,815	23,988	25,176	26,379	27,598	28,830	30,080	31,346
Total System Operating Expenses	**$65,334**	**$67,988**	**$71,244**	**$74,619**	**$78,088**	**$81,690**	**$85,404**	**$89,250**	**$93,233**	**$97,351**
NET ANNUAL SYSTEM COSTS ($000)	**$65,334**	**$67,988**	**$71,244**	**$74,619**	**$78,088**	**$81,690**	**$85,404**	**$89,250**	**$93,233**	**$97,351**
SYSTEM RATE ($/TON-MANAGED)	**$112**	**$115**	**$120**	**$125**	**$130**	**$135**	**$140**	**$145**	**$151**	**$157**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

Year Ending December	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
VIRGINIA BEACH (does not include closur										
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	534,865	538,490	542,136	545,817	549,522	553,266	557,042	560,855	564,687	568,577
Recyclables Managed	43,630	43,757	43,884	44,011	44,139	44,267	44,395	44,524	44,653	44,782
Yard Waste Managed	47,000	48,000	48,000	49,000	49,000	50,000	50,000	51,000	51,000	52,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
City Landfill	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	534,865	538,490	542,136	545,817	549,522	553,266	557,042	560,855	564,687	568,577
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	16,866	17,540	18,242	18,972	19,730	20,520	21,340	22,194	23,082	24,005
Transfer Station Operations	12,204	12,693	13,201	13,728	14,277	14,849	15,442	16,060	16,702	17,370
Solid Waste Administration	1,700	1,768	1,838	1,912	1,988	2,068	2,150	2,236	2,326	2,419
Regulatory Compliance										
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	38,209	40,094	42,059	44,122	46,284	48,540	50,915	53,404	56,007	58,730
Out of Region Disposal Costs	33,162	34,463	36,323	37,661	39,566	41,495	43,449	45,429	47,434	50,035
Total System Operating Expenses	**$102,141**	**$106,558**	**$111,663**	**$116,395**	**$121,845**	**$127,472**	**$133,296**	**$139,323**	**$145,551**	**$152,559**
NET ANNUAL SYSTEM COSTS ($000)	**$102,141**	**$106,558**	**$111,663**	**$116,395**	**$121,845**	**$127,472**	**$133,296**	**$139,323**	**$145,551**	**$152,559**
SYSTEM RATE ($/TON-MANAGED)	**$163**	**$169**	**$176**	**$182**	**$190**	**$197**	**$205**	**$212**	**$220**	**$229**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

SUMMARY

	NPV ($1000)	System Rate ($/ton)								
Year Ending December		**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
SUMMARY, SYSTEM RATE ($/TON MANAGED)										
Chesapeake	$564,920	$68	$71	$73	$77	$80	$82	$86	$89	$92
Franklin	$35,772	$105	$109	$113	$118	$122	$126	$131	$135	$139
Isle of Wight	$112,119	$76	$78	$81	$84	$87	$90	$93	$96	$99
Norfolk	$541,022	$76	$78	$81	$85	$88	$91	$95	$98	$101
Portsmouth	$237,462	$70	$72	$75	$79	$81	$84	$88	$91	$94
Southampton	$77,519	$120	$124	$128	$133	$137	$142	$147	$152	$156
Suffolk	$310,684	$59	$61	$63	$67	$69	$71	$75	$77	$79
Virginia Beach	$1,052,176	$49	$51	$52	$54	$56	$92	$96	$99	$103
SUMMARY, YEARLY COST ($000)										
Chesapeake		19,706	20,668	21,667	22,980	24,055	25,173	26,626	27,838	29,093
Franklin		1,353	1,412	1,472	1,546	1,611	1,679	1,761	1,832	1,909
Isle of Wight		3,907	4,095	4,293	4,546	4,759	4,980	5,265	5,505	5,755
Norfolk		20,000	20,791	21,709	22,904	23,887	24,906	26,220	27,319	28,455
Portsmouth		8,829	9,217	9,618	10,156	10,582	11,024	11,609	12,081	12,567
Southampton		2,924	3,050	3,181	3,341	3,483	3,631	3,806	3,964	4,130
Suffolk		10,293	10,828	11,385	12,122	12,726	13,356	14,184	14,871	15,587
Virginia Beach		26,811	27,955	29,146	30,389	31,686	51,929	54,635	56,931	59,307

1.048829382	1.048328114	1.060593663	1.046769747	1.04648621	1.057730403	1.045526806	1.045080136
1.04355883	1.042729498	1.050031802	1.042309127	1.04195701	1.048866701	1.040580335	1.041932443
1.048196843	1.048311673	1.059009661	1.046834268	1.046514076	1.057049953	1.0456978	1.045437187
1.039542417	1.044121367	1.055082616	1.042882642	1.042688439	1.052770208	1.041891865	1.041577387
1.043907277	1.043519475	1.055974539	1.041960412	1.0417158	1.053114617	1.040656611	1.040252503
1.043142158	1.043053623	1.050305806	1.042524184	1.042530506	1.048116714	1.04164097	1.041829831
1.051934514	1.05147194	1.064684322	1.049829278	1.049521665	1.061954388	1.048496679	1.048089198
1.042669054	1.042604185	1.042647362	1.042679917	1.638862589	1.052109611	1.042024343	1.041734732

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

SUMMARY

Year Ending December	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**
SUMMARY, SYSTEM RATE ($/TON MANAGED)										
Chesapeake	$96	$101	$104	$108	$112	$117	$121	$126	$131	$136
Franklin	$145	$150	$155	$161	$167	$173	$179	$185	$192	$199
Isle of Wight	$103	$107	$110	$114	$119	$123	$127	$132	$136	$141
Norfolk	$105	$110	$113	$118	$123	$127	$132	$137	$142	$147
Portsmouth	$99	$103	$106	$111	$115	$120	$124	$129	$134	$139
Southampton	$162	$168	$173	$179	$185	$191	$198	$204	$211	$218
Suffolk	$83	$86	$89	$92	$96	$100	$104	$108	$112	$116
Virginia Beach	$107	$112	$115	$120	$125	$130	$135	$140	$145	$151
SUMMARY, YEARLY COST ($000)										
Chesapeake	30,688	32,349	33,759	35,531	37,375	39,268	41,248	43,296	45,414	47,612
Franklin	1,999	2,092	2,178	2,276	2,379	2,485	2,596	2,711	2,829	2,952
Isle of Wight	6,069	6,397	6,679	7,031	7,396	7,774	8,169	8,579	9,003	9,445
Norfolk	29,887	31,376	32,643	34,226	35,868	37,551	39,308	41,122	42,996	44,938
Portsmouth	13,200	13,853	14,391	15,081	15,794	16,522	17,279	18,056	18,860	19,685
Southampton	4,325	4,528	4,712	4,928	5,153	5,384	5,626	5,875	6,132	6,403
Suffolk	16,507	17,468	18,281	19,317	20,397	21,512	22,682	23,897	25,160	26,478
Virginia Beach	62,265	65,334	67,988	71,244	74,619	78,088	81,690	85,404	89,250	93,233
	1.054822432	1.054105646	1.043602205	1.05249623	1.051877784	1.05066363	1.050419773	1.049639471	1.048938333	1.048381731
	1.046780998	1.04653361	1.041286401	1.045236665	1.045070171	1.044589581	1.044512377	1.044474483	1.043478465	1.043503871
	1.054579573	1.054005825	1.044025948	1.052674818	1.051993447	1.051011987	1.050925776	1.050123461	1.049491028	1.049021956
	1.050342798	1.04981174	1.040375154	1.048495601	1.047970308	1.046918956	1.046812345	1.046133117	1.045576537	1.045168527
	1.050313635	1.049492758	1.038861911	1.047936361	1.047256687	1.046120653	1.045772796	1.04500904	1.044482975	1.043790414
	1.047152141	1.04684408	1.040699242	1.045954699	1.045621249	1.044825512	1.044863941	1.044256685	1.043829949	1.044156254
	1.059028673	1.05822318	1.046580585	1.056642477	1.055909378	1.054681803	1.054382029	1.053558687	1.052852911	1.052388845
	1.049876069	1.049289328	1.040622034	1.047890804	1.04737241	1.0464895	1.046127446	1.045464561	1.04503302	1.044627451

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario C1.1 - All Eight Communities Go Separate Ways - Contact Out Disposal For All Waste

SUMMARY

Year Ending December	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**
SUMMARY, SYSTEM RATE ($/TON MANAGED)										
Chesapeake	$141	$147	$152	$158	$164	$170	$177	$184	$191	$198
Franklin	$205	$213	$221	$229	$236	$245	$254	$263	$272	$282
Isle of Wight	$145	$151	$156	$162	$167	$173	$179	$185	$192	$198
Norfolk	$153	$159	$164	$171	$177	$184	$191	$198	$205	$212
Portsmouth	$144	$150	$156	$162	$168	$174	$181	$188	$195	$203
Southampton	$225	$233	$241	$249	$257	$266	$275	$284	$294	$304
Suffolk	$120	$125	$130	$135	$139	$145	$150	$156	$162	$168
Virginia Beach	$157	$163	$169	$176	$182	$190	$197	$205	$212	$220
SUMMARY, YEARLY COST ($000)										
Chesapeake	49,902	52,594	55,056	57,941	60,595	63,692	66,900	70,232	73,674	77,254
Franklin	3,079	3,223	3,361	3,516	3,661	3,828	3,999	4,177	4,360	4,550
Isle of Wight	9,905	10,447	10,944	11,527	12,065	12,694	13,347	14,025	14,727	15,461
Norfolk	46,957	49,321	51,487	54,013	56,342	59,050	61,850	64,755	67,758	70,877
Portsmouth	20,543	21,560	22,473	23,550	24,522	25,669	26,847	28,064	29,318	30,614
Southampton	6,680	6,995	7,295	7,633	7,954	8,315	8,693	9,081	9,484	9,901
Suffolk	27,853	29,487	30,980	32,747	34,372	36,286	38,276	40,353	42,508	44,761
Virginia Beach	97,351	102,141	106,558	111,663	116,395	121,845	127,472	133,296	139,323	145,551

1.04809959	1.053958911	1.046804832	1.052392494	1.045807024	1.051118281	1.050360527	1.04980579	1.049009375	1.048592844
1.042886168	1.046888687	1.042789431	1.046116588	1.041305945	1.045418383	1.044713506	1.044518472	1.043933393	1.04348546
1.048769043	1.054697605	1.047552881	1.053225594	1.046695621	1.052195503	1.051382163	1.050792925	1.050081047	1.049806687
1.044931023	1.05035126	1.043897248	1.049072074	1.043110617	1.04807442	1.047408922	1.046968212	1.0463774	1.046040177
1.043580697	1.049473009	1.04233797	1.047954081	1.04126066	1.046783278	1.045894129	1.045343717	1.044681441	1.044183209
1.043223865	1.047260425	1.042826973	1.046329954	1.042075743	1.045428587	1.045391609	1.044669017	1.044344014	1.043945278
1.051925321	1.058656209	1.050666886	1.057023562	1.049614574	1.055678484	1.054848927	1.05425794	1.05340521	1.05301824
1.04416891	1.049203398	1.043244143	1.047908181	1.042377511	1.046823317	1.046181624	1.045688465	1.04521516	1.04470188

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D1.1 - Rural Urban Alignments, Rural Members Contract Disposal, Urban Communnities, New Regional Landfill, No RRF

RURAL ALIGNMENT COMMUNITY RESULTS

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	80,728	81,776	82,828	83,905	84,995	86,110	87,228	88,351	89,508	90,680
Recyclables Managed	4100	4100	4200	4200	4300	4400	4400	4500	4600	4700
Yard Waste Managed	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	80,728	81,776	82,828	83,905	84,995	86,110	87,228	88,351	89,508	90,680
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	669	700	735	769	805	843	884	925	969	1,014
Transfer Station Operations	1,918	1,994	2,074	2,157	2,243	2,333	2,426	2,523	2,624	2,729
Solid Waste Administration	490	509	530	551	573	596	619	644	670	697
Regulatory Compliance	147	153	159	166	172	179	186	194	202	210
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Transportation Cost	405	429	454	480	508	537	569	601	635	672
Out of Region Disposal Costs	2,260	2,372	2,485	2,685	2,805	2,928	3,140	3,269	3,401	3,627
Total System Operating Expenses	**$5,889**	**$6,157**	**$6,437**	**$6,807**	**$7,106**	**$7,416**	**$7,825**	**$8,157**	**$8,501**	**$8,949**
NET ANNUAL SYSTEM COSTS ($000)	**$5,889**	**$6,157**	**$6,437**	**$6,807**	**$7,106**	**$7,416**	**$7,825**	**$8,157**	**$8,501**	**$8,949**
TIPPING FEE ($ Per Ton)	**$66**	**$69**	**$71**	**$74**	**$76**	**$78**	**$82**	**$84**	**$87**	**$90**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$163,128**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D1.1 - Rural Urban Alignments, Rural Members Contract Disposal, Urban Communnities, New Regional Landfill, No RRF

RURAL ALIGNMENT COMMUNITY RERURAL ALIGNMENT COMMUNITY RESULTS

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	91,865	93,075	94,299	95,538	96,791	98,059	99,351	100,659	101,990	103,347
Recyclables Managed	4700	4800	4900	5000	5000	5100	5200	5300	5400	5500
Yard Waste Managed	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	91,865	93,075	94,299	95,538	96,791	98,059	99,351	100,659	101,990	103,347
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	1,062	1,111	1,163	1,219	1,274	1,335	1,399	1,463	1,531	1,604
Transfer Station Operations	2,839	2,952	3,070	3,193	3,321	3,454	3,592	3,735	3,885	4,040
Solid Waste Administration	725	754	784	815	848	882	917	954	992	1,031
Regulatory Compliance	218	227	236	245	255	265	276	287	298	310
WTE Facility Operating and Maintenance Expense:										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Transportation Cost	710	751	793	838	886	936	988	1044	1103	1165
Out of Region Disposal Costs	3,858	4,002	4,243	4,490	4,743	5,001	5,266	5,536	5,813	6,097
Total System Operating Expenses	**$9,412**	**$9,797**	**$10,289**	**$10,801**	**$11,326**	**$11,872**	**$12,437**	**$13,019**	**$13,622**	**$14,248**
NET ANNUAL SYSTEM COSTS ($000)	**$9,412**	**$9,797**	**$10,289**	**$10,801**	**$11,326**	**$11,872**	**$12,437**	**$13,019**	**$13,622**	**$14,248**
TIPPING FEE ($ Per Ton)	**$94**	**$96**	**$100**	**$103**	**$107**	**$111**	**$115**	**$118**	**$122**	**$126**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D1.1 - Rural Urban Alignments, Rural Members Contract Disposal, Urban Communnities, New Regional Landfill, No RRF

RURAL ALIGNMENT COMMUNITY RE RURAL ALIGNMENT COMMUNITY RESULTS

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	104,708	106,104	107,504	108,930	110,391	111,867	113,358	114,874	116,394	117,971
Recyclables Managed	0	0	0	0	0	0	0	0	0	0
Yard Waste Managed	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	104,708	106,104	107,504	108,930	110,391	111,867	113,358	114,874	116,394	117,971
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	1,679	1,756	1,837	1,923	2,013	2,107	2,205	2,304	2,413	2,527
Transfer Station Operations	4,202	4,370	4,545	4,726	4,916	5,112	5,317	5,529	5,750	5,980
Solid Waste Administration	1,073	1,116	1,160	1,207	1,255	1,305	1,357	1,412	1,468	1,527
Regulatory Compliance	323	336	349	363	377	393	408	425	442	459
WTE Facility Operating and Maintenance Expense:										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Transportation Cost	1230	1299	1371	1447	1528	1613	1703	1798	1898	2003
Out of Region Disposal Costs	6,492	6,791	7,203	7,516	7,948	8,390	8,842	9,305	9,777	10,381
Total System Operating Expenses	**$14,998**	**$15,667**	**$16,465**	**$17,182**	**$18,037**	**$18,920**	**$19,832**	**$20,772**	**$21,748**	**$22,878**
NET ANNUAL SYSTEM COSTS ($000)	**$14,998**	**$15,667**	**$16,465**	**$17,182**	**$18,037**	**$18,920**	**$19,832**	**$20,772**	**$21,748**	**$22,878**
TIPPING FEE ($ Per Ton)	**$138**	**$142**	**$148**	**$152**	**$158**	**$163**	**$169**	**$175**	**$181**	**$188**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D1.1 - Rural Urban Alignments, Rural Members Contract Disposal, Urban Communnities, New Regional Landfill, No RRF

URBAN COMMUNITY ALIGNMENT RESULTS

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,185,782	1,196,444	1,207,232	1,218,155	1,229,235	1,240,430	1,251,772	1,263,249	1,274,882	1,286,620
Recyclables Managed	79,700	80,100	80,600	81,000	81,400	81,800	82,300	82,700	83,200	83,600
Yard Waste Managed	80,000	81,000	82,000	82,000	82,000	84,000	84,000	87,000	87,000	87,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	1,185,782	1,196,444	1,207,232	1,218,155	1,229,235	1,240,430	1,251,772	1,263,249	1,274,882	1,286,620
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,067	14,618	15,208	15,806	16,429	17,077	17,770	18,474	19,205	19,967
Transfer Station Operations	30,043	31,245	32,495	33,794	35,146	36,552	38,014	39,535	41,116	42,761
Solid Waste Administration	7,670	7,977	8,296	8,628	8,973	9,332	9,705	10,093	10,497	10,917
Regulatory Compliance	2,307	2,399	2,495	2,595	2,699	2,807	2,919	3,036	3,158	3,284
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	8,300	9,572	9,658	9,745	11,063	11,164	11,266	12,632	12,749	14,153
Site Develop, New Cell, Closure	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	3,557	3,589	3,622	3,654	3,688	3,721	3,755	3,790	3,825	3,860
Additional Transportation Costs	12,398	13,077	13,780	14,532	15,309	16,131	16,999	17,907	18,856	19,854
Out of Region Disposal Costs										
Total System Operating Expenses	**$96,376**	**$100,511**	**$103,588**	**$106,788**	**$111,341**	**$114,817**	**$118,462**	**$123,500**	**$127,439**	**$132,829**
NET ANNUAL SYSTEM COSTS ($000)	**$96,376**	**$100,511**	**$103,588**	**$106,788**	**$111,341**	**$114,817**	**$118,462**	**$123,500**	**$127,439**	**$132,829**
SYSTEM RATE ($/TON-MANAGED)	**$72**	**$74**	**$76**	**$77**	**$80**	**$82**	**$84**	**$86**	**$88**	**$91**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$2,305,407**									
COMBINED NPV RURAL AND URBAN	$2,468,535									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D1.1 - Rural Urban Alignments, Rural Members Contract Disposal, Urban Communnities, New Regional Landfill, No RRF

URBAN COMMUNITY ALIGNMENT RESURBAN COMMUNITY ALIGNMENT RESULTS

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,298,545	1,310,595	1,322,801	1,335,182	1,347,689	1,360,361	1,373,209	1,386,201	1,399,380	1,412,703
Recyclables Managed	84,100	84,600	85,000	85,500	86,000	86,500	87,000	87,500	88,000	88,500
Yard Waste Managed	88,000	88,000	90,000	91,000	92,000	93,000	94,000	95,000	95,000	96,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	1,298,545	1,310,595	1,322,801	1,335,182	1,347,689	1,360,361	1,373,209	1,386,201	1,399,380	1,412,703
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	20,761	21,568	22,428	23,323	24,233	25,204	26,215	27,243	28,313	29,454
Transfer Station Operations	44,471	46,250	48,100	50,024	52,025	54,106	56,270	58,521	60,862	63,296
Solid Waste Administration	11,353	11,808	12,280	12,771	13,282	13,813	14,366	14,940	15,538	16,159
Regulatory Compliance	3,415	3,552	3,694	3,842	3,995	4,155	4,321	4,494	4,674	4,861
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	14,284	14,417	15,874	16,022	17,520	17,685	19,225	19,407	20,991	22,603
Site Develop, New Cell, Closure	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	3,896	3,932	3,968	4,006	4,043	4,081	4,120	4,159	4,198	4,238
Additional Transportation Costs	20,917	22,023	23,183	24,411	25,687	27,040	28,453	29,946	31,516	33,164
Out of Region Disposal Costs										
Total System Operating Expenses	**$137,131**	**$141,583**	**$147,560**	**$152,432**	**$158,818**	**$164,118**	**$171,004**	**$176,744**	**$184,126**	**$191,809**
NET ANNUAL SYSTEM COSTS ($000)	**$137,131**	**$141,583**	**$147,560**	**$152,432**	**$158,818**	**$164,118**	**$171,004**	**$176,744**	**$184,126**	**$191,809**
SYSTEM RATE ($/TON-MANAGED)	**$93**	**$95**	**$99**	**$101**	**$104**	**$107**	**$110**	**$113**	**$116**	**$120**
NPV @ DISCOUNT RATE OF 5% ($1000)										
COMBINED NPV RURAL AND URBAN										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D1.1 - Rural Urban Alignments, Rural Members Contract Disposal, Urban Communnities, New Regional Landfill, No RRF

URBAN COMMUNITY ALIGNMENT RE URBAN COMMUNITY ALIGNMENT RESULTS

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,426,202	1,439,886	1,453,726	1,467,750	1,481,989	1,496,383	1,510,972	1,525,766	1,540,726	1,555,899
Recyclables Managed	89,000	89,500	90,100	90,600	91,100	91,700	92,200	92,800	93,400	93,900
Yard Waste Managed	96,000	99,000	100,000	101,000	101,000	102,000	103,000	104,000	106,000	107,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	1,426,202	1,439,886	1,453,726	1,467,750	1,481,989	1,496,383	1,510,972	1,525,766	1,540,726	1,555,899
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	30,615	31,824	33,083	34,396	35,760	37,183	38,662	40,171	41,777	43,449
Transfer Station Operations	65,828	68,461	71,200	74,048	77,010	80,090	83,294	86,625	90,090	93,694
Solid Waste Administration	16,806	17,478	18,177	18,904	19,660	20,447	21,265	22,115	23,000	23,920
Regulatory Compliance	5,055	5,258	5,468	5,687	5,914	6,151	6,397	6,653	6,919	7,195
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	22,819	24,478	26,167	26,419	28,158	29,928	31,730	32,041	33,896	35,786
Site Develop, New Cell, Closure	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	4,279	4,320	4,361	4,403	4,446	4,489	4,533	4,577	4,622	4,668
Additional Transportation Costs	34,891	36,716	38,624	40,633	42,747	44,960	47,297	49,754	52,333	55,039
Out of Region Disposal Costs										
Total System Operating Expenses	**$198,327**	**$206,568**	**$215,113**	**$222,523**	**$231,729**	**$241,281**	**$251,210**	**$259,970**	**$270,671**	**$281,785**
NET ANNUAL SYSTEM COSTS ($000)	**$198,327**	**$206,568**	**$215,113**	**$222,523**	**$231,729**	**$241,281**	**$251,210**	**$259,970**	**$270,671**	**$281,785**
SYSTEM RATE ($/TON-MANAGED)	**$123**	**$127**	**$131**	**$134**	**$138**	**$143**	**$147**	**$151**	**$156**	**$160**
NPV @ DISCOUNT RATE OF 5% ($1000)										
COMBINED NPV RURAL AND URBAN										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D1.2 - Rural Urban Alignments, Rural Communities Contract Disposal, Urban Communities, New Regional Landfill, Existing RRF Facility

URBAN ALIGNMENT RESULTS

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,185,782	1,196,444	1,207,232	1,218,155	1,229,235	1,240,430	1,251,772	1,263,249	1,274,882	1,286,620
Recyclables Managed	79,700	80,100	80,600	81,000	81,400	81,800	82,300	82,700	83,200	83,600
Yard Waste Managed	80,000	81,000	82,000	82,000	82,000	84,000	84,000	87,000	87,000	87,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	755,282	765,944	776,732	787,655	798,735	809,930	821,272	832,749	844,382	856,120
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	1,910	1,986	2,066	2,148	2,234	2,324	2,416	2,513	2,614	2,718
Total System Operating Revenues	**$33,739**	**$35,088**	**$36,492**	**$37,951**	**$39,469**	**$41,049**	**$42,689**	**$44,397**	**$46,174**	**$48,020**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,067	14,618	15,208	15,806	16,429	17,077	17,770	18,474	19,205	19,967
Transfer Station Operations	30,043	31,245	32,495	33,794	35,146	36,552	38,014	39,535	41,116	42,761
Solid Waste Administration	7,670	7,977	8,296	8,628	8,973	9,332	9,705	10,093	10,497	10,917
Regulatory Compliance	2,307	2,399	2,495	2,595	2,699	2,807	2,919	3,036	3,158	3,284
WTE Facility Operating and Maintenance Expenses										
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	5,287	6,128	6,214	6,301	7,189	7,289	7,391	8,327	8,444	9,417
Site Develop, New Cell, Closure	12,410	12,410	12,410	12,410	12,410	12,410	12,410	12,410	12,410	12,410
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	2,266	2,298	2,330	2,363	2,396	2,430	2,464	2,498	2,533	2,568
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	7,897	8,372	8,866	9,396	9,948	10,532	11,153	11,804	12,489	13,211
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$132,822**	**$138,312**	**$143,247**	**$148,378**	**$154,511**	**$160,078**	**$165,895**	**$172,763**	**$179,054**	**$186,459**
NET ANNUAL SYSTEM COSTS ($000)	**$99,083**	**$103,224**	**$106,755**	**$110,427**	**$115,042**	**$119,029**	**$123,205**	**$128,366**	**$132,880**	**$138,439**
SYSTEM RATE ($/TON-MANAGED)	**$74**	**$76**	**$78**	**$80**	**$83**	**$85**	**$87**	**$90**	**$92**	**$95**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$2,416,794**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D1.2 - Rural Urban Alignments, Rural Communities Contract Disposal, Urban Communities, New Regional Landfill, Existing RRF Facility

URBAN ALIGNMENT RESULTS URBAN ALIGNMENT RESULTS

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,298,545	1,310,595	1,322,801	1,335,182	1,347,689	1,360,361	1,373,209	1,386,201	1,399,380	1,412,703
Recyclables Managed	84,100	84,600	85,000	85,500	86,000	86,500	87,000	87,500	88,000	88,500
Yard Waste Managed	88,000	88,000	90,000	91,000	92,000	93,000	94,000	95,000	95,000	96,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	868,045	880,095	892,301	904,682	917,189	929,861	942,709	955,701	968,880	982,203
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	47,114	48,999	50,959	52,997	55,117	57,322	59,615	61,999	64,479	67,058
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	2,827	2,940	3,058	3,180	3,307	3,439	3,577	3,720	3,869	4,023
Total System Operating Revenues	**$49,941**	**$51,939**	**$54,017**	**$56,177**	**$58,424**	**$60,761**	**$63,192**	**$65,719**	**$68,348**	**$71,081**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	20,761	21,568	22,428	23,323	24,233	25,204	26,215	27,243	28,313	29,454
Transfer Station Operations	44,471	46,250	48,100	50,024	52,025	54,106	56,270	58,521	60,862	63,296
Solid Waste Administration	11,353	11,808	12,280	12,771	13,282	13,813	14,366	14,940	15,538	16,159
Regulatory Compliance	3,415	3,552	3,694	3,842	3,995	4,155	4,321	4,494	4,674	4,861
WTE Facility Operating and Maintenance Expense										
RDF Facility	73,607	76,552	79,614	82,798	86,110	89,555	93,137	96,862	100,737	104,766
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	9,548	9,681	10,708	10,856	11,923	12,088	13,198	13,380	14,533	15,715
Site Develop, New Cell, Closure	12,410	12,410	12,410	12,410	12,410	12,410	12,410	12,410	12,410	12,410
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	2,604	2,640	2,677	2,714	2,752	2,790	2,828	2,867	2,907	2,947
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	13,982	14,789	15,638	16,540	17,481	18,483	19,533	20,646	21,821	23,058
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$193,301**	**$200,398**	**$208,698**	**$216,426**	**$225,360**	**$233,753**	**$243,427**	**$252,512**	**$262,943**	**$273,815**
NET ANNUAL SYSTEM COSTS ($000)	**$143,360**	**$148,459**	**$154,681**	**$160,250**	**$166,936**	**$172,992**	**$180,235**	**$186,793**	**$194,595**	**$202,733**
SYSTEM RATE ($/TON-MANAGED)	**$97**	**$100**	**$103**	**$106**	**$109**	**$112**	**$116**	**$119**	**$123**	**$127**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D1.2 - Rural Urban Alignments, Rural Communities Contract Disposal, Urban Communities, New Regional Landfill, Existing RRF Facility

URBAN ALIGNMENT RESULTS URBAN ALIGNMENT RESULTS

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,426,202	1,439,886	1,453,726	1,467,750	1,481,989	1,496,383	1,510,972	1,525,766	1,540,726	1,555,899
Recyclables Managed	89,000	89,500	90,100	90,600	91,100	91,700	92,200	92,800	93,400	93,900
Yard Waste Managed	96,000	99,000	100,000	101,000	101,000	102,000	103,000	104,000	106,000	107,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	0	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	995,702	824,886	1,023,226	1,037,250	1,051,489	1,065,883	1,080,472	1,095,266	1,110,226	1,125,399
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	69,741	72,530	75,431	78,449	81,587	84,850	88,244	91,774	95,445	99,263
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	4,184	4,352	4,526	4,707	4,895	5,091	5,295	5,506	5,727	5,956
Total System Operating Revenues	**$73,925**	**$76,882**	**$79,957**	**$83,156**	**$86,482**	**$89,941**	**$93,539**	**$97,280**	**$101,172**	**$105,219**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	30,615	31,824	33,083	34,396	35,760	37,183	38,662	40,171	41,777	43,449
Transfer Station Operations	65,828	68,461	71,200	74,048	77,010	80,090	83,294	86,625	90,090	93,694
Solid Waste Administration	16,806	17,478	18,177	18,904	19,660	20,447	21,265	22,115	23,000	23,920
Regulatory Compliance	5,055	5,258	5,468	5,687	5,914	6,151	6,397	6,653	6,919	7,195
WTE Facility Operating and Maintenance Expense										
RDF Facility	108,957	113,315	117,848	122,562	127,464	132,563	137,865	143,380	149,115	155,080
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	15,931	17,160	18,418	18,670	19,978	21,318	22,690	23,001	24,425	25,884
Site Develop, New Cell, Closure	12,410	12,410	12,410	12,410	12,410	12,410	12,410	12,410	12,410	12,410
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	2,987	2,475	3,070	3,112	3,154	3,198	3,241	3,286	3,331	3,376
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	24,359	21,034	27,186	28,715	30,330	32,025	33,821	35,716	37,711	39,811
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$284,097**	**$290,563**	**$308,008**	**$319,652**	**$332,829**	**$346,533**	**$360,793**	**$374,506**	**$389,926**	**$405,967**
NET ANNUAL SYSTEM COSTS ($000)	**$210,172**	**$213,682**	**$228,051**	**$236,496**	**$246,346**	**$256,592**	**$267,254**	**$277,225**	**$288,755**	**$300,749**
SYSTEM RATE ($/TON-MANAGED)	**$130**	**$131**	**$139**	**$143**	**$147**	**$152**	**$157**	**$161**	**$166**	**$171**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D2.1 - Rural and Urban Alignments, Both Contract For Disposal, No Resource Recovery

URBAN ALIGNMENT COMMUNITY RESULTS

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,185,782	1,196,444	1,207,232	1,218,155	1,229,235	1,240,430	1,251,772	1,263,249	1,274,882	1,286,620
Recyclables Managed	79,700	80,100	80,600	81,000	81,400	81,800	82,300	82,700	83,200	83,600
Yard Waste Managed	80,000	81,000	82,000	82,000	82,000	84,000	84,000	87,000	87,000	87,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	1,185,782	1,196,444	1,207,232	1,218,155	1,229,235	1,240,430	1,251,772	1,263,249	1,274,882	1,286,620
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,067	14,618	15,208	15,806	16,429	17,077	17,770	18,474	19,205	19,967
Transfer Station Operations	30,043	31,245	32,495	33,794	35,146	36,552	38,014	39,535	41,116	42,761
Solid Waste Administration	7,670	7,977	8,296	8,628	8,973	9,332	9,705	10,093	10,497	10,917
Regulatory Compliance	1,111	1,155	1,201	1,249	1,299	1,351	1,405	1,462	1,520	1,581
WTE Facility Operating and Maintenance Expenses										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	24,797	26,155	27,560	29,064	30,618	32,262	33,997	35,813	37,713	39,709
Out of Region Disposal Costs	33,202	34,697	36,217	38,981	40,565	42,175	45,064	46,740	48,446	51,465
Total System Operating Expenses	**$110,890**	**$115,846**	**$120,976**	**$127,522**	**$133,030**	**$138,748**	**$145,955**	**$152,117**	**$158,496**	**$166,399**
NET ANNUAL SYSTEM COSTS ($000)	**$110,890**	**$115,846**	**$120,976**	**$127,522**	**$133,030**	**$138,748**	**$145,955**	**$152,117**	**$158,496**	**$166,399**
SYSTEM RATE ($/TON-MANAGED)	**$82**	**$85**	**$88**	**$92**	**$96**	**$99**	**$103**	**$106**	**$110**	**$114**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$3,006,809**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D2.1 - Rural and Urban Alignments, Both Contract For Disposal, No Resource Recovery

URBAN ALIGNMENT COMMUNITY RE URBAN ALIGNMENT COMMUNITY RESULTS URBAN AL

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,298,545	1,310,595	1,322,801	1,335,182	1,347,689	1,360,361	1,373,209	1,386,201	1,399,380	1,412,703
Recyclables Managed	84,100	84,600	85,000	85,500	86,000	86,500	87,000	87,500	88,000	88,500
Yard Waste Managed	88,000	88,000	90,000	91,000	92,000	93,000	94,000	95,000	95,000	96,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	1,298,545	1,310,595	1,322,801	1,335,182	1,347,689	1,360,361	1,373,209	1,386,201	1,399,380	1,412,703
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	20,761	21,568	22,428	23,323	24,233	25,204	26,215	27,243	28,313	29,454
Transfer Station Operations	44,471	46,250	48,100	50,024	52,025	54,106	56,270	58,521	60,862	63,296
Solid Waste Administration	11,353	11,808	12,280	12,771	13,282	13,813	14,366	14,940	15,538	16,159
Regulatory Compliance	1,644	1,710	1,778	1,849	1,923	2,000	2,080	2,163	2,250	2,340
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	41,833	44,047	46,366	48,821	51,373	54,081	56,906	59,893	63,033	66,328
Out of Region Disposal Costs	54,539	56,356	59,526	62,754	66,037	69,378	72,780	76,241	79,765	83,349
Total System Operating Expenses	**$174,601**	**$181,738**	**$190,478**	**$199,542**	**$208,873**	**$218,583**	**$228,617**	**$239,001**	**$249,760**	**$260,927**
NET ANNUAL SYSTEM COSTS ($000)	**$174,601**	**$181,738**	**$190,478**	**$199,542**	**$208,873**	**$218,583**	**$228,617**	**$239,001**	**$249,760**	**$260,927**
SYSTEM RATE ($/TON-MANAGED)	**$119**	**$123**	**$127**	**$132**	**$137**	**$142**	**$147**	**$152**	**$158**	**$163**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D2.1 - Rural and Urban Alignments, Both Contract For Disposal, No Resource Recovery

URBAN ALIGNMENT COMMUNITY RLIGNMENT COMMUNITY RESULTS

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,426,202	1,439,886	1,453,726	1,467,750	1,481,989	1,496,383	1,510,972	1,525,766	1,540,726	1,555,899
Recyclables Managed	89,000	89,500	90,100	90,600	91,100	91,700	92,200	92,800	93,400	93,900
Yard Waste Managed	96,000	99,000	100,000	101,000	101,000	102,000	103,000	104,000	106,000	107,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	1,426,202	1,439,886	1,453,726	1,467,750	1,481,989	1,496,383	1,510,972	1,525,766	1,540,726	1,555,899
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	30,615	31,824	33,083	34,396	35,760	37,183	38,662	40,171	41,777	43,449
Transfer Station Operations	65,828	68,461	71,200	74,048	77,010	80,090	83,294	86,625	90,090	93,694
Solid Waste Administration	16,806	17,478	18,177	18,904	19,660	20,447	21,265	22,115	23,000	23,920
Regulatory Compliance	2,434	2,531	2,632	2,737	2,847	2,961	3,079	3,202	3,331	3,464
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	69,782	73,431	77,247	81,266	85,495	89,920	94,593	99,508	104,667	110,079
Out of Region Disposal Costs	88,425	92,153	97,400	101,275	106,703	112,229	117,856	123,587	129,421	136,919
Total System Operating Expenses	**$273,890**	**$285,878**	**$299,739**	**$312,626**	**$327,475**	**$342,830**	**$358,748**	**$375,209**	**$392,286**	**$411,525**
NET ANNUAL SYSTEM COSTS ($000)	**$273,890**	**$285,878**	**$299,739**	**$312,626**	**$327,475**	**$342,830**	**$358,748**	**$375,209**	**$392,286**	**$411,525**
SYSTEM RATE ($/TON-MANAGED)	**$170**	**$176**	**$182**	**$188**	**$196**	**$203**	**$210**	**$218**	**$225**	**$234**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D2.2 - Rural and Urban Alignments, Both Contract For Disposal, Existing RDF Resource Recovery

URBAN ALIGNMENT COMMUNITY RESULTS

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,185,782	1,196,444	1,207,232	1,218,155	1,229,235	1,240,430	1,251,772	1,263,249	1,274,882	1,286,620
Recyclables Managed	79,700	80,100	80,600	81,000	81,400	81,800	82,300	82,700	83,200	83,600
Yard Waste Managed	80,000	81,000	82,000	82,000	82,000	84,000	84,000	87,000	87,000	87,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	755,282	765,944	776,732	787,655	798,735	809,930	821,272	832,749	844,382	856,120
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	1,910	1,986	2,066	2,148	2,234	2,324	2,416	2,513	2,614	2,718
Total System Operating Revenues	**$33,739**	**$35,088**	**$36,492**	**$37,951**	**$39,469**	**$41,049**	**$42,689**	**$44,397**	**$46,174**	**$48,020**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	14,067	14,618	15,208	15,806	16,429	17,077	17,770	18,474	19,205	19,967
Transfer Station Operations	30,043	31,245	32,495	33,794	35,146	36,552	38,014	39,535	41,116	42,761
Solid Waste Administration	7,670	7,977	8,296	8,628	8,973	9,332	9,705	10,093	10,497	10,917
Regulatory Compliance	1,111	1,155	1,201	1,249	1,299	1,351	1,405	1,462	1,520	1,581
WTE Facility Operating and Maintenance Expenses										
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776
Mass Burn Facility										
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	15,794	16,744	17,732	18,792	19,895	21,065	22,305	23,608	24,978	26,422
Out of Region Disposal Costs	21,148	22,212	23,302	25,205	26,358	27,538	29,566	30,812	32,087	34,245
Total System Operating Expenses	**$140,174**	**$146,282**	**$152,632**	**$160,025**	**$166,888**	**$174,029**	**$182,300**	**$190,036**	**$198,071**	**$207,283**
NET ANNUAL SYSTEM COSTS ($000)	**$106,435**	**$111,194**	**$116,141**	**$122,074**	**$127,419**	**$132,981**	**$139,610**	**$145,639**	**$151,898**	**$159,263**
SYSTEM RATE ($/TON-MANAGED)	**$79**	**$82**	**$85**	**$88**	**$91**	**$95**	**$98**	**$102**	**$105**	**$109**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$2,870,358**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D2.2 - Rural and Urban Alignments, Both Contract For Disposal, Existing RDF Resource Recovery

URBAN ALIGNMENT COMMUNITY RE URBAN ALIGNMENT COMMUNITY RESULTS URBAN AI

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,298,545	1,310,595	1,322,801	1,335,182	1,347,689	1,360,361	1,373,209	1,386,201	1,399,380	1,412,703
Recyclables Managed	84,100	84,600	85,000	85,500	86,000	86,500	87,000	87,500	88,000	88,500
Yard Waste Managed	88,000	88,000	90,000	91,000	92,000	93,000	94,000	95,000	95,000	96,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	868,045	880,095	892,301	904,682	917,189	929,861	942,709	955,701	968,880	982,203
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	47,114	48,999	50,959	52,997	55,117	57,322	59,615	61,999	64,479	67,058
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	2,827	2,940	3,058	3,180	3,307	3,439	3,577	3,720	3,869	4,023
Total System Operating Revenues	**$49,941**	**$51,939**	**$54,017**	**$56,177**	**$58,424**	**$60,761**	**$63,192**	**$65,719**	**$68,348**	**$71,081**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	20,761	21,568	22,428	23,323	24,233	25,204	26,215	27,243	28,313	29,454
Transfer Station Operations	44,471	46,250	48,100	50,024	52,025	54,106	56,270	58,521	60,862	63,296
Solid Waste Administration	11,353	11,808	12,280	12,771	13,282	13,813	14,366	14,940	15,538	16,159
Regulatory Compliance	1,644	1,710	1,778	1,849	1,923	2,000	2,080	2,163	2,250	2,340
WTE Facility Operating and Maintenance Expense										
RDF Facility	73,607	76,552	79,614	82,798	86,110	89,555	93,137	96,862	100,737	104,766
Mass Burn Facility										
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	27,964	29,579	31,276	33,080	34,963	36,966	39,066	41,292	43,642	46,115
Out of Region Disposal Costs	36,458	37,844	40,154	42,520	44,942	47,423	49,964	52,564	55,226	57,950
Total System Operating Expenses	**$216,873**	**$225,926**	**$236,244**	**$246,980**	**$258,093**	**$269,682**	**$281,712**	**$294,200**	**$307,183**	**$320,696**
NET ANNUAL SYSTEM COSTS ($000)	**$166,933**	**$173,987**	**$182,228**	**$190,803**	**$199,669**	**$208,921**	**$218,521**	**$228,481**	**$238,835**	**$249,614**
SYSTEM RATE ($/TON-MANAGED)	**$114**	**$117**	**$122**	**$126**	**$131**	**$136**	**$141**	**$146**	**$151**	**$156**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario D2.2 - Rural and Urban Alignments, Both Contract For Disposal, Existing RDF Resource Recovery

URBAN ALIGNMENT COMMUNITY RLIGNMENT COMMUNITY RESULTS

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,426,202	1,439,886	1,453,726	1,467,750	1,481,989	1,496,383	1,510,972	1,525,766	1,540,726	1,555,899
Recyclables Managed	89,000	89,500	90,100	90,600	91,100	91,700	92,200	92,800	93,400	93,900
Yard Waste Managed	96,000	99,000	100,000	101,000	101,000	102,000	103,000	104,000	106,000	107,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	0	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	995,702	824,886	1,023,226	1,037,250	1,051,489	1,065,883	1,080,472	1,095,266	1,110,226	1,125,399
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	69,741	72,530	75,431	78,449	81,587	84,850	88,244	91,774	95,445	99,263
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	4,184	4,352	4,526	4,707	4,895	5,091	5,295	5,506	5,727	5,956
Total System Operating Revenues	**$73,925**	**$76,882**	**$79,957**	**$83,156**	**$86,482**	**$89,941**	**$93,539**	**$97,280**	**$101,172**	**$105,219**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	30,615	31,824	33,083	34,396	35,760	37,183	38,662	40,171	41,777	43,449
Transfer Station Operations	65,828	68,461	71,200	74,048	77,010	80,090	83,294	86,625	90,090	93,694
Solid Waste Administration	16,806	17,478	18,177	18,904	19,660	20,447	21,265	22,115	23,000	23,920
Regulatory Compliance	2,434	2,531	2,632	2,737	2,847	2,961	3,079	3,202	3,331	3,464
WTE Facility Operating and Maintenance Expense:										
RDF Facility	108,957	113,315	117,848	122,562	127,464	132,563	137,865	143,380	149,115	155,080
Mass Burn Facility										
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	48,718	42,067	54,372	57,430	60,660	64,050	67,642	71,431	75,421	79,621
Out of Region Disposal Costs	61,734	52,793	68,556	71,570	75,707	79,941	84,277	88,717	93,259	99,035
Total System Operating Expenses	**$335,707**	**$329,084**	**$366,483**	**$382,262**	**$399,723**	**$417,850**	**$436,698**	**$456,256**	**$476,608**	**$498,878**
NET ANNUAL SYSTEM COSTS ($000)	**$261,781**	**$252,202**	**$286,526**	**$299,106**	**$313,241**	**$327,909**	**$343,160**	**$358,976**	**$375,437**	**$393,659**
SYSTEM RATE ($/TON-MANAGED)	**$162**	**$155**	**$174**	**$180**	**$187**	**$194**	**$201**	**$208**	**$216**	**$224**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E1.1 - Virginia Beach Manages Own Waste; Others Align and Site Regional Landfill, No Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
SOLID WASTE QUANTITIES (Tons)											
Processible Waste Managed	855,593	864,412	873,339	882,399	891,600	900,914	910,360	919,907	929,624	939,449	949,420
Recyclables Managed	42,600	43,000	43,300	43,700	44,100	44,500	44,800	45,200	45,600	46,000	46,400
Yard Waste Managed	44,000	45,000	45,000	45,000	46,000	46,000	47,000	47,000	48,000	49,000	49,000
RDF/Navy Boiler Facility											
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility											
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	855,593	864,412	873,339	882,399	891,600	900,914	910,360	919,907	929,624	939,449	949,420
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)											
Electricity Revenues											
RDF Plant	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)											
System Operating and Maintenance Expenses											
Recycling Operations	7,039	7,313	7,618	7,917	8,229	8,555	8,914	9,270	9,640	10,025	10,429
Transfer Station Operations	19,427	20,204	21,011	21,852	22,726	23,634	24,580	25,564	26,586	27,648	28,756
Solid Waste Administration	5,548	5,770	6,001	6,241	6,491	6,751	7,021	7,301	7,593	7,897	8,213
Regulatory Compliance	1,669	1,736	1,805	1,877	1,953	2,031	2,112	2,196	2,284	2,376	2,471
WTE Facility Operating and Maintenance Expenses											
RDF Facility	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	5,989	6,915	6,987	7,059	8,024	8,108	8,193	9,199	9,296	10,334	10,444
Site Develop, New Cell, Closure	13,307	13,307	13,307	13,307	13,307	13,307	13,307	13,307	13,307	13,307	13,307
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	2,567	2,593	2,620	2,647	2,675	2,703	2,731	2,760	2,789	2,818	2,848
Additional Transportation Costs	8,946	9,448	9,969	10,526	11,104	11,716	12,362	13,040	13,750	14,497	15,293
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$65,026**	**$67,820**	**$69,852**	**$71,960**	**$75,043**	**$77,339**	**$79,754**	**$83,171**	**$85,779**	**$89,436**	**$92,295**
NET ANNUAL SYSTEM COSTS ($000)	**$65,026**	**$67,820**	**$69,852**	**$71,960**	**$75,043**	**$77,339**	**$79,754**	**$83,171**	**$85,779**	**$89,436**	**$92,295**
SYSTEM RATE ($/TON-MANAGED)	**$69**	**$71**	**$73**	**$74**	**$76**	**$78**	**$80**	**$82**	**$84**	**$86**	**$88**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$1,553,623**										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E1.1 - Virginia Beach Manages Own Waste; Others Align and Site Regional Landfill, No Resource Recovery

Year Ending December	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)									
Processible Waste Managed	959,529	969,784	980,197	990,719	1,001,390	1,012,232	1,023,223	1,034,373	1,045,668
Recyclables Managed	46,900	47,300	47,700	48,200	48,600	49,000	49,500	50,000	50,400
Yard Waste Managed	49,000	49,000	50,000	50,000	51,000	51,000	52,000	53,000	53,000
RDF/Navy Boiler Facility									
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0
Mass Burn Facility									
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	959,529	969,784	980,197	990,719	1,001,390	1,012,232	1,023,223	1,034,373	1,045,668
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)									
Electricity Revenues									
RDF Plant	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)									
System Operating and Maintenance Expenses									
Recycling Operations	10,829	11,267	11,725	12,178	12,677	13,197	13,712	14,251	14,841
Transfer Station Operations	29,906	31,102	32,346	33,640	34,985	36,385	37,839	39,354	40,928
Solid Waste Administration	8,542	8,883	9,239	9,608	9,993	10,392	10,808	11,240	11,690
Regulatory Compliance	2,569	2,672	2,779	2,890	3,006	3,126	3,251	3,381	3,516
WTE Facility Operating and Maintenance Expense									
RDF Facility	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	10,555	11,637	11,762	12,879	13,018	14,171	14,325	15,516	16,731
Site Develop, New Cell, Closure	13,307	13,307	13,307	13,307	13,307	13,307	13,307	13,307	13,307
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534
Landfill Host Fee	2,879	2,909	2,941	2,972	3,004	3,037	3,070	3,103	3,137
Additional Transportation Costs	16,124	16,996	17,921	18,883	19,905	20,973	22,105	23,296	24,547
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$95,245**	**$99,307**	**$102,554**	**$106,891**	**$110,429**	**$115,122**	**$118,951**	**$123,982**	**$129,231**
NET ANNUAL SYSTEM COSTS ($000)	**$95,245**	**$99,307**	**$102,554**	**$106,891**	**$110,429**	**$115,122**	**$118,951**	**$123,982**	**$129,231**
SYSTEM RATE ($/TON-MANAGED)	**$90**	**$93**	**$95**	**$98**	**$100**	**$104**	**$106**	**$109**	**$112**
NPV @ DISCOUNT RATE OF 5% ($1000)									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E1.1 - Virginia Beach Manages Own Waste; Others Align and Site Regional Landfill, No Resource Recovery

Year Ending December	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,057,125	1,068,760	1,080,534	1,092,483	1,104,648	1,116,954	1,129,438	1,142,115	1,154,943	1,167,993
Recyclables Managed	50,900	51,400	51,900	52,400	52,900	53,400	53,900	54,500	55,000	55,500
Yard Waste Managed	54,000	54,000	55,000	55,000	56,000	56,000	57,000	57,000	58,000	59,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	1,057,125	1,068,760	1,080,534	1,092,483	1,104,648	1,116,954	1,129,438	1,142,115	1,154,943	1,167,993
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	0	0	0	0	0	0	0	0	0	0
Total System Operating Revenues	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	15,428	16,040	16,678	17,347	18,043	18,770	19,527	20,281	21,108	21,971
Transfer Station Operations	42,566	44,268	46,039	47,880	49,795	51,788	53,860	56,014	58,255	60,583
Solid Waste Administration	12,157	12,644	13,149	13,675	14,222	14,791	15,383	15,998	16,638	17,304
Regulatory Compliance	3,657	3,803	3,955	4,114	4,278	4,449	4,627	4,812	5,005	5,205
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	16,914	18,169	19,450	19,665	20,988	22,339	23,718	23,984	25,409	26,864
Site Develop, New Cell, Closure	13,307	13,307	13,307	13,307	13,307	13,307	13,307	13,307	13,307	13,307
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	3,171	3,206	3,242	3,277	3,314	3,351	3,388	3,426	3,465	3,504
Additional Transportation Costs	25,862	27,252	28,708	30,244	31,863	33,560	35,354	37,243	39,230	41,317
Out of Region Disposal Costs	0	0	0	0	0	0	0	0	0	0
Total System Operating Expenses	**$133,596**	**$139,223**	**$145,062**	**$150,043**	**$156,344**	**$162,889**	**$169,698**	**$175,599**	**$182,951**	**$190,589**
NET ANNUAL SYSTEM COSTS ($000)	**$133,596**	**$139,223**	**$145,062**	**$150,043**	**$156,344**	**$162,889**	**$169,698**	**$175,599**	**$182,951**	**$190,589**
SYSTEM RATE ($/TON-MANAGED)	**$115**	**$119**	**$122**	**$125**	**$129**	**$133**	**$137**	**$140**	**$144**	**$149**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E1.2 - Virginia Beach Manages Own Waste; Others Align and Site Regional Landfill, Existing RDF Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
SOLID WASTE QUANTITIES (Tons)											
Processible Waste Managed	855,593	864,412	873,339	882,399	891,600	900,914	910,360	919,907	929,624	939,449	949,420
Recyclables Managed	42,600	43,000	43,300	43,700	44,100	44,500	44,800	45,200	45,600	46,000	46,400
Yard Waste Managed	44,000	45,000	45,000	45,000	46,000	46,000	47,000	47,000	48,000	49,000	49,000
RDF/Navy Boiler Facility											
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility											
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	425,093	433,912	442,839	451,899	461,100	470,414	479,860	489,407	499,124	508,949	518,920
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)											
Electricity Revenues											
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302	47,114
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0	0
Interest Income	1,910	1,986	2,066	2,148	2,234	2,324	2,416	2,513	2,614	2,718	2,827
Total System Operating Revenues	**$33,739**	**$35,088**	**$36,492**	**$37,951**	**$39,469**	**$41,049**	**$42,689**	**$44,397**	**$46,174**	**$48,020**	**$49,941**
SYSTEM OPERATING EXPENSES ($000)											
System Operating and Maintenance Expenses											
Recycling Operations	7,039	7,313	7,618	7,917	8,229	8,555	8,914	9,270	9,640	10,025	10,429
Transfer Station Operations	19,426	20,203	21,011	21,852	22,726	23,635	24,580	25,564	26,586	27,650	28,756
Solid Waste Administration	5,548	5,770	6,001	6,241	6,491	6,751	7,021	7,301	7,593	7,897	8,213
Regulatory Compliance	1,669	1,736	1,805	1,877	1,953	2,031	2,112	2,196	2,284	2,376	2,471
WTE Facility Operating and Maintenance Expenses											
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776	73,607
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	2,976	3,471	3,543	3,615	4,150	4,234	4,319	4,894	4,991	5,598	5,708
Site Develop, New Cell, Closure	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	1,275	1,302	1,329	1,356	1,383	1,411	1,440	1,468	1,497	1,527	1,557
WTE Host Fee	615	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	4,445	4,743	5,055	5,391	5,743	6,117	6,516	6,937	7,382	7,854	8,359
Out of Region Disposal Costs											
Total System Operating Expenses	**$101,256**	**$105,406**	**$109,298**	**$113,337**	**$118,000**	**$122,386**	**$126,974**	**$132,219**	**$137,179**	**$142,855**	**$148,252**
NET ANNUAL SYSTEM COSTS ($000)	**$67,517**	**$70,318**	**$72,806**	**$75,386**	**$78,531**	**$81,338**	**$84,285**	**$87,822**	**$91,005**	**$94,835**	**$98,311**
SYSTEM RATE ($/TON-MANAGED)	**$72**	**$74**	**$76**	**$78**	**$80**	**$82**	**$84**	**$87**	**$89**	**$92**	**$94**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$1,660,658**										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E1.2 - Virginia Beach Manages Own Waste; Others Align and Site Regional Landfill, Existing RDF Resource Recovery

Year Ending December	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**
SOLID WASTE QUANTITIES (Tons)											
Processible Waste Managed	959,529	969,784	980,197	990,719	1,001,390	1,012,232	1,023,223	1,034,373	1,045,668	1,057,125	1,068,760
Recyclables Managed	46,900	47,300	47,700	48,200	48,600	49,000	49,500	50,000	50,400	50,900	51,400
Yard Waste Managed	49,000	49,000	50,000	50,000	51,000	51,000	52,000	53,000	53,000	54,000	54,000
RDF/Navy Boiler Facility											
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	0
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility											
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	529,029	539,284	549,697	560,219	570,890	581,732	592,723	603,873	615,168	626,625	453,760
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)											
Electricity Revenues											
RDF Plant	48,999	50,959	52,997	55,117	57,322	59,615	61,999	64,479	67,058	69,741	72,530
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0	0
Interest Income	2,940	3,058	3,180	3,307	3,439	3,577	3,720	3,869	4,023	4,184	4,352
Total System Operating Revenues	**$51,939**	**$54,017**	**$56,177**	**$58,424**	**$60,761**	**$63,192**	**$65,719**	**$68,348**	**$71,081**	**$73,925**	**$76,882**
SYSTEM OPERATING EXPENSES ($000)											
System Operating and Maintenance Expenses											
Recycling Operations	10,829	11,267	11,725	12,178	12,677	13,197	13,712	14,251	14,841	15,428	16,040
Transfer Station Operations	29,906	31,102	32,346	33,640	34,986	36,385	37,840	39,354	40,928	42,565	44,268
Solid Waste Administration	8,542	8,883	9,239	9,608	9,993	10,392	10,808	11,240	11,690	12,157	12,644
Regulatory Compliance	2,569	2,672	2,779	2,890	3,006	3,126	3,251	3,381	3,516	3,657	3,803
WTE Facility Operating and Maintenance Expense											
RDF Facility	76,552	79,614	82,798	86,110	89,555	93,137	96,862	100,737	104,766	108,957	113,315
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	5,819	6,471	6,596	7,283	7,422	8,144	8,298	9,058	9,843	10,026	7,714
Site Develop, New Cell, Closure	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003
Post-Closure Care Escrow	534	534	534	534	534	534	534	534	534	534	534
Landfill Host Fee	1,587	1,618	1,649	1,681	1,713	1,745	1,778	1,812	1,846	1,880	1,361
WTE Host Fee	615	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	8,890	9,451	10,050	10,678	11,348	12,053	12,805	13,600	14,441	15,330	11,570
Out of Region Disposal Costs											
Total System Operating Expenses	**$153,846**	**$160,230**	**$166,334**	**$173,220**	**$179,852**	**$187,331**	**$194,506**	**$202,585**	**$211,023**	**$219,152**	**$219,867**
NET ANNUAL SYSTEM COSTS ($000)	**$101,907**	**$106,213**	**$110,157**	**$114,796**	**$119,091**	**$124,139**	**$128,787**	**$134,237**	**$139,942**	**$145,227**	**$142,985**
SYSTEM RATE ($/TON-MANAGED)	**$97**	**$100**	**$102**	**$105**	**$108**	**$112**	**$115**	**$118**	**$122**	**$125**	**$122**
NPV @ DISCOUNT RATE OF 5% ($1000)											

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E1.2 - Virginia Beach Manages Own Waste; Others Align and Site Regional Landfill, Existing RDF Resource Recovery

Year Ending December	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)								
Processible Waste Managed	1,080,534	1,092,483	1,104,648	1,116,954	1,129,438	1,142,115	1,154,943	1,167,993
Recyclables Managed	51,900	52,400	52,900	53,400	53,900	54,500	55,000	55,500
Yard Waste Managed	55,000	55,000	56,000	56,000	57,000	57,000	58,000	59,000
RDF/Navy Boiler Facility								
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility								
Plant Availability (TPD)	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	650,034	661,983	674,148	686,454	698,938	711,615	724,443	737,493
Contract Out Disposal (Tons)	0	0	0	0	0	0	0	0
SYSTEM OPERATING REVENUES ($000)								
Electricity Revenues								
RDF Plant	75,431	78,449	81,587	84,850	88,244	91,774	95,445	99,263
Mass Burn Plant	0	0	0	0	0	0	0	0
Interest Income	4,526	4,707	4,895	5,091	5,295	5,506	5,727	5,956
Total System Operating Revenues	**$79,957**	**$83,156**	**$86,482**	**$89,941**	**$93,539**	**$97,280**	**$101,172**	**$105,219**
SYSTEM OPERATING EXPENSES ($000)								
System Operating and Maintenance Expenses								
Recycling Operations	16,678	17,347	18,043	18,770	19,527	20,281	21,108	21,971
Transfer Station Operations	46,039	47,880	49,795	51,787	53,859	56,013	58,254	60,584
Solid Waste Administration	13,149	13,675	14,222	14,791	15,383	15,998	16,638	17,304
Regulatory Compliance	3,955	4,114	4,278	4,449	4,627	4,812	5,005	5,205
WTE Facility Operating and Maintenance Expense								
RDF Facility	117,848	122,562	127,464	132,563	137,865	143,380	149,115	155,080
Mass Burn Facility	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	11,701	11,916	12,809	13,729	14,678	14,944	15,938	16,962
Site Develop, New Cell, Closure	8,003	8,003	8,003	8,003	8,003	8,003	8,003	8,003
Post-Closure Care Escrow	534	534	534	534	534	534	534	534
Landfill Host Fee	1,950	1,986	2,022	2,059	2,097	2,135	2,173	2,212
WTE Host Fee	615	615	615	615	615	615	615	615
Additional Transportation Costs	17,271	18,326	19,446	20,625	21,878	23,205	24,607	26,089
Out of Region Disposal Costs								
Total System Operating Expenses	**$237,743**	**$246,958**	**$257,231**	**$267,925**	**$279,066**	**$289,920**	**$301,990**	**$314,559**
NET ANNUAL SYSTEM COSTS ($000)	**$157,786**	**$163,802**	**$170,749**	**$177,984**	**$185,527**	**$192,640**	**$200,818**	**$209,340**
SYSTEM RATE ($/TON-MANAGED)	**$133**	**$137**	**$141**	**$145**	**$150**	**$154**	**$158**	**$163**
NPV @ DISCOUNT RATE OF 5% ($1000)								

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E2.1 - Virginia Beach Manages Own Waste; Others Align and Contract for Disposal, No Resource Recovery

Year Ending December	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
SOLID WASTE QUANTITIES (Tons)											
Processible Waste Managed	855,593	864,412	873,339	882,399	891,600	900,914	910,360	919,907	929,624	939,449	949,420
Recyclables Managed	42,600	43,000	43,300	43,700	44,100	44,500	44,800	45,200	45,600	46,000	46,400
Yard Waste Managed	44,000	45,000	45,000	45,000	46,000	46,000	47,000	47,000	48,000	49,000	49,000
RDF/Navy Boiler Facility											
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility											
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	855,593	864,412	873,339	882,399	891,600	900,914	910,360	919,907	929,624	939,449	949,420
SYSTEM OPERATING REVENUES ($000)											
Electricity Revenues											
RDF Plant	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	8,907	9,263	9,634	10,019	10,420	10,836	11,270	11,721	12,190	12,677	13,184
Interest Income	534	556	578	601	625	650	676	703	731	761	791
Total System Operating Revenues	**$9,441**	**$9,819**	**$10,212**	**$10,620**	**$11,045**	**$11,487**	**$11,946**	**$12,424**	**$12,921**	**$13,438**	**$13,975**
SYSTEM OPERATING EXPENSES ($000)											
System Operating and Maintenance Expenses											
Recycling Operations	7,039	7,313	7,618	7,917	8,229	8,555	8,914	9,270	9,640	10,025	10,429
Transfer Station Operations	19,426	20,203	21,011	21,852	22,726	23,635	24,580	25,564	26,586	27,650	28,756
Solid Waste Administration	5,548	5,770	6,001	6,241	6,491	6,751	7,021	7,301	7,593	7,897	8,213
Regulatory Compliance	803	836	869	904	940	978	1,017	1,057	1,100	1,144	1,189
WTE Facility Operating and Maintenance Expenses											
RDF Facility	0	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	17,892	18,896	19,938	21,053	22,208	23,431	24,725	26,079	27,499	28,994	30,586
Out of Region Disposal Costs	23,957	25,068	26,200	28,237	29,423	30,631	32,773	34,037	35,326	37,578	39,876
Total System Operating Expenses	**$74,665**	**$78,086**	**$81,637**	**$86,204**	**$90,017**	**$93,981**	**$99,030**	**$103,308**	**$107,744**	**$113,288**	**$119,049**
NET ANNUAL SYSTEM COSTS ($000)	**$65,224**	**$68,267**	**$71,425**	**$75,584**	**$78,972**	**$82,494**	**$87,084**	**$90,884**	**$94,823**	**$99,850**	**$105,074**
SYSTEM RATE ($/TON-MANAGED)	**$69**	**$72**	**$74**	**$78**	**$80**	**$83**	**$87**	**$90**	**$93**	**$97**	**$101**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$1,825,933**										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E2.1 - Virginia Beach Manages Own Waste; Others Align and Contract for Disposal, No Resource Recovery

Year Ending December	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)									
Processible Waste Managed	959,529	969,784	980,197	990,719	1,001,390	1,012,232	1,023,223	1,034,373	1,045,668
Recyclables Managed	46,900	47,300	47,700	48,200	48,600	49,000	49,500	50,000	50,400
Yard Waste Managed	49,000	49,000	50,000	50,000	51,000	51,000	52,000	53,000	53,000
RDF/Navy Boiler Facility									
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0
Mass Burn Facility									
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	959,529	969,784	980,197	990,719	1,001,390	1,012,232	1,023,223	1,034,373	1,045,668
SYSTEM OPERATING REVENUES ($000)									
Electricity Revenues									
RDF Plant	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0
Recycling Revenues	13,712	14,260	14,830	15,424	16,041	16,682	17,350	18,043	18,765
Interest Income	823	856	890	925	962	1,001	1,041	1,083	1,126
Total System Operating Revenues	**$14,534**	**$15,116**	**$15,720**	**$16,349**	**$17,003**	**$17,683**	**$18,390**	**$19,126**	**$19,891**
SYSTEM OPERATING EXPENSES ($000)									
System Operating and Maintenance Expenses									
Recycling Operations	10,829	11,267	11,725	12,178	12,677	13,197	13,712	14,251	14,841
Transfer Station Operations	29,906	31,102	32,346	33,640	34,986	36,385	37,840	39,354	40,928
Solid Waste Administration	8,542	8,883	9,239	9,608	9,993	10,392	10,808	11,240	11,690
Regulatory Compliance	1,237	1,286	1,338	1,391	1,447	1,505	1,565	1,628	1,693
WTE Facility Operating and Maintenance Expense									
RDF Facility	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	32,248	33,992	35,841	37,766	39,810	41,947	44,210	46,592	49,095
Out of Region Disposal Costs	41,260	43,640	46,069	48,545	51,071	53,648	56,277	58,959	61,694
Total System Operating Expenses	**$124,022**	**$130,170**	**$136,558**	**$143,128**	**$149,984**	**$157,074**	**$164,412**	**$172,024**	**$179,941**
NET ANNUAL SYSTEM COSTS ($000)	**$109,488**	**$115,054**	**$120,838**	**$126,779**	**$132,981**	**$139,391**	**$146,022**	**$152,898**	**$160,050**
SYSTEM RATE ($/TON-MANAGED)	**$104**	**$108**	**$112**	**$116**	**$121**	**$125**	**$130**	**$134**	**$139**
NPV @ DISCOUNT RATE OF 5% ($1000)									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E2.1 - Virginia Beach Manages Own Waste; Others Align and Contract for Disposal, No Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,057,125	1,068,760	1,080,534	1,092,483	1,104,648	1,116,954	1,129,438	1,142,115	1,154,943	1,167,993
Recyclables Managed	50,900	51,400	51,900	52,400	52,900	53,400	53,900	54,500	55,000	55,500
Yard Waste Managed	54,000	54,000	55,000	55,000	56,000	56,000	57,000	57,000	58,000	59,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	1,057,125	1,068,760	1,080,534	1,092,483	1,104,648	1,116,954	1,129,438	1,142,115	1,154,943	1,167,993
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	0	0	0	0	0	0	0	0	0	0
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Recycling Revenues	19,516	20,296	21,108	21,953	22,831	23,744	24,694	25,682	26,709	27,777
Interest Income	1,171	1,218	1,266	1,317	1,370	1,425	1,482	1,541	1,603	1,667
Total System Operating Revenues	**$20,687**	**$21,514**	**$22,375**	**$23,270**	**$24,201**	**$25,169**	**$26,175**	**$27,222**	**$28,311**	**$29,444**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	15,428	16,040	16,678	17,347	18,043	18,770	19,527	20,281	21,108	21,971
Transfer Station Operations	42,565	44,268	46,039	47,880	49,795	51,787	53,859	56,013	58,254	60,584
Solid Waste Administration	12,157	12,644	13,149	13,675	14,222	14,791	15,383	15,998	16,638	17,304
Regulatory Compliance	1,760	1,831	1,904	1,980	2,059	2,142	2,228	2,317	2,409	2,506
WTE Facility Operating and Maintenance Expense										
RDF Facility	0	0	0	0	0	0	0	0	0	0
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
Additional Transportation Costs	51,724	54,505	57,417	60,489	63,726	67,119	70,708	74,487	78,459	82,635
Out of Region Disposal Costs	65,542	68,401	72,396	75,381	79,535	83,772	88,096	92,511	97,015	102,783
Total System Operating Expenses	**$189,176**	**$197,689**	**$207,583**	**$216,752**	**$227,380**	**$238,381**	**$249,801**	**$261,607**	**$273,883**	**$287,783**
NET ANNUAL SYSTEM COSTS ($000)	**$168,489**	**$176,175**	**$185,208**	**$193,482**	**$203,179**	**$213,212**	**$223,626**	**$234,385**	**$245,572**	**$258,339**
SYSTEM RATE ($/TON-MANAGED)	**$145**	**$150**	**$156**	**$161**	**$167**	**$174**	**$180**	**$187**	**$194**	**$201**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E2.2 - Virginia Beach Manages Own Waste; Others Align and Contract Out Disposal, Existing RDF Resource Recovery

Year Ending December	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	855,593	864,412	873,339	882,399	891,600	900,914	910,360	919,907	929,624	939,449
Recyclables Managed	42,600	43,000	43,300	43,700	44,100	44,500	44,800	45,200	45,600	46,000
Yard Waste Managed	44,000	45,000	45,000	45,000	46,000	46,000	47,000	47,000	48,000	49,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	425,093	433,912	442,839	451,899	461,100	470,414	479,860	489,407	499,124	508,949
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	31,829	33,102	34,426	35,803	37,235	38,725	40,273	41,884	43,560	45,302
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	1,910	1,986	2,066	2,148	2,234	2,324	2,416	2,513	2,614	2,718
Total System Operating Revenues	**$33,739**	**$35,088**	**$36,492**	**$37,951**	**$39,469**	**$41,049**	**$42,689**	**$44,397**	**$46,174**	**$48,020**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	7,039	7,313	7,618	7,917	8,229	8,555	8,914	9,270	9,640	10,025
Transfer Station Operations	19,426	20,203	21,011	21,852	22,726	23,635	24,580	25,564	26,586	27,650
Solid Waste Administration	5,548	5,770	6,001	6,241	6,491	6,751	7,021	7,301	7,593	7,897
Regulatory Compliance	803	836	869	904	940	978	1,017	1,057	1,100	1,144
WTE Facility Operating and Maintenance Expense	0	0	0	0	0	0	0	0	0	0
RDF Facility	49,726	51,716	53,784	55,936	58,173	60,500	62,920	65,437	68,054	70,776
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	8,889	9,485	10,110	10,782	11,485	12,235	13,033	13,875	14,765	15,708
Out of Region Disposal Costs	11,903	12,583	13,285	14,461	15,216	15,994	17,275	18,108	18,967	20,358
Total System Operating Expenses	**$103,949**	**$108,521**	**$113,293**	**$118,708**	**$123,875**	**$129,263**	**$135,375**	**$141,227**	**$147,320**	**$154,173**
NET ANNUAL SYSTEM COSTS ($000)	**$70,210**	**$73,433**	**$76,801**	**$80,757**	**$84,406**	**$88,215**	**$92,686**	**$96,830**	**$101,146**	**$106,153**
SYSTEM RATE ($/TON-MANAGED)	**$75**	**$77**	**$80**	**$83**	**$86**	**$89**	**$92**	**$96**	**$99**	**$103**
NPV @ DISCOUNT RATE OF 5% ($1000)	**$1,932,344**									

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E2.2 - Virginia Beach Manages Own Waste; Others Align and Contract Out Disposal, Existing RDF Resource Recovery

Year Ending December	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	949,420	959,529	969,784	980,197	990,719	1,001,390	1,012,232	1,023,223	1,034,373	1,045,668
Recyclables Managed	46,400	46,900	47,300	47,700	48,200	48,600	49,000	49,500	50,000	50,400
Yard Waste Managed	49,000	49,000	49,000	50,000	50,000	51,000	51,000	52,000	53,000	53,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	518,920	529,029	539,284	549,697	560,219	570,890	581,732	592,723	603,873	615,168
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	47,114	48,999	50,959	52,997	55,117	57,322	59,615	61,999	64,479	67,058
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	2,827	2,940	3,058	3,180	3,307	3,439	3,577	3,720	3,869	4,023
Total System Operating Revenues	**$49,941**	**$51,939**	**$54,017**	**$56,177**	**$58,424**	**$60,761**	**$63,192**	**$65,719**	**$68,348**	**$71,081**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	10,429	10,829	11,267	11,725	12,178	12,677	13,197	13,712	14,251	14,841
Transfer Station Operations	28,756	29,906	31,102	32,346	33,640	34,986	36,385	37,840	39,354	40,928
Solid Waste Administration	8,213	8,542	8,883	9,239	9,608	9,993	10,392	10,808	11,240	11,690
Regulatory Compliance	1,189	1,237	1,286	1,338	1,391	1,447	1,505	1,565	1,628	1,693
WTE Facility Operating and Maintenance Expense	0	0	0	0	0	0	0	0	0	0
RDF Facility	73,607	76,552	79,614	82,798	86,110	89,555	93,137	96,862	100,737	104,766
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	16,717	17,780	18,903	20,100	21,355	22,695	24,107	25,609	27,200	28,883
Out of Region Disposal Costs	21,795	22,748	24,268	25,836	27,451	29,115	30,832	32,600	34,421	36,295
Total System Operating Expenses	**$161,321**	**$168,209**	**$175,938**	**$183,997**	**$192,348**	**$201,083**	**$210,170**	**$219,611**	**$229,446**	**$239,711**
NET ANNUAL SYSTEM COSTS ($000)	**$111,380**	**$116,270**	**$121,921**	**$127,820**	**$133,924**	**$140,322**	**$146,978**	**$153,892**	**$161,098**	**$168,630**
SYSTEM RATE ($/TON-MANAGED)	**$107**	**$110**	**$114**	**$119**	**$123**	**$127**	**$132**	**$137**	**$142**	**$147**
NPV @ DISCOUNT RATE OF 5% ($1000)										

Solid Waste Management in Southside Hampton Roads - Projected Operating Results
Scenario E2.2 - Virginia Beach Manages Own Waste; Others Align and Contract Out Disposal, Existing RDF Resource Recovery

Year Ending December	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
SOLID WASTE QUANTITIES (Tons)										
Processible Waste Managed	1,057,125	1,068,760	1,080,534	1,092,483	1,104,648	1,116,954	1,129,438	1,142,115	1,154,943	1,167,993
Recyclables Managed	50,900	51,400	51,900	52,400	52,900	53,400	53,900	54,500	55,000	55,500
Yard Waste Managed	54,000	54,000	55,000	55,000	56,000	56,000	57,000	57,000	58,000	59,000
RDF/Navy Boiler Facility										
Plant Availability (TPD)	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
Ash Residue	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500	184,500
Solid Waste Processed by RDF Facility	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000	615,000
Mass Burn Facility										
Plant Availability (TPD)	0	0	0	0	0	0	0	0	0	0
Ash Residue	0	0	0	0	0	0	0	0	0	0
Solid Waste Processed by Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Regional Landfill (Tons)	0	0	0	0	0	0	0	0	0	0
Contract Out Disposal (Tons)	626,625	638,260	650,034	661,983	674,148	686,454	698,938	711,615	724,443	737,493
SYSTEM OPERATING REVENUES ($000)										
Electricity Revenues										
RDF Plant	69,741	72,530	75,431	78,449	81,587	84,850	88,244	91,774	95,445	99,263
Mass Burn Plant	0	0	0	0	0	0	0	0	0	0
Interest Income	4,184	4,352	4,526	4,707	4,895	5,091	5,295	5,506	5,727	5,956
Total System Operating Revenues	**$73,925**	**$76,882**	**$79,957**	**$83,156**	**$86,482**	**$89,941**	**$93,539**	**$97,280**	**$101,172**	**$105,219**
SYSTEM OPERATING EXPENSES ($000)										
System Operating and Maintenance Expenses										
Recycling Operations	15,428	16,040	16,678	17,347	18,043	18,770	19,527	20,281	21,108	21,971
Transfer Station Operations	42,565	44,268	46,039	47,880	49,795	51,787	53,859	56,013	58,254	60,584
Solid Waste Administration	12,157	12,644	13,149	13,675	14,222	14,791	15,383	15,998	16,638	17,304
Regulatory Compliance	1,760	1,831	1,904	1,980	2,059	2,142	2,228	2,317	2,409	2,506
WTE Facility Operating and Maintenance Expense	0	0	0	0	0	0	0	0	0	0
RDF Facility	108,957	113,315	117,848	122,562	127,464	132,563	137,865	143,380	149,115	155,080
Mass Burn Facility	0	0	0	0	0	0	0	0	0	0
Landfill Operating and Maintenance Expenses	0	0	0	0	0	0	0	0	0	0
WTE Host Fee	615	615	615	615	615	615	615	615	615	615
Additional Transportation Costs	30,660	32,550	34,541	36,653	38,891	41,250	43,756	46,410	49,214	52,177
Out of Region Disposal Costs	38,851	40,849	43,552	45,677	48,539	51,484	54,517	57,641	60,853	64,899
Total System Operating Expenses	**$250,993**	**$262,112**	**$274,326**	**$286,389**	**$299,628**	**$313,402**	**$327,750**	**$342,655**	**$358,206**	**$375,136**
NET ANNUAL SYSTEM COSTS ($000)	**$177,068**	**$185,230**	**$194,369**	**$203,233**	**$213,146**	**$223,461**	**$234,211**	**$245,375**	**$257,034**	**$269,917**
SYSTEM RATE ($/TON-MANAGED)	**$152**	**$158**	**$164**	**$169**	**$176**	**$182**	**$189**	**$196**	**$203**	**$210**
NPV @ DISCOUNT RATE OF 5% ($1000)										