SCS ENGINEERS

Final Report

Update to Solid Waste Management for Southside Hampton Roads Planning Horizon 2011-2047

Presented to:

The Regional Building

HAMPTON ROADS PDC PLANNING DISTRICT COMMISSION

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Chesapeake, Virginia 23302
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October 6, 2011
File No. 02207104.02

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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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EXECUTIVE SUMMARY

PURPOSE AND SCOPE

This report updates the study that was prepared by SCS Engineers (SCS) for the Hampton Roads Planning District Commission (HRPDC) in November 2008 (SCS, 2008). The report titled "Final Interim Report - Solid Waste Management for Southside Hampton Roads Planning Horizon 2018-2047" (commonly referred to as the "2018 and Beyond Study"), was intended to provide information and analysis to 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 was 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, legal factors, and other constraints, which differ significantly from when the use and support agreements between SPSA and the member communities were originally established in 1983 and 1984.

The 2008 Study report was considered a "Final Interim" because of the significant institutional changes that were occurring within SPSA at the time, as well as the high degree of uncertainty regarding the future operations of the Refuge Derived Fuel (RDF) Waste to Energy (WTE) Facility and SPSA itself. The Chief Administrative Officers (CAOs) of the SPSA member communities decided at the time that their efforts needed to focus on the immediate fiscal challenges facing SPSA and indicated that they wanted to revisit the 2018 and Beyond Study after the institutional and financial issues were satisfactorily addressed. Since the SCS Study was completed in November 2008, the following major events or changes have occurred:

- SPSA reorganized and a new Board was installed (January 2010), with a focus on fiscal transparency and business-like approach to management of SPSA.
- WTE Facility was sold to Wheelabrator (April 2010), substantially reducing SPSA's outstanding debt and stabilizing disposal rates.
- Amount of waste being disposed at the SPSA Regional Landfill was significantly reduced following the consummation of the agreement with Wheelabrator.

SPSA ceased providing recycling services to member communities, with responsibility assumed by Cities/Counties (2010).

The purpose of the current effort is to update the scenarios available to the Region to manage the disposal of solid waste and assess the advantages and disadvantages, institutional factors, and costs of each, and to provide recommendations for the Region to consider between 2011 and 2018 as well as from 2018 to 2047. The governmental entities involved in this effort 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.

ASSUMED 2018 CONDITIONS

The following conditions have been assumed for 2018.

- **SPSA.** SPSA's use and support agreements with the eight member communities expire near the end of January 2018. The future of SPSA past this date is yet to be decided. The analysis presented in this report considers the status quo, with SPSA managing the Regional Landfill and transfer station network, a SPSA that only manages the landfill or transfer stations, and if SPSA no longer exists, and a system configuration without the regional authority.

- **Municipal versus Commercial Waste.** Municipal waste is generally collected by the eight member communities, with commercial waste being collected by private haulers. As such, the municipalities, through SPSA or individually, only can control what happens with the waste they collect, unless they enforce or enact flow control ordinances. The analysis presented in this report focuses on municipally collected waste, although several of the scenarios considered envision SPSA also transferring commercial waste through its transfer stations to the Wheelabrator WTE Facility.

- **In-Region Disposal Capacity**. With the sale of the WTE Facility to Wheelabrator, the diversion of non-processable waste to out-of-region landfills, and the temporary diversion of ash to the Virginia Beach No. 2 Landfill, sufficient potential disposal capacity appears to exist at the Regional Landfill to manage the Region's waste during the 30-year planning period. This assumes that permits can be obtained for future expansions; however, expanding these existing facilities appears to be more feasible than siting a new regional landfill (See Sections 2.0 and 3.0).

- **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 these facilities which are permitted to accept of municipal solid waste (See 2.9.2). If the Region's waste were disposed at these out-of-region landfills, there appears to be sufficient disposal capacity, assuming future anticipated expansions are approved.

- **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). Post-2018, these facilities can either be owned or operated by SPSA, the member communities, or private firms.

- **Waste-to-Energy**. The existing Refuse Derived Fuel Waste-to-Energy Facility (WTE Facility) was purchased from SPSA in 2010 and is now owned and operated by Wheelabrator Technologies, Inc. (Wheelabrator). This facility can be maintained and

upgraded to serve the Region for the 30-year planning period. Resource recovery through use of the existing 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. A new service agreement with Wheelabrator will need to be put in place post-2018 if the facility is to be used by the Region. The service agreement can be accomplished through SPSA or new agreements negotiated separately with the member communities.

- **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.** SPSA keeps records on municipally and commercially collected solid waste received at its transfer stations, as well as construction and demolition debris, sludges, and other special wastes received at the Regional Landfill. Private facilities also handle construction and demolition debris (CDD), yard waste, and other special wastes. In 2010, SPSA managed 1,009,000 tons of solid waste through its network of transfer stations and landfill, including 487,200 tons of municipally collected solid waste at its transfer stations and landfill, 8,100 tons of residential self-delivered and other solid waste, and 513,700 tons of commercial waste, navy waste, construction demolition debris, sludges, and other special waste. In fiscal years 2007 and 2008, SPSA managed in excess of 1,500,00 tons per year. The reduction in solid waste quantities is largely due to depressed economic conditions since that time. Demographic growth projections are used to project future solid waste quantities.

- **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 after January 2018, although various biological, chemical, biochemical conversion technologies were considered. The primary feasible solid waste management strategies that the Region should implement during the planning period include recycling, yard waste management, waste-to-energy, and landfilling, in that order (See Section 3.0).

- **Recycling.** SPSA no longer provides recycling or yard waste processing services to its members, with the exception of household hazardous waste management, white goods, and tire processing at the Regional Landfill. The SPSA member communities are individually managing their respective household recycling and yard waste programs and are expected to continue doing so post-2018.

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, in 2008 and again in 2011, a series of facilitation meetings were held with the CAO's or their staff to discuss the study, 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 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, although in 2011, the Western Communities (Franklin, Isle of Wight, and Southampton) indicated interest in cooperating separately from the current eight members of SPSA to manage the disposal of its municipal solid waste. Some questioned whether waste-to-energy should be pursued in the future, although with the sale of the WTE Facility to Wheelabrator, this has become less of an issue.

- **Acceptance of Out-of-Region Waste.** All indicated some reluctance toward accepting out-of-region, especially if landfill capacity is significantly reduced for disposal of Region's waste. Two communities were somewhat supportive if out-of-region 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; however, the issue has not been actively discussed or pursued since 2008, and became less of an issue after the sale of the WTE Facility to Wheelabrator.

- **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 indicated that it was not necessarily opposed to continuing to host the 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 high system tip fees. However, the general sense is that the changes to the board structure of SPSA in 2010 have been positive and have addressed some of the historical issues the member communities have had.

  - 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.

RECOMMENDED INSTITUTIONAL MODEL FOR REGION

Section 4.0 presents the evaluation of the following institutional models that were considered during the study to identify the required organizational structure, staffing, cooperative agreements needed manage the Region's solid waste, either cooperatively or independently:

- **Status quo.** SPSA continues to provide existing services on behalf of member jurisdictions post 2018.

- **SPSA contracts for all services.** SPSA continues to provide existing services on behalf of member jurisdictions post 2018; but all transfer and disposal services are contracted to the private sector.

- **SPSA contracts for disposal services only.** SPSA negotiates for private disposal capacity on behalf of members and establishes a regional tip fee (post 2018). No transfer services are provided.

- **Independent systems.** Each municipality independently manages its own solid waste stream and develops contracts for required services. SPSA ceases to exist after 2018.

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

- **A new regional 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.

- **Public/private partnership under a new regional authority.** A fully integrated, publicly-owned and privately-operated transfer/disposal system (established with all or some existing member jurisdictions not currently members of SPSA, or resulting from a merger with another existing regional authority).

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 of regional cooperation is more fully evaluated in Section 5.0 of this report.

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

- The shortcomings of SPSA's structure and management that have been expressed by the member communities appear to have been largely addressed by the restructuring of the SPSA Board in 2010 and future refinements can be made to address other concerns.

- 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 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

potential siting of a new Regional Landfill when and if needed. 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 a 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 or transfer station), 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 (see Section 4.4.6.1). 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 Regional Landfill and/or transfer station network. If the Regional Landfill were to close, or the transfer stations divested, substantial changes in the organization would be required in terms of its responsibilities and the number of administrative, technical, operational, and support personnel employed by SPSA. SPSA could 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.

Section 4.5 addresses the specifics of implementing this recommendation including the following:

- Recommended Administrative Structure.
- Process for Changing the Administrative Structure.

- What Should the Future Use and Support Agreements for SPSA Look Like?
- Debt Management.
- Communication and Transparency of Operations.
- System Funding.
- Mission.

ALTERNATIVES EVALUATION

Section 4.0 presents an economic analysis of alternative scenarios for managing solid waste in the Region during the 30-year planning period following the expiration of the Agreements between the member communities and 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 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 became effective in early 2009, but have not been enforced. 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 disposal costs, future cell development and landfill sequencing, closure and post-closure care, and availability of out of regional disposal capacity.

Table ES-1 and Table ES-2 present a descriptive and matrix summary, respectively, of the scenarios evaluated to assess the long-term costs associated with continuing the status quo with a SPSA-type organization, disbanding SPSA or further divesting certain solid waste functions to the SPSA member communities (e.g. transfer station and transportation), and selecting various disposal strategies. The scenarios consider the following major variables:

- Cooperative Structures
  - The eight regional communities cooperate as they do now through SPSA.
  - Western communities (Franklin, Isle of Wight, and Southampton) own and operate their transfer stations and contract haul waste to Waste Management's Atlantic Waste Disposal Landfill in Waverly, Virginia.

Table ES-1. 2018 and Beyond Scenarios

Scenario	Description
A.1	Status Quo, All communities stay in SPSA under current arrangement.
A.2	Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, western communities dispose municipally collected waste at WM's Waverly LF, ash is disposed at the Regional LF at tip fee, SPSA maintains LF and transfer station network, VB keeps its landfill open for its purposes.
A.3	Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, western communities dispose at WM's Waverly LF, ash to Regional LF at tip fee, SPSA maintains Regional LF and transfer station network conveyed to members, VB keeps its landfill open for its purposes.
B.1	Eastern and western communities municipal waste disposed at out of region landfill (ORLF), Wheelabrator is responsible for ash disposal at its own internal facilities, Regional LF closed/sold, SPSA maintains transfer station network, VB keeps its landfill open for its purposes, commercial haulers develop private transfer stations for commercial waste.
B.2	Chesapeake, Norfolk, Suffolk, and Virginia Beach municipal waste disposed at an ORLF, Portsmouth municipal and commercial waste disposed at the Wheelabrator WTE Facility, western communities dispose of its municipally collected waste at WM's Waverly LF, Wheelabrator is responsible for ash disposal at its own internal facilities, the eastern and western communities own and operate their own transfer stations, Regional LF closed, VB keeps its landfill open for its purposes, commercial haulers develop private transfer stations for commercial waste.
B.3	Chesapeake, Norfolk and Suffolk municipal waste disposed at an ORLF, Portsmouth municipal and commercial waste disposed at the Wheelabrator WTE Facility, Virginia Beach municipal solid waste disposed at the VB Landfill No. 2, western communities dispose of municipally collected waste at WM's Waverly LF, and the communities own and operate the transfer stations, commercial haulers develop private transfer stations for commercial waste.
C.1	Eastern communities municipal waste disposed at the Regional LF until capacity depleted, Regional LF expanded through Cell 8/9, after which waste would be disposed at Wheelabrator WTE Facility or an ORLF, western communities municipally collected waste disposed at WM's Waverly LF, commercial haulers develop private transfer stations for commercial waste. Wheelabrator handles disposal of ash. SPSA operates LF & TSs.
C.2	Eastern communities municipally collected waste disposed at the Regional LF until capacity depleted, the Regional LF is expanded through Cell 8/9, after which waste would be disposed at Wheelabrator or out of region landfill (ORLF), western communities deliver waste to WM's Waverly LF, commercial haulers develop private transfer stations for commercial waste, Wheelabrator delivers ash to Regional LF while open. SPSA operates LF and TSs.
C.3	Eastern communities municipally collected waste disposed at the Regional LF until capacity depleted, the Regional LF is expanded through Cell 8/9, after which waste would be disposed at Wheelabrator or an ORLF, western communities deliver waste to WM's Waverly LF, commercial haulers develop private transfer stations for commercial waste, Wheelabrator manages disposal of ash at its own facilities. The eastern and western member communities own and operate the TSs.
D.1	Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, ash residue delivered to Virginia Beach LF, VB gets tip fees for ash, communities own and operate the transfer network, Regional LF closed, western communities deliver waste to WM's Waverly LF.
D.2	Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, ash residue to other WM internal facilities, communities own and operate transfer network, Regional LF closed, western communities deliver municipally collected waste to WM's Waverly LF, Virginia Beach maintains its landfill for own purposes.
E.1	Virginia Beach goes own way, constructs a new WTE facility, other eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Faciltiy, ash residue to other Wheelabrator internal facilities, communities own and operate transfer network, Regional LF closed/sold, western communities deliver municipally collected waste to WM's Waverly LF.
E.2	Virginia Beach develops a new WTE Facility, Chesapeake, Norfolk, Virginia Beach, and Suffolk go to new VB WTE Facility, ash from new facility delivered to VB LF, Portsmouth goes to Wheelabrator, ash residue from Wheelabrator disposed at another Wheelabrator internal facility, communities own and operate transfer network, Regional LF closed, western communities deliver waste to WM's Waverly LF.
F.1	Suffolk takes over Regional LF for its own waste, remaining eastern communities go to Wheelabrator, ash delivered to Wheelabrator/WM LF, communities own and operate transfer network, western communities deliver waste to WM's Waverly LF.
G.1	Similar to Scenario A.1, except that Portsmouth is not part of SPSA, but disposes its municipally collected waste directly at Wheelabrator.

Note: More detailed information on each scenario is presented in Appendix A

Table ES-2. Summary of Key Scenario Factors and Assumptions

	Organization	Waste to Energy		Landfill				Ash			Transfer Stations		Commercial
Scenario	SPSA Continues	RDF WTE	New WTE	SPSA-RLF	Suffolk-RLF	ORLF	VB LF #2	SPSA	VB	Wheelabrator	SPSA	Muni	Through TSs
A.1	Yes[6]	Yes	No	Yes	No	No	Yes[3]	Yes	No	No	Yes	No	Yes
A.2	Yes[1]	Yes	No	Yes	No	No	Yes[3]	Yes	No	No	Yes	No	Yes
A.3	Yes[1]	Yes	No	Yes	No	No	Yes[3]	Yes	No	No	No	Yes	Yes
B.1	Yes[1]	No	No	No	No	Yes	Yes[3]	No	No	Yes	Yes	No	No
B.2	No	Yes[5]	No	No	No	Yes	Yes[3]	No	No	Yes	No	Yes	No
B.3	No	Yes[5]	No	No	No	Yes	Yes[4]	No	No	Yes	No	Yes	No
C.1	Yes[1]	No	No	Yes	No	No	Yes[3]	No	No	Yes	Yes	No	No
C.2	Yes[1]	No	No	Yes	No	No	Yes[3]	Yes	No	No	Yes	No	No
C.3	Yes[1]	No	No	Yes	No	No	Yes[3]	No	No	Yes	No	Yes	No
D.1	No	Yes	No	No	No	No	Yes[3]	No	Yes	No	No	Yes	Yes
D.2	No	Yes	No	No	No	No	Yes[3]	No	No	Yes	No	Yes	Yes
E.1	No	Yes	Yes	No	No	No	Yes	No	Yes	Yes	No	Yes	Yes
E.2	No	No	Yes	No	No	No	Yes	No	Yes	Yes	No	Yes	Yes
F.1	No	Yes	No	No	Yes	No	Yes[3]	No	No	Yes	No	Yes	Yes
G.1	Yes[2]	Yes	No	Yes	No	No	Yes[3]	Yes	No	No	Yes	No	Yes

Notes:
1. Assumes SPSA includes Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach
2. Assumes SPSA includes Chesapeake, Norfolk, Suffolk, and Virginia Beach (Portsmouth delivers directly to WTE Facility)
3. Asssumes VB LF No. 2 open but only for City use (nominal disposal rate)
4. Assumes VB LF No. 2 open to receive all City's MSW.
5. Assumes Portsmouth disposes waste directly to WTE Facility, all others to ORLF.
6. Assumes SPSA includes all current member communities.

- Eastern communities (Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach) either stay with SPSA or self-perform all transfer and disposal operations and Portsmouth delivers its municipally collected waste directly to the Wheelabrator WTE Facility.

- SPSA Organizational alternatives: Landfill + Transfer Operations, Transfer Operations Only, Landfill Operations Only.

- Disposal Alternatives

  - Wheelabrator WTE (through SPSA or contracted directly with municipalities).

  - SPSA Regional Landfill (Cell 7 and Cells 8/9) (MSW and/or ash).

  - Out of Region Landfill (ORLF) (MSW and/or ash).

  - Virginia Beach Landfill No. 2 (MSW and/or ash).

  - Other Private construction and demolition debris landfills are available for handling the MSW or ash waste streams if SPSA's landfill is not operational.

  - New WTE Facility in Virginia Beach (separately or in cooperation with other eastern communities).

  - Organics Treatment Facility (currently private facilities are available to manage yard waste and other organic waste streams; new facilities not considered in evaluation).

- Transfer Station and Transfer Alternatives

  - SPSA owns and operates (either self-perform all operations or contract haul).

  - Eastern member communities own and operate. For all the scenarios considered, the assumption is made that the western communities will own and operate their own transfer stations.

- Landfill Alternatives

  - SPSA owns and operates (with or without revenue from ash from the WTE Facility).

  - Suffolk owns and operates (without revenue from WTE ash).

  - Use of Virginia Beach Landfill for WTE ash disposal, with the City receiving offsetting revenue for providing disposal.

- Out of Region Landfill (Waste Management's Atlantic Waste Disposal Landfill to serve the western communities and the Bethel Landfill for the eastern communities).

- $23 million in road improvements are included in all options where the Regional Landfill is operational during the planning period.

- In SCS's 2008 Report (SCS, 2008), the option of siting a new regional landfill in Southampton County was considered. The updated analysis no longer considers a new regional landfill during the planning period, because it appears that the existing Regional Landfill could be more easily expanded to provide disposal capacity throughout the planning period. Cell 7 and Cells 8/9 could be developed if new capacity is needed.

The focus of the scenario evaluations is municipally collected waste. The assumption is made that the commercial haulers will either cooperate with the municipalities or develop alternative transfer and disposal approaches.

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 43 (In Section 6.0) presents a summary of the implementation steps for each scenario, the advantages, the relative complexity of implementing the scenarios, the relative environmental impact of each, the net present value (NPV) cost ranking for each member community (lowest number being the lowest net NPV cost), and the advantages and disadvantages of each.

The following summary conclusions are offered:

- **Overview of NPV Cost Results (See Table ES-3)**. With the exception of Virginia Beach, the other member communities do not own their own municipal solid waste (MSW) landfill. As such, the disposal options for these communities are limited to SPSA, an out-of-region landfill, or the Wheelabrator WTE Facility. The NPV costs for the out-of-region landfill scenarios (Scenario B.1 and B.2) are generally comparable to the A Scenarios for Chesapeake, Isle of Wight, Norfolk, Portsmouth, and Virginia Beach; however, for Franklin and Southampton, shipping to an out-of-region landfill appears to be more expensive than continuing with SPSA. This is largely due to the allocation of the SPSA transfer station costs to these two communities.
  .

Table ES-3. Summary of NPV Analysis, $Millions 2018-2047(30 years)

NPV Tabulation

Scenario	Scenario Description	Net Present Value, $millions (over 30 years @ 4%)							
		Chesapeake	Franklin	Isle of Wight	Norfolk	Portsmouth	Southampton	Virginia Beach	Suffolk
A.1	All SPSA LF/TS/WTE	434.8	**26.0**	**66.6**	352.3	232.7	**34.8**	761.1	219.0
A.2	Eastern SPSA LF/TS/WTE	449.6	29.7	67.6	361.0	237.8	43.1	777.9	229.4
A.3	Eastern SPSA LF/WTE/Muni TS	436.3	29.7	67.6	367.0	222.5	43.1	781.5	228.8
B.1	All to ORLF/SPSA LF Closed/SPSA TS	428.8	29.7	67.6	348.0	230.3	43.1	753.1	222.2
B.2	All to ORLF/Muni TS/SPSA LF Closed	425.4	29.7	67.6	371.0	211.5	43.1	771.0	199.0
B.3	VB to LF No. 2/All Others to ORLF/Muni TS/ SPSA LF Closed	425.4	29.7	67.6	371.0	211.5	43.1	646.7	199.0
C.1	SPSA LF/TS/Expand LF/WTE/No Ash	348.8	29.7	67.6	300.3	202.3	43.1	661.4	155.3
C.2	SPSA LF/TS/Expand LF/WTE Ash	346.1	29.7	67.6	**298.8**	201.4	43.1	658.4	**147.9**
C.3	SPSA LF/Muni TS/Expand LF/No Ash	**344.4**	29.7	67.6	323.5	**184.7**	43.1	678.9	155.3
D.1	No LF/WTE/Muni TS/VB Ash	405.6	29.7	67.6	348.1	211.5	43.1	**633.6**	214.7
D.2	No LF/WTE/Muni TS/No VB Ash	405.6	29.7	67.6	348.1	211.5	43.1	745.4	214.7
E.1	VB Only Waste/VB WTE/Others to Wheelabrator WTE/SPSA LF Closed	405.6	29.7	67.6	348.1	211.5	43.1	894.8	214.7
E.2	VB WTE/ Others to VB WTE/ SPSA LF Closed	434.6	29.7	67.6	387.1	211.5	43.1	732.4	221.3
F.1	Suffolk Ops LF/Other WTE	405.6	29.7	67.6	348.1	211.5	43.1	745.4	225.0
G.1	Portsmouth to WTE Not Part of SPSA	469.2	29.7	67.6	372.9	211.5	43.1	800.6	242.7

NPV Summary Comparison Table Against Scenario A.1 (Status Quo) NPV_x/NPV_{A-1}

Scenario	Scenario Description	Chesapeake	Franklin	Isle of Wight	Norfolk	Portsmouth	Southampton	Virginia Beach	Suffolk
A.1	All SPSA LF/TS/WTE	100%	100%	100%	100%	100%	100%	100%	100%
A.2	Eastern SPSA LF/TS/WTE	103%	114%	101%	102%	102%	124%	102%	105%
A.3	Eastern SPSA LF/WTE/Muni TS	100%	114%	101%	104%	96%	124%	103%	104%
B.1	All to ORLF/SPSA LF Closed/SPSA TS	99%	114%	101%	99%	99%	124%	99%	101%
B.2	All to ORLF/Muni TS/SPSA LF Closed	98%	114%	101%	105%	91%	124%	101%	91%
B.3	VB to LF No. 2/All Others to ORLF/Muni TS/ SPSA LF Closed	98%	114%	101%	105%	91%	124%	85%	91%
C.1	SPSA LF/TS/ORLF or /WTE/No Ash	80%	114%	101%	85%	87%	124%	87%	71%
C.2	SPSA LF/TS/ORLF or WTE/WTE Ash	80%	114%	101%	85%	87%	124%	87%	68%
C.3	SPSA LF/Muni TS/Expand LF/No Ash	79%	114%	101%	92%	79%	124%	89%	71%
D.1	No LF/WTE/Muni TS/VB Ash	93%	114%	101%	99%	91%	124%	83%	98%
D.2	No LF/WTE/Muni TS/No VB Ash	93%	114%	101%	99%	91%	124%	98%	98%
E.1	VB Only Waste/VB WTE/Others to WheelabratorWTE/SPSA LFClosed	93%	114%	101%	99%	91%	124%	118%	98%
E.2	VB WTE/ Others to VB WTE/ SPSA LF Closed	100%	114%	101%	110%	91%	124%	96%	101%
F.1	Suffolk Ops LF/Other WTE	93%	114%	101%	99%	91%	124%	98%	103%
G.1	Portsmouth to WTE Not Part of SPSA	108%	114%	101%	106%	91%	124%	105%	111%

The NPV cost for the status quo (A.1, all communities cooperating together), appears to have the lowest NPV of the A scenarios. The NPV costs for the Scenario B scenarios are highly dependent on future fuel prices, traffic conditions, and uncertain competitive market conditions

The lowest projected NPV costs are associated with the Scenario C series and D.1 (Virginia Beach), which involve disposing all the eastern member communities municipally collected waste at the Regional Landfill, and in the case of Virginia Beach under D.1, disposing of the City's waste at their own landfill and receiving offsetting revenue from the disposal of WTE ash. The primary issues associated with Scenarios C are: 1) is the uncertainty of successfully permitting the expansion of the Regional Landfill into Cells 8/9 and Virginia Beach Landfill 2) a 100% disposal approach is not consistent with the waste management hierarchy adopted by the Region in its Regional Solid Waste Management Plan, and 3) the uncertainty regarding the disposition and market disposal rate for the WTE ash.

Scenario D, which involves the eastern member communities negotiating individually with Wheelabrator for disposal and operating their own transfer stations appears to have a NPV cost lower than the A scenarios. However, the uncertainty and risks associated with this alternative include the ability of the communities to individually negotiate a similar disposal and transfer agreement with Wheelabrator as SPSA currently has, because the current cooperative arrangement leverages the total waste stream from the municipalities. This leverage provides a stronger negotiating position.

- **New Regional Landfill Need.** The Regional Landfill and Virginia Beach Landfill No. 2 appear to have capacity to serve the Region's solid waste disposal needs during the planning period. However, each facility has various site constraints that could affect future expansion of these facilities. The Regional Landfill Cell 7 expansion has been permitted; however, expansion into Cells 8/9 will require substantial wetlands permitting and site review, all of which is feasible and easier to do than siting a new landfill. The City of Virginia Beach has concluded it is technically feasible to expand its landfill beyond Phase 4 into Cells 2B and 3; however, it understands it will face difficulties in doing so. Siting a new landfill in the Region is not critical at this juncture.

- **Waste to Energy.** Utilizing the Wheelabrator WTE Facility or constructing a new WTE Facility will result in less volumes of waste being landfilled (conserving landfill capacity), and will reduce the reliance on fossil fuels for energy generation through the use of solid waste as a renewable energy resource. With the improvements to the Wheelabrator WTE Facility and operations, there is little need to construct a new WTE facility in the Region, although the NPV analysis suggests that constructing a new WTE facility that would handle the municipally collected waste from Chesapeake, Norfolk, and Virginia Beach could be cost competitive with the status quo. The risks associated with constructing a new WTE include securing the waste stream and negotiating long-term inter-local agreements with the member communities, permitting, and financing. If the municipally collected waste that

currently is disposed at the Wheelabrator facility were diverted to a new WTE Facility, Wheelabrator likely would import waste to the Portsmouth facility from out of the region to provide fuel for the facility. Chesapeake has historically expressed concerns regarding the importation of significant quantities of waste from out of the region, especially if it is delivered via barge, and others may have concerns regarding potentially increased traffic depending on how waste is transported to the facility (barge or transfer trailers) and the transportation routes selected. A new WTE facility likely could not be permitted and constructed by 2018, and further refinement of the estimated costs would be needed to confirm the basic assumptions used for the conceptual estimates.

Incineration is preferred over landfilling per the Region's approved waste management hierarchy. SPSA has the right, in its sole discretion, to extend the term of the agreement with Wheelabrator for an additional period of 10 years, but must notify Wheelabrator by December 31, 2014 if it intends to do so. SPSA has indicated that several provisions of the agreement would likely need amending based on its experience since the facility was sold to Wheelabrator in 2010. In addition, some have expressed the opinion that a lower service fee might be possible; however, that is all speculation at this point.

- **Existing Landfills in Region.** The existing Regional Landfill and City of Virginia Beach Landfill No. 2 are important assets for controlling the long term solid waste management costs for the member communities. The Regional Landfill operation scenario (Scenario C) establishes a potential benchmark for future long-term negotiations with Wheelabrator or other disposal options.

- **Importance of Regional Landfill**. Landfilling of all municipally collected waste at the Regional Landfill, although the apparent lowest NPV cost for the Region of the scenarios considered, is inconsistent with the solid waste management hierarchy (See Figure ES-1) contained in the Region's solid waste management plan (HRPDC, 2011). Disposal is the least preferred management option, with incineration preferred over direct disposal.

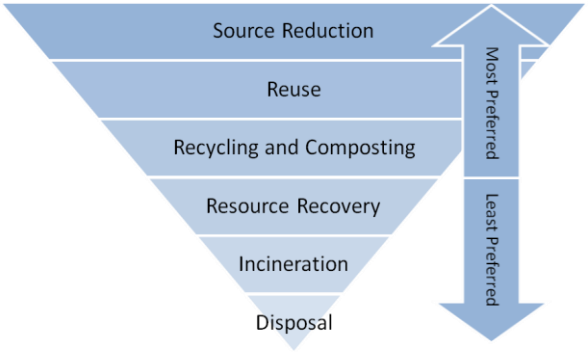

Figure ES-1. Waste Management Hierarchy

- **Out-of-Region Disposal.** For the eastern member communities (Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach) the pro forma modeling results suggest that the disposal of solid waste at an out-of-region landfill could result in slightly lower NPV costs; however, as noted above, the B Scenarios are highly dependent on fuel prices, which in recent years have been volatile. For the Western Communities, the scenario of owning their own transfer stations and contracting directly with an out-of-region landfill (WM Atlantic Waste Disposal Landfill) would appear to result in a higher NPV cost compared to the status quo (A.1). Disposing at an out-of-region landfill has a higher degree of uncertainty relative to future disposal tip fees and transportation costs compared to the other scenarios considered. With the availability of the Wheelabrator WTE Facility and the existing publically-owned landfills in the Region, reliance on an out-of-region disposal facility likely is not needed in the immediate future, but it is an available option.

- **Ash Disposal.** Substantial cost savings can be realized if either SPSA or the City of Virginia Beach is able to negotiate an ash disposal agreement with Wheelabrator (Scenarios A.1, A.2, C. 2, and D.1).

- **Transfer Station Ownership and Operation**. SPSA currently operates all the transfer stations and waste transfer operations in the Region. SPSA is making improvements to its existing Transfer Station network. After 2018, the transfer stations can be either owned or operated by SPSA or by the member communities. Incorporation of transfer station and waste transfer operations into the municipal infrastructure should not be difficult given the scope of most public works operations in the Region. However, the analysis presented in Section 5.0 suggests that operating the SPSA network as currently configured would be more cost effective than the municipalities owning and operating them; however, additional review with SPSA and the member communities is required to more fully review the key cost allocation assumptions made by SCS. If the municipalities took over the transfer operations, they each would need to hire new staff, establish operation and maintenance protocols, incorporate equipment into existing fleet operations, and provide overhead support for health and safety, accounting, environmental compliance, permitting, and engineering.

  The primary advantage of the current management of the transfer station and transfer operations is that the entire system resources can be coordinated under one management structure, which would not be the case if the transfer station and transfer operations were taken over by the municipalities. Currently, equipment and personnel can be shifted as needed between facilities to address problems that arise, which would be more difficult, if not possible to do if the cities took over the operations. However, if the cities took over the operations, they could more directly control the facilities within their jurisdictions.

  SCS's review of the SPSA's transfer station operations did not identify inefficiencies in staffing or equipment assignments. The analysis suggests that some of the overhead, maintenance, and support functions currently provided separately by SPSA could be absorbed by the member communities at no major additional cost. Divesting

the transfer stations would complicate the management or the transfer stations and transfers operations since many of the communities routinely use the transfer stations located outside of their immediate jurisdictions (e.g., Portsmouth may use Norfolk's, Virginia Beach may use Chesapeake's, etc.) without complication. Separate arrangements would need to be made for inter-jurisdictional use of these facilities. Additional, unforeseen costs and inefficiencies could result, which are not reflected in the cost figures presented in this report.

- **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 both 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, and other supporting facilities. The advantages and disadvantages of contracted are discussed in more detail in 6.1.3.

  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.

- **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 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.

- **Yard Waste.** 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 or transported to McGill Environmental Systems for processing. The McGill facility is located near Waste Management's Atlantic Waste Disposal Landfill located in Waverly, Virginia. The facility processes and composts yard waste and other organic wastes. 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).

- **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 if 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 a new landfill is unable to be sited in the Region when needed, rail haul could 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.

- **Tip Fee After 2018.** If the system tip fee model currently employed by SPSA continues for Scenario A.1 (status quo), the projected system tip fees after 2018 would be approximately $87/ton (See Figure 19). This tip fee includes all operational costs for transfer, landfilling, and disposal, including administrative overhead, and potential offsetting revenues from the disposal of other waste streams at the landfill, transfer of commercial waste to Wheelabrator, and LFG royalty payments. In today's dollars that would be approximately $69/ton. All of SPSA's current debt will be paid off at that time. However, several significant capital expenses are projected for the landfill facility in 2022-2023 to address needed roadway improvements at the facility, and by 2023 the system tip fee is projected to be approximately $99/ton.

RECOMMENDATIONS

The following recommendations are offered for future consideration:

- **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 operation of the Regional Landfill. This significant cost-control advantage would be lost if the Region does not cooperate. Retaining the ability to cost-effectively operate the Regional Landfill would be a 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), and the services requested by its members (e.g., collection, recycling, yard waste, household hazardous wastes).

Future cooperation of the Region's members (either all eight communities or a subset of the eight) 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. However, many of the member communities have moved forward with providing recycling, yard waste, and household hazardous waste services in the absence of a reliable regional approach, and returning to a regional approach may be difficult in light of past experiences within the Region.

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, expanding the existing Regional landfill or siting a new landfill, or maintaining the Regional Landfill Facility in the event that contracted disposal costs become too high.

- **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.

- **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 considered 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 will not be acceptable to their communities on a going forward basis after 2018, although the changes to the SPSA Board have alleviated these concerns somewhat. 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 be a combination of individuals with specific qualifications or expertise in business, engineering, environmental, legal, finance, construction, or solid waste disciplines. The current board has many of these characteristics and is functioning to provide critical review of business and technical matters to allow for the independent governance 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.

  - **Facility and System Ownership.** If all members of the Region decide to cooperate beyond 2018, consideration should be given to possibly 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.

  - **System Funding**. If SPSA continues as provider of transfer and disposal services to the Region, SCS recommends that the current tip fee structure be modified to

more accurately reflect the cost of services provided to each of the member communities. This can be accomplished through a special assessment or a modified tip fee structure. An alternative tip fee approach would likely result in in a tiered tip fee structure, with each community paying somewhat different rates depending on the services provided.

We understand that a special assessment has been considered in the past by the Region, but that a consensus agreement implementing a special assessment 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.

- **Utilization of Existing Facilities.** The Region, through SPSA, has substantial capital invested in the 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. Keeping the Regional Landfill under SPSA's ownership and operation provides the Region significant market control regarding future disposal

rates, regardless of whether it elects to dispose at the Wheelabrator WTE Facility or another out-of-region landfill.

- **Sale of Regional Landfill to Suffolk.** Section 5.0 presents a scenario where the City of Suffolk owns and operates the Regional Landfill (Scenario F). This scenario demonstrates that the Landfill could be operated by Suffolk, or any other member community, in a cost-effective manner. However, the cost to purchase the landfill from SPSA is not included in the NPV cost analysis for this scenario; therefore, the final NPV cost would have to be increased to incorporate this cost, which could be significant. With the exception of the City of Virginia Beach, none of the communities have recent experience or staff capable of operating a municipal solid waste landfill. New staff would have to be hired and systems put in place to manage the landfill. SCS does not recommend the Regional Landfill be sold to one of the member communities, unless the Region decides to no longer operate the landfill through SPSA.

- **Sale/Lease of Regional Landfill to Private Company.** The sale or lease of the Regional Landfill to a private company was not directly considered in this analysis; however, it is a potential option. The structure of such a sale/lease could vary widely depending on the companies responding, but the benefits could include an upfront payment, potential long-term host fees, and reduced long-term liability for the closure and post-closure of the facility.

- **Host Fee**. If SPSA continues to operate the Regional Landfill, consideration should be given paying the City of Suffolk a host fee for waste disposed at the Landfill, which should be established in a new use and support agreement with the City. A "host fee" provides recognition of the impacts that a landfill 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. The analysis presented in Section 5.0 includes a $1/ton host fee in the future cost projections.

- **Yard Waste Management**. From a policy perspective, SCS recommends that a regional facility be sited and constructed to serve the Region as soon as possible. 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. The Regional Landfill is the most logical location for such a facility in order to reduce

transportation costs which are now being incurred by some of the member communities that transport their yard waste to the McGill Environmental Services facility in Waverly, Virginia. The facility could be owned and operated by SPSA, or owned by SPSA and operated by a contractor. Alternatively, SPSA could issue an request for proposal for private companies to develop, permit, construct, and operate a new yard waste facility to serve the SPSA members.

- **Recycling.** The Region currently exceeds the 25 percent recycling rate mandated by the State through its existing programs and programs implemented by the private sector. The HRPDC has taken responsibility for collecting recycling data within the Region and reporting to the State. It is expected that the HRPDC will retain this responsibility even 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.

- **Implementation Schedule.** The basic implementation steps for the various scenarios considered in this report are presented in Table 43. Table ES-4 presents important schedule milestones for the Region to consider. The two key dates are the deadline for extending the Wheelabrator service agreement (December 31, 2014) and the expiration of the use and support agreements with SPSA (January 24, 2018). The implementation steps vary depending on the scenario selected. The SPSA member communities need to make a decision regarding their future relationship with SPSA sooner (i.e., before the December 31, 2014), rather later so that SPSA can decide how it will manage itself between now and 2018 and beyond, and the local communities can take the steps needed to secure appropriate transfer and disposal services.

Table ES-4. Implementation Schedule

Task	Dates	Comments
Deliberations by member communities on whether to pursue a cooperative approach	October 2011-December 31, 2014	The sooner this decision is made the better with respect to SPSA staff retention and the viability of SPSA operations between now and 2018.
Negotiate with Wheelabrator on terms and conditions for extending contract.	January 2012-November 2014	This would allow issues that have arisen during the initial term of the contract to be addressed; however, the financial terms would likely be different (either higher or lower) depending on market conditions.
Option: SPSA decision on extending service agreement with Wheelabrator: December 31, 2014	December 31, 2014	
Option: SPSA Continues Operating the Transfer Station and/or Landfill:	January 2018	
Negotiate new use and support agreements between SPSA and member communities.	January 2014 – August 2017	
Member Board actions on new use and support agreements	September – December 2017	
Option: Member Communities Own and Operate and Transfer Stations	January 2018	
Establish legal basis for sale of assets.	January 2011 – December 2014	
Negotiate sale price	January 2015 – December 2016	
Effect sale and facilities and equipment	January 2017 – December 2017	
Hire staff and train staff, and establish operation and maintenance systems	July – December 2017	
Establish inter-local agreements	January 2017 – December 2017	
Establish rates	January 2018	

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

In November 2008, SCS Engineers (SCS) presented the findings of the "Final Interim Report - Solid Waste Management for Southside Hampton Roads Planning Horizon 2018-2047" (commonly referred to as the "2018 and Beyond Study") to the joint boards of the Southeastern Public Service Authority (SPSA) and the Hampton Roads Planning District Commission (HRPDC). This study effort was funded and managed through the HRPDC.

The focus of the original Study (SCS, 2008) was on a 30-year planning period beginning in 2018 because the Use and Support Agreements between SPSA and its member communities expire in January 2018. The Study was intended to provide information and analysis to 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 was 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, legal factors, and other constraints, which differ significantly from when the use and support agreements with SPSA were originally established in 1983 and 1984.

The 2008 Study report was considered a "Final Interim" because of the significant institutional changes that were occurring within SPSA at the time, as well as the high degree of uncertainty regarding the future operations of the Refuge Derived Fuel (RDF) Waste to Energy (WTE) Facility and SPSA itself. The Chief Administrative Officers (CAOs) of the SPSA member communities decided at the time that their efforts needed to focus on the immediate fiscal challenges facing SPSA and indicated that they wanted to revisit the 2018 and Beyond Study after the institutional and financial issues were satisfactorily addressed. Since the SCS Study was completed in November 2008, the following major events or changes have occurred:

- SPSA reorganized and a new Board was installed (January 2010), with a focus on fiscal transparency and business-like approach to management of SPSA.
- WTE Facility was sold to Wheelabrator (April 2010), substantially reducing SPSA's outstanding debt and stabilizing disposal rates.
- Amount of waste being disposed at the SPSA Regional Landfill is significantly reduced following the consummation of the agreement with Wheelabrator.
- SPSA ceased providing recycling services to member communities, with responsibility assumed by Cities/Counties (2010).

SCS has been subsequently retained by the HRPDC to update the 2008 Study and report. The purpose of the current effort is to update the scenarios available to the Region to manage the disposal of solid waste and assess the advantages and disadvantages, institutional factors, and costs of each, and to provide recommendations for the Region to consider between now and 2018 as well as from 2018 to 2047. The governmental entities involved in this effort 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 Report 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. In conducting this study, SCS performed the following tasks:

- Task 1 – Update Background Information and Assumptions
- Task 2 – Conduct SPSA Facility Visits and Evaluations
- Task 3 – Conduct Scenario Evaluations
- Task 4 – Prepare Update to Report
- Task 5 – Facilitation Meetings

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.

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 SCS's analysis is also 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 from a Regional and municipal perspective, 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 both the 2008 Study as well as this study update was coordination with the Chief Administrative Officers from the local governments. SCS met individually with each of the CAO's and their technical and/or administrative staff to discuss their expectations regarding the study and their perspectives regarding solid waste management in the Region then and in the future. These meetings were held to identify the perceived strengths and weaknesses of the existing solid waste management system, its governance, scope of services provided, financial structure, and operations. In addition, in 2008 a series of five facilitation meetings were 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 both during the 2008 Study process and for this update.

Table 1. Chief Administrative Officers and Facilitation Participants

Jurisdiction Participants	Title	CAO Meetings	Initial Interviews
Chesapeake (2008)			
Mary Ann Saunders	Assistant City Manager	♦	♦
Jan Proctor	Deputy City Attorney	♦	♦
David Thompson	Solid Waste Administrator		♦
(2011)			
William Harrell	City Manager		

Table 1. Chief Administrative Officers and Facilitation Participants

Jurisdiction Participants	Title	CAO Meetings	Initial Interviews
Eric Martin	City Engineer	♦	♦
David Thompson	Solid Waste Administrator		♦
Franklin (2008)			
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		♦
(2011)			
June Fleming	City Manager		♦
Taylor Williams			♦
Chad Edwards	Deputy Director of Public Works		♦
Russell Pace	Director of Public Works		♦
Isle of Wight County (2008)			
Douglas Caskey	County Administrator	♦	♦
Wayne Roundtree	General Services (former)	♦	♦
(2011)			
Douglas Caskey	County Administrator	♦	♦
Edwin Wrightson	General Services		♦
Norfolk (2008)			
Stanley Stein	Assistant City Manager	♦	♦
John Kiefer	Department of Public Work		♦
(2011)			
Marcus Jones	City Manager	♦	♦
Stanley Stein	Assistant City Manager	♦	
John Kiefer	Department of Public Work		♦
Alice Kelly	Public Works		♦
Walter Coley	Solid Waste Superintendent		
Portsmouth (2008)			
Ken Chandler	City Manager	♦	♦
Judy Duffy	Asst. Director, Dept. of Public Works	♦	♦
Joe Grillo	Management Analyst		♦
Bill MGlaughlan	Director of General Services		♦
(2011)			
Jarvis Middleton	Public Works Director		♦
Southampton County (2008)			
Mike Johnson	County Administrator	♦	♦
(2011)			
Mike Johnson	County Administrator	♦	♦
Suffolk (2008)			
Selena Coffee-Glenn	City Manager	♦	
Eric Nielsen	Director of Public Works	♦	♦
Wesley King	Asst. Director of Public Works		♦
(2011)			
Selena Coffee-Glenn	City Manager	♦	
Eric Nielsen	Director of Public Works	♦	♦
LJ Hansen		♦	
Virginia Beach (2008)			
Jim Spore	City Manager	♦	
John Barnes	Waste Mgt. Administrator	♦	♦
(2011)			
Jim Spore	City Manager	♦	
Phil Davenport			♦
John Barnes	Waste Mgt. Administrator		♦
SPSA (2008)			
Bucky Taylor	Executive Director (new)	♦	
John Hadfield	Executive Director (retired)	♦	♦
Louie Jordan	Deputy Executive Director	♦	♦
(2011)			
Bucky Taylor	Executive Director	♦	♦
Liesl DeVary	Executive Director		♦

Table 1. Chief Administrative Officers and Facilitation Participants

Jurisdiction Participants	Title	CAO Meetings	Initial Interviews
HRPDC (2008)			
Art Collins	Executive Director (retired)	♦	
Dwight Farmer	Executive Director (new)	♦	
John Carlock	Deputy Executive Director	♦	
(2011)			
Dwight Farmer	Executive Director	♦	
John Carlock	Deputy Executive Director	♦	
Jay McBride	Principal Regional Planner	♦	
Whitney Katchmark	Principal Water Resource Planner	♦	

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 and then again in Winter/Spring 2011 (for this update) 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 the 2008 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.

A compilation of the survey findings is provided 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, although in 2011, the Western Communities (Franklin, Isle of Wight, and Southampton) indicated interest in cooperating separately from the current eight members of SPSA to manage the disposal of its municipal solid waste. Some questioned whether waste-to-energy should be pursued in the future, although with the sale of the WTE Facility to Wheelabrator, this has become less of an issue.

- **Acceptance of Out-of-Region Waste.** All indicated some reluctance toward accepting out-of-region waste, especially if landfill capacity is significantly reduced for disposal of Region's waste. Two communities were somewhat supportive if out-of-region 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; however, the issue has not been actively discussed or pursued since 2008, and became less of an issue after the sale of the WTE Facility to Wheelabrator.

- **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 indicated that it was not necessarily opposed to continuing to host the 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 high system tip fees. However, the general sense is that the changes to the board structure of SPSA in 2010 have been positive and have addressed some of the historical issues the member communities have had.

- 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

1.3.2 Recent Meetings with Cities and Counties

As stated previously, for this update of the 2008 Study, SCS again meet with SPSA member communities to better understand their perspectives and general views about solid waste management, especially in light of recent changes in the solid waste management "landscape" since the 2008 Study. SCS was again interested in identifying key factors, values, and criteria

that each community will apply when deciding on how to manage its solid waste in the future. A compilation of the interviews findings is provided below:

- Discussions with the western communities (City of Franklin, Southampton and Isle of Wight Counties) indicated that, following the end of their Use and Support agreements with SPSA, they will most likely transport their disposable waste to Waste Management's Atlantic Waste Disposal Landfill near Waverly (Sussex County), Virginia. Recent successful cooperation with recycling initiatives have convinced many in these communities that the involvement of SPSA in waste management initiatives is not required. These communities are interested in having SPSA divest its assets before the use and support agreements end in 2018.

- The results of recent discussions with the City of Portsmouth indicate that the City will most likely come to an agreement with Wheelabrator and transport its disposal waste to the WTE RDF Facility rather than continue as a member of SPSA post-2018.

- Several communities seem to agree that overall there appears to be greater potential for regional cooperation now that the SPSA debt issue appears to be under control. The most often mentioned potential area of cooperation is with transportation of waste in the Region including operation of the transfer stations. Although, at least one community sees the reduction in SPSA services as a reason not to continue to cooperate together in a regional authority.

1.3.3 2008 CAO Facilitation Meetings

SCS conducted a series of facilitation meetings with the CAO's in 2008. The results of these meetings are summarized in the SCS Interim Final Report on the 2018 and Beyond Study (SCS, 2009).

1.3.4 2011 CAO Facilitation Meetings

SCS met with the CAOs on the following dates in 2011 to discuss the status and findings of the study update and receive comments on the development of the scenarios evaluated for the study update and the draft report: May 19, June 22, July 21, and September 15. In addition, SCS met with SPSA staff on several occasions to discuss the details of the pro forma analysis and scenarios being considered and presented an update to the SPSA Board on July 27.

1.4 COORDINATION WITH THE PRIVATE SECTOR

During the course of the 2008 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. For the current study update, SCS meet again with Rob Clendenin and Joel Rubin to discuss the current solid waste

management landscape. In addition, SCS meet with Ed Farmer of Tidewater Fibre Corporation to discuss TFC's current initiatives with regard waste management and recycling in particular.

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. Currently, most of the Region's disposal is provided through Wheelabrator's WTE Facility and out of regional landfill facilities. The private solid waste companies are interested in expanding their role to provide comprehensive disposal services to the Region. To evaluate the potential for further waste disposal in out of region facilities, as part of the 2008 Study, 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.

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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

The SPSA Board of Directors and staff annually adopt a Strategic Management Plan to address the future of solid waste management in the SPSA region and to outline specific goals and objectives which should be addressed during the upcoming year. Many are long-term goals which will take several years to complete; however, all are reviewed annually by the Board of Directors to assess progress and to examine any changes needed to priorities or action plans.

In December 2010, the SPSA Board of Directors and staff adopted a new mission statement and vision statement. To achieve the mission and vision of SPSA, the Board also adopted several core goals:

- **Mission Statement**. To Manage and Operate Safe, Cost Effective and Environmentally Responsible Solid Waste Disposal.
- **Vision Statement.** SPSA Will be a Quality-Focused Organization which Seeks Improvement and Cost Effectiveness.
- **Cores Values.** Integrity, Excellence, Accountability, Cooperation, Teamwork.
- **Core Business.** Operate and Manage the Regional Landfill, Operate and Manage all Transfer Stations, Provide for the Transportation of Processible Waste.
- **Goals.** These represent the accomplishments the organization would like to achieve over the next five years:

Goals	Objectives
Goal 1 Establish Financial Policies	• Objective 1. To Provide Effective Financial Management • Objective 1.1: Maintain a Level and/or Declining Municipal Tipping Fee • Objective 1.2: Actions: - Develop Financial Policies for Board Approval - Monitor Financial Costs and Develop Trend Analysis
Goal 2: Consider Outsourcing SPSA Functions	• Objective 2: Sell or Lease the SPSA Portion of the Regional Office Building • Objective 2.1: Determine the Feasibility of Outsourcing Transportation Services • Objective 2.2: Determine Feasibility of Operating Household Hazardous Waste, Used Oil, Tire Shredder, White Goods Disposal and Freon Extraction Services Programs • Actions: A. Develop a 'White Paper' Outlining the Various Options for Selling/Leasing the Regional Office Building B. Perform Analysis of Existing Transportation and Equipment and Vehicle Maintenance System C. Perform an Analysis of the Household Hazardous Waste, Used Oil and Freon Extractions Programs to Determine if Programs Should Be Discontinued
Goal 3: Develop Employee Incentive and Retainage Program	• Objective 3: Establish a Board Policy Providing For an Employee Incentive/Retainage Program • Objective 3.1: Identify Key Employee Positions • Objective 3.2: Determine the Type and Level of Incentive Program • Actions: A. Develop a Board Policy That Governs the Program B. Develop a Listing and Justification for Positions Placed in This Program
Goal 4: Obtain Communities' Responses Regarding SPSA's Role In Waste Disposal	• Objective 4: Determine SPSA's Role Post 2018

Goals	Objectives
After January 24, 2018	• Actions: A. Obtain Communities' View on SPSA's Role in Regional Waste Disposal After 2018 B. Work with SCS Engineers As They Update the Post 2018 Study
Goal 5: Define "Milestone Dates"	• Objective 5: Record All "Milestone" Dates • Objective 5.1 Provide a Description of the "Milestone" Date • Objective 5.2: State the Significance of Each Date • Actions: A. List "Milestone" Dates with Description and Potential Impacts
Goal 6: Obtain the Permit for Cell 7	• Objective 6: Submit required information to finalize the Part B Application (note: this has been accomplished)
Goal 7: Determine the Future of the Regional Landfill by December 31, 2012	• Objective 7: Determine the Feasibility of Selling/Contracting Operations/Closing of the Regional Landfill • Objective 7.1: Develop an emergency operations plan for waste disposal • Objective 7.2: Establish opportunities for Board of Director's discussions of the "Pros and Cons" of operating the regional Landfill • Actions: A. Perform Legal Research to Determine if the Regional Landfill Can Be Sold, Leased or Closed Based Upon the Parameters of the Use and Support Agreements

2.1.2 Inter-local 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 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 WTE Facility. Under the Navy Contract, RDF produced at the 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 24, 2018.

2.1.3 Institutional Structure

The makeup and responsibilities of the SPSA Board of Directors since January 2010 is discussed in Section 4.2.3. 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 taken to either a SPSA transfer station or to Wheelabrator's WTE Facility (Portsmouth) for disposal. At the current time, the ash generated from the WTE Facility is sent to Virginia Beach's Landfill No. 2. SPSA also operates regional programs for white goods, household hazardous waste (HHW), tire processing, used oil collection and battery recycling.

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.

Table 2. Solid Waste Services

Service	Chesapeake	Franklin	Norfolk	Portsmouth
Solid Waste Residential Collection	The city provides weekly, automated collection using 96-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.
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	The City provides curbside recycling services for the city every other week using a 96-gallon bin.	Franklin 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 the City every other week using a 95-gallon cart.	The City operates recycling drop off locations for the city.
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.
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.

(Table 2 continued)

Service	Suffolk	Virginia Beach	Isle of Wight	Southampton
Recyclables Collection	The city offers drop-off only recycling for its residents. 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.	Drop-off only recycling sites for the county that are located at the convenience centers and the transfer station. The town of Smithfield 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. Drop-off facilities are located at six of the county's mini-transfer stations.

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.

2.1.7 Current Planning Initiatives

2.1.7.1 Cell 7 Expansion

The status of the Regional Landfill's Cell 7 expansion is discussed in Section 2.9.1.1.3.

2.1.7.2 Future Landfill Siting

There is no known effort to site and construct a new landfill either inside or outside of the Region for regional use.

2.1.7.3 Transfer Station Upgrades

According to SPSA records, a total of 753,593 tons of waste were delivered to their transfer station network in FY2010. The Annual Survey and Report as of March 01, 2011 (RW Beck) contains a description of the nine transfer stations within the Authority's network as well as anticipated maintenance items and upgrades to each facility. SCS visited each facility to confirm the Report's observations and to interview facility staff to gain a perspective on the overall operations of the system. Below is a brief description of each transfer station as well as anticipated major upgrades and equipment acquisitions. Figure 1 shows the location of each SPSA transfer station.

- **Landstown Transfer Station.** The Landstown Transfer Station is one of the two largest facilities based on design capacity (1,300 tons per day) of the stations in the SPSA system. The Landstown station contains three hoppers for waste loading. The Station received 213,975 tons of waste in FY2010, making it the busiest facility in the SPSA network during that period. The 11.5 acres that the facility is built on is owned by the city of Virginia Beach and is leased by SPSA. The facility is maintained in good condition. Recent improvements include sprinkler system upgrades, a new water supply well, new slide-up exit door, up-grades to lighting, pavement patching,

new hose reels, new sky lights and vent fans, new AC units and new stacking walls. Other than general maintenance, improvements planned for subsequent years include resurfacing the entire tipping floor as well as some repairs to the hoppers. In addition, an excavator is due to be replaced.

- **Oceana Transfer Station.** The Oceana Transfer Station has one hopper for transfer trailer loading. It received 85,954 tons of waste in FY2010. The 6.9 acres that the facility sits on is leased from the Virginia Department of Transportation (VDOT) by SPSA. Replacement of the entire transfer station building above the concrete slab was completed in April 2011. In addition, the hopper will be refurbished and the tipping floor will be resurfaced, along with new lighting and plumbing which will be installed. The scalehouse roof has recently been replaced. The Authority intends to resurface the asphalt pavement at the facility entrance in the next few years. The facility recently received a new Volvo loader and power sweeper.

- **Norfolk Transfer Station.** The Norfolk Transfer with a design capacity of 1,300 tons per day, was the second busiest station in the SPSA network with 209,769 tons of waste received. Current waste volumes handled at the facility are from 800 to 1,000 tons per day. The capability of loading three trailers at a time (similar to the Landstown Station) is incorporated into the facility design. The 6.2 acres that the facility sits on is owned by SPSA. The facility accepts waste from municipal and private haulers Monday through Friday and a half-day on Saturday. Norfolk residents only may dispose of waste from noon on Saturday or Sunday to 4:00 pm free of charge. The station is generally in an acceptable state of repair with recent major capital repairs including two thirds of the tipping floor resurfacing and replacement of the in-bound scales. Several lights have also been added to the interior of the building. Pending repairs include hopper refurbishment (in first half 2011), resurfacing of the remaining one third of the tipping floor (by the end of summer 2011) and storm water drainage improvements. Some repairs will also be made to the tipping floor push walls. The Authority plans to replace the out-bound scale and repair sections of the damaged/rusted building siding and pressure wash and paint the siding. The Authority also plans to replace one loader within the next year. The facility received an excavator from the recycling facility when SPSA stopped this surface over a year ago.

- **Chesapeake Transfer Station**. The Chesapeake Transfer Station operates with one hopper for transfer trailer loading. Approximately 127,883 tons were received in FY2010. The 4.75 acres that the facility sits on is leased from the city of Chesapeake by SPSA. According to the facility supervisor, the Authority has made the following capital improvements in recent years; trailer pad installations, tipping floor resurfacing (inside and partially outside), in-bound scale replaced (the out-bound scale was replaced in 2003), roof repairs and coating, lighting improvements including new light poles and hopper refurbishment. The Authority is planning to make repairs to the trailer parking area pavement as well as make storm water drainage improvements within the next fiscal year. The facility recently replaced a loader and sweeper. An excavator is due to be replaced in 2011

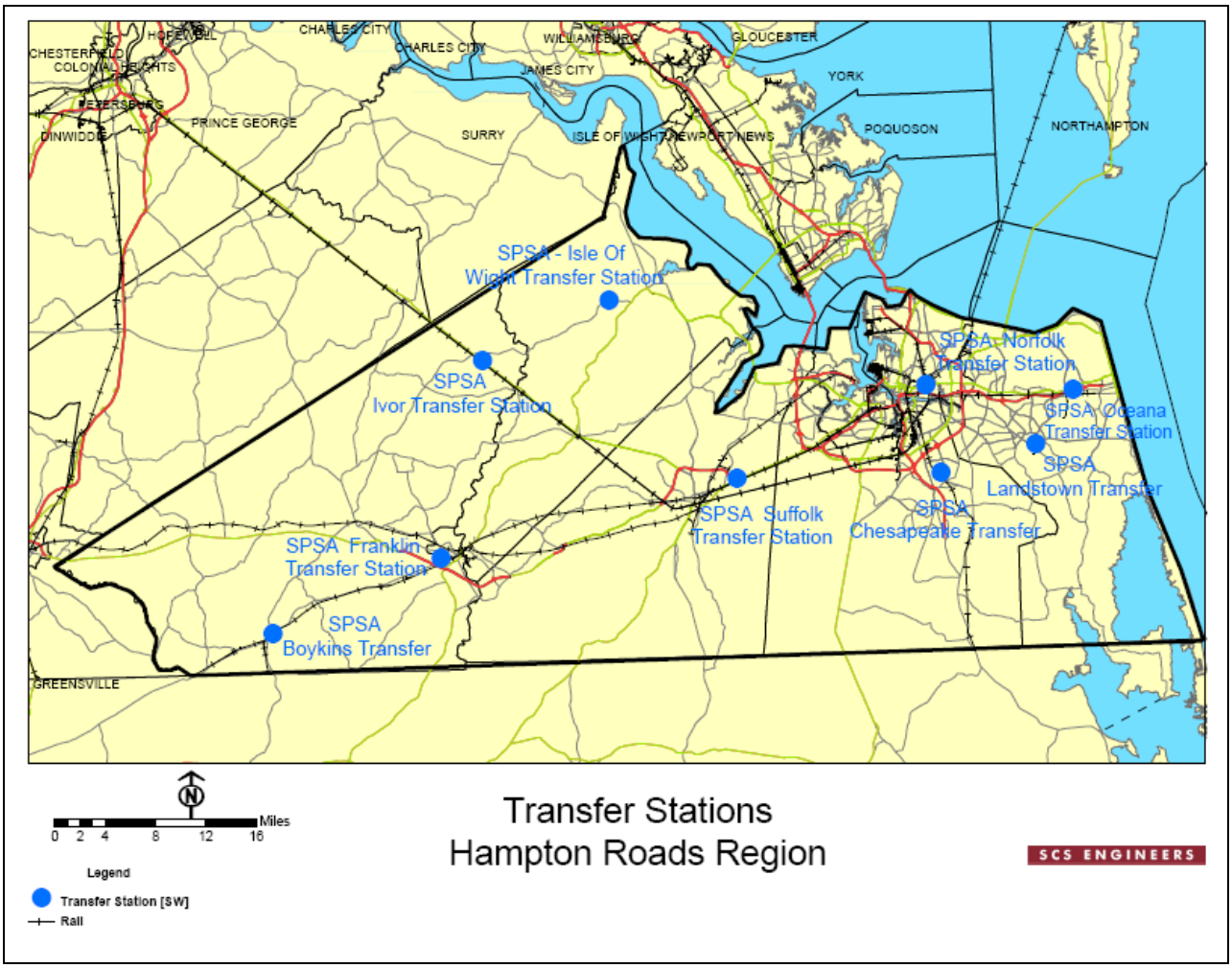


Figure 1. SPSA Transfer Station Location Map

- **Suffolk Transfer Station.** The Suffolk Transfer Station is located at the Regional Landfill and was originally intended to allow diversion of waste from the Landfill to the WTE Facility. Operation of the facility began in April 2005 with a 500-ton per day design capacity and two hoppers. The facility currently handles an estimated 100 to 450 tons per day (depending on the day of the week). Approximately 67,457 tons were received at the Station in FY2010. The land that the facility sits on is owned by SPSA. The facility is maintained in good condition with no major capital improvements planned in the near future. However, during SCS' site visit on January 20, 2011, it was noted that the tipping floor was worn near the building entrance. The supervisor stated that the remainder of the floor (which was not visible at the time of the visit) was in better condition.

- **Franklin Transfer Station.** The Franklin Transfer Station is operated by three personnel. The facility design does not include a building enclosure. The Station received 21,393 tons of waste in FY2010. The land that the facility sits on is owned

by SPSA. The Station is maintained in good condition. The tipping floor was recently resurfaced. Cleaning and repainting of the steel hopper and frame are needed to minimize corrosion. SPSA staff are currently improving site drainage by filling and grading low spots between the entrance and exit roadways. The front-end loader is scheduled to be replaced in 2014. No other major capital improvements are anticipated in the near future.

- **Isle of Wight Transfer Station.** The Isle of Wight Transfer Station uses a front-end loader to lift waste into transfer vehicles. The Station received 27,162 tons of waste in FY2010. The 6.1 acres that the facility sits on is leased by SPSA from the County. The Authority is preparing to bid out repairs to the station's tipping floor and pushwall by Spring of 2011. A new front-end loader is scheduled to be delivered to the station in February 2011.

- **Ivor Transfer Station.** The Ivor Transfer Station is primarily used for self-hauled disposal although Southampton County collection vehicles are also permitted to use the facility. Waste quantities were not tracked separately in fiscal year 2010 but the station generally accepts less than 1,000 tons of waste per year. The 1.5 acres that the facility sits on is leased by SPSA from Charles and Kathleen Clark. The Authority plans to construct a potable water well and leachate holding tank to contain drippings from the waste compactor. The improvements are scheduled to be completed by the end of 2011.

- **Boykins Transfer Station.** The Boykins Transfer Station is similar to the Ivor facility. Waste quantities were not tracked separately in fiscal year 2010 but the station generally accepts less than 1,000 tons of waste per year. The land that the facility sits on is leased by SPSA from John Evert Bryant. The Authority plans to replace the steel hopper over the compactor in 2012.

In addition to the above existing waste transfer facilities, two additional facilities are proposed as a possible alternative condition of the Special Use Permit (from the city of Suffolk) associated with the permitting of the proposed expansion of the Regional Landfill (Cell 7). It is understood that the status of these facilities is uncertain pending further evaluation by SPSA and discussions with the City.

SCS evaluated the costs incurred by SPSA to operate the current transfer station network. SPSA actual FY2007 through FY2010, as well as anticipated FY2011 budget costs were reviewed. The information presented in Table 3below is intended to provide an at-a-glance summary of the direct resources SPSA is currently utilizing to operate the individual facilities. The operations cost shown below include facility personnel salaries/benefits, equipment rental, building and equipment maintenance, fuel and utilities. They do not include capital costs for substantial building repairs and replacement equipment. The full time equivalents (FTEs) employees listed on the Table include the facility supervisor, equipment operators, solid waste assistants and scale house attendants (if applicable). Personnel not listed include human resource/administrative and environmental/safety personal that are needed to own and operate the transfer stations.

Table 3. SPSA Transfer Station Background Information

Transfer Station Name	Year Built	Design Capacity (tpd)	Throughput FY2010 (tpy)	Operating Schedule (days/week)	Personnel (FTE)	Estimated Operating Cost in FY2011	Cost per Ton of Waste Processed
Landstown	1992	1300	213,976	5.5	12	$1,075,461	$5.03
Oceana	1982	500	85,954	5.5	6.5	$488,815	$5.69
Norfolk	1987	1300	209,769	6.5	13	$1,077,244	$5.14
Chesapeake	1984	500	127,883	5.5	6	$517,624	$4.04
Suffolk	2006	500	67,457	5.5	5	$458,653	$6.80
Franklin	1985	150	21,393	5.5	3	$193,487	$9.04
IOW	1985	150	27,161	5.5	4	$255,498	$9.40
Ivor	1985	50	(1)	3.0	1(2)	$6,047	NA
Boykins	1985	50	(1)	3.0	1(2)	$8,134	NA
Totals					49.5		

(1) Throughput for Ivor and Boykins facilities were not tracked separately in FY2010.
(2) Ivor and Boykins facilities are staffed by Southampton County personnel.
FTE – Full Time Equivalent
NA – Not Applicable

The following summarizes the heavy equipment inventory at each transfer station:

Table 4. Heavy Equipment Inventory

Transfer Station	Heavy Equipment Inventory
Landstown	• 6600 Tennant Sweeper • S160 Bob cat • M316 Cat Excavator • M312 Cat Excavator • 972 G Cat Loader • 972 H Cat Loader
Oceana	• Advance Exterra Sweeper • Cat 216 Steer Loader • 950 G Cat Loader • L120 Volvo Loader • Two (2) Ottawa Yard Dogs
Norfolk	• 226 Cat Skid Steer • M313 Cat Excavator • M315C Cat Excavator • 972G HL Cat Loader • 972 H HL Cat Loader
Chesapeake	• 1308 Advance Exterra Sweeper • S160 Bobcat • M312 Cat Excavator • L120 Volvo Loader • Cat 950G Loader • Two (2) Ottawa Yard Dogs
Suffolk	• Ottawa C60 6X4 Yard Dog • M313C Cat Excavator • 962 G Cat Loader • 216 Cat Skid Steer

Table 4. Heavy Equipment Inventory

Transfer Station	Heavy Equipment Inventory
Franklin	• 6650 Tennant Sweeper • S185 Bobcat • 942GHL Cat Loader • SISU Yarddog • Capacity Yard Dog • 226B Cat Skid Steer • 924 GHL Cat Loader • Ottawa Yard Dog

SPSA projected longer term (through 2015) capital costs for substantial building repairs and heavy equipment replacement are shown on Table 5 below.

Table 5. Southeastern Public Service Authority Capitol Improvement/Equipment Replacement Plan

Cost Center	Description	2012	2013	2014	2015
Landstown Transfer Station	Wheeled Excavator 39,000 lb.		$275,000		$282,000
	Wheeled Loader 55,000 lb.				$445,000
	Parking Lot & Ramp Resurfacing	$95,000			
	Hopper Repair Holes 1, 2, 3		$65,000		
	Power Sweeper			$44,000	
Ocean Transfer Station	Repair Tipping floor retaining walls				$25,000
	Yard Dog		$74,700		$82,400
Norfolk Transfer Station	Building Insulation		$150,000		
	Wheeled Loader 55,000 lb.		$425,000		
	Concrete Wall Repair	$26,200			
	Replace steel on top of tipping floor walls	$33,000			
	Booster Pump replacement	$8,900			
Chesapeake Transfer Station	Tipping Floor Wall Repair	$15,000			
	Replace Tunnel Floor, Entrance, Exit		$120,000		
	Tipping Floor Drainage System		$190,000		
	Asphalt Paving and Repair		$300,000		
	Yard Dog		$74,700		$82,400
	Tipping Floor Wall Repair	$20,000			
	Tipping Floor Repair	$90,000			
	Pressure Washing and Painting of Buildings		$85,000		
Franklin Transfer Station	Wheeled Loader 25,000 lb.			$225,000	
Isle of Wight Transfer Station	Yard Dog		$74,700		
Boykins Transfer Station	Compactor Box (Qty2)				$21,600
	Compactor				$40,300
	Hopper Replacement	$40,000			
Totals		**$328,100**	**$1,834,100**	**$269,000**	**$978,700**

2.1.7.4 Yard Waste Management

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

2.1.8 System Financial and Tip Fee Structure

The SPSA Board of Directors implemented a revised tipping fee schedule for various classifications of waste disposal. The revised rates became effective January 1, 2011. The major tipping fee categories are shown in the Table 6.

Table 6. 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)	$145
Contract municipal solid waste (delivered on behalf of any SPSA member jurisdiction with the exception of the Cities of Virginia Beach and Suffolk)	$145
U. S. Navy waste under contact with SPSA	$35.35
Non-Processible solid waste (non-contract)	$60
CDD waste delivered to the Regional LF	$40

2.1.9 Landfill Gas Beneficial Reuse at the SPSA Regional Landfill

In November 2010, an agreement became effective between SPSA and Suffolk Energy Partners, LLC (SEP) that conveyed exclusive rights for all the landfill gas (LFG) at the Regional Landfill to SEP for capture and beneficial reuse. SEP had held the rights to the LFG under a previous agreement and owns and operates the LFG recovery system that consists of recovery wells and flare. In addition, SEP owns and operates an electrical power plant at the Landfill that generates electrical power for sale to Dominion Virginia Power. SEP is currently in the process of constructing a facility at the BASF Plant on Wilroy Road in Suffolk, approximately 2.3 miles from the Landfill that will supply LFG to the Plant for direct use (via an existing pipeline constructed in 2001) in its manufacturing process. It is understood that under the new agreement, in return for giving up the rights to the LFG, SPSA receives 30 percent of revenues from sales of recovered gas and 20 percent of revenues received from sales of electricity generated from the recovered gas. SPSA estimates that in FY2012 revenues from this agreement will be approximately $550,000.

2.2 DEMOGRAPHICS OF REGION

In 2010, the member jurisdictions of SPSA had an estimated total population of 1,145,548 with an average population density of 573 people per square mile (see Table 7, Census data from Weldon Cooper, 2010). In 2010, the largest city in the Region was Virginia Beach with over 38 percent of the population. Norfolk is the second most populated, and the city has the highest population density in the Region.

Historic population figures are shown in Table 8. 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 49 percent growth from 1970 to 2010. However, some jurisdictions experienced a decline in population during this same period.

From 2010 to 2034, the Region is expected to grow more than 23 percent to more than 1,415,100 people. This equates to an average annual growth rate of slightly less than one percent or approximately 11,340 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 9. 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 10. 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 0.69 percent through 2034, resulting in an overall increase of just over 26 percent, which reflects the growth of job opportunities (see Table 11). 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 36 percent through 2034 at an average annual rate of 0.91 percent (see Table 12). Suffolk is projected to experience the greatest growth (198 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 for each community during the study planning period.

Table 7. SPSA 2010 Population Statistics

Jurisdiction	2010 Population	Land Area (square miles)	Population Density (persons per square mile)
Virginia Beach	437,994	248	1,770
Norfolk	242,803	54	4,476
Chesapeake	222,209	340	654
Portsmouth	95,535	33	2,895
Suffolk	84,585	400	211
Isle of Wight	35,270	316	112
Southampton	18,570	600	31
Franklin	8,582	8	1,073
Total	1,145,548	1,999	573

Table 8. SPSA Member Population 1970 - 2010

	Year					
Jurisdiction	1970	1980	1990	2000	2010	Growth (1970–2010)
Chesapeake	89,580	114,486	151,982	199,184	222,209	148.1%
Franklin	6,880	7,308	7,864	8,346	8,582	24.7%
Norfolk	307,951	266,979	261,250	234,403	242,803	-21.2%
Portsmouth	110,963	104,577	103,910	100,565	95,535	-13.9%
Suffolk	45,024	47,621	52,143	63,677	84,585	87.9%
Virginia Beach	172,106	262,199	393,089	425,257	437,994	154.5%
Isle of Wight	18,285	21,603	25,053	29,728	35,270	92.9%
Southampton	18,582	18,731	17,550	17,482	18,570	-0.1%
Total	769,371	843,504	1,012,841	1,078,642	1,145,548	48.9%

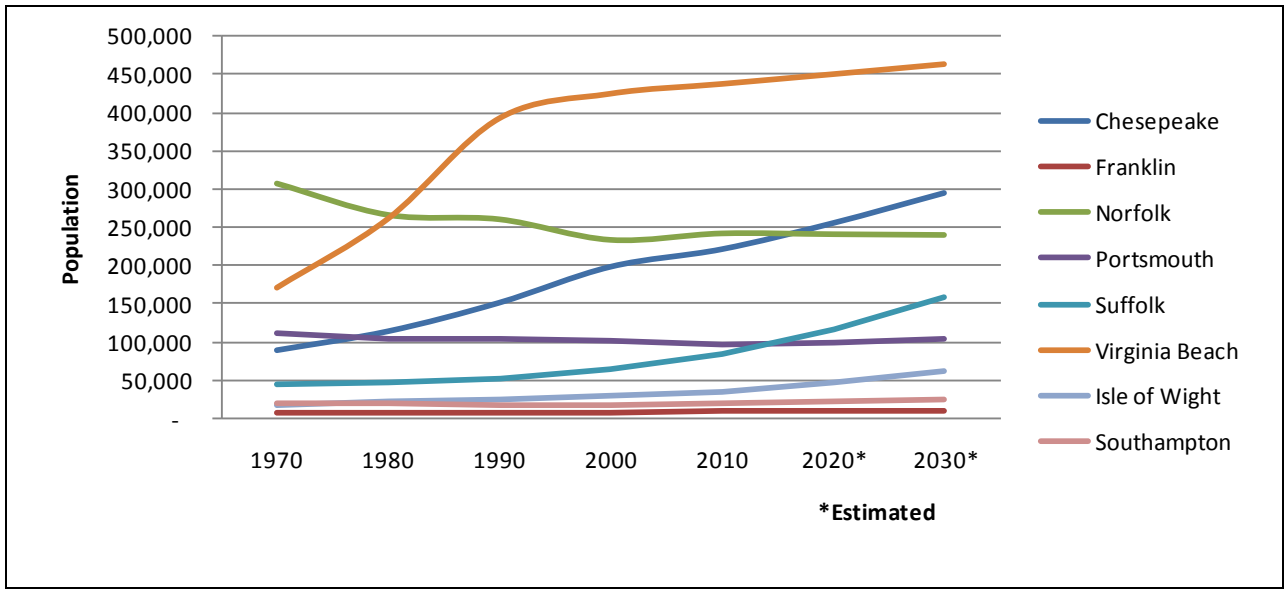


Figure 2. SPSA Projected Population Growth Trends

Table 9. SPSA Estimated Population Growth by Community

Jurisdiction	2010 Population	2034 Estimated Population	Total Growth	Average Annual Growth Rate
Chesapeake	222,209	313,600	41.1%	1.4%
Franklin	8,582	11,300	31.7%	1.2%
Norfolk	242,803	240,400	-1.0%	-0.04%
Portsmouth	95,535	104,500	9.4%	0.3%
Suffolk	84,585	180,600	113.5%	3.2%
Virginia Beach	437,994	469,200	7.1%	0.3%
Isle of Wight	35,270	68,600	94.5%	2.7%
Southampton	18,570	26,900	44.9%	1.5%
Total	1,145,548	1,415,100	23.5%	0.88%

Table 10. Comparison of Population Growth Projections

Jurisdiction	2010 Population	HRPDC Projections		VEC Projections	
		2020	2030	2020	2030
Chesapeake	222,209	263,287	299,225	272,381	308,736
Franklin	8,582	9,849	10,885	9,348	9,930
Norfolk	242,803	238,111	239,746	237,448	238,927
Portsmouth	95,535	101,411	103,617	100,429	101,071
Suffolk	84,585	129,063	165,875	122,482	151,427
Virginia Beach	437,994	450,446	463,842	470,288	493,095
Isle of Wight	35,270	50,458	63,416	44,083	51,629
Southampton	18,570	22,459	25,631	17,604	17,795
Total	1,145,548	1,265,084	1,372,238	1,274,063	1,372,610

Table 11. 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	55.31%	1.30%
Franklin	3,397	4,091	4,685	5,560	6,400	15.11%	0.41%
Norfolk	211,278	230,199	259,481	225,319	229,100	1.68%	0.05%
Portsmouth	48,087	53,996	58,979	52,831	50,300	-4.79%	-0.14%
Suffolk	18,055	19,692	20,660	26,273	81,700	210.97%	3.39%
Virginia Beach	66,246	111,607	187,249	236,446	276,100	16.77%	0.46%
Isle of Wight	9,301	11,880	12,133	16,134	36,100	123.75%	2.40%
Southampton	6,124	5,927	5,461	6,026	9,800	62.63%	1.44%
Total	385,054	469,680	611,253	671,354	849,100	26.48%	0.69%

Table 12. 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	63.9%	1.46%
Franklin	2,113	2,591	3,011	3,384	4,800	41.8%	1.03%
Norfolk	86,607	74,955	79,518	86,210	92,100	6.8%	0.19%
Portsmouth	34,470	36,796	38,706	38,170	40,000	4.8%	0.14%
Suffolk	13,116	15,726	18,518	23,283	69,400	198.1%	3.26%
Virginia Beach	45,085	85,097	135,365	154,455	176,800	14.5%	0.40%
Isle of Wight	5,028	7,050	9,031	11,319	27,200	140.3%	2.61%
Southampton	4,915	5,774	6,004	6,279	10,300	64.0%	1.47%
Total	216,512	264,351	342,177	393,000	535,200	36.2%	0.91%

2.3 COLLECTION SYSTEMS

2.3.1 Municipal Solid Waste

2.3.1.1 Municipal Collection

Below is a summary of each SPSA member's MSW collection services to its citizens. Table 13 provides a synopsis of fiscal year 2010 tonnages and the relative contributions of the SPSA member localities to the total collected waste within the Region. Historical disposal quantities are illustrated in Figure 3. Municipal quantities have decreased over the past few years and were down approximately 15 percent from fiscal year 2007 to fiscal year 2010. Table 2 contains a summary of collection services provided by each municipality.

City of Chesapeake

Chesapeake's Department of Public Works, Division of Waste Management collects residential solid waste once per week from over 65,000 households using automated vehicles. Collected waste is primarily delivered to either the WTE Facility or the SPSA Chesapeake Transfer Station located just off Greenbrier Parkway. The City supplies the residents with standard 96-gallon solid waste containers. Also available upon request is a smaller, 64-gallon container or 35-gallon container.

Chesapeake residents are able to dispose of waste at the Chesapeake Transfer Station or any other SPSA facility at no charge. Yard waste (clear bags or bundles) and bulk waste are collected weekly from residents as well. No requests are necessary for pick up of yard waste, but the City does require that requests to schedule bulk waste collection be received one week prior to the day of collection. Yard waste is delivered to Waterway Materials or the Holland Landfill, bulk waste is delivered to SPSA or to the Holland Landfill.

Residents are responsible for properly disposing of their own building debris and are directed to SPSA transfer stations and the Regional Landfill in Suffolk.

Chesapeake also collects waste from a limited number of small commercial establishments (fewer than 400) that are able to deposit all waste into two or three cans. The City does not intend to expand this service to additional establishments.

The City of Chesapeake delivered 99,969 tons of MSW to SPSA during fiscal year 2010.

City of Franklin

The City of Franklin's Department of Public Works offers collection for 3,000 residential and small commercial generators, with weekly solid waste and yard waste collection. Special collections of bulk waste are offered upon request once a month. Each of the customers is given a black 90-gallon solid waste receptacle and a green 90-gallon cart for yard waste. Bulk waste is also collected upon request. Yard waste collected is delivered to a city-owned farm where it is processed. All other wastes are taken to the SPSA Franklin transfer station. The City of Franklin delivered 4,596 tons of MSW to SPSA during fiscal year 2010.

Isle of Wight County

The County operates eight convenience centers to handle solid waste, most of which are open seven days a week. A SPSA transfer station within the County is also available for waste disposal.

If requested, curbside collection is provided to Isle of Wight County residents for a fee by a franchised commercial hauler. The Towns of Smithfield and Windsor also each provide curbside pickup for residents through an agreement with a private hauler. Smithfield provides twice-weekly pickup of both residential refuse and yard debris. The hauler provides containers for a monthly fee. No municipal refuse collection is provided for Town businesses.

The County of Isle of Wight delivered 18,676 tons of MSW to SPSA during fiscal year 2010. Approximately 600 tons of yard waste is delivered to the convenience centers, which is transported to a composting facility in Waverly, Virginia.

City of Norfolk

The Waste Management Division of the Department of Public Works collects approximately 80,000 tons of refuse, bulk waste, and yard waste annually from 61,000 households and businesses within the City. The City issues 90-gallon containers to residents of single-family homes, and curbside collection is provided once weekly by automated collection vehicles. Collection of bulk wastes is handled on the same designated day, when requested at least 24 hours in advance. In addition, yard wastes, in amounts up to 20 clear plastic bags (up to 3 cubic yards if scheduled), can also be collected at this time for recycling.

Waste collection in Norfolk's central business district takes place each Monday, Wednesday, and Friday evening. In addition, the City collects recyclables such as paper and cardboard each

Tuesday and Thursday evening. Businesses outside the central business district receive waste collection weekly.

During fiscal year 2010, the City of Norfolk delivered 77,874 tons of MSW tons of yard waste to SPSA via the Norfolk Transfer Station.

City of Portsmouth

The City of Portsmouth's Department of Public Works collects MSW from approximately 33,000 households each week using 95-gallon containers. During fiscal year 2010, the City of Portsmouth delivered 44,057 tons of MSW to the WTE Facility. Bulk waste and yard waste collection services also are provided; material is taken to the City of Portsmouth's landfill at Craney Island.

Southampton County

In addition to the Franklin Transfer Station, SPSA operates two other stations within Southampton County at Ivor and Boykins. The County offers to the residents of Southampton County fourteen mini-transfer stations. The waste collected from these mini-transfer stations is then delivered to the larger sites, where it is collected by SPSA. Southampton County residents may dispose of waste at any other SPSA facility free of charge. During fiscal year 2010, the County delivered 9,263 tons of MSW to SPSA.

City of Suffolk

The City of Suffolk Department of Public Works provides weekly residential refuse collection for all single-family homes within the City (approximately 32,000) using 90 gallon containers and automated collection vehicles. The City also provides collection services to approximately 200 businesses. Bulk and yard waste are also collected by the City. The City delivers collected waste directly to the Regional Landfill or the Suffolk Transfer Station. During fiscal year 2010, 46,607 tons of MSW were delivered to SPSA.

City of Virginia Beach

Virginia Beach provides 95-gallon solid waste containers and weekly, automated curbside collection for nearly 124,000 households within the City. Curbside bulk pickup is available to households by special request. Each request must be received 24 hours prior to the regularly scheduled collection day. Yard waste is also collected from residences on the collection day. Bulk and yard waste is delivered to the SPSA transfer stations. During fiscal year 2010, 80,134 tons were delivered to SPSA.

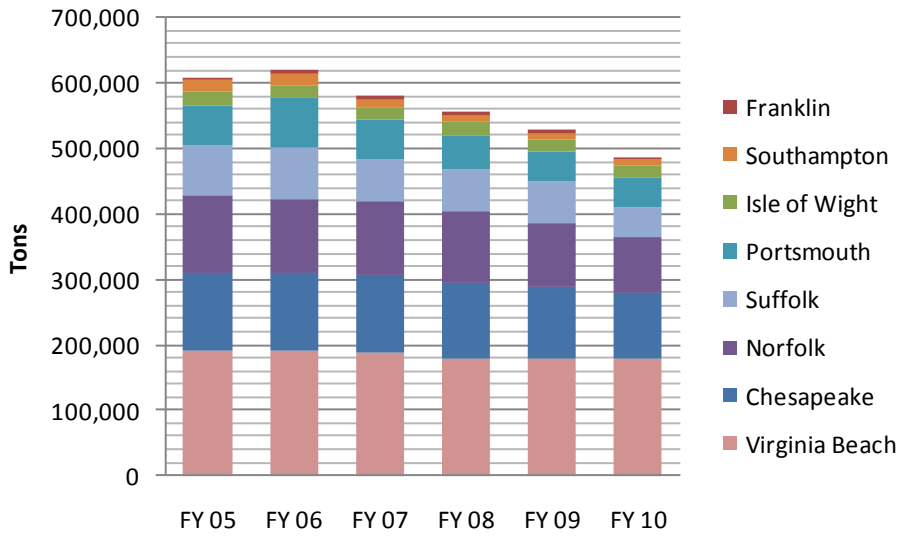
The Virginia Beach Landfill No. 2 is a 300-acre facility located in the Kempsville area of the City. Waste generated within the City by Virginia Beach residents can be delivered in privately owned vehicles to Landfill No. 2 free of charge. However, most the waste received at the Landfill is ash from the Wheelabrator WTE Facility. The Landfill currently accepts ash at a rate of approximately 200,000 tons per year.

The City operates a landfill gas recovery plant at its Landfill No. 2 in cooperation with a private firm, Ingenco. According to Ingenco, Landfill No. 2 annually produces landfill gas equivalent in energy to approximately 1.5 million gallons of fuel oil. The plant harnesses the landfill-produced methane gas for energy production, and provides the City with royalty payments annually.

Table 13. Breakdown of Municipally Collected Waste by Locality

Locality	Municipal Tonnage (FY2010)	Percentage of Total
Franklin	4,596	1.0%
Southampton County	9,263	1.9%
Isle of Wight County	18,676	3.8%
Suffolk	46,607	9.6%
Portsmouth	44,057	9.0%
Chesapeake	99,969	20.5%
Norfolk	83,892	17.2%
Virginia Beach	180,134	37.0%
Total	487,194	100%

Source: SPSA Solid Waste Quantities Report



Sources: SPSA Solid Waste Quantities Report, 2009
SPSA Proposed Annual Financial Plan

Figure 3. Historic Municipal Waste Quantities

2.3.1.2 Private Collection

Private firms continue to 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.

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 (two units) are operated by ODU (Norfolk) and one facility is operated by the Norfolk Public Health – Laboratories Bureau (Norfolk). There are currently no permitted RMW incinerators or transfer stations in the Region.

2.3.1.3 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.

2.3.1.4 Yard Waste

Yard waste generated in the Region is generally collected by the SPSA member communities. The following is a summary of what each community provides as far as yard waste collection services to its residents.

City of Chesapeake. Leaves, trimmings and grass clippings are picked up with regular collections when placed at curbside. The City requires yard waste, leaves and grass clippings to be placed in clear plastic bags. The material currently is delivered to Waterway Materials or the Holland Landfill.

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 provided with 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. Collected yard waste is delivered to a city-owned farm where it is processed.

Isle of Wight County. 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. Approximately 600 tons of yard waste is delivered to the convenience centers each year, which is transported to a composting facility in Waverly, Virginia.

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. The City disposes

of some yard waste along with bulk items with a private vendor but the majority of yard waste transported to a composting facility in Waverly, Virginia.

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. The material is transported to and disposed of in the City's landfill on Craney Island

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. Woody debris is grinded by a private vendor.

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. Collected material is sent directly to the Regional Landfill or the Suffolk Transfer Station.

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. Most yard waste collected is currently transported to a private composting facility in Waverly for beneficial reuse. Some yard waste is mulched at the City's Landfill No. 2 and used to landscape city properties.

2.3.1.5 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 2.3.1.1.2.

2.3.1.6 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 Curbside Recycling and Drop-Off Centers

Recycling in the region consists primarily of curbside recycling and drop-off locations:

- Chesapeake contracts for its curbside recycling services. The service is provided on an every-other week schedule using a 96-gallon container. With the implementation

of curbside collection, the City eliminated use of drop-off facilities. Recyclable materials include aluminum cans and foil, #1 and #2 plastic bottles and containers, glass jars and bottles, tin and steel cans, mixed paper (newspaper, office, junk mail, telephone books, catalogs/magazines), cardboard and paper bags, boxboard (e.g., cereal boxes, paper towel rolls).

- Curbside recycling in Franklin is provided through a contract with a private firm (ABS). The service provider uses an automated, single-stream system using 95-gallon carts. Items that are recyclable are, aluminum cans, cardboard, paper (office, newspaper, junk mail, catalogs, glass (clear, green and brown), metal cans, newspaper, office paper and plastics #1 through #7.

- Isle of Wight operates eight, single-stream drop-off recycling facilities at the County convenience centers (Camptown, Carroll Bridge, Carrsville, Crocker's, Jones Creek, Stave Mill, Walters and Wrenn's Mill). Materials accepted at the centers include paper (newspaper, office, magazines and telephone books, junk mail), cardboard, paperboard (cereal boxes, shoe boxes), milk and juice cartons, plastic bottles and containers (#1 through #7), glass, tin and steel cans, aluminum (cans, foil, pie plates). Additional containers are available for plastic bags, electronics, scrap metal, appliances, cooking oil, motor oil, yard waste. Residents of Smithfield receive monthly curbside collection of recyclable materials through a private contractor.

- Norfolk provides curbside collection of recyclable goods on a bi-weekly basis to 58,200 single-family homes. Each residence is provided a 90-gallon recycling container for participation in the curbside program. Citizens also have two drop-off facilities located in the City for recycling; a third site is scheduled to open soon. Office paper and cardboard are collected from Norfolk schools and other City buildings.

- The City of Portsmouth discontinued its curbside recycling program and provides residents the opportunity to recycle at seven local drop-off sites located throughout the City. The bins accept comingled materials.

- Southampton County offers recycling services through drop-off facilities as well as single-stream curbside collection (in some areas of the County) through a contract with a private firm (ABS). The County is in the process of providing containers for recycling at 11 convenience centers and transfer stations. Recyclables collected include paper, cans (aluminum, steel, tin), glass, plastic bottles and tubs, cardboard, and paperboard.

- Suffolk currently offers recycling services through 13 drop-off locations. Materials accepted include aluminum cans, plastic bottles (#1 and #2), cardboard, mixed papers, steel/tin cans and glass bottles. Suffolk currently has a franchise agreement for a private hauler for curbside collection, but must have 2,500 homeowners sign up for service for it to become effective. The cost for this service is $12 per month.

- Virginia Beach contracts for its own recycling program through Tidewater Fibre Corporation and provides containers to all residents who receive curbside waste collection from the City. Automated recycling pickup, using large 95-gallon containers, is provided on an every-other-week basis. In addition, four drop-off facilities are also located throughout the City.

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

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

All materials processing and marketing is managed by the private sector. A breakdown of the materials accepted by individual programs is provided in Table 14.

Table 14. City and County Recycling Programs

Jurisdiction	Materials Recycled											
	Plastics							Mixed Paper	Corr. Cardboard/ Paperboard	Glass	Metal Cans	Other
	#1	#2	#3	#4	#5	#6	#7					
Chesapeake	X	X						X	X	X	X	Aluminum Foil
Franklin	X	X	X	X	X	X	X	X	X	X	X	
Isle of Wight	X	X	X	X	X	X	X	X	X	X	X	Plastic Bags, Electronics, Scrap Metal, Appliances, Motor Oil, Cooking Oil, Aluminum Foil/Plates
Norfolk	X	X						X	X	X	X	Aluminum Foil
Portsmouth	X	X	X	X	X	X	X	X	X	X	X	
Southampton	X	X	X	X	X	X	X	X	X	X	X	Used Motor Oil
Suffolk	X	X						X	X	X	X	
Virginia Beach	X	X						X	X	X	X	Household Batteries, Aluminum Foil

2.4.2 SPSA Recycling Programs

Some of the regional recycling programs offered by SPSA include the following:

- **Ferrous Metal Processing Plant.** Metal collected at the WTE Facility and at the drop-off facilities is brought to this Plant for processing. (Propane tanks are collected as well and handled through a contract with a local distributor.) Ferrous metals, such as steel food and paint cans, scrap metal, and compressed gas tanks are processed into small nuggets at the Bi-Metals Recycling Facility at the Regional Landfill. These nuggets are then sold to steel mills and processed into new steel.

- **White Goods Recycling Facilities.** Refrigerators, washing machines, air conditioning units, and other large household appliances are collected from residents free of charge at the Regional Landfill. Local contractors prepare the appliances for recycling by

removing and collecting the freon for proper disposal. The scrap metal from the appliances is then recycled. In fiscal year 2010, the white goods program recycled over 1.9 Million pounds of scrap steel and aluminum. In September 2010, Virginia Beach implemented its own white goods recycling program.

- **Tire Shredder** . Tires are shredded at the Tire Processing Facility located at the Regional Landfill. The shredded tires are used for drainage projects, pipe bedding and alternate daily cover ADC). SPSA reports that approximately 400,000 tires are shredded per year.

- **Used Oil Collection Sites.** Most SPSA facilities have containers to collect motor oil from residents free of charge. Used oil is cleaned of particles and processed into new oil and fuels. The oil collected by SPSA is recycled through a contract with a private vendor.

2.4.3 Business/Multi-Family Recycling

Businesses and multi-family units currently contract with private sector recyclers for any recycling services they may receive. Some may use drop-off facilities.

2.4.4 Performance

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

2.4.4.1 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 non-disposal 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.

2.4.4.2 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 4. SPSA has consistently exceeded the state's requirement of 25 percent.

SPSA has consistently exceeded the state's requirement of 25 percent; although recycling rates are dropping with time and are below the state's average. In calendar year 2008, SPSA achieved a recycling rate of 28.9 percent; down from 37.5 percent in calendar year 2007. This decline could be due to lower reporting participation and the closure of yard waste and mulching facilities. Recycling rates somewhat rebounded in 2009.

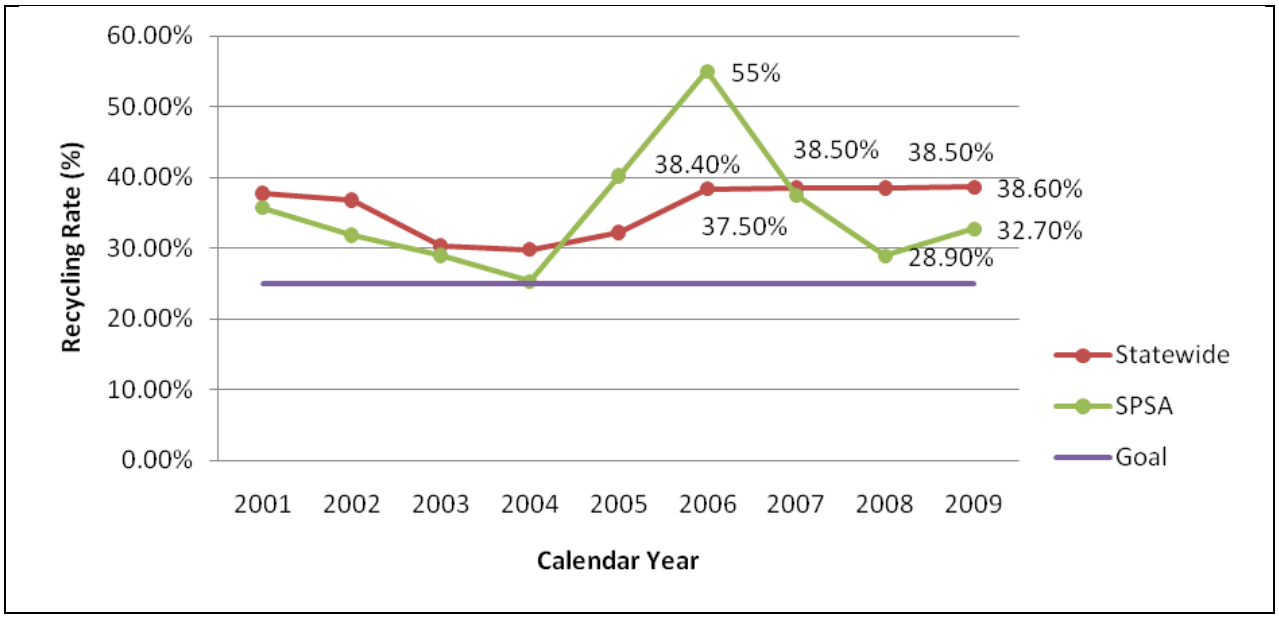


Figure 4. Comparison of Recycling Rates

HRPDC compiled the regional recycling quantities as required by the Virginia Department of Environmental Quality for calendar year 2009. These quantities are presented in Table 15. In sum, more than 386,000 tons of recyclable material were managed within the Region through SPSA, municipal, and private programs. An additional 117,200 tons of material were reported as reused (e.g., asphalt and concrete reused in new road construction and an additional 44,600 tons of material (e.g., ash, tire chips) were used as alternative daily cover at the landfill.

Table 15. Materials Recycled – Calendar Year 2009

Principal Recyclable Material	Tons
Paper	85,137
Metal	245,866
Plastic	2,897
Glass	894
Commingled	1,206
Yard Waste (composted/mulched)	35,039
Waste Wood (chipped/mulched)	420
Textiles	0
Tires	4,519
Used Oil	7,471
Used Oil Filters	148
Used Antifreeze	335
Batteries	2,437
Electronics	76
Total	386,445

The recycling quantities were apportioned to the member communities and a jurisdiction recycling rate was estimated. If recycling was known to occur in a certain community, that quantity was allocated directly to that community. For example, the recycling quantities reported by the Norfolk Naval Ship Yard were included only in the Norfolk quantities. The amount remaining was equally apportioned to all communities based on population. The base recycling rate was calculated based on principal recyclable materials and is shown in Table 16.

Because Virginia regulations allow a credit for solid waste reused, the recycling rate was recalculated taking allowable credits into account. As before, reuse attributable to a specific community was applied only to that community. For example, Virginia Beach reported the reuse of more than 88,000 tons of concrete and asphalt. The remaining reuse quantities were then apportioned based on population. The adjusted recycling rate also is shown in Table 16.

The Region did not qualify for source reduction credits.

Because Virginia regulations do not allow the total credit to exceed five percentage points, the final recycling rates for Chesapeake and Virginia Beach, as well as the regional rate, were adjusted downward as shown in Table 16.

2.5 YARD WASTE MANAGEMENT

2.5.1 Previous Regional 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) stated that SPSA received 73,497 tons of yard waste during the FY ending June 30, 2007.

SPSA had operated facilities where yard waste collected by member communities was handled, mulched and composed. The end product of this activity had been a source of revenue for the Authority through the sales of mulch and compost (marketed as Nature's Blend). According to the above referenced 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. No new Regional initiatives have been implemented since the Virginia Beach Landfill No. 2 facility was closed.

2.5.2 Current Status

The majority of yard waste generated in the Region is currently collected and processed by the SPSA member communities as discussed in Section 2.3.1.4.

Table 16. Estimated Recycling for SPSA Members-CY 2009

Jurisdiction	2009 Population	Base Recycling Rate Calculation				Credits Calculation				Final Recycling Rate
		Recycled	Disposed	Generated*	Base Recycling Rate	Reused	Recycled & Reused	Generated**	Adjusted Recycling Rate	
Chesapeake	219,975	63,120	199,127	262,246	24.1%	31,514	94,634	293,761	32.2%	29.1%
Franklin	8,480	2,544	7,676	10,220	24.9%	362	2,905	10,582	27.5%	27.5%
Isle of Wight	34,845	10,842	31,543	42,384	25.6%	1,487	12,328	43,871	28.1%	28.1%
Norfolk	243,957	97,125	220,836	317,961	30.5%	13,121	110,247	331,082	33.3%	33.3%
Portsmouth	96,282	27,562	87,157	114,719	24.0%	4,107	31,669	118,826	26.7%	26.7%
Southampton	18,402	5,268	16,658	21,926	24.0%	785	6,053	22,711	26.7%	26.7%
Suffolk	82,616	23,650	74,786	98,436	24.0%	3,524	27,174	101,960	26.7%	26.7%
Virginia Beach	437,275	156,335	395,832	552,167	28.3%	106,943	263,278	659,109	39.9%	33.3%
Total	1,141,832	386,445	1,033,613	1,420,058	27.2%	161,844	548,289	1,588,823	34.5%	32.2%

Notes: Grey-shaded cells indicate that credit exceeds 5%; final recycling rate adjusted downward for 5% maximum.

* "Generated" is the sum of "Recycled" and "Disposed."

**"Generated" is the sum of "Recycled," "Disposed," and "Reused."

2.6 C&DD MANAGEMENT

2.6.1 SPSA

SPSA currently accepts CDD material at the Regional Landfill for disposal in Cells 5 and 6. Approximately 22,900 tons of CDD material has been disposed at the Regional Landfill in FY 2011 (through March 2011) at a tipping fee of $30/ton. The newly established tipping fee for CDD is $40/ton (scheduled to become effective in FY 2012). 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. The active permitted private CDD only disposal facilities in the South Hampton Roads Region are shown in the Table 17.

There are two active CDD-only disposal facilities in the Region with capacity that extend well into the current study planning period (through 2047). The City of Portsmouth's landfill is intended for disposal of city produced CDD material only. The Centerville Turnpike CDD Landfill has a reported capacity of 2,284,413 tons (as of December 2009) with 17 years of life (VDEQ, June 2010) and is anticipated to be the only active CDD only disposal facility for the foreseeable future in the Region. The Higgerson-Buchanan Landfill has very little permitted capacity remaining although it is possible that an expansion may be permitted and constructed.

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 17. 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	800,202	53,244	17
Higgerson Buchanan Landfill	CDD	32,705	42,125	1
Centerville Turnpike CDD Landfill	CDD	2,284,413	39,290	17
John C. Holland Enterprises Landfill	Industrial	12,634,976	135,651	58.5

* From Solid Waste Managed in Virginia During Calendar Year 2009 (VDEQ June 2010)

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 may 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 2009), the Holland Landfill has over 12 million tons of capacity with an reported remaining life of more than 50 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 VDEQ records, Waterways Recycling 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 is disposed of most likely in the Centerville Turnpike CDD Landfill.

2.7 HOUSEHOLD HAZARDOUS WASTE

The current SPSA household hazardous waste (HHW) management program consists of five collection centers at the Regional Landfill as well as the Chesapeake, Franklin, Isle of Wight and Norfolk transfer stations. The service is for residential use only. SPSA staff operate the centers, in addition to several transfer station attendants that have been trained to operate the program. The Authority has a contract with a private firm to remove and properly treat or dispose of the waste.

The Regional Landfill drop off center is open Monday through Friday and in the mornings on Saturday. The remaining four 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. In FY 2010, SPSA disposed of nearly 43,000 gallons of liquid HHW and nearly 20,000 pounds of solid HHW (SPSA, March 23, 2011). Residents can still bring their used oil to any transfer station to deposit it in the used oil containers (approximately 27, 000 gallons were collected in FY 2010).

The city of Virginia Beach is the only SPSA member community that operates its own HHW drop-off facility (although Norfolk is planning to open a facility soon). The facility is located at Landfill No. 2 on Jake Sears Road and is open Monday through Saturday. Virginia Beach residents may bring their HHW to the facility to be disposed of free of charge. The HHW must be generated in the City from the primary residence and delivered in a privately owned non-commercial vehicle. Proof of residency is required to dispose of HHW. As with the SPSA facilities, disposal is limited to five gallons of liquid or 75 pounds of solid waste per visit.

2.8 WASTE-TO-ENERGY

In 1987, SPSA constructed a Refuse Derived Fuel (RDF) Plant to provide fuel to a Power Plant (Figure 5), which had been built by the U.S. Navy. Nearly half of the municipal solid waste delivered to SPSA is currently brought to the RDF Plant. The following sections briefly describe the design of these two facilities, historic and recent operational performance, sale of the facility by SPSA, contractual commitments by the plant's owner, ,and any long-term issues after 2018.

2.8.1 Sale of the WTE Facility

Over the years SPSA had accumulated nearly $240 million in debt which resulted in high tipping fees for the member communities. In 2008, the SPSA Board of Directors decided to sell some of its assets to reduce the dept, starting with the WTE operation. In May 2008, SPSA received an unsolicited proposal from Covanta Energy Corporation (Covanta) to purchase and operate the WTE facilities. In September 2008, following receipt of competing proposals from Energy Answers International, Fortistar LLC and Wheelabrator, SPSA approved the proposals from Covanta and Wheelabrator for participation in a detailed review phase in accordance to the Public Private Education Facilities and Infrastructure Act of 2002 (PPEA). From February 2009 through July 2009, SPSA and its consultants conducted extensive competitive negotiations with both companies resulting in the receipt of final offers in July 2009. Additionally, in July 2009, SPSA received an unsolicited conceptual proposal from ReEnergy Holdings LLC (ReEnergy) for the purchase of substantially all of SPSA's assets, including the WTE facilities.

In September 2009, SPSA tentatively accepted a binding and irrevocable offer from Wheelabrator to purchase and operate the RDF Plant and the Power Plant for a purchase price of $150 million. Simultaneously, SPSA accepted the ReEnergy proposal for a conceptual phase review and posted notice for a period of 45 days in order to encourage competition. On November 9, 2009, SPSA received a competing proposal from Wheelabrator and an addendum to its original proposal from ReEnergy. On November 17, 2009, SPSA's Board of Directors adopted a resolution rejecting all asset purchase proposals received from both firms and terminating all asset procurement. This resolution accepted the Wheelabrator proposal to purchase and operate the WTE facilities for a purchase price of $150 million and authorized SPSA's Executive Director to execute the contract with Wheelabrator. On April 29, 2010, the sale of SPSA's WTE facilities to Wheelabrator was completed.

2.8.2 WTE Facility

The Wheelabrator 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 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.

2.8.2.1 Design

Solid waste is delivered to the 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.

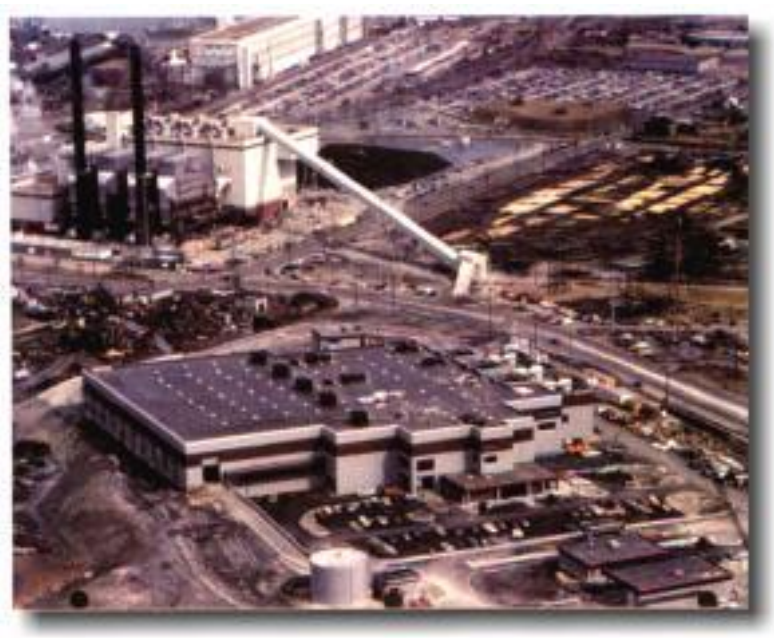


Figure 5. SPSA WTE Facility

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.

2.8.3 Power Plant

The Wheelabrator 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. The following briefly describe the operating deign for the Power Plant and discuss operating performance.

2.8.3.1 Design

The RDF produced by the 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 matter 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 and 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.

2.8.4 Contracts

2.8.4.1 Service Agreement

The Service Agreement with Wheelabrator states that SPSA will deliver, and Wheelabrator will accept and process, SPSA's solid waste at the WTE facilities from closing of the sale until January 24, 2018. SPSA may unilaterally extend the initial term for an additional period not to exceed 10 years (January 24, 2028). SPSA is required to give notice to Wheelabrator by December 31, 2014 to extend the term. During any extension, the existing terms of the Service Agreement (including the Annual Fees, as adjusted and subject to an extension period fuel surcharge) will remain in place. The following briefly describe the major facets of the agreement:

1. SPSA's Annual Waste Delivery Guarantee.

    - **SPSA's Annual Waste Delivery Guarantee**. During each year of the Service Agreement, SPSA is required to deliver, and Wheelabrator is required to accept, **500,000 tons** of solid waste delivered by SPSA at the RDF facility.

- **Annual Fee payable by SPSA**. For Wheelabrator's disposal of SPSA solid waste, SPSA is required to pay Wheelabrator an Annual Fee of **$18,000,000.** Based on an Annual Delivery Guarantee of 500,000 tons, the Annual Fee for SPSA in fiscal year 2010 is $36 per ton. In subsequent years, the Annual Fee is subject to a fixed annual increase of $2 per ton (i.e., a $1 million aggregate annual increase, before adjustments). The Annual Fee is payable in 12 equal monthly installments.

- **Put or Pay Arrangement.** The Service Agreement is structured as a "**put or pay**" contract – meaning that SPSA is required to pay the fixed monthly fee regardless of how much waste SPSA delivers to the RDF facility (i.e., regardless of whether SPSA satisfies the 500,000 ton delivery guarantee). Regardless of volume, SPSA is required to deliver to Wheelabrator all acceptable solid waste of SPSA's member communities.

- **Excess Tonnage Fee.** SPSA is required to pay an additional $36 (as adjusted each year by the Adjustment Factor) for each ton of SPSA waste delivered to the RDF facility in excess of 500,000 tons per year. SPSA has the right to divert any such "excess" waste to a disposal facility of SPSA's choice, in which case, SPSA will not pay an Excess Tonnage Fee to Wheelabrator for such waste.

2. Service Fee Formula and Adjustments. The Service Agreement includes a detailed formula for calculating the Service Fee in any Billing Month.

- **Fees payable by SPSA to Wheelabrator**: SPSA will be responsible to pay Wheelabrator:

  - The Monthly Fee (i.e., 1/12 of the Annual Fee);
  - Excess Tonnage Fees (if any);
  - Pass Through Costs
  - Other possible Adjustments, including a portion of:
    - Hazardous waste disposal costs (if any); and
    - Real property taxes payable to Portsmouth on the WTE Facilities in excess of $1 million.

- **Credits against SPSA Monthly Fee (i.e. Reductions)**. SPSA will receive a credit against (i.e., a reduction of) the Monthly Fee it owes Wheelabrator for:

  - 10% of steam energy revenues received by Wheelabrator (including 10% of amounts received from U.S. Navy for steam);
  - Hauling fee averaging $11 per ton for transporting commercial waste (i.e., non-municipal waste of member communities) from SPSA's transfer stations to RDF facility;
  - Loading fee of $2.50 per ton (as adjusted by the Adjustment Factor) for
  - loading non-processible waste and diverted waste at SPSA Transfer
  - Stations into trailers supplied by Wheelabrator for disposition at a non-
  - SPSA landfill,

- Residue disposal fee (if achieved in any Billing Year);
- Fees for transporting and disposing of waste by SPSA (other than at the
- RDF facility) as a result of Maximum Waiting Time;
- SPSA Facility Pass Through Costs; and
- Other possible Adjustments, including sourced special waste sharing fee and non-processible revenue share.

3. Wheelabrator Management, Operation and Maintenance Obligations.

- **Wheelabrator Obligations**. During the term, Wheelabrator is obligated to manage, operate and maintain the WTE Facilities in accordance with the terms and conditions contained in the Service Agreement. Specifically, Wheelabrator is required to:

  - Perform all work in compliance with applicable law;
  - Maintain the WTE Facilities and site in a clean, neat, orderly and litter
  - free condition (including all grounds, landscaping and drainage systems);
  - Secure and maintain all Permits, including environmental permits,
  - necessary to operate the WTE Facilities;
  - Comply with all laws concerning safety related issues;
  - Comply with an emergency procedures plan.

- **Penalties for Wheelabrator's Failure to Perform**. SPSA may, in certain situations, withhold funds or impose liquidated damages for Wheelabrator's failure to comply with its obligations under the Service Agreement.

4. Out of State Waste – Projected Monthly Waste Shortfalls.

- **General Prohibition of Out-of-State Waste**. Wheelabrator will not be allowed to receive Out-of-State Waste (defined as waste from any state outside of Virginia and North Carolina) at the WTE Facilities except in very limited and specific circumstances (generally when Wheelabrator is not receiving sufficient waste from SPSA as fuel to operate the WTE Facilities at capacity and generate sufficient steam and/or electricity). In no event is Wheelabrator permitted to reject deliveries of SPSA Acceptable Waste in favor of Outside-Area Waste or Out-of-State Waste.

- **Process for Accepting Outside-Area Waste and Out-of-State Waste in circumstances where additional fuel is needed to operate the WTE Facilities**.

  - If Wheelabrator, after consultation with SPSA, reasonably determines that the amount of SPSA Acceptable Waste in any month will be less than 62,500 tons, then Wheelabrator may acquire additional waste subject to and in sequence with the defined chronological steps, but only if and to the extent Wheelabrator requires additional waste to operate the WTE Facilities.
  - All Outside-Area Waste and Out-of-State Waste must be delivered directly to the RDF facility.
  - Wheelabrator is required to maintain detailed records demonstrating Wheelabrator's efforts to obtain SPSA Area Waste and Outside-Area Waste to

facilitate SPSA monitoring this situation so it can verify that the Out-of-State Waste restrictions are being followed.

5. SPSA's Tipping Floor, Scalehouses, Roadways and Truck Maintenance Facility.

- SPSA's Ownership of Tipping Floor; Scalehouses and Roadways; Transfer to Wheelabrator upon expiration or termination of Service Agreement:

  - Following closing of the transaction, SPSA will continue to own the RDF tipping floor, access roads, scalehouses and truck maintenance facility.
  - SPSA will operate and maintain the scales and scalehouses at the RDF facility to weigh SPSA and non-SPSA waste arriving at the RDF facility.
  - Wheelabrator will operate and maintain the RDF tipping floor and roadways.
  - Wheelabrator will have a purchase option to acquire the RDF tipping floor, scalehouses and access roads for $1 at the end of the Service.
  - Agreement term, (including any extension) or if the Service Agreement is terminated.

- **SPSA Truck Maintenance Facility**: SPSA will continue to own and maintain the truck maintenance facility adjacent to the RDF Facility through the end of the remaining 40-year term of the Navy land easement.

6. Disposal of Ash and Residue at a SPSA owned or contracted landfill.

- **Disposal of WTE Facility Ash at SPSA Landfill**. During the Term, SPSA will make its Suffolk landfill and any other SPSA-contracted landfill (including the Virginia Beach landfill) available to Wheelabrator to dispose of Residue (which includes ash) from the WTE Facilities.

- **Rejection Rights:** SPSA has a right to reject deliveries of Residue in a number of events, including if such waste does not otherwise meet or satisfy requirements for disposal or if SPSA's Landfill(s) reach landfill capacity limits.

- **No obligation to expand Suffolk Landfill**. SPSA has no obligation to undertake any expansion of its landfills or to maintain any landfill or any landfill capacity for disposal of ash, Residue or any other waste.

7. Early Termination of the Service Agreement.

- **Wheelabrator payment to SPSA if Service Agreement is terminated by SPSA because of Wheelabrator Event of Default**. If SPSA terminates the Service Agreement based on a Wheelabrator Event of Default, Wheelabrator is required to pay SPSA liquidated damages of:

  - $40 million if terminated in the first two years,
  - $35 million if terminated in the third or fourth year,
  - $30 million if terminated in the fifth or sixth year, and

- $25 million if terminated after the sixth year.

- **SPSA payment to Wheelabrator if Service Agreement is terminated by Wheelabrator because of SPSA Event of Default**. If Wheelabrator terminates the Service Agreement for a SPSA Event of Default, SPSA is required to pay Wheelabrator liquidated damages of $10 million.

- **SPSA Rights to Terminate Service Agreement.** SPSA has a right to terminate the Service Agreement if:

  - an Uncontrollable Circumstance occurs affecting all or a significant portion of Wheelabrator's material obligations for a period of 180 days or is reasonably anticipated to prevent performance for 180 days, or
  - SPSA's fractional share of the cumulative costs associated with the cure of all changes in Law during the term of the Service Agreement would have the effect of increasing SPSA's service fee by at least $10 per ton in the aggregate (not including any costs or expenses imposed by the City of Portsmouth, Virginia).

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 1 through 6). With the recent agreement between SPSA and Wheelabrator, the facility hours have been reduced to Tuesday through Friday; 7:00 a.m. to 4:00 p.m. The Landfill is closed Saturday through Monday, and on some holidays (on most holidays it is open only in the morning). Residents and businesses can bring their non-hazardous and commercial waste, including CDD, bulky and approved industrial process to the Landfill during these hours.

The Landfill now receives waste primarily only from residents and businesses that bring their waste directly to the Landfill. Ash from the WTE Facility ceased being placed in the Landfill in May 2010, although it is possible that ash will be disposed of in the Landfill from time to time. However, the facility may receive waste from SPSA members and/or Wheelabrator if the WTE Facility cannot accept it due to equipment malfunction. The most recent Airspace Management Report (HDR, January 2011) states that the facility is currently receiving an average of 772 tons per day. During the period from January to December 2010 approximately 241,000 tons were disposed in the Landfill. Leachate is pumped directly to the Hampton Roads Sanitation District for treatment.

2.9.1.1.1 Capacity

The Landfill was originally designed to contain four disposal cells (Cells 1 through 4), which have recently undergone the closure process (RW Beck, March 1, 2011). The capacity of Cells 1

through 4 is 12,200,000 cubic yards (9,400,000 tons). In 1998, Cell 5 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 5, a final height of 205 feet above mean sea level can be achieved. A sixth landfill cell (Cell 6) opened in May 2006. Located to the west of Cell 5, Cell 6 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 1 through 6) of the Regional Landfill is 27,200,000 cubic yards (20,900,000 tons) (RW Beck, 2008) with approximately 5,400,000 cubic yards of capacity still remaining in Cells 5 and 6 as of January 2011(HDR, March 1, 2011). With the decreased waste volume being disposed of in the Landfill the existing capacity is expected to be expended in November 2028 (HDR, March 1, 2011).

2.9.1.1.3 Expansion Potential

SPSA recently completed the process of permitting an expansion to the Regional Landfill (Cell 7) which adds an approximate 50-acre footprint with 10,000,000 cubic yards of capacity. The permitting of Cell 7 ensures that the member jurisdictions are not threatened with the unforeseen loss of the WTE Facility (e.g., the Navy determining that it no longer needs steam from the power plant, or Wheelabrator unexpectedly going out of business). This additional capacity represents an opportunity to ensure that future waste disposal remains economically viable for the member communities.

The most recent amendment of the Regional Solid Waste Management Plan indicates that the "wedge" between Cells 1through 4 and Cells 5 and 6 could provide approximately 3,200,000 cubic yards of additional capacity. 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.

Another potential expansion area exists on property adjacent to the Regional Landfill and currently owned by SPSA (the "Kirk" property and potential Cells 7 and 8/9). 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.

A potential expansion area exists to the south and west of the Cells 6 and 7, 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 6.

2.9.1.2 Virginia Beach Landfill

The Virginia Beach Landfill No. 2 (also known as Mount Trashmore 2) is an approximate 300-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. 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 WTE Facility. Since the sale of the WTE Facility to Wheelabrator in April 2010, SPSA had been fully exercising its option to dispose of the ash at the City's facility. However, as of August 2011, SPSA no longer disposes of ash at Landfill No. 2 but rather takes the ash to the Regional Landfill.

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 was 4.13 million cubic yards (or approximately 2.7 million tons assuming a waste density of 1,300 pounds per cubic yard).

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: Past 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).

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.

Fully utilizing the remaining disposal capacity of Landfill No. 2 will result in significant cost savings to the City. The City can also use the remaining disposal capacity of the landfill to

reduce its long-term disposal costs if it elects to continue disposing its waste at the Wheelabrator WTE Facility after 2018. The City, as it has in the past, could enter into a disposal agreement with Wheelabrator which would allow for the disposal of the ash from the facility at the City's landfill for a reduced tipping fee. This is similar to the approach it took when the ash disposal agreement was negotiated with SPSA and the schedule of maximum tip fees was established.

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. A report that the City submitted to VDEQ in July 2010 for financial assurance states that 48,000 cubic yards of waste was placed in the Landfill in FY 2010. The assumed density of the waste was not stated.

2.9.1.3.1 Capacity

The City's July 2010 report states that the Landfill has a remaining capacity of 3,058,738 cubic yards (as of the end of FY 2010).

2.9.1.3.2 Estimated Site Life

The City's July 2010 report states that the Landfill has a remaining life of 47.8 years (as of the end of FY 2010).

2.9.1.3.3 Expansion Potential

The City (personnel communication with Jarvis Middleton, Director of Public Works, May 23, 2011) indicated that it has no plans to expand the Landfill in the near future.

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.

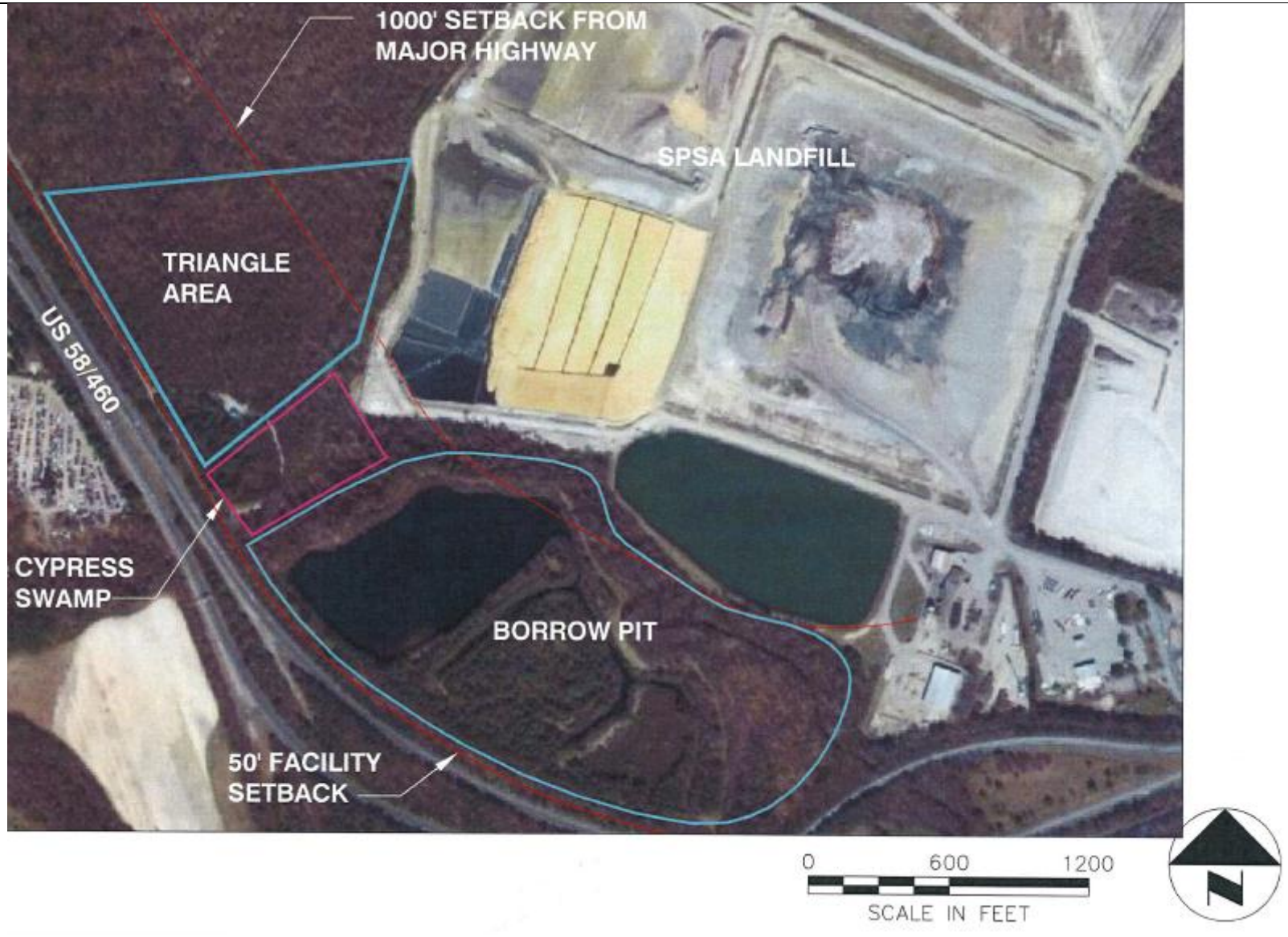


Figure 6. Potential Expansion Areas Adjacent to the SPSA Regional Landfill

2.9.2 Out of Region Disposal Facilities

Potential out of Region (eastern Virginia) disposal facilities are listed in Table 18. 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 2009). 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 7 shows the locations of most of the private disposal facilities listed in Table 18 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 18, 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

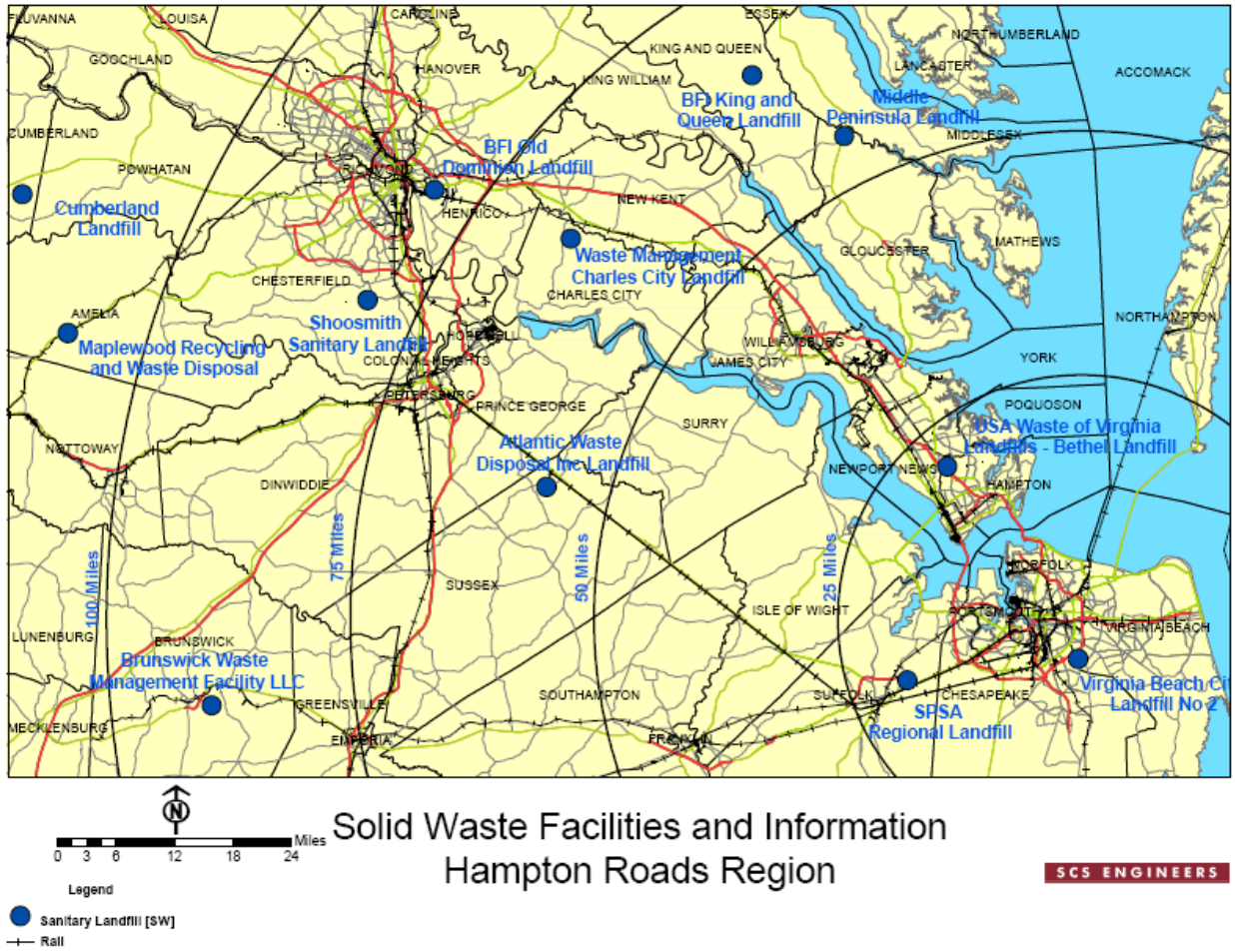
Table 19 shows the hauling distance from each transfer station (and the RDF/Power Plant) in the SPSA network to each private waste disposal facility in eastern Virginia.

2.9.2.4 Rail Access

Several of the out-region landfills listed in Table 18 and Table 19 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 7. Landfill Facilities in Eastern Virginia

Table 18. 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)	43,180,136	1,674,843	37	66,440,000	50
BFI King and Queen Landfill (Republic)	10,750,000	961,046	21.9	same	same
BFI Old Dominion Landfill (Republic)	2,900,000	562,344	11.5	7,500,000	same
Brunswick Waste Management Facility	10,675,000	628,652	27	75,000,000	50
King George Sanitary Landfill (Waste Management)	12,080,939	1,015,190	17.4	23,900,000	20
Maplewood Recycling and Disposal (Waste Management)	18,107,639	364,194	75	32,600,000	81
Middle Peninsula (Waste Management)	18,129,052	480,504	90	18,800,000	same
Bethel Landfill (Waste Management)	24,549,224	492,012	106	44,000,000	same
Charles City Landfill (Waste Management)	14,751,460	404,220	30.1	40,700,000	85
Cumberland (Republic)	NA	NA	NA	80,000,000	30
Shoosmith Sanitary Landfill	4,000,000	825,393	9	NA	NA

* From Solid Waste Managed in Virginia During Calendar Year 2009 (VDEQ, June 2010).
**From facility owners when asked in 2008.
NA - Information not available or not applicable.

Table 19. 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	Shoosmith Sanitary Landfill
Landstown	27	73	89	155	139	70	144	82	99	107	34	104
Oceanna	29	68	89	143	137	70	144	82	100	109	28	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	117	65	152	78	95	81	29	77
Boykins	44	45	76	120	107	109	153	117	83	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 believed 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.

An additional study was performed by Environmental Engineering & Technology, Inc. in 1990. The study stated that the expansion of the Regional Landfill was not deemed 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.

Environmental Engineering & Technology, Inc. also prepared a subsequent report dated May 1991, addressing the specific characteristics of the individual candidate sites. One of the sites was located outside the Region, in Camden County, North Carolina. 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 7.

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 2008, 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.

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. Approximately 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 2001-2011 budget totals $29,353,742 ($8,268,083 for solid waste collection and $21,085,659 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 2010-2011) include charges for solid waste collection in the amount of $765,746. 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 $1,539,746.

2.11.3 City of Norfolk

The Waste Management Division collects approximately 80,000 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 2010-2011 approved budget includes $7,733,968 for waste collection and $17,502,555 for disposal (total of $25,236,523).

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 2011 proposed budget includes and expenditures of $15,443,183 ($6,545,173 for collections $8,898,010 for disposal).

2.11.5 City of Suffolk

In the past, the City has used General Fund revenues to pay for the costs of solid waste collection and disposal. The City's budget for refuse collection for FY 2010-2011 was $4,095,000. On July 1, 2011, the City established a Refuse Enterprise Fund (REF) which is intended to generate funding to cover the cost of refuse collection, curbside collection, post-closure care at the Hosier Road Landfill, and all other activities related to refuse management in the City.

2.11.6 Virginia Beach

The City collects more than 180,000 tons of waste and 26,000 tons of recyclables (through a contract with Tidewater Fiber Corporation) per year. The City's operations are funded through the General Fund with FY 2010-2011 budgets totaling $11,633,202 for waste collection, $13,506,271 for waste disposal, and $5,453,904 for recycling.

2.11.7 Isle of Wight County

In fiscal year 2010, Isle of Wight County disposed of 18,676 tons of waste. The County uses its General Fund to pay for refuse collection and disposal services. For FY 2010-2011, the County has budgeted $760,137 for refuse collection and $3,176,000 for 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 2010-2011 budget includes $677,074 for waste removal, $1,350,000 for disposal and $54,772 for recycling.

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3.0 FUTURE SOLID WASTE TECHNOLOGY AND FACILITY NEEDS

This section includes discussions on 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 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.

3.1.1.2.2 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.

3.1.1.2.3 9 VAC 20 Chapter 81 - 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. In March 2011, the VDEQ adopted 9 VAC 20-81 and repealed 9 VAC 20-80. The amendment also repealed 9 VAC-100 and 101 and incorporated the vegetative waste management and yard waste composting regulations into 9 VAC 20-81. The purpose of Amendment 7 was to correct inconsistencies that occurred because of previous amendments, remove redundancy, and improve organization. Many of the revisions are clarifications of existing standards.

The types of facilities described in the regulations include sanitary landfills, industrial waste landfills, and construction/demolition/debris landfills, transfer stations, composting facilities, 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 and include requirements for design, operation, closure, postclosure care, control of decomposition gases, leachate control, groundwater monitoring, and corrective action.

To encourage the development of yard waste composting facilities, 9VAC20-81 includes new provisions intended to lessen the regulatory burden on compositing operations, while continuing to provide the same environmental protection afforded by previous regulations

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:

- Compost facility;
- Solid waste transfer station;
- Materials recovery facility;
- Waste to energy, thermal treatment, or incineration facility for petroleum contaminated soils;
- Waste pile; or
- Centralized waste treatment facility.

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 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).

3.1.1.2.7 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.

3.1.1.2.8 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.

3.1.1.2.9 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.

3.1.1.2.10 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.

3.1.1.2.11 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.

3.1.1.2.12 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.

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

3.1.2.3.1 Emissions from Landfills

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.

3.1.2.3.2 Greenhouse Gas Emissions

On October 30, 2009, the EPA issued a final rule for mandatory reporting of greenhouse gases (GHG) from selected GHG sources in the United States. This rule has been published as "Title 40 of the Code of Federal Regulations (CFR), Part 98: Mandatory Green House Gas Reporting" (40 CFR 98). Under this rule, municipal solid waste landfill owners are required to calculate GHG emissions and must annually report those emissions if the landfill generates methane (CH4) in amounts equivalent to 25,000 metric tons of carbon dioxide equivalent (CO2e) or more per year. Additionally, solid waste landfill owners must prepare and maintain a GHG Monitoring Plan to maintain compliance with the rule.

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 8):

- **First, Reduce and Reuse.** 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, Recycle and Compost.** This level includes 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, Recover Energy.** 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.

- **Finally, Dispose.** After the first 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.

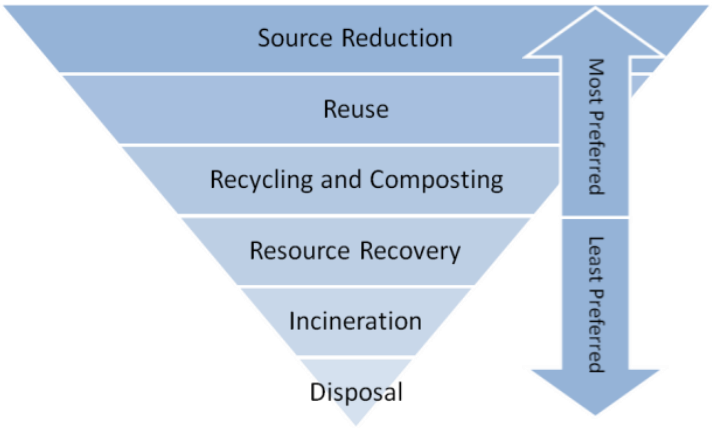


Figure 8. Waste Management Hierarchy

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 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 stations, landfills, and WTE Facility 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.

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 accompanying photographs show some waste handling facilities described earlier including an intermodal transfer yard (top, a typical large-scale intermodal transfer yard, center, a typical dual-stack intermodal car train and, bottom photo, the gondola car waste tipping station at the Roanoke Valley waste-to-energy plant).

PHOTO: ROANOKE VALLEY RESOURCE AUTHORITY

For the Region additional facilities to construct would likely include those described below. The facilities would vary depending on the use of either gondola cars or intermodal containers to contain 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 between the use of gondola cars and intermodal described above 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 20, 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 could be further evaluated once a new disposal facility is sited of selected.

Table 20. 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 day) 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 20. 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 (includes all waste streams generated in each community) 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 tonnages shown on Table 21to achieve the mandated recycling rate.

Table 21. Required Recycling Rights and Tonages-2018

Jurisdiction	2018 Projected Municipal Waste Disposed (tons)	2006 Persons per Square Mile (1)	Current Mandated Recycling Rate (%) (2)	2018 Required Recycling (tons)
Chesapeake	290,200	634	25	72,600
Franklin	11,000	1,038	25	2,800
Isle of Wight	51,300	105	25	12,800
Norfolk	281,800	4,372	25	70,500
Portsmouth	114,600	2,992	25	28,700
Southampton	24,500	30	15	3,700
Suffolk	126,800	199	25	31,700
Virginia Beach	521,800	1,748	25	130,500
Total	1,422,000		25	353,300

(1) Hampton Roads PDC, Hampton Roads Data Book, May 2007
(2) 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.

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.

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.

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.

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.

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.

Agency member communities 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 22 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 22. 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 9. 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.

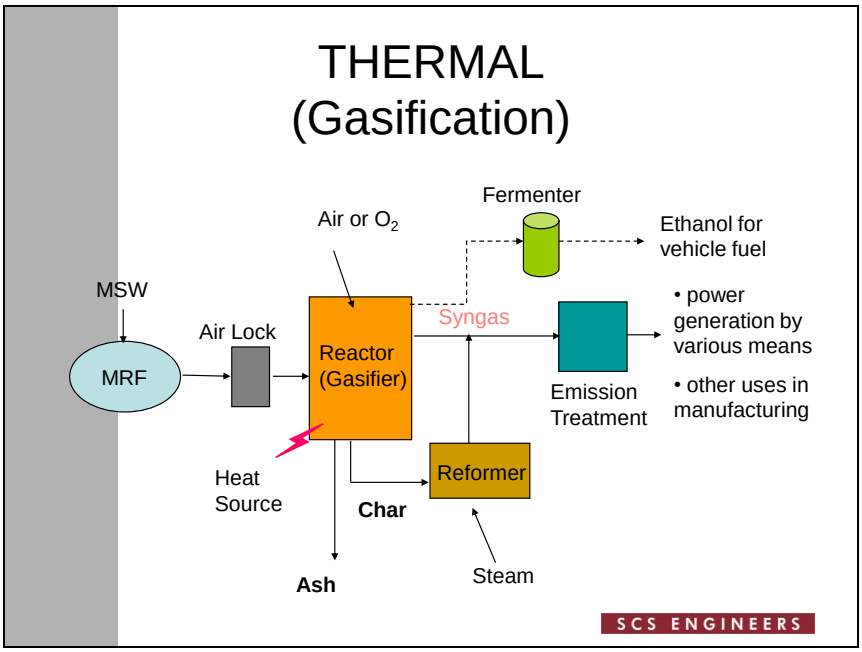


Figure 9. Basic Gasification Process

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 10.

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.

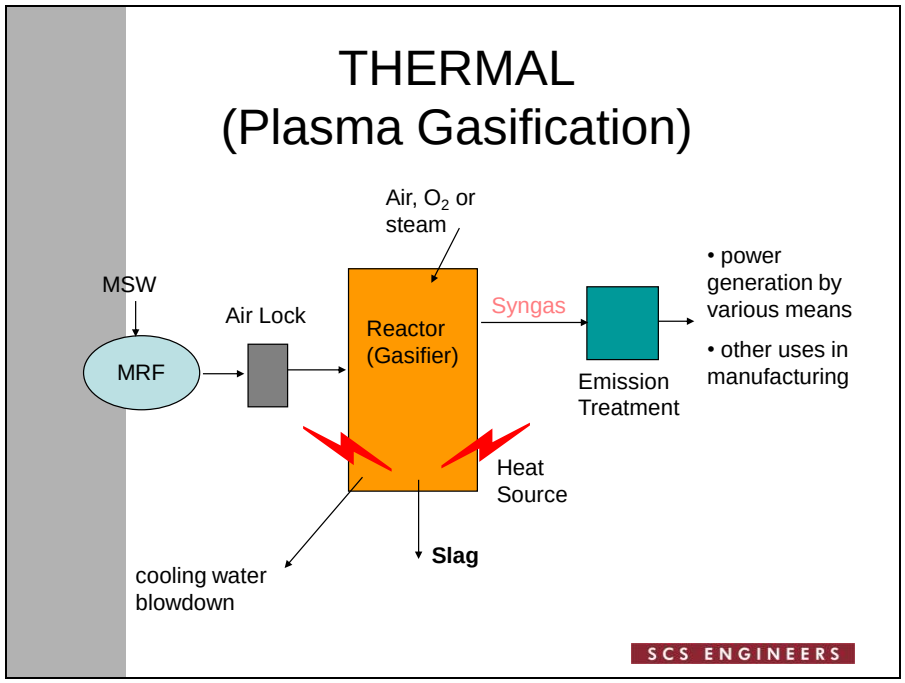


Figure 10. Basic Plasma Gasification Process

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 11.

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 12.

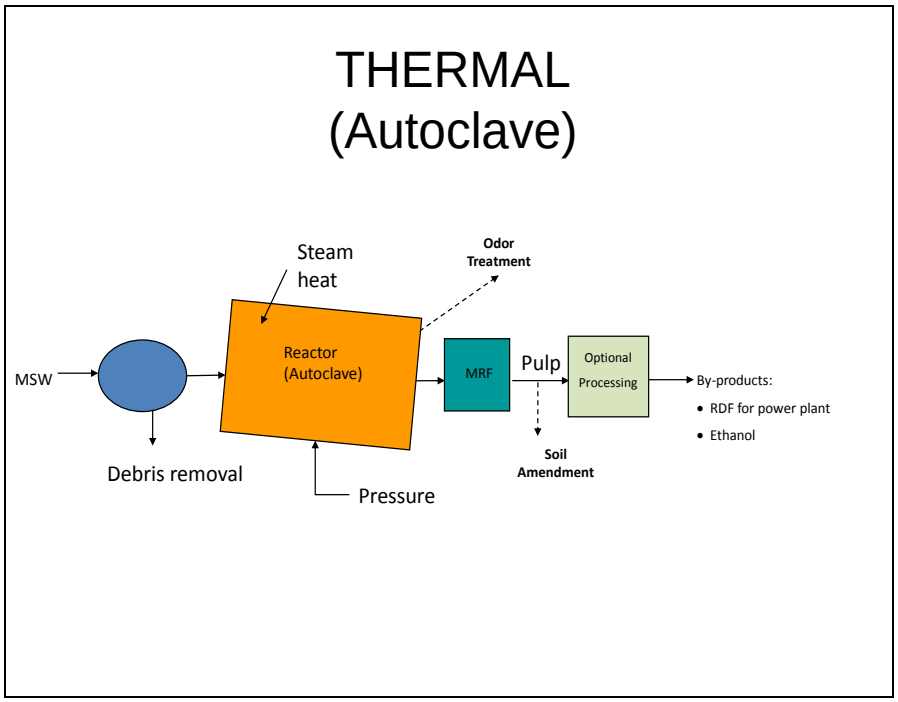


Figure 11. Basic Autoclave Process

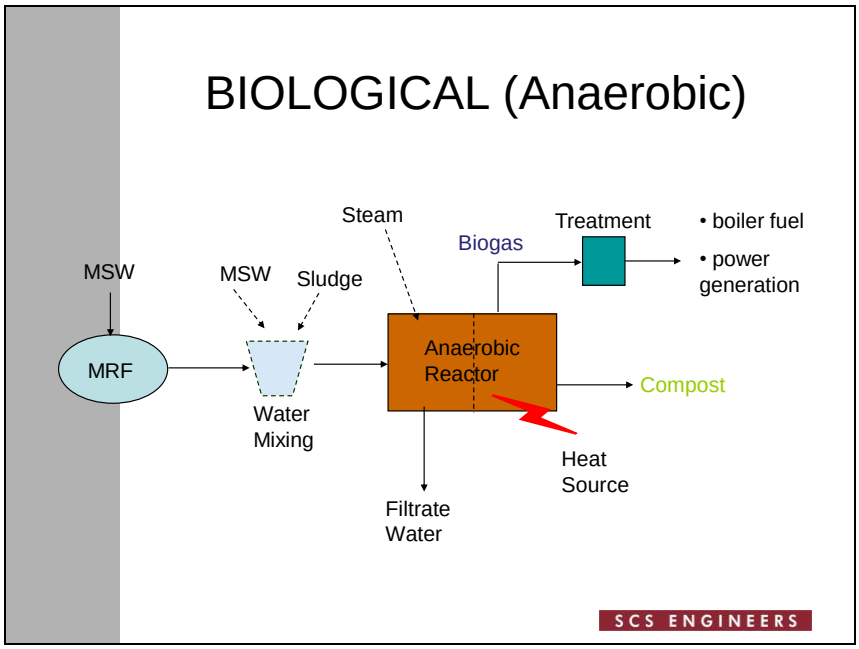


Figure 12. Basic Anaerobic Process

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 reacts 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 13.

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 23. 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.

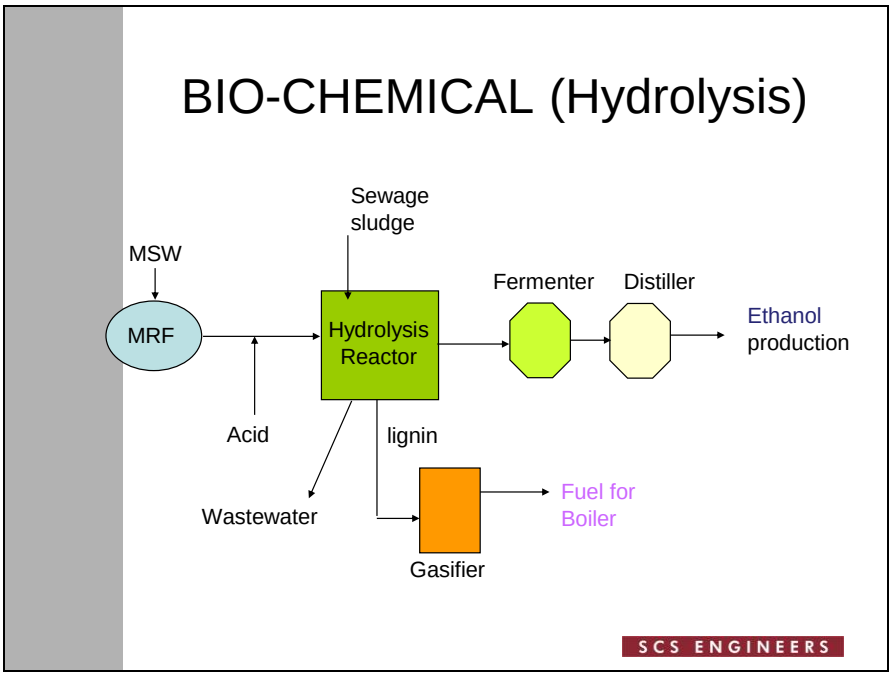


Figure 13. Basic Bio-Chemical Process

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

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 23. 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 24 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 24. 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 25 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 26 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 25. 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 26. 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 26 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 27 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 26 are provided as a comparison in the last column of Table 27.

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 14 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.

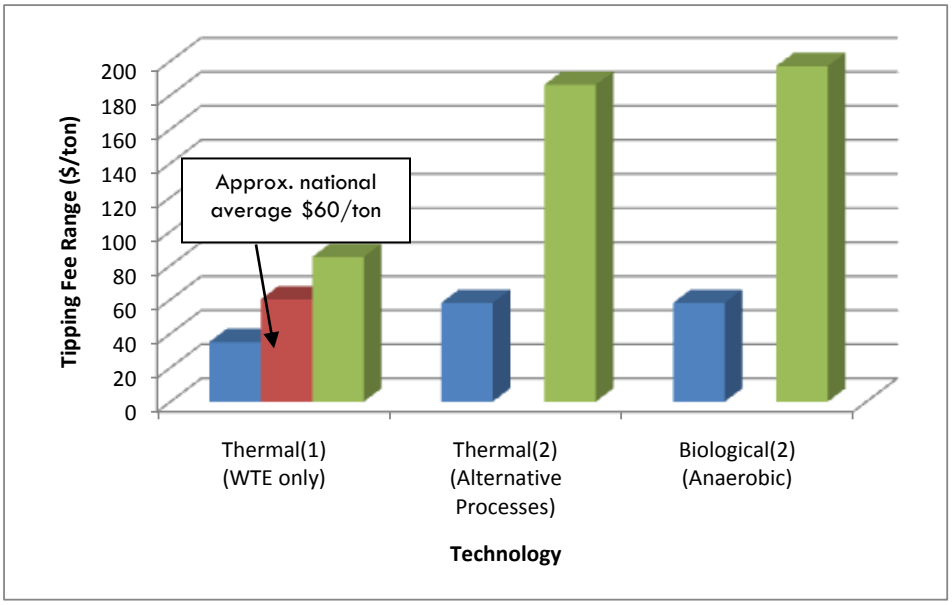
The tipping fee ranges for alternative technologies, taken from Table 26 and Table 27 are provided as a crude comparison to the WTE tipping fee. A much large range of tipping fee, from low to high is evident. These plots reflect the normal uncertainties and risks at the time of the studies, that the 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 (the possible need for 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 14. Summary of Tipping Fee Range for Technologies

Table 27. 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 26, 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 on the 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 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. The City of Virginia Beach performs some mulching of yard waste at their Landfill No. 2 for use by the City to landscape City properties. 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 and closed in 2007. The facility would be centrally 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 in the past). 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 VDEQ 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. A discussion on the current CDD recycling facilities in the Region is contained 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 (through 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 1through 7 comprise approximately 238 acres. The area of the facility not used for landfill footprint is used for office space and operations, buffers, perimeter access roads, drainage swales, stormwater 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 1through 6 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 28 summarizes the landfill development factors.

Table 28. 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 28, the land requirements for a new regional solid waste facility could be estimated if the existing Regional Landfill cannot be expanded.

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 2011 (SPSA, March 23, 2011). Most of 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). When historical data indicated a negative, or declining waste flow, as a conservative assumption, a slightly increasing waste generation rate was assumed. Commercial, Navy, CDD and Norfolk Sludge waste was not escalated because of the uncertainty of the future of these waste streams. 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. The initial (2011) waste flow tonnage for the Craney Island Landfill was determined using the expected volume at the gate (48,000 cubic yards) and an assumed density of 1,000 pounds per cubic feet.

Table 29 summarizes the individual waste flow streams and their projected accumulated volumes through the planning period.

Table 29. Projected Solid Waste Quantities for Planning Period (Not Including Yard Waste)

Waste Flow Stream	Waste Growth Escalation Rate (%/year)	Projected Waste Flow in 2011 (tons)	Projected Waste Volume Through the Planning Period (tons)	Percentage of Total (%)
Chesapeake	1.4	89,200	3,584,000	11.3
Franklin	1.2	3,600	139,000	.4
Isle of Wight	2.7	17,200	915,000	2.9
Norfolk	0.04	70,000	2,117,000	6.7
Norfolk Sludge	0.0	6,000	180,000	.6
Portsmouth (to SPSA)	.3	39,300	1,241,000	3.9
Portsmouth (to City Landfill)	.3	24,000	768,000	2.4
Southampton	1.5	7,700	316,000	1.0
Suffolk	3.2	42,300	2,511,000	7.9
Virginia Beach (to SPSA)	.3	127,600	4,080,000	12.9
Virginia Beach (to Landfill No. 2)	.3	50,000	1,602,000	5.1
Commercial	0.0	416,600	12,498,000	39.4
Navy	0.0	28,400	840,000	2.7
CDD	0.0	30,000	900,000	2.8

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

As part of this study, SCS developed, screened, and analyzed alternative institutional models for regional solid waste management, including public, private or combination systems. SCS evaluated the following institutional models to identify the required organizational structure, staffing, cooperative agreements needed, and advantages and disadvantages of each:

- **Status quo.** SPSA continues to provide existing services on behalf of member jurisdictions post 2018.
- **SPSA contracts for all services.** SPSA continues to provide existing services on behalf of member jurisdictions post 2018; but all transfer and disposal services are contracted to the private sector.
- **SPSA contracts for disposal services only.** SPSA negotiates for private disposal capacity on behalf of members and establishes a regional tip fee (post 2018). No transfer services are provided.
- **Independent systems.** Each municipality independently manages its own solid waste stream and develops contracts for required services. SPSA ceases to exist after 2018.
- **Cooperative Systems.** Select municipalities agree to cooperate together to manage their solid waste and develop contracts for collection, processing, and disposal services.
- **A new regional 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.
- **Public/private partnership under a new regional authority.** A fully integrated, publicly-owned and privately-operated transfer/disposal system (established with all or some existing member jurisdictions not currently members of SPSA, or resulting from a merger with another existing regional authority).

4.1 OVERVIEW OF 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 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 Regional Landfill began accepting solid waste. The use and support agreement with 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) Waste to Energy (WTE) Facility. Under the Navy Contract, RDF produced at the 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 RECENT CHANGES TO SPSA STRUCTURE AND FUNCTION

The following sections provide an overview of changes that have occurred since the 2008 HRPDC study (SCS, 2009) was conducted.

4.2.1 Sale of WTE Facility

In late 2007, SPSA advertised that it would entertain proposals from qualified interested parties for the sale of the WTE Facility. In April 2010, the facility was sold to Wheelabrator Technologies. Under the terms of the sale, Wheelabrator accepts and processes SPSA member community solid waste at the WTE Facility until January 24, 2018. This term can be extended by SPSA for an additional ten years. As part of the sale agreement, SPSA must deliver 500,000 tons of waste to Wheelabrator and agrees to dispose of ash from the facility. SPSA pays Wheelabrator to process waste; in turn, Wheelabrator credits SPSA with:

- Ten percent of steam energy revenues.
- A hauling fee for transporting commercial waste from the transfer stations to the WTE Facility.
- A loading fee for loading non-processable waste and diverted waste into trailers.

The non-processible waste, which historically has been disposed of in the SPSA Regional Landfill, is now taken by Wheelabrator to landfills that are located outside of the SPSA service area.

4.2.2 Discontinuation of Recycling Programs

At the time the 2008 HRPDC Study was conducted, SPSA was one of the primary providers of recycling collection services in the Region, along with the city of Virginia Beach. SPSA made the decision to discontinue curbside and drop-off recycling services; therefore, many of cities and counties are now providing these services to their citizens directly. SPSA continues to operate regional programs for white goods recycling, household hazardous waste, tire processing, used oil collection, and battery recycling.

4.2.3 New Structure for Board of Directors

Historically, the SPSA Board of Directors was appointed directly by the member jurisdictions. Each jurisdiction was allowed one board position (eight total members); the Board appointee was typically an elected official. Members also appointed alternates who typically were a city or county employee in the public works or city administrator's office.

As part of the 2008 HRPDC Study, SCS evaluated alternative board structures that could be used by SPSA or a new regional authority established to replace SPSA. The structures evaluated included a board structure that was based on population, use of ad hoc board members to vote only on particular projects or issues, at-large members that would represent districts, and an executive advisory committee. The Study recommended that the board structure be revised to provide for proportional representation that reflected the fiscal and solid waste contribution of its members.

In 2009, the Virginia General Assembly passed a bill that established a new board structure for SPSA. Now, as required by the Code of Virginia §15.2-5102.1, two Board members represent each member jurisdiction; each with voting power (16 total members). The governor appoints one Board member for each jurisdiction; the member jurisdiction appoints one government employee to serve as an Ex-Officio member. Both the Governor and the member jurisdiction may appoint an alternate Board member to serve if the Board member is not able to be in attendance. Each Board member serves a four-year term and is limited to two terms.

As part of the 2009 gubernatorial appointment process, each jurisdiction forwarded the names of three candidates for consideration by the Governor. No candidate could be an elected official and had to have "general business knowledge," such as a background in public works, finance, or waste management (as required by the statute). Each jurisdiction had to submit a Nomination for Gubernatorial Appointment form and each candidate was also required to submit an Application for Gubernatorial Appointment to the Secretary of the Commonwealth. Additionally, each candidate was required to submit other information, as appropriate, in connection with the "general business knowledge" requirement of §15.2-5102.1.

The new Board of Director's terms commenced on January 1, 2010 and will expire on December 31, 2013.

4.3 REVIEW OF INSITUTIONAL SOLID WASTE MANAGEMENT MODELS USED ELSEWHERE

As part of the planning process during the 2008 HRPDC Study (SCS, 2009), 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.

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.

4.3.1 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.

4.3.2 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 30. A general overview of the evaluation is provided below.

4.3.2.1 Membership

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

4.3.2.2 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.

4.3.2.3 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.

Table 30. 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	96 towns/cities	state	21 member municipalities, 7 associate members, 15 contract members
Population	~1 million	~2.4 million	~898,000	~335,000
Governance				
Governing Board	Board of Directors	Board of Directors	Board of Directors	Board of Directors
Board Constitution	20 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 and confirmed by Senate; 3-year terms	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 in 1975 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	President appointed by Chairperson of the Board of Directors	Chief Executive Officer appointed by Board of Directors	General Manager appointed by Board of Directors

Table 30. Solid Waste Authorities/Organizations

	Central Virginia Waste Management Authority	Connecticut Resource Recovery Authority	Delaware Solid Waste Authority	Environmental Cooperative of Maine (ecomaine)
Staff	13 authority staff	By statute, staff cannot exceed 70 personnel	202 employees (65 landfill, 8 transfer station, 9 collection station, 63 recycling operations, 57 administrative)	71 staff
Funding	Members pay CVWMA for contracted services used. All members pay a per capita annual assessment for administration. Authority remits rebates from sale of recyclable materials to participating governments.	Authority has no taxing power. Uses a general fund for central administration. Enterprise fund for disposal systems based on tip fees, electrical revenues, investments.	Enterprise fund. Primary revenue sources include tipping fees, recycling revenue, and landfill gas royalties. State provides no revenues.	Tipping fees. Members pay assessments if tip fees are not adequate to cover contractual obligations. Revenues from electricity sales and recyclables.
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 three comprehensive solid waste disposal systems.	Recycling, transfer, and disposal services. Collection services provided through licensed haulers.	Recyclables processing and waste-to-energy.
Facilities	None	Two waste-to-energy facilities, transfer stations, landfills for ash disposal, recycling facilities	Operates collection stations, transfer stations (3), recycling center and 180 drop-off facilities, composting facilities, and disposal facilities (3 landfills)	Single-stream material recovery facility, waste-to-energy facility, and landfill/ashfill

Table 30. Solid Waste Authorities/Organizations

	Central Virginia Waste Management Authority	Connecticut Resource Recovery Authority	Delaware Solid Waste Authority	Environmental Cooperative of Maine (ecomaine)
Ownership/Operation	Contracted services are provided by the private sector. In 2009 participated in a joint procurement with VPPSA and Newport News for curbside recycling.	Waste-to-energy facilities are owned by CRRA but operated by private companies. CRRA for other services. Contracts with 45 haulers and additional WTE	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	Waste handling agreements/participating municipalities are obligated to deliver waste
Debt Management				
Debt	None	Yes	Yes	Yes
Bondholder		CRRA	DSWA	ecomaine
Repayment System		Revenues. Some construction bonds require repayment by the contractor for the facility and not the authority. Conduit bonds for Covanta	Revenues	Revenues

Table 30. 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	~507,000	~5.7 million	~3.7 million
Governance				
Governing Board	Fairfax County Board of Supervisors	Board of Directors	A partnership of 23 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 for 5-year terms	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). Four-year terms.
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, Lancaster County Municipal Waste Ordinance	Special districts. The 23 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	Chief Executive Officer appointed by Board of Directors	No. Administrative staff led jointly by Chief Engineer and General Manager	Appointed by Board of Directors with approval of the Governor

Table 30. Solid Waste Authorities/Organizations

	Fairfax County, Virginia	Lancaster County Solid Waste Management Authority	Sanitation Districts of Los Angeles County	Northeast Maryland Waste Disposal Authority
Staff	Fairfax County Department of Public Works; 33 administrative, 289 operations	79 total staff	Administrative staff organized into 8 departments	~ 11 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 and compost facility
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/private operation.	Authority owns 2 facilities; 1 is privately owned. All operated under private contract.
Flow Control	No. Uses several	Yes/No. Municipal waste	No.	No.

Table 30. Solid Waste Authorities/Organizations

	Fairfax County, Virginia	Lancaster County Solid Waste Management Authority	Sanitation Districts of Los Angeles County	Northeast Maryland Waste Disposal Authority
	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.	generated in Lancaster County is directed to Authority facilities through a combination of waste flow ordinances and hauler agreements: a) Municipal ordinances direct waste to Authority; b) County flow ordinance designates LCSWMA as responsible entity; c) Hauler agreements - 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.		
Debt Management				
Debt	Yes	Yes	Yes	Yes
Bondholder	Fairfax County	LCSWMA	Commerce Refuse-to-Energy Authority	NEA
Repayment System	General Fund	Revenues	Revenues	Operating Revenues

Table 30. 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	~1.3 million	~950,000	~1.5 million	~212,000
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, Councilors elected by region's voters (non-partisan)	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. Because of state legislation introduced in 2010, VPPSA is exploring options to change the structure of the board of directors.
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				

Table 30. Solid Waste Authorities/Organizations

	Solid Waste Authority of Palm Beach County	Pinellas County, Florida	Portland Metro	Virginia Peninsulas Public Service Authority
Executive Director	Appointed by Authority Governing Board	No	Chief Operating Officer appointed by Council President	Appointed by Board of Directors
Staff	437 staff (9 executive, 166 administrative, 262 operations)	Department of Solid Waste Operations, Pinellas County Utilities; 79 positions	106 Metro staff involved with waste management; 1,600 total	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; tipping fees at transfer stations. 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				

Table 30. Solid Waste Authorities/Organizations

	Solid Waste Authority of Palm Beach County	Pinellas County, Florida	Portland Metro	Virginia Peninsulas Public Service Authority
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.
Facilities	Material recovery facilities, 5 transfer stations, waste-to-energy, vegetation processing facilities, composting facility	Waste-to-energy, landfill, mulching facility	Transfer stations (uses private landfill).	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.

Table 30. Solid Waste Authorities/Organizations

	Solid Waste Authority of Palm Beach County	Pinellas County, Florida	Portland Metro	Virginia Peninsulas Public Service Authority
Debt Management				
Debt	Yes	No. Last bond paid in 2006. Recent projects paid for with reserve money.	Yes, but not for solid waste projects.	No.
Bondholder	SWA		Metro	
Repayment System	Revenues		Bond Funds	

4.3.2.4 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).

4.3.2.5 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.

4.4 ALTERNATIVE INSTITUTIONAL MODELS FOR REGION

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

- **Status quo.** SPSA continues to provide existing services on behalf of member jurisdictions post 2018. Some services are provided using SPSA employees (e.g., transfer operations) and other services are contracted to the private sector (e.g., waste disposal capacity). SPSA continues to operate regional programs for white goods recycling, household hazardous waste, tire processing, used oil collection, and battery recycling. Recyclable collection services continue to be provided by member jurisdictions.

- **SPSA contracts for all services.** SPSA continues to own all currently owned assets and to provide existing services on behalf of member jurisdictions post 2018; but all transfer and disposal services are contracted to the private sector. SPSA continues to operate regional programs for white goods recycling, household hazardous waste, tire processing, used oil collection, and battery recycling.

- **SPSA contracts for disposal services only.** SPSA negotiates for private disposal capacity on behalf of members and establishes a regional tip fee (post 2018). No transfer services are provided. Members haul directly to the selected disposal location using municipal forces or through contracts with the private sector. This scenario further requires that SPSA liquidate its transfer assets and the Regional Landfill. Under this scenario, SPSA no longer provides regional programs.

- **Independent systems.** Each municipality independently manages its own solid waste stream and develops contracts for required services. SPSA ceases to exist after 2018.

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

- **A new regional 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. Existing and new facilities will be owned and managed by the new regional authority. Disposal would to be a function of the private sector.

- **Public/Private Partnership under a New Regional Authority.** A fully integrated, publicly-owned and privately-operated transfer/disposal system (established with all or some existing member jurisdictions not currently members of SPSA, or resulting from a merger with another existing regional authority).

The size, organization, and responsibilities of SPSA will depend on the assets it is required to manage (e.g., landfill and/or transfer stations), and the services requested by its members (e.g., recycling, yard waste, household hazardous wastes). For each model presented, the required organizational structure, staffing, and cooperative agreements needed are discussed. An overview of implementation issues also is provided.

4.4.1 Status Quo

4.4.1.1 Administrative Structure

Currently, SPSA is governed by a board of directors consisting of 16 representatives, and an alternate representative. Half of the representatives are appointed by the governor. The remaining representatives and alternates are 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. By state statute, the executive director is not permitted to execute or commit SPSA to any contract, memorandum of agreement or memorandum of understanding without an informed vote of approval by the Board except:

- Contracts for the purchase of goods and services for an aggregate sum of less than $30,000, that are exempted from competitive negotiation or competitive sealed bidding by Board policy.

- Sole-source and emergency procurements made pursuant to Virginia's Public Procurement Act.

The status quo alternative continues to use the current administrative structure of SPSA. After 2018, the board of directors will continue to be appointed in the same manner with the board representing the community members that wish to remain a part of the organization. The size of the board of directors will be dependent upon the number of member jurisdictions.

Under this alternative, the SPSA Board of Directors 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. The personnel, facility, and organizational infrastructure currently exist to support this alternative. Many of the facilities will have not reached their useful life by 2018 and could serve the Region well into the future.

4.4.1.2 Staffing

Daily transfer operations continue to be managed by SPSA program and facility staff. Total staff needed continues to be approximately 140 personnel. This staffing level also assumes that SPSA continues to operate the household hazardous waste program, white goods recycling, tire processing, used oil collection, and battery recycling.

4.4.1.3 Facilities

Existing facilities will continue to be owned and managed by SPSA. These facilities include the regional landfill and the transfer stations.

4.4.1.4 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. SPSA will be responsible for negotiating a disposal agreement on behalf of the members.

4.4.1.5 Implementation Summary

Timeframe: A minimum lead time of two years would be needed to draft and negotiate new SPSA support agreements and allow time for members to review and approve agreements. SPSA would also require at least one year to procure waste disposal services on behalf of its members.

Economies of Scale: Can be realized through the continued operation of regional programs and cost sharing across member jurisdictions.

System Funding: A tip fee funding approach would be used that allocates system costs to the total waste stream delivered to the SPSA transfer system. The tip fee would include system charges that are not directly related to the disposal function, such as administrative costs and regional programs such as household hazardous waste collection.

Debt Management: Costs for most facility needs could be managed through the capital improvement budgeting process. However, debt could be incurred if new transfer facilities are required or the Regional Landfill is expanded.

Disposal Market Leverage: SPSA would continue to manage a significant amount of waste, which should provide for significant leverage when negotiating disposal terms with a private sector provider. For example, the Central Virginia Waste Management Authority (CVWMA) currently has negotiated tipping fees that range from $27.76 to $35.59 per ton for disposal of waste collected from area convenience centers. The Virginia Peninsulas Public Service Authority (VPPSA) has a negotiated tipping fee of approximately $24 per ton for waste collected through the Middle Peninsula Solid Waste System operated by VPPSA.[1]

4.4.2 SPSA Contracts For All Services

Legislation passed in 2009 requires SPSA to consider outsourcing any or all functions that may result in reduced costs to the authority. SPSA is further required to annually issue requests for proposals that potentially reduce the costs of any of its programs. In addition, SPSA is required to accept and review any proposals under the Public-Private Education Facilities and Infrastructure Act of 2002 (§56-575.1 et seq.) that potentially reduce the costs of any of its programs.

This requirement could affect the future role of SPSA, from providing services to one of contracting for services.

4.4.2.1 Administrative Structure

The regional authority would still be managed by a board of directors using the current SPSA structure; adjusted for the number of members. Operations would continue to be managed by an Executive Director appointed by the board. The authority would require the ability to contract with private firms for operation of SPSA-owned facilities.

4.4.2.2 Staffing

Daily operations would continue to be managed by SPSA program staff. Total staff needed by SPSA will be significantly reduced (fewer than 20) since SPSA would no longer be providing personnel to operate transfer stations. For example, the CVWMA, which negotiates recycling and collection/disposal contracts for communities surrounding Richmond, operates with fewer than 12 staff.

4.4.2.3 Facilities

Existing and new facilities would be owned by SPSA but operated by private companies under contract to the authority. SPSA would still retain responsibility for maintaining and upgrading facilities as required.

4.4.2.4 Cooperative Agreements

As under the Status Quo alternative, this alternative also requires that cooperative agreement be negotiated between member jurisdictions and SPSA to allow for operation past 2018. Under the agreements, SPSA would continue to be responsible for transfer and disposal of waste generated

in the Region, while the member jurisdictions would be responsible for collection and delivering waste to designated facilities. Similar to CVWMA and VPPSA, SPSA will pay for transfer and disposal and seek reimbursement from members.

4.4.2.5 Implementation Summary

Timeframe: A minimum lead time of two years would be required to draft and negotiate new SPSA support agreements and allow time for members to review and approve agreements. SPSA would also require at least one year to procure waste transfer and disposal services on behalf of its members.

Economies of Scale: Can be realized through the continued operation of regional programs and cost sharing across member jurisdictions.

System Funding: A tip fee funding approach would be used that allocates system costs to the total waste stream delivered to the SPSA transfer system. The tip fee would include only system charges that are directly related to the transfer and disposal functions, since these costs would be set by the private sector operator. A new funding approach would be required to allocate administrative and regional program costs. These costs could be allocated to members through a per capita annual assessment. This is the approach used by the CVWSA.

Debt Management: Costs for most facility needs could be managed through the capital improvement budgeting process. However, debt could be incurred if new transfer facilities are required or the Landfill is expanded.

Disposal Market Leverage: SPSA would continue to manage a significant amount of waste, which should provide for significant leverage when negotiating disposal terms with a private sector provider.

4.4.3 SPSA Contracts For Disposal Services Only

4.4.3.1 Administrative Structure

The regional authority would still be managed by an Executive Board using the current SPSA structure. Operations would continue to be managed by an Executive Director appointed by the board. The authority would require the ability to contract with private firms.

4.4.3.2 Staffing

Daily operations would continue to be managed by program staff of the Authority. Total staff needed by the regional authority will be significantly reduced (fewer than 15).

4.4.3.3 Facilities

SPSA would no longer own the transfer stations. This scenario would require that the transfer station assets be sold to private firms or transferred to the respective communities. This scenario also assumes that SPSA would no longer own the regional landfill.

4.4.3.4 Cooperative Agreements

This alternative also requires that cooperative agreement be negotiated between member jurisdictions and SPSA to allow for operation past 2018. Under the agreements, SPSA would continue to be responsible for disposal of waste generated in the Region, while the member jurisdictions would be responsible for collection and delivering waste to the designated disposal facility. As with the earlier alternative, SPSA would pay disposal costs and seek reimbursement from members.

4.4.3.5 Implementation Summary

Timeframe: A minimum lead time of two years would be needed to draft and negotiate new SPSA support agreements and allow time for members to review and approve agreements. SPSA would also require at least one year to procure waste transfer and disposal services on behalf of its members.

Economies of Scale: Economies of scale are lost for the transfer system if they are owned and operated by individual communities or private firms. Duplicative staffing and equipment would be required for member communities. Flexibility in diverting waste to alternative facilities would also be lost. Economies of scale would also be lost with respect to the operation of other regional programs; individual communities will be required to establish programs for household hazardous waste, white goods recycling, and used oil/battery recycling.

System Funding: A tip fee funding approach would be used to allocate disposal costs among the members. Administrative costs could be allocated to members through a per capita annual assessment.

Debt Management: No debt should be incurred since SPSA will no longer own any facilities or equipment.

Disposal Market Leverage: SPSA would continue to provide for the management of a significant amount of waste, which should provide for significant leverage when negotiating disposal terms with a private sector provider.

4.4.4 Independent Systems

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

4.4.4.1 Administrative Structure

The administrative structure would 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 would be responsible for developing budgets; acquiring funding; negotiating contracts; and constructing, operating, and maintaining facilities owned/operated by the jurisdiction.

4.4.4.2 Staffing

Number and qualifications of staff required by each jurisdiction would be dependent on 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: 4 total (recycling/composting, disposal, general administrative, clerk).
- Transfer station operations: 8 total (manager, scale house attendants, equipment operators, drivers, clerk) depending on scale of operation (see Section 2.1.7.3 for the current staffing at each SPSA transfer station).

4.4.4.3 Facilities

Existing facilities would be owned/operated by the jurisdictions in which they are located or by private firms.

4.4.4.4 Cooperative Agreements

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

Under this alternative, it has been assumed that each individual community would act on its own. However, there is the possibility that communities could join together in the procurement process for required services. For example, one community could take the lead on the procurement process for disposal and others could be allowed to "piggyback" onto the contract. Each community, though subject to the same terms, would enter into a separate contract agreement with the selected vendor.

4.4.4.5 Implementation Summary

Timeframe: Communities will require at least one year to procure waste transfer and disposal services.

Economies of Scale: Economies of scale are lost for the waste management systems because they would be operated by individual communities. Duplicative staffing and equipment would be required for member communities. Flexibility in diverting waste to alternative facilities would also be lost. Economies of scale would also be lost with respect to the operation of other regional programs; individual communities would be required to establish programs for household hazardous waste, white goods recycling, and used oil/battery recycling.

System Funding: The disposal facility would charge a per-ton tip fee directly to the communities. The communities would continue to recoup costs based on current mechanisms (e.g., general fund, monthly fees). Communities would also need to budget for additional administrative costs for managing contracts and other programs.

Debt Management: Debt may be incurred by individual communities depending on the facilities owned/operated by the communities.

Disposal Market Leverage: Disposal market leverage would be reduced since individual communities would be negotiating contracts directly with private sector disposal sites. However, communities joining together in the contracting process may provide for lower disposal rates. More leverage may be gained with longer disposal contract terms (i.e., 5 to 7 year terms).

4.4.5 Cooperative Systems

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

4.4.5.1 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.

4.4.5.2 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.

4.4.5.3 Facilities

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

4.4.5.4 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.

4.4.5.5 Implementation Summary

Timeframe: Communities will require at least one year to negotiate cooperative agreements and an additional year to procure waste transfer and disposal services.

Economies of Scale: Economies of scale could be regained depending on the amount of waste generated by the cooperating communities. Some duplicative staffing and equipment would be required for member communities. Flexibility in diverting waste to alternative facilities would also be lost. Economies of scale would also lost with respect to the operation of other regional programs; cooperating and remaining individual communities would be required to establish programs for household hazardous waste, white goods recycling, and used oil/battery recycling.

System Funding: The disposal facility would charge a per-ton tip fee directly to the cooperating and individual communities. The communities would continue to recoup costs based on current mechanisms (e.g., general fund, monthly fees). Communities would also need to budget for additional administrative costs for managing contracts and other programs.

Debt Management: Debt may be incurred by both cooperating and individual communities depending on the facilities owned/operated by the communities.

Disposal Market Leverage: Disposal market leverage could be reduced; communities joining together in the contracting process may provide for lower disposal rates depending on the amount of waste generated. More leverage may be gained with longer disposal contract terms (i.e., 5 to 7 year terms).

4.4.6 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 from a merger with another existing regional authority. The authority will require the ability to contract with private firms. This alternative assumes that the new regional authority continues to provide the same services currently provided by SPSA.

4.4.6.1 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.

4.4.6.2 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.

4.4.6.3 Administrative Structure Based on Population of Members

Currently, each SPSA member city and county is entitled to two members 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 a 20-member board. Member jurisdictions with a population of up to 75,000 are represented by one voting member, 75,001 to 150,000 are represented by two voting members and 150,001 and above are represented by three voting members on the CVWMA Board of Directors.

Applying the approach used by CVWMA to a new regional authority, would result in a 16-member board, representing the eight jurisdictions as shown in Table 31.

Table 31. Membership Based on Population Level

Community	Current Number of Representatives	2010 Population*	Board Membership Based on Population: to 50,000 = 1, 50,001 to 100,000 = 2, 100,001+ = 3
Chesapeake	1	222,209	3
Franklin	1	8,582	1
Isle of Wight County	1	35,270	1
Norfolk	1	242,803	3
Portsmouth	1	95,535	2
Southampton County	1	18,570	1
Suffolk	1	84,585	2
Virginia Beach	1	437,994	3
	8	1,145,548	16

*Population from Weldon Cooper Center for Public Service, www.coopercenter.org

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 32.

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

4.4.6.4 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.

With the exception of Portsmouth and Franklin, each of the current SPSA member jurisdictions has at least one facility (transfer station or landfill) within its borders as shown in Table 33. 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 32. Membership Based on Proportion of Population

Community	Current Number of Representatives	2010 Population*	% of Total Population	Board Membership Based on Proportion of Total Population: to 10% = 1, 11% to 29% = 2, 30%+ = 3
Chesapeake	1	222,209	20%	2
Franklin	1	8,582	1%	1
Isle of Wight County	1	35,270	3%	1
Norfolk	1	242,803	21%	2
Portsmouth	1	95,535	8%	1
Southampton County	1	18,570	2%	1
Suffolk	1	84,585	7%	1
Virginia Beach	1	437,994	38%	3
	8	1,145,548	100%	12

*Population from Weldon Cooper Center for Public Service, www.coopercenter.org

Table 33. Location of SPSA Facilities

Location	SPSA Facilities
Chesapeake	Transfer Station
Franklin	None
Isle of Wight County	Transfer Station
Norfolk	Transfer Station
Portsmouth	None
Southampton County	Transfer Stations (3)
Suffolk	Landfill/Transfer Station
Virginia Beach	Transfer Stations (2)

4.4.6.5 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.

4.4.6.6 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

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

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.

4.4.6.7 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 similar to that used by SPSA today.

4.4.6.8 Facilities

Existing and new facilities will be owned and managed by the new regional authority. Disposal would be a function of the private sector.

4.4.6.9 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.

4.4.6.10 Implementation Summary

Timeframe: A minimum lead time of two years would be required to establish a new authority and draft and negotiate new support agreements and allow time for members to review and approve agreements.

Economies of Scale: Can be realized through the continued operation of regional programs and cost sharing across member jurisdictions.

System Funding: A tip fee funding approach would be used that allocates system costs to the total waste stream delivered to the new authority transfer system. The tip fee would include system charges that are not directly related to the disposal function, such as administrative costs and regional programs such as household hazardous waste collection.

Debt Management: Costs for most facility needs could be managed through the capital improvement budgeting process. However, debt could be incurred if new transfer facilities are required.

Disposal Market Leverage: The new authority would continue to manage a significant amount of waste, which should provide for significant leverage when negotiating disposal terms with a private sector provider.

4.4.7 A Public/Private Partnership Managed by a Regional Authority

4.4.7.1 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.

4.4.7.2 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 from current staff SPSA levels (fewer than 25).

4.4.7.3 Facilities

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

4.4.7.4 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.

4.4.7.5 Implementation Summary

Timeframe: A minimum lead time of two to three years would be required to draft and negotiate new regional authority support agreements and allow time for members to review and approve agreements. The new authority would also require at least one year to procure waste transfer and disposal services on behalf of its members.

Economies of Scale: Can be realized through the continued operation of regional programs and cost sharing across member jurisdictions.

System Funding: A tip fee funding approach would be used that allocates system costs to the total waste stream delivered to the new authority transfer system. The tip fee would include only system charges that are directly related to the transfer and disposal functions, since these costs would be set by the private sector operator. A new funding approach would be required to allocate administrative and regional program costs. These costs could be allocated to members through a per capita annual assessment.

Debt Management: Costs for most facility needs could be managed through the capital improvement budgeting process. However, debt could be incurred if new transfer facilities are required.

Disposal Market Leverage: The new authority would continue to manage a significant amount of waste, which should provide for significant leverage when negotiating disposal terms with a private sector provider.

4.5 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 of 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 structure and management that have been expressed by the member communities appear to have been largely addressed by the restructuring of the SPSA Board in 2010 and future refinements can be made to address other concerns.
- 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 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 potential siting of a new Regional Landfill when and if needed. 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 or transfer station), 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 (see Section 4.4.6.1). 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 Regional Landfill and/or transfer station network. If the Regional Landfill were to close, or the transfer stations divested, substantial changes in the organization would be required in terms of its responsibilities and the number of administrative, technical, operational, and support personnel employed by SPSA. SPSA could 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.

4.5.1 Recommended Administrative Structure

4.5.1.1 Number of Board Members

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 two Board members that represent each member jurisdiction (16 total members). The governor appoints one Board member for each jurisdiction; the member jurisdiction appoints one government employee to serve as an Ex-Officio member. Several alternative representation models and their associated Board sizes are presented in Table 34. 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.

4.5.1.2 Board Member Qualifications

Currently, SPSA's Board of Directors is comprised of Governor appointees, along with officials appointed by the member jurisdictions. Again, based on earlier discussions with SPSA membership, many believe that politicians did 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

Table 34. SPSA Board Membership Options

Community	2010 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	222,209	20%	2	3	3	3	2
Franklin	8,582	1%	1	1	1	1	1
Isle of Wight County	35,270	3%	1	1	1	1	1
Norfolk	242,803	21%	2	3	3	3	2
Portsmouth	95,535	8%	1	2	2	1	1
Southampton County	18,570	2%	1	1	1	1	1
Suffolk	84,585	7%	1	2	2	1	1
Virginia Beach	437,994	38%	3	3	3	3	3
Total	1,145,548	100%	12	16	16	15	12

*Population from Weldon Cooper Center for Public Service, www.coopercenter.org

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.

4.5.2 Process for Changing the Administrative Structure

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. Legislative changes also will be required because state legislation establishes SPSA's board structure. Legal advice should be sought on these issues.

4.5.3 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 cover. 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 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. Key issues will be board representation and voting rights, tip fee structure, host fees, and term of the agreement. SCS believes these issues can be negotiated.

4.5.4 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 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, although the sale of the WTE Facility significantly reduced the remaining debt. SPSA has established a policy to not take on new debt through January 2018.

4.5.5 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.

4.5.6 System Funding

Much of the difficulty that SPSA has faced 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. 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. It also does not, in some cases, apportion costs of service, appropriately.

The following options are available for funding the solid waste operations of the Region:

- Tip Fee (as currently calculated)
- Tip Fee (based on cost of service)
- 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.

4.5.6.1 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.

4.5.6.2 Tip Fee Based on Cost of Service

As a part of the financial analysis presented in this report (See Section 5.0), SCS was able to categorize SPSA's expenses that are directly related to a given municipality (e.g., transfer station and transfer vehicles), and to allocated the costs to the municipalities and to the various functions provided by SPSA (disposal, transfer, fleet, and overhead support (environmental, information technology, health and safety, accounting, etc.). This approach could be further refined and developed to more fairly allocate costs to the member communities. The end result would be that some members might pay more and others less depending on their use of the facilities and systems.

4.5.6.3 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).

4.5.6.4 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.

4.5.6.5 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.

4.5.6.6 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.

4.5.7 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.

4.6 IMPLEMENTATION ISSUES

The following presents an overview of issues that should be considered for continuation or dissolution of SPSA.

4.6.1 Continuation of SPSA

4.6.1.1 Term of New Use and Support Agreements

New inter-local agreements (e.g., use and support agreements) will need to be drafted and executed before 2018 if the jurisdictions agree to cooperate to manage solid waste in the Region. An issue that must be explored is the length of time the agreements should be in effect. The original use and support agreements were for a period of more than 30 years.

The new use and support agreements should have a term long enough to allow for disposal contracts with terms of 5 to 10 years to leverage low rates with the private sector and also long enough to allow SPSA to engage in long-term planning and operation. A minimum 20-year term should be considered for the use and support agreements.

4.6.1.2 Board Structure

All of the Board member terms are on the same four-year cycle and on December 31, 2013 and December 31, 2017. Should SPSA continue beyond 2018, an alternative should be evaluated to stagger the terms for the Board of Director's so as to limit disruption as new members become familiar with issues and Board procedures.

However, the Virginia statute does not provide procedures for removal of Governor-appointed Board members if they fail in the performance of their duties. The SPSA restated articles of

incorporation end the term of an Ex-Officio Board member upon termination of full-time salaried employment with the jurisdiction.

4.6.1.3 Future Debt

If SPSA maintains ownership of either the transfer stations or the landfill, the authority may be required in the future to incur debt for capital expenses. State law prohibits SPSA from issuing long-term bond indebtedness to fund operational expenses. State law further establishes procedures that SPSA must follow prior to issuance of new debt:

- The Board is required to perform a due diligence investigation of the appropriateness of issuing the debt, including an analysis of the costs of repaying the debt. The due diligence analysis must be certified by an external certified public accountant, reviewed by the Board, and approved by a vote of a minimum of 75 percent of the Board.

- The issuance of new debt requires a vote of a minimum of 75 percent of the Board.

4.6.1.4 Assets located in non-member communities

This discussion assumes that SPSA will continue beyond 2018, but without participation with some of the current member communities. In this scenario, SPSA will need to decide on how to dispose of assets (e.g., transfer stations) located in those communities in a manner that is fair and equitable.

4.6.2 Dissolution of SPSA

4.6.2.1 Official Dissolution of SPSA

Most authorities in Virginia are limited to a 50-year term, which would have limited the existence of SPSA. However, in 2000, the state passed legislation that allows SPSA to have perpetual existence until dissolved pursuant to §15.2-5109.

If the SPSA board decides to dissolve the authority, each member jurisdiction must adopt a resolution declaring and finding that SPSA should be dissolved. After adoption of the resolutions, articles of dissolution must be filed with the State Corporation Commission. When the affairs of SPSA have been terminated, the member jurisdictions must file articles of termination of corporate existence with the State Corporation Commission.

However, there are certain long-term obligations that must be considered.

4.6.2.1.1 Landfill Post-Closure Care

State regulations require that a landfill be closed with a final cover when operations cease. The owner is also required to perform certain post-closure care activities at the site for a minimum time period after closure. The required post-closure care period is 30 years from site closure, but this can be shortened or extended by the Virginia Department of Environmental Quality (VDEQ) as necessary to ensure protection of human health and the environment. Post-closure care

involves the routine inspection of the facility, maintenance of the infrastructure (e.g., final cover system, stormwater management structures, leachate collection equipment, gas monitoring system), and environmental monitoring.

Each facility must estimate the worst case cost for closure and post-closure care and provide financial assurance. The owner or operator must review the estimates annually and update the financial assurance instrument as appropriate.

The current closure and post-closure cost estimate for the regional landfill and the Virginia Beach Landfill Phase 1 cell is approximately $22 million. SPSA currently budgets for these closure and post-closure care costs as an operating expense and plans to finance the costs with operating revenues. SPSA meets the financial assurance requirements for VDEQ through the local government test supplements by a bank issued letter of credit. It is SPSA's intent to have closure/post-closure costs fully funded by 2018.

However, two issues need resolution:

- Even if sufficient funds are set aside, a mechanism needs to be put in place for management of post-closure activities and disbursement of funds. Under its agreement with Suffolk, SPSA is required to convey the landfill to Suffolk after closure. Presumably, Virginia Beach and Suffolk could manage post-closure activities.

- SPSA is currently funding post-closure activities for a period of 30 years. There could be the possibility that VDEQ could lengthen this timeframe if warranted. The jurisdictions could be required to finance additional activities beyond the amount set aside.

4.6.2.1.2 Environmental Trust Funds

SPSA has established Environmental Protection Trust Funds with Suffolk and Virginia Beach to address claims relating to environmental pollution or groundwater damages that are made against the Regional Landfill and the Virginia Beach Landfill for a 30-year period after cessation of operations at the Regional Landfill or after termination of the ash disposal agreement with Virginia Beach. SPSA is required to make a minimum contribution each year to each fund. At the end of the 30-year period, remaining funds will be distributed to the member jurisdictions based on the proportion of tipping fees paid by each member.

The trust funds are under control of both SPSA and the respective city/county. If SPSA is to be dissolved, a successor/assign for SPSA will need to be named for the future management of these trust funds.

4.6.2.2 Procedures for Withdrawal of Members

The Code of Virginia, 15.2-5112 provides that no locality may withdraw from an authority if that authority has outstanding bonds without the unanimous consent of all of the holders of such bonds.

In 2000, the state assembly passed legislation that allows for the withdrawal of individual members without full dissolution of SPSA and without regard to any outstanding bonds issued by SPSA. This act allows a member to withdraw by resolution or ordinance with further notification of withdrawal to the State Corporation Commission. The State Corporation Commission will then issue a certificate of withdrawal.

While any member may withdraw from SPSA, all obligations incurred by the locality while it was a member remain in effect following withdrawal. This should not be an issue if all bonds are paid by 2018.

However, as discussed earlier, each current member will also have obligations with respect to closure/post-closure requirements for the regional landfill and the Virginia Beach landfill.

4.6.2.3 Distribution of Assets

SPSA currently owns assets that have economic value. SPSA will need to decide on how to dispose of assets (e.g., transfer stations, landfill) in a manner that is fair and equitable to its members. For example, if assets are sold to the private sector, the proceeds could be distributed in a manner similar to that established for the trust funds. The proceeds from the trust funds are to be distributed based on the proportion of tipping fees paid by the members.

5.0 PRO FORMA ANALYSIS

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 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 became effective in early 2009, but have not been enforced. 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 disposal costs, future cell development and landfill sequencing, closure and post-closure care, and availability of out of regional disposal capacity.

5.1 SCENARIOS

Table 35 presents a summary of the scenarios evaluated to assess the long-term costs associated with continuing the status quo with a SPSA-type organization, disbanding SPSA or further divesting certain solid waste functions to the SPSA member communities (e.g. transfer station and transportation), and selecting various disposal strategies. The scenarios consider the following major variables:

- Cooperative Structures
  - Western communities (Franklin, Isle of Wight, and Southampton) own and operate their transfer stations and contract haul waste to Waste Management's Atlantic Waste Disposal Landfill in Waverly, Virginia.
  - Eastern communities (Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach) either stay with SPSA or self-perform all transfer and disposal operations and Portsmouth delivers its municipally collected waste directly to the Wheelabrator WTE Facility.

Table 35. 2018 and Beyond Scenarios

Scenario	Description
A.1	Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, western communities dispose municipally collected waste at WM's Waverly LF, ash is disposed at the Regional LF at tip fee, SPSA maintains LF and transfer station network, VB keeps its landfill open for its purposes.
A.2	Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, western communities dispose at WM's Waverly LF, ash to Regional LF at tip fee, SPSA maintains Regional LF and transfer station network conveyed to members, VB keeps its landfill open for its purposes.
B.1	Eastern and western communities municipal waste disposed at out of region landfill (ORLF), Wheelabrator is responsible for ash disposal at its own internal facilities, Regional LF closed/sold, SPSA maintains transfer station network, VB keeps its landfill open for its purposes, commercial haulers develop private transfer stations for commercial waste.
B.2	Chesapeake, Norfolk, Suffolk, and Virginia Beach municipal waste disposed at an ORLF, Portsmouth municipal and commercial waste disposed at the Wheelabrator WTE Facility, western communities dispose of its municipally collected waste at WM's Waverly LF, Wheelabrator is responsible for ash disposal at its own internal facilities, the eastern and western communities own and operate their own transfer stations, Regional LF closed, VB keeps its landfill open for its purposes, commercial haulers develop private transfer stations for commercial waste.
B.3	Chesapeake, Norfolk and Suffolk municipal waste disposed at an ORLF, Portsmouth municipal and commercial waste disposed at the Wheelabrator WTE Facility, Virginia Beach municipal solid waste disposed at the VB Landfill No. 2, western communities dispose of municipally collected waste at WM's Waverly LF, and the communities own and operate the transfer stations, commercial haulers develop private transfer stations for commercial waste.
C.1	Eastern communities municipal waste disposed at the Regional LF until capacity depleted, Regional LF expanded through Cell 8/9, after which waste would be disposed at Wheelabrator WTE Facility or an ORLF, western communities municipally collected waste disposed at WM's Waverly LF, commercial haulers develop private transfer stations for commercial waste. Wheelabrator handles disposal of ash. SPSA operates LF & TSs.
C.2	Eastern communities municipally collected waste disposed at the Regional LF until capacity depleted, the Regional LF is expanded through Cell 8/9, after which waste would be disposed at Wheelabrator or out of region landfill (ORLF), western communities deliver waste to WM's Waverly LF, commercial haulers develop private transfer stations for commercial waste, Wheelabrator delivers ash to Regional LF while open. SPSA operates LF and TSs.
C.3	Eastern communities municipally collected waste disposed at the Regional LF until capacity depleted, the Regional LF is expanded through Cell 8/9, after which waste would be disposed at Wheelabrator or an ORLF, western communities deliver waste to WM's Waverly LF, commercial haulers develop private transfer stations for commercial waste, Wheelabrator manages disposal of ash at its own facilities. The eastern and western member communities own and operate the TSs.
D.1	Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, ash residue delivered to Virginia Beach LF, VB gets tip fees for ash, communities own and operate the transfer network, Regional LF closed, western communities deliver waste to WM's Waverly LF.
D.2	Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, ash residue to other WM internal facilities, communities own and operate transfer network, Regional LF closed, western communities deliver municipally collected waste to WM's Waverly LF, Virginia Beach maintains its landfill for own purposes.
E.1	Virginia Beach goes own way, constructs a new WTE facility, other eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Faciltiy, ash residue to other Wheelabrator internal facilities, communities own and operate transfer network, Regional LF closed/sold, western communities deliver municipally collected waste to WM's Waverly LF.
E.2	Virginia Beach develops a new WTE Facility, Chesapeake, Norfolk, Virginia Beach, and Suffolk go to new VB WTE Facility, ash from new facility delivered to VB LF, Portsmouth goes to Wheelabrator, ash residue from Wheelabrator disposed at another Wheelabrator internal facility, communities own and operate transfer network, Regional LF closed, western communities deliver waste to WM's Waverly LF.
F.1	Suffolk takes over Regional LF for its own waste, remaining eastern communities go to Wheelabrator, ash delivered to Wheelabrator/WM LF, communities own and operate transfer network, western communities deliver waste to WM's Waverly LF.
G.1	Similar to Scenario A.1, except that Portsmouth is not part of SPSA, but disposes its municipally collected waste directly at Wheelabrator.

Note: More detailed information on each scenario is presented in Appendix A

- SPSA Organizational alternatives: Landfill + Transfer Operations, Transfer Operations Only, Landfill Operations Only.

- Disposal Alternatives
  - Wheelabrator WTE (through SPSA or contracted directly with municipalities).
  - SPSA Regional Landfill (Cell 7 and Cells 8/9) (MSW and/or ash).
  - Out of Region Landfill (ORLF) (MSW and/or ash).
  - Virginia Beach Landfill No. 2 (MSW and/or ash).
  - Other Private construction and demolition debris landfills are available for handling the MSW or ash waste streams if SPSA's landfill is not operational.
  - New WTE Facility in Virginia Beach (separately or in cooperation with other eastern communities).
  - Organics Treatment Facility (currently private facilities are available to manage yard waste and other organic waste streams; new facilities not considered in evaluation).

- Transfer Station and Transfer Alternatives
  - SPSA owns and operates (either self-perform all operations or contract haul).
  - Eastern member communities own and operate. For all the scenarios considered, the assumption is made that the western communities will own and operate their own transfer stations.

- Landfill Alternatives
  - SPSA owns and operates (with or without revenue from ash from the WTE Facility).
  - Suffolk owns and operates (without revenue from WTE ash).
  - Use of Virginia Beach Landfill for WTE ash disposal, with the City receiving offsetting revenue for providing disposal.
  - Out of Region Landfill (Waste Management's Atlantic Waste Disposal Landfill to serve the western communities and the Bethel Landfill for the eastern communities).
  - $23 million in road improvements are included in all options where Regional Landfill is operational during the planning period.

- In SCS's 2008 Report (SCS, 2008), the option of siting a new regional landfill in Southampton County was considered. The updated analysis no longer considers a new regional landfill during the planning period, because it appears that the existing Regional Landfill could be more easily expanded to provide disposal capacity throughout the planning period. Cell 7 and Cells 8/9 could be developed if new capacity is needed.

A summary matrix of the key scenario inputs and assumptions is provided in Table 36 and more detail is provided in Appendix A, Exhibit A-1. This matrix indicates for each scenario whether SPSA continues, and if so, under what structure (landfill and transfer, landfill only, transfer only), where municipally collected waste would be disposed (WTE Facility, Regional Landfill, Virginia Beach Landfill No. 2, or an out-of-region landfill), where ash residue from the Wheelabrator WTE Facility would be disposed, who would operate the transfer stations, how commercial waste would be handled through the transfer stations.

The focus of the scenario evaluations is municipally collected waste. The assumption is made that the commercial haulers will either cooperate with the municipalities or develop alternative transfer and disposal approaches.

5.2 PRO FORMA COST MODEL AND ASSUMPTIONS

A pro forma cost model was developed to simulate the projected municipal waste flows from the member communities, the projected costs and potential offsetting revenues for managing these wastes, the distribution of the waste to various processing/disposal facilities, the estimated remaining service life of the Regional Landfill and the Virginia Beach Landfill No. 2, and the allocation of costs to the member communities under each scenario. The pro forma cost analysis was prepared from the perspective of SPSA and the respective member communities. The pro forma cost model includes the projected costs between now and January 2018, but the scenario evaluations focus on the period planning period of 2018 through 2047 (fiscal year).

The analysis takes into account the various provisions of the use and support and ash disposal agreements with the member communities (e.g., zero tip fee for Suffolk and a set rate schedule for the City of Virginia Beach through 2015), the allocation of certain landfill closure costs between SPSA and the City of Virginia Beach, and use of SPSA reserves to reduce debt and thereby lower operating expenses. The use and support agreements expire in January 2018, and the ash disposal agreement with the City of Virginia Beach expires December 31, 2015. The projected costs are allocated to the member community solid waste budgets to allow for quasi "full-cost accounting" of solid waste management in the Region. Net present value (NPV) costs are calculated for each scenario for the planning period of 2018 to 2047 to allow for comparison of the scenarios from a cost perspective. 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. For this analysis, a lower NPV represents a more favorable scenario from an overall cost perspective.

Table 36. Summary of Key Scenario Factors and Assumptions

	Organization	Waste to Energy		Landfill				Ash			Transfer Stations		Commercial
Scenario	SPSA Continues	RDF WTE	New WTE	SPSA-RLF	Suffolk-RLF	ORLF	VB LF #2	SPSA	VB	Wheelabrator	SPSA	Muni	Through TSs
A.1	Yes[1]	Yes	No	Yes	No	No	Yes[3]	Yes	No	No	Yes	No	Yes
A.2	Yes[1]	Yes	No	Yes	No	No	Yes[3]	Yes	No	No	No	Yes	Yes
B.1	Yes[1]	No	No	No	No	Yes	Yes[3]	No	No	Yes	Yes	No	No
B.2	No	Yes[5]	No	No	No	Yes	Yes[3]	No	No	Yes	No	Yes	No
B.3	No	Yes[5]	No	No	No	Yes	Yes[4]	No	No	Yes	No	Yes	No
C.1	Yes[1]	No	No	Yes	No	No	Yes[3]	No	No	Yes	Yes	No	No
C.2	Yes[1]	No	No	Yes	No	No	Yes[3]	Yes	No	No	Yes	No	No
C.3	Yes[1]	No	No	Yes	No	No	Yes[3]	No	No	Yes	No	Yes	No
D.1	No	Yes	No	No	No	No	Yes[3]	No	Yes	No	No	Yes	Yes
D.2	No	Yes	No	No	No	No	Yes[3]	No	No	Yes	No	Yes	Yes
E.1	No	Yes	Yes	No	No	No	Yes	No	Yes	Yes	No	Yes	Yes
E.2	No	No	Yes	No	No	No	Yes	No	Yes	Yes	No	Yes	Yes
F	No	Yes	No	No	Yes	No	Yes[3]	No	No	Yes	No	Yes	Yes
G	Yes[2]	Yes	No	Yes	No	No	Yes[3]	Yes	No	No	Yes	No	Yes

Notes:
1. Assumes SPSA includes Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach
2. Assumes SPSA includes Chesapeake, Norfolk, Suffolk, and Virginia Beach (Portsmouth delivers directly to WTE Facility)
3. Asssumes VB LF No. 2 open but only for City use (nominal disposal rate)
4. Assumes VB LF No. 2 open to receive all City's MSW.
5. Assumes Portsmouth disposes waste directly to WTE Facility, all others to ORLF.

The structure and major assumptions of the pro forma model are summarized below:

- **Model Structure.** The pro forma model is an excel spreadsheet that performs various decision tree, cost allocation, and forecasting functions.

- **2012-2047 Waste Generation Estimates** (See Table 37). Waste generation estimates were prepared based on historical data from SPSA, which includes segregation by municipality for municipal and commercial waste delivered to the SPSA system at each of the transfer stations, Regional Landfill, and WTE Facility. The waste generation rates are escalated based on the projected growth rates presented in the draft Regional Solid Waste Management Plan (SCS/HRPDC, 2011).

- **SPSA Budgets**. SPSA provided their detailed 2011 and 2012 budgets which includes the operational budget and capital expenditure budgets through 2016 for the categories listed in Table 38. Future projections assume that most of the costs are escalated at an assumed consumer price index (CPI) of 3 percent, with the exception of fuel, which is assumed to escalate at 4 percent. The SPSA budget was used to establish baseline functional costs for landfill, transfer station, fleet and maintenance operations, organizational support (e.g., IT, safety, environmental, etc.), and the waste to energy service fee.

- **Member Community Budgets.** Each of the SPSA member communities provided their 2011-2012 detailed solid waste budgets for collection, disposal, and other solid waste functions (e.g., yard waste, household hazardous waste, and recycling costs). All the municipal budgets are structured slightly different in terms of the detail presented and the breakdown of the costs by function. The City of Virginia Beach's landfill budget was evaluated and expanded upon to include accruals for future cell and closure construction for Cells 4 and 2B/3 using similar per acre development assumptions for new cell construction and closure construction ($350,000 per acre and $150,000 per acre, respectively). Cost and offsetting potential revenue items were added to each of the member community solid waste budgets depending on the scenario considered.

- **Cost Allocation by Function**. Each cost in the SPSA and member community budgets are categorized as follows:

  - Function: Collection, Support, Disposal, Transfer (Transfer Station or Fleet), Recycling, Reserves.

  - Facility: System, Landfill, Transfer Station, Scalehouse, Tire, HHW, etc.

  - Type: Accruals, Capex, Closure, Depreciation. Financing, Ops, Staffing.

  - Municipality: Chesapeake, Franklin, Isle of Wight, Norfolk, Portsmouth, Southampton, Suffolk, Virginia Beach, and All (not specific to a municipality, but a system facility).

- The budget is summarized by municipality for the functions identified above on a cost basis as well as an allocated basis offset by the non-municipal tip fee revenues.

Similar allocation was done within the individual member community budgets. The SPSA cost to each municipality is a single line their respective budgets. This line item was segregated between the functions identified above.

- **Transfer Station Costs.** The SPSA budget has detailed historical (2007 to 2010) and projected cost information for 2011 and 2012 on the operation of its transfer stations. These costs were used to develop future SPSA costs projections and costs that the member communities might expect to assume if they were to internalize the transfer station and transfer operations. The assumption is made that the member communities will purchase new transfer trailers and transfer vehicles after 2018 if they take over the operations of these facilities. **The current pro forma cost model does not include any purchase price the member communities may have to pay to acquire SPSA's transfer stations.**

- **Fleet Maintenance.** SPSA's fleet budget includes operation and maintenance of equipment associated with the landfill, transfer station, the transfer vehicles (trucks and trailers), and other support vehicles and equipment. SPSA provided SCS with its capital asset list, which included the date of purchase for each piece of equipment, and where each piece of equipment is assigned. SPSA maintains 42 tractor trucks, 70 transfer trailers, and 130 other pieces of landfill and other support equipment. SCS prepared estimates of future replacement costs for all key equipment, and allocated these costs to the municipalities if the transfer station and fleet transfer operations were taken over by the municipalities. In all cases, for the contract hauling option, we assume that the municipalities will own and maintain the transfer trailers.

- **Fleet Transportation Costs.** Other than labor, two of the largest cost items for this department are fuel and tires. Transportation costs are adjusted as a function of the disposal option selected and resulting hauling distances. For contract hauling, the contract SPSA previously had with First Tee is used to estimate "hook and haul" costs.

- **Landfill Operational Costs.** SPSA has historical data on the staffing and operational costs of the Regional Landfill. The historical costs cover periods when the Regional Landfill was fully staffed and operating three shifts, to the current, significantly reduced, staffing and operational schedule. A cost model was developed based on this data to estimate future operational costs as a function of the amount of waste received at the landfill. The cost model is presented in Figure 15. The costs were adjusted to 2011 dollars and are escalated per the CPI to the appropriate year.

- **Allocation of Costs to SPSA Members**. Support costs are either allocated to the municipalities as a function of the projected waste disposal rates or on a direct percent basis. For example, if a functional cost is independent of the quantity of waste handled (e.g., a scalehouse), it is distributed on a straight percentage basis.

Table 37. Municipal Solid Waste Disposal Rate Projects (2012-2047) (Tons/Year)

Member Community	Growth Rate	2012 Jun-12	2013 Jun-13	2014 Jun-14	2015 Jun-15	2016 Jun-16	2017 Jun-17	2018 Jun-18	2019 Jun-19	2020 Jun-20	2021 Jun-21
Municipal Waste Stream		**396,900**	**400,600**	**404,500**	**408,400**	**412,400**	**416,400**	**420,700**	**424,700**	**429,200**	**433,700**
Chesapeake	1.4%	89,200	90,400	91,700	93,000	94,300	95,600	97,000	98,300	99,700	101,100
Franklin	1.2%	3,600	3,600	3,700	3,700	3,800	3,800	3,900	3,900	4,000	4,000
Isle of Wight	2.7%	17,200	17,700	18,100	18,600	19,100	19,700	20,200	20,700	21,300	21,900
Norfolk	0.04%	70,000	70,000	70,100	70,100	70,100	70,100	70,200	70,200	70,200	70,300
Portsmouth	0.3%	39,300	39,400	39,500	39,600	39,700	39,800	39,900	40,000	40,100	40,200
Southampton	1.5%	7,700	7,800	7,900	8,100	8,200	8,300	8,400	8,500	8,700	8,800
Virginia Beach	0.3%	127,600	128,000	128,400	128,800	129,200	129,600	130,000	130,400	130,800	131,200
Suffolk	3.2%	42,300	43,700	45,100	46,500	48,000	49,500	51,100	52,700	54,400	56,200

Member Community	Growth Rate	2022 Jun-22	2023 Jun-23	2024 Jun-24	2025 Jun-25	2026 Jun-26	2027 Jun-27	2028 Jun-28	2029 Jun-29	2030 Jun-30	2031 Jun-31
Municipal Waste Stream		**438,200**	**442,700**	**447,400**	**452,200**	**457,300**	**462,100**	**467,300**	**472,700**	**478,100**	**483,400**
Chesapeake	1.4%	102,500	103,900	105,400	106,900	108,400	109,900	111,400	113,000	114,600	116,200
Franklin	1.2%	4,100	4,100	4,200	4,200	4,300	4,300	4,400	4,400	4,500	4,500
Isle of Wight	2.7%	22,500	23,100	23,700	24,300	25,000	25,600	26,300	27,100	27,800	28,500
Norfolk	0.04%	70,300	70,300	70,300	70,400	70,400	70,400	70,400	70,500	70,500	70,500
Portsmouth	0.3%	40,300	40,400	40,500	40,600	40,700	40,800	40,900	41,000	41,100	41,200
Southampton	1.5%	8,900	9,100	9,200	9,300	9,500	9,600	9,800	9,900	10,100	10,200
Virginia Beach	0.3%	131,600	132,000	132,400	132,800	133,300	133,700	134,100	134,500	134,900	135,300
Suffolk	3.2%	58,000	59,800	61,700	63,700	65,700	67,800	70,000	72,300	74,600	77,000

Member Community	Growth Rate	2032 Jun-32	2033 Jun-33	2034 Jun-34	2035 Jun-35	2036 Jun-36	2037 Jun-37	2038 Jun-38	2039 Jun-39	2040 Jun-40	2041 Jun-41
Municipal Waste Stream		**489,100**	**494,800**	**500,700**	**506,500**	**512,800**	**519,300**	**525,400**	**532,100**	**539,000**	**545,900**
Chesapeake	1.4%	117,800	119,400	121,100	122,800	124,500	126,300	128,000	129,800	131,700	133,500
Franklin	1.2%	4,600	4,600	4,700	4,700	4,800	4,900	4,900	5,000	5,000	5,100
Isle of Wight	2.7%	29,300	30,100	30,900	31,700	32,600	33,500	34,400	35,300	36,300	37,200
Norfolk	0.04%	70,600	70,600	70,600	70,600	70,700	70,700	70,700	70,800	70,800	70,800
Portsmouth	0.3%	41,300	41,400	41,500	41,600	41,700	41,800	41,900	42,000	42,100	42,300
Southampton	1.5%	10,400	10,500	10,700	10,800	11,000	11,200	11,300	11,500	11,700	11,900
Virginia Beach	0.3%	135,700	136,200	136,600	137,000	137,400	137,900	138,300	138,700	139,200	139,600
Suffolk	3.2%	79,400	82,000	84,600	87,300	90,100	93,000	95,900	99,000	102,200	105,500

Table 37. Municipal Solid Waste Disposal Rate Projects (2012-2047) (Tons/Year)

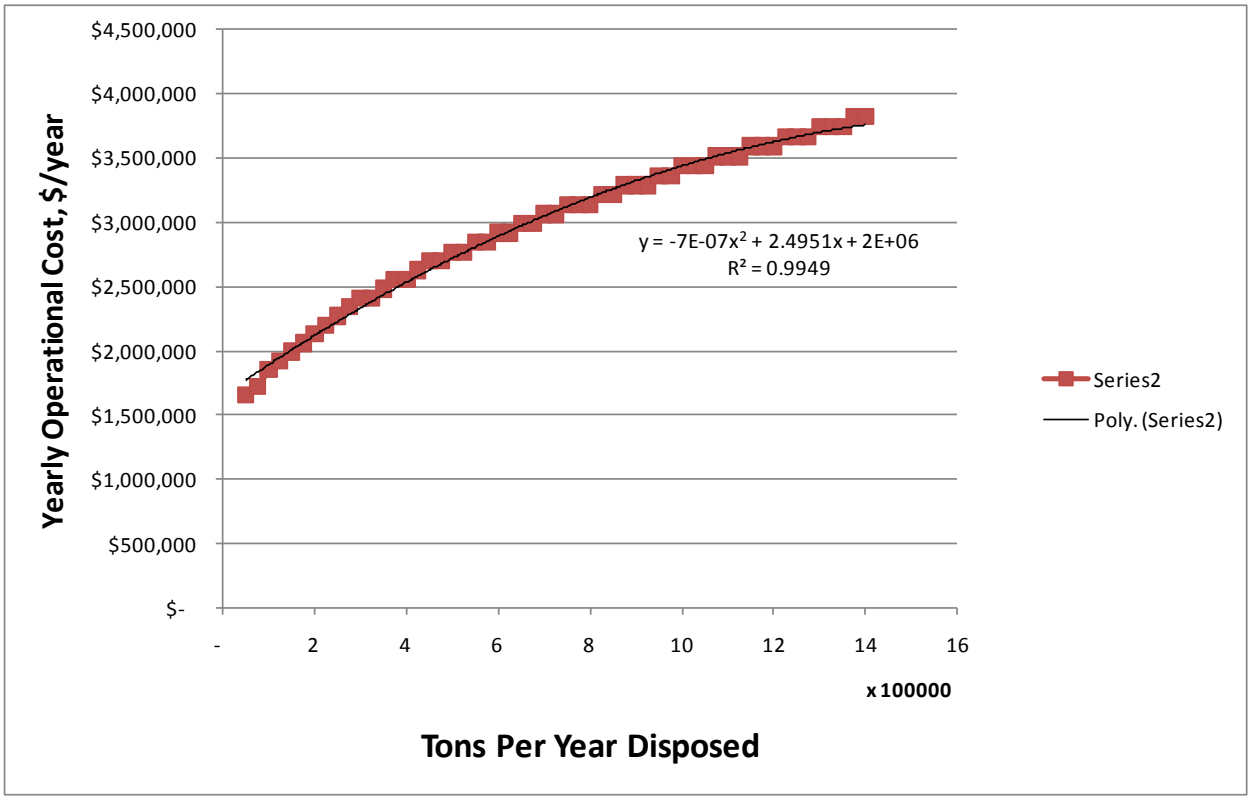
Member Community	Growth Rate	2042 Jun-42	2043 Jun-43	2044 Jun-44	2045 Jun-45	2046 Jun-46	2047 Jun-47
Municipal Waste Stream		**552,800**	**560,200**	**567,500**	**574,900**	**582,900**	**590,800**
Chesapeake	1.4%	135,400	137,300	139,200	141,100	143,100	145,100
Franklin	1.2%	5,100	5,200	5,300	5,300	5,400	5,500
Isle of Wight	2.7%	38,300	39,300	40,300	41,400	42,600	43,700
Norfolk	0.04%	70,800	70,900	70,900	70,900	71,000	71,000
Portsmouth	0.3%	42,400	42,500	42,600	42,700	42,800	42,900
Southampton	1.5%	12,000	12,200	12,400	12,600	12,800	13,000
Virginia Beach	0.3%	140,000	140,500	140,900	141,300	141,800	142,200
Suffolk	3.2%	108,800	112,300	115,900	119,600	123,400	127,400

Table 38. SPSA Budget Structure

Live Scenario	1						
A.1	SPSA LF/ TS/WTE						
Model - SPSA Operations							
Dept	Budget Summary	Function	Facility	Type	Municipality	2011	2012
	Totals, Cash Flow					**$62,928,921**	**$52,667,944**
	Totals (With Accruals, Depreciation, and Interest)						
	Total Department Expenses					**$15,099,879**	**$15,120,843**
801	Accounting Department	Support	System	Ops	All	337,227	302,189
802	Executive Offices	Support	System	Ops	All	959,008	912,328
803	Human Resources	Support	System	Ops	All	277,025	387,895
804	Purchasing Department	Support	System	Ops	All	156,034	163,921
805	Safety	Support	System	Ops	All	145,488	154,592
812	Operations Administration	Support	System	Ops	All	202,798	208,630
813	Regional Landfill	Disposal	Landfill	Ops	All	2,139,103	1,761,424
814	Fleet Maintenance	Support	System	Ops	All	1,247,200	1,335,658
815	Transportation	Transfer	Fleet	Ops	All	3,749,583	3,878,666
816	Norfolk Transfer Station	Transfer	Transfer Station	Ops	Norfolk	993,938	1,068,548
817	Chesapeake Transfer Station	Transfer	Transfer Station	Ops	Chesapeake	475,971	552,359
819	Franklin Transfer Station	Transfer	Transfer Station	Ops	Franklin	193,487	221,331
820	Ivor Transfer Station	Transfer	Transfer Station	Ops	Southampton	6,047	14,405
821	Boykins Transfer Station	Transfer	Transfer Station	Ops	Southampton	8,134	16,411
822	Isle of Wight Transfer Station	Transfer	Transfer Station	Ops	Isle of Wight	255,498	291,574
823	Oceana Transfer Station	Transfer	Transfer Station	Ops	Virginia Beach	426,335	458,901
825	Regional Office Building	Support	System	Ops	All	177,752	132,898
826	Environmental Management	Support	System	Ops	All	270,122	350,033
828	Landstown Transfer Station	Transfer	Transfer Station	Ops	Virginia Beach	992,155	1,029,605
837	Grounds Maintenance	Support	System	Ops	All	-	-
838	Public Relations & Marketing	Support	System	Ops	All	-	-
839	Information Technology	Support	System	Ops	All	726,724	547,212
842	Facilities Maintenance	Support	System	Ops	All	21,817	-
843	Tire Processing Facility	Disposal	Tire	Ops	All	187,746	205,429
844	Household Hazardous Waste Program	Disposal	HHW	Ops	All	85,092	108,040
847	Suffolk Transfer Station	Transfer	Transfer Station	Ops	Suffolk	417,000	428,484
850	Virginia Beach LF White Goods	Recycling	White Good	Ops	Virginia Beach	17,276	-
851	Suffolk Regional LF White Goods Program	Recycling	White Good	Ops	All	69,001	11,445
852	Scalehouse Operations	Transfer	Scalehouse	Ops	All	562,318	578,865
890	**Other Contractual Expenses**					**$18,202,418**	**$19,080,000**
	VB O&M Agreement	Disposal	Landfill	Ops	All	2,859,691	2,970,000
	Service Fee to Wheelebrator	Disposal	WTE	Ops	All	$15,342,727	$16,110,000
	Host Fee, Suffolk	Disposal	Landfill	Ops	All		
	Contract for Hauling						
	Disposal to ORLF						
890	**Deposit to Closure Fund / Trusts Fund**					**$ 2,515,000**	**$ 5,463,000**
890	Regional Landfill	Disposal	Landfill	Closure	All	2,500,000	2,000,000
890	Regional Landfill	Disposal	Landfill	Closure	All	10,000	10,000
890	Regional Landfill	Disposal	Landfill	Closure	All	5,000	5,000
890	Regional Landfill	Disposal	Landfill	Closure	All	-	3,448,000
890	**Capital Improvement / Equipment Replacement (Full Capital Costs)**					**$ 5,101,557**	**$ 1,940,101**
890	**Debt Service**					**$22,010,067**	**$ 9,564,000**
890	**Interest Expense**					**$ -**	**$ -**
890	**Reserves & Contingency**					**$ -**	**$ 1,500,000**
890	**Depreciation & Accruals**					**$ -**	**$ -**
890	**Disposal, Equipment**	**Disposal**	**Landfill**	**Accruals**	**All**		
890	**Transfer Station**						
890	**Transfer Fleet**						
890	**Support**	Support	System	Accruals	All		
890	**Recycling**	Recycling	Recycling	Accruals	All		
890	**Landfill Cell**	Disposal	Landfill	Accruals	All		

(Note: Items in red added to SPSA budget structure, and some lines are hidden for presentation purposes)

- **SPSA Services Provided.** As indicated above, if the municipalities internalize the transfer station operations, with SPSA only operating the Regional Landfill, or if the Regional Landfill is closed and SPSA only operates the transfer stations, SPSA's overhead would be reduced, and certain overhead functions would be transferred to the municipalities. SCS developed estimates of the reduction in SPSA overhead costs, and the allocation of overhead costs to the municipalities.



Data source: SPSA historical landfill operational cost data from 2007 to 2010

Figure 15. Landfill Operational Cost Model

- **Closure Costs and Accruals**

  - **Regional Landfill.** Future closure costs after 2018 are estimated at $150,000 per acre (2011 dollars). $2.5 million per year is budgeted for closure accruals through 2018.

  - **Virginia Beach No. 2 Phase 1 and 2A closure.** SPSA is responsible for its share of the reasonable closure and post-closure care costs for the City's landfill in accordance with the ash disposal agreement. The reasonable share is based on the proportional amount of waste disposed in the various cells of the City Landfill. SCS has estimated that SPSA's and the City's share allocation of the closure costs is approximately $12 million (2012 dollars), and $15 million, respectively (See Table 39). SCS assumed that SPSA will accrue and pay this expense to the City of Virginia Beach at approximately $2.3 million per year for six years at 4 percent interest to cover these closure cost obligations prior to the end of January 2018.

Table 39. Closure Cost Allocation Based on Tonnage Disposed
Virginia Beach Landfill No. 2

Closure Cost Allocation Based on Tonnage
Virginia Beach Landfill
CIP

Description				Original Estimate	Fiscal Year Ending														Total Project
				2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Phase 1 Closure																			
Permit				$ 100,000			$ 106,090												$ 106,090
Design				2,100,000			2,227,890												2,227,890
Construction				17,000,000				18,576,360											18,576,360
Subtotal, Phase 1				**$ 19,200,000**	**$ -**	**$ -**	**$ 2,333,980**	**$ 18,576,360**	**$ -**	**$ -**									**$ 20,910,340**
SPSA Share		59.96%		$ 11,512,520	$ -	$ -	$ 1,399,000	$ 11,139,000	$ -	$ -									$ 12,538,000
City Share		40.04%		$ 7,687,480	$ -	$ -	$ 935,000	$ 7,438,000	$ -	$ -									$ 8,373,000
																			-
Phase 2A Closure																			-
Permit				$ 100,000													142,580		142,580
Design				850,000													1,211,900		1,211,900
Construction				5,453,000														8,007,910	8,007,910
Subtotal, Phase 1				**$ 6,403,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,354,480**	**$ 8,007,910**	**$ 9,362,390**
SPSA Share		0.00%		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
City Share		100.00%		$ 6,403,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,354,480	$ 8,007,910	$ 9,362,390
Totals				**$ 25,603,000**	**$ -**	**$ -**	**$ 2,334,000**	**$ 18,577,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,354,480**	**$ 8,007,910**	**$ 30,273,390**
SPSA Share				$ 11,512,520	$ -	$ -	$ 1,399,000	$ 11,139,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,538,000
City Share				$ 14,090,480	$ -	$ -	$ 935,000	$ 7,438,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,354,480	$ 8,007,910	$ 17,735,390
SPSA Payment for closure, $/year:				$2,329,896	PMT @ 4%, 6 years based on future value in 2012 input into SPSA City of VB Closure Fund in SPSA Ops Tab														
Virginia Beach total Payment for closure, $/year				$5,181,517															
SPSA Payment for closure, 2012 Dollars				$12,213,632															
Virginia Beach total Payment for closure, 2012 Dollars				$14,948,590															

Likewise, for the City's budget, SCS has assumed that the City will accrue approximately $5.2 million per year during the same period for the overall closure costs (net cost of $2.9 million per year). This annual cost could be reduced by accruing the Phase 2 closure costs over a longer period (e.g., through 2024).

- **Host Fee to Suffolk.** For the purpose of this analysis a $1 per ton host fee (2011 dollars) was assumed for each ton of waste disposed in the Regional Landfill. This cost is allocated to the SPSA budget as a cost and as offsetting revenue to the Suffolk budget.

- **Waste Disposal Tipping Fee Schedules**. SCS surveyed all the private disposal facilities within 200+ miles of the South Hampton Roads Region. Tip fees are reported to range from $20 (near Richmond) to $55 per ton (See Table 40). The Waste Management Landfills closest to the Region (Waste Management's Atlantic Waste Disposal Landfill in Sussex County and the Bethel Landfill in Newport News) have reported tip fees from $43 to $51 per ton; however, we understand that Southampton has a current contract with Atlantic Waste Disposal Landfill to dispose of some of its waste at $31 per ton. This indicates that the tip fee rate charged by private facilities is subject to negotiation and may vary from the posted tip fee. For the purpose of this analysis, we have assumed tip fees at private disposal facilities as shown in Table 41. If tip fees differ significantly from these rates, the results of the analysis may vary. Also, the rate that SPSA or Virginia Beach could charge for the disposal of ash was estimated to reflect the internal rate of disposal that Wheelabrator might have to pay otherwise. For example, if Waste Management's internal disposal costs = $15/ton and transportation adds another $11/ton, the target disposal rate would be $26/ton for making it cost effective for Wheelabrator to dispose of the ash at the SPSA or Virginia Beach Landfill No. 2. A 2018 ash disposal rate of $30 per ton was set in the pro forma for estimating potential revenues to either SPSA or Virginia Beach for the disposal of ash from the Wheelabrator WTE facility.

- **Capital Expenses/Debt.** We understand that certain SPSA finance costs may vary between now and 2018 depending on whether the remaining debt is retired on an accelerated basis. The financing costs presented in SCS's pro forma are based on information provided by SPSA in February/March 2011. The SPSA budget assumes that no new debt will be incurred through January 2018, and all capital expenditures will be expensed in the year the cost is incurred. After 2018, capital costs are expensed on an amortized basis based on the projected service life of the asset. Landfill capital expenses for construction of new cells and closures is allocated on an accrual basis, with interest costs estimated based the balance of the capital costs and cumulative accrual.

- **Escalators, Investment Rate, and Discount Factor**

  - CPI = 3 percent
  - Fuel = 4 percent
  - Discount factor for NPV and present worth calculations and interest rate for financing or interest earnings: 4 percent

Table 40. Survey of Landfill Tip Fees

Facility	Tipping Fees	Location	Contact Information	Operator
Big Bethel Landfill	$43.00/ton (One ton minimum fee) Plus $5.00 Fuel Charge <2 tons or $10.00 Fuel Charge for >2 tons	City of Hampton	City of Hampton Public Works 757-727-8311	USA Waste of Virginia
Charles City Landfill	$50.00/ton In-County or $65.00/ton Outside-County	Henrico County	http://www.co.henrico.va.us/departments/utility/solid-waste/	Waste Management
Shoosmith Sanitary Landfill	$20.00 to 40.00/ton based on Volume	Chesterfield County	Mike Cole 804-461-9302	Virginia Waste Services
Middle Peninsula Landfill	$48.00/ton (One ton minimum fee)	Gloucester County	Scale House 804-693-5109	Waste Management
Maplewood Recycling and Waste Disposal	$45.00/ton plus varying fuel surcharges	Amelia County	Scale House 804-561-5787	Chambers Waste Systems of VA
King George Landfill and Recycling Center	$39.00/ton	King George County	http://www.king-george.va.us/county-offices/department-of-solid-waste--recycling/solid-waste--recycling.php	King George County
Brunswick Waste Management Facility, LLC	$36.00/ton	City of Lawrenceville	Debbie Creech 434-848-9277	Brunswick County
BFI Old Dominion Landfill	$55.00/ton on average (Minimum of $55.00 plus varying fuel charges	Henrico County	Scale House 804-226-6198	Republic Services
BFI King and Queen Landfill	$55.00/ton on average (Minimum of $55.00 plus varying fuel charges	City of Little Plymouth	Scale House 804-785-2146	Republic Services
Sussex County Landfill	$45.00 to $51.00/ton	Sussex County	804-834-8300 (Waverly Office)	Atlantic Waste Disposal, Inc.
Cumberland County Landfill (Not Yet in Operation)	$35.00 to $50.00/ton	Cumberland County	Tim Torrez ttorrez@republicservices.com	Republic Services

Table 41. Assumed Tip Fee Rates(2012-2028)

Other Disposal Option Market Rate Assumptions	2012	2013	2014	2015	2016	2017	2018	2019	2020
WM Waverly LF	$31.93	$32.89	$33.87	$34.89	$35.94	$37.02	$38.13	$39.27	$40.45
WM Bethel LF	$40.00	$42.00	$44.00	$46.00	$48.00	$50.00	$52.00	$54.00	$56.00
City of Virginia Beach LF									
New VB WTE Facility									
Wheelabrator	$40.00	$42.00	$44.00	$46.00	$48.00	$50.00	$52.00	$54.00	$56.00
Host Fee (Suffolk), $/ton Received (Applicable 2018 and Beyond)							1.23	1.27	1.30

Other Disposal Option Market Rate Assumptions	2021	2022	2023	2024	2025	2026	2027	2028
WM Waverly LF	$41.66	$42.91	$44.20	$45.52	$46.89	$48.30	$49.75	$51.24
WM Bethel LF	$57.00	$59.00	$61.00	$63.00	$64.00	$66.00	$68.00	$70.00
City of Virginia Beach LF								
New VB WTE Facility								
Wheelabrator	$57.00	$59.00	$61.00	$63.00	$64.00	$66.00	$68.00	$70.00
Host Fee (Suffolk), $/ton Received (Applicable 2018 and Beyond)	1.34	1.38	1.43	1.47	1.51	1.56	1.60	1.65

(Rates through 2028 provided for illustrative purposes, projections are available through 2047, put are merely escalated at the CPI rate, also the Wheelabrator rate is escalated at the CPI rate after 2018)

- **SPSA Cost Allocations to Member Communities**. SPSA's revenue detail model was incorporated into SCS's pro forma model in order to mimic the cost allocation methodology to the SPSA member communities through January 2018. The basic structure of the model distributes the net SPSA costs (costs minus offsetting revenues from disposal of commercial waste, C&D, the Wheelabrator service agreement, landfill gas, white goods, household hazardous waste programs, other miscellaneous revenues, and the tip fees from the City of Virginia Beach per the ash disposal agreement), and to Chesapeake, Franklin, Isle of Wight County, Norfolk, Southampton County, and Portsmouth based on the quantity of municipal solid waste delivered to the SPSA system from each member community. A dollar per ton figure is calculated, which includes the transfer stations, transfer and disposal operations. Suffolk pays zero through January 2018. The revenue detail model has been modified for the period of 2018-2047 to allocate all net costs to participating members (the eastern communities of Chesapeake, Norfolk, Suffolk, and Virginia Beach) based on the projected disposal rates.

- **Reserves**. SPSA currently has reserves, which can and have been used (e.g., in 2011) to reduce its net costs, debt service, and future significant increases in the tip fee. However, the current pro forma analysis does not include additional cost reductions through use of reserves, although such may be needed minimize significant year to year tip fee increases.

- **Sale of Regional Landfill to Suffolk**. For Scenario F.1, the assumption is made that the City of Suffolk would purchase and operate the Regional Landfill and use it for disposal of its municipal solid waste. However, the pro forma analysis does not include the purchase price for the landfill. The valuation of the landfill is beyond the scope of this study. The purchase price would likely add significant costs that currently are not reflected in the cost projections for this scenario.

- **New WTE Facility**. Under Scenario E.1 and E.2, SCS evaluated the cost of developing a new WTE facility in Virginia Beach. For Scenario E.1, SCS assumed the facility would be sized to handle only the City's municipal waste stream, while for Scenario E.2, the facility size would be increased to handle waste from Chesapeake, Norfolk, Virginia Beach, and Suffolk.

5.3 PRO FORMA MODEL RESULTS

The pro forma model developed by SCS provides projections on the costs for managing solid waste in the Region from a municipal and regional perspective for the scenarios described in Table 35. The model also provides information on how the Regional Landfill and Virginia Beach Landfill No. 2 site capacities and future expansion sequencing is impacted for each scenario. The results of the pro forma analysis are presented in the following tables and figures:

- **Table 42 and Figure 16** – Summary of Net Present Value Costs for Solid Waste Management for each member community. This table and figure include the costs for collection, disposal, transfer stations, and other costs reflected in the member community budgets and provides the "full-cost" of managing solid waste for each

member community over the planning period (2018 to 2047). Table 42 also provides a relative comparison of the NPVs for each scenario by dividing the NPV for each scenario by the NPV of the status quo scenario (A.1). This calculation illustrates on a percentage basis how much more or less the scenario is compared to the status quo scenario over a 30-year period. The scenarios highlighted in red indicate the scenario with the apparent lowest NPV cost for each member community.

- **Appendix A - Exhibit A-2 to Exhibit A-7, Projected Solid Waste Management Costs by Municipality for 2012-2028 (shows cost by function).** These exhibits present the cost trends over the planning period through 2028 (ten years after the current use and support agreements with SPSA expire) for recycling (if available), disposal, collection, transfer, and general support functions.

  - Exhibit A-2 - Chesapeake
  - Exhibit A-3 - Norfolk
  - Exhibit A-4 - Portsmouth
  - Exhibit A-5- Suffolk
  - Exhibit A-6 - Virginia Beach
  - Exhibit A-7 - Western Communities (Franklin, Isle of Wight, and Southampton)

  The analysis for Franklin, Isle of Wight, and Southampton shows only one scenario because each of these communities have indicated their preference to either contract directly to dispose at Waste Management's Atlantic Waste Disposal Landfill for disposal (the western communities) or dispose directly at the Wheelabrator WTE Facility (Portsmouth). However, a comparison of the projected costs between participating in SPSA and not can be discerned by comparing the 2012-2018 cost trends to 2018 and beyond trends.

- **Figure 17 and Figure 18 – Remaining site capacity curves by fiscal year end for the Regional Landfill and Virginia Beach No. 2 Landfill.** These series of curves illustrate the depletion rate for each landfill by scenario, when future expansion would be needed, and whether the respective site capacities of each landfill would be reached during the planning period. The capacity curves presented assume that SPSA and the City of Virginia Beach will successfully gain all the approvals from the Virginia Department of Environmental Quality, other regulatory agencies, and local entities to fully develop these two sites. With all permitting efforts, there is risk that permitting may not be successful, or take longer than expected, especially when there are wetlands and other surrounding community issues to be resolved.

- **Figure 19 – Presents the projected system tip fee for continuing the current solid waste management system under SPSA.** The projected tip fees using the current SPSA tip fee model for the status quo (A.1) are plotted are plotted on the exhibit. For this scenario, the projected system tip fees after 2018 would be approximately $87/ton (future dollars) steadily increasing to over $100/ton by 2023. This projected tip fee includes all operational costs for transfer, landfilling, and disposal, including administrative overhead, and potential offsetting revenues from the disposal of other waste streams at the landfill, transfer of commercial waste to Wheelabrator, and LFG

royalty payments. In today's dollars, the projected 2018 tip fee would be approximately $69/ton.

Table 42. Summary of NPV Analysis, $Millions 2018-2047(30 years)

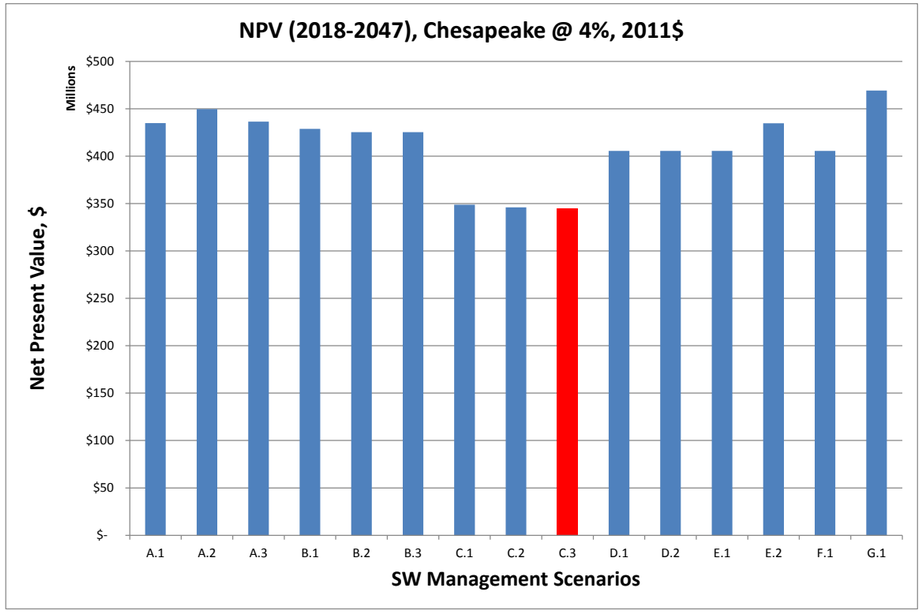
NPV Tabulation

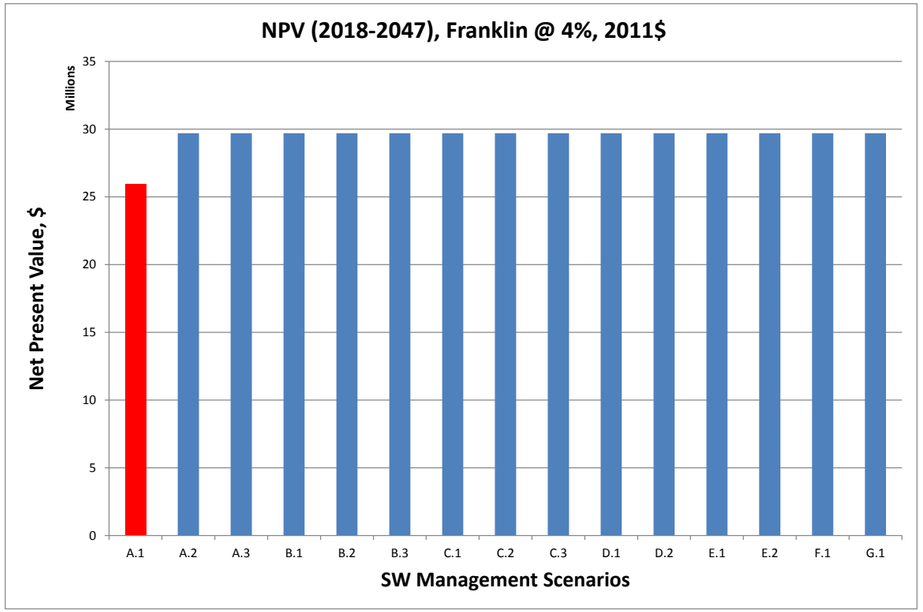
Scenario	Scenario Description	Net Present Value, $millions (over 30 years @ 4%)							
		Chesapeake	Franklin	Isle of Wight	Norfolk	Portsmouth	Southampton	Virginia Beach	Suffolk
A.1	All SPSA LF/TS/WTE	434.8	**26.0**	**66.6**	352.3	232.7	**34.8**	761.1	219.0
A.2	Eastern SPSA LF/TS/WTE	449.6	29.7	67.6	361.0	237.8	43.1	777.9	229.4
A.3	Eastern SPSA LF/WTE/Muni TS	436.3	29.7	67.6	367.0	222.5	43.1	781.5	228.8
B.1	All to ORLF/SPSA LF Closed/SPSA TS	428.8	29.7	67.6	348.0	230.3	43.1	753.1	222.2
B.2	All to ORLF/Muni TS/SPSA LF Closed	425.4	29.7	67.6	371.0	211.5	43.1	771.0	199.0
B.3	VB to LF No. 2/All Others to ORLF/Muni TS/ SPSA LF Closed	425.4	29.7	67.6	371.0	211.5	43.1	646.7	199.0
C.1	SPSA LF/TS/Expand LF/WTE/No Ash	348.8	29.7	67.6	300.3	202.3	43.1	661.4	155.3
C.2	SPSA LF/TS/Expand LF/WTE Ash	346.1	29.7	67.6	**298.8**	201.4	43.1	658.4	**147.9**
C.3	SPSA LF/Muni TS/Expand LF/No Ash	**344.4**	29.7	67.6	323.5	**184.7**	43.1	678.9	155.3
D.1	No LF/WTE/Muni TS/VB Ash	405.6	29.7	67.6	348.1	211.5	43.1	**633.6**	214.7
D.2	No LF/WTE/Muni TS/No VB Ash	405.6	29.7	67.6	348.1	211.5	43.1	745.4	214.7
E.1	VB Only Waste/VB WTE/Others to Wheelabrator WTE/SPSA LF Closed	405.6	29.7	67.6	348.1	211.5	43.1	894.8	214.7
E.2	VB WTE/ Others to VB WTE/ SPSA LF Closed	434.6	29.7	67.6	387.1	211.5	43.1	732.4	221.3
F.1	Suffolk Ops LF/Other WTE	405.6	29.7	67.6	348.1	211.5	43.1	745.4	225.0
G.1	Portsmouth to WTE Not Part of SPSA	469.2	29.7	67.6	372.9	211.5	43.1	800.6	242.7

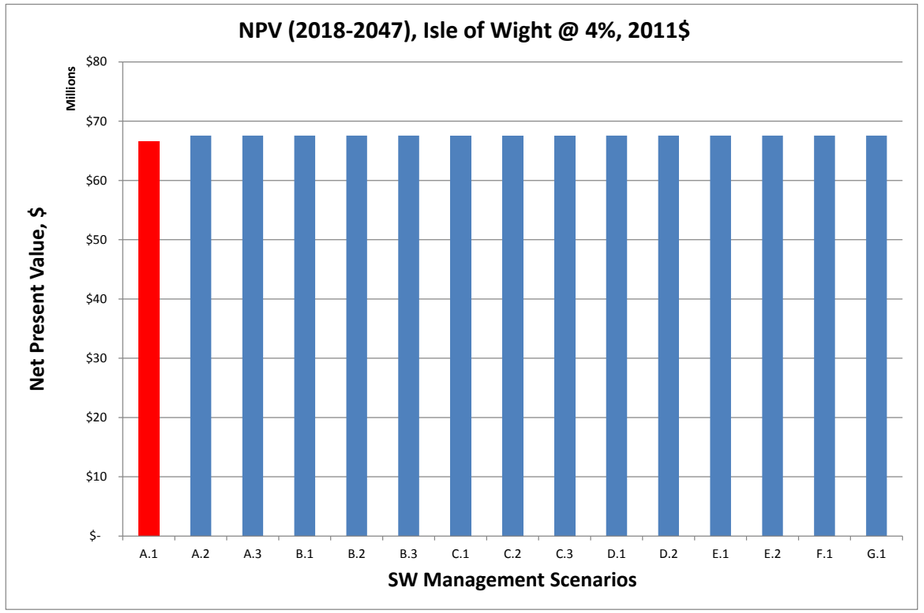
NPV Summary Comparison Table Against Scenario A.1 (Status Quo) NPV_x/NPV_{A-1}

Scenario	Scenario Description	Chesapeake	Franklin	Isle of Wight	Norfolk	Portsmouth	Southampton	Virginia Beach	Suffolk
A.1	All SPSA LF/TS/WTE	100%	100%	100%	100%	100%	100%	100%	100%
A.2	Eastern SPSA LF/TS/WTE	103%	114%	101%	102%	102%	124%	102%	105%
A.3	Eastern SPSA LF/WTE/Muni TS	100%	114%	101%	104%	96%	124%	103%	104%
B.1	All to ORLF/SPSA LF Closed/SPSA TS	99%	114%	101%	99%	99%	124%	99%	101%
B.2	All to ORLF/Muni TS/SPSA LF Closed	98%	114%	101%	105%	91%	124%	101%	91%
B.3	VB to LF No. 2/All Others to ORLF/Muni TS/ SPSA LF Closed	98%	114%	101%	105%	91%	124%	85%	91%
C.1	SPSA LF/TS/ORLF or /WTE/No Ash	80%	114%	101%	85%	87%	124%	87%	71%
C.2	SPSA LF/TS/ORLF or WTE/WTE Ash	80%	114%	101%	85%	87%	124%	87%	68%
C.3	SPSA LF/Muni TS/Expand LF/No Ash	79%	114%	101%	92%	79%	124%	89%	71%
D.1	No LF/WTE/Muni TS/VB Ash	93%	114%	101%	99%	91%	124%	83%	98%
D.2	No LF/WTE/Muni TS/No VB Ash	93%	114%	101%	99%	91%	124%	98%	98%
E.1	VB Only Waste/VB WTE/Others to WheelabratorWTE/SPSA LFClosed	93%	114%	101%	99%	91%	124%	118%	98%
E.2	VB WTE/ Others to VB WTE/ SPSA LF Closed	100%	114%	101%	110%	91%	124%	96%	101%
F.1	Suffolk Ops LF/Other WTE	93%	114%	101%	99%	91%	124%	98%	103%
G.1	Portsmouth to WTE Not Part of SPSA	108%	114%	101%	106%	91%	124%	105%	111%

Figure 16. Net Present Value of 30-Year Solid Waste Management Costs (2018 – 2047)







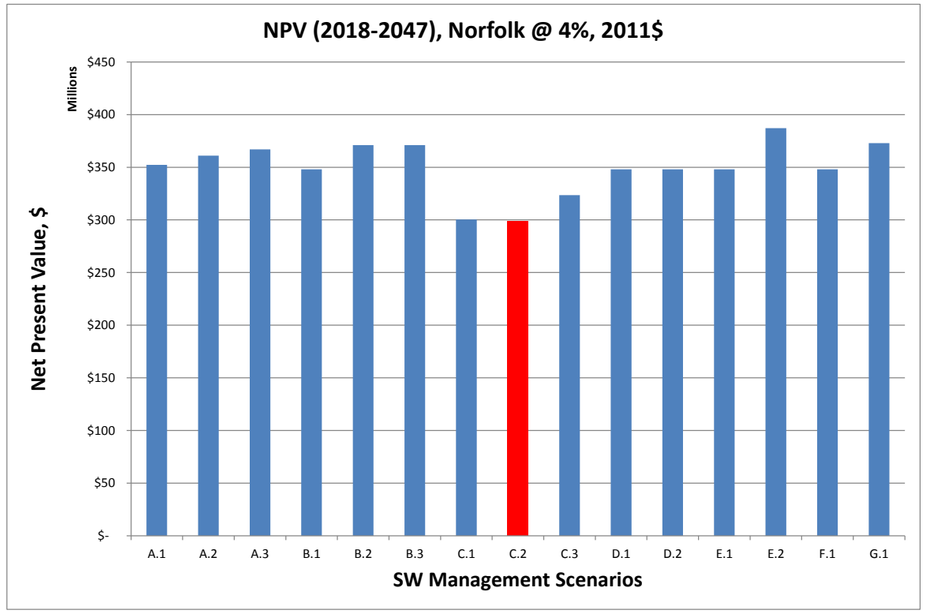
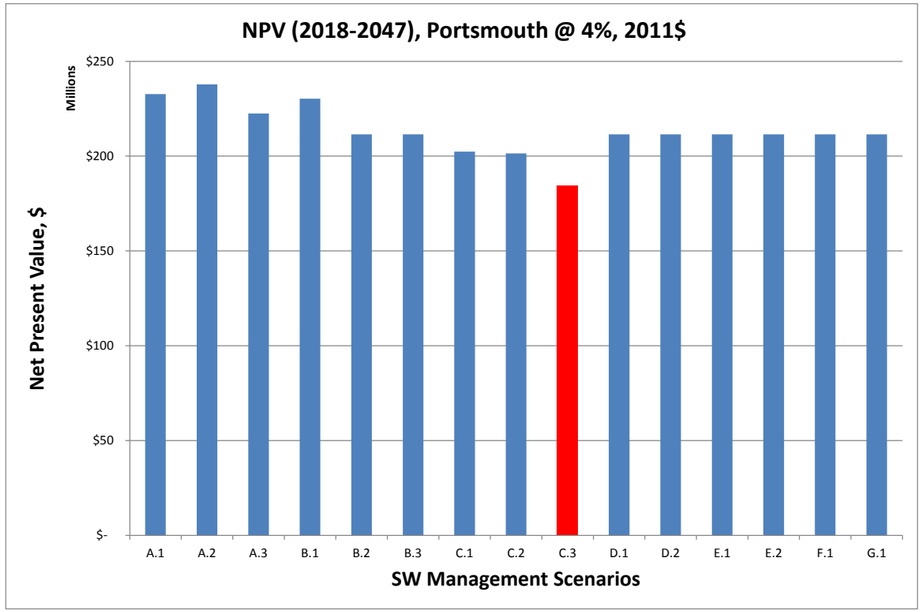
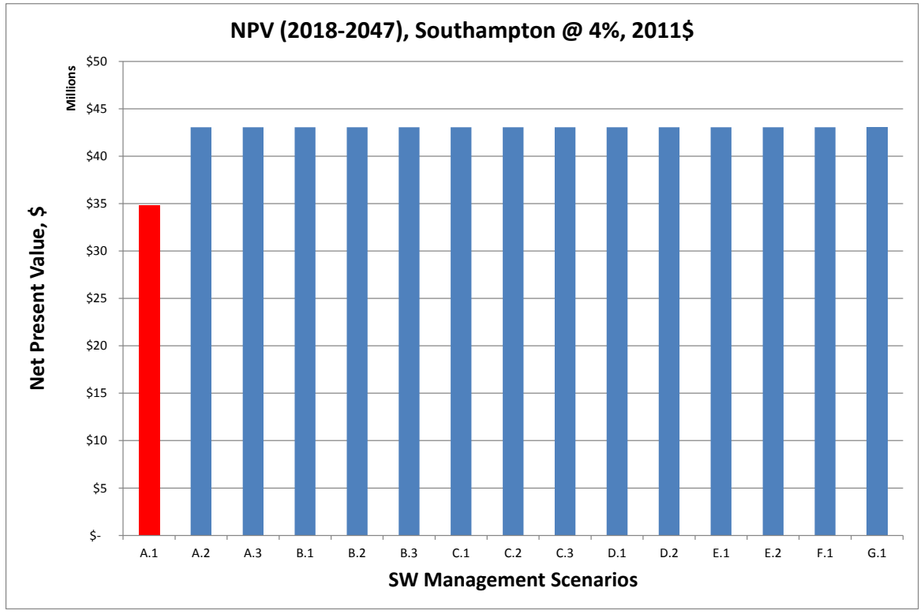
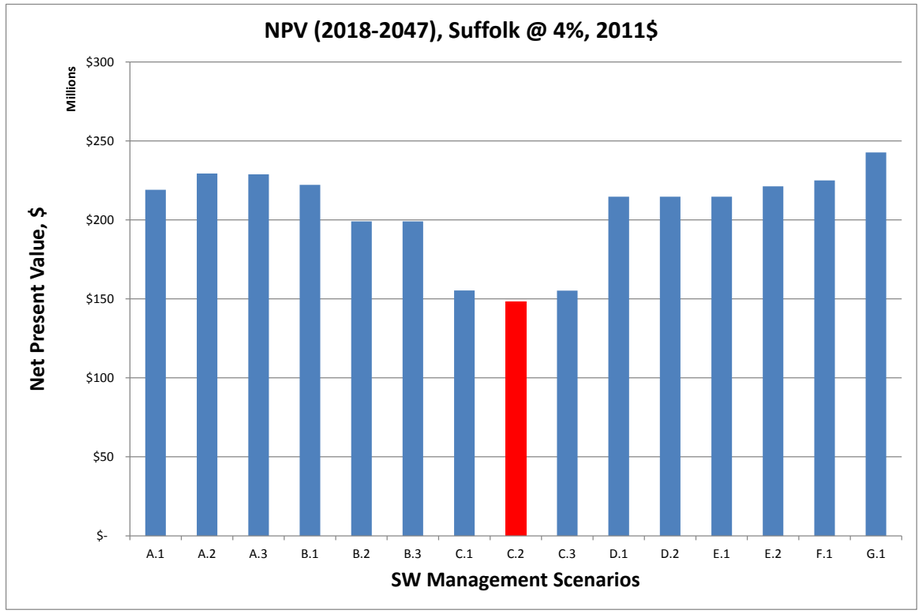


Figure 16. Net Present Value of 30-Year Solid Waste Management Costs (2018 – 2047)







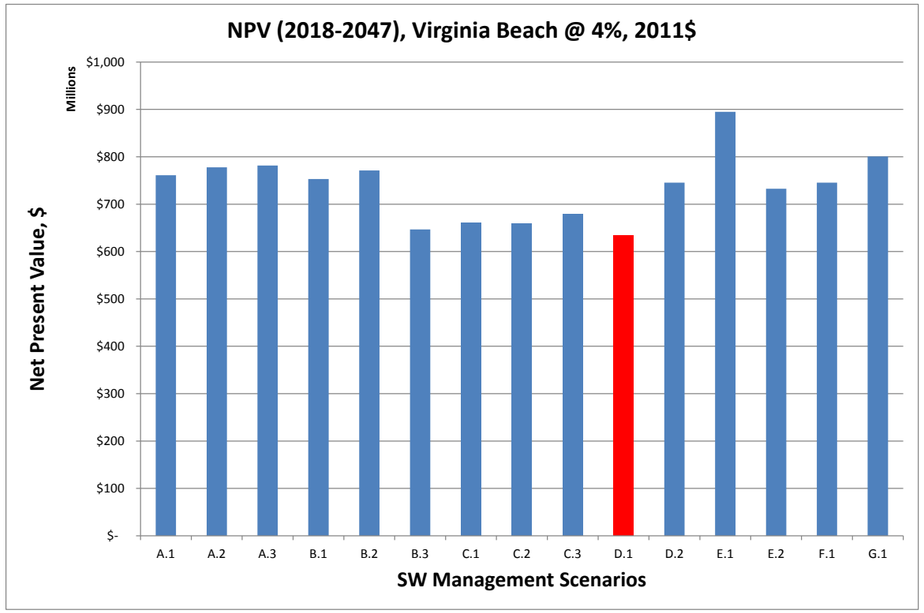
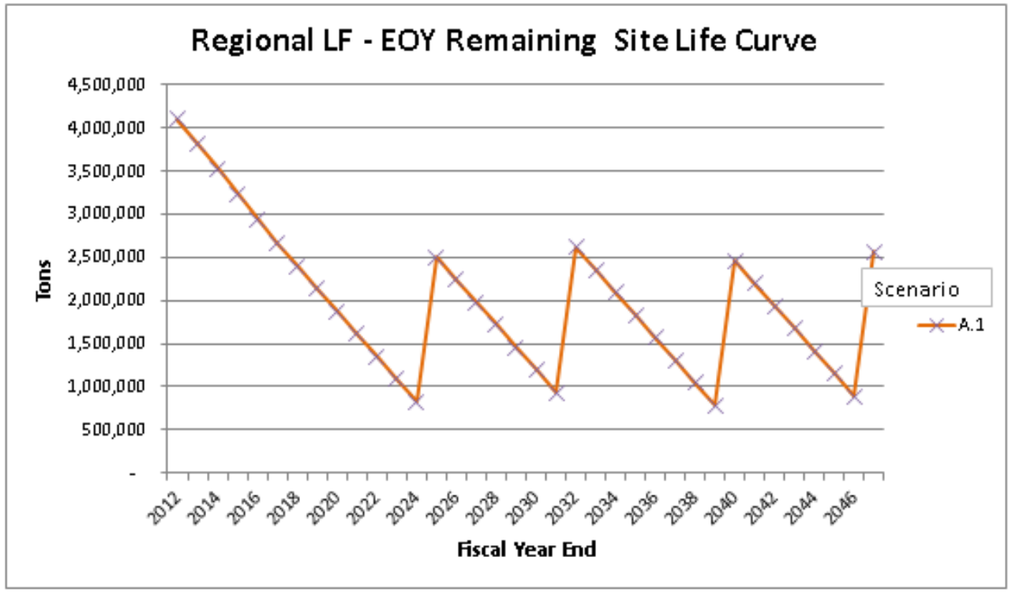
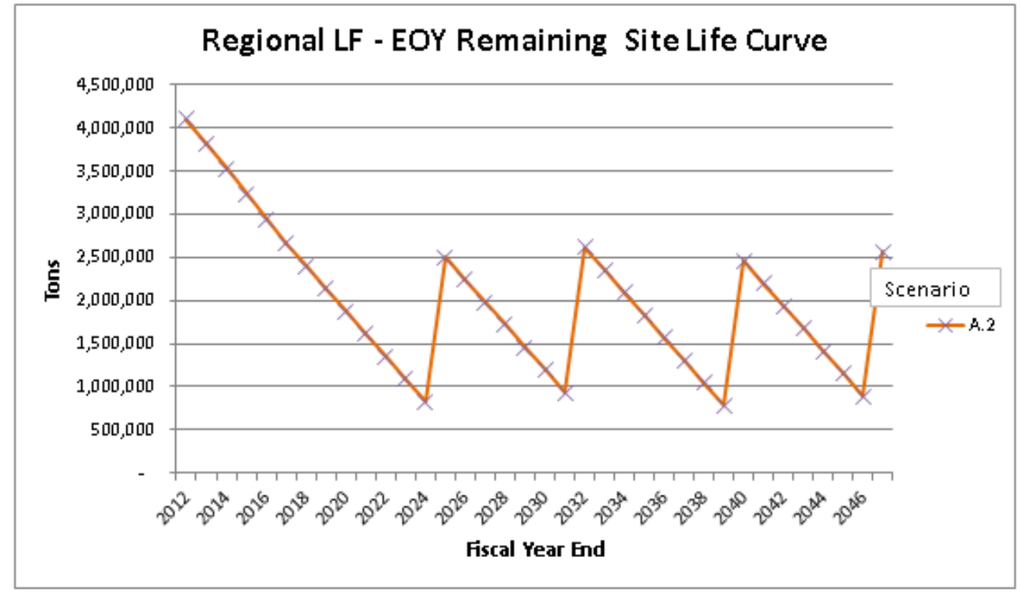
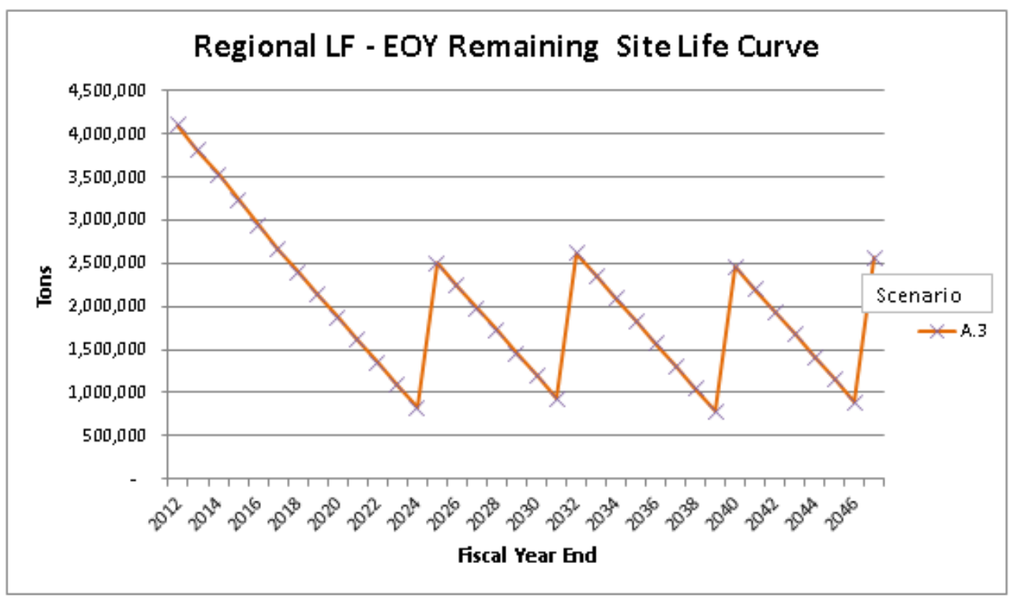


Figure 17. Regional Landfill Site Capacity Curve By Scenario







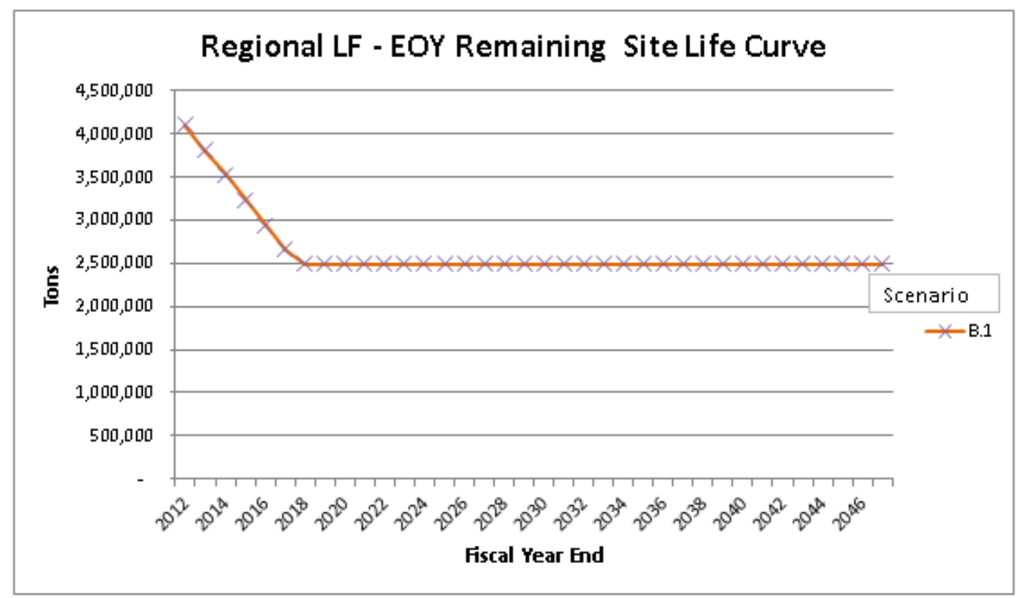
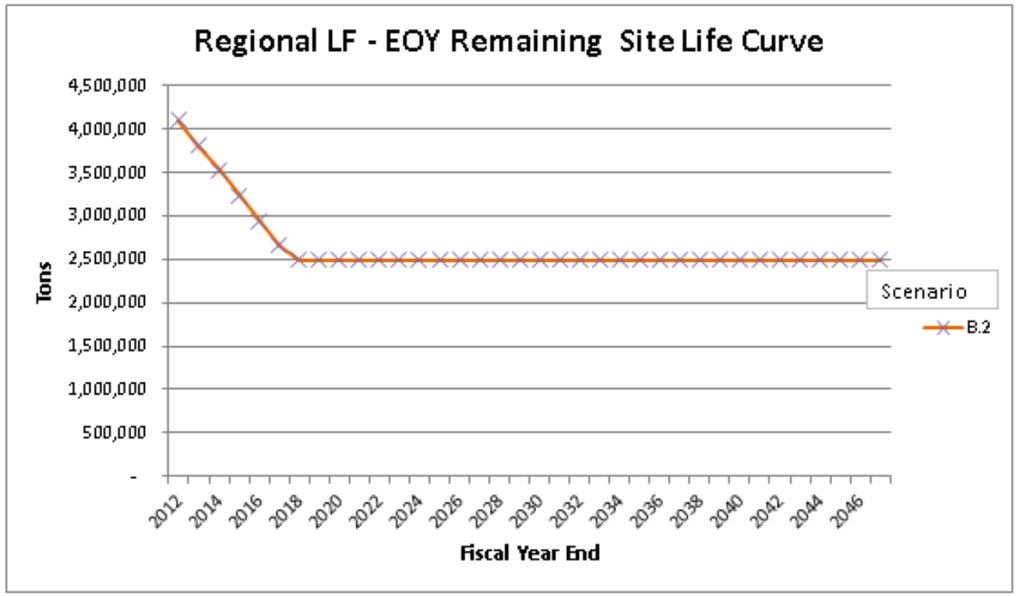
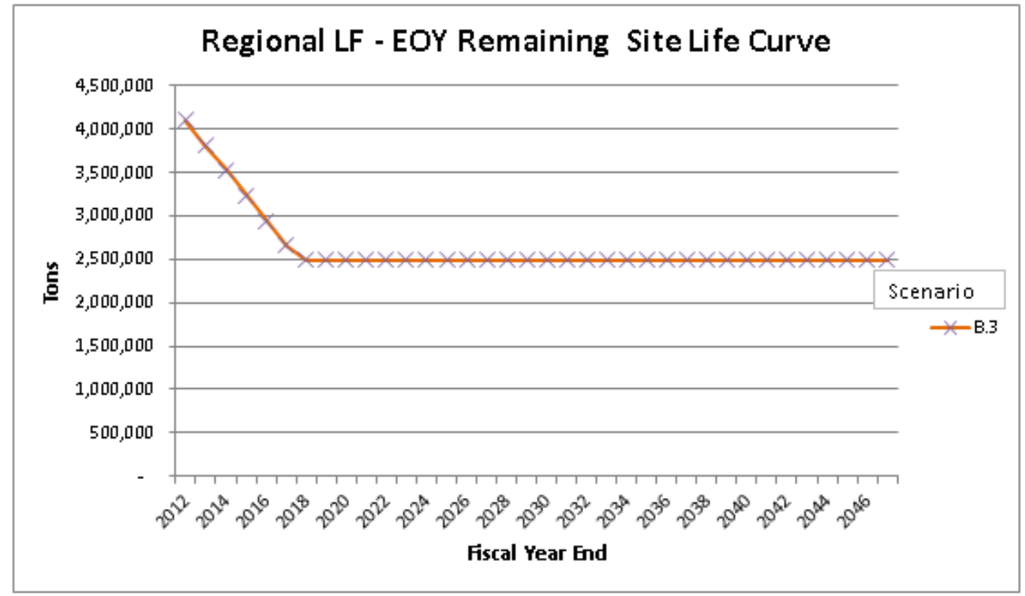
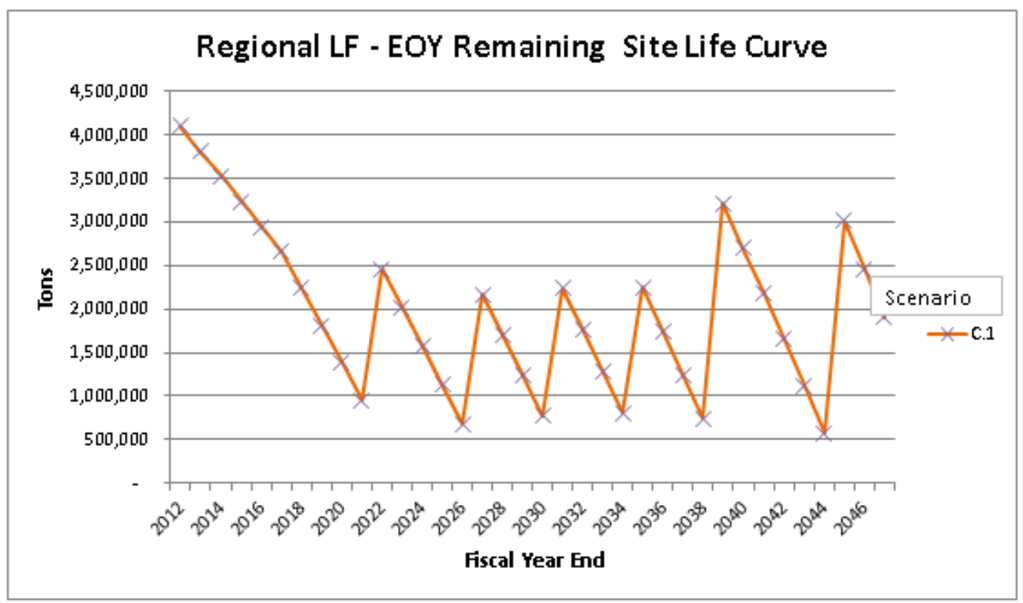


Figure 17. Regional Landfill Site Capacity Curve By Scenario







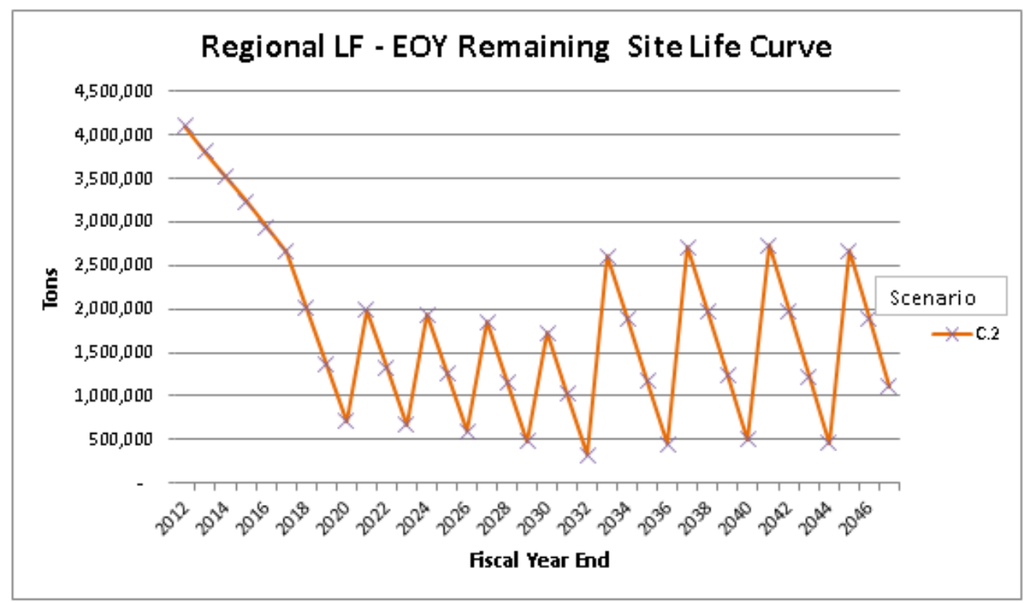
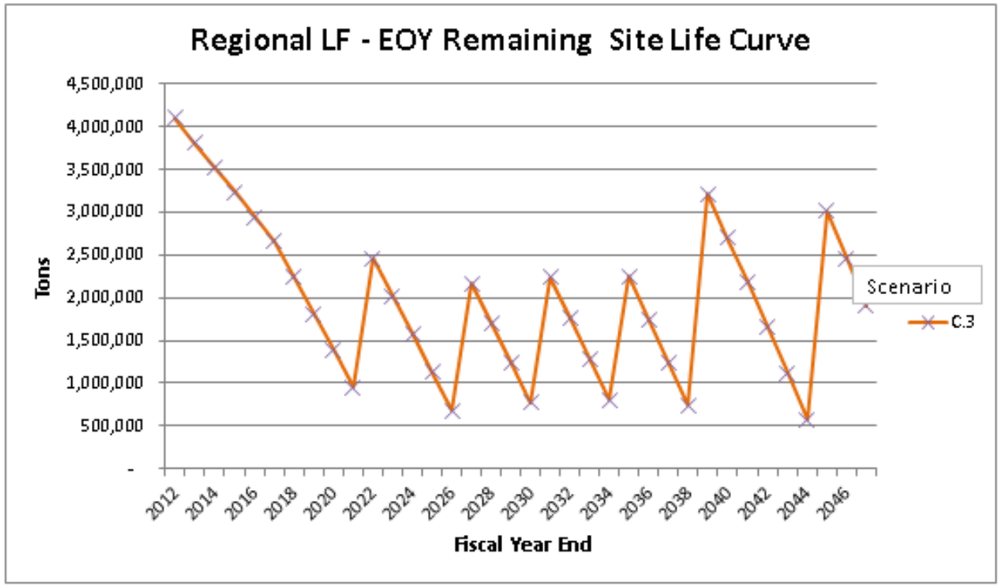
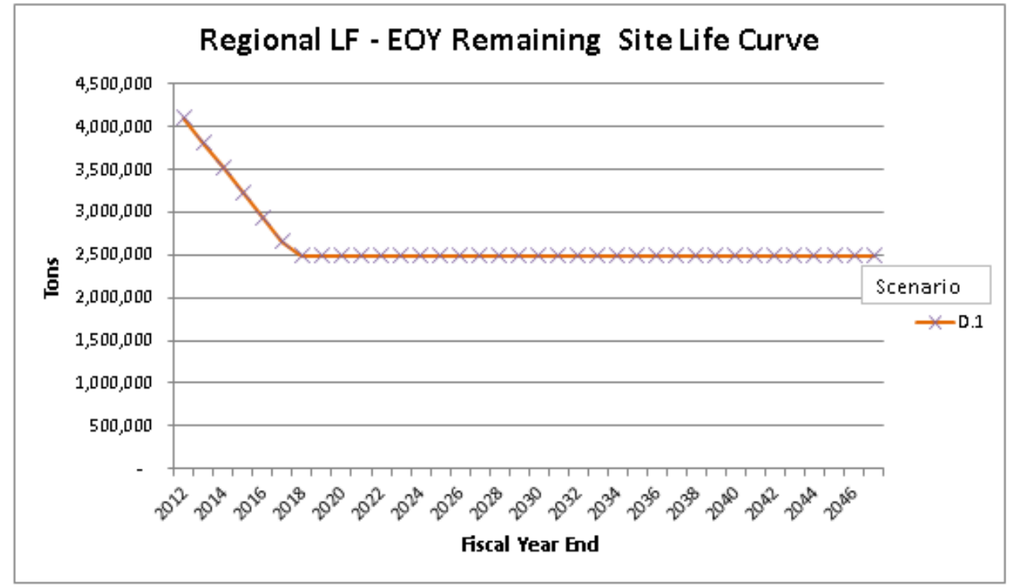
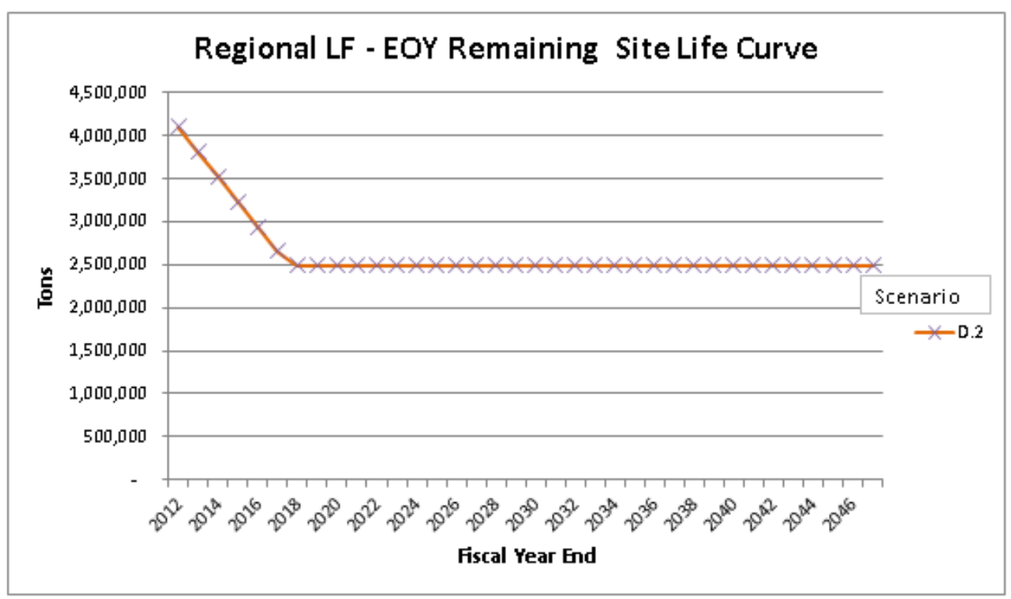


Figure 17. Regional Landfill Site Capacity Curve By Scenario







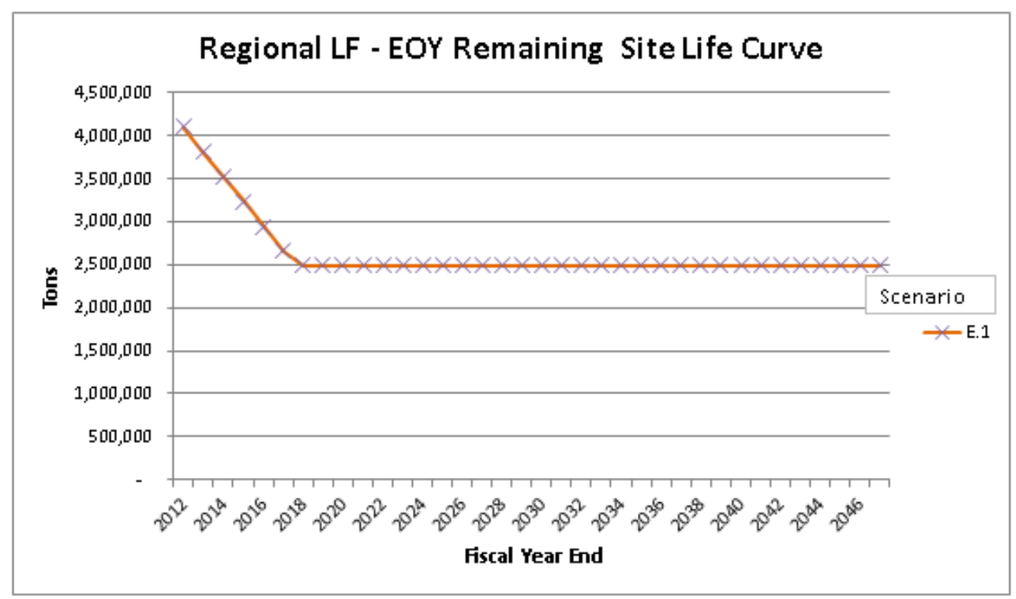
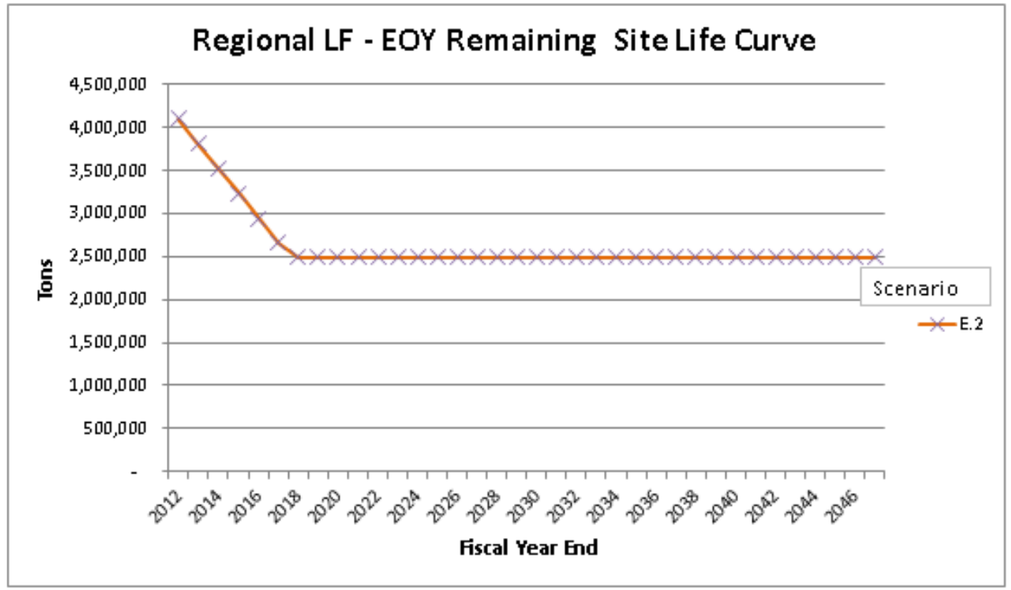
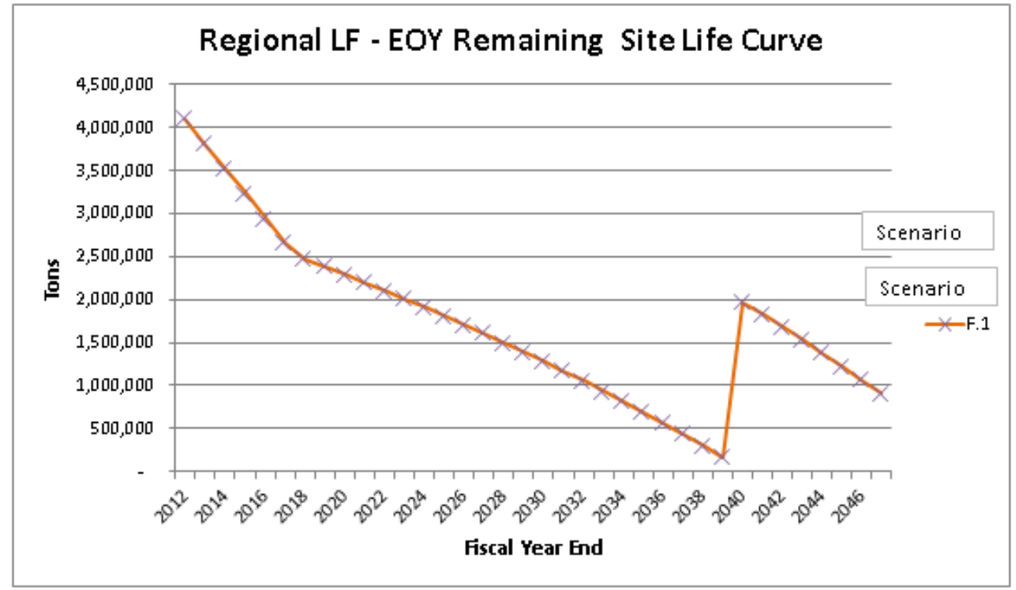


Figure 17. Regional Landfill Site Capacity Curve By Scenario





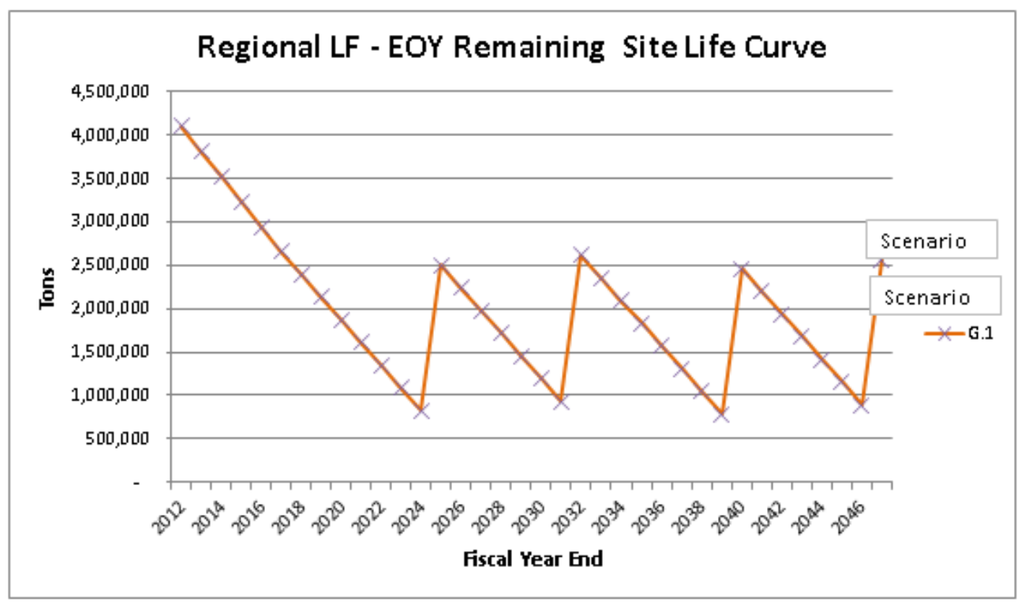
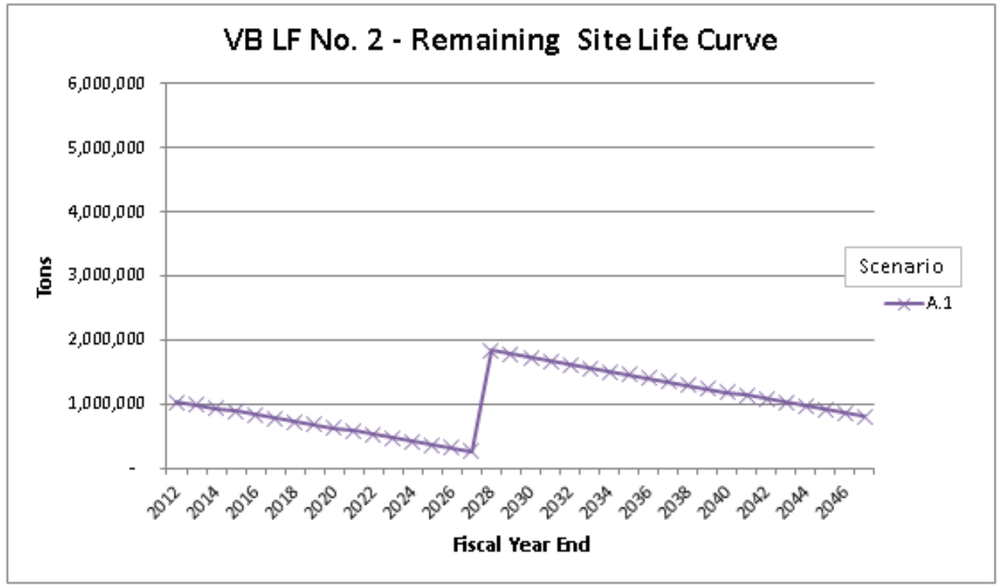
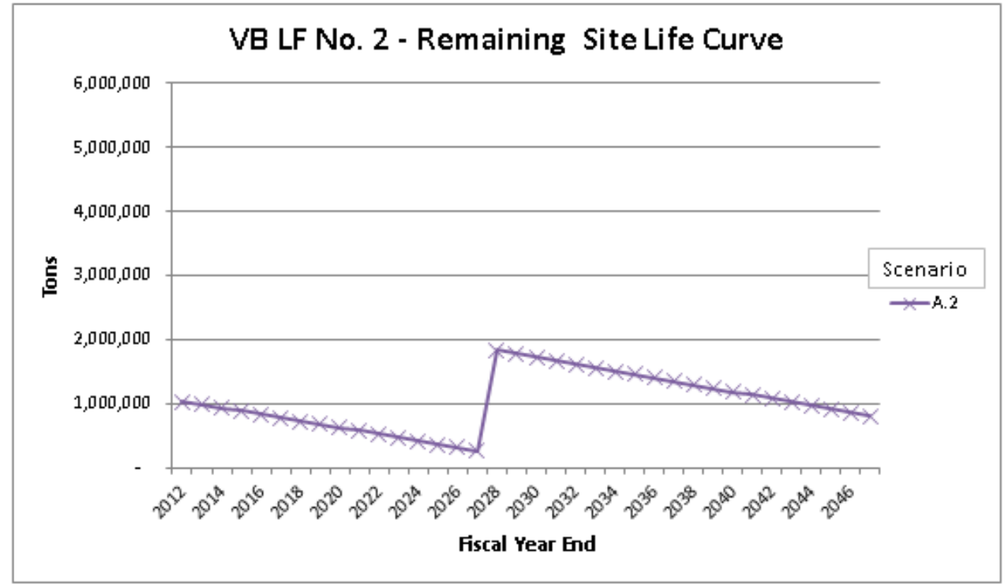
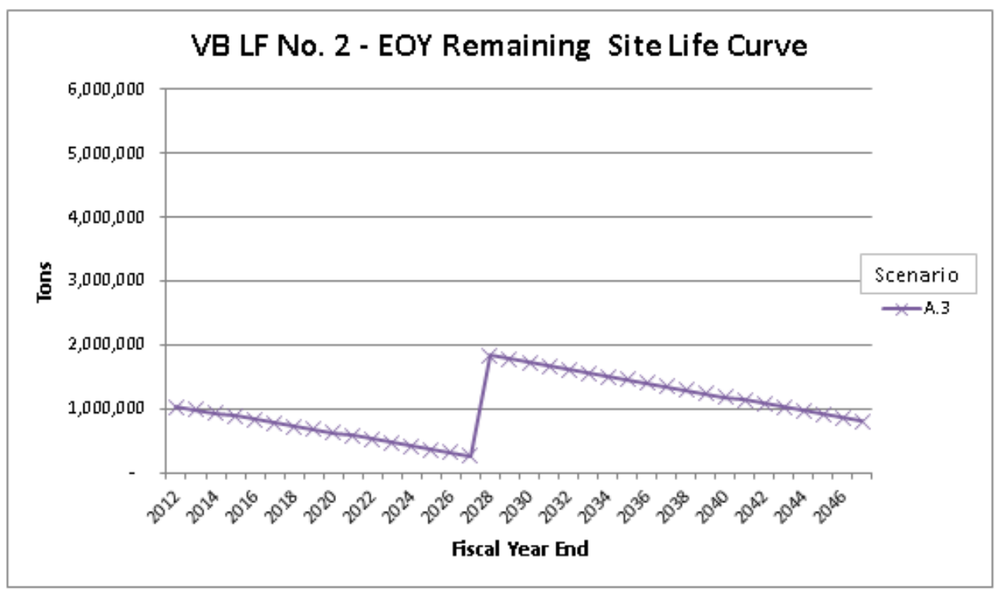


Figure 18. Virginia Beach Landfill No. 2 Site Capacity Curve By Scenario







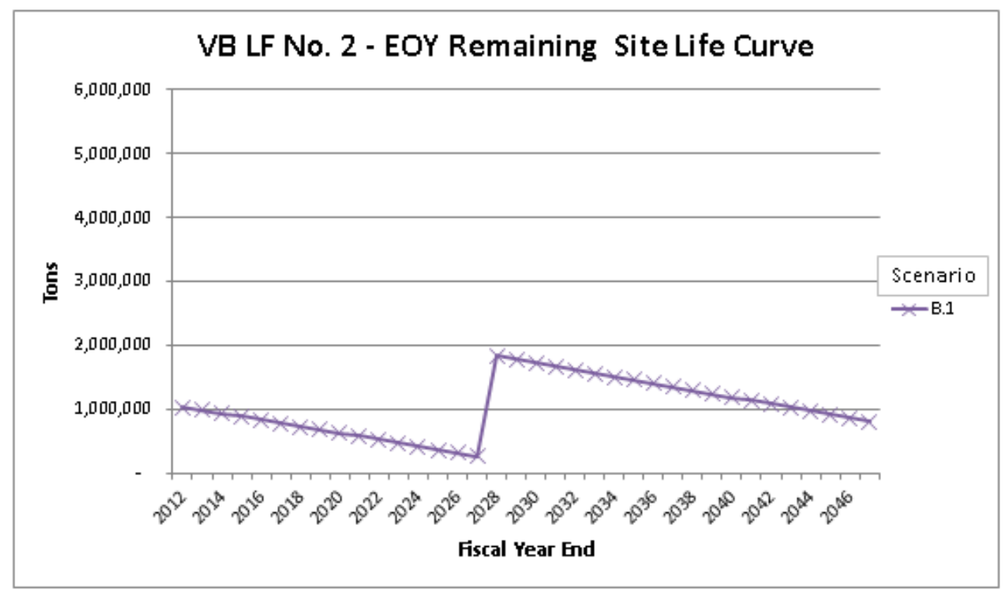
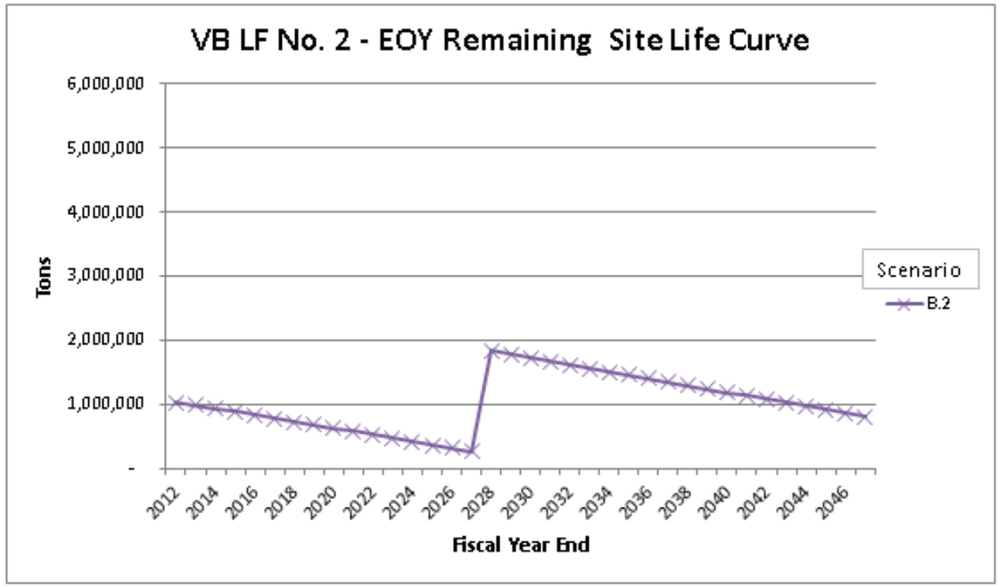
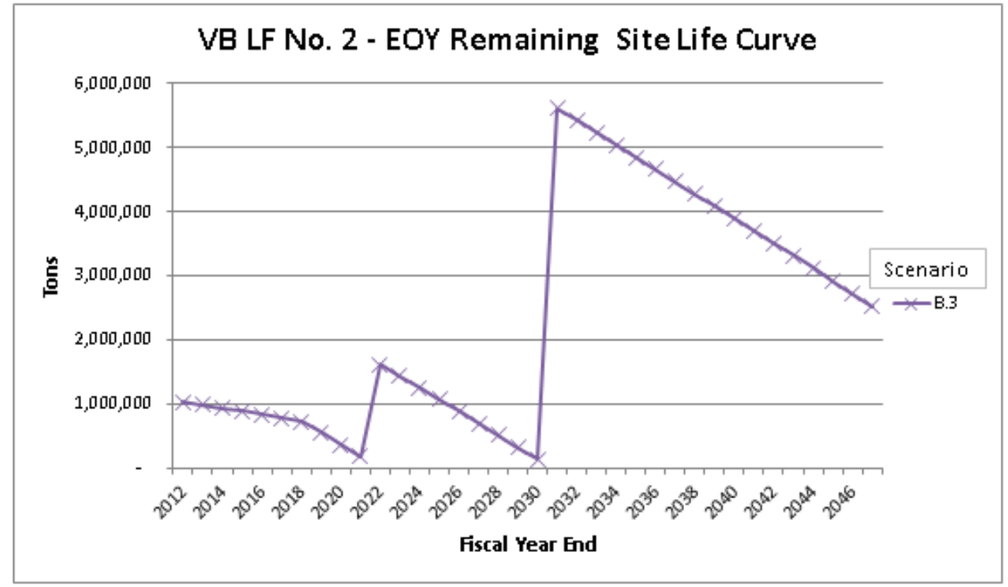
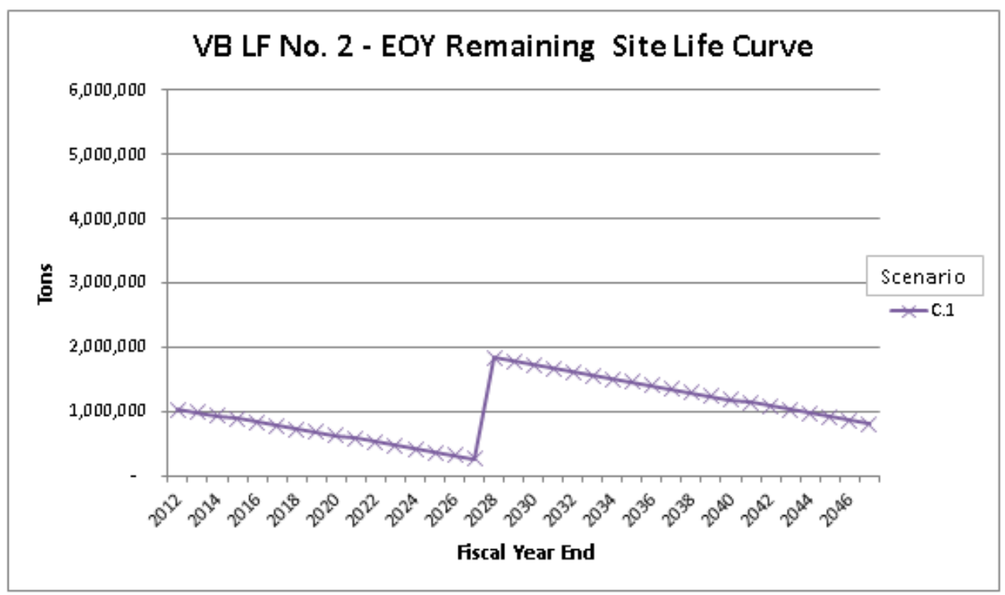


Figure 18. Virginia Beach Landfill No. 2 Site Capacity Curve By Scenario







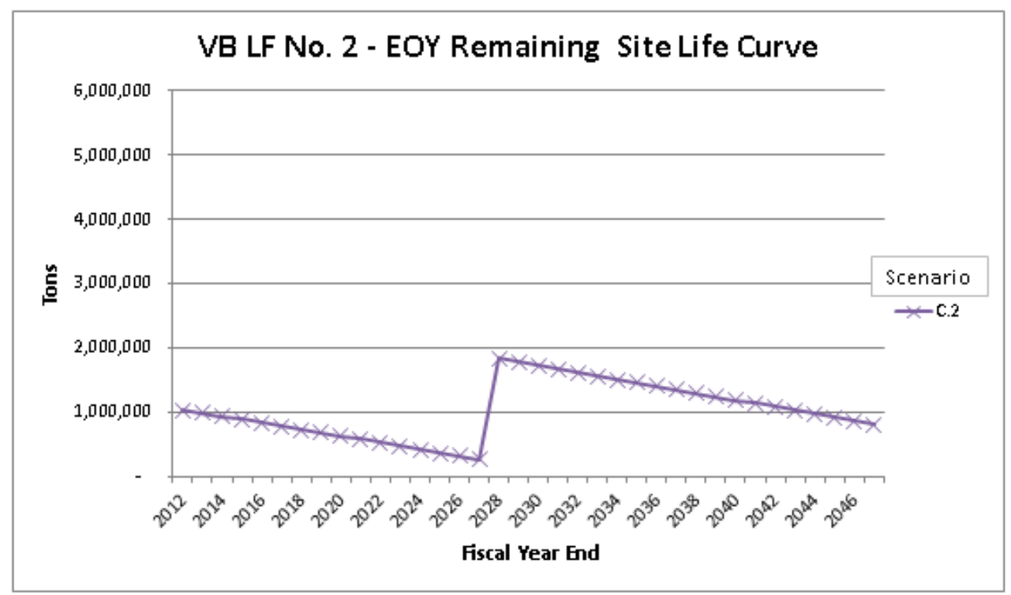
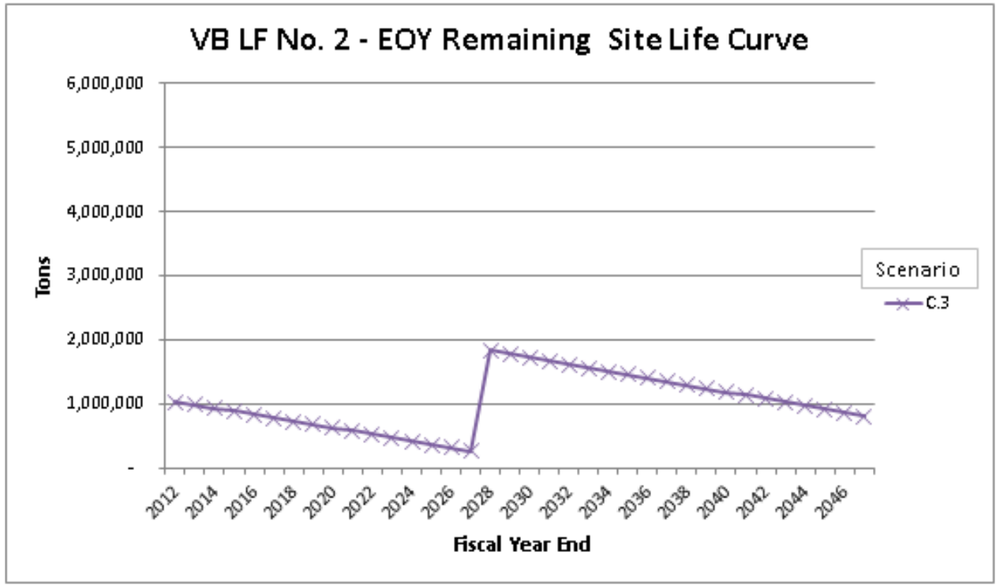
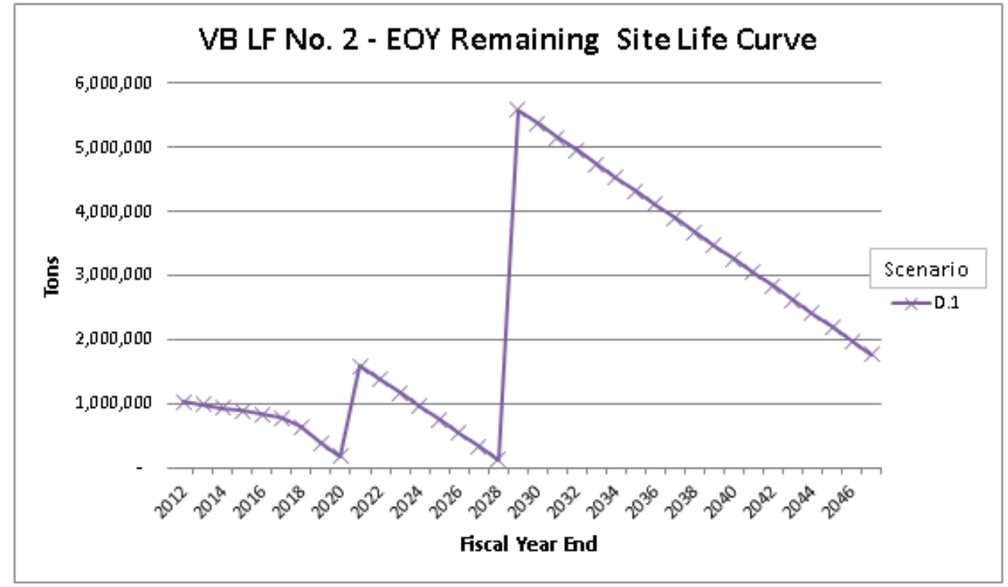
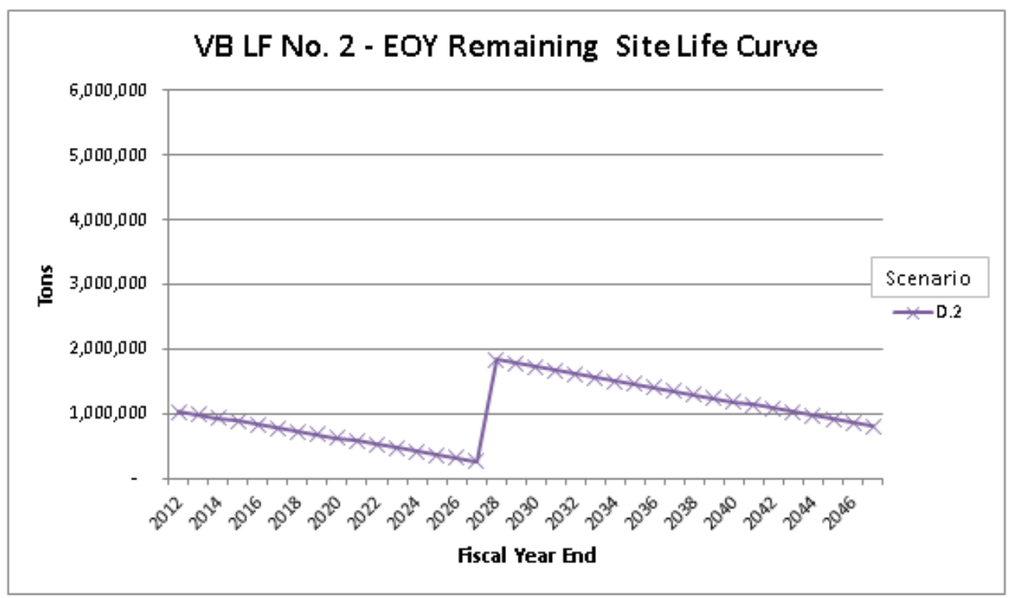


Figure 18. Virginia Beach Landfill No. 2 Site Capacity Curve By Scenario







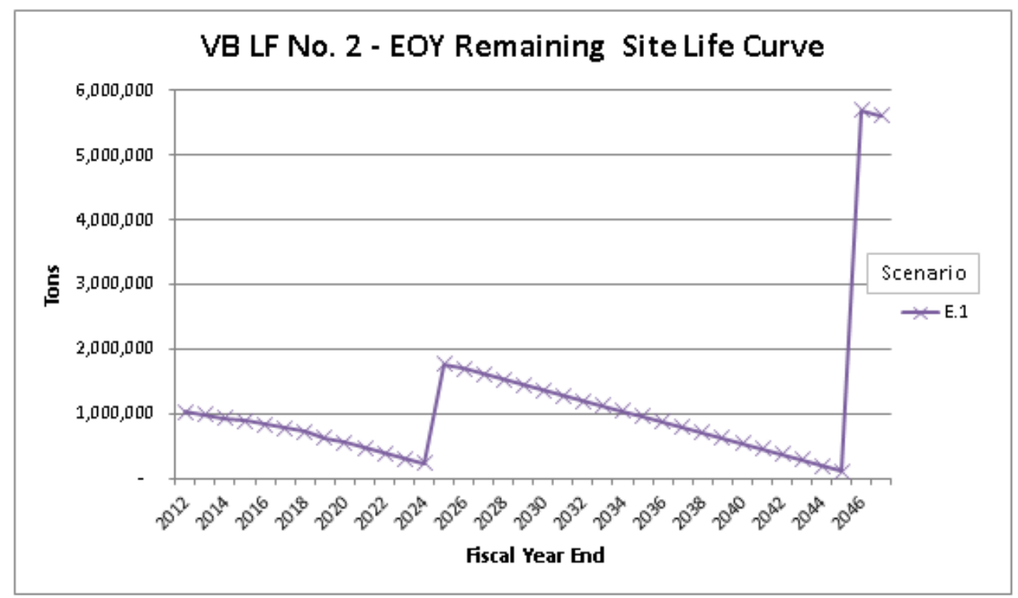
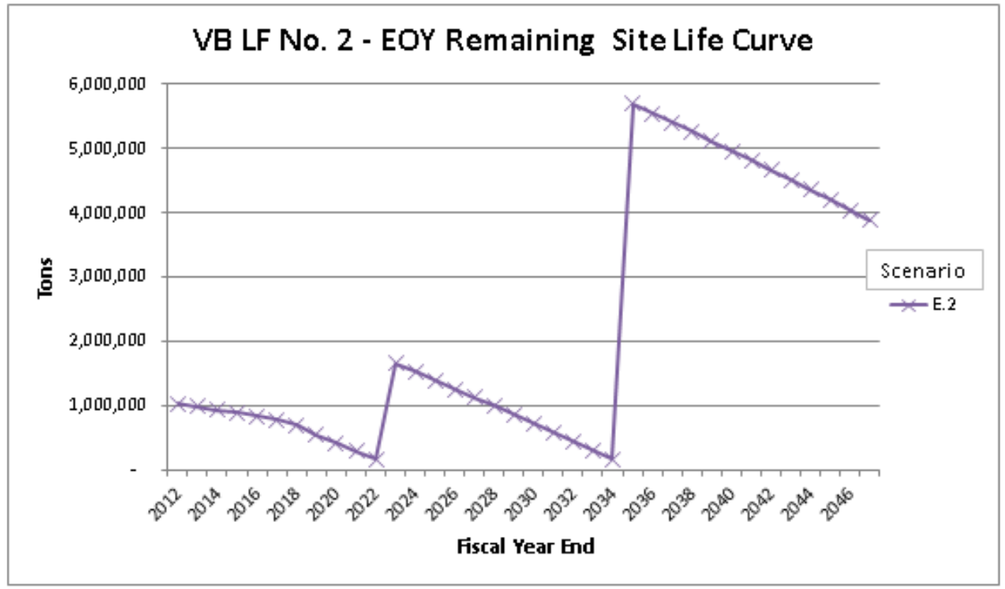
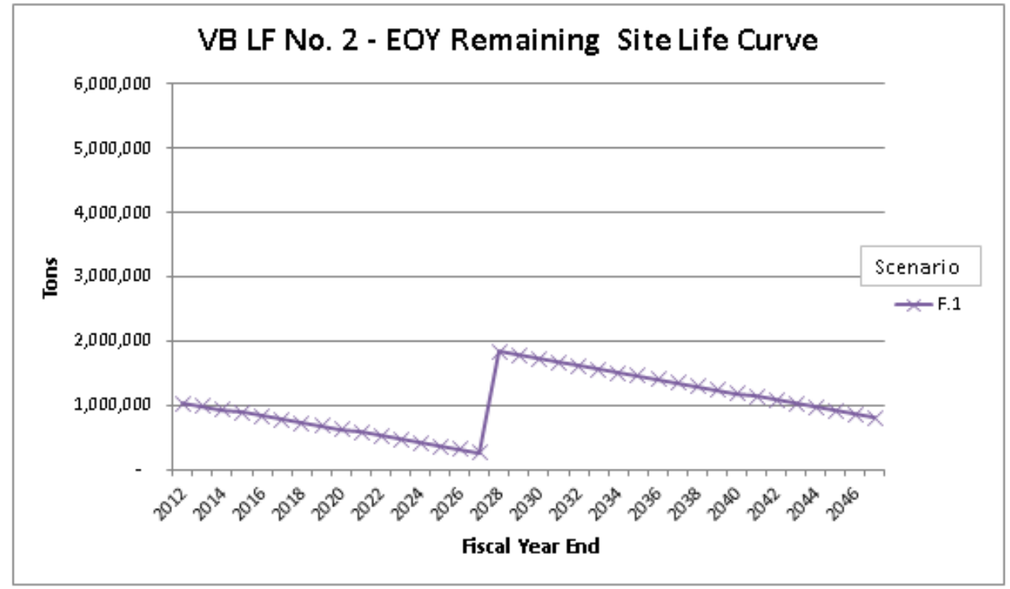
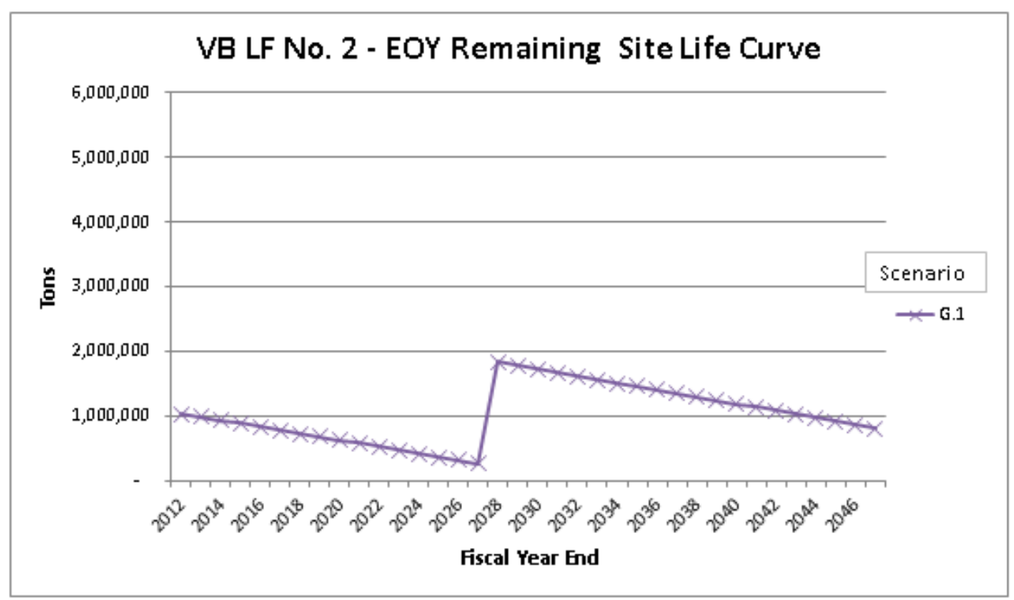


Figure 18. Virginia Beach Landfill No. 2 Site Capacity Curve By Scenario







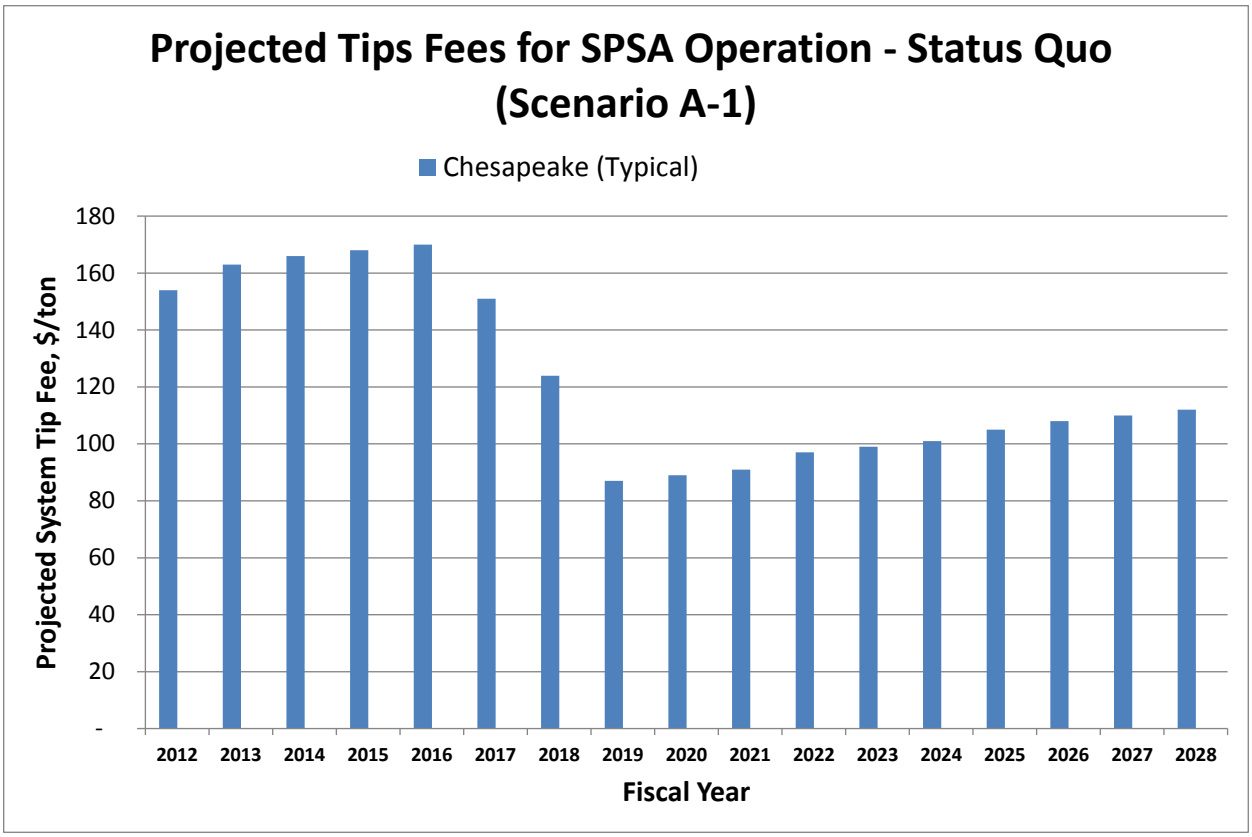


Figure 19. Projected System Tip Fees for SPSA Operations (Scenario A-1)

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6.0 FINDINGS AND RECOMMENDATIONS

6.1 FINDINGS

6.1.1 Observation on Pro Forma Cost Analysis

- **Overview of NPV Cost Results (See Table 42)**. With the exception of Virginia Beach, the other member communities do not own their own landfill. As such, the disposal options for these communities are limited to SPSA, an out-of-region landfill, or the Wheelabrator WTE Facility. The NPV costs for the out-of-region landfill scenarios (Scenario B.1 and B.2) are generally comparable to the A Scenarios for Chesapeake, Isle of Wight, Norfolk, Portsmouth, and Virginia Beach; however, for Franklin and Southampton, shipping to an out-of-region landfill appears to be more expensive than continuing with SPSA. This is largely due to the allocation of the SPSA transfer station costs to these two communities. The NPV cost for the status quo (A.1, all communities cooperating together), appears to have the lowest NPV of the A scenarios.

  The NPV costs for the Scenario B scenarios are highly dependent on future fuel prices, traffic conditions, and uncertain competitive market conditions. The lowest projected NPV costs are associated with the Scenario C series and D.1 (Virginia Beach), which involves disposing all the eastern member communities municipally collected waste at the Regional Landfill, and in the case of Virginia Beach under D.1, disposing of the City's waste at their own landfill and receiving offsetting revenue from the disposal of WTE ash. The primary issues associated with Scenarios C are: 1) is the uncertainty of successfully permitting the expansion of the Regional Landfill into Cells 8/9 and the Virginia Beach Landfill, 2) a 100% disposal approach is not consistent with the waste management hierarchy adopted by the Region in its Regional Solid Waste Management Plan, and 3) the uncertainty regarding the disposition and market disposal rate for the WTE ash.

  Scenario D, which involves the eastern member communities negotiating individually with Wheelabrator for disposal and operating their own transfer stations appears to have a NPV cost lower than the A scenarios. However, the uncertainty and risks associated with this alternative include the ability of the communities to individually negotiate a similar disposal and transfer agreement with Wheelabrator as SPSA currently has, because the current cooperative arrangement leverages the total waste stream from the municipalities. This leverage provides a stronger negotiating position.

- **Status Quo, WTE and Regional Landfill Operation (Scenario A).** The existing Wheelabrator WTE Facility is an important asset for the Region. Use of the facility for disposal of the member community municipally collected waste provides 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. Scenario A.1 presents the scenarios of operating the

system as currently configured, which includes disposing of municipally and commercially collected waste at the Wheelabrator WTE Facility through the existing transfer station network, and disposing of the ash residue at the Regional Landfill. Scenario A.1 maintains the current institutional arrangement between the Cities and SPSA. Scenario A.2 keeps the Regional Landfill under SPSA and the eastern member communities cooperate through SPSA, while the western region members dispose at an out-of-region landfill. Scenario A.3 is similar to A.2, except the eastern member communities take over their respective transfer stations and transfer operations. If the system tip fee model currently employed by SPSA continues for Scenario A.1, the projected system tip fees after 2018 would be approximately $87/ton (See Figure 19). This tip fee includes all operational costs for transfer, landfilling, and disposal, including administrative overhead, and potential offsetting revenues from the disposal of other waste streams at the landfill, transfer of commercial waste to Wheelabrator, and LFG royalty payments. In today's dollars that would be approximately $69/ton. All of SPSA's current debt will be paid off at that time. However, several significant capital expenses are projected for the landfill facility in 2022-2023 to address needed roadway improvements at the facility, and by 2023 the system tip fee is projected to be approximately $99/ton.

- **Transfer Station Ownership and Operation**. SPSA currently operates all the transfer stations and waste transfer operations in the Region. SPSA is making improvements to its existing Transfer Station network. Recently, SPSA has upgraded the Oceana Transfer Station, made major improvements to the Norfolk Transfer Station, and major improvements and maintenance is planned for other facilities in the future. Routine maintenance and facility upgrades will continue to be needed between now and 2018 in order for the facilities to be fully functional into the future, regardless of how other regional solid waste system components are configured.

  After 2018, the transfer stations can be either owned or operated by SPSA or by the member communities. Incorporation of transfer station and waste transfer operations into the municipal infrastructure should not be difficult given the scope of most public works operations in the Region. This alternative was addressed in several of the scenarios presented in Section 5.0, and would require new staff to be hired, operation and maintenance protocol established, equipment incorporated into existing fleet operations, and overhead support provided for health and safety, accounting, environmental compliance, permitting, and engineering. The analysis presented in Section 5.0 is inconclusive regarding any substantial financial or operational benefit that may result from the transfer of operations to the municipalities. The primary advantage of the current management of the transfer station and transfer operations is that the entire system resources can be coordinated under one management structure, which would not be the case if the transfer station and transfer operations were taken over by the municipalities. Currently, equipment and personnel can be shifted as needed between facilities to address problems that arise, which would be more difficult, if not possible to do if the cities took over the operations. However, if the cities took over the operations, they could more directly control the facilities within their jurisdictions.

The pro forma analysis indicates that significant savings likely cannot be achieved by the Cities taking over the transfer stations and transfer operations. Table 42 shows that the projected NPV costs over 30 years for Scenario A.2 for each of the municipalities is slightly lower for Chesapeake and Suffolk (3% and 2%, respectively), but slightly higher for Virginia Beach and Norfolk (1% and 2%), respectively. The variation is likely due to the assumed offsetting revenues from hauling of commercial waste and the equipment mix at each transfer station. SCS's review of the SPSA's transfer station operations did not identify inefficiencies in staffing or equipment assignments. The analysis suggests that some of the overhead, maintenance, and support functions currently provided separately by SPSA could be absorbed by the member communities at no major additional cost. Divesting the transfer stations would complicate the management or the transfer stations and transfers operations since many of the communities routinely use the transfer stations located outside of their immediate jurisdictions (e.g., Portsmouth may uses Norfolk's, Virginia Beach may use Chesapeake's, etc.) without complication. Separate arrangements would need to be made for inter-jurisdictional use of these facilities. Additional, unforeseen costs and inefficiencies could result, which are not reflected in the cost figures presented in this report.

- **Out-of-Region Landfill Disposal vs Regional Landfill Disposal (Scenario B vs Scenario C).** 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 (See Figure 7and Table 18). 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 previously evaluated the location and short-term and long-term disposal capacities of facilities which are permitted to dispose of municipal solid waste (SCS, 2008; SCS, 2011). Discussions with the various companies that own and operate these facilities suggest that significant future unpermitted capacity exists at these facilities.

  The pro forma analysis suggests that disposing the Region's municipally collected solid waste either at the Regional Landfill or at the nearest out-of-region landfills (Bethel or Atlantic Waste Landfills) are viable alternatives. Disposing at the relatively nearby out-of-region landfills would result in similar NPV costs as the A Scenarios; however, the location and distance of these facilities from the member communities is a key factor influencing the cost for disposal. If other, more distant facilities were considered, the NPV cost would increase. Disposing at an out-of-region landfill has a higher degree of uncertainty relative to future disposal tip fees and transportation costs compared to the other scenarios considered.

  Disposing all municipally collected waste at the Regional Landfill would result in the most significant reductions in costs and lowest calculated NPV for the following reasons.

- Transportation costs are lower transferring waste to the Regional Landfill versus an out-of-region landfill.

- Future costs for Scenarios B.1, B.2, and B.3 are highly dependent on the projected tip fees and fuel costs, all which are difficult to predict; therefore, there is a higher degree of uncertainty in the NPV costs presented. In addition, the closest out of region landfills are owned by Waste Management (Bethel Landfill and Atlantic Waste Landfill), which is the parent company of Wheelabrator, and we would expect Waste Management to adjust fees such that sufficient waste would be delivered to the Wheelabrator WTE Facility.

- Scenario B.3 involves the City of Virginia Beach disposing its municipally collected waste at its landfill. This is one of the lower cost NPV scenarios for Virginia Beach, which is consistent with the results for Scenario C-1 through C-3, which indicates that operating the Region's landfills for disposal of municipally collected waste would be the lowest cost approach for the Region.

- By 2018, all SPSA's current debt will be paid off, which includes all the investments in the Regional Landfill.

- Due to traffic issues in the Region, the out-of-region disposal option could result in more inefficiency in operating the waste transfer system and increased costs. The fiscal impact of these potential inefficiencies is difficult to project.

- **Regional Landfill Only Operation (Scenario C).**

  - For the Eastern Communities (Chesapeake, Norfolk, Portsmouth, Suffolk and Virginia Beach), the scenario of disposing municipally collected waste at the Regional Landfill appears to be the apparent lowest NPV cost for managing municipally collected waste.

  - Scenarios C-2 shows what cost reductions could be anticipated if SPSA was able to negotiate a contract and ash disposal agreement with Wheelabrator WTE Facility; however, it is uncertain whether Wheelabrator would negotiate such an agreement if SPSA members do use the WTE Facility.

  - Also, all the C-scenarios assume that the landfill would be expanded through Cell 8/9 and a host fee paid to Suffolk. SCS estimates that the Regional landfill would have sufficient capacity through the planning period if Cell 8/9 is developed.

  - The scenario assumes that the road improvements around the landfill entrance would be constructed and that the western communities would dispose of their waste at Waste Management's Atlantic Waste Disposal Landfill.

  - Both the C and D scenarios demonstrate the importance of having the municipally-owned landfills in the Region in controlling the long term costs for solid waste disposal for the member eastern member communities in particular.

- Landfilling of all municipally collected waste at the Regional Landfill, although the apparent lowest NPV cost for the Region of the scenarios considered, is inconsistent with the solid waste management hierarchy (See Figure 20) contained in the Region's solid waste management plan (HRPDC, 2011). Disposal is the least preferred management option, with incineration preferred over direct disposal.

- **Close Regional LF (Scenario D)**. Scenarios D.1 and D.2 assume the Regional Landfill would be closed and all municipally collected waste disposed at the Wheelabrator WTE Facility. Scenario D.1 assumes that Wheelabrator would disposes of its ash at the Virginia Beach Landfill No. 2, where Scenario D.2 assumes Wheelabrator would dispose of its ash at its own facilities. If the City of Virginia Beach was able to negotiate an ash disposal agreement with Wheelabrator, the revenue to the City would significantly reduce the City's overall solid waste system costs (Scenario D.1). The Region would not fully realize the benefit of the capital it has invested if the Regional Landfill were closed before the remaining disposal capacity of the facility was exhausted.

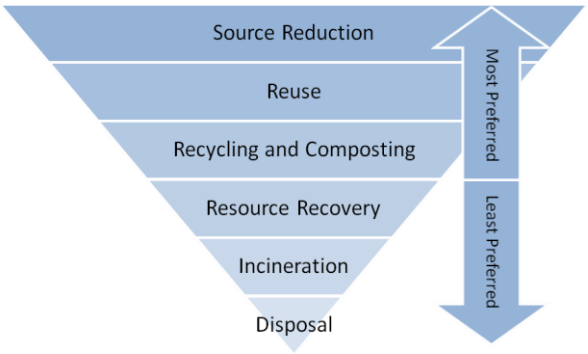

Figure 20. Waste Management Hierarchy

- **WTE in the Region.** Utilizing the Wheelabrator WTE Facility or constructing a new WTE Facility will result in less volumes of waste being landfilled (conserving landfill capacity), and will reduce the reliance on fossil fuels for energy generation through the use of solid waste as a renewable energy resource. With the improvements to the Wheelabrator WTE Facility and operations, there is little need to construct a new WTE facility in the Region, although the NPV analysis suggests that constructing a new WTE facility that would handle the municipally collected waste from Cheseapeake, Norfolk, and Virginia Beach could be cost competitive with the status quo. The risks associated with constructing a new WTE include securing the waste stream and negotiating long-term inter-local agreements with the member communities, permitting, and financing. If the municipally collected waste that currently is disposed at the Wheelabrator facility were diverted to a new WTE Facility, Wheelabrator likely would import waste to the Portsmouth facility from out of the region to provide fuel for the facility. Chesapeake has historically expressed concerns regarding the importation of significant quantities of waste from out of the region, especially if it is delivered via barge, and others may have concerns regarding

potentially increased traffic depending on how waste is transported to the facility (barge or transfer trailers) and the transportation routes selected. A new WTE facility likely could not be permitted and constructed by 2018, and further refinement of the estimated costs would be needed to confirm the basic assumptions used for the conceptual estimates.

As indicated above, incineration is preferred over landfilling per the Region's approved waste management hierarchy. SPSA has the right, in its sole discretion, to extend the term of the agreement with Wheelabrator for an additional period of 10 years, but must notify Wheelabrator by December 31, 2014 if it intends to do so. SPSA has indicated that several provisions of the agreement would likely need amending based on its experience since the facility was sold to Wheelabrator in 2010. In addition, some have expressed the opinion that a lower service fee might be possible; however, that is all speculation at this point.

- **Sale of Regional Landfill to Suffolk.** The NPV cost for Scenario F (Suffolk owns and operates the Regional Landfill) demonstrates that the facility could be operated by the City (or any other eastern member community) to provide a competitive disposal option. However, the cost to purchase the landfill from SPSA is not included in the NPV cost this scenario; the final NPV cost would have to be increased to incorporate this cost, which could be significant. Suffolk has no recent experience or staff capable of operating the landfill. New staff would have to be hired and systems put in place to manage the landfill.

- **Sale/Lease of Regional Landfill to Private Company.** The sale or lease of the Regional Landfill to a private company was not directly considered in this analysis; however, it is a potential option. The structure of such a sale/lease could vary widely depending on the companies responding, but the benefits could include an upfront payment, potential long-term host fees, and reduced long-term liability for the closure and post-closure of the facility.

- **Landfill Disposal Capacity.** The Regional Landfill and Virginia Beach Landfill No. 2 appear to have capacity to serve the Region's solid waste disposal needs during the planning period. However, each facility has various site constraints that could affect future expansion of these facilities. The Regional Landfill Cell 7 expansion has been approved; however, expansion into Cells 8/9 will require substantial wetlands permitting and site review, all of which is feasible and easier to do than siting a new landfill. The City of Virginia Beach has concluded it is technically feasible to expand its landfill beyond Phase 4 into Cells 2B and 3; however, it understands it will face difficulties in doing so.

6.1.2 Summary of Scenario Evaluations

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 43 presents a summary of the implementation steps for each scenario, the advantages, the relative complexity of implementing the scenarios, the relative environmental impact of each, the NPV cost ranking for each member community (lowest number being the lowest net NPV cost), and the advantages and disadvantages of each.

In summary, the following general conclusions are offered:

- Siting a new landfill in the Region is not critical at this juncture. The existing Regional Landfill has significant remaining capacity in Cells 6 and 7, and further expansion into Cell 8/9 appears to be more practical than siting a new landfill.

- Resource recovery through use of the existing Wheelabrator 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. Use of the facility will reduce the reliance on fossil fuels for energy generation through the use of solid waste as a renewable energy resource. With the improvements to the Wheelabrator facility and operations, there is little need to construct a new WTE facility in the Region, although the NPV analysis suggests that constructing a new WTE facility could be cost competitive with the status quo. 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 existing Regional Landfill and City of Virginia Beach Landfill are important assets for controlling the long term solid waste management costs for the member communities. The Regional Landfill operation scenario (Scenario C) establishes a potential benchmark for future long-term negotiations with Wheelabrator or other disposal options.

- For the eastern member communities (Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach) the pro forma modeling results suggest that the disposal of solid waste at an out-of-region landfill could result in slightly lower NPV costs; however, as noted above, the B Scenarios are highly dependent on fuel prices, which in recent years have been volatile. For the Western Communities, the scenario of owning their own transfer stations and contracting directly with an out-of-region landfill (WM Atlantic Waste Disposal Landfill) would appear to result in a higher NPV cost compared to the status quo (A.1). Disposing at an out-of-region landfill has a higher degree of uncertainty relative to future disposal tip fees and transportation costs compared to the other scenarios considered. With the availability of the Wheelabrator WTE Facility and the existing publically-owned landfills in the Region,

Table 43. Scenario A: Summary of Scenario Implementation Steps, Complexity of Implementation, Environmental Impacts, NPV Ranking, and Advantages/Disadvantages

Evaluation Factors	A.1	A.2	A.3
	All SPSA LF/TS/WTE	Eastern SPSA LF/TS/WTE	Eastern SPSA LF/WTE/Muni TS
Steps to Implement	1. Potentially redefine mission and services provided by SPSA. 2. If desired, reconfigure SPSA Board. 3. Develop new long-term agreements, including rate setting methodology, duration of agreements, etc. 4. Status quo on operations of landfill and transfer stations. 5. Begin long-term planning for full development of Regional LF. 6. Make improvements to Regional LF per conditional use permit. 7. Make decision on Wheelabrator extension by end of 2014 and/or negotiate terms for 2018 and beyond. 8. No change to regional solid waste management plan.	1. Redefine mission and services provided by SPSA. 2. Reconfigure SPSA Board. 3. Develop new long-term agreements, including rate setting methodology, duration of agreements, etc. 4. Status quo on operations of landfill and transfer stations. 5. Begin long-term planning for full development of Regional LF. 6. Make improvements to Regional LF per conditional use permit. 7. Make decision on Wheelabrator extension by end of 2014 and/or negotiate terms for 2018 and beyond. 8. No change to regional solid waste management plan. 9. Western communities, negotiate purchase of transfer stations by municipalities from SPSA. 10. Western communities, municipalities hire staff and set up systems to operate transfer stations.	1. Redefine mission and services provided by SPSA. 2. Reconfigure SPSA Board. 3. Develop new long-term agreement with SPSA for disposal of various waste streams and ash. 4. Develop inter-local agreements for sharing transfer stations. 5. Begin long-term planning for full development of Regional LF. 6. Make improvements to Regional LF per conditional use permit. 7. Negotiate purchase of transfer stations by municipalities from SPSA. 8. Municipalities hire staff and set up systems to operate transfer stations. 9. Notify Wheelabrator by the end of 2014 that its contract with SPSA will not be extended, and municipalities individually negotiate new agreements with Wheelabrator. 10. No change to Regional solid waste management plan, except ownership and operation of the transfer stations and disposal contract agreements.
Implementation Complexity	Low	Moderate	Moderate
Environmental Impact	No Change	No change to moderate (less waste being delivered to the WTE facility from the community member since Western communities would be disposing at an out-of-region landfill.)	Moderately Higher (some redundancy in equipment and materials likely due to individual operation of TS's by municipalities)
Ranking on NPV Costs			
Chesapeake	8	10	9
Franklin	1	2	2
Isle of Wight	1	2	2
Norfolk	6	7	8
Portsmouth	7	8	5
Southampton	1	2	2
Suffolk	6	11	10
Virginia Beach	9	11	12
Advantages	1. Existing systems in place to handle municipal and commercial waste. 2. Provides for Regional participation and cooperation in solid waste planning. 3. Negotiation position for future disposal rates improved because of economies of scale. 4. Seamless management of municipal waste flows in Region. 5. Maintains competitive alternative disposal options (i.e. Regional LF), which also further enhances disposal negotiations. 6. No new transfer stations needed (except if desired for logistical reasons). 7. Makes full use of existing the Regional LF asset. 8. Maximizes energy recovery through WTE facility. 9. Comparing Scenarios A (SPSA/WTE and SPSA/LF) to Scenario C demonstrates that their likely is room for significant negotiation of the service fee with Wheelabrator after 2018. 10. For Western communities, this is the scenario with the lowest NPV cost.	1. Existing systems in place to handle municipal and commercial waste. 2. Provides for Regional participation and cooperation in solid waste planning. 3. Negotiation position for future disposal rates improved because of economies of scale. 4. Seamless management of municipal waste flows in Region. 5. Maintains competitive alternative disposal options (i.e. Regional LF), which also further enhances disposal negotiations. 6. No new transfer stations needed (except if desired for logistical reasons). 7. Makes full use of existing the Regional LF asset. 8. Maximizes energy recovery through WTE facility for eastern communities. 9. Comparing Scenarios A (SPSA/WTE and SPSA/LF) to Scenario C demonstrates that their likely is room for significant negotiation of the service fee with Wheelabrator after 2018.	1. Increases flexiblity to respond to market changes. 2. Existing systems in place to handle municipal and commercial waste. 3. Increases autonomy of cities. 4. Maintains competitive alternative disposal options (i.e. Regional LF), which also further enhances disposal negotiations. 5. Generally, slightly lower NPV costs than A.1, although given the number of variables involved in the analysis, the NPV difference, which covers 30 years of projections may not be significant. 6. Makes full use of he existing SPSA Regional LF asset. 7. Maximizes energy recovery through WTE facility. 8. Comparing Scenarios A (SPSA/WTE and SPSA/LF) to Scenario C demonstrates that their likely is room for significant negotiation of the service fee with Wheelabrator after 2018.
Disadvantages	1. Less independence by SPSA members. 2. Possibly slower to respond to market changes, although recent history of SPSA shows reseponsiveness to market changes (e.g., landfill staffing and equipment utilization). 3. Significant capital investments needed for the full development of the Regional LF to address cell expansions and closure, plus roadway improvements. 4. Generally, not the lower NPV scenario, except for Western communities, which may suggest that the cost allocation methodolgy may need adjustment to more fairly allocate cost of services.	1. Less independence by SPSA members. 2. Possibly slower to respond to market changes, although recent history of SPSA shows reseponsiveness to market changes (e.g., landfill staffing and equipment utilization). 3. Inconclusive economic benefits from divesting transfer stations to municipalities given the number of variables involved in the analysis and the relative NPV difference between A.2 and A.3, which covers 30 years of projections. 4. Significant capital investments needed for the full development of the Regional LF to address cell expansions and closure, plus roadway improvements. 5. Generally, not the lower NPV scenario.	1. Somewhat reduces regional cooperation through separation of transfer and disposal operations. 2. SPSA members must take on capital requirements for transfer stations. 3. SPSA members must increase staffing and overhead support. 4. More complex inter-local agreements needed. 5. Less flexibility in managing waste flows in Region. 6. Individual agreements for disposal potentially required either with Wheelabrator or out of region landfill (most likely same company). 7. Inconclusive economic benefits from divesting transfer stations to municipalities given the number of variables involved in the analysis and the relative NPV difference between A.2 and A.3, which covers 30 years of projections 8. Significant capital investments needed for the full development of the Regional LF to address cell expansions and closure, plus roadway improvements. 9. Generally, not the lower NPV scenario.

Table 43. Scenario A: Summary of Scenario Implementation Steps, Complexity of Implementation, Environmental Impacts, NPV Ranking, and Advantages/Disadvantages

Evaluation Factors	Scenarios		
	B.1	B.2	B.3
	All to ORLF/SPSA LF Closed/SPSA TS	All to ORLF/Muni TS/SPSA LF Closed	VB to LF No. 2/All Others to ORLF/Muni TS/ SPSA LF Closed
Steps to Implement	1. Redefine mission and services provided by SPSA. 2. Reconfigure SPSA Board. 3. Develop new long-term agreements with SPSA. 4. Negotiate disposal agreements with private landfill companies. 5. Reconfigure SPSA for TS only operation. 6. Evaluate disposition of the Regional LF (e.g. sale/lease of LF assets, closure, etc.). 7. Private hauling companies would have to site, permit, and construct own transfer station network or haul directly to WTE or landfills in region. 8. Notify Wheelabrator by the end of 2014 that its contract with SPSA will not be extended. 9. Modify the Regional solid waste management plan to address changes to collection, transfer, recycling, and disposal.	1. Municipalities separately negotiate disposal agreements with private landfill companies. 2. Dissolve SPSA. 3. Evaluate disposition of the SPSA assets (e.g. sale/lease of LF and TS assets). 4. Develop interlocal agreements for inter-city use of transfer stations for contingency operations. 5. Negotiate purchase of transfer stations. 6. Municipalities to hire staff and set up systems to operate transfer stations. 7. Private hauling companies would have to site, permit, and construct own transfer station network or haul directly to WTE or landfills in region. 8. Notify Wheelabrator by the end of 2014 that its contract with SPSA will not be extended. 9. Modify the Regional solid waste management plan to address changes to collection, transfer, recycling, and disposal.	Same as B.2, plus: 1. Virginia Beach make improvements to VB No. 2 LF to permit future expansions and handle City's MSW.
Implementation Complexity	High	High	High
Environmental Impact	Higher (transport costs, fuel usage, greenhouse gas emission, increase dependence on fossil fuels, does not fully utilize existing disposal capacity)	Higher (transport costs, fuel usage, greenhouse gas emission, increase dependence on fossil fuels, does not fully utilize existing disposal capacity)	Higher (transport costs, fuel usage, greenhouse gas emission, increase dependence on fossil fuels, traffic issues)
Ranking on NPV Costs			
Chesapeake	6	5	5
Franklin	2	2	2
Isle of Wight	2	2	2
Norfolk	4	9	9
Portsmouth	6	4	4
Southampton	2	2	2
Suffolk	8	4	4
Virginia Beach	8	10	2
Advantages	1. If the SPSA Regional LF sold, revenue from sale could reduce disposal costs or fund long-term liabilities of landfill. 2. Provides for regional participation and cooperation in solid waste planning through transfer stations and SPSA continuation. 3. Reduced traffic and other environmental impacts to surrounding communities of the Regional LF (closed) and Virginia Beach LF No. 2 (open, but low rates of disposal).	1. Increases flexiblity to respond to market changes. 2. Increases autonomy of cities. 3. If LF sold, revenue from sale could reduce disposal costs depending (immediate cash and potential long-term). 4. Reduced traffic and other environmental impacts to surrounding communities of the Regional LF (closed) and Virginia Beach LF No. 2 (open, but low rates of disposal). 5. For Portsmouth, disposal at WTE facility is centrally located for convenient direct disposal.	1. Increases flexiblity to respond to market changes. 2. Increases autonomy of cities. 3. If LF sold, revenue from sale could reduce disposal costs depending (immediate cash and potential long-term). 4. For Portsmouth, disposal at WTE facility is centrally located for convenient direct disposal.
Disadvantages	1. If Regional LF closed, disposal competition reduced, which could result in increased disposal costs. If LF is sold, compeition, depending on who purchased it, could still provide for disposal compeition in Region. 2. Future cost highly dependent on fuel pricing. 3. Less control of future costs. 4. Significantly more traffic due to long-haul of waste to ORLF. 5. New private transfer stations likely to be siited to handle commercial waste. 6. Does not optimize use and investment in the Regional LF. 7. Does not optimize utilization of energy value of MSW. 8. Must manage sale of SPSA assets and establish systems for managing long-term liabilities (assuming landfill not sold). 9. Portsmouth would have to deliver waste to another municipalities transfer station.	Same as B.1.	Same as B.1, plus: 1. Increased traffic and other environmental impacts to surrounding communities of the Virginia Beach LF No. 2. Virginia Beach would need to manage an urban landfill and potentially make upgrades to reduce impacts to surrounding community (currently under consideration by City). 2. Available landfill airspace at the Virginia Beach LF No. 2 consumed at a quicker rate, requiring more frequent cell expansions and capital to construct new cells and periodic closures.

Table 43. Scenario A: Summary of Scenario Implementation Steps, Complexity of Implementation, Environmental Impacts, NPV Ranking, and Advantages/Disadvantages

Evaluation Factors	Scenarios		
	C.1	C.2	C.3
	SPSA LF/TS/Expand LF/WTE/No Ash	SPSA LF/TS/Expand LF/WTE Ash	SPSA LF/Muni TS/Expand LF/No Ash
Steps to Implement	1. Redefine mission and services provided by SPSA. 2. Reconfigure SPSA Board. 3. Develop new long-term agreements, including rate setting methodology, duration of agreement, etc. 4. Staff operations to handle higher volumes of uncombusted MSW. 5. Review and likely reduce staffing and equipment at transfer stations for a municipal-only waste operation. 5. Begin long-term planning for full development of Regional LF. 6. By the end of 2014, notify Wheelabrator that contract with SPSA will not be extended beyone 2018. 7. Change Regional solid waste management plan to describe changes to solid waste system. 8. Notify commercial haulers that only municipally collected waste will be handled at transfer stations. 9. Evaluate Suffolk host fee.	Same as C.1, plus: 1. Negotiate with Wheelabrator for the disposal of ash. .	Same as C.1, plus: 1. Develop interlocal agreements for inter-city use of transfer stations for contingency operations. 2. Negotiate purchase of transfer stations by municipalities from SPSA. 3. Municipalities hire staff and set up systems to operate transfer stations. 4. Private hauling companies would have to site, permit, and construct own transfer station network or haul directly to WTE or landfills in Region. .
Implementation Complexity	Low	Moderate	Low
Environmental Impact	Moderately Higher (increase dependence on fossil fuels, increased odor potential at LF, traffic issues)	Moderately Higher (increase dependence on fossil fuels, increased odor potential at LF, although slightly decreased with ash, traffic issues)	Moderately Higher (increase dependence on fossil fuels, increased odor potential at LF)
Ranking on NPV Costs			
Chesapeake	3	2	1
Franklin	2	2	2
Isle of Wight	2	2	2
Norfolk	2	1	3
Portsmouth	3	2	1
Southampton	2	2	2
Suffolk	3	1	2
Virginia Beach	4	3	5
Advantages	1. Existing systems in place to handle municipal waste. 2. Provides for regional participation and cooperation in solid waste planning. 3. Negotiation position for future disposal rates improved because of economies of scale. 4. Seamless management of municipal waste flows in region. 5. Maintains competitive alternative disposal options (i.e. Regional LF), which also further enhances future disposal negotiations. 6. No new transfer stations needed (except if desired for logistical reasons). 7. Makes full use of existing SPSA Regional LF asset. 8. Increases revenue potential from LFG because higher mass of organics being disposed in Regional LF compared to an operation that primarily disposes of incinerator ash. 9. Offset operational costs by accepting other waste streams for disposal. 10. C Scenarios generally among the lowest NPV cost for municipalities.	Same as C.1, plus: 1. Decrease in overall costs with acceptance of ash from WTE facility; however, it is uncertain whether Wheelabrator would dispose at Regional LF if Region does not bring its waste to the WTE Facility. 2. Acceptance of ash can reduce daily cover needs and costs at the landfill. 3. Lowest cost scenario for most municipalities; however, uncertainty mentioned in (1) should be considered.	Same as C.1, plus: 1. Increases flexiblity to respond to market changes. 2. Increases autonomy of cities.
Disadvantages	1. Available landfill airspace consumed at a quicker rate, requiring more frequent cell expansions and capital to construct new cells and periodic closures. 2. Higher disposal rate of MSW which could increase odor challenges at the landfill. 3. Does not optimize utilization of energy value of MSW. 4. Increased traffice at landfill from deliveries of MSW. 5. Significant capital investments needed for the full development of the Regional LF to address cell expansions and closure, plus roadway improvements.	Same as C.1. 1. Increased traffic at landfill from deliveries of ash and unprocessed MSW.	Same as C.1, plus: 1. Somewhat reduces regional cooperation through separation of transfer and disposal operations. 2. SPSA members must take on capital requirements for transfer stations. 3. SPSA members must increase staffing and overhead support. 4. More complex inter-local agreements needed. 5. Less flexibility in managing waste flows in Region. 6. Individual agreements for disposal potentially required either with Wheelabrator or out of region landfill (most likely same company).

Table 43. Scenario A: Summary of Scenario Implementation Steps, Complexity of Implementation, Environmental Impacts, NPV Ranking, and Advantages/Disadvantages

Evaluation Factors	Scenarios	
	D.1	D.2
	No LF/WTE/Muni TS/VB Ash	No LF/WTE/Muni TS/No VB Ash
Steps to Implement	1. Dissolve SPSA. 2. Evaluate disposition of SPSA assets (e.g., sale/lease of LF and TS assets). 3. Municipalities to hire staff and set up systems to operate transfer stations. 4. Municipalities negotiate rates for commercial hauling of waste to WTE facility. 5. Notify Wheelabrator that SPSA will not be extending its contract after 2018. 6. Individually negotiate disposal agreement with Wheelabrator. 7. Virginia Beach negotiate an ash disposal agreement with Wheelabrator. 8. Virginia Beach make improvements to VB No. 2 LF and permit future expansions and handle ash disposal and bypass waste. 9. Change Regional solid waste management plan to describe changes to solid waste system.	Same as D.1, except Virginia Beach would not need to negotiate an ash disposal agreement or make provision for handling the ash.
Implementation Complexity	High	High
Environmental Impact	Moderately Higher (some redundancy in equipment and materials likely due to individual operation of TS's by municipalities)	Moderately Higher (some redundancy in equipment and materials likely due to individual operation of TS's by municipalities)
Ranking on NPV Costs		
Chesapeake	4	4
Franklin	2	2
Isle of Wight	2	2
Norfolk	5	5
Portsmouth	4	4
Southampton	2	2
Suffolk	5	5
Virginia Beach	1	7
Advantages	1. Existing systems in place to handle municipal and commercial waste. 2. No new transfer stations needed (except if desired for logistical reasons). 3. Makes full use of existing City of VB LF No. 2, which reduces the City's solid waste management costs by offsetting revenues from disposal of ash. 4. Elimination of SPSA overhead expenses, although municipalities would incur increased overhead with TS and transfer operations. 5. No new transfer stations needed (except if desired for logistical reasons). 6. Maximizes energy recovery through WTE facility. 7. Reduced traffic and other environmental impacts to surrounding communities of the Regional LF (closed).	1. Same as D.1, except the City of Virginia Beach would not benefit from revenues from the disposal of ash. 3. Reduced traffic and other environmental impacts to surrounding communities of the Regional LF (closed) and Virginia Beach LF No. 2 (open, but low rates of disposal).
Disadvantages	1. Not as strong a negotiation position for controlling future disposal rates because 1) the Regional LF is not a factor, 2) municipalities would need to negotiate separately for disposal services (loss of economies of scale and market strenth). 2. Does not optimize use and investment in the Regional LF. 3. Increased traffic and other environmental impacts to surrounding communities of the Virginia Beach LF No. 2. Traffic increase would be similar to what occurred in 2010/2011. 4. The City would need to manage an urban landfill and potentially make upgrades to reduce impacts to surrounding community (currently under consideration by City) 5. Available landfill airspace at the Virginia Beach LF No. 2 consumed at a quicker rate, requiring more frequent cell expansions and capital to construct new cells and periodic closures.	Same as D.1, plus: 1. Increase in costs for the City of Virginia Beach solid waste operations, because ash would be handled directly by Wheelabrator.

Table 43. Scenario A: Summary of Scenario Implementation Steps, Complexity of Implementation, Environmental Impacts, NPV Ranking, and Advantages/Disadvantages

Evaluation Factors	Scenarios	
	E.1	E.2
	VB Only Waste/VB WTE/Others to Wheelabrator WTE/SPSA LF Closed	**VB WTE/ Others to VB WTE/ SPSA LF Closed**
Steps to Implement	1. Dissolve SPSA. 2. Evaluate disposition of SPSA assets (e.g., sale/lease of LF and TS assets). 3. Municipalities to hire staff and set up systems to operate transfer stations. 4. Municipalities negotiate rates for commercial hauling of waste to WTE facility. 5. Notify Wheelabrator that SPSA will not be extending its contract after 2018. 6. Chesapeake, Norfolk, Portsmouth, and Suffolk individually negotiate disposal agreement with Wheelabrator. 7. Virginia Beach sites, permits, finances, and constructs a new waste to energy facility to manage its municipal and commercial waste. 8. Virginia Beach makes improvements to VB No. 2 LF and permits future expansions to handle ash disposal and City's bypass waste. 9. Change Regional solid waste management plan to describe changes to solid waste system.	Same as E.1, plus: 1. Virginia Beach sites, permits, finances, and constructs a new waste to energy facility to manage Chesapeake, Norfolk, Suffolk, and Virginia Beach's municipal solid waste. Portsmouth and commercial waste would dispose at the Wheelabrator WTE facility. 2. Virginia Beach makes improvements to VB No. 2 LF and permits future expansions to handle ash disposal and bypass waste. 3. Develop interlocal agreements for inter-city use of transfer stations for contingency operations. 3. Negotiate purchase of transfer stations by municipalities from SPSA. 4. Municipalities hire staff and set up systems to operate transfer stations. 5. Private hauling companies to site, permit, and construct own transfer station network or haul directly to WTE or landfills in Region. 6. Change Regional solid waste management plan to describe changes to solid waste system.
Implementation Complexity	High	High
Environmental Impact	Moderate (significant new construction, new significant air pllution source, but utilizes a renewable energy source)	Moderate (significant new construction, new significant air pllution source, but utilizes a renewable energy source)
Ranking on NPV Costs		
Chesapeake	4	7
Franklin	2	2
Isle of Wight	2	2
Norfolk	5	11
Portsmouth	4	4
Southampton	2	2
Suffolk	5	7
Virginia Beach	14	6
Advantages	1. Maximizes utilization of WTE in the region. 2. Virginia Beach would be self-sufficient. 3. Possible synergies with energy utilization from the new WTE facility by CBN.	Same as E.1
Disadvantages	1. Requires extensive siting, permitting efforts for a new WTE facility. 2. Capital intensive. 3. Redundant WTE facility capacity in Region. Wheelabrator would likely have to ship in out-of-region waste to support its WTE facility. 4. Uncertainty in permitting and costs. 5. One of more expensive alternatives.	1. Same as E.1 1. Larger and more capital intensive facility. 2. New disposal agreements would be required between the City and the other municipalilties, similar to those that were required for the formation of SPSA. 3. Pressure on Wheelabrator to ship in out-of-region waste would increase because of diversion of more municipal waste.

Table 43. Scenario A: Summary of Scenario Implementation Steps, Complexity of Implementation, Environmental Impacts, NPV Ranking, and Advantages/Disadvantages

Evaluation Factors	Scenarios	
	F.1	G.1
	Suffolk Ops LF/Other WTE	**Portsmouth to WTE Not Part of SPSA**
Steps to Implement	1. Negotiate sale of Regional LF to Suffolk. 2. Suffolk secure necessary financing for purchase and future expansions. 3. Make improvements to Regional LF per conditional use permit.	Same as A.1, plus: 1. Portsmouth to separately negotiate disposal agreement with Wheelabrator.
Implementation Complexity	High	Low
Environmental Impact	Low	No Change
Ranking on NPV Costs		
Chesapeake	4	11
Franklin	2	2
Isle of Wight	2	2
Norfolk	5	10
Portsmouth	4	4
Southampton	2	2
Suffolk	9	12
Virginia Beach	7	13
Advantages	1. Suffolk would have long-term disposal capacity for municipal and commercial waste. 2. Comparable to NPV costs for WTE energy scenarios.	1. Portsmouth can dispose of its municipally collected waste at a potentially lower cost by direct disposal at the WTE facility independent of SPSA.
Disadvantages	1. Suffolk would assume long-term liabilities of landfill. 2. Suffolk would likely have to finance the purchase of the landfill as well other significnat capital needs for roadway improvements, cell expansions, and closures. 3. Solid waste disposal operational budget would increase. 4. Not the lowest cost scenario for Suffolk.	Same as A.1, plus: 1. Increased $/ton cost to municipalities because of reduced overall tonnage to system because Portsmouth would dispose directly at the WTE Facility and not be a part of SPSA.

reliance on an out-of-region disposal facility likely is not needed in the immediate future, but it is an available option.

- Substantial cost savings can be realized if either SPSA or the City of Virginia Beach are able to negotiate an ash disposal agreement with Wheelabrator (Scenarios A.1, A.2, A.3, C. 2, and D.1).

- Preliminary analysis suggests that operating the SPSA network as currently configured would be more cost effective than the municipalities owning and operating them; however, additional review with SPSA and the member communities is required to more fully review the key cost allocation assumptions made by SCS. SCS's review of the transfer station operations did not identify inefficiencies in SPSA's staffing or equipment assignments. The analysis suggests that some of the overhead, maintenance, and support functions currently provided separately by SPSA could be absorbed by the member communities at no major additional cost. Divesting the transfer stations would complicate the management or the transfer stations and transfers operations since many of the communities routinely use the transfer stations located outside of their immediate jurisdictions (e.g., Portsmouth may use Norfolk's, Virginia Beach may use Chesapeake's, etc.) without complication. Separate arrangements would need to be made for inter-jurisdictional use of these facilities.

6.1.3 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 both 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, 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.

6.1.4 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 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.

6.1.5 Yard Waste

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 or transported to McGill Environmental Systems for processing. The McGill facility is located near Waste Management's Atlantic Waste Disposal Landfill located in Waverly, Virginia. The facility processes and composts yard waste and other organic wastes. 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).

6.1.6 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 if 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 a new landfill is unable to be sited in the Region when needed, rail haul could 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.

6.1.7 Regional Management of Solid Waste

For the South Hampton Roads area, the HRPDC currently serves as the regional agency responsible for developing the regional solid waste management plan for the eight participating cities and counties. 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.

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 when needed.
  - 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 operation of the Regional Landfill. This significant cost-control advantage would be lost if the Region does not cooperate. Retaining the ability to cost-effectively operate the Regional Landfill would be a 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), and the services requested by its members (e.g., collection, recycling, yard waste, household hazardous wastes).

Future cooperation of the Region's members (either all eight communities or a subset of the eight) 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. However, many of the member communities have moved forward with providing recycling, yard waste, and household hazardous waste services in the absence of a reliable regional approach, and returning to a regional approach may be difficult in light of past experiences within the Region.

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 Regional Landfill Facility in the event that contracted disposal costs become too high.

6.2.2 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.

6.2.3 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 considered 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 will not be acceptable to their communities on a going forward basis after 2018, although the changes to the SPSA Board have alleviated these concerns somewhat. 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 be a combination of individuals with specific qualifications or expertise in business, engineering, environmental, legal, finance, construction, or solid waste disciplines. The current board has many of these characteristics and is functioning to provide critical review of business and technical matters to allow for the independent governance 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.

- **Facility and System Ownership.** If all members of the Region decide to cooperate beyond 2018, consideration should be given to possibly 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.

6.2.4 Utilization of Existing Facilities

The Region, through SPSA, has substantial capital invested in the 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. Keeping the Regional Landfill under SPSA's ownership and operation provides the Region significant market control regarding future disposal rates, regardless of whether it elects to dispose at the Wheelabrator WTE Facility or another out-of-region landfill.

SCS does not recommend the Regional Landfill be sold to one of the member communities, unless the Region decides to no longer operate the landfill through SPSA.

6.2.5 Host Fee

If SPSA continues to operate the Regional Landfill, consideration should be given paying the City of Suffolk a host fee for waste disposed at the Landfill, which should be established in a new use and support agreement with the City. A "host fee" provides recognition of the impacts that a landfill 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. The analysis presented in Section 5.0 includes a $1/ton host fee in the future cost projections.

6.2.6 Yard Waste Management

From a policy perspective, SCS recommends that a regional facility be sited and constructed to serve the Region as soon as possible. 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. The Regional Landfill is the most logical location for such a facility in order to reduce transportation costs which are now being incurred by some of the member communities that transport their yard waste to the McGill Environmental Services facility in Waverly, Virginia. The facility could be owned and operated by SPSA, or owned by SPSA and operated by a contractor. Alternatively, SPSA could issue an request for proposal for private companies to develop, permit, construct, and operate a new yard waste facility to serve the SPSA members.

6.2.7 Recycling

The Region currently exceeds the 25 percent recycling rate mandated by the State through its existing programs and programs implemented by the private sector. The HRPDC has taken responsibility for collecting recycling data within the Region and reporting to the State. It is expected that the HRPDC will retain this responsibility even 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.

6.2.8 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. Alternatively, the system tip fee structure could be modified to more accurately reflect the cost of service to each of the member communities. Such an approach would result in a tiered tip fee structure, with each community paying somewhat different rates depending on the services provided.

We understand that a special assessment has been considered in the past by the Region, but that a consensus agreement implementing a special assessment 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.

6.2.9 Implementation Schedule

The basic implementation steps for the various scenarios considered in this report are presented in Table 43. Table 44 presents important schedule milestones for the Region to consider. The two key dates are the deadline for extending the Wheelabrator service agreement (December 31, 2014) and the expiration of the use and support agreements with SPSA (January 24, 2018). The implementation steps vary depending on the scenario selected. The SPSA member communities need to make a decision regarding their future relationship with SPSA sooner (i.e., before the December 31, 2014), rather later so that SPSA can decide how it will manage itself between now

and 2018 and beyond, and the local communities can take the steps needed to secure appropriate transfer and disposal services.

Table 44. Implementation Schedule

Task	Dates	Comments
Deliberations by member communities on whether to pursue a cooperative approach	October 2011-December 31, 2014	The sooner this decision is made the better with respect to SPSA staff retention and the viability of SPSA operations between now and 2018.
Negotiate with Wheelabrator on terms and conditions for extending contract.	January 2012-November 2014	This would allow issues that have arisen during the initial term of the contract to be addressed; however, the financial terms would likely be different (either higher or lower) depending on market conditions.
Option: SPSA decision on extending service agreement with Wheelabrator: December 31, 2014	December 31, 2014	
Option: SPSA Continues Operating the Transfer Station and/or Landfill:	January 2018	
Negotiate new use and support agreements between SPSA and member communities.	January 2014 – August 2017	
Member Board actions on new use and support agreements	September – December 2017	
Option: Member Communities Own and Operate and Transfer Stations	January 2018	
Establish legal basis for sale of assets.	January 2011 – December 2014	
Negotiate sale price	January 2015 – December 2016	
Effect sale and facilities and equipment	January 2017 – December 2017	
Hire staff and train staff, and establish operation and maintenance systems	July – December 2017	
Establish inter-local agreements	January 2017 – December 2017	
Establish rates	January 2018	

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Appendix A

Scenario Descriptions and Pro Forma Model Output Results

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	A.1	Status Quo, Wheelabrator Disposal, All Communities in SPSA

All current SPSA communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, ash is disposed at the Regional LF at tip fee, **SPSA maintains LF and transfer station network,** VB keeps its landfill open for its purposes.

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	Yes	No	No	No	No	No	No	Yes	No	
Franklin	Yes	No	No	No	No	No	No	Yes	No	
Isle of Wight	Yes	No	No	No	No	No	No	Yes	No	
Norfolk	Yes	No	No	No	No	No	No	Yes	No	
Portsmouth	Yes	No	No	No	No	No	No	Yes	No	
Southampton County	Yes	No	No	No	No	No	No	Yes	No	
Virginia Beach	Yes	No	No	No	No	No	No	Yes	No	
Suffolk	Yes	No	No	No	No	No	No	Yes	No	Yes
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No			
Navy Processible Solid Waste	Yes	No	No	No	No	No	No			
Construction & Demolition Debris	No	Yes	No	No	No	No	No			
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No			
Sludge-Norfolk	No	Yes	No	No	No	No	No			
Other Waste	No	Yes	No	No	No	No	No			
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No			
Wheelabrator WTE Ash	No	Yes	No	No	No	No	No			
New VB WTE Ash	No	No	No	No	No	No	No			
Non-Processibles	Yes	No	No	No	No	No	No			
Contract Haul?								Yes/No	Yes	
Regional LF Roadway Improvements?		Yes								
Expand Cell 7		Yes								
Expand Cell 8/9		Yes								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	A.2	Eastern Communities SPSA, Wheelabrator Disposal, Western Communities No Longer in SPSA

Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, western communities dispose municipally collected waste at WM's Waverly LF, ash is disposed at the Regional LF at tip fee, **SPSA maintains LF and transfer station network,** VB keeps its landfill open for its purposes.

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	Yes	No	No	No	No	No	No	Yes	No	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	Yes	No	No	No	No	No	No	Yes	No	
Portsmouth	Yes	No	No	No	No	No	No	Yes	No	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	Yes	No	No	No	No	No	No	Yes	No	
Suffolk	Yes	No	No	No	No	No	No	Yes	No	Yes
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No			
Navy Processible Solid Waste	Yes	No	No	No	No	No	No			
Construction & Demolition Debris	No	Yes	No	No	No	No	No			
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No			
Sludge-Norfolk	No	Yes	No	No	No	No	No			
Other Waste	No	Yes	No	No	No	No	No			
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No			
Wheelabrator WTE Ash	No	Yes	No	No	No	No	No			
New VB WTE Ash	No	No	No	No	No	No	No			
Non-Processibles	Yes	No	No	No	No	No	No			
Contract Haul?								Yes/No	Yes	
Regional LF Roadway Improvements?		Yes								
Expand Cell 7		Yes								
Expand Cell 8/9		Yes								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	A.3	Eastern Communities SPSA, Muni TS Ops, Wheelabrator Disposal, Western Communities No Longer in SPSA
		Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, western communities dispose at WM's Waverly LF, ash to Regional LF at tip fee, SPSA maintains Regional LF and **transfer station network conveyed to members**, VB keeps its landfill open for its purposes.

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	Yes	No	No	No	No	No	No	No	Yes	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	Yes	No	No	No	No	No	No	No	Yes	
Portsmouth	Yes	No	No	No	No	No	No	No	Yes	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	Yes	No	No	No	No	No	No	No	Yes	
Suffolk	Yes	No	No	No	No	No	No	No	Yes	Yes
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No			
Navy Processible Solid Waste	Yes	No	No	No	No	No	No			
Construction & Demolition Debris	No	Yes	No	No	No	No	No			
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No			
Sludge-Norfolk	No	Yes	No	No	No	No	No			
Other Waste	No	Yes	No	No	No	No	No			
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No			
WTE Ash	No	Yes	No	No	No	No	No			
New VB WTE Ash	No	No	No	No	No	No	No			
Non-Processibles	Yes	No	No	No	No	No	No			
Contract Haul?									Yes	
Regional LF Roadway Improvements?		Yes								
Expand Cell 7		Yes								
Expand Cell 8/9		Yes								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	B.1	Out of Region LF Disposal, SPSA TS Ops, Western Communities No Longer in SPSA

Eastern and western communities municipal waste disposed at out of region landfill (ORLF), **Wheelabrator is responsible for ash disposal** at its own internal facilities, **Regional LF closed/sold, SPSA maintains transfer station network,** VB keeps its landfill open for its purposes, commercial haulers develop private transfer stations for commercial waste.

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	No	No	No	No	Yes	No	No	Yes	No	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	No	No	No	No	Yes	No	No	Yes	No	
Portsmouth	No	No	No	No	Yes	No	No	Yes	No	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	No	No	No	No	Yes	No	No	Yes	No	
Suffolk	No	No	No	No	Yes	No	No	Yes	No	No
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Navy Processible Solid Waste	Yes	No	No	No	No	No	No	No		
Construction & Demolition Debris	No	No	No	No	No	No	No	No		
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Sludge-Norfolk	No	No	No	No	Yes	No	No	No		
Other Waste	No	No	No	No	Yes	No	No	No		
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No	No		
WTE Ash	Yes	No	No	No	No	No	No	No		
New VB WTE Ash	No	No	No	No	No	No	No	No		
Non-Processibles	No	No	No	No	Yes	No	No	No		
Contract Haul?								Yes/No	Yes	
Regional LF Roadway Improvements?		No								
Expand Cell 7		No								
Expand Cell 8/9		No								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	B.2	Out of Region LF Disposal, Muni TS Ops, Western Communities, No SPSA

Chesapeake, Norfolk, Suffolk, and Virginia Beach municipal waste disposed at an ORLF, **Portsmouth municipal and commercial waste disposed at the Wheelabrator WTE Facility**, western communities dispose of its municipally collected waste at WM's Waverly LF, **Wheelabrator is responsible for ash disposal at its own internal facilities,** the eastern and western communities own and operate their own transfer stations, Regional LF closed, VB keeps its landfill open for its purposes, commercial haulers develop private transfer stations for commercial waste.

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	No	No	No	No	Yes	No	No	No	Yes	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	No	No	No	No	Yes	No	No	No	Yes	
Portsmouth	Yes	No	No	No	No	No	No	No	No	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	No	No	No	No	Yes	No	No	No	Yes	
Suffolk	No	No	No	No	Yes	No	No	No	Yes	No
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Navy Processible Solid Waste	Yes	No	No	No	No	No	No	No		
Construction & Demolition Debris	No	No	No	No	No	No	No	No		
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Sludge-Norfolk	No	No	No	No	Yes	No	No	No		
Other Waste	No	No	No	No	Yes	No	No	No		
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No	No		
WTE Ash	Yes	No	No	No	No	No	No	No		
New VB WTE Ash	No	No	No	No	No	No	No	No		
Non-Processibles	No	No	No	No	Yes	No	No	No		
Contract Haul?										
Regional LF Roadway Improvements?		No								
Expand Cell 7		No								
Expand Cell 8/9		No								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	B.3	Out of Region LF Disposal, Muni TS Ops, Western Communities, No SPSA, VB to VB LF No. 2

Chesapeake, Norfolk and Suffolk municipal waste disposed at an ORLF, **Portsmouth municipal and commercial waste disposed at the Wheelabrator WTE Facility, Virginia Beach municipal solid waste disposed at the VB Landfill No. 2,** western communities dispose of municipally collected waste at WM's Waverly LF, and the communities own and operate the transfer stations, commercial haulers develop private transfer stations for commercial waste.

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	No	No	No	No	Yes	No	No	No	Yes	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	No	No	No	No	Yes	No	No	No	Yes	
Portsmouth	Yes	No	No	No	No	No	No	No	No	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	No	No	Yes	No	Yes	No	No	No	Yes	
Suffolk	No	No	No	No	Yes	No	No	No	Yes	No
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Navy Processible Solid Waste	Yes	No	No	No	No	No	No	No		
Construction & Demolition Debris	No	No	No	No	No	No	No	No		
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Sludge-Norfolk	No	No	No	No	Yes	No	No	No		
Other Waste	No	No	No	No	Yes	No	No	No		
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No	No		
WTE Ash	Yes	No	No	No	No	No	No	No		
New VB WTE Ash	No	No	No	No	No	No	No	No		
Non-Processibles	No	No	No	No	Yes	No	No	No		
Contract Haul?										
Regional LF Roadway Improvements?		No								
Expand Cell 7		No								
Expand Cell 8/9		No								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	C.1	SPSA Regional LF Alternative, Western Communities No Longer in SPSA
		Eastern communities municipal waste disposed at the Regional LF until capacity depleted, Regional LF expanded through Cell 8/9, after which waste would be disposed at Wheelabrator or an ORLF, western communities municipally collected waste disposed at WM's Waverly LF, commercial haulers develop private transfer stations for commercial waste. Wheelabrator handles disposal of ash. **SPSA operates LF & TSs.**

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	No	Yes	No	No	No/Yes	No	No	Yes	No	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	No	Yes	No	No	No/Yes	No	No	Yes	No	
Portsmouth	No	Yes	No	No	No/Yes	No	No	Yes	No	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	No	Yes	No	No	No/Yes	No	No	Yes	No	
Suffolk	No	Yes	No	No	No/Yes	No	No	Yes	No	Yes
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No			
Navy Processible Solid Waste	Yes	No	No	No	No	No	No			
Construction & Demolition Debris	No	Yes	No	No	No	No	No			
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No			
Sludge-Norfolk	No	Yes	No	No	No	No	No			
Other Waste	No	Yes	No	No	No	No	No			
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No			
WTE Ash	Yes	No	No	No	No	No	No			
New VB WTE Ash	No	No	No	No	No	No	No			
Non-Processibles	No	Yes	No	No	No	No	No			
Contract Haul?								Yes/No	Yes	
Regional LF Roadway Improvements?		Yes								
Expand Cell 7		Yes								
Expand Cell 8/9		Yes								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	C.2	SPSA Regional LF and TS Alternative, Western Communities No Longer in SPSA, WTE Ash to Regional LF
		Eastern communities municipally collected waste disposed at the Regional LF until capacity depleted, the Regional LF is expanded through Cell 8/9, after which waste would be disposed at Wheelabrator or out of region landfill (ORLF), western communities deliver waste to WM's Waverly LF, commercial haulers develop private transfer stations for commercial waste, **Wheelabrator delivers ash to Regional LF** while open. **SPSA operates LF and TSs.**

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	No	Yes	No	No	No/Yes	No	No	Yes	No	No
Franklin	No	No	No	No	Yes	No	No	No	Yes	No
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	No
Norfolk	No	Yes	No	No	No/Yes	No	No	Yes	No	No
Portsmouth	No	Yes	No	No	No/Yes	No	No	Yes	No	No
Southampton County	No	No	No	No	Yes	No	No	No	Yes	No
Virginia Beach	No	Yes	No	No	No/Yes	No	No	Yes	No	No
Suffolk	No	Yes	No	No	No/Yes	No	No	Yes	No	Yes
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Navy Processible Solid Waste	Yes	No	No	No	No	No	No	No		
Construction & Demolition Debris	No	Yes	No	No	No	No	No	No		
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Sludge-Norfolk	No	Yes	No	No	No	No	No	No		
Other Waste	No	Yes	No	No	No	No	No	No		
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No	No		
WTE Ash	No/Yes	Yes	No	No	No	No	No	No		
New VB WTE Ash	No	No	No	No	No	No	No			
Non-Processibles	No	Yes	No	No	No	No	No	No		
Contract Haul?								Yes/No	Yes	
Regional LF Roadway Improvements?		Yes								
Expand Cell 7		Yes								
Expand Cell 8/9		Yes								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	C.3	SPSA Regional LF Alternative, Western Communities No Longer in SPSA, WTE Ash to Regional LF, Muni TS Ops
		Eastern communities municipally collected waste disposed at the Regional LF until capacity depleted, the Regional LF is expanded through Cell 8/9, after which waste would be disposed at Wheelabrator or an ORLF, western communities deliver waste to WM's Waverly LF, commercial haulers develop private transfer stations for commercial waste, **Wheelabrator manages disposal of ash at its own facilities. The eastern and western member communities own and operate the TSs.**

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	No	Yes	No	No	No/Yes	No	No	No	Yes	No
Franklin	No	No	No	No	Yes	No	No	No	Yes	No
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	No
Norfolk	No	Yes	No	No	No/Yes	No	No	No	Yes	No
Portsmouth	No	Yes	No	No	No/Yes	No	No	No	Yes	No
Southampton County	No	No	No	No	Yes	No	No	No	Yes	No
Virginia Beach	No	Yes	No	No	No/Yes	No	No	No	Yes	No
Suffolk	No	Yes	No	No	No/Yes	No	No	No	Yes	Yes
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Navy Processible Solid Waste	Yes	No	No	No	No	No	No	No		
Construction & Demolition Debris	No	Yes	No	No	No	No	No	No		
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Sludge-Norfolk	No	Yes	No	No	No	No	No	No		
Other Waste	No	Yes	No	No	No	No	No	No		
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No	No		
WTE Ash	Yes	No	No	No	No	No	No	No		
New VB WTE Ash	No	No	No	No	No	No	No	No		
Non-Processibles	No	Yes	No	No	No	No	No	No		
Contract Haul?								Yes/No	Yes	
Regional LF Roadway Improvements?		Yes								
Expand Cell 7		Yes								
Expand Cell 8/9		Yes								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	D.1	Wheelabrator, Municipal Owned Transfer Network, **Ash to VB LF**

Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, **ash residue delivered to Virginia Beach LF**, VB gets tip fees for ash, communities own and operate the transfer network, **Regional LF closed**, western communities deliver waste to WM's Waverly LF.

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	Yes	No	No	No	No	No	No	No	Yes	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	Yes	No	No	No	No	No	No	No	Yes	
Portsmouth	Yes	No	No	No	No	No	No	No	Yes	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	Yes	No	No	No	No	No	No	No	Yes	
Suffolk	Yes	No	No	No	No	No	No	No	Yes	No
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Navy Processible Solid Waste	Yes	No	No	No	No	No	No	No		
Construction & Demolition Debris	No	No	No	No	No	Yes	No	No		
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Sludge-Norfolk	No	No	No	No	Yes	No	No	No		
Other Waste	No	No	No	No	Yes	No	No	No		
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No	No		
WTE Ash	No	No	Yes	No	No	No	No	No		
New VB WTE Ash	No	No	No	No	No	No	No	No		
Non-Processibles	Yes	No	No	No	No	No	No	No		
Contract Haul?									Yes/No	
Regional LF Roadway Improvements?		No								
Expand Cell 7		No								
Expand Cell 8/9		No								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	D.2	Wheelabrator, Municipal Owned Transfer Network, **Ash to Wheelabrator Facility**

Eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Facility, **ash residue to other WM internal facilities**, communities own and operate transfer network, Regional LF closed, western communities deliver municipally collected waste to WM's Waverly LF, Virginia Beach maintains its landfill for own purposes.

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	Yes	No	No	No	No	No	No	No	Yes	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	Yes	No	No	No	No	No	No	No	Yes	
Portsmouth	Yes	No	No	No	No	No	No	No	Yes	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	Yes	No	No	No	No	No	No	No	Yes	
Suffolk	Yes	No	No	No	No	No	No	No	Yes	No
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Navy Processible Solid Waste	Yes	No	No	No	No	No	No	No		
Construction & Demolition Debris	No	No	No	No	No	Yes	No	No		
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Sludge-Norfolk	No	No	No	No	Yes	No	No	No		
Other Waste	No	No	No	No	Yes	No	No	No		
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No	No		
WTE Ash	Yes	No	No	No	No	No		No		
New VB WTE Ash	No	No	No	No	No		No	No		
Non-Processibles	Yes	No	No	No	No	No		No		
Contract Haul?									Yes/No	
Regional LF Roadway Improvements?		No								
Expand Cell 7		No								
Expand Cell 8/9		No								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	E.1	Virginia Beach Alternative, VB Waste Only, New VB WTE, No SPSA

Virginia Beach goes own way, constructs a new WTE facility, other eastern communities municipal and commercial waste disposed at the Wheelabrator WTE Faciltiy, ash residue to other Wheelabrator internal facilities, communities own and operate transfer network, Regional LF closed/sold, western communities deliver municipally collected waste to WM's Waverly LF.

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	Yes	No	No	No	No	No	No	No	Yes	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	Yes	No	No	No	No	No	No	No	Yes	
Portsmouth	Yes	No	No	No	No	No	No	No	Yes	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	No	No	Yes	Yes	No	No	No	No	Yes	
Suffolk	Yes	No	No	No	No	No	No	No	Yes	No
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No			
Navy Processible Solid Waste	Yes	No	No	No	No	No	No			
Construction & Demolition Debris	No	No	No	No	No	Yes	No			
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No			
Sludge-Norfolk	No	No	Yes	No	No	No	No			
Other Waste	No	No	Yes	No	No	No	No			
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No			
WTE Ash	Yes	No	No	No	No	No	No			
New VB WTE Ash	No	No	Yes	No	No	No	No			
Non-Processibles	Yes	No	No	No	No	No	No			
Contract Haul?									Yes/No	
Regional LF Roadway Improvements?		No								
Expand Cell 7		No								
Expand Cell 8/9		No								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	E.2	Virginia Beach Alternative, Eastern Waste, with New VB WTE

Virginia Beach develops a new WTE Facility, Chesapeake, Norfolk, Virginia Beach, and Suffolk go to new VB WTE Facility, ash from new facility delivered to VB LF, Portsmouth goes to Wheelabrator, ash residue from Wheelabrator disposed at another Wheelabrator internal facility, communities own and operate transfer network, Regional LF closed, western communities deliver waste to WM's Waverly LF.

	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	No	No	No	Yes	No	No	No	No	Yes	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	No	No	No	No	Yes	
Norfolk	No	No	No	Yes	No	No	No	No	Yes	
Portsmouth	No	No	No	Yes	No	No	No	No	Yes	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	No	No	Yes	Yes	No	No	No	No	Yes	
Suffolk	No	No	No	Yes	No	No	No	No	Yes	No
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Navy Processible Solid Waste	Yes	No	No	No	No	No	No	No		
Construction & Demolition Debris	No	No	No	No	No	Yes	No	No		
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No	No		
Sludge-Norfolk	No	No	Yes	No	No	No	No	No		
Other Waste	No	No	Yes	No	No	No	No	No		
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No	No		
WTE Ash	Yes	No	No	No	No	No	No	No		
New VB WTE Ash	No	No	Yes	No	No	No	No	No		
Non-Processibles	Yes	No	No	No	No	No	No	No		
Contract Haul?									Yes/No	
Regional LF Roadway Improvements?		No								
Expand Cell 7		Yes								
Expand Cell 8/9		Yes								

Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	F	**Suffolk Owns** and Operates Regional LF

Suffolk takes over Regional LF for its own waste, remaining eastern communities go to Wheelabrator, ash delivered to Wheelabrator/WM LF, communities own and operate transfer network, western communities deliver waste to WM's Waverly LF.

	Disposal Option									
Waste Stream	**Wheelabrator**	**SuffolK LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	Yes	No	No	No	No	No	No	No	Yes	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	Yes	No	No	No	No	No	No	No	Yes	
Portsmouth	Yes	No	No	No	No	No	No	No	No	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	Yes	No	No	No	No	No	No	No	Yes	
Suffolk	Yes	Yes	No	No	No	No	No	No	Yes	No
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No			
Navy Processible Solid Waste	Yes	No	No	No	No	No	No			
Construction & Demolition Debris	No	Yes	No	No	No	No	No			
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No			
Sludge-Norfolk	No	Yes	No	No	No	No	No			
Other Waste	No	Yes	No	No	No	No	No			
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No			
WTE Ash	No	No	No	No	No	No	No			
Non-Processibles	Yes	No	No	No	No	No	No			
Contract Haul?									Yes/No	
Regional LF Roadway Improvements?		Yes								
Expand Cell 7		Yes								
Expand Cell 8/9		Yes								

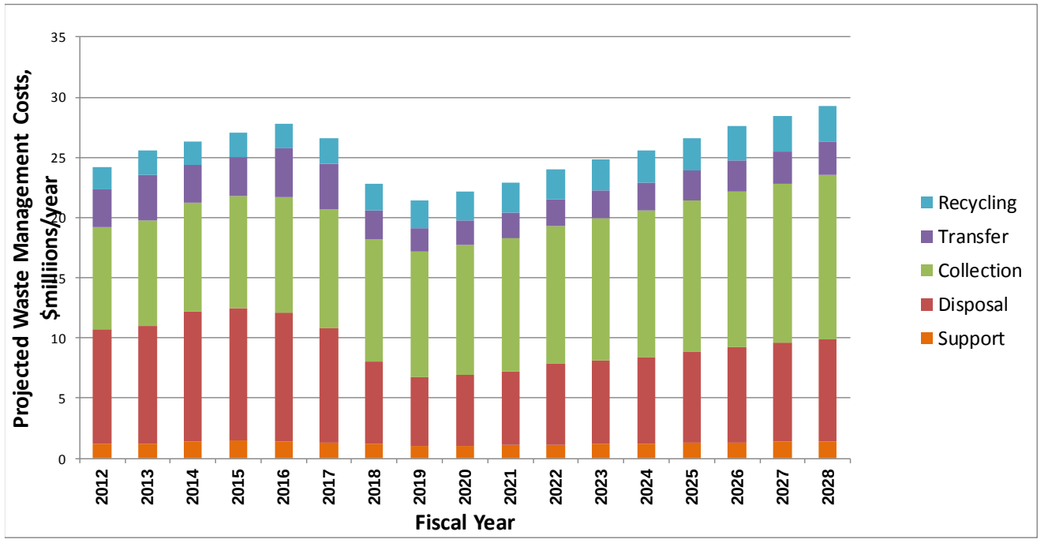
Exhibit A-1. Summary of Scenario Input Assumptions

Scenario	G.1
	Similar to Scenario A.1, except that Portsmouth is not part of SPSA, but disposes its municipally collected waste directly at Wheelabrator.

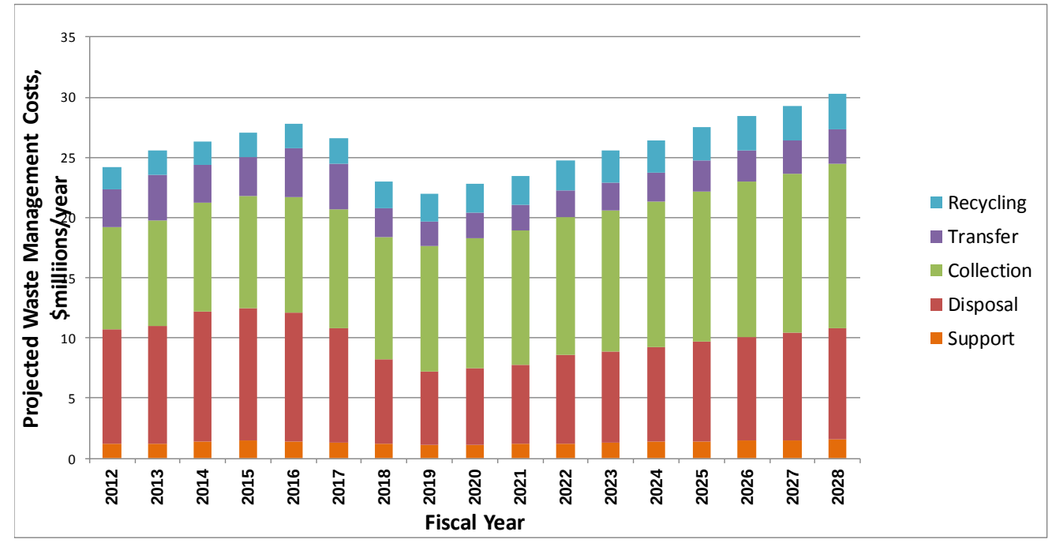
	Disposal Option									
Waste Stream	**Wheelabrator**	**Regional LF**	**VB LF**	**New WTE**	**ORLF**	**C&D LF**	**New LF**	**SPSA TS**	**Muni TS**	**Host Fee**
Municipal Waste Stream										
Chesapeake	Yes	No	No	No	No	No	No	Yes	No	
Franklin	No	No	No	No	Yes	No	No	No	Yes	
Isle of Wight	No	No	No	No	Yes	No	No	No	Yes	
Norfolk	Yes	No	No	No	No	No	No	Yes	No	
Portsmouth	Yes	No	No	No	No	No	No	No	No	
Southampton County	No	No	No	No	Yes	No	No	No	Yes	
Virginia Beach	Yes	No	No	No	No	No	No	Yes	No	
Suffolk	Yes	No	No	No	No	No	No	Yes	No	Yes
Non-Municipal Waste										
Non-Contract Commercial Waste	Yes	No	No	No	No	No	No			
Navy Processible Solid Waste	Yes	No	No	No	No	No	No			
Construction & Demolition Debris	No	Yes	No	No	No	No	No			
Out-of-Area Contract Commercial Waste	Yes	No	No	No	No	No	No			
Sludge-Norfolk	No	Yes	No	No	No	No	No			
Other Waste	No	Yes	No	No	No	No	No			
Contract Commercial Tipping Fees	Yes	No	No	No	No	No	No			
Wheelabrator WTE Ash	No	Yes	No	No	No	No	No			
New VB WTE Ash	No	No	No	No	No	No	No			
Non-Processibles	Yes	No	No	No	No	No	No			
Contract Haul?								Yes/No	Yes	
Regional LF Roadway Improvements?		Yes								
Expand Cell 7		Yes								
Expand Cell 8/9		Yes								

Exhibit A-2. Chesapeake, Projected Solid Waste Management Costs (2012 – 2028)

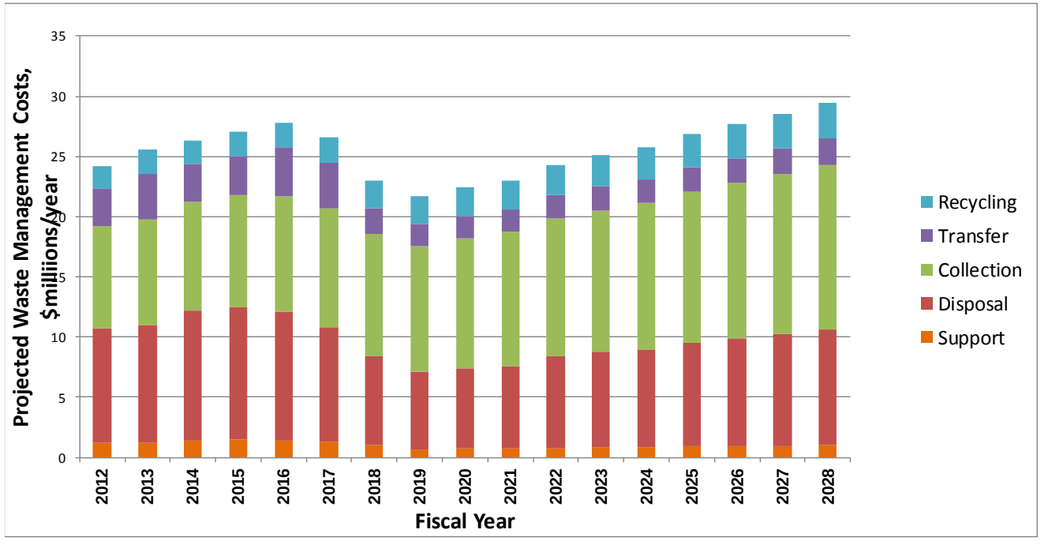
Scenario A.1 - All SPSA LF/ TS/WTE
Municipality: Chesapeake



Scenario A.2 - Eastern SPSA LF/ TS/WTE
Municipality: Chesapeake



Scenario A.3 - Eastern SPSA LF/WTE/ Muni TS
Municipality: Chesapeake



Scenario B.1 - All to ORLF/SPSA TS
Municipality: Chesapeake

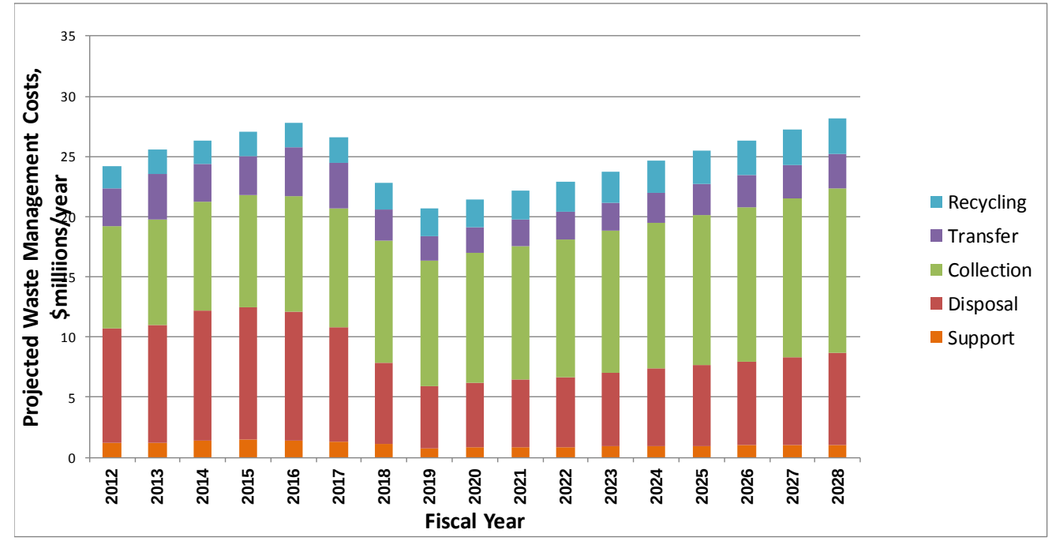
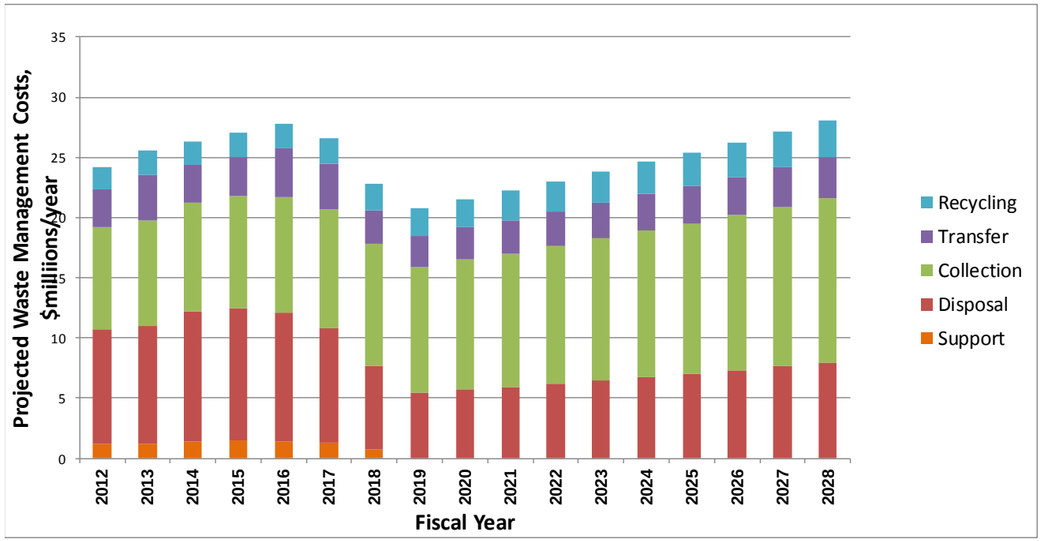
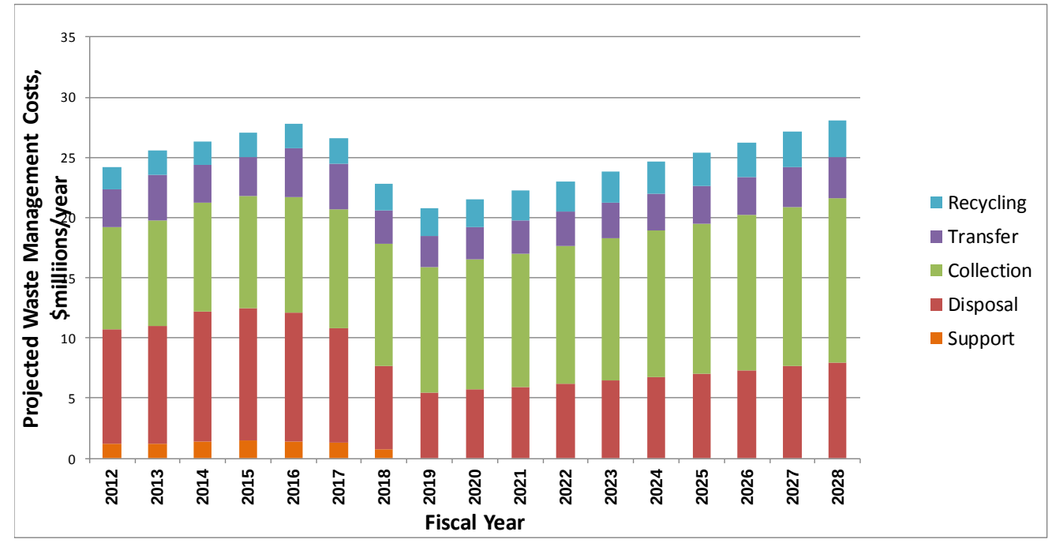


Exhibit A-2. Chesapeake, Projected Solid Waste Management Costs (2012 – 2028)

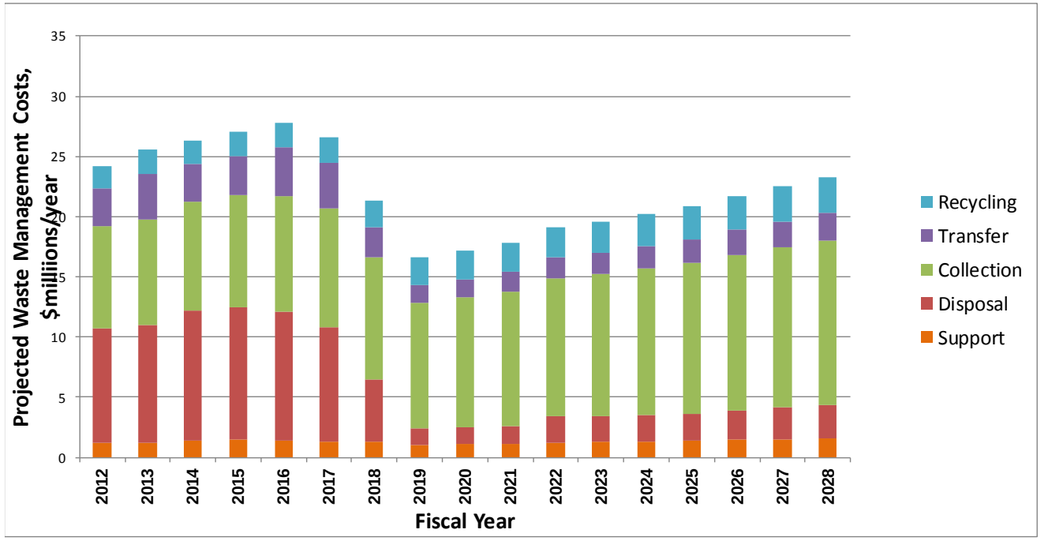
Scenario B.2 - All to ORLF/Muni TS
Municipality: Chesapeake



Scenario B.3 - VB to LF No. 2/All Others to ORLF/Muni TS
Municipality: Chesapeake



Scenario C.1 - SPSA LF/TS/Expand LF/No Ash
Municipality: Chesapeake



Scenario C.2 - SPSA LF/TS/Expand LF/WTE Ash
Municipality: Chesapeake

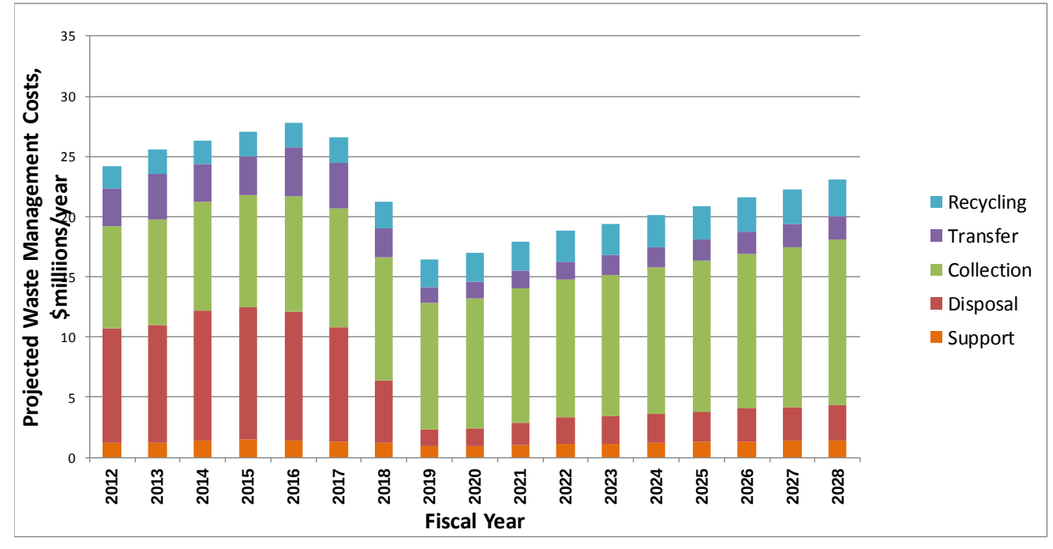
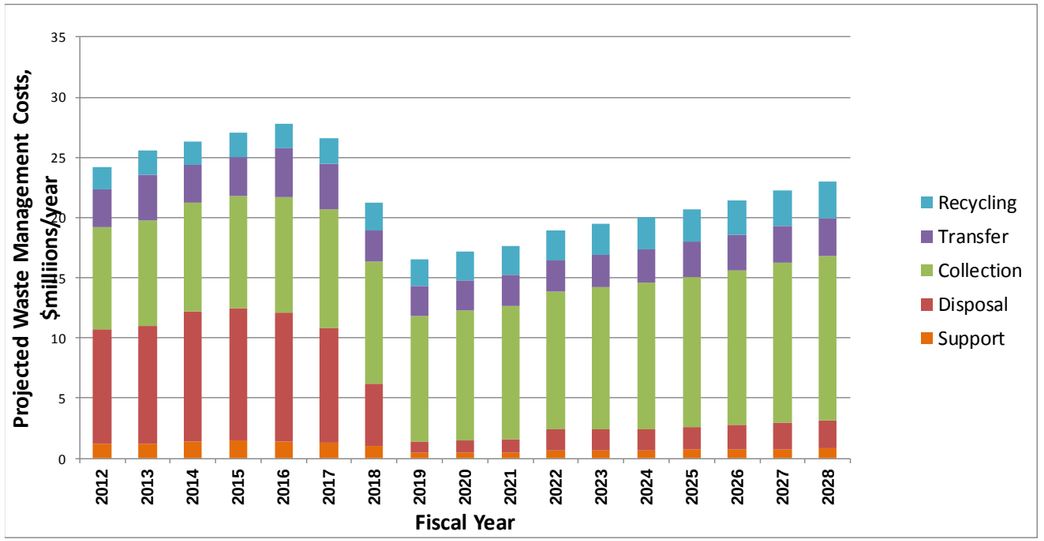
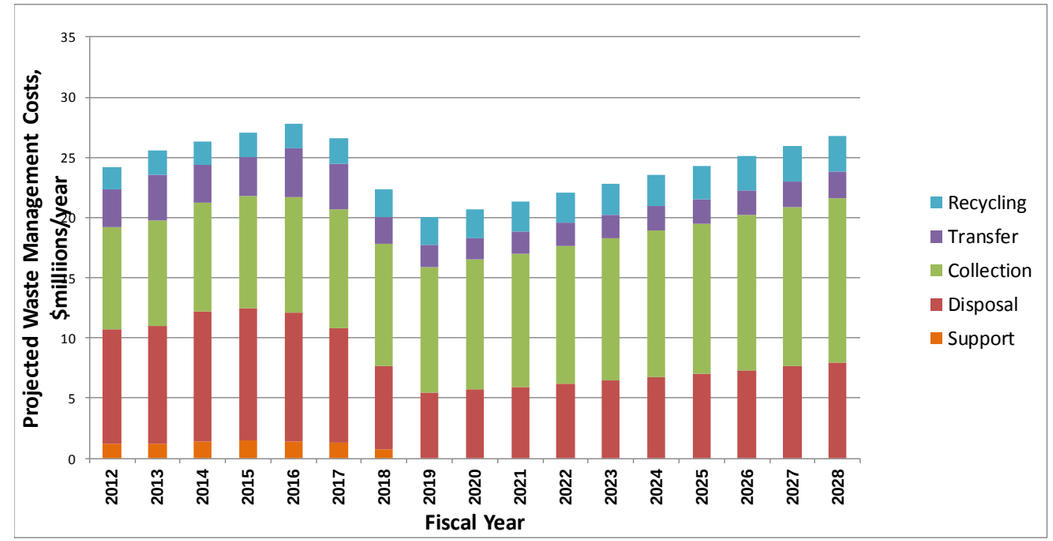


Exhibit A-2. Chesapeake, Projected Solid Waste Management Costs (2012 – 2028)

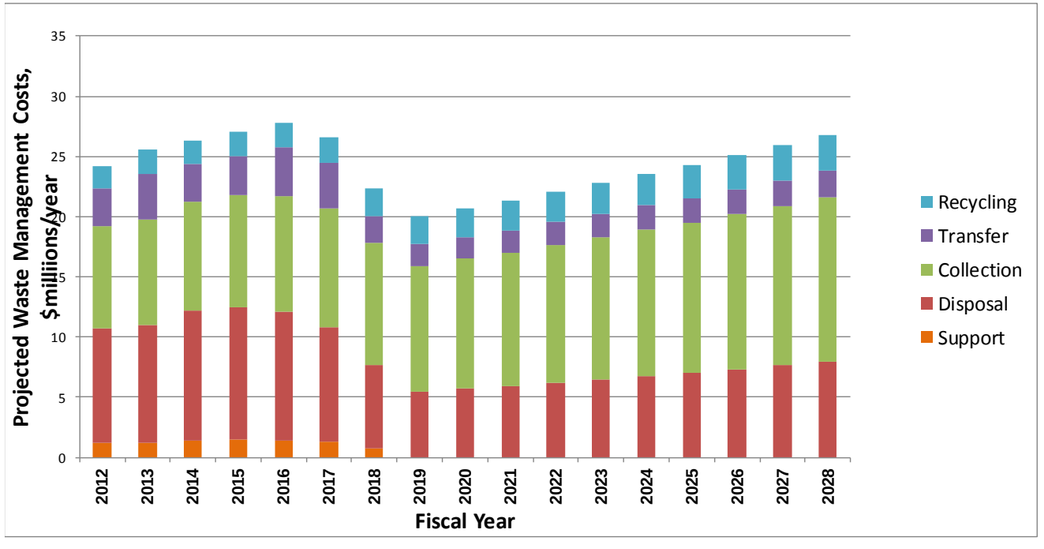
Scenario C.3 - SPSA LF/Muni TS/Expand LF/No Ash
Municipality: Chesapeake



Scenario D.1 - No LF/WTE/Muni TS/VB Ash
Municipality: Chesapeake



Scenario D.2 - No LF/WTE/Muni TS/No VB Ash
Municipality: Chesapeake



Scenario E.1 - VB Only Waste/VB WTE/Others to WheelabratorWTE/SPSA LFClosed
Municipality: Chesapeake

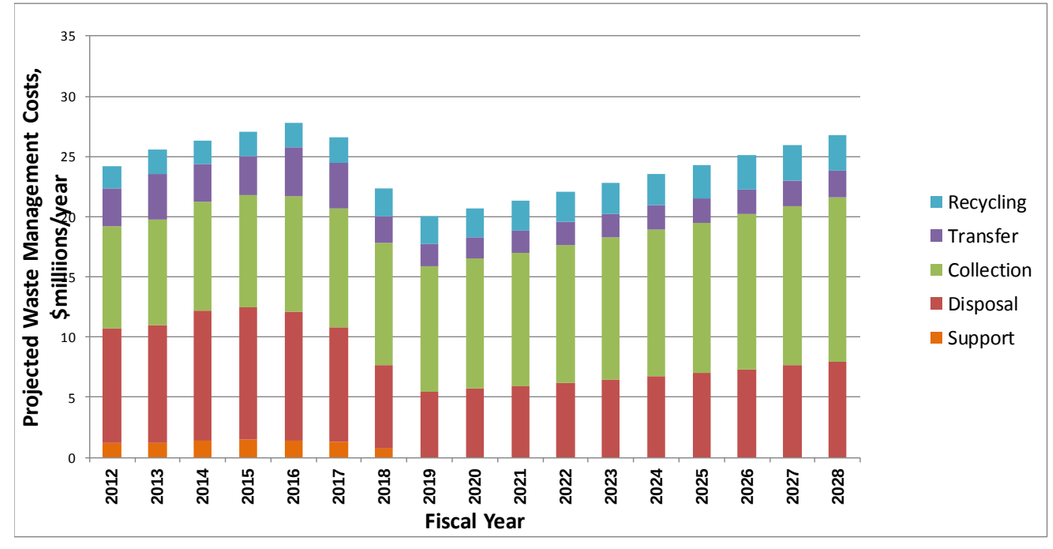
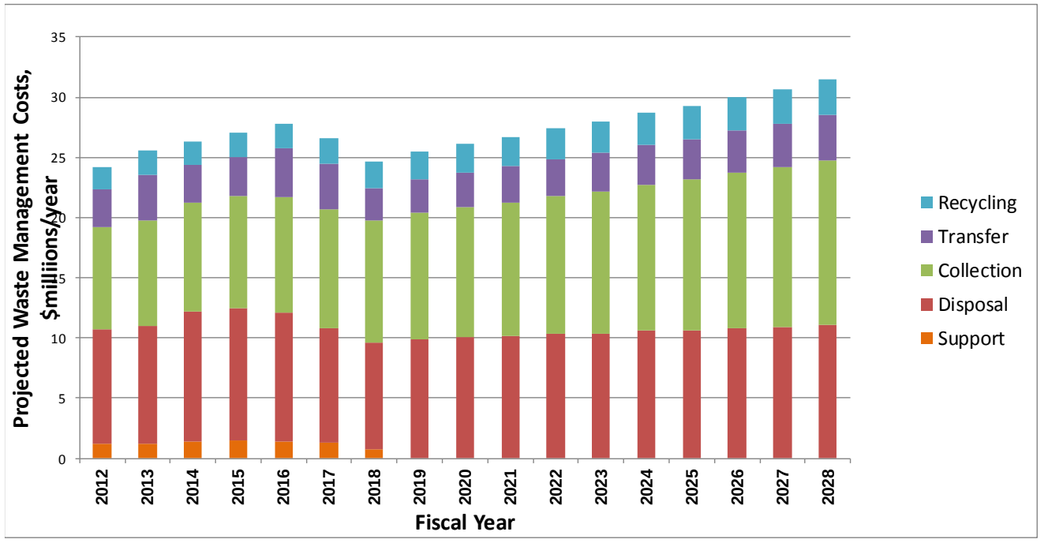
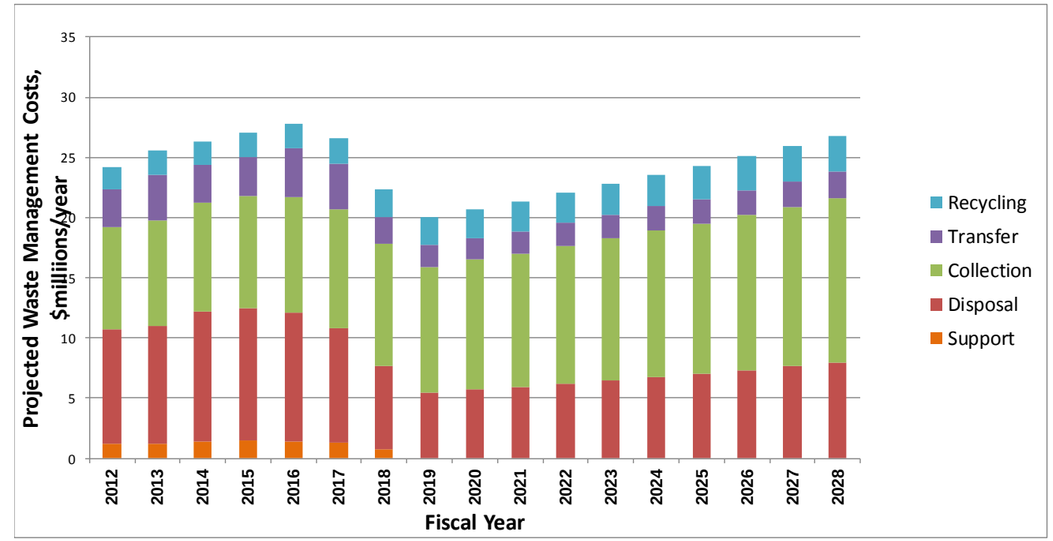


Exhibit A-2. Chesapeake, Projected Solid Waste Management Costs (2012 – 2028)

Scenario E.2 - VB WTE/ Others to VB WTE/ SPSA LF Closed
Municipality: Chesapeake



Scenario F.1 - Suffolk Ops LF/Other WTE
Municipality: Chesapeake



Scenario G.1 - Portsmouth to WTE Not Part of SPSA
Municipality: Chesapeake

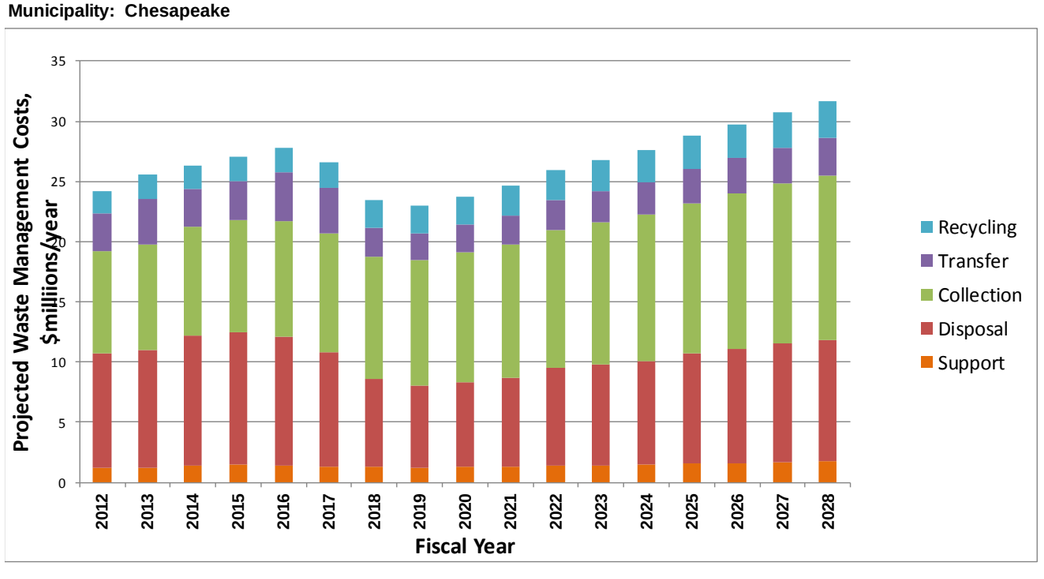
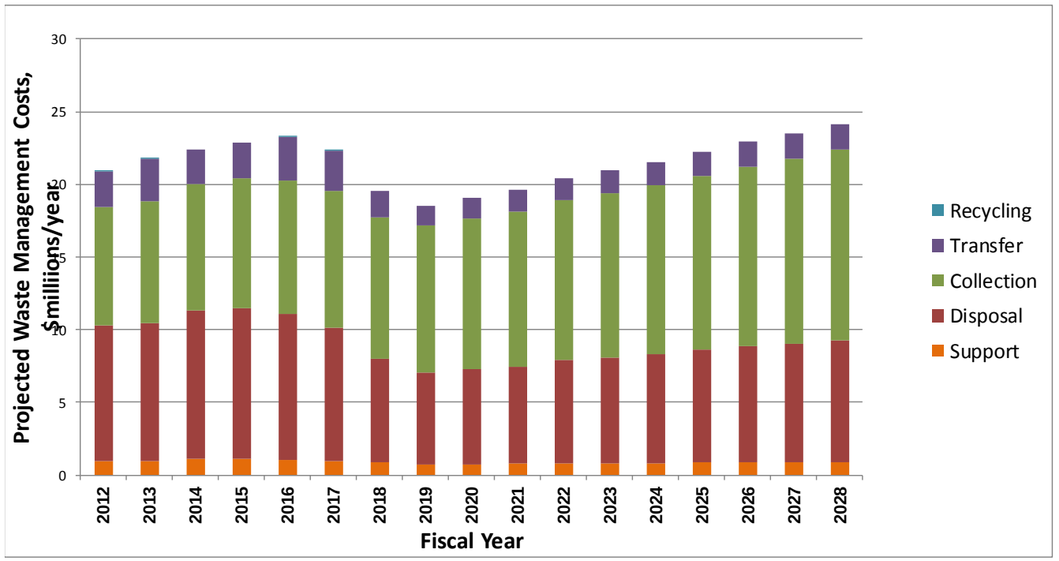
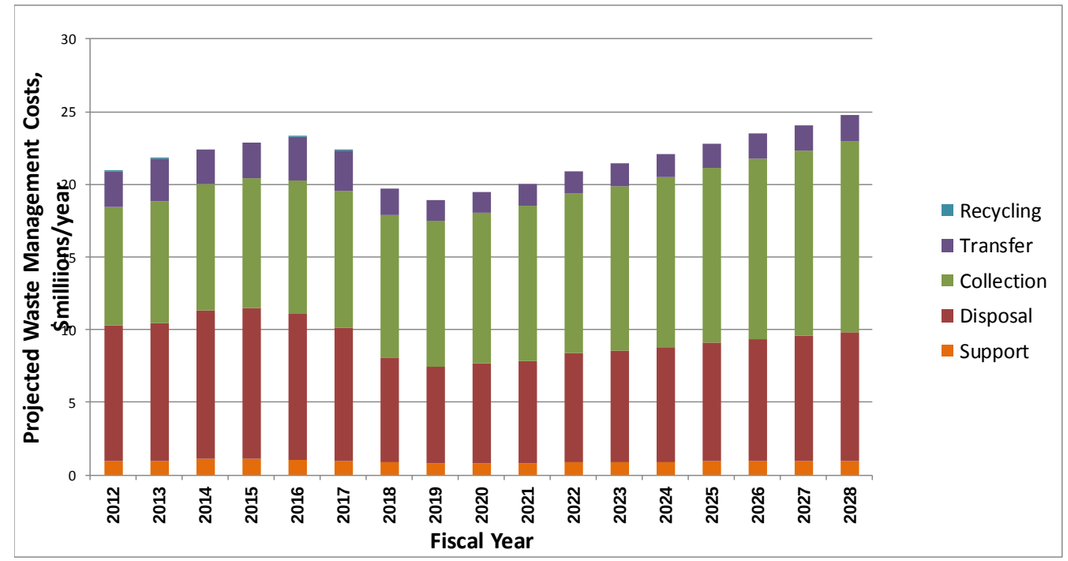


Exhibit A-3. Norfolk, Projected Solid Waste Management Costs (2012 – 2028)

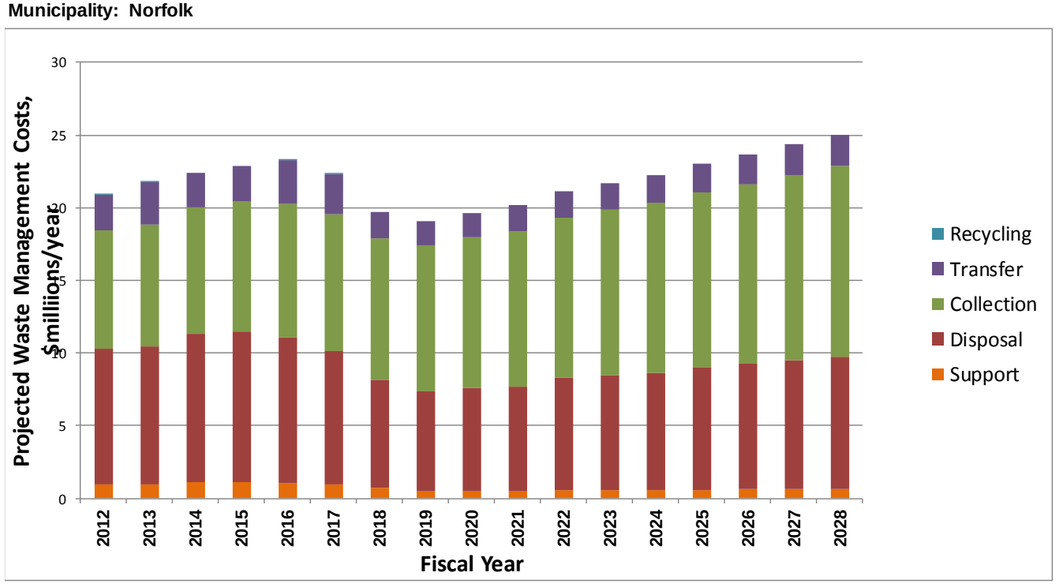
Scenario A.1 - All SPSA LF/ TS/WTE
Municipality: Norfolk



Scenario A.2 - Eastern SPSA LF/ TS/WTE
Municipality: Norfolk



Scenario A.3 - Eastern SPSA LF/WTE/ Muni TS
Municipality: Norfolk



Scenario B.1 - All to ORLF/SPSA TS
Municipality: Norfolk

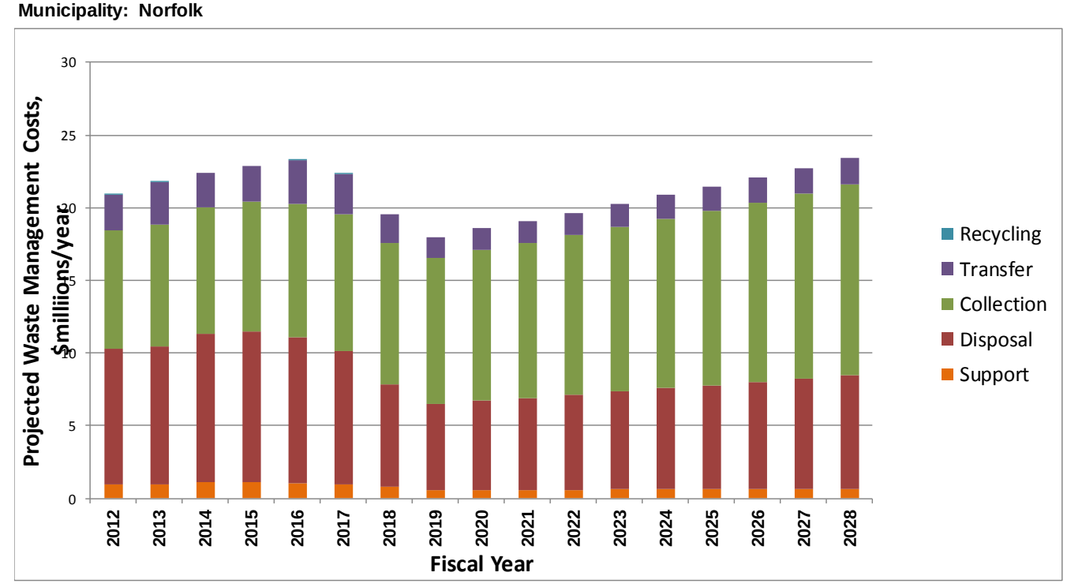
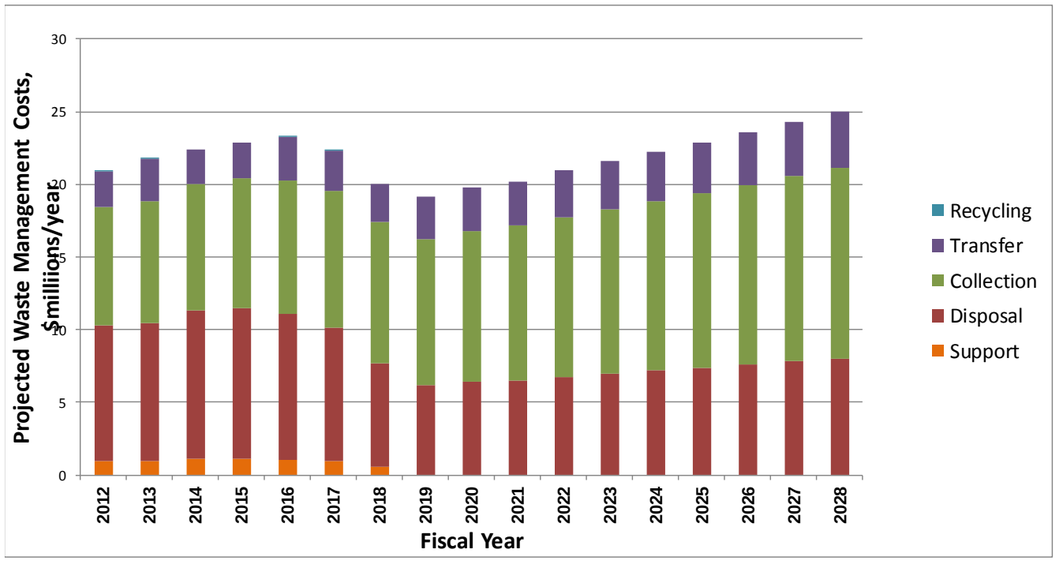
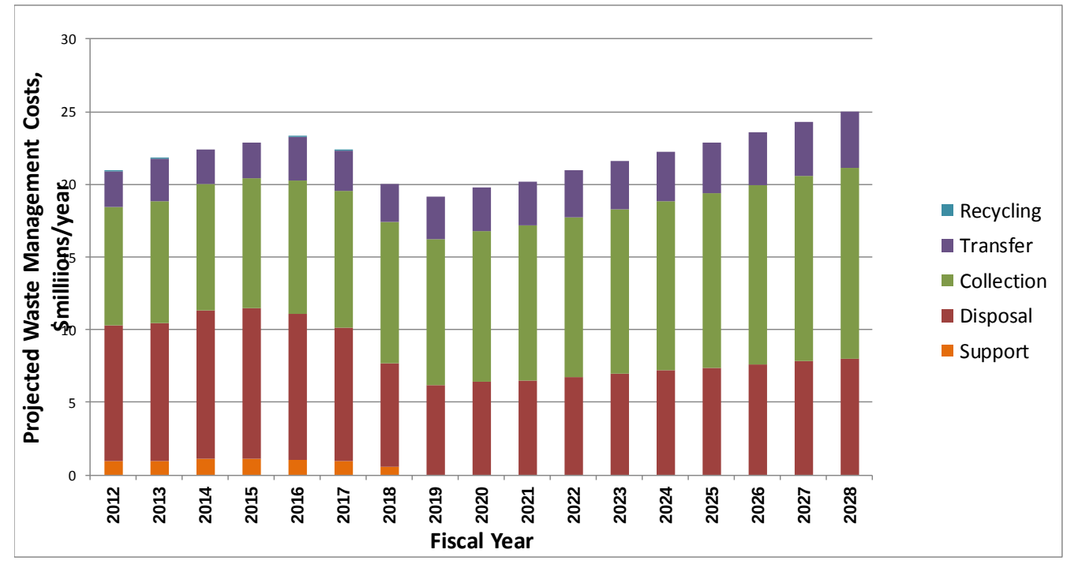


Exhibit A-3. Norfolk, Projected Solid Waste Management Costs (2012 – 2028)

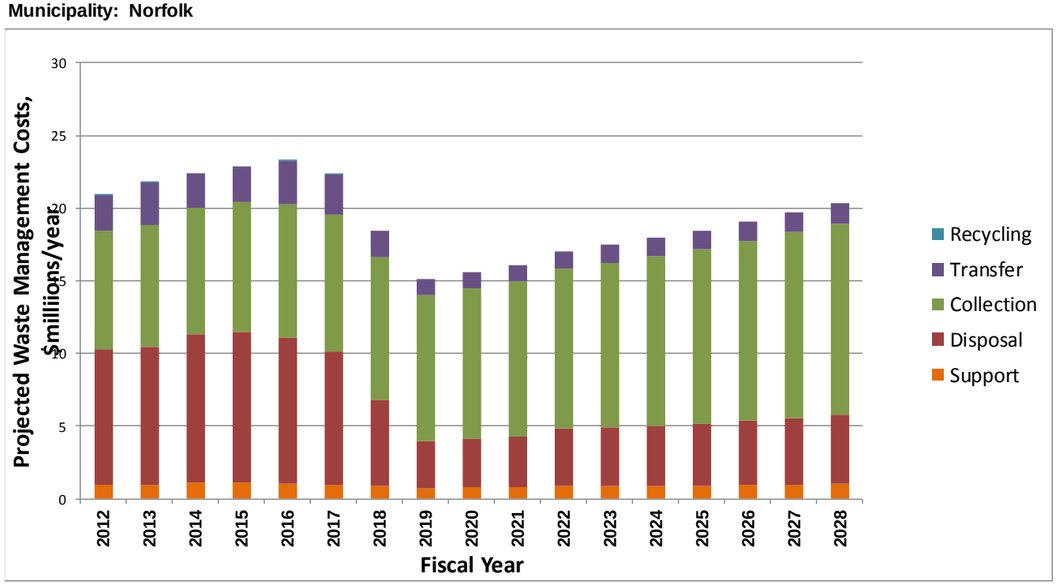
Scenario B.2 - All to ORLF/Muni TS
Municipality: Norfolk



Scenario B.3 - VB to LF No. 2/All Others to ORLF/Muni TS
Municipality: Norfolk



Scenario C.1 - SPSA LF/TS/Expand LF/No Ash
Municipality: Norfolk



Scenario C.2 - SPSA LF/TS/Expand LF/WTE Ash
Municipality: Norfolk

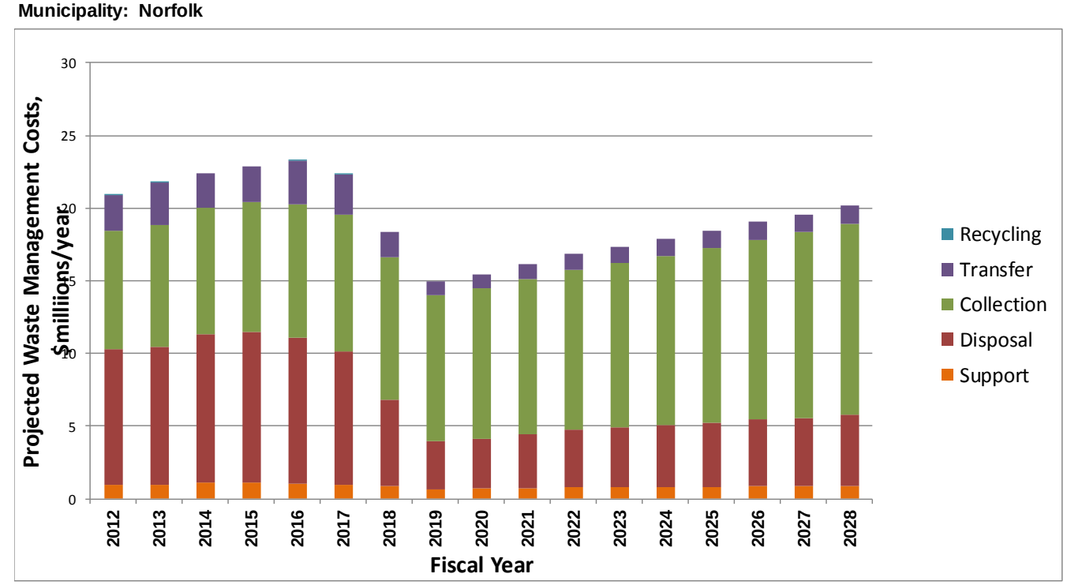
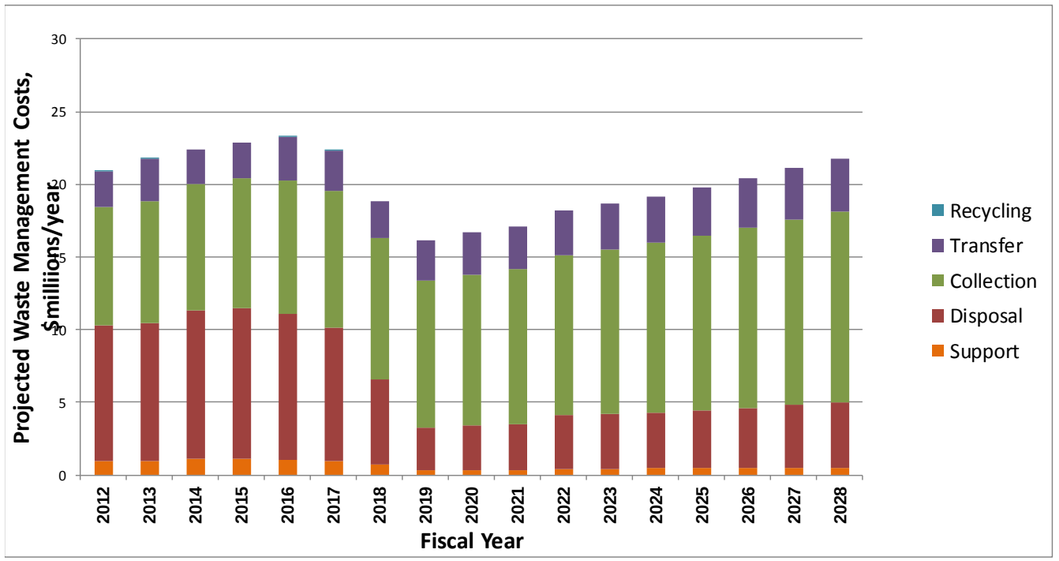
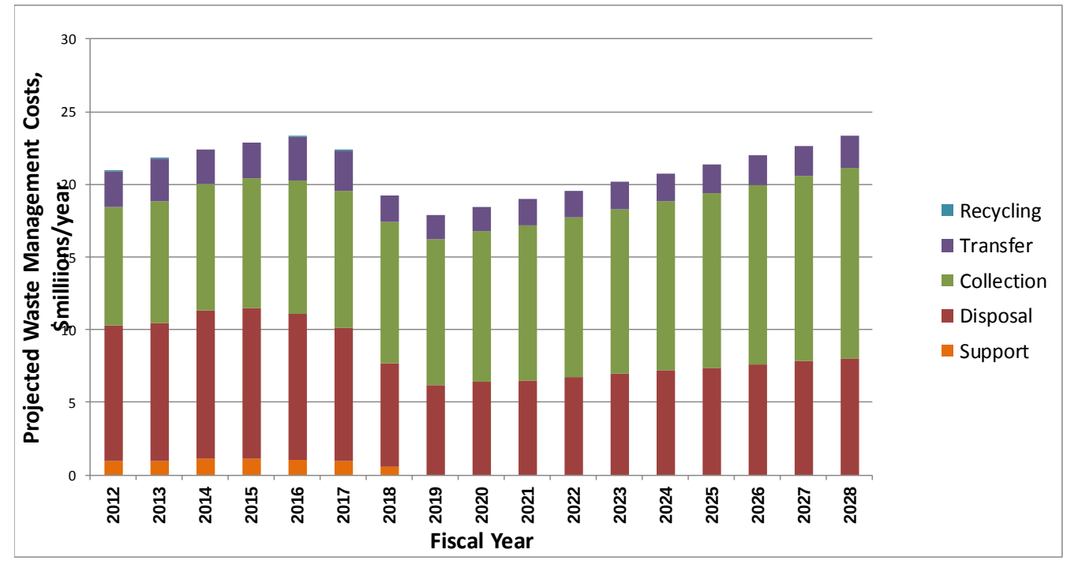


Exhibit A-3. Norfolk, Projected Solid Waste Management Costs (2012 – 2028)

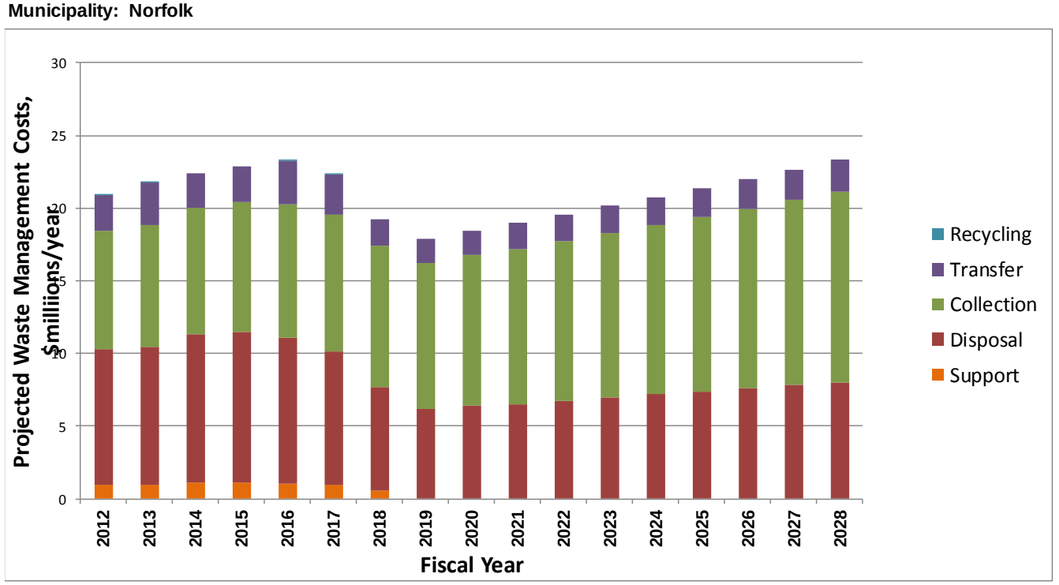
Scenario C.3 - SPSA LF/Muni TS/Expand LF/No Ash
Municipality: Norfolk



Scenario D.1 - No LF/WTE/Muni TS/VB Ash
Municipality: Norfolk



Scenario D.2 - No LF/WTE/Muni TS/No VB Ash
Municipality: Norfolk



Scenario E.1 - VB Only Waste/VB WTE/Others to WheelabratorWTE/SPSA LFClosed
Municipality: Norfolk

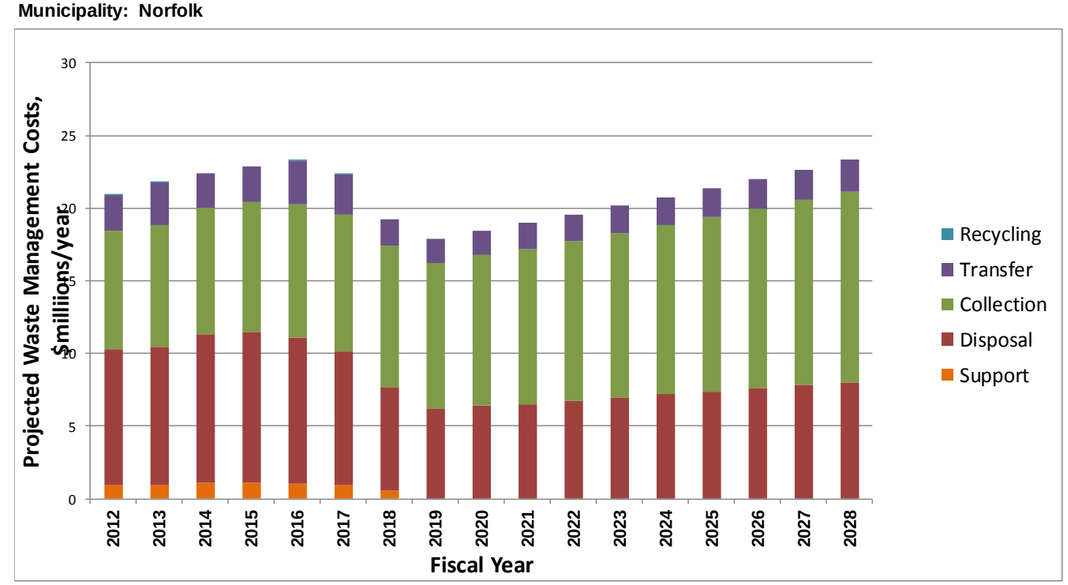
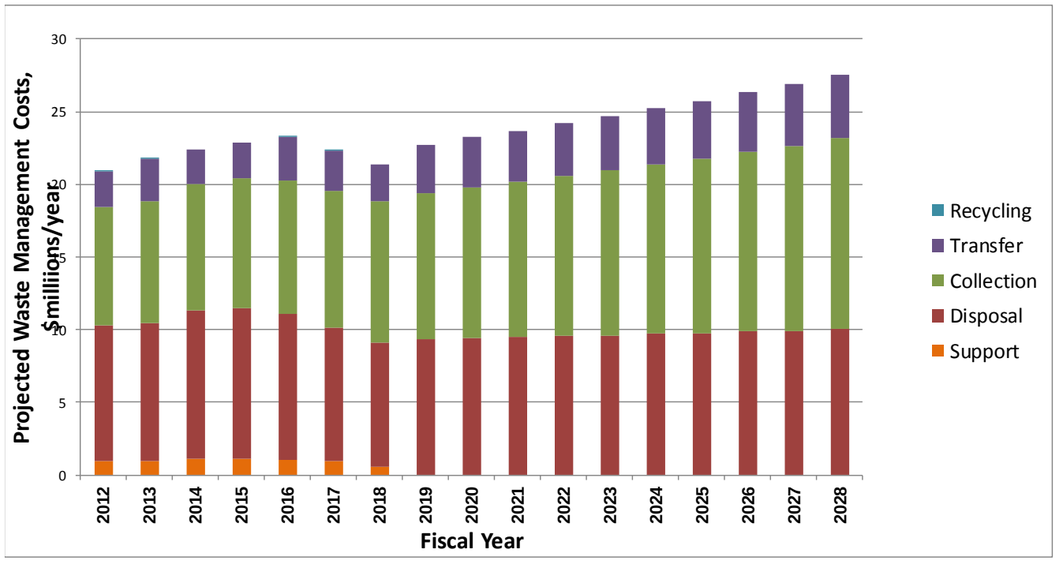
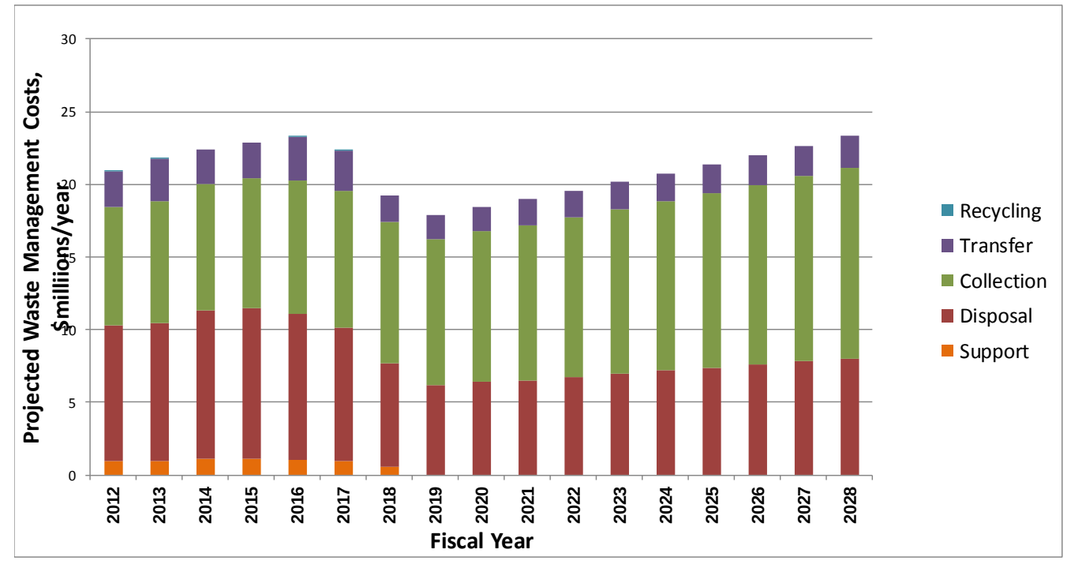


Exhibit A-3. Norfolk, Projected Solid Waste Management Costs (2012 – 2028)

Scenario E.2 - VB WTE/ Others to VB WTE/ SPSA LF Closed
Municipality: Norfolk



Scenario F.1 - Suffolk Ops LF/Other WTE
Municipality: Norfolk



Scenario G.1 - Portsmouth to WTE Not Part of SPSA
Municipality: Norfolk

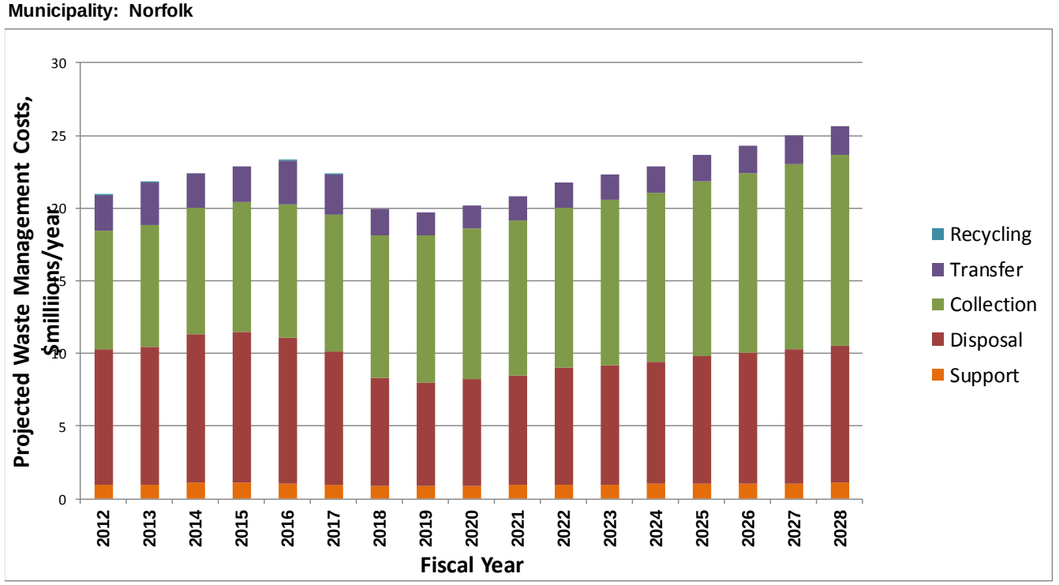
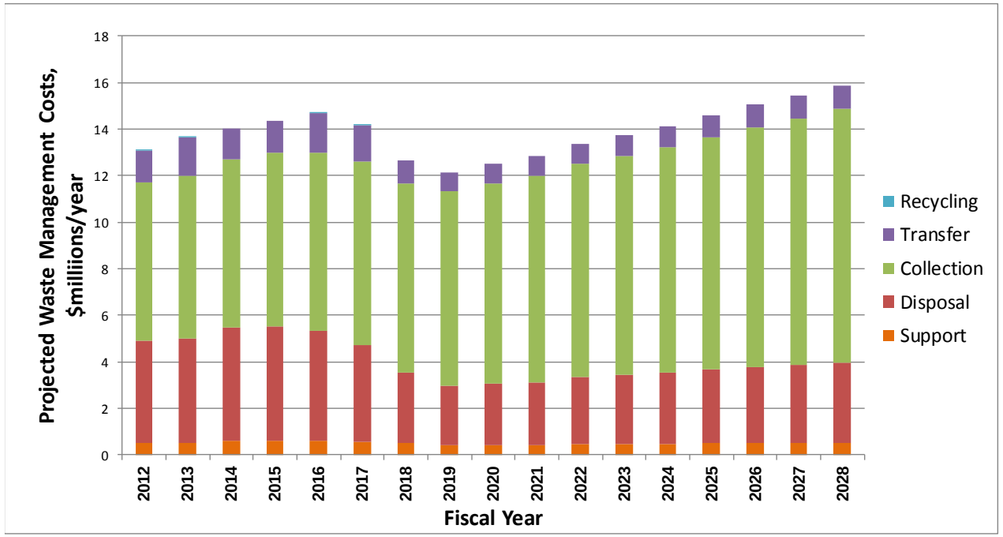
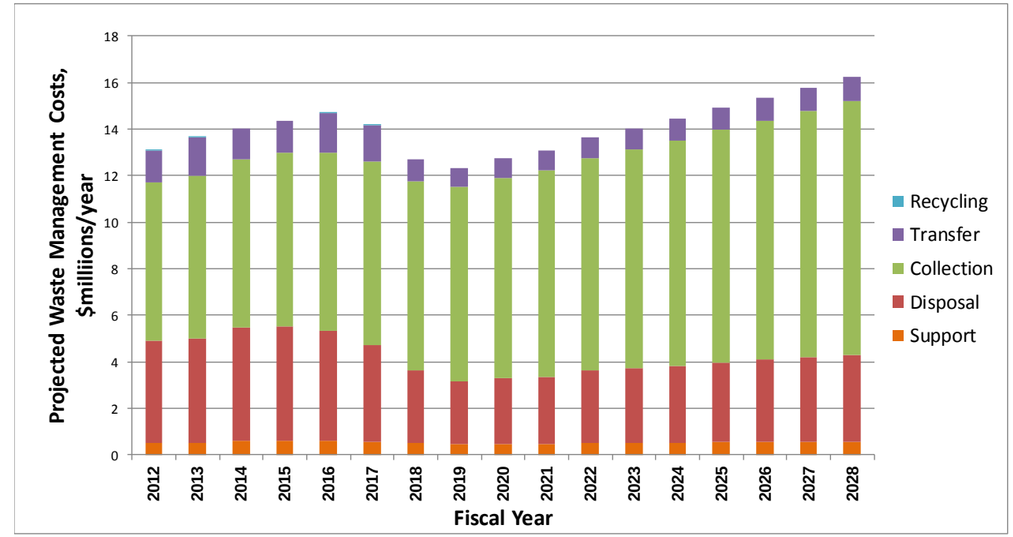


Exhibit A-4. Portsmouth, Projected Solid Waste Management Costs (2012 – 2028)

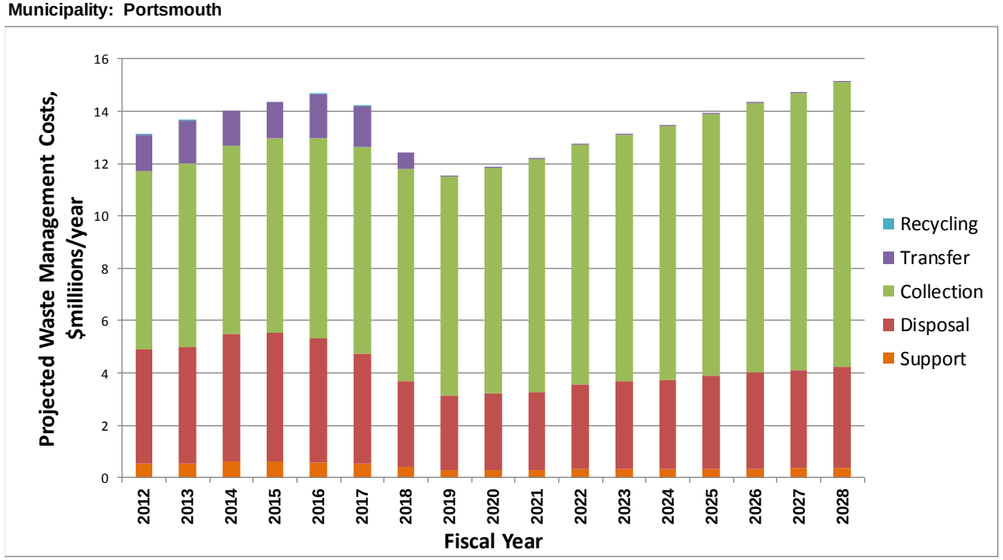
Scenario A.1 - All SPSA LF/ TS/WTE
Municipality: Portsmouth



Scenario A.2 - Eastern SPSA LF/ TS/WTE
Municipality: Portsmouth



Scenario A.3 - Eastern SPSA LF/WTE/ Muni TS
Municipality: Portsmouth



Scenario B.1 - All to ORLF/SPSA TS
Municipality: Portsmouth

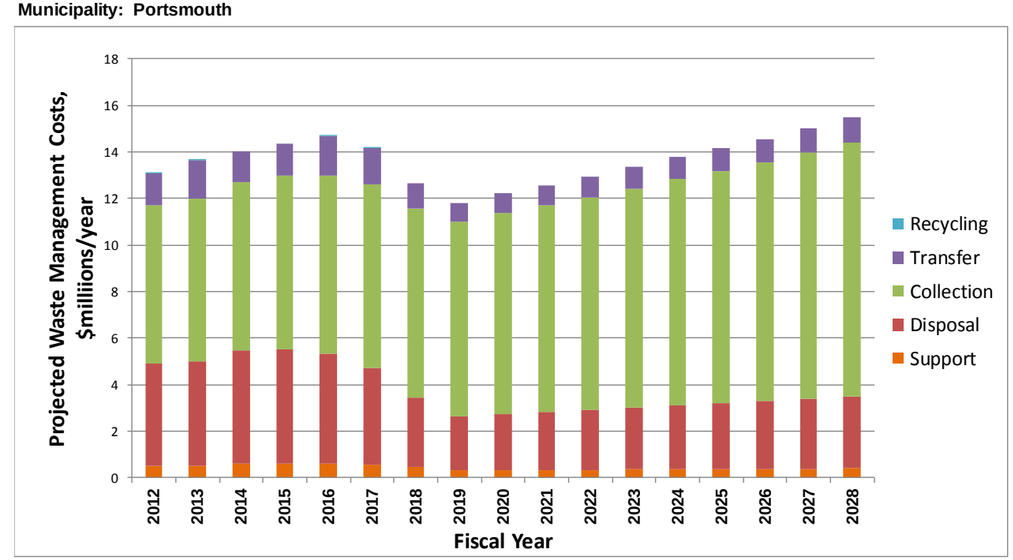
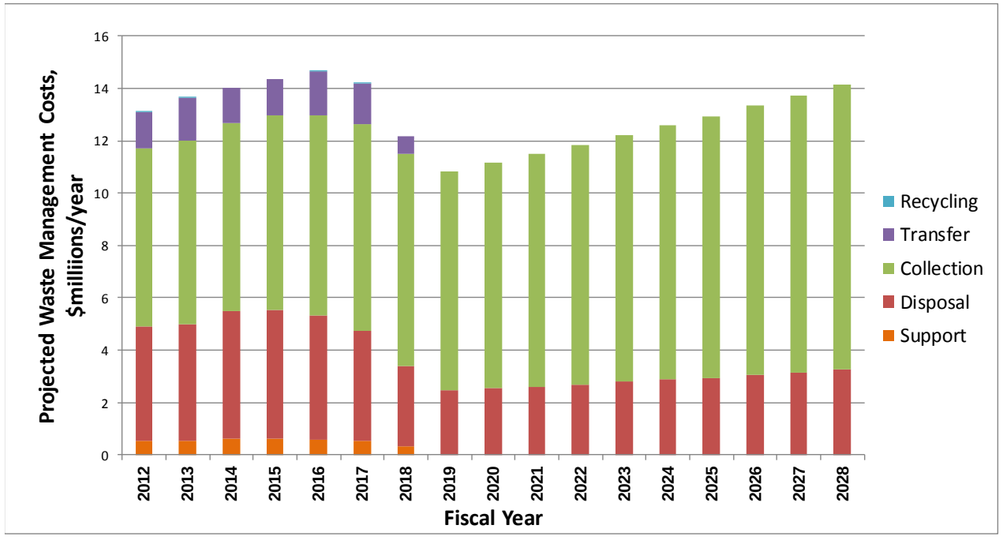
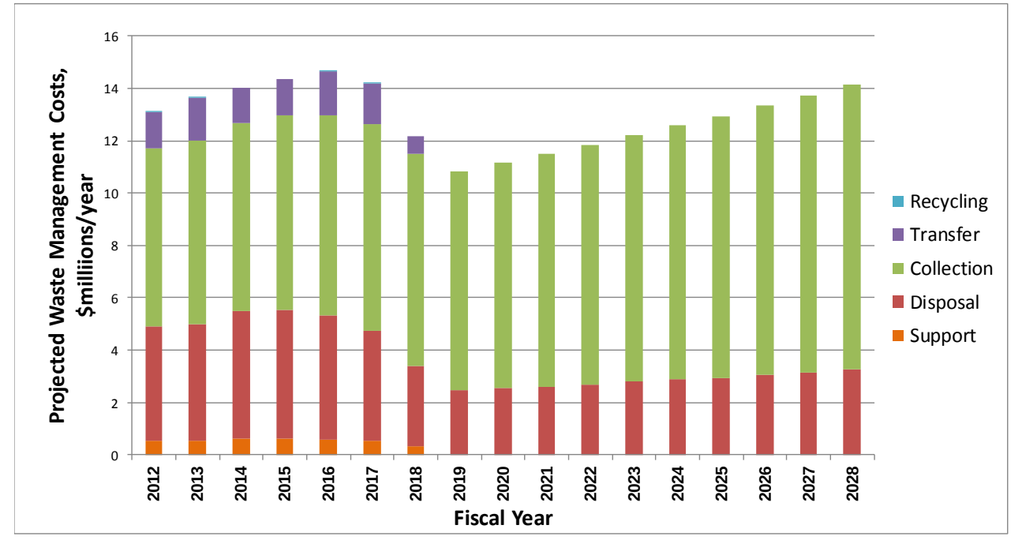


Exhibit A-4. Portsmouth, Projected Solid Waste Management Costs (2012 – 2028)

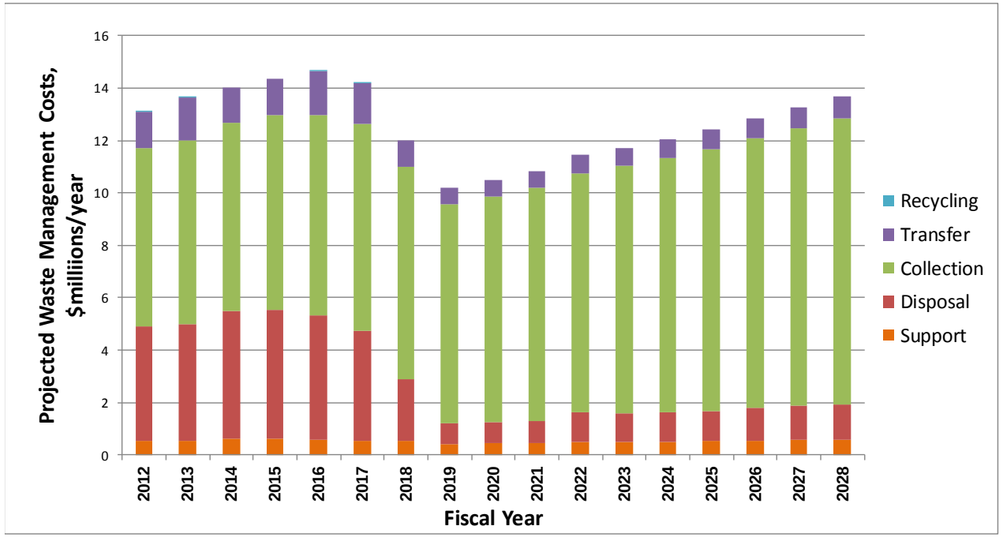
Scenario B.2 - All to ORLF/Muni TS
Municipality: Portsmouth



Scenario B.3 - VB to LF No. 2/All Others to ORLF/Muni TS
Municipality: Portsmouth



Scenario C.1 - SPSA LF/TS/Expand LF/No Ash
Municipality: Portsmouth



Scenario C.2 - SPSA LF/TS/Expand LF/WTE Ash
Municipality: Portsmouth

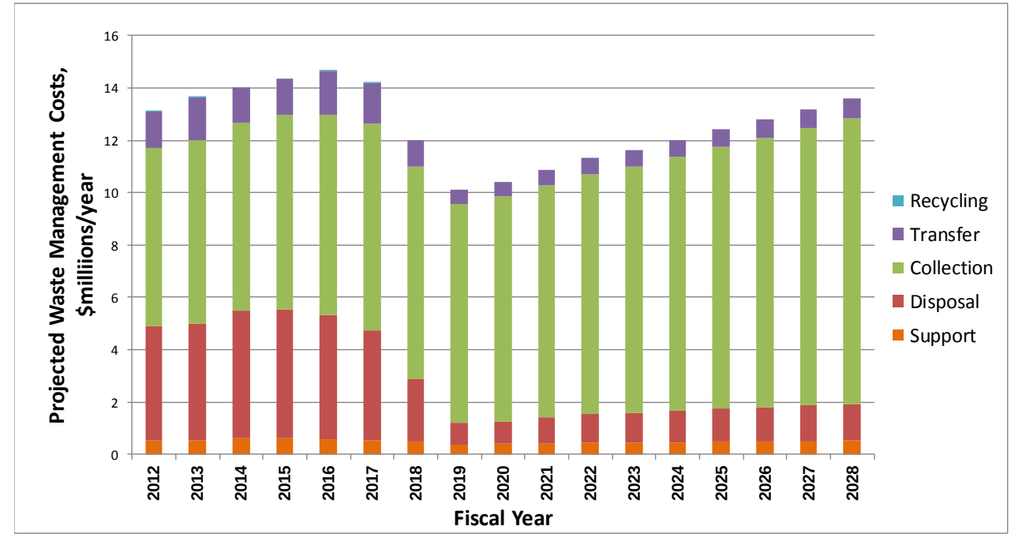
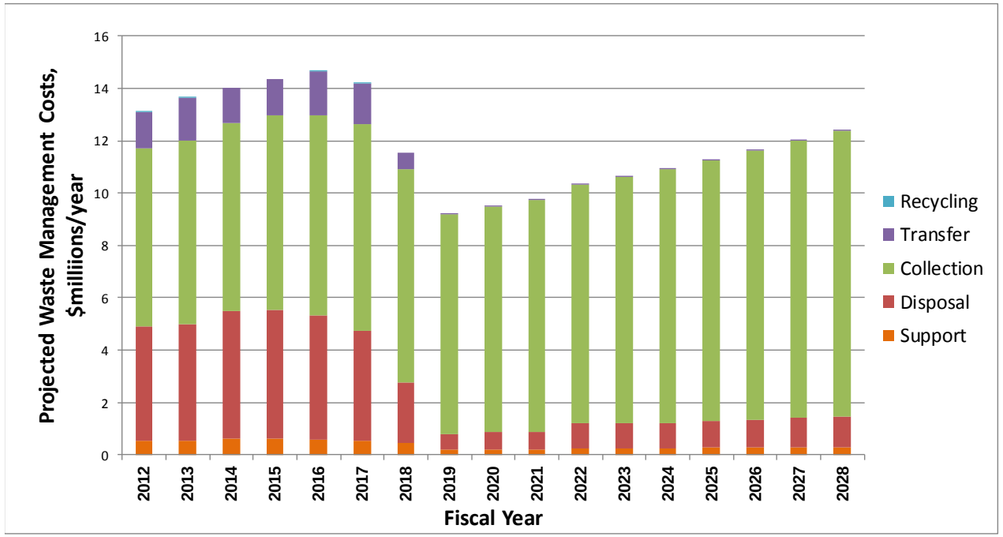
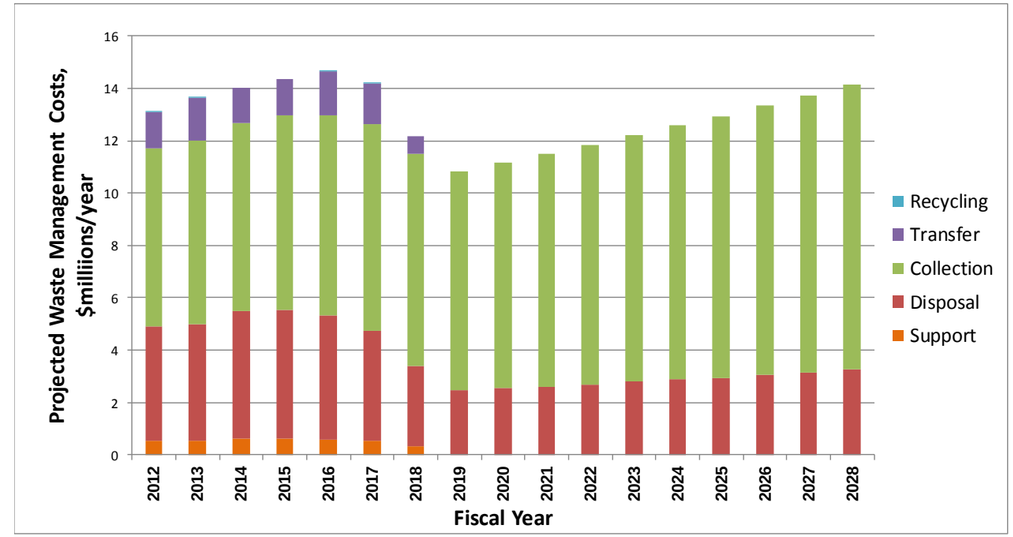


Exhibit A-4. Portsmouth, Projected Solid Waste Management Costs (2012 – 2028)

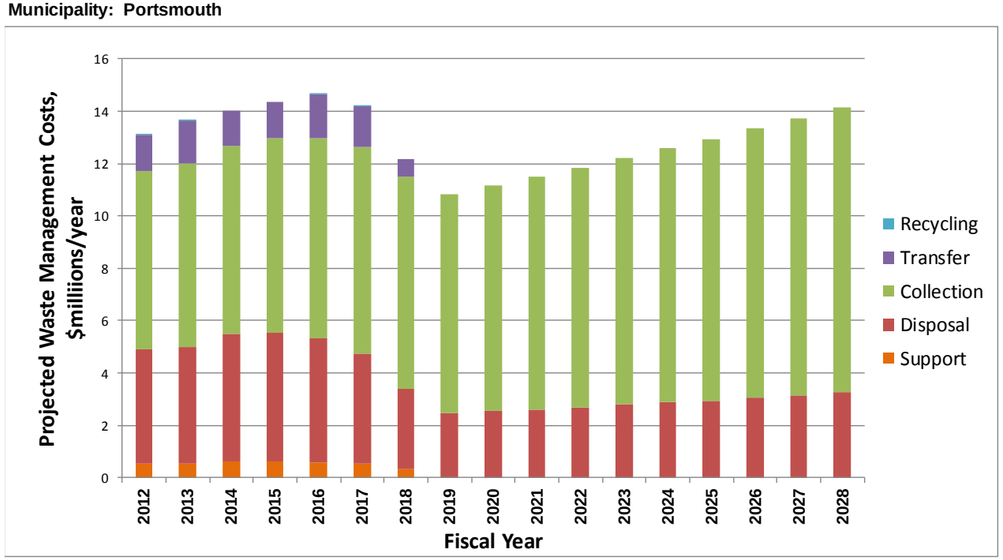
Scenario C.3 - SPSA LF/Muni TS/Expand LF/No Ash
Municipality: Portsmouth



Scenario D.1 - No LF/WTE/Muni TS/VB Ash
Municipality: Portsmouth



Scenario D.2 - No LF/WTE/Muni TS/No VB Ash
Municipality: Portsmouth



Scenario E.1 - VB Only Waste/VB WTE/Others to WheelabratorWTE/SPSA LFClosed
Municipality: Portsmouth

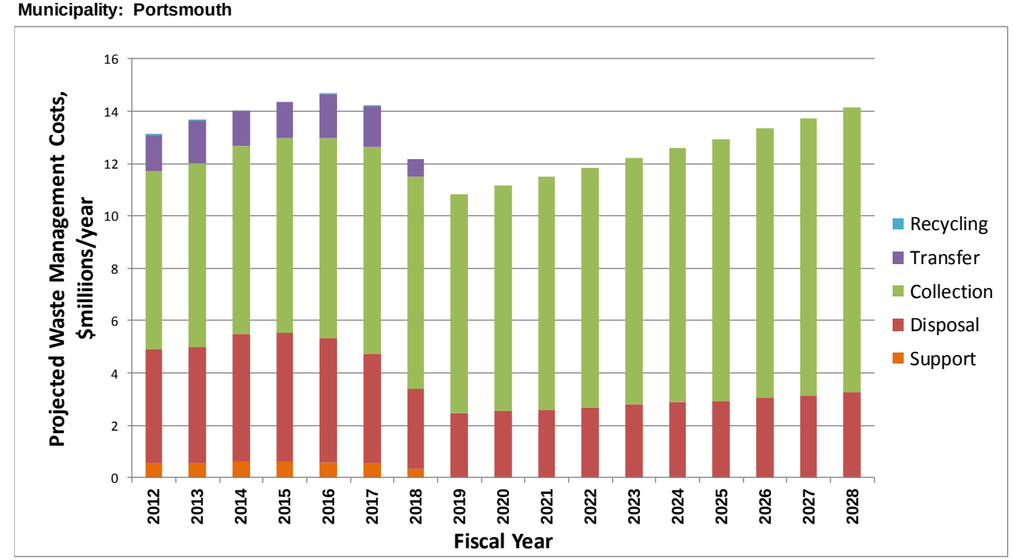
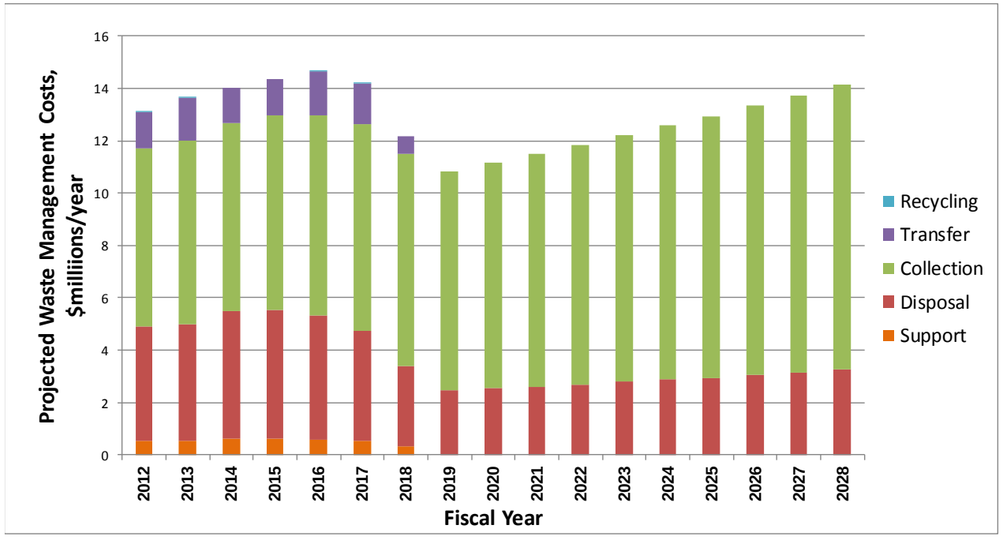
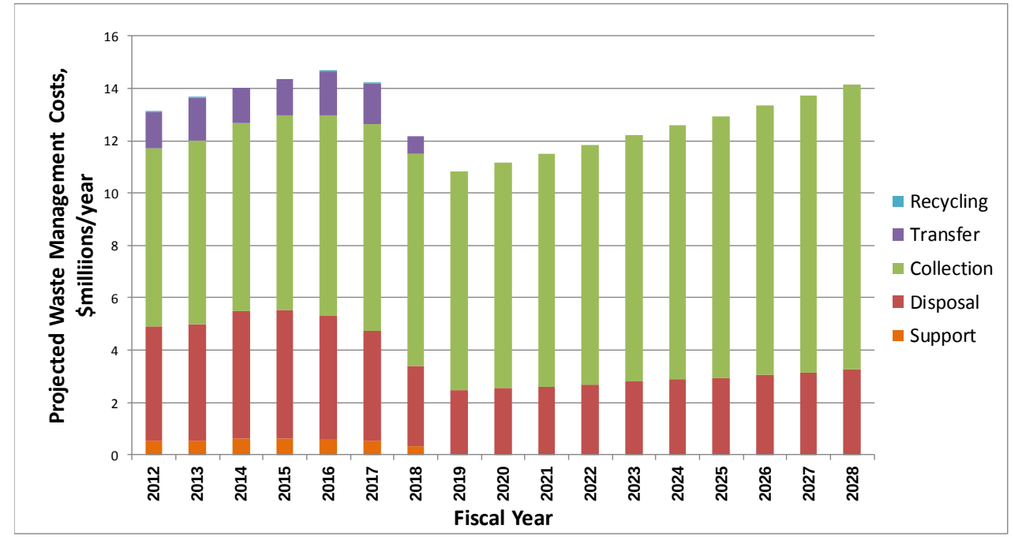


Exhibit A-4. Portsmouth, Projected Solid Waste Management Costs (2012 – 2028)

Scenario E.2 - VB WTE/ Others to VB WTE/ SPSA LF Closed
Municipality: Portsmouth



Scenario F.1 - Suffolk Ops LF/Other WTE
Municipality: Portsmouth



Scenario G.1 - Portsmouth to WTE Not Part of SPSA
Municipality: Portsmouth

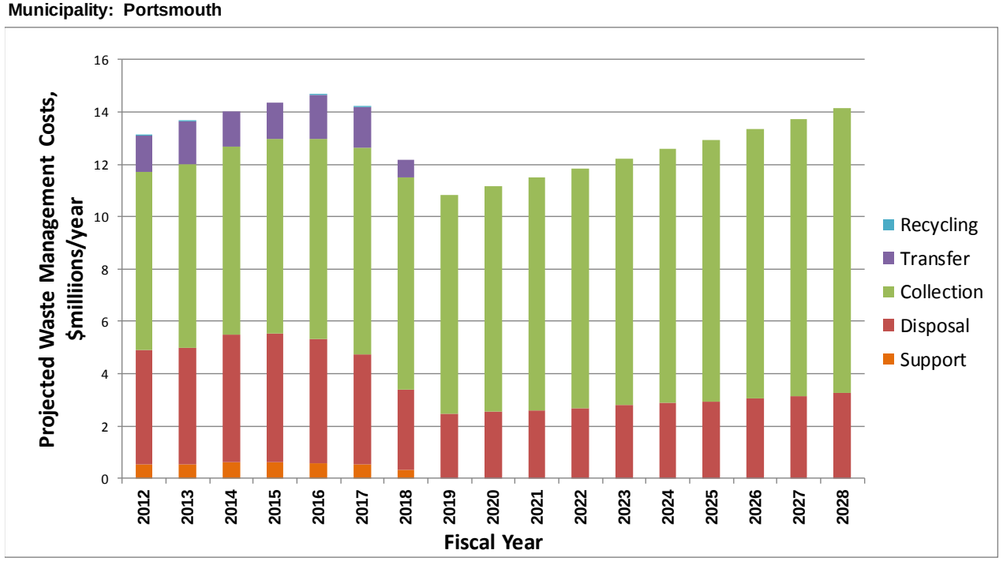
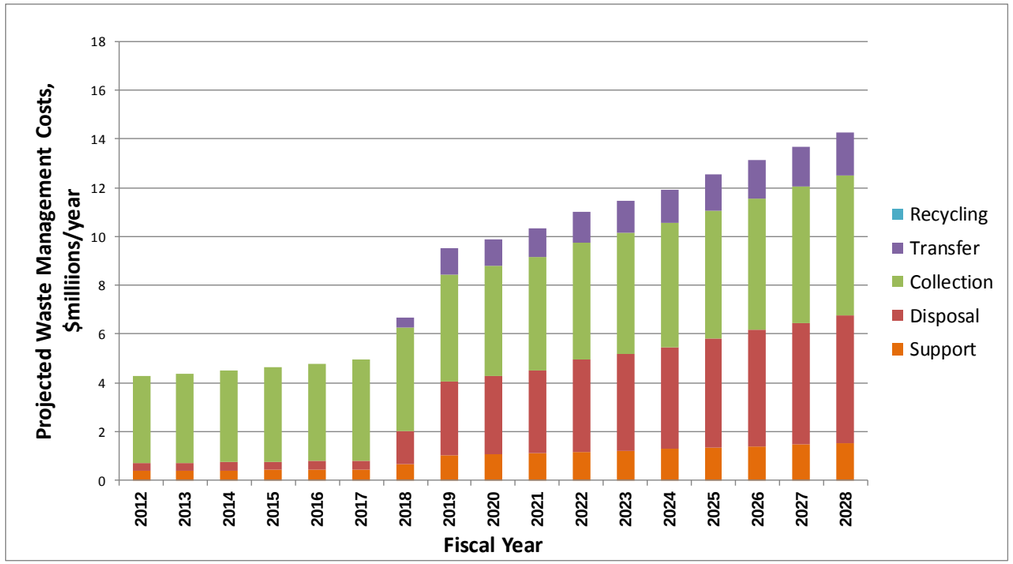
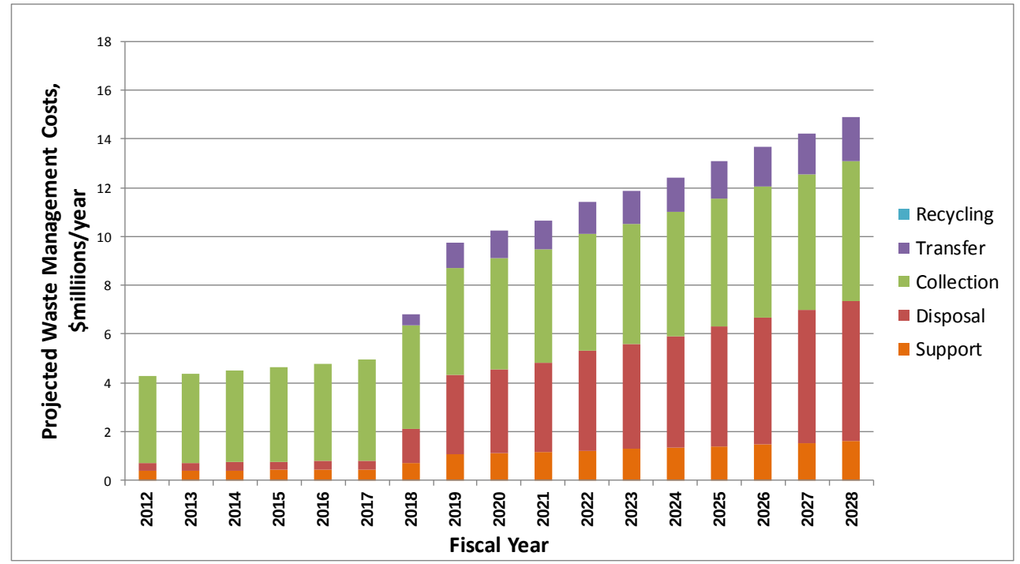


Exhibit A-5. Suffolk, Projected Solid Waste Management Costs (2012 – 2028)

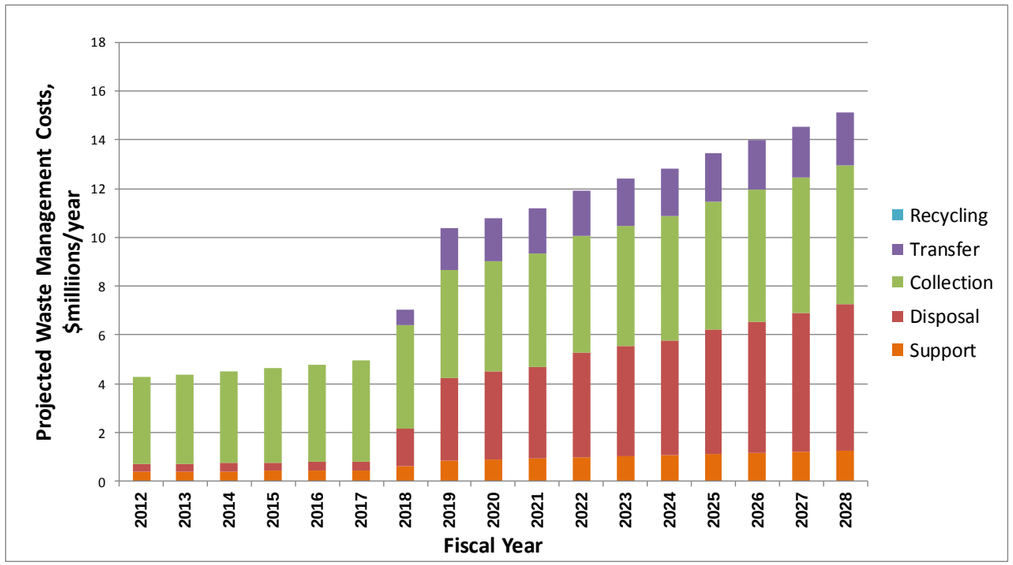
Scenario A.1 - All SPSA LF/ TS/WTE
Municipality: Suffolk



Scenario A.2 - Eastern SPSA LF/ TS/WTE
Municipality: Suffolk



Scenario A.3 - Eastern SPSA LF/WTE/ Muni TS
Municipality: Suffolk



Scenario B.1 - All to ORLF/SPSA TS
Municipality: Suffolk

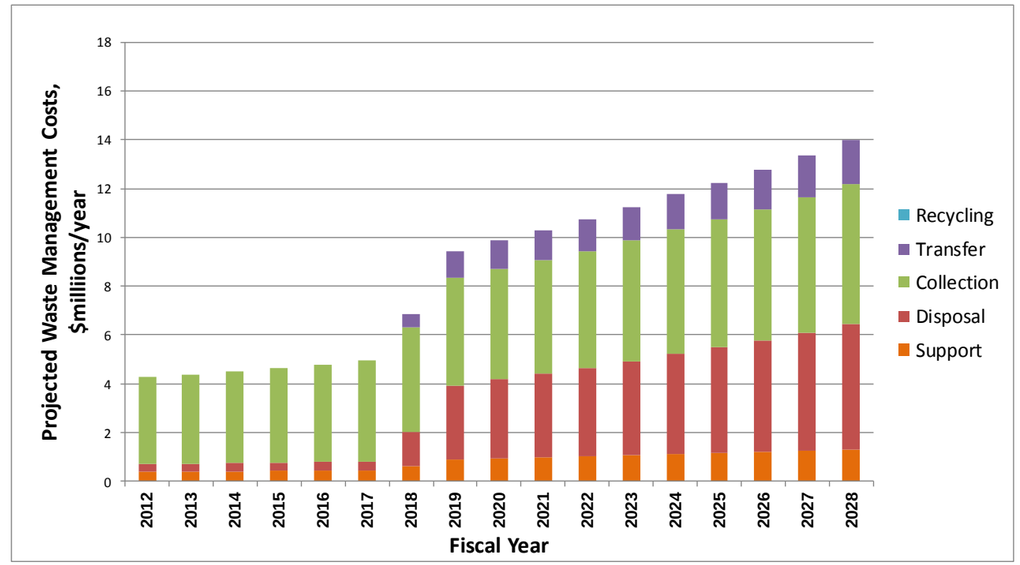
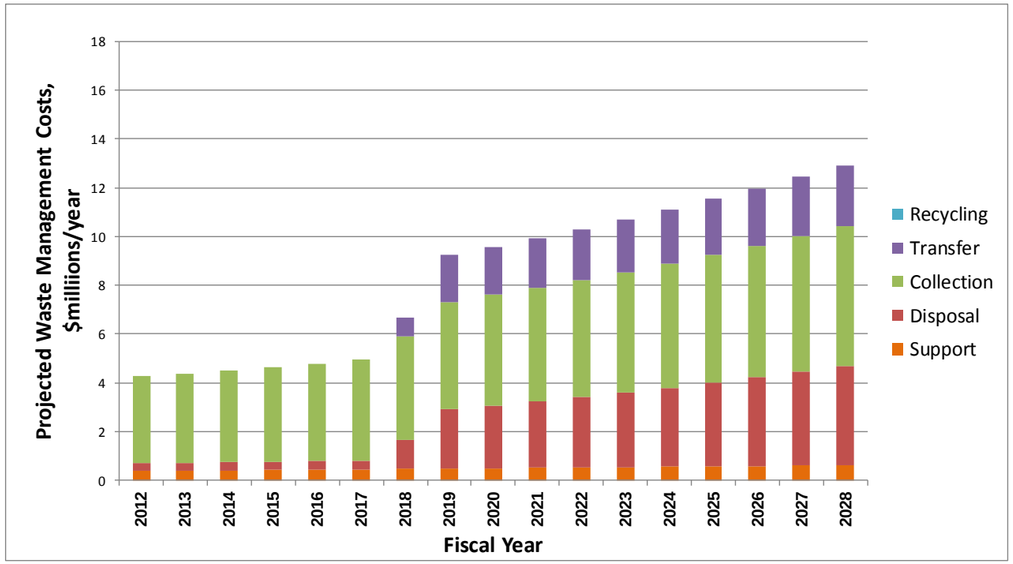
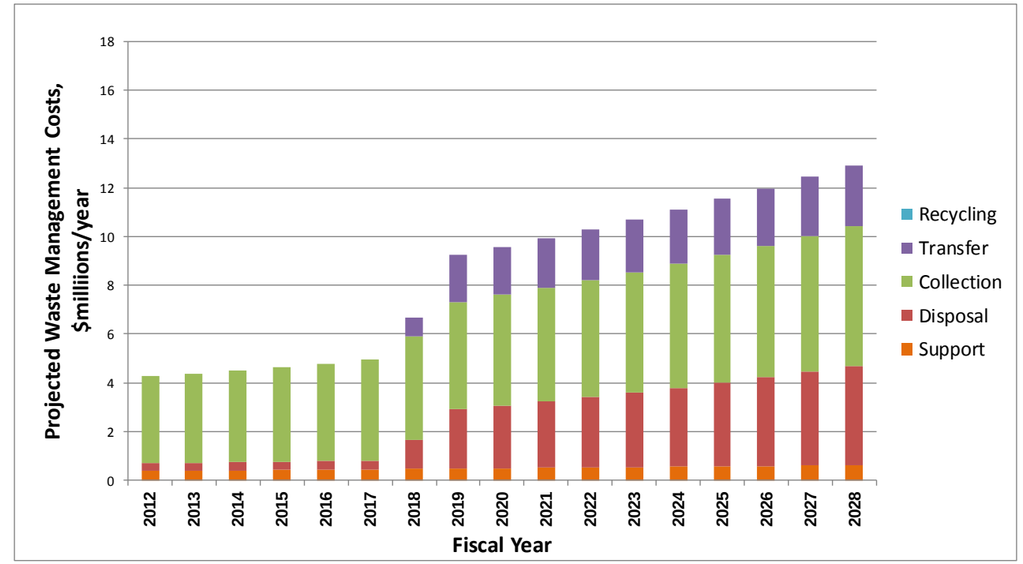


Exhibit A-5. Suffolk, Projected Solid Waste Management Costs (2012 – 2028)

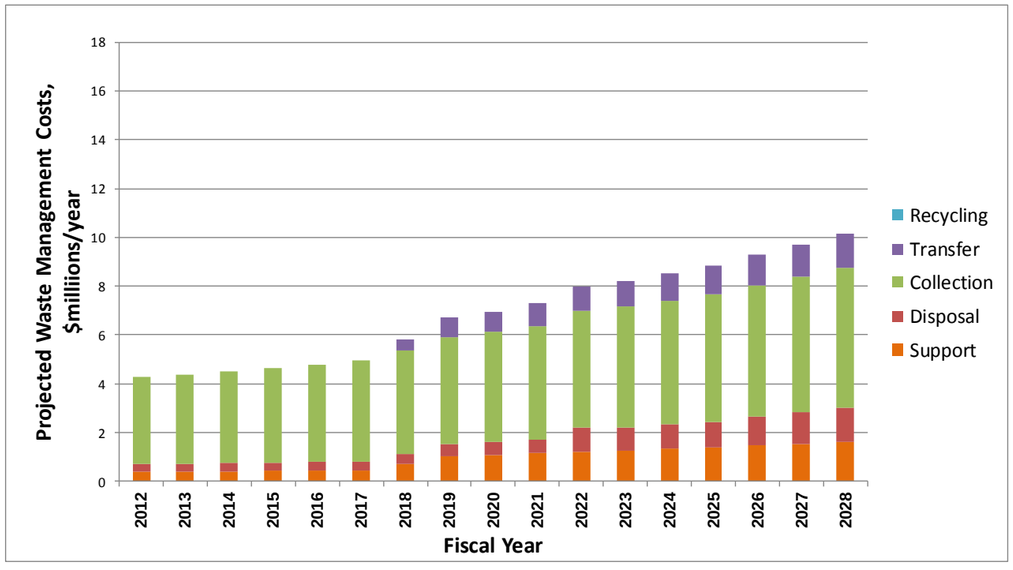
Scenario B.2 - All to ORLF/Muni TS
Municipality: Suffolk



Scenario B.3 - VB to LF No. 2/All Others to ORLF/Muni TS
Municipality: Suffolk



Scenario C.1 - SPSA LF/TS/Expand LF/No Ash
Municipality: Suffolk



Scenario C.2 - SPSA LF/TS/Expand LF/WTE Ash
Municipality: Suffolk

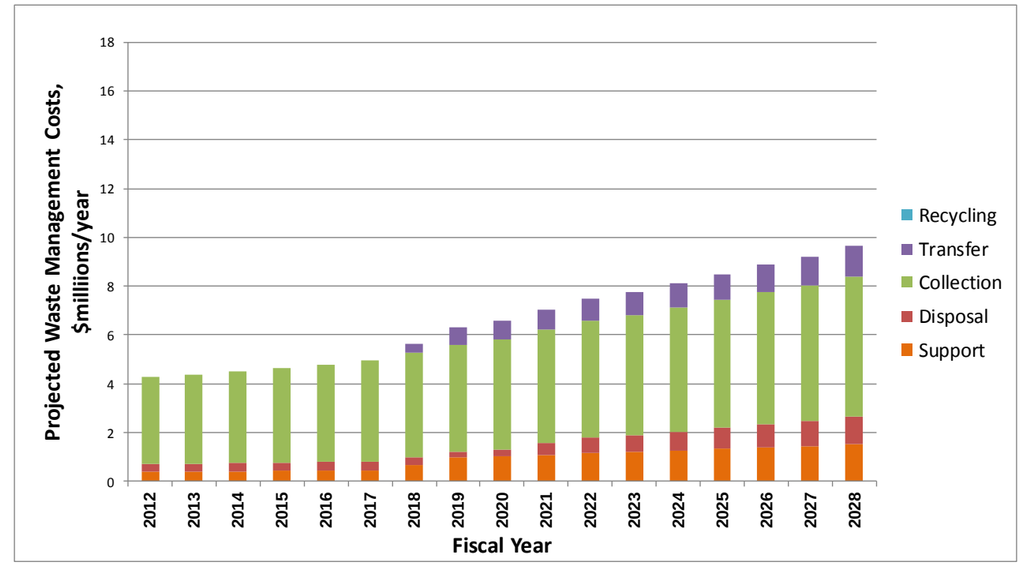
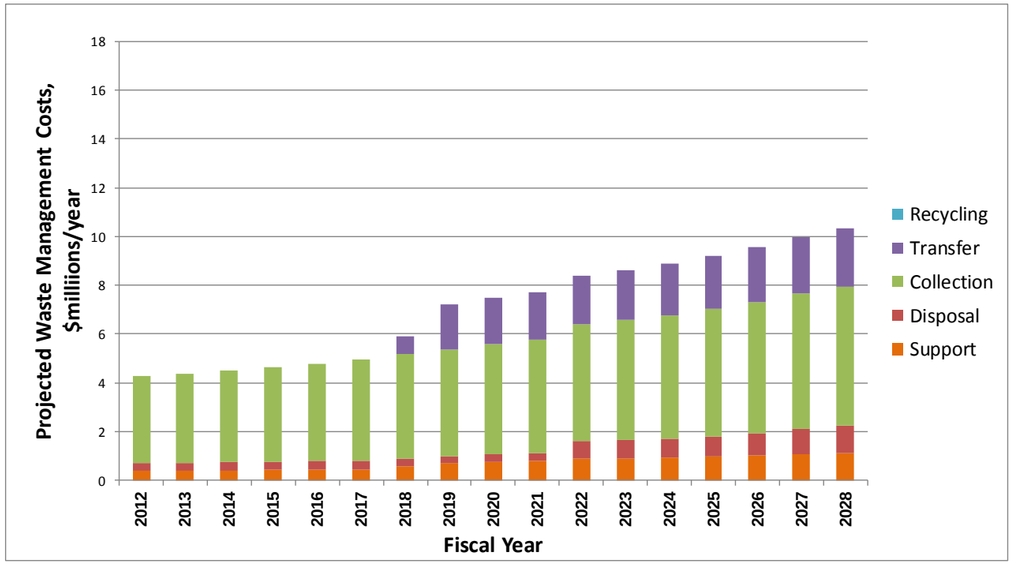
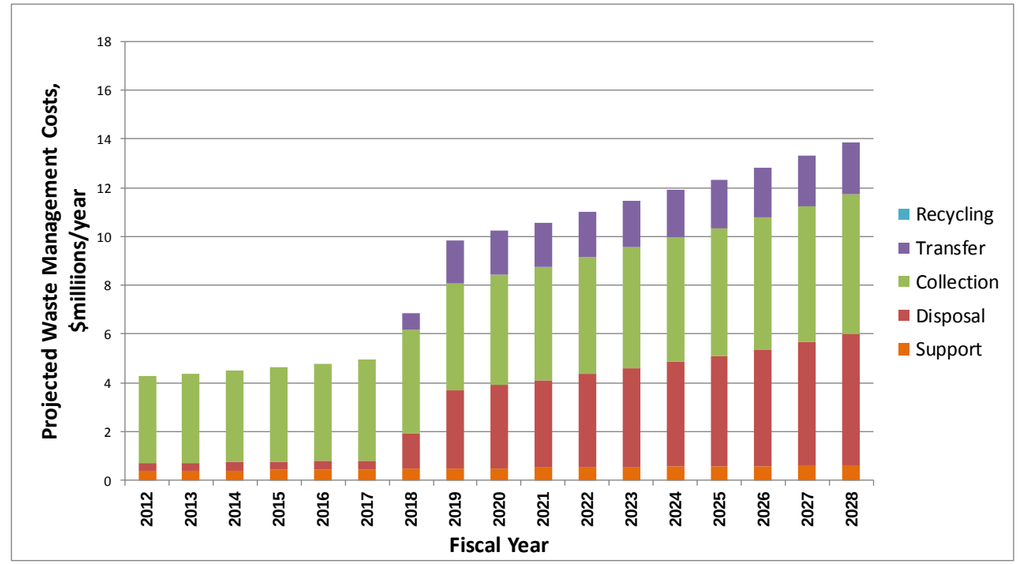


Exhibit A-5. Suffolk, Projected Solid Waste Management Costs (2012 – 2028)

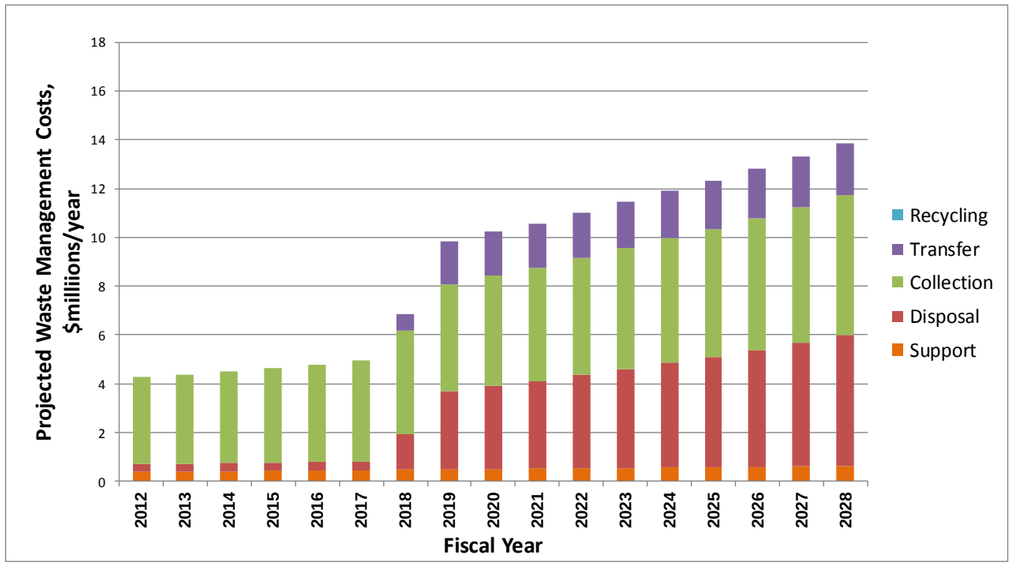
Scenario C.3 - SPSA LF/Muni TS/Expand LF/No Ash
Municipality: Suffolk



Scenario D.1 - No LF/WTE/Muni TS/VB Ash
Municipality: Suffolk



Scenario D.2 - No LF/WTE/Muni TS/No VB Ash
Municipality: Suffolk



Scenario E.1 - VB Only Waste/VB WTE/Others to WheelabratorWTE/SPSA LFClosed
Municipality: Suffolk

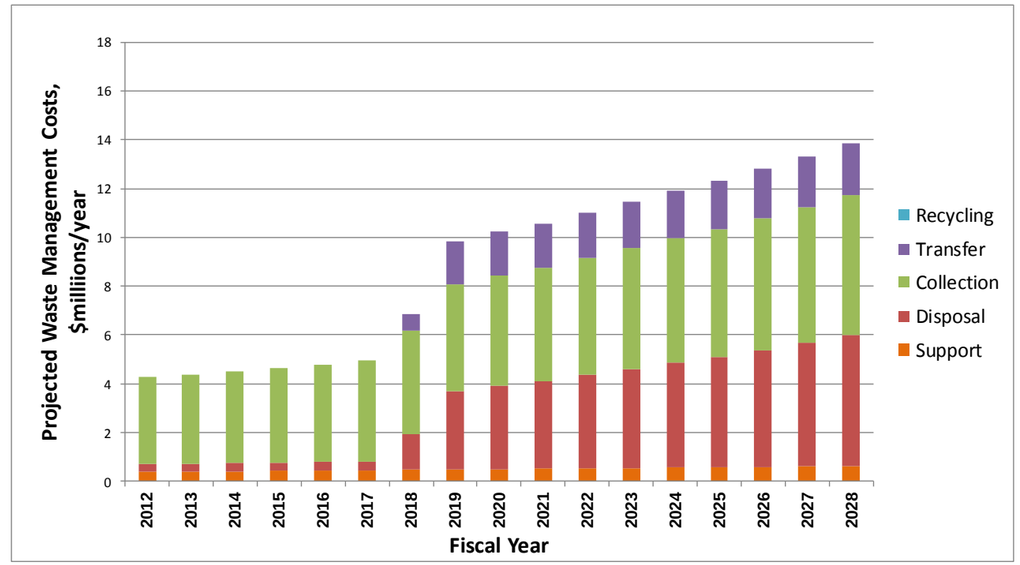
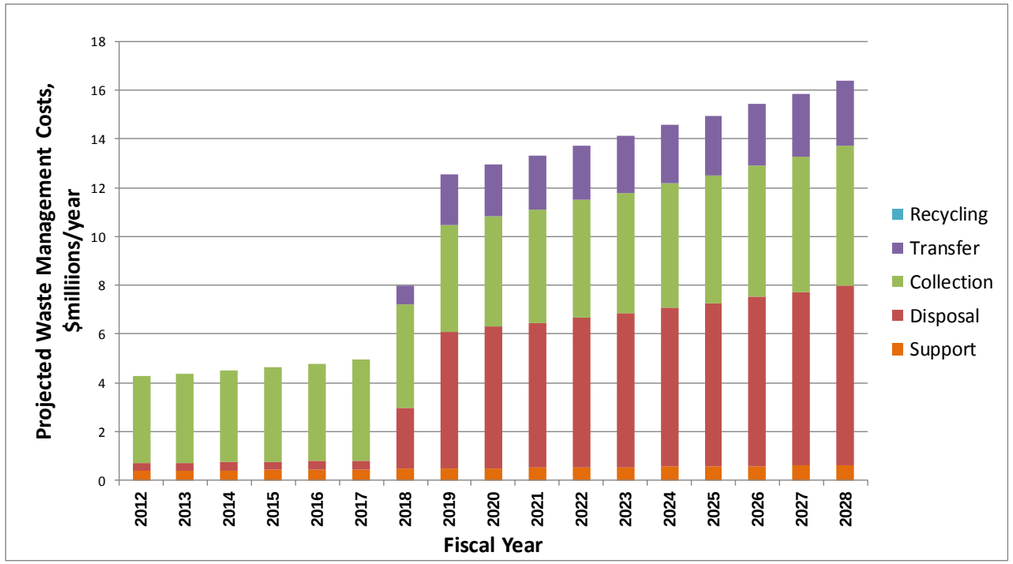
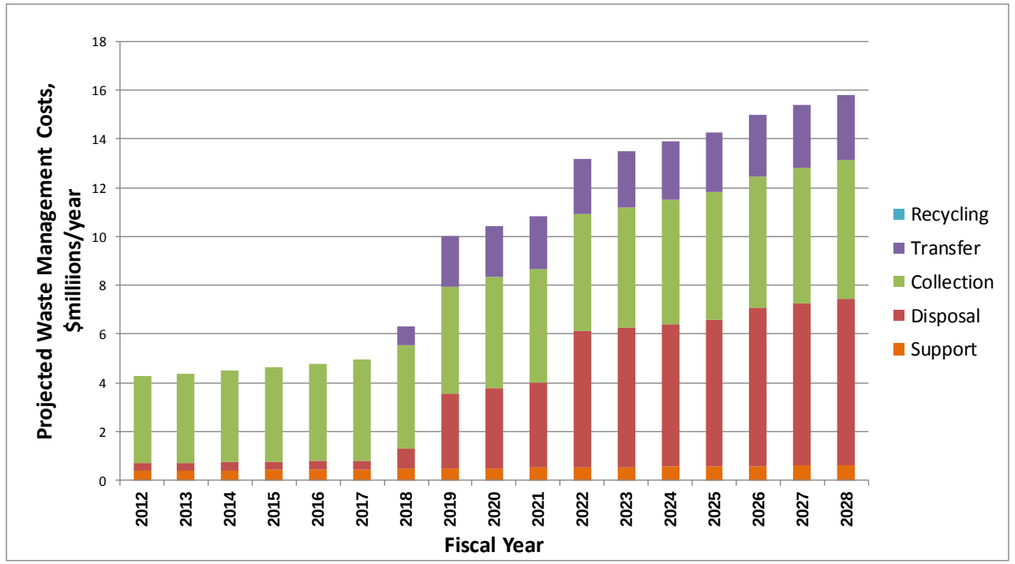


Exhibit A-5. Suffolk, Projected Solid Waste Management Costs (2012 – 2028)

Scenario E.2 - VB WTE/ Others to VB WTE/ SPSA LF Closed
Municipality: Suffolk



Scenario F.1 - Suffolk Ops LF/Other WTE
Municipality: Suffolk



Scenario G.1 - Portsmouth to WTE Not Part of SPSA
Municipality: Suffolk

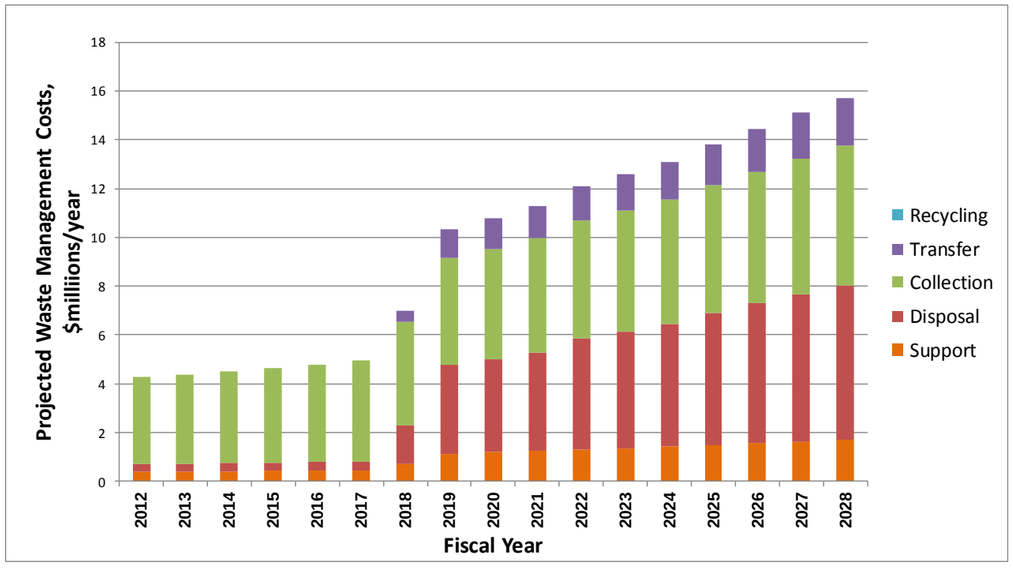
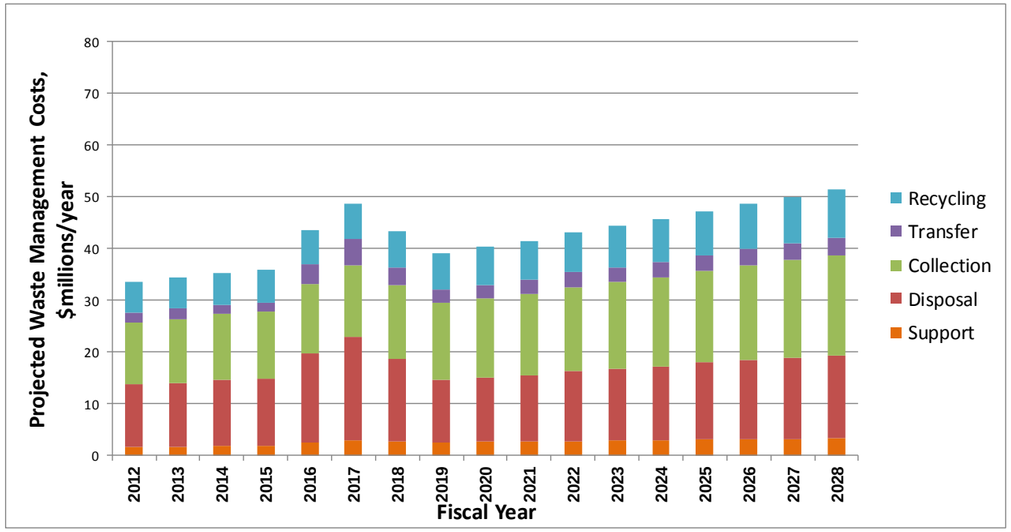
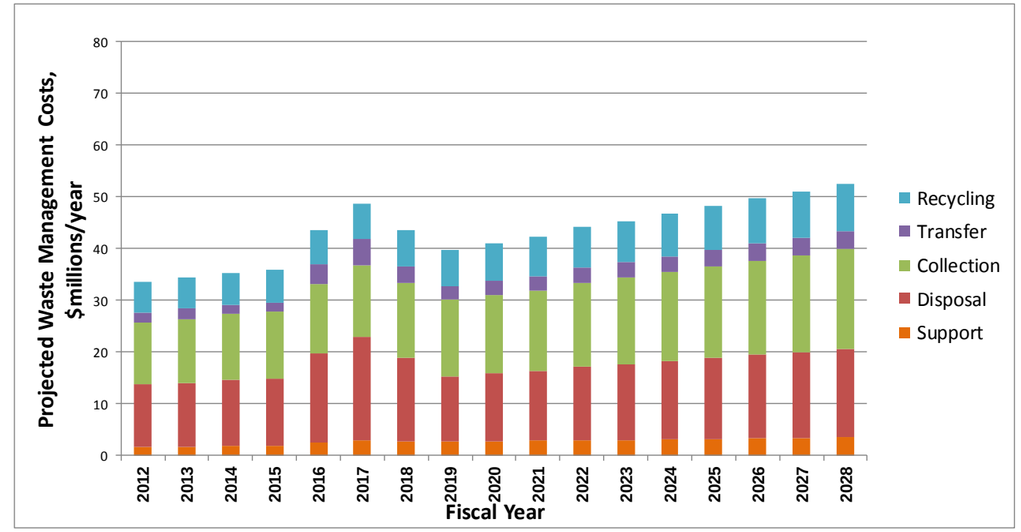


Exhibit A-6. Virginia Beach, Projected Solid Waste Management Costs (2012 – 2028)

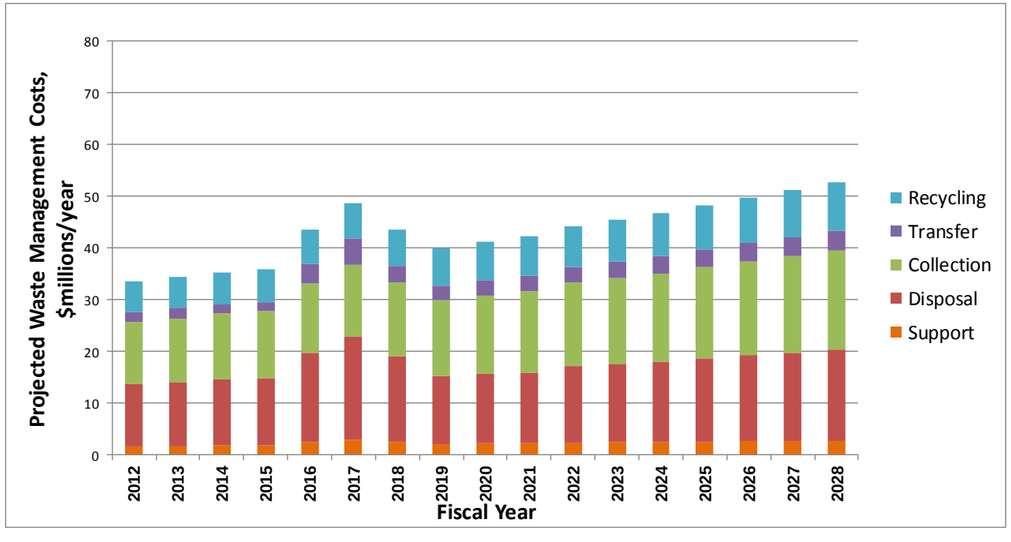
Scenario A.1 - All SPSA LF/ TS/WTE
Municipality: Virginia Beach



Scenario A.2 - Eastern SPSA LF/ TS/WTE
Municipality: Virginia Beach



Scenario A.3 - Eastern SPSA LF/WTE/ Muni TS
Municipality: Virginia Beach



Scenario B.1 - All to ORLF/SPSA TS
Municipality: Virginia Beach

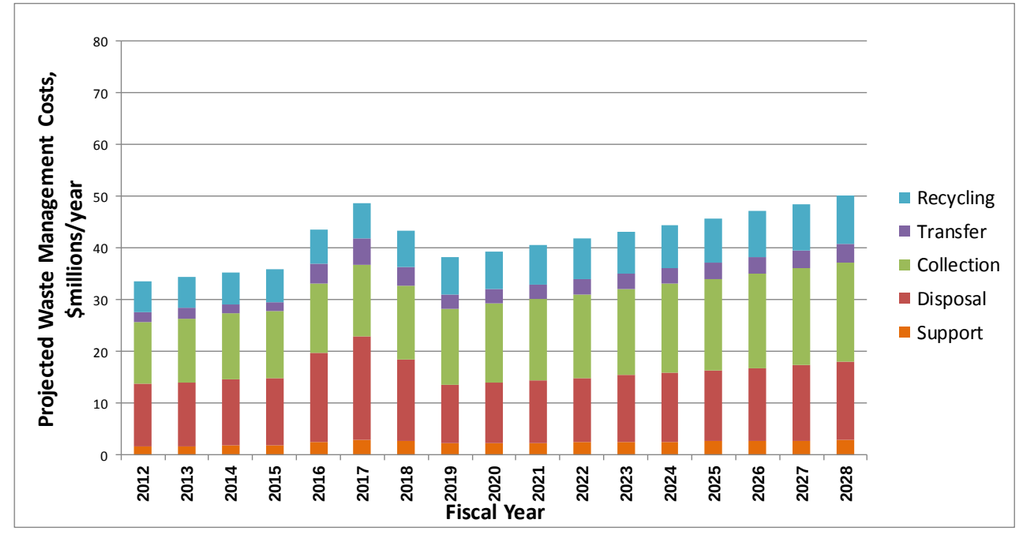
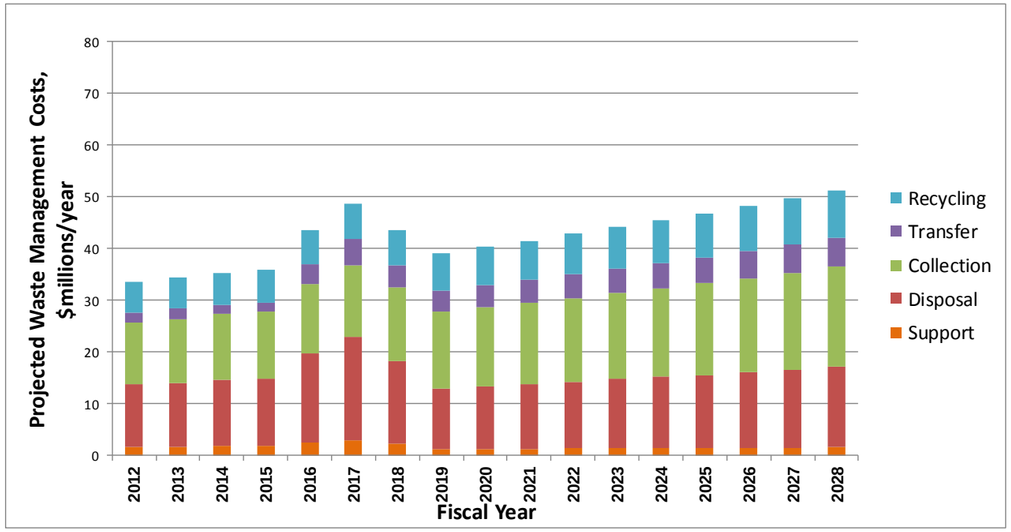
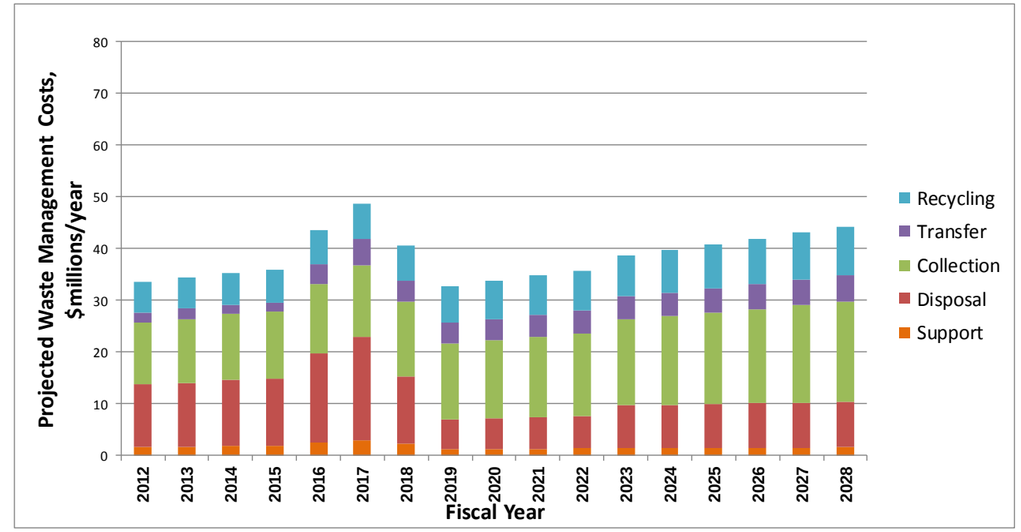


Exhibit A-5. Suffolk, Projected Solid Waste Management Costs (2012 – 2028)

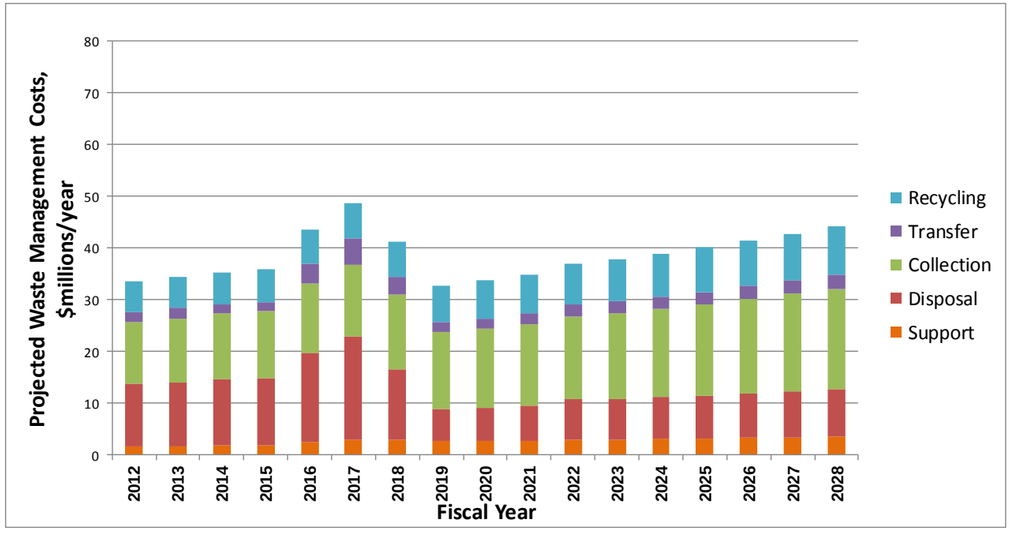
Scenario B.2 - All to ORLF/Muni TS
Municipality: Virginia Beach



Scenario B.3 - VB to LF No. 2/All Others to ORLF/Muni TS
Municipality: Virginia Beach



Scenario C.1 - SPSA LF/TS/Expand LF/No Ash
Municipality: Virginia Beach



Scenario C.2 - SPSA LF/TS/Expand LF/WTE Ash
Municipality: Virginia Beach

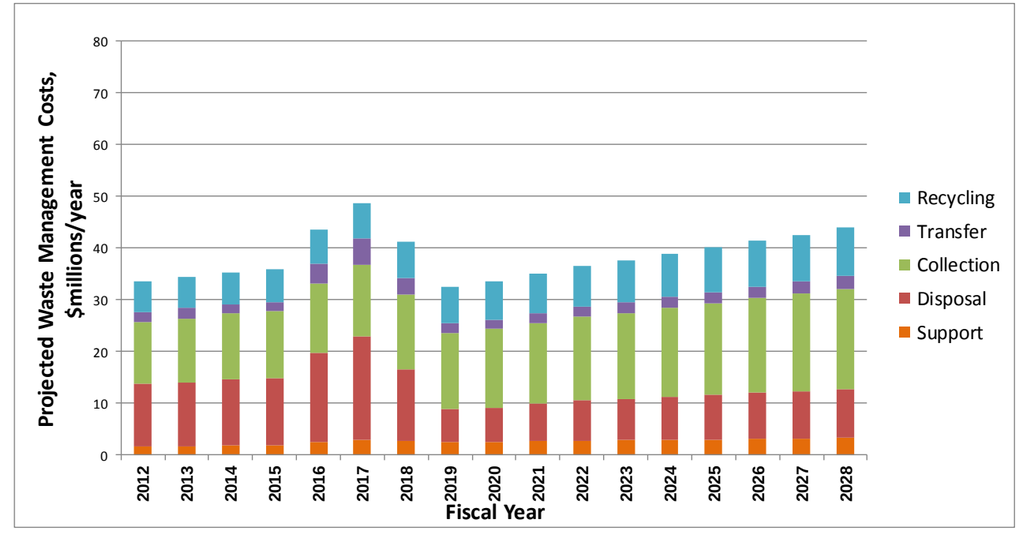
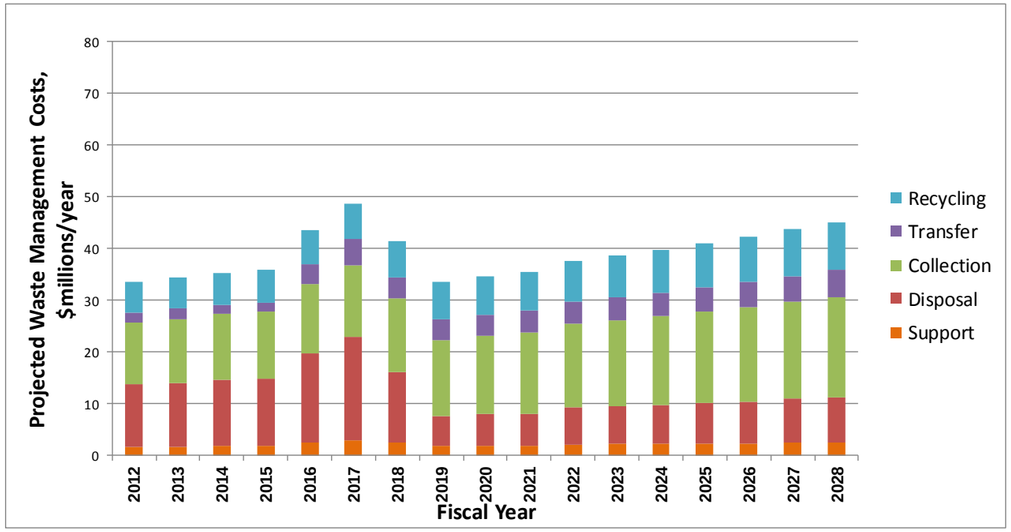
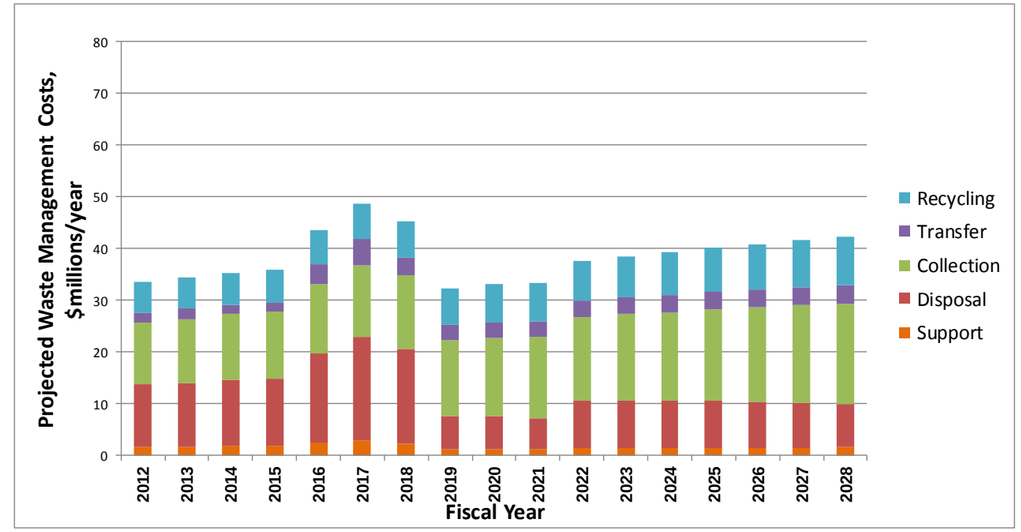


Exhibit A-5. Suffolk, Projected Solid Waste Management Costs (2012 – 2028)

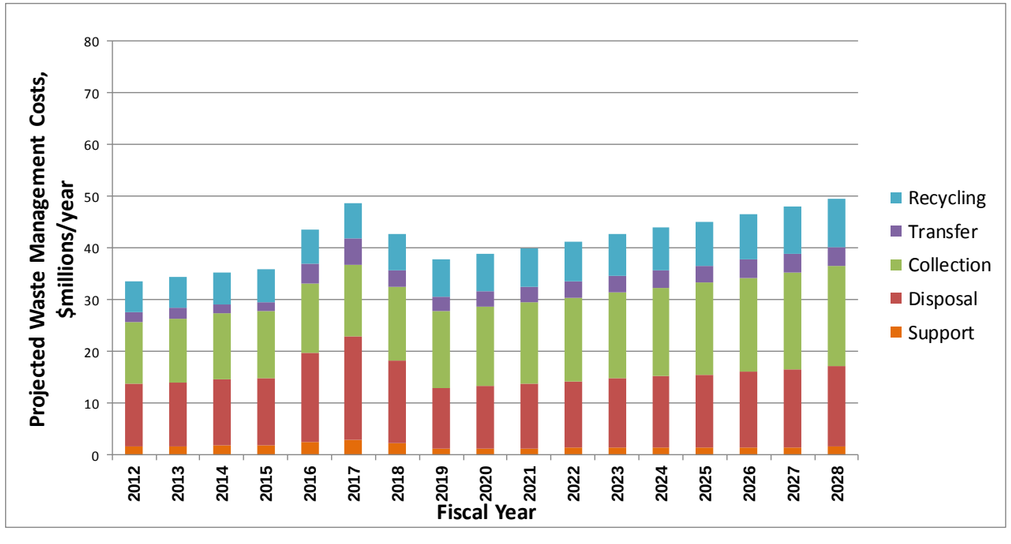
Scenario C.3 - SPSA LF/Muni TS/Expand LF/No Ash
Municipality: Virginia Beach



Scenario D.1 - No LF/WTE/Muni TS/VB Ash
Municipality: Virginia Beach



Scenario D.2 - No LF/WTE/Muni TS/No VB Ash
Municipality: Virginia Beach



Scenario E.1 - VB Only Waste/VB WTE/Others to WheelabratorWTE/SPSA LFClosed
Municipality: Virginia Beach

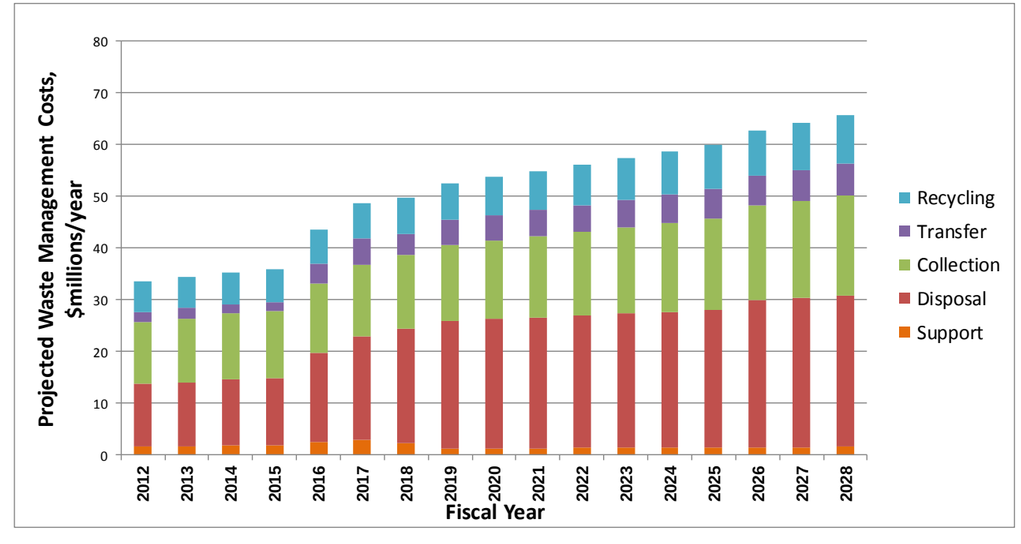
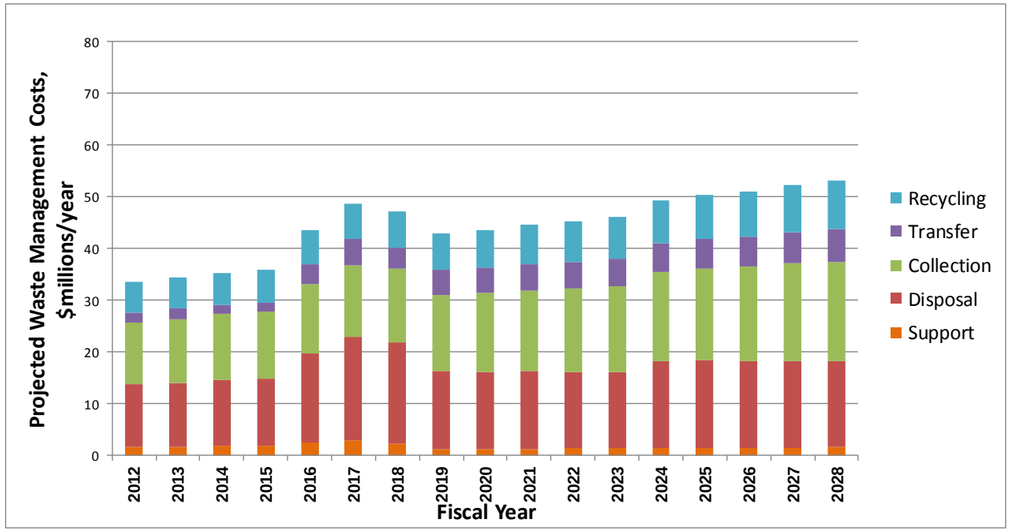
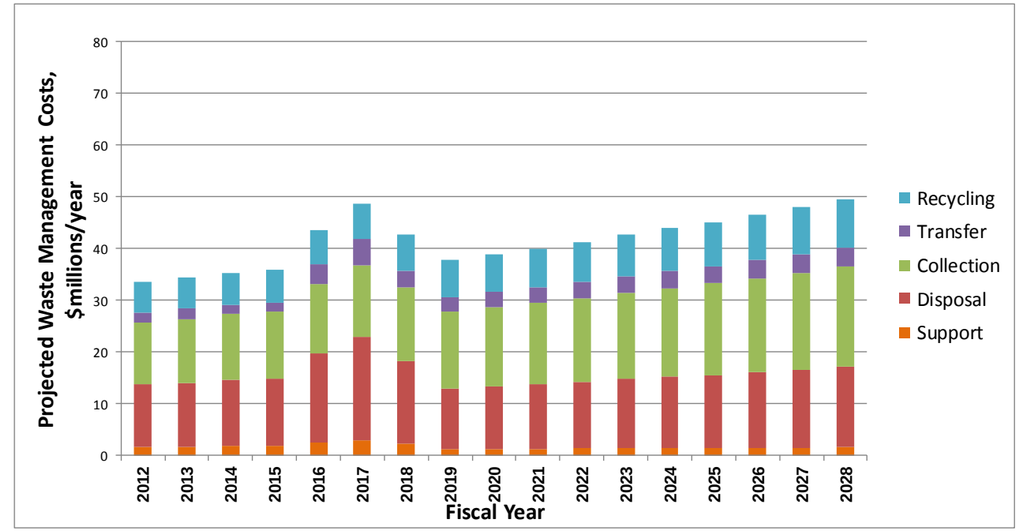


Exhibit A-5. Suffolk, Projected Solid Waste Management Costs (2012 – 2028)

Scenario E.2 - VB WTE/ Others to VB WTE/ SPSA LF Closed
Municipality: Virginia Beach



Scenario F.1 - Suffolk Ops LF/Other WTE
Municipality: Virginia Beach



Scenario G.1 - Portsmouth to WTE Not Part of SPSA
Municipality: Virginia Beach

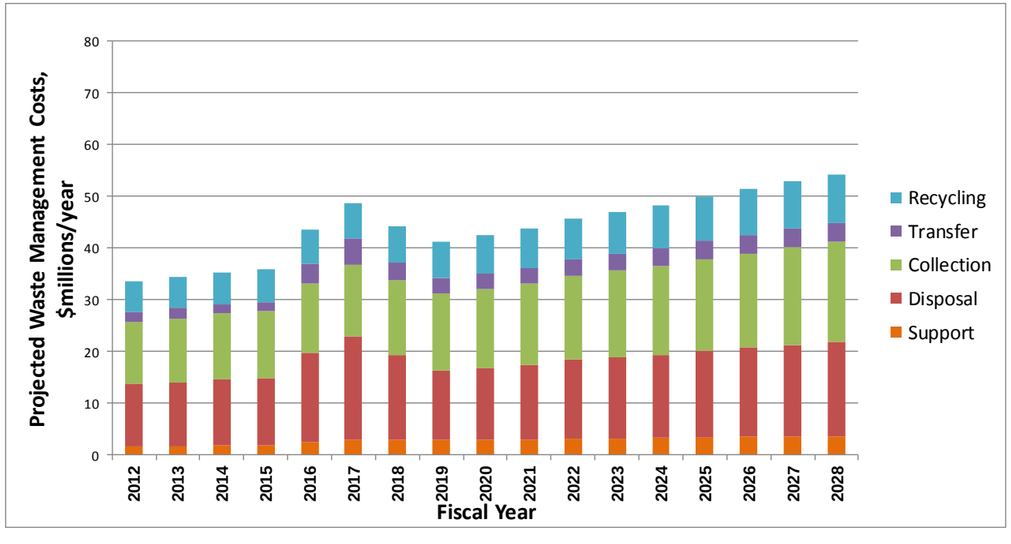
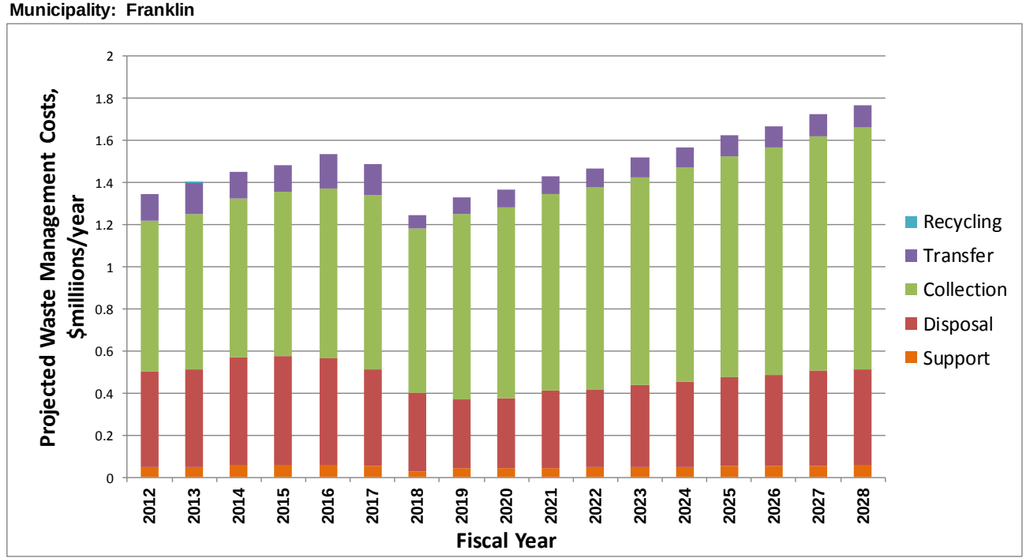
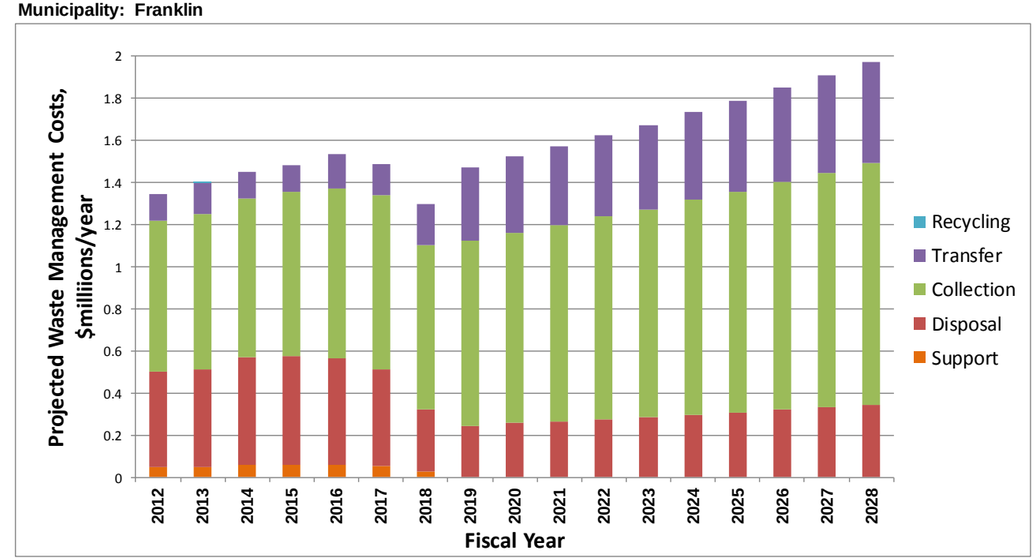


Exhibit A-7. Western Communities, Projected Solid Waste Management Costs (2012 – 2028)

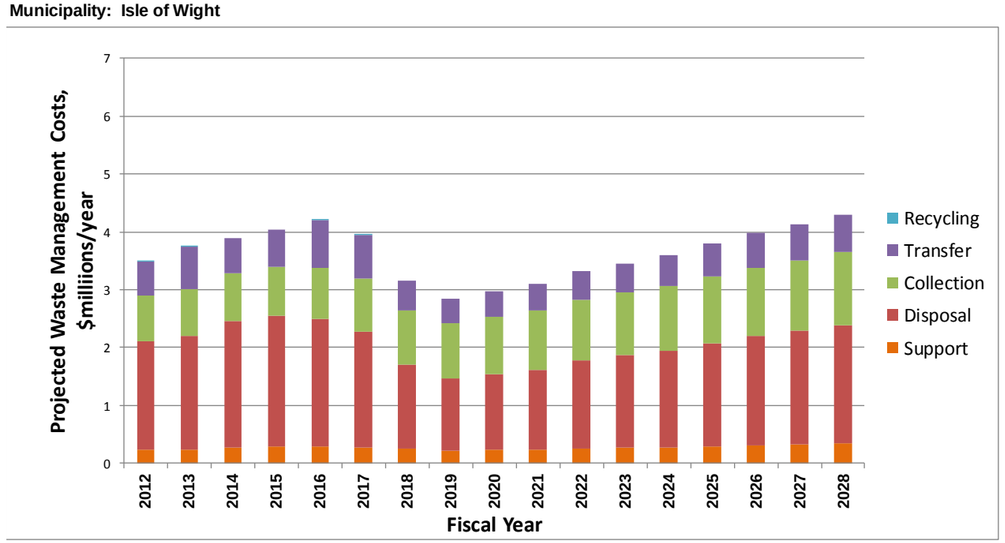
Scenario A.1 - All SPSA LF/ TS/WTE
Municipality: Franklin



Scenario B.2 - All to ORLF/Muni TS
Municipality: Franklin



Scenario A.1 - All SPSA LF/ TS/WTE
Municipality: Isle of Wight



Scenario B.2 - All to ORLF/Muni TS
Municipality: Isle of Wight

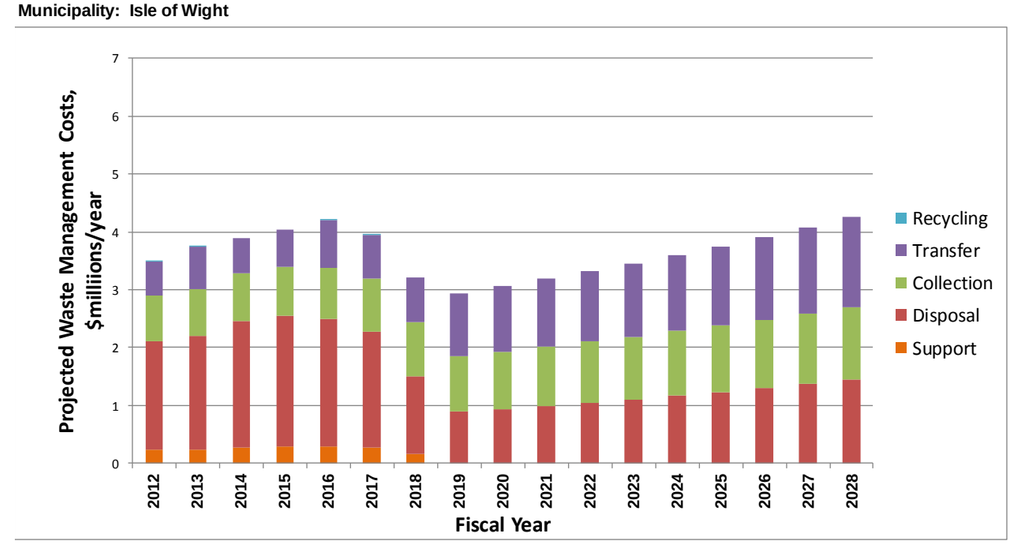
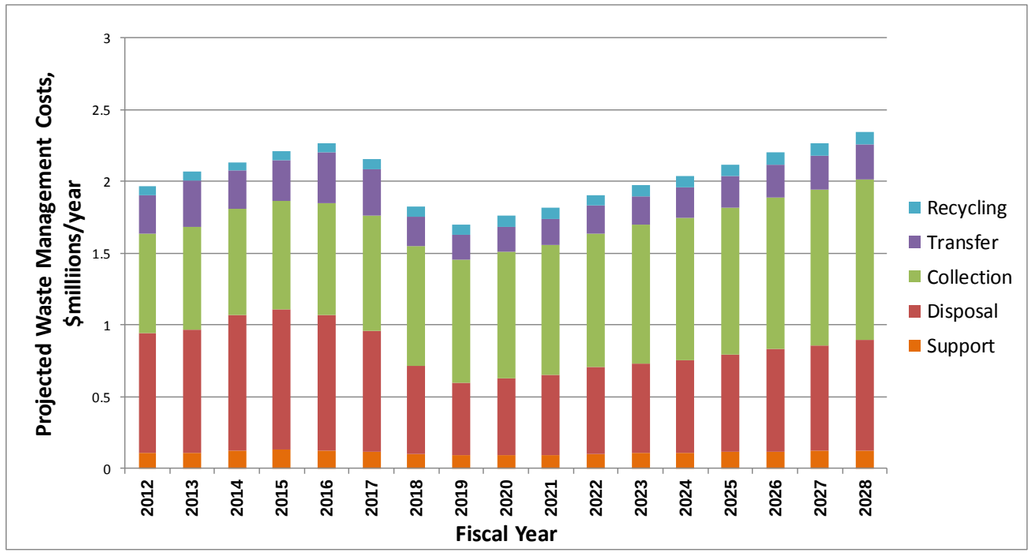
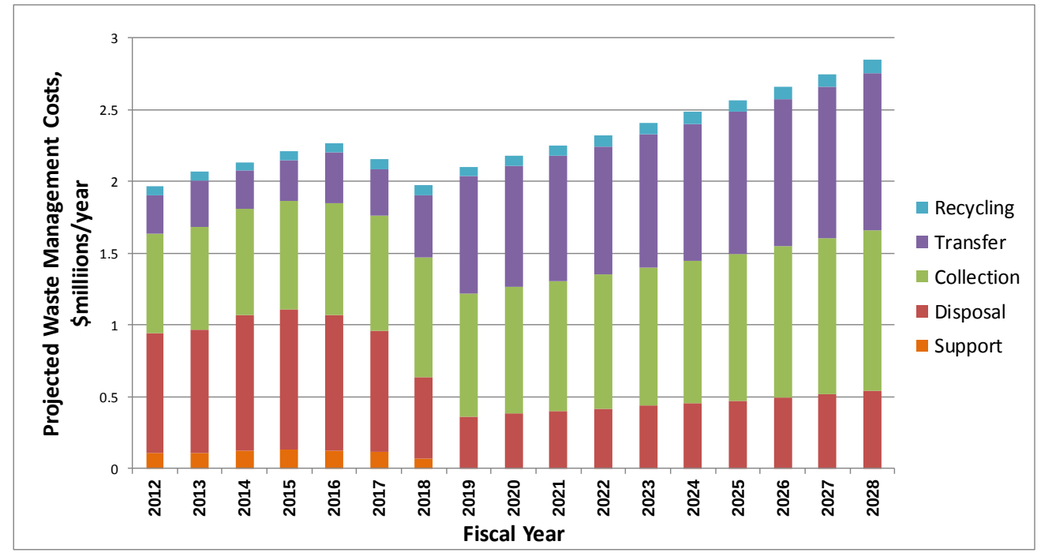


Exhibit A-7. Western Communities, Projected Solid Waste Management Costs (2012 – 2028)

Scenario A.1 - All SPSA LF/ TS/WTE
Municipality: Southampton



Scenario B.2 - All to ORLF/Muni TS
Municipality: Southampton