

1.1 Purpose

Presented in this report (the “Report”) are the results of the review of future solid waste management options undertaken by R. W. Beck, Inc. (“Beck”) on behalf of Carroll County, Maryland (the “County”). The County currently operates a solid waste management system (the “System”) which addresses the solid waste management needs of the residents and businesses of the County. The purpose of the review is to assist the County in formulating a strategy on: (1) how to charge for the cost of the solid waste management services it provides for the citizens and businesses of the County; and (2) determining the most economical means of disposing of solid waste during the period 2011 through 2031. Based on the review as discussed in this Report, Beck has identified various options for the County’s consideration regarding a future strategy to address these two issues.

1.2 Scope of Report

The Report was undertaken in accordance with the terms and conditions of a Professional Services Agreement dated May 13, 2005 (the “PSA”) between Beck and the Northeast Maryland Waste Disposal Authority (the “Authority”). The specific tasks that were performed by Beck in undertaking this review were as follows:

1. Review data on the County’s estimate of current and future solid waste generation.
2. Review data on the existing components of the System.
3. Develop Projected Operating Results of the System for both a six-year period from 2005 through 2010 and a 20-year period 2011 through 2031.
4. Develop a list of competing solid waste management facilities located within a reasonable hauling distance of the County.
5. Review alternate recycling strategies for the County’s consideration.
6. Review the following alternative municipal solid waste management strategies:
 - a) long haul out of the County
 - b) the current commercial viability and status of alternative waste-to-energy technologies including: (i) mass burn; (ii) gasification; (iii) waste-to-ethanol; and (iv) plasma arc
 - c) construction of a commercially demonstrated waste-to-energy facility

- d) review information developed by others regarding the construction and operation of an organics composting facility and a municipal solid waste composting facility
7. Identify alternative strategies for the funding of solid waste management services.
8. Prepare a report summarizing the results of Beck's review.

1.3 Executive Summary

This Report sets forth information to assist the County in formulating a strategy to dealing with various solid waste management issues. The Report presents various options to:

- 1) Increase the efficiency of its recycling system
- 2) Dispose of solid waste upon termination of the current long-haul transfer option under contract with Waste Management Inc. ("WMI").
- 3) Fund the cost of solid waste management services

Recycling

The percentage of material being recycled has decreased each year between 2002 and 2004 as it reduced from 48 percent in 2002 to 32 percent in 2004. The decrease in the level of recycling is associated with the fact that the County's solid waste is no longer being transferred to the York County Resource Recovery Center where it was combusted to generate energy and the County received credit for the recycled scrap metal and residue ash recovered by that facility. In Section 4 of this Report we have identified a number of changes to the recycling system for the County's review and consideration. The changes have been segregated by the amount of cost and level of effort required on the part of the County. Among those changes which would be of a relatively low cost, but should help the County more efficiently manage its recycling program, are the following:

- 1) Obtain additional data on the current recycling program
 - a. If possible, track the number of households that subscribe to curbside recycling. Because this information is compiled by private haulers, it may be difficult to obtain.
 - b. Review accounting efforts to ensure that the full cost of the recycling program is described.
- 2) Improve Education/Outreach
- 3) Consider making changes to the hauler licensing requirements so that they would result in increased recycling or improved cost-effectiveness.

Other options for consideration which would require more effort on the part of the County include the following:

- 1) Manage the collection function on a more regional basis

- a. Utilize the County's Community Planning Areas in establishing collection contracts
 - b. Divide the County into regions and contract collection by region
- 2) Develop franchise areas for the collection of solid waste and recyclables
 - 3) Consider Single Stream Collection of recyclables

Solid Waste Disposal Options

We have developed two sets of alternative analyses for the County's review and consideration. The first set of analyses assume the County receives in the System 100 percent of the solid waste currently generated in the County. We have identified this first set of analyses as "100% County Waste to System." The County estimates that approximately one-third of the waste being generated in the County is currently being disposed/delivered at non-County facilities. Due to the economies of scale associated with the development of a larger disposal facility, we believe that it would be in the best financial interests of the County and the municipalities to work together to find a mutually acceptable waste disposal option which address all of the solid waste generated in the County.

At the County's request, we have developed a second set of analyses which assume that the County does not receive that solid waste currently being disposed at alternative facilities by certain municipalities in the County and by certain private haulers collecting in the County. We have identified this second set of analyses as "Current Waste Stream Received at County." We have been informed that the municipalities may be interested in delivering their solid waste to the System. We believe the two sets of cases cover the range of potential waste deliveries to the System and the information presented herein will allow the County to evaluate the financial impacts associated with the potential range of waste delivery options.

For the two different waste delivery options, we have developed Projected Operating Results for the period 2011 through 2031 which calculates the projected costs for the following solid waste management options:

- 1) Continue the current long-haul transfer to disposal facilities located outside the County. As discussed in Section 3 of this Report, we believe that, during the foreseeable future, landfills located in Virginia will represent the lowest cost of disposal for out-of-state long-haul options.

We have included, as a sensitivity analysis for this particular option, an additional set of projections which assume that the cost of long-haul transfer increases at twice the rate of inflation due to increases in the cost of diesel fuel and the need to locate new disposal capacity at more distant locations.

- 2) Construct a County-only waste-to-energy facility sized to meet the waste disposal needs of just the County. We have assumed the construction of a facility capable of processing approximately 600 TPD.
- 3) Construct a regional waste-to-energy facility sized to meet the waste disposal needs of the County and one other similarly sized public entity. For this option we

have assumed the construction of a facility capable of processing approximately 1,500 TPD. The construction of this larger facility allows for economies of scale associated with the construction cost and the operating and maintenance expenses.

- 4) Construct a municipal solid waste composting facility sized at 600 TPD and have all process residue long-hauled out of the County for disposal. This option is assumed to generate 420 TPD of final compost product.

As a variation to this option, we have developed an additional set of projections which assume the County will construct a 600 TPD municipal solid waste composting facility and landfill all the process residue at the County's Northern Landfill.

We also developed two additional cases for the composting option which assume the County will have to pay \$15 per ton to transfer and transport the 420 TPD of finished compost product to some party who will accept the material at no cost to the County.

- 5) Continue landfilling waste at the Northern Landfill and site a new landfill when the Northern Landfill has been depleted.

This results in nine different sets of projections for each of the two waste delivery levels, for a total of eighteen sets of Projected Operating Results. In addition, at the County's direction, all the cases assume the County will repay the current Solid Waste Fund Deficit of approximately \$9,000,000 by paying \$1,000,000 per year during each of the next nine years.

To assist the County in its evaluation, we have estimated the number of years of useful life of the Northern Landfill if the County decided to landfill all solid waste generated in the County. We estimate that under that operating assumption, the Northern Landfill would be fully depleted within approximately ten to eleven years based on an assumed compaction rate of municipal solid waste of 1,200 pounds per cubic yard. This compares to an estimated useful remaining life of the Northern Landfill of approximately 50 years under a continuation of the long-haul transfer option. Determining both the cost and the amount of time required to acquire a parcel of land of sufficient size to serve as a replacement for the Northern Landfill was beyond the scope of this review. However, based on our experience on behalf of other public sector entities, we would expect that it could require a significant amount of time to locate, purchase, permit, design and construct a new landfill. The County should not under estimate the value to the County of the potential airspace at the Northern Landfill.

Presented in Table 1-1 is a summary of the estimated total cost of disposal for both of the assumed waste delivery scenarios of the five options (and four variations) outlined above during the period 2006 through 2031. Also presented in Table 1-1 is a summary of the net present value of the calculated total cost of disposal assuming a discount rate of five percent. It should be noted that in all eighteen cases, we have assumed that the County will continue to long-haul transfer from 2006-2011 while the facilities are being permitted, financed and constructed so the cost of all eighteen cases is the same during that time period.

We have also included an estimate of the average cost per ton to allow the County the ability to compare the unit costs between the two different levels of waste deliveries to the System.

Table 1-1
Summary of Estimated Cost of Disposal
(\$000)

System Disposal Cost	Nominal Cost	Net Present Value	Nominal Cost \$/Ton	Net Present Value \$/Ton
100 Percent County Waste to Stream				
Long-Haul	\$541,800	\$287,300	\$67	\$36
Long-Haul / Increased Fuel Costs	\$745,800	\$370,400	\$92	\$46
600 TPD Waste-to Energy Facility	\$644,700	\$342,600	\$80	\$42
Regional 1,500 TPD Waste-to Energy Facility	\$492,300	\$269,500	\$61	\$33
Compost Facility / Landfill	\$549,700	\$297,800	\$68	\$37
Compost Facility / Long-Haul	\$598,700	\$319,600	\$74	\$40
Compost Facility with Haul Cost/ Landfill	\$601,900	\$322,400	\$74	\$40
Compost Facility with Haul Cost/ Long-Haul	\$651,000	\$344,200	\$81	\$43
Landfill	\$406,800	\$220,600	\$50	\$27
Current Waste Stream Received at System				
Long-Haul	\$405,400	\$217,800	\$72	\$39
Long-Haul / Increased Fuel Costs	\$547,400	\$275,700	\$97	\$49
600 TPD Waste-to Energy Facility	\$528,200	\$279,400	\$94	\$50
Regional 1,500 TPD Waste-to Energy Facility	\$375,900	\$206,300	\$67	\$37
Compost Facility / Landfill	\$438,300	\$237,400	\$78	\$42
Compost Facility / Long-Haul	\$462,200	\$250,100	\$82	\$44
Compost Facility with Haul Cost/ Landfill	\$490,600	\$261,900	\$87	\$47
Compost Facility with Haul Cost/ Long-Haul	\$514,500	\$274,700	\$91	\$49
Landfill	\$313,100	\$170,300	\$56	\$30

The information in Table 1-1 indicates that the lowest cost option, on a net present value basis, involves only landfilling at the Northern Landfill until that facility is depleted and then siting a new landfill at some other location in the County.

Representatives of the County have indicated that landfilling only is not their desired approach. Of the other alternative options considered, the lowest cost option involves the construction of a regional waste-to-energy facility sized at 1,500 TPD. This option takes advantage of economies of scale of a larger facility as well as the ability to generate electricity for sale.

The next lowest cost option is a continuation of the long-haul alternative - assuming that the cost of long-haul increases each year at the assumed annual rate of inflation of 2.4 percent. We have defined “long-haul” as any option which requires the use of a transfer station and transfer vehicles to transport waste for disposal outside the County. Our experience indicates that it is not economical to transport waste in collection vehicles for distances greater than 35 to 30 miles, one way.

If one assumes that the cost of long-haul goes up at twice the assumed rate of inflation (4.8 percent per year) because of continued increases in the cost of diesel fuel and the more distant location of new landfill sites, the total costs of the long-haul option for the 100 percent County waste to System cases are calculated to increase from \$287,300,000 to \$370,400,000. Assumptions regarding the future price of diesel fuel and location of disposal sites will have a significant impact on the long-haul option.

It is important to note that the estimated capital and operating expenses of the composting options used in our analysis were conceptual planning estimates developed by the Authority’s composting consultant (the “Compost Consultant”). The Compost Consultant assumed that the compost material derived from the processing of municipal solid waste will not generate any revenue because of the contaminants that will remain in the final compost product. Such contaminants include small pieces of plastic, glass, metal, and other inorganic matter. In addition, the analysis assumes that the County will be able to find some source who will be able to utilize 420 TPD of compost material processed from municipal solid waste at no cost to the County. In the event the County must pay some fee for the removal and disposal of the compact product, the cost of the compost options will increase accordingly. We believe the County will find it a challenge to find a market for 420 TPD of compost product processed from municipal solid waste. Because of our belief that it is unlikely that the County will be able to find a credit-worthy entity who can utilize 420 TPD of compost produced from municipal solid waste, we ran additional analyses for the two compost options which assume the County will have to pay \$15 per ton to haul the compost product to a site where it can be beneficially used.

The analysis presented in Section 6 of this Report indicates that the compost options are not economically competitive with other alternatives being considered. Therefore, due to the uncertainty of the technology, the higher costs and the lack of a market for the final product, we are of the opinion that the County eliminate the composting of municipal solid waste as an option as it continues its evaluation of alternatives.

The projected operating results indicate that there are significant savings which could be realized by increasing the size of a waste-to-energy facility from 600 TPD to 1,500 TPD, which strongly favors a regional approach to the implementation of waste-to-energy facility.

The County has indicated that it has the following three principal criteria it will consider in evaluating waste disposal options:

1. Manage costs in a predictable fashion;
2. Remain independent; and
3. Maximize the life of the Northern Landfill.

Presented in Table 1-2 is a summary matrix which presents the waste disposal options and the ability of that option (expressed in high, medium or low) to meet the County's three primary objectives.

Table 1-2
Summary Matrix

Option	Manage Cost Predictably	Maintain Independence	Maximize Life of Landfill
Long Haul	Low	Low	High
600 TPD WTE Facility	High	High	Medium
Regional 1,500 TPD WTE Facility	High	High	Medium
Compost Facility/Landfill	Low	High	Medium
Compost Facility/Long Haul	Low	High	High
Continued Landfilling	Medium	High	Low

Funding Strategies

Section 7 presents information on alternative strategies for different methods of funding the cost of the County's solid waste management services. The different funding strategies available for the County's consideration include tip fees, a system benefit charge ("SBC"), user fees and impact fees. Section 7 sets forth a lengthy discussion of the specific features of each strategy, the impact on stakeholders, the steps required to implement each strategy and advantages and disadvantages of each of these four funding strategies. In reviewing these funding strategies, the County will need to consider the system which is equitable, simple to administer and easy to predict. Further, because the County has debt on the System, it will need to adopt a funding strategy which attracts sufficient waste to the System to allow the generation of sufficient revenues to meet the System's revenue requirements.

In addition to the four funding strategies, Section 7 discusses alternative methods of controlling where solid waste is disposed. These methods include: 1) flow control strategies; 2) private hauler licensing/permitting and the creation of franchise/contract collection districts.

Appendix B of this report provides a detailed evaluation of the structure and possible range of tip fees, SBCs and impact fees were the County to pursue these funding mechanisms.

Tip fees are in fact the primary current revenue source for the System, and will almost certainly remain so in the future. Of the remaining funding strategies shown in Appendix B, we note that solid waste impact fees are extremely rare in the industry, and can identify only four municipalities that have implemented such fees. For this reason, it is recommended that impact fees for solid waste not be pursued at this time.

Ultimately, we believe it is likely that the County will have to implement SBCs in some form and for at least some customer classes to assure a means of recouping System revenues. Our analysis suggests that the maximum residential SBC would be in the range of \$81 per year for a single family household assuming the County continues to manage the current fraction of wastes generated in the County, but would decrease to \$75 if the County managed all waste (and therefore generated tip fee revenues on all wastes).

Finally, we note that having SBCs would provide a mechanism for the County at some point in the future to improve control of solid waste collection in the County in the form of contracts or franchises. Contract costs could be charges to appropriate customer classes via the SBC, while wastes collected could be directed to County-managed facilities. Such a system would provide maximum control of solid waste in Carroll County, and also maximize throughput at County-managed facilities resulting in lower unit costs for these facilities.

1.4 Project Development and Management

Several of the options discussed in this Report involve the development, financing and management of capital intensive, complex projects. This is particularly true for landfill gas recovery, waste to energy facilities and recycling processing facilities.

As a Member of the Northeast Maryland Waste Disposal Authority, the County has access to experienced professionals who will work on the County's behalf to procure a project at a reasonable cost, and to manage the project for the long term. The Authority can also own the facility on behalf of the County, or can manage a privately owned facility. These decisions will be made by the County.

As an example of the activities associated with these projects, presented below is a list of typical project requirements for which the Authority can provide assistance to the County.

Project Development

- Assist the County in finding a suitable site
- Assure the provision of utilities, including water, wastewater, and electricity
- Define the permitting requirements

Project Procurement

- Conduct a public competitive procurement
- Write a Request for Proposals and issue
- Respond to vendors' questions
- Review responses and write evaluation report
- Assist the County in selection of a vendor

Project Contracts

Negotiate contracts for:

- Site Purchase or Site Lease
- Purchase and sale of energy (steam and/or electricity)
- Residue Disposal (If out of County)
- Transportation Services
- Full Service Design-Build-Operate Contract

Project Finance

- Prepare financial analysis to assist the County in selecting a financing option
- Prepare and circulate all bond documents
- Arrange and conduct sale of bonds

Construction Management

- Provide a qualified engineer to oversee construction and acceptance testing

Operations Management

- Review Vendor's performance and compliance with contracts
- Manage disputes on behalf of the County

1.5 Conclusions

Presented below are the principal conclusions we have reached regarding our analysis of the County's recycling program, waste disposal options, and funding strategies.

1. There are a series of relatively low cost options the County could undertake to improve the efficiency of its current recycling program. These measures are described in detail in Section 4 of the Report and fall within the following general categories: (a) attempt to develop better information and data on the current recycling program; (b) improve education and outreach within the County; and (c) consider changing the hauler licensing requirements to either increase the level of recycling or improve the cost-effectiveness of the service.
2. There are several additional changes the County could consider making to the recycling program which would be more expensive than the options identified above. These include: (a) managing the collection function on a regional basis; (b) develop franchise areas for the collection of both solid waste and recyclables; and (c) consider single stream collection of recyclables.
3. The projected lowest cost disposal option analyzed as part of this Report involves a resumption of only landfilling solid waste at the Northern Landfill until that site

is depleted and then siting a new landfill someplace in the County. However, the County has indicated that landfilling in the County is the least desired alternative. The next lowest cost disposal option we identified would involve the construction of a 1,500 TPD regional waste-to-energy facility. This option is followed by a continuation of the current long-haul transfer operation if the annual cost of such an option increases at the rate of inflation. The long-haul transfer option could be subject to increases in diesel fuel costs that go up at a rate greater than the assumed increase in inflation of 2.4 percent and the location of new disposal options at more distant locations. In such an event, long-haul transfer could become the most expensive option.

4. The composting options are based on the assumption that the County will be able to find some credit-worthy source who will take 420 TPD of compost product processed from municipal solid waste at no cost to the County. Based on the reported problems with quality and contaminants as discussed in Section 5 of this Report, we believe that it will be a challenge for the County to realize this assumption. Therefore, the cost of the compost options will increase by whatever fee the County may be required to pay for the removal of some or all of the composted material. In addition, we believe it is extremely unlikely that the County will be able to execute a long-term contract with a credit-worthy entity who would agree to take the compost product produced by a municipal solid waste composting facility. We have included two sensitivity analyses which assume the County must pay \$15 per ton to transport the finished compost product to a third party. Due to the technical challenges of the technology, the uncertainty of finding a credit-worthy entity who will take 420 TPD of compost product processed from solid waste, and the potential additional cost to transport and/or dispose of the material, we recommend the County eliminate the solid waste compost alternatives from further consideration.
5. Based on our analysis of alternative funding strategies, it appears that a combination of tip fees and SBCs represent the most appropriate combination of revenue mechanisms to fund the County's solid waste system at this time. Tip fees are already the primary source of System funding. This analysis suggests that the maximum SBC for a single family households is in the range of \$81 annually assuming current waste flows, with the rate reduced to \$75 if the County managed all wastes generated in the County. To the extent feasible, we note that contracting for solid waste collection in the County unincorporated areas would further support the County's control of waste flow, and could be billed as a component of the SBC.