

## EXECUTIVE SUMMARY

### INTRODUCTION

The team of Earth Tech, Inc. (Earth Tech), and R.W. Beck (Beck) was contracted by the City of Sioux Falls, South Dakota (City) to develop a Regional Solid Waste Master Plan. The general topics of the Master Plan are focused on landfill design, operations, environmental and land use issues. Waste diversion, recycling, tip fees, and financial aspects are likewise critical elements of the Master Plan.

The Sioux Falls Regional Sanitary Landfill (SFRSL) is owned and operated by the City of Sioux Falls. The Sioux Falls Public Works Department currently manages the operation of the facility. The facility is charged with the proper management of solid waste materials generated by a five county service area of approximately 200,000 citizens. The landfill currently accepts approximately 525 tons per day of municipal solid waste (MSW) and approximately 200 tons per day of construction and demolition (C&D) debris.

SFRSL has a total permitted area of approximately 469 acres. The City also owns approximately 160 acres of adjacent property that is not currently included in the facility permit. The current disposal areas of the landfill consist of a 160-acre active area (Active Area), and a 160-acre expansion area (Expansion Area). Surrounding properties owned by the City are devoted to facility operations, storm water management, and buffer. The 160-acre Active Area is currently being utilized for the disposal of MSW and C&D. The Active Area will soon reach its permitted capacity for MSW and will therefore will be closed in phases over the next few years. Disposal of C&D in the Active Area will continue until final grades are achieved.

Future disposal of MSW is planned to occur within the 160 acre Expansion Area located to the west of the Active Area. The Expansion Area is estimated to have capacity for an operating life of approximately 34 years. Construction of the first cell in the Expansion Area was completed, with the exception of a leachate removal and management system, in 2002. Landfilling operations in Cell 1 has not yet begun.

The scope of this Master Plan is based on approximately 20 topics that were initially outlined by the City of Sioux Falls in their request for proposal and further defined during subsequent meetings. The topics of interest were categorized into the five major sections outlined in this report. The major subjects are addressed as follows:

- Regulatory and Environmental Assessments
- Operational Assessment and Issues
- Landfill Development and Long Term Management
- Financial Analysis
- Waste Diversion

## **REGULATORY AND ENVIRONMENTAL ASSESSMENTS**

The City is committed to complying with all regulatory requirements for the design, construction, and operation of the SFRSL. In addition, it is recognized that regulatory requirements may not address all site-specific conditions and the City's local obligation to minimize risks to the public and the environment.

### ***Physical Setting***

Information regarding the physical setting of the site was reviewed to characterize and understand conditions that play a role in the development and operation of the facility. Based on the available information, the following specific recommendations are provided to improve site data and the understanding of site conditions and how the physical setting may affect the development and operation of the solid waste disposal facility:

- During site work in 2003, it was noted that a number of the monitoring wells were missing locks and some were in need of repair due to surface erosion. Existing monitoring wells should be repaired and maintained as needed for long-term use.
- Review of site documents encountered inconsistencies in the survey information for monitoring wells. All wells should be re-surveyed (location, and elevations of ground and top of inner casing) as necessary to provide reliable, accurate location and elevation information for site characterization and development purposes.
- The geologic conditions below the landfill and the Wisconsinan/pre-Illinoian contact should be defined to evaluate likely ground water pathways in features unique to interglacial periods.
- Detailed soil boring logs, geotechnical data, and innovative technologies (e.g., surface geophysics, borehole geophysics) should be considered to define physical soil properties and depositional environment (i.e., subglacial, intraglacial, interglacial, resedimented, etc.).
- Geologic cross-sections should be updated to incorporate newer site data, regional information, and interpretations as well as proposed landfill base grades.
- Average linear flow velocities should be calculated in both the horizontal and vertical flow directions in order to define preferred ground water flow paths.
- The conceptual ground water model should be updated to reflect any new information obtained.

### ***Permit Compliance Review***

The SFRSL must obtain and comply with a number of federal, state, and local permits. The following permits and permitting issues were reviewed:

- County Solid Waste Permit
- State Solid Waste Permit

- NPDES Permit
- Wetlands and Waters of the State
- Air Permits and Requirements
- Local Zoning

**County Solid Waste Permit:** This permit was issued by Minnehaha County with an effective date of July 17, 2001. The term of the permit is five years and therefore expires July 17, 2006. The permit authorizes use of the Expansion Area and new scale-house area for the purpose of operating a MSW landfill. The Active Area does not require a County solid waste permit since this portion of the property was considered an existing landfill when Minnehaha County passed their solid waste ordinance in 1991.

There are a number of conditions included in the Minnehaha County Solid Waste Permit. The conditions are typically requests for submittal of documents to the County Office of Planning and Zoning. With the exception of a berming/landscaping plan (Condition #1), it appears that all of the other required documents have been submitted to the County. Certain conditions indicate that documents are to be “on file” with the County, implying that review and approval by County Staff is not required. Other conditions indicate that some documents are to be submitted for “staff approval.” Although the County has acknowledged submittal, we are not aware if the County has “approved” any of the documents submitted. We recommend that the City clarify this issue with County staff.

**State Solid Waste Permit:** This permit was issued to the City by the South Dakota Department of Environment and Natural Resources (SDDENR) November 26, 2002. The permit carries a 5-year term and therefore expires November 26, 2007. Although many of the permit conditions are subject to interpretation, we are aware of no significant compliance issues with the permit. This is based on our review of the available documents as well as conversations and meetings with SDDENR staff during the preparation of this report.

**NPDES Permit:** The SFRSL is currently regulated under Surface Water Discharge Permit for Storm Water Discharges Associated with Industrial Activities, General Permit #SDR 000000. This permit became effective December 16, 1997, and expired December 15, 2002. On November 4, 2002, the SDDENR issued a letter stating that their renewal permit has not been completed. They stated that any facility that submitted an NOI by December 15, 2003, would be allowed coverage under an administrative extension of the existing permit. The City submitted a Notice of Intent for Reauthorization (NOI) and it was received by the SDDENR on December 13, 2002. We understand that recent conversations between City and SDDENR staff confirmed that the SFRSL is covered under the extended permit and the renewal permit will be issued shortly.

The Storm Water Pollution Prevention Plan for the facility was originally developed as a requirement of the NPDES permit in 1993. Significant changes have occurred to the landfill operations since the development of the 1993 plan. We recommend that this plan be updated to reflect current facility design, operations, as well as current permit requirements. This should be done after updating the closure plan.

**Wetlands and Waters of the State:** Earth Tech reviewed available documents provided by the City addressing waters of the U.S. (including wetland) issues at the SFRSL. Based on the available documentation, it appears that permitting efforts for recent construction at the site have been addressed.

One major exception is the mitigation project and permit certification for the Cell 1 construction. The nationwide permit authorization for this project expired April 3, 2003. Since the mitigation project will not be completed until later in 2003, the City should contact the USACE to verify the status of the permit and the steps necessary to return to compliance.

For future site development, we recommend that a meeting be held with pertinent agencies to review anticipated permitting feasibility and identify any potential issues. As part of the agency coordination, the likelihood of obtaining permits related to full expansion and required mitigation and design features should be identified.

It is our understanding that a wetland mitigation project was under consideration in the buffer area east of the Active Site. This project was put on hold pending the results of this site review. Although little detail is available about this project at the present time, we have no major concerns about this project from a conceptual standpoint. If the City chooses, this project could proceed. We recommend that this project be closely coordinated with current and potential future groundwater monitoring and remediation activities that may occur in response to ground water contamination identified in this vicinity.

In addition to, or instead of, the mitigation project east of the Active Site, we recommend that the City consider a mitigation project associated with the relocation of the Wall Lake drainage ditch in the Expansion Area. Permitting of the ditch relocation may be made more acceptable to agencies if it was combined with a mitigation project that includes meanders to elongate and stabilize the drainage in a favorable way. This mitigation project is contingent on the City purchasing adjacent property to the south and west of the Expansion Area.

**Air Permits and Requirements:** Earth Tech reviewed available documents addressing air quality compliance at the SFRSL. Initially, it was discovered that the facility did not have a required Title V permit. It is our understanding that the City recently (May 2003) applied for the Title V permit that includes both the Active Area and the Expansion Area. The rules also require that a Design Capacity Report be prepared for the Expansion Area (within 30 days after beginning construction). The City should verify with the SDDENR if the Design Capacity Report is needed.

Tier 2 landfill testing was performed at SFRSL by Earth Tech in July 2003. Although the July 2003 testing indicates that collection and control of landfill gas is not currently required under the NSPS, calculations indicate that the threshold for this may be reached in 2004. The landfill has three options to continue compliance with the air quality rules. Tier 2 testing can be performed again in 2004. If the testing results in lower non-methane organic compound (NMOC) concentration, the landfill may postpone having to install a gas collection system. However, if the results of the new testing are higher, Tier 3 of the NSPS will be triggered. Tier 3 testing is used to determine a gas generation rate from the landfilled waste. If the results still show greater than 50 MG/yr NMOC emissions, a collection system would be required. The third option is for the landfill to install a gas collection system at this time, and dispense with performing further gas sampling.

**Zoning Review:** The area surrounding SFRSL is primarily utilized for agricultural purposes. Several groupings of single-family homes are also present. The facility and the adjoining properties are zoned "A-1," Agricultural. Local zoning ordinances control property usage in Minnehaha County and landfills are subject to conditional use permitting in an A-1 district. Conditional use permits have been issued for the Active Area, the Expansion Area, and the parcel of land associated with the new scale-house facility.

### ***Environmental Monitoring Evaluation***

The SFRSL solid waste permit was reviewed along with State (ASRD 74:27) and federal (40 CFR, Part 258) regulations as part of the evaluation of environmental monitoring at the SFRSL. Based on our review, the following recommendations are made:

- Establish specific, permanent gas probes along property boundaries in order to monitor for potential methane migration.
- Improve the characterization of site geology and hydrogeology to establish likely ground water flow paths, particularly below the proposed base grades in the Expansion Area.
- Prepare a site-specific monitoring plan for ground water, surface water, leachate, and methane to outline all regulatory requirements pertaining to facility monitoring to be used by the City as well as those contracted to complete the work. To be of greater use to the facility and meet state of practice, the ground water monitoring plan should include additional information as follows:
  - Relevant point of compliance.
  - Monitoring network.
  - Monitoring frequency.
  - Monitoring parameters.
  - Statistical Methods.
  - Monitoring protocol.

### ***Primary Containment Evaluation***

Cell 1 in the Expansion Area was constructed in 2002 using an alternative liner system consisting of in-situ soils. Item 2.02 of the State Solid Waste Permit authorizes the use of in-situ clay soils as an alternative liner system with the following conditions:

- A qualified third-party Professional Geologist or equivalent, experienced in the hydrogeology of glacial till, is present on-site during cell excavation to ensure that the in-situ clay soils are of the characteristics stated in the permit application.
- Any discontinuities in the in-situ soil, or any soil material which is more permeable than  $1 \times 10^{-7}$  cm/sec are over-excavated as necessary and an engineered soil liner with a permeability of no more than  $1 \times 10^{-7}$  cm/sec be constructed in that area.
- The outside sidewalls of the cell(s) are lined with a synthetic liner no more permeable than  $1 \times 10^{-7}$  cm/sec.

During the construction of Cell 1, significant sand bodies were encountered at and below the base of the landfill. Although visible portions of this material were subcut 4 feet and replaced with clay, it was not possible to know if adequate liner materials existed beneath the other portions of the cell unless either the in-situ soils were removed and replaced with an engineered liner, or sufficient characterization through drilling and probing was performed. Direct push probes performed in May 2003 identified sand seams and layers within relatively close proximity to the bottom of the cell in areas that were not previously subcut and replaced with clay.

**Cell 1 Development Recommendations:** Considerable investment has been made by the City in the construction of Cell 1. This includes substantial effort taken during the construction to remove sand that was encountered at the base of the landfill and to replace it with up to 4 feet of compacted clay. The presence of sand seams in areas that were not subcut does present some risk to the integrity of the liner system. However, soil probes conducted in 2003 did not encounter sand seams at the most critical locations of the cell, which are along the leachate line trench and sump.

If the apparent uncertainty and potential risk associated with the construction are acceptable to the City, we recommend that the development and filling of Cell 1 proceed. To minimize potential risks, we recommend that Cell 1 not be used as a leachate collection point for upgradient cells. That is, the leachate collection system currently in Cell 1 will only service Cell 1. Future Cell 2 should be redesigned such that it has its own sump and leachate collection system that also services future upgradient Cell 3.

**Future Cell Development Recommendations:** The use of in-situ liner for future cell development is not recommended. Based on the current available information, there is no reason to believe that conditions similar to those encountered in the 2002 Cell 1 construction will not be encountered during the construction of one or more future cells. If the design remains unchanged, it is reasonable to assume that the liner for future cells will consist of a combination of in-situ soils and engineered clay liner (resulting from subcuts of unsuitable material). A uniform thickness of low permeable material cannot be assured under these conditions. The only way this can be assured is by requiring an engineered liner that completely covers the base grade and is integral to the sidewall liner.

Section 2.02 of the SDDENR Solid Waste Permit indicates that the operator “may” use in-situ clay soils as an alternative liner system. Presumably, the permit does not restrict more conservative liner systems (although a permit modification may be necessary in some cases). For future construction in the Expansion Area, we recommend that a more conservative liner system be implemented. The designs for a more conservative liner appropriate for this site will vary. Ultimately, the design that is chosen by the City will be based on cost versus the relative benefit in increased environmental protection.

What would be considered the “industry standard” liner system is described in the ARSD 74:27:12:17 (what the SDDENR requires if an alternative liner is not approved). This consists of a composite liner having a 60-mil geomembrane underlain by two feet of compacted clay with permeability of  $1 \times 10^{-7}$  cm/sec or less. It is our opinion that this type of liner is appropriate for this site.

If the City chooses to, other alternative liner systems, less conservative than the composite system described above, may be used. The sidewall liner, as constructed in Cell 1, appears to be well designed and provides reasonable environmental protection. For the base of the landfill, an alternative liner consisting of 4-foot thick compacted clay could be considered. The compacted clay should have permeability of  $1 \times 10^{-7}$  cm/sec or less. This liner would be more conservative than the in-situ liner and offer more assurance that a uniform thickness of low permeable material is present beneath the waste.

### ***Closure/Post Closure Care Evaluation***

The City’s current Closure/Post-Closure Care Plan (Plan) for the landfill was reviewed. The Plan was prepared by HDR Engineering (HDR) and is dated August 2001. The Plan provides a description of activities, schedules, and features related to closure and post-closure care of the Active Area of the facility. The Expansion Area is not included in this Plan. For closure and post-closure of the Expansion Area, the Plan makes reference to the Permit Application (presumably the most recent application dated August 2001).

The requirements for the Closure/Post-Closure Care plan are contained in ARSD 74:27:15. Based on review of the available documents, it appears that for the Active Area, the Plan meets the requirements of the ARSD. However, for the Expansion Area, reference to other engineering documents, specified and unspecified, does not constitute a Closure/Post-Closure Plan in accordance with the ARSD.

We recommend that the Closure/Post-Closure Plan be updated to address the entire facility, including the Active Site and the Expansion Area. This updated Plan should be a comprehensive engineering document that is based on current site conditions. The drawings for the closure plan should be detailed enough so that they can be used by the operator for closure construction and staking of the final waste grades. For a complete design, the closure plan should include a complete analysis of storm water management features, including detailed location and design of all permanent surface water conveyance structures such as ditches, berms, letdown structures, culverts, and storm sewers.

Based on review of existing Closure/Post-Closure Plan and other documents associated with SFRSL, there are a number of design issues associated with closure that should be considered in future permitting efforts and Plan revisions. These are summarized as follows:

- Future Plan revisions should take into account current topographic conditions, location of existing waste units (as recently surveyed by the City), and placement of infrastructure (i.e., the proposed leachate loadout facility and flare).
- The permitted cover section for the Active Area is the minimum required under ARSD 74:27:12:21. Additional benefit in reduction of infiltration and resulting leachate generation could be realized by increasing the thickness of the cover. Considering the surplus of on-site clay soils, we recommend that the City consider this for future closure construction.
- The permitted final cover of the Expansion Area exceeds the final cover standards outlined in ARSD 74:27:12:21. We support the use of the more conservative permitted cover system in the Expansion Area. However, we recommend that for constructability, the permeability standard for the clay barrier layer of the cap be reduced from  $1 \times 10^{-7}$  cm/sec to  $1 \times 10^{-6}$  cm/sec. We then recommend that the thickness of the rooting layer of the cap be increased to provide a more substantial rooting zone for vegetation.
- The current designs for both the Active Area and the Expansion Areas include slopes at the top of the landfills of approximately 2 percent. In our experience, slopes this shallow are difficult to build and maintain. On a landfill, they are not sufficient to overcome the eventual subsidence of waste, resulting in ponded areas. To help ensure positive drainage off of the landfill cap, a minimum slope of five percent is recommended. To address this issue on the Active Area, we recommend that the City explore with the SDDENR the potential of a vertical expansion so that the top slopes can be increased. For reasons similar to those outlined above, we recommend that the design of the Expansion Area be modified to provide minimum slopes of 5 percent.

## OPERATIONAL ASSESSMENT AND ISSUES

Representatives from Earth Tech and R.W. Beck performed an operational assessment of the City's landfill. The representatives met with City staff in January 2003 to observe landfill operations to obtain a better understanding of current operations and to make recommendations to the City to improve the operations. A comprehensive list of topics was discussed with City personnel including scale-house operations, traffic, C&D waste, the Active Area, equipment, composting, soil stockpiles, Expansion Area, operating procedures, and buffer land.

The overall assessment is that the landfill operations are well managed, the scale operations are state of practice, the record keeping on equipment is very good. Recommendations to further improve the landfill operations are as follows:

- Reconfigure the entrance road at the scale-house and upgrade the road from the scale-house to the working face to facilitate traffic flow.
- Develop an expanded public drop-off area near the scale-house to minimize the need for the public to haul their waste to the landfill disposal area.
- Modify the present standard operating procedures to minimize the quantities of non-construction and demolition materials (i.e., organics) being deposited in the unlined C&D disposal area.
- Upgrade the access road by widening the road for two-way semi-truck traffic for the gravel segment to Cell 1. This improvement is being implemented in 2003. Paving the perimeter access road is recommended for 2004.
- Move the compost area from its present location to an area east of the scale-house to allow more space for composting and to allow continued development of the C&D area. Consider using wood grindings from this operation for alternative daily cover. Outsource the processing (grinding) of wood that is too big to be processed by the City's existing tub grinder.
- Move forward with the design and implementation of a leachate collection system to ensure best management practices. In particular, a leachate storage and loadout facility will be constructed for Cell 1 in 2003 and 2004.
- Install landfill gas monitoring probes around the perimeter of the landfill and monitor them as part of the facility's monitoring program.
- Develop a comprehensive surface water management plan for the entire site in conjunction with an updated closure plan.
- Move forward with the purchase of an additional, larger compactor for the MSW area to increase waste density and maximize the landfill site life.
- Proceed with the proposed equipment items identified in the City's Capital Improvements Program and the Implementation Plan (Section 7.0 of the Master Plan) to maintain efficient operations.

- Continue to monitor the cost effectiveness of the present landfill equipment maintenance service agreement by benchmarking the per hour operating costs for the various types of heavy equipment over the next 12 to 24 months.
- Move forward with the design and building of a new maintenance building to ensure optimal space for the maintenance and storage of all the landfill equipment.
- Consider relocating the landfill manager's office to the existing maintenance/office building to provide closer access between the landfill manager and landfill superintendent.
- Continue to communicate with the U.S. Army Corps of Engineers to have the Corps use about 1 million cubic yards of surplus soil from the landfill stockpile for the flood control project in Sioux Falls.
- Continue with the adjacent property acquisition program to ensure an adequate buffer zone for future landfill expansion and landfill support facilities.
- Contract annual aerial surveys of the site and provide adequate survey control and closure plans to site personnel. Update surveys of monitoring wells to required accuracy standards.

## **LANDFILL DEVELOPMENT AND LONG-TERM MANAGEMENT**

The unlined Active Area is approaching capacity for municipal solid waste (MSW) but will continue to fill with C&D material for many years before permitted final grades are reached. Areas of MSW that have reached final grades will be closed in 2004 and 2005.

The Expansion Area site life is estimated to be approximately 34 years with filling in Cell 1 expected to begin by January 2004. The Expansion Area will be developed as 15 cells and will be closed in 10 phases over its operating life.

Unless other arrangements are made, it is estimated that a surplus of 3.3 million cubic yards of soil stockpile may remain at the time of final site closure. Use of excess soil to improve final cover of the landfill or to create screening berms would be of benefit to the City and is recommended.

The City has acquired property adjacent to the landfill to maintain buffers. We recommend acquisition of additional properties that are important for the long-range development plans. In particular, properties should be purchased to the west and south of the Expansion Area to allow the rerouting of the Wall Lake drainage from the proposed fill area.

As required, leachate will be removed from the Expansion Area cells to maintain a liquid level of 12 inches or less on the liner. As a proactive measure, leachate will be extracted from the existing leachate mound in the Active Area. Initially, we recommend that the leachate extraction system consist of ten vertical leachate extraction wells. The wells would eventually be combined with a landfill gas extraction system in the future.

Leachate generation estimates and evaluations of leachate management options are included in the Master Plan. Eight different options are presented for collecting, storing, treating, and disposing of an estimated average annual leachate volume of 1,600,000 gallons from both the Active and

Expansion Areas. Our recommendation is to proceed with the apparent most economical treatment option, which is to haul leachate to the POTW by landfill personnel in landfill-owned trucks. This system should be in place when waste placement is initiated in Cell 1 of the Expansion Area, which is expected in December 2003.

After about 5 years of leachate management, we recommend the City evaluate continued truck hauling of the leachate and compare it to the other promising alternatives such as leachate evaporation ponds or construction of a forcemain to the City sewer system. At that time the City will have a better understanding of operating costs for hauling leachate based on actual volumes, and a decision can be made as to the most cost-effective long term approach.

Results of the NSPS landfill gas Tier 2 testing performed in July 2003 suggest that SFRSL may exceed the 50.0-mg/yr threshold for NMOC in 2004. The NSPS requires gas collection and control for landfill emissions of 50.0 mg/yr or greater. If the threshold is exceeded, the anticipated schedule would be to prepare a design plan for submittal to SDDENR in 2005. Bidding would be expected to occur in 2006, and construction and startup would be completed in 2007. Initially, the MSW portion of the Active Area would have gas extraction and control. A dual leachate and gas extraction system is proposed in the Active Area to provide a cost effective means of extracting leachate. A blower and flare will be used for extraction and destruction of the landfill gas. In the future, options for beneficial use of landfill gas could be investigated and evaluated based on feasibility and cost.

## **FINANCIAL ANALYSIS**

The financial analysis included two subtasks - financial assurance review and tipping fee analysis. The objective of the financial assurance review was to examine the City financial assurance calculation and determine the adequacy of the annual payments to meet regulatory and physical closure and post-closure requirements. The tipping fee analysis involved review of current landfill operational costs and planned facility and equipment upgrades in conjunction with the total landfill revenue. The objective was to identify a potential tip fee level needed to generate adequate revenue to meet future program needs through the next 5 years.

### ***Financial Assurance***

Two alternative calculations were performed that used the present values for closure and post-closure costs, total financial obligation, and projected monthly payment. The first scenario represented projected closure and post-closure obligations assuming these begin at the end of the projected life of the landfill in 2038. The second scenario represented projected closure and post-closure obligations assuming they begin when the largest segment of the Expansion Area to be open at any one time must be closed.

Per our review and discussions with the SDDENR staff, the annual set aside of approximately \$109,000 per year identified in the first scenario may be adequate to meet the requirements. We recommend presenting this alternative calculation to the SDDENR for consideration. At minimum, we recommend the existing closure and post-closure per unit cost estimates be updated so financial assurance calculations can be more reliably updated during the future operating life of the SFRSL.

### ***Tipping Fee Analysis***

Based upon our analysis, we have calculated the MSW and C&D tip fees needed for the total nominal revenues to approximately equal the total nominal expenses for the 2003 – 2008 time frame. Assuming the present tip fees for the other materials remain constant (i.e., yard waste, asbestos, tires, etc.) and that the level of increase in the C&D rate mirrors the increase in the MSW rate, the tip fees would need to be \$25.00 and \$26.00, respectively. This level of tipping fee is within the reported range of tip fees for other landfills in the region. We recommend the City consider implementing an increase in the tip fees to generate adequate revenue to cover the projected operating expenses.

### **WASTE DIVERSION**

In the development of the Regional Solid Waste Master Plan for the City, Beck analyzed the waste diversion activities within the Sioux Empire Region (Region). This Region is made up of five counties that use the SFRSL. As part of this analysis, Beck carried out the following tasks:

- Assessment of Regional Opportunities to Share Diversion Facilities and Equipment.
- Materials Recovery Processing and Reuse Evaluation.
- Evaluation of the Waste Reduction, Reuse, and Recycling Public Education and Information Program.

Through data provided by the City, as well as meetings with City staff, the Solid Waste Planning Board, the local haulers, and local recyclable materials processors, Beck characterized the current waste diversion programs. Recommendations were then made for improving waste diversion in Sioux Falls and the Region via policy and operational changes. Our recommendations for each of the tasks are as follows:

#### ***Regional Opportunities to Share Diversion Facilities and Equipment***

- Add language to the Solid Waste Disposal Agreement that is signed each year by the municipalities that use the SFRSL, to ensure that landfill users are aware that a tub grinder and trommel screen are available for their use for a fee, as well as the use of the City's new Household Hazardous Materials (HHM) collection facility that is expected to be operational in 2004.

#### ***Materials Recovery Processing and Reuse Evaluation***

- Consider standardizing the recycling program to ensure consistency between haulers regarding bin type, material type collected, and collection schedule.
- Enforce the landfill ban by conducting more frequent and consistent load inspections, and consider charging a fee above and beyond the current tip fee when a hauler violates the ban.
- To increase landfill diversion, consider mandating that commercially generated old corrugated cardboard be recycled.

- Consider an ordinance that requires the separation of C&D at construction sites and promote the reuse and recycling of C&D materials to increase waste diversion.
- To better monitor the effectiveness of the recycling program, the City should require that the haulers submit a monthly or quarterly recycling tonnage report.
- Require that the haulers itemize their collection services on their invoices to inform residents they are paying for recycling service.
- Strengthen efforts to increase recycling at multi-unit dwellings through a targeted education program, pilot collection program, and/or revisions to the applicable City ordinance.
- Consider partnering with the private sector to organize an annual or semi-annual electronics collection event.
- Consider partnering with the private sector to organize an annual or semi-annual electronics collection event.
- Consider a waste composition study to determine the quantities of additional recyclable materials (i.e., glass and mixed paper) in the waste stream.
- Consider adding glass to the recycling program via the current residential collection program or through a drop-off program because viable markets exist in the Region.

Recommendations for the City's yard waste program include:

- Require haulers to list the fee charged for yard waste collection on license applications.
- Require, via ordinance, all haulers to collect yard waste, and list collection fee on their bills as a separate line item.
- Include yard waste information on all public education pieces.
- Consider selling finished compost and obtain a license from the State to distribute finished compost.

***Evaluation of the Waste Reduction, Reuse, and Recycling Public Education and Information Program***

- Update the Comprehensive Solid Waste Source Reduction and Recycling Plan (Plan). The State requires local governments to update this Plan every 5 years. The Sioux Empire Regional Plan was last updated in December of 1998.
- Hire a staff person or redefine an existing City position to dedicate to recycling program management. If possible, research grant opportunities to pay for part or all of this person's salary.
- Enforce proper recycling setouts, to reduce contamination and amount of unacceptable materials. Work with the haulers to educate the residents by leaving reminder tags.

- When feasible, the City should identify disposal options for other materials such as tires, appliances, scrap metal, electronics, etc. in their printed materials. This information should also be added to the City’s website.
- Update and re-publish the Business Recycling Guide that was developed in the mid-1990s as part of the Region’s Comprehensive Solid Waste Source Reduction and Recycling Plan. Form a committee to oversee the design and content of the guide and develop a distribution plan.
- The City should increase the public education budget and expand its public education efforts to increase the visibility of the recycling and waste diversion programs. It is recommended that at least \$1.00 per household per year be budgeted for public education.

## IMPLEMENTATION PLAN

The Master Plan includes an implementation schedule that is a summary of the recommendations, capital improvements, and projects recommended over the next 10 years. Also included is a listing of new, recommended or replacement equipment over a five-year schedule. Each entry listed was rated in accordance with its priority for implementation. The estimated cost (if any) and year of implementation provides the basis for the tipping fee analysis included with the Master Plan.

In total, 81 separate items are listed on the Implementation Plan. These items are grouped into eight major categories. As would be expected, the majority of the recommendations are proposed for implementation, and associated costs incurred, within the next five years. The following table provides a summary of the estimated expenditures for the first five years of the plan by major category.

**TABLE ES-1**

### IMPLEMENTATION COST SUMMARY

Category	Estimated Cost and Year of Implementation				
	2004	2005	2006	2007	2008
Environmental and Compliance	\$81,000	\$100,000	\$50,000	\$0	\$0
Operational Improvements	\$1,621,000	\$10,000	\$1,660,000	\$10,000	\$410,000
Landfill Development	\$1,999,900	\$2,974,850	\$1,198,600	3,185,300	\$140,000
Equipment	\$970,444	\$817,000	\$362,000	\$685,000	\$627,000
HHW Facility	\$1,500,000	\$0	\$0	\$0	\$0
Recycling	\$525,000	\$0	\$0	\$0	\$0
Reuse	\$10,000	\$0	\$0	\$0	\$0
Public Information/Education	\$95,000	\$40,000	\$40,000	\$40,000	\$40,000
<b>Total</b>	<b>\$6,802,344</b>	<b>\$3,941,850</b>	<b>\$3,310,600</b>	<b>\$3,920,300</b>	<b>\$1,217,700</b>