

CONDUCTING A FEASIBILITY STUDY OF A SMALL COMMUNITY SOLID WASTE INFRASTRUCTURE NEEDS

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ABSTRACT

The County currently owns and operates a Class I landfill on an 18-acre site. A five-acre portion of the site (Phase II) was opened in May 2008, which was designed to maximize the remaining air space of the landfill. A partial closure of the original 12-acre cell has been completed to provide separation of the leachate collection systems. The latest annual topographic survey, which was completed in 2011, was utilized by SCS to calculate the remaining site capacity of the new cell, estimated at roughly 1.25 years.

Consequently, the County had to urgently develop a long-term, Strategic Business Plan (Plan) to address its solid waste infrastructure needs. Those two words, “strategic planning” implies an ongoing process that helps ensure how an organization determine where it is going, how it will get there, and what tools and resources are necessary to achieve the desired results.

To help in this effort, SCS assisted the County in determining the technical and economic feasibility of several major alternatives such as:

- Developing a new landfill infrastructure within the County
- Transfer solid waste out of County

To determine the feasibility of these alternatives, SCS develop baseline projected solid waste generation rates, what landfill size would be necessary to meet the anticipated demand, can operational changes can reduce County costs, what are the projected tipping fees and assessments for these alternatives, and are these competitive compared to surrounding counties and counties of comparative size. Several innovative financial modeling and landfill design software packages were employed to help decision-makers visualize the impacts of these decisions on the planning process.

This paper provides an overview of the process and provides a case study that similarly-sized counties can utilize in making solid waste infrastructure decisions.

INTRODUCTION

As a public owner and operator of a landfill for the disposal of municipal solid waste, termed a Class I Landfill by the Florida Department of Environmental Protection (FDEP), Hardee County (County) has historically been faced with addressing operational issues, which has impacted short and long-term costs. These have included finding temporary solutions to the landfill’s drainage issues by modifying the underdrains to handle landfill leachate, setting tipping fees, setting aside mandated landfill closure costs, finding markets for recyclables, constructing additional Landfill capacity (new cells), providing staff training to meet State requirements, and enacting a mandatory garbage collection system to provide revenues for landfill operations.

While addressing these issues over the course of the past 20 years, the County has also been faced with having to evaluate the need for further investment in the landfill as well as considering privatization options proposed by private solid waste providers. Some of these proposals include the sale of the County Landfill or development a new privately-operated and owned, regional landfill, which would transport solid waste for disposal from communities outside the County. Other options included looking at hauling solid waste to a central disposal point (e.g., Okeechobee County Landfill) and developing a local transfer station. For the most part, these proposals were strongly opposed by the public, who were concerned with issues over local truck traffic, loss of local control, and potential contamination from solid waste hauled into the local landfill.

Not unlike other similarly-sized, rural communities, the County at the time of the study was faced with critical decisions on future solid waste management. The County currently owns and operates a Class I landfill (Landfill) on an 18-acre footprint (Figure 1). A five-acre portion of the site (Phase II, Section 1) was opened in May 2008, which was designed by SCS to maximize the remaining air space of the landfill. A partial closure of the original 12-acre cell has been completed to provide separation of the leachate collection systems and for future “piggy-back” of waste onto Phase I. The latest annual topographic survey was utilized by SCS to calculate the

remaining site capacity of the new cell, which is estimated at roughly two to three years depending on several factors.

EXISTING SOLID WASTE SYSTEM

Facilities

Landfill: The Hardee County Landfill is located east of the City of Wauchula on Airport Road, approximately one mile north of State Road 636. The County operates the Landfill under Florida Department of Environmental Protection (DEP) Permit No. 38414-011-SC/01. This Landfill Operations Permit was renewed on May 12, 2008 and has an expiration date of May 12, 2013. The Landfill has been owned and operated by the County since 1981 when filling operations commenced. The Landfill is located on an approximately 116-acre, County-owned parcel (the Site). To date, the County has constructed Phase I and Section 1 of Phase II of the Landfill.

Phase I of the Landfill is located in the northwest corner of the site and comprises approximately 13.6 acres. This area was designed with a natural clay liner and geomembrane sideliner. This area was operated primarily as a bale-fill type operation. A majority of the incoming solid waste for Phase I was baled on the former “dirty” MRF and transported to this area for placement at the working face. During periods when the MRF was not operational, waste was taken to the area designated for “loose waste” or un-baled waste.

Pursuant to a FDEP closure permit, the Phase I Landfill was closed in its entirety (maximum height of elevation 169 feet National Geodetic Vertical Datum or NGVD) with a final closure cap over the top, north, and east side slopes (approximately 7.0 acres) including the following components (from top to bottom):

- 12-inch intermediate cover soil layer
- 40 mil textured linear low density polyethylene (LLDPE) geomembrane
- 300 mil biplanar geocomposite
- 18-inch protective cover soil layer
- 6-inch sodded topsoil layer

The final Phase I Landfill closure of the west and south side slopes was approximately 6.6 acres. Closure of the final closure cap system of this area was designed with the intent of it serving as the bottom liner system for the future Phase II Section 1 and 2 Landfill areas. This area includes the following components (from top to bottom):

- 24-inch intermediate cover soil layer
- 60 mil textured linear low density polyethylene (LLDPE) geomembrane
- 300 mil biplanar geocomposite
- 24-inch protective cover soil layer
- Sod or ConCover on the west side slope (a spray on biodegradable, non-flammable, non-toxic foam product)

In March 2007, the Landfill was expanded to include an area comprising approximately five acres, now known as the Phase II Section I Landfill Expansion, which had an estimated disposal capacity of roughly 173,000 cubic yards of waste. This new Landfill area included the installation of a groundwater control system, 12-inch compacted subgrade, geosynthetic clay liner (GCL) with a maximum hydraulic conductivity of 5×10^{-9} cm/sec, a 60 mil textured high density polyethylene (HDPE) geomembrane, triplanar geocomposite, a leachate collection and detection system, and a two-foot drainage layer.

In accordance with the current Landfill Operations Plan, the Phase II Section I Landfill area 1 “piggybacks” onto the south side slope of the Phase I Landfill area. Therefore, the Phase I Landfill closure liner system on the south side slope will be the bottom liner system when the Phase I Section I Landfill area reaches final grade.

The two Landfill phases have independent and separate leachate collection systems. Leachate generated in the Phase I disposal area is collected in a perimeter collection pipe surrounding the waste materials. Leachate drains into a series of nine different manholes and then pumped to one of leachate storage tanks. The Phase II Section I Landfill Expansion construction included replacing the existing 8-inch HDPE leachate collection pipes (MH-6 to MH-7 to MH-8) with new 10-inch diameter HDPE leachate collection pipes to improve drainage.

The Phase II Section I Landfill Expansion leachate collection and detection system is comprised of geocomposite materials that are designed to collect and drain leachate toward eight-inch perforated HDPE collection pipe that drain towards a central sump in the northeast corner of the site. A 24-inch riser pipe is located in the sump with a pump to discharge leachate into the leachate storage tanks. The system is designed for jet cleaning and video camera access for cleaning and inspection.

The Phase II Section I Landfill Expansion modified the existing stormwater management plan through construction of a perimeter, at grade series of swales and ditches, which are

designed to channel runoff into two wet detention ponds for treatment and attenuation of a 25-year, 24 hour design storm event.

The County pumps the leachate tanks for the Landfill for disposal at the City of Wauchula Municipal Wastewater Treatment Plant. The County and the City have an interlocal agreement to provide for treatment of leachate from the Landfill. In 2010, the County hauled approximately 3.1 million gallons of leachate at a cost to the County of approximately \$19,200.

Materials Recovery Facility (MRF): The Materials Recovery Facility (MRF) has operated under separate permit conditions that are outlined in FDEP Permit 126620-002-SO/31. This permit, which was issued by FDEP in 2005, has expired. The MRF historically provided the County with a waste reduction/recycling method for the Landfill.

Initially, as described above, the Landfill was operated a bale fill-type landfill with the MRF serving as a “dirty MRF”. Wastes were baled at the MRF as a volume reduction method for the Landfill by segregating recyclables from the non-recyclable wastes and then baling the non-recyclable waste for disposal in the Landfill cells. Vehicles were instructed to dump their waste onto the MRF tipping floor. Inmates from the Hardee Correctional Institute (the local State prison) pulled segregated corrugated cardboard from the tipping floor. The load was then placed onto a conveyor belt and additional recyclable materials (glass, metals, plastics, and paper) were segregated from the solid waste. Wastes excessively dirty or containing contaminated recyclables were then fed to the Harris Badger baler where the waste was baled and then transported by truck to the Landfill for eventual disposal. This process reduced the space consumed in the Landfill.

Currently, the MRF is not utilized to produce waste bales for disposal in the Landfill. Inmates are used to pull segregated cardboard and aggregate source separated recyclables from the two drop-off centers for delivery to the County’s recyclables markets.

Yard Waste Processing Area: Yard trash delivered to the Landfill is diverted from the incoming waste stream by a County spotter and deposited in the Yard Waste Processing Area, which is located immediately north of the Scalehouse and administrative offices. Loads are spread out to look for unacceptable waste materials or waste material that does not belong in the Yard Waste Processing Area. County personnel or contract labor is used typically to remove plastic bags prior to aggregating the yard waste for processing into mulch. The County utilizes the services of an independent contractor (consolidated Resource Recovery) to grind the yard waste

assuming a minimum frequency of every six months or when 3,000 tons (12,000 cubic yards) are accumulated.

Processed yard waste (mulch) is used for erosion control at the Landfill, as an organic additive to cover soils, general landscaping around the Landfill, or made available for public re-use. In 2010, about 8,800 cubic yards of yard waste and vegetative debris was hauled off-site to the Okeelanta biomass facility, which is located South Bay, to be used as boiler fuel.

Household Hazardous Waste Collection Facility: Household hazardous waste collection facility is located southeast of the MRF. The facility is used for the temporary storage of special wastes such as used oil, lead acid batteries, and household hazardous wastes. Used oil is consolidated into two 350 gallon tanks. Lead acid batteries are stacked three high on pallets, with cardboard placed between each layer, and then shrink-wrapped. Private contractors are hired for the removal of the recyclable special wastes such as used oil lead acid batteries, and fluorescent light bulbs.

Solid Waste Collection

Each municipality (Bowling Green, Town of Zolfo Springs, and Wauchula) in the County has the right to regulate its own solid waste collection services. All three municipalities use their own employees and equipment to provide solid waste collection services to both residential and commercial customers within their municipal boundaries.

In January 2002, the County entered into a five-year franchise agreement with Hardee County Disposal, Inc. for both residential and commercial customers within the unincorporated areas. This agreement has been extended twice (2006 and 2010) and currently runs through September 30, 2017. The franchisee is required to deliver these wastes to the County’s designated facility (Landfill). Pursuant to the agreement, the firm provides these services at an annual contract rate, which may be adjusted pursuant to the escalation terms in the agreement (*Consumer Price Index (CPI) for all Urban Consumers, Lakeland-Winter Haven, all items (1967 = 100) or successor reports issued by the U.S. Department of Labor*). The County is billed for the residential fee, which is based upon the total number of residential units within the unincorporated areas that are assessed annually as a special assessment on the County Tax Roll. The franchisee bills commercial customers and residential customers monthly requiring special services at rates included in the franchise agreement.

Pursuant to County Ordinance No. 01-07 and Section 125.01 (1) (q) and 125.66, *Florida Statutes*, the County enacted “universal solid waste collection” in the unincorporated areas. This ordinance established, what is normally defined as “solid waste flow control”, requiring that all solid waste generated

within the County (e.g., municipalities and unincorporated areas) must be delivered to the County's designated facility (currently the County Landfill). Briefly, the Ordinance provides for the adoption of an annual rate resolution during the County's budget process for each fiscal year and provides for a special solid waste assessment to be imposed on improved residential property owners on the Tax Roll. County Resolution 11-27 has established that the solid waste cost to be assessed among improved residential properties for the Fiscal Year commencing October 1, 2011 is approximately \$833,860 and equal to an assessment rate of \$171.93 for each residential dwelling unit (estimated to be 4,300 homes).

Recycling Programs

The County's recycling program currently consists of a operating a drop-off station at the Landfill and second station located at Hardee Disposal Inc. maintenance yard on Townsend Street. County residents are able to drop-off the following materials; newspaper, glass bottles (clear and color), cardboard, batteries, used oil, aluminum, and metal. There is no curbside pick-up available at this time, but any resident is welcome to drop off anything during normal business hours.

Staffing and Personnel

The County's solid waste system is operated by the Solid Waste Department, which is part of the County's Public Works Division. Pursuant to FDEP operator training rules, the designated responsible person for the Department and Landfill is Ms. Teresa Carver, who serves as the County's Solid Waste Director. The Landfill and adjacent solid waste facilities are open for disposal of solid waste Monday through Saturday between the hours of 7:30 a.m. and 5:00 p.m. excluding County holidays.

The Landfill has a staff of five including the Superintendent, two Heavy Equipment Operators (HEOs), one Resource Recovery Operator (RRO) and one Weigh Master. The recycling program has a staff of two with the addition of contract labor support from the Hardee Correctional Institute.

Waste Quantities

The Landfill receives solid wastes from the three municipalities as well as franchised hauler for the unincorporated areas of the County. Figure 2 graphically illustrates the tonnages delivered from these sources (residential, commercial and construction and demolition debris (C&D)) during 2002-2010. As shown, there was a significant downturn in the waste quantities in 2008 due to the impacts of the economic recession on residential and commercial waste volumes and the decline in the housing construction market.

LANDFILL DISPOSAL CAPACITY

Pursuant to Specific Condition No. C. 13.f of the Landfill Operating Permit, the County is required to submit an annual report to FDEP detailing the remaining capacity and life of site for the Phase II, Section I of the Landfill. The most recent report is dated May 2, 2011.

Briefly, the May 2011 report developed an estimate of the remaining Landfill airspace for placement of waste materials and cover soils. To estimate the remaining available airspace for placement of waste materials and cover soils, SCS compared the aerial topographic survey conducted by Pickett and Associates, Inc. dated April 9, 2011, with the landfill build out through Sequence 7 on the current Landfill plan. The difference between the two topographies represented the remaining volume available for landfill operations as currently permitted. The gross remaining available airspace for placement of waste materials and cover soils was estimated to be 115,113 cubic yards (CY). SCS assumed that 5 percent of the gross available airspace would be used for cover material, therefore, leaving approximately 109,357 CY of airspace available in the Phase II Section I areas for waste disposal.

Based on past County Landfill operations SCS estimated the in-place waste density to be approximately 34 pounds per cubic foot (pcf) or approximately 914 pounds per cubic yard from the 2010 calculations. Table 3 represents the available and consumed airspace based on the waste disposal tonnage per capita of approximately 0.644 tons per person as calculated from landfill scale records from April 2010 through March 2011.

As shown in Table 1, SCS estimated the remaining available airspace in the Phase II Section I landfill area through Fill Sequence No. 7 will be exhausted by approximately late November 2013

FINANCIAL ASPECTS OF SYSTEM

Current Fee Schedule

Pursuant to County Ordinance 890-09, the BOCC has the authority to set tipping fees by resolution for the Landfill. Table 2 shows the current established tipping fees for the Landfill.

Enterprise Fund

The County has established the Solid Waste Fund as an Enterprise Fund to manage all of the revenues and operating expenses for collection and disposal of solid waste within the County. The County operates the only Class I Landfill within the County.

Revenues

Operating revenues for the County's solid waste system are generated from residential special assessments, Landfill tipping fees, sales of recovered recyclables, State grants, and interest from these funds.

Expenses

The County annually budgets operating expenses expended for management of the County's solid waste system.

Closure Costs

Pursuant to rules promulgated by the Florida Department of Environmental Protection (FDEP), the County is required to demonstrate financial assurance for closure of the Landfill. Since the Landfill was opened in 1990, the County has annually deposited funds in its operating budget into a restricted closure reserve to cover the costs of Landfill closure. An annual certification is submitted to FDEP by the Department, which provides updated Landfill closure costs.

COUNTY DEMOGRAPHICS

Table 3 details population rates from 1970 through 2010 (the most current Federal Census) for each municipality within the County, the unincorporated area, and the County as a whole. These data show a significant increase in population from 1970 to 1980, a slight decline in overall population from 1980 to 1990, and significant growth from 1990 to 2000. Although there was a slight decline in the unincorporated population between 2000 and 2010, the County's overall population continued to grow in a positive manner including double-digit growth in both Wauchula and Zolfo Springs.

Table 4 includes the most current population projections, which have been developed by the Bureau of Economic and Business Research, University of Florida (BEBR), for the County through 2040. These projections are based on the "Medium BEBR projections", which according to the County's Planning Department have historically proven to be most representative of actual conditions in the County. The BEBR Medium projections are also the recommended basis (rates) for growth and development when determining need for a community. As indicated in the overall BEBR 2011 report, population growth in Florida has slowed substantially due to the recent recession and the collapse of the housing market. The BEBR population projections for 2015-2040 for Hardee County illustrate this slow growth rate in population.

Using the current solid waste generation rate of about 0.644 tons per person per year, these population projections were converted into solid waste generation projections from 2015

through 2040. These data show only a slight increase in solid waste, which will require disposal during this planning period.

INSTITUTIONAL OPTIONS

For the purpose of the Pro forma financial analysis, two potential institutional strategies were developed: (1) one that assumes continued landfilling of MSW at the County Landfill; and (2) a second option that assumes long-haul transport and disposal of MSW outside the County using County forces.

Design, Permit and Construct Phase II, Section 2 Landfill Expansion

The Phase I Landfill closure system on the south side slope will be the bottom liner system when the Phase II Section 1 Expansion Landfill area attains final grade. Similarly, to maximize landfill capacity, plans for future expansion include a Phase II Section Expansion, which is anticipated to be located to the west of the Phase I and II Section 1 areas. The design for the Phase II Section 2 area will enable this new expansion area to also "piggyback" this area onto the west side slope of the Phase I Landfill area. Thus, the Phase I Landfill closure liner system on the west side slope will also be the bottom liner system when this new expansion area "piggybacks" the formerly closed Landfill cell. This design would maximize landfill capacity for the County, while utilizing the existing bottom liner system already funded in the previous Phase I Landfill Closure project.

To calculate the Phase II, Section 2 total air space volume, a bottom base, three-dimensional (3D) AutoCAD™ model was initially developed utilizing the most recent Landfill topographic survey (April 9, 2011). The completed Sequence 5 and 7 and Phase II, Section 2 bottom cell (top of sand) surfaces was then "pasted" into this model. This enabled the SCS design team to compare the bottom surface of this model to a previous (September 9, 2003) Phase II, Section 2 final cover design to help calculate an estimated available fill for the expansion.

As noted in Table 5, this estimated available fill (607,186 cubic yards) for the Phase II, Section 2 design must be reduced by both the estimated volume of the ultimate cover cap (23,288 cubic yards) and daily cover soil use (30,359 cubic yards). Thus, the estimated landfill capacity of the proposed Phase II, Section 2 Landfill Expansion design is assumed to be 553,538 cubic yards. To calculate an estimated landfill life for the Phase II, Section 2 Landfill Expansion, different landfill effective densities were utilized (914, 1,200 and 1,500 pounds per cubic yard of waste).

The lower density (914 pounds per cubic yard) has been the assumed historic Landfill density used by the County and SCS for FDEP landfill life reports; 1,200 pounds per cubic yard is

generally regarded as the solid waste industry “standard” for landfill density; and 1,500 pounds per cubic yard is assumed to be a landfill density shown on “best in class” landfill operations. Table 5 shows estimates on estimated landfill life of the Phase II, Section 2 Landfill Expansion based on these different assumed densities (13.9, 18.2, and 22.8 years). Table 6 provides an estimated construction cost and an annualized debt service cost (assuming a 5% interest cost) for the expansion.

Design, Permit, and Construct Phase III Landfill Expansion

There is a potential onsite to expand the Landfill further to include acreage, which was partially used during construction as a storage area for liquids resulting from dewatering for the Phase I, Section 1 Landfill. Similar to the development of the Phase II, Section 2 Landfill Expansion design, a bottom base, three dimensional (3D) AutoCAD™ model was constructed to calculate the potential air space volume, utilizing the current Landfill topographic survey (April 9, 2011). Table 7 details the design assumptions for the Phase III Landfill Expansion. These calculations assume that Phase II Section 2 is initially constructed to take advantage of the additional surface volume.

As noted in Table 7, the estimated available fill (906,963 cubic yards) for the Phase III design must be reduced by both the estimated volume of the ultimate cover cap (23,843 cubic yards) and daily cover soil use (45,348 cubic yards). Thus, the estimated landfill capacity of the proposed Phase III Landfill Expansion design is assumed to be 837,772 cubic yards. To calculate an estimated landfill life for the Phase III Landfill Expansion, three different landfill effective densities were again utilized (914, 1,200 and 1,500 pounds per cubic yard of waste). Table 10 shows estimates on estimated landfill life of the Phase III Landfill Expansion based on these different assumed densities (34.9, 45.8, and 57.2 years).

Dispose of County MSW at Out-of-County Location

This option assumes that the County would close the existing Landfill, not complete the expansion, and dispose of all of the County’s MSW previously landfilled out-of-county. A decision by the County to develop a transfer station versus direct haul by typical solid waste collection vehicles to a disposal site typically involves examination of the following major variables:

- MSW Disposal Site Locations
- Average Payloads of Collection Vehicles and Transfer Vehicles
- Travel Speed and Distance for Haul Vehicles
- Transfer Facility Size, Technology and Operating Practices
- Collection and Transfer Vehicle Operating Costs

Possible Disposal Locations: As shown in Table 8, potentially available landfills in proximity to Hardee County are significantly distant (greater than the typical 32 mile round trip distance industry standard), negating the use of traditional residential packer trucks for direct haul, a sufficient number of semi-tractor trailers hauling MSW from a County transfer station would be needed for timely and cost-effective transport of the County’s solid waste to the ultimate out-of-county disposal location.

Transfer Station: Further, under this alternative operating scenario, the County would also need to construct and operate a transfer station with either County staff or have a private operator provide these same services. The purpose would be to consolidate all of the waste from Hardee Disposal, Inc. and individual waste generators currently delivering MSW to the Landfill into larger transfer trailers to achieve transportation cost savings. An example of this savings would be to take from four collection vehicles with five ton average payloads and two-man operating crews and place all of the waste on a single, semi-trailer with a single driver hauling roughly 21-23 tons of solid waste per truck to a remote landfill.

Based on our analysis of the County’s solid waste system and knowledge of the solid waste industry, SCS is of the opinion that the County has two potential design alternatives; (1) retrofit the existing MRF into a solid waste transfer station; or (2) design and construct a new solid waste transfer station utilizing available space at the Landfill, which would be considered by SCS as the same as area proposed for construction of the Phase III Landfill Expansion. The following paragraphs briefly describe these two alternatives.

SCS staff evaluated the existing MRF building to assess its condition and potential to be converted to an approximate 100 ton per day transfer station. There did not appear to be any significant visible damage from Hurricane Charlie in 2005. The intent of a building renovation would be to restore the building back to close to a near-new condition. Overall, we judged the condition of the building to be fair to poor. As such, a significant retrofit of the building would be needed with a capital cost estimated at \$655,290.

The second option would be construction of a simply-designed, transfer station that utilizes an “open-top” loading system either through a lift and load method. Typically, for smaller-sized stations, the lift and load method, using a front-end loader for compaction, is the most cost effective. The principal features of the open-top system include the following basic features:

- Concrete tipping floor on an elevated earth embankment
- Temporary floor storage of waste

- A metal building and interior concrete containment walls
- Trailer drive through for loading
- Front-end loader

Transfer Station Operations: Typical annual operating costs of the proposed transfer station, either the retrofitted MRF or new transfer station, would include labor, building and site maintenance, utilities, rolling stock fuel, equipment O&M replacement, supplies, debt service, and other similar costs, which are required to manage the received waste at the station and transport it to using transfer trailers to the ultimate disposal location out-of-county (Table 8). These costs are limited to the actual on-site operations and do not include the hauling operation costs, which are noted in the following section.

Hauling/Transportation Costs: The hauling equipment used in the transfer of MSW consists of a truck tractor and a trailer. The truck tractors used are those commonly employed in the trucking industry with the capability of hauling 21 to 23 tons of MSW at highway speeds. Under Florida's weight laws, a truck/trailer must be within the gross vehicle weight limit on state highways, roads, and bridges.

Open-top walking floor trailers can easily be loaded to legal weight limits and more easily comply with bridge weight standards in moist rural Florida communities. The transfer trailers are usually aluminum open top, leak resistant, tandem axle semi-trailers with hydraulic operated "walking/live floors" that are specially designed to haul MSW. The entire trailer including the tailgate and walking floor is usually specified to be leak resistant (not leak-proof). The tailgate is usually equipped with an air gate that can be opened to reduce friction loss when transporting empty loads, and is also equipped with a tarping system to minimize litter. The challenge of MSW transfer is to achieve the greatest amount of cubic volume while maintaining long-term durability.

The cost of transportation includes labor (drivers), the annual fixed cost of ownership of the tractors and trailers, licenses, taxes, depreciation, and insurance. In addition to these fixed costs, certain costs vary with mileage traveled to the ultimate disposal location. Variable costs typically include fuel, oil, tires, maintenance and repairs, and the time needed to travel to the disposal site, unload the trailer, and then return to the transfer station to pick up the next load.

An Excel™-based Transportation Model was utilized by SCS to calculate estimated transportation costs from the proposed County transfer station, which was discussed in the paragraphs above. This model takes in to consideration the following cost information and data to arrive at an overall cost per ton for MSW transportation costs:

- Labor – Based on average hourly rates for County employees (drivers) estimated at \$11.58.
- Benefit Package – Estimated at 40% of average annual County labor rate.
- Equipment initial costs – Tractor \$95,000 and trailer \$55,000.
- Equipment life – Seven years.
- Equipment resale value – Tractor \$15,000 and trailer \$10,000
- Fuel use – 4.5 miles per gallon.
- Trailer weight factor – 21 tons per load

As indicated in the paragraphs above, there are a number of public and private landfills, which potentially may enter into a long-term contract to accept MSW delivered from a County transfer station. Based on the calculated round trip distance from the proposed County transfer station to these different MSW disposal locations, using Google Map™, estimated travel and MSW unloading times, estimates was then made of the minimum number of tractors, trailers, and drivers realistically needed for optimal MSW transport to these locations. These data, as well as the assumptions noted above, were then used as inputs for the SCS Transportation Model.

Figure 3 graphically illustrates the estimated per ton MSW transportation costs from the proposed County transfer station to these six different public and private landfills with different fuel (diesel) price assumptions. Based on the results of the model, it is not surprising that the Polk County Landfill appears to have the lowest estimated transportation costs (between \$18.60 and \$20.16 per ton). The other landfills have much higher MSW transportation costs due to their relative round trip distances to the proposed transfer station, the cost of the additional equipment needed to service the County's MSW transportation needs, and the increasing impact of fuel on overall MSW transportation costs. Fuel is a critical commodity in MSW transportation, and upward fluctuations in costs in recent years suggest that any decision to transfer MSW outside the County must consider long-term fuel management risk. Most transportation agreements with private MSW haulers usually allow fuel costs to be adjusted on an annual, quarterly, or more frequent basis.

Lastly, we interviewed private MSW hauling firms to conduct a "reality check" on the MSW transportation costs calculated by the SCS Transportation Model. It appears that the results of the Model, which were calculated for a County-operated transportation system, are in sync with that potentially offered

by a private MSW hauling firm. This is not to say that a private hauler could not prepare a lower bid price than shown by use of County equipment and employees, since a few trucking firms may have available fully-amortized equipment, decide to run their operation with lower insurance coverage, or use lower experienced drivers.

Out-of-County Landfill Tipping Fees: The last cost component of the out-of-county disposal option is an estimate of a proposed long-term tipping or gate fee to be charged by each potential host landfill. Absent a firm bid or proposal, SCS contacted each community or firm to identify a possible initial per ton fee. We supplemented this information or data with current posted prices for each landfill, adopted board rate resolutions, or recent proposals (formal or informal) made to a similar governmental entity for MSW disposal. Every attempt was made to identify if the reported rate included only MSW disposal or MSW disposal along with transportation costs from a community transfer station.

ECONOMIC ANALYSIS

A Pro Forma Model (Model) was built to investigate the long-run (life cycle) costs of various institutional options by the County to provide for MSW disposal capacity. The following sections briefly discuss the various assumptions, which were used by SCS in development of the Model. Confirmation of these assumptions was made with County staff to assure their reasonableness and reliability with current Department operations and SCS' knowledge of general solid waste industry practices.

Model Assumptions

Services Provided in Model Scenarios: Table 10 lists the assumed solid waste program activities which are anticipated to be performed under the two Pro Forma scenarios. For the purpose of this report, SCS assumed that regardless of whether or not the County continued to provide landfill services, it would continue to provide executive management of the solid waste system (i.e., collection and special assessments), operation of the scalehouse, recycling services, and required FDEP environmental monitoring related to the existing Landfill (post closure care for 30 years). The costs of these activities or program have been included in each specific scenario.

Project Financing: Discussions with the County indicated that the Department does not have a sufficient fund balance to fund construction of the Phase II, Section 2 Landfill Expansion or the proposed transfer station. As such, the County would have to borrow funds to pay for the costs of construction for these proposed projects.

According to the County's Finance Director, these projects can be funded through use of County cash reserves, bank loans, letters of credit, and bond proceeds. Traditionally, the County has utilized the Florida Local Government Finance Commission's (FLGFC) commercial paper pooled loan program, which offers local governments in Florida lower interest rates and fees than traditional municipal sources of borrowing, such as bank loans, public offerings of debt, or lease purchase financing. The issuance cost is \$2,000 per million financed and an underwriter fee of \$2,500. Interest is a "blended market rate" based on the actual rates of sale for FLGFC commercial paper with eight basis points assigned to dealer fees and 18 basis points assigned to administrative costs. This program has an established term limit of five years and dollar limits of \$3,000,000 for all capital loans. Consequently, in discussions with the County, it was agreed that for Pro Forma Modeling purposes, SCS would utilize a conservative interest rate of 5 percent for both of these projects over an assumed 20 year term of the financing. The County has conducted initial conversations with other lenders and financial advisors in reference to the solid waste infrastructure projects.

Planning Period: As noted in the paragraphs above, both projects have projected lives of at least 20 years. With improved landfill compaction, the Phase II, Section 2 Landfill Expansion is estimated to provide a minimum of 22 years of landfill life based on MSW generation projections for the County. Further, both the MRF retrofit or transfer station alternatives are anticipated to provide at least a 20 year facility life.

Escalation: For financial modeling purposes, the following escalators have been utilized:

- Salaries – 4% annually
- Health insurance – 5.5%
- Supplies and miscellaneous expenses – 3%

FINANCIAL MODEL RESULTS AND STUDY FINDINGS

SCS analyzed two major alternatives for the County to manage its MSW. Based on a review of these two management options, SCS constructed a Model to calculate preliminary, planning-level costs, which can be used to evaluate future solid waste policies and strategies for the County. The Model was built as a tool that can be used to evaluate future strategies as more detailed information and data 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 County data, prices and escalation factors typical of the solid waste industry, and planning-level cost estimates for landfill

expansions, transfer station facilities, and MSW transportation costs. Table 11 summarizes the results of these analyses.

These data and our analysis indicate the following major conclusions and recommendations:

- The remoteness of the County to potential out-of-county disposal locations makes MSW transportation costs very expensive. Further, the impact of rapidly escalating diesel fuel prices and new economy standards for long-haul MSW equipment poses significant risks to the County. Based on our discussions to date, the limited MSW quantities generated by the County preclude significant interest from the private sector in providing the County with proposals for lower than market tipping fees and private funding for the required transfer station and transfer equipment.
- Pursuant to FDEP regulations, the County will have continuing responsibilities for the management of closed portions of the Landfill, including the stormwater management system, leachate disposal, and maintenance of Landfill cover materials. These responsibilities would extend for 30 years after closure of Phase I and Phase II, Section 1, and would continue even if the county decided to dispose of MSW in an out-of-county landfill. Further, the County would continue to manage the current solid waste assessment program, monitor MSW delivered to the Landfill by operating the weigh scales, and manage the current recycling program. All of these costs must be considered in evaluating any overall savings, if any, for out-of-county disposal.
- The modeling results indicate that the option with the least System cost is for the County to continue to operate the Landfill with additional expansions (Phase II, Section 2 and Phase III). The alternative, which considered the modification of the existing MRF into as transfer station and transportation to the closest out-of-county disposal facility (Polk County Central Landfill), would result in higher costs for the County as compared to expanding the existing Landfill. The net present value (NPV) for the annual savings for continued landfill operations with expansions compared to out-of-county disposal over the planning horizon (FY 13-20) in the Model is calculated to be \$3,495, 347.
- The development of the Landfill expansion (Phase II, Section 2) can be completed by FY 13 given current County operating results and MSW generation trends. There are good landfill design options available to the

County to extend the life of Phase II, Section 1 Landfill through increased landfill elevation and improved compaction rates. This would provide the County with additional capacity while the Phase II, Section 2 Expansion is permitted and constructed. These options are being explored at the current time with FDEP. While the FDEP has taken steps recently to reduce the potential permitting review process, it is unlikely given past history that the County would see major time savings. Consequently, the design and permitting process should be initiated quickly to enable the County to move expeditiously into the Phase II, Section 2 Landfill Expansion and to take advantage of potential construction costs savings.

In summary, the following is a proposed initial project schedule:

- Completion of final design – three to six months
- FDEP permitting process – six to nine months
- Bidding, construction and certification – 12 to 15 months

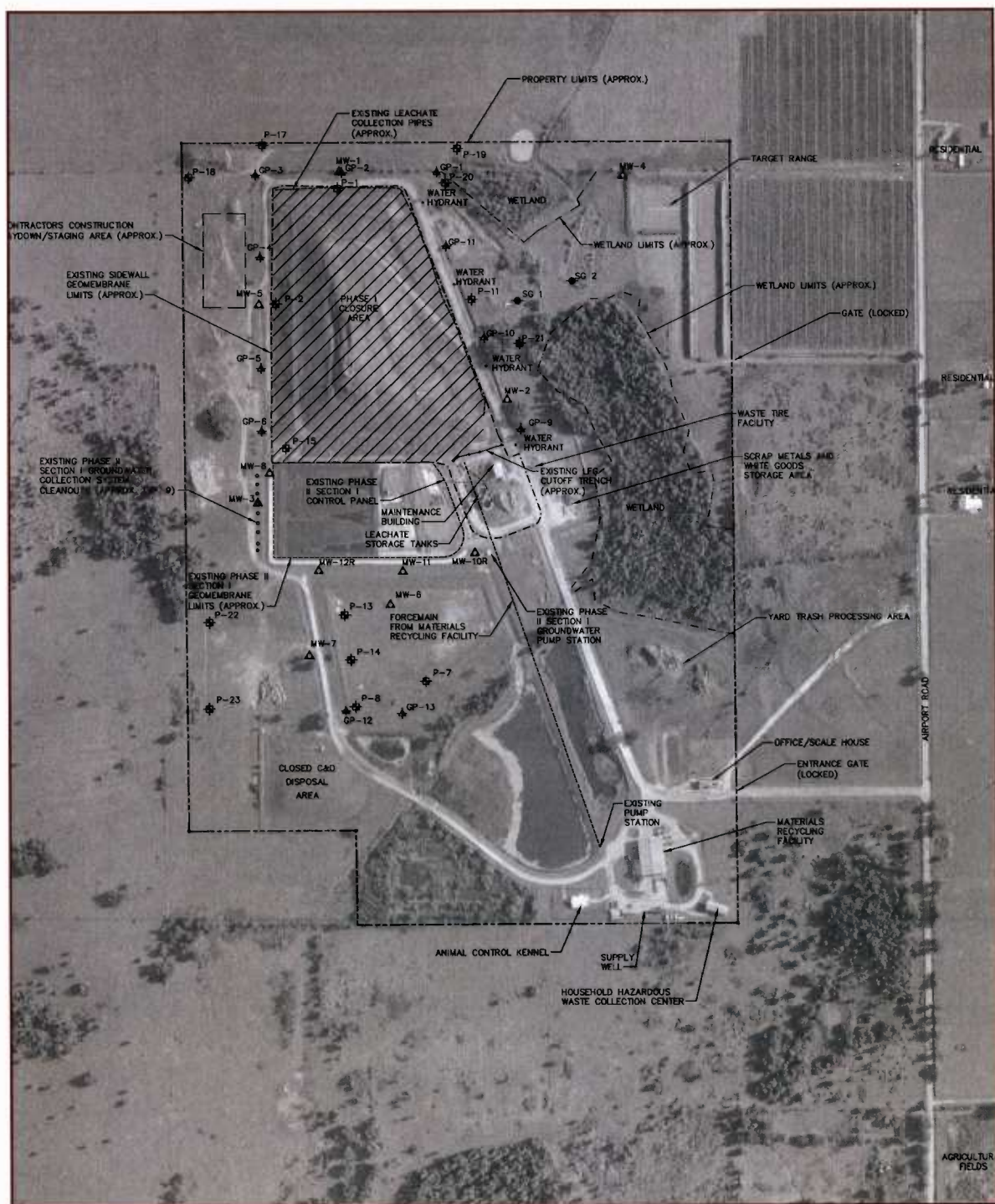
Some efficiency can be obtained through undertaking a few of the major tasks simultaneously (i.e., design and permitting and perhaps development of construction specifications). As of the writing of this report, a study is being undertaken by the County and SCS to analyze the current landfill compaction rate. If the results indicate that the county is achieving a landfill density rate above 914 pounds per cubic yard, which was used for initial landfill planning purposes, the County could have additional time to complete the Phase II, Section 2 Landfill Expansion project.

Given the cost of Landfill expansion, the County should take steps to immediately improve the current landfill density/compaction rate and minimize landfill daily cover. Both of these will require additional County Landfill expenditures in employee training and alternative cover equipment as discussed in the paragraphs below.

SCS is of the opinion that increased expenditures in landfill training will ultimately reduce overall County costs, while at the same time enable the County to maximize the long-term capacity of the Landfill. Numerous training options for County staff exist in the solid waste industry through programs made available through equipment suppliers (e.g., Caterpillar and Ring Power), peer mentoring programs (SWANA), and individual landfill operations consultants.

REFERENCES

1. Bureau of Economics and Business Research, University of Florida, *Florida County Population Projections*, June 2011.
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4. Hardee County, *Amendment to and Renewal of Franchise for Solid Waste Collection Service*, August 5, 2010.
5. Hardee County, Florida, *Comprehensive Plan*, Amended December 2008.
6. SCS Engineers, *Estimate of Remaining Capacity and Life of Site, Hardee County Landfill Phase II, Section I Disposal Areas*, May 2, 2011.
7. SCS Engineers, *Application for Phase I Closure Permit*, April 2009.
8. SCS Engineers, *Operations Plan, Phase I and Phase II, Section 1 Landfill Expansion*, June 2007.
9. SCS Engineers, 2011, "Feasibility Study of Solid Waste Infrastructure Needs", Prepared for Hardee County, Florida, November 4, 2011.



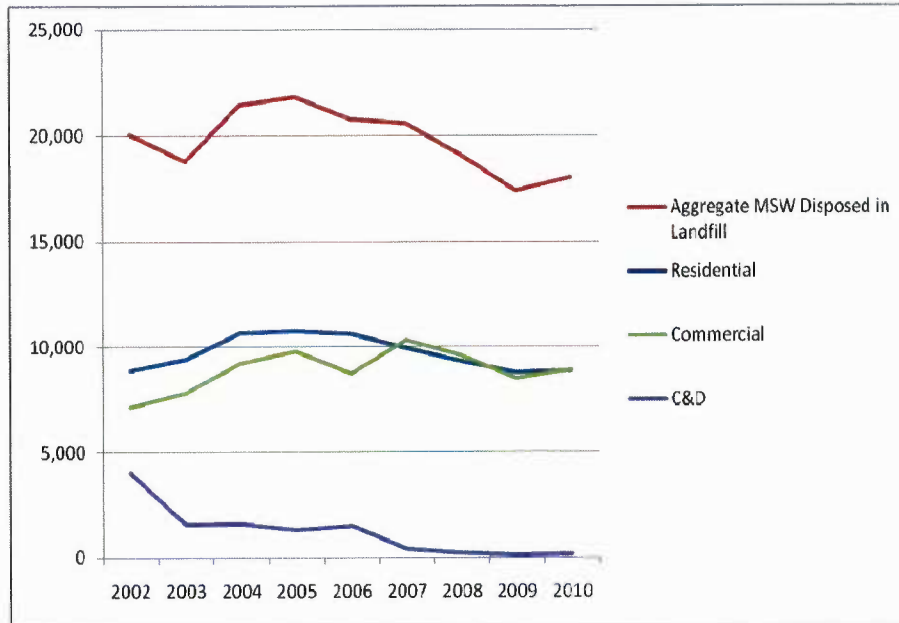


Figure 2. Solid Waste Disposed in Hardee County Landfill, 2002-2010

Table 1. Available and Consumed Airspace, Hardee County Landfill

Time Period (Month and Year)	Population	Waste Disposed of in Class I Landfill (Tons)	Airspace Consumed (Cy)	Available Airspace (Cy)
				109,357
April 11 - March 12	28,314	18,235	39,902	69,455
April 12 - March 13	28,314	18,235	39,902	29,553
April 13	28,314	1,520	3,325	26,228
May 13	28,314	1,520	3,325	22,903
June 13	28,314	1,520	3,325	19,578
July 13	28,314	1,520	3,325	16,253
August 13	28,314	1,520	3,325	12,928
September 13	28,314	1,520	3,325	9,603
October 13	28,314	1,520	3,325	6,278
November 13	28,314	1,520	3,325	2,953
December 13	28,314	1,520	3,325	-372

Table 2. Landfill Tipping Fees and Charges

Material	Rate (\$) Per Ton
Residential	
<i>Solid Waste</i>	
City	62.50
County	0.00
<i>Wood and Yard Waste</i>	
City	62.50
County	0.00
Tires	125.00
C&D Debris	62.50
Recyclables	0.00
Scrap Metal	0.00
Commercial	
<i>Solid Waste</i>	62.50
<i>Wood and Yard Waste</i>	62.50
Tires	125.00
C&D Debris	62.50
Recyclables	0.00
Scrap Metal	0.00
Special Handling	100.00
Asbestos	100.00
Pre-Tested Contaminated Soil	100.00
Load Fee	5.00 each
Weight Tickets	2.00 each

Table 3. Hardee County Population, 1970-2010

	1970	1980	1990	2000	2010
County Total	14,889	20,357	19,499	26,935	27,931
Unincorporated			13,191	18,037	17,973
Bowling Green			1,836	2,892	2,930
Zolfo Springs			1,219	1,641	1,827
Wauchula			3,253	4,368	5,001

Source: Bureau of Economic and Business Research (BEBR), 2011.

Table 4. Population and Solid Waste Generation Projections

Projections	2015	2020	2025	2030	2035	2040
Population County (Total)	28,000	28,300	28,600	28,900	29,200	29,500
Population Incorporated: Bowling Green Zolfo Springs Wauchula*	9,782	9,887	9,992	10,097	10,201	10,306
Solid Waste Generation (Tons Per Year)	18,032	18,225	18,418	18,612	18,805	18,998

*= Extrapolated using the Medium BEBR projections and the calculated percentage of growth for the Total County Population between 2010 and 2040.

Table 5. Design Assumptions for Phase II, Section 2 Landfill Expansion

Design Assumptions	Calculation	Measure	Estimated Landfill Life (Years) Based on Assumed Landfill Density (Pounds Per Cubic Yard)		
			914	1,200	1,500
Estimated Surface Area	628,785	Square feet			
Available Fill	607,186	Cubic Yards			
Volume Reduction: Cap					
Daily Cover					
Estimated Annual Waste	23,288	Cubic Yards	13.9	18.2	22.8
Generation	30,359	Cubic Yards			
	18,235	Tons			

Table 6. Estimated Capital Costs for Phase II, Section 2 Landfill Expansion

Cost Items	Estimated Costs (\$)
Cell Construction @\$300,000 x 5.2 acres	1,560,000
Engineering Design and construction CQA	450,000
Contingency @10%	201,000
TOTAL	2,211,000
Annualized Cost @ 5% interest rate, 20 year horizon	\$177,416

Table 7. Design Assumptions for Phase III Landfill Expansion

Design Assumptions	Calculation	Measure	Estimated Landfill Life (Years) Based on Assumed Landfill Density (Pounds Per Cubic Yard)		
			914	1,200	1,500
Estimated Surface Area	643,767	Square feet			
Available Fill	906,963	Cubic Yards			
Volume Reduction: Cap					
Daily Cover					
Estimated Annual Waste	23,843	Cubic Yards	21.0	27.6	34.5
Generation	45,348	Cubic Yards			
	18,235	Tons			

Table 8. Information on Possible Disposal Locations for Hardee County MSW

Landfill	Ownership		Estimated One-Way Haul Distance	Travel Time (Hours and Minutes)
	Public	Private		
Polk County Central Landfill	X		41	0:59
Manatee County Lena Road Landfill	X		57	1:09
Charlotte County Zemel Road Landfill	X		63	1:19
Sarasota Knights Trail Road Landfill	X		78	1:40
Okeechobee Landfill (Waste Management)		X	87	1:55
J.E.D. Landfill (WSI)		X	102	2:14

Table 9. Estimated Transfer Station Initial Annual Operating Cost

Cost Component	Factor	Retrofitted MRF/Transfer Station	New Transfer Station
Labor		70,350	70,350
Building and Site Maintenance		10,000	25,000
Utilities		5,000	17,000
Rolling Stock fuel		7,000	12,000
Equipment O&M Replacement		20,000	35,000
Subtotal Operation and Maintenance		112,350	159,350
Contingency	15%	16,853	23,903
Supplies	5%	5,618	7,968
Administrative Overhead	20%	22,470	31,870
Annual Debt Service		52,582	121,600
Estimated Total Facility Annual Cost		\$209,872	\$344,690

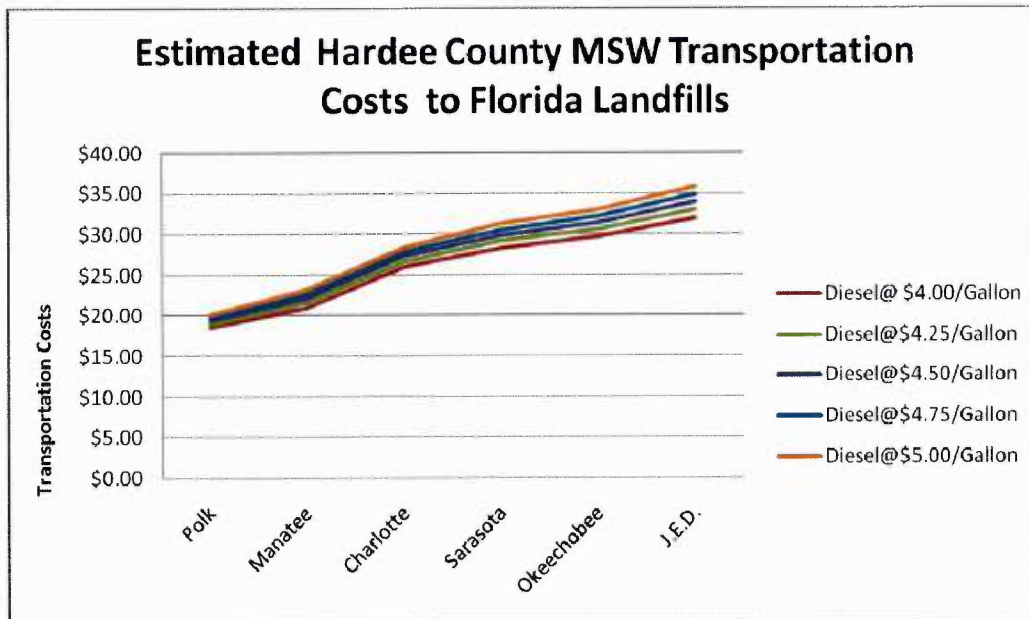


Figure 3. Estimated County MSW Transportation Costs to Florida Landfills

Table 10. Solid Waste Program Responsibilities Under Different Pro Forma Model Scenarios

Services or Operations Provided	Landfill Expansion	Out-Of-County Disposal
Executive Manager	X	X
Monitoring of Residential and Commercial Collection and Special Assessments	X	X
Scalehouse Operation	X	X
Landfill Operations	X	X
Recycling Program	X	X
Waste Tire Site	X	X
Residential and Commercial Small Quantity Generator	X	X
Scrap Metal Site	X	X
Wood and Yard Waste Site	X	X
MRF	X	
Transfer Station Operations		X
MSW Transportation		X
Phase II, Section 1 Landfill Closure	X	X
Landfill Post-Closure Care (Phase I and II Landfill)	X	X

Table 11. Financial Comparisons of County MSW Management Alternatives

					Fiscal Year										
					11	12	13	14	15	16	17	18	19	20	
Estimated Revenues					\$117.29	\$122.07	\$92.54	\$93.01	\$93.47	\$93.94	\$94.42	\$94.89	\$95.37	\$95.85	
Estimated Expenditures By Cost Center															
Landfill					\$105.22	\$109.63	\$111.85	\$93.19	\$94.79	\$96.02	\$97.30	\$98.61	\$99.96	\$101.36	
Remaining Landfill Responsibilities With Out-of-County Option					\$0.00	\$0.00	\$34.70	\$23.04	\$23.53	\$24.04	\$24.57	\$25.11	\$25.68	\$26.27	
Recycling					\$10.19	\$10.34	\$10.59	\$10.91	\$11.24	\$11.57	\$11.92	\$12.28	\$12.65	\$13.03	
Transfer OFC					\$0.00	\$0.00	\$98.36	\$98.79	\$99.81	\$100.85	\$104.16	\$105.00	\$106.14	\$107.32	
MANAGEMENT OPTIONS															
Continue Landfilling With Expansion															
Landfill					105.22	109.63	111.85	93.19	94.79	96.02	97.30	98.61	99.96	101.36	
Recycling					10.19	10.34	10.59	10.91	11.24	11.57	11.92	12.28	12.65	13.03	
Total System Rate					115.41	119.96	122.44	104.10	106.02	107.60	109.22	110.89	112.61	114.38	
Out of County Disposal															
Remaining Landfill Responsibilities With Out-of-County Option					0.00	0.00	34.70	23.04	23.53	24.04	24.57	25.11	25.68	26.27	
Recycling					0.00	0.00	10.59	10.91	11.24	11.57	11.92	12.28	12.65	13.03	
Transfer OFC					0.00	0.00	98.36	98.79	99.81	100.85	104.16	105.00	106.14	107.32	
Total System Rate					0.00	0.00	143.65	132.74	134.58	136.47	140.65	142.39	144.47	146.62	
Cost Savings With Continued Landfilling															
Total System Rate							21.21	28.64	28.55	28.87	31.43	31.50	31.86	32.24	
Total Dollars							386,729	522,217	520,671	526,497	573,193	574,483	581,021	587,812	\$4,272,624
NPV					\$3,495,347										