2011 LANDFILL MANAGEMENT EXCELLENCE AWARD

NOMINATION FORM

Program/Facility Nominated:
Brazos Valley Solid Waste Management Agency, Inc.

Contact Person Name & Title: Samantha Best, Landfill Superintendent

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Nomination submitted by (if different than information listed above):
Name: Michael Oden        Phone #: (214) 733-5911        Email: michael.oden@hdrinc.com

If selected for an award, how would you like the name of the organization to read on the award (limit of 50 characters)?
Brazos Valley Solid Waste Management Agency, Inc.

2011 Applications must be submitted to SWANA no later than Friday, April 15, 2011

*** PLEASE NOTE THAT ENTRY REQUIREMENTS HAVE RECENTLY CHANGED ***

See the attached Entry & Eligibility Requirements sheet for further information

Application Checklist: (Please make sure the following items are included in your submittal packet):
- Completed nomination form with signed release statement (this page), to be scanned and included in digital submission
- 1 copy of your award submittal on a CD-ROM or via email: Techprograms@swana.org
- Executive Summary of your nomination (NO more than 200 words)
- At least 2 pictures of your operation (may be included in nomination text)
- Check or credit card payment (made payable to SWANA) for nomination fee (in U.S. dollars)

Please mail all application packages to:
SWANA
ATTN: Technical Programs Department
1100 Wayne Avenue, Suite 700
Silver Spring, MD 20910

Release Statement: I certify that the information provided in this application is accurate and correct to the best of my knowledge. SWANA reserves the right to publish the enclosed information. Nominations become the property of SWANA. My signature gives SWANA the right to reprint or make available for purchase any portion of this submittal.

Signature: [Signature]        Date: April 15, 2010
Brazos Valley Solid Waste Management Agency, Inc. (BVSWMA) provides disposal services to the cities of Bryan and College Station, Texas, and rural communities in the Brazos Valley area, disposing of approximately 300,000 tons per year with a peak day of 1,400 tons. BVSWMA is currently transitioning from Rock Prairie Road Landfill, which is near capacity, to the recently constructed Twin Oaks Landfill.

The Rock Prairie Road Landfill, located in a section of College Station, Texas, that has experienced rapid development, has been the disposal location for BVSWMA customers since its creation in the early 1990s. The site is located adjacent to land that will become part of the city’s park system upon landfill closure. BVSWMA has incorporated features on the landfill property that can be incorporated into the future park and is considering a landfill gas-to-energy project to be implemented after closure.

With a forward-thinking design, Twin Oaks Landfill is the only LEED Silver Certified landfill in the nation. Designed for efficiency, onsite facilities house sustainable features like natural lighting, water reuse and motion-sensored lighting. A unique landfill presence, the Twin Oaks site is home to an endangered orchid species, which required extensive collaboration with regulatory agencies during landfill design.

“The citizens of the entire Brazos Valley should be very proud to be leaders in the area of environmental stewardship and responsible municipal solid waste disposal. The Twin Oaks Landfill has already attracted environmental professionals from around the country who came to tour this one-of-a-kind facility, and I’m sure many more will follow as the facility provides for the region’s solid waste disposal needs for the next several decades.”

Bryan Griesbach
BVSWMA Executive Director
Section 1
Design & Construction

“The opportunity to work on BVSWMA’s Twin Oaks Landfill from start to finish has been the most challenging and rewarding experience in my solid waste career. The project took a tremendous amount of commitment and perseverance and we are ecstatic to call this facility our new home.”

Samantha Best
Twin Oaks Landfill Superintendent

Siting
In order to select the optimal site for Twin Oaks Landfill, a study was commissioned to locate property that met regulatory location restrictions and provided 40 years of capacity for the region. It was imperative that the site have sufficient clay soils to construct that portion of the landfill liner and ease of access for customers. Identification of a site that met the criteria above while minimizing impacts to surrounding land use and earning public support was a complex process. BVSWMA worked tirelessly to fully understand the long-term needs and balance those needs against the costs and benefits in the study area, which is characterized by rapid growth and development. The result was identification of the 609-acre site for the new Twin Oaks Landfill sitting adjacent to State Highway 30 in Grimes County, Texas.

Site Preparation and Design
A master plan for BVSWMA’s Twin Oaks Landfill included an ultimate build-out of the site, considering potential consolidation of operations and expansion of services. The plan also identified key issues to be addressed during the design and construction of the facility components. Carefully planned, site preparation was well-organized and designed for future growth. Several elements contributed to the success of the Twin Oaks Landfill design, including:

- LEED Silver Certification
- Highway access
- Entrance road design
- Site sequencing
- Driver’s service area
- Citizen’s convenience and recycling area
- Vehicle de-mudder
- Maintenance facility
- Onsite water well for construction
- Evaporation pond
- Aerobic sewage system
- Endangered species protection
The actual design of the landfill began in late 2005, almost 15 years after the need was identified. Site development was resequenced so that the area closest to the highway was completed first, thus minimizing future visual impacts as the area was developed. Screening berms were created to improve aesthetics along the highway.

The Twin Oaks Landfill site is located in an undeveloped rural area adjacent to a state highway that provides excellent access opportunities. A number of steps were taken to alleviate potential impacts of the overall development of the site on traffic and road conditions, including improvements to State Highway 30 itself. An adequate onsite vehicle queue distance was designed into the internal roadway system to prevent traffic using the facility from backing onto the highway. Concrete pavement and onsite systems to allow debris and mud from landfill activity to be removed before vehicles return to the highway were included in the overall site design. Dual scales at the scale house entrance keep traffic moving into the landfill, while a single scale and bypass lane for repeat customers make the exit process efficient.

To take advantage of the Highway 30 access, a new roadway system was designed from the highway into the site, including a bridge across Alum Creek. Due to the heavy vehicles planning to use the site and the fact that the bridge is a critical component of the site infrastructure, special attention was given to the bridge design. Plans for the bridge necessitated coordination with Grimes County and the Federal Emergency Management Agency (FEMA) to show no offsite impacts and redefine the flood plain.

BVSWMA wanted to ensure that individual residents and small haulers received quality service at the landfill. To meet this need, Twin Oaks was designed with a citizen's convenience area separate from the active disposal area used by commercial vehicles. This area provides residents with a safe, efficient option for disposing of waste and recyclable material at the landfill. The citizen's convenience area is grade-separated and enables residents to backup vehicles to unload trash and recyclables into their respective roll-off boxes. Located near the scale house, workers oversee materials being unloaded and ensure there are adequate bins for storage of the materials.
Twin Oaks has an onsite “de-mudder” to assist in removing mud from vehicles before exiting the site. Required by permit, it is similar to a cattle-guard pipe structure. Vehicles leaving the landfill during wet weather can drive across the de-mudder to jar any accumulated mud from their vehicles. Removed mud is collected from beneath the structure and returned to the landfill. Upon leaving the landfill, vehicles exit the site via a long driveway, allowing any remaining mud to fall before entering the highway. This feature keeps the highway clean and safe for drivers.

The maintenance facility also includes a washing system to clean the vehicles between uses. Exemplifying the landfill’s sustainable components, wash water from the vehicle wash system and facility floors cycles through a treatment system that removes debris and grease, and prepares the water for reuse. Processes include filtration, aeration, ozone treatment and use of a microbe and nutrient system to digest grease.

Preserving funds for the landfill, a five-acre contaminated water evaporation pond was designed on the site to prevent the need to haul leachate and contaminated water offsite or to develop an onsite industrial waste water treatment facility. The evaporation pond was initially designed to hold the anticipated annual generation of contaminated water based on net evaporation in the area and current generation at Rock Prairie Road. Capacity was added to safeguard the landfill in the event a large storm, which has the potential to create a large volume of contaminated water in any new disposal cell. When sufficient waste volumes have been received, the pond will also serve as a surge storage facility as the majority of the anticipated contaminated water is managed by re-circulation into the waste. A dual-contained (4-inch inside a 6-inch) leachate transmission line transports leachate almost 5,000 feet from the first landfill cell to the evaporation pond.
The Twin Oaks Landfill design utilizes an onsite aerobic sewage system to process domestic waste water from the landfill facilities. The system uses multiple stages to treat the sewage including aeration, clarification, chlorination and discharge. The treated effluent is then used to irrigate plants.

The discovery of an onsite endangered orchid species, the Navasota ladies'-tresses (NLT), required designing around areas with known populations. To protect the orchid, 141 acres of landfill property were deed-recorded to remain an undisturbed natural environment for the species, and arrangements were made for the purchase of 22 acres of offsite property that had known NLT colonies and was in the process of being developed.

Construction Techniques

Flexibility during design was critical in adapting to challenges as they developed. As excavation progressed, lignite, a brownish black coal, was encountered at the bottom of the cell. The presence of lignite produced an unfavorable amount of water during construction with potential to create hydrostatic uplift beneath the constructed liner. This risk will persist until sufficient waste, to balance the uplift from the water, is placed in the cell. The team was able to quickly adapt to this challenge by devising a method to install an under-drain system and connect it to an existing perimeter de-watering system that had been constructed for the landfill sidewalls. This not only allowed construction to proceed but provided long-term protection of the liner system.

Because Texas was experiencing a drought during construction, a 320-foot-deep water well was installed for construction water. The well was utilized until the drought ended and rain water could be harvested and used. The landfill was designed for a local water utility district to supply potable water for onsite use. However, installation of the line to the facility was not completed until near the end of construction. Though the site now has water service, the well is being maintained for future use during construction to minimize the need for potable water.

During design, a location that would not impact the deed-restricted areas was designated to pile excess soil for future use. A master plan detailing the timing of construction for future landfill cells showed the location chosen would be needed for expansion in approximately 15 years, requiring the soil to be relocated. As the team considered the financial implications, it became apparent that another location would be more advantageous. The team acted on a cost-effective bid to move the soil another quarter-mile away. Although this location still requires the soil to be relocated in the future, it is a more cost-effective option for the near future and prevents the need to move the soil for several years.

Due to the amount of onsite property dedicated for habitat conservation, the five-acre evaporation pond was configured between two deed-recorded areas. A leachate transmission line was placed along the property line in an area that was required as a buffer zone and had to remain accessible for fire fighting equipment. Excess soil from the cell excavation was required to be placed within future disposal cells since the remaining usable property contained valuable habitat and was being conserved. Close collaboration with regulatory agencies resulted in the placement of groundwater wells and methane monitoring probes in locations specifically selected to minimize potential impacts to habitat areas.
CQA
BVSWMA paid close attention to quality assurance throughout the construction process. In addition to typical construction management and materials testing, a project-specific Soil and Liner Quality Control Plan (SLQCP) was maintained to ensure landfill liner components were developed and installed correctly. The cell and pond liner systems underwent rigorous testing, with the results submitted to the Texas Commission on Environmental Quality (TCEQ) for approval.

The site infrastructure, maintenance and scale facilities were continuously monitored for adherence to applicable building codes, design requirements and LEED standards. Soil density, concrete strength, weld certifications, pipe pressure testing as well as extensive strength testing on bridge components was performed.

Site Soils
During the site selection process, the soil at each potential location was evaluated for its landfill suitability. It was discovered that the soil at the Twin Oaks site had high clay content for use in the landfill liner and desirable select fill soil for general building requirements. The soil anticipated to be encountered during excavation was considered during construction sequencing, providing suitable select fill soil for construction of the rest of the site infrastructure. Liner quality soil was stockpiled adjacent to the cell, or excavated as needed once the disposal area was ready for clay liner. Utilizing the onsite soil enabled BVSWMA to avoid added cost from importing select fill for the infrastructure and building sites or clay for use in the liner system.

Hydrology/Geology
The Twin Oaks site was strategically selected. The landfill footprint utilizes a hilltop location that minimizes the need to manage rainfall from offsite. It was intentionally sited south of Alum Creek, outside the flood plain, to prevent impacts to the surface water. This required construction of a bridge across the creek, creating improved access on the property. Stormwater flows from the landfill were designed to show no increase in runoff rates. Impacts from bridge construction showed no offsite increase in water levels.

The native soils encountered on and adjacent to the site consist of the Singleton, Burlewash and Shiro Series. These units are characterized as nearly level to strongly sloping, well to moderately drained, sandy and loamy soils. These soils are formed in tuffaceous sandstones and shale with Singleton soils found on broad flats and the Burlewash and Shiro soils found on slopes and hillsides. The claypan types of soils typical of these units tend to act as physical barriers to the downward movement of water.
**State-of-the-Art Sanitary Landfill**

BVSWMA has incorporated state-of-the-art, environmentally conscious elements throughout the landfill. Interior roads, as well as improvements to the state highway, were designed with safety in mind. Adequate lanes were added to the highway to allow turning into and out of the facility. Onsite roads were specifically designed to maximize available queuing of vehicles without impacting highway traffic. Concrete was chosen for the majority of the site for increased longevity and to reduce the “heat island” effect caused by darker surfaces.

The entrance facilities were designed for customer convenience to minimize wait times and idling vehicles. Two inbound scales were installed, one for frequent customers with known tare weight and BVSWMA EZ-tag, and the other for customers that need more assistance. A single scale is used at the exit for customers requiring an exit weight for billing purposes. Bypass lanes are provided on both sides for those vehicles not required to use the scales. In order to minimize noise inside the scale house, the walls were constructed with insulated concrete form, which effectively soundproofs the facility from noisy disposal vehicles.

A citizen’s convenience area, separate from the active disposal area used by commercial vehicles, provides residents and small haulers a safe, efficient option for disposing of waste and recyclable material at the landfill. The citizen’s convenience area is grade-separated and has capacity for up to nine roll-off boxes for waste or recyclable materials. The containers are unloaded as needed to maintain adequate capacity and the area is monitored by landfill personnel to ensure that only approved material is dropped off.

Landfill cells are outfitted with Subtitle D liners: two feet of clay, 60 mil HDPE synthetic liners, and a leachate collection system. Excess moisture and leachate are collected and stored in an onsite evaporation pond. Additional groundwater protection is provided by in-situ clay materials located beneath the site.

Striving for economic use of onsite resources, the landfill liners are also used for onsite composting. A permitted biosolids compost operation is co-located on top of waste filled areas. The groundwater protection provided by the landfill liner system serves as groundwater protection for the compost operations. BVSWMA compost and mulch from the Rock Prairie Road Landfill is in high demand among residents. By increasing operational capacity and consolidating operations, additional compost material can be created and re-used, thereby conserving landfill space.

The Twin Oaks Landfill master plan highlights a landfill gas collection system to be used as the site is further developed. The system includes a series of wells, either vertical or horizontal, which are placed in the waste and connected by a series of pipes to a blower or vacuum. Once installed, a slight negative pressure can be maintained on the landfill, extracting and collecting the landfill gas for beneficial re-use. Horizontal wells will be installed as waste is deposited and used in conjunction with leachate recirculation.

A weather station is being constructed at the Twin Oaks site to monitor and record rainfall, wind speed and barometric pressure. BVSWMA is requesting the station be designated as a certified weather station to provide information to the general public. Due to the remote location of the site, the closest certified station is located nearly 15 miles away.
The Twin Oaks Landfill is leading the industry as the first landfill to receive LEED certification for the entire facility. In March 2011, Twin Oaks Landfill received LEED Silver Certification from the U.S. Green Building Council. From selecting local building supply vendors to recycling water used in the maintenance building, sustainability was considered in each step of the design process.

A sample of the many “green” features at Twin Oaks Landfill includes:

- Geothermal wells for heating and cooling
- Motion detection and timers on lights
- Recycled water and harvested rain water
- Reflective surfaces
- FEV parking
- Use of recycled building materials
- Use of regional products
- Use of products with low VOC content

These components, as well as recycling materials used during construction instead of disposing, assisted BVSWMA in obtaining the points required to reach LEED Silver Certification.

The design of the site required conservation of 141 acres of landfill property for endangered species habitat. Accounting for almost one quarter of the landfill property, these areas cannot be used and must remain in a natural condition. By utilizing designs that incorporated these areas into the overall facility, a unique balance between man and nature has been achieved.

Overall Planning and End-use Planning

Planning for the Twin Oaks Landfill site began in 1992 when BVSWMA was created and waste disposal consolidated at the Rock Prairie Road Landfill site. At that time, Rock Prairie Road Landfill was envisioned to reach capacity by the year 2000. As plans for Twin Oaks were taking place, careful consideration was given to the closure planning at Rock Prairie Road Landfill to ensure a streamlined conversion to Twin Oaks Landfill. A transition plan was created that outlined regulatory requirements, remaining capacity, and needs for additional equipment in order to move from one site to the other. A permit amendment to include additional property and several permit modifications were required to provide the necessary capacity at Rock Prairie Road Landfill. As Twin Oaks Landfill begins to receive the region's waste, Rock Prairie Road Landfill is undergoing closure activities.

BVSWMA proactively installed a gas collection and control system at Rock Prairie Road Landfill to minimize odor potential. To take advantage of this renewable resource, a gas-to-energy project is being initiated on the site. Global positioning system (GPS) equipment is used on all equipment at the Rock Prairie Road Landfill site to monitor compaction, control soil usage and to monitor remaining capacity as it closes. GPS is also used to record daily waste disposal locations.

Located in burgeoning College Station, Rock Prairie Road Landfill is being re-purposed as a city park. A previously excavated soil-borrow area is being developed as a 15-acre lake for residents to enjoy. BVSWMA has closely coordinated with the City of College Station Parks Department to incorporate the final landfill layout into their plans.

Master planning of the Twin Oaks site was performed once the required permits were secured. Plans were made to incorporate future facilities at the site as space and needs were confirmed.
Brazos Valley Solid Waste Management Agency, Inc.
Grimes County, Texas

Section 2
Environmental Controls

BVSWMA voluntarily installed a landfill gas collection and control system that is currently destroying CO₂ emissions equivalent of 10.2 million gallons of gasoline per year.

Groundwater and Leachate Monitoring

The groundwater beneath the sites is monitored semi-annually from a series of wells surrounding the landfill footprint. Wells are located 600 feet apart around the perimeter. Also constructed around the perimeter of the site, probes are used to monitor methane levels.

Landfill cells are outfitted with Subtitle D liners; a 60-mil HDPE synthetic liner, two feet of clay and a leachate collection system. Each cell has a dedicated pump (or a gravity drain to an external storage facility), located within a sump at the lowest point in the cell, to remove accumulated leachate. Pumps also have a level transducer connected to a control panel that notifies employees when the leachate level becomes too high. Excess moisture and leachate are collected in an onsite evaporation pond or circulated into the waste, preventing the need for offsite treatment.

Resource Conservation and Compatibility with the Environment

BVSWMA obtained an Individual 404 permit for impact to waters of the U.S. and a biological opinion for unavoidable impacts to endangered species. This entailed coordination with the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Texas Historical Commission, Texas Commission on Environmental Quality and Texas Parks and Wildlife Department to address various environmental concerns.

Of particular note during the environmental surveys was identification of the presence on the proposed site of the Navasota ladies'-tresses (Spiranthes parksii), known as NLT. This federally and state-listed endangered terrestrial orchid is known to exist only in 11 Texas counties, and the blooming and survey period is only two to three weeks each fall. The counties with known populations include Grimes County, the location of the 609-acre Twin Oaks Landfill. Recalling the first NLT research activities, Mike Oden, project manager for HDR (project engineer, architect and environmental consultant) says, “Our first survey, back in 2001, spotted just around 35 plants; however, due to drought-like conditions that year, additional surveys were needed. In 2002 we identified over 700 plants on the site which made avoidance of the plants not only impractical but not feasible.”
The graph below compares the survival rate (percent of individuals producing vegetative material above ground each season) of two types of transplantation methods, soil-intact and bare-root, versus those not transplanted at Twin Oaks.

**NLT TRANSPLANT SURVIVAL RATE**

**Percent of Productive Individuals**

<table>
<thead>
<tr>
<th>Growth Period</th>
<th>2007 Bare-Root (n=10)</th>
<th>2007 Soil-Intact (n=59)</th>
<th>2007 Natural (n=variable)</th>
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<tbody>
<tr>
<td>2007 Flower</td>
<td>n=198</td>
<td>n=540</td>
<td></td>
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<tr>
<td>2008 Rosette</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008 Flower</td>
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<td>n=248</td>
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<tr>
<td>2011 Rosette</td>
<td>n=6</td>
<td>n=55</td>
<td></td>
</tr>
</tbody>
</table>

**Percentage of productive individuals during each orchid growing season after soil-intact and bare-root transplantation in the rosette growing season of 2007.**

n = the number of Natural individuals observed each season.

HDR project biologists quickly became experts on the orchid, a plant that few regulatory agency staff had even seen. “We embarked on a five-year effort to develop a biological assessment and adaptive management plan for the site. The U.S. Fish and Wildlife Service finalized the Biological Opinion in 2006, clearing the way for the Corps to issue the Section 404 permit,” said Oden.

To protect the orchid, 141 acres of landfill property were deed-recorded to remain an undisturbed natural environment for the species, and arrangements were made for the purchase of 22 acres offsite that had known NLT colonies. Additionally, BVSWMA assisted the city of College Station in designating 75 acres of Lick Creek Park as a Natural Habitat Conservation Zone.

Protection of the species is an ongoing project; the project team continues to conduct onsite surveys with professors and students from Texas A&M University’s Department of Ecosystems and Science Management. The Adaptive Management Plan developed includes:

- Onsite – vegetation management
- Field monitoring – surveys for NLT conducted annually
- Transplantation – documented success with transplanted NLT and Spiranthes rosettes
- Seed collection and propagation – success within laboratory settings
- Disturbance (manipulation of cover)
Texas A&M University students have been working to create a more favorable habitat with controlled burn plots to get rid of competing species; exclosures, which essentially are fences around plants to keep herbivores from eating them; seed propagation; and transplanting plants from areas needed for project development into the deed-restricted areas. The ultimate result will be a better understanding of the plant life history and management strategies for future conservation of the orchid and the Post Oak Savannah habitat in which it occurs.

The team also worked with the U.S. Army Corps of Engineers to mitigate stream impacts. BVSWMA’s stream mitigation costs were reduced by approximately $450,000 by working with the agency and the local mitigation bank. The stream mitigation itself is completed. Enough flowers have been transplanted to offset the long-term potential impact to approximately half of the 700 NLT identified. Reporting will continue for a while on the progress of the habitat enhancements, seed plots and transplants of the NLT.

**Human Health**

Twin Oaks Landfill was designed to achieve LEED Silver Certification. Including sustainable components improves indoor air quality and provides environmental controls to ensure employees have a healthy work environment. The facility’s design (scale house and maintenance building) features white roof tops, geothermal wells, water re-use tanks and other sustainable construction features.

White roofs help keep the buildings cool, reducing the “heat island” effect, waterless urinals and low-flow fixtures are incorporated throughout to reduce water consumption, and rain water is collected from the scale house building to be used for irrigation.

There is also a provision for future installation of photovoltaic panels on the scale house roof to capture solar energy. The roof is tilted southward to maximize solar exposure.

“There was a good reason for the choices that the designers made,” Oden explained. “For example, the transportation engineers opted for concrete instead of asphalt for the road because concrete reduces heat and provides a more durable surface for the anticipated use. The architects specified features that would make use of extensive natural lighting. The interior lights are tied to motion detectors and timers so they go off when not in use, saving electricity.”

**Environmental Controls**

Environmental controls at the Rock Prairie Road Landfill include 15 groundwater monitoring wells spaced around the 100 acres of filled land. These wells are monitored semi-annually with results reports to the TCEQ. Additionally, quarterly testing is performed on 12 methane monitoring probes around the landfill.

BVSWMA voluntarily installed a landfill gas collection and control system during closure of the first 50 acres at Rock Prairie Road Landfill in 2005. Since that time, approximately 850 standard cubic feet per minute (scfm) of landfill gas has been destroyed. According to the Landfill Gas to Electricity Benefits Calculator developed by the Landfill Methane Outreach Program, this is equivalent to the CO2 emissions from 10.2 million gallons of gasoline per year.

The Twin Oaks Landfill currently has 36 groundwater monitoring wells (18 sets of two wells monitoring the upper and lower zone) spaced every 600 feet around the perimeter of the first four cells to be developed (110 acres). These cells are estimated to provide capacity for the landfill for the first 15-20 years of operation. As the landfill is further constructed, four sets of wells will be removed and 11 additional sets installed. A total of 50 wells will then encompass the entire 214 acres of land to be filled. Quarterly testing is currently underway to establish baseline groundwater quality. Going forward, the wells will be sampled and tested on a semi-annual basis.

A total of 20 methane monitoring probes, tested quarterly, will also surround the 214 acres of land to be filled at Twin Oaks. A landfill gas master plan was prepared to enable BVSWMA to be proactive in the installation and operation of a landfill gas collection and control system at Twin Oaks similar to what was done at Rock Prairie Road.
Brazos Valley Solid Waste Management Agency, Inc.
Grimes County, Texas

Section 3
Regulatory Compliance

BVSWMA was awarded the Technology Excellence Award by the Texas Association of Government Information Technology Managers for using computer aided earth moving systems on landfill equipment.

Role in Community Integrated Solid Waste Management System

Critical to the local community, BVSWMA has been the sole provider of solid waste disposal for Bryan and College Station, Texas since 1992. Residents are invited to dispose of waste and recyclables at the site. BVSWMA also offers composting services for area residents and businesses and a household hazardous waste collection program. With high demand, compost is sold to residents.

Environmental Compliance - Past Three Years

Twin Oaks Landfill has been dedicated to environmental compliance since the landfill site was selected. In addition to formal reports and submittals, BVSWMA has maintained open communication with regulatory agencies to proactively address requirements needed to ensure a timely opening. The Twin Oaks site has a permit from the United States Army Corps of Engineers for impacts to waters of the U.S. and from the BlueBonnet Groundwater Conservation District for the onsite water production well.

Rock Prairie Road Landfill consistently maintains an excellent compliance record. The TCEQ performs annual compliance inspections at Rock Prairie Road Landfill. The most recent inspection, conducted in 2010, found BVSWMA to be in compliance.

Both sites operate in compliance with a site-specific solid waste permit, storm water pollution prevention plan (NPDES permit) and groundwater monitoring wells installed in accordance with the Texas Water Development Board. Reports on all constructed liners are submitted to the TCEQ for approval prior to placing waste over those liners.
Awards Letters and Facility Inspection Data

APWA Reporter - LEED Certification Article

Twin Oaks Landfill was recently highlighted in the March 2011 issue of APWA Reporter for strides in sustainable landfill design. The article explains project components designed for LEED certification and specific features that reduce environmental impacts to the community.

Technology Excellence Award

In 2006, BVSWMA was awarded the Technology Excellence Award by the Texas Association of Government Information Technology Managers. BVSWMA was selected for this statewide award for using computer aided Earth moving systems on landfill equipment.
Section 4
Planning, Operations & Financial Management

Historically, BVSWMA, Inc. has maintained some of the lowest landfill rates in the region.

Meeting Design & Operational Objectives

BVSWMA planning and operations activities are designed to provide safe and efficient disposal of solid waste. This begins by obtaining accurate records of waste tonnages received and continues through the use of heavy equipment for compaction and alternative daily cover materials that do not consume space, and providing annual compaction calculations to measure improvement. Since installing GPS equipment at the Rock Prairie Road site, airspace utilization has increased dramatically.

The GPS system was implemented in 2005, improving landfill utilization by 40 percent. Improvements were made in waste compaction and soil cover usage.

Other operations that improve the utilization of disposal space include a white goods recycling program and composting. Large appliances are accepted and segregated until sufficient quantities are accumulated to send to an offsite metal recycler. Any appliances containing CFCs are handled separately and the CFCs are removed by certified technicians prior to recycling. Clean brush is also segregated and stored on site to be chipped and given away as mulch or sent to be composted. Future plans call for the BVSWMA compost operation to be consolidated at Twin Oaks and to utilize the landfill liner as environmental control for the compost operation.

LANDFILL COMPACTION IMPROVEMENT

Airspace Utilization Factor

Trend Line
Estimated Operating Budget Per Year

BVSWMA is a non-profit local governmental corporation formed in 2010 under a joint agreement of the cities of Bryan and College Station, Texas.

Using a very unique, cooperative agreement, the city employees that were associated with the landfill and compost operations were allowed to maintain employment with the city and work for BVSWMA as borrowed employees. BVSWMA executive director and all future employees will be hired directly by BVSWMA.

The current operations at the Rock Prairie Road Landfill and the existing compost facility have an annual operational budget of approximately $6 million dollars. It is anticipated that this budget will not change significantly after the landfill operations are transitioned to the new Twin Oaks Landfill. The landfill gate rates are tonnage based and are adjusted on an annual basis to meet the balance of being a non-profit, but self-funding corporation.

Future Expansion

Anticipating significant growth in Bryan and College Station, Twin Oaks Landfill is designed for future expansion. After the Twin Oaks site was selected a strategic master plan was developed to outline a clear development plan. Looking to the future, the site is planned to incorporate a material recovery facility, administration building and compost facility as demand grows. With 609 acres of property at Twin Oaks, 141 acres are dedicated habitat and 214 acres are available for disposal. The first cell developed encompassed 15 acres, leaving 199 acres remaining to be developed for disposal. The remaining acreage will be used for facilities and soil management.

Employee Health and Safety Training

BVSWMA takes pride in the fact that 15 employees have municipal solid waste (MSW) licenses. They hold mandatory weekly safety meetings to discuss different aspects of the safety program. These meetings are typically held to discuss specifics for the time of year or recent events. BVSWMA also conducts CPR, first aid and blood borne pathogen training for all employees. All new employees hired by BVSWMA attend orientation that includes health and safety training. Orientation for equipment operators and scale operators is complemented with a standard operating procedure and training booklet developed by BVSWMA. BVSWMA considers its employees to be valuable assets with each staff member playing a role in keeping the landfill and environment safe. All employees receive waste screening training.

In 2006, BVSWMA received a National Safety Award of Merit for occupational health and safety.

Possessing a thorough understanding of the types of materials allowed to be disposed of enables BVSWMA employees to protect the landfill from undesirable materials. In order to minimize customer confusion, BVSWMA staff informs them of which types of materials are accepted and visually inspects each load upon entering the facility. Full-time spotters are present at the citizen’s convenience area to monitor unacceptable materials. Additionally, random inspections of individual loads are performed. Typically, two vehicles per day are asked to unload materials for a thorough inspection.

BVWSMA’s programs are designed to make the landfills safe for employees, customers and the environment.
“Using the computer-aided earth moving system has significantly improved operations and resulted in direct taxpayer savings by permitting more efficient use of available landfill space and conservation of dirt used to cover waste.”

Samantha Best
Twin Oaks Landfill Superintendent

Section 5
Equipment/Systems & Technology

Equipment Utilized
BVSWMA utilizes three caterpillar 836 compactors (one as a backup) for compacting waste. These are the heaviest of the caterpillar compactors and are designed to achieve a maximum waste density. For soil movement, an excavator and articulated dump trucks are used. This arrangement is most conducive to excavation of clay soils and for segregating different soil strata as it is encountered.

Other equipment includes dozers and front-end loaders, backhoes and various smaller equipment. For alternate daily cover, a tarp machine is used to spread reusable tarps over the compacted waste at the end of the day. This not only protects the waste from vectors and rainfall, but saves valuable space that otherwise would be consumed by soil cover.

The compactors and excavators (as well as a rover ATV) are equipped with GPS equipment as an aid in achieving maximum compaction and to accurately track soil usage and airspace consumption. Since installing the equipment in 2005, compaction has improved over 40 percent.

Maintenance & Employee Training
Routine (and non-routine) maintenance is performed by two BVSWMA mechanics. This enables the landfill to keep equipment running without having to rely on third-party vendors. Employees that are hired to drive equipment are trained in safety and proper operation before being allowed to operate. Ongoing training is provided on any new equipment that the employee is asked to operate. Cross training is also provided to allow operator time off and to provide opportunities for advancement.

BVSWMA employees routinely participate in SWANA Landfill Road-E-Os and are frequent state winners and compete at the national level. This record is a prime indication of the exhaustive training provided by BVSWMA.
Back-up Systems

BVSWMA has a variety of back-up systems in place to ensure facilities remain in operation at all times. Back-up systems utilized by BVSWMA began with the third landfill compactor. This machine caught fire and was considered a total loss as the amount quoted to repair the machine was more than its value. BVSWMA mechanics took it upon themselves to rebuild the machine at about half the quoted cost, providing the landfill a back-up compactor for times when the other compactors are being serviced. This is a tremendous asset for the transition period from the Rock Prairie Road Landfill to Twin Oaks Landfill. Having at least two compactors available at all times ensures maximum compaction of the waste is achieved and the landfill airspace is utilized efficiently.

The Twin Oaks Landfill site has implemented several back-up systems into the design. Due to its rural location, in the case of a power outage it could be several hours or even days before electric service is restored. The scale house has the ability to attach a generator owned by BVSWMA in case of a power failure. All transaction equipment (scales, computers) is on a common electrical panel and can be run from the generator with the flip of a switch. These systems keep customers satisfied by enabling operations to proceed uninterrupted if power is lost at the site.

Leachate and contaminated water recirculation is the main disposal method for BVSWMA. A back-up evaporation pond has been constructed at Twin Oaks as an additional means of management.
“As a non-profit, local government corporation, BVSWMA, Inc. is able to provide long term, cost-effective solid waste disposal that meets the needs and expectations of the community that we serve.”

Bryan Griesbach
BVSWMA Executive Director

**Site Appearance**

BVSWMA’s pride in maintaining a neat, clean site is evident in the steps taken to minimize impact on the community including:

- Screening berms to add visual appeal
- Highway construction to eliminate traffic back-up
- Sequenced construction designed to move away from the neighboring community as construction progresses
- Permanent perimeter wind fence and mobile wind fences to block debris from blowing offsite
- Tree corridor along the creek near the disposal area acts as buffer
- Natural areas dedicated to orchid preservation
- Adopt-a-Highway program
- Employee road litter pick-up for two miles in either direction at both landfills
- Wildflower plantings
- Participation in local Earth Day events
- Trash-off for Keep Brazos Beautiful (Keep Texas Beautiful affiliate)

BVSWMA maintains such a clean site at Rock Prairie Road that neighbors in the Pebble Creek subdivision, located across the street from the landfill, have called to ask where the landfill is located!

**Community Education and Customer Service**

Realizing the importance of community support for the landfill, BVSWMA offers community education tours for customers. Educational tours include landfill visits by area residents and students ranging from home school pupils to college graduate students. In addition to landfill tours, BVSWMA offers unique community learning opportunities via compost demonstration gardens. Dedicated tours focus on the site’s environmental controls, endangered species and wetlands preservation. Facility tours highlight the sustainable features utilized in the construction and materials to obtain LEED Silver Certification.

BVSWMA representatives lead presentations in the community for Texas A&M University and the local Council of Governments, where the landfill superintendent serves as the chairperson for the Solid Waste Advisory Committee at the Brazos Valley Council of Governments.

BVSWMA established a Citizens Advisory Committee (CAC) to assist in the site selection of Twin Oaks early in the process. The CAC’s role was to help the community understand that the facility is a necessary and environmentally acceptable means of managing solid waste.
BVSWMA also maintains a website that explains the components of a landfill, the compost operation and what is acceptable to throw away. Other events such as HHW collection and participation in community events are also advertised.

Even criminals make use of landfills, and BVSWMA does its part to counteract area criminal activity. BVSWMA has solidified a positive reputation in working with local police and the FBI to recover evidence that has made its way to the landfill. By knowing when certain trucks arrive at the site, BVSWMA can accurately locate where the load was placed due to the use of onsite GPS resources. By knowing an approximate disposal location, landfill personnel know where to search and have been successful in finding evidence that has been used in crimes.

**Landscaping and Control of Windblown Materials**

In an effort to minimize environmental impacts, landscaping at Twin Oaks landfill focuses on native species. Hardy native species are adapted to Texas weather conditions and require less water than imported species. Further reducing water needs, the onsite facilities capture rain water that is used for irrigation and dust control. A permanent perimeter wind fence and mobile wind fences are used to catch debris before it can blow offsite. Onsite trees also provide a screening mechanism for blowing litter.
Innovative or Unique Aspects

Twin Oaks is exceptionally unique as the first landfill to receive LEED certification at any level. Thoughtful planning and critical thinking uncovered opportunities to achieve LEED Silver Certification for Twin Oaks Landfill.

What makes this facility different from the rest?

Successfully hosting endangered species on a landfill site required extensive collaboration with regulatory agencies and a uniquely planned site design. The onsite discovery of the endangered orchid species, the Navasota ladies’-tresses, required designing around many deed-restricted areas. To protect the orchid, 141 acres of landfill property were deed-recorded to remain an undisturbed natural environment for the species, and arrangements were made for the purchase of 22 acres offsite that had known NLT colonies.

Cultural preservation drew the attention of BVSWMA planners since the landfill site includes a small plot of land where once stood a previously undocumented pre-Civil War one-room cabin. This bit of history has been registered as a Texas State Archaeological Site, and, as such, the area was carefully excavated and the artifacts recovered and documented prior to development of the landfill.

Obtaining community support to develop a greenfield site required extensive research and careful site selection. The ultimate location of Twin Oaks landfill enabled BVSWMA to design a sustainable site that is effectively planned for future growth.

BVSWMA brought a modern landfill facility to a rural location that incorporates many sustainable features and will act as an environmental showcase for decades to come.
03/09/2011

Samantha Best
Landfill Superintendent
Brazos Valley Solid Waste Management Agency
7600 Rock Prairie Road P.O. Box 9960
College Station, TX 77842
United States

Greetings,

On behalf of the U.S. Green Building Council, I would like to congratulate you on achieving Leadership in Energy and Environmental Design (LEED®) certification for Twin Oaks Landfill. Your project’s final LEED rating reflects 36 documented and approved points, which corresponds to the silver certification level under the LEED for New Construction rating system.

LEED certification identifies Twin Oaks Landfill as a pioneering example of sustainable design and demonstrates your leadership in transforming the building industry. In honor of this impressive achievement and in appreciation of your participation in LEED, we are pleased to present you with the enclosed certificates recognizing your accomplishment.

We encourage owners of certified projects to enroll in USGBC’s Building Performance Partnership (BPP). BPP allows building owners to track and analyze operational performance relative to LEED credit achievement. USGBC’s BPP participants are eligible for annual performance reports, report cards and real-time data interfaces to aid in their building performance goals. For information on BPP: www.usgbc.org/bpp. If you have any questions or comments, please contact us at www.usgbc.org or www.gbci.org.

Congratulations once again on earning LEED certification, and thank you for your commitment to our common goal of building a healthy, sustainable future.

Sincerely,

S. Richard Fedrizzi
President, CEO & Founding Chairman
U.S. Green Building Council
Solid waste buildings striving for LEED certification

Jay Marcotte
Assistant Director of Public Works
City of Bryan, Texas
Member, APWA Solid Waste Management Committee

Buildings are one of the distinguishing elements of human civilization. However, if buildings are not constructed thoughtfully, they waste precious natural and financial resources, harm the environment, and endanger the health of those who use them. In 1998, the U.S. Green Building Council (USGBC) established the Leadership in Energy and Environmental Design (LEED) certification system to provide nonbiased third-party recognition that a building was constructed using environmentally sound principles that encompass energy and water efficiency, carbon emissions reduction, indoor air quality, and developmental impact. Using these five categories, USGBC has developed a rating system based on obtaining a certain amount of points (100 being the highest). These points are established on how efficient the five categories are in any given building. The levels are:

- LEED Certified: 40-49 points
- LEED Silver: 50-59 points
- LEED Gold: 60-79 points
- LEED Platinum: 80-100 points

When one thinks of an environmentally friendly LEED-certified building, you might think of a new modern city building, a refurbished school or library, but I would bet you would never think of all the buildings inhabited at a 1,000-plus-tons-per-day landfill facility. That is exactly what the professionals at the Brazos Valley Solid Waste Management Agency (BVSWMA) Inc. are setting out to do with their new Twin Oaks Landfill Facility in Anderson, Texas.

In the Bryan/College Station area, about 15 miles southwest of Texas A&M off HWY 30, BVSWMA Inc. is making a difference. The staff takes great pride in their community and aspires that its working environment reflects the core values of its population. These values include quality of life, increasing efforts towards sustainability, and economic viability. With design and oversight from HDR, the new Twin Oaks facility is currently in the process of obtaining LEED Silver status for this project, which includes three buildings located on the premises.

The project area is approximately 610 acres and it consists of site preparation, landfill space and new construction of three buildings:

- Scale House/Administration: 2,900 sf
- Driver Service Building: 675 sf
- Maintenance Building: 14,700 sf

During construction, the project diverted 75% of the construction waste from being landfilled. Separate containers were used to collect waste at the site for steel, concrete, cardboard, sheetrock and wood. The amount of recycled content was 20% (post-consumer ½ pre-consumer), and includes steel and steel products, flooring products, ceiling tiles, concrete reinforcement, insulation and wood doors. The project also utilized 20% of the material within a 500-mile radius of the landfill site; these materials included steel, steel products, ceiling tile and insulation.

Energy usage is a large component of this project. The weather in south-central Texas can be quite extreme. The hottest months in the year are July and August with an average high of 96 degrees, and a low of 73 degrees. The coldest month is January with an average high of 61 degrees, and a low of 40 degrees. Humidity is a factor in this climate and the average annual rainfall is approximately 39 inches. Based on these factors, air conditioning is used for the majority of the year to help offset the heat and humidity. The project complies with ASHRAE 90.1-2004, and achieves a 22% energy savings over
All the buildings have been designated as non-smoking, with a designated smoking area 25 feet away from all the entrances and fresh air intakes. A construction IAQ plan during occupancy and before construction was established and followed throughout the project's process. This includes the confirmation that air handlers were not operated during the construction (or MERV 8 filters were used during construction) and the proper flush-out or air quality testing before occupancy. Low emitting materials were used throughout all the buildings, including paints, adhesives, carpet systems and composite wood. Lighting controls are present throughout the building with the use of controls in each office, daylight and occupancy sensors, and task lighting for the cubicle areas. All the systems were installed to comply with ASHRAE 62.1-2004 and ASHRAE 55-2004.

Water conservation efforts include that all the buildings will be using low-flow water fixtures. The toilets will use infrared sensors and urinals will be waterless; these measures decrease the water usage from a baseline by 33%. All buildings were constructed with rain barrels that would be used in irrigating the surrounding vegetation and plant life. The project also received design credits for a truck washwater recycling area; exemplary performance for SSc5.2 maximized open space at the facility and the implementation of a green education program.

BVSWMA Inc. is excited about the opportunity to showcase their environmentally friendly landfill facility, which is slated to open this spring. Having the LEED Professional Accreditation in hand, it is an excellent opportunity for them to advertise their expertise—and their ability to lead and guide green development projects in any industry, including landfills.

Jay Marcotte can be reached at (979) 209-5521 or jmarcotte@bryants.gov.

Speaking of success...

The City of College Station received one of three statewide awards recognizing “Technology Excellence” at the 2006 Texas Association of Government Information Technology Managers (TAGITM) in Galveston. The awards were selected from thirteen total submissions by various Texas cities and counties.

College Station was recognized for a Computer-Aided Earthmoving System implemented at the Rock Prairie Road Landfill as a joint effort between the City’s Office of Technology and Information Services (now Information Services) and the Brazos Valley Solid Waste Management Agency (BVSWMA).

“Using this system has significantly improved operations and resulted in direct taxpayer savings by permitting more efficient use of available landfill space and conservation of dirt used to cover waste,” said Samantha Best, Landfill Supervisor. She added that the system eliminates the need for surveying and manually staking the site of work, plus provides optimum compaction and grading by continually providing a variety of real-time data (i.e. number of passes, grade and slope information etc.) to equipment operators.

In June of 2004, the City of College Station issued a Request for Proposal (RFP) from firms to provide a comprehensive computer-aided Global Positioning System (GPS) based earthmoving system. This system was to be used in compaction and grading work at BVSWMA’s Rock Prairie Road Landfill.

In December 2004, a contract was awarded to Mustang Tractor & Equipment Company of Bryan for installation of the system. According to Neil Black, Program Manager for the Information Technology installation, this system is unique in that it required incorporating computer hardware and software, GPS receivers, a SQL database and a 900 MHz radio system. The system was installed and tested over the next several months and has been in operation for about one year.

May sales tax receipts (April sales) have been received from the State Comptroller’s Office. The City collected $1,280,894 for the month of May, representing a 9.16% increase in revenue from the same month a year earlier. Sales tax collections for FY06 YTD are 7.85% above FY05 collections.

Tax revenues were projected to grow at or around the 5% trend. The Budget Office will continue to monitor sales tax revenue projections and report accordingly should there be any changes from the forecasted amount.

<table>
<thead>
<tr>
<th>May FY06 Receipts</th>
<th>May FY05 Receipts</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,280,894</td>
<td>$1,173,426</td>
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<tr>
<td>Actual Difference</td>
<td>$107,468</td>
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<tr>
<td>Percent Difference</td>
<td>9.16%</td>
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</table>

<table>
<thead>
<tr>
<th>FY06 YTD Receipts</th>
<th>FY05 YTD Receipts</th>
</tr>
</thead>
<tbody>
<tr>
<td>$11,219,714</td>
<td>$10,402,997</td>
</tr>
<tr>
<td>Actual Difference</td>
<td>$816,717</td>
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<tr>
<td>Percent Difference</td>
<td>7.85%</td>
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</table>

Ben Roper, Assistant Information Services Director; Neil Black, Systems Analyst; Samantha Best, Landfill Supervisor; and Pete Caler, BVSWMA Director, are pictured with the technology excellence award presented in May for the computer-aided earthmoving system now operational at the Rock Prairie Landfill. Pictured below is the system in use by Jerry King, equipment operator.
Brazos Valley Solid Waste Management Agency, Inc.
Rock Prairie Road Landfill

Emission Reductions and Environmental and Energy Benefits for Landfill Gas Energy Projects

For electricity generation projects, enter megawatt (MW) capacity: [ ]
For direct-use projects, enter landfill gas utilized by project: [ ]
- OR -

million standard cubic feet per day (mmscfd)

or

standard cubic feet per minute (scfm)

<table>
<thead>
<tr>
<th>Direct Equivalent Emissions Reduced</th>
<th>Avoided Equivalent Emissions Reduced</th>
<th>Total Equivalent Emissions Reduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMTCO₂E/yr</td>
<td>MMTCO₂E/yr</td>
<td>MMTCO₂E/yr</td>
</tr>
<tr>
<td>tons CH₄/yr</td>
<td>tons CO₂/yr</td>
<td>tons CH₄/yr</td>
</tr>
<tr>
<td>tons of methane per year</td>
<td>tons of carbon dioxide per year</td>
<td>tons of methane per year</td>
</tr>
<tr>
<td>0.0900</td>
<td>4,724</td>
<td>0.0106 11,683</td>
</tr>
<tr>
<td>Equivalent to any one of the following annual benefits:</td>
<td>Equivalent to any one of the following annual benefits:</td>
<td>Equivalent to any one of the following annual benefits:</td>
</tr>
<tr>
<td>Environmental Benefits</td>
<td>Environmental Benefits</td>
<td>Environmental Benefits</td>
</tr>
<tr>
<td>• Annual greenhouse gas emissions from __ passenger vehicles: 16,485</td>
<td>• Annual greenhouse gas emissions from __ passenger vehicles: 1,941</td>
<td>• Annual greenhouse gas emissions from __ passenger vehicles: 18,426</td>
</tr>
<tr>
<td>• Carbon sequestered annually by __ acres of pine or fir forests: 20,456</td>
<td>• Carbon sequestered annually by __ acres of pine or fir forests: 2,409</td>
<td>• Carbon sequestered annually by __ acres of pine or fir forests: 22,865</td>
</tr>
<tr>
<td>• CO₂ emissions from __ barrels of oil consumed: 209,319</td>
<td>• CO₂ emissions from __ barrels of oil consumed: 24,649</td>
<td>• CO₂ emissions from __ barrels of oil consumed: 233,968</td>
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<tr>
<td>• CO₂ emissions from __ gallons of gasoline consumed: 10,216,475</td>
<td>• CO₂ emissions from __ gallons of gasoline consumed: 1,203,058</td>
<td>• CO₂ emissions from __ gallons of gasoline consumed: 11,419,533</td>
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</tbody>
</table>

Energy Benefits (based on project size entered):
• Heating __ homes: 2,889

For additional environmental benefit options, view the Greenhouse Gas Equivalencies Calculator on the EPA Clean Energy Web site.

View Calculations and References

LFGE Benefits Calculator
http://www.epa.gov/lmop/res/calc.htm

Last updated 2/20/09