SWANA 2011

Composting Excellence Award

City of San Diego
Environmental Services Department
Waste Reduction & Disposal Division
(The Miramar Greenery)
Executive Summary
Located on 74 acres of a closed section of the City of San Diego’s Miramar Landfill, the Greenery annually processes over 100,000 tons of organic waste into high quality compost, mulch and wood chips for use in erosion control and re-vegetation projects at the landfill and for sale to the public.

Operated by the Waste Reduction and Disposal Division of the Environmental Services Department since 1985, the Greenery is fully integrated into the City’s overall waste management system and is a major contributor to the City achieving its state-mandated requirement to divert 50% of its waste from landfill disposal.

All products produced at the Greenery are of high quality, available to the public and environmentally beneficial by improving soils, conserving water and enhancing landscapes. Sales of the Greenery’s organic products are approximately $500,000 per year and are increasing each year as more residents and businesses learn of the availability of these valuable commodities at competitive prices.

Equipment and processes are continually upgraded to take additional feed stocks beyond the traditional yard wastes. New feed stocks being accepted include lumber, pallets, dry wall and commercial food waste.

The Miramar Greenery is an outstanding example of the City’s commitment to environmental protection and stewardship.
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Introduction

The City of San Diego has been responsible for the collection and disposal of municipal solid waste generated in the City since voters enacted a People’s Ordinance in an April 1919 general election placing that responsibility on the City. Starting in May 1919, City employees began providing collection services to San Diego’s 25,000 residents using five mule drawn wagons. Collected garbage was sold as feed to hog farmers and the other materials were disposed of in the City dump. Backyard incinerators were often used by residents to dispose of combustible materials until the late 1940’s.

In the 92 years since the People’s Ordinance was enacted, San Diego’s population has grown to 1.4 million and the City expanded to an area of 332 square miles. The collection fleet has grown to 155 collection vehicles providing separate collection of refuse, comingled recyclable material and green (yard) waste. Commercial, industrial and construction and demolition wastes are collected by eleven private hauling companies operating under franchises from the City.

The City dump has been replaced by the state-of-the-art Miramar Landfill which receives over a million tons of refuse per year for disposal. The landfill includes fee booths, disposal areas, a recycling buy-back center, a household hazardous waste transfer station, a landfill gas to energy facility, a native plants nursery and the Miramar Greenery. This fully integrated facility is an outstanding example of the City’s environmental stewardship.

Design of the Miramar Greenery

The Miramar Greenery (Greenery), a 74-acre organics recycling facility located on a closed portion of the West Miramar Landfill is operated by the Waste Reduction and Disposal Division (WRAD) of the City’s Environmental Services Department (ESD).

Greenery operations began in 1985, with a single tub grinder and several light duty front-end loaders to divert a portion of the growing quantities of yard waste being delivered to the landfill for disposal into a product that could be used for erosion control on landfill surfaces and slopes. The only product produced originally was ground mulch, which found limited public acceptance because much of the City collected green waste was in plastic bags and the technology of the time could not remove the shredded plastic pieces from the finished product. However, since the four phases of the Miramar Landfill (South, North, West I, and West II) covered over 900 acres, there was plenty of use for the mulch as a surface cover material to protect re-vegetation areas on closed sections of the landfills and for erosion control on landfill slopes.

In 1997, WRAD/ESD began to upgrade the facility by introducing large-scale windrow composting operations, while continuing to produce mulch for erosion. Since then, the equipment and operations have been continually upgraded to reduce contamination, produce a greater variety of high quality compost and wood chip products and increase the quantity and variety of materials accepted and processed. The enhanced composting operations have been solely designed, implemented and operated by ESD staff.
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Physical Design Overview
The current Greenery composting system has four main functions and nine separated operating areas:

Facility Access and Material Drop-off Area
1) Material drop-off zone for general yard waste. Separate areas designated for large self unloading refuse collection vehicles and heavy duty trucks/trailers and an area for smaller hand unloading pickup trucks and trailers.
2) Material drop-off zone for clean wood (lumber), dry wall and woody landscaping materials (tree trunks, large limbs, etc.).
3) Material drop-off zone for pre-approved source separated food waste.

Equipment Operating Areas
4) Grinding area #1, Diamond Z Model 7000 horizontal grinder.
5) Grinding area # 2, Diamond Z Model E6000 tub grinder.
6) Wood chip drying and screening area, Komptech trommel screen and MegaMite colorizer.
7) Compost screening area, Komptech XL Multistar star screen and Komptech Farwick Hurricane air knife.

Compost Windrows
8) Compost windrows (22 acres), Scarab Model 828 straddle turner.

Finished Product Storage Areas
9) Finished products are stored in piles or bunkers with a separate storage area for City residents to pick up mulch or compost.

Greenery Operations
Facility Access and Material Drop-off
Located approximately one half mile into the landfill complex from the fee booths, the Greenery is accessed via the landfill’s main access road and a single entry road into the facility for all customers. When vehicles enter the facility, they are directed to the appropriate drop-off area. The general public is directed to one material drop-off area while the larger City collection vehicles and self unloading commercial trucks are sent to a separate area to provide a safety buffer zone for the protection of the general public.

Grinding Equipment Operating Areas
The Greenery has two separate grinding areas. The primary grinding area uses a Diamond Z Model 7000 horizontal grinder to handle the bulk of the 100,000 tons per year of yard waste that will be placed into windrows for further processing into compost. The second grinding area utilizes an older, but still highly capable, Diamond Z Model E6000 tub grinder used to grind clean dimensional lumber and pallets into wood chips and to provide specialty grinds to meet the specifications of wholesalers that make bulk purchases.

The wood chip screening and colorizing area is directly adjacent to the E6000 grinding area and uses an Amerimulch MegaMite colorizer to dye woodchips with a non-toxic iron oxide dye. The Greenery produces five colors of woodchips; natural, brown, red, black and plain Colored woodchips command a higher price than plain woodchips.
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The final compost screening area is located at the highest point in the Greenery so the finished product is never contaminated with unfinished feedstock, which has not yet had all potential pathogens destroyed, or by runoff water passing through uncured windrows. There the fully composted material is screened into three sizes by a recently acquired state of the art Komptech XL star screen and light plastics are removed using air sifting technology. The result is high quality compost that is consistent from batch to batch.

Windrow Processing and Management

The Greenery has 22 acres that can accommodate up to 55 windrows in various phases of the composting or mulch curing processes. Ground green wastes are placed into windrows that are 18 feet wide at the base, 10 feet tall and up to 600 feet long using a Caterpillar 657G scraper and a front end loader. The windrows are then shaped using a Scarab 828 straddle turner, which also regularly turns the windrows to aerate the piles and to ensure consistent temperatures and moisture content as well as continued aerobic digestion through the curing process.

The windrows are aligned from east to west to conform to site contours and prevailing winds to facilitate proper drainage and control runoff water. Windrows are placed 20 feet apart to accommodate watering and turning. Windrows containing mixed green and food waste are in a separate area on the site.

Compost is made from ground yard trimmings, or ground yard trimmings mixed with ground food wastes, placed in windrows which are turned and watered for 70 days. During this time, microorganisms digest the carbon and nitrogen rich materials causing the windrows to sustain temperatures of 140-165 degrees F. The sustained high temperatures eliminate most weed seeds and eliminate potential pathogens while breaking down the ground material into beneficial soil nutrients. The finished compost is given a final screening to a particulate size of one-half inch minus and any remaining light plastic particles are removed to create the final product.

Windrows with combined ground yard trimmings and food wastes are processed the same way as windrows with exclusively yards but are located in a separate area.

Mulch is made by a shortened composting process (15 days instead of 70 days) using shredded tree and yard trimmings. During the two week curing period, microorganisms digest the carbon and nitrogen rich create sustained temperatures of 145-160 degrees F to eliminate pathogens and weed seeds. The resulting mulch, while not a soil amendment, is an excellent ground cover and erosion control material.

The majority of the Greenery's windrows are used to produce compost and go through the full 70 day active composting process. For quality control, every 5,000 cubic yards of composted materials are tested for regulated metals, fecal coli form, salmonella, pH, organic matter, particle distribution and carbon / nitrogen (C:N) ratios.

Finished Products & Storage

After composted material has passed quality control and maturity testing, it is moved from the windrow area to the screening area for final processing. The material is given a final screening to ½ inch minus or to ⅜ minus and the transported to the final storage area for sale to the public. Oversized materials from the screening pass through and air sifter to remove film plastic and other light contaminants. The clean "over's" are either sold as woody mulch for ground cover or reintroduced into new windrows to increase porosity.
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Environmental Design

The Greenery was designed to take full advantage of the natural site contours and to optimize the site’s layout to ensure the efficient processing of the materials from initial receipt of raw green wastes to the sale of finished product. With a 74 acre site, the four functions and nine distinct operations could be laid out to maximize the efficient use of the machinery and personnel in the composting operation.

Another major environmental concern addressed in the site's design was the control of run on and runoff water during San Diego’s infrequent rains.

System Merits

While the process of creating marketable compost can be technically challenging given the heterogeneous nature of the incoming feedstock, the Greenery has refined its processes and upgraded its equipment to create compost and other products that are uniform from batch to batch, meet customer specifications, are highly desired by the public and are beneficial to the environment.

Collected greens are ground, arranged into windrows, and turned every three days, until the Process to Further Reduce Pathogens (PFRP) is achieved. PRFP requires maintaining the windrow interior above 131°F for 15 consecutive days and five turnings. This high temperature kills weed seeds and other pathogens, making the compost material safe for all uses. Windrows are monitored closely during the 70 day composting process with the temperature and moisture content of the windrow measured daily and water added as needed.

Environmental Protection

The basic premise of all Greenery operations is environmental protection. Key components of the Greenery’s environmental protection efforts are the inspection of incoming feedstock to eliminate contaminates and ongoing product testing.

Incoming loads are first inspected at the fee booths to ensure they contain only source separate green waste. The loads are additionally inspected when they are unloaded and any incidental contaminates are removed or the load contains previously undiscovered contaminates, it is rejected and sent to the disposal area.

The Greenery tracks windrow in a batch system, which helps determine when sampling and laboratory analysis will occur. Windrowed materials are never transferred from the curing area to the screening area before satisfactory maturity results have been reported.

The City is proud of the lengths taken to ensure positive impacts on human health, environmental quality and resource conservation. To that end, the Greenery employs a stringent testing schedule to ensure the quality and safety of the compost and mulch materials provided to the public.

ISO 14001 Certification

In 2002, ESD’s Refuse Disposal Division, now designate as WRAD, developed and implemented an Environmental Management System (EMS) that was certified to the ISO 14001 international standard. The certification included the Miramar Landfill, including the Greenery operation, and the inactive landfills managed by ESD, with the Miramar Landfill becoming the first publicly managed landfill in the nation to achieve ISO 14001 certification.
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In 2010, ESD determined that it had achieved all possible benefits of annually renewing its ISO 14001 certification at a cost of $65,000 per year, so the program was internalized. The EMS was continued if full force, but without the lengthy and costly annual ISO recertification process.

The EMS developed during the ISO certification process reinforced ESD’s existing culture of environmental stewardship and proved the relationship between environmental responsibility and fiscal responsibility is synergistic.

Specific Environmental Management Programs (EMPs) developed and implemented by the EMS resulted in the following achievements:

Equipment Operations

Standard Operating Procedures (SOPs) were developed and implemented to shut down diesel equipment during breaks and lunch periods, where previously the equipment was left idling, and to periodically blow out the radiators to improve their cooling ability. Equipment lease contracts were modified to require EMS participation to limit engine warm up idle times during morning maintenance periods. As a result, this SOP eliminated over 20,000 idle time hours with a monthly reduction of approximately: 200,000 lbs CO\textsubscript{2}, 1,200 lbs CO, 6,000 lbs NO\textsubscript{x}, 400 lbs PM 10 and 75 lbs SO\textsubscript{x}. Additionally, since equipment lease payments are based on engine hours, which register the same at idle as at full power, the elimination of unnecessary engine idle hours saves over $2 million dollars in lease payments.

Reclaimed Water Use

By shifting to the exclusive use of reclaimed water from the City’s North City Water Reclamation Facility for dust control and composting operations, approximately 31 million gallons of potable water are saved annually. The shift to reclaimed water also provided significant annual cost savings. Water usage charges were reduced by approximately $30,000 and by downsizing the potable water meter from a six inch main to a four inch main saves an additional $6,000 in monthly meter charges.

The Greenery also eliminated 100% of its use of potable water for processing mulch and compost. Compost was selected as the test case medium due to the stringent requirements and testing it goes through prior to being marketed to the public. Completed compost product was sampled by a contracted test lab and the results indicated the compost was safe and a better end product than compost processed with potable water.

Environmental Compatibility

A positive effect of the Greenery’s compost operations is its compatibility with San Diego’s environment through local landscaping projects. Due to the availability of low cost or free compost produced at the Greenery and its educational and outreach programs, San Diego residents are discovering that tilling compost into San Diego’s poor quality soils improves soil texture, increases water holding capacity and adds nutrient value. Therefore, the use of mulch and compost conserves water, reduces erosion and runoff water, and reduces the need for chemical fertilizers.

In addition, the Greenery not only prevents environmental impacts itself, but also generates products that help others avoid environmental impacts. Greenery compost helps amend the sandy and clay soils in the San Diego region.
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Compost slowly releases nutrients to plants and improves the characteristics of the soil, allowing sandy soil to absorb more moisture and nutrients, and clay soils to drain.

Both compost and mulch help to minimize water use in San Diego’s arid climate, by reducing ground surface evaporation and improving water retention in the soil for plant utilization. Compost and mulch also reduces the need for pesticides while providing a fertile environment for beneficial organisms in the soil.

The mulch generated is used at the landfill to cover slopes, thereby preventing erosion and runoff. A study at the SDSU Soil Erosion Laboratories has found that the Miramar Greenery mulch is able to cut erosion down to 0% and prevent runoff by 50% in even extreme rain conditions. The Greenery mulch is more effective than other synthetic ground cover materials tested in the SDSU lab.

The specifications of the Greenery mulch have also been included in the Regional Standards Committee Green Book as Type 12(b) mulch, meaning that it has been accepted as an appropriate material for use in erosion control, dust control, and other applications on construction project sites. The cities of Poway and Escondido recommend that builders use Greenery mulch to cover bare ground at their construction sites prior to the City approving occupancy permits.

Overall, the Greenery lengthens the life of the City’s Miramar landfill by annually diverting over 100,000 tons of green waste, food waste, wood, dry wall and other organics from landfill disposal.

Innovative or Unique Aspects of the Greenery’s Composting System

ESD has created several innovative partnerships that enable the Greenery to diversify its feedstock, maximize its efficiency and create highly desirable end products. For example, the City is actively expanding food waste as a supplemental feedstock working closely with local institutions to accept food waste generated by their operations.

To insure the food waste does not contain contaminants, the City has an intensive pre-approval process that includes: meeting with facility staff and administrators, providing technical assistance regarding on-site logistics, training all kitchen, maintenance and administrative staff, and a “Pilot Program Phase” where a facility representative inspects and evaluates the first three loads delivered to the Greenery. Once the Pilot Program Phase is successfully completed, the facility becomes a regular, pre-approved program participant.

Program participants must be located in the City of San Diego, and must be serviced by a City franchised waste hauler. Loads must be hauled to the Greenery in a tightly sealed container on a vehicle capable of end dumping the material.
Current participants in the program include the Marine Corps Recruit Depot, Hilton Bayfront Hotel, PETCO Park (the home of the SD Padres), Point Loma Nazarene University, San Diego Convention Center, San Diego International Airport, San Diego State University, Sea World – San Diego, University of California – San Diego, and Science Applications International Corporation (SAIC).

As an incentive to institutions to participate in the program, pre-approved food waste is accepted at the Greenery for $25 per ton as compared to $52 per ton for landfill disposal fees.

Greenery staff closely monitors the incoming material and communicates directly with program participants regarding contamination issues. The accepted food scraps are combined with the green waste, adding to the richness of the compost.

Over the past year, the City has also assisted in the processing of post-consumer food waste from large events, including San Diego Earth Day (April 2010), San Diego County Fair (June/July 2010), Encinitas Wine Festival (July 2010), Fat Tire Brewery Tour de Fat (October 2010).

Another unique partnership was made in 2010 when Innovive Inc., a San Diego company that provides animal cages and bedding to the bio-medical research industry, approached ESD about implementing an animal bedding composting program so they could achieve zero waste. ESD Staff conducted a site visit to Innovive’s facility and determined the granulized corn cob animal bedding, with its small amounts of mice urine and feces, would be appropriate for open windrow composting. Urea is an excellent source of readily available nitrogen and when received in a feedstock helps kick start the composting process.

Based on these innovative partnerships and the high quality of compost produced, the Greenery now supplies compost to one of the largest orchards in the region, Durling Nursery. Durling is a main supplier of container plants to Home Depot and other major chains.
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Aerated Static Pile System Pilot Project

In 2009, Greenery staff conducted a pilot of Aerated Static Pile composting systems. The goal of the pilot was to provide hands-on training for staff on a technology that would meet the strict air and water discharge requirements that are expected to be adopted for the San Diego region and to evaluate the quality and characteristics of the compost end product.

Two systems were pre-qualified for the pilot project, and ESD selected the GORE Cover System technology for a compost demonstration. A GORE system was installed at the Greenery, where it processed two batches of green waste into compost. The technology and its compost product were evaluated based on the following parameters:

- Operating capability of technology
- Ability to produce high quality finished compost
- Ability to meet or exceed local, county and state regulations
- Total cost to build and operate compost technology

Marine Corps Air Station, Miramar Re-Vegetation Project

The Greenery is located on land leased from Marine Corps Air Station (MCAS) Miramar and was involved in an innovative use of mulch in a re-vegetation project at the air station. When MCAS Miramar environmental staff proposed to mitigate and re-vegetate 88 acres of land infested with non-native annual weeds, ESD partnered with their consultant, Bitterroot Consultants, to provide over 68,000 cubic yards of mulch, at no cost, for the re-vegetation project. By spreading six inches of mulch over the 88 acres, native perennial plant growth is encouraged, while the growth of annual weeds is inhibited through the redistribution of nitrogen in the soil.

How the Greenery is Different from Other Composting Facilities

The City of San Diego’s Greenery recycling program is outstanding because of the on-going efforts of City employees. The entire program is run by employees, in every step, from the curbside collection residential green wastes, to the process of the materials into marketable compost and wood chip products to the sales of end products. In addition, City employees take pride in their educational efforts associated with the Greenery. All candidates for the designation of Master Composter in San Diego are required to tour the facility to gain a big picture view of composting operations and its environmental benefits. Greenery staff is conducts frequent site tours for community groups, school children, college and university students and dignitaries interested in learning about the composting process.

Another unique aspect that sets the Miramar Greenery apart is a commitment to continuous compost research. In 2010 the Greenery conducted an extensive research project testing the compostability of table ware labeled and sold as compostable. The results of this study were featured in August 2010 issue of Biocycle Magazine.
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Regulatory Compliance

The Miramar Greenery is separately permitted from the Miramar Landfill and has a "Full Solid Waste Facility Permit - Compostable Material Handling" issued by the San Diego Local Enforcement Agency and approved by the State of California’s Department of Resources, Recycling and Recovery (CalRecycle). The Greenery is operating in full compliance with all operating permits and regulatory requirements.

The Greenery system is fully integrated into, compatible and complimentary with the City’s overall solid waste management system. As a component of the Miramar Landfill, it exemplifies a successful landfill waste diversion program, not only by utilizing a portion of the closed landfill for its operation, but by producing products that are beneficial for landfill revegetation efforts, erosion control and slope stability.

The Greenery is inspected monthly by an inspector from the San Diego Local Enforcement Agency of Cal-Recycle. Any areas of concern identified by the inspector during a site visit are immediately addressed. Additionally, a team of dedicated staff annually review the operating permit to determine if any operation areas are having recurring issues during inspections. If an area is identified as needing updated planning, the team initiates a permit revision to ensure the operation is always in compliance and operating in a safe and healthy manner.

During an inspection in 2010 the LEA noted concern over the post-grinding stockpile height limit, which cannot exceed 25 feet in height. To mitigate this concern, the pile was surveyed and a stake was placed to indicate maximum pile height so operators can keep the facility in compliance, and windrows are built at a more frequent pace to remove material from the stockpile as it comes in. The Greenery has not received a Notice of Violation nor been placed on the State list of non-complying facilities.

Waste Screening and Quality Control

Material being delivered to the Greenery is visually inspected by fee booth personnel at the entrance to the Miramar Landfill to determine if there is contamination. If no contamination is visible, a reduced rate is charged. If material brought to one of the Greenery drop-off zones is found to be contaminated (i.e. contamination initially “hidden” under the visible layers of material when entering the landfill), Greenery staff requires the individual to reload the material. These individuals must then pay the full waste disposal charge on top of the fee they already paid to bring the material to the Greenery. If Greenery staff must reload the material, an additional handling fee is charged. These monetary penalties serve as a deterrent to those wishing to bring contaminated material to the Greenery. This comprehensive quality control program, consisting of on-site inspections and enforcement of the additional fees, allows the City to produce, on a consistent basis, high quality compost and mulch.
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The Greenery also has strict quality control over in-coming material from the City’s residential curbside greenery collection program. Quality control measures include a customer hotline, inspections of curbside materials, and placing notices on containers with unacceptable materials to educate residents on proper participation. Additionally, because of potential contamination issues, residential greens collected using automated collection trucks are taken to a different landfill where the greens are used as Alternative Daily Cover instead of being composted.

Planning

Planning Process

As described earlier, the Greenery began primarily as a grinding operation to produce a mulch material for on-site use for erosion control on landfill slopes and surfaces. With the passage of AB 939, California’s Integrated Waste Manage Act of 1989, which required cities to achieve a 50% diversion rate from landfill disposal by 2000, it was determined that current system’s product contamination and poor product quality would jeopardize the success of the operation and impact the City’s ability to achieve state-mandated diversion rates. In order to address these concerns, ESD staff created a long-term plan for continued improvements to bring the Greenery into regulatory compliance, increase diversion, provide a clean and aesthetically pleasing experience for the public, create marketable products and generate revenue. The following steps in the planning process were designed and implemented to achieve these intended results:

Operation Site

- Obtain a Compostable Materials Handling Permit to operate a composting facility.
- Develop a food scrap composting program and protocols.
- Develop a website with pricing and product information.
- Add 45 acres of area to the site to increase the size and number of composting windrows.
- Underground Landfill Gas Collection lines.
- Create professional quality directional and facility signage, and product use information signs.
- Develop a customer service booth.

Equipment Upgrades

- Replace a Morbark 737 Trommel screen (50 cy/hour) with a Komptech XL Star Screen with dual air sifters (250 cy/hour).
- Add a Amerimulch MegaMite Colorizer to make custom woodchip products

Product Upgrades

- Obtained a US Composting Council’s Seal of Testing Assurance certification for compost.
- Provide compost and mulch free to City residents.
- Diversified product offerings to meet many end user needs. We now offer red, brown, black, and natural woodchips, ½-3” compost, 2-4” mulch.
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Product Upgrades (cont.)

- Develop a website with pricing and product information.
- Increase marketing and education efforts regarding green waste compost.
- Offer bulk discounts and deferred accounts.

Continued Research and Planning

- Conduct a Pilot of the Aerated Static Pile technology: Gore Cover System
- Explore new sources of feedstock (post-consumer food waste from events, animal bedding from Innovive, Kelp processing by-product).
- Research conveying equipment, and electric powered equipment to reduce diesel fuel consumption.
- Conduct a research study on compostable table ware.
- Conduct a pilot on palm frond processing equipment, and composting techniques.
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Greenery System Downtime

The Greenery experiences only a few instances of system downtime; however, downtime does occur under the following circumstances:

- During equipment maintenance and repair.
- Heavy rain and muddy conditions – Creates difficult working conditions and puts strain on equipment to handle wet material.
- Windy conditions – If winds are too strong, equipment is shut down to maintain air quality and to minimize product contamination due to material being blown throughout the site.

Performance, Economics & Cost-Effectiveness

Operational Efficiency Study

In anticipation adding 45 acres to the site for additional windrow and processing space, in 2009-2010 ESD staff conducted an intensive Time and Motion study to break down and analyze all components of the system’s operation. Over 5,000 hours of observational data was recorded and analyzed for efficiency. The result was an eloquent understanding of the most “costly” and time consuming aspects of the operation. ESD is currently conducting additional research and implementing site design changes and equipment upgrades to improve the efficiency and cost effectiveness of the Greenery.

Measuring Success

Since the City of San Diego faces State mandates to divert 50% of its waste from landfill disposal, a top priority and a key measurement of success is the amount of material diverted from landfill disposal. From material processing to product marketing, the Greenery diverts over 100,000 tons of material annually.

Additional measures of success include the quality and amount of material produced/sold, and the cost of the operation. These factors represent the acceptance by the public to use the Greenery and to purchase the compost and other materials produced at the Greenery. Finally, success of the facility is measured by the tipping fee rate and cost of the finished products needed for the facility to be self supporting without subsidies. The Greenery is cost competitive in both areas and less costly than most privately operated composting facilities in Southern California.
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The facility’s operational performance has exceeded the goals and expectations set forth. As stated above, the main purpose of the Greenery was to divert material from landfill disposal. However, with careful planning, market research, quality control and educational efforts, the facility is selling more products and generating increased revenues each year.

Fostering Customer Service

Customers, both material providers and end-product users, are key to the success of the Greenery’s composting operation. Customer service, therefore, is extremely important in order to maintain positive, on-going relationships with our customers. This is achieved in several ways:

- **Customer Hotline:** ESD customer service operators provide detailed information to customers who wish to dispose of organic material at the Greenery, or who are interested in obtaining Greenery products.
- **Website:** The Greenery has its own page on the City of San Diego’s website, where product information, pricing, hours of operation and even a live camera showing traffic at the gate are available.
- **Price Incentives:** The Greenery accepts greens from the City curbside greenery collection program, private contractors, and homeowners countywide. Businesses and non-city residents depositing green waste in the Greenery pay half of the cost they would have paid for landfill disposal, while City residents can drop off home generated yard waste for free. These financial incentives help maximize diversion, while saving customers money. The cost of sales tax and loading material into a vehicle is included in the price per cubic yard for compost, mulch, and wood chips.
- **Personal Attention:** ESD Greenery staff provides personal attention and assistance to on-site customers. This includes accommodating special orders/blends of material, facilitating tours, loading materials etc.
- **Material delivery:** ESD offers bulk material delivery for a cost recovery fee only.
- **Free samples:** ESD is proud of the material produced at the Greenery and free samples are provided to participants at the annual Earth Fair in Balboa Park, to community groups during presentations and to groups or individuals taking a tour of the Greenery.
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**System Budget and Costs**

The costs and revenues for the Greenery are budgeted within the Miramar Landfill’s annual operating budget. This program is considered cost-effective and its costs appropriate based on the goals of increasing diversion from landfill disposal, saving precious landfill capacity and recovering and recycling a valuable resource. Because of this, emphasis is placed on making marketable materials that will gain widespread acceptance and to insure we are able to “close the loop”. Efforts are continually being expended to add new materials to facility’s feed stocks, and to increase the amount of material diverted from disposal. Being sited at the active landfill also allows for the synergy of having additional equipment and staff available for unusual circumstances.

Based on a 2011 survey of tipping fees at privately operated facilities accepting and processing green waste material, as shown by the following tale, the Greenery is very cost competitive. Additionally, ESD continues to enhance the value of the Greenery’s products and sales are continuing to grow each year.

<table>
<thead>
<tr>
<th>Facility</th>
<th>Annual Tonnage</th>
<th>Per Ton Tip Fee</th>
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</thead>
<tbody>
<tr>
<td>Miramar Greenery</td>
<td>100,000 plus</td>
<td>$22 City, $25 Non-City</td>
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<tr>
<td>Sycamore &amp; South Bay</td>
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<td>$32.75</td>
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<td>Landfills</td>
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<td>Agraservice</td>
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<td>Recology</td>
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<td>Tierra Verde Industries</td>
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<td>Zanker</td>
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</table>

From the initial design of the Greenery as a modest grinding operation to create mulch for erosion control through all of the modifications that have been implemented to include new feed stocks and produce new and improved products, the Greenery has always stayed within budget and met or exceeded all operational expectations.
Utilization of Equipment/Systems and Technologies

The following equipment is currently being utilized at the Greenery:

- 2 grinders – Diamond Z E6000 tub grinder and Diamond Z 7000 horizontal grinder
- 5 front end loaders – used for moving material into windrows, loading grinders, loading large quantities of end products for bulk users, etc.
- 1 windrow turner – Scarab 828 straddle turner used specifically to shape and turn compost windrows.
- 1 coal scraper – 40 cubic yard used to move large quantities of material from one area of the site to another.
- 1 star screen with varying speeds – Komptech XL Star used to screen compost
- 1 water truck – used to water windrows and maintain dust control.
- 1 colorizer – MegaMite used to color wood chips with non-toxic iron oxide dye.
- 1 air knife – Komptech Farwick Hurricane used for separating film plastic and other light contaminants.
- 1 trommel screen – Komptech Magnum used to screen wood chips

The Komptech star screen is ESD’s most recent equipment purchase (2009). This machinery was purchased to allow the Greenery to accept more food waste and other feedstock for landfill diversion while continuing to produce a high quality product. In particular, the Multistar XL will allow the Greenery to process more post-consumer food waste that may be contaminated with plastic utensils, plastic bags.

Equipment efficiency and effectiveness is designed into the overall Greenery operation. City staff participates in a thorough review, testing and specification process prior to purchasing equipment to be used at the Greenery. Product demonstrations are required in order for the City to determine the merits of each system for the Greenery operation.
SWANA Composting Systems Excellence Award

Standard Operating Procedures (SOPs) were also developed and implemented to shut off the equipment during breaks and lunch periods and to regularly blow out the radiators. Equipment lease contracts were modified to add an EMS participation clause as well as minimum warm up idle times during morning maintenance periods. In addition the site is designed to provide the most efficient use of machinery during routine operations.

Demonstration of windrow turner by Komptech

Palm grinding pilot with Diamond Z grinder
Employee and Public Health & Safety

Training and safety is an integral part of the overall operation of the Greenery. ESD employs only full time equipment operators to maintain the Greenery. This means that each employ is fully trained in composting and equipment operation. ESD supervisors conduct bi-weekly safety and training tailgate sessions, which discuss any current safety issues, on-going operational safety requirements, EMS procedures and upcoming training opportunities. Staff are trained and evaluated on proper use and maintenance of all of the equipment in operation at the Greenery. This provides for a safe working environment, not only for ESD staff, but for customers as well.

In addition, ESD has worked with a number of groups to help improve the quality of the mulch and compost end product. These groups provided low cost labor while ESD provided training and employment opportunities: the State of California (Department of Corrections, Donovan Prison), County of San Diego (Department of Probation, Public Service), and the non-profit Alpha Project (Homeless Job Rehabilitation).

Public Acceptance, Appearance and Aesthetics

ESD strives to maintain clean, well-maintained equipment, vehicles and operations yard. Although some equipment is older and well worn, staff takes pride in keeping them looking their best and operating at peak performance. The facility is kept free from litter and debris that may blow from material drop-off zones or the surrounding landfill. Industry visitors often comment that it is the cleanest facility in the State.

In addition, staff has taken personal pride in creating an aesthetically pleasing and welcoming entrance to the Greenery facility. A 1949 Studebaker pick-up truck was refurbished and painted by Greenery staff and placed at the entrance to the facility on a beautifully landscaped berm that showcases available mulch, colored wood chips and compost. Landscaping in and around the facility provide a pleasing experience to visitors and customers.

Public Relations and Public Education

Mulch is free to San Diego residents, and non-residents and businesses pay $5/yard. Compost is free to San Diego residents if self-loaded and sold for $12/yard to both residents and non-residents if loaded by the City staff. Bulk rates are offered on compost, wood chips and mulch. In the past several years, the City has marketed its greenery materials to San Diego residents and businesses through brochures, newspaper and radio ads, and calls to potential customers.
SWANA Composting Systems Excellence Award

ESD’s marketing strategy, combined with public education efforts, has helped to create greater public awareness of the value and uses for compost or mulch and the services offered by the Greenery. The result is a very successful program that diverts green waste from the landfill and creates quality organic materials that are increasingly in demand by the public. Additionally, the City’s Park department provides a great opportunity to showcase the high quality of products from the Greenery. Material was recently delivered to the Friends of Balboa Park for Arbor Day tree planting and to a native plant restoration project by the San Diego Audubon Society.
Public education and outreach efforts have included a video titled “The Miracle of Mulch and Compost” (posted on website) which illustrates the benefits of compost and mulch, a “Got Mulch?” campaign that relies on banners for use at the landfill and bumper stickers of the same design that are distributed at a wide variety of venues. The video has been shown on the City Access channel numerous times. Local anchorman and “Environmental” reporter Loren Nancarrow has done a series of pieces on the Miramar Greenery, shown on local TV during prime time viewing.

In addition, numerous tours and field trips are hosted at the Greenery to expose the public and school children to the composting operation, the usefulness of mulch and compost, and the closed loop aspect of creating a usable product.

Due to the Greenery’s location on a portion of closed landfill, the closest neighbor is the landfill itself. Other “neighbors” include the Marine Corps Air Station (MCAS) Miramar and a City Metropolitan Wastewater Department biosolids facility. The Greenery maintains a “good neighbor” status with each of these entities by keeping the facility clean, well maintained and properly managed.

The Miramar Greenery is an outstanding example of the City’s commitment to environmental protection and stewardship and a resource greatly valued and appreciated by the community it serves.

Attachments

1) Brochure, “Guide to Recycled Landscape Products”
2) STA Compost Technical Data Sheet
3) Miramar Greenery Pricing Sheet
4) BioCycle Article