City of San José
Environmental Services Department

INTEGRATED WASTE MANAGEMENT
ZERO WASTE STRATEGIC PLAN

November 2008

Table of Contents

Introduction 2
A World Without Waste 2
What is Zero Waste? 3
Evaluating Zero Waste 4
Increase Environmental Benefits to the Community 4
Improve Quality of Service 4
Support Local, State and National Mandates 5
Address Fiscal Impacts 5
Community Engagement 6
Leadership 6
Partnership & Collaboration 7
Zero Waste Plan Structure 9
Policies 11
Zero Waste Policies 11
Policy Leadership 16
Climate Protection 19
Green Jobs 21
Recycling Market Development 22
Finances & Funding 23
Programs 24
Residential 24
Single-Family 24
Problem Materials 25
Recycle Plus Program Enhancements 25
Multi-Family 28
Commercial Programs 30
City Facilities 32
Public Areas & Parks 33
Special Events 33
City Venues & Operations 35
Schools 36
Go Green Schools Program 37
Union School District Pilot 37
Construction & Demolition 39
Diversion Deposit Program 39
CDDD Evaluation 39
Opportunities for Increasing Diversion of Disposed C&D Debris 40
Self-Haul & Non-Franchised Contractors 42
Opportunities to Address Self-Haul and Non-Franchised Waste 43
Facilities 45
Context for Facilities 45
Existing & Planned Infrastructure 46
Future Infrastructure 49
Water Pollution Control Plant Master Plan 50
Envision San José 2040 53
Key Initiatives for Achieving Zero Waste 54

A World Without Waste

In October 2007, San José unveiled its Green Vision for the future. The Vision provides a comprehensive approach to achieve sustainability through new technology and innovation. In adopting its Green Vision, the City established 10 Green Vision goals to achieve within 15 years:

San José Green Vision

1. Create 25,000 Clean Tech jobs as the World Center of Clean Tech Innovation
2. Reduce per capita energy use by 50 percent
3. Receive 100 percent of our electrical power from clean renewable sources
4. Build or retrofit 50 million square feet of green buildings

Tree Planting - Lee Mattheson MS

"Which World Do You Want?" by Student Art Contest Winner, Hyeongshin, Age 8 Parkview Elementary School, San Jose

5. Divert 100 percent of waste from landfill and convert waste-to-energy
6. Recycle or beneficially reuse 100 percent of our wastewater
7. Adopt a General Plan with measurable standards for sustainable development
8. Ensure that 100 percent of public fleet vehicles run on alternative fuels
9. Plant 100,000 new trees and replace 100 percent of our streetlights with smart, zero emission lighting
10. Create 100 miles of interconnected trails

The Zero Waste Strategic Plan (Plan) supports several Green Vision goals, including Goal 1 - create green jobs, Goal 2 - reduce energy use, Goal 3 - generate renewable energy, Goal 4 - build green, and Goal 7 - plan for sustainable development. However, the primary focus of the Plan is to identify the path to achieve zero waste, as articulated in Goal 5.

This goal, further described in the City's Zero Waste Resolution, was approved by the City Council in October 2007 and established the specific objectives of:

- 75 percent diversion by 2013 and
- Zero waste by 2022.

The resolution also identified the City's zero waste principles as:

- Improve "downstream" reuse and recycling of end-of-life products and materials to ensure their highest and best use
- Pursue "upstream" redesign strategies to reduce the volume and toxicity of discarded products and materials while promoting less wasteful lifestyles
- Support the reuse of discarded products and materials to stimulate and drive local economic workforce development
- Preserve land for sustainable development and green industry infrastructure

In November 2005, in honor of World Environment Day, the City signed the Urban Environmental Accords. The Accords are a declaration by participating city governments to build ecologically sustainable, economically dynamic, and socially equitable futures for their citizens. Signatories to the Accords agree to perform the following actions:

- Establish a policy to achieve zero waste going to landfills and incinerators by 2040.
- Adopt a citywide program that reduces the use of a disposable, toxic, or non-renewable product category by at least 50 percent in seven years.
- Implement "user-friendly" recycling and composting programs to reduce per capita solid waste sent to landfill and incineration by 20 percent in seven years.

Garden Preparation at Lee Matheson Middle School

What is Zero Waste?

"Zero Waste" is a perception change. It requires rethinking what we have traditionally regarded as garbage and treating all materials as valued resources instead of items to discard. Zero waste entails shifting consumption patterns, more carefully managing purchases, and maximizing the reuse of materials at the end of their useful life.

Zero waste takes into account the whole materials management system, from product design and the extraction of natural resources, to manufacturing and distribution, to product use and reuse, to recycling or disposal.

In developing policies and programs to achieve zero waste, the City can both maximize diversion from landfills (through program implementation and facility development) and reduce generation of waste (through zero waste policies and education). Achieving zero waste entails encouraging the City, its residents, and its businesses to reevaluate what we view as waste.

Ultimately, zero waste contributes to achieving a greener community. In order to reach true sustainability, Plan strategies must address People, Planet, and Profit as a "triple bottom line," achieving social, environmental, and economic sustainability.

Evaluating Zero Waste

Each of the Plan initiatives described in the policies, programs, and facilities sections of this report can be evaluated based on the following four evaluation criteria established for the zero waste planning process:

1. Increase Environmental Benefits to the Community
2. Improve Quality of Service
3. Support Local, State, and National Mandates
4. Address Fiscal Impacts

The following lists show the guiding principals for applying the four evaluation criteria.

Increase Environmental Benefits to the Community

- Reduce vehicle emissions to support Urban Environmental Accords Action 14
- Support San José's Climate Action Plan
- Reduce and mitigate landfill and other facility impacts
- Invest in new, safe technologies and processes for infrastructure
- Consider environmental benefits and impacts in siting and permitting of new facilities
- Protect public health and the environment
- Analyze markets for recoverable materials to consider the highest and best use of materials and the implications of reliance on domestic and overseas markets

Improve Quality of Service

- Improve customer convenience such as offering a broader range of collection programs and container options; improving the recycling program for residents; improving call center responsiveness; and enhanced and targeted customer outreach

Newby Island Compost Facility

- Improve aesthetics - control of graffiti, litter and illegal dumping; specification of container types, quality, and placement
- Provide incentives to participate in, and maximize the effectiveness of, program initiatives
- Ensure that program initiatives are convenient, accessible and appropriate
- Ensure equity for all customers
- Create City operations that serve as a model for zero waste

Support Local, State and National Mandates

- Increase diversion to support the zero waste goal from the City's Green Vision Goal 5, the City's 2007 Zero Waste Resolution, and the Urban Environmental Accords Action 4 (zero waste goal)
- Reduce the use of a disposable, toxic, or non-renewable product category by at least 50 percent in seven years to achieve Urban Environmental Accords Action 5
- Implement user-friendly recycling and composting programs pursuant to Urban Environmental Accords Action 6
- Support the City Sustainable Energy Policy and Action Plan
- Support the "Reduce, Reuse, Recycle" hierarchy
- Strengthen Environmentally Preferable Purchasing efforts
- Support Extended Producer Responsibility efforts
- Lead by example

Address Fiscal Impacts

- Minimize impact on customer rates and provide rate equity
- Minimize impact on City's revenue streams
- Minimize contract management and enforcement costs for programs
- Invest in infrastructure

- Invest in green jobs and economic development
- Address long-term fiscal planning and assess full economic impacts
- Understand the potential impact on system fees (hauling, tipping, franchise)

Community Engagement

Public engagement for zero waste is a fundamental and iterative process. The Commercial Solid Waste System Redesign project is the first large scale implementation within the Plan. Businesses have been involved in this initiative since February 2008 as described in Appendix D: Stakeholder Engagement Processes for Zero Waste. This appendix also describes outreach efforts related to reducing the proliferation of single-use carryout bags. These efforts have included retailer and grocery store stakeholders since February 2008. City staff will continue to seek input from appropriate audiences before implementing elements of the Plan.

Leadership

The City has implemented many state-of-the-art waste diversion programs for both the residential and commercial sectors, including single-stream recycling, innovative organics processing, and an effective construction and demolition debris recovery program. In 2000, the City achieved a 64 percent diversion rate which was the highest level of diversion by any big city in the country.

The City has also been a leader in developing fee structures and cost models that provide incentives to maximize waste diversion. Historically, the City has used its fee structure to encourage the private sector to develop new approaches to processing materials such as organics, construction and demolition debris, and mixed waste. As a result, the infrastructure for managing recoverable materials within San José is unique in California.

2008 was a significant year for the City's recycling programs. The City reasserted its national leadership with several projects, including implementing progressive waste diversion programs for multi-family residences, City facilities, special events and venues, and schools. Council also approved two significant evaluations of the City's largest waste streams: Commercial and Construction and Demolition (C&D). Finally, San Jose enhanced its influence in developing regional and statewide environmental policy with such initiatives as: sponsorship and passage of SB 1357 which will authorize up to $20 million in unclaimed California Redemption Value (CRV) funds for community recycling efforts; staff appointment to the board of the California Product Stewardship Council; support for developing regional options for reducing single-use carryout bags; and appointment of staff to the California Integrated Waste Management Board (CIWMB)'s Organics Roadmap Taskforce.

Partnership & Collaboration

San José recognizes that the road to zero waste cannot be traveled alone and has sought partnerships to fulfill its mission. The City is an active member in each of the following organizations.

Bay Area Zero Waste Communities

Bay Area Zero Waste Communities is an informal group of zero waste cities that share information and work cooperatively on innovative zero waste policy solutions. Policy discussions include development of a model service-ware ordinance requiring the use of reusable, recyclable or compostable service-ware in restaurants.

BayROC

Founded in 1996, the Bay Area Recycling Outreach Coalition (BayROC) is a collaboration of staff representing over 40 San Francisco Bay Area cities, counties, and other public agencies. These agencies promote waste reduction and buy-recycled concepts through a variety of media campaigns focusing on personal action and behavior change.

California Product Stewardship Council

This organization was formed to advocate for "cradle to cradle" producer responsibility at the state and local level. Since its formation, the California Product Stewardship Council has helped the California Integrated Waste Management Board set aggressive priorities for Extended Producer Responsibility and has supported legislation promoting take-back policies. The Council, which includes staff from San José, co-sponsored successful State legislation requiring manufacturers to create an infrastructure that makes it convenient for consumers to return mercury thermostats to retailers.

The Recycling & Waste Reduction Commission of Santa Clara County

This 10-member body of representatives from communities throughout Santa Clara County serves as the principal advisor to city and town councils and the Board of Supervisors of Santa Clara County on solid waste planning issues. The Commission also has state-mandated responsibilities, such as review and oversight of the Countywide Integrated Waste Management Plan and Siting Element, local Source Reduction and Recycling Elements, Household Hazardous Waste Elements, and Non-disposal Facility Elements. All of these reports are required by state law.

The Recycling & Waste Reduction Technical Advisory Committee (TAC)

San Jose Wetlands

This committee is composed of solid waste professionals from cities within Santa Clara County, representatives of the private solid waste industry, business representatives, and representatives of interested community organizations. TAC provides technical support and recommendations in the general area of integrated waste management and policy to the Recycling & Waste Reduction Commission. San José chairs the Source Reduction and Recycling Subcommittee which is developing a countywide carryout bag regulation to address the problems of disposable carryout bags on a regional level. The City is working with TAC to strengthen its regional collaboration and long-term solid waste planning role.

Green Cities California

City staff, along with representatives from 10 other major California cites, met in May 2006 to discuss leveraging their combined experience, influence, and sustainability goals to advocate for collective, urban, environmental action. In June 2008, the City formally adopted the Green Cities California Resolution, pledging to collaborate with local governments throughout the nation to adopt sustainable policies and practices.

Cities Keep It Clean Partnership

In September 2008, San José was the first city in the Bay Area to join the Cities Keep It Clean Partnership. San José committed to protect the San Francisco Bay from: trash, mercury, e-waste, pharmaceuticals, pesticides, vehicle pollution, and runoff.

Bay Area Climate Collective

The City is an original signatory, along with San Francisco and Oakland, of the Bay Area Climate Change Compact. This Compact establishes regional leadership in fully supporting the statewide climate change goals instituted in Assembly Bill 32. The Compact encourages local action to reduce greenhouse gas emissions and recognizes that some challenges can best be addressed through regional partnerships. Compact signatories strive to enable and expand the environmental, economic, and equity benefits of climate action. The Compact also provides for achieving a more aggressive zero waste goal by 2020 instead of 2022.

Responsible Purchasing Network (RPN)

In 2007, the City joined RPN, an international network of buyers dedicated to socially responsible and environmentally sustainable purchasing. This organization offers information and training in Environmentally Preferable Procurement.

Bay Friendly Gardening Coalition

San José is a charter member of this coalition and is spearheading efforts to bring the program to Santa Clara County. The Bay Friendly Gardening Program promotes sustainable gardening and landscaping practices that help reduce waste, conserve

energy, save water, prevent pollution, and protect local habitat.

State Organics Roadmap Taskforce

City staff is a member of this statewide task force that is working with the Integrated Waste Management Board to reduce yard trimmings landfills by 50 percent. The task force is involved in lifecycle analysis for composting, siting, permitting, yard trimmings Alternative Daily Cover (ADC) reduction, and compost marketing.

Garbage Dumped at Newby Island Landfill

Zero Waste Plan Structure

The Zero Waste Strategic Plan includes this document and several technical appendices, including the studies undertaken by the City in 2007 and 2008 to:

- Identify the City's current disposal and diversion tonnages
- Characterize the City's disposed waste
- Identify opportunities for increasing diversion
- Describe the City's existing infrastructure
- Evaluate the policy, program, and facility options available to the City

The Plan provides an overview of key zero waste initiatives and describes policies, programs, and facilities that the City will need within the next 14 years to realize the City's vision of achieving zero waste.

Key initiatives include short-term goals to be implemented from 2008-2013, and long-term goals to be implemented between 2013 and 2022.

Short-term goals—divert 75 percent of waste from landfills:

- Enhance residential recycling to maximize recycling and composting from single-family and multi-family residents
- Redesign commercial waste system to provide recycling and composting services to all businesses and institutions in the City
- Enhance the construction and demolition debris recycling to increase diversion from the building sector
- Evaluate anaerobic digestion of food scraps at the San José/Santa Clara Water Pollution Control Plant
- Pursue opportunities to support Extended Producer Responsibility initiatives and target reduction of single-use carryout

bags as well as non-recyclable/non-compostable take-out food packaging

Long-term goals—get to zero waste:

- Modify existing revenue streams to mitigate funding lost from zero waste efforts
- Support implementing zero waste policies locally, regionally, and statewide, such as regional landfill bans of targeted materials and Extended Producer Responsibility
- Continue implementing mixed waste recycling of single-family residential garbage and recycling processing residue to ensure that all recyclable and compostable materials are diverted from landfills
- Develop and strengthen markets for recoverable and reusable materials, and lead by example, requiring recycled content in City purchased materials, and encouraging local market development
- Promote the future development of energy conversion technologies for converting residual wastes into energy
- Educate the public about the benefits of reducing wasteful consumption

Over the past year, the City completed the following studies to support the findings of the Zero Waste Strategic Plan. Some of the studies are included as appendices to this report or published on-line at:

http://www.sjrecycles.org/zerowaste.asp

Commercial Redesign White Paper

(Transportation & Environment Committee, December 3, 2007) Evaluates current performance and alternatives for improving the commercial recycling and solid waste system

Waste Characterization Study

(Transportation & Environment Committee, May 5, 2008) Characterizes City disposed waste from single-family residential and commercial generators.

Extended Producer Responsibility Work Plan

(Transportation & Environment Committee, October 6, 2008) Provides the work plan for implementing Extended Producer Responsibility (EPR) initiatives locally and in support of regional and statewide initiatives

Needs Assessment for the Integrated Waste Management Zero Waste Strategic Plan Development, November 2008, Appendix A

Compiles diversion and disposal data for single-family, multi-family, commercial, City facilities, construction and demolition debris, commercial hauler waste, and alternative daily cover. Provides projected quantities and characterization of disposed waste through 2040. Provides recommendations for program enhancements.

Assessment of Infrastructure for the Integrated Waste Management Zero Waste Strategic Plan Development, November 2008, Appendix B

Summarizes the City's current waste management infrastructure including all landfills, transfer stations, and waste processing facilities used by the City.

Opportunities for Alternative Revenue Generating Mechanisms for the Integrated Waste Management Zero Waste Strategic Plan Development, October 2008, Appendix C

Evaluates funding and financing mechanisms for General Fund solid waste related revenues and for funding future zero waste programs.

Stakeholder Engagement Processes, November 2008, Appendix D

Describes the process that the City undertook to solicit feedback from stakeholders for the commercial solid waste system redesign and carryout bag policy initiatives.

Energy Conversion Technologies & Facilities, November 2008, Appendix E

Describes conversion technologies that the City could consider for future implementation and outlines evaluation criteria.

Zero Waste Policies

This section describes policies that support the City in achieving 75 percent diversion by 2013 and zero waste by 2022. These policies include:

- Environmentally Preferable Procurement
- Extended Producer Responsibility and Product Stewardship
- Disposable Packaging Reduction
- Reducing Single-Use Carryout Bag Initiative

Paper at Green Waste Recovery Baled for Market

Environmentally Preferable Procurement

In 2001, the City adopted the Environmentally Preferable Procurement Policy (EP3) to use environmentally preferable goods and services where possible to demonstrate leadership and help move the market toward more environmentally sound commerce. The EP3 Steering Committee establishes policy which is implemented by the EP3 Implementation Team.

The Green Vision adopted by San José focused the City's purchasing goals on renewable energy, energy conservation, green building, alternative fuel for the municipal fleet, and zero emission street lighting.

The City's EP3 multi-year strategic plan includes the following goals:

- Fully incorporate EP3 into all contracting processes
- Disseminate information about green products to all City contractors, grantees, and City departments, and also establish an EP3 liaison program
- Review one-third of commodities procured by the Finance Department annually to identify green product and service alternatives and incorporate EP3 specifications into upcoming solicitations for the reviewed commodities
- Incorporate EP3 into the City's construction, operations, and maintenance activities
- Use benefits calculators (such as those that quantify the environmental benefits of computer and recycled paper purchases) to track the City's progress in reducing the environmental impacts of purchasing
- Identify performance measures to monitor progress.

Electronic Waste

The City received recognition for its recent successes in environmental procurement. In October 2007, the U.S. Environmental Protection Agency recognized the City as a Green Electronics Champion for its early adoption of the national EPEAT environmental standard for computers. In April 2008, the City's environmental purchasing efforts were recognized with a Green California Leadership Award at the Green California Summit in Sacramento.

Next Steps for EP3

In 2008-2009 the City plans to continue implementing the EP3 multi-year strategic plan, which entails the following actions:

1. Incorporate EP3 into the City's grants manual
2. Revise landscaping specifications to incorporate Integrated Pest Management and to support use of mulch and compost
3. Develop a schedule to discontinue the use of disposable, toxic or non-renewable products as outlined in the Urban Environmental Accords
4. Develop meaningful, understandable, and achievable performance measures

5. Continue to collaborate with City departments and outside agencies
6. Continue to implement the Green Fleet Administrative Policy
7. Analyze incorporating Extended Producer Responsibility into the City's procurement practices

Extended Producer Responsibility

Extended Producer Responsibility (EPR) and product stewardship combine strategies to promote the integration of environmental costs associated with products throughout their life-cycles into the market price of products. This effort shifts the costs of managing waste products from a government-funded and ratepayer-financed system, to an open market system. The shift can include cooperation from distributors and retailers to create a convenient, closed-loop system in which consumers can return products at the end of life for recycling or re-use. This EPR effort also aims to create incentives for manufacturers to further design products to minimize environmental impact.

In October 2008, the Transportation & Environment Committee accepted a report on the City's EPR work plan to:

- Establish EPR as a Legislative Guiding Principle of the City
- Support the work of the Product Stewardship Institute and the California Product Stewardship Council
- Promote engagement and partnering with businesses to implement EPR
- Incorporate EPR policies into the City's product procurement practices
- Return with an implementation plan for pharmaceutical take-back programs

Plastic Bags Create Litter

The City supports the California Product Stewardship Council's efforts to implement EPR initiatives statewide. After considering the possible negative impacts of adopting local EPR regulations, the City opted to prioritize regional EPR efforts instead. A good example of a regional EPR effort is the City's leadership in developing a countywide carryout bag regulation.

Next Steps for EPR

1. Work with area hospitals and pharmacies to establish household pharmaceuticals collection systems for their customers
2. Work with State and Federal legislators to amend regulations to facilitate

establishment of household pharmaceutical collection stations

3. Identify area pharmacies willing to take-back medicines and sharps from their customers for proper disposal
4. Identify retail outlets willing to take back Universal Wastes such as batteries, electronics, and compact fluorescent lights
5. Identify a retail partner willing to accept packaging (such as polystyrene blocks or film plastic) returned by its customers
6. Promote EPR partnerships through website links and City directories
7. Formally recognize San José businesses that showcase exemplary EPR practices
8. Continue to support State and Federal legislation that implements EPR practices

Disposable Packaging Reduction

The City has pledged through its Green Vision to "divert 100 percent of the waste from our landfill and convert waste to energy"; and through the Urban

Environmental Accords to "adopt a citywide program that reduces the use of a disposable, toxic, or non-renewable product category by at least 50 percent in seven years." As part of meeting both of these pledges, the City is researching strategies to reduce the consumption of single-use carryout bags and food packaging.

Litter, including disposable packaging, is a problem for the City and its watershed. Despite comprehensive litter management programs, the City, County, and State have failed to reduce litter generation and accumulation in local creeks and streams to an acceptable level. As a result, the City may face millions of dollars in mandatory capital improvements to the stormwater system to reduce the build up of litter that flows into the watershed, such as plastic bags and foam food packaging. Stormwater system improvements alone will not eliminate these waste products from City creeks. Plastic debris, including foam and bags, comprises 60 percent of litter in streams in the San Francisco Bay Area. Much of this debris is carried into San Francisco Bay and the Pacific Ocean where it accumulates. Single-use plastic carryout bags and foam food packaging do not degrade in the marine environment and substantially affect marine life.

Litter Pollutes the Guadalupe River

Next Steps for Reducing Disposable Packaging

1. Create outreach material for City food establishments describing the types of take-out packaging that can be recycled or composted by the City.
2. Discuss the reduction of other hard-to-recycle food packaging, such as foam food containers, with stakeholders, and consider the following enforcement measures:
   - Impose a citywide ban such as Portland, San Francisco, Oakland, Millbrae and other cities
   - Support legislation addressing recyclability or compostability of food packaging
3. Investigate banning the use of foam food packaging purchased by or used at City facilities.
4. Work with restaurants near City Hall to phase out take-out foam food packaging, thus developing synergy with the City Hall composting program.

Reducing Single-Use Carryout Bags

Plastic bags are easily carried by wind and water throughout the City and to distant locations with serious environmental consequences. Plastic bags can take up to 1,000 years to decompose, causing serious harm to aquatic animals and ecosystems. Paper bags are resource-intensive. While they are compostable, the manufacturing process and the recycling of paper bags use a large amount of energy and natural resources.

The City is working on a countywide solution to address this issue with the Santa Clara County Recycling and Waste Reduction Commission (Commission), the Santa Clara County Cities Association, and other local jurisdictions. The goal of this effort is to create a consistent regional approach for businesses and customers. A regional approach will also have a greater positive impact on the environment by conserving energy and materials, reducing greenhouse gases and other air pollutants, reducing litter in streets, storm drains and creeks; and reducing the cost of litter control and recycling programs.

City staff and stakeholder groups are collaborating with the Commission to develop a model ordinance. The Commission provided policy direction regarding key components for ordinance language at its October 2008 meeting. The Commission directed county staff and its Technical Advisory Committee (TAC) to present the model ordinance to the Commission at the December 2008 meeting. City staff will also continue to conduct stakeholder outreach to the San José retail and grocer community and work with chambers and business groups. City stakeholders including bag manufacturers, retailers, and consumers are already involved in policy development and identifying issues, including the type of regulation including which stores to regulate,

the bag types to be regulated, and the performance standards to adopt.

Next Steps for Reducing Single-Use Carryout Bags

1. Subcommittee to draft recommendations for a model ordinance to be submitted to the Santa Clara County Recycling and Waste Reduction Commission, the County Board of Supervisors, and all local jurisdictions for consideration- Spring/Summer 2009
2. Implementation of a "Bring Your Own Bag" campaign in San José in partnership with other similar Bay Area efforts. This initiative could include the provision of reusable bags at reduced or no cost to City residents in partnership with other organizations. - Spring 2009
3. Support state legislation in the upcoming legislative cycle that reduces the use of single-use carryout bags and other problem waste material, including packaging
4. Engage stakeholders to address carryout bags at restaurants and food establishments

Policy Leadership

Many potential policies or legislative actions impacting zero waste are actively being discussed at regional and statewide levels. San José has taken the lead in analyzing and promoting these actions. Many of these planning initiatives align with the City of San José 2009 Legislative Guiding Principles that support:

- Innovation and employment
- Producer responsibility and sustainable product design
- Sustainable development
- Preservation of natural resources
- Environmental protection
- Climate protection
- Energy innovation

The City adopted the following phased approach to zero waste implementation.

Phase 1 – Voluntary actions, education, and creation of incentives

Phase 2 – New programs and advocacy

Phase 3 – Bans, mandates, and legislation

San José has been active over the years in phase one and two activities, but to meet zero waste goals, the City may need to focus on bans, mandates, advocacy, and legislation.

Landfill Regulations & Material Bans

Material bans at landfills are common across the country for easily divertible materials such as yard trimmings and cardboard. In California, state law prohibits many hazardous materials from disposal in landfills, including needles and sharps, asbestos, treated wood, pesticides and household chemicals, automotive chemicals, mercury-containing items, universal wastes (batteries, used motor oil and paint), tires, and some electronic wastes.

Typically, bans are implemented statewide or at publicly owned facilities such as those in Fresno, Santa Cruz and Sonoma County. The Alameda County Solid Waste Management Authority and Source Reduction and Recycling Board (Stopwaste.org) is currently evaluating bans that could target yard trimmings and cardboard at the private landfills within Alameda County. The City and Stopwaste.org have discussed regional implementation of disposal bans to ensure that materials do not move from one jurisdiction to another.

Key considerations for material disposal bans include:

- Ensure adequate opportunities exist for all waste generators to divert the materials proposed to be banned (self-haul, construction and demolition, and commercial generators).
- Phase in the requirements over an appropriate term, beginning with education, followed by a notice of violation, followed by enforcement.
- Consider illegal dumping impacts that can result from poorly implemented material bans and affect costs for City clean up, enforcement, and disposal.
- Evaluate the value of synchronizing bans with local adoption of generator mandates.

Another key factor in landfill use is the cost of disposal. Large low cost regional landfills, such as Republic Services' Potrero Hills Landfill in Solano County, act as a magnet for waste from San José. City garbage dumped at these facilities negatively impact both revenues and financial incentives that the City has set up to encourage recycling.
These landfills also create an incentive for haulers to truck waste 70 or more miles from San José creating a larger carbon foot print than local disposal. As a result, staff is exploring regional and statewide approaches to address the impact of low-cost, out-of-county disposal.

Next Steps for Landfill Regulations

1. Assess the opportunities for regional solutions using material bans with Stopwaste.org and others - ongoing
2. Engage stakeholders to ascertain the level of acceptance of bans or mandates - 2012-2013.
3. Analyze impacts of potential illegal dumping on City services and low income neighborhoods where material bans could affect proper disposal.
4. Evaluate a fee for all wastes exported from San José. San Mateo County is currently considering such a fee, among other options, to address impact of low cost out-of-county landfill fees.
5. Support legislation to adopt a statewide landfill surcharge with an exemption for locally-enacted landfill fees or other statewide solution for low cost regional landfill issue.

Alternative Daily Cover

By state law, the use of approved materials as

Alternative Daily Cover (ADC) currently counts as diversion and counts toward the 50% diversion requirements. However, there are concerns that ADC may be over-used and that the materials being used as ADC could be diverted and used for other higher and better uses. In addition, during the planning period (through 2040), many landfills will close, affecting both waste disposal and the potential for ADC use.

ADC use in San José has ranged from 100,000 tons per year to nearly 240,000 tons per year over the last six years. In 2006, 165,086 tons of ADC was used totaling nearly 9% of the overall waste generation.

The key materials used as ADC include Construction and Demolition Debris (C&D) and green waste. The City has already set policy to minimize use of these recoverable materials as ADC in order to ensure the highest and best use.

For example, the City's residential contracts do not allow green waste to be used for landfill activities, and require yard trimmings haulers to process material for compost or mulch, rather than ADC. The same policy will be recommended for the commercial solid waste system redesign.

Because much of the current ADC applications in San José are C&D waste, the City will also evaluate the most environmentally sustainable uses for this material as part of the 2009 comprehensive review of the C&D program.

City staff is participating on a CIWMB-organized task force to create long-term recommendations about ADC use statewide. San José has supported legislation to remove green waste from the landfill by eliminating the diversion credit for green waste ADC, or charging fees for green waste. Pending future legislation, San José will continue to lead by voluntarily minimizing the affects of ADC use.

ADC Next Steps

1. Prepare a comprehensive ADC analysis that examines long-term trends and forecasts of ADC use, summary of the haulers delivering various material types ADC to landfills, alternatives to ADC that are available to landfills, and medium and long-term capacity projections for ADC with upcoming landfill closures. This may be completed as part of the upcoming CDDD program review and the commercial redesign process.

San Jose ADC Type	Tonnage 2006
C&D Debris	105,059
Green Waste	41,818
Sludge	1,257
Mixed Waste	16,875
Other	77
Total ADC	**165,086**

2. Continue utilizing City policies and contract practices that minimize ADC use.
3. Participate as a model city in development of the CIWMB Organics Roadmap to minimize green waste disposed of in the landfill, such as compost market development, compost specification and use requirements.
4. Analyze and comment on potential legislation that reduces the use of green waste as ADC through removal of diversion credit, fees or other mechanisms.

Generator Mandates

Several communities in California have adopted or are considering mandatory requirements for source-separation of waste for recycling, including Santa Cruz County, Palo Alto, Sacramento, San Diego, and San Francisco. Mandatory requirements for source-separation include:

- Extensive outreach and education to inform generators of the new requirements.
- Phase-in of the requirements over a number of years, beginning with education, followed by a notice of violation, and enforcement.

Next Step for Generator Mandates

- Study generator mandates in other communities. Review model ordinances, effective education materials, and enforcement procedures from other jurisdictions.
- Determine the impact of generator mandates on other possible actions such as landfill material bans.

Climate Protection

The Urban Environmental Accords, adopted by the City of San José in 2005, include a goal for signatory cities to reduce greenhouse gas (GHG) emissions by 25 percent by 2030 (Action 3). Assembly Bill (AB) 32, together with Executive Order S-3-05, set a statewide goal of reducing GHG emissions to 1990 levels by 2020 and 80 percent below 1990 levels by 2050. In 2007, the San José City Council also adopted municipal GHG reductions to bring City GHG emissions below 1990 levels as follows:

Goal to bring GHG emissions below 1990 levels	
By Year	**Percentage Below 1990 Levels**
2012	25%
2015	30%
2020	35%
2030	50%
2045	80%

In its AB 32 Proposed Scoping Plan, the California Air Resources Board (CARB) has determined that 1990 may not be a realistic baseline for local government due to data availability and set a goal of 15 percent reduction from current GHG emissions levels instead. CARB also acknowledges that waste management practices help reduce the GHG emissions that contribute to climate change.

In addition to the other environmental benefits of diverting waste from the landfill, the City's progress toward zero waste will also result in a reduction of GHG emissions. For example, by composting and recycling all of the waste that is recoverable under current City community recycling programs, there is potential to reduce carbon dioxide (CO2) emissions by over 537,000 tons (CO2 equivalent).[1] This amount is equivalent to reducing annual GHG emissions from over 98,000 passenger vehicles or from electricity used by over 71,000 homes.[2] As additional alternatives to landfilling are developed, the amount of GHG reduced could be greater.

City staff has provided comments on CARB's Proposed Scoping Plan, which is slated for adoption on December 11, 2008. The plan includes "Recycling and Waste" recommendations that specifically advocate for the following:

- Improved landfill methane control and capture.
- High recycling/ zero waste activities including increased commercial recycling, production and markets for compost, anaerobic digestion, extended producer responsibility and environmentally preferable purchasing.

In order to qualify carbon offsets, the California Climate Action Registry (CCAR) has protocols to certify emission reductions related to livestock, forest, landfill and urban forest projects. CCAR is also completing a protocol for local governments and evaluating standardized protocols related to organic waste diversion, such as composting and anaerobic digestion.

City staff is developing a baseline GHG inventory and emissions reduction plan for municipal operations as well as citywide community emissions. The City is working with Joint Ventures Silicon Valley and Sustainable Silicon Valley to determine how a regional community climate action plan might benefit both San José and the surrounding communities. Other portions of the Plan elaborate on the City's current activities related to increasing commercial recycling, exploring anaerobic digestion and increasing Extended Producer Responsibility and Environmentally Preferable Purchasing. In line with City and statewide goals to reduce GHG emissions, additional steps may be

[1] Based on 51% recoverable materials identified in the *Needs Assessment for the Integrated Waste Management Zero Waste Plan Development*, Appendix B, and emissions figures calculated with the U.S. Environmental Protection Agency (EPA)'s Waste Reduction Model (WARM) calculator, http://www.epa.gov/WARM.
[2] EPA's Greenhouse Gas Equivalencies Calculator, http://www.epa.gov/cleanenergy/energy-resources/calculator.html

taken to reduce those emissions that are associated with the City's waste management practices.

Next Steps for Climate Protection

1. Continue to participate in the development of climate change and carbon offset protocols, plans and regulations being developed by State and other agencies, such as the California Air Resources Board and CCAR, to ensure that recycling, composting and anaerobic digestion are appropriately measured for their climate change impacts.
2. Pursue the verification of carbon credits for City projects under new or existing California Climate Action Registry protocols.
3. Advocate for legislation such as AB 32 that will raise the profile of the City's waste reduction and recycling programs and their role in reducing GHG emissions
4. Ensure that waste management programs are adequately represented in San José's Climate Action Plan.
5. Work with neighboring jurisdictions to evaluate and consider regional landfill bans, particularly for organic materials such as food waste and yard trimmings that contribute to methane generation at landfills.

Green Jobs

The Green Vision includes the creation of green jobs in San José. These are jobs created by businesses and organizations that improve environmental quality and sustainability.

The new green economy can help lift people out of poverty while improving the environment. The City's recycling programs and related policies are a catalyst for green jobs in the City and the region. The Institute for Local Self-Reliance has estimated that every 10,000 tons of materials discarded per year can create the following full-time jobs:

- 1 job at a landfill, or
- 4 jobs at a compost facility, or
- 10 jobs at a recycling facility, or
- 25 jobs at a recycling-based manufacturer, or
- 75 to 250 jobs at a reuse facility

Recycling Creates Jobs

The following recent City programs created new green jobs in San José:

Special event and City facility recycling — The City is working with 150 members and staff of the San José Conservation Corps to

implement recycling at special events and City facilities.

Multi-family and City facility recycling and composting — The City is working with local private waste management companies to create green jobs processing and composting waste materials from multi-family residential complexes and City facilities.

Next Steps for Green Jobs

1. Expand, attract, and support green businesses.
2. Continue to support the development of green jobs through investment in zero waste programs and infrastructure.
3. Continue to provide outreach to the City's youth and other job-seekers, educate them about opportunities in green jobs and new technology.
4. Provide information on training opportunities and journey level positions at local green businesses.

Recycling Market Development

Encouraging sustainable local markets for the post-consumer materials that end up in landfills is essential to any recycling program. It is not possible to reach the City's diversion goals without viable markets for recycled end products. However, financial barriers to businesses interested in manufacturing recyclables have often been too great to overcome. The California Integrated Waste Management Board designated the City a Recycling Market Development Zone (RMDZ) to encourage market creation and development. The RMDZ program provides attractive loans to fund recycling-based manufacturing businesses. Due to the progressive and ever changing nature of this industry, alternate loan funding is essential as many conventional lenders are apprehensive about these projects due to the limited track records.

Scrap Metal Ready for Recycling

In an effort to achieve the Green Vision, San José is positioning itself to become a leader in this program. As new technologies develop, San José would like to leverage the resources of RMDZ to encourage infrastructure development locally. Due to the CIWMB program's current narrow scope, only a small percentage of businesses are eligible for this funding. Also, the maximum loan amounts may not be enough to encourage large scale operations. San José will work with the RMDZ staff to evaluate current program restrictions and help ensure more funding is available for more projects.

Next Steps for RMDZ

1. Continue to work with stakeholders to identify areas for program improvement.
2. Continue to collaborate with other jurisdictions to increase RMDZ program funding at the State level.

Finances & Funding

Recycling programs have historically been funded from fees on solid waste that is disposed at landfills. The City's fee for the residential collection programs is used to pay for garbage, recycling, and yard trimmings collection as well as street sweeping services. Commercial haulers pay a franchise fee based on the volume of solid waste collected for disposal. Also, the City receives General Fund revenue from the Disposal Facility Tax assessed on landfills within the City. Over the medium to long-term, as the City's zero waste programs become more successful in reducing the need for disposal, City revenues will decrease and there will be a need to identify alternative means of funding.

The City conducted a survey of its fee structures, and revenue alternatives which is included as Appendix D "Opportunities for Alternative Revenue Generating Mechanisms." The report describes several City fees and taxes and how they will change over time. Revenues discussed include:

- Disposal Facility Tax
- Commercial Solid Waste Collection Franchise Fee
- Commercial Source Reduction and Recycling Fee
- County Planning Fee

The report also discusses possible alternative fees, including:

- Solid Waste Development Impact Fees
- Vehicle Impact Fees
- Street Sweeping Fees
- Host Fees
- Extended Producer Responsibility Fees
- Advanced Disposal/Recycling Fees
- Revenues from the Sale of Carbon Credits

Additional review must occur before these fees can be recommended.

Next Steps for Finances & Funding

- Develop alternative fee based options and/or alternative fees to address the impact of waste diversion activities on the General Fund and Integrated Waste Management Fund - 2009-2010.
- Examine the remaining capacity at local landfills and incoming tonnage to estimate when the City would need to replace the Disposal Facility Tax revenue with an alternative funding mechanism and evaluate revenue options— 2010.
- Continue to support a statewide landfill surcharge to fund local programs and facilities.
- Ensure that the redesign of the commercial, residential, and construction and demolition programs will phase-in cost recovery.

This section describes program options that may be implemented to achieve the City's goals of 75 percent diversion by 2013 and zero waste by 2022.

Residential

The residential sector accounts for 32 percent of the City's total disposed waste stream; with 24 percent from single-family households and 8 percent from multi-family complexes.

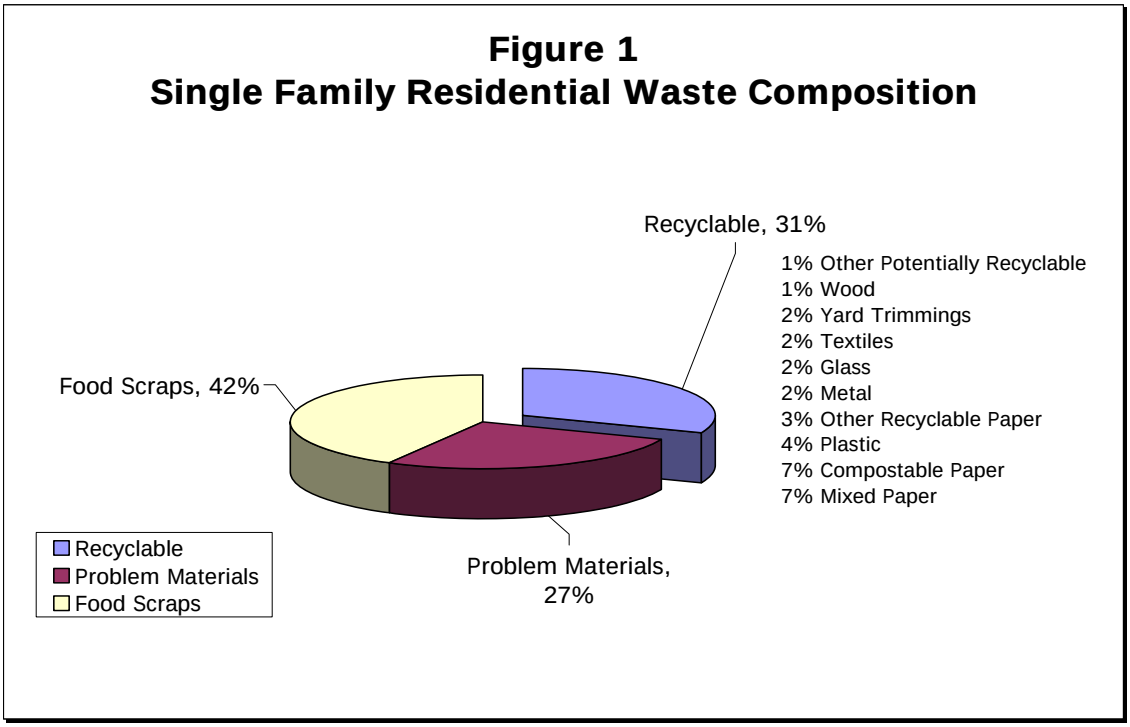
The residential sector comprises both single-family residences and multi-family complexes. In San José, single-family collection services are provided to single-family residences, townhomes, and multi-family complexes that choose cart services. Multi-family collection services are provided to all multi-family complexes that choose bin services. Seventy-five percent of residential waste is generated by single-family households in the City and 25 percent of residential waste is generated at multi-family complexes.

Lower Emissions 2007
California Waste Solutions Recycling Truck

Single-Family

The City's residential recycling program is one of the largest privatized systems in the United States and provides collection services to approximately 205,000 single-family units citywide. The current single-family Recycle Plus program was implemented in 2002 with comprehensive services including:

- Unlimited single-stream collection of recyclable materials (paper and cardboard, cans and cartons, glass bottles and jars, plastic containers, polystyrene foam, scrap metal, and textiles) in wheeled carts. Extra recyclables may be placed in paper bags next to the recycling cart.
- Garbage collection in wheeled carts, with monthly fees based on the size of the cart. Extra garbage may be placed in plastic bags next to the garbage cart (for an extra fee).
- Yard trimmings collection is offered as loose-in-the-street collection or subscription cart collection with loose-in-the-street collection of overages.
- Monthly street sweeping.
- Used motor oil and oil filters collected separately at the curb.
- Large item collection by appointment (for an extra fee).
- Neighborhood Cleanup Program
- Household Hazardous Waste Program
- Home Composting Program



In evaluating improvements to the current Recycle Plus program, the following materials could be targeted for increased diversion:

- Plastic bottles and containers
- Aluminum and steel cans
- Textiles
- Paper

Other materials not currently captured in the Recycle Plus program also offer a significant opportunity to increase overall residential diversion. For example, compostable materials, including food scraps, compostable paper, and wood represent nearly 53 percent of materials that could be diverted from the landfill.

Problem Materials

A relatively large percentage of materials disposed by generators in the City consists of non-recyclable "problem" materials, including composite materials (composed of more than one material), non-recoverable special waste, non-recoverable construction and demolition debris, treated wood, and disposable diapers. These problem materials comprise 27 percent of single-family disposed waste and 17 percent of disposed waste citywide. These materials are considered non-recyclable because they are not currently marketed by material recovery facilities in San José. Strategies for addressing non-recyclable or problem materials, such as Extended Producer Responsibility and recycling market development are discussed in the policies section.

Recycle Plus Program Enhancements

The expiration of the City's current single-family Recycle Plus collection agreements

provides the opportunity for enhancing the current residential collection system. Options to be considered to maximize diversion, some of which are mutually exclusive, include:

Recyclables

- Change from a single-stream recycling cart to a split recycling cart where a divider is placed in the recycling cart and mixed paper is collected on one side and mixed containers are collected on the other side of the cart to improve marketability of cleaner products.
- Co-collect recyclables and garbage and then process them at a solid waste processing facility.
- Increase program participation and reduce disposal of recyclable materials through intensive outreach, incentives, enforcement or mandates.

Organics

- Provide a compostables cart to all residential customers and co-collect yard trimmings, food scraps, compostable paper, wood waste, and other organics.
- Provide a separate cart for food scraps, grass clippings, and compostable paper for use in a digestion operation, and also continue to collect yard trimmings loose in the street as well as in separate wheeled carts (for an extra fee).
- Co-collect organic materials and garbage; process at a solid waste processing facility.
- Offer periodic or seasonal loose-in-the-street yard trimmings and leaf collection as an addition to a compostables cart option.

Garbage (material not segregated for recycling or composting, also called residual wastes)

- Process garbage at a solid waste processing facility (a dirty MRF).
- Increase processing of residual garbage with energy conversion technologies.

The Recycle Plus agreements expire in 2013. Two of the five Recycle Plus agreements include provisions to extend the term for up to two years (July 2015). They City may also be able to extend the remaining three contracts for a similar term. This could provide the City more opportunity to evaluate how to move the City's residential sector towards zero waste, and to work with existing haulers on pilot programs, such as food scrap collection.

The additional time would also allow the City to evaluate alternative collection techniques and new processing technologies. Finally, the City can better redesign the residential program after the commercial program redesign and construction and demolition program redesign begin. The need to have new residential contracts in place by July 2013 would require staff to begin pilots in early 2009 and then start drafting the Request for Proposals documents in late 2009, which would be very challenging. Currently, new contracts would need to be in place by

Yard Trimmings Collection in San Jose

summer of 2011 to allow for the two year transition period required with any major programmatic change. This timeline does not provide sufficient opportunity to fully develop and evaluate pilots and would result in staff implementing major system changes to both the residential and commercial systems at the same time, putting a large strain on existing City resources.

Next Steps for Single-Family

1. Evaluate whether to extend three of the current Recycle Plus agreements for up to two years. This analysis would include: the time required to implement and evaluate pilot programs, cost-savings to the City, and current contractor performance. Upon Council approval, negotiate and execute agreement extensions if appropriate – 2009
2. Increase recycling program participation and reduce recycling contamination through options such as outreach, incentives, enforcement or mandates. These efforts can also reduce hazardous materials contamination of recycling and garbage.
3. Consider removing difficult-to-recycle materials from the recycling program and evaluate new materials for recycling.
4. Evaluate a pilot program to provide a split cart in place of the single-stream recycling cart to collect mixed paper on one side and mixed containers and other materials on the other side - 2009.
5. Evaluate a pilot program to provide a separate cart to co-collect some or all yard trimmings, food scraps, compostable paper, wood waste, and other organics – 2009.
6. Evaluate a pilot program to provide a separate cart to co-collect food scraps and compostable paper –2009.
7. Evaluate a pilot program to test effectiveness of periodic/seasonal loose-in-the-street yard trimmings collection – 2009 in conjunction with organics cart collection pilot.
8. Analyze benefits of mandatory cart collection of yard trimmings to reduce stormwater pollution.
9. Evaluate a pilot program to process garbage for recyclables and compostables.
10. Confirm availability of processing capacity for composting (food scraps, yard

Claw Collects Yard Trimmings

trimmings and other organics), for mixed waste composting, and for the anaerobic digestion of source-separated food scraps processing – 2010.

11. Monitor developments in every-other-week collection of non-putrescible refuse (as practiced in Toronto and being considered in Berkeley) – Late 2012 (dependent on extension of Recycle Plus Agreements).
12. Analyze street sweeping residue to determine if there are feasible alternatives to its current use as landfill cover.
13. Develop Request for Proposals for Recycle Plus Services based on results of pilot programs, stakeholder input, feedback from service providers, and availability of processing capacity in early 2010 (2012 if extended).

Multi-Family

In order to achieve the zero waste goal, the City must dramatically increase its recycling in every sector of the City, including multi-family complexes. Multi-family generators account for 7 percent of disposed waste citywide. The City's franchised waste haulers serve approximately 93,000 multi-family living units in 3,200 multi-family complexes. The current agreements expire July 2013.

The current multi-family Recycle Plus program was implemented in 2002. Comprehensive services include:

- Unlimited single-stream collection of recyclable materials (paper and cardboard, cans and cartons, glass bottles and jars, plastic containers, polystyrene foam, scrap metal, and textiles) in bins (dumpsters) or carts.
- Yard trimmings collection is offered as loose-in-the-street and subscription cart collection.
- Monthly street sweeping
- Garbage collection in bins
- Large item collection by appointment (for an extra fee)
- Neighborhood Cleanup Program

Apartment Recycling in San Jose

- Household Hazardous Waste Program
- Home Composting Program

Multi-family recycling and waste programs are difficult to implement for a number of reasons. Effective outreach to this population has been challenging since apartment dwellers are a more transient population with diverse language requirements. Multi-family buildings often suffer from the "tragedy of the commons" problem, where no one takes responsibility for shared trash and recycling areas. By 2003, the City's multi-family collection contractor achieved a diversion rate of only 18 percent. To reach the contractually required 35 percent diversion rate, which is among the highest rates of diversion for this sector, the contractor sent 25 percent of garbage collected to a mixed waste processing facility, with most of the material composted at the Z-Best Composting Facility in Gilroy. However, in order to achieve zero waste, the City needs to do more.

In July 2008, the City modified the diversion program for multi-family complexes. Instead of sending most multi-family garbage directly to the landfill, the City's contractor, GreenTeam of San José, delivers all of this material to a new solid waste processing facility in San José. This facility, operated by GreenWaste Recovery, removes recyclables such as cans, bottles, and clean paper as well as large non-processable items. Remaining materials, consisting largely of organics, are composted at the Z-Best Composting Facility in Gilroy.

This program can help the City achieve its zero waste goal without the extra challenge of trying to enforce new recycling requirements for residents, property managers, and owners. This program is, in fact, invisible to property owners and residents and defers more stringent recycling 'mandates' on property owners such as those being implemented in San Francisco and San Diego. Traditional recycling is still encouraged at multi-family properties.

The City requires GreenWaste Recovery to ensure waste diversion rates of up to 75 percent, making San José's multi-family recycling program among the most successful in the country. The City's program can serve as a model for other communities looking for alternatives to imposing unpopular recycling mandates.

In order to implement this new program and fund annual contractual obligations resulting from fuel and labor increases, the City increased multi-family customer rates by 8 percent in July 2008 to fund the program.

Next Steps for Multi-Family

1. Evaluate extending the Recycle Plus Agreements for services to multi-family complexes to 2015. Evaluation would include: implementing and evaluating pilot programs, processing capacity issues, contractor performance, and cost-savings. Upon Council approval, negotiate and execute agreement extensions if appropriate – 2009.

2. Monitor the effectiveness of the new multi-family program and its achievement of 70 to 75 percent diversion.
3. Increase recycling program participation and reduce recycling contamination through options such as outreach, incentives, enforcement or mandates.
4. Confirm the on-going availability of open windrow composting. This technology can release emissions, such as volatile organic compounds, and may be more strictly regulated in the future.
5. Evaluate developments in new technology to convert mixed waste to appropriate energy conversion technologies.
6. Develop Request for Proposals for Recycle Plus Multi-Family Services based on results of the pilot program evaluation, stakeholder input, feedback from service providers, and availability of processing capacity in early - 2010-2012.

Downtown Business Recycling

Commercial Programs

Commercial waste comprises 32 percent of disposed waste citywide. Since 1995, the City has regulated its commercial sector through non-exclusive franchises. Currently, about 20 franchise haulers hold Commercial Solid Waste and Recyclables Collection Franchises and compete with each other on a customer-by-customer basis to provide solid waste collection services to approximately 9,600 businesses citywide. Approximately 4,900 businesses receive recycling collection services from the franchised haulers.

In 2007, the franchised haulers reported a 14.1 percent diversion rate excluding construction and demolition (C&D) debris. The commercial sector as a whole has a much higher diversion rate, due to separate collection of high-value, source separated recyclables from large generators. However, based on the results of the City's Waste Characterization Study completed in May 2008, nearly 79 percent of disposed commercial waste could be recycled or composted. Fifteen percent of the recoverable material in this study was C&D and could be recovered through improvements in the C&D diversion program.

Commercial generators report difficulty with obtaining cost-effective recycling programs through the franchised haulers.

In December 2007, City staff presented the Commercial Redesign White Paper to the City Council. This paper evaluated the current

system performance and identified alternatives for improving the commercial recycling and solid waste system. The key findings from this white paper were:

- Significant opportunities exist to increase diversion of materials from the commercial waste stream.
- Recycling services available to most customers are limited in the current system
- Hauler investment in recycling infrastructure is limited due to a lack of guaranteed customer base.
- Customer service and hauler compliance with franchise agreements and municipal code provisions are inconsistent and difficult to enforce in the current system.

The City recognized the potential for increased diversion and formed a commercial redesign team. This team evaluated eight different approaches to commercial hauler regulation and conducted surveys of other high performing jurisdictions. Staff undertook an extensive stakeholder outreach process to better understand the needs of the business community and the challenges that both businesses and contractors face when trying to increase recycling. The results of this outreach were incorporated into the recommendations brought forward to the City Council.

In September 2008, the commercial redesign team presented its findings to the City Council and received direction to pursue a new approach for commercial collection in San José. The new system will put the City in a better position to achieve its environmental goals, stabilize revenue, and offer better services to businesses.

Similar to the single-family Recycle Plus Program model, the City will pursue an exclusive service district model to maximize collection routing efficiencies, establish diversion standards for all waste streams, facilitate equitable rate setting, enforce performance standards for all contractors, provide the most options for setting and collecting City fees, and establish standards for collection vehicles.

Entities exempt from the new exclusive service district model may include:

- Small businesses covered by the Recycle Plus program
- Mixed use developments covered by the Recycle Plus program
- Multi-family complexes

Examples of materials exempt from the new model include:

- Specialty recyclables not collected in the new system
- Materials for which the customer is compensated
- Self-hauled waste (except garbage, which may not be self-hauled)
- Donated materials
- Organics materials composted on-site
- Construction and demolition materials

The City anticipates that if the commercial sector could realize its full potential, the City's overall diversion rate could increase to 75 percent.

Next Steps for Commercial

1. Provide recycling education and offer more robust technical assistance to targeted businesses to maximize waste diversion efforts.
2. Evaluate requiring covered trash and recycling at all facility enclosures to minimize blowing debris.
3. Evaluate prohibiting locating trash enclosures and bins adjacent to creeks.
4. Issue a Request for Proposals, for redesign of the commercial system—2009.
5. Award new franchise agreements—2011.
6. Implement new commercial collection systems—2012.

City Facilities

San José models best practices by providing state-of-the-art recycling programs throughout the community in public areas and parks, and at City facilities and special events.

Waste generated by City facilities represents less than one percent of the City's total disposed waste stream. However, the City recognizes that in striving for zero waste, the City must model best practices for its residents and businesses.

The solid waste and recyclable materials generated from municipal facilities and public containers throughout the City are collected and processed under one collection agreement. Under this agreement, a contractor collects all the waste and mixed recyclables for all City facilities, including large venues and parks.

Yard trimmings collection is provided on a limited basis for small sites, including fire stations and libraries. GreenWaste Recovery provides yard trimmings recycling to these small civic facilities as part of the single-family yard trimmings program.

City Facility solid waste, like the multi-family program waste, is processed at a local solid waste processing facility. The facility

separates the recyclables as well as large items that can not be recycled or composted and sends organics offsite for composting. The agreement for City facilities waste collection also specifies a required minimum diversion rate of 70 percent.

In addition, the San José Conservation Corps (SJCC) provides source-separated beverage container collection services to approximately 33% of City facilities and to over 160 parks.

Public Areas & Parks

The City has long promoted the concept of "recycle where you live, work, and play" to unify the City's recycling programs and to ensure easy access to recycling,

Covering more than 160 parks ranging from large concession-based parks to neighborhood parks and tot lots, over 500 recycling containers throughout the parks system give residents and visitors an opportunity to pitch in and recycle.

The SJCC provides onsite collection of recyclables at each park, and uses proceeds from their beverage container redemption program to help defray the cost of their job training and other educational programs.

With grant funding assistance from the State Department of Conservation, the City has placed recycling containers at the following locations throughout the City:

- Mineta San José International Airport
- Alum Rock Village
- City Hall
- City Parks
- Community Centers
- San José McEnery Convention Center
- Downtown
- Japantown
- Libraries
- Alameda Business District
- West San Carlos Business District

The City also began processing the waste picked up from its 800 Public Litter Cans collected citywide. The recyclable and compostable materials in the public litter cans are diverted from disposal in a program that is the first of its kind in the nation.

Next Steps for Public Areas & Parks

1. Secure additional grant funding to implement recycling programs.
2. Implement recycling programs at new parks, and restart or expand programs at existing parks.
3. Partner with Parks Division to promote recycling.
4. Evaluate collaborating with VTA to place and maintain recycling and trash cans at transit stops and on vehicles.

Special Events

Special events provide a unique opportunity for the City to teach its residents, businesses, and visitors about zero waste. Over the past year, the City has made a concerted effort to "green" special events throughout the City. The City formally acknowledges event

sponsors with three categories of events that demonstrate commitment to green practices through waste reduction, reuse and, recycling:

Category 1: Going Green Event — event organizers arrange for recycling collection service, require vendors to use recyclable #1 plastic cups and containers, and protect all storm drains from discharges. Events have a goal to achieve 30% to 40% waste reduction at this level.

Category 2: Green Event — in addition to the practices listed for Going Green, event organizers require vendors to use compostable service-ware, implement a composting program, provide education and environmental awareness, and provide adequate recycling staff or volunteers at the event. Events have a goal to achieve at least 40% to 60% waste reduction at this level.

Category 3: Zero Waste Event — in addition to the practices listed for a Green Event, event organizers require all vendors to use only recyclable and compostable materials and collect and recycle cooking oil, prohibit plastic water bottles and use water stations, calculate the event's greenhouse gas emissions and obtain off-set credits, and provide an interactive activity to raise environmental awareness. Events have a goal to achieve greater than 60% waste reduction at this level.

Special events held in the City have achieved extraordinary success at reducing waste.

The five large public events targeted to model zero waste practices in 2008 were:

1. **Tapestry Arts Festival —** achieved Green Event status and recycled and composted 85 percent this year.
2. **San José Jazz Festival —** achieved Zero Waste status and increased its diversion rate from 60 percent in 2007 to 93 percent in 2008.
3. **Cinco de Mayo —** achieved Going Green status and recycled 44 percent.

Zero Waste Event – City Hall Rotunda

4. **American Independence Festival —** which achieved Green Event status and recycled and composted 70 percent.
5. **IAHF Italian Family Festa —** which achieved Green Event status and recycled and composted 77 percent.

The City partners with the SJCC to offer recycling services at special events. The SJCC provided more than 150 members and staff to green these events. Further, GreenWaste Recovery sorts and processes the event's compostable material and garbage. Involvement of the event planners, event production staff, and the food vendors played an instrumental role in the success of the Special Events program in 2008.

Next Steps for Special Events

1. Evaluate the current program to determine opportunities for improvement.
2. Develop a resource kit to assist event organizers in reducing the waste generated at their events.

City Venues & Operations

In addition, the City has initiated programs at key City venues including:

1. **Norman Y. Mineta San José International Airport —** The airport is striving for zero waste and is one of the country's leading airports for environmental conservation and sustainability. Additional recycling containers have been added to concession areas, hold rooms, and near security checkpoints. The airport also participates in the City facility mixed waste recycling program, and is working with its vendors and tenants on targeted zero waste initiatives.
2. **San José McEnery Convention Center —** The City's largest venue for events and conventions is also a model for sustainability. The Convention Center waste recycled ranges from paper products and scrap metal, to carpeting and to food waste. What cannot be recycled, like furniture and foam boards, is donated to non-profit organizations, such as the Resource Area for Teaching, and local schools. The Convention Center is one of the few West Coast centers that composts

Children's Discovery Museum Kids Café Sign

food scraps and other compostables. The center operators also offer products that are recyclable or compostable, such as plates, cups, flatware, napkins, and box lunch containers.

3. **Children's Discovery Museum of San José** — Through a partnership with the City and Hope Services, the Museum is going green with an expanded recycling program and a new food waste composting pilot, which will allow the Museum to recycle, compost or reuse almost all of the waste it generates. With over 325,000 visitors per year, the Museum is in a unique position to educate and inspire its youngest guests and their families to recycle, compost, and care about their community and their environment.

4. **The Tech Museum of Innovation —** The Tech Museum is another world-class venue in the City that will be inspiring zero waste with a focus on technology innovation and hands-on interactive exhibits.

5. **City Hall —** The City's premier green building also serves as a model for practicing zero waste. To show that they can "walk their talk," City employees participate in one of the most successful City facility recycling programs in the country. Achieving diversion rates in excess of 70 percent, the City serves as a model of zero waste behavior for its residents and businesses.

Next Steps for City Venues & Operations

1. Expand the City's model recycling and composting program to all City facilities and large public venues.
2. Work with the Department of Transportation and the City's contractors to divert more of the inert materials disposed through the City's corporation yard operations.
3. Establish food scrap composting pilots at City Hall and the Airport – 2009.
4. Monitor the diversion rates of the new mixed waste recycling programs.
5. Continue to evaluate processing capacity and other innovations to enhance programs at City facilities.

Schools

The school recycling program has been core element of the City's education and outreach programs for over eight years.

The City has over 300 K-12 schools, with 237 public schools organized in 19 school

districts, and 78 private schools. With 262,348 students, San José is home to one of the nation's most diverse student populations. More than 54 languages are spoken by students and their families in San José schools. Many (10%) of the City's students are low income, living below the poverty line.

Go Green Schools Program

Key features of schools program include:

- Free recycling containers for paper, and beverage bottle and can recycling through a unique partnership with the nonprofit Resource Area for Teachers
- On-site technical assistance to schools to design and implement campus recycling and other green programs.
- Information for schools about How to Start a Green Schools Program through the program's website and print materials.
- On-line Schools Resource Directory – local, state, and national environmental resources for San José schools.
- Annual Schools Environmental Conference.
- Annual Green Schools Mini-Grants – providing up to $5,000 for projects supporting school recycling and other environmental measures.

The program serves as an environmental resource center for schools throughout the City, connecting 73 San José schools with free recycling supplies and other green resources, encouraging them to green their schools at whatever level and pace they choose. Through the program, 69 schools have developed recycling programs, and 45 schools have been awarded mini-grants.

Over 400 tons of paper and 372,000 bottles and cans have been recycled in the first two years of the program's operation. Schools participating in the recycling program have experienced reductions in garbage up to 50 percent. The program website, its online recycling supplies order process, and Resource Directory generated 30 new school recycling programs in its first three months.

In September 2008, the program won the National Recycling Coalition's Outstanding K-12 Program Award.

Union School District Pilot

The City is working with the Union School District to launch a composting and recycling program at all of its six elementary schools, two middle schools, and the district office.

Go Green Schools –San Jose Students Sort Recyclables

To address three major sources of school waste, students, faculty, and staff are composting lunch waste; and recycling paper, bottles and cans. An important element of the program is the replacement of traditional Styrofoam food service-ware with compostable plates, cups and utensils which can be transformed into soil at an off-site commercial composting facility.

The City provides technical assistance to the school district and supports the program by paying the differential between what the District paid in 2007 for their service-ware, and what they are paying in 2008 for compostable service-ware. By using compostable plates, cups, and utensils, and sending all this along with food scraps to be composted, the District will be able to keep most of its waste from going into landfills.

Next Steps for Schools

The City recognizes that achieving zero waste will require a change in our culture. K-12 students comprise the next generation of environmental stewards. Students who recycle at school encourage their families to recycle at home. By focusing on the next generation, the City is investing in the program participants of the future. To continue this investment the City will:

1. Continue and enhance programs and services to all schools in the City.
2. Evaluate the Union School District pilot program to assess feasibility and launch an organics collection program with all school districts in the City — 2010-2013.
3. Create additional partners, including City businesses and civic organizations, to broaden support for the schools program — 2009-2010.
4. Implement a comprehensive outreach campaign to inform City schools and school districts about no and low cost green resources available for zero waste, water and energy conservation, and how to become a certified Green Business — 2009.
5. Achieve a 60 percent participation rate in the schools program by 2011.

Processed Construction and Demolition Debris

Construction & Demolition

Construction and demolition (C&D) debris generated in the City is collected by franchised haulers or self-hauled. A significant amount of waste from construction projects, including roofing projects, is included in the self-haul and non-franchised sector.

Diversion Deposit Program

The City provides incentives for C&D debris diversion through its model Construction and Demolition Diversion Deposit (CDDD) program. The CDDD program is nationally recognized for its success at developing public/private partnerships with recycling facilities to reduce the amount of C&D debris buried in landfills.

Used Concrete for Crushing & Reuse

When applying for a building permit, prospective permittees who meet the CDDD minimum threshold pay a deposit based on the square footage and type of project. To receive a refund of the deposit, permittees provide documentation to the City that they have diverted at least 50 percent of the C&D debris generated by the project. Permittees can demonstrate diversion by documenting their specific recycling efforts or by submitting documentation that they have delivered their construction and demolition debris to a certified facility.

To assist permittees in documenting diversion and to encourage development of C&D debris recycling infrastructure, the City certifies facilities that meet a minimum of 50 percent diversion.

Sorted Wood Waste for Recycling

CDDD Evaluation

Recognizing that C&D debris represents a large fraction of the City's waste stream (nearly 30 percent), the City initiated a project in 2008 to evaluate the CDDD program. The City recently completed an analysis of C&D debris delivered to landfills, material recovery facilities, and transfer stations in the City. As shown in Figure 2, approximately 72 percent of disposed mixed C&D debris can be recycled or reused.

Opportunities for Increasing Diversion of Disposed C&D Debris

The City is evaluating the CDDD program and plans to have new program requirements by Summer 2009 that will be used for the recertification of all existing and new C&D facilities participating in the CDDD program. Aspects of the CDDD program currently being examined include establishing new reporting requirements for CDDD certified facilities.

Currently, CDDD facilities report facility-wide diversion rates and tonnages to the City regardless of origin. The facilities currently do not provide specific information about San José generators. The City is working with facilities to report diversion and disposal tonnage of C&D debris originating within the City.

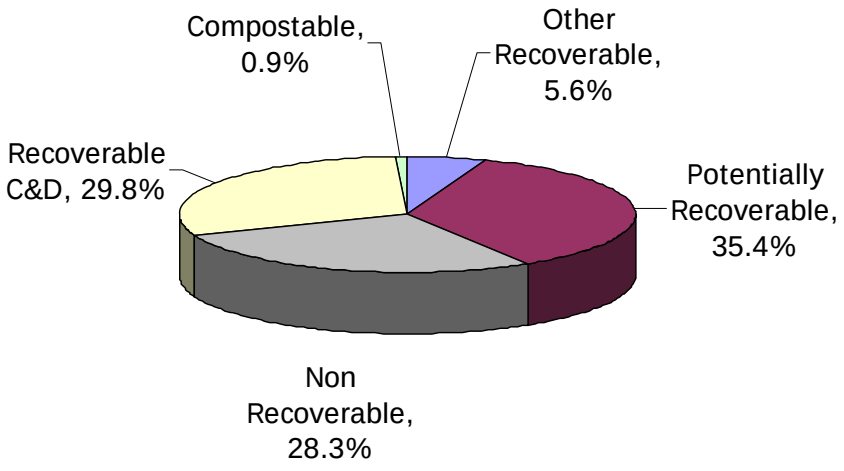
Additional Incentives for Permittees

The City is reviewing the minimum and maximum thresholds and deposit rates to determine if they are consistent with similar programs in other jurisdictions. Staff will also explore whether it may also be possible to incorporate Leadership in Energy and Environmental Design (LEED) and Green Building standards within the program framework as part of the overall requirements for permittees.

Incentives for Building Contractors

A large number of construction, demolition, and roofing contractors work in San José . However, a limited number of contractors work on the majority of projects in the City. The City may consider certifying building contractors or specialty contractors (such as roofing contractors) and allowing them to

Figure 2
Divertability of Disposed Mixed C&D



report on behalf of their customers on an annual, aggregated basis. These contractors could provide documentation of diversion from disposal or proof that they use a certified facility.

Incentives for Deconstruction, Salvaging & Reuse

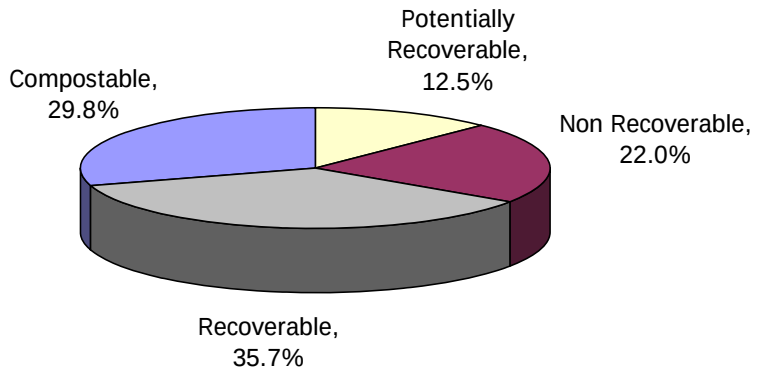
The City could evaluate options for requiring permitted construction contractors to salvage reusable materials before building demolition. The City may also wish to require or encourage building owners to remodel existing buildings through adaptive reuse, rather than demolishing the building. In an adaptive reuse design, the major building elements of the existing building are kept intact and are incorporated into the new use (e.g., factory buildings converted to condominiums, warehouse building converted to live-work lofts).

C&D recycling programs are important for projects pursuing LEED Certification. With specific reuse and salvage requirements in place, the CDDD program can assist a project earn more points since points are awarded for using local and salvaged materials. The CDDD program can be a resource for new construction projects seeking LEED certification. As diversion requirements continue to increase, assisting permittees with LEED Certification will be a valuable contribution to the City's Green Vision.

Next Steps for Construction & Demolition

1. Evaluate CDDD program enhancements and present recommendations to City Council — Fall 2009.
    - Identify opportunities to increase

Figure 3
Divertability of Self-Haul Waste Stream



Recycled Construction Material Ready for New Projects

diversion based on the results of the materials characterization study at C&D certified facilities. Identify and survey C&D programs in other jurisdictions to evaluate program features that may be incorporated into the City's CDDD program.

- Review current policies, requirements, procedures, reporting, and accounting controls of the CDDD program and incorporate improvements that support the Plan and Green Vision goals.
- Establish new program recommendations by Summer 2009 based on information gathered from C&D markets, C&D facilities operations and infrastructure, and review of other successful C&D programs.

2. Implement new program requirements in 2010 with recertification of all existing and new C&D facilities and new program literature.

Self-Haul & Non-Franchised Contractors

One third of the City's total disposed waste is from waste self-hauled by the generator and/or non-franchised contractors. The sources of this waste might include non-franchised contractors, illegal contractors, clean-up or junk removal companies, businesses or residents self-hauling their own waste, landscapers, gardeners, and construction and demolition contractors.

Except for prohibiting self-haul of putrescible wastes (garbage), the City does not currently regulate this portion of the waste stream and diversion rates from self-haul and non-

Roll Off Box Debris Collection

franchised waste generators cannot be tracked. As the City becomes more and more successful in achieving significant diversion rates from its franchised haulers, it will become more important to focus on the self-haul and non-franchised waste.

The City recently completed a characterization of self-haul waste delivered to solid waste facilities in the City. Self-haul loads were divided into two categories:

Residential – waste generated from single or multi-family residences, even when the waste is hauled by another person or company.

Non-residential – waste generated from businesses, schools, government offices, and other institutions that are not residences, even when the waste is hauled by another person or company.

During the sampling period (conducted on weekend days), 106 self-haul samples were characterized, including 83 residential samples and 23 non-residential samples.

As shown in Figure 3, approximately 78 percent of waste disposed by self-haul generators can be recycled or reused.

Opportunities to Address Self-Haul and Non-Franchised Waste

Improving diversion from self-hauled waste is an area the City needs to address.

Incentives for Self-Haulers at City Landfills

Self haulers use several landfills in San José . The City could work with local landfills to encourage diversion for self-haulers, such as establishing recovery parks at the landfills and providing tipping fee incentives.

Resource Recovery Parks

A resource recovery park enables the public to:

- Reduce their cost because there is less waste for disposal.
- Recover some value from the sale of materials in a "one-stop service center" for reuse, recycling, and composting.
- Buy other items of value from reuse, recycling, compost, and recycled-content retail stores.

Resource recovery parks can be designed at a smaller scale to have less impact than large-scale solid waste facilities.

Each of the landfills in the City currently provides free drop-off areas for recyclables and some of the landfills allow self-haulers to separate construction and demolition debris and yard trimmings materials. However, a significant amount of self-haul materials still end up buried in the landfills.

The City could work with the landfill operators to enhance public disposal areas, to provide more opportunities to divert recoverable materials.

Tipping Fee Incentives

To encourage self-haul generators to separate materials for recycling and composting, the landfills could provide a tiered tipping fee. All

self-haul loads could be directed to the area designated for separating materials into market categories (glass, metals, plastic, yard trimmings, asphalt, concrete, inerts, mixed construction debris, etc.). Those self-haulers wishing to bypass the materials separation area could do so by paying an extra fee.

Consider Landfill Material Bans

As discussed in the policies section, the City could work with landfill operators to ban certain materials, such as cardboard and yard trimmings from the landfill. A landfill ban would encourage landfills to give generators a chance to source-separate and self-haulers the opportunity to segregate materials for recycling and composting.

Expand CDDD Thresholds

The City's requirements under the CDDD program have been effective for projects that require a building permit and meet the CDDD project thresholds. It is possible that much of the construction and demolition debris generated by self-haul comes from building projects that fall below the CDDD threshold or do not require a building permit. To encourage these self-haul generators to divert C&D debris from disposal, the City could amend its CDDD thresholds to require that all projects requiring a building permit comply with the CDDD program requirements.

For generators of small levels of C&D debris, the City may wish to require that all loads be

Workers Sort Recyclables at Green Waste Recovery MRF

delivered to a CDDD facility rather than requiring these generators to pay a deposit.

Non-Franchised Generators

The City is not unique in having a significant portion of its waste uncharacterized and unregulated. However, because the City is host to a number of local landfills used by non-franchised generators, it is in a better position to require the landfills to provide information about these generators, so that the City can develop programs for addressing this waste stream. The City's CDDD certified facilities could also track and report to the City diversion and disposal from non-franchised generators.

Next Steps for Self-Haul & Non-Franchise Waste

Work with landfills to address self-haul and non-franchised contractors. Identify landfill partners willing to develop resource recovery parks and tipping fee incentives. 2010

Evaluate City development of resource recovery parks for self-haul waste on publicly-owned lands or in other areas of the City. 2013 (Las Plumas)

Require landfills and CDDD facilities to provide information about non-franchised waste contractors. 2010

Evaluate landfill ban initiatives in neighboring jurisdictions (Alameda and Santa Cruz counties) and consider imposing regional landfill bans in cooperation with other regional landfill hosts.

This section describes facilities that will be needed to achieve the City's goals of 75 percent diversion by 2013 and zero waste by 2022.

Context for Facilities

The City's solid waste infrastructure has historically been provided by the private sector. The City encouraged private sector development with the following:

Self Haul Load Delivered to C&D Recycling Facility

- Entering into processing and disposal contracts;
- Supporting new technology (such as food scrap composting and C&D recycling) with grants; and
- Designing programs and regulations to encourage private sector investment in new processing infrastructure.

The infrastructure for managing recoverable materials in San José is extensive compared to many communities in the state.
In planning future programs, the City should consider the following:

- Existing private sector infrastructure and plans for expansions.
- Service voids which may require City development support, such as organics processing, conversion technologies, and household hazardous waste facilities.
- Future regulation of facilities, such as composting facilities.
- Opportunities to invest in new technologies, such as anaerobic digestion, gasification and other conversion technologies.
- Opportunities for hosting regional facilities to meet the needs of Santa Clara County and the Bay Area.
- Opportunities for using anaerobic digestion capacity at the San José /Santa Clara Water Pollution Control Plant.
- Opportunities for regional collaboration with other Bay Area waste water treatment plants.
- Opportunities for energy conversion and steam generation technologies. New facilities could provide energy for key City operations and facilities.
- Availability of appropriately zoned land

Existing & Planned Infrastructure

The City evaluated its current waste management system, including landfills, transfer stations, and waste processing facilities. This Infrastructure Assessment Report is attached as Appendix B. The report identified 27 facilities serving the City including: five landfills, nine recycling and transfer stations, four composting facilities, and eight mixed materials construction and demolition debris processing facilities.

Findings of the Infrastructure Assessment Report:

Landfills—The three major landfills in the City, Guadalupe Mines, Kirby Canyon, and Newby Island are projected to exhaust their permitted disposal capacity or reach their daily tonnage limits between 2020 and 2025. Guadalupe and Newby are expected to close in that period, while Kirby will reach its permit limits and operate at that level until it is full or its lease expires. The Zanker Road

and Zanker Road Resource Management, Ltd. landfills will continue to operate beyond 2025,

Food Waste Composting at Zanker's Z-Best Facility

and will continue to accept small amounts of construction and demolition wastes, yard trimmings, industrial waste and tires. The City will need to identify disposal options for non-recyclable residual waste in the future. Remaining landfill capacity may be reduced by changed business plans, such as Zanker's current initiative to close its disposal operation earlier to allow for facility construction, or by sale of long-term capacity to other jurisdictions.

In addition, under current zoning and permits, some processing operations at landfills may be required to close when disposal operations cease.

Recycling and transfer stations — There are nine facilities currently located in San José, one facility is permitted, but not in current operation, and two new facilities are planned for development by the private sector. No capacity shortfall is anticipated for MRFs that accept recyclable materials.

Composting facilities — There are four composting facilities used by the City or located within Santa Clara County. One compost facility plans to expand and one anaerobic digestion facility is in the planning stage. No capacity shortfall is anticipated. However, concerns about emissions from compost facilities (including volatile organic compounds) could inhibit future expansions or development of new facilities. In addition, other areas do not have infrastructure in their locality and need access to compost facilities. Three large Bay Area counties are actively seeking additional capacity and are looking to South Bay facilities to meet their needs. San José will compete with these jurisdictions for all of the additional capacity near and in San José.

Table 2 Planned Future Capacity Table 3

Facility Type	Planned Capacity
Recycling and transfer	745,800 tons
Composting	561,600 tons
Construction and demolition	468,000 tons

Source: Facility Assessment Report, November

Annual Facility Capacity and Projected Capacity Need (in tons)

Facility Type	Facility Capacity (2007)		Capacity Need	
	Permitted	Unused	2007/08	2040
Landfills or other disposal	4,274,400	2,423,840	153,356	227,588
Recycling and transfer	1,475,448	580,115	198,274	294,247
Composting	1,054,560	422,068	196,793	292,051
Construction and demolition	4,859,400	3,417,514	176,807	262,390

Source: Facility Assessment Report, November 2008

Construction and demolition — There are eight mixed materials construction and demolition facilities used by the City and one new facility planned for development. No capacity shortfall is anticipated.

Table 3 summarizes the permitted capacity of facilities used by the City and the unused capacity at these facilities in 2007. This table also projects capacity needed by the City if it were to continue with current program and processing options. As zero waste programs are implemented, diversion capacity will increase and landfill needs will move towards zero.

Table 2 summarizes the planned capacity of facilities that are slated for development by the private sector.

Food Waste Bagger at Z-Best Composting Facility

Future Infrastructure

San José leads several efforts to develop new facilities and technologies. Given that much of the City's zero waste infrastructure for recycling, composting, construction and demolition, and transfer will be provided by the private sector, the City is pursuing innovative opportunities to meet service needs for facilities and new technology that will address:

- Household hazardous waste and building materials reuse and recycling.
- Technology that is compatible with existing infrastructure at the San José /Santa Clara Water Pollution Control Plant, such as anaerobic digestion of fats, oils, grease and food scraps.
- Conversion technology to create energy from residual wastes.

Environmental Innovation Center

The City will be relocating the San José Household Hazardous Waste (HHW) drop-off facility to the warehouse site located at 1608 Las Plumas Avenue. Part of this facility will be operated by the County of Santa Clara's Department of Environmental Health and will provide San José with its sole permanent HHW drop-off site, and serve nearby County residents.

Historically, San José residents have recycled or disposed of nearly 1 million pounds of hazardous material annually through the HHW program. This program prevents the

Artist's Rendering of Remodeled Las Plumas Site

materials from entering the solid waste stream or the storm and sanitary sewer system.

The award to construct the facility is anticipated for early 2009, with groundbreaking in the Spring and a facility grand opening in Summer 2009. This facility will be constructed as a part of a larger environmental campus, the Environmental Innovation Center, which will provide additional environmental education and building materials re-use and recycling operations open to residents and businesses.

Facility design is scheduled for 2009, with a 2010 opening date. The facility will be designed to meet green building standards and is anticipated to achieve a Leadership in Energy and Environmental Design (LEED) Platinum rating through the US Green Building Council. The joint collaboration between San Jose State University students and the City to develop a conceptual plan for this facility won the California Chapter of the

American Planning Association's Outstanding Planning Achievement Award for 2008.

Water Pollution Control Plant Master Plan

The City is coordinating the development of the Zero Waste Strategic Plan with the San José /Santa Clara Water Pollution Control Plant (Plant) Master Plan. Lands around the plant could be suitable for future development of zero waste infrastructure and opportunities exist for synergy with the programs of the Plant, including biosolids management, food scrap diversion, and processing of fats, oils, and grease.

The City has identified the following linkages between the plans.

Plant Master Plan & Zero Waste Strategic Plan Alignment

- Rehabilitation of Plant digesters to accommodate fats, oils and grease, and food scraps.
- Possible use of Plant lands to co-locate zero waste infrastructure, including energy conversion technology, yard trimmings processing, and preprocessing activities, that compliment Plant operations
- Biosolids management, reduction, and disposal.
- Collaboration with Plant's neighboring landfills.
- Reduction of Plant waste streams (grit, screenings).

Fats, Oils & Grease (and Food Scraps)

San Jose/Santa Clara Water Pollution Control Plant

Fats, oils, and grease (FOG) are generated by residential, commercial, institutional and industrial generators, including:

- Restaurants
- Grocery stores
- Hospitals
- Food processors
- Residents

The City inspects businesses to ensure compliance with FOG disposal requirements. FOG materials accumulate in the sewer system causing blockages and filling interceptor structures. In 2007, approximately

640 tons of grease were removed from the primary treatment area at the San José/Santa Clara Water Pollution Control Plant.

Currently, most FOG materials are disposed at a local landfill. However, FOG has value in the digester because it is easily digestible. The Plant is considering installing a FOG receiving station that would collect FOG and pump it into the plant sewage sludge digesters where much of the FOG would be converted into methane to create energy, and offset the amount of natural gas the Plant buys.

The City is currently evaluating its FOG control program operations and will make recommendations for improvements to the program in March 2009. Tasks include estimating FOG waste volume and evaluating:

- FOG waste disposal practices
- Alternative FOG waste disposal options, including a "Waste-FOG-to-Energy" program
- FOG outreach efforts
- FOG-related grants and loans

Similarly, food scraps perform somewhat similar to FOG. As a part of the renovation of the Plant facilities, the City is exploring the use of existing digesters to process food scraps. As part of the Plant Master Plan process, the City will evaluate the feasibility of processing food scraps at the Plant.

Energy Conversion Technology

In December 2007, in response to the Green Vision, the City released a Request for Information to evaluate the cost effectiveness and feasibility of locating an alternative technology energy recovery facility on Plant lands which would use selected City waste materials.

Hamburg, Germany Waste to Energy Conversion Facility

Some of the conversion technologies that create energy from waste include:

- **Synthetic gas generation**: using plasma arc gasification, gasification and pyrolysis
- **Waste-to-energy**: using fluidized bed and grate technology for incineration
- **Biomass to energy**: using fluidized bed technology for incineration and steam generation
- **Anaerobic digestion**: producing a biogas which can be combusted to create energy

Other conversion technologies that produce products other than energy include:

- **Hydrolysis**: using a chemical reaction to produce sugars that can be converted to ethanol or other products
- **Mechanical processing:** using mechanical processes to produce organics and non-organic feedstocks
- **Chemical processing:** using chemicals and catalysts to convert waste to by-products

Descriptions of these technologies as well as a summary of evaluation considerations are included in the Conversion Technologies and Facilities Report (Appendix F).

Tesla Motors

Tesla Motors, a zero-emission, all-electric car company, plans to locate its headquarters, manufacturing, and research and development campus in San José. The proposed facility would be located on buffer lands adjacent to the Plant.

As a large-scale manufacturing facility, Tesla may wish to collaborate with the City on green energy solutions to power its operations. A facility of this scale could be an appropriate customer for energy and steam created through potential conversion technology projects.

Next Steps for Energy Conversion Technology

1. Continue to pursue use of rehabilitated digesters at the Plant for FOG and food scraps. The relative ease of implementing a FOG program will allow the City to test the feasibility of using the plant capacity for non-traditional streams such as food scraps.
2. Assess the development of high solids digesters or stand-alone low solids digesters for more diverse waste streams.

Biomass Facility (employing Fluidized bed technology), Central Valley, CA

3. Monitor the development of emerging gasification technology for applicability to municipal solid waste.
4. Perform an analysis of possible feedstocks available for all types of conversion technologies.

5. Evaluate any potential social and political issues of siting a traditional waste-to-energy facility in San José.
6. Evaluate the air emissions control requirements of the Bay Area Air Quality Management District for technologies under consideration.
7. Assess the possibility of entering into the carbon credit market with waste conversion projects.

Envision San José 2040

As part of the Envision San José 2040 General Plan update process, Zero Waste staff will be partnering with the City's Planning Department to update General Plan goals and policies related to waste

Management. Envision San José 2040 is a multi-year process and goal and policy revisions and additions will be developed in the coming year.

The following table shows existing goals and

South bay Wetlands

policies and potential changes (underlined text) which could impact zero waste goals and infrastructure in San Jose.

	Proposed Policy Changes
Policy 1	Monitor the continued availability of long-term disposal capacity to ensure adequate solid waste disposal capacity ***until the City's Zero Waste goals are achieved.***
Policy 2	No new candidate landfill sites should be designated until the need for additional landfill capacity has been established. Source reduction ***through*** recycling, composting**,** ***market-based and energy conversion*** alternatives should be taken into account when evaluating the need for a landfill.
Policy 4	The preferred method for increasing the City's landfill capacity is to ***maximize*** the capacity of existing landfill sites ***until they are no longer needed. Efforts to extend the life of landfills will require further development of*** recycling, resource recovery and composting ***infrastructure*** to ensure adequate long term capacity.

Zero Waste Initiative	2008-2013 to 75 percent Diversion	2013-2022 to Zero Waste
1. Commercial Redesign	√	
2. Food Scraps Composting and Recycling (including anaerobic digestion)	√	√
3. CDDD Redesign and Enhancements	√	
4. Residential System Enhancements	√	√
5. Landfill Regulations	√	√
6. Generator Mandates		√
7. Extended Producer Responsibility Programs	√	√
8. Mixed Waste Recycling	√ (Commercial)	√ (Single-Family Residential)
9. Future Development of Energy Conversion Technologies		√

Table 4, Zero Waste Initiatives

As described in the policies, programs and facilities sections, the City is rolling out several key initiatives for achieving zero waste. A number of these initiatives will be undertaken within the next five years to reach the City's interim goal of 75 percent diversion by 2013. Some of these initiatives will be implemented in the long-term over the next 5 to 15 years to reach the City's long-term goal of zero waste by 2022. Additionally, a few of these initiatives will begin to be implemented in the short-term, but will come to full fruition in the long-term. Table 4 lists the zero waste initiatives and the short-term and long-term schedule for implementation.

Zero Waste Initiatives

1. **Commercial Redesign –** The City has embarked on a new program designed to provide recycling and composting collection services to all businesses and institutions in the City. If the commercial sector is able to realize its full potential, the City's overall diversion rate could increase to 75 percent. In the short-term, the City will finalize the commercial system design, procure new collection and processing contracts, and roll-out the new system to all commercial businesses citywide.

2. **Food Scraps Composting and Recycling –** The City has a unique opportunity to use digestion capacity at the Water Pollution Control Plant for food scrap diversion. In the short-term the City will evaluate the feasibility of developing commercial collection routes dedicated to food scraps, preprocessing these materials to prepare them for digestion, and managing the digestate through beneficial reuse and composting. In the long-term, the City will consider future options for processing residential food scraps for digestion.

3. **CDDD Redesign and Enhancements –** The City will implement enhancements for improving the CDDD program and increasing diversion of construction and demolition debris from the franchised haulers and from the non-franchised and self-haul sectors.

4. **Residential System Enhancements –** The City's single-family agreements will expire within the next five to seven years. In the short-term, the City will evaluate new collection and processing options, including co-collecting yard trimmings and food scraps; and separately collecting food scraps for digestion. In the long-term, the City will finalize the new collection and processing system and procure new collection and processing contracts.

5. **Landfill Regulations –** Zero waste policies, including landfill bans and EPR programs, may be needed to reach beyond maximizing recycling to reducing the overall volume of waste. In the short-term, the City will work with its regional

Alternative Fuel Generated From Waste

partners on local and statewide solutions.

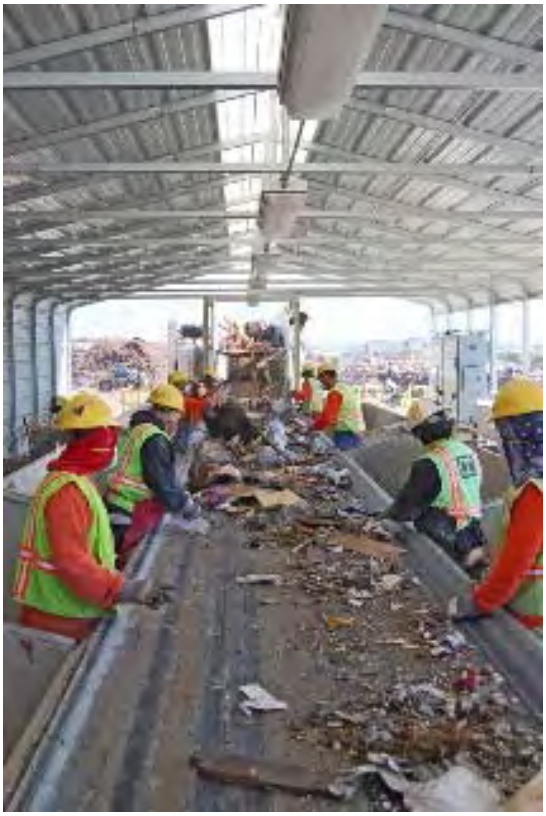
6. **Generator Mandates –** City will evaluate this if programs alone are not achieving required results.

7. **Extended Producer Responsibility –** The City will advocate for EPR legislation at the state level and engage local businesses in voluntary take-back programs. The City will work with Stopwaste.org and others to determine whether bans of materials, such as cardboard and yard trimmings, will be effective in increasing diversion of these materials.

   Ultimately, EPR requirements for the prohibition or mandating take-back of many toxic and hard-to-recycle materials may be necessary to end landfill disposal and achieve zero waste.

8. **Mixed Waste Recycling –** In the future, the City may require processing of all mixed waste loads prior to disposal to ensure that all recyclable and compostable materials are diverted. The City will evaluate the success of its multi-family and City facility mixed waste processing program and determine whether it is appropriate for further expansion to the single-family residential and commercial sectors. The City will also monitor the development of new processing capacity for mixed waste processing planned by the private sector.

9. **Future Development of Energy Conversion Technologies –** Conversion technologies for processing mixed waste to create energy, including synthetic gas generation, are emerging and still in their pilot stage of development. Waste-to-energy and biomass are mature technologies, but difficult to implement in populated areas. As a feature of the Water Pollution Control Plant Master Plan, the City is actively considering anaerobic digestion for FOG and food scraps. In the long-term, the City will evaluate the options for converting residual waste-to-energy and ultimately achieving the goal of zero waste.



Sorting C&D at Zanker Facility

Appendix A

Needs Assessment for the Integrated Waste Management Zero Waste Strategic Plan Development

Presented to:

City of San José
Environmental Services Department

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

November 3, 2008

R3 Consulting Group, Inc.
Resources, Respect, Responsibility

Table of Contents

Table of Contents

Section 1: Executive Summary 1-1

Background..... 1-1

Goals 1-2

Objectives of This Study 1-3

Project Approach 1-4

Report Organization..... 1-8

Limitations..... 1-8

Section 2: Overall City-wide Waste Stream Review 2-1

Demographics..... 2-1

Waste Generation, Characterization and Projections through 2040 2-6

Waste Characterization Summary 2-7

Section 3: Single-Family Dwellings (SFD) 3-1

Introduction and Summary of Current Programs 3-1

Summary of Total Tons Disposed and Diverted 3-3

Waste Characterization Summary 3-4

Summary of Major Waste Types..... 3-6

Summary of Minor Waste Types to Target for New or Expanded Programs..... 3-7

Recommendation..... 3-10

Section 4: Multi-Family Dwellings (MFD) 4-1

Introduction and Summary of Current Programs 4-1

Summary of Total Tons Disposed and Diverted 4-3

Waste Characterization Summary 4-3

Summary of Major Waste Types..... 4-4

Summary of Minor Waste Types to Target for New or Expanded Programs..... 4-4

Recommendation..... 4-7

R3

Table of Contents

Section 5: Commercial – Franchised Collection 5-1

Introduction and Summary of Current Programs 5-1

Summary of Total Tons Disposed and Diverted 5-3

Summary of Major Waste Types 5-5

Summary of Minor Waste Types to Target for New or Expanded Programs 5-5

Recommendation 5-7

Section 6: City Facilities 6-1

Introduction and Summary of Current Programs 6-1

Summary of Total Tons Disposed and Diverted 6-2

Waste Characterization Summary 6-2

Summary of Major Waste Types 6-4

Summary of Minor Waste Types to Target for New or Expanded Programs 6-4

Recommendation 6-6

Section 7: Construction and Demolition – Franchised Collection 7-1

Introduction and Summary of Current Programs 7-1

Summary of Total Tons Disposed and Diverted 7-4

Waste Characterization Summary 7-4

Summary of Major Waste Types 7-6

Summary of Minor Waste Types to Target for New or Expanded Programs 7-6

Recommendation 7-8

Section 8: Non-Franchised Hauler 8-1

Introduction and Summary of Current Programs 8-1

Summary of Total Tons Disposed and Diverted 8-1

Waste Characterization Summary 8-2

Summary of Major Waste Types 8-4

Summary of Minor Waste Types to Target for New or Expanded Programs 8-5

Recommendation 8-6

Table of Contents

Section 9: Alternative Daily Cover 9-1
Introduction and Summary of Data Collection..... 9-1
Summary of Total Tons Disposed and Diverted 9-4
Summary of Major Waste Types..... 9-4
Recommendation..... 9-5

TABLES

TABLE 1A – Data Sources 1-5

TABLE 2A – Summary Projections of Landfilled and Diverted Tons 2-3

TABLE 2A.1 – Waste Composition Data..... 2-7

TABLE 2B – Remaining Diversion Potential 2-8

TABLE 3A – Residential Service Providers 3-1

TABLE 3B – Single-Family Waste Composition Analysis 3-5

TABLE 3C – Single-Family Waste Composition Major Category Ranking 3-7

TABLE 3D – Single-Family Waste Composition Minor Category Ranking 3-8

TABLE 4A – Multi -Family Waste Composition Analysis 4-3

TABLE 4B – Multi -Family Waste Composition Major Category Ranking 4-4

TABLE 4C – Multi -Family Waste Composition Minor Category Ranking 4-6

TABLE 5A – Commercial – Franchised Collection Waste Composition Analysis..... 5-4

TABLE 5B – Commercial – Franchised Collection Waste Composition Major Category Ranking..... 5-5

TABLE 5C – Commercial – Franchised Collection Waste Composition Minor Category Ranking..... 5-6

Table of Contents

TABLE 6A – City Facility Waste Composition Analysis..... 6-3

TABLE 6B – City Facility Waste Composition Major Category Ranking 6-4

TABLE 6C – City Facility Waste Composition Minor Category Ranking 6-5

TABLE 7A – Construction and Demolition – Franchised Collection Waste Composition Analysis..... 7-5

TABLE 7B – Construction and Demolition – Franchised Collection Waste Composition Major Category Ranking 7-6

TABLE 7C – Construction and Demolition – Franchised Collection Waste Composition Minor Category Ranking 7-7

TABLE 8A – Non-Franchised Waste Composition Analysis..... 8-3

TABLE 8B – Non-Franchised Waste Composition Major Category Ranking 8-4

TABLE 8C – Non-Franchised Waste Composition Minor Category Ranking 8-5

TABLE 9A – City of San José ADC Totals, 2002 – 2007..... 9-3

TABLE 9B – ADC from Material Originating in San José..... 9-5

FIGURES

FIGURE 2A.1 – Total Generated 2-4

FIGURE 2A.2 – Total Landfilled..... 2-5

FIGURE 2A.3 – Total Diverted..... 2-6

FIGURE 3C – Single-Family Waste Composition Major Category Ranking 3-7

FIGURE 3D – Single-Family Waste Composition Minor Category Ranking 3-9

Table of Contents

FIGURE 4C – Multi-Family Waste Composition Minor Category Ranking 4-6

FIGURE 5C – Commercial – Franchised Collection Top 5 Materials Landfilled 5-6

FIGURE 6C – City Facility Waste Composition Major Category Ranking 6-5

FIGURE 7C – Construction and Demolition – Franchised Collection Top 5 Materials Landfilled 7-8

FIGURE 8B – Non-Franchised Waste Composition Major Category Ranking 8-4

FIGURE 8C – Non-Franchised Top 5 Materials Landfilled 8-6

FIGURE 9A – City of San José ADC Totals, 2002 - 2007..... 9-4

Section 1

Executive Summary

Background

In 2007, the City Council of San José ("City") requested staff to develop an Integrated Waste Management ("IWM") Zero Waste Strategic Plan that will establish policy as it relates to the City's waste management program through the year 2040. The City's objectives are to provide resource conservation, waste reduction, pollution prevention, and a sustainable economy. The IWM Zero Waste Strategic Plan addresses the following key components for achieving Zero Waste:

- Strengthening recycling programs;
- Identifying infrastructure requirements for reuse, recycling and composting;
- Establishing effective waste prevention programs, incentives and fee structures; and,
- Identifying economic development opportunities from expanding solid waste processing facilities and industries using recycled materials as feedstock.

The City has passed a resolution establishing a goal of 75 percent waste diversion by 2013, and a goal of Zero Waste by 2022. Staff has reviewed Zero Waste plans from other cities and found that many of the initiatives under development by Zero Waste cities are already being implemented or planned for the City.

R3 Consulting Group Inc., ("R3") along with our subcontractor Environmental Planning Consultants ("EPC,") were retained by the City of San José to prepare this Needs Assessment to project generation, disposal and diversion tonnages through the year 2040, including flow estimates and characterization by generator sector.

In order to meet proposed waste reduction goals, the IWM Zero Waste Strategic Plan will consider key strategies such as food waste composting, reducing packaging, extended producer responsibility, the commercial solid waste system design, improved services for multi-family dwellings, and many others. Staff will also evaluate opportunities for generating energy from selected waste materials as a component of the City's IWM Zero Waste Strategic Plan.

Relationship to Other Studies Being Conducted for the City's IWM Zero Waste Strategic Plan

This Needs Assessment is only one portion of a suite of studies that are being conducted to gather information for the City's IWM Zero Waste Strategic Plan. The various studies include:

- A review of the Construction and Demolition Debris Deposit Program ("CDDD");
- Commercial Solid Waste System Redesign and Enhancement Options Study;
- Waste Characterization Study for Single-Family waste, MRF residuals and Commercial Waste;
- An Assessment of Infrastructure, Planning and Land Use Issues; and
- An Analysis for the IWM Zero Waste Strategic Plan of Alternative Financing and Revenue-Generating Mechanisms.

Goals

The Needs Assessment gathered and consolidated waste characterization and tonnage data from a variety of City and non-City sources in order to meet the following goals:

- Determine the volume of material generated, disposed, and recycled from the residents and businesses of the City, with waste projections through 2040;
- Identify significant material not currently being diverted, by generator sector, and material type, with waste projections through 2040;
- Provide waste characterization data by generator sector;
- Provide recommendations regarding portions of the waste stream that could be targeted with new or improved programs; and
- Provide recommendations on increasing waste diversion through the CDDD program.

Objectives of This Study

The objectives of this Needs Assessment are to:

(1) Provide the project team with background to develop the IWM Zero Waste Strategic Plan;

(2) Document significant waste materials generated in the City which are not currently being diverted; and

(3) Develop recommendations on portions of the waste stream to target for new or expanded diversion programs.

This Needs Assessment utilized the following information which was available for both calendar and fiscal periods between 2002 and 2007:

- City demographics;
- Demographic projections;
- Waste stream generation and trends;
- Disposal tonnage;
- Diversion tonnage;
- Material flows; and
- Waste characterization data.

The above information was analyzed by the following sectors of generators, and to the extent feasible, the waste characterization (by sector) of materials types that are currently disposed and could potentially be diverted from the landfills. The following sectors of waste and recyclables generation have been reviewed:

- Single-Family Dwellings ("SFD");
- Multi-family Dwellings ("MFD");
- Commercial Sector (from franchisees only);
- City Facilities;
- Construction and Demolition debris ("C&D") (from franchisees only);
- Non-franchised Hauler waste ("Self-haul") material; and,
- Alternative Daily Cover ("ADC").

City of San José Diversion Rate, as Calculated by the California Integrated Waste Management Board ("CIWMB")

The City's 2006 Reporting Year unofficial diversion rate, as calculated by the CIWMB, is 60 percent, and was 59 percent in

2005 and 62 percent in 2004. Those diversion rates have been calculated using a projection methodology called the "Adjustment Methodology." In the case of the City, the waste generation diversion rate estimates were calculated using data collected in the City's 1999 New Base Year study, and projections were made to calculate a waste generation figure for the year 2006. The Adjustment Methodology differs greatly from the methodology used to summarize disposal and diversion in this report. This report's emphasis was on gathering measured tonnage data for major programs operated by the City in 2006/07, as well as other readily-available tonnage data from landfills.

This study was NOT conducted using the same procedures as a New Base Year Study, and it does not contain a high level of detail on non-City-operated diversion programs and source reduction activities conducted by residents, businesses, and others in the City. Some of the diversion tonnages that are not included in this study are: diversion from the CDDD program, diversion by private recyclers that are not required to be franchised, backyard composting, reuse, etc. These additional diversion activities are expected to continue in the future.

We used the CIWMB's 2006 disposal total in this report, as well as the CIWMB's 2006 calendar year total for generation for the City of San José, as the 2007 data has not yet been published on the CIWMB's web site. The City provided disposal and diversion totals for the 2006/07 fiscal year, and we used those data to summarize the tonnage from each program. There were tonnage differences between 2006 and 2006/07, and based on disposal totals, we estimate those differences to be under 3 percent.

Project Approach

Description of Data Received

We utilized several sources in gathering data for this report. The table below summarizes the data sources.

TABLE 1A

Data Sources

Waste Stream	Data Source for Tonnage	Data Source for Waste Composition
Single-Family	City data for Fiscal Year 2006/07, including disposal, recycling, and yard trimmings collection	Cascadia Consulting Group's City of San José Waste Characterization Study, May 2008
Multi-Family	City data for Fiscal Year 2006/07, including disposal and composting collection	CIWMB 2004 Statewide Waste Characterization Study for Multi-Family Waste
Commercial (1)	City data for Fiscal Year 2006/07 and HF&H Consultants' Commercial Redesign White Paper of November, 2007, including disposal, recycling and yard trimmings collection	Cascadia Consulting Group's City of San José Waste Characterization Study, May 2008
City Facilities	City data for Fiscal Year 2006/07, for both disposal and recycling	CIWMB 2006 Statewide Waste Characterization Study for Commercial Waste
Construction and Demolition Debris	City data for Fiscal Year 2006/07 and HF&H Consultants' Commercial Redesign White Paper, for both disposal and recycling	CIWMB 2006 Statewide Waste Characterization Study for Construction and Demolition Debris Waste

Waste Stream	Data Source for Tonnage	Data Source for Waste Composition
Non-Franchised Hauler Waste	Calculated, based on subtracting all other known waste quantities from the total waste quantity delivered to landfills in 2006, for disposal quantity only (no data available for non-franchised diversion)	CIWMB 2004 Statewide Waste Characterization Study for Self-haul Waste
Alternative Daily Cover and other "Beneficial Use" at disposal facilities	CIWMB web site totals for ADC, as well as more detailed data on AIC, cover material, and inerts from Santa Clara County	All ADC was reported by waste type, so there was no need to use additional studies to estimate waste composition
Overall, City-wide Waste Stream	Tonnage data was a calculated sum of all of the waste streams. CIWMB official disposal data for calendar year (CY) 2006 was used for total disposal, and CIWMB official generation total for CY 2006 was used for generation.	Composition data for the overall waste stream was calculated as a weighted average of all of the individual sector waste streams combined.

(1) Commercial waste composition was based on the weighted average of the Front-Loader, Compactor and Debris Box waste composition data.

Calculations and Projection Methodology

In order to prepare this report, it was necessary to complete several types of calculations.

- Most figures presented in this report were based on actual tonnage values that were either reported to various entities, including the City, Santa Clara County, or the CIWMB, or included in various reports which are cited.
- The overall waste stream was calculated by adding up the individual sector waste streams. Non-franchised hauler

waste disposal is not reported to the City; therefore, we calculated non-franchised hauler disposal by subtracting all of the other waste streams from the total disposal that is summarized on the CIWMB's web site.

- The tons of remaining waste, by waste material type, were calculated by multiplying individual waste material composition percentages by the total tonnage for that waste stream sector.
- Diversion tonnage totals were included in this report exactly as they were reported to us by the City, by material type. No additional calculations were performed.
- Projections were made based on population growth rates. The Association of Bay Area Governments ("ABAG") has made population projections for the City through 2035. We used the annual growth rate for 2030 through 2035 for the years 2036 through 2040. *Note: the CIWMB uses three factors to project waste quantities: population, taxable sales (adjusted for inflation), and employment. ABAG projects population data thirty years into the future, and also makes projections of employment, which are based on population growth rates. ABAG does not project taxable sales figures more than two years into the future.*
- We calculated the percentages of each waste sector's disposal that were (1) recyclable, (2) compostable, (3) potentially recyclable, and (4) non-recyclable, based on assigning the individual waste categories in the waste composition analysis into one of those four groups. The single family residential section of this report lists the material types that are in each group.

Recommendations

Our recommendations are listed in each section of this report, so that the recommendations for a particular sector are grouped with the rest of the data for that sector. Our recommendations focus on portions of the waste stream to target for new or expanded diversion programs, materials that represent a significant portion of the waste stream, possess a strong potential market demand, and/or economic advantages associated with recycling or waste prevention. Our initial recommendations are at a high level as the IWM Zero Waste Strategic Plan stakeholders' meetings have not yet been conducted and new and improved programs have not been evaluated or selected.

Report Organization

Data in this report is organized into the following sections:

Section 1. Executive Summary

Section 2. Overall City-Wide Waste Stream Review

Section 3. Single-Family Sector

Section 4. Multi-Family Sector

Section 5. Commercial Sector – Franchised Collection

Section 6. City Facilities Sector

Section 7. Construction and Demolition Sector – Franchised Collection

Section 8. Non-Franchised Hauler Sector

Section 9. Alternative Daily Cover

Within each section, the report addresses and summarizes the following information:

- Introduction and Summary of Current Diversion Programs;
- Waste Generation, Characterization and Projections Through 2040;
- Summary of Total Tons Disposed and Diverted;
- Waste Characterization Study Summary;
- Summary of Major Waste Types;
- Summary of Minor Waste Types to Target for New or Expanded Programs; and
- Recommendations.

Limitations

The availability of data varies greatly by sector, ranging from very complete and consistent data for the single-family sector to almost no tonnage data for non-franchised hauler waste.

Recent Changes to the Multi-Family Program and City Facilities Program

The data used in preparing the Multi-Family Dwellings (MFD) and City Facilities sections of this report were developed just before the City approved expansion of the Multi-Family mixed waste composting program and implementation of a mixed waste composting program for City Facilities. Implementation of the new programs will cause significant changes to the tonnage projections and future waste composition portions of the MFD and City Facilities sections of this report; however, new data are not yet available, as the programs are just beginning.

Waste Composition Data

For some sectors, such as single-family and commercial, the City had recently completed a new waste composition study. For the remainder of the sectors, Statewide waste composition data was used.

The two waste composition studies used different waste type categories. The statewide waste composition study used approximately 20 more waste categories than the study conducted for the City. In this report, we combined data to present composition data for the City overall.

Tonnage Data

Some waste sectors are very closely monitored, such as the single-family, multi-family, and City Facility sectors. The data that is available for these sectors is much more complete than the data for some of the other sectors.

This study does not analyze materials for suitability with energy or conversion technologies, though such an analysis is certainly possible, using the data provided herein.

Diversion Rates for Each Sector

Single Family Diversion. The Large Item collection, Neighborhood Clean-up, and Yard Trimmings programs collect materials from both the single-family and multi-family sectors, and some small civic facilities (such as fire stations). The materials disposed and diverted through these programs are all reported in the single-family sector. Therefore, the tonnages in the single-family sector are overstated by the inclusion of these materials and the tonnages in the multi-family and City sectors are understated by the exclusion of these materials. Due to the manner in which these materials are tracked and reported it was not possible to reclassify materials collected from multi-family and small civic units into those sectors.

Non-Franchised Hauler Diversion. As a result of the manner in which data for Non-Franchised Hauler (self-haul) material is reported to the City, this sector shows a diversion percentage of zero. Section 8 of this report contains recommendations related to changes in reporting requirements for this sector.

Material Type Growth Projections

Growth of material by types is projected using a straight line methodology with no consideration given to changes which might occur to the waste stream over time as certain materials are replaced with other materials.

Rounding

In this report, tonnages are rounded to the nearest ton, and waste composition percentages are rounded to either the nearest whole percent (in the text) or nearest tenth of a percent (in the tables). Due to this rounding, the tonnages and percentages presented in this report, when added together, may not exactly match the subtotals and totals shown.

Section 2

Overall City-wide Waste Stream Review

Demographics

The City has franchised waste collection and diversion programs that serve:

- Approximately 200,000 single-family units;
- Approximately 93,000 Multi-Family Dwellings in 3,200 MFD complexes;
- All City Facilities, including administrative buildings, the airport, parks, convention center, fire and police stations and libraries; and
- Approximately 8,000 – 10,000 commercial businesses.

In addition, non-franchised haulers, contractors, landscapers, clean-up companies and self-hauler vehicles (residential and commercial) collect material from C&D projects, individual residents, businesses and many other types of projects throughout the City.

Summary of Total Tons Disposed and Diverted

The City's total waste generation is 1,869,203 tons, and the City's overall diversion rate is 60 percent, according to the Adjustment Methodology calculation provided on the California Integrated Waste Management Board's website for 2006.

City-wide disposal amounts to 753,749 tons for 2006, according to the official statistic provided by the CIWMB. The City-wide diversion total for 2006 is 1,115,454 as estimated by the CIWMB Adjustment Method. For the purposes of this report, this tonnage total can be split into two parts:

1. City-tracked diversion programs, such as recycling and yard trimmings collection programs, including ADC, amount to 568,713 tons. (These diverted tons are listed by sector in table 2A as "single family dwelling, diverted," "multi-family dwelling, diverted," etc.);
2. Other diversion activities for which no regular tonnage tracking exists, are estimated to be 546,741 tons using the CIWMB Adjustment Methodology. (The Executive Summary discusses these tons under the heading, "City of San José Diversion Rate, as Calculated by the CIWMB.")

Overall City-wide Waste Stream Review

The first step in the analysis of the City's waste stream was to document the total waste generated, landfilled, and diverted for each of the following sectors, using tonnage data provided by the City:

- Single-family;
- Multi-family;
- Commercial (from franchisees only);
- City Facilities;
- Construction & Demolition Debris (from franchisees only);
- Non-franchised haulers (including self-haul); and,
- Alternative Daily Cover ("ADC.")

That information, which is summarized in Table 2A and illustrated in Figure 2A.1 – Figure 2A.3, provides a number of insights. Future waste generation is projected in Table 2A using the ABAG population growth multiplier, 1.21 percent per year, or 48.4 percent by 2040. These projections describe what will happen if the City continues with current program and processing options, i.e., if the City does not implement new zero waste policies and programs. These numbers provide a baseline for future planning and comparison purposes.

Overall City-wide Waste Stream Review

TABLE 2A

Summary Projections of Landfilled and Diverted Tons

Waste Stream	Actual 06/07	% of Total Generated	Projected 2010	2020	2030	2040
Single Family Dwelling						
Landfilled	183,132	9.8%	190,427	218,007	242,973	271,776
Diverted	230,721	12.3%	239,911	274,658	306,112	342,400
Total	413,853	22.1%	430,338	492,665	549,084	614,175
Diversion Rate	**55.7%**		**55.7%**	**55.7%**	**55.7%**	**55.7%**
Multi Family Dwelling						
Landfilled	59,938	3.2%	62,326	71,352	79,523	88,951
Diverted	30,188	1.6%	31,390	35,937	40,052	44,800
Total	90,126	4.8%	93,716	107,289	119,576	133,751
Diversion Rate*	**33.5%**		**33.5%**	**33.5%**	**33.5%**	**33.5%**
Commercial - Franchised Collection						
Landfilled	243,407	13.0%	253,102	289,760	322,943	361,226
Diverted	40,117	2.1%	41,715	47,757	53,226	59,535
Total	283,524	15.2%	294,817	337,516	376,169	420,761
Diversion Rate	**14.1%**		**14.1%**	**14.1%**	**14.1%**	**14.1%**
City Facilities						
Landfilled	6,236	0.3%	6,484	7,423	8,273	9,254
Diverted	1,591	0.1%	1,654	1,894	2,111	2,361
Total	7,827	0.4%	8,138	9,317	10,384	11,615
Diversion Rate	**20.3%**		**20.3%**	**20.3%**	**20.3%**	**20.3%**
C & D - Franchised Collection						
Landfilled	4,278	0.2%	4,448	5,092	5,676	6,348
Diverted	101,010	5.4%	105,033	120,245	134,016	149,903
Total	105,287	5.6%	109,481	125,338	139,691	156,251
Diversion Rate	**95.9%**		**95.9%**	**95.9%**	**95.9%**	**95.9%**
Non-Franchised Haulers						
Landfilled	256,759	13.7%	266,986	305,655	340,658	381,041
Diverted	-	0.0%	-	-	-	-
Total	256,759	13.7%	266,986	305,655	340,658	381,041
Diversion Rate	**0.0%**		**0.0%**	**0.0%**	**0.0%**	**0.0%**
ADC						
Landfilled	-	0.0%	-	-	-	-
Diverted	165,086	8.8%	171,662	196,524	219,030	244,995
Total	165,086	8.8%	171,662	196,524	219,030	244,995
Diversion Rate	**100.0%**		**100.0%**	**100.0%**	**100.0%**	**100.0%**
Totals						
Landfilled (per CIWMB web site for CY 2006)	753,749	40.3%	783,773	897,289	1,000,046	1,118,596
Diverted	568,713	30.4%	591,366	677,015	754,546	843,994
Additional Diversion not tracked by this Study	546,741	29.2%	568,520	650,860	725,396	811,388
CIWMB Total Generation (2006 Value used for 06/07 FY)	1,869,203	100.0%	1,943,659	2,225,164	2,479,988	2,773,978
Diversion Rate	**59.7%**		**59.7%**	**59.7%**	**59.7%**	**59.7%**
Growth Rate vs. 06/07			**3.98%**	**19.04%**	**32.68%**	**48.40%**

* The overall MFD diversion rate is 33.5%, however, the MFD contractor achieved a 35% diversion rate on categories of material that are subject to the minimum diversion rate guarantee.

R3

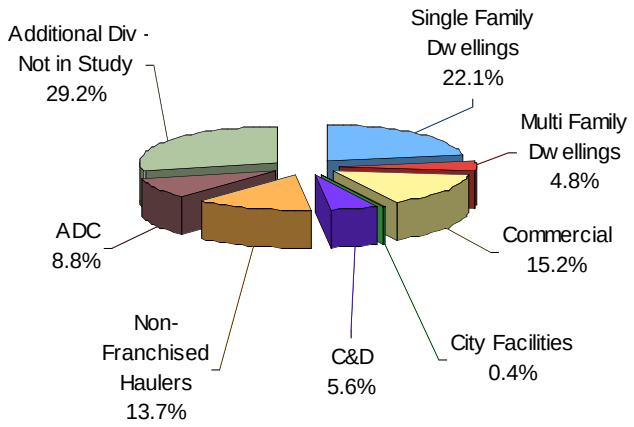
Overall City-wide Waste Stream Review

Generation

As shown in Table 2A, the Single-Family sector accounts for approximately one-fourth (22.1 percent) of the total material generated in the City followed by the Commercial sector (15.2 percent) and the Non-Franchised Hauler sector (which includes self-haul material) (13.7 percent). As defined by the CIWMB, the amount generated in the City in 2006 was 1,869,203 tons, as shown in Table 2A. The Multi-Family sector is 4.8 percent and C&D is 5.6 percent, while the City Facilities waste stream is very small, representing less than 1 percent of the overall total. However, it is important that this waste stream achieve high diversion rates as a way for City government to present a good example to the community. "Additional diversion not in this study" amounts to approximately 29 percent, and may include: diversion from the CDDD program, diversion by private recyclers that are not required to be franchised, backyard composting, reuse, etc.

FIGURE 2A.1

Total Generated

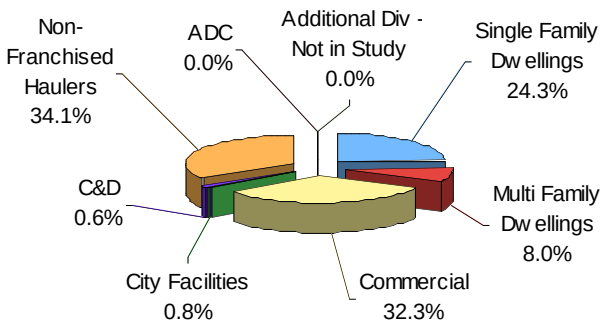


Disposal

Analysis of the landfilled tonnage figures in Table 2A shows that the disposal portion of the Non-franchised Hauler waste stream, at 256,759 tons, comprises approximately one-third (34.1 percent) of the material currently disposed (landfilled) in the City. The second largest portion of disposal was the Commercial sector, with disposal of 243,407 tons, or 32.3 percent of the City's disposal total. The Single-Family Dwelling Residential sector was the third largest disposal portion, with 183,132 tons, or 24.3 percent of total disposal. ADC is shown as 0.0 percent since materials used for ADC are not counted as disposed using the CIWMB methodology.

FIGURE 2A.2

Total Landfilled



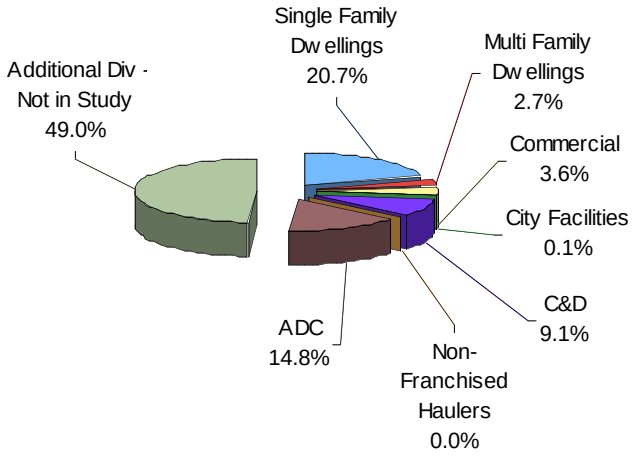
Diversion

- The overall diversion rate for the waste streams listed in Table 2A above is 59.7 percent.
- The diversion rates for the Single-Family, Multi-family, Commercial, and Non-franchised Hauler sectors are 55.7 percent, 33.5 percent, 14.1 percent, and 0.0 percent respectively.
- ADC materials account for approximately 14.8 percent of the material currently diverted.
- The recovery rate for City Facilities (per the City's tonnage tracking system) was 20.3 percent for FY 2006/07. In 2008, a new system was implemented, bringing the City Facilities recovery rate to over 70 percent.
- Figure 2A.3 presents all of the sector components of diversion. The City's total diversion for 2006 is 1,115,454 tons, according to the CIWMB Adjustment Methodology.
- "Additional diversion not in this study" amounts to approximately 49 percent of overall diversion, and may include: diversion from the CDDD program, diversion by private recyclers that are not required to be franchised, backyard composting, reuse, etc.

Overall City-wide Waste Stream Review

FIGURE 2A.3

Total Diverted



Waste Generation, Characterization and Projections through 2040

Table 2A is the Summary Projection of Landfilled and Diverted Tons, and it shows the City's overall waste generation for FY 2006/07. Table 2A shows that the largest waste sector in the City is the Single-family sector, which comprises 22.1 percent of the overall waste stream. The City has implemented several diversion programs in this sector, and the sector's diversion rate is well above 50%.

The next largest sector is the Commercial sector at 15.2 percent of the overall waste stream, followed by the Non-Franchised Hauler sector, at 13.7 percent of the overall waste stream. The Commercial sector represents the greatest opportunity for increased recycling, because its diversion rate is currently only 14.1%. Table 2A only includes the major programs that the City operates and tracks (through its contractors and franchised haulers).

Tonnages for all categories have been projected in 5-year increments through 2040 using population adjustments for the City which have been developed by the ABAG Study, *Projections 2007*. Population assumptions for 2006 thru 2008 were interpolated using actual 2005 population totals and 2010 projections. The 2040 population growth figure was assumed to be equal to the 2035 growth figure. The overall, city-wide waste stream is projected to grow by approximately 1.21 percent per year; or by 48.4 percent by 2040.

Using the FY 06/07 tonnages as the starting point for waste generation, disposal and diversion tonnages were projected for each waste stream through 2040. Details are provided in Sections 3 through 9 of this report.

The projections in Table 2A have not been adjusted to account for the impact of new or expanded diversion programs since FY 2006/07. As those program plans are developed, they can be incorporated into the projections to show the impact on both overall diverted and disposed tonnages and the resulting composition of the remaining disposal waste stream. Overall, with an approximate disposal rate of 700,000 tons per year, the City of San José will have to reduce its waste stream by approximately 50,000 new tons per year, each year, in order to reach Zero Waste by 2022.

Waste Characterization Summary

Having established the relative size of each of the waste streams and the portion of each waste stream that is landfilled and diverted, the composition of the landfilled material was then documented based on available waste composition data. For purposes of that analysis, the following waste composition data sources were used:

TABLE 2A.1

Waste Composition Data

Waste Stream	Sample Origin	Source Document
Single Family Dwellings	San Jose	Cascadia 2008 Waste Composition Study for City of San Jose
Multi-Family Dwellings [1]	Statewide Data	CIWMB 2004 Statewide Waste Characterization Study
Commercial [2]	San Jose	Cascadia 2008 Waste Composition Study for City of San Jose
City Facilities	San Jose	Cascadia 2008 Waste Composition Study for City of San Jose - Commercial Waste Composition
Construction & Demolition	Statewide Data	CIWMB 2006 Statewide Waste Characterization Study
Self Haul	Statewide Data	CIWMB 2004 Statewide Waste Characterization Study
ADC	NA	NA

[1] The data for the multi-family sector describes the multi-family program as it was in FY 2006/07. However, major program changes were implemented in mid-2008 to increase the program diversion rate and new program data are not yet available.

[2] Commercial waste composition based on the weighted average of the Front-Loader, Compactor and Debris Box

Overall City-wide Waste Stream Review

Remaining Diversion Potential

Table 2B focuses on recoverable material types only, in order to illustrate new potential diversion opportunities and provides information for all material type / waste stream combinations for the top 50 percent of the waste stream. As shown, there are a total of 30 recoverable material types by waste stream with more than 27 of them exceeding 2,000 tons. In addition, it should be noted that what is considered recoverable in the current programs will change as the City moves towards its goal of Zero Waste.

TABLE 2B

Remaining Diversion Potential

Waste Stream	Rank by Waste Stream	Recoverable Material Type	Annual Tons	Percent of Total Landfilled	Cumulative Percent	Percent of Total Generated	Cumulative Percent of Total Generation
Single Family	1	Food Waste	70,572	9.4%	9.4%	3.8%	3.8%
Non-Franchised Haulers	1	Lumber	55,301	7.3%	16.7%	3.0%	6.7%
Commercial	1	Food Wastes	38,594	5.1%	21.8%	2.1%	8.8%
Commercial	2	Compostable Paper	24,533	3.3%	25.1%	1.3%	10.1%
Commercial	3	OCC/Kraft	22,078	2.9%	28.0%	1.2%	11.3%
Commercial	4	Leaves/Grass/Brush/Stumps	16,250	2.2%	30.2%	0.9%	12.2%
Non-Franchised Haulers	2	Concrete	15,829	2.1%	32.3%	0.8%	13.0%
Commercial	5	Mixed Recyclable Paper	15,546	2.1%	34.3%	0.8%	13.8%
Non-Franchised Haulers	3	Gypsum Board	13,505	1.8%	36.1%	0.7%	14.6%
Non-Franchised Haulers	4	Rock, Soil, & Fines	12,827	1.7%	37.8%	0.7%	15.2%
Single Family	2	Mixed Papers	11,246	1.5%	39.3%	0.6%	15.9%
Single Family	3	Compostable Paper	10,920	1.4%	40.8%	0.6%	16.4%
Multi-Family	1	Food	10,430	1.4%	42.1%	0.6%	17.0%
Non-Franchised Haulers	5	Other Ferrous Metal	9,373	1.2%	43.4%	0.5%	17.5%
Commercial	6	Textiles/Leather/Rubber	8,642	1.1%	44.5%	0.5%	18.0%
Non-Franchised Haulers	6	Remainder/Composite Metal	7,375	1.0%	45.5%	0.4%	18.4%
Non-Franchised Haulers	7	Leaves and Grass	7,262	1.0%	46.5%	0.4%	18.7%
Commercial	7	High Grade Paper	5,581	0.7%	47.2%	0.3%	19.0%
Commercial	8	Glass Bottles and Jars (all colors)	3,707	0.5%	47.7%	0.2%	19.2%
Multi-Family	2	Remainder/Composite Organics	3,628	0.5%	48.2%	0.2%	19.4%
Multi-Family	3	Remainder/Composite Paper	3,561	0.5%	48.7%	0.2%	19.6%
Multi-Family	4	Prunings and Trimmings	3,185	0.4%	49.1%	0.2%	19.8%
Single Family	4	Newspaper	2,934	0.4%	49.5%	0.2%	19.9%
Single Family	5	Yard Waste	2,934	0.4%	49.9%	0.2%	20.1%
Multi-Family	5	Lumber	2,746	0.4%	50.2%	0.1%	20.3%
Multi-Family	6	Newspaper	2,644	0.4%	50.6%	0.1%	20.4%
Single Family	6	Recyclable Glass	2,608	0.3%	50.9%	0.1%	20.5%
C&D	1	Lg Asphalt without re-Bar	346	0.0%	51.0%	0.0%	20.6%
C&D	2	Dirt & Sand	282	0.0%	51.0%	0.0%	20.6%
C&D	3	Clean Dimensional Lumber	253	0.0%	51.0%	0.0%	20.6%
			384,690	51.0%			20.6%

Table 2B provides a number of key insights including:

- Residential Food Waste (10.8 percent) is the single largest component of the City's waste stream and along with Residential Compostable Paper (1.4 percent) comprise 12.2 percent of total disposal;
- Commercial Food Waste (5.1 percent) is the third largest component of the City's waste stream and along with

Commercial Compostable Paper (3.3 percent) comprises 8.4 percent of total disposal;

- Non-franchised Hauler Lumber (7.3 percent) is the second largest component of the City's total disposal;
- Commercial OCC/Kraft (2.9 percent), Mixed Recyclable Paper (2.1 percent) and High Grade Paper (0.7 percent) comprise 5.7 percent of the City's total disposal; and
- Residential Mixed Paper comprises 1.5 percent of total disposal.
- The column, "Rank by Waste Stream" gives each waste category's rank within its waste sector. For example, in the first row of data, the "1" indicates that "food waste" is the largest component of waste, by weight, in the Single Family waste stream.
- Note that the items in Table 2B are the waste stream categories that, taken together, add up to more than 50% of the City's remaining waste to landfill. The table begins with the largest single item (at 9.4% of the City's total waste stream) and includes the top 30 items in the City's waste stream. Other items, which are not listed in this table, comprise the other 50% of waste that is currently sent to landfills, and the waste categories in the last 50% are each less than 1% of the City's waste stream.

This page intentionally left blank.

Section 3

Single Family Dwellings (SFD)

Introduction and Summary of Current Programs

The City has approximately 200,000 single-family units that receive weekly solid waste, recycling, and yard trimmings collection services.

Available Diversion Programs

Single-family residents in the City have access to the following diversion programs:

- Weekly Curbside Recycling Collection
- Unlimited Weekly Curbside Yard trimmings Collection
- On-call Large Item Collection
- Periodic Neighborhood Clean-up Events
- Back Yard Composting Subsidies
- Buy-Back/Drop-Off Centers for Recyclables
- Household Hazardous Waste Drop-off

Solid Waste Collection Services

Single family solid waste collection services are provided by two companies, Garden City Sanitation (GCS) and GreenTeam. These companies have exclusive contracts to operate in three separate service districts of the City, as shown in Table 3A. Container sizes range from twenty (20) gallon containers up to ninety-six (96) gallons.

TABLE 3A

Residential Service Providers

Material Stream	District		
	A	B	C
Single Family Dwellings			
Solid Waste	Garden City Sanitation	GreenTeam	Garden City Sanitation
Recycling	California Waste Solutions	GreenTeam	California Waste Solutions
Yard Trimmings	GreenWaste Recovery		

R3

Single Family Dwellings (SFD)

Curbside Recycling Services

Single family recycling collection services are provided by two companies, California Waste Solutions (CWS) and GreenTeam of San José. These companies have exclusive contracts to operate in three separate districts of the City. Under the terms of the recycling collection agreements, the companies are required to divert at least 30 percent of the total residential solid waste and recyclable material collected. The City's program accepts over 40 different items for recycling, including all commonly accepted recyclables, as well as some hard-to-recycle items, such as expanded polystyrene foam, textiles, and other materials.

Yard Trimmings and Residential Street Sweeping Collection

Green Waste Recovery (GWR), provides Yard Trimmings collection service under exclusive agreements to provide loose in the street collection or cart service to all residents of the City. GWR also provides residential street sweeping services.

Under its agreement, Green Waste Recovery must divert at least 95 percent of all the yard trimmings material collected. Collected material is recycled into high quality soil amendments including compost, mulch, or wood chips. Some of the material is then used in City parks and community gardens, while the balance is sold for agricultural uses or co-generation fuel.

Large Item Collection

The City offers residents on-call curbside collection of Large Items such as furniture that cannot fit into the regular collection cart. Residents are charged an additional fee for this service. The two collection companies providing this service are required to divert at least 50 percent of the material collected through this program. The tonnage data for material collected through this program is tracked separately and included in the residential waste and recycling statistics provided in this section.

Neighborhood Clean-up Events

The City also offers residents access to periodic "free" Neighborhood Clean-up (NCU) events to discard their Large Items. NCU events require the resident to haul their material to a pre-determined location on a specific date. The City currently requires the companies that provide these services to divert a minimum of 50 percent of the material collected through this program. Beginning January 2009, the hauler for the NCU program for most of the City (Recycle Plus collection districts A and C) will be required to achieve 75% minimum diversion for this

program. The tonnage data for material collected through this program is separately tracked and included in this report.

Other Solid Waste Diversion Programs

The City participates in other, lower-volume, solid waste diversion programs for the single-family sector that have not been included in this report. These programs include the back yard composting program, household hazardous waste drop-off, buy-back and drop-off centers, and others.

Residential Rate Structure

The rates charged to customers include volume based garbage, unlimited curbside recycling, unlimited yard trimmings collection and monthly street sweeping services. Yard trimmings cart service is available by subscription at an additional cost. The rate structure is set to provide an incentive for residents to recycle and divert material from the solid waste container. The rates are structured such that a 96 gallon container rate is three times (triple) the amount of the 32 gallon waste container rate. If residents have more waste than can fit in their garbage container, they are required to purchase extra garbage stickers to place on extra bags for collection. On-premise service is available at an additional cost. Reduced rates are available to customers who qualify in the categories of: low-income, medical exemption, and persons with disabilities.

Summary of Total Tons Disposed and Diverted

The reported Single Family Sector waste stream totaled 413,853 tons for FY 2006/07. Of that amount 230,721 tons were diverted through recycling, yard trimmings collection, and diversion of street sweepings, large items, and neighborhood clean-up items.

Current Diversion Rate

The single-family diversion rate, for the programs summarized in this report is 55.7 percent for FY 2006/07.

Single Family Dwellings (SFD)

Waste Characterization Summary

Single-Family Solid Waste

The single-family solid waste characterization data was based on Cascadia Consulting Group's March 17 – March 28, 2008 "City of San José Waste Characterization Study, Final Report – DRAFT, May 2008." For that study, single-family waste was defined as the material placed in designated solid waste (garbage) containers originating from households that have individual, curbside collection service.

Table 3B provides the composition of the SFD waste stream based on Cascadia's Waste Characterization Study.

TABLE 3B

Single-Family Waste Composition Analysis

Waste Category	Percentage	Amount 06/07	Projected 2040
Recyclable Paper	9.8%	15,972	23,704
Mixed Papers	6.9%	11,246	16,689
Newspaper	1.8%	2,934	4,354
OCC	0.6%	978	1,451
Other Paper	0.5%	815	1,209
Plastic	4.0%	6,519	9,675
#1 PET Bottles and Containers	0.6%	978	1,451
#2 HDPE Bottles and Containers	0.5%	815	1,209
#3, #4, #5 and #7 Bottles and Containers	0.6%	978	1,451
Durable Plastic	0.6%	978	1,451
Plastic Bags and Other Film	0.1%	163	242
Polystyrene	0.7%	1,141	1,693
Other Plastic	0.9%	1,467	2,177
Metal	2.3%	3,749	5,563
Aluminum Beverage Cans	0.2%	326	484
Aluminum Foil	0.3%	489	726
Steel (Tin) Cans	0.8%	1,222	1,814
Other Scrap Metal	0.5%	815	1,209
Other Metal	0.6%	896	1,330
Glass	1.9%	3,097	4,596
Recyclable Glass	1.6%	2,608	3,870
Other Glass	0.3%	489	726
Organic Materials	51.8%	84,426	125,291
Compostable Paper	6.7%	10,920	16,206
Food Waste	43.3%	70,572	104,732
Yard Waste	1.8%	2,934	4,354
Textiles	1.6%	2,608	3,870
Other Potentially Recyclable Materials	1.6%	2,608	3,870
Automotive Batteries	0.1%	163	242
Electronics	0.1%	163	242
Oil Filters	0.0%	-	-
Tanks	0.0%	-	-
Tires	0.0%	-	-
TVs and CRT Monitors	0.0%	-	-
Wood	0.9%	1,467	2,177
Other Universal Waste	0.5%	815	1,209
Non-Recyclable Materials	27.0%	44,006	65,306
Sub Total	100.0%	162,984	241,875
Residual			
Recycling		18,455	27,388
Yard Trimmings		1	1
Neighborhood Clean Up		950	1,410
Large Items		742	1,101
Total Residual		20,148	29,900
Total Landfill		183,132	271,776

Single-family Recyclables and Residuals

In this report, single-family recyclables are presented in the same way that they were included in the sales data provided by the City. This characterization of single-family recyclables differs, therefore,

Single Family Dwellings (SFD)

from the Cascadia Waste Characterization Study for single-family recyclables.

The Cascadia study also includes additional information on the characterization of residual material from the sorting of recyclables from single-family residences. One of the findings of the Cascadia study was that 90 percent of the MRF residual materials are actually recoverable through MRF or energy conversion. MRF residuals are the materials that are not recovered after single-family recyclables are sorted. Due to technology enhancements at the CWS MRF in January 2008, increased diversion potential is anticipated which would reduce this residual tonnage in the future.

Summary of Major Waste Types

Table 3C provides a ranking of the major waste categories, as presented in the Cascadia study, based on disposal tonnages. "Major" categories are the names of groups of materials, and "minor" categories are the sub-groups, or individual material types. This information is also presented graphically in Figure 3C. As shown in Table 3C, the top 4 major waste stream categories are:

- Organic wastes comprise the majority of the material from single-family dwellings that is still being disposed, at over 51.8 percent of the single-family waste stream;
- Non-recyclable materials at 27.0 percent. According to the Cascadia study, this includes other glass, other metal, other paper, other plastic and "non-recyclable." For example, "other paper" may include paper with other materials attached in sufficient quantities to be considered contaminated; "other glass" may include glass that is combined with other materials such as mirrors, light bulbs, or candle holders; "other metal" may include small non-electronic appliances or metal window blinds, etc. "Other plastic" may include disposable razors, pens, and other plastic items. "Non-recyclable items" may include disposable diapers, contaminated textiles, ash, etc.
- Recyclable paper, at 9.8 percent; and
- Plastic, at 4.0 percent.

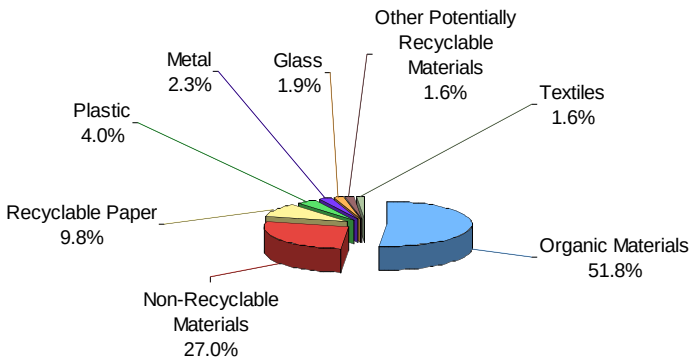
TABLE 3C

Single-Family Waste Composition
Major Category Ranking

Major Waste Category	Percentage	Amount 06/07	Projected 2040
Organic Materials	51.8%	84,426	125,291
Non-Recyclable Materials	27.0%	44,006	65,306
Recyclable Paper	9.8%	15,972	23,704
Plastic	4.0%	6,519	9,675
Metal	2.3%	3,749	5,563
Glass	1.9%	3,097	4,596
Other Potentially Recyclable Materials	1.6%	2,608	3,870
Textiles	1.6%	2,608	3,870
Sub Totals	100.0%	162,984	241,875
Total Residual		20,148	29,900
		183,132	271,776

FIGURE 3C

Single-Family Waste Composition
Major Category Ranking



Summary of Minor Waste Types to Target for New or Expanded Programs

Table 3D provides a ranking of the individual waste categories sampled in the Cascadia study. This information is also presented graphically in Figure 3D.

Single Family Dwellings (SFD)

As shown in Figure 3D, the top 5 minor recoverable waste categories are:

- Food Waste represents the largest material type in the SFD waste stream at 43.3 percent;
- Mixed Paper at approximately 6.9 percent;
- Compostable Paper at 6.7 percent;
- Newspaper at 1.8 percent; and
- Yard trimmings at 1.8 percent.

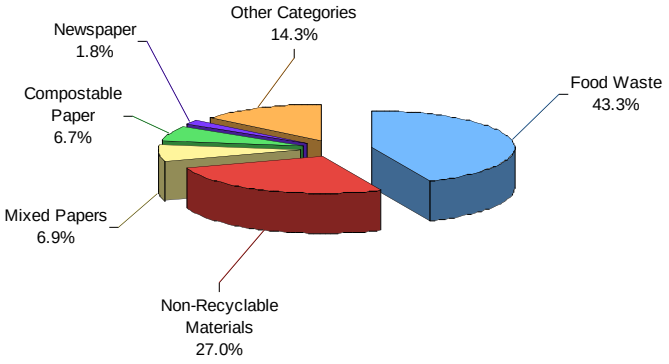
TABLE 3D

Single-Family Waste Composition
Minor Category Ranking

Minor Waste Category	Percentage w/o residuals	Percentage with residuals	Amount 06/07	Projected 2040
Food Waste	43.3%	38.5%	70,572	104,732
Non-Recyclable Materials	27.0%	24.0%	44,006	65,306
Mixed Papers	6.9%	6.1%	11,246	16,689
Compostable Paper	6.7%	6.0%	10,920	16,206
Newspaper	1.8%	1.6%	2,934	4,354
Yard Waste	1.8%	1.6%	2,934	4,354
Recyclable Glass	1.6%	1.4%	2,608	3,870
Textiles	1.6%	1.4%	2,608	3,870
Other Plastic	0.9%	0.8%	1,467	2,177
Wood	0.9%	0.8%	1,467	2,177
Steel (Tin) Cans	0.8%	0.7%	1,222	1,814
Polystyrene	0.7%	0.6%	1,141	1,693
#1 PET Bottles and Containers	0.6%	0.5%	978	1,451
Durable Plastic	0.6%	0.5%	978	1,451
OCC	0.6%	0.5%	978	1,451
#3, #4, #5 and #7 Bottles and Containers	0.6%	0.5%	978	1,451
Other Metal	0.6%	0.5%	896	1,330
Other Paper	0.5%	0.4%	815	1,209
#2 HDPE Bottles and Containers	0.5%	0.4%	815	1,209
Other Scrap Metal	0.5%	0.4%	815	1,209
Other Universal Waste	0.5%	0.4%	815	1,209
Other Glass	0.3%	0.3%	489	726
Aluminum Foil	0.3%	0.3%	489	726
Aluminum Beverage Cans	0.2%	0.2%	326	484
Plastic Bags and Other Film	0.1%	0.1%	163	242
Automotive Batteries	0.1%	0.1%	163	242
Electronics	0.1%	0.1%	163	242
Sub Totals	100.0%	89.0%	162,984	241,875
Residual:				
Recycling		10.1%	18,455	27,388
Neighborhood Clean Up		0.5%	950	1,410
Large Items		0.4%	742	1,101
Yard Trimmings		0.0%	1	1
		11.0%	20,148	29,900
Total Landfill		100.0%	183,132	271,776

FIGURE 3D

Single-Family Waste Composition
Minor Category Ranking



The Cascadia Waste Characterization Study classified the minor waste types into four "major" groups: 1) Recyclable, 2) Compostable, 3) Potentially Recyclable, and 4) Non-recyclable. For consistency, we have used those same groupings throughout this report.

For single-family waste, using the City recyclable categories, the profile of recoverable and non-recoverable materials in the single-family waste stream is as follows:

- Compostable categories (yard trimmings, food waste and compostable paper) represent 52 percent of the single-family waste stream;
- Recyclable materials are 17 percent;
- Non-recyclable items are 30 percent; and
- Potentially recyclable materials (those that may be recycled if new markets are found, or changes are made to current contracts) amount to one percent.

The Cascadia study listed the following materials into the categories given above:

- Recyclable: #1 PET bottles and containers, #2 HDPE bottles and containers, #3, #4, #5 and #7 bottles and containers, aluminum beverage cans, aluminum foil, durable plastic, mixed papers, newspaper, OCC, other scrap metal, plastic bags and other film, polystyrene, recyclable glass, steel (tin) cans, and textiles;
- Compostable: compostable paper, food waste, and yard waste;
- Potentially recyclable: automotive batteries, electronics, oil filters, tanks, tires, TV's and CRT monitors, and wood; and

- Non-recyclable: other glass, other metal, other paper, other plastic, and non-recyclables.

Material Recovery Facility (MRF) Residuals

Residuals from the sorting process at the MRF were examined as part of Cascadia's Waste Characterization Study. Residuals from the residential recycling program amounted to 18,455 tons in FY 2006/07, making residuals one of the largest categories of single-family waste. The Cascadia study found that "approximately 10 percent of the materials currently being discarded as residuals from the MRF processing operations would likely still be landfilled."

Some of the MRF residuals could be recovered for recycling; the Cascadia study specifically mentions scrap metal and textiles. The study also finds that 80 percent of the MRF residuals have energy value.

Recommendations

Maximize Yield from Existing Programs

The results of the single-family waste characterization study show that the yard trimmings collection program is very effective at capturing that material, with yard trimmings comprising only 2 percent of the material in the single-family disposal stream.

In contrast, the recycling program can be improved to capture more material. As shown in Tables 3B through 3D, many items are still being disposed that could be recycled. Items such as mixed paper, newspaper, cardboard, plastic bottles, plastic bags, and aluminum, steel and glass containers, can be added to the existing curbside recycling program. These materials comprise approximately 17 percent of the existing single-family waste that is currently being sent to landfills.

MRF Residuals

Since MRF residuals are a large remaining percentage of the waste stream, the City could study the potential of increased recycling of these materials through increased requirements on its contractors.

Begin a Compostables Diversion Program

Food waste and other compostable material represents over 43 percent of the single-family waste stream, which makes it the

single largest component of that waste stream currently being landfilled.

Single Family Dwellings (SFD)

This page intentionally left blank.

Section 4

Multi-Family Dwellings (MFD)

Introduction and Summary of Current Programs

The City has approximately 93,000 Multi-Family Dwellings (MFD). MFD collection service is made available to 3,200 MFD complexes, defined by type of service (bin or cart), by GreenTeam of San José, under an exclusive agreement with the City.

GreenTeam provides solid waste and recyclable collection service to MFD complexes using 96 gallon carts, roll-off compactors, and metal bins ranging in size from 1 to 8 cubic yards. The collection frequency is required to be a minimum of one time per week and up to five times per week.

The rates charged to MFD complexes include the provision of recyclable and loose in the street yard trimmings collection service. The rate structure is designed to provide an incentive for residents to recycle and divert material from the solid waste container.

Under the terms of the Agreement between the City and GreenTeam, the company must divert at least 35 percent of the material collected and that requirement has been met.

Weekly Recyclable Collection

The MFD recycling collection program collects separated recyclables from participating multi-family complexes in the City. The separate collection program collects the same list of items included in the SFD recycling collection program. Through the separate collection of recyclables, GreenTeam diverted 17 percent of the multi-family material collected in FY 2006/07.

Mixed Waste Recycling and Composting

Given constraints and difficulties to comply with the recycle program guidelines for some property owners, GreenTeam has struggled with increasing recycling at many multi-family dwellings. In May 2008, the City and GreenTeam implemented a new program to collect and recycle all MFD garbage in order to significantly increase the recycling and composting rate for this sector. All apartment waste is now delivered to a transfer station in San Jose where most of the recyclables are pulled out and the compostable fraction is separated. The compostable waste is then hauled to a facility in Gilroy for composting. Based on preliminary reports, GreenTeam expects to achieve a 75 percent recovery rate from the mixed waste recycling and composting program.

Multi-Family Dwellings (MFD)

Yard Trimmings Collection

The City offers collection of yard trimmings for multi-family complexes. As previously discussed, the amount of material collected from these complexes is included in the statistics for the single-family yard trimmings program.

Large Item Collection

The City offers MFD residents on-call collection of Large Items, such as furniture, at a rate that is dependent on the number of items to be collected. There is a fixed base rate that covers up to 3 items; then, there is a separate charge for each additional item. Green Team, the collection company, is required to divert at least 50 percent of the material collected through this program. As previously discussed, the amount of material collected through this program is included in the statistics for the single-family Large Item collection program.

Neighborhood Clean Up Events

The City also offers MFD residents access to periodic "free" Neighborhood Clean-up events to discard their Large Items. These collection events provide residents with the opportunity to dispose of Large Items and many other types of solid waste not allowed in weekly collection service, such as lumber, scrap metal, e-waste, and other rubbish. The events require the residents to haul their material to a pre-determined location on a specific date. The City currently requires the companies that provide these services to divert a minimum of 50 percent of the material collected through this program. Beginning January 2009, the hauler for the NCU program for most of the City (Recycle Plus collection districts A and C) will be required to achieve 75% minimum diversion for this program.

As previously discussed, the amount of material collected through this program is included in the statistics for the single-family Neighborhood Clean-up events.

MFD Rate Structure

The rates charged to customers include unlimited recycling and unlimited yard trimmings collection at no additional charge. The rate structure is set to provide an incentive for residents to recycle and divert material from the solid waste container.

Multi-Family Dwellings (MFD)

Summary of Total Tons Disposed and Diverted

The reported Multi-Family Sector waste stream totaled 90,124 tons for FY 2006/07. Of that amount 30,186 tons were diverted.

Waste Characterization Summary

Table 4A provides the composition of the entire multi-family waste stream based on waste composition percentages compiled by the CIWMB in the 2004 Statewide Waste Characterization Study.

TABLE 4A

Multi-Family Waste Composition Analysis

Waste Category	Percentage	Amount 06/07	Projected 2040
Paper	24.6%	13,557	20,120
Uncoated Corrigated Cardboard	3.8%	2,109	3,129
Paper Bags	0.8%	443	658
Newspaper	4.8%	2,644	3,923
White Ledger	2.8%	1,533	2,275
Colored Ledger	0.1%	44	65
Computer Paper	0.0%	3	4
Other Office Paper	0.6%	317	470
Magazines and Catalogs	1.5%	852	1,264
Phone Books and Directories	0.5%	251	373
Other Miscellaneous Paper	3.3%	1,801	2,673
Remainder/Composite Paper	6.5%	3,561	5,285
Glass	6.5%	3,598	5,340
Clear Glass Bottles and Containers	2.6%	1,457	2,162
Green Glass Bottles and Containers	1.9%	1,038	1,540
Brown Bottles and Containers	1.4%	758	1,125
Other Glass Bottles and Containers	0.0%	4	6
Flat Glass	0.0%	10	16
Remainder/Composite Glass	0.6%	331	491
Metal	4.9%	2,683	3,981
Tin/Steel Cans	1.0%	528	784
Major Appliances	0.0%	-	-
Used Oil Filters	0.0%	-	-
Other Ferrous Metal	0.7%	407	603
Aluminum Cans	0.5%	289	429
Other Non-Ferrous Metal	0.1%	40	60
Remainder/Composite Metal	2.6%	1,418	2,104
Electronics	0.1%	64	94
Brown Goods	0.0%	8	13
Computer-related Electronics	0.1%	41	62
Other Small Consumer Electronics	0.0%	13	20
Television and Other Items with CRTs	0.0%	0	0
Plastic	8.5%	4,669	6,929
PETE Containers	1.1%	617	916
HDPE Containers	1.2%	637	945
Miscellaneous Plastic Containers	0.6%	335	497
Plastic Trash Bags	1.0%	529	786
Plastic Grocery and Other Merchandise Bags	0.7%	392	582
Non-Bag Com. And Indus. Packaging Film	0.0%	5	7
Film Products	0.0%	0	0
Other Film	1.1%	587	870
Durable Plastic Items	1.2%	666	989
Remainder/Composite Plastic	1.6%	902	1,338

Waste Category	Percentage	Amount 06/07	Projected 2040
Organic	39.3%	21,651	32,132
Food Waste	18.9%	10,430	15,478
Leaves and Grass	3.3%	1,833	2,720
Prunings and Trimmings	5.8%	3,185	4,727
Branches and Stumps	0.2%	128	191
Agricultural Crop Residues	0.0%	-	-
Manures	1.0%	553	821
Textiles	2.8%	1,526	2,265
Carpet	0.7%	368	546
Remainder/Composite Organics	6.6%	3,628	5,384
Construction & Demolition	11.5%	6,354	9,429
Concrete	1.8%	980	1,454
Asphalt Paving	0.0%	-	-
Asphalt Roofing	0.1%	32	47
Lumber	5.0%	2,746	4,075
Gypsum Board	1.3%	741	1,100
Rock, Soil, and Fines	0.1%	36	53
Remainder/Composite Construction & Demolition	3.3%	1,819	2,700
Household Hazardous Waste	0.6%	353	523
Paint	0.1%	35	52
Vehicle and Equipment Fluids	0.0%	-	-
Used Oil	0.0%	-	-
Batteries	0.4%	213	316
Remainder/Composite Household Hazardous Waste	0.2%	105	155
Special Waste	1.7%	953	1,414
Ash	0.0%	0	0
Sewage Solids	0.0%	-	-
Industrial Sludge	0.0%	-	-
Treated Medical Waste	0.0%	1	2
Bulky Items	1.7%	934	1,386
Tires	0.0%	8	12
Remainder/Composite Special Waste	0.0%	10	15
Mixed Residue	2.3%	1,251	1,856
Sub Total	100.0%	55,132	81,818
Residual			
Recycling		815	1,209
Mixed Waste Composting		3,991	5,923
Total Landfill from Diversion Residual		4,806	7,132
Total Landfill		59,938	88,951

Multi-Family Dwellings (MFD)

Summary of Major Waste Types

As shown in Table 4B, based on statewide averages, the top 4 major waste stream categories are:

- Organic waste represents 39.3 percent of the multi-family waste stream;
- Paper at 24.6 percent;
- C&D materials at 11.5 percent; and
- Plastics at 8.5 percent.

TABLE 4B

Multi-Family Waste Composition
Major Category Ranking

Major Waste Category	Percentage	Amount 06/07	Projected 2040
Organic	39.3%	21,651	32,132
Paper	24.6%	13,557	20,120
Construction & Demolition	11.5%	6,354	9,429
Plastic	8.5%	4,669	6,929
Glass	6.5%	3,598	5,340
Metal	4.9%	2,683	3,981
Mixed Residue	2.3%	1,251	1,856
Special Waste	1.7%	953	1,414
Household Hazardous Waste	0.6%	353	523
Electronics	0.1%	64	94
Residual	0.0%	-	-
Sub Totals	100.0%	55,132	81,818
Total Residual		4,806	7,132
		59,938	88,951

Summary of Minor Waste Types to Target for New or Expanded Programs

Table 4C provides a ranking of the top 5 minor waste categories. This information is also presented graphically in Figure 4C:

- Food waste, represent 18.9 percent of the multi-family waste stream;

- Remainder/composite organics, at 6.6 percent;
- Remainder/composite paper, at 6.5 percent;
- Prunings and trimmings, at 5.8 percent; and
- Lumber, at 5.2 percent.

For the multi-family waste stream, using recyclable categories for the City, the profile of recoverable and non-recoverable materials in the multi-family waste stream is as follows:

- Recyclable materials amount to 33 percent of the multi-family waste stream (using current City recycling categories);
- Compostable categories (yard trimmings, food waste and compostable paper) amount to 33 percent;
- Potentially recyclable materials (those that may be recycled if new markets are found, or changes made to current contracts) amount to 8 percent; and
- Non-recyclable items amount to 25 percent.

Multi-Family Dwellings (MFD)

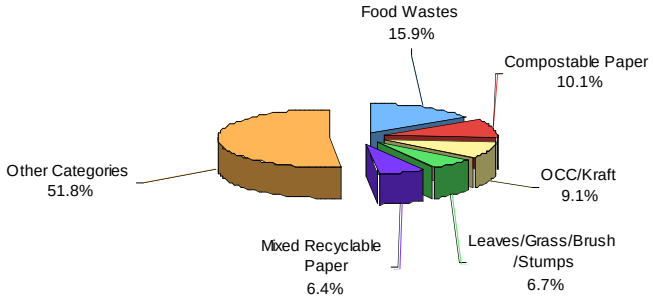
TABLE 4C

Multi-Family Waste Composition
Minor Category Ranking

Minor Waste Category	Percentage	Amount 06/07	Projected 2040	Minor Waste Category	Percentage	Amount 06/07	Projected 2040
Food Waste	18.9%	10,430	15,478	Batteries	0.4%	213	316
Remainder/Composite Organics	6.6%	3,628	5,384	Branches and Stumps	0.2%	128	191
Remainder/Composite Paper	6.5%	3,561	5,285	Remainder/Composite Household Hazardous Was	0.2%	105	155
Prunings and Trimmings	5.8%	3,185	4,727	Colored Ledger	0.1%	44	65
Lumber	5.0%	2,746	4,075	Computer-related Electronics	0.1%	41	62
Newspaper	4.8%	2,644	3,923	Other Non-Ferrous Metal	0.1%	40	60
Uncoated Corrigated Cardboard	3.8%	2,109	3,129	Rock, Soil, and Fines	0.1%	36	53
Leaves and Grass	3.3%	1,833	2,720	Paint	0.1%	35	52
Remainder/Composite Construction & Demolitic	3.3%	1,819	2,700	Asphalt Roofing	0.1%	32	47
Other Miscellaneous Paper	3.3%	1,801	2,673	Other Small Consumer Electronics	0.0%	13	20
White Ledger	2.8%	1,533	2,275	Flat Glass	0.0%	10	16
Textiles	2.8%	1,526	2,265	Remainder/Composite Special Waste	0.0%	10	15
Clear Glass Bottles and Containers	2.6%	1,457	2,162	Brown Goods	0.0%	8	13
Remainder/Composite Metal	2.6%	1,418	2,104	Tires	0.0%	8	12
Mixed Residue	2.3%	1,251	1,856	Non-Bag Com. And Indus. Packaging Film	0.0%	5	7
Green Glass Bottles and Containers	1.9%	1,038	1,540	Other Glass Bottles and Containers	0.0%	4	6
Concrete	1.8%	980	1,454	Computer Paper	0.0%	3	4
Bulky Items	1.7%	934	1,386	Treated Medical Waste	0.0%	1	2
Remainder/Composite Plastic	1.6%	902	1,338	Television and Other Items with CRTs	0.0%	0	0
Magazines and Catalogs	1.5%	852	1,264	Film Products	0.0%	0	0
Brown Bottles and Containers	1.4%	758	1,125	Ash	0.0%	0	0
Gypsum Board	1.3%	741	1,100	Agricultural Crop Residues	0.0%	-	-
Durable Plastic Items	1.2%	666	989	Asphalt Paving	0.0%	-	-
HDPE Containers	1.2%	637	945	Industrial Sludge	0.0%	-	-
PETE Containers	1.1%	617	916	Major Appliances	0.0%	-	-
Other Film	1.1%	587	870	Sewage Solids	0.0%	-	-
Manures	1.0%	553	821	Used Oil	0.0%	-	-
Plastic Trash Bags	1.0%	529	786	Used Oil Filters	0.0%	-	-
Tin/Steel Cans	1.0%	528	784	Vehicle and Equipment Fluids	0.0%	-	-
Paper Bags	0.8%	443	658				
Other Ferrous Metal	0.7%	407	603	Sub Totals	100.0%	55,132	81,818
Plastic Grocery and Other Merchandise Bags	0.7%	392	582				
Carpet	0.7%	368	546	Residual:			
Miscellaneous Plastic Containers	0.6%	335	497	Mixed Waste Composting		3,991	5,923
Remainder/Composite Glass	0.6%	331	491	Recycling		815	1,209
Other Office Paper	0.6%	317	470			4,806	7,132
Aluminum Cans	0.5%	289	429				
Phone Books and Directories	0.5%	251	373	Total Landfill		59,938	88,951

FIGURE 4C

Multi-Family Waste Composition
Minor Category Ranking



Recommendations

A major change has already been made in the multi-family sector, with the 2008 expansion of the multi-family mixed waste recycling and composting program. This program change is a good fit with the sector's waste composition, with nearly 40 percent organics and 25 percent paper. This program expansion will likely lead to significant improvements in the multi-family sector's diversion rate. With this program change in mind, our recommendations include:

- Because of the establishment of the new mixed waste recycling program, the data in this section, especially the projections of future waste composition, will change dramatically; however, the new program data will not be available for several months. We recommend that the City revise the waste composition and tonnage estimates as soon as it receives sufficient, reliable new program data.
- Closely monitor the results of the program expansion to determine the multi-family sector's new diversion rate; and
- Continue attempts at getting new multi-family complexes to join the weekly recyclable collection program.

As the City continues to expand and improve programs for the single-family sector, those programs should continue to be offered to the multi-family sector as well, as is the current practice.

This page intentionally left blank.

Section 5

Commercial – Franchised Collection

Introduction and Summary of Current Programs

The City has approximately 8,000 – 10,000 businesses that receive solid waste collection services and thousands of businesses also receive recycling services from the franchised haulers. These figures do not include businesses that do not use a franchised hauler because of other collection arrangements, including company-owned vehicles hauling the material to a disposal facility, central distribution facility or to a recycling center.

In 1995, the City approved changes to the Municipal Code to establish the non-exclusive Commercial Solid Waste and Recyclables Collection Franchises. In the new franchise agreements, franchised haulers were required to provide reports on the material collected and pay certain fees. The Franchise agreements do not require the companies to divert material collected from business in the City.

The City has more than 20 non-exclusive franchised solid waste and recycling collection companies in 2008. Commercial businesses in the City can choose from the lists of recycling companies and non-exclusive franchised haulers to select the company that is able to provide the solid waste and recycling services that each business desires.

Under the current program, franchised hauler agreements for services with businesses cannot exceed 6 months, and the hauler is required to provide 30 days written notice prior to the automatic renewal of an agreement. This was intended to give businesses the opportunity to shop around for a franchised hauler that will provide the best services at the best prices.

The City is currently working on a comprehensive redesign of the Commercial Franchised Collection system, and the redesigned system will have a goal of reaching a much higher diversion rate.

Summary of Current City Diversion Programs

- Recyclables Collection
- Yard Trimmings Collection
- School Recyclables Collection
- Other Programs

Commercial – Franchised Collection

Recyclables Collection

Materials collected by the franchised haulers and Recyclers include:

- C&D;
- Food and beverage containers;
- Office (anything that tears, plus food and beverage containers);
- Organics;
- Processed MSW;
- Single-stream recyclables;
- Cardboard;
- Food waste;
- Glass;
- Green waste;
- Inerts;
- Metal;
- Mixed Paper;
- Plastic; and
- Wood.

The collection of most commercial recyclables is conducted through programs that require the customers to separate material by type. Some franchised haulers offer commingled recycling programs where recyclable materials are mixed into one bin to be collected and then hauled to a processing facility where the materials are separated.

Yard Trimmings Collection

In FY 2006/07, the franchise haulers reported over 21,000 tons of organic waste diversion.

School Recyclables Collection

In 2005, the City implemented the San José Go Green Schools Program. Through this program, schools are provided recycling containers for paper items and beverage containers. The City employs one full time position dedicated to promoting school recycling programs. The program also supports food waste diversion through pilot collection programs and mixed waste composting at selected schools. The City also offers Go Green

mini-grants to develop school-wide and in-classroom recycling, composting, and other environmental education programs.

The City provided fiscal year 2006/07 information identifying the schools in the city. The report identified over 200 schools in 20 School Districts, including San José State University and the San José Evergreen Community College District. The total student population in the City in FY 2006/07 was approximately 198,000 students.

The City conducted a diversion analysis for the San José Unified School District for FY 2006/07. Based on the analysis, the San José Unified School District is diverting approximately 18 percent of the material generated through the school recycling collection program.

The amounts collected and recycled from the schools are not identified and reported separately. Most materials collected for disposal and recycling for the City schools are included in the information provided by the franchised haulers.

Summary Total Tons Disposed and Diverted

The reported Commercial Sector waste stream totaled 283,524 tons for FY 2006/07. Of that amount 40,117 tons or 14.1 percent were diverted.

Waste Characterization Summary

Table 5A provides the composition of the entire commercial waste stream.

Commercial – Franchised Collection

TABLE 5A

Commercial – Franchised Collection Waste Composition Analysis

Waste Category	Percentage	Amount 06/07	Projected 2040
Paper	30.6%	74,383	110,388
OCC/Kraft	9.1%	22,078	32,765
Wax Coated OCC	1.4%	3,326	4,936
Books	0.3%	722	1,071
Mixed Recyclable Paper	6.4%	15,546	23,072
High Grade Paper	2.3%	5,581	8,282
Compostable Paper	10.1%	24,533	36,408
Remainder/Composite Paper	1.1%	2,597	3,855
Plastic	15.1%	36,680	54,435
#1 PET Bottles/Jars	0.6%	1,416	2,101
#2 HDPE Bottles/Jars	0.8%	1,906	2,828
#3 - #7 Bottles/Containers	0.2%	595	882
Food Service Exp. Polystyrene	0.8%	1,930	2,864
Other Food Service Plastics	1.3%	3,047	4,522
Non-Food Service Exp. Polystyrene	0.8%	1,983	2,942
Recoverable Film	1.0%	2,325	3,451
Other Film	5.6%	13,571	20,140
Other Rigid Plastic	2.7%	6,615	9,817
Remainder/Composite Plastic	1.4%	3,293	4,886
Metal	4.8%	11,677	17,329
Ferrous/Bimetal Cans	0.6%	1,390	2,063
Other Ferrous	3.1%	7,577	11,244
Appliances	0.4%	868	1,288
Aluminum Cans	0.2%	441	654
Other Non-Ferrous Metal	0.6%	1,401	2,079
Glass	1.9%	4,733	7,024
Glass Bottles and Jars (all colors)	1.5%	3,707	5,502
Flat Glass	0.3%	699	1,037
Other Glass	0.1%	327	485
Organic	24.3%	58,926	87,449
Food Waste	15.9%	38,594	57,274
Leaves/Grass/Brush/Stumps	6.7%	16,250	24,115
Cooking Grease	0.0%	74	109
Disposable Diapers	1.2%	2,796	4,149
Remainder/Composite Organics	0.5%	1,214	1,801

Waste Category	Percentage	Amount 06/07	Projected 2040
Construction & Demolition	15.0%	36,534	54,219
Asphalt Composition Shingles	0.3%	758	1,124
Other Asphalt Roofing	0.2%	421	624
Concrete/Brick/Ashpalt	0.6%	1,516	2,250
Untreated/Unpainted Lumber	3.0%	7,261	10,775
Painted/Stained Lumber	6.2%	14,944	22,178
Wood Shingles	0.0%	-	-
Clean Gypsum Board	0.0%	26	39
Ceramics	0.3%	679	1,008
Carpet and Carpet Padding	2.1%	5,090	7,554
Other Rock/Soil/Fines	0.8%	1,926	2,858
Remainder/Composite C&D	1.6%	3,914	5,809
Hazardous Materials	0.2%	530	786
HHW	0.1%	312	463
Pharmaceuticals/Houshold Medical	0.1%	153	227
Other Remainder Composite HHW	0.0%	65	97
Universal Waste	0.5%	1,304	1,935
Compact Fluorescent Bulbs (CFLs)	0.0%	8	12
Fluorescent Tubes	0.0%	17	26
Car and Other Lead Acid Batteries	0.0%	1	1
Household & Other Small Batteries	0.0%	56	84
CRTs	0.0%	10	15
Electronic Devices	0.5%	1,211	1,798
Special Waste	7.4%	17,997	26,708
Ash	0.0%	1	2
Treated Medical Waste	0.9%	2,148	3,188
Mattresses and Box Springs	0.0%	55	82
Furniture	1.1%	2,786	4,135
Tires	0.3%	675	1,001
Mixed Residue	1.5%	3,689	5,475
Textiles/Leather/Rubber	3.6%	8,642	12,825
Sub Total	100.0%	242,764	360,273
Residual			
Recycling		642	953
Total Landfill		243,407	361,226

The commercial waste composition analysis provided in Table 5A is based on Cascadia Consulting Group's "City of San José Waste Characterization Study, Final Report – DRAFT, May 2008." Commercial waste was defined as waste collected from a business by one of the larger hauling companies that have a franchise approved by the City. The commercial waste stream was divided into three sub streams corresponding to the type of vehicle or container used for collection:

- Waste collected in debris boxes;
- Waste collected in stand-alone roll-off compactors; and,

- Waste collected as part of front-loader truck routes.

Summary of Major Waste Types

As shown in Table 5B, the top four major waste stream categories are:

- Paper, represents 30.6 percent of the commercial waste stream;
- Organic waste, at 24.3 percent;
- C&D materials, at 15.1 percent; and
- Plastics, at 15.0 percent.

TABLE 5B

Commercial – Franchised Collection Waste Composition Major Category Ranking

Major Waste Category	Percentage	Amount 06/07	Projected 2040
Paper	30.6%	74,383	110,388
Organic	24.3%	58,926	87,449
Plastic	15.1%	36,680	54,435
Construction & Demolition	15.0%	36,534	54,219
Other Materials	7.4%	17,997	26,708
Metal	4.8%	11,677	17,329
Glass	1.9%	4,733	7,024
Universal Waste	0.5%	1,304	1,935
Hazardous Materials	0.2%	530	786
Total Residual	100.0%	242,764	360,273

Summary of Minor Waste Types to Target for New or Expanded Programs

Table 5C provides a ranking of the individual waste categories sampled in the Cascadia study. This information is also presented graphically in Figure 5C.

As shown in Figure 5C, the top 5 recoverable minor waste categories are:

- Food waste, represents 15.9 percent of the commercial waste stream;
- Compostable paper, at 10.1 percent;
- OCC/Kraft, at 9.1 percent;

Commercial – Franchised Collection

- Leaves/grass/brush/stumps, at 6.7 percent; and
- Mixed recyclable paper, at 6.4 percent.

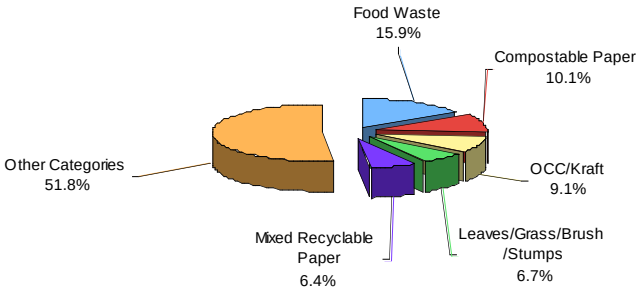
TABLE 5C

Commercial – Franchised Collection Waste Composition Minor Category Ranking

Minor Waste Category	Percentage	Amount 06/07	Projected 2040	Minor Waste Category	Percentage	Amount 06/07	Projected 2040
Food Waste	15.9%	38,594	57,274	#1 PET Bottles/Jars	0.6%	1,416	2,101
Compostable Paper	10.1%	24,533	36,408	Ferrous/Bimetal Cans	0.6%	1,390	2,063
OCC/Kraft	9.1%	22,078	32,765	Remainder/Composite Organics	0.5%	1,214	1,801
Leaves/Grass/Brush/Stumps	6.7%	16,250	24,115	Electronic Devices	0.5%	1,211	1,798
Mixed Recyclable Paper	6.4%	15,546	23,072	Appliances	0.4%	868	1,288
Painted/Stained Lumber	6.2%	14,944	22,178	Asphalt Composition Shingles	0.3%	758	1,124
Other Film	5.6%	13,571	20,140	Books	0.3%	722	1,071
Textiles/Leather/Rubber	3.6%	8,642	12,825	Flat Glass	0.3%	699	1,037
Other Ferrous	3.1%	7,577	11,244	Ceramics	0.3%	679	1,008
Untreated/Unpainted Lumber	3.0%	7,261	10,775	Tires	0.3%	675	1,001
Other Rigid Plastic	2.7%	6,615	9,817	#3 - #7 Bottles/Containers	0.2%	595	882
High Grade Paper	2.3%	5,581	8,282	Aluminum Cans	0.2%	441	654
Carpet and Carpet Padding	2.1%	5,090	7,554	Other Asphalt Roofing	0.2%	421	624
Remainder/Composite C&D	1.6%	3,914	5,809	Other Glass	0.1%	327	485
Glass Bottles and Jars (all colors)	1.5%	3,707	5,502	HHW	0.1%	312	463
Mixed Residue	1.5%	3,689	5,475	Pharmaceuticals/Houshold Medical	0.1%	153	227
Wax Coated OCC	1.4%	3,326	4,936	Cooking Grease	0.0%	74	109
Remainder/Composite Plastic	1.4%	3,293	4,886	Other Remainder Composite HHW	0.0%	65	97
Other Food Service Plastics	1.3%	3,047	4,522	Household & Other Small Batteries	0.0%	56	84
Disposable Diapers	1.2%	2,796	4,149	Mattresses and Box Springs	0.0%	55	82
Furniture	1.1%	2,786	4,135	Clean Gypsum Board	0.0%	26	39
Remainder/Composite Paper	1.1%	2,597	3,855	Fluorescent Tubes	0.0%	17	26
Recoverable Film	1.0%	2,325	3,451	CRTs	0.0%	10	15
Treated Medical Waste	0.9%	2,148	3,188	Compact Fluorescent Bulbs (CFLs)	0.0%	8	12
Non-Food Service Exp. Polystyrene	0.8%	1,983	2,942	Ash	0.0%	1	2
Food Service Exp. Polystyrene	0.8%	1,930	2,864	Car and Other Lead Acid Batteries	0.0%	1	1
Other Rock/Soil/Fines	0.8%	1,926	2,858	Wood Shingles	0.0%	-	-
#2 HDPE Bottles/Jars	0.8%	1,906	2,828				
Concrete/Brick/Ashpalt	0.6%	1,516	2,250	Sub Totals	100.0%	242,764	360,273
Other Non-Ferrous Metal	0.6%	1,401	2,079				
				Residual:			
				Recycling		642	953
						243,407	361,226

FIGURE 5C

Commercial – Franchised Collection Top 5 Materials Landfilled



For the commercial waste stream, using City standard recycling categories, the profile of recoverable and non-recoverable materials in the commercial waste stream is as follows:

- Recyclable materials amount to 46 percent of the commercial waste stream;
- Compostable categories (yard trimmings, food waste and compostable paper) amount to 33 percent;
- Potentially recyclable materials (those that may be recycled if new markets are found, or changes made to current contracts) amount to 12 percent; and
- Non-recyclable items amount to 9 percent.

Commercial – Franchised Collection

Recommendations

The City is working with HF&H Consultants to evaluate various options for improving the commercial waste collection and recycling system in the City. The City has conducted stakeholder outreach, and presented recommendations for commercial system re-design to the City Council in September 2008. Council approved the following recommendations::

1. Prepare a procurement strategy for Council consideration to solicit proposals for commercial solid waste collection, with two to three haulers awarded exclusive franchise agreements for services within geographical districts.

2. Approve the scope of the franchise system, with certain exemptions, to include collection of solid waste, recyclables, and organics, in bags, carts, front-load bins, roll-off boxes, and compactors; and,

3. Return to the Transportation and Environment Committee in December 2008 with final recommendation for the commercial solid waste system redesign including an implementation plan, terms of an exclusive franchise, an implementation plan for securing processing and disposal capacity, and related policy issues for Council consideration.

We noted from the data presented in Table 5A that a large portion of the commercial disposed waste stream, 46 percent, could be diverted through a traditional commingled recycling collection program, using standard City recycling categories.

The next largest opportunity in the commercial sector is composting, with 33 percent of commercial waste disposal consisting of compostable materials. It is important to note that

there would be challenges with collecting food waste in the City, due to the diversity of types of businesses, as well as a relatively small restaurant sector, at approximately 12 percent of the commercial waste stream.

Commercial – Franchised Collection

Section 6

City Facilities

Introduction and Summary of Current Programs

The City promotes and coordinates solid waste, recycling, and yard trimmings collection programs for the City facilities including all City office buildings, City parks, City public litter containers, the Convention Center, and the Norman Y. Mineta San José International Airport. These programs do not address most of the wastes generated in the City's field operations, including street and sewer repairs and landscape maintenance, which are either delivered to the City's corporation yards by City staff or are the responsibility of construction and maintenance contractors.

The City also develops and promotes several programs to address source reduction and procurement policies to reduce the amount of waste generated within the City. The City adopted an Environmentally Preferable Purchasing policy in 2001, and updated the policy in 2007. The policy calls for waste reduction in the manufacture and use of products and packaging purchased by the City and other waste reduction and recycled content measures in the City's purchasing activities. The City also recently adopted a work plan to establish Extended Producer Responsibility as a legislative, procurement and regulatory priority.

Summary of Current City Diversion Programs

City Facilities Solid Waste and Recyclables Collection

The solid waste and recyclable material generated from the City facilities and public containers throughout the City are collected and processed under a collection agreement between the City and GreenTeam. Under this agreement, two haulers, GreenTeam and Greenwaste Recovery, collect segregated material and provide mixed waste processing and composting services.

GreenTeam does all the waste collection for all City facilities, including parks, though they do not collect recycling at parks. Since early 2007, GreenTeam has been collecting mixed recyclables, including mixed paper, cardboard and beverage containers, from City facilities and the airport. The second hauler, Greenwaste Recovery, does all the processing for what GreenTeam collects, as well as collects waste from the over 800 public litter containers ("PLCs") found on City streets. The agreement for City facilities waste collection specifies a required minimum diversion rate of 70 percent.

City Facilities

Beginning in May 2008, all waste from City operations and PLC's is now being taken to a processing facility in San Jose where the recyclables and non-processable wastes are pulled out and the organic fraction is separated and taken to a composting facility south of Gilroy. This mixed waste processing program is performed in conjunction with the existing source separated recyclables collection. The combined program results in the City achieving a minimum of 75 percent diversion for its operations.

City Facilities and Parks Recycling

A third organization, the San José Conservation Corps ("SJCC") also provides some collection services at City facilities, specifically beverage containers from recycling bins at over 150 parks and the airport. SJCC uses proceeds from their beverage container redemption program to help defray costs of their job training and other educational programs.

City Facilities Yard Trimmings Collection

Yard Trimmings collection is provided on a limited basis for parks and small sites, including fire stations and libraries. GreenWaste Recovery provides Yard Trimmings collection to these small civic facilities as part of the single-family Yard Trimmings program.

Summary Total Tons Disposed and Diverted

The reported City Facilities Sector waste stream totaled 7,827 tons for FY 2006/07. Of that amount 1,591 tons were diverted.

Waste Characterization Summary

There has not been a waste characterization study conducted that specifically targeted City facility waste. For this report, we used the commercial waste stream data from the Cascadia Waste Characterization Study to develop the characterization of City Facility waste. See Table 6A for the complete waste characterization data.

City Facilities

TABLE 6A

City Facility Waste Composition Analysis

Waste Category	Percentage	Amount 06/07	Projected 2040
Paper	30.6%	1,911	2,835
OCC/Kraft	9.1%	567	842
Wax Coated OCC	1.4%	85	127
Books	0.3%	19	28
Mixed Recyclable Paper	6.4%	399	593
High Grade Paper	2.3%	143	213
Compostable Paper	10.1%	630	935
Remainder/Composite Paper	1.1%	67	99
Plastic	15.1%	942	1,398
#1 PET Bottles/Jars	0.6%	36	54
#2 HDPE Bottles/Jars	0.8%	49	73
#3 - #7 Bottles/Containers	0.2%	15	23
Food Service Exp. Polystyrene	0.8%	50	74
Other Food Service Plastics	1.3%	78	116
Non-Food Service Exp. Polystyrene	0.8%	51	76
Recoverable Film	1.0%	60	89
Other Film	5.6%	349	517
Other Rigid Plastic	2.7%	170	252
Remainder/Composite Plastic	1.4%	85	126
Metal	4.8%	300	445
Ferrous/Bimetal Cans	0.6%	36	53
Other Ferrous	3.1%	195	289
Appliances	0.4%	22	33
Aluminum Cans	0.2%	11	17
Other Non-Ferrous Metal	0.6%	36	53
Glass	1.9%	122	180
Glass Bottles and Jars (all colors)	1.5%	95	141
Flat Glass	0.3%	18	27
Other Glass	0.1%	8	12
Organic	24.3%	1,514	2,246
Food Waste	15.9%	991	1,471
Leaves/Grass/Brush/Stumps	6.7%	417	619
Cooking Grease	0.0%	2	3
Disposable Diapers	1.2%	72	107
Remainder/Composite Organics	0.5%	31	46

Waste Category	Percentage	Amount 06/07	Projected 2040
Construction & Demolition	15.0%	938	1,393
Asphalt Composition Shingles	0.3%	19	29
Other Asphalt Roofing	0.2%	11	16
Concrete/Brick/Ashpalt	0.6%	39	58
Untreated/Unpainted Lumber	3.0%	187	277
Painted/Stained Lumber	6.2%	384	570
Wood Shingles	0.0%	-	-
Clean Gypsum Board	0.0%	1	1
Ceramics	0.3%	17	26
Carpet and Carpet Padding	2.1%	131	194
Other Rock/Soil/Fines	0.8%	49	73
Remainder/Composite C&D	1.6%	101	149
Hazardous Materials	0.2%	14	20
HHW	0.1%	8	12
Pharmaceuticals/Houshold Medical	0.1%	4	6
Other Remainder Composite HHW	0.0%	2	2
Universal Waste	0.5%	33	50
Compact Fluorescent Bulbs (CFLs)	0.0%	0	0
Fluorescent Tubes	0.0%	0	1
Car and Other Lead Acid Batteries	0.0%	0	0
Household & Other Small Batteries	0.0%	1	2
CRTs	0.0%	0	0
Electronic Devices	0.5%	31	46
Special Waste	7.4%	462	686
Ash	0.0%	0	0
Treated Medical Waste	0.9%	55	82
Mattresses and Box Springs	0.0%	1	2
Furniture	1.1%	72	106
Tires	0.3%	17	26
Mixed Residue	1.5%	95	141
Textiles/Leather/Rubber	3.6%	222	329
Total Landfill	100.0%	6,236	9,254

Uses Commercial Tonnage figures to establish percentage allocation.

If City facilities waste were to be characterized, we would expect significant differences from the overall commercial waste stream. For example, waste from certain City facilities, such as office buildings, will be very similar to the commercial waste stream; much of the waste from the airport may resemble the waste composition of restaurants, while waste from the City's parks will be predominantly from public litter containers, since landscape wastes are hauled to City corporation yards by staff for collection by GreenWaste Recovery.

City Facilities

Summary of Major Waste Types

As shown in Table 6B, the top 4 major waste stream categories are:

- Paper, represents 30.6 percent of the City Facility waste stream;
- Organic waste, at 24.3 percent;
- C&D materials, at 15.1 percent; and
- Plastics, at 15.0 percent.

TABLE 6B

City Facility Waste Composition
Major Category Ranking

Major Waste Category	Percentage	Amount 06/07	Projected 2040
Paper	30.6%	1,911	2,835
Organic	24.3%	1,514	2,246
Plastic	15.1%	942	1,398
Construction & Demolition	15.0%	938	1,393
Special Waste	7.4%	462	686
Metal	4.8%	300	445
Glass	1.9%	122	180
Universal Waste	0.5%	33	50
Hazardous Materials	0.2%	14	20
Total Residual	100.0%	6,236	9,254

Summary of Minor Waste Types to Target for New or Expanded Programs

Table 6C provides a ranking of the individual waste categories sampled in the Cascadia study for commercial waste. This information is also presented graphically in Figure 6C.

City Facilities

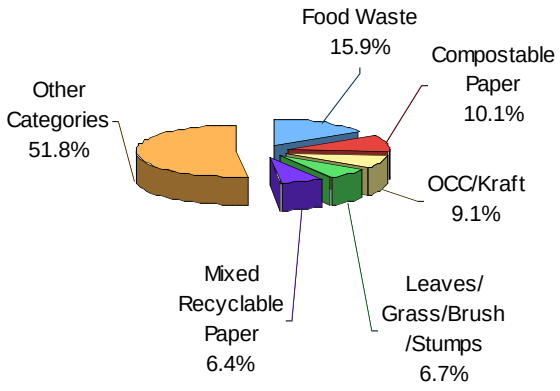
TABLE 6C

City Facility Waste Composition
Minor Category Ranking

Minor Waste Category	Percentage	Amount 06/07	Projected 2040	Minor Waste Category	Percentage	Amount 06/07	Projected 2040
Food Waste	15.9%	991	1,471	#1 PET Bottles/Jars	0.6%	36	54
Compostable Paper	10.1%	630	935	Ferrous/Bimetal Cans	0.6%	36	53
OCC/Kraft	9.1%	567	842	Remainder/Composite Organics	0.5%	31	46
Leaves/Grass/Brush/Stumps	6.7%	417	619	Electronic Devices	0.5%	31	46
Mixed Recyclable Paper	6.4%	399	593	Appliances	0.4%	22	33
Painted/Stained Lumber	6.2%	384	570	Asphalt Composition Shingles	0.3%	19	29
Other Film	5.6%	349	517	Books	0.3%	19	28
Textiles/Leather/Rubber	3.6%	222	329	Flat Glass	0.3%	18	27
Other Ferrous	3.1%	195	289	Ceramics	0.3%	17	26
Untreated/Unpainted Lumber	3.0%	187	277	Tires	0.3%	17	26
Other Rigid Plastic	2.7%	170	252	#3 - #7 Bottles/Containers	0.2%	15	23
High Grade Paper	2.3%	143	213	Aluminum Cans	0.2%	11	17
Carpet and Carpet Padding	2.1%	131	194	Other Asphalt Roofing	0.2%	11	16
Remainder/Composite C&D	1.6%	101	149	Other Glass	0.1%	8	12
Glass Bottles and Jars (all colors)	1.5%	95	141	HHW	0.1%	8	12
Mixed Residue	1.5%	95	141	Pharmaceuticals/Houshold Medical	0.1%	4	6
Wax Coated OCC	1.4%	85	127	Cooking Grease	0.0%	2	3
Remainder/Composite Plastic	1.4%	85	126	Other Remainder Composite HHW	0.0%	2	2
Other Food Service Plastics	1.3%	78	116	Household & Other Small Batteries	0.0%	1	2
Disposable Diapers	1.2%	72	107	Mattresses and Box Springs	0.0%	1	2
Furniture	1.1%	72	106	Clean Gypsum Board	0.0%	1	1
Remainder/Composite Paper	1.1%	67	99	Fluorescent Tubes	0.0%	0	1
Recoverable Film	1.0%	60	89	CRTs	0.0%	0	0
Treated Medical Waste	0.9%	55	82	Compact Fluorescent Bulbs (CFLs)	0.0%	0	0
Non-Food Service Exp. Polystyrene	0.8%	51	76	Ash	0.0%	0	0
Food Service Exp. Polystyrene	0.8%	50	74	Car and Other Lead Acid Batteries	0.0%	0	0
Other Rock/Soil/Fines	0.8%	49	73	Wood Shingles	0.0%	-	-
#2 HDPE Bottles/Jars	0.8%	49	73				
Concrete/Brick/Ashpalt	0.6%	39	58				
Other Non-Ferrous Metal	0.6%	36	53	Sub Totals	100.0%	6,236	9,254

FIGURE 6C

City Facility Waste Composition
Major Category Ranking



City Facilities

As shown in Figure 6C, the top 5 recoverable minor waste categories are:

- Food waste represents 15.9 percent of the City Facility waste stream;
- Compostable paper at 10.1 percent;
- OCC/Kraft at 9.1 percent ;
- Leaves/grass/brush/stumps at 6.7 percent; and
- Mixed recyclable paper at 6.4 percent.

For the City Facility waste stream, using recyclable categories for the City, the profile of recoverable and non-recoverable materials in the City Facility waste stream is as follows:

- Recyclable materials amount to 46 percent of the City Facility waste stream (using City standard recycling categories);
- Compostable categories (yard trimmings, food waste and compostable paper) amount to 33 percent;
- Potentially recyclable materials (those that may be recycled if new markets are found, or changes made to current contracts) amount to 12 percent; and
- Non-recyclable items amount to 9 percent.

Recommendations

The City Facilities sector is the smallest waste sector in the City which was evaluated; however, it represents an opportunity to use innovative waste reduction and recycling practices to serve as an example to residents and businesses throughout the City. Also, because it is such a small waste stream, this sector can be used to conduct pilot programs.

Implementing a visible source-separated composting program, including food waste, may be difficult in this sector, it may be beneficial to do so, both as a smaller-scale pilot program before expanding to the commercial sector, and to serve as an example to the community.

Beginning in May 2008, all waste from City operations and PLC's is now being taken to a processing facility in San Jose where the recyclables and non-processable wastes are pulled out and the organic fraction is separated and taken to a composting facility south of Gilroy. This mixed waste processing program is performed in addition to the existing source separated recyclables

collection. The combined program results in the City achieving a minimum of 75 percent diversion for its operations.

This page intentionally left blank.

Section 7

Construction and Demolition – Franchised Collection

Introduction and Summary of Current Programs

This section summarizes three separate but related components for the collection and recycling of C&D. They are 1) C&D collected by the City's franchised haulers, 2) the CDDD program, and 3) City certified facilities for C&D processing.

C&D Collected by Franchised Haulers

Franchised haulers are required to report tons collected as either recycling or garbage. A portion of the recycled tons reported to the City are described as C&D. Non-franchised haulers, which include contractors, landscapers, and homeowners, are categorized as self-haul and are not required to report to the City.

CDDD Program

The City adopted an ordinance on March 1, 2001 that amended the Municipal Code to establish the CDDD program. The goal of the CDDD program is to encourage the diversion of C&D debris from landfills. The City collects a deposit based on square footage and type of project that is planned, and fully refunds the deposit if the permitee either reuses C&D material or takes it to one of the City-certified recovery facilities

Many projects requiring a building permit under chapter 24.02 of the City Municipal Code also require a CDDD deposit (some exemptions apply). Projects which require CDDD deposits include:

- New residential construction projects over $115,000 in value;
- New non-residential construction projects over $135,000 in value;
- Residential alterations over $2,000 in value; and,
- Non-residential alterations over $5,000 in value.

The deposit program was implemented to help ensure that the person or business applying for a building permit develop a plan to divert or reuse C&D debris generated from the project. Qualified compliance options include bringing materials to a CDDD Certified Facility, donating or reusing materials, or some combination of the two.

Deposits are refunded when at least 50 percent of the material is diverted from landfills. Partial refunds are made based on the

actual diversion percentage when the diversion is less 50 percent of the material disposed.

Certified Facilities

The City has developed a public/private partnership with various types of recycling facilities through the CDDD program. The City has established criteria to identify certified facilities which may include the following:

- Recycling facilities;
- Composting facilities;
- Landfills;
- Material recovery facilities; or,
- Re-use facilities.

A number of certified facilities are required to track all incoming and out-going C& D material and must report activity on a monthly basis in a format prescribed by the City.

Reporting CDDD Data

In order to understand C&D as part of the City's overall waste percentage, some details of the CDDD program must be given. The percentage of commercial solid waste reported as C&D is 5.6 percent, as shown in Table 2A. This is the C&D reported by franchised haulers. However since self-haulers, and other haulers referred to as non-franchised haulers, are not required to report their tons to the City, their tons are not included in the 5.6 percent.

Some, but not all, self-haulers and other non-franchised haulers are part of the CDDD program. The CDDD tonnages cannot act as a proxy for overall C&D however because some self-haulers and other non-franchised haulers do not register themselves in the CDDD program. Their tonnages are not captured as C&D, although the facility may evaluate the haul at the gatehouse, and the facility may report it as C&D. CDDD facilities collectively report diverting approximately 1,000,000 tons of material per year. (CDDD program statistics and an analysis of self-haul tonnages are being reviewed outside of this study, as part of the overall CDDD program evaluation). The CDDD program can provide an estimate of the C&D waste stream from data reported by the four landfills participating in the program. However, the CDDD program may represent only a portion of the C&D activity that occurs in the City. Over the past five years (FY 2002/03 to 2006/07) the City has issued over 157,000 building permits. Of that 157,000, approximately 28,000 or 18 percent were subject to the CDDD program requirements.

CDDD and C&D statistics are further complicated by other factors such as:

- In the CDDD program, facilities are certified, and provide regular reporting to the City to show that the facility is diverting at least 50 percent of incoming material. However, the incoming material comes from both inside the City and outside of the City. City of origin data for CDDD and C&D is not currently reported.
- Also, facilities receive material from projects that must meet CDDD requirements and have registered themselves as CDDD, from projects that do not have to meet CDDD requirements, but that are bringing in C&D, and from projects that are not even "construction and demolition" projects, but that are bringing in C&D material.

Thus CDDD facility recycling totals do not provide a complete picture of C&D diversion activities occurring in the City. The C&D figure of 5.6 percent of the waste stream is what is reported by franchised haulers, and does not currently describe all C&D activity.

The C&D materials that are diverted by certified facilities are also used as ADC and Alternative Intermediate Cover ("AIC"). Those materials are reported by facility and material type.

Those materials were summarized in Section 9 of this report, and the tonnage data was found to be reliable and useable. We did not assign any of that tonnage data to this sector, Construction and Demolition.

CDDD facilities sometimes send outgoing material to another CDDD facility, where that same quantity of material is reported again as incoming material. Therefore, the total material tonnages can not be used for analysis without finding and eliminating "double-counted" tonnages.

Waste Generation, Characterization and Projections through 2040

This section summarizes only the C&D that is hauled by franchised haulers and reported to the City. As shown in Table 2A, Summary Projection of Landfilled and Diverted Tons (Section 2), the C&D waste stream (both disposal and recycling) comprises 5.6 percent of the City's overall waste generation for FY 2006/07, though for reasons described above, these figures are not an accurate estimate of the C&D waste stream.. Rather, they represent that portion of the C&D waste stream that we were able to gather through the available records.

Construction and Demolition – Franchised Collection

Summary of Total Tons Disposed and Diverted

Disposal amounts to 4,278 tons in the C&D sector for FY 2006/07. Diversion from recycling of C&D collected by franchised haulers amounts to 101,010 tons for FY 2006/07. The diversion rate for the C&D material collected by franchise haulers is reported as 95.9 percent.

Waste Characterization Summary

Table 7A provides the composition of the C&D waste stream based on waste composition percentages compiled by the CIWMB in the 2006 Statewide Waste Characterization Study.

Construction and Demolition – Franchised Collection

TABLE 7A

Construction and Demolition– Franchised Collection
Waste Composition Analysis

Waste Category	Percentage	Amount 06/07	Projected 2040
Paper	3.2%	139	206
Uncoated Corrigated Cardboard	0.8%	33	49
Paper Bags	0.1%	5	8
Newspaper	0.2%	8	11
White Ledger	0.1%	4	5
Colored Ledger	0.1%	4	6
Computer Paper	0.0%	-	-
Other Office Paper	0.0%	0	1
Magazines and Catalogs	0.0%	1	1
Phone Books and Directories	0.0%	0	0
Other Miscellaneous Paper	0.7%	31	45
Remainder/Composite Paper	1.2%	53	79
Glass	1.1%	47	69
Clear Glass Bottles and Containers	0.1%	2	4
Green Glass Bottles and Containers	0.0%	1	1
Brown Bottles and Containers	0.0%	1	2
Other Glass Bottles and Containers	0.0%	0	0
Flat Glass	0.6%	27	40
Remainder/Composite Glass	0.4%	15	22
Metal	4.0%	170	253
Tin/Steel Cans	0.0%	1	1
Major Appliances	0.7%	28	42
Used Oil Filters	0.0%	-	-
HVAC Ducting	0.1%	5	7
Other Ferrous Metal	2.4%	103	152
Aluminum Cans	0.0%	0	0
Other Non-Ferrous Metal	0.4%	16	24
Remainder/Composite Metal	0.4%	18	27
Electronics	0.2%	8	11
Brown Goods	0.0%	1	1
Computer-related Electronics	0.0%	1	2
Other Small Consumer Electronics	0.0%	2	3
Television and Other Items with CRTs	0.1%	4	6
Plastic	0.8%	34	50
PETE Containers	0.0%	0	1
HDPE Containers	0.0%	2	2
Miscellaneous Plastic Containers	0.0%	0	0
Plastic Trash Bags	0.0%	1	2
Plastic Grocery and Other Merchandise Bag	0.0%	0	0
Non-Bag Com. And Indus. Packaging Film	0.1%	3	5
Film Products	0.1%	4	5
Other Film	0.0%	1	1
Durable Plastic Items	0.2%	10	15
Expnd. Polystyr. Packaging/Insulation	0.1%	3	4
Remainder/Composite Plastic	0.2%	10	15
Organic	3.0%	126	188
Food Waste	0.0%	1	1
Leaves and Grass	0.5%	23	35
Prunings and Trimmings	0.4%	19	28
Branches and Stumps	0.1%	3	5
Agricultural Crop Residues	0.0%	-	-
Manures	0.0%	-	-
Textiles	0.2%	6	10
Carpet	1.0%	44	65
Carpet Padding	0.2%	9	14
Remainder/Composite Organics	0.5%	20	30
Construction & Demolition	86.7%	3,709	5,505
Lg Concrete with re-Bar	0.6%	26	39
Lg Concrete without re-Bar	5.2%	223	331
Sm Concrete with re-Bar	0.7%	32	47
Sm Concrete without re-Bar	4.3%	184	273
Lg Asphalt with re-Bar	0.0%	1	1
Lg Asphalt without re-Bar	8.1%	346	514
Sm Asphalt with re-Bar	0.7%	30	45
Sm Asphalt without re-Bar	1.2%	49	73
Composition Roofing	10.2%	435	646
Other Asphalt Roofing	4.4%	187	277
Other Aggregates	6.4%	273	405
Clean Dimensional Lumber	5.9%	253	376
Clean Engineered Lumber	4.5%	191	284
Pallets and Crates	1.8%	76	112
Other Recyclable Wood	3.1%	131	194
Painted/Stained Wood	4.6%	199	295
Treated Wood	0.3%	11	17
Clean Gypsum Board	4.5%	192	285
Painted/Demolition Gypsum Board	3.6%	153	227
Large Rock	0.9%	38	57
Small Rock/Gravel	0.7%	32	47
Dirt & Sand	6.6%	282	419
Fiberglass Insulation	0.2%	8	12
Remainder/Composite Construction & Demolition	8.3%	357	530
Household Hazardous Waste	0.4%	16	23
Paint	0.1%	3	4
Vehicle and Equipment Fluids	0.0%	-	-
Used Oil	0.0%	-	-
Batteries	0.3%	13	19
Remainder/Composite Household Hazardous Wast	0.0%	0	0
Special Waste	0.6%	27	39
Ash	0.0%	-	-
Sewage Solids	0.0%	-	-
Industrial Sludge	0.0%		-
Treated Medical Waste	0.0%	-	-
Bulky Items	0.6%	25	36
Tires	0.0%	2	2
Remainder/Composite Special Waste	0.0%	0	1
Mixed Residue	0.1%	3	4
Total Landfill	100.0%	4,278	6,348

Construction and Demolition – Franchised Collection

Summary of Major Waste Types

As shown in Table 7B, the top 4 major waste stream categories are:

- C&D materials, represents 86.7 percent of the C&D waste stream;
- Metal, at 4.0 percent;
- Paper, at 3.2 percent; and
- Organic waste, at 3.0 percent.

TABLE 7B

Construction and Demolition – Franchised Collection Waste Composition Major Category Ranking

Major Waste Category	Percentage	Amount 06/07	Projected 2040
Construction & Demolition	86.7%	3,709	5,505
Metal	4.0%	170	253
Paper	3.2%	139	206
Organic	3.0%	126	188
Glass	1.1%	47	69
Plastic	0.8%	34	50
Special Waste	0.6%	27	39
Household Hazardous Waste	0.4%	16	23
Electronics	0.2%	8	11
Mixed Residue	0.1%	3	4
Total Residual	100.0%	4,278	6,348

Summary of Minor Waste Types to Target for New or Expanded Programs

Table 7C provides a ranking of the top 5 minor waste categories. This information is also presented graphically in Figure 7C are:

- Composite Roofing, represents 10.2 percent of the C&D waste stream;
- Remainder/composite C&D, at 8.3 percent;
- Large Asphalt without re-Bar, at 8.1 percent;
- Dirt and Sand, at 6.6 percent; and
- Other Aggregates, at 6.4 percent.

Construction and Demolition – Franchised Collection

TABLE 7C

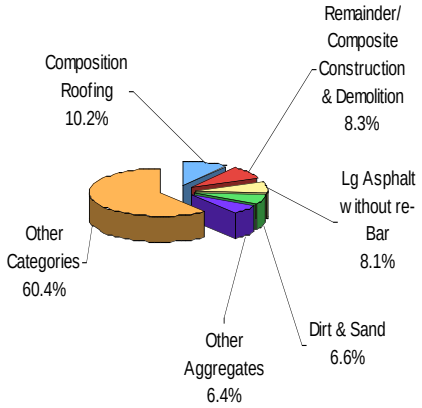
Construction and Demolition – Franchised Collection
Waste Composition Minor Category Ranking

Minor Waste Category	Percentage	Amount 06/07	Projected 2040	Minor Waste Category	Percentage	Amount 06/07	Projected 2040
Composition Roofing	10.2%	435	646	Television and Other Items with CRTs	0.1%	4	6
Remainder/Composite Construction & Demolitic	8.3%	357	530	Colored Ledger	0.1%	4	6
Lg Asphalt without re-Bar	8.1%	346	514	White Ledger	0.1%	4	5
Dirt & Sand	6.6%	282	419	Film Products	0.1%	4	5
Other Aggregates	6.4%	273	405	Branches and Stumps	0.1%	3	5
Clean Dimensional Lumber	5.9%	253	376	Non-Bag Com. And Indus. Packaging Film	0.1%	3	5
Lg Concrete without re-Bar	5.2%	223	331	Expnd. Polystyr. Packaging/Insulation	0.1%	3	4
Painted/Stained Wood	4.6%	199	295	Paint	0.1%	3	4
Clean Gypsum Board	4.5%	192	285	Mixed Residue	0.1%	3	4
Clean Engineered Lumber	4.5%	191	284	Clear Glass Bottles and Containers	0.1%	2	4
Other Asphalt Roofing	4.4%	187	277	Other Small Consumer Electronics	0.0%	2	3
Sm Concrete without re-Bar	4.3%	184	273	Tires	0.0%	2	2
Painted/Demolition Gypsum Board	3.6%	153	227	HDPE Containers	0.0%	2	2
Other Recyclable Wood	3.1%	131	194	Plastic Trash Bags	0.0%	1	2
Other Ferrous Metal	2.4%	103	152	Brown Bottles and Containers	0.0%	1	2
Pallets and Crates	1.8%	76	112	Computer-related Electronics	0.0%	1	2
Remainder/Composite Paper	1.2%	53	79	Green Glass Bottles and Containers	0.0%	1	1
Sm Asphalt without re-Bar	1.2%	49	73	Lg Asphalt with re-Bar	0.0%	1	1
Carpet	1.0%	44	65	Food Waste	0.0%	1	1
Large Rock	0.9%	38	57	Tin/Steel Cans	0.0%	1	1
Uncoated Corrigated Cardboard	0.8%	33	49	Magazines and Catalogs	0.0%	1	1
Small Rock/Gravel	0.7%	32	47	Other Film	0.0%	1	1
Sm Concrete with re-Bar	0.7%	32	47	Brown Goods	0.0%	1	1
Other Miscellaneous Paper	0.7%	31	45	PETE Containers	0.0%	0	1
Sm Asphalt with re-Bar	0.7%	30	45	Other Office Paper	0.0%	0	1
Major Appliances	0.7%	28	42	Remainder/Composite Special Waste	0.0%	0	1
Flat Glass	0.6%	27	40	Miscellaneous Plastic Containers	0.0%	0	0
Lg Concrete with re-Bar	0.6%	26	39	Aluminum Cans	0.0%	0	0
Bulky Items	0.6%	25	36	Plastic Grocery and Other Merchandise Bags	0.0%	0	0
Leaves and Grass	0.5%	23	35	Phone Books and Directories	0.0%	0	0
Remainder/Composite Organics	0.5%	20	30	Remainder/Composite Household Hazardous Was	0.0%	0	0
Prunings and Trimmings	0.4%	19	28	Other Glass Bottles and Containers	0.0%	0	0
Remainder/Composite Metal	0.4%	18	27	Computer Paper	0.0%	-	-
Other Non-Ferrous Metal	0.4%	16	24	Used Oil Filters	0.0%	-	-
Remainder/Composite Glass	0.4%	15	22	Agricultural Crop Residues	0.0%	-	-
Batteries	0.3%	13	19	Manures	0.0%	-	-
Treated Wood	0.3%	11	17	Vehicle and Equipment Fluids	0.0%	-	-
Durable Plastic Items	0.2%	10	15	Used Oil	0.0%	-	-
Remainder/Composite Plastic	0.2%	10	15	Ash	0.0%	-	-
Carpet Padding	0.2%	9	14	Sewage Solids	0.0%	-	-
Fiberglass Insulation	0.2%	8	12	Industrial Sludge	0.0%	-	-
Newspaper	0.2%	8	11	Treated Medical Waste	0.0%	-	-
Textiles	0.2%	6	10				
Paper Bags	0.1%	5	8	Total Landfill	100.0%	4,278	6,348
HVAC Ducting	0.1%	5	7				

Construction and Demolition – Franchised Collection

FIGURE 7C

Construction and Demolition – Franchised Collection
Top 5 Materials Landfilled



For the C&D waste stream, using recyclable categories for the City, the profile of recoverable and non-recoverable materials in the C&D waste stream is as follows:

- Recyclable materials amount to 45 percent of the C&D waste stream;
- Compostable categories (yard trimmings, food waste and compostable paper) amount to 1 percent;
- Potentially recyclable materials (those that may be recycled if new markets are found, or changes made to current contracts) amount to 23 percent; and
- Non-recyclable items amount to 30 percent.

Recommendations

Gather Additional Data to Quantify C&D Sector and Non-Franchised Hauler Sector

In this report, the C&D sector appears small, representing only 5.6 percent of the City's overall waste generation for 2006. However, when combined with the "Non-franchised Hauler" sector, the two sectors amount to 19.3 percent of the City's overall waste generation. It will be very difficult for the City to effectively plan to divert wastes from these sectors without knowing how much waste is generated, who handles the waste, where it originates (construction, demolition versus other sources), and what the material types are. Because the quantity of the material in these two sectors (C&D and Non-Franchised Haulers) is so large, comprising 34.6 percent of the City's remaining disposal, and

because so little is known about this waste stream, we recommend that the City conduct a thorough and comprehensive review of the waste types, waste sources, types of projects, and waste haulers of this material. The City is already planning to study a portion of these materials in the upcoming CDDD Program Review, and we recommend that the City expand the scope of that project to more completely study these waste sectors.

In addition, that review should also include an analysis of the facility needs and facility capacity for these materials.

Construction and Demolition – Franchised Collection

This page intentionally left blank.

Section 8

Non-Franchised Hauler

Introduction and Summary of Current Programs

In Sections 3 through 7 of this report, we have summarized the waste disposal and waste diversion tonnages that are tracked by the City. For fiscal year 2006/07 the total amount of waste disposal tracked by the City was 496,990 tons. However, the CIWMB web site, which reports data on a calendar year basis, indicated that a total 753,749 tons of waste was delivered to City landfills in 2006. The difference of 256,759 tons, or 13.7 percent of the total waste generated was not tracked by the City and the City has no information regarding this waste. It has been classified in this report as "Non-Franchised Hauler" material.

This is a common situation in jurisdictions throughout the State. This unaccounted-for waste is typically called "self-haul" material. In this report, we use the term "Non-Franchised Hauler" waste, to indicate that the waste may be coming from a variety of sources. The sources of the waste might include non-franchised haulers, illegal haulers, clean-up or junk removal companies, businesses or residents self-hauling their own waste, landscapers, gardeners, and C&D contractors.

Waste Generation, Characterization, and Projections through 2040

As shown in Table 2A (Summary Projection of Landfilled and Diverted Tons), the non-franchised waste stream comprises the third largest percentage of the waste stream in the City, accounting for 13.7 percent of the total waste generated.

The figures in these tables include the solid waste disposed in landfills that are not accounted for in the other sectors (SFD, MFD, Commercial, City Facilities, and C&D).

Summary of Total Tons Disposed and Diverted

Disposal from Non-franchised haulers was estimated to be 256,759 tons in FY 2006/07.

Non-Franchised Hauler

Current Diversion Rate

The diversion rate for this sector is unknown for FY 2006/07, as no diversion data are reported to the City by these haulers.

Waste Characterization Summary

Non-Franchised Solid Waste

Non-Franchised solid waste characterization data was based on the California Integrated Waste Management Boards' Characterization Study conducted in 2004. For that study, non-franchise waste was defined as "waste that is transported to the disposal site by someone other than a contracted or franchised hauler."

Table 8A provides the composition of the Non-Franchised waste stream based on the Waste Characterization Study.

Non-Franchised Hauler

TABLE 8A

Non-Franchised Waste Composition Analysis

Waste Category	Percentage	Amount 06/07	Projected 2040
Paper	7.1%	18,235	27,062
Uncoated Corrigated Cardboard	3.3%	8,569	12,717
Paper Bags	0.1%	280	415
Newspaper	0.2%	625	928
White Ledger	0.6%	1,621	2,405
Colored Ledger	0.0%	41	61
Computer Paper	0.0%	21	31
Other Office Paper	0.3%	713	1,058
Magazines and Catalogs	0.2%	631	937
Phone Books and Directories	0.1%	262	389
Other Miscellaneous Paper	1.0%	2,482	3,683
Remainder/Composite Paper	1.2%	2,990	4,438
Glass	1.0%	2,575	3,821
Clear Glass Bottles and Containers	0.4%	918	1,362
Green Glass Bottles and Containers	0.1%	192	285
Brown Bottles and Containers	0.0%	77	114
Other Glass Bottles and Containers	0.0%	38	56
Flat Glass	0.0%	98	145
Remainder/Composite Glass	0.5%	1,252	1,857
Metal	8.0%	20,585	30,549
Tin/Steel Cans	0.3%	727	1,079
Major Appliances	1.0%	2,454	3,642
Used Oil Filters	0.0%	-	-
HVAC Ducting	0.0%	-	-
Other Ferrous Metal	3.7%	9,373	13,910
Aluminum Cans	0.0%	77	114
Other Non-Ferrous Metal	0.2%	579	859
Remainder/Composite Metal	2.9%	7,375	10,945
Electronics	0.6%	1,494	2,218
Brown Goods	0.1%	240	356
Computer-related Electronics	0.2%	400	594
Other Small Consumer Electronics	0.3%	849	1,260
Television and Other Items with CRTs	0.0%	5	7
Plastic	3.9%	10,033	14,890
PETE Containers	0.1%	275	407
HDPE Containers	0.1%	192	285
Miscellaneous Plastic Containers	0.0%	98	145
Plastic Trash Bags	0.1%	252	374
Plastic Grocery and Other Merchandise Bags	0.0%	96	143
Non-Bag Com. And Indus. Packaging Film	1.2%	2,953	4,383
Film Products	0.1%	137	203
Other Film	0.2%	462	686
Durable Plastic Items	1.3%	3,228	4,791
Expnd. Polystyr. Packaging/Insulation	0.0%	-	-
Remainder/Composite Plastic	0.9%	2,340	3,472

Waste Category	Percentage	Amount 06/07	Projected 2040
Organic	14.0%	35,914	53,298
Food Waste	1.0%	2,686	3,986
Leaves and Grass	2.8%	7,262	10,777
Prunings and Trimmings	1.2%	3,197	4,744
Branches and Stumps	0.8%	2,033	3,017
Agricultural Crop Residues	0.0%	-	-
Manures	0.0%	-	-
Textiles	0.8%	2,011	2,984
Carpet	4.5%	11,483	17,042
Carpet Padding	0.0%	-	-
Remainder/Composite Organics	2.8%	7,243	10,749
Construction & Demolition	54.6%	140,099	207,913
Concrete	6.2%	15,829	23,491
Asphalt Paving	0.0%	101	150
Asphalt Roofing	7.1%	18,138	26,917
Lumber	21.5%	55,301	82,069
Gypsum Board	5.3%	13,505	20,042
Rock, Soil, & Fines	5.0%	12,827	19,036
Remainder/Composite Construction & Demolition	9.5%	24,398	36,208
Household Hazardous Waste	0.1%	258	383
Paint	0.0%	39	57
Vehicle and Equipment Fluids	0.0%	30	44
Used Oil	0.0%	2	4
Batteries	0.0%	69	102
Remainder/Composite Household Hazardous Waste	0.0%	118	175
Special Waste	10.6%	27,108	40,229
Ash	0.3%	771	1,145
Sewage Solids	0.0%	-	-
Industrial Sludge	0.0%	-	-
Treated Medical Waste	0.0%	-	-
Bulky Items	10.2%	26,219	38,910
Tires	0.0%	77	115
Remainder/Composite Special Waste	0.0%	40	59
Mixed Residue	0.2%	458	679
Total Landfill	100.0%	256,759	381,041

Non-Franchised Hauler

Summary of Major Waste Types

Table 8B provides a ranking of the major waste categories, as presented in the CIWMB study, based on disposal tonnages. "Major" categories are the names of groups of materials, and "minor" categories are the sub-groups, or individual material types. This information is also presented graphically in Figure 8B. As shown in Table 8B, the top 5 major waste stream categories are:

- C&D wastes comprise the majority of the material from non-franchise haulers that is still being disposed, at 54.6 percent of the non-franchise waste stream;
- Organic waste at 14.0 percent;
- Special Waste at 10.6 percent;
- Metal at 8 percent; and
- Recyclable paper at 7.1 percent.

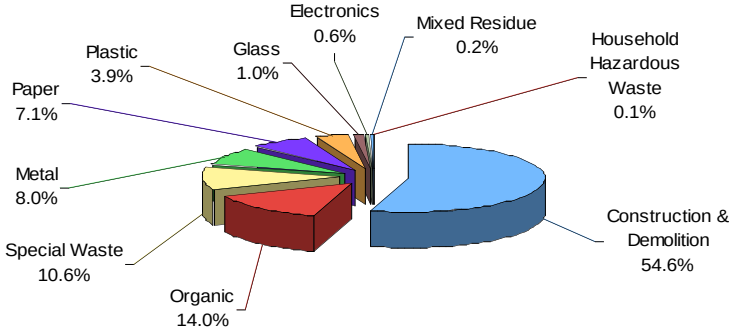
TABLE 8B

Non-Franchised Waste Composition
Major Category Ranking

Major Waste Category	Percentage	Amount 06/07	Projected 2040
Construction & Demolition	54.6%	140,099	207,913
Organic	14.0%	35,914	53,298
Special Waste	10.6%	27,108	40,229
Metal	8.0%	20,585	30,549
Paper	7.1%	18,235	27,062
Plastic	3.9%	10,033	14,890
Glass	1.0%	2,575	3,821
Electronics	0.6%	1,494	2,218
Mixed Residue	0.2%	458	679
Household Hazardous Waste	0.1%	258	383
Total Residual	100.0%	256,759	381,041

FIGURE 8B

Non-Franchised Waste Composition
Major Category Ranking



Summary of Minor Waste Types to Target for New or Expanded Programs

Non-Franchised Hauler

Table 8C provides a ranking of the individual waste categories sampled in the Cascadia study. This information is also presented graphically in Figure 8C.

As shown in Figure 8C, the top 5 minor recoverable waste categories are:

- Lumber represents the largest material type in the non-franchise waste stream at approximately 21.5 percent,
- Bulky Items at approximately 10.2 percent;
- Asphalt roofing at 7.1 percent
- Concrete at 6.2 percent; and
- Gypsum Board at 5.3 percent.

TABLE 8C

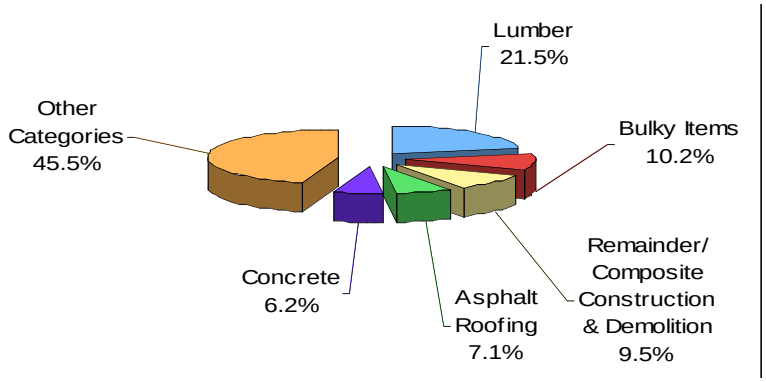
Non-Franchised Waste Composition
Minor Category Ranking

Minor Waste Category	Percentage	Amount 06/07	Projected 2040	Minor Waste Category	Percentage	Amount 06/07	Projected 2040
Lumber	21.5%	55,301	82,069	Phone Books and Directories	0.1%	262	389
Bulky Items	10.2%	26,219	38,910	Plastic Trash Bags	0.1%	252	374
Remainder/Composite Construction & Demolition	9.5%	24,398	36,208	Brown Goods	0.1%	240	356
Asphalt Roofing	7.1%	18,138	26,917	Green Glass Bottles and Containers	0.1%	192	285
Concrete	6.2%	15,829	23,491	HDPE Containers	0.1%	192	285
Gypsum Board	5.3%	13,505	20,042	Film Products	0.1%	137	203
Rock, Soil, & Fines	5.0%	12,827	19,036	Remainder/Composite Household Hazardous Waste	0.0%	118	175
Carpet	4.5%	11,483	17,042	Asphalt Paving	0.0%	101	150
Other Ferrous Metal	3.7%	9,373	13,910	Flat Glass	0.0%	98	145
Uncoated Corrigated Cardboard	3.3%	8,569	12,717	Miscellaneous Plastic Containers	0.0%	98	145
Remainder/Composite Metal	2.9%	7,375	10,945	Plastic Grocery and Other Merchandise Bags	0.0%	96	143
Leaves and Grass	2.8%	7,262	10,777	Tires	0.0%	77	115
Remainder/Composite Organics	2.8%	7,243	10,749	Aluminum Cans	0.0%	77	114
Durable Plastic Items	1.3%	3,228	4,791	Brown Bottles and Containers	0.0%	77	114
Prunings and Trimmings	1.2%	3,197	4,744	Batteries	0.0%	69	102
Remainder/Composite Paper	1.2%	2,990	4,438	Colored Ledger	0.0%	41	61
Non-Bag Com. And Indus. Packaging Film	1.2%	2,953	4,383	Remainder/Composite Special Waste	0.0%	40	59
Food Waste	1.0%	2,686	3,986	Paint	0.0%	39	57
Other Miscellaneous Paper	1.0%	2,482	3,683	Other Glass Bottles and Containers	0.0%	38	56
Major Appliances	1.0%	2,454	3,642	Vehicle and Equipment Fluids	0.0%	30	44
Remainder/Composite Plastic	0.9%	2,340	3,472	Computer Paper	0.0%	21	31
Branches and Stumps	0.8%	2,033	3,017	Television and Other Items with CRTs	0.0%	5	7
Textiles	0.8%	2,011	2,984	Used Oil	0.0%	2	4
White Ledger	0.6%	1,621	2,405	Agricultural Crop Residues	0.0%	-	-
Remainder/Composite Glass	0.5%	1,252	1,857	Carpet Padding	0.0%	-	-
Clear Glass Bottles and Containers	0.4%	918	1,362	Expnd. Polystyr. Packaging/Insulation	0.0%	-	-
Other Small Consumer Electronics	0.3%	849	1,260	HVAC Ducting	0.0%	-	-
Ash	0.3%	771	1,145	Industrial Sludge	0.0%	-	-
Tin/Steel Cans	0.3%	727	1,079	Manures	0.0%	-	-
Other Office Paper	0.3%	713	1,058	Sewage Solids	0.0%	-	-
Magazines and Catalogs	0.2%	631	937	Treated Medical Waste	0.0%	-	-
Newspaper	0.2%	625	928	Used Oil Filters	0.0%	-	-
Other Non-Ferrous Metal	0.2%	579	859				
Other Film	0.2%	462	686				
Mixed Residue	0.2%	458	679	Total Landfill	100.0%	256,759	381,041
Computer-related Electronics	0.2%	400	594				
Paper Bags	0.1%	280	415				
PETE Containers	0.1%	275	407				

Non-Franchised Hauler

FIGURE 8C

Non-Franchised
Top 5 Materials Landfilled



We categorized the minor waste types into four groups: Recyclable, Compostable, Potentially Recyclable, and Non-recyclable.

For Non-Franchised waste, using recyclable categories for the City, the profile of recoverable and non-recoverable materials in the non-franchised waste stream is as follows:

- Recyclable materials amount to 45 percent of the Non-Franchised waste stream (using the City's standard recycling categories);
- Compostable categories (yard trimmings, food waste and compostable paper) amount to 6 percent;
- Potentially recyclable materials (those that may be recycled if new markets are found, or changes made to current contracts) amount to 23 percent; and,
- Non-recyclable items amount to 26 percent.

Recommendations

- Establish reporting requirements for certified CDDD and solid waste facilities to identify non-franchise tonnage and diversion amounts. These new reporting requirements should be developed as part of the overall CDDD program review.
- Require certified facilities to report inbound and diverted tons based on Franchise haulers, CDDD material, the City's non-franchise (non-CDDD) material, and all material originating outside of the City; and
- Adopt a policy that defines best management practices and end use markets for diverted material.

Section 9

Alternative Daily Cover

Introduction and Summary of Data Collection

Materials that are recycled at a landfill, or used as soil cover material, Alternative Daily Cover (ADC) and Alternative Intermediate Cover (AIC), or inert construction material for tipping pads and road beds are not considered "disposal," and therefore have a beneficial effect on diversion rates. Some materials that are not designated as disposal are also not subject to the City's Disposal Facility Tax, and none are currently subject to City or County AB 939 fees, or the state fee on landfilled waste. We have included ADC in this report as a separate sector, though ADC materials may actually come from all of the other sectors in the City. In particular, much ADC waste may have originated from the Construction and Demolition and Non-Franchised Hauler sectors, but there is no reliable data to document this.

Several material types can be used as ADC. The types of materials from the City that were used as ADC in 2006 included:

- Yard Trimmings;
- Mixed C&D;
- Auto Shredder Fluff;
- Sludge; (Sludge was also used for AIC)
- Compost; and
- Other materials (not specified.)

The California Integrated Waste Management Board ("CIWMB") requires landfills to report ADC use, including material types and tonnage. These amounts are reported on the CIWMB web site. R3 obtained and summarized ADC data from thirty-two landfills, from 2002 to 2007. CIWMB has published data through 2006. The 2007 data was obtained through a county-by-county data gathering effort and is considered preliminary and subject to change before being published.

In addition, individual counties require reporting of additional material uses. Materials used for other purposes at landfills, including AIC, recycled materials, and use of inert waste as construction materials on-site, are summarized in reports sent to the counties by the facilities, but are not included on the CIWMB web site. The additional landfill diversion material types that are reported at the County level, but not included on the CIWMB web site, include the following:

- Recycled materials;
- ADC roofing;
- Inert mixed construction;
- Inert concrete;
- Inert various;
- Inert shingles;
- Inert hazardous asbestos;
- Inert non-hazardous; and,
- Inert tire.

R3 researched the ADC, AIC and other materials diverted at landfills, obtaining information from both the CIWMB web site, and by contacting individual counties to obtain county-wide reports on materials diverted and beneficially reused on-site at landfills.

Waste Generation, Characterization, and Projections through 2040

Table 9A shows the ADC totals, by material type, for 2002 through 2006. The preliminary total for 2007 is shown as well. Of all the sectors studied for this report, ADC has the most varied history, in terms of total tonnage per year. For example, ADC totals were nearly 239,000 tons in 2002, dropped to just over 102,000 tons in 2003, rose to over 208,000 tons in 2005, and have declined to 109,000 tons for 2007. See Figure 9A for a graphical representation of the historical ADC tonnage totals.

Alternative Daily Cover

TABLE 9A

City of San José
ADC Totals, 2002 - 2007

Alternate Daily Cover - Total	2002*	2003*	2004*	2005*	2006*	2007 est.**
Pacheco Pass Sanitary Landfill	210	180	95	56	-	-
Zanker Material Processing Facility		-	-	-	1,730	3,078
Newby Island Sanitary Landfill	92,380	3,691	60,122	86,734	66,812	39,637
Zanker Road Class III Landfill	-	-	-	-	656	106
Kirby Canyon Recycle. - Disp. Facility	64,397	21,616	16,472	69,599	61,595	28,173
Guadalupe Sanitary Landfill	79,276	64,669	51,099	29,624	22,775	17,160
Tri Cities Recycling - Disposal Fac	61	12,384	31,864	22,142	11,269	*19,415*
Altamont Landfill - Resource Recovery	1,497	92	107	15	62	*69*
Vasco Road Sanitary Landfill	743	-	-	-	3	*1*
West Contra Costa landfill	-	-	-	-	62	*16*
Monterey Regional Wst Mgmt Dst/Marina LF	20	50	31	38	76	78
Forward, Inc.	-	4	19	6	16	*11*
Potrero Hills Landfill	20	25	756	32	18	919
Keller Canyon Landfill	-	16	-	-	-	
Arvin Sanitary Landfill	-	-	-	-	-	
Bakerfield S.L.F.(BENA)	-	-	-	-	-	
Avenal Landfill	-	-	-	-	-	
CWMI - B18 Nonhazardous Codisposal	-	-	-	-	-	
Azusa Land Reclamation Co, Inc.	-	-	26	7	-	
Redwood Sanitary Landfill	-	10	2	-	-	
Highway 59 Disposal Site	-	-	-	-	-	
Billy Wright Disposal Site	-	-	-	-	-	
Crazy Horse Sanitary Landfill	-	-	-	-	-	
Sacramento County Landfill (Kiefer)	36	-	-	-	-	
L - D Landfill Co	-	-	-	-	-	
John Smith Road Class III Landfill	-	-	-	-	-	
Foothill Sanitary Landfill	-	-	-	-	-	
North County Landfill	-	-			-	
OX Mountain Sanitary Landfill	38	9	31	20	12	
B - J Dropbox Sanitary Landfill	-	-	-	-	-	
Fink Road Landfill	-	-	-	-	-	
Covanta Stanislaus, Inc.	-	-	-	-	-	
Total Tons	238,678	102,746	160,624	208,273	165,086	108,662

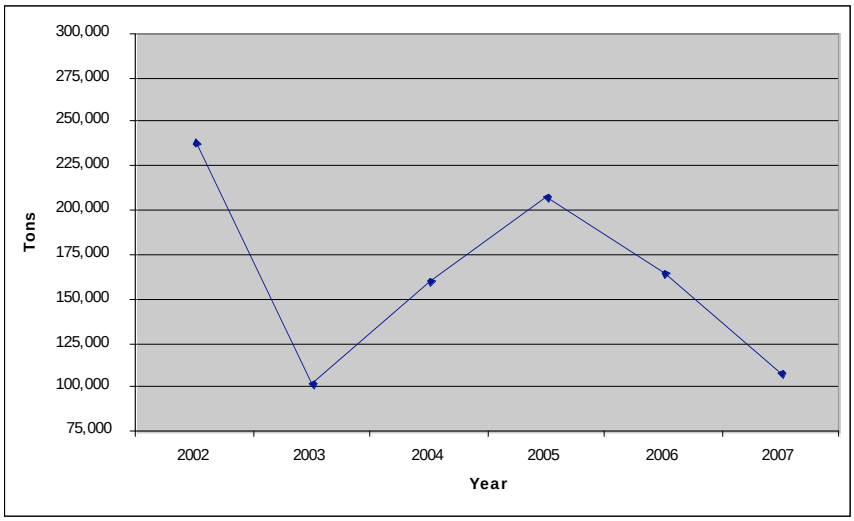
* 2002 - 2006 data was obtained from the CIWMB website

** County Landfill Facility Quarterly Reporting & Fee Remittance Forms and Quarterly Facility Summary for Santa Clara County were only available for the 1st, 2nd & 3rd quarters of the year. Estimates were made by dividing available data by 3 and multiplying the result by 4.

Alternative Daily Cover

FIGURE 9A

City of San José
ADC Totals, 2002 - 2007



Summary of Total Tons Disposed and Diverted

The ADC total for 2006 was 165,086 tons, or nearly 9 percent of overall waste generation.

Summary of Major Waste Types

As shown in Table 9B, the top 5 major ADC waste types in 2006 categories were:

- C&D at 63.6 percent;
- ADC green waste at 25.3 percent;
- ADC Mixed Waste at 10.2 percent;
- Sludge at .76 percent; and
- Other at .05 percent.

TABLE 9B

ADC from Material Originating in San José

ADC Type	Tonnage 2006
ADC C&D Debris	105,059
ADC Green Waste	41,818
ADC Sludge	1,257
ADC Mixed	16,875
Other ADC	77
ADC Tonnage Total	165,086

Alternative Intermediate Cover

The CIWMB does not include AIC data on its web site. R3 obtained AIC data from Santa Clara County for 2006. One site, the Newby Island Sanitary Landfill, used nearly 212,000 tons of material as AIC. Of that total, approximately 65,000 tons was labeled, "beneficial reuse," and approximately 146,000 tons was "sludge."

Recommendations

By state law, ADC use already "counts" as diversion, by virtue of the fact that it does not "count" as disposal. However, there are concerns that ADC may be over-used in the City, and that the materials being used as ADC could be diverted and used for other, "Higher and Better" uses. In addition, during the planning period (through 2040), many landfills will close, affecting both waste disposal and ADC use. The following summary of the landfill capacity forecast is taken from "Attachment B, San José Disposal Capacity," from the Zero Waste Goals staff report to the Transportation and Environment Committee on September 20, 2007:

> *"Santa Clara County's "Five-Year Integrated Waste Management Plan Report" shows that the six landfills in Santa Clara County are expected to reach capacity from 2010 (Palo Alto) to 2034 (Kirby Canyon). However, these dates are based on current flows to each site, and do not address the results of each closure as it happens. With the most heavily used site in the County, Newby Island, expected to close by 2024, and to cut off non-contracted business much sooner than that, Guadalupe and Kirby Canyon Landfills will almost certainly see increased flows, resulting in their capacity being exhausted sooner than they now project."*

Alternative Daily Cover

Even if Kirby Canyon is stays open through an extended lease term until 2034, as has been reported, their permitted daily capacity is only sufficient to handle about 90% of the waste materials (whether disposed or diverted) currently handled by Kirby and Guadalupe.

Since ADC has ranged from 100,000 tons per year to nearly 240,000 tons per year for the last six years, and since one site received over 200,000 tons of material in 2006 as AIC, together, ADC and AIC are nearly as large as the combined disposal of single-family and commercial (franchised) waste. It should be noted that site operators have reported that large quantities of the materials reported as cover soils, ADC, or AIC have been stockpiled for use in subsequent years or at closure.

The City has already been working to minimize use of materials as ADC, and to ensure that materials are destined for the "highest and best use." A City representative is participating in a CIWMB-organized task force to create long-term recommendations about ADC use statewide. In the future, state law or state regulations may limit or eliminate the use of green waste as ADC.

In addition, the City's residential contracts require yard trimmings haulers to use yard trimmings as compost or mulch, rather than ADC. The same policy will be recommended for the commercial redesign process.

As mentioned in the Construction and Demolition debris section, the City will also be reviewing material uses as part of the more comprehensive review of the CDDD program.

With these on-going efforts in mind, our recommendations include:

- Prepare a more comprehensive ADC report that examines long-term trends and forecasts of ADC use, summary of the haulers that are delivering ADC of various material types to landfills, alternatives to ADC that are available to those haulers, and medium- and long-term capacity projections for ADC and AIC that would take into account upcoming landfill closures. This may be completed as part of the upcoming CDDD program review and the commercial redesign process.
- Continue contract practices and pursue other efforts and policies in the City that seek to minimize ADC use.
- Participate in CIWMB Organics Roadmap activities that provide tools for minimizing green waste removal as ADC, such as compost market development, specification and use ordinances.

Appendix B

Final Report

Assessment of Infrastructure for the Integrated Waste Management Zero Waste Strategic Plan Development

Presented to:

City of San José

Environmental Services Department

November 3, 2008

R3 Consulting Group, Inc.
Resources, Respect, Responsibility

Table of Contents

Table of Contents

Section 1: Introduction 1-1
Background 1-1
Methodology 1-2
Limitations 1-2
Objective 1-3

Section 2: Major Findings and Assessments 2-1
Current Waste Management System 2-1
Summary of Facility Needs Through 2040 2-10
Future Capacity and Land Use Issues 2-14
Summary of Planned Facility Changes 2-17
Changes in Movement of Material 2-18

Tables

Table 2.1 - Total Available Capacity of Landfills in the City of San José, 2008 – 2040 2-3
Table 2.2 – Tons Landfilled from the City of San José, per the CIWMB's Disposal Reporting System 2-3
Table 2.3 – Available Capacity – 2007 Tonnages 2-9
Table 2.4 – Needs for Recycling Processing Capacity in Excess of Capacity Currently Being Used (Mixed Recyclables for Residential and Commercial Sources) 2-12
Table 2.5 – Needs for C&D Debris Processing Capacity in Excess of Capacity Currently Being Used (Materials from C&D, Self-Haul and Non-Franchised Haulers) 2-12
Table 2.6 – Needs for Composting Facility Capacity in Excess of Capacity Currently Being Used (Materials from All Sources) 2-13
Table 2.7 – Minimum Need for Landfill or Other Disposal / Transformation Capacity if All Potential Materials are Recycled or Composted (Non-Recyclable Materials from All Sources) 2-13
Table 2.8 – Current Capacity and Projected Future Capacity By 2013 2-18

R3

Table of Contents

This page intentionally left blank.

Section 1

Introduction

Background

In 2007, the City Council of San José (City) requested staff to develop an Integrated Waste Management (IWM) Zero Waste Strategic Plan that will establish policy as it relates to the City's waste management program through the year 2040. The City's objectives are to provide for resource conservation, waste reduction, pollution prevention and a healthy economy. The Zero Waste Strategic Plan development process will address the following key components for achieving Zero Waste:

- Strengthen recycling programs;
- Identify infrastructure requirements for reuse, recycling and composting;
- Establish effective waste prevention programs, incentives and fee structures; and,
- Identify economic development opportunities from expanding solid waste processing facilities and industries using recycled materials as feedstock.

The City passed a resolution establishing the goal of achieving 75 percent waste diversion by 2013, and achieving Zero Waste by 2022. Staff has reviewed Zero Waste plans from other cities and found that many of the initiatives under development by other Zero Waste cities are already being implemented or planned for the City.

R3 Consulting Group Inc., (R3) along with our subcontractor, Environmental Planning Consultants (EPC), were retained by the City of San José to prepare this Assessment of Infrastructure to:

- Summarize the City's current waste management system including all landfills, transfer stations, and waste processing facilities used by the City;
- Identify the need for future facilities, based on a review of the current waste management system and information from the accompanying report, the Needs Assessment; and,
- Develop land use recommendations regarding needs for solid waste management infrastructure to assist with development of the City's General Plan 2040. These land use recommendations may relate to the City's Water Pollution Control Plant or other City or privately controlled property.

In order to meet proposed waste reduction goals, the IWM Zero Waste Strategic Plan will consider key strategies such as food waste composting, reducing packaging, extended producer responsibility, the commercial solid waste system design, improved services for multi-family dwellings, and many other programs. Staff will also evaluate opportunities for generating energy from selected waste materials.

Introduction

Relationship to Other Studies Being Conducted for the City's IWM Zero Waste Strategic Plan

This Assessment of Infrastructure is only one of a suite of studies that are being conducted to gather information for the City's IWM Zero Waste Strategic Plan. These studies include:

- A Needs Assessment to estimate the amounts and types of waste needed to be diverted now through 2040;
- A review of the Construction and Demolition Diversion Deposit Program (CDDD);
- A Commercial Solid Waste System Redesign and Enhancement Options Study;
- A Waste Characterization Study for Single-Family Waste, MRF Residuals and Commercial Waste; and
- An Analysis of Alternative Financing and Revenue-Generating Mechanisms.

As part of this study we identified and contacted 27 facilities serving the City, including: five landfills, nine recycling and transfer stations, five composting facilities, and eight mixed materials construction and demolition (C&D) debris processing facilities. There are many other facilities that primarily handle a single type of material (such as scrap metal, paper, or concrete). These facilities were excluded from this facility capacity survey.

Methodology

Information for this report was obtained from:

- A review of facility data on the California Integrated Waste Management Board's (CIWMB) Solid Waste Information System (SWIS) website;
- Reports submitted by the facilities to the City;
- Interviews with facility operators and site visits to selected facilities; and,
- Telephone follow-up interviews with site operators for key information.

Limitations

Data Not Available: Most of the facilities studied handle materials from more than one source (either a mix of residential and commercial, or similar materials from more than one jurisdiction). However, detailed data were not available on the sources of materials for all facilities. This report includes as much data as were available, particularly for construction and demolition debris.

Introduction

Facilities are often permitted to receive more than one material type within their allowed tonnage. Many of the facilities permitted to receive construction wastes may also be permitted to receive municipal solid wastes (MSW). To help clarify the current capacity for C&D materials Table 2.3 of this report lists the mixed C&D processors studied and their permitted capacity. However, the facilities in Table 2.3 are also permitted to receive materials other than C&D, so to the extent that they receive MSW, they reduce the amount of C&D materials they can receive.

Some processing facilities separate mixed loads and ship the residual materials to another processing facility. For example, in 2007 Premier Recycling hauled approximately 14,000 tons of its residual material to the Kirby Canyon Landfill. That same 14,000 tons is shown as received at both Premier and Kirby. Also, the two Zanker landfills each receive materials that get reloaded and shipped to landfills outside the County.

Data Sets: Facilities are issued permits for the maximum tonnage that can be received on any day. It would be rare for a facility to be able to receive the maximum permitted tonnage (and only the maximum permitted tonnage) each day it was operating. Facilities are permitted to operate six or seven days a week, but the wastes or recyclables are only collected five or six days a week. Some material generation rates vary seasonally. So the actual throughput could never be expected to equal the permitted capacity. To more accurately reflect the actual conditions, the permitted capacity for each facility identified in Table 2.1 is based on operating six days a week, rather than seven days a week; except for the four facilities that receive wastes only from the City's residential collection program, which operates five days a week.

Future Capacity and Need: Most facilities contacted cooperated willingly in this survey, however they were reluctant to make predictions about future operations, especially beyond five years.

Objective

The goal of this report is to estimate whether enough facility capacity exists to handle all the recycling and processing needed to accomplish zero waste goals. To determine this, the following objectives must be met:

- Describe the City's current waste management system, identifying the current facilities used to handle the City's waste, including:
    - Landfills;
    - Recycling and Transfer Stations;
    - Composting Facilities; and,
    - Mixed Materials C&D processing facilities;
- Quantify the capacity needed in tons for processing, transfer, and landfill facilities through 2040;

R3

Introduction

- Quantify the "gap" between current facility availability and future facility needs; and,
- Describe the land use necessary to provide the City with sufficient capacity to handle its waste locally.

Current Waste Management System

Landfills

There are currently five operational landfills in the City. Since two of the facilities have nearly identical names, we have included the unique CIWMB permit number as an additional identifier for each facility. The facility closure dates listed below were obtained from the CIWMB's SWIS database.

1. The Guadalupe Mines Landfill [43-AN-0015-01] is owned by Waste Management, has a maximum permitted throughput of 3,650 tons per day (tpd), and is projected to close in 2021. The facility is permitted to accept C&D, mixed municipal wastes, industrial wastes, and yard trimmings.

   A total of 240,945 tons were disposed of in the Guadalupe Mines Landfill in 2007. The landfill received 425,963 tons from the City (158,056 tons[1] disposed plus 267,907 tons of C&D) in 2007, for an average of about 1,335 tpd[2]. The tonnage disposed from the City has been increasing over the last four years.

2. The Kirby Canyon Recycling & Disposal Facility [43-AN-0008-01] is owned by Waste Management, and has a maximum permitted throughput of 2,600 tpd. Kirby Canyon Recycling & Disposal is projected to close before 2025. The facility is permitted to accept mixed municipal waste, industrial waste, C&D waste, tires, and yard trimmings.

   A total of 208,331 tons were disposed of in the Kirby Canyon Recycling & Disposal Facility in 2007. The landfill received 335,138 tons from the City (19,972 tons disposed plus 315,166 tons of C&D) in 2007, for an average of about 1,075 tpd[2]. The tonnage disposed trend for the City is down from a high of 104,314 tons in 2005, and 61,456 tons in 2006.

3. The Newby Island Landfill [43-AN-0003-01] is owned by Allied Waste, has a maximum permitted throughput of 4,000 tpd, and is projected to close in 2021. The landfill currently is in the process of requesting an expansion that will allow it to operate at least through 2024. The facility is permitted to accept C&D waste,

---

[1] County Landfill Facility Quarterly Reporting & Fee Remittance Forms and Quarterly Facility Summary for Santa Clara County were only available for the 1st, 2nd and 3rd quarters of the year. Estimates were made by dividing available data by 3 and multiplying the result by 4.

[2] An average was found by dividing the total tons received by 312 operational days per year.

Major Findings and Assessments

industrial waste, mixed municipal waste, sludge (biosolids), tires, yard trimmings, and contaminated soil.

A total of 608,655 tons were disposed of in the Newby Island Landfill in 2007. The landfill received 608,663 tons from the City (an average of about 1,950 tpd[2]). The City disposed of 392,063 tons[1] at Newby Island Landfill (an average of about 1,255 tpd[2]) in 2007; the tonnage received trend is down from the high in 2006.

4. The Zanker Road Materials Processing Facility (ZMPF) [43-AN-0001-01] is owned by Zanker Road Resource Management, Limited. It has a maximum permitted throughput of 1,250 tpd, with no closure date projected because few tons are disposed of annually on-site. The facility is permitted to accept C&D waste, and other designated inert materials (but no MSW).

   A total of 11,882 tons were disposed of in the ZMPF in 2007. The landfill received 194,196 tons from the City in 2007; and disposed of 3,969 tons[1], for and average of about 13 tpd[2]. The remainder was processed for recycling. The tonnage received from the City has been decreasing over the last three years.

5. The Zanker Road Landfill (ZRL) [43-AN-0007-01] is owned by Zanker Road Resource Management, Limited. It has a maximum permitted throughput of 2,600 tpd, with no closure date projected because they use so little capacity annually. The facility is permitted to accept C&D, yard trimmings, industrial wastes, and tires.

   A total of 7,780 tons were disposed of in the ZRL in 2007. The landfill received 296,600 tons from the City in 2007 and disposed of 3,699 tons[1], for an average of about 12 tpd[2]. The tonnage received at ZRL from the City has been decreasing over the last three years[1].

The total permitted landfill capacity of the five operating landfills in the City is 14,450 tpd, or 5,275,000 tons per year, based on operating seven days a week, or almost 4,500,000 tons per year based on operating six days a week. The total tonnage received at these landfills from the City is approximately 1,850,500 tons per year. The actual tonnage disposed of from the City in these landfills in 2007 was less than 578,000 tons, or only about 1,850 tpd on average.

The Guadalupe Mines, Kirby Canyon, and Newby Island landfills are projected to close some time between 2020 and 2025. Because they bury so little tonnage, the ZMPF and the ZRL are expected to continue operating beyond 2025.

Major Findings and Assessments

TABLE 2.1 Total Available Capacity of Landfills in the City of San José, 2008 - 2040								
Capacity	2008	2010	2015	2020	2025	2030	2035	2040
Tons/Day	14,450	14,450	14,450	14,450	4,200	4,200	4,200	4,200
Tons/Year (in millions)	5.3	5.3	5.3	5.3	1.5	1.5	1.5	1.5

Note: This table reflects the closure of the Guadalupe Mines, Kirby Canyon and Newby Island landfills between 2020 and 2025, and the ZMPF and ZRL continuing to operate. However, at the current fill rates, if all of the wastes from the City were diverted to the two Zanker Road facilities they would only have about one year of capacity, and hence would also have to close before 2025. Additionally, if the current trend of less waste being landfilled each year continues, the actual closure dates for the Guadalupe Mines, Kirby Canyon and Newby Island landfills could be much later.

TABLE 2.2 Tons Landfilled from the City of San José, per the CIWMB's Disposal Reporting System						
Municipal Solid Waste	2002*	2003*	2004*	2005*	2006*	2007**
Newby Island Sanitary Landfill	404,334	420,268	393,447	405,638	434,832	392,063
Guadalupe Sanitary Landfill	79,648	86,876	76,730	89,099	131,433	158,056
Potrero Hills Landfill	72,441	68,066	78,985	51,361	54,288	69,369
Kirby Canyon Landfill	81,408	76,529	85,875	104,314	61,456	19,972
Altamont Landfill	2,993	1,063	2,740	2,216	23,124	16,931
John Smith Road Class III Landfill	-	2	1	11,565	17,960	15,301
West Contra Costa Landfill	n/a	8	20	21,449	5,667	*6,786*
CWMI - Nonhazardous Co-disposal	316	16,119	236	335	120	*4,203*
Zanker Material Processing Facility	6,011	9,612	12,872	7,968	5,613	3,969
Zanker Road Class III Landfill	9,143	7,941	7,330	6,986	5,530	3,699
Forward, Landfill	941	1,403	2,204	2,376	3,902	1,974
Crazy Horse Sanitary Landfill	n/a	n/a	1,736	2,573	1,411	1,111

R3

Major Findings and Assessments

TABLE 2.2

Tons Landfilled from the City of San José, per the CIWMB's Disposal Reporting System

Municipal Solid Waste	2002*	2003*	2004*	2005*	2006*	2007**
Vasco Road Sanitary Landfill	266	538	908	758	4,474	987
OX Mountain Sanitary Landfill	631	713	948	824	749	*809*
Azusa Land Reclamation Co, Inc.	341	584	858	771	400	*653*
Monterey Region WMD / Marina LF	196	332	294	453	380	419
B-J Dropbox Sanitary Landfill	63	140	814	234	164	*338*
Pacheco Pass Sanitary Landfill	2,194	1,378	146	223	26	193
Fink Road Landfill	65	26	75	41	17	108
Bakersfield S.L.F.(BENA)	n/a	29	56	38	93	*54*
Covanta Stanislaus, Inc.	53	53	67	27	41	*47*
Keller Canyon Landfill	128	76	237	2,683	2,051	41
Billy Wright Disposal Site	3	19	42	37	11	*27*
Avenal Landfill	n/a	n/a	n/a	n/a	5	*5*
Redwood Sanitary Landfill	12	5	9	-	-	*4*
Foothill Sanitary Landfill	3	5	1	6	1	*3*
Highway 59 Disposal Site	n/a	4	-	-	n/a	1
Tri Cities Recycling - Landfill	-	-	-	-	-	-
Arvin Sanitary Landfill	137	48	n/a	n/a	n/a	-
Sacramento County Landfill (Kiefer)	3,171	842	4,330	n/a	n/a	
L-D Landfill Co	n/a	n/a	21	n/a	n/a	
North County Landfill	-	7	n/a	n/a	1	-
Total Municipal Solid Waste	664,498	692,686	670,982	711,975	753,749	697,123

* 2002 - 2006 data was obtained from the CIWMB website

** County Landfill Facility Quarterly Reporting & Fee Remittance Forms and Quarterly Facility Summary for Santa Clara County were only available for the 1st, 2nd & 3rd quarters of the year. Estimates were made by dividing available data by 3 and multiplying the result by 4.

R3

Major Findings and Assessments

MRF / Transfer Stations

Many of the Material Recovery Facilities (MRFs) in the area are permitted as transfer stations as well. Transfer Stations are solid waste facilities that receive more than 10 percent garbage, but are not landfills. These fall into two groups in the City; those that primarily receive wastes that will be transferred to a landfill with little or no processing, and those that receive recyclables for processing that are contaminated to the level that a solid waste facility permit is required. Since some of the facilities have nearly identical names, we have included the unique CIWMB permit number as an identifier for each facility. The Mission Trail Station is in the city of Santa Clara; all of the other stations are in San José.

1. The California Waste Solutions (CWS) MRF [43-AN-0024-01] processes Single Stream Recyclables from the City's single-family residential recycling collection program in Service Districts A and C. Based on a residue rate above 10 percent, the facility has had to be permitted as a Solid Waste Facility. It is permitted to receive 530 tpd. By operating five days a week it has a maximum capacity of 137,800 tons per year. Reports to the City indicate that the CWS MRF received about 91,520 tons in 2007.

2. The GreenTeam MRF [43-AN-0020] at 575 Charles Street is owned by Waste Connections, and receives and processes Single Stream Recyclables from the City's Service District B single-family residential collection program and from the City's multi-family recycling program citywide; and single stream recyclables from the West Valley cities. A report to the City indicates that the GreenTeam MRF received about 65,000 tons in 2007.

3. GreenTeam operates a direct transfer operation at its MRF [43-AN-0020-01] at 575 Charles Street to transfer small loads of garbage from split body garbage and recycling trucks and consolidate those loads for the trip to Newby Island Landfill to reduce time spent in traffic with a light load of garbage. In direct transfer, the garbage is unloaded from the split body trucks directly into transfer trailers, without ever touching the ground. Prior to July 2008, this facility was also used to transfer some garbage collected from multi-family residences to Z-Best for processing and composting. This direct transfer operation is permitted at up to 149 tpd, or about 38,740 tons per year while operating five days a week. Reports to the City indicate that the GreenTeam direct transfer facility received and direct transferred a total of about 25,000 tons in 2007. In 2008, as a result of the City's expansion of its multifamily recycling program, with all multi-family garbage delivered directly to GreenWaste Recovery for processing, the GreenTeam direct transfer site is currently receiving less material than it did in 2007, and therefore currently has more available capacity than it did in 2007.

4. GreenTeam is also permitted to operate a direct transfer operation in its corporation yard at 1333 Oakland Road [43-AN-0022-01]. It

R3

Major Findings and Assessments

is permitted to receive small loads from split body garbage and recycling trucks which are consolidated for the trip to Newby Island Landfill to reduce time spent in traffic with a light load of garbage. This direct transfer operation is permitted at up to 149 tpd, or about 38,740 tons per year while operating five days a week. However, while it does have a permit, this facility has never been operated as a direct transfer site.

5. The GreenWaste Recovery MRF [43-AN-0019-01] has recently undergone a major redesign and expansion to increase the throughput and recovery rate, while reducing on-going operating costs. The permit now allows it to receive 1,400 tpd, or 436,800 tons per year while operating six days a week. It receives mixed wastes from some contract service areas (such as from Portola Valley, Woodside, and Los Altos Hills); the garbage from the City's multi-family dwellings; garbage from facilities operated by the City; yard trimmings; C&D materials; and scrap wood from various sources. The mixed wastes and yard trimmings are transferred to the Z-Best Compost Facility for composting; the inerts are shipped to the ZMPF or ZRL for processing; and separated recyclables are sold directly to market. Reports to the City indicate that the Green Waste Recovery MRF received and direct transferred about 269,000 tons in 2007. Due to an expansion of the City's multifamily recycling program in 2008, this facility is currently receiving more material than it did in 2007.

6. The Mission Trail Transfer Station [43-AO-0002-01] primarily receives materials from their own hauling operations in the City of Santa Clara, and also receives C&D loads from a few large contractors in the City of San Jose. This transfer station is permitted at 375 tpd, or 117,000 tons per year while operating six days a week.

   In 2007, Mission Trail reported receiving 81,571 tons, of which 1,100 tons were C&D materials from the City.

7. Premier Recycling [43-AN-0023-01] receives materials from their own hauling operations. It has a permitted capacity of 300 tpd, or 93,600 tons per year, while operating six days a week. It received an average of 200 tpd in 2007. It is permitted to receive C&D materials, and also processes separated recyclables.

   In 2007, Premier Recycling reported receiving 59,607 tons of C&D materials that included 38,311 tons of mixed C&D materials. The facility disposed of 13,983 tons (or 36.5 percent) from the mixed C&D loads.

8. The Recyclery [43-AN-0014-01], owned by Allied Waste, is permitted to receive up to 1,690 tpd, or 527,280 tons per year, while operating six days a week. The facility receives recyclables, tires, industrial wastes, and yard trimmings. In 2007 they received almost 280,000 tons of recyclables, down from over 350,000 tons in 2005.

9. The Rogers Avenue Transfer Station [43-AN-0025-01] is owned by Norcal Waste Systems and is currently permitted to accept up to 99 tpd of mixed municipal wastes and C&D wastes, but it is not currently operational. Norcal Waste Systems plans to open it again within the next few years as a recycling-only facility.
10. The Valley Recycling Processing Facility [43-AN-0025-01] primarily receives materials from its own hauling operations. It is permitted for 175 tpd, or 54,600 tons per year, while operating six days a week. In 2007 they processed 1,544 tons.

Composting Facilities

There are four (4) active composting facilities in the region. Permitted capacity for each facility is based on operations running six days a week.

1. Newby Island Composting Facility Landfill [43-AN-0017-01] is owned by Allied Waste, and permitted to accept yard trimmings and food wastes. The facility is permitted to receive 680 tpd, or 212,160 tons per year. The facility received 64,240 tons in 2007, or an average of 200 tpd.
2. The Pacheco Pass Composting Facility [43-AA-0004] is owned by Norcal Waste Systems and permitted to receive 1,000 tpd, or 312,000 tons per year, of yard trimmings and food wastes. The facility received 30,125 tons in 2007. The facility primarily receives materials from Morgan Hill and Gilroy.
3. Zanker Composting Facility [43-AN-0001-01] is located at the Zanker Road Landfill and permitted to receive 200 tpd (five days a week), or 62,400 tons per year. The facility currently receives an average of 60 tpd, or 16,000 tons per year, of yard trimmings that are transferred to the Z-Best Composting Facility for processing. Zanker is not currently composting at their facility.
4. Z-Best Composting Facility [43-AA-0015-01] is owned by Zanker Road Resource Management, Limited. It is permitted to receive 1,500 tpd, or 468,000 tons per year, of agricultural wastes, food wastes, yard trimmings, manure, and mixed municipals. Within the 1,500 tpd permit limit, 700 tpd is the maximum allowable for food waste. In 2007, the facility received an average of almost 925 tpd (five days a week), or 240,252 tons for the year. Even though the facility currently operates at a level below its permitted capacity, Z-Best reports they may have reached their maximum practical operating capacity due to current constraints of roads, equipment, types of materials accepted, and facility size.

C&D Processing Facilities

Eight (8) facilities in the City, and several others in the region, process mixed C&D materials. These facilities and many others also process separated C&D materials. This report already included separated C&D material processing capacity and facilities in the tonnages for the Landfills and MRF/Transfer Facilities, so the permitted capacity described

Major Findings and Assessments

here is not additional capacity. Table 2.3 shows processing capacity for Mixed C&D material, but the capacity is not double counted in the totals.

The Mixed C&D materials being processed is based on the facility reports of the CDDD system:

1. The GreenWaste Recovery MRF reported receiving 84,784 tons of C&D materials and disposed of only 36,160 tons (or 42.6 percent) from all C&D materials in 2007; but disposed of 65 percent of the incoming mixed C&D materials.
2. The Guadalupe Mines Landfill received 257,907 tons of C&D materials, and disposed of only 17,880 tons (or 6.9 percent) from the C&D loads; but disposed of 12.9 percent of the incoming mixed C&D materials in 2007.
3. The Kirby Canyon Landfill received 315,166 tons of C&D materials and disposed of only 4,410 tons (or only 1.4 percent) from the C&D loads; and only disposed of 2.1 percent of the incoming mixed C&D materials in 2007.
4. The Newby Island Landfill received 232,082 tons of C&D materials, and disposed of only 3,600 tons (or 1.55 percent) from the C&D loads; but disposed of 10.8 percent of the incoming mixed C&D materials, in 2007.
5. Premier Recycling receives materials from their own hauling operations. The facility disposed of 13,983 tons (or 23.5 percent) from the C&D loads; but 36.5 percent of the incoming mixed C&D loads, in 2007.
6. Valley Recycling is owned by Environmental Resource Recovery, Inc. In 2007 Valley Recycling received 1,544 tons of C&D materials, and shipped all of it to commodity markets or other processing facilities.
7. The ZMPF receives materials from many sources. In 2007, they reported receiving 194,196 tons of C&D materials, and disposed of 63,058 tons (or 32.4 percent) from the C&D loads; but disposed of 37.5 percent of the incoming mixed C&D materials.
8. The ZRL also receives materials from many sources. In 2007, they reported receiving 296,600 tons of C&D materials, and disposed of only 12,353 tons (or 4.1 percent) from the C&D loads; but disposed of 17.8 percent of the incoming mixed C&D materials.

TABLE 2.3

Available Capacity – 2007 Tonnages

A. LANDFILLS	Permitted Capacity [1]	2007 Tons Received	Unused Capacity
1. Guadalupe Mines	1,138,800	481,052	657,748
2. Kirby Canyon	811,200	519,233	291,967
3. Newby Island	1,248,000	1,001,718	246,282
4. ZMPF	390,000	194,196	195,804
5. ZRL	686,400	296,600	389,800
SubTotal	**4,274,400**	**2,492,799**	**1,781,601**
B. MRF/TRANSFER			
1. CA Waste Solutions [1]	137,800	91,520	46,280
2. GreenTeam MRF [1]	78,000	65,000	13,000
3. GreenTeam Transfer [1]	38,740	25,000	13,740
4. GreenTeam Transfer [1]	38,740	0	38,740
5. GreenWaste MRF	436,800	268,514	168,286
6. Mission Trail	117,000	81,571	35,429
7. Premier	93,600	59,607	33,993
8. Recyclery	527,280	279,668	247,612
9. Rogers Avenue	30,888	0	30,888
10. Valley Recycling	54,600	39,009	15,591
SubTotal	**1,475,448**	**763,318**	**643,559**
C. COMPOSTING			
1. Newby Island	212,160	64,240	147,920
2. Pacheco	312,000	30,125	281,875
3. ZRL	62,400	16,000	46,400
4. Z-Best	468,000	240,252	0 [2]
SubTotal	**1,054,560**	**350,617**	**476,195**
TOTAL [3]	**6,804,408**	**3,606,734**	**2,901,355**
D. C&D			
1. GreenWaste MRF	436,800	84,784	352,016
2. Guadalupe	1,138,800	257,907	880,893
3. Kirby	811,200	315,166	496,034
4. Newby	1,248,000	232,082	1,015,918
5. Premier	93,600	59,607	33,993
6. Valley Recycling	54,600	1,544	53,056
7. ZMPF	390,000	194,196	195,804
8. ZRL	686,400	296,600	389,800
SubTotal	**4,859,400**	**1,441,886**	**3,417,514**

1. 'Permitted Capacity' = permitted tpd for four MRF/Transfer facilities operational 260 days per year; all other facilities are operational 312 days per year

   For many facilities, the permitted capacity is the amount the facility could receive if it operated six days per week. However, many collection operations, such as residential collection, only deliver materials to facilities five days per week, so facilities often can not operate at their full capacity.
2. Permitted capacity at Z-Best is 1,500 tons per day, but the facility is currently operating at the practical limit of its physical capacity, so the "unused capacity" is zero.
3. Total does not include C&D because total facility capacity is already listed for each site in the other sections of this table.

Major Findings and Assessments

Summary of Facility Needs Through 2040

This Assessment of Infrastructure report compares the potential needs for facilities to process materials with the availability of permitted facilities, as shown in Tables 2.1 through 2.3. Tables 2.1 through 2.3 show that, even after processing enough materials to give the City a 60% diversion rate, many facilities still have available capacity to process more materials, as shown in the "Unused Capacity" column.

Calculation of Amount of New Materials That Will Need Processing

To reach its Zero Waste goals, more materials will need to be recycled and composted. The goal of this report is to estimate whether enough facility capacity exists to handle all of the City's additional recyclables and compostables if the City was to capture all of those materials through expanding existing programs and developing new collection programs. In addition, we have prepared these figures for the existing situation in 2007/08, as well as for 2040, to prepare for growth.

This report assumes that all of the existing materials will exist in the same proportions in future years. In reality, some materials will change, as new products are developed and older products decrease in market share. In addition, some materials will disappear from the waste stream through new source reduction efforts, such as reduction of plastic bag use as more residents use canvas bags, or reduction of yard trimmings as more residents start backyard composting or xeriscaping. This report attempts to estimate the maximum amount of materials that will need to be processed by assuming that no source reduction will occur. This is done in order to ensure that the City has sufficient processing capacity.

In the development of the Needs Assessment for the City's IWM Zero Waste Plan Development Report, R3 used waste composition data for each waste sector to create a profile of recoverable and non-recoverable waste types, using the following groupings of materials:

- **Compostable material categories**, including yard trimmings, food wastes and compostable paper;
- **Recyclable materials**, using the categories of materials that are currently recycled in the City's existing programs;
- **Potentially recyclable materials**, if new markets are developed; and,
- **Non-recyclable materials**.

The City of San Jose's processing capacity needs are summarized in the following tables. The recyclable, potentially recyclable, and compostable materials totals that are summarized in Tables 2.4, 2.5 and 2.6 are new, ADDITIONAL materials that have the potential to be recycled or composted, rather than being disposed of. These tables do not include materials that are currently being recycled or composted. Each of the

following tables refers to a different type of processing capacity, as follows:

- Table 2.4 summarizes materials that would need to go to a mixed recyclables processing facility;
- Table 2.5 summarizes materials that would need to be processed at a C&D processing facility;
- Table 2.6 summarizes materials that would need to be composted; and,
- Table 2.7 summarizes materials that can not be processed by mixed recyclables processing, composting, and C&D processing.

Major Findings and Assessments

TABLE 2.4 Mixed Recyclables Processing Capacity Needs (Source: Residential and Franchised Haulers)						
Waste Sector	Recyclable Materials, 2007/08	Potentially Recyclable Materials, 2007/08	Total of Recyclable and Potentially Recyclable Materials, 2007/08	Recyclable Materials, 2040	Potentially Recyclable Materials, 2040 *	Total of Recyclable and Potentially Recyclable Materials, 2040
Single-family Dwellings	26,621	1,772	28,393	93,348	2,629	95,977
Multi Family Dwellings	19,960	4,959	24,919	37,417	7,359	44,776
Commercial Businesses	111,534	29,799	141,333	174,699	44,223	218,922
City Facilities	2,864	765	3,629	5,021	1,135	6,156
TOTAL	160,979	37,295	198,274	310,485	55,346	365,831

* "Recyclable Materials, 2040" includes the tonnage growth of materials that are currently being recycled (due to population growth) as well as the NEW materials that can be recycled through greater participation in the recycling programs.

TABLE 2.5 C&D Processing Capacity Needs (Source: Franchised and Non-Franchised Haulers)						
Waste Sector	Recyclable Materials, 2007/08	Potentially Recyclable Materials, 2007/08	Total of Recyclable and Potentially Recyclable Materials, 2007/08	Recyclable Materials, 2040	Potentially Recyclable Materials, 2040 *	Total of Recyclable and Potentially Recyclable Materials, 2040
Franchised Haulers	1,933	1,004	2,937	51,762	1,490	53,252
Non-Franchised Hauler	115,938	57,932	173,870	172,057	85,974	258,031
TOTAL	117,871	58,936	176,807	223,819	87,464	311,283

* "Recyclable Materials, 2040" includes the tonnage growth of materials that are currently being recycled (due to population growth) as well as the NEW materials that can be recycled through greater participation in the recycling programs.

TABLE 2.6 Compost Processing Capacity Needs (Source: Residential/Franchised/Non-Franchised)		
Waste Sector	Compostable Materials, 2007/08	Compostable Materials, 2040 *
Single-family Dwellings	80,038	186,368
Multi-family Dwellings **	20,120	39,002
Commercial Businesses	79,375	128,348
City Facilities	2,038	3,025
Construction and Demolition	46	69
Non-Franchised Hauler Waste	15,176	22,523
TOTAL	196,793	379,335

* "Recyclable Materials, 2040" includes the tonnage growth of materials that are currently being recycled (due to population growth) as well as the NEW materials that can be recycled through greater participation in the recycling programs.

** Beginning July 1, 2008 all multifamily compostable materials are sent to Z-Best for composting.

TABLE 2.7 Non-Recyclable/Landfill Capacity Needs (Source: Residential/Franchised/Non-Franchised)		
Waste Sector	Non-Recyclable Materials, 2007/08	Non-Recyclable Materials, 2040
Single-family Dwellings	46,194	68,553
Multi-family Dwellings	14,897	22,108
Commercial Businesses	22,696	33,683
City Facilities	566	840
Construction and Demolition	1,292	1,918
Non-Franchised Hauler Waste	67,711	100,486
TOTAL	153,356	227,588

Major Findings and Assessments

Future Capacity and Land Use Issues

The facilities identified are all privately owned. They may contract for tonnages from other jurisdictions and not maintain any capacity for materials from the City; or alternately, the City could contract with the facilities to reserve the capacity for City needs.

Facility operators have responded well to the City implementing new programs by providing the necessary facility capacity. Eight permitted mixed C&D processing facilities have been certified in and around the City since the implementation of the CDDD program. Provided sufficient lead time, it is likely that the facility operators would also install additional processing capacity for programs that the City wants to implement.

For this study, facility operators were requested to project future available capacity and to project changes in the movement of classes of materials by facility. Unless these changes were already in the active planning stages, facility operators were not willing or able to project capacity that was not already on line.

The following potential changes were identified:

1. Newby Island Compost Facility

Allied Waste is planning to expand the Newby Island Compost Facility from the currently permitted capacity of 680 tpd to 980 tpd in 2009 or 2010. The expansion will enable Allied Waste to accept more food wastes and yard trimmings.

2. Newby Island Dirty MRF

Allied Waste is planning to open a dirty (i.e. mixed waste) MRF at the landfill sometime in the future, after 2011. The MRF will have a permitted capacity of 150 tpd. Allied Waste is considering several other options for expanding recycling at the Newby Island Landfill in the future, but was not prepared to comment on them at this time.

3. Recyclery Dirty MRF

Allied Waste is planning to convert part of the operations of the Recyclery to a dirty MRF in the next two years. The dirty MRF will have a permitted capacity of 150 tpd.

4. Rogers Avenue Transfer Station

Norcal Waste Systems indicated that the Rogers Avenue Transfer Station will be re-opened in 2010 as a recycling only facility (not accepting MSW) after it is outfitted to process up to 300 tpd, or 78,000 tons per year while operating five days a week, of single stream recyclables from residential and commercial collection programs.

5. San José-Santa Clara Water Pollution Control Plant

The buffer lands around the San Jose-Santa Clara Water Pollution Control Plant (WPCP) could become the home to numerous facilities that would process portions of the City's wastes. The primary benefit to the

City in siting these facilities on treatment plant lands is that they would be under public control, and would continue to be available for City and potentially regional use beyond the term of any one processing agreement. The City could then contract for operation of each facility as Sunnyvale does for the SMaRT Station, or operate some of them with City staff as it does with the WPCP. The WPCP and its treatment lands are owned by the Tributary Agencies: San Jose, Santa Clara, Milpitas, Cupertino Sanitary District, West Valley Sanitation District (including Campbell, Los Gatos, Monte Sereno, Saratoga), County Sanitation Districts 2-3, Sunol and Burbank Sanitary Districts. Any siting of waste processing facilities on Treatment Plant lands would be evaluated as part of the Treatment Plant Master Planning Process currently underway and the facilities may be planned to serve jurisdictions within the tributary boundaries or a larger geographic region.

- *Sludge composting:* Most directly, the City could use some of this land for a composting facility that would produce high quality compost from the treatment plant sludge, commercial food wastes, soiled paper and yard trimmings. This could reduce the area needed for sludge settling and drying ponds, and actually increase the amount of land available for beneficial purposes in the buffer zone.
- *Organics pre-processing:* The City could develop a compostable materials pre-treatment plant that would prepare separately collected organic materials to be processed so that they can be directly fed into a digester at the plant. Pretreatment would include the removal of inorganic materials and the size reduction (grinding) of the organics to ensure that they can be digested quickly.
- *Organics digester:* The pre-processed organics would be fed directly into an existing digester at the treatment plant, where the digesting compostables would generate methane that would be recovered to generate electricity. Alternatively, since the digesters may not work efficiently with these loadings, the City could develop a dedicated digester for this organic material.
- *City-owned MRF:* The City could use some of the buffer lands to site a MRF and transfer station. The MRF would be used to process residential recyclables collected under the City's franchise agreements, thus avoiding the need for each successive contractor to find a location at which to process these materials. This facility could be sized to process the recyclables collected under a franchised commercial waste system. The facility could be designed to include the loading of transfer trailers that would allow the City to transfer residue from this and other processing facilities to a distant landfill.
- *Energy generation:* Finally, the City could develop a facility that uses mixed plastic wastes and other non-compostable material types, which are a residue from the recyclables processing

Major Findings and Assessments

facilities in the City, to generate electricity. These materials would be heated in the absence of oxygen to produce a liquid (oil) or gaseous fuel.

None of these elements is exclusive, and the City could implement all of them to manage selected elements of the City's waste stream.

Preservation of Industrial Land Use Designations

The San José General Plan 2020 designates buffer lands around the Water Pollution Control Plant as Light Industrial. The City will need to ensure that these buffer lands and other industrial lands throughout the City maintain an industrial designation so that the City can meet its future waste management infrastructure needs. The City often experiences pressure to convert industrial lands to residential uses in order to support the City's growing population. However, residential uses and waste management infrastructure uses are often considered incompatible. Thus the City must balance its land use so future waste management operations can support the needs of future populations. The General Plan Update 2040 process is underway and industrial land use as it relates to zero waste goals will need to be addressed in that process

6. ZMPF Mega-MRF and In-Vessel Composting Plans

The planned new ZMPF will include a 70-foot tall, 200,000 square foot footprint MRF. The facility has received local land use permits to accept 5,000 tpd, seven days a week; or up to 1,825,000 tons per year. At only 4,000 tpd and six days a week, it would still receive 1,248,000 tons per year. Additional permits from the City are pending, and the CIWMB will have to concur with the Solid Waste Facility Permit that will be issued by the Local Enforcement Agency (City of San José). The new MRF building is projected to open no sooner than 2012.

The Mega-MRF will have multiple processing areas, and will be capable of processing up to:

- 1,200 tpd of mixed commercial wastes and single stream recyclables;
- 1,400 tpd of mixed municipal wastes and multi-family dwelling wastes;
- 800 tpd of organic rich loads; and,
- 1,600 tpd of C&D loads.

They intend to transfer the collected yard trimmings and green waste materials to either the ZRL or Z-Best for processing, and transfer all other compostable materials (including food waste) separated from all the incoming materials to Z-Best for in-vessel composting.

Materials streams leaving the MRF would include:

- Processed recyclables ready to be marketed;
- Clean yard trimmings and green waste to be hauled to ZRL or Z-Best for composting; and,

- Mixed organics that will be conveyed to Z-Best for in-vessel composting.

Summary of Planned Facility Changes

The following list is a summary of the proposed facility expansions that were identified in this study, and which were described in detail on the previous pages. Table 2.8 shows projected overall capacity that will exist if proposed expansions are added to the total existing capacity. Note that the additional PLANNED capacities exceed the additional NEEDED capacities that were summarized in tables 2.4, 2.5 and 2.6. The available EXISTING capacity that was summarized in table 2.3 appears to be sufficient to meet future needs of the City of San Jose that were summarized in tables 2.4, 2.5 and 2.6. However, these privately owned facilities may choose to sell capacity to other jurisdictions, thus limiting San Jose's available capacity. Also, for many facilities, the maximum permit throughputs can not be achieved, due to practical operational constraints.

- 300 tpd of food waste and yard trimmings processing at Newby Island;
- 150 tpd of MSW at the dirty MRF at Newby Island (date uncertain);
- 150 tpd of MSW at the dirty MRF at the Recyclery;
- 300 tpd of Single Stream Recyclables processing at Rogers Street; and,
- 5,000 tpd of residential, commercial and C&D processing at the ZMPF.

Major Findings and Assessments

TABLE 2.8 Current Capacity and Projected Future Capacity By 2013			
Proposed Facilities	Projected Capacity	Used Capacity	Unused Capacity
TOTALS from Table 2.3	**6,804,408**	**3,606,734**	**2,901,355**
1. Newby Island Compost	93,600	0	93,600
2. Newby Island Dirty MRF (date of opening is unknown, but after 2013)	0	0	0
3. Recyclery Dirty MRF	46,800	0	46,800
3. Rogers Avenue MRF [1]	78,000	0	78,000
4. SJ WPCP	TBD	0	TBD
5. ZMPF	1,560,000	0	1,560,000
Total	**8,582,808**	**3,606,734**	**4,679,755**

1. 'Projected Capacity' = permitted tpd for facilities are calculated as operational 260 days per year; all other facilities are operational 312 days per year.

.

Changes in Movement of Materials

The City has contracted with GreenWaste Recovery to process the mixed wastes collected from multi-family dwellings at the Z-Best compost facility. This will add an estimated 60,000 to 80,000 tons of mixed waste to the facility. However, since the facility is currently operating at capacity for mixed waste (even though there is technically capacity for clean yard trimmings), in order to receive these tonnages, the Z-Best facility must displace some other tons of mixed wastes.

Many other communities in Santa Clara, Alameda and San Mateo Counties are planning to implement mixed organics or food waste collection and composting programs. Unless additional facilities come on line, there will not be sufficient permitted capacity to provide this service to everyone who desires it. Other cities, such as Palo Alto, may currently be using facilities in San Jose to process their recyclables or organics. To insure that composting capacity is available at competitive prices for organics from the City, the City could permit City-owned land, and hire a private contractor to operate the compost facility.

Changes in Collection Programs

The City's residential collection contracts are generally for relatively short periods. This means that at the end of each contract term, there may be

changes to the collection and materials processing systems. The current Recycle Plus contract may terminate in as little as five years, and there will be a new collection agreement. The collection system that will be used in the next agreement is still unknown, as are the space requirements for processing the collected materials, but the new contractor will have to identify a site from which to operate.

The City is considering making changes in their current non-exclusive commercial franchises up to and including turning them into exclusive franchises. This will likely change the flow of materials from the current processing facilities and disposal sites to other facilities and landfills.

Changes to the Commercial Waste Management System

The City is evaluating potential changes to the commercial waste management system. These changes may shift the flow of recyclables from one facility to another and the flow of wastes from one landfill to another.

Changes to the CDDD Program

The City is evaluating changes to the CDDD Program. These changes are likely to create a need to bring additional processing capacity on-line, and may cause the movement of C&D wastes from one facility to another.

Extended Producer Responsibility

Expanding Extended Producer Responsibility requirements will change the waste stream; reducing or eliminating some or all of the hard to manage material types.

Future Changes to Regional Landfill Capacity

Landfill capacity in the nine-county Bay Area region is limited. A landfill's closure date is a projection that is based on the estimated total capacity of the facility and may be adjusted, based on increased or decreased volumes of material received at the landfill. The landfills in Santa Clara County all have current closure dates in the 2020's; some may remain open until the 2030's. Some landfills in San Mateo, San Joaquin, Santa Cruz and Solano Counties have landfills with estimated closure dates within the next 12 years.

Currently, there are no proposed NEW landfills scheduled to be built in the Bay Area at this time, but some existing landfills will be permitted for additional capacity to extend the operating life. As each landfill closes, the waste that was formerly sent to the closed landfill must be sent to the remaining open landfills, which in turn, may force the remaining landfills to close earlier than expected. Even while still open, the remaining landfills may begin to reach their daily permit capacities, resulting in longer hauls for open market disposal.

It is projected that the City's IWM Zero Waste Strategic Plan will result in decreased waste flows to landfills in Santa Clara County. However, landfill closures in surrounding counties may represent opportunities for

Major Findings and Assessments

Santa Clara County landfills to attract additional waste. The three most likely opportunities are:

1. The City of San Francisco contract with the Altamont landfill will expire in the next five to seven years, and San Francisco may seek landfill capacity in Santa Clara County landfills;
2. Jurisdictions in San Mateo County that are part of the South Bayside Waste Management Authority may seek landfill capacity in Santa Clara County after the year 2018, when the Ox Mountain landfill is scheduled to close; and,
3. Unincorporated Santa Cruz County and Watsonville may seek landfill capacity in Santa Clara County after 2019, when the Buena Vista landfill in Santa Cruz County closes.
4. The Crazy Horse landfill in Monterey County (north of Salinas), which currently receives wastes from Morgan Hill and Gilroy, will be closing in the next two years.

Appendix C

Final Report

Opportunities for Alternative Revenue Generating Mechanisms for the Integrated Waste Management Zero Waste Strategic Plan Development

Prepared for:

City of San José

Environmental Services Department

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

November 3, 2008

R3

Table of Contents

Table of Contents

Section 1: Introduction 1-1
Background 1-1
Goals 1-2
Project Approach 1-2
Organization of this Report 1-3

Section 2: Summary of Existing Fees 2-1
List of Fees and Taxes Reviewed in This Report 2-1
Framework for Summary of Current Fees and Taxes 2-2

Section 3: Options for Modifying Existing Fees 3-1
Options for Modifying Existing Fees 3-1

Section 4: Alternative Revenue Generating Mechanisms 4-1
Alternative Revenue Generating Mechanisms 4-1
1. Fees Assessed on the Hauler 4-2
2. Solid Waste Development Impact Fees 4-5
3. Vehicle Impact Fees 4-6
4. Street Sweeping Fees 4-7
5. Host Fees Assessed on Solid Waste Facilities 4-9
6. Extended Producer Responsibility Fees and Advanced Disposal/Recycling Fees 4-12
7. Revenues from the Sale of Carbon Credits 4-15

Tables

Table 2-1: Disposal Facility Tax Revenue 2002/03 – 2007/08 2-4
Table 2-2: Summary of Fees 2008/09 Time Period 2-12
Table 4-1: Summary of Fees Assessed on the Hauler 4-4
Table 4-2: Summary of Development Impact Fee Survey 4-6
Table 4-3: Summary of Vehicle Impact Fees 4-7
Table 4-4: Summary of Street Sweeping Fees 4-8
Table 4-5: Facility Host Fees 4-11

R3

Table of Contents

This page intentionally left blank.

R3

Section 1

Introduction

Background

In 2007, the City Council of San José ("City") requested staff to develop an Integrated Waste Management ("IWM") Zero Waste Strategic Plan that will establish policy as it relates to the City's waste management program through the year 2040. The City's objectives are to provide resource conservation, waste reduction, pollution prevention, and a sustainable economy. The IWM Zero Waste Strategic Plan addresses the following key components for achieving Zero Waste:

- Strengthen recycling programs;
- Identify infrastructure requirements for reuse, recycling and composting;
- Establish effective waste prevention programs, incentives, and fee structures; and,
- Identify economic development opportunities from expanding solid waste processing facilities and industries using recycled materials as feedstock.

In 2007, the City established a goal of 75 percent waste diversion by 2013, and a goal of Zero Waste by 2022. Staff has reviewed Zero Waste plans from other cities and found that many of the initiatives under development by Zero Waste cities are already being implemented or planned for the City.

R3 Consulting Group Inc., ("R3") was retained by the City to prepare this Analysis of Alternative Revenue Generating Mechanisms for the City's Zero Waste Strategic Plan.

In order to meet proposed waste reduction goals, the IWM Zero Waste Strategic Plan will consider key strategies such as food waste composting, reducing packaging, extended producer responsibility, the commercial solid waste system design, improved services for multi-family dwellings, and many others. Staff will also evaluate opportunities for generating energy from selected waste materials as a component of the City's Zero Waste Strategic Plan.

Relationship to Other Studies Being Conducted for the City's Zero Waste Strategic Plan

This Analysis of Alternative Financing Mechanisms is only one portion of a suite of studies that are being conducted to gather information for the City's Zero Waste Strategic Plan. The various studies include:

- A Needs Assessment study to estimate the amounts and types of waste that will need to be diverted now through 2040;
- A review of the Construction and Demolition Debris Deposit Program ("CDDD");
- A Commercial Solid Waste System Redesign and Enhancement Options Study;

- A Waste Characterization Study for Single-Family waste, MRF residuals and Commercial Waste; and,
- An Assessment of Infrastructure, Planning and Land Use Issues.

Goals

This Analysis of Alternative Financing Mechanisms has the following goals:

- Initially, to summarize the fees and taxes related to solid waste and recycling that the City is currently collecting;
- To discuss how the current fees and taxes will change over time, due to growth of the waste stream related to population increases;
- To discuss how the current fees and taxes will change over time, due to reductions to the waste stream as the Zero Waste Strategic Plan is implemented (i.e., decreases in fees at landfills as landfill tonnages decrease, and decreases in franchise fees as tonnage decreases); and,
- To identify alternative fees and taxes that may be imposed in order to replace existing revenues.

Project Approach

Description of Data Received

We requested and received several financial documents and ordinances from the City that summarized the City's current fee structure, current revenues, and current expenses for solid waste and recycling activities.

Calculations and Projection Methodology

There are several revenue sources that are summarized in this report. Each revenue source has a different assessment method. The calculations and projection methodology are described separately for each revenue source.

Limitations

Existing fees listed in this report are current as of July 1, 2008.

For existing fees, we used several data sources to compile information for this report. We relied on the on-line version of the City's municipal code, and assumed that the on-line municipal code is kept up-to-date. Very recent changes to the City's municipal code would not be reflected in this report. We also contacted and received information from the City's Code Enforcement Division regarding the Local Enforcement Agency fee, and received information from the County of Santa Clara's Solid Waste Program, and the County's Household Hazardous Waste Program, regarding the fees that those agencies collect.

This report does not summarize the fees related to solid waste disposal that are imposed by the State of California (California Integrated Waste Management Board disposal fee.)

Organization of this Report

This report is organized into 4 sections, as follows:

Section 1: Introduction

Section 2: Summary of Existing Fees

Section 3: Options for Modifying Existing Fees

Section 4: Alternative Fees that May be Utilized by the City in the Future

This page intentionally left blank.

Section 2

Summary of Existing Fees

List of Fees and Taxes Reviewed in This Report

This section summarizes eight fees and taxes that are currently collected by the City, relating to solid waste and recycling. The first six fees and taxes are imposed by the City, and the last two fees are imposed by the County of Santa Clara and later remitted to the City. This report does not summarize any fees or taxes imposed by the State of California.

The fees and taxes included in this report are:

1. The Disposal Facility Tax. This is a tax on operators of landfills in the City. The tax is $13 per ton disposed, and the revenues are directed to the City's General Fund.
2. The Disposal Facility Operator Integrated Waste Management Fee. This is a City fee of $0.00 per ton, and would be paid by operators of landfills and composting facilities in the City, but is currently suspended. The revenues from this fee would be directed to the City's Integrated Waste Management Fund for use in planning and implementing the City's AB 939 programs.
3. City Solid Waste Enforcement Fee. This fee is imposed by the City's "state Certified" solid waste Local Enforcement Agency ("LEA") on all state permitted solid waste facilities and operations to fund state mandated "comprehensive" solid waste enforcement related inspections and enforcement duties related to handling, transportation, illegal dumping (blight) enforcement and outreach, for all solid waste within the City. It is $0.98 per ton. The revenue recovered from this fee supports the City's Code Enforcement Division as the California Integrated Waste Management Board's ("CIWMB") "sole agency responsible for carrying out solid waste enforcement in it's jurisdiction" (14 CRR Division 7, 27, CCR Division 2, and Division 30 of the Public Resource Code ["PRC"]).
4. Commercial Solid Waste Collection Franchise Fee. This fee is paid by the City's commercial waste generators and collected by commercial haulers. The fee is assessed on a per cubic yard basis, and revenues from this fee are deposited into the City's General Fund.
5. Commercial Source Reduction and Recycling Fee. This fee is paid by the City's commercial haulers. The fee is assessed on a per cubic yard basis, and revenues from this fee are deposited into the City's Integrated Waste Management fund.
6. CDDD Program. The CDDD deposits are neither fees nor taxes. However, some deposits become ineligible for refund, and can be used for activities related to the CDDD program and construction and demolition ("C&D") waste diversion.

R3

7. County Planning Fee. Santa Clara County levies a County Planning fee at all solid waste facilities in the County to fund the preparation and implementation of its Countywide AB 939 Integrated Waste Management Plan and related documents. The fee is $0.56 per ton of waste disposed.

8. Countywide AB 939 Implementation Fee and Countywide Household Hazardous Waste (HHW) Fee. This is an overall fee of $3.55 on all tons of solid waste disposed in the County or transferred for out-of-county disposal. A portion of this fee ($1.50) is distributed quarterly to the jurisdictions in the County based on the total waste disposed during that quarter by each jurisdiction. The other portion of the fee ($2.05) is used by the County's Environmental Health Department to provide household hazardous waste (HHW) drop-off services for the entire County, including the City. The program is funded through several mechanisms, including a HHW fee assessed on tonnage disposed at disposal facilities in the County, State grants, and fees paid by small-quantity generators. The HHW fee is currently $2.05 per ton.

Framework for Summary of Current Fees and Taxes

There are several fees and taxes associated with solid waste and recycling that are either directly assessed by the City, or collected by the County, and ultimately received by the City. For the purposes of this study, we did not include fees or taxes that are a revenue source for the County or the State, though such fees do exist.

The solid waste fees and taxes that are received by the City provide revenues for both the City's General Fund, and the City's Integrated Waste Management Fund.

In order to simplify the explanation of the fees and taxes, and to make them more understandable, we developed the following framework to describe each fee or tax:

- Name of Fee or Tax;
- Authority for Fee or Tax: the name of the document (i.e., municipal code) that authorizes the City or County to assess the fee or tax;
- Cost Basis and Assessment Method: such as whether the fee or tax is assessed on a "per ton" basis, or a "per cubic yard" basis, the amount of the fee or tax, and who is responsible for payment (such as a landfill operator or a waste hauler). This section also describes how the amount of the fee or tax may change over time, and what entity has the authority to increase the amount or change the assessment method.

- Where funds are received: in this analysis, funds may be received initially by the County, and then remitted to the City, or may be received by the City directly;
- Name of fund receiving the Fee or Tax: in this analysis, the funds receiving the fee or tax are either the City's General Fund or Integrated Waste Management Fund;
- Limitations on how the Fee or Tax can be spent: in certain cases, fees can only be spent only on specified projects; and
- Amount collected annually through this Fee or Tax, and projections through 2040.

1. Disposal Facility Tax

Authority. The Disposal Facility Tax ("DFT") is authorized by the City's municipal code, in sections 4.78.010 through 4.78.470. It is the City's business tax for disposal facilities, and was imposed in lieu of a business license tax. In 1992, the DFT replaced a prior industry-specific business license tax, which had first been established in the 1980's on a volume basis and had been changed to $3 per ton in 1989.

Cost Basis and Assessment Method. The DFT is assessed on all tons of solid waste disposed in landfills in the City, at the rate of $13 per ton disposed. (All waste disposed at the landfills in the City is subject to the tax, regardless of whether the waste comes from the City or another jurisdiction.)

In addition, some alternative daily cover may be taxed at the same rate. Each facility is exempt from paying the DFT on the "first 33,500 tons of construction and demolition materials used at the site in each fiscal year (July 1 – June 30), provided that the materials have been approved by the California Integrated Waste Management Board"[1] as proper materials to use as alternative daily cover.

Where Funds are Received and Name of Receiving Fund. The disposal facility tax is paid by landfill operators each month directly to the City, and becomes revenue to the City's General Fund.

Limitations on How Fee or Tax Can Be Spent. There are no limitations on how this tax can be used by the City.

Amount Collected Annually and Projections through 2040. The City provided a 6-year history of amounts received through the DFT. The summary appears in the table below. The City has received between $14 million and $16 million per year for the past six (6) years. If each of the four landfills in the City used the maximum exemption tonnage of 33,500 tons per year, there would be a maximum uncollected/exempt tax revenue of $1,742,000 per year.

[1] City of San José municipal code, section 4.78.020.D.

Summary of Existing Fees

TABLE 2 - 1
Disposal Facility Tax Revenue
2002/03 through 2007/08

	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Disposal Tax (in Dollars)	$ 16,260,805	$ 14,552,127	$ 14,973,616	$ 15,343,616	$ 14,717,336	$ 13,701,351
Landfilled (in tons)	1,250,831	1,119,394	1,151,817	1,180,278	1,132,103	1,053,950

Disposal Facility Tax revenue is projected to decrease to approximately $13.2 million in 2008/09, due to decreases in waste disposal as a result of the implementation of new waste diversion programs in the City facilities and multi-family sector.

In calendar year 2007, approximately 578,000 tons of waste from the City was disposed in the City landfills. (Another 120,000 tons of the City waste were disposed at facilities outside of the City.)

Compared to 2007 disposal quantities, the City will have to reduce disposal by another 200,000 tons in order to reach its diversion rate goal of 75% by 2013. If landfill disposal decreases by approximately 200,000 tons between 2008 and 2013, revenues from the DFT tax would decrease by approximately $1.9 million per year, as compared to 2008/09 projections. However, this does not consider the effect of waste from other cities, which may increase or decrease over time.

If the City achieves Zero Waste in 2022, the lost revenue due to decreasing the City's waste stream entirely would be approximately $7.5[2] million annually. This reduction may be partially offset if processing residues are disposed at waste-to-energy facilities in the City, which could be subject to the DFT if they were required to have Solid Waste Facility permits. Even without Zero Waste, overall revenues from the tax would decrease substantially during the 2020's as the landfills in the City begin to reach capacity[3], and other jurisdictions that use landfills in the City implement more aggressive waste diversion goals.

---

[2] In 2007, 578,000 tons of waste from the City was disposed in landfills located in the City. At $13 per ton, the disposal facility taxes from this waste were approximately $7.5 million.

[3] Landfill closure dates are based on current permit documents and current flows of waste into the landfills. Closure dates are subject to future changes.

Disposal Sites

There are five operating disposal sites in the City. Two of the landfills are owned by Waste Management, Inc.: the Guadalupe Landfill and Kirby Canyon Landfill. The Newby Island Landfill is owned by Allied Waste Industries, Inc. (formerly BFI). The Zanker Road Landfill and Zanker Material Processing Facility (which includes a small disposal area) are owned by Zanker Road Resource Management.

Pursuant to settlement agreements with the City, and Newby Island, Kirby Canyon, and Guadalupe landfills, these operations may exempt certain materials from the DFT. Specifically, Newby Island Landfill is allowed to exempt the first 60,000 tons of green waste used each year as Alternative Daily Cover ("ADC"). Kirby Canyon Landfill and Guadalupe Landfill may each exempt annually 33,500 tons of construction and demolition materials used for ADC or may assign a share of one site's exemption to the other.

Future Closure of Disposal Sites

Each of the landfill sites listed above has limited permitted capacity to accept waste. In September 2007, the City contracted with Environmental Planning Consultants to prepare a report entitled, "Resource Management Infrastructure Requirements Assessment." This report found that, at current disposal rates, it is estimated that disposal capacity in the City could be severely limited in 2020's, and that all current sites could close by the 2030's. The City's agreement with Newby Island Landfill expires in 2020 or until at permitted capacity. Increasing diversion could extend the life expectancy of local landfills significantly.

Note that the landfills will continue to receive waste until they are filled. Therefore, the same amount of Disposal Facility Tax will ultimately be received by the City over time, even if the City reduces disposal levels significantly. However, DFT revenues can be reduced by use of more tax-exempt materials than actually needed for cover or on-site construction. Total tax revenues might also be reduced by business decisions or changes in operations that dedicate landfill areas to other purposes, such as collection or processing facilities.

2. Disposal Facility Operator Integrated Waste Management Fee (a.k.a. AB 939 Fee)

Authority. The California Public Resources Code provides that the City may charge a fee to pay the costs incurred by the City in preparing, adopting and implementing the Integrated Waste Management Plan.

Cost Basis and Assessment Method. Solid waste landfill operators and composting facilities would be required to pay the fee but transfer stations are exempt. According to the City's municipal code, the Disposal Facility Operator Integrated Waste Management Fee is assessed on "the types or amounts of wastes accepted at the disposal facility." The amount of the fee is currently set at $0.00 per ton; since the Countywide AB939 Implementation Fee is in effect.

R3

The City Council establishes the fee by council resolution.

Where Funds are Received and Name of Receiving Fund. If the fee was not currently suspended, the Disposal Facility Operator Integrated Waste Management Fee would be paid by landfill and composting site operators each month directly to the City, and would become revenue in the City's IWM Fund.

Limitations on How Fee or Tax Can Be Spent. The City's municipal code specifies that the fee "shall be used to pay the costs incurred by the City in preparing, adopting and implementing the Integrated Waste Management Plan required under Division 30 of the California Public Resources Code."

Amount Collected Annually and Projections through 2040. For 2007/08, the City received no revenues from this fee since it is set at "0." It may, however, be implemented in future years.

3. City Solid Waste Enforcement Fee

Authority. The City municipal code section 9.10.960, through authority provided in California PRC sections 43213 and 43222 authorize the City's LEA to recover a Solid Waste Enforcement Fee for the implementation of "comprehensive" solid waste enforcement duties mandated in state law (PRC Division 30, and CCR Title 14 & 27), and municipal code. The City LEA acts as the lead permitting and enforcement agency for the CIWMB for all solid waste facilities, operations, transfer, processing, handling, illegal dumping, storage and blight outreach, within the City. The CIWMB conducts ongoing "Certification" of the Code Enforcement Department, housed within the City's Planning, Building, Code Enforcement Division, as the LEA for the City.

Cost Basis and Assessment Method. This fee is paid by solid waste facility operators, including landfills, composting facilities, and transfer stations. For fiscal year 2008/09, the fee is "$0.98 per ton of refuse, including cover material, inert construction material and recyclable material."

The fee is set by council resolution, and can change periodically through the City's Fees and Charges resolution.

Where Funds are Received and Name of Receiving Fund. The Solid Waste Enforcement Fee is currently imposed on operators of facilities with a Solid Waste Facility permit issued by the CIWMB. Facilities subject to this fee can include landfills, transfer stations, MRFs, and compost facilities. Operators pay this fee each month directly to the City, and revenues are deposited in the City's General Fund.

Amount Collected Annually and Projections through 2040. Since this fee is based upon facility throughput, the fee may increase at transfer stations, MRFs and composting sites within the City as the City processes more material for diversion. At the same time, the fee may decrease at landfills as less waste is disposed of at landfills. For fiscal year 2007/08, the total amount collected through this fee program was $2,843,839.

4. Commercial Solid Waste Collection Franchise Fee

The City maintains a non-exclusive franchise system for commercial waste haulers. There are currently about 20 haulers authorized to provide service in the City. Haulers that collect commingled recyclables and/or garbage are required to obtain a San José Business Tax Certificate and a Commercial Solid Waste and Recyclables Collection Franchise. The franchise grants the holder the right to compete with other franchisees to collect solid waste and commingled recyclables from non-residential properties in San José, and to provide temporary debris box services to residences, businesses and construction sites.[4]

Authority. The Commercial Franchise Fee is authorized by section 9.10.1710 of the City's Municipal Code.

Cost Basis and Assessment Method. The franchise fee amount is set by City Council resolution. Haulers who do not perform front loader service are exempt from paying franchise fees for the first 20,000 uncompacted cubic yards collected each year. For 2008/09, the commercial solid waste franchise fees remain unchanged as follows:

a. $3.67 per cubic yard for each uncompacted cubic yard of solid waste collected;

b. $11.01 per cubic yard for each compacted cubic yard of solid waste collected;

c. $61.17 per ton for each ton of solid waste collected by Green Team of San José in roll-off containers and compactors pursuant to the Agreement for Solid Waste Collection Services at City Facilities for which franchise fees are required to be charged by weight rather than volume; and,

d. $0.00 for collection of recyclables.

Recyclables are also subject to this fee; however, the amount of the fee has historically been set at $0.00. By not assessing fees for recyclables collection, commercial haulers are provided a financial incentive to reuse or recycle and divert materials from landfill disposal.

Commercial franchise fees are not charged on waste collected under the City's CDDD program, except for the small fraction of these materials that are collected by a franchised hauler and delivered to a landfill within the City for disposal.

Where Funds are Received and Name of Receiving Fund. Commercial Solid Waste franchise fees are deposited into the City's General Fund. Franchise Haulers submit monthly on-line reports to the Environmental Services Department substantiating the fees paid to the City.

[4] Council Agenda Report regarding granting of franchise to All Points Roll-Off, Inc., June 12, 2001.

Limitations on How Fee or Tax Can Be Spent. There are no limitations on how this fee can be used by the City.

Amount Collected Annually and Projections Through 2040. For 2007/08, the City's General Fund received just over $12 million and the City projects receiving $11.8 million for the General Fund in 2008/09 through this fee. As the City moves toward achieving its Zero Waste goals, these fees collected will decrease in proportion to the decreases in waste disposal.

5. Commercial Source Reduction and Recycling Fee

San José maintains a non-exclusive franchise system for commercial waste haulers. There are currently approximately 20 haulers authorized to provide service in the City.

Authority. The California PRC authorizes the City to collect a commercial source reduction and recycling fee (also called the commercial AB 939 fee) to be used by the City in preparing, adopting and implementing the Integrated Waste Management Plan. The City adopted this fee under section 9.10.1435 of the San José Municipal Code.

Cost Basis and Assessment Method. This fee is assessed on commercial solid waste generators (i.e., businesses), and is collected by the solid waste collector (i.e., commercial franchised hauler). The solid waste collector (i.e., hauler) is required to remit the fee to the City, accompanied by a report that summarizes how the fees were calculated. There are late charges for late reports and for paying fees late. Nonprofit charitable reusers, such as non-profit thrift stores, are exempt from the fee. Currently, the City exempts Salvation Army, Goodwill, and Hope Services as nonprofit charitable reusers. Small businesses that generate less than one cubic yard of solid waste per week, and are approved for inclusion in the City's residential solid waste collection program, also do not pay the fee. Recyclables can be subject to this fee; however, the amount of the fee has historically been set at $0.00.

The Commercial AB 939 fee amount is set by City Council resolution. For 2008/09, the commercial AB 939 fees remain as follows:

a. $0.89 per cubic yard for each uncompacted cubic yard of solid waste collected;

b. $2.67 per cubic yard for each compacted cubic yard of solid waste collected; and,

c. $0.00 for collection of recyclables.

Where Funds are Received and Name of Receiving Fund. This fee is deposited into the Integrated Waste Management Fund.

Limitations on How Fee or Tax Can Be Spent. The City's municipal code specifies that the "fees shall be used to pay the costs incurred by the City in preparing, adopting and implementing the Integrated Waste Management Plan required under Division 30 of the California Public Resources Code."

Amount Collected Annually and Projections through 2040. The Integrated Waste Management's budget documents project revenues of approximately $3.2 million through this fee for 2008/09.

6. Construction and Demolition Diversion Deposit ("CDDD") Program

Authority. The CDDD Program is authorized by section 9.10.2400 of the San José Municipal Code.

Cost Basis and Assessment Method. The CDDD deposits are fees that are paid at the time of application for a building permit. Most small C&D projects are exempt from the deposit program, but larger projects are not. Deposits are returned to applicants when they provide documentation proving that at least 50 percent of the waste generated by the project was diverted from landfill disposal. Partial deposits can be refunded for applicants that diverted less than 50 percent. Many applicants do not claim refunds.

Where Funds are Received and Name of Receiving Fund. Deposits are placed into the Integrated Waste Management Fund until they are claimed. Deposits are officially considered "abandoned" one year after the project has been finalized or listed as inactive. At this time, abandoned deposits may be used for CDDD purposes.

Limitations on How Fee or Tax Can Be Spent. The City's municipal code section 9.10.2470 specifies the CDDD unclaimed deposits can be used, as follows:

"Moneys received by the City as diversion deposits shall be used only for:

A. Payment of diversion deposit refunds;

B. Costs of administration of the program established by this part;

C. Cost of programs whose purpose is to divert from landfill disposal the waste from construction, demolition and alteration projects; and

D. Costs of programs whose purpose is to develop or improve the infrastructure needed to divert from landfill disposal the waste from construction, demolition and alteration projects."

Amount Collected Annually and Projections Through 2040. Prior to 2007, the City did not recognize any CDDD "ineligible refunds" as revenues. For the 2008/09 and 2009/10 fiscal years, IWM has budgeted $800,000 in revenue, due to "ineligible refunds." This revenue source will vary as C&D activity increases or decreases. There is also a lag between the time that a CDDD deposit is initially paid, and the time that the deposit is considered as "ineligible for refund" or an abandoned deposit. The Environmental Services Department and R3 are currently conducting a full evaluation of the CDDD program, including an assessment of the reasons why CDDD deposits are abandoned. Resulting modifications to this program could yield fewer abandoned deposits and result in lower annual revenues from this source.

7. County Planning Fee

Santa Clara County levies a fee at all solid waste facilities in the County to fund the preparation of its Countywide AB 939 documents and implementation of Countywide diversion programs approved by the Santa Clara County Recycling and Waste Reduction Commission.

Authority. This fee is authorized by the County Board of Supervisors, and is also approved by all of the cities in the County through the review process of the Recycling and Waste Reduction Commission (RWRC) and its Technical Advisory Committee.

Cost Basis and Assessment Method. The fee is $0.56 per ton of waste disposed. The fee is also assessed at transfer stations on waste that is disposed of in out-of-county landfills.

Where Funds are Received and Name of Receiving Fund. This fee is collected by Santa Clara County. The County retains the fee.

Limitations on How Fee or Tax Can Be Spent. These funds are reserved for costs associated with preparing the Countywide Integrated Waste Management Plan; participating in the preparation of other documents required by AB 939, such as Source Reduction and Recycling Elements, Non-Disposal Facility Elements, and Household Hazardous Waste Elements; design and implementation of Countywide diversion programs, such as those currently in place for Home Composting, Green Business, and Green Building; and Countywide public education efforts.

Amount Collected Annually and Projections through 2040. These fees are remitted to the County. The City does not receive any funding from this particular Countywide fee.

8. Countywide AB 939 Implementation Fee and Countywide Household Hazardous Waste (HHW) Fee

The County assesses an AB939 fee ($3.55) on all tons disposed in the County or transferred for out-of-County disposal. A portion of this fee ($1.50) is distributed quarterly to the jurisdictions in the County based on the total waste disposed during that quarter by each jurisdiction. The other portion of the fee ($2.05) is used to fund Household Hazardous Waste ("HHW") programs in the County.

The County's Environmental Health Department provides household hazardous waste (HHW) drop-off services for the entire County, including San José. The program is funded through several mechanisms, including a HHW fee assessed on tonnage disposed at disposal facilities in the County, grants, and fees paid by small-quantity generators.

Authority. This fee is authorized by the County Board of Supervisors, and is approved in advance by all of the cities in the County through written agreement.

Cost Basis and Assessment Method. The AB 939 Implementation portion of the fee is $1.50. The HHW fee is $2.05 per ton. The entire fee is

assessed on in-county waste disposal and is also assessed at transfer stations on waste that is disposed of in out-of-county landfills.

Where Funds are Received and Name of Receiving Fund.

The overall fee is collected by Santa Clara County. The County remits $1.50 of the fee (the AB 939 Implementation portion) to the City of waste generation. The County calculates the amounts due to the cities quarterly. When fees are remitted to the City of San José, they are deposited into the Integrated Waste Management Fund.

For the HHW portion of the fee, a formula is used for calculating fixed costs and variable costs of the program, and that formula is used to calculate the costs for each city's portion of the program. For some cities, the $2.05 per ton fee at the landfills is sufficient to cover all HHW program costs, and for other cities, the $2.05 per ton fee is insufficient. For San José, the $2.05 per ton fee at the landfill has exceeded actual program costs that are covered by the County program. As a result, the County has remitted approximately $200,000 per year to the City of San José for use in funding the City's additional HHW programs. This money is deposited into the IWM Fund.

Limitations on How Fee or Tax Can Be Spent. Funds are to be spent on AB 939 Implementation and HHW programs only, respectively.

Amount Collected Annually and Projections through 2040. The City has received approximately $1 million per year through the AB 939 portion of this fee, and has projected receiving approximately $1 million per year for the next few years through this fee.

For the HHW portion of this fee, the County typically receives in excess of $1 million annually on behalf of San José, and operates the HHW program with those funds. The San José portion that is in excess of the program's fixed and variable expenses, as allocated to San José, have been approximately $200,000 per year. The City projects that this additional revenue will continue to be approximately $200,000 per year for the next several years.

Summary of Existing Fees

Table 2-2, below, summarizes the various fee and tax revenues that the City receives each year related to solid waste.

TABLE 2 - 2
Summary of Fees 2008/09 Time Period
(rounded to nearest hundred thousand dollars)

Fee Name	General Fund Revenues	IWM Fund
1. Disposal Facility Tax	$13,200,000	
2. Disposal Facility Operator AB 939 Fee		$0
3. City Solid Waste Enforcement Fee[1]	$3,300,000	
4. Commercial Solid Waste Collection Franchise Fee	$12,000,000	
5. Commercial Source Reduction and Recycling Fee		$3,200,000
6. Construction and Demolition Diversion Deposit ("CDDD") Program		$800,000
7. County Planning Fee		$0
8.A. Countywide AB 939 Implementation Fee		$1,000,000
8.B. Countywide Household Hazardous Waste ("HHW") Fee, portion returned to City		$200,000
Subtotals, by Fund	$28,500,000	$5,200,000
GRAND TOTAL	$33,700,000	

[1] Although this fee is designated for code enforcement, the revenues are placed in the City's General Fund.

R3

Section 3

Options for Modifying Existing Fees

Options for Modifying Existing Fees

This section reviews some potential opportunities for modifying existing fees. Further analysis for any of these options will include a thorough legal review and a cost study to confirm that costs attributed to a fee are appropriate, not recovered by another fee, and fee revenue does not exceed cost recovery.

A. Some of the fees summarized in this report can be set to automatically increase every year provided the increase does not exceed actual cost of the programs.

   Automatic increases can reduce uncertainty for fee-payers, because they will know about scheduled increases in advance. Also, small annual increases can reduce the need for periodic larger increases ("spikes") in fee amounts. For example, the County of Los Angeles assesses a "Countywide Integrated Waste Management Fee" on all tons disposed of in the County. That fee will increase each year at the same percentage increase as the Consumer Price Index.

B. The City could explore revising its ordinance to assess the disposal facility tax on the waste that is collected in the City but disposed of in landfills outside of the City, thus avoiding payment of the City's Disposal Facility Tax. .

C. If the State and the County consider charging an AB939 fee on materials used for alternative daily cover ("ADC") and for other "beneficial uses" at disposal facilities, the City may want to evaluate taking similar action.

   As an example, a Los Angeles County ordinance allows the Director of Public Works to establish standards for exemption for non-soil ADC materials. One advantage of this approach would be that a new fee on ADC would bring in new revenues from collectors, such as landscapers, which currently pay no solid waste related fees or taxes to the City.

D. If the State considers expanding or clarifying local government's authority for charging AB939 fees, the City might consider imposing fees on materials that are collected and/or processed in the City, but are recycled or composted, and not disposed.

   The City could still keep the diversion incentive in place by placing much smaller fees on recycling and composting than disposal. Such a fee might affect companies that are not currently paying integrated waste fees or taxes to the City. Example companies are clean-up companies and haulers that do not obtain a franchise to collect in the City.

E. The CDDD program is a major component of the City's waste diversion plan. These materials constitute a large percentage of the City's waste stream, yet the City receives no franchise fees related to

R3

the collection or processing of C&D materials, except for the small fraction collected by franchised haulers for disposal at landfills within the City. There are several points at which a fee could be collected, and there are advantages and disadvantages of assessing the franchise fees and/or cost recovery fees in various ways, as discussed below.

i. Assess the fee when a building permit or demolition permit is issued. This is the same fee assessment method that is used to collect CDDD deposits. One disadvantage of assessing a fee on CDDD material as a condition of receiving a building permit is that it increases the total cost burden of receiving a building permit.

ii. A second option would be to retain a small portion, perhaps five percent of the CDDD deposit amount, as a "City Administrative Fee," that could be used by the City as though they were franchise fees. As a result, the CDDD deposit program would only return ninety-five percent of the deposit back to an applicant who fully complies with the program requirements. This option would bring in new monies for the general fund in addition to the monies from the "ineligible deposits" that accrue to the Integrated Waste Management Fund.

iii. A third option would be to assess franchise fees or business license taxes on the CDDD facilities themselves. One disadvantage of this approach is that the fee would apply to CDDD facilities that are located in the City of San José; the City would have no authority to assess franchise fees on facilities that are located in another jurisdiction.

iv. A fourth option would be to assess franchise fees on C&D waste that is collected by the franchised haulers. A disadvantage of this approach is that C&D waste is hauled by many types of entities, and only some of them are franchised. The franchised haulers could be put at a disadvantage when competing for business to haul C&D waste.

F. In Commercial system re-design, as new exclusive franchise agreements are put in place, the City could explore requiring haulers to pay a fee for waste disposed of in landfills outside of the City.

Except for the Solid Waste Enforcement Fee ("SWEF,"), landfill fees set by the City, County and State are currently applied only to wastes that are reported as "disposal" under the State's Disposal Reporting System. This excludes the materials that were exempted from the Disposal Facility Tax in 1992 (cover material and inert construction material used at the disposal facility and recyclable materials that are removed from the sites.) As reporting requirements and operations have changed over time, it also excludes Alternative Daily Cover and other waste materials that are put to "beneficial use" at the site, such as shredded yard

trimmings used for erosion control and C&D processing residues delivered to other facilities for use as Alternative Daily Cover. As a result, more than 30% of landfilled wastes are now exempted from fees and taxes. The City will continue work with the County to evaluate applying the Countywide AB 939 Implementation Fee to a broader range of landfilled materials.

G. Commercial franchise fees can be assessed on gross receipts, rather than on loose cubic yards. Assessing commercial franchise fees on gross receipts would ensure that the City was receiving a portion of the revenues for all integrated waste management services, not just garbage collection service. It will be especially important to collect franchise fees on the expanded basis of services, as the City implements new programs to reduce the amount of commercial waste landfilled. Over time, as haulers' rates increase, their gross receipts will increase, and the City's franchise fee receipts would increase accordingly.

H. Remove the 20,000 uncompacted cubic yard annual exemption for Franchised Haulers who do not perform front loader service from paying the Commercial Solid Waste Franchise Fee. The exemption was originally designed to apply to small businesses, but it currently affects the majority of haulers that provide debris box services (approximately 18 haulers). The annual value of removing this exemption is over $1.3 million in increased General Fund revenues.

I. The Mayor's March, 2008 Budget Message emphasized that all City departments should assess fees that provide for full cost recovery. Accordingly, the Integrated Waste Management Department could review the fees it charges for certain activities, to ensure the fees reflect reasonable cost recovery. Examples include the fee charged to non-disposal solid waste facilities (such as transfer/processing stations and Material Recovery Facilities) for an amendment of the City's Non-Disposal Facility Element ("NDFE"), or the fee charged to a solid waste hauler for initial application or renewal of their annual franchise. The fees that are currently charged to the haulers and facility operators are nominal, and do not cover the cost of staff time that is needed to process the applications or renewals.

This page intentionally left blank.

Alternative Revenue Generating Mechanisms

List of Alternative Revenue Generating Mechanisms that are Included in this Report

This section summarizes seven revenue generating mechanisms that are not currently being used by the City. Many of these mechanisms are being used in various Cities throughout the state, and we have provided examples of these practices. Further analysis for any of these mechanisms will include a thorough legal review and a cost study to confirm that costs attributed to a fee are appropriate, not recovered by another fee, and fee revenue does not exceed cost recovery.

The alternative revenue generating mechanisms included in this report are:

1. Fees Assessed on the Hauler. This fee type includes a group of various fees that are assessed on haulers, including franchise fees, AB 939 fees, public education fees, billing fees, administrative fees, etc.
2. Solid Waste Development Impact Fees. These fees are designed to help a municipality recover the initial capital costs associated with expanding its solid waste operations to accommodate and serve new developments.
3. Vehicle Impact Fees. Vehicle impact fees are fees that are charged to collection service providers to recover street maintenance costs associated with the collection of solid waste, recycling, and yard waste.
4. Street Sweeping Fees. These are designed to recover costs of street sweeping by applying a portion of the street sweeping cost to each user, either on a per-account basis, or on a percentage basis.
5. Host Fees Assessed on Solid Waste Facilities. Host fees are fees charged to solid waste facility operators. Such facilities include landfills, transfer stations, or material recovery facilities ("MRFs"). Host fees are designed to recover street maintenance, litter abatement, code enforcement or other costs resulting from the impacts of the facility.
6. Extended Producer Responsibility ("EPR") Fees and Advanced Disposal or Advanced Recycling Fees. Extended Producer Responsibility is a policy approach that extends the responsibility of producers for their products throughout the products' lifecycles. There are generally no governmental fees associated with EPR. Governmental fees are more likely to take the form of an

Advanced Recycling Fee, where the government collects a fee at the point of sale for a particular product, and uses the fee revenue to fund recycling programs for that type of product.

7. Revenues from the Sale of Carbon Credits. Carbon credits may be available for sale if they are allowed for recycling programs through a future "cap-and-trade" system for greenhouse gas emissions, which may be established in California or the entire United States in the next few years.

Framework for Descriptions of Alternative Revenue Generating Mechanisms

We developed the following framework to describe each potential new revenue source that is included in this section of this report:

- Name of Revenue Generating Mechanism;
- General Description;
- Consistency with City's Existing Programs;
- Risks and Constraints, such as Proposition 218; and,
- Volatility of Funds from this Mechanism and Expected Revenues.

Methodology

To gather information on Alternative Revenue-Generating Mechanisms, we reviewed our internal databases in order to identify revenue-generating programs related to solid waste that are currently being used by other cities in California. We then contacted cities by telephone to verify the current fee amounts and structures of the fees. In some cases, we conducted telephone surveys to gather new information. Some cities also provided background documents to us.

Researchers also included attending a seminar on carbon credits, and reviewing published works on carbon credits and EPR.

1. Fees Assessed on the Hauler

General Description

Franchise fees, AB 939 fees, and other administrative fees are assessed on refuse collection contractors in the majority of cities in the State of California. The various fees can include franchise fees, AB 939 fees, public education fees, billing fees, administrative fees, environmental mitigation fees, etc. There are a variety of methods for fees assessed on the hauler, including:

- Annual flat fee, either a fixed flat fee, or a base amount that is either fixed in some cases, or adjusted annually by changes in the Consumer Price Index ("CPI.") Example cities for flat franchise fees include Oakland, Las Gallinas, Novato, West Bay Sanitary District, and Sunnyvale;

- The most common franchise fee and AB 939 fee assessment method is a percentage fee based on gross receipts, or receipts net of disposal costs. Hundreds of cities in California assess fees using this method, and the fees are required by either municipal code language or contract language. The percentage amounts of the fees range from 2% to 24%. Many cities assess BOTH franchise fees and AB 939 fees;
- Specific dollar amount per ton or per cubic yard. The City currently collects AB 939 fees in this way, and a few cities collect AB 939 fees on a per-ton basis; and
- Fees per account, such as an amount per account per year or per month.

In general, these fees are included in the rates that customers pay, and are not shown on the customers' bills.

Consistency of Hauler Fees with City's Existing Programs

Franchise fees are authorized by the City's municipal code. Franchise fee requirements are included as a provision in the franchise agreement between the City and the Hauler, and/or the agreement may reference the municipal code. For the City, new franchise fees could be imposed at the time that new contracts are established. Many cities consider franchise fee revenues as unrestricted revenues, and franchise fees are generally deposited into the city general funds.

Volatility of Hauler Fees, and Expected Revenues through 2040

If franchise fees are set as a percentage of gross receipts, the amount of franchise fees collected would change each year, based on the collection contractor's overall revenues. The haulers' revenues, and thus the City's franchise fees, generally rise and fall as the overall economy rises and falls.

If franchise fees are set as a fixed dollar amount per year for the entire contract term, they would remain stable over time. Cities with fixed dollar amount franchise fees typically include an escalator clause, so that the dollar amount increases each year, in keeping with inflation.

Table 4 – 1 below provides a sample of the fees assessed on the hauler by various cities.

Alternative Revenue Generating Mechanisms

TABLE 4 - 1
Summary of Fees Assessed on the Hauler

City	Population, 2008	Exclusive or non-Exclusive Commercial Collection	Fee Name	Fee Methodology	Annual Escalator	Annual Amount / Percentage	How Are Fees Assessed?
Elk Grove [1]	139,542	Permit System	Commercial Refuse Hauler Fees	% of Gross Revenue	No	Amount Ranges from 8% to 35% based on Diversion Amounts	Included in rates
Las Galinas Sanitary District	48,383	Yes	Franchise Fee	Flat Fee	No	$25,000	Included in rates
City of LA [2]	4,045,873	Permit System	AB 939	% of Gross Revenue	No	10%	All Customers
Novato	52,737	Yes	Franchise Fee	Flat Fee	No	$45,000	Included in rates
Oakland	420,183	Yes	Franchise Fee	Flat Fee	Yes, 80% of CPI	$4,320,000	All Customers
			Other Fees	Flat Fee	Yes, 80% of CPI		All Customers
Rancho Santa Margarita	49,764	Yes	Franchise Fee	5%			Included in rates
			Outreach Fee	Flat Fee	Yes, CPI	$60,000	Included in rates
San Francisco	824,525	1 Hauler with 2 permits	Impound Account	Calulated Amount	Based on City Solid Waste Budget	$6,000,000	Residential Only
Sunnyvale	137,538	Yes	Franchise Fee	Flat Fee	Yes, 100% of CPI	$1,535,737	All Customers
San Diego	1,336,865	Permit System	AB 939 Fee [3]	$7.00 Per ton	Set by Council Resolution	$10,100,000	Included in rates
			Franchise Fee [3]	$12.00 per ton			Included in rates
			Refuse Collector Business Tax [4]	$8.00 per ton			Included in rates
West Bay Sanitary District	3,000	Yes	Franchise Fee	Flat Fee	No	$5,000	Included in rates

[1] Fee is based on diversion requirement of 30% or greater = 8% fee, Under 21% diversion = 14% fee, Less than 3% diversion = 35% fee
[2] Applies to haulers collecting over 1,000 tons per year
[3] Applies to haulers generating over 75,000 tons per year
[4] Applies to self haul tons over two ton loads and all out-of-City waste

2. Solid Waste Development Impact Fees

General Description

Solid waste development impact fees are designed to help a municipality recover the initial capital costs associated with expanding its solid waste operations to accommodate and serve new developments. Expansion costs that need to be recovered may include the costs of purchasing solid waste and recycling collection vehicles and collection containers, building new facilities or expanding current ones, and occasionally include the costs of recruiting new staff. These fees are specifically related to one-time expansion costs, as opposed to on-going operating costs.

Residential impact fees are typically calculated on a per unit basis, while commercial impact fees are typically calculated on the basis of waste volume. Cities may re-calculate the fees every few years, or increase the fee each year by the Consumer Price Index (CPI), or other escalation factor.

R3 has identified 8 cities in California that assess or are considering assessing such fees on new developments: Clovis, Redlands, Merced, Hanford, Lompoc, Hemet, Fresno and Roseville.

Consistency of Development Impact Fees with City's Existing Programs

Development fees are generally stand-alone programs, and do not impact the City's existing programs or existing contracts. However, most cities are sensitive to the financial pressure that new development fees place on new development in the City, and may waive certain development fees in times of lower volumes of new construction.

Volatility of New Development Impact Fees, and Expected Revenues through 2040

New developments can be expensive for the City to service initially. For example, providing new carts and public education to a new home can cost the City $150 – 200 as a one-time cost. Some proposed new developments may have 5,000 to 10,000 new homes, and at $150 per home, the costs to the City to set up new collection services for 5,000 homes could range from $750,000 to $1,000,000.

New development impact fees are subject to new construction cycles. In times of more development, the fees would rise, and the fees would be lower in years where new development volumes decrease. Table 4 – 2 below summarizes the fees charged by the cities and other related details.

TABLE 4 - 2
Summary of Development Impact Fee Survey

City	Fee Amount Per Building Type					Fee Methodology	
	Single- Family ($/unit)	Multi-Family ($/unit)	Mobile Home ($/unit)	Com.	Ind.	Res.	Com.
Redlands	$650	$325	N/A	$52/ppd		N/A	Waste Generation
Hemet Container	$59	$59	$59	$225 - $520		Per Unit	Waste Volume
Equip.	$53	$37	$53	$0.033/ gsf	$0.027/ gsf		
Clovis	$306	$114	N/A	$114/unit		Per Unit	Fixed Rate/ Waste Volume
Lompoc	60 gal -$67.41 90 gal - $68.48 350 gal - $271.68 450 gal - $341.57	No Standardized Fee. Dependent on the number and size of containers at the project site.				Per Unit	Waste Volume
Merced	$299.55	$207.55	$299.55	All non-residential cost of bin + proportion of truck used		Per Unit	Waste Volume
Hanford	$215.46	$119.79	N/A	All non-residential cost of bin + proportion of truck used		Per Unit	Waste Volume

ppd = pounds per day
gsf = gross square foot

3. Vehicle Impact Fees

General Description

Vehicle impact fees are fees that are charged to collection service providers to recover street maintenance costs associated with the collection of solid waste, recycling, and yard waste. In addition, some cities have imposed vehicle impact fees on construction vehicles, as well. A vehicle impact fee can be determined by analyzing the impacts of the vehicles on the jurisdiction's streets as a percentage of total vehicle impacts and allocating a proportional share of street maintenance cost requirements to those vehicles.

There are over 30 cities in California that have studied refuse vehicle impact fees and/or construction vehicle impact fees. We have included details for seven cities in California that have assessed a vehicle impact fee: Alameda, Modesto, Menlo Park, Rolling Hills Estates, Tiburon, Twenty-nine Palms, and Woodside.

Consistency of Vehicle Impact Fees with City's Existing Programs

Once the vehicle impact fee amount is calculated, it can be assessed in a variety of ways. For refuse vehicle impacts, a flat fee can be charged to the hauler, with or without an annual escalator, or a fee can be calculated as a percentage of gross receipts.

For construction vehicle impacts, the fee can be assessed as a percentage of permit valuation, on a per-square-foot of construction basis, or in other ways, as determined by the City.

Volatility of Vehicle Impact Fees, and Expected Revenues through 2040

Table 4 – 3 below summarizes cities implementing a vehicle impact fee and the fees charged by the cities.

TABLE 4 - 3
Summary of Vehicle Impact Fees

City	Population, 2008	Does City charge a Vehicle Impact fee on refuse? On construction?	When was VIF established?	Is the fee charged to the hauler only, or is it visibly shown on the customer's bill?	If charged to hauler, how? Annual lump-sum payment to City?	How much does the City collect annually from this fee?
Alameda	75,823	Yes	2002	Fee is charged to customer, but was reimbursed to the customer by the City for the first two years		N/A
Modesto	209,936	Yes Refuse		10.5% of gross receipts passed through on the garbage rates charged to customers	N/A	$1.7 million
Menlo Park	31,490	Yes Construction	2005	Fee is charged to contractor	0.58% of the total construction project value and exempting residential alterations, residential repairs, and all projects less than $10,000 in value	varies
Rolling Hills Estates	8,185	Yes Refuse	2005	Hauler Only	Annual lump-sum in advance	$131,250 4/1/08 $150,000 4/1/09
Tiburon	8,917	Yes Refuse & Construction	2005		Construction - 1% of permit valuation	Refuse - $70,000
Twentynine Palms	27,966	Yes Refuse	2004	Hauler Only	15% franchise fee to offset costs of impacts to streets	N/A
Woodside	5,625	yes Construction	1991	Fee is charged to contractor / hauler	$1 / cubic yard, for everything over 30 cubic yards	varies

4. Street Sweeping Fees

General Description

Street sweeping fees are included in refuse collection rates in cities throughout California. In San José, street sweeping costs are included in residential refuse collection fees, and some commercial street sweeping costs are also charged to businesses.

In many cities, street sweeping fees are designed to simply recover costs of street sweeping by applying a portion of the street sweeping cost to each user, either on a per-account basis, or on a percentage basis. In addition to street sweeping, some cities also recover costs for tree trimming and/or median island maintenance through the solid waste fund as well. R3 has identified 8 cities in California that assess or are

considering assessing such fees on new developments: Calabasas, Claremont, Culver City, Glendale, Merced, Santa Monica, Sacramento and Whittier.

Consistency of Street Sweeping Fees with City's Existing Programs

In the City, the cost of residential street sweeping is already passed through to residential customers, included in the residential rates.

Volatility of Street Sweeping Fees, and Expected Revenues through 2040

Table 4 – 4 below summarizes cities implementing street sweeping fees and the fees charged by the cities.

TABLE 4 - 4
Summary of Street Sweeping Fees

City	Population, 2008	Street Sweeper	Dept/Fund Cost is Acctd	Are Fees Assessed to Customer?	How Are Fees Assessed	In refuse rates or as separate rate?	Allocation Method (Res/Com)	Do you conduct protest hearings?
Calabasas	23,725	Yes	AB 939 Regulatory Fees	Per Ton, sliding scale	No	Approx. $230,000 per year	Fees are charged on a per-ton basis, with the dollar amount of the fee dependent on the quarterly diversion rate of the hauler, ranging from $12.50/ton for 50% diversion, to $10/ton for 75% diversion.	AB 939 fund
Claremont	37,242	Contracted Out	Sanitation Fund	Yes	Com. - by bldg. $10/month/owner Single Family - $10.31 per qtr per/home	Separate charge on refuse bill	N/A	No. On bills prior to 1996
Culver City	40,694	Clean Street	SW Acct	Yes	N/A	In refuse rate	By curb mile, 48% residential, 52% commercial	Yes for Residential Rates
Glendale	207,157	City Crews	Integrated Waste Mgmt Fund	Yes	N/A	in "refuse base rate" but not itemized	By curb mile, 80% residential, 20% commercial	N/A
Merced	80,608		Solid Waste Rates	Yes	$1.53 per month per customer	In refuse rate	N/A	N/A
Santa Monica	91,439	City Crews	Solid Waste Ent. Fund	Res - no Comm - yes	Water meter size (1", 11/4", 2")	Res - Included Comm - separate fee	N/A	Pre 1996
Sacramento	475,743	City Crews	Public Works Ent. Fund	Yes	Variable from $1.24 to $4.06 per month, based on type of service account	Fees on Utility Bills	N/A	N/A
Whittier	86,945	City Crews	Public Works Ent. Fund	Yes		Separate charge on refuse bill	N/A	N/A

5. Host Fees Assessed on Solid Waste Facilities

General Description

Host fees are fees charged to the solid waste facility operators. Facilities may include landfills, transfer stations, or material recovery facilities ("MRFs"). Host fees are designed to recover street maintenance, litter abatement, code enforcement, or other costs resulting from the impact of such facilities. A host fee can be determined by analyzing the cost impacts related to vehicles on the jurisdiction's streets, potential litter abatement costs, and staff costs for inspections. Host fees are sometimes calculated by allocating a proportional share of those costs to each ton of material that the facility receives.

Hosts fees may be assessed on the following materials or other bases:

- All tons disposed (may exempt tons diverted);
- All tons received;
- Out of City/County tons;
- A percentage of gate revenue; or
- A fixed amount per year.

Consistency of Host Fees with City's Existing Programs

Host fees are authorized through various mechanisms, including through the City's municipal code, Conditional Use Permits, Franchise Agreements, Memorandums of Understandings (MOU's), or Business Permits. Host fee requirements are typically listed as a clause in the contract between the host city and the facility operator, and/or the contract may reference the municipal code. For the City, new host fees could be imposed at the time that new solid waste or recycling facilities are developed or existing solid waste or recycling facilities are expanded. There may also be opportunities to charge host fees on solid waste facilities located on public property like the HHW facility on Las Plumas or facilities which may be located in the future on lands owned by the City-Santa Clara Water Pollution Control Plant.

Host fees may be considered either unrestricted revenue or revenue to be used for a defined purpose. Many cities consider host fee revenues as unrestricted revenues and are host fees are generally deposited into a city's general fund.

Volatility of Host Fees, and Expected Revenues through 2040

If a per-ton fee assessment method is used, the volatility of host fees would be related to the volume of material received by the facility. Solid waste volumes will generally rise and fall with the economy, and with development. Solid waste volumes may fall as new diversion programs are implemented.

If the assessment method is a flat fee, the impacts may be as follows:

The host fee amount would be exactly the same every year, unless an escalator clause is included that would increase the fee each year.

While a flat fee protects the City from lower revenues in times of lower waste volumes, it also keeps the City from sharing in higher revenues when larger waste volumes are received.

The impacts on the facility are the opposite. The facility may suffer from the relatively high obligation of the flat host fee when waste volumes are low, and may experience proportionally higher profits when waste volumes are higher, due to the flat host fee.

Host fees based on disposal or out-of-city/county tons will decrease as the cities implement new programs to support zero waste goals.

Host fees based on all tons including disposal, diverted, and recyclable tons will experience less volatility in total revenue generate per year through the year 2040.

Table 4 – 5 below provides a sample of the Host fees assessed on various solid waste facilities in California.

TABLE 4 - 5
Facility Host Fees

Facility	Facility Location	Owner	Operator	Permitted Tons/Day	"Host" Fee	Authorization	Adjustment	Based on	Equivalent Fee/Assessed Per Ton	Recipient/ Use
Transfer Stations & Recycling Facilities										
Downey Area Recycling & Transfer - DART	Downey	Los Angeles County Sanitation District	Los Angeles County Sanitation District	1,500	$1.32 per ton	Development Agreement	Based on tipping fees and sale of recyclables	Disposal tons and recycling sales	$1.32	General Fund
Rainbow Transfer Station & MRF	Huntington Beach	JBST Properties	Rainbow Disposal	2,800	2% of gross receipts	Franchise Agreement	None	Public dumping charges ("paid disposal")	$0.64	General Fund
Waste Management Transfer Station	South Gate	Waste Management	Waste Management	2,000	$400,000 per year	Operating Agreement	CPI	Flat fee	$0.64 or more, depending on actual throughput	General Fund
South Gate Transfer Station	South Gate	Los Angeles County Sanitation District	Los Angeles County Sanitation District	1,000	$1.26 per ton	Permit Fee	CPI	All inbound tons	$1.26	General Fund
Interior Removal Specialist - MRF	South Gate	Interior Removal Specialist	Interior Removal Specialist	3,000	$1.25 per ton	Permit Fee	$.05 per ton per year	All inbound tons	$1.25	General Fund
Hanson Aggregate C&D Recycling	South Gate	Hanson Aggregate C&D Recycling	Hanson Aggregate C&D Recycling	1,000	2% of gate revenue	Permit Fee	Based on gate revenues	All inbound tons	$.14 (3)	General Fund
Landfills										
Olinda Alpha Sanitary Landfill	Brea	County of Orange IWMD	County of Orange IWMD	8,000	$1.50 per ton (1)	MOU	Adjusts to $1.50 per ton on 2014	All Out-of-city tons	$1.50 per ton (1)	City of Brea Sanitation and Streets Fund
Colton Sanitary Landfill	Colton	City of San Bernardino	City of San Bernardino	3,100	$1.00 per ton (2)	MOU	No	Disposal tons	$1.00	City Of Colton
Scholl Canyon Landfill	Glendale	City of Glendale	Los Angeles County Sanitation District	3,400	25% of Gate Fee	City Ordinance	Based on Tipping fee	All Out-of-city tons	$10.02	City of Glendale General Fund
Frank K. Bowerman Sanitary Landfill	Irvine	County of Orange IWMD	County of Orange IWMD	8,500	$1.50 per ton (1)	MOU	Adjusts to $1.50 per ton on 2014	All Out-of-city tons	$1.50 per ton (1)	City of Irvine Sanitation and Streets Fund
Puente Hills Landfill	Los Angeles County - Unincorporated Area (Whittier)	Los Angeles County Sanitation District	Los Angeles County Sanitation District	13,200	$1.00 per ton	CUP	No	Disposal tons	$1.00	Los Angeles County Community Enhancement Fund
					$1.00 per ton	CUP	No	Disposal tons	$1.00	Puente Hills Native Habitat Land Trust
					10% of Gate Fee	County Ordinance	Based on tipping fee	Disposal tons	$2.94	Los Angeles County General Fund
San Timoteo Sanitary Landfill	Redlands	County of San Bernardino	County of San Bernardino	1,000	$1.00 per ton (2)	MOU	No	Disposal tons	$1.00	City of Redlands
Mid-Valley Landfill	Rialto	County of San Bernardino	County of San Bernardino	7,500	$4.98 per ton	Development Agreements	Yes	Disposal tons	$2.49 to each city	City of Rialto and City of Fontana
Victorville Sanitary Landfill	Victorville	County of San Bernardino	County of San Bernardino	1,600	$.50 per ton (2)	MOU	No	Disposal tons	$0.50	City of Victorville and City of Hesperia

(1) The Host fee is a fixed amount until 2014. Then the fee converts to $1.50 per ton.
(2) Landfill Mitigation Fund - for mitigation of hosting landfill, road repair, illegal dumping
(3) Source - Estimated amount per ton by Public Works Director

6. Extended Producer Responsibility Fees and Advanced Disposal/Recycling Fees

General Description

Extended Producer Responsibility ("EPR") is a policy approach that extends the responsibility of producers for their products throughout the products' lifecycles. There are generally no governmental fees associated with EPR. The original definition by Professor Thomas Lindqvist emphasized "total life cycle environmental improvement of product systems by extending the responsibilities of the manufacturer of the product to various parts of the entire life cycle of the product, and especially to the take-back, recycling and final disposal of the product."[5] EPR can include programs that emphasize the end-of-life management of products, after consumers discard them. Alternatively, the definition used by the California Integrated Waste Management Board emphasizes reducing environmental impacts:

> *"Extended Producer Responsibility (EPR) is the extension of the responsibility of producers, and all entities involved in the product chain, to reduce the cradle-to-cradle impacts of a product and its packaging; the primary responsibility lies with the producer, or brand owner, who makes design and marketing decisions."*[6]

The vast majority of EPR systems are established at the country or state level. EPR systems would be difficult to establish for an individual city, because if a manufacturer refused to participate, that manufacturer could still offer their products for sale in neighboring jurisdictions. In addition, it is difficult and costly for a jurisdiction to establish enforcement systems with manufacturers and retailers, because, unlike state governments, these are not pre-existing enforcement relationships. State governments are already in the business of imposing sales taxes and regulating products sold by retailers, for example. There may also be issues of consistency with state law.

<u>Advanced Disposal/Recycling Fees</u>

An alternative policy to EPR is one that uses "Advanced Disposal Fees" or "Advanced Recycling Fees" collected when products are purchased. When using an Advanced Recycling Fee, the government collects a fee at the point of sale for a particular product, and uses the fee revenue to conduct recycling programs for that type of product. This approach

---

[5] Lindhqvist, Thomas. (2000) *Extended Producer Responsibility in Cleaner Production*. IIIEE Dissertations 2000:2. Lund: IIIEE, Lund University.

[6] California Integrated Waste Management Board, EPR Framework Policy

generally has higher administrative costs than EPR systems, because it involves a third party, the government, in the process.

California Electronic Waste Recycling Act

An example of an Advanced Recycling Fee ("ARF") is California's Electronic Waste Recycling Act, which went into effect in 2005. In this system, consumers pay an advanced recycling fee when they purchase a product covered by the act, such as a computer monitor or television. The fees paid by consumers are deposited into a fund that is managed by the State of California. The state then pays recyclers for collecting and processing electronics that are collected under the Act. One of the goals of the Act was to relieve local governments of the costs of collecting and recycling electronic wastes, which are banned from landfill disposal.

Environmental Levy for Alcohol Bottles in Ontario, Canada

The Province of Ontario, Canada places an environmental levy of 10 cents on non-refillable alcohol containers. This offers brewers, vintners and alcohol producers a financial incentive to package in refillable bottles. Funds from the environmental levy are placed in the general fund of the province, and there is no restriction on how the funds can be spent. This example shows how one Extended Producer Responsibility fee is used to bring funding to a government, though the primary purpose of the fee is to encourage greater use of refillable alcohol beverage containers.

San Francisco's Litter Reduction Efforts with Businesses

The City of San Francisco has been exploring new ways to deal with litter production in the City. San Francisco conducted a survey of litter and found some of the top components of litter were cigarette butts and items related to fast food (napkins, containers, etc.) The City then began a dialogue with fast food retailers. Ideas have been explored to have retailers provide additional litter containers, and to "adopt-a-block" to clean up the entire block rather than cleaning limited to their own property. While such an approach would not bring fees directly to the City, if the businesses take on direct responsibility for more litter clean-up activities, the City's cost of litter clean-up would be reduced.

Single-use Carryout Bag Reduction Initiative

The City is currently reviewing its options with reducing single-use carryout bags. These options may involve a component that would levy a fee on plastic and/or paper carryout bags. That fee could be used by the City for litter-related education and/or litter reduction related to single-use carryout bags. Such a fee should be carefully coordinated with the City Attorney to ensure compliance with State law. Some jurisdictions, such as the County of Los Angeles, have investigated assessing a fee on plastic carryout bags. The City is participating in the "Cities Keep It Clean" program, initiated by Save the Bay. The Cities Keep It Clean program is considering fees and/or bans for plastic grocery bags as one option to reduce litter.

Existing law requires large grocery stores to have on-site containers for collection of plastic bags for recycling. Recently proposed (but not approved) statewide legislation (AB 2058 and AB 2769) would have imposed a $0.25 fee on single-use carryout bags at large grocery stores . A portion of the fee would have been remitted to the CIWMB, and monies would have been expended to administer and enforce the provisions of the single-use carryout bag law. The remainder of the fee would have been used for grants to cities and counties, to implement single-use carryout bag recycling, and pollution prevention and outreach programs. The law would have required stores to develop public education materials related to single-use carryout bag recycling.

Takeout Food Packaging

In recent years, more than a dozen cities in the State of California have begun to regulate takeout food packaging. Several of them have banned foamed polystyrene from City facilities, and others have banned foamed polystyrene from use for takeout food packaging at local restaurants. To date, these programs have not included a fee component; however, a fee or fine could be a component of these programs. Fees could be used for recycling education or litter reduction. The City is participating in the Save the Bay program, "Cities Keep It Clean." Fees or bans on non-biodegradable or non-compostable take out food containers are being considered as an option for reducing litter under that program.

Consistency of EPR or ARF Fees with City's Existing Programs

Extended Producer Responsibility aligns well with the City's Zero Waste planning efforts. Consistency of specific EPR or ARF fees with the City's existing programs would need to be determined on a case-by-case basis, depending on the product type.

There is usually a very strong link between imposing an EPR or ARF fee and the policy goal that the fee is intended to accomplish. EPR and ARF fees are not usually implemented in order to provide general fund revenues or overall program revenues. The example in Ontario Canada of the environmental levy on non-refillable alcohol beverage containers showed that an EPR fee was imposed to encourage refillables over one-way beverage containers, and a side benefit is that that fee provides general fund revenues to the Province. Another example is that the California electronics fee is used solely to fund the electronics program. A direct program-funding approach is nearly always the case in the design of ARF fee programs.

Volatility of EPR or ARF Fees, and Expected Revenues through 2040

EPR and ARF fees are generally tied to one specific type of product, and the annual amount of the fees collected is tied to the sales of the product. Fees are generally charged on a "per product sold" basis. This can be a very appropriate way to generate just the right amount of fees to handle a specific volume of waste. For instance, the electronic waste fees collected

in the State of California increase as sales of electronic products increase, and that may occur at the same rate that old electronics are discarded.

Revenues from EPR and ARF fees would need to be projected on a case-by-case basis. Revenue projections would be speculative, because there are very few examples to draw from, especially on the level of an individual jurisdiction.

7. Revenues from the Sale of Carbon Credits

General Description

While there is widespread agreement that an industrial "cap-and-trade" system for greenhouse gas ("GHG") emissions[7] will be established in the United States in the next few years, there is a great deal of speculation and uncertainty about the exact details of that system. A "cap-and-trade" system would establish an overall upper limit, a cap, on the total amount of greenhouse gas emissions allowable nationwide. Within that overall cap, portions of the total allowable emissions would be allotted to various businesses and organizations within the country (or state, if a state system.)

An individual business or organization is termed an "operator." Each operator would have an allowance of carbon credits. A carbon credit is a permit that allows the holder to emit one ton of carbon dioxide[8]. If their actual emissions were below the allowance, that operator would have excess carbon credits that could be sold. In contrast, if an operator chooses to exceed their allowance, that operator would have to purchase carbon credits from another operator. In this way, the market system seeks to reduce carbon emissions at the lowest possible cost. For example, in certain cases, it will be cheaper for an operator to purchase carbon credits from another operator than it will be to install new equipment to reduce emissions. Credits can be bought and sold, and can be widely traded in open markets, as is currently the case in many Countries that signed on to the Kyoto Protocol.[9]

---

[7] The major greenhouse gases which affect the climate include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, and others. They are generally expressed in terms of carbon dioxide equivalents (eCO_2.)

[8] One ton of carbon dioxide emissions is the standard unit of measurement for greenhouse gases. Emission of other greenhouse gases, such as methane, are expressed in "carbon dioxide equivalents," based upon their relative global warming potential.

[9] The Kyoto Protocol was adopted at the United Nations Framework Convention on Climate Change in 1997. It contains legally binding commitments for countries to reduce their anthropogenic emissions of greenhouse gases.

Legislation has been introduced in the United States Congress to implement a cap-and-trade system, but the legislation did not pass into law. In California, AB 32 became law in 2006. As a result of AB 32, the State's Air Resources Board is charged with establishing a program to reduce statewide greenhouse gas emissions. "The Act caps California's greenhouse gas emissions at 1990 levels by 2020. The Act authorizes the state board to adopt market-based compliance mechanisms including cap-and-trade."[10]

Consistency of Carbon Credits with City's Existing Programs

The City of San José is in the process of implementing new solid waste diversion programs that will reduce greenhouse gas emissions, and many more GHG-reducing programs are planned to be implemented as part of the City's Zero Waste Strategic Plan. However, these programs do not qualify as carbon credit projects under the currently available industry project protocols and standards. As mentioned, there is collaborative state action to coordinate programs to statewide greenhouse gas emissions reductions. California Climate Action Registry ("CCAR") will be working with the Air Resources Board to implement AB 32. In addition, CCAR has created a division called the Carbon Action Reserve. The purpose of this new division is to build more creditability into the voluntary, volatile carbon credit market. The Reserve has launched a growing public database of all carbon credits produced and then retired (retirement due to a monetary donation given to retire the credit). A prerequisite to build creditability and qualify credit projects is by creating standard guidelines of how to measure and report carbon credits. Currently the CCAR Reserve has four approved project protocols: Livestock, Landfills, Forest, and Urban Forestry. Although there are a limited number of project protocols currently approved, CCAR is working on creating several new project protocols. The most recent development includes discussions of developing a Co-Digester Protocol, which could potentially include some projects included in the proposed Zero Waste Strategic Plan.

The State of California has yet to decide the following key parameters of a cap-and-trade system:

- Which industries will be affected, and therefore given allowances that may be traded;
- The year of the baseline for new programs to "count" – typically, programs established before this year are considered "existing programs," and only "new" emissions reductions will qualify for carbon credits that can be sold;
- Which set of protocols might be used in California. There are several competing systems to calculate each "carbon credit," each

[10] As taken from the web site of the Pew Center on Global Climate Change, regarding the California Global Warming Solutions Act of 2006.

with its own calculation methodology, and its own determination of what activities "count."

Revenues from Carbon Credits – Risks and Constraints

There are many unresolved issues associated with carbon credits. The initial risk is that recycling and other waste reduction activities may be entirely left out of the State's cap-and-trade system that is currently being designed by the Air Resources Board to implement AB 32. Therefore, recycling and composting may be ineligible for carbon credits. Waste reduction activities need to be defined in the California and/or national cap-and-trade system in order to create revenues from the sale of carbon credits.

If recycling and composting are eligible for carbon credits, the resulting issue is determining which entity owns the carbon credits. Some companies, such as lessors of rooftop solar panels, are preemptively including clauses in contracts that state that the carbon credits belong to the lessor, even though no such credits exist at this time. The City could likewise claim future rights to any carbon credits in its contracts with franchised haulers. This may or may not be effective for the City, however, since carbon credits may not be defined as belonging to the entity that produces the recyclables or compostables, but rather may be defined as belonging to the entity that purchases the recycled or composted material.

Volatility of Revenues from the Sale of Carbon Credits, and Expected Revenues through 2040

Timing, eligibility and pricing of carbon credits resulting from waste reduction activities is entirely speculative at this point. The City may benefit from remaining engaged in the ongoing discussions at the Air Resources Board. The City and others in the recycling industry may be able to advocate for inclusion of waste reduction activities, creating a potential benefit of additional financing for waste reduction activities in the future.

Carbon Offsets

A carbon offset is a consumer product in which consumers can purchase "carbon offsets" to balance the impact of carbon emissions from individual daily actions. Carbon offset project developers "sell" the rights of offsets to consumers and then direct the money into developing carbon-reduction projects that would otherwise not have taken place. An example might include planting trees to sequester the equivalent amount of carbon emissions that offset an individual's estimated emissions due to their household use of electricity. As compared to the industrial carbon credits under the proposed cap and trade system, carbon offsets are the consumer version. Carbon offsets are voluntarily "purchased," and do not occur as a result of regulation. Currently carbon offsets can be purchased in the price range of $4 to $10 per ton. In contrast, if a cap-and-trade system is established, carbon credits may be priced at around $30 per ton, which is the approximate current value in European markets.

While some of the City's Green Vision plans might be partially funded by sale of carbon offsets using existing models, such as tree planting, structuring marketable carbon offsets related the Zero Waste efforts may be much more difficult. Each of the components of the Zero Waste Strategic Plan should be evaluated for this purpose during design and implementation.

Similarly, solid waste diversion programs do not qualify as carbon credit programs under the currently available industry project protocols and standards. Carbon credits are sold for several times the value of carbon offsets. Because of the higher value paid for carbon credits, the City may find it worthwhile to remain engaged in the ongoing discussions of new project protocols being developed by CCAR, to ensure that the City's projects become eligible to qualify as carbon credits.

Appendix D
Stakeholder Engagement Process
October 2008

Commercial Redesign
(From Attachment 3, May 2008 memo to T&E Committee)
http://www.sanjoseca.gov/clerk/CommitteeAgenda/TE/20080818/TE20080818_c.pdf

In order to obtain a comprehensive view of current recycling practices in the business community, staff engaged in an extensive outreach campaign. Stakeholder input came from San José small and large businesses, schools, faith-based organizations, non-profits, and garbage/recycling haulers. Staff completed the outreach campaign in two phases. Phase one included information gathering intended to help staff evaluate system options. During this phase staff received from 535 on-line business surveys, conducted 22 individual business interviews, and spoke seven franchised haulers via a written survey or face to face interview. Information was collected about current business recycling programs, barriers to recycling, and input on potential changes to the collection system. Phase two expanded on the first phase, educating the business community on the evaluation process. In Phase two, staff conducted presentations to the Silicon Valley Leadership Group Environmental Committee, Joint Venture Silicon Valley, the Silicon Valley Chamber of Commerce, and the Construction Roundtable. In addition, staff conducted informational meetings with business that wanted to participate in the process beyond Phase one and individually with all the current franchised haulers who wanted to meet.

This attachment details the stakeholder engagement activities used to obtain feedback from the business community.

<u>Phase One –Proposal Research</u>

Online Survey - An online survey on the City's Environmental Services webpage was made available during the period of February 8 to April 17, 2008. More than 500 business customers responded to the survey. This survey was advertised through a multi-lingual direct mail postcard that was sent to 20,000 businesses and advertisements through the San José Business Journal. In addition over 25 business associations were contacted about this tool.

Presentations- City staff gave presentations to the following organizations; presentations included both an explanation of the evaluation process and an opportunity for feedback on the current garbage and recycling system.

- San José Downtown Association
- Story Road Business Association
- West San Carlos Street Business Association
- Hispanic Chamber of Commerce of Silicon Valley
- BOMA (Building Owners and Managers Association)
- IFMA (International Facility Management Association)
- Silicon Valley Association of Non-Profits
- San José Redevelopment Agency's Business District Managers

Case Study Interviews- Staff conducted twenty-two individual interviews with facilities managers or other representatives from the following businesses:

- Restaurants (Peets, City Bagel)
- Hotels (Fairmont Hotel)
- Retail (The Plant Shopping Center, Oakridge Mall, West San Carlos (strip mall), Copyland, PW Market, Whole Foods)
- Office (Equity Office, Doubleday Relocation)
- High tech (Adobe, Cisco, Xilinx, Altera)
- Entertainment (Camera Cinema, San José Repertory, San José Giants Stadium)
- Schools (Franklin-McKinley School District, Union School District)
- Other (Kaiser Hospital)

Staff selected these businesses for case studies because many of them had employees who were dedicated to managing their garbage and recycling services as a primary job function.

Phase 1 Results - Results from the survey, presentations, and interviews yielded the following:

- The biggest barriers to recycling are cost, limited options for recycling provided by haulers, space for containers, and difficulty in sorting materials.

- Survey respondents stated that they could increase recycling by having more recycling choices available, decreasing the cost of recycling service, and receiving technical assistance.

- With no background details on program structure or benefits, responses were split on the subject of exclusive versus non-exclusive collection systems, with large businesses being slightly more in favor of the current system and small to medium sized businesses favoring exclusive.

- The business community expressed a strong desire to increase their recycling, and there was a great deal of interest about the City's proposed changes in support of the Green Vision.

Detailed results of the survey can be found at:
http://www.sjrecycles.org/business/pdf/BusinessRecyclingSurveyResults_5-9-08.pdf

Phase Two- Proposal Evaluation

This phase was focused on educating the businesses about the evaluation process, including the benefits of an exclusive system and addressing any concerns that may have been identified in the survey process.

Presentations- Staff presented the survey results and proposed recommendations to the Silicon Valley Leadership Group, Joint Venture Silicon Valley, Silicon Valley Chamber of Commerce, and the Construction Roundtable.

One-on-One Interviews- Staff conducted follow-up conversations with some businesses that had expressed concern during the first phase of outreach.

Phase Two Results- When businesses were presented with the data from the waste characterization along with the results of the survey data, there was a general understanding of the City's desire to pursue an exclusive system. Many of the businesses that were initially opposed to the idea of an exclusive system were more supportive after having seen the data and learning more about the benefits such a system could provide. Staff will continue to engage the business community throughout the evaluation and re-design process.

Hauler Outreach

Staff engaged the current franchised haulers for input on the current system, barriers to increased recycling, and reaction to redesign options.

Phase One- Information Gathering
The four largest haulers who have 90% of the commercial accounts and other interested haulers took part in in-person interviews and completed a survey. Staff conducted an information meeting for all haulers that included an overview of the current system, the Zero Waste and Green Vision goals, and a summary of the commercial evaluation process.

Company	Written Survey	In-person interview
A & A Recycling	X	
Allied Waste Services	X	X
GreenWaste Recovery	X	X
GT Waste	X	X
Stevens Creek Disposal	X	X
Valley Recycling	X	
Recycle West		X

Staff solicited input on the current obstacles to commercial solid waste collection in San Jose. Responses included:

- City dictating or limiting collection times
- Current franchise fees structure and administration
- Paying high landfill fees and having to charge lower prices to compete with haulers operating in the City without a franchise or outside the franchise system.

The highlights from the survey, presentation, and interviews are detailed below:

- When haulers were asked if prices would increase under each of the exclusive system options being considered, four of the six replied that they may increase. Two of six

respondents stated that they would not necessarily increase, because these systems may allow for better route efficiencies and guaranteed customer base.

- The haulers that responded were generally in favor of generator mandates for recycling. Several responded that they would be willing to help enforce such mandates. Respondents also were in favor of performance and/or diversion mandates on the hauling companies themselves.

- The hauler community also recognizes barriers to increasing recycling through the current system.

- Haulers would like to see increased education for the business community, mandatory recycling, hauler diversion mandates, and lower fees for processing and/or landfill.

Phase Two Evaluation Follow-Up

When presented with the proposed concept of a district-based exclusive system, the four largest haulers and some of the smaller haulers were supportive of the concept. The smaller haulers, who mostly deal with drop box and/or Construction and Demolition (C&D) debris, were generally opposed to an exclusive system including C&D collection because it would most likely eliminate their ability to do business in San José. As a result of this feedback, staff re-evaluated including C&D in the proposed exclusive system. All of the haulers expressed an interest in the City procuring processing capacity to allow more haulers the ability to compete in the selection process. Many also requested that the City procure disposal capacity.

Since September 9, 2008 when Council directed staff to proceed with new system development, staff has continued its outreach efforts. On-going efforts to inform the business community on the commercial system redesign have included updates mailed to the 20,000 businesses in the City's business tax database, ongoing meetings with the current commercial haulers, a presentation at the Chamber of commerce, and contacts to each of the neighborhood business districts, Silicon Valley Leadership Group, and Sustainable Silicon Valley.

Plastic Bag Stakeholder Outreach
October 2008

On January 16, 2008, the Rules and Open Government Committee directed staff to add the prohibition of plastic checkout bags to the initiatives being evaluated under the Green Vision Goal #5, Divert 100% of Waste from Landfill. During the Green Vision Study Session on February 1, 2008, Council also discussed that that reusable bags are the environmentally superior alternative to single-use bags and requested strategies to reduce the use of paper bags in addition to plastic. At this Study Session, Council approved adding an evaluation of prohibiting nonrecyclable and non-compostable plastic checkout bags in grocery and retail stores in San Jose to the Green Vision Implementation Plan.

Following these directives, staff met with industry representatives from the grocers' community and from the plastics industry in February 2008. Since that time, meetings have been conducted every other Wednesday for San José stakeholders including industry representatives from Safeway, PW Market, Target, Nijiya Market, California Grocers Association, the American Chemistry Council, Moore Recycling Association and Roplast plastic bag manufacturers. Representatives from neighboring cities, such as Morgan Hill, Palo Alto, Mountain View, and Milpitas have also attended these meetings.

Conference calls were conducted with the American Paper and Forestry Association, as well as with the manager of a major San José shopping mall.

In August 2008, staff developed plans for more targeted outreach to a larger community of grocers and retailers. In October 2008, 5,124 flyers were mailed to San José retailers and grocers to announce an online survey being conducted regarding single-use carry-out plastic and paper bag reduction. A website was launched to promote reusable bags and to serve as a portal to the online survey. The website provides email contact info for submitting questions and feedback on the proposed action to ban single-use bags with a fee option for continued use.

Emails were sent to the Hispanic Chamber of Commerce as well as to Redevelopment Agency staff who work with neighborhood business associations, to ask for their assistance in contacting retailers about the survey. Emails were also sent to retailers listed with the following business associations: Willow Glen Business Association, Alameda Business Association, Story Road Business Association. Various business chambers in San Jose are being contacted to alert their members of the opportunity to provide input to the plastic and paper bag action. Plans are currently underway to visit business association meetings, in order to meet with retailers and grocers and ask for their input.

Additional outreach to the retailer and grocer communities will be made in the future using neighborhood and business district newspapers. Council members are being asked to let their retailer and grocer constituents know about the online survey and proposed plastic and paper bag action.

FINAL REPORT
Appendix E:
Conversion Technologies and Facilities for the Integrated Waste Management Zero Waste Strategic Plan Development

Prepared by:

HDR Engineering, Inc.

115 Sansome Street, Suite 800

San Francisco, CA 94104

Presented to:

City of San Jose

Environmental Services Department

November 14, 2008

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY
Environmental Services

1.0 Introduction

In order to meet the City's Zero Waste goals of 75 percent diversion by 2013 and zero waste by 2022, the City of San Jose will need to consider implementation of a variety of Conversion Technologies as described in this report. Through the implementation of new solid waste policies and ordinances combined with various Conversion Technology systems, the City could reach its Zero Waste goals.

Conversion technologies include a wide array of thermal, biological, chemical, and mechanical technologies capable of converting municipal solid waste (MSW) into useful products and chemicals, fuels such as hydrogen, natural gas, ethanol and biodiesel, and energy in the form of steam and/or electricity. Conversion technologies are currently used to manage solid waste in Europe, Israel, Japan and Canada, but are not yet in commercial operation in the United States. There have been pilot demonstrations of conversion technologies in the U.S., but the absence of larger-scale demonstration facilities and commercial facilities in this country has been an obstacle to demonstrating the capabilities and benefits of these technologies for processing MSW.

Public sector interest in conversion technologies has increased in the U.S. in recent years, based on the desire to enhance recycling and beneficial use of waste, reduce dependence on landfilling and imported fossil fuels, and reduce greenhouse gas emissions. Investigations and initiatives have been conducted or are underway in such locations as New York City; Los Angeles, CA (City and County); Santa Barbara, CA(City and County); San Jose, CA; St. Lucie County, Florida, and Taunton, Massachusetts.

The City of San José has expressed interest in developing renewable energy from portions of municipal solid waste (MSW) streams using *Conversion Technologies* to realize the Green Vision goals of:

- Creating 25,000 Clean Tech jobs as the World Center of Clean Tech Innovation
- Reducing per capita energy use by 50 percent
- Receiving 100 percent of electrical power from clean renewable sources
- Diverting 100 percent of the waste from landfills and converting waste-to-energy

The Sustainable Energy Policy and Action Plan, developed in April 2008 provides a "road map" for the City to develop sustainable energy sources. The City's Zero Waste goals include a similar path of analyzing emerging Conversion Technologies that can increase materials diversion from landfilling. An increased awareness and concern about greenhouse gas emissions has increased

an interest in alternatives in placing waste materials into landfills. The incentives of sustainable energy, Zero Waste and climate protection have led the City to evaluate the potential for using Conversion Technology systems in the management of solid wastes.

In addition to Conversion Technologies, facilities that support or facilitate diversion activities are also needed. The City's Zero Waste goals will require the expansion, renovation or development of new infrastructure to support the efficient recovery of resources from the waste stream. In many cases, these types of facilities will be needed upstream of Conversion Technology facilities. Additional Materials Recovery Facilities (MRFs) are likely to be needed in order to facilitate the initial receipt, sorting, and recovery of various waste streams. In particular, MRFs with capabilities of receiving specific waste streams will be needed to achieve the 'highest and best use' goals of resource recovery. Consequently, MRFs configured to receive Commercial, Construction and Demolition, Multifamily or other types of specifically targeted waste streams may be needed. To economize the collection efficiencies and transfer aspects of the residues, these waste-stream specific MRFs could be co-located in a mega-MRF operation.

In order to meet Zero Waste goals, Conversion Technology facilities will also be required downstream of these MRFs. The City is assessing options for conversion technology using a multi-phase protocol, which included an RFI for energy as first step in analysis. The goal of the RFI was to identify possible methods of developing energy using the waste stream as a feedstock. An analysis of the RFI responses was performed concluding one technology (gasification, by Thermoselect) was the most appropriate for the City's consideration. Our subsequent independent analysis concluded this technology has not been developed to a commercial level. Consequently, we conclude the City is better waiting for evidence of this or other technologies to be proven before implementing it at a commercial level.

2.0 Overview of Technologies

As noted above, there is a broad range of Conversion Technologies to convert solid wastes or similar industrial waste residues into useful products. They include a wide array of thermal, biological, chemical, and mechanical technologies capable of converting municipal solid waste (MSW) into useful products and chemicals, fuels such as hydrogen, natural gas, ethanol and bio-diesel, and energy in the form of steam and/or electricity. Conversion Technologies can be grouped into several broad categories:

- **Thermal Processing.** Thermal processing includes technologies such as gasification, plasma gasification, and pyrolysis, which use or produce heat, under controlled conditions, to convert MSW into a synthesis gas (that can be used to produce a fuel, or cleaned and combusted to generate electricity) and other usable products (e.g., vitrified aggregate, carbon-based char, metal). More traditional forms of thermal processing include Waste-to-Energy (WTE) technologies. WTE technologies involve combusting the MSW in controlled conditions to generate electricity and industrial grade steam.
- **Biological Processing**. Anaerobic Digestion and MSW Composting are biological technologies. Anaerobic digestion reduces the biodegradable, organic fraction of MSW through controlled decomposition by microbes. It occurs in the absence of oxygen and produces a biogas that can be combusted to generate electricity as well as compost. Current anaerobic digestion processes can occur in two types of in-vessels; low solids digesters (similar to typical Waste Water Treatment Plant digesters) and high solid digesters (common in Europe). In-vessel composting of MSW features controlled oxygen, moisture, and temperature environments to accelerate the decomposition of organics. Each in-vessel stage is generally followed by a curing stage, which is either an aerated-static pile, or traditional windrow. Biological technologies such as anaerobic digestion are often combined with mechanical pre-processing systems, which allow for the recovery of traditional recyclables.
- **Hydrolysis.** Hydrolysis is a chemical reaction in which water, typically with an acid, reacts with the cellulose fraction of MSW (e.g., paper, food waste, yard waste) to produce sugars, with additional processing to convert the sugars to ethanol or other products.
- **Other.** Other processes include a variety of mechanical and refining processes that produce products but which do not necessarily fit into the above categories.

In addition to technologies that convert the solid wastes into useful products, reaching Zero Waste will also require recovery of useful products as commodities to market. Materials recovery is included in this report in recognition of its important role in the solid waste management system

2.1 Materials Recovery Facilities

Materials Recovery Facilities (MRF's) are necessary in the solid waste infrastructure to be able to identify the arriving materials highest and best use before employing a Conversion Technology.

In terms of expended energy, materials would ideally be recovered as commodities (paper, cardboard, plastics, etc.) and returned to recycling markets rather than being converted to heat or digested. Consequently, MRF's remain as the first component of this Conversion Technology report. A brief overview of waste stream specific MRFs and the concept of a mega-MRF are as follows.

In order to recover specific materials for their highest and best use, from mixed waste streams, materials processing and sorting will be needed. Over the past decade, the emergence of MRFs dedicated to "Single Stream" materials has been observed. These Single Stream MRFs utilize equipment uniquely designed to receive, process, and sort a wide variety of materials into discrete commodities. Entirely new devices have been designed to separate two-dimensional from three-dimensional materials. The use of industrial based technologies such as optical sorting has been applied to the waste recovery industry to separate various types of plastics, glass or non-metallic materials. In addition to Single Stream MRFs, Commercial MRFs and/or Construction Demolition MRFs are going to be needed to meet zero waste goals. Like the Single Stream MRFs these facilities would specialize in their specific waste streams. Commercial MRFs will need to be equipped to identify and extract high value fibers (office, mixed papers, cardboard), but will also need to accommodate a variety of other materials such as containers (glass, aluminum, plastics, etc.), wood (pallets), and other mixed materials (electronics) while allowing the removal of non-desirable materials such as hazardous wastes. Similarly, Construction & Demolition MRFs would process and sort concrete, dirt, metals, drywall, wood, etc. Another possibility for a waste stream specific MRF is that of a Multifamily MRF. This waste stream is rich with a variety of high value materials (cardboard, paper, containers, etc.), yet includes higher levels of organics (kitchen wastes) and bulky items (furniture). A MRF equipped to process a broad waste stream of this sort is typically called a 'Dirty MRF' in that it is equipped to process a waste stream consisting of both recyclables mixed with residuals.

Any combination of these Commercial, Construction & Demolition or Dirty MRFs at a single site is referred to as a mega-MRF. The benefit of the mega-MRF includes:

- Such a facility simplifies collection systems by being co-located
- Pre-processed streams at one facility can be directed to processing systems at another in order to 'high-grade' or further improve resource recovery.
- Residuals from the various functions can be consolidated for shipment using the most efficient method

Following the presorting and resource recovery efforts of the various MRFs, the need for recovering energy from the residuals is beneficial. These energy recovery functions will be referred to as Conversion Technologies.

2.2 Gasification and Plasma Arc (Synthesis gas generation - Emerging Thermal Technology)

The emerging thermal technologies such as gasification and plasma arc employ a method of heating the fuel to above combustion temperatures in a pressurized reaction chamber, but with very little or no oxygen. Under these conditions, the feedstock materials are broken into gas, liquid and solid forms. The gaseous forms are processed or 'refined' to produce a synthetic gas similar to methane. The liquids are typically metals and are cooled and recovered as a mixture of various metals, capable of further refinement elsewhere. The solids are typically carbon and slag and generally a waste product.

Gasification and plasma arc technologies require the fuel to be relatively uniform in size, similar to the fluidized bed technology described below. Consequently, these technologies require the use of a front-end processing system to produce a consistently sized feedstock. Typical pre-processing systems include the material being shredded prior to being placed in the reaction chamber.

The pre-processing size reduction effort can be costly due to the need to shred the entire waste stream prior to application. Materials which are non combustible or pose other challenges are removed or excluded from these facilities's feedstock. In some cases, feedstock materials require the addition of high Btu value materials such as industrial wastes, shredded tires or plastics to improve or maintain the quality of the syngas. The addition of these materials could be up to ten percent of the mix depending upon the Btu value of the overall feedstock.

Many of the emerging advanced thermal technologies are designed to produce a synthesis gas or "syngas" that can be cleaned and combusted to produce electricity or processed to produce a fuel. Although there are many classifications and sub-classifications of alternative thermal technologies in the industry, the basic alternative thermal processing technologies are ***plasma arc gasification***, ***gasification*** and ***pyrolysis (or advanced thermal processing/waste-to-energy)***.

- **Plasma arc systems** operate by passing high voltage, high current electricity between two electrodes, to create an electrical arc. Inert gas under pressure is

passed through the arc into a sealed container fed with waste material, reaching temperatures between 4,000°C and 7,000°C in the arc column. At these temperatures most types of waste, including hazardous and toxic substances, are broken into basic elemental constituents in a gaseous form, as well as liquefied solids (metals and silica). Non-ionized gases in the reactor chamber can reach 1200º C, and the molten solid "slag" is typically around 1700º C.

- **Gasification and pyrolysis** use high temperatures to break down the carbon components of MSW. Both technologies use less oxygen than conventional mass-burn incineration. There are numerous companies throughout the world developing, constructing and pilot or bench-scale testing these facilities on MSW as a feedstock. One company, Interstate Waste Technologies (IWT) claims to have seven (7) commercial scale (105 to 612 tons per day (TPD)) gasification plants in operation in Japan using MSW and industrial waste as feedstock. Among the many gasification vendors, Ebara Corporation headquartered in Tokyo, Japan, and Entech Solutions headquartered in Devon, England are two of the more prominent vendors that have approached the U.S. marketplace. There are several pyrolysis vendors including International Environmental Solutions (IES) with a test plant in Romoland, California and GEM America, located in Summit, New Jersey.

Gasification facility in Japan

2.3 Grate technologies (Mass Burn Waste-to-Energy)

With this system, MSW is fed onto a reciprocating grate where combustion takes place. Almost all of the post-recycling municipal waste stream can be processed by this technology without any presorting. Mass burn Waste-to-Energy (WTE) can accept the widest range of feedstock and can process the materials without extensive pre-processing.

Feedstock for a mass burn WTE facility typically consists of post-recycled municipal waste residues. Wastes entering the combustion chamber are slowly tumbled down an inclined grate such that a wide variety of material sizes and shapes as well as a variety of material thermal values can be mixed together and combusted without prior pre-treatment or pre-sizing. Materials which are non combustible or incur challenges for the air pollution control system such as white goods (washing machines, refrigerators, etc.), auto batteries, and sheetrock are removed or excluded from the feedstock. These materials are typically easy to exclude from municipal wastes.

Due to the type of processing, mass burn WTE facilities do not require a pre-processing phase. However, facility operators must observe arriving materials to remove unwanted materials before they enter the combustion chamber. In some WTE facilities where the feedstock includes commercial and industrial wastes, materials are sorted at a Materials Recovery Facility prior to thermal treatment in order to remove undesirable materials and potentially recoverable materials.

An integrated or waste heat steam boiler is used for thermal recovery. Grate technology combustion is used in large-scale commercial operations in more than 50 plants in the U.S. and more than 500 in Europe and Asia.

A major consideration with waste-to-energy facilities is that an extensive set of air pollution control devices is needed for gas clean-up. The typical air pollution control devices used in the U.S. include selective non-catalytic reduction, a spray dryer absorber, activated carbon injection, and a fabric filter. This type of air emissions control technology can achieve emission requirements compliant with European and US emission requirements.

The more common versions of these facilities are known as advanced mass burn incineration. There are currently 50 commercial-sized waste-to-energy (WTE) plants in the U.S. and over 500 WTE plants worldwide. The modern version of the WTE facilities have been in operation for over 30 years in the U.S., while its average facility has operated for 18 years. Throughputs range

from 200 tpd to over 3,000 tpd. Steam produced in the boiler is used to drive a steam turbine generator for power production.

The emissions systems for these advanced thermal facilities include robust flue gas cleaning systems. The term 'advanced thermal' implies the use of a high temperature boiler that ensures an optimum incineration process for the destruction of dioxins and furans and to minimize the synthesis of dioxins and furans in the 575°F to 400°F temperature range. The nitrous oxide (NO_X) is reduced by spraying ammonia water into the combustion chamber (advanced selective non-catalytic reduction method). Each incineration/steam-generating process line has its own flue-gas cleaning unit. Adsorbent that has already been used in the bag house filter, but with low uptake, is added to the flue gas leaving the boiler to capture heavy metals and organic pollutants. Residual dust particles in the flue gas from the steam generator are separated with the adsorbent.

The flue gas passes through a two-stage hydrogen chloride (HCL)-scrubber where process water is added to separate any readily soluble halogen compounds containing chlorine, fluorine, bromine, and iodine. Potentially harmful gases are dissolved in many water droplets and thus separated from the flue gas. The crude HCL-acid produced in the HCL-scrubbers has an HCL-concentration of about 10 percent. In a separate process, this crude HCL-acid is rectified and concentrated up to a strength of at least 30 percent and can be sold for technical applications.

The sulfur oxides (SO_2 + SO_3) are separated by a neutral single-stage scrubber. Here lime is used to bind the sulfur oxides. The lime combines with the sulfur compounds and part of the residual oxygen in the flue gas to form calcium sulphate, commonly known as gypsum. This gypsum is used in the construction industry to manufacture plaster or wallboards.

WTE facility (grate technology), Hamburg Germany

2.4 Fluidized bed technology (RDF Waste-to-Energy)

Most of the existing biomass facilities currently use a fluidized bed combustion technology which consists of an updraft blower through a bed of super heated sand, wherein biomass fuel including homogeneous materials such as wood chips, peach pits, or almond husks are suspended in the updraft current while they are combusted in the presence of oxygen. The resulting heat is used to create steam which is directed to a steam turbine to generate electricity. Fluidized bed technologies can use MSW as a fuel, known as refuse derived fuel, shredded and made relatively uniform before processing.

The fluidized bed incinerator requires the fuel to be relatively uniform in size to maintain the materials in a similar state of suspension while burning. Consequently, this technology requires the use of a front-end processing system to produce a consistently sized feedstock. Typical pre-processing systems include the material being shredded and or palletized. This practice of pre-processing of the waste is typically called ***Refuse Derived Fuel (or commonly RDF)***. Much of

the metal, glass, and other non-combustible materials are removed during front-end processing. The pre-processing size reduction effort can be costly due to the need to shred the entire waste stream prior to application. Like mass burn, RFD WTE facilities require exclusion or sorting of contaminants such as white goods, auto batteries, sheetrock, etc. Due to the more robust RDF pre-treatment technology, these materials are can be removed at the facility if they have not already been removed from the waste stream by other recycling or diversion programs before reaching the facility.

Combustion performance and stable operation has been reported to challenge some facilities although some operational advantages may offer opportunities for better performance. One advantage is that lime can be added directly to the combustor chamber to help control acid gases such as sulfur dioxide (SO_2). Generally, nitrous oxide (NO_x) emissions are lower than for mass-burn facilities. A downstream waste heat boiler is used for thermal recovery, and air pollution control is generally similar to that for mass-burn combustion.

The emissions systems for these fluidized bed types of advanced thermal facilities are very similar to the emissions control systems in the WTE (grate technologies) described above, with the primary differentiator being the quantity of fly ash to bottom ash. While WTE grate technology type facilities typically produce mostly bottom ash with very little fly ash, fluidized bed facilities typically produce mostly fly ash with very little bottom ash. This condition is typically more a function of the type of feedstock (Refuse Derived Fuel or biomass for fluidized bed as opposed to MSW for WTE facilities). Depending upon the levels of contaminants in the fly ash, some fly ash has commercial value in Europe and Asia as a concrete additive or soil amendment. Fly ash (from MSW feed facilities) in the US is typically deemed unacceptable for this use and is disposed in Class II landfills.

WTE (Fluidized Bed technology), Madrid Spain

2.5 Biomass to energy (Fluidized Bed Technology)

Biomass facilities convert processing heat directly to electricity or other industrial products such as high pressure steam. Biomass feedstock materials are typically wood chips or other homogeneous materials, such as peach pits or almond husks. The materials are suspended in the updraft current while they burn in the presence of oxygen. Biomass facilities receive a specific feedstock that is selected to be free of air polluting contaminants such as metals or plastics which would produce air emissions requiring more robust air emissions systems. Biomass facilities typically use a ***fluidized bed technology*** for incineration. Biomass facilities typically employ a fluidized bed technology for the incineration function. Wood chips are an ideal fuel insomuch as they can be easily developed from brush, green wastes, and wood wastes. This feedstock can relatively easily be made free of contaminants such as metal, glass, and other non-combustible materials by removing them in a pre-sorting facility. Biomass facilities typically accept only pre-processing and size reduced fuel ready for combustion.

Biomass facilities are required to comply with the same rigorous emission standards as waste-to-energy facilities. However, the more benign biomass fuel contains less problematic materials and consequently has less robust air emissions equipment. The typical air pollution control devices used in the U.S. include selective non-catalytic reduction, a spray dryer absorber, activated carbon injection, and a fabric filter. These air emissions devices are generally similar to mass burn air emissions devices and produce similar air emissions levels.

The emissions systems for most Biomass facilities are very similar to the emissions control systems in the WTE (grate technologies) and Fluidized bed type facilities described above. Namely, Biomass facilities generate a higher quantity of fly ash to bottom ash. One differentiator is that most Biomass fly ash is not a toxic waste. Due to the typically high content of lime, many Biomass facilities sell their fly ash as a soil amendment. A variety of soil stabilization uses make this product marketable.

Biomass facility (employing Fluidized bed technology), Central Valley California

2.6 Biological processing Overview

Technologies that utilize biological processing can be categorized as either ***anaerobic digestion*** or ***aerobic composting***. Depending upon the feedstock, many of the biological processing technologies utilize a mechanical pre-processing system to remove bulky, non-processables, and recyclables from the input stream prior to processing.

The quantity and size of anaerobic digester facilities has increased in recent years in Europe. One key driver is the European Union Landfill Directive that requires EU member states to stabilize organic material prior to landfilling. The directive stipulates targets (expressed as the amount of unstabilized waste that can be landfilled): 75 percent of the 1995 level by 2006; 50 percent of the 1995 level by 2010; and 35 percent of the 1995 level by 2016. Waste can be stabilized by incineration (with energy recovery), composting or digestion.

Because of this EU Landfill Directive, municipalities throughout Europe have begun constructing various stabilization plants, including digesters, composters and MBT (mechanical biological treatment) plants that use either digestion or composting for the biological component. Anaerobic digestion processing facilities can afford to charge high tip fees (reportedly up to $140/metric ton) in European countries subject to the Landfill Directive as they are competing with incineration and landfilling, both of which cost $90 to $140/metric ton (MT). There are green power incentives in many European locations, where all green power produced by digesters must be purchased by the local utility for a minimum of 15 cents/kwhr. The combination of high tipping fees and high energy revenues makes the economics of digestion attractive in many European locations.

It was estimated that in 1999, European AD plants processed about one million tons/year of mixed MSW or source separated organics (SSO) in 53 plants. In 2005, it was estimated that there were 74 AD facilities in operation, mostly in Europe, processing SSO or mixed MSW. In 2006, it was estimated that the number of AD facilities commercially operating or under construction had increased to 124 (many of the facilities under construction in 2005 had become operational in 2006), processing almost 4 million tons/year of waste. Many of the AD facilities currently in operation, particularly those with operational experience of greater than five years, have capacities smaller than 20,000 MT/year, although there is a trend to build larger anaerobic digestion facilities because of economies of scale.

2.7 Anaerobic Digestion Overview

Anaerobic digestion is a process where biodegradable material (the organic fraction of MSW) is broken down using bacteria in the absence of oxygen in an enclosed vessel. The process produces a biogas which can be combusted to create energy. Biological technologies such as anaerobic digestion are often combined with mechanical pre-processing systems, which allow for the recovery of traditional recyclables and improve the biological processes by removing unwanted materials such as glass prior to the digesters.

There is a broad array of anaerobic digestion systems that use differing types of techniques to facilitate the digestion process. The anaerobic digestion process to treat MSW could be divided into two types of digesters; high solids (above 20% solids) and low solids (below 10% solids). Each of these types of digestion has their own unique methods of facilitating the digestion process. In general, high solids digesters use a single phase system as opposed to low solids digesters which use a two-phase system (separating hydrolysis from the methanogeic phase). These systems are described in more detail in the following sections.

In general, feedstocks to anaerobic digester systems consist of an organically rich material. Such feedstock is typically agricultural wastes and food waste, but can also be the organic fraction of mixed MSW with appropriate pre-treatment systems to remove the inorganic fraction. Anaerobic digestion systems typically do not include yard waste, shrubs or woody materials. Even though these materials are organic, they are not readily digestible. Such materials are used in the post-digestion aerobic composting phase, as appropriate.

Depending on the type of feedstock, the extent and type of pre-processing varies. Preprocessing systems consist of the removal of contaminates such as inorganic materials such as grit, rocks, glass, plastics, and oversized materials. Such materials accumulate in the bottom of the digesters, reducing the volume of the digester and potentially causing operational problems with issues such as mixing and materials flow. The ideal feedstock for anaerobic digesters typically consists of homogenous uniform materials with similar biological digestion durations. Consequently, in addition to removal of contaminants, preprocessing systems consist of making material a uniform size (shredding and screening), and moisture conditioning to obtain the appropriate and consistent moisture content. Ultimately the purpose of the preprocessing system is to assure the digester is presented with a consistent feedstock to maintain a stable biological process within the digester.

Anaerobic digestion generally occurs in two phases; a hydrolysis phase which is acidiogenic and a digestion phase which is methaneogenic. In Europe, high solids digestion systems vary, but

generally allow these processes to occur within one tank and do not separate the phases into separate tanks. In contrast, low solids digestion systems typically provide for separate tanks for the hydrolysis phase from the methaneogenic phase. There are variations to this approach wherein high solids digestion systems use separate tanks for each of the hydrolysis and digestion phase, but these approaches are in the research and development levels.

Both high and low solids anaerobic digesters tend to be operated at mesophilic temperatures in order to maintain a consistent biological habitat.

There are a wide variety of different types and configurations of tanks used in these systems. Mixing systems also vary, although most systems do not rely on in-tank mixing devices to avoid the need for mechanical repairs within the tanks. Ultimately, the types of tanks and mixing systems depend upon the type of feedstock and its solids (or moisture) content. High solids content systems typically rely on auger systems to evacuate materials from the tank as opposed to low solids systems which rely on liquid pumping systems to evacuate the materials from the tank.

Digestion systems have different methods of using the biogas produced by the digesters. Biogas quality generally consists of 55% to 65% methane which is considered a low Btu fuel. Also, compared to natural gas (approximate 100% methane equivalent) biogas often contains relatively high moisture and some trace contaminants (potentially H_2S but also minerals or other materials). Gas clean up systems are usually employed depending upon how the gas will be used. For energy recovery, the most commonly used method is to use the biogas as a fuel for an internal combustion (IC) engine. There are a wide variety of IC engines manufactured in various countries which are equipped to burn the low Btu value biogas. The IC engines typically require some level of gas cleanup consisting of moisture and H_2S removal. In some cases, the biogas is used as a boiler fuel for various types of industrial applications. Gas cleanup systems for boiler fuel varies depending upon how the gas is used, whether it is blended with natural gas, etc. Net power output is claimed to range between 150 kWh/ton and 270 kWh/ton depending on the technology type utilized (note these are from current vendor supplied information). This is much lower than other technologies as the processes require large amounts of internal energy usage.

The post-digestion processing varies according to the type of digestion system. High solids digesters typically employ an aerobic composting phase following the digestion phase to stabilize the digestate. The composting system typically uses a bulking material such as yard waste. The relatively high moisture content of the digestate provides the necessary water for composting when mixed with the yard waste which facilitates the aerobic composting phase at an optimal

moisture content. Following aerobic composting, the material is typically screened to remove contaminants (glass, plastics, rocks). Low solids digestate can be treated differently insomuch as this digestate can be stable when extracted directly from the digester. Low solids digestate can be dewatered and used as a moisture retention soil conditioner in agricultural or nursery applications.

2.7.1 Low solids digesters

Low solids digesters which are typically used in Waste Water Treatment Plants. A low solids anaerobic digestion process, using either organic rich materials or effluent derived from MSW as a primary feedstock, employs the use of the digester to treat the organic fraction of the feedstock. The feedstock for this type of digester is limited to the organically rich liquid. Consequently, the feedstock is typically food waste or may even be rinse water from MSW feedstock. Typically, the celloustic portion of the waste stream is screened out of the effluent before being fed into the digester. The process is typically two-phase whereby the effluent first enters acidogenic bioreactor for several pretreatments. There, readily metabolized substances already in solution are fermented (e.g., sugars fermented to alcohols), while certain complex molecules are biologically hydrolyzed to their simpler components (cellulose to sugar, fats to acetic acid). The overflow, which is rich in such intermediate metabolites and organic particles (typically under 0.12 inch), then enters the second phase, an Upflow Anaerobic Blanket (UASB) digester. A fibrous residue is recovered from the acidogenic reactors and used as a soil amendment. This digestate is generally stable and does not require subsequent composting.

The UASB digester is a high rate anaerobic digester that was developed in the 1970s by Lettinga et al. in the Netherlands to treat high strength wastewaters. A constant upward flow of water is maintained in the reactor, resulting in the formation of a stable layer of granules containing high densities of microorganisms (the sludge blanket). The MSW is essentially converted into wastewater in the first treatment stage, so the organics can further be converted in a high efficiency UASB reactor; the operating temperature is between 95 and 110°F. The hydraulic retention time is on the order of 1 day (the solids retention time is much longer). Due to: 1) the nature of the process, and 2) the large water inventory in the system, the methane content of the biogas is higher than for a typical high solids anaerobic digestion system (there may be some opportunity for the CO_2 to dissolve and be released at other points in the process). As a result, the biogas has a higher heat value exceeding 700 Btu/standard cubic foot.

Excess granules and water are transferred to a settling tank. Supernatant is pumped to the physical separation/preparation element as needed for makeup water, or to an aerobic reactor for polishing if necessary. Water may be stored or used immediately, for example in irrigation. The solids are dewatered for use as stabilized organic soil amendment.

Low solids digesters retain the solids much longer but also manage much less quantity as compared to high solids digesters. As a result, low solids digesters encounter less odor problems than high solids digesters. Low solids digesters also have less contamination in the compost as compared to the compost of high solids digesters. The digestate from low solids digesters are generally lignin-based and can be stabilized during the anaerobic digestion phase and not be useful for subsequent composting. These digestates retain very little useful solids as a soil amendment. Low solids digestion is the current technology employed at the San Jose Waste Water Treatment Plant. The City is currently evaluating use of the Plant Land facilities for low solids digestion which is described in more detail in Section 3.

Low solids anaerobic digester, Tel Aviv Israel

2.7.2 High solids digesters

High solids digesters are commonly used in Europe where they are used to process MSW. High solids anaerobic digesters can harvest the highly prutrescible fraction of feedstock, and produce a digestate that during subsequent composting retains value as a soil amendment. The feedstock to these high solids digesters consists of the organic fraction of mixed MSW. In order to separate the organic fraction from the MSW, a pre-treatment system is typically co-located with the digesters and consists of an array of mechanical and manual sorting systems. Operational parameters such as pre-processing, retention time, and mixing technology are important considerations in terms of facility odors and quality of digestate. The odor challenges of these facilities are generally related to the undigested solids converting from anaerobic to aerobic when being handled during the initial aerobic composting phase. Another notable challenge of the solids digesters is the presence of undesirable materials (glass and plastics) in the finished compost. Facility operators continue to refine their pre and post-processing efforts to address these issues.

The high solids anaerobic digestion process typically employs a single phase digestion system wherein hydrolysis and methane production occur in the same tank. The process begins with the semi-solid materials being injected near the bottom of a cylindrical digester. Before it is introduced into the digester, the feed is diluted as needed to approximately 33 percent total solids with re-circulated wastewater, steam is injected to bring the material up to optimal digester temperature of 38°C (100°F), and some digester effluent is mixed in. These various operations are automated. During their time in the digester, the contents are mixed via pulsed injections of pressurized biogas (120 psi) from the bottom of the digester. As a result, there are no moving parts inside the digester, which minimizes maintenance requirements. Typically, the waste resides in the digester for 3 to 4 weeks. The digester effluent has approximately 27 to 29 percent total solids and flows out by gravity when isolating valves are opened. It is dewatered, aerobically matured, and marketed as compost. Adding feed and extracting effluent are conducted during operating hours, but the biogasification process is continuous.

The challenges with the process are two fold; quality of compost and odor issues. Insomuch as the MSW feedstock contains broken glass, ceramics, etc. as well as film plastics, these materials pass through the high solids anaerobic digestion relatively unchanged. Due to their size, removal of these materials is difficult. Consequently, the resulting compost contains relatively high quantities of these contaminants, thereby reducing the marketability of the compost. Also, the

high solids anaerobic digestion process typically relies on a single stage digester where the pH is maintained at a relatively high level to accelerate hydrolysis of the feedstock. Under such conditions, sulfides are formed requiring a relatively robust air emission and control system. Complicating these issues, the digestate from the high solids anaerobic digestion typically retain an anaerobic condition, thereby requiring further air emissions controls.

High Solids Anaerobic Digester, Barcelona Spain

2.8 Aerobic composting

Aerobic composting is a process where biodegradable material is broken down using bacteria in the presence of oxygen to produce a soil amendment called compost. The composting of yard trimmings and biosolids are well established processes with readily marketable products. Landfill diversion using MSW composting is challenging due to the variability of the feedstock and the

difficulty in separating the organic fraction from non-organic residues. Therefore, the MSW industry has struggled due to product quality issues, odors, and economics. The primary issues have been the presence of contaminants (broken glass, plastics, etc.) in the finished compost, and odors from the processing phase. There are currently 13 mixed MSW composting facilities in the U.S. including, Bedminster, Conporec, Herhof, Engineered Compost Systems, Z-Best, etc.

Composting has been successfully applied on a large scale to the green waste fractions of the municipal waste stream. Attempts to compost mixed MSW in the U.S. have generally failed due to odor related issues and to economically produce a marketable product. In some cases, food waste has been included with yard trimmings to produce a marketable product. However, the nitrogen in meats and fatty materials tends to produce unpleasant odors, so composting is generally restricted to vegetable matter. Even in this case, odors can be generated that are objectionable to some neighbors. The addition of MSW with green waste typically results in elevated levels of plastics, metals and glass that reduce the quality of the compost. Significant post-process screening is typically required to improve the compost quality to a marketability level. When the entire waste stream is used as feedstock, composting can reduce the residential waste stream currently being landfilled by 5% to 10%. With separate collections and self-haul delivery of green waste, landfill diversion can increase to 10% to 20%.

One of the successful trends in the aerobic composting industry is the addition of food wastes to the feedstock. Where co-collection of food and yard wastes is possible, this feedstock has been composted successfully. The addition of food wastes requires pre-screening to remove contaminants, depending upon the extent of public education and awareness. Also, finished compost product may require post-treatment screening to remove contaminants such as film plastics. The benefit of restricting the addition of food waste rather than MSW is that, when co-collected, the addition of food waste can occur without the additional contamination associated with the MSW feedstock. The benefits of adding food wastes to the yard waste collection and composting system is that removal of the wetter food wastes from the remainder of the MSW reduces the contamination of other components in the MSW such as cardboard and paper. This improved MSW quality could be capable of processing in a mixed waste MRF to recover these materials. Further discussion of this issue is discussed below.

Aerobic MSW Composting, California

2.9 Hydrolysis

Hydrolysis technologies are effective on the cellulose fraction of MSW, including paper, food waste, and yard waste. Thus, a pre-processing technology would be required to separate out the non-organic fraction. Hydrolysis can be a chemical process, or a biological process. Specifically in relation to MSW, hydrolysis refers to a reaction of the cellulose fraction of the waste (e.g., paper, food waste, yard waste) to produce sugars. The sugars are then fermented to produce an alcohol, followed by distillation to separate the water from the alcohol and recover a concentrated, fuel-grade ethanol.

2.9.1 Chemical Hydrolysis

In **Chemical Hydrolysis**, water, typically with an acid, reacts with the cellulose fraction of MSW (e.g., paper, food waste, yard waste) to produce sugars, with additional processing to convert the sugars to ethanol or other products. Since the acid is only the catalyst for the reaction and is not consumed in the process, it can typically be extracted and recycled in the process. Some of the specific hydrolysis processes include enzymatic, dilute acid and concentrated acid hydrolysis.

2.9.2 Biological Hydrolysis:

Biological Hydrolysis involves use of special enzymes that break down the cellulose organically, converting complex organic molecules to simple sugars. This process is the natural degradation process of organic material, but managed under confined conditions to maximize performance results. This process requires control of conditions to foster the biological process such as control of temperature and pH. This process also requires more time than the Chemical process. The application of a MSW feedstock to a Biological Hydrolysis process remains at a research and development level at this time.

Since this technology is still in the research and development stage for MSW, it has not been established at a commercial scale. Among several companies researching and developing the technology for MSW are Masada, Blue Fire Ethanol, and Bioengineering Resources, Inc. Blue Fire received a $40 million grant from the US Department of Energy to develop a commercial scale cellulosic ethanol plant; however, the feedstock is planned to include mostly green and wood waste with some MRF residuals.

2.9.3 Fuel Development (Ethanol)

In addition to anaerobic digestion and aerobic composting processes, use of MSW feedstock as potential fuel development (cellulose derived ethanol) is being pursued. The County of Los Angeles recently approved the Blue Fire Plant to be constructed near Lancaster CA. When completed, the plant will reportedly produce ethanol by processing 170 tons of MSW per day. The County received $40M to construct the plant and has received significant grants from the US Department of Energy. The grant requires matching funds to be provided by the developer. A similar technology is being tested in Canada; however, the results have not yet been favorable. Until the Blue Fire plant has demonstrated a commercial operation, the technology remains at a research and development level.

2.10 Other Technologies

A variety of other technologies are being developed which convert portions of solid waste feedstock into secondary products. These are described below.

2.10.1 Mechanical pre-processing

Mechanical sorting is a front-end technology that involves physical techniques to homogenize the fibers, film plastics, and organics into a pulpy mixture which can subsequently be screened to separate MSW into two fractions, a pulpy mixture of organic and paper fibers (lignin), and large items (cans, glass, metals) generally containing non-organic materials. The process allows the large fraction containing recyclables to be recovered from the MSW stream. The pulpy organic fraction is useful as a feedstock for either a digester or other energy producing alternative technology processes. Autoclaving is a mechanical process where MSW is introduced to certain temperature and pressure conditions within a containerized vessel over a certain period of time. This produces the separation of organic vs. in-organic fractions, as described above. These separated fractions from the autoclave could then be gasified, or fed to an anaerobic digestion facility or converted using other such processes to create energy or other useful by-products. Another benefit of autoclaving, is reduction in volume for landfilling. Although the volume of MSW introduced into an autoclave is reduced, the post autoclave material has a higher density which will yield some landfill "air space" savings. Several companies have or are in the process of developing this technology. One such firm is working with the US Department of Agriculture testing multiple feed-stocks, including MSW, with the resultant end-products being sent to various test facilities (i.e., distillation laboratories, gasification facilities, anaerobic digester facilities, etc.).

2.10.2 Depolymerization processing

Chemical processing technologies utilize a combination of chemicals, catalysts and processes such as depolymerization to convert MSW to useful by-products. Depolymerization involves a thermal reaction encompassing several complex steps to refine the product. Changing World Technologies has developed a thermal depolymerization technology at a commercial level on poultry processing waste, but not on MSW. Changing World Technologies as well as other companies are researching the use of MSW as a feedstock to this technology. Energy Visions is marketing a "patented" process using a German technology, KDV (catalytic depolymerization) that claims to use the organic fraction of waste to produce a low sulfur diesel fuel. We are not aware of any development of this technology beyond laboratory testing and research.

2.11 Summary of Conversion Technologies

Summarizing, the status of the technologies, as reported in the Conversion Technology Summary Report (HDR, April 1008), is provided in Table 1, below.

Table 1. Development Status of Conversion Technologies for MSW

Technology Category	Commercial Use Outside U.S. for MSW	Pilot Testing with MSW in U.S.	Additional Research and Testing Required for MSW
Plasma Arc			✓
Gasification	✓4	✓5	
Mass Burn WTE	✓1		
Fluidized Bed WTE	✓1		
High Solids Anaerobic Digestion	✓3	✓2	✓
Low Solids Anaerobic Digestion	✓2	✓2	✓
Aerobic Composting	✓3	✓3	
Hydrolysis		✓	✓
Other (Mechanical)		✓	✓
Other (Depolymerization)			✓

Footnotes:

1. Currently in Commercial Use in the US and requires no additional pilot testing or research.
2. Use limited to feedstock consisting of source separated organics, and typically excludes MSW.
3. Feedstock is the extracted organic fraction of MSW, not the entire MSW stream.
4. Commercial facilities exist mainly in Japan with little to no operating available.
5. Small test plants exist operating on MSW feedstocks, however still have very limited operating hours on small amounts of MSW; in very preliminary stages of testing.

Also, to clarify how the various technologies compare to each other in terms of feedstock, energy capture, emissions control etc., Table 2 provides a comparison of these key issues.

Table 2. Technology Comparison

Technology Category	Fuel/Feedstock	Pre-Processing	Process	Energy capture	Emissions Control	Waste products
Gasification and Plasma Arc	High Btu MSW, industrial waste	Shredding	High temperature reaction chamber (no or little oxygen)	Syngas as fuel to IC or other	IC or boiler emissions control	char
Mass Burn WTE	MSW	None	Incineration	Heat to steam turbines or other	Flu gas control	Bottom and fly ash
Fluidized Bed WTE	MSW/RDF	Shredding or RDF	Incineration	Heat to steam turbines or other	Flu gas control	Bottom and fly ash
High Solids Anaerobic	Organic fraction of MSW	Extract Organics from	Biological degradation (no	Biogas to fuel to IC or other	IC NOX and biological	Inorganic fines,

Digestion		MSW	oxygen)		process	rejected MSW
Low Solids Anaerobic Digestion	Source separated organics	Removal of non-digestible	Biological degradation (no oxygen)	Biogas to fuel to IC or other	IC NOX and biological process	Inorganic fines
Aerobic Composting	Organic fraction of MSW	Extract Organics from MSW	Biological degradation (no oxygen)	None	None (1)	Inorganic fines, rejected MSW
Hydrolysis	Not known	Not known	Not known	Not known	Not known	Not known
Other (Mechanical)	MSW	Varies but generally none	Autoclave (pressurization) and screening	None	Not known	Not known
Other (Depolymerization)	Not known	Not known	Not known	Not known	Not known	Not known

Footnotes:

1. Emissions control is anticipated in near future to limit VOC emissions. In-vessel requirements are anticipated.

Table 3 illustrates a comparison of net power output in kilowatt-hours per ton of processed material. It should be noted that plasma arc gasification, gasification, and pyrolysis technologies have not been proven using MSW as a feedstock at commercial levels in the US. Thus, it is our opinion, that until they are proven these emerging thermal technologies should not be rated higher than mass burn at about 550 to 600 kWh per ton. Therefore, the significance of this table

is that thermal conversion systems tend to convert feedstock into electricity at higher rates than the biological processes. The lower net electricity generation rate of the biological processes is due to greater internal power consumption requirements of these systems.

Table 3. Comparison of Net Energy Produced – Georgia Tech

Process [1]	Net Electricity to Grid (kWh/ton MSW) [2]
Plasma Arc Gasification	**816**
Conventional Gasification (Conventional Fixed/Fluidized Bed Technologies)	**685**
Pyrolysis & Gasification (Thermoselect technology)	**685**
Pyrolysis (MES R21 Technology)	**571**
Incineration (Mass Burn Technology)	**544**
Anaerobic Digestion [3]	**150 to 270**

[1] Based on 300 – 3,600 tpd of MSW conversion;
[2] Steam turbine electricity generation is assumed
[3] Based on HDR information garnered from vendors

Sources: EFW Technology Overview, The Regional Municipality of Halton, Submitted by Genivar, URS, Ramboll, Jacques Whitford & Deloitte, Ontario, Canada, May 30, 2007;

In terms of timing, we believe the use of the Plant lands surplus anaerobic digesters to process FOG and possibly food wastes will be high on the City's priority list. Continued use of the City's aerobic composting program is another key component necessary in meeting the City's short-term diversion goals.

To meet the City's long-term diversion goals, further exploration of some thermal technology is necessary. The following section will address the applicability of these conversion technologies for the City.

3.0 Applicability to San José Zero Waste Goals

The City of San Jose has a unique opportunity to select from a growing array of the various technologies described above. Meeting the City's Zero Waste goals of 75 percent diversion by 2013 will require identification and implementation of short-term goals while the more distant zero waste goal of 2022 will require identification and implementation of long-term goals. In either case, the City of San Jose will need to implement several Conversion Technologies concurrently to achieve these goals.

The following sections describe the applicability of these technologies to San Jose's current waste situation.

3.1 Thermal – Synthesis gas generation Gasification and Plasma Arc:

If gasification technology (for the production of a synthesis gas) proves to be commercially viable, such a technology would be applicable for San Jose. If viable, such a process would be useful for the direct production of electricity, or the synthesis gas could be used as a replacement of natural gas for industrial purposes.

If gasification is used for its production of synthesis gas, the gasification facility would need to be adjacent, or very near to the industrial facility so as to limit the transport distance from the gasification facility to the industrial user. The syngas could be transported relatively short distances (few hundred feet) while retaining it's thermal and pressure properties. However, as noted above, this technology is not as yet developed to a commercially viable level. Although some MSW technology suppliers are conducting research and development efforts on fuel production (either to augment or substitute for electricity generation), synthesis gas generation from MSW waste has not been proven on a commercial scale.

The prevailing practice in the MSW market continues to be electricity generation, with the newest focus being on the use of combined cycle power generation systems for greater efficiency. While this technology is closer to commercial viability, its use has generally relied on industrial wastes with high value Btu feedstock. To date, gasification using exclusively MSW feedstock has not been demonstrated to be commercially competitive (in terms of operating at

industrially acceptable availability levels over several years of consistent use). Gasification technology research indicates that this technology holds promise using somewhat high Btu value MSW as a primary feedstock, although scale-up of these facilities will be necessary. Consequently, we recommend the City continue to watch this technology mature.

Additionally, of these technologies, the City has received a proposal for implementing the plasma arc gasification technology based on the responses to the City's Request for Information (CDM, March 2008). However, upon further review, there are no commercial scale plasma arc gasification facilities operating on MSW currently in the U.S., although there are pilot and bench-scaled facilities developed and operated by many different vendors. Through our analysis with other public entities, we understand plasma arc gasification technology facilities are reportedly operational at sizes of approximately 50 to 250 tons per day. However, upon further scrutiny, these facilities are typically operating on a higher Btu value of feedstock than typically observed in MSW feedstock. Thus, from our perspective, plasma arc gasification technologies would still require a large scale-up to commercial scale. Nevertheless, this technology holds promise in that, if developed, it could provide both a method of recovering energy from the waste materials without generating air emissions which necessitate exhaustive air cleanup systems. Consequently, although we recommend the City continue to watch this technology evolve, we cannot conclude that plasma arc gasification is commercially viable at this time.

3.2 Thermal – Waste to Energy (Grate Technology):

The waste-to-energy technology, primarily using grate technology has become the industry standard in Europe for MSW feedstock. A variety of innovative emissions control improvements over the past decade has led to an overall public acceptance of these facilities throughout the European Union. The benefit of this technology has been its ability to receive and process a relatively low Btu value mixed waste stream (MSW) into thermal products (high pressure steam, hot water for district heating and electrical power) without expensive pre-processing systems. As such, WTE using grate technology is relatively simple as compared to other WTE technologies. San Jose's MSW (black bin) wastes would provide a somewhat similar feedstock to the European WTE facilities. As described above, WTE facilities require extensive emissions control systems which represent about half of the facility cost. If San Jose were to implement this technology, a minimum of 500 to 750 tons per day of MSW would need to be dedicated to the facility for economic viability. In Europe, where pre-thermal recycling is prevalent, these facilities serve regions where the minimum commitment of waste stream levels

do not compete for recyclables (which generally have higher Btu values). For San Jose to be assured that a WTE facility would be viable without infringing on recycling related efforts, an evaluation of the composition and volumes of the residue waste stream, following all other recovery programs, would be needed.

3.3 Thermal – Waste-to-Energy (Fluidized Bed Technology)

This technology is in limited commercial use in the U.S. for MSW based feedstock applications with only one operating facility. Fluidized bed combustion is commonly used throughout the US for biomass based feedstock materials. The plant that currently burns the City's biomass is one of several fluidized bed incinerators in the California's central valley. Fluidized bed technology is also used commonly for other fuel sources such as when coal is used as a feedstock for combustion. It is also well suited for uniform waste streams such as tires, or sludge.

Consequently, the use of a fluidized bed technology could be applicable in San Jose, but most likely limited to biomass or sludge and not MSW. The reason is that MSW is not a likely feedstock is the requisite pre-processing (shredding to make a uniform feedstock) effort to prepare MSW for a fluidized bed incinerator is very costly. Apart from using a fluidized bed technology for MSW feedstock, its application as an energy producer using biomass and sludge are also possible. This potential use is described below.

3.4 Thermal – Biomass (Fluidized Bed Technology)

The City has received an expression of interest in the private development of a regional Biomass facility in San José. The City reports that approximately 11,000 tons of wood wastes is shipped from San José to existing Biomass facilities in the central valley. Presumably, other jurisdictions are doing the same as the City, exporting their biomass fuel to similar Biomass facilities out of the Bay Area. The City received a private offering for the development of a Biomass facility that would attract fuel from the greater Bay Area. Assuming fuel supplies are available, such a facility would indeed use less petroleum than the current practice of shipping these materials to the central valley. For planning purposes, most Biomass facilities require approximately 225,000 to 250,000 bone dry tons (BDT) of fuel available within 100 miles to be economically viable. Existing Biomass facilities in the central valley rely on a mixture of agricultural and urban fuels

to make up their feedstock. Changes in regulations such as prohibitions to open burning of some agricultural wastes have provided central valley Biomass plants a steady and reliable fuel supply. In order to determine the viability of a Biomass facility in San José, a study of the available supply of fuel would be necessary. The existing 11,000 tons of San José wood chips would represent approximately 3% (three percent) of the minimum annual fuel supply for a San José based Biomass facility. As a host to support such a facility, the City would need to explore attracting biomass feedstock from a wide variety of sources, including other jurisdictions and their respective urban wood supplies as well as other agencies such as the Santa Clara Valley Water District who maintain the regions water ways.

3.5 Low Solids Anaerobic Digestion

Low solids anaerobic digestion employs essentially the same types of digesters as most waste water treatment plant sludge digesters. Typically, low solids anaerobic digestion digesters operate at relatively dilute conditions (typically 4 to 6% solids). As such, the City's waste current exploration of using the excess capacity at the San José Waste Water Treatment Plant is an example of applying this type of technology to the MSW feedstock. The City has retained a consultant to evaluate the possible renovation of several surplus digesters at the Plant lands. The evaluation will include consideration of various modifications, including renovation of the facility to include a pre-treatment facility. Other considerations include an evaluation of the digestate resulting from the process. In addition to use of the surplus digesters at the Plant lands using a MSW type feedstock, the City's consultant is also evaluating the possible use of fats, oils and greases (FOG) as feedstock to the digesters. Further discussion of this issue is provided below.

In addition to evaluating the use of the surplus digesters at the Plant lands, other issues which will need to be evaluated to include determining if an appropriate feedstock is available for the this technology. Two differing approaches for developing the feedstock are being used; a source separated food waste and a rinsed MSW feedstock. The source separated food waste feedstock would be more appropriate for San Jose because such a waste stream can be identified and collected separately. We would anticipate the food rich feedstock could be isolated from the commercial restaurant and grocery store business. A pilot test of collecting this feedstock would be necessary to evaluate the feedstock's composition and contamination levels. This information would be needed for refinement of the Plant lands pre-treatment system design.

When the evaluation report is completed, and further study of the feedstock is completed (vis-à-vis a pilot study of a source separated food waste feedstock) the City will be in a better position of determining if low solids anaerobic digestion is appropriate for use in San Jose.

3.6 Food Waste and/or FOG as Feedstock for Low Solids Anaerobic Digestion

One example of a low solids anaerobic digestion is the use of a waste water treatment plant digester. The East Bay Municipal District (EBMUD) is using its excess treatment capacity by feeding prepared food and Fats, Oils and Grease (FOG) into its digester. Similar to most other waste water treatment plant digesters, the EBMUD digester is a low solids type anaerobic digester. The feedstock is prepared for injection into the digester by screening and removal of undesirable materials (metals, plastics, glass, etc.) and diluted for pumping into the digester. These materials, when prepared properly are ideally suited to digest within the normal parameters of the waste water treatment plant type digesters. Depending upon the feedstock, the total solids reduction and Btu values are compatible with waste water treatment plant type digesters.

There are two full-scale AD facilities currently operating in North America that process MSW, both near Toronto, Ontario, Canada. The City of Toronto's Dufferin Organics Processing Facility has been operating full scale at a capacity of 25,000 MT/year since 2004 using BTA wet digestion technology. The City's Green Bin program provides curbside household organics collection to 500,000 households and 20,000 businesses; therefore, a large source separated organics stream is available for processing at the facility. The second facility, located in Newmarket, Ontario outside of Toronto, also uses the BTA wet digestion technology. The plant, owned by Halton Recycling, had been closed but recently restarted at a lower throughput than its design capacity of 400 MT/ton.

Possible use of the surplus digester capacity is currently being evaluated as a part of the Plant Master Plan development process. In addition to evaluating use of a source separated food waste feedstock for anaerobic digestion, the possible use of the FOG as a feedstock is being considered. As discussed above, the benefits of FOG are that these materials can be relatively easily emulsified and mixed into the existing low solids digesters. These materials break down relatively quickly providing an increase in the production of biogas (low grade methane) which can be extracted and used as an offset to the Plant's current practice of purchasing natural gas

(high grade methane). Another benefit of using FOG is that this material has a very high solids destruction potential. Consequently, very little digestate will result from the use of this material.

As discussed above, when the evaluation report of the Plant lands is completed, the City will be in a better position to determine if low solids anaerobic digestion, in particular use of FOG as a feedstock, is appropriate for use in San Jose.

3.7 High Solids Anaerobic Digestion

High solids anaerobic digestion is not particularly well suited for use in San Jose. The existing digesters at the Plant lands are not appropriate for use of this technology. Employing this technology would require construction of an entirely new set of digesters, in addition to the development of a pre-treatment system. Also, high solids anaerobic digestion would require an enclosed aerobic composting system to be developed to treat the materials which have been digested in the anaerobic process. Consequently, use of this technology would require construction of an entirely new facility and would not rely on re-use of the existing excess capacity digesters or related facilities. Also, post high solids anaerobic digesters observed in Europe tend to produce a compost product which is relatively high in glass and plastics content. Such a product would likely have little to no value in the California compost market. To remedy this condition, a robust glass and film plastics removal system would be a necessary addition to the other array of equipment noted above if this technology is employed. Consequently, we recommend against use of the high solids anaerobic digester in San Jose.

3.8 Biological Aerobic Composting

The use of aerobic composting has been a common practice to manage yard wastes in San Jose for many years. San Jose has a mature compost production and distribution program using yard waste as the primary feedstock. The success of the compost program is largely based on its unlimited yard waste residential collection program. This unique but popular program allows residents to set-out bulky, unlimited (limited by street frontage and traffic safety parameters) yard waste which is collected using a mobile clamping apparatus.

As noted above, one of the successful trends in the aerobic composting industry is the addition of food wastes to the feedstock. The limitation of adding food waste in San Jose is that the current bulky yard waste collection system is not prone to the addition of food wastes.

The placement of food scraps in the uncontained piles of yard waste would be an attractant for vectors resulting in a health risk and public nuisance. In order to co-collect food wastes, the use of a container is needed. Consequently, if the City wishes to consider adding food wastes to its aerobic composting program, a pilot study of a cart would be needed. The use of a green waste cart system is common in many cities throughout the US. However, the unlimited yard waste set-out program is one of the reasons for San Jose's robust compost program. Consequently, how the cart collection system affected San Jose's unlimited yard waste set-out program would need to be explored.

In addition to the feedstock issues, air quality concerns with non attainment, are particularly exacerbated by volatile organic carbon (VOC) emissions. The quantity of VOC emissions varies according to the feedstock. VOC emissions are generally lower with woody materials (such as brush and twigs), and increase with more leaves and grass. Food waste materials reportedly emit a higher quantity of VOC's.

Aerobic composting has recently been evaluated in the San Joaquin Air Pollution Control District as a potential source emission. We anticipate that future regulations will address VOC emissions from composting facilities such that open-air composting of MSW is likely not a viable long-term alternative. Despite these odds, we also recognize the existing Aerobic Composting facility operated by Z-Best has been successful in producing marketable MSW based compost while managing operations to meet regulatory challenges with respect to odor and surface water management. Consequently, we conclude this program could remain an integral part of the short-term Zero Waste plan. However, continued monitoring of the air emissions standards set by the BAAQMD will be necessary to be assured of the continued use of aerobic composting MSW. For the time being, this facility remains a good local solution as part of the Zero Waste plan implementation.

4.0 Technology Recommendations

As the City plans to meet Zero Waste short- and long-term goals, we recommend the City continue to compare the following technologies:

- Gasification
- Advanced Thermal (WTE Grate Technologies)
- Biomass (Fluidized bed technologies)

- Low solids Anaerobic Digestion (i.e., use of the City's waste water treatment plant anaerobic digestion capacity)
- High solids Anaerobic Digestion of food wastes
- High solid Anaerobic Digestion of FOG
- MSW Aerobic Composting (continued use of Z-Best operation for the short term)

Steps are already being taken to explore Low Solids Anaerobic Digestion of food waste and FOG at the Water Pollution Control Plant, and MSW Aerobic Composting would be continued at the Z-Best facility in Gilroy. Identification of additional Materials Recovery Facilities such as the Zanker Mega MRF that will retain the 'highest and best use' of specific waste streams such as Commercial, Construction & Demolition or Multi-Family, is also in process. Other technologies listed above would need to be analyzed for their appropriateness in San Jose.

Due to the scale that would be required, we believe the following technologies are **not** developed adequately for further consideration in San Jose at this time:

- Plasma Arc
- Hydrolysis
- Chemical Processing
- Mechanical Processing

5.0 Next Steps

The next steps in analyzing the applicability of various conversion technologies can be identified by reviewing the following Table 4 which provides an overview of actions based on the following criteria/issues:

- Ability of the technology to operate commercially
- Type of feedstock
- Extent of pre-treatment needed
- Potential environmental issues such as emissions, odors, residues
- Conformance with regulatory parameters

- Ability to be incorporated into existing infrastructure (Plant Master Plan)
- Economics
- Likely social and political acceptance issues
- Acceptability with other agencies
- Need for potential pilots

The table reveals several repeating themes which demonstrate the need for global next steps. Alternatively, the next steps for some issues are unique to certain technologies. The common recommended steps include:

- Conduct an analysis of the types of composition and quantity of feedstock available for consideration
- Evaluate the economics (capital and operations) of the possible technologies
- Initiate discussions with regulators to clarify facility pilot or full scale development requirements
- Engage the local community, industry stakeholders, and regulatory agencies to clarify the community values as they relate to emerging waste technologies
- Develop criteria that reflect the values of the City, community, and regulatory parameters
- Perform a scoring and ranking analysis of the respective technologies according to the criteria developed above

The next phase of analysis will be to clarify technology parameters so that the City can compare the various technology options to maximize diversion, energy generation and overall sustainability.

Table 4. Summary of Next Steps to Compare Technologies

	Issue/Action Item	Technology/Facility					
		Mega Materials Recovery Facility	Anaerobic Digestion using Plant Lands	Aerobic Composting	Biomass Incineration	Emerging Conversion Technology	Modern Waste-to-Energy
1	**Confirm Technology is proven/appropriate**	no action needed	Technology is being developed in CA and is proven in Israel. Application of technoligy is currently being studied as a part of the Plant Masterplan	Technology is proven	Technology is proven	Technology is not proven in the US. Technology is being developed in Asia and Canada. Continue to watch over time	Technology is proven in Europoe, Older versions of technology are proven in CA and other regions of the US
2	**Confirm condition of feedstock**	revisit feedstock pending selection of treatment technologies	Pilot study food waste collection to determine composition	no action needed	Study needed to explore feedstock availability within 100 mile radius	Confirm technology feedstock of international facilities with LA and others	Confirm Btu value of residue assuming various technologies are selected
3	**Determine extent of pre-treatment necessary**	no action needed	Based on pilot study results of feedstock study (above) evaluate pre-treatment needs	no action needed	Explore pre-treatment for urban woods feedstock	Confirm technology pre-treatment of international facilities with LA and others	Based on Btu value results, determine if pre-treatment is necessary
4	**Evaluate environmental issues (emissions, odors, traffic, etc.)**	no action needed	Explore international facility impacts, particularly odors. Explore truck traffic impacts and circulation issues on Plant Lands site	Confirm air quality issues are acceptable at existing Z Best facility	Quantify Biomass environmental issues (primarily emissions and truck traffic)	Confirm technology pre-treatment of international facilities with LA and others	Confirm technology pre-treatment of international facilities with LA and others
5	**Confirm regulatory setting**	no action needed	Check with local, regional and state regulatory agencies	Confer with BAAQMD re pending regulations affecting windrow compost technology	Check with local, regional and state regulatory agencies	Check with local, regional and state regulatory agencies	Check with local, regional and state regulatory agencies
6	**Incorporate solid waste infrastructure into Plant Master Plan**	not applicable	Expand Plant Master plan to include infrastructure improvements, particularly truck circulation and pre-treatment facilities	not applicable	Explore Plant Master plan for possible Biomass plant, particularly feedstock storage area	Explore Plan Master plan for Conversion Technology footprint and associated infrastructure	Explore Plan Master plan for WTE facility footprint and associated infrastructure
7	**Confirm technology economics (capital and operations)**	Develop capital and operation cost pro-forma and compare cost/ton to other technologies	Develop capital and operation cost pro-forma and compare cost/ton to other technologies	Develop capital and operation cost pro-forma and compare cost/ton to other technologies	Develop capital and operation cost pro-forma and compare cost/ton to other technologies	Develop capital and operation cost pro-forma and compare cost/ton to other technologies	Develop capital and operation cost pro-forma and compare cost/ton to other technologies
8	**Evaluate social/political acceptance issues**	Develop public outreach to key constituents and stakeholders. Explore acceptance issues.	Develop public outreach to key constituents and stakeholders. Explore acceptance issues.	Develop public outreach to key constituents and stakeholders. Explore acceptance issues.	Develop public outreach to key constituents and stakeholders. Explore acceptance issues.	Develop public outreach to key constituents and stakeholders. Explore acceptance issues.	Develop public outreach to key constituents and stakeholders. Explore acceptance issues.
9	**Collaborate with other regional agencies**	no action needed	Contact EBMUD to discuss technology, logistical and implementation issues	no action needed	Contact SF PUC regarding regional biomass facility concepts	Contact City of LA regarding results of Alternative Technology review and selection	Contact City of LA regarding results of Alternative Technology review and selection
10	**Explore appropriateness of pilot projects to confirm unknowns**	no action needed	Develop pilot study of feedstock quality. Develop pilot study of Digester performance. Develop pilot study of digestate drying and management	no action needed	no action needed	Develop pilot study of feedstock availability pending results of LA and other Alt Tech selection results	Pilot test feedstock of potentially tributary feedstock's (residues) resulting from selection of other technologies
11	**Compare and contrast technology to other options**	Develop and implement scoring and ranking comparison of each technology, incorporating environmental, economic, social/political and other parameters. Conclude with ranking preference of technology	Develop and implement scoring and ranking comparison of each technology, incorporating environmental, economic, social/political and other parameters. Conclude with ranking preference of technology	Develop and implement scoring and ranking comparison of each technology, incorporating environmental, economic, social/political and other parameters. Conclude with ranking preference of technology	Develop and implement scoring and ranking comparison of each technology, incorporating environmental, economic, social/political and other parameters. Conclude with ranking preference of technology	Develop and implement scoring and ranking comparison of each technology, incorporating environmental, economic, social/political and other parameters. Conclude with ranking preference of technology	Develop and implement scoring and ranking comparison of each technology, incorporating environmental, economic, social/political and other parameters. Conclude with ranking preference of technology

A descriptive summary of these next steps follows:

5.1 Thermal

The overarching issue for thermal technologies is the need for very robust air emissions control systems. This requirement is not only necessary for practical reasons such as complying with air emissions regulations but also for social and political reasons as these facilities often draw political opposition. The following next-steps address the thermal conversion technologies of gasification, biomass, and waste-to-energy:

5.1.1 Gasification

As gasification facilities continue to expand their feedstocks from industrial (relatively high Btu) fuels to municipal solid waste (relatively low Btu), data will become available that solidifies the performance capability of this emerging technology. Unknowns such as thermal efficiency and mechanical reliability will become clear. With continued operation using MSW, emissions data will be compiled which will become available. The efficiency, reliability, regulatory compliance, etc. will in time, also become known. Assuming the City is willing to wait for the development of this technology to grow in its ability to perform at commercial levels, the City's next steps are to wait and watch. If, however, the City desires to become a part of the development of this technology, the City could participate in supporting its development. Acting as in incubator, the City could assist in developing gasification by fostering research and development efforts, funding pilot demonstration projects, etc.

5.1.2 Biomass

The next step in determining the viability of a San José based Biomass facility to perform an analysis of the possible feedstock. Typically, such a study would explore the available fuel supply and would consider competing markets, within a one hundred (100) mile radius. The unique traffic congestion issues of the Bay Area, compounded by the recent increase in petroleum fuel may have a deleterious impact on this fuel supply. Further complicating this issue, some jurisdictions have dedicated their urban wood (in the form of green waste) to existing facilities. These issues would need to be explored and analyzed to determine the viability of fuel for a modern Biomass facility. As noted above, the current 11,000 tons of wood waste San José ships to central valley Biomass plants accounts for approximately three percent (3%) of the necessary 225,000 to 250,000 bone dry tons required for plant economics.

In addition to the availability of fuel, an analysis of the air emissions requirements unique to both the Bay Area Air Quality Management District and the potentially sensitive receptors of a specific site would need to be evaluated. This air-emissions analysis combined with a fuel availability study would be necessary as a technical pre-feasibility study. Non technical issues such as social/political issues should also be considered.

5.1.3 Waste-to-energy

Inasmuch as modern waste-to-energy technology has been proven to comply with stringent air emissions requirements in the US, Europe and Asia, the next step in determining the viability of a San José based WTE facility is an analysis of the social/political aspects of such a facility. The two primary objections to such a facility are: the elevated commitment of financial resources to such a facility that could be used for other resource recovery efforts, and overcoming the stigma of antiquated WTE facilities that were in operation decades ago.

WTE facilities are typically very expensive ventures, costing hundreds of millions of dollars to construct and a commitment of high tipping fees to operate. As such, these facilities operate best where their products are valued. For example, the most modern, yet most expensive facility in Europe (MVR Hamburg Germany) relies on the sale of electricity as well as commercial grade high pressure steam (sold to the adjacent ship manufacturing facility), low grade steam for other industrial purposes, hot water for district heading, and the sale of ash as a construction product. The sale of these various products reduces the pressure on the solid waste tip fee substantially. Ideally, a WTE facility is viewed by its hosting jurisdiction as a power generation facility that has as its feedstock an otherwise non-valued material.

In addition to these technical issues, the social/political acceptability of such a facility would need to be explored. In particular, any development of this magnitude would need to fully address the 'environmental justice' aspects of its location. The City has suggested the Water Pollution Control Plan properties as a potential site for future solid waste infrastructure. This location is particularly problematic given its history and the significance of environmental justice in California's Environmental Quality Act regulations.

Another step for consideration is the demand for secondary products that a WTE facility would provide. Typical WTE products include electricity (which although is of value, electricity alone typically does not justify such a facility), high and low pressure steam, and hot water.

Another aspect of determining viability of such a facility is the availability of cooling water. Proximity to a water source such as the Bay or fresh water sources would be necessary.

Finally, similar to a Biomass facility, an analysis of the air emissions requirements unique to both the Bay Area Air Quality Management District (BAAQMD) and the potentially sensitive receptors of a specific site would need to be evaluated. The combination of the economic (former commitments, demand for products, etc), air-emissions analysis (BAAQMD sensitive receptors and regulatory settings) combined with a social/political (environmental justice) study would be necessary as a technical pre-feasibility study.

5.2 Biological

The overarching issue for biological technologies is threefold: 1.) the applicability of existing infrastructure to be useful for a solid waste feedstock; 2.) the technical performance of the system to comply with air emissions standards and; 3.) the technical performance of the facility to produce valuable by-products (compost free of contaminants). The following next-steps address the thermal conversion technologies of anaerobic digestion:

5.2.1 Anaerobic Digestion

As described above, two forms of anaerobic digestion are common: low and high solids digestion systems. While Europe has employed high solids digestion, their performance is mixed. Odorous operations producing compost of questionable value are concerning. As such, the City's next steps in the anaerobic digestion are similar to that of gasification above. Namely, as the various facilities throughout the world continue to employ a mixed MSW feedstock to their digesters, data will become available that solidifies the performance capability of this emerging technology. Unknowns such as thermal efficiency and mechanical reliability will become clear. As with gasification, continued use of MSW, emissions data will be compiled and will become available. For high-solids digesters, important issues such minimizing objectionable odors and the ability to produce a valuable compost byproduct will become clearer. For low solids digestion, issues such as management of the non-digested residues, thermal, and biological efficiency will become clearer. These issues of efficiency, reliability, regulatory compliance, product quality, etc. will in time, become known. Assuming the City is willing to wait for the development of this technology to grow in its ability to perform at commercial levels, the City's next steps are to wait and watch. If however, the City desires to become a part of the development of this technology, the City could participate in supporting its development. Acting as an incubator, the City could assist in developing pilot projects such as dedicating an unused digester to be used as a food waste digester is an ideal beginning for this technology.

In order to gain an understanding of these solid wastes in the Waste Water industry, the initial attempt to use FOG as a feedstock to a digester is a good beginning. The use of FOG as a feedstock to be prepared, screened, emulsified and fed into a digester is the next ideal step in this process.