



# City of Oceanside

## Final Report: Organics Feasibility Study



HF&H Consultants, LLC

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*This document is formatted for double-sided printing*

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## EXECUTIVE SUMMARY

### Overview

The City of Oceanside (City) is in the process of developing solutions for its residents and businesses to participate in source reduction and recycling of organic materials (e.g., food scraps and food-soiled paper) to complement the City's already successful yard trimmings composting program.

The City's Zero Waste Strategic Resource Management Plan sets a goal of 75% to 90% diversion from landfill by 2020. With a current 68% recycling rate, enhanced organics management and recycling will be paramount to reaching the City's overall Zero Waste goal. The City's Zero Waste framework describes implementing programs and services based on the highest and best use of materials. The Zero Waste Strategic Resource Management Plan identifies organic materials, particularly food waste, as one of the largest remaining components of the materials sent to landfill by the City.

In addition to the City's Zero Waste Strategic Resource Management Plan, several external factors are driving the City's desire to provide programs, including:

- A State policy goal of achieving a 75% recycling rate by 2020, as adopted in 2011 (AB 341<sup>1</sup>);
- A Statewide mandatory commercial and multi-family organics recycling law adopted in 2014 (AB 1826<sup>2</sup>) that requires local jurisdictions to adopt organics recycling programs, monitor customer adoption of and participation in those programs, and perform education and outreach activities to covered generators; and,
- State law requiring local jurisdictions to implement programs to achieve a 75% reduction in the amount of organics sent to landfill by 2025 (SB 1383<sup>3</sup>). These requirements expand on those of AB 1826 in a number of ways, the most significant of which include: 1) broadening the covered generators to include single-family residences; 2) establishing penalties for non-compliance by requiring local agencies to establish a random inspection and progressive, fine-based, enforcement program; 3) broadening the covered materials to include more types of organic materials; and, 4) broadening requirements for local governments to monitor the participation of generators and report that information to CalRecycle. These regulations are still under development and may change significantly before adoption. CalRecycle's proposed implementation schedule is presented in Figure ES-1 below.

**Figure ES-1: SB 1383 Implementation Schedule**

Activity	Timeline
CalRecycle Regulatory Development and Formal Rulemaking	2017-2019
CalRecycle Technical and Program Support to Jurisdictions, Generators	2019-Ongoing
State Goal: 50% Reduction in Organics Disposal	1/1/2020
Regulations Effective, Enforceable Against Jurisdictions (up to \$10k/day)	1/1/2022
Jurisdictional Enforcement on Generators Begins	1/1/2024
State Goal: 75% Reduction in Organics Disposal, 20% Edible Food Recovery	1/1/2025

<sup>1</sup> [https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=201120120AB341](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201120120AB341)

<sup>2</sup> [http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=201320140AB1826](http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1826)

<sup>3</sup> [https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=201520160SB1383](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1383)

The City is well-positioned to achieve these policy goals. The City's efforts in this regard are supported by an existing system, including an effective yard trimmings composting program operated by Agri Service, Inc., effective collection and recycling solutions provided by Waste Management (WM), and existing City infrastructure in the form of the San Luis Rey Water Reclamation Facility (abbreviated as "SLRWRF" in some report figures due to space constraints). Commitments made by the City to create the existing system also result in certain constraints on options. For example, the City's franchise agreement with WM grants the exclusive right to perform collection services in the City through December 2023, thereby precluding options that would involve collection of those materials by other parties.

## Materials Available for Recovery

In order to establish a baseline for the amount of materials available for recovery, the City, WM, and HF&H Consultants, LLC (HF&H) cooperated in the performance of a waste characterization study specific to the City's Single-Family, Multi-Family, and Commercial waste generators. The waste characterization study focused on the materials sent for landfill disposal, as opposed to materials sent for recycling or composting, in order to understand the organics materials currently being sent to landfill. Figure ES-1 below provides information on the top five material types present in the material that generators in the City send for landfill disposal. Section 2 of this report describes the waste characterization study and analysis in more detail.

The results of the waste characterization study indicate that approximately 30,587 tons per year, or 33.9%, of the material sent to landfill from generators in the City are food scraps or compostable paper. Another 5,944 tons per year, or 6.6%, of the total materials, are "non-recoverable" organic materials that were too mixed with other material types to permit recovery. These three organic materials comprise the three largest material types sent to landfill.

It is also worth noting that the City has significantly less yard trimmings (i.e., leaves/grass, prunings/trimmings, branches/stumps) in its disposal stream than other communities, when comparing to the CalRecycle 2014 Waste Characterization Study for the Southern California Region. This is likely the result of a mature yard trimmings composting program in the City at the El Corazon Compost Facility. This facility recovers more than 60,000 tons per year, approximately 20,000 tons per year of which comes from the curbside yard trimmings collection program. This serves as an indicator of the community's willingness to participate in source separation activities needed to recycle other organic materials. It also indicates that there is not a significant need for the City to target these materials with its organics strategy as it is successfully diverting this material from landfilling already.

**Figure ES-2: Summary Waste Characterization – Top 5 Materials**

Material Type	Single-Family	Multi-Family	Commercial	TOTAL
<b>Food</b>	8,299 Tons 21.0%	2,582 Tons 21.4%	9,624 Tons 24.9%	20,505 Tons 22.7%
<b>Compostable Paper</b>	4,166 Tons 10.6%	1,013 Tons 8.4%	4,582 Tons 11.9%	9,760 Tons 10.8%
<b>Non-Recoverable Organics</b>	2,677 Tons 6.8%	935 Tons 7.7%	2,332 Tons 6.0%	5,944 Tons 6.6%
<b>Non-Recoverable Plastics</b>	1,048 Tons 2.7%	1,583 Tons 4.0%	2,116 Tons 5.5%	3,648 Tons 4.0%
<b>Textiles</b>	1,555 Tons 3.9%	701 Tons 5.8%	1,222 Tons 3.2%	3,478 Tons 3.9%

HF&H worked with WM to understand how much of this available material could reasonably be recovered by implementing programs that require generators to separate their food scraps from other waste. Based on the available quantities of food scraps and compostable paper in the landfill stream and reasonable performance benchmarks from other communities with organics diversion programs, it is reasonable to assume that between 7,491 and 10,930 tons per year could be diverted within three to five years of

*“While collection programs can scale up over time, the City must build facility infrastructure that meets its long-term needs. This includes 36,000+ tons per year of organics generated in the City, plus an allowance for expected growth.”*

establishing new programs primarily focused on single-family and commercial generators. This estimate is significantly less than the total available organic materials in the disposal stream. It is based on the experience of mature food scraps programs in communities like San Francisco and Alameda County who have had food collection programs for more than a decade and have implemented fine-based enforcement programs. These communities have demonstrated that even after successful implementation, significant volumes of organics still remain in the landfill stream. It is possible that the City could significantly exceed the performance level estimated here as programs mature and especially if enforceable source separation mandates are established by the State. While collection programs can scale up over time, the City must build facility infrastructure that meets its long-term needs. This includes 36,000+ tons per year of organics generated in the City, plus an allowance for expected growth.

## Program Options

The City received input from industry and public stakeholders on nearly 30 potential organics management solutions (Section 3) covering upstream (source reduction, feeding people, etc.) and downstream (industrial uses, composting) options of the U.S. EPA’s food recovery hierarchy. Each of these options were considered by the City and HF&H. Following the Zero Waste framework, several of the upstream options identified present opportunities for the City to reduce waste and feed people before wasted organic materials are available for downstream recovery strategies. With regard to the downstream opportunities, the City selected 6 of the 14 large-scale solutions for a more in-depth analysis of the costs, benefits, and technical feasibility considerations associated with each (Sections 4 and 5).

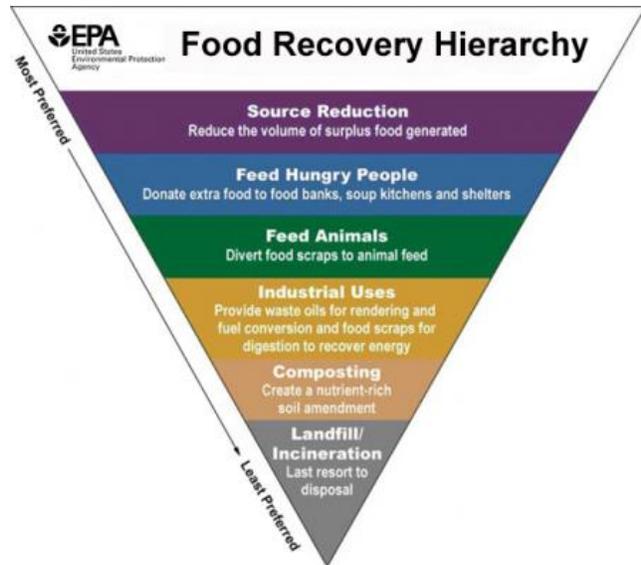
The options selected for further analysis were chosen because they were believed to have the highest likelihood of:

- Timely access to the processing facility that would receive the material;
- Compatibility with the City’s existing contracts with Waste Management and Agri Service, Inc.;
- Customer acceptance and active participation; and,
- Cost-effectively providing the services to the community.

## Options for Source Reduction and Feeding People

The City’s Zero Waste goal prioritizes the highest and best uses of materials. In the case of food waste, the highest and best use is to reduce the wasting of food and to feed hungry people. Among the options identified by industry and non-profit stakeholders, the City and HF&H have identified the following options for further consideration:

1. **Commercial Technical Assistance for Food Waste Reduction:** As the City works with food generating businesses to promote recycling and food waste recovery options, it would be valuable for that technical assistance to include strategies for managing purchasing and food handling in a way that reduces the amount of food waste generated in the first place. These strategies range from basic inventory management and ordering strategies to more sophisticated technology solutions like “Lean Path” which employs a weight-based measurement and reporting platform for restaurant managers.



2. **Residential Education for Food Waste Reduction:** Through the City’s current channels for providing education and outreach to residents, it would be very cost-effective to include information useful to households about managing their purchasing, food storage, and discards to reduce food waste. Resources are available to the City at minimal cost through US EPA’s “Food Recovery Challenge”<sup>4</sup>.

3. **Franchise Subcontractor Food Rescue Collection:** The City’s franchise hauler could subcontract with a local non-profit or other service provider to collect food from large and/or consistent generators of edible food (large hospitality venues, caterers, industrial/institutional kitchens, bakeries, etc.) and deliver it for redistribution or value-added processing. WM is currently developing a similar type of program for their new commercial franchise areas in the City of Los Angeles.

4. **El Corazon Food Recovery and Culinary Arts Training Kitchen:** The City has identified the El Corazon Senior Center as the prime venue for developing a food processing kitchen for rescued food (food that would otherwise be waste) in Oceanside. Through the development of this kitchen the City aims to provide a venue that can serve the City’s waste reduction needs, while also supporting the development of a culinary arts training venue for the local community and at risk populations.

## Collection Options

Three options were considered for residential collection:

1. **Mixed Organics Collection (R1)** – Customers are asked to place food scraps (and possibly food-soiled paper) in their existing green cart along with their yard trimmings.
2. **Bag-Based Collection (R2)** – Customers are asked to place food scraps and food soiled paper in a designated organics collection bag. This bag is then placed in an existing cart for collection with another material (yard trimmings, recycling, or solid waste) and separated at the pre-processing site.
3. **Separate Food Scraps Collection (R3)** – Customers are asked to place food scraps and food soiled paper in a separate container dedicated to those materials. Residential customers would be asked to sort materials into a total of four containers: recyclable materials, yard trimmings, food scraps, and all other non-recyclable trash.

<sup>4</sup> <https://www.epa.gov/sustainable-management-food/food-recovery-challenge-frc>

One option was identified for commercial collection which involves separation of food scraps and, depending on the pre-treatment and processing solution selected, food-soiled paper into a separate container (C). This program would require routing and collection of this material separate from other recycling and solid waste.

### **Pre-Treatment/Processing Options**

Once organics are collected from residential and commercial generators, they could be pre-treated and processed using any of the following options:

1. **Waste Management CORE® in Orange to Los Angeles Sanitary District:** Materials (R2/R3, C) would be transported to Orange County for pre-treatment at an existing WM CORE® facility. The CORE® system separates organic materials from contaminants and converts the organic fraction into a bio-slurry suitable for injection into a digester used in wastewater treatment. In this option, the slurry would be transported from the CORE® in Orange County to Los Angeles Sanitary District (LA SAN) for digestion. These facilities are currently operating and have the necessary permits and contractual arrangements in place for this use. The current facilities are adequately sized to accept the volume of material likely to be generated in the City.
2. **Waste Management CORE® at El Corazon to San Luis Rey Water Reclamation Facility:** Materials (R2/R3, C) would be transported to El Corazon for pre-treatment at a CORE® facility and the slurry transported to San Luis Rey Water Reclamation Facility for digestion. This would require multi-party agreement between the City, Agri Service, and WM for the use of a portion of the El Corazon site. It would also require some modification to the El Corazon Master Plan which requires relocating the existing composting facility. In addition, the cost-effectiveness of this solution is dependent on attracting materials from other communities in the region to realize the desired economies of scale.
3. **Waste Management CORE® at Palomar Transfer Station to San Luis Rey Water Reclamation Facility:** Materials (R2/R3, C) would be transported to the Palomar Transfer Station in Carlsbad for pre-treatment at a CORE® facility and the slurry transported to San Luis Rey Water Reclamation Facility for digestion. This would require multi-party agreement between the City, Republic Services (the operator of the Transfer Station), and WM for the use of a portion of the Palomar site. In addition, the cost-effectiveness of this solution is dependent on attracting materials from other communities in the region to realize the desired economies of scale.
4. **Mixed Organics Composting with Agri Service:** Materials (R1, C) would be transported to Agri Service, pre-treated and added to the existing compost process. The current site has all required permits for this use, however some CEQA analysis is required (see Section 4). This would require some modification to the City's agreement with Agri Service and would require some additional capital investment by Agri Service or the City for the new equipment required for effective pre-treatment. One challenge with this approach is that the El Corazon Master Plan and Specific Plan both identify the need to relocate the composting operation during Phase 6 of that Master Plan (estimated 2024). If a suitable alternative site cannot be located, this solution will be temporary.

5. **San Luis Rey Water Reclamation Facility Receiving, Pre-Treatment, and Treatment:** Materials (R2/R3, C) would be transported to the San Luis Rey Water Reclamation Facility for pre-treatment and injection into the anaerobic digesters. R2 materials would have to be sorted at a separate site (e.g. transfer station, recycling facility) prior to transport to SLRWRF. Permitting and CEQA requirements are significant, and would include the City to obtaining a Solid Waste Facility Permit.



6. **Industrial-Scale Dehydration of Organic Materials:** Materials (R2/R3, C) would be delivered to a dehydration facility where they would be pre-treated and dehydrated in an industrial-scale dehydration machine. The byproducts include water and dried material. The dried material can be used as a biomass fuel product to power the dehydrator or as a blending agent for compost. This would require an agreement between the City, the equipment vendor, and the operator of an appropriately-permitted facility. Ideally, siting would be at El Corazon or Palomar Transfer Station, as both facilities are nearby and have Solid Waste Facility Permits with adequate capacity.

### Estimated Costs and Benefits

HF&H worked with the private service providers and technology vendors to understand the reasonably-anticipated range of costs associated with collection, transportation, pre-treatment, and processing for each of the seven solutions. This resulted in planning-level cost estimates for each of the seven solutions. Figure ES-2 below summarizes the expected range of costs (expressed in dollars and as a percentage of the current solid waste system revenue) and estimated greenhouse gas emissions reductions for each solution.

The tonnages associated with all of the seven solutions are based on the same estimated tonnage collected from residential (3,300-6,274 tons per year) and commercial (4,191-4,656 tons per year) customers in the City. These tonnages represent an estimate of performance during the early implementation of the programs (one to five years). Ultimately, with full implementation of the requirements of AB 1826 (in 2020) and then SB 1383 (in 2025), food diversion may exceed 9,400 tons per year from residents and 10,650 tons per year from businesses.

The range of costs (low to high) are primarily driven by the volume of material handled, but also include some differing assumptions about the operator's approach to the program (level of pre-treatment equipment and labor, use of different technology approaches, etc.). As the tonnage of collected material increases, it is likely that variable program costs, particularly those related to pre-treatment and processing, will increase with volume over time.

Figure ES-3: Summary Cost/Benefit Analysis\*

Configuration		Annualized Cost (000s)	Estimated Rate Impact	GHG Emissions (Reduction)/Increase
COfRe® Orange to LA SAN	R2,C	\$1,167-\$1,774	5.4%-8.2%	(2,193)-(3,227)
	R3,C	\$2,739-\$3,038	12.6%-14.0%	(1,879)-(2,913)
COfRe® Corazon to SLRWRF	R2,C	\$1,529-\$2,570	7.1%-11.9%	(2,434)-(3,579)
	R3,C	\$3,101-\$3,834	14.3%-17.7%	(2,120)-(3,265)
COfRe® Palomar to SLRWRF	R2,C	\$1,273-\$2,215	5.9%-10.2%	(2,384)-(3,505)
	R3,C	\$2,845-\$3,479	13.1%-16.0%	(2,070)-(3,191)
Agri Service Composting	R1,C	\$1,003-\$1,212	4.6%-5.6%	(4,387)-(6,492)
SLRWRF Pretreatment & Processing	R2,C	\$1,245-\$1,803	5.7%-8.3%	(2,469)-(3,632)
	R3,C	\$2,817-\$3,067	13.0%-14.1%	(2,155)-(3,318)
Industrial-Scale Dehydration	R2,C	\$1,038-\$2,118	4.8%-9.8%	(2,553)-(4,041)
	R3,C	\$2,610-\$3,382	12.0%-15.6%	(2,239)-(3,727)

\*See notes for this table in Section 5.

It should be noted that these are planning level cost estimates and the underlying assumptions for any selected solution(s) should be further refined on the basis of specific operating requirements as determined in negotiations between the City and the hauler and/or service provider(s).

## Recommendations

From the detailed review of the various options considered in this report, HF&H has developed specific recommendations for the City's consideration. This study did not find any single solution that was both immediately ready for implementation and sustainable in the long term. As a result, these recommendations are based on first identifying an immediate option available for the City to begin offering food waste recovery options to the community and then developing long-term solutions.

1. **Short-Term Solution.** HF&H recommends that the City enter into negotiations with Waste Management to implement a commercial collection program and the "COfRe® at Orange to LA SAN" processing approach as an immediate-term solution to achieving compliance with the requirements of AB 1826, however it will not comply with the requirements of SB 1383. This processing strategy is fully permitted and operational and should result in the least time to implementation of any of the options considered. In addition, the program appears to be relatively cost-competitive with other options considered and benchmarks competitively with programs implemented by other Southern California communities. The program provides the least benefit in terms of GHG reductions, resulting primarily from the transportation required to deliver materials from Oceanside to Orange. Ultimately, the City should see greater cost and environmental benefits from the development of a more permanent local processing solution (see recommendations 3, 4, and 5 below). The collection program developed from this negotiation should be developed as a long-term program, but with some flexibility for reducing the transportation and processing costs, based on changes to processing location, and lessons learned from the first 6 to 12 months of the program. The processing arrangements developed

from this negotiation should be negotiated to have a shorter term, with some options for extension, in order to allow the City to redirect the material to the long-term solution once developed.

2. **Residential Collection.** HF&H recommends that the City to work towards residential solutions that use either the R1 or R2 collection approach. All but one of the solutions require either the R2 or R3 collection approach. There are significant cost and emissions differences between the two approaches, as illustrated in Figure ES-2. The R3 collection approach adds annual costs of \$1,264,000-\$1,572,000 per year, reduces the GHG benefits, and will result in increased heavy duty truck traffic with all of the associated noise, congestion, and road impacts.
3. **Compost Facility Siting Study.** HF&H conducted an independent cost benefit analyst of the El Corazon Compost Facility and found that the “Agri Service Composting” configuration could be cost-effective and provide GHG benefits; unfortunately, the challenges related to this processing approach remove it from consideration. First, the El Corazon Master Plan and Specific Plan both describe a relocation of this operation to allow other uses of the site and mitigate any potential nuisance to development of the El Corazon park and business facilities. The Master Plan calls for a relocation in 2024, making the timing unrealistic to complete the capital improvements necessary. Second, Agri Service has expressed continued concerns about the impact to the marketability of their end products resulting from the likely increase in contamination. Further, Agri Service has expressed concern that the costs presented herein may not be adequate to manage the increased contamination. Agri Service has not provided a proposal to the City that demonstrates the requirements necessary to overcome those concerns. This service is critical to the City’s State diversion compliance required under AB 939, AB 1826, and SB 1383.

HF&H recommends that the City begin the process of identifying a replacement composting site either within the Biosolids Master Plan or through a separate Compost Facility Siting Study that would determine alternative locations to El Corazon. As part of this evaluation and any future CEQA and permitting work for the selected site, it would be wise for the City to assume that the site could accept a full spectrum of food materials (with up to 30% contamination), in addition to the current yard trimmings. Doing so will ensure the greatest long-term flexibility for the use of that site.

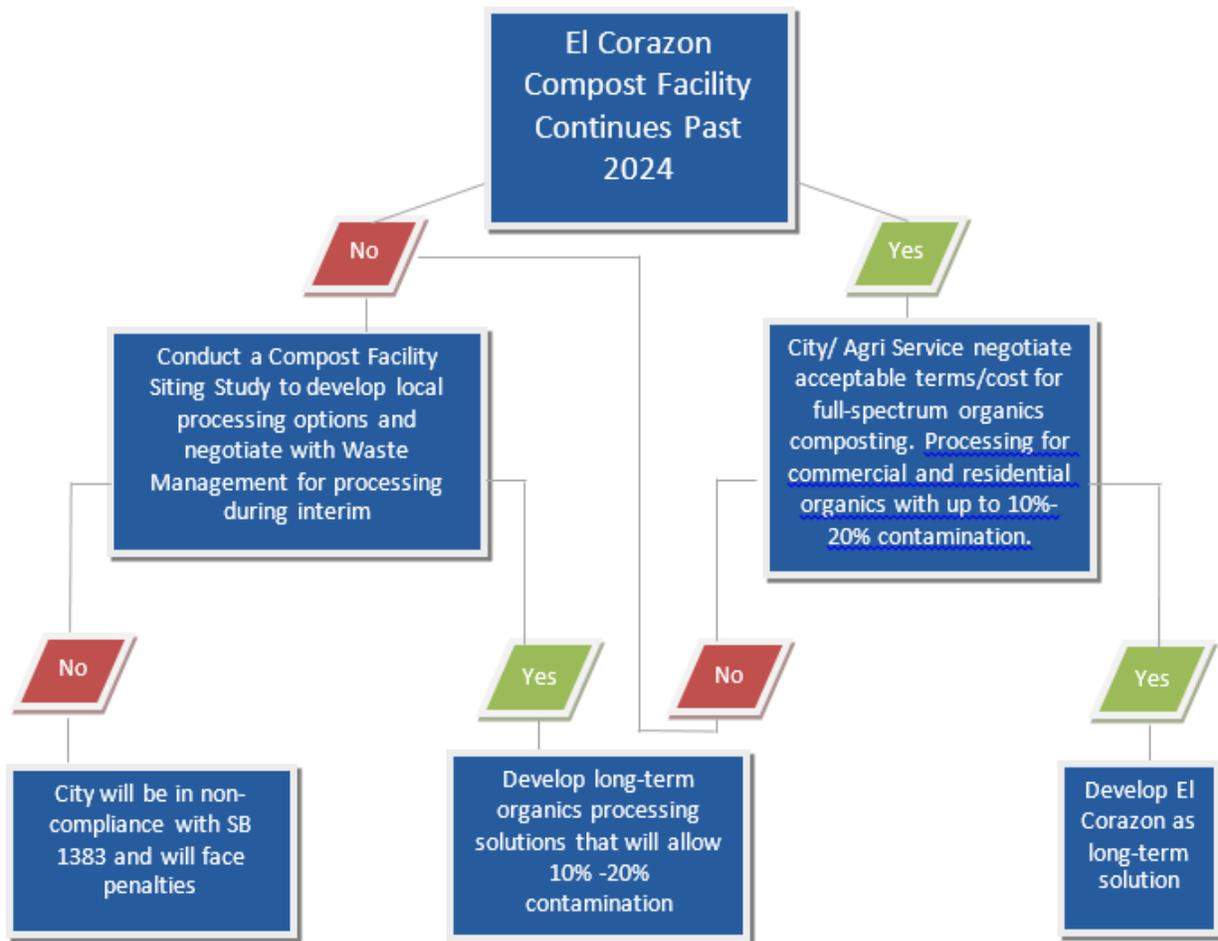
4. **Integrated Organic Waste to Energy and Biosolids Master Plan.** The City is in process on a comprehensive study related to the SLRWRF which will consider upgrading biosolids processing and the inclusion of organic wastes. HF&H understands that this effort will include studying the various operational and permitting issues associated with receiving and pre-treating collected organics at that site. This study will be critical to informing the City’s ultimate decision about whether that site could be used for the full scope of services (i.e. receiving, pre-treatment, and processing) or if another site (e.g. Palomar Transfer Station) should be responsible for the receiving and pre-treatment activity.
5. **Long-Term Solution.** HF&H recommends that the City use the information from the Compost Facility Siting Study and the Integrated Organic Waste to Energy and Biosolids Master Plan to make a decision about its long-term approach to providing organics recovery solutions to the community. One potential outcome is that the City could compost its biosolids at the San Luis Rey Water Reclamation Facility in a small-scale, in-door facility with advanced odor mitigation technologies. If this occurred, the biosolids composting process would likely need a bulking agent

(e.g. yard trimmings). As such, a combined solution for organics and biosolids could provide synergistic benefits for the City and its utility ratepayers.

- Food Rescue.** In addition to the City’s efforts to recover organics to a compost or digestion facility, the City should consider implementing programs to recover edible food and provide it to people who are food insecure. This is consistent with the City’s Zero Waste goal and is an element of the jurisdictional requirements of SB 1383. The City has already taken steps towards this with the funding of the food rescue kitchen grant and there are a number of programmatic approaches described in Section 3 of this report. At a minimum, for SB 1383 compliance (based on the December 2017 draft of the regulations), the City will need to identify potential recipients of donated food and develop resources to connect potential food donors to those recipients. The City may wish to further support this effort to enhance convenience for businesses and effectiveness for the recipient organizations. One approach would be to contract (or subcontracting through the WM franchise agreement) with a service provider who could collect food from donors and deliver it to the recipients.

Figure ES-4 on the following page provides a high-level decision tree for understanding how the City would work through the process in Recommendations 3, 4, and 5 to determine the long-term solution.

**Figure ES-4 – Organics Recommendations Decision Tree**



## SECTION 1. PROJECT BACKGROUND

### Policy Considerations

The City's Zero Waste Strategic Resource Management Plan sets a goal of 75% to 90% diversion from landfill by 2020. With a current 68% recycling rate, enhanced organics management and recycling will be paramount to reaching the City's overall Zero Waste goal. The City's Zero Waste framework describes implementing programs and services based on the highest and best use of materials. The Zero Waste Strategic Resource Management Plan identifies organic materials, particularly food waste, as one of the largest remaining components of the materials sent to landfill by the City. In considering approaches to diverting those materials from landfill, the City should consider prioritizing strategies based on the food recovery hierarchy developed by US EPA with waste reduction and feeding people coming before down-stream strategies like composting and anaerobic digestion.



In addition to the City's Zero Waste goals, there are State-level legislation driving the need for development of organics solutions. That legislation includes:

- **The California Integrated Waste Management Act of 1989 (AB 939):** This law established requirements on every local government in California to develop and implement effective programs to divert at least 50% of waste generated in each community from landfills by 2000.
- **The Jobs and Recycling Act of 2011 (AB 341):** This law establishes a Statewide “policy goal that not less than 75 percent of solid waste generated be source reduced, recycled, or composted by the year 2020” (Public Resources Code Section 41780.02(a)).
- **Mandatory Commercial Organics Recycling (AB 1826, 2014):** This law establishes a requirement that all local jurisdictions provide programs for the recovery of organic materials from businesses and multi-family properties by January 1, 2016. The law further requires those covered organic waste generators to participate in the programs at different implementation timelines (April 2016, January 2017, January 2019, and January 2020) based on the volume of organic materials generated. Failure by the City to comply with this law may result in significant fines from the State.
- **Short-Lived Climate Pollutants: Organic Waste Methane Emissions Reductions (SB 1383, 2016):** This law establishes the most ambitious disposal reduction mandates since the passage of AB 939 in 1989. It requires CalRecycle and the California Air Resources Board to establish regulations to reduce disposal of organic waste in landfills, compared with a 2014 baseline, by 50% no later than 2020 and by 75% no later than 2025. In addition, the law requires recovery of 20% of edible food for human consumption by 2025. While the State agencies have just begun their regulatory development process and specific requirements are uncertain at this time, the current draft regulations:
  - Require local agencies to establish source separation programs for all covered organic materials;
  - Include enforcement provisions involving financial penalties for generators that fail to comply;
  - Allows for significant penalties (up to \$10,000 per day) against local agencies who fail to implement the programs required under the regulations by January 2022.

## **Current Assets of the City**

The City has certain assets (i.e. its Solid Waste Franchise Agreement, the El Corazon Compost Facility, and the SLRWRF) that may be useful to it in developing the programs and services needed to meet these policy objectives.

### **Franchised Collection Services**

The City is responsible for the development, implementation and enforcement of local solid waste collection programs with collection services provided by a franchised hauler. The City has a solid waste franchise agreement with WM to provide exclusive solid waste services within the City to residential, multi-family, commercial, and industrial customers. That franchise agreement is valid through December 31, 2023.

### **Agri Service Compost Operation at El Corazon**

The City currently leases space at El Corazon to Agri Service to operate a compost facility capable of handling all of the green waste collected from residents in the City as well as material brought to that site by landscapers, contractors, and other “self-haulers” of acceptable materials. That lease was most recently updated in November 2009 and has a 15 year term (expiring in 2024).

That facility currently holds a Solid Waste Facility Permit that permits composting of “Green Material and Food Material” and allows the receipt of up to 500 tons per day of solid feedstock and 75 tons per day of liquid waste for production of compost and mulch. That permit was most recently reviewed and updated with minor changes in 2017. HF&H has reviewed the various permit documents for the El Corazon Compost Facility (Solid Waste Facility #37-AA-0907), including the: Report of Compost Site Information (October 2017); Odor Impact Management Plan (October 2017); CEQA Certification and Conditional Use Permit approved by the City of Oceanside Planning Commission (December 2011); and, General Waste Discharge Requirements for Composting Operations (August 2015). Those documents clearly and broadly describe the facility as being permitted for acceptance of “food waste”. Some compost facility permits specifically limit the acceptance of food materials by including restrictions like “pre-consumer food waste” or “the amount of food waste mixed with the green waste must not be more than 15% by volume”. None of the documents reviewed by HF&H contain any such limitation, nor are there references to additional permitting approvals required for increased handling of food waste, provided that doing so does not exceed the total permitted volumes for the facility. HF&H confirmed our understanding of this with a Local Enforcement inspector from San Diego County Department of Environmental Health. This existing operation and permitting offer the City a potential resource for managing the food waste generated by residents and/or businesses.

The City’s June 28, 2005 “El Corazon Land Use Master Plan Project Report” identified the need to temporarily relocate the compost operation to the southwest entry of the property during Phase 1 of the Master Plan. This relocation has already been accomplished. The Master Plan further identifies the need to permanently relocate the compost facility during Phase 6 of the plan. These planning requirements are further reinforced in the City’s September 9, 2009 “El Corazon Specific Plan”. City staff has indicated that this permanent relocation may occur on a similar timeline as the 2024 expiration of the lease with Agri Service.

**San Luis Rey Water Reclamation Facility**

The City's Department of Water Utilities, Wastewater Division operates the San Luis Rey Water Reclamation Facility to treat wastewater including treating solids with an anaerobic digestion process to reduce pathogens and vectors. Based on discussions with City staff, that facility may be capable, with relatively minor capital improvements, of accepting pre-treated food waste materials for co-digestion with the current bio-solids. This would provide an opportunity for beneficial use of organic wastes generated within the City. Many local Districts such as LA SAN, East Bay Municipal Utilities District (EBMUD), the Orange County Sanitation District, and the Encina Joint Powers Authority inject organic wastes such as food waste and fats, oils, and grease (FOG) into their anaerobic digesters, which has resulted in an increase in volatile solids destruction while generating additional biogas that can be used to produce electricity, offset natural gas usage, or power fleet vehicles. Treatment of organic wastes at SLRWRF will be evaluated in the 2017 Integrated Organic Waste to Energy/Biosolids Master Plan.

## SECTION 2. DETERMINATION OF AVAILABLE MATERIALS

In order to establish a baseline for the amount of materials available for recovery, the City, WM, and HF&H cooperated in the performance of a waste characterization study specific to the City’s Single-Family, Multi-Family, and Commercial waste generators. The waste characterization study focused on the approximately 90,000 tons per year of materials collected by WM and sent for landfill disposal, as opposed to materials sent for recycling or composting. This section focuses on the results of the waste characterization study and the determination of the materials available for recovery. Appendix 2a to this report presents the methodology employed for the waste characterization study.

### Waste Characterization Findings

The Waste Characterization Study performed on the landfill-bound solid waste collected from generators in the City confirms and further informs the City’s previous understanding that a significant volume of the material currently sent to landfill is comprised of food waste and compostable (food-soiled) paper. Figure 2-1 below illustrates the summary findings of the waste characterization in terms of annual tonnage, by material type.

**Figure 2-1: Summary Composition of Franchised Disposal Stream (Tons per Year)**

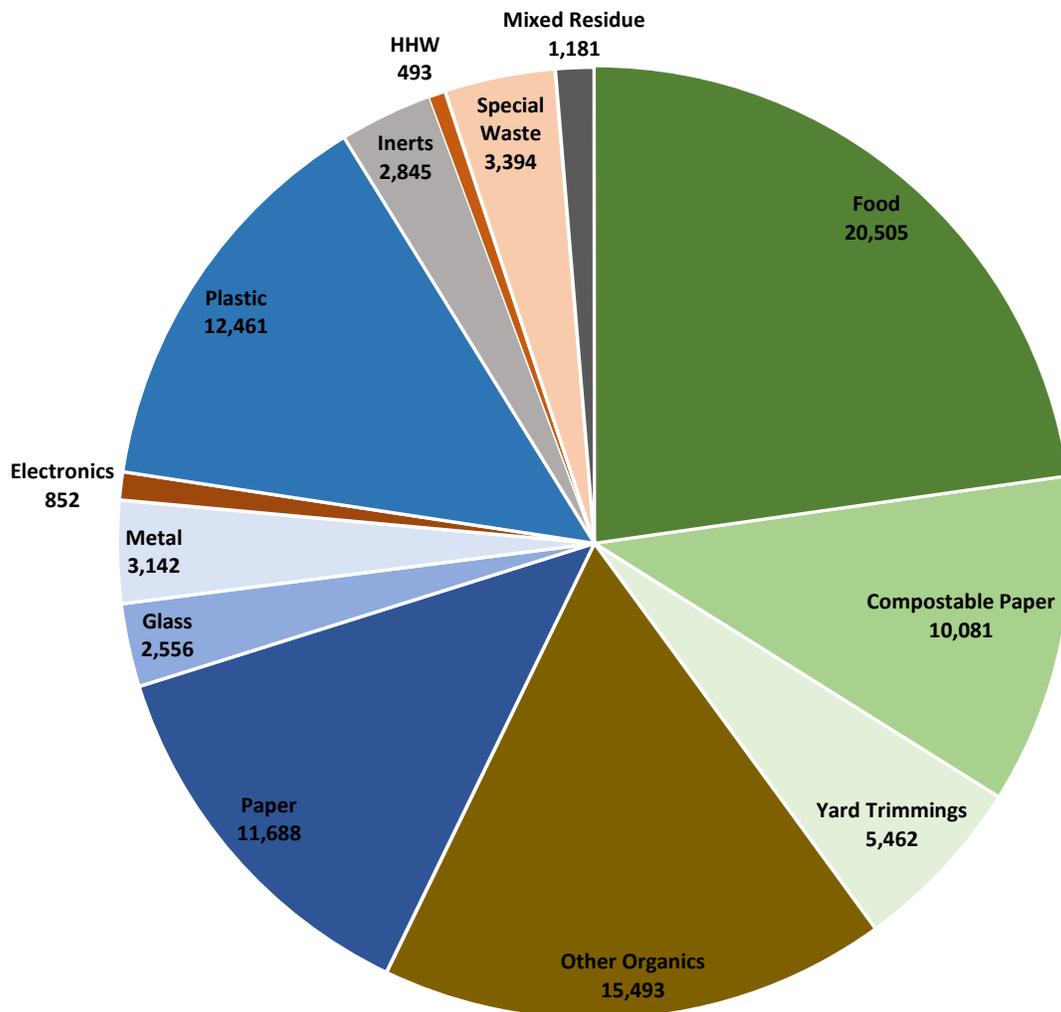


Figure 2-2 below details the material characterization by sector. This waste characterization was done to support the organics feasibility study; therefore, more detailed material type information is presented here for the organic materials. Appendix 2b to this report presents the detailed composition for all of the detailed material types for each of the sectors studied.

**Figure 2-2: Detailed Characterization of Waste Stream by Sector**

Category	Material	SINGLE FAMILY		MULTI FAMILY		COMMERCIAL		CITYWIDE	
		%	Tons	%	Tons	%	Tons	%	TONS
Organics	Food	21.0%	8,299.26	21.4%	2,582.16	24.9%	9,623.97	22.7%	20,505.39
	Other Miscellaneous Paper - Compostable	0.2%	69.79	0.4%	44.30	0.5%	206.73	0.4%	320.82
	Remainder / Composite Paper - Compostable	10.6%	4,165.62	8.4%	1,013.28	11.9%	4,581.51	10.8%	9,760.41
	Leaves and Grass	3.6%	1,425.95	3.8%	458.06	2.4%	910.05	3.1%	2,794.06
	Prunings and Trimmings	3.6%	1,438.89	1.2%	145.83	1.0%	373.46	2.2%	1,958.18
	Branches and Stumps	1.4%	562.06	0.4%	52.90	0.2%	94.68	0.8%	709.64
	Manures	0.2%	88.18	0.0%	-	0.1%	20.15	0.1%	108.33
	Textiles	3.9%	1,554.51	5.8%	701.25	3.2%	1,222.31	3.9%	3,478.07
	Carpet	1.6%	635.89	0.4%	50.36	0.5%	199.05	1.0%	885.30
	Clean Dimensional Lumber	1.8%	715.69	0.6%	66.76	0.5%	179.47	1.1%	961.92
	Clean Engineered Wood	1.1%	426.10	0.1%	16.90	0.3%	128.89	0.6%	571.89
	Clean Pallets & Crates	0.3%	100.62	2.1%	255.21	2.9%	1,105.26	1.6%	1,461.09
	Other Wood Waste	3.0%	1,165.20	2.2%	270.52	1.7%	646.20	2.3%	2,081.92
	Remainder / Composite Organic	6.8%	2,677.04	7.7%	934.74	6.0%	2,332.37	6.6%	5,944.15
	<b>SUBTOTAL All Organics</b>		<b>59.1%</b>	<b>23,324.80</b>	<b>54.6%</b>	<b>6,592.27</b>	<b>56.0%</b>	<b>21,624.10</b>	<b>57.2%</b>
<b>SUBTOTAL Paper</b>		<b>9.3%</b>	<b>3,651.86</b>	<b>14.2%</b>	<b>1,712.80</b>	<b>16.4%</b>	<b>6,323.38</b>	<b>13.0%</b>	<b>11,688.04</b>
<b>SUBTOTAL Glass</b>		<b>3.0%</b>	<b>1,190.20</b>	<b>3.4%</b>	<b>412.60</b>	<b>2.5%</b>	<b>953.45</b>	<b>2.8%</b>	<b>2,556.25</b>
<b>SUBTOTAL Metal</b>		<b>3.5%</b>	<b>1,381.72</b>	<b>3.3%</b>	<b>403.87</b>	<b>3.5%</b>	<b>1,356.09</b>	<b>3.5%</b>	<b>3,141.68</b>
<b>SUBTOTAL Electronics</b>		<b>1.0%</b>	<b>409.26</b>	<b>1.2%</b>	<b>142.31</b>	<b>0.8%</b>	<b>300.07</b>	<b>0.9%</b>	<b>851.64</b>
<b>SUBTOTAL Plastic</b>		<b>12.0%</b>	<b>4,743.49</b>	<b>13.1%</b>	<b>1,583.05</b>	<b>15.9%</b>	<b>6,134.74</b>	<b>13.8%</b>	<b>12,461.28</b>
<b>SUBTOTAL Inerts and Other Material</b>		<b>3.5%</b>	<b>1,373.59</b>	<b>3.2%</b>	<b>383.47</b>	<b>2.8%</b>	<b>1,088.02</b>	<b>3.2%</b>	<b>2,845.08</b>
<b>SUBTOTAL HHW</b>		<b>0.7%</b>	<b>290.30</b>	<b>0.3%</b>	<b>35.60</b>	<b>0.4%</b>	<b>166.78</b>	<b>0.5%</b>	<b>492.68</b>
<b>SUBTOTAL Special Waste</b>		<b>5.6%</b>	<b>2,225.98</b>	<b>4.9%</b>	<b>593.79</b>	<b>1.5%</b>	<b>574.37</b>	<b>3.8%</b>	<b>3,394.14</b>
<b>Mixed Residue</b>		<b>2.2%</b>	<b>883.72</b>	<b>1.7%</b>	<b>208.27</b>	<b>0.2%</b>	<b>88.75</b>	<b>1.3%</b>	<b>1,180.74</b>
<b>GRAND TOTAL - All Materials</b>		<b>100.0%</b>	<b>39,474.91</b>	<b>100.0%</b>	<b>12,068.00</b>	<b>100.0%</b>	<b>38,609.75</b>	<b>100.0%</b>	<b>90,152.66</b>

This study demonstrates that the volume of food waste in the disposal stream is larger than any other category of materials. When food and compostable paper are added together, they comprise more of the disposal stream than all of the traditional recyclable materials categories combined (33.9% for food and compostable paper vs. 33.1% for paper, metal, plastic, and glass) This is likely a result of the City's successful programs for recycling green waste and traditional recyclable materials which have successfully reduced those materials as a portion of the disposal stream and resulted in the City's achievement of a 68% diversion rate.

### Estimate of Potential for Material Recovery

HF&H worked with WM to understand how much of this available material could reasonably be recovered by implementing programs that require generators to separate their food scraps from other waste. Based on the available quantities of food scraps and compostable paper in the landfill stream and reasonable performance benchmarks from other communities with organics diversion programs, it is reasonable to assume that between 7,491 and 10,930 tons per year could be diverted within the first one to five years of establishing new programs primarily focused on single-family and commercial generators. Ultimately, with full implementation of the requirements of AB 1826 (in 2020) and then SB 1383 (in 2025), food diversion could exceed 9,400 tons per year from residents and 10,650 tons per year from businesses. While collection programs can scale up over time, the City must build facility infrastructure that meets its long-term needs. This includes 36,000+ tons per year of organics generated in the City, plus an allowance for expected growth.

### Single-Family Residential Generators

HF&H estimates that between 3,300 and 6,274 tons per year of food scraps and food soiled paper could reasonably be collected from single-family residents in the City during the first one to five years of program implementation. This equates to between 8% and 16% of the total single-family disposal stream and between 26% and 50% of the available single-family food and compostable paper identified in the waste characterization study. This performance level estimate is based on the participation and performance levels experienced in existing and mature programs in other parts of the state.

Figure 2-3 below details the assumptions and calculation methodology used in that estimate based on: the number of customers included in the program, an estimated percentage of those customers who are likely to participate in the program, and the level of participation by those participants (average pounds of food collected per participant per week).

**Figure 2-3: Estimated Single-Family Residential Performance**

	Low Performance	High Performance
<b>A) Program Customers</b>	42,308	46,674
<b>B) Participation Rate</b>	50%	55%
<b>C) Pounds/Participant/Week</b>	6.0	9.4
<b>D) Tons for Collection</b>	3,300	6,274

Note: D = (A x B x C x 52 weeks)/2000 pounds per ton

The range of program customers results from using either just the number of single-family homes in the City or adding to that number the multi-family residences that receive service in a similar fashion to single-family customers (mobile home parks, townhomes, etc.) Participation rates and levels of participation vary among communities who have residential food scrap programs, resulting in a significant range of estimated material recovery potential.

The lower end of the range may be more reflective of an early implementation of a voluntary program while the higher end of the range may be reflective of a more mature program and/or a program that includes some participation mandate. In both cases, the pounds per participant per week are based on benchmarks from communities with full spectrum food scraps program (i.e., vegetative, meat, bones, dairy, food-soiled paper). If the program is defined with a more restricted list of accepted materials, there may be a significant impact on performance.

### Commercial Generators

HF&H estimates that between 4,191 and 4,656 tons per year of food scraps and food soiled paper could reasonably be recovered from commercial customers in the City during the first one to five years of program implementation. This equates to between 11% and 12% of the total commercial disposal stream and between 29% and 32% of the available commercial food and compostable paper identified in the waste characterization study. This performance level estimate is based on the participation and performance levels experienced in existing and mature programs in other parts of the state.

The low estimate of commercial organics tonnage availability was performed by WM in January 2016 in response to a request from the City to analyze organic materials generation by customers required to comply with AB 1826. A summary of that analysis is presented below in Figure 2-4, the more detailed analysis includes potentially sensitive customer information and is therefore not included in this report.

HF&H has reviewed the analysis, in detail, for reasonableness and accuracy and agrees to both. That analysis involved:

- Identifying all commercial customers and current subscription levels in the City;
- Classifying those customers by type of business (e.g., retail, restaurant, office, school);
- Applying organic waste generation factors to each business type based on CalRecycle’s “2014 Generator-Based Characterization of Commercial Sector Disposal and Diversion in California” and using the Southern California Regional data from that study; and,
- Calculating the resulting tonnage of organics generated by those businesses for each phase of implementation under AB 1826. It is worth noting that this analysis does not include the significant additional number of generators covered by the requirements of SB 1383.

**Figure 2-4: Summary of AB 1826 Customer Organics Generation (Tons)**

		<b>Tier 1:</b> 8+ Cubic Yard Organics Generators	<b>Tier 2:</b> 4+ Cubic Yard Organics Generators	<b>Tier 3:</b> 4+ Cubic Yard Waste Generators
<b>Bin Customers</b>	<b>Weekly</b>	9.85	28.40	57.57
	<b>Annual</b>	511.97	1475.61	2,991.24
<b>Roll-off Customers</b>	<b>Weekly</b>	21.08	22.09	23.10
	<b>Annual</b>	1,095.40	1,148.01	1,200.10
<b>All Customers</b>	<b>Weekly</b>	30.93	50.49	80.66
	<b>Annual</b>	1,607.37	2,623.62	4,191.34

Following discussions with WM as part of this feasibility study, WM supplied cost and operating information to the City and HF&H for the commercial collection program contemplated by this study. In that analysis, WM identified an increase in the annual tonnage to 4,656. HF&H understands that this increase in tonnage estimated for recovery is based on a commercial organics program that is available to all commercial customers who wish to participate, not just the customers required to comply with Tiers 1-3 of AB 1826.

It is reasonable to assume, based on the available quantities of organic materials in the commercial waste stream, that these tonnage estimates could be exceeded, perhaps significantly, if the program includes a participation mandate and robust education and technical assistance to generators. Similar to the estimate of residential tonnage available for recovery, the performance of the program will be dependent upon how the final program is defined in terms of factors impacting customer acceptance (available collection frequencies, allowance for use of bags for containing organic materials, etc.) as well as the extent of the acceptable materials (vegetative food, meat, bones, dairy, food-soiled paper, etc.)

## SECTION 3. IDENTIFICATION OF PROGRAM OPTIONS

On January 30, 2017, the City hosted a series of stakeholder meetings to solicit input from industry, non-profit, and public stakeholders. These discussions focused on options for managing organics that are currently disposed by the various sectors of generators in the City. In addition, HF&H has had discussions with City staff and has reviewed information provided by the City and WM as a part of prior discussions about the City's organics program. Those meetings, discussions, and documents, along with HF&H's experience with organics programs in other communities, form the basis for the preliminary inventory of options presented below. More detailed program descriptions for programs selected for further analysis are provided in Section 4.

### Upstream Options

1. **Produce Good "Crop Swap" Model** – City to support gleaning organization(s) with funding for personnel and vehicle(s) to do gleaning of fruit trees, etc. at smaller properties. Food is recovered for food insecure individuals and/or value added and shelf-stable products.
2. **Produce Good Seasonal Fruit Collection** – City to work with gleaning organizations for seasonal curbside collection of home-grown fruits and vegetables. Food is recovered for food insecure individuals and/or value added and shelf-stable products.
3. **Produce Good Farmers' Market Collection** – City to permit and support collection of unsold produce at the end of Farmers' markets. Food is recovered for food insecure individuals and/or value added and shelf-stable products.
4. **Kitchens for Good Recovered Food Processing Center** – City to permit and support development of a food processing facility to receive, process, and add value and shelf-stabilization for recovered food products.
5. **Franchise Subcontractor Food Rescue Collection** – City and franchise hauler to identify subcontractor (Urban Corps, Produce Good, etc.) to collect food from large and/or consistent generators of edible food (large hospitality venues, caterers, industrial/institutional kitchens, bakeries, etc.) Franchise rates to support collection personnel, refrigerated vehicle(s), and cold storage.
6. **Commercial Food Reduction Technical Assistance** – City to provide resources to Oceanside's food service businesses and institutional kitchens for waste audits, technical assistance, equipment, and/or technology (e.g., Lean Path).
7. **Residential Food Reduction Education** – City to enhance public education and outreach surrounding home-based options for reducing wasted food. This could build on the existing "Love Your Planet" program and leverage resources from the EPA's "Food Too Good to Waste" initiative.
8. **Animal Feed Education** – City to identify animal feed outlets and educate large generators of suitable feedstocks (i.e., primarily pre-consumer vegetative material) about the opportunities for and limitations surrounding diverting food to animal feed.

### Distributed/Small-Scale Options

9. **Distributed Dehydration Equipment Grants** – City to provide facilitation and/or grant support to mid- and large-scale food generators (200 to 2,000 lbs/day) to assist with equipment and capital improvements for installation of dehydration systems at the generator site.

10. **Community Composting** – City to provide training and technical assistance to homeowner’s groups (e.g., Homeowner’s Associations, Mobile Home Parks, Apartment Buildings) that are interested in establishing centralized community composting areas for residents.
11. **Small Scale Collectors** – City to permit and regulate small-scale organics collectors (e.g., Urban Corps, Food2Soil) and mid-scale composters (e.g., Solana Center Model or Food2Soil) to provide a fee-for-service collection program for small-volume generators (65 gallons per week or less). Likely requires amendment to franchise agreement with WM, as this may violate the exclusive nature of the franchise.

### Large-Scale Collection Options

12. **Residential Mixed Organics Collection** – Residential customers commingle yard trimmings and food scraps in organics cart for collection.
13. **Residential “Bag” Program** – Residential customers bag food scraps and place them in the cart with yard trimmings or solid waste. Bags removed at tipping point and delivered for processing.
14. **Residential Separate Food Scraps Collection** – Residential customers place food scraps in a separate container. Residential customers would be asked to sort materials into a total of four containers: recyclable materials, yard trimmings, food scraps, and all other non-recyclable trash.
15. **Commercial Collection** – Commercial customers separate food scraps and food-soiled paper into a dedicated container for collection.

### Large-Scale Processing Options

16. **WM CORE® (Orange) to LA SAN** – WM delivers collected material to the CORE® in Orange for slurring. WM delivers slurry to LA SAN for anaerobic digestion.
17. **WM CORE® (Orange) to San Luis Rey Water Reclamation Facility** – WM delivers collected material to the CORE® in Orange for slurring. WM delivers slurry to the San Luis Rey Water Reclamation Facility for anaerobic digestion.
18. **WM CORE® (Orange) to Encina WPCF** – WM delivers collected material to the CORE® in Orange for slurring. WM delivers slurry to Encina Water Pollution Control Facility for anaerobic digestion.
19. **WM CORE® (Palomar) to Oceanside San Luis Rey Water Reclamation Facility** – WM builds a new CORE® facility at the Palomar Transfer Station. WM delivers collected material to the CORE® at Palomar for slurring. WM delivers slurry to the San Luis Rey Water Reclamation Facility for anaerobic digestion.
20. **WM CORE® (Palomar) to Encina WPCF** – WM builds a new CORE® facility at the Palomar Transfer Station. WM delivers collected material to the CORE® at Palomar for slurring. WM delivers slurry to Encina Water Pollution Control Facility for anaerobic digestion.
21. **WM CORE® (Corazon) to San Luis Rey Water Reclamation Facility** – WM builds a new CORE® facility at El Corazon. WM delivers collected material to the CORE® at El Corazon for slurring. WM delivers slurry to the San Luis Rey Water Reclamation Facility for anaerobic digestion.
22. **WM CORE® (Corazon) to Encina WPCF** – WM builds a new CORE® facility at El Corazon. WM delivers collected material to the CORE® at El Corazon for slurring. WM delivers slurry to Encina Water Pollution Control Facility for anaerobic digestion.

23. **Receiving, Pre-Treatment, and Processing at San Luis Rey Water Reclamation Facility** – City secures Solid Waste Facility Permit for the San Luis Rey Water Reclamation Facility. City builds a receiving station and pre-treatment facility at the San Luis Rey Water Reclamation Facility and injects slurried material into existing anaerobic digestion process for co-digestion.
24. **El Corazon to San Luis Rey Water Reclamation Facility** – WM delivers collected material to Agri Service at El Corazon. Agri Service installs de-packaging and slurring system and adds staffing at El Corazon. Agri Service delivers slurry to the San Luis Rey Water Reclamation Facility for anaerobic digestion.
25. **Mixed Composting with Agri Service** – WM delivers collected material to Agri Service at El Corazon. Agri Service installs de-packaging and pre-processing system and adds staffing at El Corazon. Agri Service adds pre-processed food waste to existing curbside yard trimmings compost piles.
26. **Mixed Composting with Agromin** – WM delivers collected material to Agromin. Agromin installs de-packaging and pre-processing system and adds staffing. Agromin adds pre-processed food waste into existing yard trimmings compost.
27. **Industrial-Scale Dehydration of Organic Waste** – WM delivers collected material to El Corazon. City, Agri Service, and equipment vendor to arrange permitting, civil work, and equipment installation for Industrial Scale Dehydrator (~20 TPD). Agri Service to operate the dehydrator system. Dehydrated cake by-product composted at El Corazon and liquid by-product used to offset water needs on site.
28. **Mixed Waste Processing for Organics Recovery** – City to direct mixed waste to a sorting facility designed to recover organics from general refuse. This could be done for any individual sector (e.g., Multi-family) or for all sectors. Such facilities typically integrate sorting and organics processing for their customers.
29. **Dry Fermentation Anaerobic Digestion** – WM delivers collected material to an existing (e.g., CR&R Perris/Riverside County) or planned (EDCO North San Diego County) dry fermentation anaerobic digestion facility.

### Options Identified for Further Consideration

HF&H and the City considered the preliminary program options identified to determine which options were appropriate for more detailed feasibility analysis. The following programs were selected for further consideration and City Staff requested that HF&H perform both technical and cost analysis on the large-scale collection and processing options (see Sections 4 and 5) on the basis that they would provide the greatest likelihood of:

- ✓ Timely access to the processing facility that would receive the material;
- ✓ Compatibility with the City's existing contracts with Waste Management and Agri Service, Inc.;
- ✓ Customer acceptance and active participation; and,
- ✓ Cost-effectively providing the services to the community.

### Upstream Options:

- Commercial Technical Assistance for Food Waste Reduction
- Residential Education for Food Waste Reduction
- Franchise Subcontractor Food Rescue Collection

- Food Rescue Kitchen

**Collection Options:**

- Commercial Organics Collection
- Residential Mixed Organics Collection
- Residential Bag-Based Organics Collection
- Residential Separate Food Scraps Collection

**Processing Options:**

- Waste Management CORE® in Orange to LA SAN
- Waste Management CORE® at El Corazon to San Luis Rey Water Reclamation Facility
- Waste Management CORE® at Palomar Transfer Station to San Luis Rey Water Reclamation Facility
- Mixed Organics Composting with Agri Service
- Oceanside San Luis Rey Water Reclamation Facility Receiving, Pre-treatment, and Treatment
- Industrial-Scale Dehydration of Organic Waste

## SECTION 4. TECHNICAL ANALYSIS OF PROGRAM OPTIONS

For each of the collection and processing options analyzed, HF&H considered the following factors:

- **Compatibility with the Existing System** – Will implementation of this option be compatible with the City's current zero waste system including the City's policy goals, ordinances, and contractual commitments?
- **Technology Risk** – Does this option present a significant risk of failure or unexpected cost due to the technology solutions involved?
- **Permitting and Land Use Considerations** – Will this option involve significant environmental review, permitting, and/or land use challenges?
- **Customer Acceptance** – How likely are customers to successfully participate in the program and what issues may improve or detract from customer acceptance?
- **Collateral Benefits** – What benefits result from this option, beyond landfill diversion?
- **Operational/Logistical Considerations** – What significant operational or logistical issues will the City or program operator need to consider in the implementation of the option?
- **Implementation Timeline** – What are the major milestones for implementing the program and how long are those efforts likely to take?

### Collection Options

#### Commercial Organics Collection System

##### Program Overview

Under this program, commercial customers are asked to separate their food scraps into a container specifically dedicated to such materials. Depending on the pre-treatment and treatment options selected, this material could include food scraps (vegetative, meat, bone, and dairy), food soiled paper, compostable food service items (e.g., utensils, plates, clamshells), and/or compostable or plastic bags (only for purposes of containing other materials). This program would require routing and collection of this material separate from other recycling and/or solid waste.



In addition to the food scraps, which are the primary focus of this study, AB 1826 and SB 1383 require the City to develop programs to recover yard trimmings. If the commercially-collected material goes to a composting facility for final processing, it is possible that yard trimmings could be commingled with the food waste and the materials could be co-composted. If the commercial food material goes to a digestion or dehydration facility, the City should consider expanding the current cart-based yard trimmings program to commercial customers.

##### Compatibility with Existing System

This program would require an amendment to the current franchise agreement with WM and, potentially, some modifications to the City's existing solid waste ordinance. The amendment to the franchise agreement should define the program specifications, collection requirements, service frequencies,

collection assets (vehicles and containers), customer outreach and education requirements, and compensation arrangements. The solid waste ordinance, at a minimum, should ensure that there are no definitional conflicts that require covered organic materials to be placed with solid waste for collection. In addition, the City may wish to establish local participation mandates (similar to those established by the State under AB 1826 and SB 1383) and related enforcement provisions.

### **Technology Risk**

This program has no significant technology risk involved. The program is common in California and throughout North America. It has been implemented by WM in numerous other California jurisdictions without significant problems.

### **Permitting and Land Use Considerations**

Changes to collection programs, especially those that do not result in development of new facilities, generally do not require any environmental review, special permitting, or land use decisions.

### **Customer Acceptance**

Similar programs are common throughout North America and the customer acceptance issues are well documented. Obstacles to customer acceptance for commercial organics programs include: cost impacts to the business, staff time and training/re-training requirements, odor and vector concerns, and space accommodations both inside and outside the business. The most successful programs factor these concerns into their program definition, including:

- Providing some financial incentives to participation. Typically, these organics collection programs have a higher cost of service than solid waste collection (which benefits from greater collection route density and lower material density) and recycling collection (which benefits from some positive commodity value to partially offset collection costs). Despite this, most successful programs provide a discount, relative to refuse collection service. This is typically accomplished through distributing some of the costs to the solid waste rates and/or provision of direct subsidy by the public agency.
- Providing regular, in person, outreach and technical assistance to businesses. Establishing correct participation for businesses requires a consultative “sales” model where the outreach staff or recycling coordinators work with the business to offer the program. Outreach staff will then work with businesses to understand and overcome the barriers and concerns of each particular business with appropriate training and tools. Outreach tools often include options for interior collection containers, graphically-oriented signage, and training tools (e.g., graphic illustrations of process, short training videos) This outreach should also include revisiting the business on a regular basis. Businesses often implement organics programs and then abandon them or dramatically reduce participation as a result of management or staff turn-over or unresolved barriers. Frequent follow-up visits can provide staff retraining, restock of program tools, and help to address new or unresolved barriers.
- Allowing customers to place separated organics in either durable compostable or plastic bags to provide for safe and convenient transportation from interior to exterior containers and to mitigate odor and vector concerns. If bags are accepted in the system to promote customer convenience, it is critical that the pre-treatment solution include some de-bagging and contaminant removal technology.
- Ensuring that organics collection service is offered at least as frequently as garbage service. Restaurants and other food service establishments have significant health and safety concerns related to their handling of waste materials. In addition, they are very sensitive to customer perception of

cleanliness. In order to address these issues, they commonly schedule frequent (3-6 times per week) refuse collection to ensure that odors and vectors are not present.

- Offering a range of container sizes to provide some flexibility to businesses that may have space constraints.

### **Collateral Benefits**

Participation in this program by food service establishments has the potential to significantly reduce the use of the sanitary sewer system for transmission of food and particularly the fats, oils, and grease that tend to create costly maintenance problems. The City could consider creating incentives for restaurants who successfully participate in organics separation by reducing their sewer bill, in recognition that they are no longer a high-strength discharge customer.

### **Operational/Logistical Considerations**

This collection program must be carefully defined based on the processing option selected and the level of pre-treatment.

If this material will be delivered for composting, it can accept certain materials (i.e., compostable bags, food soiled paper, compostable food service items, and plant materials) that are not allowable in a wet anaerobic digestion process (such as the one at the City's San Luis Rey Water Reclamation Facility).

If the material will be delivered directly for treatment without a pre-treatment process that includes contaminant removal, plastic bags cannot be used for aggregating materials and all materials placed for collection must be thoroughly separated at the point of generation. In this case, it will be important for the franchisee's employees to visually verify that contaminants are not present in the material prior to collection. If such contaminants are present, the material should not be collected and the customer should be contacted to educate and inform them that collection cannot/will not occur until such contaminants are removed.

While the requirements of AB 1826 provide for a phased-in approach to commercial generators, based on their size, HF&H recommends that the City make this program available to any business or multi-family property in the City that would like to participate. Typically, these services and accompanying training are prioritized with the largest generators receiving the first round of proactive outreach. This is a sound approach to the proactive outreach and would provide the greatest cost-effectiveness early in the program. In addition, the City should provide these services and trainings on a reactive basis to any other organics generators that are interested in participating. The generators who request the service tend to participate most successfully in the programs and are less labor-intensive to train and monitor. In addition, this broader approach to accepting customers should ease the compliance burden when the requirements of SB 1383 take effect.

Depending on the ultimate facility, this collection approach would require between one and two full time (Monday through Saturday) routes to handle the volume of tonnage identified. If and as the program matures and the volumes generated increase, it may be necessary to establish additional routes.

### **Implementation Timeline**

The following activities will need to be performed in order to implement the program. Estimated timelines for each activity are provided.

- Negotiate Contract Amendments – 2-4 months, plus City Council consideration/approval

- Develop and Procure Customer Education Package – 2-3 months, following approval of contracts
- Customer Acquisition – Intensive during first 6 months to establish minimum route density; ongoing throughout life of program to expand participation and invite new businesses.
- Equipment Acquisition – 2-4 months, concurrent with initial Customer Acquisition
- Technical Assistance and Outreach – Intensive during first year of program to ensure continued and correct participation; ongoing throughout the life of the program to maintain existing customers and acquire new customers. This will include site visits for each business – an estimated 1,500 site visits to ensure proper interior set-up, bin placement, labels, backend services, and staff training.
- Monitoring Contamination and Participation – Initially: 2-3 weeks during start-up; minimum once per year ongoing, more if contamination is a chronic or persistent problem at the facility.

## Residential Mixed Organics Collection System

### Program Overview



Under this program, single-family residential customers are asked to commingle yard trimmings and food scraps in a “mixed organics” cart for collection. Mixed organics collection programs commonly accept yard trimming materials along with food scraps (vegetative, meat, bone, and dairy) and food soiled paper. Many such programs also accept compostable bags and compostable food service items (e.g., utensils, plates, clamshells) in order to improve convenience and program acceptance for customers. This program would leverage the existing yard trimmings collection program operations and assets (i.e., existing routes, existing vehicles, existing carts). This program is somewhat limited in its pre-treatment and treatment options, due to the commingling of yard trimmings and food scraps.

### Compatibility with Existing System

This program would leverage both the existing yard trimmings collection program and the existing composting contract with Agri Service. By utilizing existing contracts and contractors, there is no need to wait for the end of a contract to implement programs. Some minor amendments are likely needed to both the collection franchise agreement with WM (to incorporate the addition of food scraps and collateral education/outreach) and the composting agreement with Agri Service (to provide for added contamination removal and acceptance of food scraps, food soiled paper, compostable bags and/or compostable food service items). These amendments should not require significant capital investment by either contractor and, therefore, should not warrant opening negotiation of other items (contract term, compensation methodology, etc.) in either contract. The primary incompatibility with this approach results from the El Corazon Master Plan and Specific Plan which identify other developments at El Corazon which are likely to have odor sensitivities as well as the ultimate need to relocate the compost facility.

If this program were combined with the use of a different composting facility (i.e., Agromin), compatibility with the existing system would be compromised as it would conflict with the current contractual obligations the City has with Agri Service.

### Technology Risk

This program has no technology risk involved. The program is common in California and throughout North America. It has been implemented by WM in numerous other California jurisdictions, including WM delivering material to third-party composters, without significant problems.

### Permitting and Land Use Considerations

Changes to collection programs, especially those that do not result in development of new facilities, generally do not require any environmental review, special or additional permitting, or land use decisions.

### Customer Acceptance

Similar programs are common throughout North America and the customer acceptance issues are well documented. The single largest barrier to customer acceptance is the perceived “ick factor” of handling and storing food scraps (that have the potential to generate odor and attract vectors) in a different

manner than the household is currently accustomed to. This program requires behavior change by customers, which can be very challenging to accomplish in the short term. Even the most successful and long-established programs find that more than half of households do not participate in the program on a weekly basis.

Successful programs have demonstrated that certain program parameters and education/outreach tools are effective in increasing customer acceptance and participation in the program. Successful approaches have included some combination of: 1) providing customers with “kitchen pails” for separating food scraps inside the household and transporting food scraps to collection carts; 2) allowing customers to use compostable bags to mimic traditional bagging of waste prior to placing it in the garbage cart; 3) accepting all types of food scraps to prevent customer confusion and frustration over the common barrier to successful recycling of “what goes where”; 4) program start-up package (kitchen pail, “how to” guide, etc.) delivered to every home on the normal collection day one to two weeks prior to the start of the program; and, 5) regular multi-media program reminders (postcards, newsletters, billboards, truck-side messaging, social media, etc.) that include tips and tricks for overcoming the “ick factor.”

### **Collateral Benefits**

Co-collection of food scraps with yard trimmings and delivery of those materials to existing facilities reduces air emissions, traffic impacts, and pavement impacts relative to separate collection of the materials.

### **Operational/Logistical Considerations**

Adding food scraps to the yard trimmings program may result in increased contamination at the compost facility. This often results from “aspirational recycling” where customers place material in the container for composting that they hope or believe will be compostable. It can also result from customers using traditional plastic garbage bags to contain their food scraps – a problem that is also present in traditional yard trimmings and recycling programs.

In order to manage this, the collection contractor and/or the City may need to invest in periodic container surveys and use of “oops tags” or “non-collection notices” to educate customers who place contaminants for collection. In addition, the compost facility may need to increase its existing staffing for contaminant removal.

In order to optimize collection efficiencies, multi-family and commercial customers that request cart-based organics collection service should be allowed to participate in this program by placing their food scraps and any yard trimmings they may generate into an organics cart. This allows all cart-based customers to be routed efficiently while still accommodating those multi-family and commercial customers that may have space or operational constraints that make bin-based service impractical. This also eliminates the need to route additional collection trucks by “carpooling” the food and yard trimmings in the same vehicles.

As discussed above in the Customer Acceptance section, the City will need to design, procure, and distribute supporting education and outreach materials and other tools to all customers in the program. At the City’s scale, this is a significant effort and will likely require outside resources. The City’s franchise hauler could perform this work. Alternatively, some communities have engaged local advertising companies who routinely place door hangers and leaflets at homes and businesses. If the work requires direct engagement with customers about the program, it is critical that the labor force is fully trained on the program requirements and benefits.

### Implementation Timeline

The following activities will need to be performed in order to implement the program. Estimated timelines for each activity are provided.

- Negotiate Contract Amendments – 2-4 months, plus City Council consideration/approval.
- Develop and Procure Customer Education Package – 3-4 months, following approval of contracts.
- Public workshops and focused outreach – 6 months, concurrent with and extending beyond roll-out
- Distribution of Program Start-up Kit – 1 month, collection day one to two weeks prior to start-up.
- Procure staffing and logistics to distribute kits and education packets – 1 month
- Monitoring Contamination and Participation – Initially: 2-3 weeks during start-up; minimum once per year ongoing, more if contamination is a chronic or persistent problem at the facility.

## **Residential Bag-Based Collection System**

### Program Overview



Under this program, customers receiving cart-based service (primarily single-family) are asked to bag their food scraps and place those bags in their yard trimmings, recycling, or solid waste containers. The selected container is primarily a function of the receiving facility, a matter of both permitting and cost efficiency. Those bags are then separated from the rest of the collected materials at a receiving facility so they can be processed. Bag-based organics collection programs commonly only accept food scraps (vegetative, meat, bone, and dairy), but may be capable of handling limited volumes of food soiled paper. Bags for these programs are typically a stronger plastic and are distinctly colored (yellow is common). This program would leverage the existing yard trimmings collection program operations and assets (i.e., existing routes, existing vehicles, existing carts). This program is typically preferred, instead of mixed organics collection, if the treatment of yard trimmings is separate from the treatment of food scraps.

### Compatibility with Existing System

This program would be compatible with the City's existing system as it leverages existing collection assets and facilities. By utilizing existing contracts and contractors, there is no need to wait for the end of a contract to implement programs. A minor amendment to the collection franchise agreement with WM is needed to incorporate the addition of food scraps and collateral education/outreach. A more significant amendment will be needed for the facility that will sort organics bags from other materials. Depending on the processing system and available routing there is a potential to enhance contacts in order to separate organic bags from other materials.

### Technology Risk

This program has no technology risk involved. The program is used in several California agencies and other communities throughout North America. It has been implemented by WM in at least one Southern California jurisdiction, without significant problems.

### **Permitting and Land Use Considerations**

Changes to collection programs, especially those that do not result in development of new facilities, generally do not require any environmental review, special or additional permitting, or land use decisions.

We anticipate that the initial receiving and separation would occur at a facility that already has a Solid Waste Facility Permit with adequate unused permit capacity (e.g., Agri Service or Palomar Transfer Station), therefore no additional permitting would be needed for this activity.

### **Customer Acceptance**

Similar programs and pilot studies in other California communities indicate that customer acceptance of a bag-based program may be greater than a mixed organics program. These programs tend to more readily overcome the primary barrier to residential organics participation – the “ick factor”. This is the case because generators are not asked to significantly change their behavior. As with the current refuse program, generators are allowed to put their food scraps in plastic bags that can be sealed, thereby minimizing the generation of odors and attraction of vectors. The only behavior changes required of generators are that they are asked: 1) not to commingle food scraps with other materials that could be contaminants; and, 2) to place that bag into a different container for collection (assuming that it will be directed to the yard trimmings or recycling container). Some jurisdictions that operate these programs recommend providing the special bags to customers (typically ~60 per year or ~15 per quarter). They believe that doing so reduces a barrier to customer acceptance – having to purchase the correct bags themselves. It may also help to serve as a periodic reminder of the program and creates an opportunity to encourage participation and education of organics recycling.

### **Collateral Benefits**

Collection of food scraps in an existing container and delivery of those materials to existing facilities reduces air emissions, traffic impacts, and pavement impacts relative to separate collection of the materials.

### **Operational/Logistical Considerations**

In order to optimize collection efficiencies, multi-family and commercial customers that request cart-based collection service could be allowed to participate in this program by bagging their food scraps and placing them in the designated cart. This allows all cart-based customers to participate in the program without routing any additional collection vehicles.

As mentioned under Customer Acceptance above, it may be beneficial to provide bags to customers in advance. From an operational/logistics perspective, providing the bags to customers ensures uniformity and helps the sorters quickly identify which bags should be separated for organics processing. The City will need to design, procure, and distribute supporting education and outreach materials and other tools to all customers in the program. At the City’s scale, this is a significant effort and will likely require outside resources. The City’s franchise hauler could perform this work. Alternatively, some communities have engaged local advertising companies who routinely place door hangers and leaflets at homes and businesses. If the work requires direct engagement with customers about the program, it is critical that the labor force is fully trained on the program requirements and benefits. The City may also wish to conduct workshops and/or community training events to help educate customers about proper participation in the program.

Food scraps collected under this method are typically more contaminated than those collected in a mixed organics program and, therefore, require more significant pre-treatment. The primary contaminant are

the bags themselves. Additionally, the materials in the bag may be more contaminated because the bag itself tends to hide contaminants that cannot be identified at the point of collection by the driver.

### Implementation Timeline

The following activities will need to be performed in order to implement the program. Estimated timelines for each activity are provided.

- Negotiate Contract Amendments – 2-4 months, plus City Council consideration/approval.
- Develop and Procure Customer Education Package – 3-4 months, following approval of contracts.
- Public workshops and focused outreach – 6 months, concurrent with and extending beyond roll-out
- Distribution of Program Start-up Kit – 1 month, collection day one to two weeks prior to start-up.
- Procure staffing and logistics to distribute kits and education packets – 1 month
- Monitoring Contamination and Participation – Initially: 2-3 weeks during start-up; minimum once per year ongoing, more if contamination is a chronic or persistent problem at the facility.

## **Residential Separate Food Scraps Collection System**

### Program Overview



Under this program, customers receiving cart-based service (primarily single-family) would be provided an additional cart for the collection of food scraps. Due to the relatively small amount, by volume, of food scraps generated by each customer, these containers could be significantly smaller (20- or 32-gallons) than the current yard trimmings containers (64- or 96-gallons). This source separated organics collection program would accept food scraps (vegetative, meat, bone, and dairy) and may be capable of handling food soiled paper. This type of program is preferred, instead of mixed organics collection, if the treatment of yard trimmings is separate from the treatment of food scraps. The program would likely be more costly than a bag-based program, but may experience higher participation levels, as evidenced by recent, similar pilot studies and program implementations in the California cities of Sunnyvale and Milpitas.

### Compatibility with Existing System

This program would be compatible with the existing system, in part, by preserving the current yard-trimmings-only collection and processing system, thereby eliminating the need to amend the Agri Service agreement. By amending the existing collection agreement with Waste Management, there is no need to wait for the end of a contract to implement programs. An amendment to the collection franchise

agreement with WM is needed to incorporate the addition of food scraps and collateral education/outreach.

### **Technology Risk**

This program has no technology risk involved. The program is used in a couple of California agencies and other communities throughout North America. It is particularly common in Ontario, Canada where source separated food scraps collection has existed for decades in many communities.

### **Permitting and Land Use Considerations**

Changes to collection programs, especially those that do not result in development of new facilities, generally do not require any environmental review, special or additional permitting, or land use decisions. The increased truck traffic and emissions resulting from the routing of an additional residential containers is not likely to increase either criteria pollutants or GHG emissions by a significant enough amount to require mitigations, but it may be appropriate for the City to conduct an environmental assessment under CEQA.

### **Customer Acceptance**

Similar programs and pilot studies in other California communities indicate that customer acceptance of a source-separated food scraps program may be greater than a mixed organics program. These programs tend to more-readily overcome the primary barrier to residential organics participation – the “ick factor”. This is the case because generators are not asked to significantly change their behavior. As with the current refuse program, generators are allowed to put their food scraps in plastic bags before placing them in the cart, thereby minimizing the generation of odors and attraction of vectors. The only behavior changes required of generators are that they are asked: 1) not to commingle food scraps with other materials that could be contaminants; and, 2) to place that bag into a different container for collection.

### **Collateral Benefits**

Unlike the other two residential collection programs evaluated here, this approach results in negative collateral impacts, rather than benefits. By adding collection vehicles to service an additional container, this program increases air emissions, traffic impacts, and pavement impacts.

### **Operational/Logistical Considerations**

If both this program and a commercial food scraps collection program are implemented, it may be possible for residential and multi-family/commercial food scraps that are collected in carts to be routed together, providing some operational efficiencies.

Unlike the bag-based program described above, this program should allow customers to provide their own bags for containing the food scraps inside the container. This will reduce program costs and minimize changes to customer behavior. The City may also wish to consider having the collector provide a periodic “wash-out” service, for a small fee, to any customer, upon request.

The City will need to design, procure, and distribute supporting education and outreach materials and other tools to all customers in the program. At the City’s scale, this is a significant effort and will likely require outside resources. The City’s franchise hauler could support this work by distributing such educational materials along with the new containers that would be provided to customers. Alternatively, some communities have engaged local advertising companies who routinely place door hangers and leaflets at homes and businesses. If the work requires direct engagement with customers about the

program, it is critical that the labor force is fully trained on the program requirements and benefits. The City may also wish to conduct workshops and/or community training events to help educate customers about proper participation in the program.

Food scraps collected under this method are typically more contaminated than those collected in a mixed organics program; therefore, they require more significant pre-treatment. The primary contaminants are the bags that customers are allowed to use to contain their food scraps. Additionally, the materials in the bag may be more contaminated because the bag itself tends to hide contaminants that cannot be identified at the point of collection by the driver.

### Implementation Timeline

The following activities will need to be performed in order to implement the program. Estimated timelines for each activity are provided.

- Negotiate Contract Amendments – 2-4 months, plus City Council consideration/approval.
- Develop and Procure Customer Education Package – 3-4 months, following approval of contracts.
- Public workshops and focused outreach – 6 months, concurrent with and extending beyond roll-out
- Distribution of Containers and Program Start-up Kit – 1 month, on the customer's collection day, one to two weeks prior to start-up.
- Monitoring Contamination and Participation – Initially: 2-3 weeks during start-up; minimum once per year ongoing, more if contamination is a chronic or persistent problem at the facility.

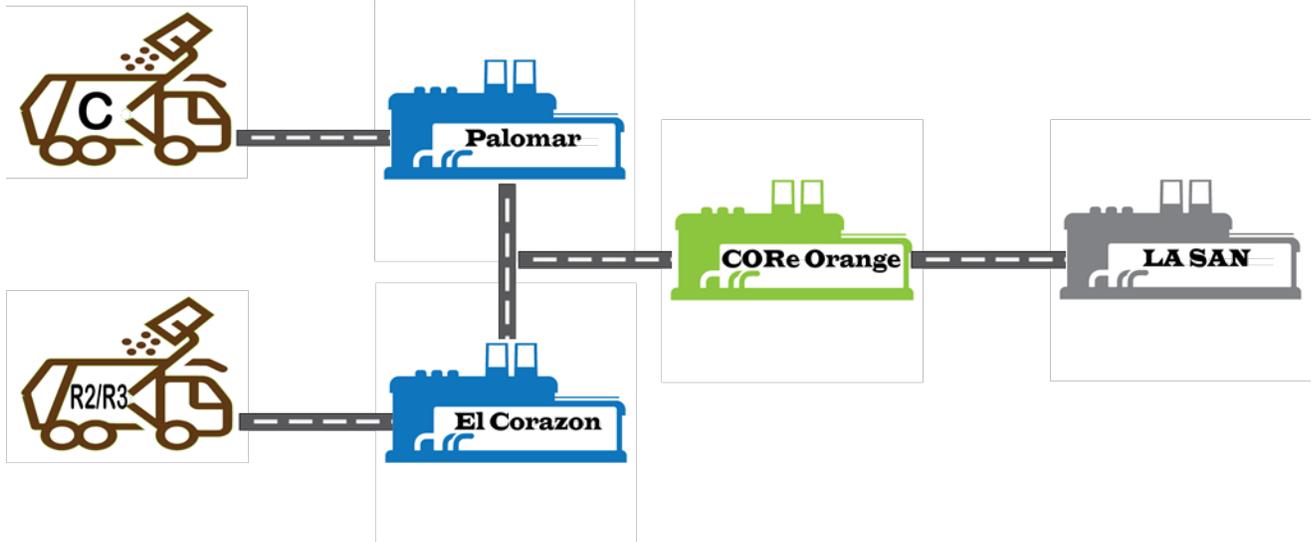
## **Processing Options**

### **Waste Management CORE® in Orange to Los Angeles Sanitary District**

#### Program Overview

Under this program, materials collected from a bag-based (R2) or separate food scraps collection (R3) residential program and/or a commercial collection program would be delivered to the WM CORE® facility in the City of Orange. That facility would receive the material and pre-treat it using WM's proprietary CORE® technology. This technology separates organic materials from contaminants and then converts the organic fraction into an engineered bio-slurry that is suitable for direct injection into a wastewater digestion system. The CORE® facility then transfers this bio-slurry into a sealed and watertight truck (similar to those used to service portable toilets and septic systems). This truck would then transport the material to the LA SAN waste water treatment plant in Carson, California. At this facility, material is pumped into holding tanks that provide for continuous injection of the bio-slurry into the digesters and the treatment works on a 24 hour per day, 7 day per week basis. This continuous injection is critical to maintaining the microbiological balance within the digesters.

Figure 4-1: WM CORE® (Orange) to LA SAN System Configuration



### Compatibility with Existing System

This program would require the implementation of the commercial collection system and bag-based (R2) or separate food scraps collection (R3) residential collection system, as well as contracting with WM for this service. Otherwise, there are no significant incompatibilities with the existing system that should make this approach challenging to develop or implement.

### Technology Risk

This program has little to no technology risk. The program between WM and LA SAN has been successful through its pilot phase and is currently scaling up. This sort of program has also been successful (with slightly different pre-treatment technology) at EBMUD, where it accepts slurried organic materials from the City of San Francisco and the Central Contra Costa Solid Waste Authority.

### Permitting and Land Use Considerations

The facilities in question are already permitted for the uses envisioned under this program and WM represents that their permits have adequate additional capacity to handle the volume of material that would be generated in Oceanside.

### Customer Acceptance

This pre-treatment approach has a relatively high tolerance for contaminants and is specifically designed to remove them prior to the process of creating the bio-slurry. This should help facilitate customer acceptance by allowing customers to place organic materials in plastic bags. It would also reduce negative and potentially confusing messaging to customers about “prohibited” items, as it would not require strict provisions for non-collection of materials that have other contaminants. This approach does have a relatively high sensitivity to glass contaminants and customers would need to be educated about this and have frequent reminders, especially if that contamination becomes evident in the system.

### Collateral Benefits

This program results in significant generation of biogas in the anaerobic digester. This biogas is converted to electrical energy which offsets the power demands of the wastewater treatment facility. This is in

addition to the environmental benefits resulting from generating and using clean energy. The economic benefits of the biogas generation accrues to LASAN rather than the City.

### Operational/Logistical Considerations

Most of the significant operational and logistical considerations are covered in the above descriptions of the collection programs. A major consideration, if the bag-based collection (R2) approach is used, is where the residential bags are removed from their carrier waste stream. The City and the collection contractor will need to determine the appropriate container – trash, recycling, or yard trimmings – for bagged food scraps to be placed in. This determination should be made based on the most cost-efficient receiving facility – transfer station, recycling facility, or compost facility – to perform the bag separation.

In addition, this program requires transporting materials from Oceanside to Orange (nearly 60 miles each direction). Organics collection routes are typically limited by weight rather than the number of locations that an operator can service in a day. When they reach the legal load limit, they must stop collecting and deliver the collected material to the receiving facility. As the program scales up to include more customers than can be handled in a single truck load each day, it may be appropriate to consider a consolidation and transfer location for the organics collected from the route to reduce the time spent transporting materials to Orange from Oceanside.

### Implementation Timeline

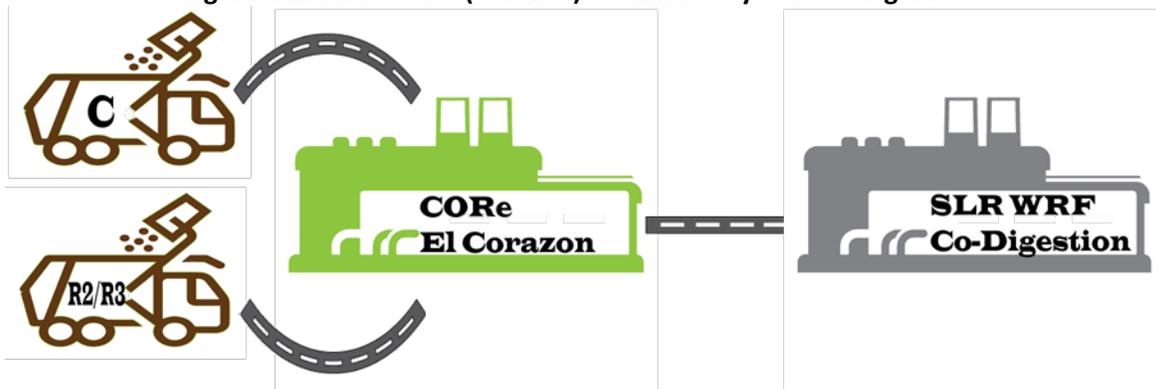
The following activities will need to be performed in order to implement the program. Estimated timelines for each activity are provided.

- Negotiate Contract for Organics Processing – 2-4 months, plus City Council consideration/approval.
- See above for implementation timeline for the commercial and bag-based residential collection programs.

## **Waste Management CORE® at El Corazon to the San Luis Rey Water Reclamation Facility**

### Program Overview

Under this program, materials collected from a bag-based (R2) or separate food scraps collection (R3) residential program and/or a commercial collection program would be delivered to the El Corazon compost facility operated by Agri Service. WM would site a CORE® system on approximately 10,000 square feet of that site. That facility would receive the material and pre-treat it using WM's proprietary CORE® technology. This technology separates organic materials from contaminants and then converts the organic fraction into an engineered bio-slurry that is suitable for direct injection into a wastewater digestion system. The CORE® facility then transfers this bio-slurry into a sealed and watertight truck (similar to those used to service portable toilets and septic systems). This truck would then transport the material to the San Luis Rey Waste Water Reclamation Facility. That facility would be upgraded to allow for storage and continuous injection of the bio-slurry. At this facility, material is pumped into holding tanks that provide for continuous injection of the bio-slurry into the digesters and the treatment works on a 24 hour per day, 7 day per week basis. This continuous injection is critical to maintaining the microbiological balance within the digesters.

Figure 4-2: WM CORE<sup>®</sup> (Corazon) to SLRWRF System Configuration

### Compatibility with Existing System

This program may be somewhat challenging to conform to the existing system, as it would require some arrangement between the City (who owns the El Corazon site), Agri Service (who is the current leaseholder for the site and the holder of the Solid Waste Facility Permit), and WM (who developed the CORE<sup>®</sup> technology). It is possible that this could be resolved through multi-party agreements between the three parties to sublease a portion of the site and address reasonable concerns that WM may have to protect the proprietary nature of their technology. This is further complicated by the long-term desire to relocate the compost facility, currently located at El Corazon, to another location.

Another significant consideration with this program relates to economies of scale. Oceanside may contribute 20% to 30% of the material necessary to achieve the desired project scale of ~100 tons per day. To avoid a high price for this program, the City may need to attract additional volume from other cities in the region. This typically involves multi-party agreements between the public agencies, their collection service providers, and the facility operator.

This program would require the implementation of the commercial collection system and bag-based residential collection system, as well as contracting with WM for this service.

### Technology Risk

The technology risk of this program is relatively low, but there are some considerations specific to the San Luis Rey Water Reclamation Facility.

Generally, the CORE<sup>®</sup> bio-slurry program between WM and LA SAN has been successful through its pilot phase and is currently scaling up. This sort of program has also been successful (with slightly different pre-treatment technology) at EBMUD where it accepts slurried organic materials from the City of San Francisco and the Central Contra Costa Solid Waste Authority.

Specific to the San Luis Rey Water Reclamation Facility, the treatment facility has conducted minor pilots with direct injections from other companies, but has not accepted the bioslurry produced by the CORE<sup>®</sup>. Prior to finalizing any agreements, the City's wastewater engineers should work closely with WM to analyze the bio-slurry and, if appropriate, test the acceptance of some of the material from the Orange facility. There is also a significant difference between the LA SAN and EBMUD systems to that in Oceanside in terms of the scale of the facilities. Oceanside also needs to verify that there is sufficient capacity to accept the material at the San Luis Rey Water Reclamation Facility at full scale operation of the organics program, peak volume for wastewater treatment, and considering the periodic need to take a digester off

line for maintenance. This verification should be a part of the 2017 Integrated Organic Waste to Energy/Biosolids Master Plan.

### **Permitting and Land Use Considerations**

The facilities in question are already permitted for the uses envisioned under this program. The Agri Service Solid Waste Facility Permit has adequate additional capacity to handle the volume of material that would be generated in Oceanside.

There is some potential for concern regarding odors that may be generated by the CORE<sup>®</sup> receiving and pre-treatment operation at El Corazon. This facility has some sensitive adjacent uses, most notably a large sports park, hotels, and residential community adjacent to the site. The El Corazon Master Plan describes relocating the current green waste compost facility during Phase 6 of that plan. In order to use this site for this purpose, the Master Plan would need to be revised or an alternative location would need to be identified for these activities.

The El Corazon site will require construction improvements including: a receiving pad; a building to house the processing equipment, a small office, and a laboratory for testing the equipment; and, installation of the CORE<sup>®</sup> pre-treatment system itself. This will require typical permits for construction of such a structure. This may include some additional stormwater improvements on the site, however the existing stormwater management system at the site is quite robust and any such requirements should be relatively minor. Some analysis would be required to determine whether this constitutes a project under CEQA and whether the “Existing Facilities” categorical exemption could be applied. Depending on the scope of the improvements, it is possible that more significant environmental analysis and mitigations would be needed.

There should be no significant impact to land uses adjacent to the San Luis Rey Water Reclamation Facility under this program. Traffic for material deliveries would be limited to a few trips each day. There should be no noticeable odor resulting from the transfer of material from the pumping truck to the holding tanks or from the holding tanks into the digesters.

### **Customer Acceptance**

This pre-treatment approach has a relatively high tolerance for contaminants and is specifically designed to remove them prior to the process of creating the bio-slurry. This should help facilitate customer acceptance by allowing customers to place organic materials in plastic bags. It would also reduce negative and potentially confusing messaging to customers about “prohibited” items, as it would not require strict provisions for non-collection of materials that have other contaminants. This approach does have a relatively high sensitivity to glass contaminants and customers would need to be educated about this and have frequent reminders, especially if that contamination becomes evident in the system.

### **Collateral Benefits**

This program results in significant generation of biogas and greater volatile solids destruction (reduced solids) in the anaerobic digester. This biogas is converted to electrical energy which offsets the power demands of the wastewater treatment facility. Because the San Luis Rey Water Reclamation Facility is owned by the City, this results in financial benefit for the City’s ratepayers as well as the environmental benefits resulting from clean energy. Determining the specific volumes of gas and energy production is should be a part of the 2017 Integrated Organic Waste to Energy/Biosolids Master Plan.

### Operational/Logistical Considerations

Many of the operational and logistical considerations are covered in the above descriptions of the collection programs and the discussion within this program of the compatibility with the existing system and permitting. One of the most significant logistical issues would be the need to relocate the compost facility, and therefore the pre-treatment facility that is essential to this processing option, as identified in the El Corazon Master Plan. Given the level of capital investment required for construction and installation of the pre-treatment equipment, this is a significant issue.

This program would require establishment of a receiving and pre-treatment area at the El Corazon site. It would also require additional sorting of the residential yard trimmings at that site to remove the bagged residential food scraps. These bagged materials would be conveyed to the pre-treatment area and would receive the same pre-treatment as commercial materials.

This program involves transporting the resulting bio-slurry between El Corazon and the San Luis Rey Water Reclamation Facility. The City will need to arrange that transportation, potentially with WM as the operator of the CORE, and establish acceptable receiving hours and make facility access arrangements with whichever party is responsible for this transportation function.

### Implementation Timeline

The following activities will need to be performed in order to implement the program. Estimated timelines for each activity are provided.

- Negotiate Multi-Party Contract for Organics Processing – 3-6 months, plus City Council consideration/approval
- Continued Testing/Analysis of Bio-Slurry at San Luis Rey Water Reclamation Facility – 6 months
- Final Design of Improvements at El Corazon and San Luis Rey Water Reclamation Facility – 4-6 months
- Construction of Improvements at El Corazon – 18 months
- Construction of Improvements at San Luis Rey Water Reclamation Facility – 6-18 months (conducted during improvements at El Corazon)
- Testing/Commissioning of CORE® Process – 3 months
- See above for implementation timeline for the commercial and bag-based residential collection programs.

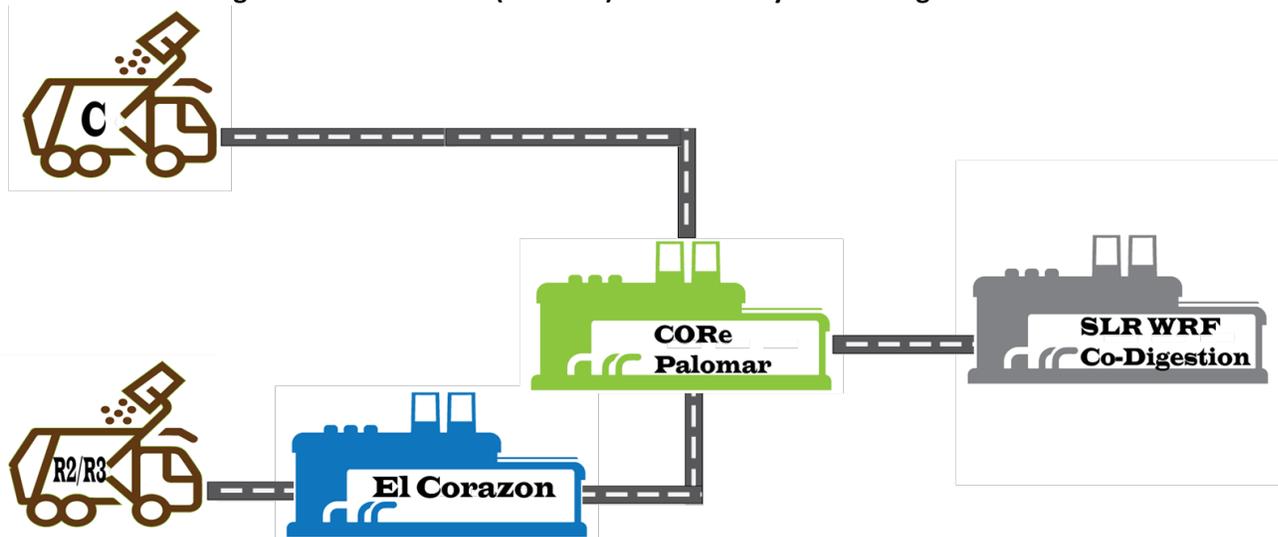
## **Waste Management CORE® at Palomar Transfer Station to the San Luis Rey Water Reclamation Facility**

### Program Overview

Under this program, materials collected from a bag-based (R2) or separate food scraps collection (R3) residential program and commercial collection program would be delivered to the Palomar Transfer Station owned by Republic Services. The bag-based residential materials could be initially collected in any of the residential containers, sorted at the initial receiving facility for those materials, and then delivered to the organics receiving area at Palomar. The City should work with its contract partners to determine the most cost-efficient initial receiving facility to perform that separation.

WM would site a CORE<sup>®</sup> system on approximately 10,000 square feet of that site. That facility would receive the material and pre-treat it using WM's proprietary CORE<sup>®</sup> technology. This technology separates organic materials from contaminants and then converts the organic fraction into an engineered bio-slurry that is suitable for direct injection into a wastewater digestion system. The CORE<sup>®</sup> facility then transfers this bio-slurry into a sealed and watertight truck (similar to those used to service portable toilets and septic systems). This truck would then transport the material to the San Luis Rey Water Reclamation Facility. That facility would be upgraded to allow for storage and continuous injection of the bio-slurry. At this facility, material is pumped into holding tanks that provide for continuous injection of the bio-slurry into the digesters and the treatment works on a 24 hour per day, 7 day per week basis. This continuous injection is critical to maintaining the microbiological balance within the digesters.

**Figure 4-3: WM CORE<sup>®</sup> (Palomar) to SLRWRF System Configuration**



#### Compatibility with Existing System

This program will be challenging to conform to the existing system, as it would require some arrangement between the City, the City of Carlsbad (who is the landowner), Republic Services (who is the operator of the site and the holder of the Solid Waste Facility Permit), and WM (who developed the CORE<sup>®</sup> technology). It is possible that this could be resolved through multi-party agreements between the three parties to sublease a portion of the site and address reasonable concerns that WM may have to protect the proprietary nature of their technology.

Another significant consideration with this program relates to economies of scale. Oceanside may contribute 10% to 20% of the material necessary to achieve the desired project scale of approximately 100 tons per day. To avoid a high price for this program, the City may need to attract additional volume from Carlsbad (with somewhat smaller volumes than the City would contribute) and other cities in the region. This typically involves multi-party agreements between the public agencies, their collection service providers, and the facility operator. In the case of the Palomar Transfer Station, one advantage is that Carlsbad also uses that facility and it would provide a convenient tipping point for both agencies.

This program would require the implementation of the commercial collection system and bag-based residential collection system as well as contracting with WM for this service.

### **Technology Risk**

The technology risk of this program is relatively low, but there are some considerations specific to the San Luis Rey Water Reclamation Facility.

Generally, the CORE® bio-slurry program between WM and LA SAN has been successful through its pilot phase and is currently scaling up. This sort of program has also been successful (with a slightly different pre-treatment technology) at EBMUD where it accepts slurried organic materials from the City of San Francisco and the Central Contra Costa Solid Waste Authority.

The San Luis Rey Water Reclamation Facility has conducted minor pilots with direct injections from other companies, but has not accepted the bioslurry produced by the CORE®. Prior to finalizing any agreements, the City's wastewater engineers should work closely with WM to analyze the bio-slurry and, if appropriate, test the acceptance of some of the material from the Orange facility. There is also a significant difference between the LA SAN and EBMUD systems to that in Oceanside in terms of the scale of the facilities. Oceanside needs to also verify that there is sufficient capacity to accept the material at the San Luis Rey Water Reclamation Facility at full scale operation of the organics program, peak volume for wastewater treatment, and considering the periodic need to take a digester off line for maintenance. These issues should be evaluated in the City's 2017 Integrated Organic Waste to Energy/Biosolids Master Plan.

### **Permitting and Land Use Considerations**

The facilities in question are already permitted for the uses envisioned under this program. The Palomar Transfer Station Solid Waste Facility Permit has adequate additional capacity to handle the volume of material that would be generated in Oceanside.

The Palomar Transfer Station will require construction improvements including: a building (or space within the existing building) to house the processing equipment, a small office, and a laboratory for testing; and, installation of the CORE® pre-treatment system itself. This will require typical permits for construction of such a structure. This may include some additional stormwater improvements on the site, the specific nature of which are highly site-dependent and would require additional analysis during design of the improvements. Some analysis would be required to determine whether this constitutes a project under CEQA and whether the "Existing Facilities" categorical exemption could be applied. Depending on the scope of the improvements, it is possible that more significant environmental analysis and mitigations would be needed.

There should be no significant impact to land uses adjacent to the San Luis Rey Water Reclamation Facility under this program. Traffic for material deliveries would be limited to a few trips each day. There should be no noticeable odor resulting from the transfer of material from the pumping truck to the holding tanks or from the holding tanks into the digesters.

### **Customer Acceptance**

This pre-treatment approach has a relatively high tolerance for contaminants and is specifically designed to remove them prior to the process of creating the bio-slurry. This should help facilitate customer acceptance by allowing customers to place organic materials in plastic bags. It would also reduce negative and potentially confusing messaging to customers about "prohibited" items, as it would not require strict provisions for non-collection of materials that have other contaminants.

### **Collateral Benefits**

This program results in significant generation of biogas in the anaerobic digester. This biogas is converted to electrical energy, which offsets the power demands of the wastewater treatment facility. The San Luis Rey Water Reclamation Facility is owned by the City, so this energy results in financial benefit for the City's ratepayers as well as the environmental benefits resulting from generating and using clean energy. The City's upcoming Integrated Organic Waste to Energy/Biosolids Master Plan should inform the magnitude of these benefits when combined with other system improvements that may be needed for the site.

### **Operational/Logistical Considerations**

Many of the operational and logistical considerations are covered in the above descriptions of the collection programs and the discussion within this program of the compatibility with the existing system and permitting.

A major consideration, especially with this processing approach, is where the residential bags are removed from their carrier waste stream. The City and the collection contractor will need to determine the appropriate container – trash, recycling, or yard trimmings – for bagged food scraps to be placed in. This determination should be made based on the most cost-efficient receiving facility – transfer station, recycling facility, or compost facility – to perform the bag separation.

This program involves transporting materials between Palomar and San Luis Rey Water Reclamation Facility. The City will need to establish acceptable receiving hours and make facility access arrangements with whichever party is responsible for this transportation function.

### **Implementation Timeline**

The following activities will need to be performed in order to implement the program. Estimated timelines for each activity are provided.

- Negotiate Multi-Party Contract for Organics Processing – 3-6 months, plus City Council consideration/approval.
- Continued testing/Analysis of Bio-Slurry at San Luis Rey Water Reclamation Facility – 6 months.
- Final Design of Improvements at Palomar and San Luis Rey Water Reclamation Facility – 4-6 months.
- Construction of Improvements at Palomar – 18 months.
- Construction of Improvements at the San Luis Rey Water Reclamation Facility – 6-18 months (conducted during improvements at Palomar).
- Testing/Commissioning of CORE® Process – 3 months.
- See above for implementation timeline for the commercial and bag-based residential collection programs.

## **Mixed Organics Composting with Agri Service**

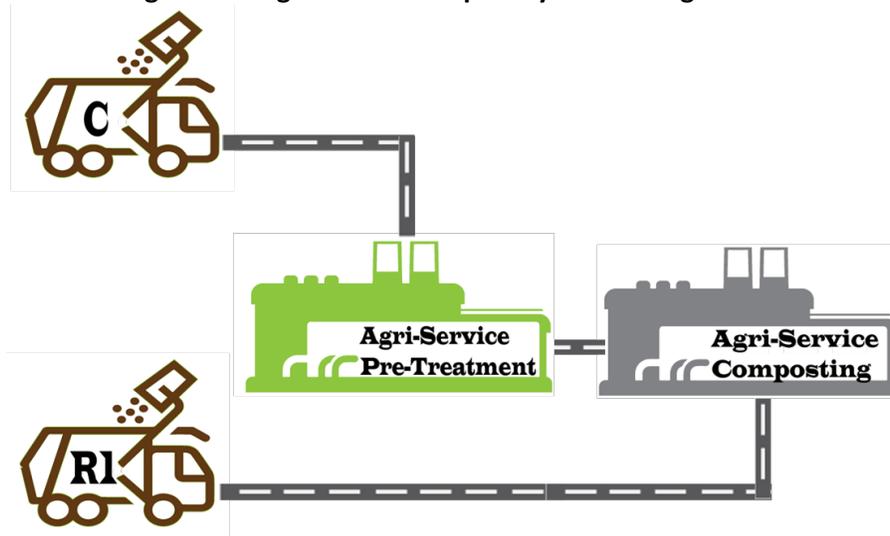
### **Program Overview**

Under this program, materials collected from a residential mixed organics program and/or a commercial collection program would be delivered to the El Corazon compost facility operated by Agri Service. Agri Service would likely need to add some additional receiving space and pre-treatment equipment on approximately 7,500 square feet of that site. That receiving facility would receive the commercial material

and pre-treat it using contamination removal equipment such as a de-packager and/or press. This technology separates organic materials from contaminants and, in the process, sizes and macerates the resulting organic material. This material would then be added to the existing compost process.

That receiving and pre-treatment area may only be needed for the commercial materials. The existing contamination removal equipment used for the current yard trimmings program may be adequate to handle a residential mixed organics stream with some additional labor.

**Figure 4-4: Agri Service Compost System Configuration**



#### **Compatibility with Existing System**

This program would require the implementation of one or both of the commercial collection system and residential mixed organics collection system as well as amending the contract with Agri Service for the expanded scope of services contemplated by this program. Otherwise, there are no significant incompatibilities with the existing system that should make this approach challenging to develop or implement.

#### **Technology Risk**

This program has little to no technology risk. Similar programs are in operation at dozens of compost sites throughout California. The only minor technology risk relates to the selection of the equipment for the pre-treatment. There are several systems on the market that are specifically designed to remove the volume and types of contaminants that are expected from commercial food waste generators. HF&H is aware of several of these systems in operation in California and, as with most technologies of this type, there are trade-offs between them. The more significant trade-offs involve the balance between recovering as much organic material as possible while eliminating as much contamination as possible. Other trade-offs have to do with operating and maintenance costs. HF&H recommends that Agri Service be responsible for the equipment selection since they are the ones that will experience the consequences of those trade-offs.

#### **Permitting and Land Use Considerations**

The Agri Service Solid Waste Facility Permit has adequate additional capacity to handle the volume and type of material that would be generated in Oceanside. In addition, their Compost Permit envisions taking a full scope of food waste materials as well as yard trimmings.

There is some potential for concern regarding odors that may be generated by the receiving and pre-treatment operation at El Corazon. This facility has some sensitive adjacent uses, most notably a large sports park adjacent to the site.

The El Corazon site will require construction improvements including: a receiving pad; a building to house the processing equipment; and, installation of the pre-treatment system itself. This will require typical permits for construction of such a structure. This may include some additional stormwater improvements on the site, however the existing stormwater management system at the site is quite robust and any such requirements should be relatively minor. Some analysis would be required to determine whether this constitutes a project under CEQA and whether the “Existing Facilities” categorical exemption could be applied. Depending on the scope of the improvements, it is possible that more significant environmental analysis and mitigations would be needed.

The most significant land use consideration related to the use of the El Corazon site is the El Corazon Master Plan and Specific Plan. The Master Plan identifies the need to permanently relocate the composting operation during Phase 6 of that plan in order to make way for other features of the El Corazon park facility. City staff anticipates that this is likely to occur at approximately the same time as the expiration of the current lease and operating agreement with Agri Service (November 2024).

### **Customer Acceptance**

The most significant customer acceptance issues are documented in the collection program options above. This approach, including the added pre-treatment at the site, has a relatively high tolerance for contaminants and is specifically designed to remove them prior to introducing the organic materials to the compost process. This should help facilitate customer acceptance by allowing customers to place organic materials in plastic bags. It would also reduce negative and potentially confusing messaging to customers about “prohibited” items, as it would not require strict provisions for non-collection of materials that have other contaminants.

### **Collateral Benefits**

Use of the El Corazon site for all receiving, pre-treatment, and treatment options provides the lowest overall vehicle miles and, therefore, the lowest air emissions, traffic, and road impacts, among all of the options considered.

In addition, with respect to the material collected from commercial customers, this program could cost-efficiently transition to delivery of organic slurry to the San Luis Rey Water Reclamation Facility at a later date, once economies of scale are sufficient to make that program more cost efficient. The sized and macerated commercial material would likely need to be blended to the acceptable levels for suspended and volatile solids to allow introduction to the San Luis Rey Water Reclamation Facility process. Improvements at the San Luis Rey Water Reclamation Facility would also be needed to facilitate this.

### **Operational/Logistical Considerations**

The operational and logistical considerations are covered in the above descriptions of the collection programs and the discussion within this program of the compatibility with the existing system and permitting.

### **Implementation Timeline**

The following activities will need to be performed in order to implement the program. Estimated timelines for each activity are provided.

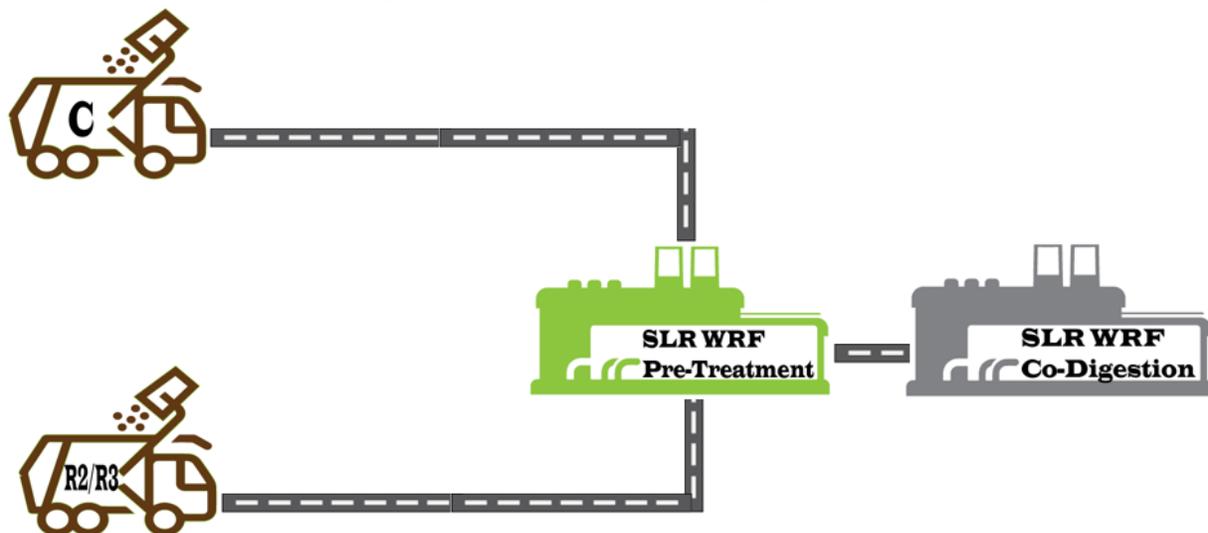
- Negotiate Contract Amendment for Organics Processing – 1-3 months, plus City Council consideration/approval
- Final Design of Improvements at El Corazon – 3-4 months
- Construction of Improvements at El Corazon – 9-12 months
- Testing/Commissioning of Material and Receiving/Pre-Treatment Process – 1 month
- See above for implementation timeline for necessary collection program(s).

## Receiving, Pre-treatment, and Treatment at Oceanside San Luis Rey Water Reclamation Facility

### Program Overview

Under this program, materials collected from a bag-based (R2) or separate food scraps collection (R3) residential program and/or a commercial collection program would be delivered to the San Luis Rey Water Reclamation Facility. The City would site a pre-treatment system on approximately 10,000 square feet of that site (assuming development of a ~100 ton per day system). That facility would receive the material and pre-treat it using de-packaging and/or press equipment. This equipment separates organic materials from contaminants and then converts the organic fraction into a slurry. That slurry may need to be mixed to achieve certain specifications to ensure it is suitable for direct injection into a wastewater digestion system. The facility would be upgraded to allow for storage and continuous injection of the slurry. Material would be pumped directly from pre-treatment into holding tanks that provide for continuous injection of the bio-slurry into the digesters on a 24 hour per day, 7 day per week basis. This continuous injection is critical to maintaining the microbiological balance within the digesters.

Figure 4-5: SLRWRF System Configuration



### Compatibility with Existing System

This approach would be compatible with the existing system and would require no changes to contracts or ordinances beyond those required to implement the collection programs.

This program would require the implementation of either or both of the commercial collection system and bag-based residential collection system.

### **Technology Risk**

This program has little to no technology risk. This sort of program has been successful at EBMUD, where it accepts slurried organic materials from the City of San Francisco and the Central Contra Costa Solid Waste Authority. It is also used outside of California, including implementation at Disney World in Orlando, Florida and several Canadian commercial organics programs (e.g., Toronto and Vancouver).

### **Permitting and Land Use Considerations**

Permitting challenges for this approach may be significant. The San Luis Rey Water Reclamation Facility would need to acquire a Solid Waste Facility Permit in order to receive and pre-treat this material. Acquiring a Solid Waste Facility Permit anywhere in California can be challenging due to neighbor concerns. In addition, such an expansion will require CEQA analysis, as this type of activity was not included in previous San Luis Rey Water Reclamation Facility environmental documents. Both of these processes require input from the public.

### **Customer Acceptance**

This pre-treatment approach has a relatively high tolerance for contaminants and is specifically designed to remove them prior to the process of creating the slurry. This should help facilitate customer acceptance by allowing customers to place organic materials in compostable or plastic bags. It would also reduce negative and potentially confusing messaging to customers about “prohibited” items, as it would not require strict provisions for non-collection of materials that have other contaminants.

### **Collateral Benefits**

This program results in significant generation of biogas in the anaerobic digester and depending on how the ultimate program is configured can result in reduced collections costs and reduced greenhouse gasses. This biogas generated at the SLRWRF is currently converted to electrical energy, which offsets the power demands of the wastewater treatment facility. Additional biogas could be used to produce more electrical energy to further offset electrical energy at the facility or could be used for other beneficial reuses such as production of compressed natural gas to fuel City fleet vehicles or production of bioplastics. If the City co-located a green waste facility at SLRWRF, then this option also enables reduction of collections costs and reductions in greenhouse gasses by streamlining the sorting process inherent in the R2 collection method and having only one destination for both green waste and organic waste. The San Luis Rey Water Reclamation Facility is owned by the City, which results in financial benefit for the City’s ratepayers as well as the environmental benefits resulting from generating and using clean energy.

### **Operational/Logistical Considerations**

Many of the operational and logistical considerations are covered in the above descriptions of the collection programs and the discussion within this program of the compatibility with the existing system and permitting.

This program involves receiving materials at the San Luis Rey Water Reclamation Facility. The City will need to establish acceptable receiving hours and make facility access arrangements with the franchise collector.

### Implementation Timeline

The following activities will need to be performed in order to implement the program. Estimated timelines for each activity are provided.

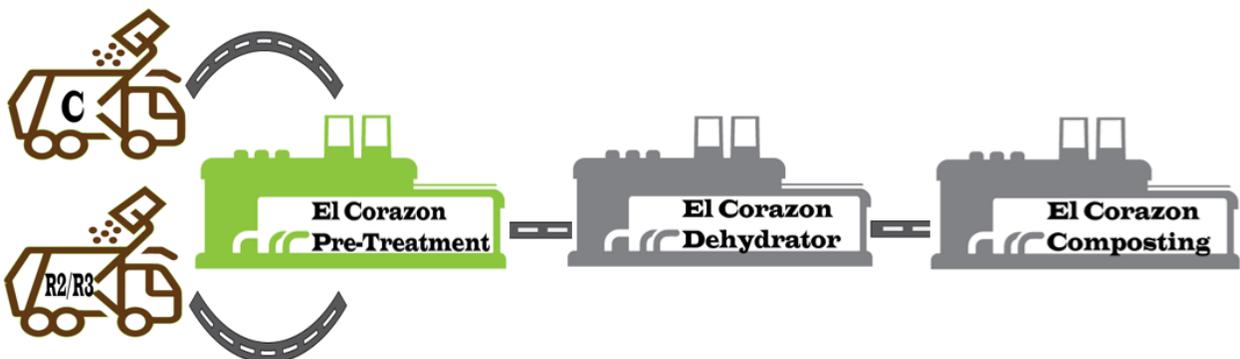
- Negotiate Contract for Organics Processing – 1-3 months, plus City Council consideration/approval.
- Continued testing/Analysis of Bio-Slurry at the San Luis Rey Water Reclamation Facility – 6 months.
- Environmental Review – 4-6 months.
- Permitting (Solid Waste Facility, Water, Air) – 12-36 months.
- Final Design of Improvements at the San Luis Rey Water Reclamation Facility – 3-4 months.
- Construction of Improvements at the San Luis Rey Water Reclamation Facility – 18 months.
- Testing/Commissioning of CORE® Process – 3 months.
- See above for implementation timeline for necessary collection program(s).

### **Industrial-Scale Dehydration**

#### Program Overview

Under this program, materials collected from a bag-based (R2) or separate food scraps collection (R3) residential program and/or a commercial collection program would be delivered to a dehydration facility. The location of the dehydration facility would need to be established and, if the site does not already have a Solid Waste Facility Permit, one would need to be obtained. Ideally, the dehydrator would be sited at an existing solid waste facility like El Corazon or the Palomar Transfer Station. This facility would receive the organic materials, pre-sort for large and particularly problematic (polystyrene foam, plastics, whole glass bottles, metal, etc.) contaminants, shred the material to a size of approximately 2" x 2" or smaller, and load the shredded materials into an industrial-scale dehydrator. The dehydrator heats the materials to approximately 300 degrees Fahrenheit. The dehydration process produces two byproducts: 1) dried and highly concentrated organic material; and, 2) water. The system vendor represents that this heating process is sufficient to achieve pathogen reduction for the organic materials and results in a byproduct that is high in nitrates. After the drying process, the solid byproduct would need to be screened to remove any remaining contaminants. That final byproduct may be suitable for either: 1) a biomass fuel product used to power the dehydrator itself; or, 2) an additive or blending agent for compost.

**Figure 4-6: Industrial-Scale Dehydration System Configuration**



### **Compatibility with Existing System**

This program will be somewhat challenging to conform to the existing system, as it would require some arrangement between the City, a solid waste facility operator (in order to benefit from an existing Solid Waste Facility Permit), and the technology vendor. These multi-party agreements may take some time to arrive at, and it would be wise to negotiate with both Agri Service and the Palomar Transfer Station to fully understand the cost and operational trade-offs associated with both sites. In the event that an agreement to site this facility cannot be achieved with either of those operators, the barriers to this approach are significant and involve siting and permitting a new solid waste facility.

The technology vendor has a scalable model that would allow the parties to “right size” the facility to either meet the demand for just Oceanside or to accommodate other communities in the region that may wish to participate. If regional participation can be accomplished, there may be economic benefits to all participating communities related to a broader sharing of both the capital and operating costs.

This program would require the implementation of either or both of the commercial collection system and bag-based residential collection system as well as contracting with WM for this service.

### **Technology Risk**

There are potentially significant technology risks associated with this approach. While this technology has been deployed in California on a small scale (including a 2,000 pound per day installation at the Anaheim Convention Center) and internationally on a large scale (including a 10 ton per day system at the London-Gatwick Airport), the vendor reports that it has never been permitted on a large-scale basis in California. Particular technology risks include:

- 1) The technology should significantly reduce or eliminate the disposal of organic materials in a landfill, thereby eliminating the methane-generating potential of such materials. In general, CalRecycle views composting, anaerobic digestion, mulch production, and regulated land application as acceptable material recovery strategies for organic materials. To our knowledge, CalRecycle has not reviewed or approved this technology as a material recovery strategy that complies with the requirements of AB 1826 or SB 1383.
- 2) If the dried byproduct is to be used as fuel in a biomass boiler, that boiler would likely need to be permitted by the local air district. Biomass boilers, generally, are common in industrial applications. The air district would be interested in the particular feedstocks for the boiler and the resultant emissions profile. In particular, the air district is likely to be concerned about any materials that have the potential to generate harmful emissions (plastics, polystyrene foam, heavy metals, etc.) and the project would likely have to demonstrate successful removal of those types of contaminants from the process prior to introduction into the boiler.
- 3) If the dried byproduct is to be used as an additive or blending agent for compost, the composter and their customers are likely to demand third-party laboratory testing of the byproduct. This testing will be needed to ensure that it is, in fact, a productive contributor to soil health and does not create some liability for the composter or end user. The technology vendor reports that they have done no independent testing of the byproduct, but indicates that the City of Anaheim blends the byproduct from the unit at the Anaheim Convention Center into soils that they use in landscaping projects.
- 4) The water resulting from the dehydration process may be acceptable for direct use in a composting process or for dust control at a solid waste facility, compost site, or construction site.

It may also be acceptable to use for groundwater recharging projects. However, the vendor reports that they have done no independent testing of the water resulting from this process. Without this testing, it is unclear whether the water may have some form of contamination that requires advanced treatment prior to use.

These technology risks, individually or in combination, may be significant. HF&H recommends that if the City wishes to pursue this approach, it work with the technology vendor, prior to making any significant investment, to conduct the appropriate testing of the byproducts from smaller-scale applications (e.g., Anaheim Convention Center) and meet with appropriate regulatory agencies to understand their perspectives on the acceptability and compliance concerns of this approach.

### **Permitting and Land Use Considerations**

In addition to the permitting considerations identified in the “technology risks” section above, this type of system would need to operate under a Solid Waste Facility Permit. Co-location of this technology at either the El Corazon site or the Palomar Transfer Station, in cooperation with the operator of the site, would be ideal. Acquiring a Solid Waste Facility Permit anywhere in California is challenging due to neighbor concerns. In addition to the Solid Waste Facility Permit, such a site would likely need to perform a full Environmental Impact Report under CEQA. These are significant efforts that may be challenged by any number of community or environmental groups.

### **Customer Acceptance**

The most significant customer acceptance issues are documented in the collection program options above. This approach, including the added pre-treatment at the site, has a moderate tolerance for contaminants and is designed to remove them either prior to or following the dehydration process. With the likely air district concerns about introducing petroleum-based plastics into the thermal process, it may be necessary to only allow customers to use bio-plastic/compostable bags for containment of food materials and to conduct some systematic contamination inspections and follow-up education at the point of customer set-out to minimize the risks of introducing these problematic materials into the process.

### **Collateral Benefits**

This process may provide significant quantities of usable water for other processes. The vendor represents that a 10 ton per day installation would yield approximately 538,000 gallons of water each year. At the scale required by the City (~20 tons per day), it is possible that the process could recover as much as one million gallons of water per year.

### **Operational/Logistical Considerations**

The operational and logistical considerations are covered in the above descriptions of the collection programs and the discussion within this program of the compatibility with the existing system and permitting. The technology vendor does not also act as the operator of the system. The most significant operational and logistical issue will involve the process for defining who will operate the system and at what site. From there, more minor logistical arrangements will need attending to.

### **Implementation Timeline**

The following activities will need to be performed in order to implement the program. Estimated timelines for each activity are provided.

- Negotiate Multi-Party Contract for Organics Processing – 3-6 months, plus City Council consideration/approval.
- Final Design of Improvements at El Corazon – 3-4 months.
- Construction of Improvements at El Corazon – 9-12 months.
- Testing/Commissioning of Dehydration Process – 1 month.
- See above for implementation timeline for necessary collection program(s).

## SECTION 5. COST/BENEFIT ANALYSIS OF PROGRAM OPTIONS

In addition to the technical feasibility considerations described in Section 4 above, HF&H prepared planning-level estimates of the anticipated range of annual costs (including amortization of the initial capitalization and annual operations and maintenance costs) and potential greenhouse gas (GHG) impacts of each option. Figure 5-1 below presents the summary results of the cost/benefit estimates for each program configuration.

**Figure 5-1: Summary of Cost/Benefit Analysis for Selected Configurations**

Configuration		Annualized Cost (000s)	Estimated Rate Impact	GHG Emissions (Reduction)/Increase
COré® Orange to LA SAN	R2,C	\$1,167-\$1,774	5.4%-8.2%	(2,193)-(3,227)
	R3,C	\$2,739-\$3,038	12.6%-14.0%	(1,879)-(2,913)
COré® Corazon to SLRWRF	R2,C	\$1,529-\$2,570	7.1%-11.9%	(2,434)-(3,579)
	R3,C	\$3,101-\$3,834	14.3%-17.7%	(2,120)-(3,265)
COré® Palomar to SLRWRF	R2,C	\$1,273-\$2,215	5.9%-10.2%	(2,384)-(3,505)
	R3,C	\$2,845-\$3,479	13.1%-16.0%	(2,070)-(3,191)
Agri Service Composting	R1,C	\$1,003-\$1,212	4.6%-5.6%	(4,387)-(6,492)
SLRWRF Pretreatment & Processing	R2,C	\$1,245-\$1,803	5.7%-8.3%	(2,469)-(3,632)
	R3,C	\$2,817-\$3,067	13.0%-14.1%	(2,155)-(3,318)
Industrial-Scale Dehydration	R2,C	\$1,038-\$2,118	4.8%-9.8%	(2,553)-(4,041)
	R3,C	\$2,610-\$3,382	12.0%-15.6%	(2,239)-(3,727)

- Notes:
- 1) Costs presented do not include any CEQA, permitting, or design costs.
  - 2) Economics for the COré® at Corazon or Palomar are based on receiving additional materials which are outside of the City's control, but may be within WM's control.
  - 3) Cost estimates include savings resulting from avoided landfill disposal costs.
  - 4) Cost information supplied by potential service providers include potentially significant limitations for factors that they cannot account for at this time.
  - 5) Cost information supplied by potential service providers assume differing debt structures and schedules.
  - 6) GHG emissions impacts are expressed in Metric Tons of Carbon Dioxide Equivalents (MTCO<sub>2e</sub>)
  - 7) Cost estimates related to the use of the SLRWRF are preliminary and will be updated as part of the City's 2017 Integrated Organic Waste to Energy/Biosolids Master Plan.

### Approach to Cost Estimation

In general, the cost estimates presented above were prepared in cooperation with the private-sector stakeholder(s) who would be the City's contractors for each option, if that option were selected. HF&H also received information from the City about the costs of upgrades that would be required at the San Luis Rey Water Reclamation Facility, for the purposes of the scenarios that included that facility for final treatment. All cost information was supplied to HF&H at the City's request and HF&H reviewed each submittal for completeness and reasonableness of the assumptions made. Where appropriate, HF&H made modifications to the cost estimates and then shared those revisions with the stakeholder.

Each cost configuration represents the necessary combination of: collection from customers, transportation to the pre-treatment location, pre-treatment activity(ies), transportation to the processing location (if different from the pre-treatment location), and processing. In the configurations where energy

is produced at the San Luis Rey Water Reclamation Facility, conservative estimates have been made for the energy production value.

The range of costs presented above are largely driven by the volume of material that is collected, transported, sent for pre-treatment, and ultimately processed. This results from two factors. The first is the typical nature of variable costs, which increase as volume increases. The second results from HF&H's assumption, confirmed by some of the potential contractors, that the infrastructure required for pre-treatment may be more extensive as the volumes of material collected from customers increase (due to higher levels of contamination).

The high end of the cost range for all of the configurations other than "Agri Service Composting," which uses a mixed organics collection approach (R1), reflects the separate food scraps collection from residential customers (R3). This approach, relative to bag-based collection (R2) that is included in the low end of the range for all configurations, adds costs of between \$1,264,000 and \$1,572,000 per year.

The annual costs have been compared to the current estimated solid waste system revenues of \$21,679,700 per year in order to estimate the rate impact of these added programs. However, it should be noted that the actual rate impacts may be materially different depending on how the City Council decides to fund the programs (see discussion below of funding approaches).

HF&H has not provided the detailed cost estimates, including all of the operating assumptions and cost factors, as part of this report because the City intends to negotiate with potential private partners. Disclosure of this detailed cost information prior to such negotiations has the potential to negatively impact the City's position in those negotiations as well as the competitive opportunities of each of the potential contractors.

## **Approach to GHG Estimation**

In order to estimate the GHG emissions impact of the system configurations presented in this report, HF&H utilized the "Greenhouse Gas Reduction Calculator" developed by the California Air Resources Board and CalRecycle as required by the California Senate Budget and Fiscal Review Committee for the Waste Diversion Grant and Loan Program. This calculator "allows users to estimate the net GHG benefit from a variety of specific waste diversion activities using a life-cycle approach." The calculator includes the life-cycle emissions reductions for various treatment approaches, including composting and various forms of anaerobic digestion. For the composting options analyzed in this study, the factors for aerated static pile composting were applied. For the options involving the use of the San Luis Rey Water Reclamation Facility, the factors for co-digestion in a medium-to-large facility producing electricity were applied. For the dehydration option, the calculator does not include full lifecycle analysis of that technology, so HF&H modified the input factors to include: the emissions resulting from the energy consumption of the equipment, emissions reductions associated with landfill avoidance, and the emissions reductions associated with composting the dry byproduct (in the high tons scenario only, the low tons scenario assumes that the dry byproduct is used to offset energy consumption).

For each configuration, HF&H calculated the change in transportation mileage resulting from new collection routing (specific to the material collected from commercial customers) as well as the need to move materials between transfer, pre-treatment, and processing facilities (where appropriate). Where possible, based on the information available, HF&H also included the GHG emissions resulting from increased energy consumption for pre-treatment. Finally, HF&H calculated the emissions reductions (as compared with landfilling) associated with each treatment approach.

The R3 collection approach adds approximately 314 tons of annual CO<sub>2</sub>e in GHG emissions, resulting from the additional collection vehicles required for that scenario.

## Program Funding Options

Funding for solid waste programs is most commonly accomplished through rates paid by customers with occasional opportunities for grant funding. That combination of options is the most common for funding these programs, but there are numerous options for implementing those funding approaches. Current funding options may include:

- **Greenhouse Gas Reduction Fund Grants** – CalRecycle has had two cycles of grants and loans to fund food waste prevention and organics infrastructure. In FY 2014/15, the total amount available was \$25 million. In both FY 2016/17 and FY 2017/18, \$40 million was allocated from the Greenhouse Gas Reduction Fund..
- **California Energy Commission Grants for Biogas Energy Production** – The California Energy Commission has periodically awarded grants (\$21 million in April 2015) for projects that involve converting organic waste into electricity. The funding for these grants is inconsistent, but may be appropriate, if available, for funding upgrades needed to the San Luis Rey Water Reclamation Facility in order to co-digest the organics at that site.
- **Ratepayer Funding, No-Charge Organics Service** – Over the past thirty years, most local governments have funded recycling programs by simply adding the cost of those programs to garbage rates. This has been an attractive approach because it creates significant economic incentives for customers to participate in the programs. The City could elect to apply this strategy to the new organics programs and infrastructure costs. One drawback to this approach is that it creates a significant disincentive to the collection service provider because the more successful the program is, the more it costs them with no added revenue.
- **Ratepayer Funding, Discounted Organics Service** – Many commercial organics collection programs throughout California have been established to include some charge for the service. This charge frequently ranges from 50% to 80% of the cost of an equivalent level of garbage collection service. This is typically not adequate to fund the actual costs of the service and some, smaller, rate increase is needed on the garbage rates to pay for the subsidized organics program rates. HF&H has worked with many of these programs and has found that the 20% to 50% discount is sufficient to motivate behavior change. In fact, there is no apparent performance difference between communities with discounted organics services and those who offer the service at no added charge.
- **Ratepayer Funding, Cost-of-Service** – Since the adoption of AB 1826, some agencies in California have chosen to provide organics services at the actual cost of service. With a State mandate on businesses to participate in organics recycling, many agencies have felt that no subsidy is required. In the few cases where this has happened, there has been significant resistance to program participation due to the significant added cost and the current lack of any State-level enforcement on generators for failure to participate in programs.

The three ratepayer funding approaches described above can be applied at either the sector level (e.g., residential, commercial) or at the system level. Once the City has determined a final program configuration and has final pricing, detailed rate analysis will be appropriate, perhaps evaluated under different funding scenarios as described above.

## SECTION 6. FINDINGS AND RECOMMENDATIONS

Through the conduct of the analysis described in this report, HF&H has identified a number of findings and recommendations for consideration and further action by the City as it begins to implement an organics program.

### Findings

- 1. Economies of scale are critical to cost-effectiveness.** Nearly all of the options considered by this study include significant fixed costs and result in the development of infrastructure that is capable of handling more material than is generated by the City's customers. WM has stated that it is not worthwhile to develop a new CORE<sup>®</sup> facility, regardless of the siting, unless significant additional materials are identified. Similarly, the pre-processing equipment used in the Agri Service Composting and San Luis Rey Water Reclamation Facility scenarios is capable of handling approximately 15 tons per hour, meaning that all of the City's material could be processed in 1-2 hours and the equipment would be idle for the remainder of the working day.
- 2. Other local government agencies in the region are looking for organics solutions.** While discussing this study with industry and non-profit stakeholders as well as other local government agencies in the region, it became clear that there is insufficient organics processing capacity locally. Since all of the other local governments are also required to develop programs to comply with State mandates, they are in need of such infrastructure. These other jurisdictions may serve as regional partners to help realize the benefits of the economies of scale described in Finding 1 above.
- 3. Siting for a composting facility should be a priority.** The current El Corazon compost facility operated by Agri Service is responsible for recycling approximately 70,000 tons per year of green waste, including more than 20,000 tons per year from the City's curbside program and more than 25,000 tons per year from residents and businesses in the City who self-haul their green waste to that facility. The El Corazon Master Plan identifies the need to permanently relocate the composting operation during Phase 6 of that plan in order to make way for other features of the El Corazon park facility. City staff anticipates that this is likely to occur at approximately the same time as the expiration of the current lease and operating agreement with Agri Service (November 2024). The facility has all of the permitting and approvals required, other than a contract amendment with the City, to accept a full spectrum of food scraps. In order to appropriately manage both the odor and contamination that could result from accepting an increased volume of food scraps at the site, improvements are likely needed for a tipping and pre-processing building. Given the short term remaining before the current lease and operating agreement expire, it would not be reasonable to make significant investments in building improvements. The City should prioritize the siting for a permanent facility, as the siting, permitting, and development for an operation of that nature can take years. Ideally, the new site should be permitted with similar or increased material handling volumes and accepted material types.
- 4. Bag-based residential collection programs are critical for cost-effectiveness of many options, but may be inconsistent with the City's Zero Waste Goal.** Nearly all of the options contemplated under this study involve collecting residential food waste separately from other yard trimmings. The cost of collecting this material separately in bags offers significant savings (\$1,264,000 - \$1,572,000 per year) when compared to collecting it in a separate (fourth) collection from each residence. However, these benefits come at the cost of two to three million plastic bags that would be added to the waste stream each year. It may be possible for the City to secure a durable compostable plastic bag for this purpose; however, the City would need to work with the compost facility to ensure acceptance and diversion

of the bags, as they are typically challenging to compost and generally only accepted as an incidental part of compost programs.

## Recommendations

From the detailed review of the various options considered in this report, HF&H has developed specific recommendations for the City's consideration. This study did not find any single solution that was both immediately ready for implementation and sustainable in the long term. As a result, these recommendations are based on first identifying an immediate option available for the City to begin offering food waste recovery options to the community and then developing long-term solutions.

- 1. Short-Term Solution.** HF&H recommends that the City enter into negotiations with Waste Management to implement a commercial collection program and the "CORe® at Orange to LA SAN" processing approach as an immediate-term solution to achieving compliance with the requirements of AB 1826, however it will not comply with the requirements of SB 1383. This processing strategy is fully permitted and operational and should result in the least time to implementation of any of the options considered. In addition, the program appears to be relatively cost-competitive with other options considered and benchmarks competitively with programs implemented by other Southern California communities. The program provides the least benefit in terms of GHG reductions, resulting primarily from the transportation required to deliver materials from Oceanside to Orange. Ultimately, the City should see greater cost and environmental benefits from the development of a more permanent local processing solution (see recommendations 3, 4, and 5 below). The collection program developed from this negotiation should be developed as a long-term program, but with some flexibility for reducing the transportation and processing costs, based on changes to processing location, and lessons learned from the first 6 to 12 months of the program. The processing arrangements developed from this negotiation should be negotiated to have a shorter term, with some options for extension, in order to allow the City to redirect the material to the long-term solution once developed.
- 2. Residential Collection.** HF&H recommends that the City to work towards residential solutions that use either the R1 or R2 collection approach. All but one of the solutions require either the R2 or R3 collection approach. There are significant cost and emissions differences between the two approaches, as illustrated in Figure ES-2. The R3 collection approach adds annual costs of \$1,264,000-\$1,572,000 per year, reduces the GHG benefits, and will result in increased heavy duty truck traffic with all of the associated noise, congestion, and road impacts.
- 3. Compost Facility Siting Study.** HF&H conducted an independent cost benefit analyst of the El Corazon Compost Facility and found that the "Agri Service Composting" configuration could be cost-effective and provide GHG benefits; unfortunately, the challenges related to this processing approach remove it from consideration. First, the El Corazon Master Plan and Specific Plan both describe a relocation of this operation to allow other uses of the site and mitigate any potential nuisance to development of the El Corazon park and business facilities. The Master Plan calls for a relocation in 2024, making the timing unrealistic to complete the capital improvements necessary. Second, Agri Service has expressed continued concerns about the impact to the marketability of their end products resulting from the likely increase in contamination. Further, Agri Service has expressed concern that the costs presented herein may not be adequate to manage the increased contamination. Agri Service has not provided a proposal to the City that

demonstrates the requirements necessary to overcome those concerns. This service is critical to the City's State diversion compliance required under AB 939, AB 1826, and SB 1383.

HF&H recommends that the City begin the process of identifying a replacement composting site either within the Biosolids Master Plan or through a separate Compost Facility Siting Study that would determine alternative locations to El Corazon. As part of this evaluation and any future CEQA and permitting work for the selected site, it would be wise for the City to assume that the site could accept a full spectrum of food materials (with up to 30% contamination), in addition to the current yard trimmings. Doing so will ensure the greatest long-term flexibility for the use of that site.

4. **Integrated Organic Waste to Energy and Biosolids Master Plan.** The City is in process on a comprehensive study related to the SLRWRF which will consider upgrading biosolids processing and the inclusion of organic wastes. HF&H understands that this effort will include studying the various operational and permitting issues associated with receiving and pre-treating collected organics at that site. This study will be critical to informing the City's ultimate decision about whether that site could be used for the full scope of services (i.e. receiving, pre-treatment, and processing) or if another site (e.g. Palomar Transfer Station) should be responsible for the receiving and pre-treatment activity.
5. **Long-Term Solution.** HF&H recommends that the City use the information from the Compost Facility Siting Study and the Integrated Organic Waste to Energy and Biosolids Master Plan to make a decision about its long-term approach to providing organics recovery solutions to the community. One potential outcome is that the City could compost its biosolids at the San Luis Rey Water Reclamation Facility in a small-scale, in-door facility with advanced odor mitigation technologies. If this occurred, the biosolids composting process would likely need a bulking agent (e.g. yard trimmings). As such, a combined solution for organics and biosolids could provide synergistic benefits for the City and its utility ratepayers.
6. **Food Rescue.** In addition to the City's efforts to recover organics to a compost or digestion facility, the City should consider implementing programs to recover edible food and provide it to people who are food insecure. This is consistent with the City's Zero Waste goal and is an element of the jurisdictional requirements of SB 1383. The City has already taken steps towards this with the funding of the food rescue kitchen grant and there are a number of programmatic approaches described in Section 3 of this report. At a minimum, for SB 1383 compliance (based on the December 2017 draft of the regulations), the City will need to identify potential recipients of donated food and develop resources to connect potential food donors to those recipients. The City may wish to further support this effort to enhance convenience for businesses and effectiveness for the recipient organizations. One approach would be to contract (or subcontracting through the WM franchise agreement) with a service provider who could collect food from donors and deliver it to the recipients.