APPENDIX G

Trip Generation and Operations Analyses

HEXAGON TRANSPORTATION CONSULTANTS, INC.

Memorandum

To: Julie Mier, David J. Powers & Associates

From: Robert Del Rio

Date: May 27, 2010

Subject: Trip Generation and Operations Analyses for the Proposed Anaerobic Digestion Facility on the Nine Par Site in San Jose, California

Hexagon Transportation Consultants, Inc. has completed a preliminary trip generation and operations analyses for the proposed anaerobic digestion facility on the former Nine Par Landfill (Nine Par Site) in San Jose, California. The project as proposed will consist of a 270,000-ton per year dry fermentation anaerobic digestion facility on a 41-acre site located along Los Esteros Road.

The purpose of the trip generation analysis is to determine the need for a full traffic study addressing any impacts associated with the proposed project. The determination of the need for the preparation of a full traffic study is based on the City of San Jose guidelines for preparation of traffic studies and the number of trips estimated to be generated by the project. The preliminary trip generation and operations analyses includes trip generation estimates for the proposed project, projections of trips to be added to the roadway system by the project, and level of service calculations and operational analysis at selected intersections. A comprehensive traffic analysis will only be completed if deemed necessary by city staff.

Roadway System and Site Driveways

With the development of the project, the existing roadway system in the immediate vicinity of the site was assumed to remain unchanged from its existing configuration. The project site is accessed via Zanker Road/ Los Esteros Road.

Project Description

GreenWaste Recovery, Inc. is proposing a 270,000-ton per year dry-fermentation Anaerobic Digestion (AD) facility to process and recover energy (biogas) from the organic portion of municipal solid waste generated by the City of San Jose and surrounding communities.

The proposed AD facility would operate 24 hours a day seven days a week with a total of approximately 26 employees, which include drivers, mechanics, supervisors, and office staff. Approximately 8 of these employees would work evenings, while the remainder of employees would work normal day shifts between 7:00 AM and 4:00 PM. It is anticipated that approximately 105 large volume transfer vehicles and 45 wheel collection/route vehicles would access the site everyday to deliver organic materials to be processed, and approximately 60 vehicles per day would access the facility to collect the processed organics and take them to their final destinations. Organic materials to be processed are anticipated to be delivered from within a 150-mile radius (occasionally from a greater distance) but on the average of less than 50 miles away. The finished product is anticipated to be delivered within a 200-mile radius (occasionally to a greater distance) but on average to a distance less than 50 miles away.

It should be noted that although the proposed facility is planned to receive and process a total of 270,000 tons of material a year, the above truck traffic represents the delivery and transfer of only 225,000 tons of material. The remaining 45,000 tons of material per year would be transferred from the existing adjacent facility. No additional truck traffic would be added to the study intersections as a result of the transfer of materials from teh adjacent facility.

Trip Generation, Distribution, and Assignment

Trip Generation

The magnitude of traffic produced by a new development is typically estimated by applying the size of the project to the applicable trip generation rate contained in the Institute of Transportation Engineers (ITE) Trip Generation Manual. However, the ITE manual does not include trip generation rates for Anaerobic Digestion facilities. Therefore, the amount of traffic generated by the proposed project was estimated based on information obtained from GreenWaste Recovery, Inc, which includes number of employees, employee shift times, and anticipated daily truck activity at the site, as well as Hexagon's experience with past similar projects in the area. The vehicular trips associated with the proposed project were separated into two components: 1) auto trips and 2) truck trips.

Auto Trips

Auto trips simply refer to all passenger vehicle trips that would be generated by the proposed project. These trips would mainly represent employee trips to and from the site throughout their work shifts. It is anticipated that the proposed AD facility would employ a total of 26 employees with 8 of these employees working evenings and the remainder of employees working normal day shifts between 7:00 AM and 4:00 PM. Based on this information, it was assumed that 4 employees would work from 4:00 PM to 1:00 AM, 4 employees from 10:00 PM to 7:00 AM, and the remaining 18 employees from 7:00 AM to 4:00 PM. The daily traffic generated by the project's employees was estimated based on work shift information and the assumption that all employees would drive to the project site alone, arrive right before their work shift, and leave the site immediately after the end of their work shift. In addition, it is anticipated that there would be an average of 10 visitors and 10 deliveries to the site every day between the hours of 8:00 AM and 6:00 PM. Based on the provided information and assumptions, it is estimated that the proposed facility would generate a total of 92 daily auto trips, with 4 and 22 auto trips occurring during the AM and PM peak hours, respectively.

Truck Trips

The expected truck traffic generated by the proposed project would mainly be composed of 2 different truck trips: 1) trucks delivering materials to the site to be processed, and 2) trucks collecting the finished product from the project site to be delivered to their final destination. It is anticipated that approximately 105 large volume transfer vehicles and 45 wheel collection/route vehicles would access the site everyday to deliver organic materials to be processed, and approximately 60 vehicles per day would access the facility to collect the processed organics and take them to their final destinations.

Based on the above information and assumptions, it is estimated that the proposed project would generate a total of 420 daily truck trips, with 22 trips occurring during the AM and PM peak hours. Since truck trips do not have the same effect on the transportation network as auto trips, the estimated project truck traffic was factored up using a heavy vehicle adjustment factor of 1.5 to yield passenger-vehicle equivalent trips (a truck trip is considered to represent 1.5 passenger-vehicle trips).

Overall, the project is estimated to generate a total of 730 daily passenger-vehicle equivalent trips, with 38 (19 inbound and 19 outbound) trips occurring during the AM peak hour and 56 (19 inbound and 37 outbound) trips occurring during the PM peak hour. The daily project vehicular activity and trip generation estimates are presented in Table 1.

Table 1
Daily Project Vehicular Activity

Hours of Operation	Transfer/Processing Facility: Auto Trips Employees	Auto Trips Visitors	Delivery Trucks	Truck Trips Delivering/ Collecting	Total Auto Trips In	Total Auto Trips out	Total Truck Trips In	Total Truck Trips out	Total Trips/a/ In	Total Trips/a/ Out	Grand Total
12:00 AM				6 arrivals	0	0	6	6	9	9	18
to 1:00 AM				6 departures							
1:00 AM	4 departures			6 arrivals	0	4	6	6	9	13	22
to 2:00 AM				6 departures							
2:00 AM				6 arrivals	0	0	6	6	9	9	18
to 3:00 AM				6 departures							
3:00 AM				6 arrivals	0	0	6	6	9	9	18
to 4:00 AM				6 departures							
4:00 AM				7 arrivals	0	0	7	7	11	11	22
to 5:00 AM				7 departures							
5:00 AM				8 arrivals	0	0	8	8	12	12	24
to 6:00 AM				8 departures							
6:00 AM				8 arrivals	18	0	8	8	30	12	42
to 7:00 AM	18 arrivals			8 departures							
7:00 AM	4 departures			10 arrivals	0	4	10	10	15	19	34
to 8:00 AM				10 departures							
8:00 AM		**1 arrival**	**1 arrival**	**11 arrivals**	**2**	**2**	**11**	**11**	**19**	**19**	**38**
to 9:00 AM		**1 departure**	**1 departure**	**11 departures**							
9:00 AM		1 arrival	1 arrival	11 arrivals	2	2	11	11	19	19	38
to 10:00 AM		1 departure	1 departure	11 departures							
10:00 AM		1 arrival	1 arrival	12 arrivals	2	2	12	12	20	20	40
to 11:00 AM		1 departure	1 departure	12 departures							
11:00 AM		1 arrival	1 arrival	12 arrivals	2	2	12	12	20	20	40
to 12:00 PM		1 departure	1 departure	12 departures							
12:00 PM		1 arrival	1 arrival	12 arrivals	2	2	12	12	20	20	40
to 1:00 PM		1 departure	1 departure	12 departures							
1:00 PM		1 arrival	1 arrival	12 arrivals	2	2	12	12	20	20	40
to 2:00 PM		1 departure	1 departure	12 departures							
2:00 PM		1 arrival	1 arrival	12 arrivals	2	2	12	12	20	20	40
to 3:00 PM		1 departure	1 departure	12 departures							
3:00 PM		1 arrival	1 arrival	11 arrivals	6	2	11	11	23	19	42
to 4:00 PM	4 arrivals	1 departure	1 departure	11 departures							
4:00 PM	**18 departures**	**1 arrival**	**1 arrival**	**11 arrivals**	**2**	**20**	**11**	**11**	**19**	**37**	**56**
to 5:00 PM		**1 departure**	**1 departure**	**11 departures**							
5:00 PM		1 arrival	1 arrival	10 arrivals	2	2	10	10	17	17	34
to 6:00 PM		1 departure	1 departure	10 departures							
6:00 PM				7 arrivals	0	0	7	7	11	11	22
to 7:00 PM				7 departures							
7:00 PM				7 arrivals	0	0	7	7	11	11	22
to 8:00 PM				7 departures							
8:00 PM				7 arrivals	0	0	7	7	11	11	22
to 9:00 PM				7 departures							
9:00 PM				6 arrivals	4	0	6	6	13	9	22
to 10:00 PM	4 arrivals			6 departures							
10:00 PM				6 arrivals	0	0	6	6	9	9	18
to 11:00 PM				6 departures							
11:00 PM				6 arrivals	0	0	6	6	9	9	18
to 12:00 AM				6 departures							
TOTAL DAILY TRIPS:	52	20	20	420	46	46	210	210	365	365	730

Source: Based on information from GreenWaste email date 12/03/09

/a/ The estimated project truck traffic was factored up using a heavy vehicle adjustment factor of 1.5 to yield passenger-vehicle equivalent trips (a truck trip is considered to represent 1.5 passenger-vehicle trips).

Trip Distribution and Assignment

The trip distribution pattern for the site generated traffic is based on information obtained from GreenWaste on the anticipated service areas of the proposed project, existing travel patterns on the surrounding roadway system, and the locations of complementary land uses. All project traffic would access the project site via SR 237 and Zanker Road. It was assumed that 50 percent of the project traffic would come from the west on SR 237, 40 percent from the east on SR 237, and 10 percent from the south on Zanker Road.

Intersection Level of Service Analysis

Level of service calculations were performed for those intersections identified to be of critical importance. The key intersections analyzed are:

1 SR 237 and Zanker Road (N)
2 SR 237 and Zanker Road (S)

Results of the level of service analysis indicate that both study intersections currently operate and are projected to continue to operate at LOS C or better conditions under existing, background, and project conditions (See Table 2).

Intersection Operations Analysis

The operations analysis is based on vehicle queuing for high-demand movements at intersections. Vehicle queues were estimated using a Poisson probability distribution, which estimates the probability of "n" vehicles for a vehicle movement using the following formula:

$$P(x=n) = \frac{\lambda^n e^{-(\lambda)}}{n!}$$

Where:

P (x=n) = probability of "n" vehicles in queue per lane
n = number of vehicles in the queue per lane

λ = average number of vehicles in the queue per lane (vehicles per hour per lane/signal cycles per hour)

The basis of the analysis is as follows: (1) the Poisson probability distribution is used to estimate the 95th percentile maximum number of queued vehicles per signal cycle for a particular movement; (2) the estimated maximum number of vehicles in the queue is translated into a queue length, assuming 25 feet per vehicle; and (3) the estimated maximum queue length is compared to the existing or planned available storage capacity for the movement. This analysis thus provides a basis for estimating future storage requirements at intersections.

Traffic Operations Requirements

Traffic operational requirements are determined based on the adequacy of existing storage to accommodate estimated maximum vehicle queues at turn pockets. The project is said to create a significant adverse impact on traffic conditions if for either peak-hour:

> The estimated maximum (95th-percentile) vehicle queue exceeds the available storage capacity of an intersection turn pocket.

A significant traffic operational impact is said to be satisfactorily mitigated when measures are implemented that would provide the storage capacity needed to accommodate the estimated maximum vehicle queues.

The operations analysis indicated that although the length of the southbound left-turn pocket at the intersection of SR 237 and Zanker Road (S) is shown to be inadequate to store the anticipated queue length under project conditions, the same turn pocket was projected to be inadequate under

background conditions. The addition of the project generated traffic at this location (14 peak hour trips) would extend the queue length by only one vehicle (from 18 to 19 vehicles, or 450 to 475 ft.) during the PM peak hour. The vehicle queuing analysis is summarized in Table 2.

Traffic Study Requirements

The need for the preparation of a traffic impact analysis for a particular development is based on its estimated trip generation and its effect on surrounding transportation facilities. For this analysis, the criterion used to determine the need for a traffic study is based solely on the City of San Jose trip generation thresholds and level of service standards.

Based on the City of San Jose requirements for preparation of traffic impact studies, it does not appear that there is a need to prepare a full traffic study for the proposed development due to the following reasons:

- Per City of San Jose standards, all new development projected to generate 100 or more AM or PM weekday peak hour trips must prepare a Traffic Impact Analysis to evaluate transportation impacts of the project. The proposed project is only estimated to generate 38 and 56 AM and PM, respectively, peak hour trips.
- Critical intersections in the vicinity of the project site were evaluated and found to be currently operating at LOS B conditions. The addition of project traffic at these locations would not deteriorate the intersections levels of service to LOS E or worse. Therefore, based on City of San Jose level of service standards, the proposed project would not create any intersection impacts.
- Project traffic was found to have minimal effect on intersection operations, since the project would not add more than one vehicle to the existing maximum left-turn vehicle queue at the selected critical locations.

Table 2
Operational Analysis Summary

		Existing		Background		Project		Project Vehicular Queue Analysis [2]					
								Southbound LT			Eastbound LT		
	Peak Hour	Avg. Delay[1]	LOS	Avg. Delay[1]	LOS	Avg. Delay[1]	LOS	Vehicles	Length (ft.)[3]	Storage Avail. (ft.)	Vehicles	Length (ft.)[3]	Storage Avail. (ft.)
SR 237 and Zanker Road (N)	AM	12.5	B	14.5	B	14.7	B	3	75	200	--	--	--
	PM	11.1	B	17.3	B	17.5	B	5	125	200	--	--	--
SR 237 and Zanker Road (S)[4]	AM	17.5	B	20.2	C	20.2	C	7	175	300	5	125	625
	PM	11.2	B	17.3	B	17.5	B	**19**	**475**	**300**	2	50	625

Notes:
[1] Average control delay for signalized intersections based on HCM 2000 Operations Method using TRAFFIX software.
[2] Vehicle queue calculations based on cycle length for signalized operations.
[3] Assumes 25 feet per vehicle queued.
[4] SBL PM at 237/Zanker (S) queue is also inadaquate under background conditions.