Appendix B – Air Quality and Greenhouse Gas Supporting Information

Contains:

- 2019 Air Quality and Greenhouse Gas Emissions Report (SCS Engineers) and peer review (EMC Planning Group)
- 2019 Health Risk Assessment for Increased Truck Traffic (Illingworth and Rodkin)
- 2020 Toxic Air Contaminant Emissions Evaluation for Proposed Capacity Expansion (Yorke Engineering)
- 2019 Air Dispersion Modelling Report (Englobe) and peer review (Yorke Engineering)
- 2020 GHG Offset Memorandum (SCS Engineers) and 2023 peer review (AECOM)
- 2022 Bioaerosols Memorandum (AECOM)
- 2023 NOx Emissions Mitigation Memorandum (AECOM)
- 2023 Updated Air Quality and Greenhouse Gas Modeling (AECOM)

E M C

EMC PLANNING GROUP INC.
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Tel 831·649·1799 Fax 831·649·8399 www.emcplanning.com

To: **David Rader, Senior Planner**

From: **Ron Sissem, Principal**

Date: **March 23, 2020**

Re: **Peer Review of SCS Emissions Report**

Message:

At the request of the County, EMC Planning Group has conducted an independent review of the *Emissions from Proposed Changes to Z-Best Facility in Gilroy, California* dated December 20, 2019 prepared by SCS Engineers on behalf of Z-Best Products to verify the technical accuracy of the information, and identify any apparent deficiencies, errors and omissions affecting the completeness, methodologies, findings and adequacies of the analysis.

As a part of the review, EMC Planning Group requested revisions to reflect correct site acreage, peak truck traffic emissions, and typos. The county staff was advised of the necessary revisions or additions to the report. In turn, SCS Engineers modified the report to address the requested revisions.

This review letter and updated report from SCS Engineers are a part of the administrative record for the EIR. As revised, the *Emissions from Proposed Changes to Z-Best Facility in Gilroy, California* as revised is appropriate for use as reference in the EIR.

December 20, 2019
File No. 01219043.00

Mr. John Doyle
Operations Manager
Z-Best Products
980 State Highway 25
Gilroy, California

Subject: Emissions from Proposed Changes to Z-Best Facility in Gilroy, California

Dear Mr. Doyle:

Z-Best Composting (Z-Best) has prepared a Notice of Preparation (NOP) for proposed changes (Project) at the Z-Best facility at 980 State Highway 25, Gilroy (Site). The Bay Area Air Quality Management District (BAAQMD) provided comments on the California Environmental Quality Act (CEQA) Notice of Preparation (NOP) for the Project in a November 15, 2018 letter to the County of Santa Clara Department of Planning and Development. At the request of Z-Best, SCS Engineers (SCS) has prepared this response to BAAQMD questions.

The project includes the removal of the existing municipal solid waste (MSW) and foodwaste in-vessel composting system (CTI bag system) and the construction of a primary covered aerated static pile (CASP) and a secondary (curing) aerated static pile composting for MSW and foodwaste composting. The CASP system would have negative aeration with emissions controlled by biofilters for primary (active) composting and positively aerated static piles for secondary (curing) composting. The Project also includes site improvements, such as modifications to the detention basin. The Project will result in the capacity to compost an additional 875 tons per day (tpd) of MSW and/or foodwaste.

This additional 875 tpd of composting capacity would be permitted as an increase in the monthly capacity for the site. Composting reactive organic gas (ROG) emissions occur over the composting cycle, so it is appropriate to evaluate the daily change in ROG emissions based on this daily average composting rate. The project would also increase the peak daily composting rate, but this peak daily rate is independent of the monthly throughput rate.

Construction-Related Emissions

The BAAQMD requested that the emissions from the construction of the Project be quantified.

To calculate the construction emissions from the Project, SCS evaluated the project the California Emission Estimator Model (CalEEMod). The emissions calculated include mobile sources and on-road emissions related to construction, including emissions from worker commutes and the importation of soil. The emissions were calculated using construction information including the area of surface disturbed, equipment counts, and the duration of construction activities provided by Z-Best and Golder Engineering, who prepared project drawings. The pollutants analyzed include ROG, oxides of nitrogen (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and greenhouse gas (GHG).

A summary of basic project information is shown in Table 1.

Table 1. Basic Project Information

Parameter	Value
Location	Santa Clara County
Climate Zone	4
Land Use Type	General Light Industry
Lot Acreage	157.32

John Doyle provided an expected construction schedule and equipment counts. Construction would occur in three phases: grading, trenching, and paving. The duration and equipment count for each phase are shown in Table 2.

Table 2. Construction Phases and Equipment

Parameter	Grading	Trenching	Paving
Duration (months)	3	2	3
Graders	1		
Off-highway trucks (water truck)	1		
Other construction equipment (compactor)	1		
Rubber tired dozer	1		
Scraper	5		
Tractors/Loaders (includes excavator)		2	
Off-highway trucks (concrete pump truck)			1
Other construction equipment (concrete finisher)			1
Paver			1
Paving Equipment			1

The project includes the use of a water truck, which would mitigate dust emissions from soil operations and off-road vehicle travel. These mitigation measures were included in CalEEMod emission calculations. Emissions for the Project construction phase and off-site construction emissions are shown in Table 3 on an annual and a per day basis for summer and winter emissions. CalEEMod outputs, including all input parameters, are included in Attachment A.

On-Road Emissions

The BAAQMD also requested the quantification of emissions from on-road vehicles. On-road vehicle emissions were calculated using the vehicle miles traveled (VMT) provided by Hexagon Engineering and emission factors Emission Factor (EMFAC) model. Employee trips are assumed to be light duty auto (LDA). Haul vehicles are assumed to be tractor trailers. A summary of the VMT by and emission factor by trip type is shown in Table 4. The emissions are shown in Table 5. The EMFAC output is included in Attachment B.

Table 3. Construction Emissions

Period	ROG	NO_x	CO	SO_2	Fugitive PM_{10} (dust)	Exhaust PM_{10}	Total PM_{10}	Fugitive $PM_{2.5}$ (dust)	Exhaust $PM_{2.5}$	Total $PM_{2.5}$	Total GHG[1]
Annual (tons/year)	0.393	2.01	2.73	0.008	0.261	0.168	0.429	0.082	0.154	0.236	747
Summer (lb/day)	8.44	111	56.7	0.176	6.28	3.63	9.92	1.99	3.34	5.33	17,773
Winter (lb/day)	8.47	111	56.9	0.175	6.28	3.63	9.92	1.99	3.35	5.33	17,638
Off-Site (lb-day)	0.768	22.67	5.48	0.066	1.66	0.076	1.74	0.453	0.073	0.525	7,004

[1]Annual GHG Emissions shown in Metric tons of CO2 equivalent (MTCO2e) per year, daily emissions in pounds of CO2 equivalent per day

Table 4. On-Road VMT and Emission Factors

Trip Type	VMT/day	Emission Factors (g/VMT)						
		ROG	NO_x	CO	SO_2	Exhaust PM_{10}	Exhaust $PM_{2.5}$	Total GHG
Existing								
Employees	3090	0.0133	0.0536	0.761	0.00273	0.00161	0.00148	276
Trucks	7348	0.161	4.58	0.597	0.0133	0.0952	0.0911	1410
Post Project								
Employees	4076	0.0133	0.0536	0.761	0.00273	0.00161	0.00148	276
Trucks	15060	0.161	4.58	0.597	0.0133	0.0952	0.0911	1410

Table 5. On-Road Emissions

Trip Type	Emissions (lb/day)						
	ROG	NO_x	CO	SO_2	Exhaust PM_{10}	Exhaust $PM_{2.5}$	Total GHG
Existing							
Employees	0.091	0.36	5.18	0.019	0.011	0.010	1,879
Trucks	2.61	74.13	9.66	0.22	1.54	1.47	22,821
Post Project							
Employees	0.12	0.48	6.83	0.025	0.014	0.013	2,478
Trucks	5.34	151.93	19.80	0.44	3.16	3.02	46,772
Trucks (peak days)	6.93	197.20	25.71	0.57	4.10	3.92	60,711

Listing of Emission Sources

The BAAQMD has requested a listing of emission sources at the existing facility by source name and permitted source number. Emission sources for both the existing facility and the post-Project facility are listed in Table 6.

The Project includes the removal of S-28, the enclosed vessel for composting, the construction of the CASP and biofilter system, upgrading the overs screen, and the addition of a new electric trommel screen. The Site is also in the process of adding a new grinder and diesel engine to power the grinder, which is unrelated to the Project but has been included in Table 6 for completeness.

Table 6. Existing and Proposed Emission Sources

Emission Source	Permit Number	Existing	Post-Project
Green Waste Trommel Screen w/Water Spray	S-3	x	x
Green Waste Compost Windrows (15 acres) w/Water Spray	S-4	x	x
Finished Compost and Mulch Stockpiles (5 Acres) w/Water Spray	S-5	x	x
MSW Building Sort Line Disc Screen	S-8	x	x
Conveyors, MSW (2x), Green Waste/Compost (13x), MSW/Compost (13x)	S-10	x	x
Composted Green Waste 1" Overs Rotary Screen w/Water Spray	S-13	x	x
Composted MSW Fines Denzimetric Table #1 w/Baghouse	S-15	x	x
Green Waste Trommel Screen (60') w/Water Spray	S-18	x	x
Composted MSW BHS 1" Disc Screen	S-19	x	x
Mobile Diesel Engine, Peterson 6701B	S-20	x	x
Mobile Grinding Operation	S-22	x	x
Composted MSW Trommel Screen w/Water Spray	S-23	x	x
Composted MSW Fines Densimetric Table #2 w/Baghouse	S-24	x	x
Composted Green Waste Wind Shifter w/Baghouse	S-25	x	x
Finished Green Waste Compost Trommel Screen w/Water Spray	S-26	x	x
Composted MSW Trommel Screen w/Water Spray	S-27	x	x
Enclosed Vessel Composting Operating (CTI Bag)	S-28	x	
Unprocessed MSW Stockpiles	S-29	x	x
Composted MSW Stockpiles	S-30	x	x
Unprocessed Green Waste Stockpiles	S-31	x	x
Processed Green Waste Stockpiles	S-32	x	x
MSW Bag Breaker	S-33	x	x
Composted MSW BHS 1 inch Overs Screen w/Water Spray	S-34	x	modified
Covered Negative Aerated Static Pile Composting (Active Phase)	new		new
Aerated Static Pile Composting (Curing Phase)	new		new
Composted MSW Trommel Screen w/Water Spray (same as S-23)	new		new

Evaluation of Compost Process

The CASP composting process with a biofilter and abatement through a biofilter is the level of emissions control currently required by BAAQMD. The BAAQMD has determined that he best available control technology (BACT) for composting process is a CASP with a positive pressure system with a biofilter cover (typically finished compost), or CASP with a negative pressure system and an engineered biofilter to control emissions.

SCS was provided a source test report by Horizon Air Measurement Services, Inc. for a facility in Southern California that Z-Best believes is comparable to the proposed facility. Emission factors for ROG, called precursor organic compounds (POCs) in the BAAQMD, determined from that source test are used to calculate emissions from the CASP (active) and positive pressure ASP (curing) phases of the composting process as shown in Table 7. The emission factor for tipping piles prescribed by the California Air Resources Board (CARB), and required for use by the BAAQMD, is used for the emission factors from piles tipped in the tipping building. The factor is typically based pounds per ton per day emissions, but since Z-Best plans to process all incoming waste within 24 hours, we show the emission factor as simply lb/ton. Waste will also be tipped directly onto the CASP piles, which will result in no emissions from tipped waste before it is added to the active curing phase.

Please note that the emission factors derived from the aforementioned source test are abnormally low compared to data SCS has seen for similar operations. These factors are also significantly lower than the CARB-prescribed factors for POCs, which the BAAQMD has required for permitting for other compost facilities in the BAAQMD. ECS believes that the tested composting facility and the Site are significantly better designed and that the engineered systems result in much lower emissions than systems with only “rudimentary” engineering and process control. If the BAAQMD accepts these factors, they will become permit limits, and Z-Best will be required to do testing annually to prove they can meet these levels on a continuous basis. Because of the potential challenge of passing a source test with such a low emission factor, the emission factor was increased by a factor of 50 percent.

The active composting process is mitigated by a CASP system mitigates 80 percent of VOC emissions per CARB and BAAQMD evaluations. The curing composting process will be mitigated by a positive pressure ASP with a moist compost cover layer, which provides mitigation of 50 percent of VOC emissions. The source test being used in this analysis did not provide independent testing of the curing piles, so the emission factor for the curing pile is assumed to be the same as for active composting. Curing piles have lower emission rates than the active, so the use of the emission factor for the active composting phase is a conservative assumption and is expected to overestimate VOC emissions.

BAAQMD has not published a BACT determination for composting. Several other facilities have been permitted in the BAAQMD with BACT defined as a CASP as BACT for the active composting phase. BAAQMD has not proposed BACT for the curing phase, and the use of a positive ASP with moist compost layer exceeds the mitigation required by BAAQMD.

POC emissions from the composting process, both before and after mitigation, are shown in Table 7.

Table 7. POC Emissions from Composting Process

Phase	Emission Factor (lb/wet ton of material)	Daily Throughput (tpd)	Uncontrolled Daily Emission (lb/day)	Control Efficiency	Controlled Daily Emission (lb/day)	Controlled Annual Emissions (tons/year)
In-building tipping	0.2	219	43.8	0	43.75	7.98
Negative CASP (Active Phase)	0.0151	875	13.2	80%	2.64	0.48
Positive ASP (Curing Phase)	0.0151	875	13.2	50%	6.61	1.21
Total			70.2		53.00	9.67

CLOSING

This additional information was provided to address emissions-related questions from the BAAQMD about the proposed modification of the Z-Best composting facility in Gilroy, California. The emissions information for construction and on-road emissions, and the information about permitted sources can be incorporated into or referenced ban appropriate CEQA document for the proposed modification of the facility.

If you have any questions or concerns about this evaluation, please contact the undersigned at 562-637-4561.

Sincerely,

Raymond H. Huff, R.E.P.A.
Vice President
SCS Engineers
Sincerely,

Patrick S. Sullivan, R.E.P.A., C.P.P., B.C.E.S.
Senior Vice President
SCS Engineers

attachments

Attachment A

CalEEMod Output

Z-Best Gilroy

Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	0.00	1000sqft	157.32	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	4			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Acreage from Golder Drawing 5A - AERATED STATIC PILE COPOSTING PERMIT PACKAGE

Construction Phase - grading expected to take 3 months
trenching expected to take 2 months
construction expected to take 59 working days

Off-road Equipment - Equipment counts based on highest number of equipment planned for each phase
Grading "other construction equipment" is compactor

Off-road Equipment - Off Highway Truck is concrete pumping trucks (estimated 250 hp)
Other construction equipment is ride on concrete finishers (37 hp)

Off-road Equipment - equpment use from description of construction activities provided by email on 2/25/18

Trips and VMT - trip counts provided by site

Grading -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	5
tblConstructionPhase	NumDays	620.00	78.00
tblConstructionPhase	NumDays	440.00	69.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblLandUse	LotAcreage	0.00	157.32
tblOffRoadEquipment	HorsePower	402.00	250.00
tblOffRoadEquipment	HorsePower	172.00	37.00
tblOffRoadEquipment	LoadFactor	0.38	0.42
tblOffRoadEquipment	LoadFactor	0.42	0.36
tblOffRoadEquipment	OffRoadEquipmentType		Pavers
tblOffRoadEquipment	OffRoadEquipmentType		Paving Equipment
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	5.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Trenching
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Paving
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	0.00	6,200.00
tblTripsAndVMT	VendorTripNumber	0.00	50.00
tblTripsAndVMT	WorkerTripNumber	23.00	33.00
tblTripsAndVMT	WorkerTripNumber	5.00	25.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.3926	5.0050	2.7257	8.1700e-003	0.5433	0.1675	0.7107	0.1759	0.1542	0.3301	0.0000	743.4052	743.4052	0.1587	0.0000	747.3718
Maximum	**0.3926**	**5.0050**	**2.7257**	**8.1700e-003**	**0.5433**	**0.1675**	**0.7107**	**0.1759**	**0.1542**	**0.3301**	**0.0000**	**743.4052**	**743.4052**	**0.1587**	**0.0000**	**747.3718**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.3926	4.8362	2.7257	8.1700e-003	0.2612	0.1675	0.4287	0.0822	0.1542	0.2364	0.0000	743.4046	743.4046	0.1587	0.0000	747.3712
Maximum	**0.3926**	**4.8362**	**2.7257**	**8.1700e-003**	**0.2612**	**0.1675**	**0.4287**	**0.0822**	**0.1542**	**0.2364**	**0.0000**	**743.4046**	**743.4046**	**0.1587**	**0.0000**	**747.3712**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**3.37**	**0.00**	**0.00**	**51.92**	**0.00**	**39.68**	**53.29**	**0.00**	**28.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**4-1-2020**	**6-30-2020**	4.6448	4.6448
2	**7-1-2020**	**9-30-2020**	0.3505	0.2876
		Highest	4.6448	4.6448

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	4/1/2020	6/30/2020	6	78	
2	Trenching	Trenching	7/1/2020	8/31/2020	6	53	
3	Paving	Paving	9/1/2020	11/19/2020	6	69	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 429

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Graders	1	8.00	187	0.41
Grading	Off-Highway Trucks	1	8.00	402	0.38
Grading	Other Construction Equipment	1	8.00	172	0.42
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	5	8.00	367	0.48
Trenching	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Off-Highway Trucks	1	8.00	250	0.42
Paving	Other Construction Equipment	1	8.00	37	0.36
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	9	33.00	0.00	6,200.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	2	5.00	0.00	0.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	2	25.00	50.00	0.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

3.2 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4623	0.0000	0.4623	0.1537	0.0000	0.1537	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2994	3.4312	1.9957	4.3000e-003		0.1387	0.1387		0.1276	0.1276	0.0000	377.9513	377.9513	0.1222	0.0000	381.0072
Total	**0.2994**	**3.4312**	**1.9957**	**4.3000e-003**	**0.4623**	**0.1387**	**0.6010**	**0.1537**	**0.1276**	**0.2812**	**0.0000**	**377.9513**	**377.9513**	**0.1222**	**0.0000**	**381.0072**

3.2 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0258	0.8996	0.1842	2.4400e-003	0.0526	2.9200e-003	0.0555	0.0145	2.8000e-003	0.0172	0.0000	236.4395	236.4395	0.0108	0.0000	236.7099
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.2700e-003	3.0700e-003	0.0322	1.0000e-004	0.0102	7.0000e-005	0.0103	2.7100e-003	6.0000e-005	2.7800e-003	0.0000	8.7535	8.7535	2.1000e-004	0.0000	8.7589
Total	**0.0300**	**0.9026**	**0.2164**	**2.5400e-003**	**0.0628**	**2.9900e-003**	**0.0657**	**0.0172**	**2.8600e-003**	**0.0200**	**0.0000**	**245.1930**	**245.1930**	**0.0110**	**0.0000**	**245.4688**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1803	0.0000	0.1803	0.0599	0.0000	0.0599	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2994	3.4312	1.9957	4.3000e-003		0.1387	0.1387		0.1276	0.1276	0.0000	377.9508	377.9508	0.1222	0.0000	381.0067
Total	**0.2994**	**3.4312**	**1.9957**	**4.3000e-003**	**0.1803**	**0.1387**	**0.3190**	**0.0599**	**0.1276**	**0.1875**	**0.0000**	**377.9508**	**377.9508**	**0.1222**	**0.0000**	**381.0067**

3.2 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0258	0.8996	0.1842	2.4400e-003	0.0526	2.9200e-003	0.0555	0.0145	2.8000e-003	0.0172	0.0000	236.4395	236.4395	0.0108	0.0000	236.7099
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.2700e-003	3.0700e-003	0.0322	1.0000e-004	0.0102	7.0000e-005	0.0103	2.7100e-003	6.0000e-005	2.7800e-003	0.0000	8.7535	8.7535	2.1000e-004	0.0000	8.7589
Total	**0.0300**	**0.9026**	**0.2164**	**2.5400e-003**	**0.0628**	**2.9900e-003**	**0.0657**	**0.0172**	**2.8600e-003**	**0.0200**	**0.0000**	**245.1930**	**245.1930**	**0.0110**	**0.0000**	**245.4688**

3.3 Trenching - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0111	0.1116	0.1208	1.6000e-004		7.0600e-003	7.0600e-003		6.4900e-003	6.4900e-003	0.0000	14.4612	14.4612	4.6800e-003	0.0000	14.5781
Total	**0.0111**	**0.1116**	**0.1208**	**1.6000e-004**		**7.0600e-003**	**7.0600e-003**		**6.4900e-003**	**6.4900e-003**	**0.0000**	**14.4612**	**14.4612**	**4.6800e-003**	**0.0000**	**14.5781**

3.3 Trenching - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4000e-004	3.2000e-004	3.3200e-003	1.0000e-005	1.0500e-003	1.0000e-005	1.0600e-003	2.8000e-004	1.0000e-005	2.9000e-004	0.0000	0.9012	0.9012	2.0000e-005	0.0000	0.9018
Total	**4.4000e-004**	**3.2000e-004**	**3.3200e-003**	**1.0000e-005**	**1.0500e-003**	**1.0000e-005**	**1.0600e-003**	**2.8000e-004**	**1.0000e-005**	**2.9000e-004**	**0.0000**	**0.9012**	**0.9012**	**2.0000e-005**	**0.0000**	**0.9018**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0111	0.1116	0.1208	1.6000e-004		7.0600e-003	7.0600e-003		6.4900e-003	6.4900e-003	0.0000	14.4612	14.4612	4.6800e-003	0.0000	14.5781
Total	**0.0111**	**0.1116**	**0.1208**	**1.6000e-004**		**7.0600e-003**	**7.0600e-003**		**6.4900e-003**	**6.4900e-003**	**0.0000**	**14.4612**	**14.4612**	**4.6800e-003**	**0.0000**	**14.5781**

3.3 Trenching - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4000e-004	3.2000e-004	3.3200e-003	1.0000e-005	1.0500e-003	1.0000e-005	1.0600e-003	2.8000e-004	1.0000e-005	2.9000e-004	0.0000	0.9012	0.9012	2.0000e-005	0.0000	0.9018
Total	**4.4000e-004**	**3.2000e-004**	**3.3200e-003**	**1.0000e-005**	**1.0500e-003**	**1.0000e-005**	**1.0600e-003**	**2.8000e-004**	**1.0000e-005**	**2.9000e-004**	**0.0000**	**0.9012**	**0.9012**	**2.0000e-005**	**0.0000**	**0.9018**

3.4 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0423	0.3698	0.3178	6.5000e-004		0.0178	0.0178		0.0164	0.0164	0.0000	57.4057	57.4057	0.0186	0.0000	57.8698
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0423**	**0.3698**	**0.3178**	**6.5000e-004**		**0.0178**	**0.0178**		**0.0164**	**0.0164**	**0.0000**	**57.4057**	**57.4057**	**0.0186**	**0.0000**	**57.8698**

3.4 Paving - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.4400e-003	0.1874	0.0501	4.3000e-004	0.0103	8.9000e-004	0.0112	2.9700e-003	8.5000e-004	3.8100e-003	0.0000	41.6266	41.6266	1.9900e-003	0.0000	41.6763
Worker	2.8600e-003	2.0600e-003	0.0216	6.0000e-005	6.8400e-003	4.0000e-005	6.8800e-003	1.8200e-003	4.0000e-005	1.8600e-003	0.0000	5.8663	5.8663	1.4000e-004	0.0000	5.8699
Total	**9.3000e-003**	**0.1895**	**0.0717**	**4.9000e-004**	**0.0171**	**9.3000e-004**	**0.0180**	**4.7900e-003**	**8.9000e-004**	**5.6700e-003**	**0.0000**	**47.4928**	**47.4928**	**2.1300e-003**	**0.0000**	**47.5462**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0423	0.2010	0.3178	6.5000e-004		0.0178	0.0178		0.0164	0.0164	0.0000	57.4056	57.4056	0.0186	0.0000	57.8698
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0423**	**0.2010**	**0.3178**	**6.5000e-004**		**0.0178**	**0.0178**		**0.0164**	**0.0164**	**0.0000**	**57.4056**	**57.4056**	**0.0186**	**0.0000**	**57.8698**

3.4 Paving - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.4400e-003	0.1874	0.0501	4.3000e-004	0.0103	8.9000e-004	0.0112	2.9700e-003	8.5000e-004	3.8100e-003	0.0000	41.6266	41.6266	1.9900e-003	0.0000	41.6763
Worker	2.8600e-003	2.0600e-003	0.0216	6.0000e-005	6.8400e-003	4.0000e-005	6.8800e-003	1.8200e-003	4.0000e-005	1.8600e-003	0.0000	5.8663	5.8663	1.4000e-004	0.0000	5.8699
Total	**9.3000e-003**	**0.1895**	**0.0717**	**4.9000e-004**	**0.0171**	**9.3000e-004**	**0.0180**	**4.7900e-003**	**8.9000e-004**	**5.6700e-003**	**0.0000**	**47.4928**	**47.4928**	**2.1300e-003**	**0.0000**	**47.5462**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	14.70	6.60	6.60	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.610498	0.036775	0.183084	0.106123	0.014413	0.005007	0.012610	0.021118	0.002144	0.001548	0.005312	0.000627	0.000740

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

Land Use	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	kBTU/yr	tons/yr										MT/yr					
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Out door Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Z-Best Gilroy

Santa Clara County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	0.00	1000sqft	157.32	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	4			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Acreage from Golder Drawing 5A - AERATED STATIC PILE COPOSTING PERMIT PACKAGE

Construction Phase - grading expected to take 3 months
trenching expected to take 2 months
construction expected to take 59 working days

Off-road Equipment - Equipment counts based on highest number of equipment planned for each phase
Grading "other construction equipment" is compactor

Off-road Equipment - Off Highway Truck is concrete pumping trucks (estimated 250 hp)
Other construction equipment is ride on concrete finishers (37 hp)

Off-road Equipment - equpment use from description of construction activities provided by email on 2/25/18

Trips and VMT - trip counts provided by site

Grading -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	5
tblConstructionPhase	NumDays	620.00	78.00
tblConstructionPhase	NumDays	440.00	69.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblLandUse	LotAcreage	0.00	157.32
tblOffRoadEquipment	HorsePower	402.00	250.00
tblOffRoadEquipment	HorsePower	172.00	37.00
tblOffRoadEquipment	LoadFactor	0.38	0.42
tblOffRoadEquipment	LoadFactor	0.42	0.36
tblOffRoadEquipment	OffRoadEquipmentType		Pavers
tblOffRoadEquipment	OffRoadEquipmentType		Paving Equipment
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	5.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Trenching
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Paving
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	0.00	6,200.00
tblTripsAndVMT	VendorTripNumber	0.00	50.00
tblTripsAndVMT	WorkerTripNumber	23.00	33.00
tblTripsAndVMT	WorkerTripNumber	5.00	25.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	8.4447	110.6535	56.6554	0.1760	13.5151	3.6320	17.1470	4.3927	3.3441	7.7368	0.0000	17,679.2801	17,679.2801	3.7610	0.0000	17,773.3058
Maximum	**8.4447**	**110.6535**	**56.6554**	**0.1760**	**13.5151**	**3.6320**	**17.1470**	**4.3927**	**3.3441**	**7.7368**	**0.0000**	**17,679.2801**	**17,679.2801**	**3.7610**	**0.0000**	**17,773.3058**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	8.4447	110.6535	56.6554	0.1760	6.2836	3.6320	9.9156	1.9892	3.3441	5.3334	0.0000	17,679.2801	17,679.2801	3.7610	0.0000	17,773.3058
Maximum	**8.4447**	**110.6535**	**56.6554**	**0.1760**	**6.2836**	**3.6320**	**9.9156**	**1.9892**	**3.3441**	**5.3334**	**0.0000**	**17,679.2801**	**17,679.2801**	**3.7610**	**0.0000**	**17,773.3058**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**53.51**	**0.00**	**42.17**	**54.71**	**0.00**	**31.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	4/1/2020	6/30/2020	6	78	
2	Trenching	Trenching	7/1/2020	8/31/2020	6	53	
3	Paving	Paving	9/1/2020	11/19/2020	6	69	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 429

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Graders	1	8.00	187	0.41
Grading	Off-Highway Trucks	1	8.00	402	0.38
Grading	Other Construction Equipment	1	8.00	172	0.42
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	5	8.00	367	0.48
Trenching	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Off-Highway Trucks	1	8.00	250	0.42
Paving	Other Construction Equipment	1	8.00	37	0.36
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	9	33.00	0.00	6,200.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	2	5.00	0.00	0.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	2	25.00	50.00	0.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

3.2 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					11.8548	0.0000	11.8548	3.9400	0.0000	3.9400			0.0000			0.0000
Off-Road	7.6770	87.9800	51.1712	0.1103		3.5558	3.5558		3.2714	3.2714		10,682.56 28	10,682.56 28	3.4550		10,768.93 68
Total	**7.6770**	**87.9800**	**51.1712**	**0.1103**	**11.8548**	**3.5558**	**15.4107**	**3.9400**	**3.2714**	**7.2114**		**10,682.56 28**	**10,682.56 28**	**3.4550**		**10,768.93 68**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6530	22.6030	4.5765	0.0631	1.3892	0.0744	1.4636	0.3807	0.0712	0.4519		6,730.735 1	6,730.735 1	0.2996		6,738.224 1
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1147	0.0704	0.9076	2.6700e-003	0.2711	1.6900e-003	0.2728	0.0719	1.5600e-003	0.0735		265.9821	265.9821	6.5100e-003		266.1448
Total	**0.7677**	**22.6734**	**5.4841**	**0.0658**	**1.6603**	**0.0761**	**1.7364**	**0.4526**	**0.0728**	**0.5254**		**6,996.717 2**	**6,996.717 2**	**0.3061**		**7,004.369 0**

3.2 Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.6234	0.0000	4.6234	1.5366	0.0000	1.5366			0.0000			0.0000
Off-Road	7.6770	87.9800	51.1712	0.1103		3.5558	3.5558		3.2714	3.2714	0.0000	10,682.5628	10,682.5628	3.4550		10,768.9368
Total	**7.6770**	**87.9800**	**51.1712**	**0.1103**	**4.6234**	**3.5558**	**8.1792**	**1.5366**	**3.2714**	**4.8080**	**0.0000**	**10,682.5628**	**10,682.5628**	**3.4550**		**10,768.9368**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6530	22.6030	4.5765	0.0631	1.3892	0.0744	1.4636	0.3807	0.0712	0.4519		6,730.7351	6,730.7351	0.2996		6,738.2241
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1147	0.0704	0.9076	2.6700e-003	0.2711	1.6900e-003	0.2728	0.0719	1.5600e-003	0.0735		265.9821	265.9821	6.5100e-003		266.1448
Total	**0.7677**	**22.6734**	**5.4841**	**0.0658**	**1.6603**	**0.0761**	**1.7364**	**0.4526**	**0.0728**	**0.5254**		**6,996.7172**	**6,996.7172**	**0.3061**		**7,004.3690**

3.3 Trenching - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4190	4.2103	4.5594	6.2100e-003		0.2662	0.2662		0.2449	0.2449		601.5370	601.5370	0.1946		606.4008
Total	**0.4190**	**4.2103**	**4.5594**	**6.2100e-003**		**0.2662**	**0.2662**		**0.2449**	**0.2449**		**601.5370**	**601.5370**	**0.1946**		**606.4008**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0174	0.0107	0.1375	4.0000e-004	0.0411	2.6000e-004	0.0413	0.0109	2.4000e-004	0.0111		40.3003	40.3003	9.9000e-004		40.3250
Total	**0.0174**	**0.0107**	**0.1375**	**4.0000e-004**	**0.0411**	**2.6000e-004**	**0.0413**	**0.0109**	**2.4000e-004**	**0.0111**		**40.3003**	**40.3003**	**9.9000e-004**		**40.3250**

3.3 Trenching - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4190	4.2103	4.5594	6.2100e-003		0.2662	0.2662		0.2449	0.2449	0.0000	601.5370	601.5370	0.1946		606.4008
Total	**0.4190**	**4.2103**	**4.5594**	**6.2100e-003**		**0.2662**	**0.2662**		**0.2449**	**0.2449**	**0.0000**	**601.5370**	**601.5370**	**0.1946**		**606.4008**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0174	0.0107	0.1375	4.0000e-004	0.0411	2.6000e-004	0.0413	0.0109	2.4000e-004	0.0111		40.3003	40.3003	9.9000e-004		40.3250
Total	**0.0174**	**0.0107**	**0.1375**	**4.0000e-004**	**0.0411**	**2.6000e-004**	**0.0413**	**0.0109**	**2.4000e-004**	**0.0111**		**40.3003**	**40.3003**	**9.9000e-004**		**40.3250**

3.4 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2252	10.7180	9.2121	0.0189		0.5169	0.5169		0.4755	0.4755		1,834.1714	1,834.1714	0.5932		1,849.0016
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2252**	**10.7180**	**9.2121**	**0.0189**		**0.5169**	**0.5169**		**0.4755**	**0.4755**		**1,834.1714**	**1,834.1714**	**0.5932**		**1,849.0016**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1827	5.3718	1.3579	0.0127	0.3062	0.0255	0.3317	0.0882	0.0244	0.1125		1,345.5498	1,345.5498	0.0613		1,347.0833
Worker	0.0869	0.0534	0.6876	2.0200e-003	0.2054	1.2800e-003	0.2067	0.0545	1.1800e-003	0.0557		201.5016	201.5016	4.9300e-003		201.6249
Total	**0.2696**	**5.4251**	**2.0455**	**0.0148**	**0.5115**	**0.0268**	**0.5383**	**0.1426**	**0.0256**	**0.1682**		**1,547.0514**	**1,547.0514**	**0.0663**		**1,548.7082**

3.4 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2252	5.8263	9.2121	0.0189		0.5169	0.5169		0.4755	0.4755	0.0000	1,834.171 4	1,834.171 4	0.5932		1,849.001 6
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2252**	**5.8263**	**9.2121**	**0.0189**		**0.5169**	**0.5169**		**0.4755**	**0.4755**	**0.0000**	**1,834.171 4**	**1,834.171 4**	**0.5932**		**1,849.001 6**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1827	5.3718	1.3579	0.0127	0.3062	0.0255	0.3317	0.0882	0.0244	0.1125		1,345.549 8	1,345.549 8	0.0613		1,347.083 3
Worker	0.0869	0.0534	0.6876	2.0200e-003	0.2054	1.2800e-003	0.2067	0.0545	1.1800e-003	0.0557		201.5016	201.5016	4.9300e-003		201.6249
Total	**0.2696**	**5.4251**	**2.0455**	**0.0148**	**0.5115**	**0.0268**	**0.5383**	**0.1426**	**0.0256**	**0.1682**		**1,547.051 4**	**1,547.051 4**	**0.0663**		**1,548.708 2**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	14.70	6.60	6.60	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.610498	0.036775	0.183084	0.106123	0.014413	0.005007	0.012610	0.021118	0.002144	0.001548	0.005312	0.000627	0.000740

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Z-Best Gilroy

Santa Clara County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	0.00	1000sqft	157.32	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	4			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Acreage from Golder Drawing 5A - AERATED STATIC PILE COPOSTING PERMIT PACKAGE

Construction Phase - grading expected to take 3 months
trenching expected to take 2 months
construction expected to take 59 working days

Off-road Equipment - Equipment counts based on highest number of equipment planned for each phase
Grading "other construction equipment" is compactor

Off-road Equipment - Off Highway Truck is concrete pumping trucks (estimated 250 hp)
Other construction equipment is ride on concrete finishers (37 hp)

Off-road Equipment - equpment use from description of construction activities provided by email on 2/25/18

Trips and VMT - trip counts provided by site

Grading -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	5
tblConstructionPhase	NumDays	620.00	78.00
tblConstructionPhase	NumDays	440.00	69.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblLandUse	LotAcreage	0.00	157.32
tblOffRoadEquipment	HorsePower	402.00	250.00
tblOffRoadEquipment	HorsePower	172.00	37.00
tblOffRoadEquipment	LoadFactor	0.38	0.42
tblOffRoadEquipment	LoadFactor	0.42	0.36
tblOffRoadEquipment	OffRoadEquipmentType		Pavers
tblOffRoadEquipment	OffRoadEquipmentType		Paving Equipment
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	5.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Trenching
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Paving
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	0.00	6,200.00
tblTripsAndVMT	VendorTripNumber	0.00	50.00
tblTripsAndVMT	WorkerTripNumber	23.00	33.00
tblTripsAndVMT	WorkerTripNumber	5.00	25.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	8.4700	111.2206	56.9371	0.1748	13.5151	3.6332	17.1483	4.3927	3.3453	7.7380	0.0000	17,543.5636	17,543.5636	3.7747	0.0000	17,637.9308
Maximum	**8.4700**	**111.2206**	**56.9371**	**0.1748**	**13.5151**	**3.6332**	**17.1483**	**4.3927**	**3.3453**	**7.7380**	**0.0000**	**17,543.5636**	**17,543.5636**	**3.7747**	**0.0000**	**17,637.9308**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	8.4700	111.2206	56.9371	0.1748	6.2836	3.6332	9.9168	1.9892	3.3453	5.3345	0.0000	17,543.5636	17,543.5636	3.7747	0.0000	17,637.9308
Maximum	**8.4700**	**111.2206**	**56.9371**	**0.1748**	**6.2836**	**3.6332**	**9.9168**	**1.9892**	**3.3453**	**5.3345**	**0.0000**	**17,543.5636**	**17,543.5636**	**3.7747**	**0.0000**	**17,637.9308**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**53.51**	**0.00**	**42.17**	**54.71**	**0.00**	**31.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	4/1/2020	6/30/2020	6	78	
2	Trenching	Trenching	7/1/2020	8/31/2020	6	53	
3	Paving	Paving	9/1/2020	11/19/2020	6	69	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 429

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Graders	1	8.00	187	0.41
Grading	Off-Highway Trucks	1	8.00	402	0.38
Grading	Other Construction Equipment	1	8.00	172	0.42
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	5	8.00	367	0.48
Trenching	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Off-Highway Trucks	1	8.00	250	0.42
Paving	Other Construction Equipment	1	8.00	37	0.36
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	9	33.00	0.00	6,200.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	2	5.00	0.00	0.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	2	25.00	50.00	0.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

3.2 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					11.8548	0.0000	11.8548	3.9400	0.0000	3.9400			0.0000			0.0000
Off-Road	7.6770	87.9800	51.1712	0.1103		3.5558	3.5558		3.2714	3.2714		10,682.5628	10,682.5628	3.4550		10,768.9368
Total	**7.6770**	**87.9800**	**51.1712**	**0.1103**	**11.8548**	**3.5558**	**15.4107**	**3.9400**	**3.2714**	**7.2114**		**10,682.5628**	**10,682.5628**	**3.4550**		**10,768.9368**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6710	23.1545	4.9249	0.0620	1.3892	0.0756	1.4648	0.3807	0.0724	0.4531		6,616.6469	6,616.6469	0.3137		6,624.4887
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1220	0.0860	0.8410	2.4500e-003	0.2711	1.6900e-003	0.2728	0.0719	1.5600e-003	0.0735		244.3538	244.3538	6.0600e-003		244.5053
Total	**0.7930**	**23.2405**	**5.7659**	**0.0645**	**1.6603**	**0.0773**	**1.7376**	**0.4526**	**0.0739**	**0.5266**		**6,861.0007**	**6,861.0007**	**0.3197**		**6,868.9940**

3.2 Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.6234	0.0000	4.6234	1.5366	0.0000	1.5366			0.0000			0.0000
Off-Road	7.6770	87.9800	51.1712	0.1103		3.5558	3.5558		3.2714	3.2714	0.0000	10,682.5628	10,682.5628	3.4550		10,768.9368
Total	**7.6770**	**87.9800**	**51.1712**	**0.1103**	**4.6234**	**3.5558**	**8.1792**	**1.5366**	**3.2714**	**4.8080**	**0.0000**	**10,682.5628**	**10,682.5628**	**3.4550**		**10,768.9368**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6710	23.1545	4.9249	0.0620	1.3892	0.0756	1.4648	0.3807	0.0724	0.4531		6,616.6469	6,616.6469	0.3137		6,624.4887
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1220	0.0860	0.8410	2.4500e-003	0.2711	1.6900e-003	0.2728	0.0719	1.5600e-003	0.0735		244.3538	244.3538	6.0600e-003		244.5053
Total	**0.7930**	**23.2405**	**5.7659**	**0.0645**	**1.6603**	**0.0773**	**1.7376**	**0.4526**	**0.0739**	**0.5266**		**6,861.0007**	**6,861.0007**	**0.3197**		**6,868.9940**

3.3 Trenching - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4190	4.2103	4.5594	6.2100e-003		0.2662	0.2662		0.2449	0.2449		601.5370	601.5370	0.1946		606.4008
Total	**0.4190**	**4.2103**	**4.5594**	**6.2100e-003**		**0.2662**	**0.2662**		**0.2449**	**0.2449**		**601.5370**	**601.5370**	**0.1946**		**606.4008**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0185	0.0130	0.1274	3.7000e-004	0.0411	2.6000e-004	0.0413	0.0109	2.4000e-004	0.0111		37.0233	37.0233	9.2000e-004		37.0463
Total	**0.0185**	**0.0130**	**0.1274**	**3.7000e-004**	**0.0411**	**2.6000e-004**	**0.0413**	**0.0109**	**2.4000e-004**	**0.0111**		**37.0233**	**37.0233**	**9.2000e-004**		**37.0463**

3.3 Trenching - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.4190	4.2103	4.5594	6.2100e-003		0.2662	0.2662		0.2449	0.2449	0.0000	601.5370	601.5370	0.1946		606.4008
Total	**0.4190**	**4.2103**	**4.5594**	**6.2100e-003**		**0.2662**	**0.2662**		**0.2449**	**0.2449**	**0.0000**	**601.5370**	**601.5370**	**0.1946**		**606.4008**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0185	0.0130	0.1274	3.7000e-004	0.0411	2.6000e-004	0.0413	0.0109	2.4000e-004	0.0111		37.0233	37.0233	9.2000e-004		37.0463
Total	**0.0185**	**0.0130**	**0.1274**	**3.7000e-004**	**0.0411**	**2.6000e-004**	**0.0413**	**0.0109**	**2.4000e-004**	**0.0111**		**37.0233**	**37.0233**	**9.2000e-004**		**37.0463**

3.4 Paving - 2020

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Off-Road	1.2252	10.7180	9.2121	0.0189		0.5169	0.5169		0.4755	0.4755		1,834.1714	1,834.1714	0.5932		1,849.0016
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2252**	**10.7180**	**9.2121**	**0.0189**		**0.5169**	**0.5169**		**0.4755**	**0.4755**		**1,834.1714**	**1,834.1714**	**0.5932**		**1,849.0016**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1928	5.4223	1.5577	0.0124	0.3062	0.0259	0.3321	0.0882	0.0248	0.1130		1,308.5759	1,308.5759	0.0663		1,310.2328
Worker	0.0924	0.0652	0.6371	1.8600e-003	0.2054	1.2800e-003	0.2067	0.0545	1.1800e-003	0.0557		185.1165	185.1165	4.5900e-003		185.2313
Total	**0.2852**	**5.4875**	**2.1948**	**0.0142**	**0.5115**	**0.0272**	**0.5387**	**0.1426**	**0.0260**	**0.1686**		**1,493.6924**	**1,493.6924**	**0.0709**		**1,495.4641**

3.4 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2252	5.8263	9.2121	0.0189		0.5169	0.5169		0.4755	0.4755	0.0000	1,834.1714	1,834.1714	0.5932		1,849.0016
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2252**	**5.8263**	**9.2121**	**0.0189**		**0.5169**	**0.5169**		**0.4755**	**0.4755**	**0.0000**	**1,834.1714**	**1,834.1714**	**0.5932**		**1,849.0016**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1928	5.4223	1.5577	0.0124	0.3062	0.0259	0.3321	0.0882	0.0248	0.1130		1,308.5759	1,308.5759	0.0663		1,310.2328
Worker	0.0924	0.0652	0.6371	1.8600e-003	0.2054	1.2800e-003	0.2067	0.0545	1.1800e-003	0.0557		185.1165	185.1165	4.5900e-003		185.2313
Total	**0.2852**	**5.4875**	**2.1948**	**0.0142**	**0.5115**	**0.0272**	**0.5387**	**0.1426**	**0.0260**	**0.1686**		**1,493.6924**	**1,493.6924**	**0.0709**		**1,495.4641**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	14.70	6.60	6.60	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.610498	0.036775	0.183084	0.106123	0.014413	0.005007	0.012610	0.021118	0.002144	0.001548	0.005312	0.000627	0.000740

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Attachment B

EMFAC Output

EMFAC2017 (v1.0.2) Emission Rates
Region Type: Air District
Region: BAY AREA AQMD
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RUNLS, g/vehicle/day for IDLEX, RESTL and DIURN

Region	Calendar Y	Vehicle Cat	Model Year	Speed	Fuel	ROG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	CH4_RUNEX	PM10_RUNEX	PM2_5_RUNEX	SOx_RUNEX	SOx_STREX	N2O_RUNEX
BAY AREA /	2020	LDA	Aggregatec	Aggregatec	GAS	0.013321179	0.760834107	0.053576977	276.358803	0.003284054	0.001605795	0.001476507	0.002734794	0.000581507	0.005456194
BAY AREA /	2020	T7 tractor	Aggregatec	Aggregatec	DSL	0.161086208	0.597015221	4.579019292	1409.592818	0.007482037	0.095204504	0.091086	0.013317134	0	0.221568361

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M E M O

Date: August 22, 2019
Updated February 26, 2020

To: **Tanya Kalaskar**
EMC PLANNING GROUP INC.
301 Lighthouse Avenue, Suite C
Monterey, California 93940

From: James A. Reyff
Illingworth & Rodkin, Inc.
1 Willowbrook Court, Suite 120
Petaluma, CA 94954

RE: Z-Best Composting Facility - Gilroy, CA

SUBJECT: Health Risk Assessment for Increased Truck Traffic Job#19-153

This memo addresses the health risk impacts from increase truck traffic caused by the Z-Best Composting Facility project. The purpose of the proposed project is to modify Z-Best's existing municipal solid waste (MSW) composting operations to enable more efficient composting. This is planned to be achieved by converting the existing Compost Technologies, Inc. composting process and technology, which utilizes composting bags, with an Engineered Composting System process and technology, which consists of aerated static pile (ASP) technology. The ASP technology and operations modifications would enable Z-Best to increase its current permitted MSW composting capacity from 1,500 tons per day to 2,750 tons per day. The proposed expansion would result in an increase of 32 additional employees. The additional employees would result in 64 new daily trips (32 inbound and 32 outbound trips). Under normal conditions the proposed project would generate 100 additional trucks per day, or 200 truck trips (100 inbound and 100 outbound) per day. In addition, for 20 days per year there would be an additional 57 trucks per day, or 114 trips per day, in addition to the normal 200 trips per day. All of this traffic would use State Route 25. A traffic study prepared by Hexagon indicates that 83 percent of the traffic would be traveling to the west and 17 percent would travel east of the project site. Truck traffic is expected to occur at night from about 6:00 p.m. to 9:00 a.m.

The primary health risk impacts to off-site sensitive receptors associated with this action would be caused by heavy-duty diesel trucks. Diesel particulate matter (DPM), emitted by these trucks, is a potent toxic air contaminant (TAC) that increases cancer risk. While automobiles are also a source of TACs, the impact they pose compared to trucks is insubstantial due to the much lower emission rates and types of TACs they emit. Therefore, this screening health risk assessment evaluated the effects of emissions from diesel trucks to sensitive receptors near the highway.

As previously discussed, the project would generate 200 daily heavy-duty truck trips, assumed to occur 365 days per year, with an additional 114 trips per day for 20 days per year, over a project lifetime of 30 years. These were assumed to include a mix of heavy heavy-duty diesel trucks (HHDT) and medium heavy-duty diesel trucks (MHDT) category trucks. Travel emissions were estimated for 55-mph and 35-mph speeds, based on rates generated by the Caltrans version of the EMFAC2017 vehicle emissions model, known as CT-EMFAC. The model was run for Santa Clara County assuming 100% Truck category 2, which is a mix of HHDT and MHDT. The analysis year was 2020 only, as future decreases in truck emissions were not incorporated into this analysis. CT-EMFAC provides emission rates for mobile source air toxics (MSATs) that include diesel particulate matter.

The U.S. EPA AERMOD dispersion model was used to predict DPM and $PM_{2.5}$ concentrations at sensitive receptors (residences) in the vicinity of the project truck travel. The AERMOD model is a BAAQMD-recommended model for use in modeling analysis of these types of emission activities for CEQA projects.[1] Annual DPM and $PM_{2.5}$ concentrations from truck traffic were computed using the model at sensitive receptors. Some groups of people are more affected by air pollution than others. The State has identified the following people who are most likely to be affected by air pollution: children under 16, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, and elementary schools. Residential locations are assumed to include infants and small children. Residences along State Route 25 both east and west of the project site were included as sensitive receptors. Figure 1 shows the locations of residences along State Route 25 that may be affected by the project truck trips.

The modeling used two sets of meteorological data:

(1) A five-year data set (2013 - 2017) of hourly meteorological data from San Martin Airport prepared for use with the AERMOD model by the Bay Area Air Quality Management District (BAAQMD). The airport is about 8.7 to 9.7 miles north of the western State Route 25 roadway segments that were used for modeling impacts at receptors 1 through 4 (see Figure 1).

(2) A five-year data set (2009 - 2014)[2] of hourly meteorological data from Hollister Municipal Airport prepared for use with the AERMOD model by the California Air Resources Board. The airport is about 1.5 to 2.0 miles southeast of the eastern State Route 25 roadway segments were used for modeling impacts at receptors 5 through 7 (see Figure 1). Receptor 8 was not included in the modeling since it is more than 1,000 feet from State Route 25.

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1 Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May.

2 The five years of data were comprised of the period from February 1, 2009 through January 31, 2014.

Project operation was assumed to occur for 365 days per year and that the trucks would be traveling on State Route 25 during the nighttime from about 6:00 p.m. to 9:00 a.m. The emissions from truck travel were modeled with the AERMOD model using line-area sources representing the expected truck travel routes within about 1,000 feet of the residential receptors (see Figures 2, 3, and 4). DPM and $PM_{2.5}$ concentrations were calculated at sensitive receptors using receptor heights of 1.5 meters (4.9 feet) to represent the breathing heights of the residents in nearby single-family homes. Residential receptors are assumed to include all receptor types with almost continuous exposure.

Figures 2, 3, and 4 show locations of modeled roadway segments (emission sources) and sensitive receptors (Figures 2 and 3 are for receptors west and Figure 4 is for receptors east). Also shown in the figures are the receptors that would be most affected by the project TAC and $PM_{2.5}$ emissions along the roadway segment modeled.

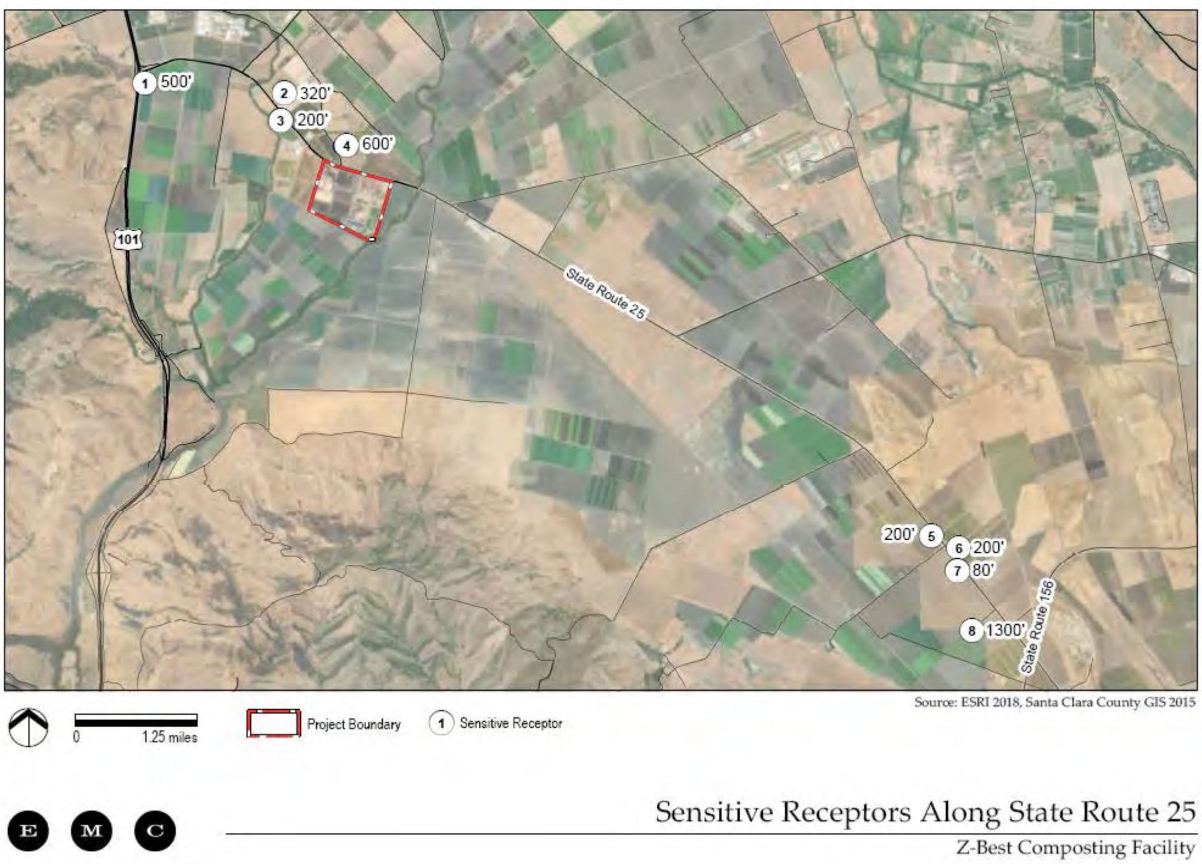

Figure 1


Roadway Segments and Receptor Location Modeled for West Receptor #1
4091700
4091600
4091500
4091400
4091300
4091200
UTM - Northing (meters)
Road Segments
Used for Modeling
Residential Receptor Location used for Modeling
629000
629100
629200
629300
UTM - Easting (meters)

Figure 2

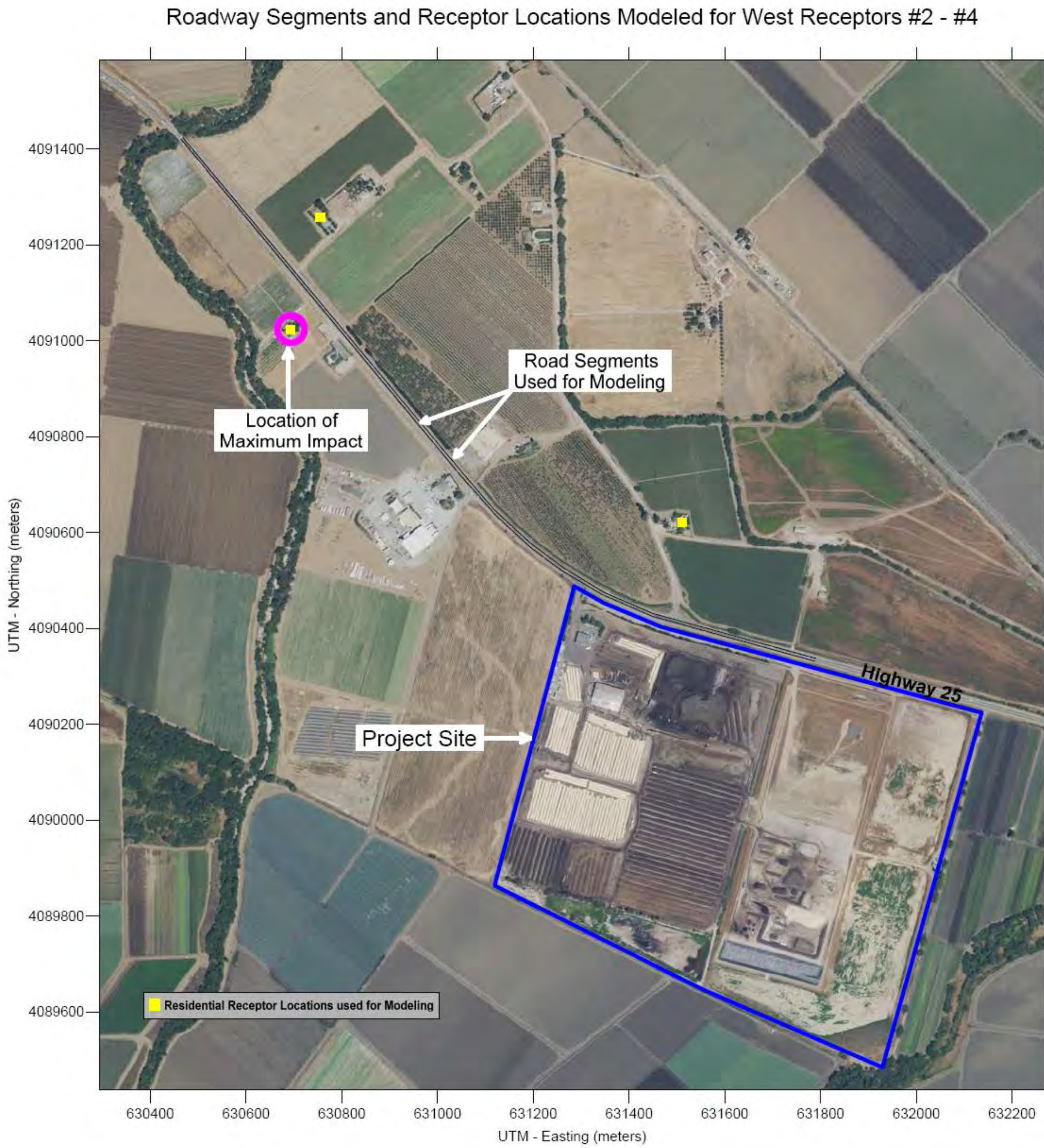
Roadway Segments and Receptor Locations Modeled for West Receptors #2 - #4
Road Segments
Used for Modeling
Location of
Maximum Impact
Highway 25
Project Site
Residential Receptor Locations used for Modeling
4091400
4091200
4091000
4090800
4090600
4090400
4090200
4090000
4089800
4089600
UTM - Northing (meters)
630400
630600
630800
631000
631200
631400
631600
631800
632000
632200
UTM - Easting (meters)

Figure 3

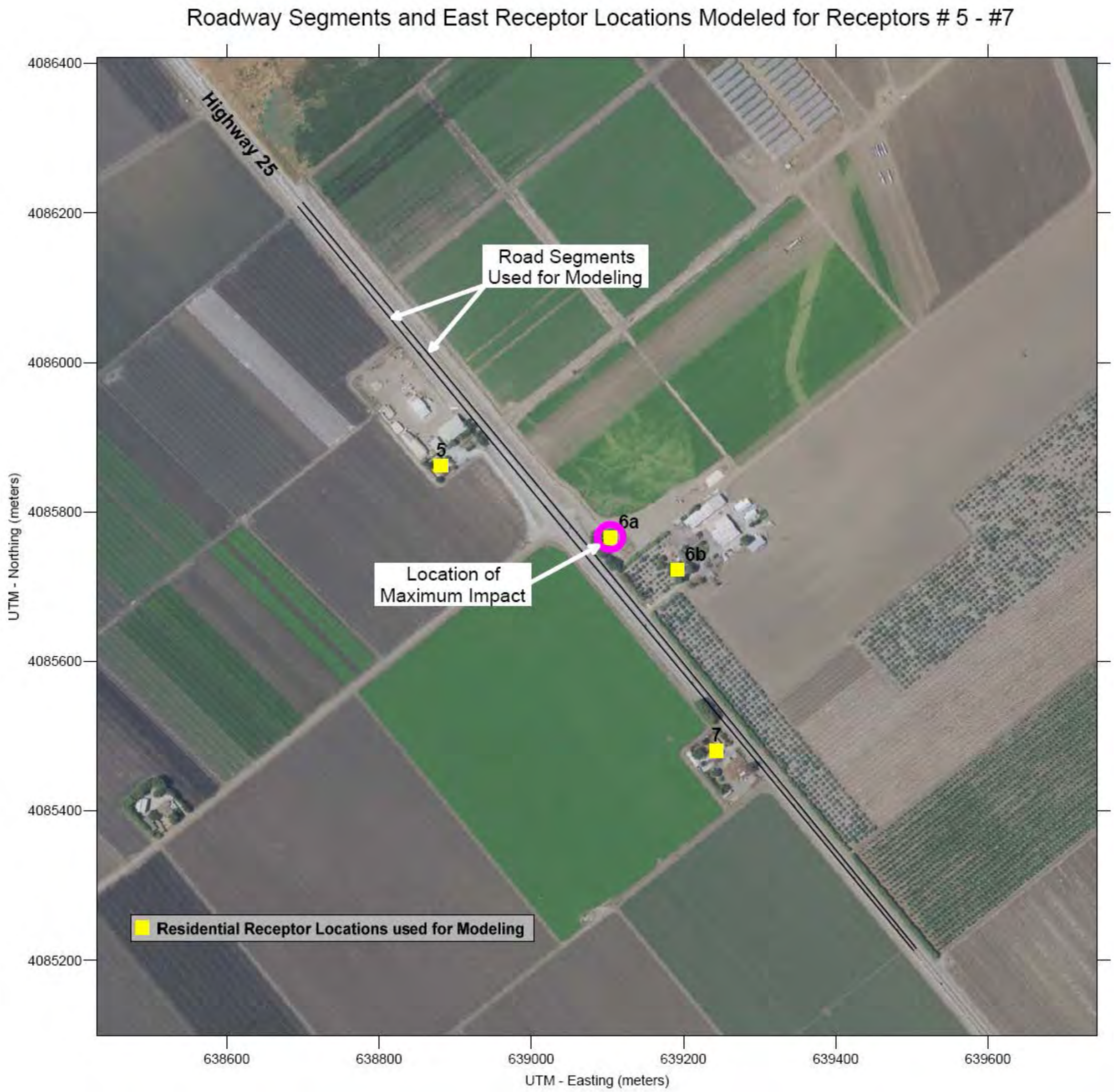

Figure 4

Increased cancer risks from the truck traffic emission sources were calculated using the modeled maximum annual DPM concentrations and BAAQMD recommended risk assessment methods and parameters described in *Attachment 1*. These methods evaluate cancer risk due to DPM exposure and incorporate age sensitivity factors methods for infant (third trimester to two years of age) and children (two years of age to 16 years). The sensitive receptor identified with the maximum increased cancer risk caused by the project traffic is referred to as the Maximally Exposed Individual (MEI). The maximum cancer risk would occur at receptor #3 and is considered to be the location of the MEI. All other receptors would have lesser impacts with respect to increase cancer risk caused by the project. The $PM_{2.5}$ concentration and non-cancerous health risk impacts (i.e. Hazard Index) were also calculated. These results are also based on the maximum annual concentration but include sources of $PM_{2.5}$ besides DPM (e.g., brake and tire wear and re entrained roadway dust). The maximum $PM_{2.5}$ concentration and Hazard Index occur at the same location as the cancer risk MEI, receptor #3.

Table 1 reports the community risk impacts in terms of MEI for cancer risk, maximum annual $PM_{2.5}$ concentration and maximum annual Hazard Index for the project truck traffic. *Attachment 2* includes the truck traffic health risk assessment assumptions and computations.

Table 1. Project Traffic Health Risk Impacts at the Location of Maximum Impact

Source	Lifetime Cancer Risk at MEI (per million) [1]	Maximum Annual	
		$PM_{2.5}$ ($\mu g/m^3$)	Hazard Index
State Route 25 Segment - west			
Project Increase	7.0	0.04	<0.01
BAAQMD Single-Source Threshold	*>10.0*	*>0.3*	*>1.0*
Significant?	*No*	*No*	*No*

Supporting Documentation

Attachment 1 is the methodology used to compute community risk impacts, including the methods to compute lifetime cancer risk from exposure to project emissions.

Attachment 2 is the summary of the health risk assessment inputs and outputs. AERMOD dispersion modeling files for this assessment are not included, but are available upon request and would be provided in digital format.

Attachment 1: Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to Toxic Air Contaminates (TACs) requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (CARB) develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[3] These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.[4] This HRA used the 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[5] Exposure parameters from the OEHHA guidelines and the recent BAAQMD HRA Guidelines were used in this evaluation.

Cancer Risk

Potential increased cancer risk from inhalation of TACs is calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency and duration of exposure. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day (L/kg-day) or liters per kilogram of body weight per 8-hour period for the case of worker or school child exposures. As recommended by the BAAQMD for residential exposures, 95th percentile breathing rates are used for the third trimester and infant exposures, and 80th percentile breathing rates for child and adult exposures. For children at schools and daycare facilities, BAAQMD recommends using the 95th percentile 8-hour breathing rates. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of

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3 OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.
4 CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.
5 BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. December 2016.

30 years for sources with long-term emissions (e.g., roadways). For workers, assumed to be adults, a 25-year exposure period is recommended by the BAAQMD. For school children a 9-year exposure period is recommended by the BAAQMD.

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors is allowed by the BAAQMD if there are no schools in the project vicinity have a cancer risk of one in a million or greater assuming 100 percent exposure (FAH = 1.0).

Functionally, cancer risk is calculated using the following parameters and formulas:

Cancer Risk (per million) = $CPF \times Inhalation\ Dose \times ASF \times ED/AT \times FAH \times 10^6$

Where:

CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = $C_{air} \times DBR^* \times A \times (EF/365) \times 10^{-6}$

Where:

C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
8HrBR = 8-hour breathing rate (L/kg body weight-8 hours)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

* An 8-hour breathing rate (8HrBR) is used for worker and school child exposures.

The health risk parameters used in this evaluation are summarized as follows:

Parameter	***Exposure Type →***	**Infant**		**Child**	**Adult**
	Age Range →	**3rd Trimester**	**0<2**	**2 < 16**	**16 - 30**
DPM Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day) 80th Percentile Rate		273	758	572	261
Daily Breathing Rate (L/kg-day) 95th Percentile Rate		361	1,090	745	335
8-hour Breathing Rate (L/kg-8 hours) 95th Percentile Rate		-	1,200	520	240
Inhalation Absorption Factor		1	1	1	1
Averaging Time (years)		70	70	70	70
Exposure Duration (years)		0.25	2	14	14*
Exposure Frequency (days/year)		350	350	350	350*
Age Sensitivity Factor		10	10	3	1
Fraction of Time at Home (FAH)		0.85-1.0	0.85-1.0	0.72-1.0	0.73*

* For worker exposures (adult) the exposure duration and frequency are 25 years 250 days/year and FAH is not applicable.

<u>Non-Cancer Hazards</u>

Non-cancer health risk is usually determined by comparing the predicted level of exposure to a chemical to the level of exposure that is not expected to cause any adverse effects (reference exposure level), even to the most susceptible people. Potential non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is diesel particulate matter (DPM). For DPM, the chronic inhalation REL is 5 micrograms per cubic meter ($\mu g/m^3$).

<u>Annual $PM_{2.5}$ Concentrations</u>

While not a TAC, fine particulate matter ($PM_{2.5}$) has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under the California Environmental Quality Act (CEQA). The thresholds of significance for $PM_{2.5}$ (project level and cumulative) are in terms of an increase in the annual average concentration. When considering $PM_{2.5}$ impacts, the contribution from all sources of $PM_{2.5}$ emissions should be included. For projects with potential impacts from nearby local roadways, the $PM_{2.5}$ impacts should include those from vehicle exhaust emissions, $PM_{2.5}$ generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

Attachment 2: Modeling Inputs Assumptions and Summary of Output

```
         File Name:   Santa Clara (SF) - 2020 - Annual.EF
CT-EMFAC2017 Version:   1.0.2.27401
          Run Date:   2/20/2020 5:34:37 PM
              Area:   Santa Clara (SF)
     Analysis Year:   2020
            Season:   Annual

=======================================================================

Vehicle Category        VMT Fraction           Diesel VMT Fraction      Gas VMT Fraction
                        Across Category        Within Category          Within Category
         Truck 1             0.000                  0.456                    0.544
         Truck 2             1.000                  0.944                    0.044
       Non-Truck             0.000                  0.013                    0.966

=======================================================================

              Road Type:       Major/Collector
     Silt Loading Factor:                  CARB        0.032 g/m2
Precipitation Correction:                  CARB        P = 64 days      N = 365 days

=======================================================================

Fleet Average Running Exhaust Emission Factors (grams/veh-mile)

       Pollutant Name       35 mph          55 mph
                PM2.5     0.051048        0.070217
                 PM10     0.053358        0.073393
                  TOG     0.183346        0.111236
        1,3-Butadiene     0.000332        0.000218
         Acetaldehyde     0.011762        0.007584
             Acrolein     0.000007        0.000005
              Benzene     0.003325        0.002163
            Diesel PM     0.053827        0.073597
         Ethylbenzene     0.000550        0.000363
         Formaldehyde     0.023592        0.015221
          Naphthalene     0.000163        0.000100
                  POM     0.000386        0.000296
                 DEOG     0.159814        0.103026

=======================================================================

Fleet Average Running Loss Emission Factors (grams/veh-hour)

       Pollutant Name   Emission Factor
                  TOG          0.237727
        1,3-Butadiene          0.000000
              Benzene          0.002377
         Ethylbenzene          0.003899
          Naphthalene          0.000333

=======================================================================

Fleet Average Tire Wear Factors (grams/veh-mile)

       Pollutant Name   Emission Factor
                PM2.5          0.006679
                 PM10          0.026716

=======================================================================

Fleet Average Brake Wear Factors (grams/veh-mile)

       Pollutant Name   Emission Factor
                PM2.5          0.037827
                 PM10          0.088263

=======================================================================

Fleet Average Road Dust Factors (grams/veh-mile)

       Pollutant Name   Emission Factor
                PM2.5          0.124766
                 PM10          0.831771

=============================END======================================
```

Z-Best Compost Facility - Morgan Hill, CA
2020 Increased Project Truck Emissions - DPM

Road Segment	Road Segment Length (ft)	Road Segment Length (m)	Modeled Road Width (ft)	Initial[a] Vertical Height (m)	Initial[a] Vertical Dispersion (m)	Release[a] Height (m)	Percent of Daily Trucks (%)	No. of Trucks Trips	Travel Speed (mph)	DPM[b] Emission Factor (g/veh-mi)	Truck Travel DPM Emissions Daily (g/day)	Daily (lb/day)	Hourly (lb/hr)	Annual (lb/year)
On-Ramp & Northbound Highway 25-Rec #1	2312	705	31.7	6.8	3.16	3.4	83%	85.6	35	0.05383	2.017	0.00445	2.97E-04	1.62
Off-Ramp & Southbound Highway 25-Rec #1	1783	543	31.7	6.8	3.16	3.4	83%	85.6	35	0.05383	1.556	0.00343	2.29E-04	1.25
Norhtbound Highway 25-Rec #s 2-4	5794	1766	31.7	6.8	3.16	3.4	83%	85.6	55	0.07360	6.913	0.01524	1.02E-03	5.56
SouthboundHighway 25-Rec #s 2-4	5794	1766	31.7	6.8	3.16	3.4	83%	85.6	55	0.07360	6.913	0.01524	1.02E-03	5.56
Norhtbound Highway 25-Rec #s 5-7	4209	1283	31.7	6.8	3.16	3.4	17%	17.5	55	0.07360	1.029	0.00227	1.51E-04	0.83
SouthboundHighway 25-Rec #s 5-7	4209	1283	31.7	6.8	3.16	3.4	17%	17.5	55	0.07360	1.029	0.00227	1.51E-04	0.83

[a] Line-area source parameters based on EPA 2015

[b] Emission factor from CT-EMFAC2017 for running exhaust for 2020

Truck Information

Normal Trucks per day =	100
Normal Truck Trips per day =	200
Normal Annual Trucks =	36,500
Additional Trucks per Year* =	1,140
Total Trucks per Year =	37,640
Total Trucks per day =	103.1
Operation Days =	365
Delivery Truck Hours (hrs/day)** =	15

* Additional 57 truck per day (114 trucks trips per day) for 20 days per year
** Truck operation from 6 PM to 9 AM

References:
EPA 2015 - *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and maintenance Areas*, November 2015

Z-Best Compost Facility - Morgan Hill, CA
2020 Increased Project Truck Emissions - PM2.5 Emissions

Road Segment	Road Segment Length (ft)	Segment Length (m)	Modeled Road Width (ft)	Initial[a] Vertical Height (m)	Initial[a] Vertical Dispersion (m)	Release[a] Height (m)	Percent of Daily Trucks (%)	No. of Daily Trucks	Travel Speed (mph)	PM2.5[b] Emission Factors (g/veh-mi): Vehicle Exhaust	Tire & Brake Wear	Fugitive Road Dust	Total PM2.5 Emissions	Truck Travel Fugitive PM2.5 Emissions: Daily (g/day)	Daily (lb/day)	Hourly (lb/hr)	Annual (lb/year)
On-Ramp & Northbound Highway 25-Rec #1	2312	705	31.7	6.8	3.16	3.4	83%	85.6	35	0.05105	0.04451	0.12477	0.22032	8.257	0.01820	1.21E-03	6.64
Off-Ramp & Southbound Highway 25-Rec #1	1783	543	31.7	6.8	3.16	3.4	83%	85.6	35	0.05105	0.04451	0.12477	0.22032	6.368	0.01404	9.36E-04	5.12
Norhtbound Highway 25-Rec #s 2-4	5794	1766	31.7	6.8	3.16	3.4	83%	85.6	55	0.07022	0.04451	0.12477	0.23949	22.494	0.04959	3.31E-03	18.10
SouthboundHighway 25-Rec #s 2-4	5794	1766	31.7	6.8	3.16	3.4	83%	85.6	55	0.07022	0.04451	0.12477	0.23949	22.494	0.04959	3.31E-03	18.10
Norhtbound Highway 25-Rec #s 5-7	4209	1283	31.7	6.8	3.16	3.4	17%	17.5	55	0.07022	0.04451	0.12477	0.23949	3.347	0.00738	4.92E-04	2.69
SouthboundHighway 25-Rec #s 5-7	4209	1283	31.7	6.8	3.16	3.4	17%	17.5	55	0.07022	0.04451	0.12477	0.23949	3.347	0.00738	4.92E-04	2.69

[a] Line-area source parameters based on EPA 2015
[b] Emission factor forvehicle exhaust, tire and brake wear from CT-EMFAC2017 for 2020

Truck Information

Normal Trucks per day =	100
Normal Truck Trips per day =	200
Normal Annual Trucks =	36,500
Additional Trucks per Year* =	1,140
Total Trucks per Year =	37,640
Annual Average Trucks per day =	103.1
Operation Days =	365
Delivery Truck Hours (hrs/day) =	15

* Additional 57 truck per day (114 trucks trips per day) for 20 days per year
** Truck operation from 6 PM to 9 AM

Truck Fugitive PM2.5 Emission Information

Truck Tire Wear Emission Factor (g/veh-mi) =	0.00668
Truck Brake Wear Emission Factor (g/veh-mi) =	0.03783
Truck Road Dust Emission Factor (g/veh-mi) =	0.12477
Total Fugitive PM2.5 Emissions (g/veh-mi) =	0.16927

References:
EPA 2015 - *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and maintenance Areas*, November 2015

Z-Best Composting, Morgan Hill - Cancer Risks from Project Operation
Project Truck Traffic
Residential Receptor #1 (1.5 meter receptor heights)

Cancer Risk Calculation Method

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

Cancer Potency Factors $(mg/kg\text{-}day)^{-1}$

TAC	CPF
DPM	1.10E+00

	Infant/Child			Adult
Age -->	**3rd Trimester**	**0 - <2**	**2 - <16**	**16 - 30**
Parameter				
ASF	10	10	3	1
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
ED =	0.25	2	14	14
AT =	70	70	70	70
FAH =	0.85	0.72	0.72	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

MEI Cancer Risk From: Project Truck Traffic

Exposure Duration (years)	Age	Age Sensitivity Factor	DPM Annual Conc (ug/m3)	DPM Cancer Risk (per million)
0.25	-0.25 - 0*	10	0.00532	0.06
2	1 - 2	10	0.00532	1.26
14	3 - 16	3	0.00532	1.39
14	17 - 30	1	0.00532	0.21
Total Increased Cancer Risk				**2.9**

* Third trimester of pregnancy

Maximum PM2.5 Concentration ($\mu g/m^3$) = 0.02179

Z-Best Composting, Morgan Hill - Cancer Risks from Project Operation
Project Truck Traffic
Residential Receptors #2 - #4 (1.5 meter receptor heights)

Cancer Risk Calculation Method

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

Cancer Potency Factors $(mg/kg\text{-}day)^{-1}$

TAC	CPF
DPM	1.10E+00

	Infant/Child			Adult
Age -->	3rd Trimester	0 - <2	2 - <16	16 - 30
Parameter				
ASF	10	10	3	1
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
ED =	0.25	2	14	14
AT =	70	70	70	70
FAH =	0.85	0.72	0.72	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

MEI Cancer Risk From: Project Truck Traffic

Exposure Duration (years)	Age	Age Sensitivity Factor	DPM Annual Conc (ug/m3)	DPM Cancer Risk (per million)
0.25	-0.25 - 0*	10	0.01277	0.15
2	1 - 2	10	0.01277	3.02
14	3 - 16	3	0.01277	3.33
14	17 - 30	1	0.01277	0.51
Total Increased Cancer Risk				**7.0**

* Third trimester of pregnancy

Maximum PM2.5 Concentration ($\mu g/m^3$) = 0.04149

Z-Best Composting, Morgan Hill - Cancer Risks from Project Operation
Project Truck Traffic
Residential Receptors #5 - #7 (1.5 meter receptor heights)

Cancer Risk Calculation Method

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

Cancer Potency Factors $(mg/kg\text{-}day)^{-1}$

TAC	CPF
DPM	1.10E+00

	Infant/Child			Adult
Age -->	3rd Trimester	0 - <2	2 - <16	16 - 30
Parameter				
ASF	10	10	3	1
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
ED =	0.25	2	14	14
AT =	70	70	70	70
FAH =	0.85	0.72	0.72	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

MEI Cancer Risk From: Project Truck Traffic

Exposure Duration (years)	Age	Age Sensitivity Factor	DPM Annual Conc (ug/m3)	DPM Cancer Risk (per million)
0.25	-0.25 - 0*	10	0.00136	0.02
2	1 - 2	10	0.00136	0.32
14	3 - 16	3	0.00136	0.35
14	17 - 30	1	0.00136	0.05
Total Increased Cancer Risk				**0.7**

* Third trimester of pregnancy

Maximum PM2.5 Concentration ($\mu g/m^3$) = 0.00442

June 10, 2020

Mr. Ron Sissem, MRP
Principal
EMC Planning Group, Inc.
301 Lighthouse Avenue, Suite C
Monterey, CA 93940

Subject: Toxic Air Contaminant (TAC) Emissions Evaluation for Proposed Capacity Expansion of the Z-Best Composting (Z-Best) Facility

Dear Mr. Sissem:

At the request of the County, Yorke Engineering, LLC (Yorke) performed an independent review for EMC Planning Group, Inc. (EMC) of the potential impacts on TAC emissions resulting from the proposed increase in permitted composting capacity (Project) at the Z-Best Composting (Z-Best) facility in Gilroy, CA. EMC is assisting the County of Santa Clara Department of Planning and Development with the preparation of an Environmental Impact Report (EIR) for the Project.

PROPOSED COMPOSTING CAPACITY INCREASE

Yorke understands that the Project will result in the capacity to compost an additional 875 tons per day (tpd) of municipal solid waste (MSW) and/or food waste. This additional 875 tpd of composting capacity would be permitted as an increase in the monthly capacity for the site. The Project includes the removal of the existing MSW and food waste in-vessel composting system (CTI bag system), and the construction of a covered aerated static pile (CASP) under negative aeration with emissions controlled by biofilters for primary (active) composting of MSW and food waste, and positively aerated static piles (ASPs) with a biofilter cover (finished compost) for secondary (curing) composting.

The Z-Best facility also accepts green waste, which after processing to remove uncompostable material is composted in an existing open windrow system. Other wastes, primarily inert material, is separated from the waste feed streams and transported offsite.

The current facility capacity for MSW and food waste is 700 tpd. This is also the current MSW/food waste sublimit allowed in the current facility's total waste limit on peak days. Thus, the peak MSW and food waste that would be allowed after implementation of the Project is the sum of the current limit of 700 tpd and the proposed additional capacity of 875 tpd, or 1,575 tpd. Yorke understands that the Project proposes no permitted increase in the daily capacity for green waste composting including on peak days.

COMPOSTING AIR EMISSIONS ESTIMATION METHODOLOGY

Methodology Overview

Prior to discussing the specific calculations and assumptions used for Pre- and Post-Project TAC emissions, this section presents an overview description of the methodology to provide context.

Precursor Organic Compounds

Emissions of precursor organic compounds (POCs) occur over the composting cycle. All composting TACs currently assessed by the Bay Area Air Quality Management District (BAAQMD) and other California air districts are chemicals in a class of compounds called "reactive organic gases" (ROG), with the exception of ammonia. ROG are called "precursor organic compounds" (POCs) in BAAQMD regulations. In other California air districts and under U.S. Environmental Protection Agency (USEPA) regulations, these same compounds are referred to as volatile organic compounds (VOCs). These are all different names for the same class of compounds. This can be confusing when examining assessments from different agencies, so important to point out in the context of this Project.

ROG, VOC, and POC are organic compounds[1] that can undergo photochemical reaction with nitrogen oxides (NOx) in the atmosphere in the presence of sunlight to form photochemical oxidants, which are respiratory irritants. POCs are considered "criteria air pollutants", since they are "precursors" to an air pollutant with an ambient air quality standard, photochemical oxidants measured as ozone[2].

Ammonia

Ammonia is also a chemical released over the composting cycle, and is also a TAC. It is formed by nitrogen in the waste feed. The chemical formula for ammonia is NH_3 (one nitrogen atom and three hydrogen atoms), so ammonia is <u>not</u> an organic molecule. Although the content of the waste stream is chiefly organic with a high carbon content, some of the organic compounds in the waste streams contain nitrogen, and that nitrogen can form ammonia in the composting emissions. The amount of ammonia in the emissions depends on the carbon-to-nitrogen ratio (C/N) in the feed streams, as well as how well the composting is aerated. That is, how well air is mixed into the composting process. The better the aeration, the lower the ammonia (as well as POC) emissions. This is discussed further in this report.

Basic Calculation Methodology Approach

The basic methodology to estimate TAC emissions begins with the application of POC and ammonia "emission factors" to the amount of waste being composted. Higher POC and ammonia emission factors are applied to the amount of waste in the composting cycle. Lower POC and ammonia emission factors are applied the waste feed storage piles on the tipping floor, as waste decomposition can begin there prior to being placed into active compositing. If emissions are controlled by an air pollution control device after being emitted from composting, as is the case with the Post-Project configuration, then a control

[1] An organic compound is made up of carbon atoms, with other major atoms being hydrogen, oxygen, and/or nitrogen. Organic compounds can also include also other atoms depending on the compound. The majority of emissions from composing are organic compounds due to the high organic content of the waste streams being composted.

[2] Ozone is a molecule made up of three oxygen atoms and is highly reactive. Normal oxygen is comprised of two oxygen atoms, and is a stable gas. Ozone is the primary photochemical oxidant in "smog." Ozone is colorless, but the presence of NOx pollutants, which help to form ozone in reaction with sunlight, is brown, giving smog its brown appearance.

efficiency is applied. For example, if the process is 80 percent controlled, then 20 percent of the composting emissions will vent to the atmosphere.

For TAC emissions estimates, the amount of ammonia emissions estimated by the emission factors and control device efficiencies are used directly in the TAC emissions assessment. The other TACs are fractions of the POC emissions. Thus, the estimated TAC emissions after any air pollution control device are determined by using the POC emissions and the results from a UC Davis composting study.[3] The UC Davis study reports each measured individual VOC constituent as a percentage of the total VOC emissions. Note that the study reports "VOCs" that contribute to photochemical oxidant formation, and thus, these are the same as POCs as discussed in this report for BAAQMD permitting purposes. The emissions of those POCs that are TACs are estimated by applying those corresponding weight fractions from the UC Davis study. The TACs that are POCs include: isopropyl alcohol, methanol, naphthalene, propene, and acetaldehyde.

More specifics on the emission factors and control equipment assumptions used for the Pre- and Post-Project emissions are described further in the following two sections

Pre-Project MSW/Food Waste Emissions Calculation Description

As depicted earlier, current MSW and food waste composting at Z-Best occurs in the CTI bag system. To assess potential POC emissions from the CTI bags, emission factors were taken from a California Air Resources Board (CARB) report, *ARB Emissions Inventory Methodology for Composting Facilities*, March 2015 (CARB Report). CARB averaged emission factors from various studies on green waste composting to recommend a POC emission factor of 3.58 pounds of POC per ton of waste composted (lb/ton) over the composting (active and curing) cycle. For storage piles on the tipping floor, a POC emission factor of 0.2 pounds per ton per day for tipping piles is recommended in the CARB Report. Since Z-Best processes incoming waste within 24 hours, the emission factor was used simply as 0.2 lb/ton. TAC emissions from these POC emissions were determined as described earlier using the UC Davis composting study.[3]

The recommended ammonia emission factor in the CARB Report is 0.78 lb/ton. Ammonia emissions from storage piles were not addressed in the CARB Report. An ammonia emission factor of 0.02 lb/ton was used from BAAQMD Application 26437 (for Waste Management of Alameda County – Altamont Pass).

The existing composting at Z-Best does not employ air pollution control devices, thus no control factors were applied. Attachment 1 provides full details on emissions from the CTI bags resulting from the currently permitted throughput of 700 tpd of MSW and food waste using the cited emission factors, along with example calculations. The estimated emission results are summarized in the "POC and TAC Emission Estimates" section below.

Post-Project MSW/Food Waste Emissions Calculations

The BAAQMD, as a Responsible Agency, provided comments on the California Environmental Quality Act (CEQA) Notice of Preparation (NOP) for the Project in a November 15, 2018, letter to the County of Santa Clara Department of Planning and Development. At the request of Z-Best,

[3] Kumar, Anuj, et al, "Volatile organic compound emissions from green waste composting: Characterization and ozone formation", Atmospheric Environment, January 7, 2011, Table 4.

SCS Engineers (SCS) prepared responses to the BAAQMD letter, as updated in SCS' December 20, 2019 response letter (SCS Letter). The following summarizes MSW/food waste composting air emissions calculations from the proposed aerated static pile (ASP) systems as presented in the SCS Letter.

SCS cited a source test report by Horizon Air Measurement Services, Inc., for a facility in Southern California similar to the proposed ASP systems at the Gilroy facility. POC emission factors determined from that source test were used to calculate POC emissions from the CASP (active) and positive pressure ASP (curing) phases of the composting process as presented in Table 1 for the additional 875 tpd of MSW/food waste composting in the proposed new ASP systems, reproduced from the SCS December 20, 2019 letter. For active phase composting, a biofilter is proposed for emissions control, providing 80 percent POC emissions reduction as stated in the SCS letter as well as in the above-referenced CARB Report. For the curing phase, a moist compost cover layer is proposed for emissions control providing 50 percent POC emissions reduction as stated in the SCS letter, slightly lower than in the above-referenced CARB Report. For storage piles on the tipping floor, the POC emission factor of 0.2 lb/ton described above was used. Waste will also be tipped directly onto the CASP piles, which results in no emissions from tipped waste before added to the active phase. There is no emissions control proposed for the tipping floor, as shown in Table 1.

Table 1. POC Emissions from the Additional 875 tpd MSW/Food Waste Composting*

Phase	Emission Factor (lb/wet ton of material)	Daily Throughput (tpd)	Uncontrolled Daily Emission (lb/day)	Control Efficiency	Controlled Daily Emission (lb/day)	Controlled Annual Emissions (tons/year)
In-building tipping	0.2	219	43.8	0	43.75	7.98
Negative CASP (Active Phase)	0.0151	875	13.2	80%	2.64	0.48
Positive ASP (Curing Phase)	0.0151	875	13.2	50%	6.61	1.21
Total			70.2		53.00	9.67

* Reproduced from December 20, 2019, SCS Letter.

For ammonia, the tipping floor storage pile emissions were estimated by Yorke from the ammonia emission factor of 0.02 lb/ton described in the Pre-Project emissions section. The SCS Letter did not provide an ammonia emission factor for composting. It was set equal to the POC emission factor for the new ASP systems for the reasons discussed in the following paragraph.

The low POC composting emissions from the proposed ASP systems result from much enhanced aeration and increased aerobic (i.e., high oxygen) conditions, which in turn, reduces organic emissions. Ammonia is produced from the nitrogen content in the waste, which will be lower than the carbon content in an organic waste stream. Thus, per ton of waste feed, ammonia emissions are lower than POC emissions. The same enhanced aeration that reduces POC emissions will also reduce ammonia emissions, since ammonia formation results from anaerobic (low oxygen) conditions. Setting the ammonia emission factor equal to the POC emission factor is, therefore, conservative (i.e., should overestimate ammonia emissions).

Yorke assumed 53 percent control of ammonia emissions from active composting, consistent with the CARB Report. Ammonia control for the curing phase by compost cover was estimated using the ammonia efficiency by biofilter multiplied by the ratio of POC emissions control by cover compost divided by POC control by biofilter.

Attachment 1 provides full details on the calculation of estimated emissions from the proposed new ASP systems resulting from the additional 875 tpd of MSW/food waste, and for the full proposed future capacity of 1,575 of MSW and food waste upon inclusion of the current 700 tpd capacity in the Post-Project configuration. Included in Attachment 1 are example calculations for both the additional 875 tpd of waste feed and the final 1,575 tpd configuration. For the additional 875 tpd, numbers presented the Table 1 from the SCS Letter are reproduced in Attachment 1. The estimated emissions results are summarized in the "POC and TAC Emission Estimates" section below.

POC AND TAC EMISSIONS ESTIMATES

The permitted Pre-Project POC emissions at an operating capacity of 700 tpd of MSW/food waste were estimated at 2,541 lb/day and 463.7 tons/year facility-wide, based on the assumptions used.

The proposed Post-Project POC emissions at an operating capacity of 1,575 tpd of MSW/food waste were estimated at 95.5 lb/day and 17.43 tons/year facility-wide, based on the assumptions used, which included the new proposed ASP systems with additional emissions control.

Table 2 shows the estimated difference in TAC emissions between Pre- and Post-Project conditions. Calculation details are presented in Attachment 1.

Table 2. TAC Emissions: Current 700 tpd and Future 1575 tpd MSW/Food Waste Composting

Compounds	Pre-Project		Post-Project		Difference	
	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)
Isopropanol	44.8	392,000	1.68	14,700	-43.1	-377,300
Methanol	13.5	25,700	0.509	4,460	-13.0	-21,240
Naphthalene	0.529	1,000	0.0199	174	-0.51	-826
Propene	0.233	441	0.00875	76.7	-0.224	-364.3
Acetaldehyde	0.148	281	0.00557	48.8	-0.142	-232.2
Ammonia	22.9	201,000	1.46	12,800	-21.4	-188,200

The Pre-Project TAC emissions are already accounted for in the currently permitted operation. The proposed action will create the capacity for an additional 875 tpd of MSW/food waste. Table 3 shows the estimated post-project TAC emissions for the 875 tpd increase in MSW/food waste, a subset of the total Post-Project emissions in Table 2. Calculation details are presented in Attachment 1. This is discussed further in the Findings section.

Table 3. TAC Emissions from Future Additional 875 tpd MSW/Food Waste Composting

Compounds	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)
Isopropanol	0.935	8,190
Methanol	0.283	2,480
Naphthalene	0.0111	96.8
Propene	0.00486	42.6
Acetaldehyde	0.00309	27.1
Ammonia	0.809	7,090

FINDINGS ON TAC EMISSIONS

TAC Emissions Change from Pre-Project to Post-Project Permitted Throughputs

The key findings of this assessment for CEQA are summarized in Table 2. Pre-Project TAC emissions were estimated assuming 700 tpd of MSW/food waste composted in CTI bags using composting emission factors recommended in the March 2015 CARB Report, supplemented with the other cited information. The Post-Project TAC emissions were estimated assuming the baseline 700 tpd throughput plus the proposed additional 875 tpd, for a Post-Project total of 1,575 tpd composted in the new ASP systems. As previously noted, source test data were used to establish a much lower POC emission factor as explained in the December 2019 SCS Letter. Thus, there are lower POC-based TAC emissions, and lower ammonia emissions.

Table 2 shows substantial reductions in all TAC emissions between the Pre-Project and Post-Project cases for composting activity. This net reduction in TAC emissions creates a net air quality benefit with implementation of the Project.

TAC Emissions from Processing the Additional 875 tpd of MSW and Food Waste

Table 3 shows TAC emissions associated with only the proposed additional 875 tpd waste throughput to be treated in the new ASP systems. This subset of the overall change from Pre-Project to Post-Project conditions in Table 2. The additional 875 tpd capacity will be considered by the BAAQMD in air permitting, since the current 700 tpd is already operating. The BAAQMD will evaluate potential health risks with the proposed additional throughput and would need to find health risks acceptable in order to grant an air permit. Again, the currently permitted 700 tpd would also be composted in the new ASP systems as a result of the Project, which is not reflected in Table 3. As depicted in Table 2, those accompanying future emission reductions would more than offset the TAC emissions estimated for the additional 875 tpd capacity increase in Table 3.

CONCLUSIONS

Yorke evaluated documentation on composting air emissions associated with the proposed Project and applied currently accepted methodologies to estimate the Post-Project emissions to assess the potential change in TAC emissions from Pre-Project conditions. This showed that all TAC emissions from the composting process would be reduced after Project implementation. This net reduction in TAC emissions with implementation of the Project would create a net air quality benefit. Exposures to TACs from facility composting operations will be reduced substantially from the current conditions.

CLOSING

Should you have any additional questions on the above, please contact me at (510) 853-1277 or Raj Rangaraj at (949) 420-9519, or through the email addresses below.

Sincerely,

John Koehler

John Koehler, Sc.D.
Senior Engineer
Yorke Engineering, LLC
JKoehler@YorkeEngr.com

cc: Dr. Raj Rangaraj, Yorke Engineering, LLC, RRangaraj@YorkeEngr.com

Enclosures:

1. Attachment 1 – POC and TAC Emission Estimates

ATTACHMENT 1 – POC AND TAC EMISSION ESTIMATES

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EXISTING MSW/FOOD WASTE PROCESSING

Note: Example Calculations on Next Page

INPUTS - CTI Bags (MSW & Food Waste)

Process Parameters	Values	Units
Daily Max Throughput	700	tons/day
Annual Max Throughput	255,500	tons/yr
Tipping Floor Throughput[1]	175.2	tons/day
Tipping Floor Throughput	63,948	tons/year
Operating Days	365	days/year
Composting POC EF[2]	**3.58**	lb/ton
Composting NH3 EF[2]	**0.78**	lb/ton
POC Stockpile EF[2]	**0.20**	lb/ton
NH3 Stockpile EF[3]	**0.02**	lb/ton

References: [1]SCS Letter, 12/20/2019; to estimate the 700 tpd daily maximum, the 219 tpd tipping floor throughput in SCS Letter for 875 tpd was prorated to 700 tpd.
[2]CARB, Emissions Inventory Methodology for Composting Facilities, March 2015
[3]BAAQMD Application 26437 (for Waste Management of Alameda County – Altamont Pass)

Table 1: POC and NH3 Composting Emissions

Pollutant	Emission Factor (lb/ton processed)	Uncontrolled Emissions (tpy)	Uncontrolled Emissions (lbs/day)	Uncontrolled Tipping Floor Emissions (tpy)	Uncontrolled Tipping Floor Emissions (lbs/day)	Total Emissions (lbs/day)	Total Emissions (tons/year)
Composting POC	3.58	457.3	2506	--	--	2506	457.3
Composting NH3	0.78	99.6	546	--	--	546	99.6
Tipping Floor POC	0.20	--	--	6.39	35.0	35.0	6.39
Tipping Floor NH3	0.02	--	--	0.64	3.50	3.50	0.64
					Total POC:	2541.0	463.7
					Total NH3:	549.50	100.3

Table 2: TAC Composting Emissions

Compounds	% VOC***	lb/hr**	lb/yr
Isopropyl alcohol*	42.31%	4.48E+01	3.92E+05
Methanol*	12.79%	1.35E+01	2.57E+04
Naphthalene*	0.50%	5.29E-01	1.00E+03
Propene*	0.22%	2.33E-01	4.41E+02
Acetaldehyde*	0.14%	1.48E-01	2.81E+02
Ammonia*	NA	2.29E+01	2.01E+05

* Toxic Air Contaminants (TACs) regulated by BAAQMD.
** Maximum daily POC is divided by 24 hours since composting is continuous although loading processes are not.
***As percent total VOC from: Kumar, Anuj, et al, “Volatile organic compound emissions from green waste composting: Characterization and ozone formation”, Atmospheric Environment, January 7, 2011, Table 4.
(Note: VOCs are the same as POCs under BAAQMD regulation.)

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EXISTING MSW/FOOD WASTE PROCESSING

EXAMPLE CALCULATIONS

Composting POC

POC Composting Emission Factor (lb/ton)		Throughput tons/day		POC lbs/day
3.58	x	700	=	2506.0

POC lbs/day		Operating Days per Year		lbs per ton		POC tons/year
2506.0	x	365	÷	2000	=	457.3

Composting Ammonia (NH3)

NH3 Composting Emission Factor (lb/ton)		Throughput tons/day		NH3 lbs/day
0.78	x	700	=	546.0

NH3 lbs/day		Operating Days per Year		lbs per ton		NH3 tons/year
546.0	x	365	÷	2000	=	99.6

Tipping Floor POC

POC Composting Emission Factor (lb/ton)		Throughput tons/day		POC lbs/day
0.20	x	175.2	=	35.0

POC lbs/day		Operating Days per Year		lbs per ton		POC tons/year
35.0	x	365	÷	2000	=	6.39

TAC Emissions Calculation (Isopropyl Alcohol)

IPA (Percent POC)		Daily POC* (lb/day)		Days per Year		IPA lbs/year		IPA ** lbs/hr
42.31%	x	2541.0	x	365	=	3.92E+05	=	44.8

* Composting plus Tipping Floor

** 8760 hrs/yr

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POST-PROJECT ADDITONAL MSW/FOOD WASTE PROCESSING

Note: Example Calculations on Next Page

INPUTS - CASP System with Biofilter (MSW & Food Waste)		
Process Parameters	**Values**	**Units**
Daily Max Throughput	875	tons/day
Annual Max Throughput	319,375	tons/yr
Tipping Floor Throughput[1]	219	tons/day
Tipping Floor Throughput	79,935	tons/year
Operating Days	365	days/year
Composting POC EF[1]	**0.0151**	lb/ton
Composting NH3 EF[1,2]	**0.0151**	lb/ton
POC Stockpile EF[3]	**0.20**	lb/ton
NH3 Stockpile EF[4]	**0.02**	lb/ton

References: [1]SCS Letter, 12/20/2019
[2]Assumes with New CASP system, NH3 emissions not higher than POC emissions; set to POC emissions as a maximum value.
[3]CARB, Emissions Inventory Methodology for Composting Facilities, March 2015
[4]BAAQMD Application 26437 (for Waste Management of Alameda County – Altamont Pass)

Control Efficiencies		
Device	**POC[5]**	**NH3[6]**
Biofilter	80%	53%
Compost Cover	50%	33.1%

References: [5]SCS Letter, 12/20/2019
[6] Biofilter NH3 efficiency from CARB 2015; Compost cover NH3 efficiency assumes biofilter efficiency for NH_3 ratioed by Compost Cover POC/Biofilter POC.

Table 1: POC and NH3 Composting Emissions

Pollutant	Emission Factor (lb/ton processed)	Composting Uncontrolled Emissions (tpy)	Composting Uncontrolled Emissions (lbs/day)	Controlled Active Phase Emissions (tpy)	Controlled Active Phase Emissions (lbs/day)	Controlled Curing Phase Emissions (tpy)	Controlled Curing Phase Emissions (lbs/day)	Uncontrolled Tipping Floor Emissions (tpy)	Uncontrolled Tipping Floor Emissions (lbs/day)	Total Emissions (lbs/day)	Total Emissions (tons/year)
Composting POC	0.0151	2.41	13.2	0.482	2.64	1.21	6.61	--	--	9.25	1.688
Composting NH3	0.0151	2.41	13.2	1.133	6.21	1.61	8.84	--	--	15.05	2.746
Tipping Floor POC	0.20	--	--	--	--	--	--	7.99	43.8	43.80	7.99
Tipping Floor NH3	0.02	--	--	--	--	--	--	0.799	4.38	4.38	0.80
									Total POC:	53.0	9.68
									Total NH3:	19.4	3.55

Table 2: TAC Composting Emissions

Compounds	% VOC***	lb/hr**	lb/yr
Isopropyl alcohol*	42.31%	9.35E-01	8.19E+03
Methanol*	12.79%	2.83E-01	2.48E+03
Naphthalene*	0.50%	1.11E-02	9.68E+01
Propene*	0.22%	4.86E-03	4.26E+01
Acetaldehyde*	0.14%	3.09E-03	2.71E+01
Ammonia*	NA	8.09E-01	7.09E+03

* Toxic Air Contaminants (TACs) regulated by BAAQMD.
** Maximum daily POC is divided by 24 hours since composting is continuous although loading processes are not.
***As percent total VOC from: Kumar, Anuj, et al, "Volatile organic compound emissions from green waste composting: Characterization and ozone formation", Atmospheric Environment, January 7, 2011, Table 4.
(Note: VOCs are the same as POCs under BAAQMD regulation.)

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POST-PROJECT ADDITONAL MSW/FOOD WASTE PROCESSING

EXAMPLE CALCULATIONS

Composting POC Active Phase

POC Composting Emission Factor (lb/ton)		Throughput tons/day		1.0 - Control Efficiency		POC lbs/day
0.0151	x	875	x	20%	=	2.64

Composting POC Curing Phase

POC Composting Emission Factor (lb/ton)		Throughput tons/day		1.0 - Control Efficiency		POC lbs/day
0.0151	x	875	x	50%	=	6.61

Total Composting Emissions

Active+Curing POC lbs/day		Operating Days per Year		lbs per ton		POC tons/year
9.25	x	365	÷	2000	=	1.688

Composting Ammonia (NH3) Curing Phase

NH3 Composting Emission Factor (lb/ton)		Throughput tons/day		1.0 - Control Efficiency		NH3 lbs/day
0.0151	x	875	x	47%	=	6.21

NH3 lbs/day		Operating Days per Year		lbs per ton		NH3 tons/year
6.21	x	365	÷	2000	=	1.133

Tipping Floor POC

POC Composting Emission Factor (lb/ton)		Throughput tons/day		1.0 - Control Efficiency		POC lbs/day
0.20	x	219	x	100%	=	43.80

POC lbs/day		Operating Days per Year		lbs per ton		POC tons/year
43.8	x	365	÷	2000	=	7.99

TAC Emissions Calculation (Isopropyl Alcohol)

IPA (Percent POC)		Daily POC* (lb/day)		Days per Year		IPA lbs/year		IPA ** lbs/hr
42.31%	x	53.0	x	365	=	8.19E+03	=	0.935

* Composting (Active+Curing) plus Tipping Floor

** 8760 hrs/yr

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POST-PROJECT TOTAL MSW/FOOD WASTE PROCESSING

Note: Example Calculations on Next Page

INPUTS - CASP System with Biofilter (MSW & Food Waste)		
Process Parameters	**Values**	**Units**
Daily Max Throughput	1,575	tons/day
Annual Max Throughput	574,875	tons/yr
Tipping Floor Throughput[1]	394.2	tons/day
Tipping Floor Throughput	143,883	tons/year
Operating Days	365	days/year
Composting POC EF[2]	**0.0151**	lb/ton
Composting NH3 EF[2,3]	**0.0151**	lb/ton
POC Stockpile EF[4]	**0.20**	lb/ton
NH3 Stockpile EF[5]	**0.02**	lb/ton

References: [1]Combined tipping floor throughputs for the "Existing" and "Added MSW" cases.
[2]SCS Letter, 12/20/2019
[3]Assumes with New CASP system, NH3 emissions not higher than POC emissions; set to POC emission factor as a maximum
[4]CARB, Emissions Inventory Methodology for Composting Facilities, March 2015
[5]BAAQMD Application 26437 (for Waste Management of Alameda County – Altamont Pass)

Control Efficiencies		
Device	**POC[6]**	**NH3[7]**
Biofilter	80%	53%
Compost Cover	50%	33.1%

References: [6]SCS Letter, 12/20/2019
[7] Biofilter NH3 efficiency from CARB 2015; Compost cover NH3 efficiency assumes biofilter efficiency for NH_3 ratioed by Compost Cover POC/Biofilter POC.

Table 1: POC and NH3 Composting Emissions

Pollutant	Emission Factor (lb/ton processed)	Composting Uncontrolled Emissions (tpy)	Composting Uncontrolled Emissions (lbs/day)	Controlled Active Phase Emissions (tpy)	Controlled Active Phase Emissions (lbs/day)	Controlled Curing Phase Emissions (tpy)	Controlled Curing Phase Emissions (lbs/day)	Uncontrolled Tipping Floor Emissions (tpy)	Uncontrolled Tipping Floor Emissions (lbs/day)	Total Emissions (lbs/day)	Total Emissions (tons/year)
Composting POC	0.0151	4.34	23.8	0.868	4.76	2.17	11.89	--	--	16.65	3.038
Composting NH3	0.0151	4.34	23.8	2.040	11.18	2.90	15.90	--	--	27.08	4.943
Tipping Floor POC	0.20	--	--	--	--	--	--	14.39	78.8	78.84	14.39
Tipping Floor NH3	0.02	--	--	--	--	--	--	1.439	7.88	7.88	1.44
									Total POC:	95.5	17.43
									Total NH3:	35.0	6.38

Table 2: TAC Composting Emissions

Compounds	% VOC***	lb/hr**	lb/yr
Isopropyl alcohol*	42.31%	1.68E+00	1.47E+04
Methanol*	12.79%	5.09E-01	4.46E+03
Naphthalene*	0.50%	1.99E-02	1.74E+02
Propene*	0.22%	8.75E-03	7.67E+01
Acetaldehyde*	0.14%	5.57E-03	4.88E+01
Ammonia*	NA	1.46E+00	1.28E+04

* Toxic Air Contaminants (TACs) regulated by BAAQMD.
** Maximum daily POC is divided by 24 hours since composting is continuous although loading processes are not.
***As percent total VOC from: Kumar, Anuj, et al, "Volatile organic compound emissions from green waste composting: Characterization and ozone formation", Atmospheric Environment, January 7, 2011, Table 4.

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POST-PROJECT TOTAL MSW/FOOD WASTE PROCESSING

EXAMPLE CALCULATIONS

Composting POC Active Phase

POC Composting Emission Factor (lb/ton)		Throughput tons/day		1.0 - Control Efficiency		POC lbs/day
0.0151	x	1575	x	20%	=	4.76

Composting POC Curing Phase

POC Composting Emission Factor (lb/ton)		Throughput tons/day		1.0 - Control Efficiency		POC lbs/day
0.0151	x	1575	x	50%	=	11.89

Total Composting Emissions

Active+Curing POC lbs/day		Operating Days per Year		lbs per ton		POC tons/year
16.65	x	365	÷	2000	=	3.038

Composting Ammonia (NH3) Curing Phase

NH3 Composting Emission Factor (lb/ton)		Throughput tons/day		1.0 - Control Efficiency		NH3 lbs/day
0.0151	x	1575	x	47%	=	11.18

NH3 lbs/day		Operating Days per Year		lbs per ton		NH3 tons/year
11.18	x	365	÷	2000	=	2.040

Tipping Floor POC

POC Composting Emission Factor (lb/ton)		Throughput tons/day		1.0 - Control Efficiency		POC lbs/day
0.20	x	394.2	x	100%	=	78.84

POC lbs/day		Operating Days per Year		lbs per ton		POC tons/year
78.8	x	365	÷	2000	=	14.39

TAC Emissions Calculation (Isopropyl Alcohol)

IPA (Percent POC)		Daily POC* (lb/day)		Days per Year		IPA lbs/year		IPA ** lbs/hr
42.31%	x	95.5	x	365	=	1.47E+04	=	1.68

* Composting (Active+Curing) plus Tipping Floor

** 8760 hrs/yr

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July 31, 2019

Mr. Ron Sissem, MRP
Principal
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Monterey, CA 93940
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Subject: Review of Odor Modeling

Dear Mr. Sissem:

At the request of the County, Yorke Engineering, LLC (Yorke) performed an independent peer review of the revised odor modeling analysis for EMC Planning Group, Inc. (EMC) on the proposed modifications at the Z-Best Composting (Z-Best) facility in Gilroy, CA. EMC is assisting the County of Santa Clara Department of Planning and Development with the preparation of an Environmental Impact Report (EIR) for the Project. Yorke assessed the data used to determine odor emissions for the sources modeled, source parameters for the air dispersion modeling, consistency of other modeling inputs with the Bay Area Air Quality Management District (BAAQMD) requirements, and adequacy of the revised analysis relative to accepted professional standards.

Yorke determined that the emissions workbook (ZBEST ODOR MODEL METRICS June 2019) and final Englobe Corporation (Englobe) report, *Air Dispersion Modelling Report: Z-Best Composting Facility*, dated June 2019, adequately documented the methodology and steps used to complete the odor analysis. Therefore, there is no need to independently review the AMS/EPA Regulatory Model (AERMOD) modeling files. Yorke has no recommendations regarding revisions or additions to the report.

PROJECT BACKGROUND

EMC is preparing a Draft Environmental Impact Report (DEIR) on behalf of the County of Santa Clara for proposed modifications to the Z-Best facility, located in a rural area of Gilroy. The modifications involve installation of aerated static pile (ASP) composting technology to replace CTI bags. A negative ASP venting to a biofilter is planned for primary composting (active phase), and positive ASP is proposed for secondary composting (curing phase). These systems are designed by Engineered Composting Systems (ECS). This is expected to reduce volatile organic compound (VOC) and odorous emissions compared to current facility operations. Work to date to assess current and future facility odors has included odor sampling at the existing CTI bags, and, to represent future ASP emissions, sampling at other similar ECS facilities processing similar feedstock. These results with additional input from ECS were incorporated into an Odor Report dated February 24, 2017 (2017 Odor Report), prepared by Englobe. Review of this work by the BAAQMD resulted in questions on the odor analysis, for which ECS provided input. Atmospheric Dynamics, Inc. (ADI), on behalf of EMC, provided additional comments as documented in Table 1-1 of the revised Odor Report. Englobe has revised the odor modeling to address the review comments provided by ADI and prepared a revised odor report dated June 2019. EMC requested that Yorke independently assess the revised odor modeling report.

ODOR MODELING METHODOLOGY

The odor modeling methodology is based on guidance for determining odor thresholds and use of regulatory air dispersion modeling programs. The following sections summarize our review of the odor modeling methodology followed in preparing the revised odor report.

Odor Standard

Initially, the methodology used by Englobe was based on the California Air Resources Board (CARB) and South Coast Air Quality Management District (SCAQMD) documented odor threshold of 5 dilutions to threshold (D/T)[1,2] and modeling the odor concentration to meet that D/T standard. However, consistent with the ADI review letter issue #1 ("Use 4 OU instead of 5"), a D/T of 4 OU/m^3 was used in the revised odor report as a more conservative approach[3]. This standard establishes an odor threshold requirement of four volumes of odor free air to one volume of exhaust air to reach the odor detection threshold consistent with typical practice for projects within the BAAQMD jurisdiction.

Air Dispersion Modeling Analysis

To demonstrate compliance with an odor standard of 4 D/T at the fenceline, Englobe used AERMOD to simulate air dispersion conditions associated with stack release characteristics and site (building) geometry. AERMOD is a steady-state plume dispersion model that incorporates air dispersion calculations based on planetary boundary layer turbulence structure and scaling concepts. AERMOD includes the treatment of both surface and elevated sources, and both simple and complex terrain. AERMOD, like most dispersion models, uses mathematical formulations to characterize the atmospheric processes that disperse pollutants emitted by a source. Using odor emission rates (OU/s), exhaust parameters, terrain characteristics, and meteorological inputs, AERMOD calculates down-wind pollutant concentrations at specified receptor locations. AERMOD is recommended by both the USEPA and BAAQMD for stationary source air dispersion modeling. At the time of modeling for the revised odor report, the latest version of AERMOD was utilized (version 18081).

Receptor Grid

For the revised odor report, Englobe used a nested receptor grid with tiered spacing up to 5,000 meters from the center of the facility. Minimum receptor spacing in areas of maximum concentration should be at least 100 meters, which this nested receptor grid satisfies. In addition, 10 additional discrete receptors were added for the closest

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[1] Amoore, J.E., The Perception of Hydrogen Sulfide odor in Relation to Setting an Ambient Standard, (1985), Prepared for the California Air Resources Board.

[2] South Coast Air Quality Management District (1993). California Environmental Quality Act (CEQA) Air Quality Handbook.

[3] OU = odor unit. Synonymous with D/T. Four D/T equals 4 OU per cubic meter of air (OU/m^3).

neighboring properties to adequately capture maximum odor impacts. For facilities in rural areas with scattered receptors, this is consistent with BAAQMD practice.

Meteorological (MET) data

For the revised odor report, preprocessed MET data (5th-generation Mesoscale Model or MM5) for a six-year averaging period (2010-2015) from Lakes Environmental was used by Englobe. The MM5 MET data was utilized as the Gilroy meteorological station is no longer recording site data. Utilizing MM5 MET data is a common practice in air dispersion modeling and is widely accepted by the U.S. EPA and local air districts.

Terrain Considerations

For the revised odor report, elevations for all receptors, buildings, and emission sources were imported directly into AERMOD View™ by Englobe using the WebGIS import feature from the 30-meter National Elevation Dataset (NED) files from the United States Geological Survey (USGS). All geographical coordinates referenced were in the UTM coordinate system with the NAD83 datum. In addition, a secondary treatment of terrain data was performed for the facility for the stockpile heights (not accounted for in the NED files) as this will have impacts on the ground level odor concentrations. This is a common practice used in air dispersion modeling and is widely accepted by local air districts.

On-Site Buildings

For the revised odor report, all significant buildings (Primary MSW processing building and office building) were included in the dispersion model by Englobe for the purpose of estimating building downwash. Downwash can occur due to wind flow over a structure that can draw pollutant plumes closer to the ground. Building downwash effects were assessed using the Building Profile Input Program for PRIME (BPIPPRM). This is standard practice used in air dispersion modeling.

Source Information and Release Parameters

Table 2-1 and Table 2-2 of the revised odor modeling report summarizes the sources and emission rates used in AERMOD by Englobe for both the current odor and proposed odor emission sources. The revised odor report included figures showing how the sources were configured for input to the dispersion model. The updated modeling odor emission rates for both the current and proposed odor emission sources were calculated as described below.

Odor Emission Rate- Existing

Odor emission rates emanating from the CTI bags were calculated as follows:

$$E = [(O*V)/A]*C$$

Where:

E = Odor emission rate ($OU/s/m^2$)

O = Odor measurement within headspace (OU/m^3)

V = Volumetric air flow into each bag (m^3/min)

A = Area per bag (m^2)

C = min/60 sec

Odor Emission Rate- Proposed (Primary and Secondary Composting)

Odor emission rates emanating from active phase composting using negatively aerated static piles venting to biofilters and curing phase composting using positively aerated static piles were calculated as follows:

E = [(O*V*(1-CE))/A]*C

Where:

E = Odor emission rate (OU/s/m^2)

O = Odor measurement from aeration duct (OU/m^3)

V = Volumetric air flow into duct or ASP (m^3/min)

CE = Control Efficiency of biofilter (assumed as 85% for biofilter and 0% (i.e. unabated) for curing phase)

A = Area per biofilter or ASP (m^2)

C = min/60 sec

Additional comments in the ADI review letter were identified as issues #2, #3 and #4 (“Difficulty in reviewing table 2-1”, “Emanation rates for CTI bags and ASP biofilters”, “ASP and biofilter sizes”, respectively).

In the 2017 odor report, the CTI bags were modeled as three separate sources defined by the age of the content with the emission rates derived from actual measurement data. For the revised odor report, the odor emission rates for the CTI bags were averaged and modeled as a single source rather than as three separate sources. This approach is reasonable.

The revised odor report updated the odor emission rates for the proposed ASP composting sources from literature values to odor sampling measurements taken at ECS reference facilities. The revised emission rates are presented in Tables 2-1 and 2-2 of the revised odor report. The emission rate values presented are consistent with the emissions workbook where the equations above are implemented. While we have reviewed the workbook, we have not reviewed the source of the OU data used in the calculations. The abatement efficiency assumptions are consistent with practice.

The graphical locations of the modeled and excluded sources for the current facility are presented in Map 1 while the proposed sources along with the excluded sources are presented in Map 2 of the revised odor report. The dimensions of the ASP and biofilters were also adequately represented in Map 2 of the revised odor report and are more specifically documented in the emission workbook. It should be noted that some green waste sources were excluded from this analysis (ADI review letter issue #5) since those sources are present in the current and proposed facility and will operate unchanged.

ODOR MODELING RESULTS

In the revised odor report, air dispersion modeling results in units of odor concentrations (odor units per cubic meter, OU/m^3) were compared to the odor detection threshold by Englobe. Odor compounds disperse quickly with short timescales that are nearly instantaneous in nature. Therefore, AERMOD was run with the lowest averaging period (1-hour) available in the model. A 6-year average run was also conducted for both the current and proposed operations at the facility.

Updates in emission rates with the current CTI system for the revised modeling resulted in minimal differences in the maximum hourly and 6-year average odor concentrations compared to that in the 2017 odor report. This is to be expected as the odor emission rates for the CTI system were similar to that reported in the initial 2017 odor report.

With the proposed system, odor impacts were reduced compared to the initial analysis presented in the 2017 odor report. The reduction can be attributed to the lower odor emission rates used in the revised modeling. The methodology used to calculate the odor emission rates incorporated odor measurements that better reflect the emission rates specific to the facility.

CONCLUSION

The revised odor report by Englobe included updating the odor threshold from 5 OU/m^3 to 4 OU/m^3 and revising the odor emission rates for both the current and proposed sources. Odor emission rates for the current emission sources (CTI bags) were derived from measurements, and averaged and modeled as a single source rather than separate sources. For the proposed system (negative ASP with biofilter for active phase and positive ASP for curing phase), the odor emission rates were updated from literature values to odor sampling measurements from similar facilities. In addition, Englobe's revised modeling, as reflected in the revised odor report, did not include the impacts from the green waste windrows and other unaffected emission sources at the facility. Since these green waste windrows and other unaffected emission sources will continue to operate unchanged in the proposed facility, their exclusion from an evaluation of the potential odor impacts of proposed changes to the composting technology is appropriate.

Englobe's air dispersion modeling results suggest that the 6-year and 1-hour average for the proposed system are well below 4 OU/m^3 for the discrete neighboring receptors. Concentration isopleths in the revised odor report suggest that the 6-year average modeled concentrations are well below 4 OU/m^3 for the nested grid while the 1-hour average modeled concentrations may be between 4 OU/m^3 and 5 OU/m^3 for a few nested receptors outside the west-side fenceline (the revised odor report is not sufficiently documented to investigate this further). Further, the modeling results for the proposed ASP system indicate significantly lower concentrations than for the current CTI bag system. This may be attributed to the lower modeled odor emission rates calculated for the revised analysis. Overall, Yorke finds the Englobe analysis presented in the revised Odor Report adequately addresses the ADI comments and the overall methodology used in the odor assessment is generally consistent with current practice.

PEER REVIEW STATEMENT

At the request of the County, Yorke Engineering, LLC, has conducted an independent peer review of Englobe's June 2019 Odor Report for the modifications proposed by Z-Best Project to verify the technical accuracy of the information, and identify any apparent deficiencies, errors and omissions affecting the completeness, methodologies, findings and adequacies of the analysis. The ultimate goal of the peer review is to help ensure that the information contained in the June 2019 Odor Report meets accepted professional standards for use in the EIR.

This peer review letter is part of the administrative record for the EIR. Based on the peer review conducted, Yorke Engineering concludes Englobe's June 2019 Odor Report as revised is appropriate for use as reference in the EIR.

CLOSING

Should you have any questions or concerns, please contact me at (510) 853-1277 or Raj Rangaraj at (949) 420-9519, or through the email addresses below.

Sincerely,

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Sols Matériaux Environnement

Z-Best Composting Facility

AIR DISPERSION MODELLING REPORT Z-BEST COMPOSTING FACILITY

Current & Proposed Expansion Gilroy, California, USA

JUNE 2019

129-P-0018788-0-01-001-00

FINAL REPORT

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0A	2019-06-10	Preliminary revision of the report following ADI review
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Table of contents

1 INTRODUCTION & FACILITY DESCRIPTION 1

1.1 Mandate & purpose 1
1.2 Description of the facility, topography and local environment 2
1.3 Context 2

2 INITITAL IDENTIFICATION OF SOURCES AND CONTAMINANTS 3

2.1 Discussion on sources & contaminant modelled 3

3 ASSESSMENT OF THE SIGNIFICANCE OF CONTAMINANTS AND SOURCES 4

3.1 Discussion on other sources of contaminants (negligible and neighbouring sources) 6

4 OPERATING CONDITIONS, EMISSION RATES ESTIMATION & DATA QUALITY 7

4.1 Operating conditions 7
4.1.1 Current operation process 7
4.1.2 Proposed expansion process 7
4.2 Emission rates calculation & assumptions 7

5 SOURCES VARIABLE EMISSION FACTORS AND OPERATING HOURS 8

5.1 Meteorological data 8
5.2 Topographical data 10
5.3 Receptors grid & discrete receptors 11
5.4 Building considerations 11

6 EMISSION SUMMARY TABLES, CONCLUSION AND RECOMMENDATIONS 12

6.1 Current operation results 12
6.2 Proposed expansion operation results 12

Appendices

Appendix A ECS Memo and odor assessment report
Appendix B Figures

1 Introduction & facility description

Along with the Engineered Compost Systems' (ECS) Memo, this section provides a description of the mandate and its purpose.

1.1 Mandate & purpose

The mandate for the original 2017 report consisted of modelling and comparing the odor dispersion resulting from the emissions of the existing Municipal Solid Waste (MSW) composting process compared against the proposed expansion of the composting process using ECS compost technology. This new report has the same mandate but has been revised following the review that was performed by ADI (letter dated Dec. 10 2018).

ECS collected air samples and measured air flow from the existing Z-Best facility and a nearby MSW facility with ECS compost technology (Mariposa, CA, Landfill). ECS had the air samples analyzed for odor based on dynamic olfactometry which reports odor unit (OU). This data was provided to Englobe for input in an air model based on odor emissions from identified sources (OU/s/m², OU/s). Odoriferous species are reactive and will deposit on available surfaces, thus reducing the odor level at receptors located downwind of the sources (Final Odor Emission Technical Report, Jones & Stokes, 2007). Odor is also comprised of a wide variety of compounds that have widely varying detection thresholds, making generalized odor unit (OU) a much more relevant measure of odor impact.

The main objective of this study was to better show and compare the current odor footprint of the MSW composting process with the modelled odor footprint resulting from the proposed technology upgrade and expansion of the MSW composting process without the influencing factors of facility components (and odor sources) that will not be altered. MSW is currently processed in CTI bags, which will be replaced in the upgraded and expanded facility with a two-stage aerated static pile (ASP) from ECS. The ECS system consists of a negatively aerated covered aerated static pile primary composting (CASP) venting to static biofilters. The secondary composting process (curing) is a positively aerated static pile (ASP). Odor data were all pulled from actual measurements on similar composting site; please refer to Appendix A for the memo from ECS wherein the data sources and the data are presented. A copy of each of these reports are also included in this appendix.

Graphical dispersion of odors of the current process and proposed expansion process were modelled using the latest version of AERMOD (version 18081).

It should be noted that the purpose of this study was not to provide professional advice or conformity to any state or federal regulation, its objective was to compare two scenarios of odor dispersion.

1.2 Description of the facility, topography and local environment

The Z-Best Composting Facility (Z-Best) is in Santa Clara County near the City of Gilroy.

The site is flat, and subject to strong winds at times. These wind conditions have been modelled in this exercise by the addition of a meteorological dataset of 6 years (from 2010 to 2015).

Agricultural activities border the facility on all sides. Potential receptors have been added to the model, based on a review of aerial photography, and previous studies.

1.3 Context

As previously stated in this section, the purpose of this study is to compare two different composting technologies regarding their odor emission dispersion following the review from ADI of the report that was prepared in 2017. The table below presents an overview at how each of these interrogations were integrated in the review of this report.

Table 1-1: Overview of the interrogations from ADI

ADI review letter issue #	ADI comment	Englobe actions in this new report
1	Use 4 OU instead of 5	The threshold for odor unit was adjusted throughout this report.
2	Difficulty in reviewing table 2-1	An Excel file containing all the calculations is included with the report
3	Emanation rates for CTI bags and ASP biofilters	All emanations rates are now based on odor assessment, refer to appendix A for all details.
4	ASP and biofilter sizes	All dimensions for the entirety of the units is supplied in appendix B
5	Modifications to greenwaste	The facility expansion is only for MSW processed by ECS system as a replacement for the CTI bags system on similar footprint. The new waste is tipped straight into ECS bunkers for immediate processing. There are no changes to the greenwaste and thus it and all related equipment and sources have been removed from this modeling exercise.

Key odor emission rates included for this study (primary and secondary composting) were provided by ECS. The dispersion model output integrates odor emission rates for all modelled sources, whilst considering all existing local conditions such as prevailing winds, topography, exhaust locations, and buildings.

2 Initital identification of sources and contaminants

A list of all potential sources of odor has been established based on the information provided by the client for both processes. Maps 1 and 2 indicate the location of all potential sources considered in this study, and they are listed in Tables 2-1 and 2-2.

2.1 Discussion on sources & contaminant modelled

As stated previously, all possible sources have not been considered since the proposed change in the MSW composting technology does not modify the odor emission rate for unrelated greenwaste sources. The tipping building was also removed from the calculations as its throughput will not be affected by increased total requested throughput. Additional feedstock beyond what is processed currently by the tipping building will be directed straight into ECS CASP bunkers, bypassing the tipping building entirely. Following the ADI comments, only the sources associated to the CTI bags system or the CASP biofilters and ASP surfaces were modeled. All other sources that remains constant following the change to the MSW composting process were excluded.

The only aspect of air emissions considered in this study was odor.

3 Assessment of the significance of contaminants and sources

The Tables 2-1 and 2-2 summarizes the information about the assessment of sources, and their respective emission rates. Site and facility information was provided by ECS.

Table 2-1: Current odor emission sources modelled and odor emission rates (CTI system only – no change to greenwaste windrow planned and thus not modelled)

Source ID	Description	Emission rate modelled 2019 [OU/s*m²]	Data Source	Emission rate modelled 2017 (Original facility) [OU/s*m²]	Data Source
4	Positively aerated CTI BAG surface emission (average 0-120 days for simplification)	7	I	-	
4_A1	Positively aerated CTI BAG surface emission 0-40 days	-		7.14	II
4_A2	Positively aerated CTI BAG surface emission 40-80 days	-		6.69	II
4_A3	Positively aerated CTI BAG surface emission 80-120 days	-		6.35	II

* Data Source I: Average of data sources in Data Source II. The bags do not move locations as they age, so over the course of a year, it is better to model these sources as one combined area source, rather than location specific age specifc sources.

* Data Source II: Odor Samples collected in Tedlar bags and lung chamber send to IDES, Ontario, CA for analysis. appendix A

Table 2-2: Proposed odor emission sources modelled and odor emission rates (ECS system only – no change to greenwaste windrow planned and thus not modelled)

Source ID	Description	Emission rate modelled 2019 [OU/s*m²]	Data Source	Emission rate modelled 2017 [OU/s*m²]	Data Source
BIO1	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO2	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO3	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO4	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO5	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO6	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO7	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO8	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO9	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO10	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO11	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
BIO12	Negatively aerated CASP to biofilter surface emission	0.13	III	2.31	V
ASP1	Positively aerated curing ASP surface emission	0.16	IV	0.12	V
ASP2	Positively aerated curing ASP surface emission	0.16	IV	0.12	V
ASP3	Positively aerated curing ASP surface emission	0.16	IV	0.12	V
ASP4	Positively aerated curing ASP surface emission	0.16	IV	0.12	V
ASP5	Positively aerated curing ASP surface emission	0.16	IV	0.12	V

Notes:

Data Source III: Odor sampling at ECS reference facilities in washington state 2014-2018. See xls file.

Data Source IV: odor sampling at ecs reference facility at Mariposa, CA, 2017, values in ides report, appendix A

Data Source V: odor estimates from various studies and literature

In the previous report the odor threshold was based on a report by the California Air Resources Board (CARB)[1], which highlighted current approaches on odors and suggested thresholds of annoyance, AERMOD criteria were refined. The CARB study suggested that the level at which odor reaches a 'nuisance' level is approximately five times the threshold of detection (5 OU). In addition, the California's South Coast Air Quality Management District[2] states that at a value of 5 OU/m^3 Dilution/Threshold (D/T), people become consciously aware of the presence of an odor; between 5 to 10 OU/m^3 D/T, odors may be strong enough to evoke a complaint.

Based on these assumptions, Englobe previously selected a comparative value of 5 OU/m^3 D/T on an average of 6 years, and 10 OU/m^3 to 20 OU/m^3 for the 99.5 % and 98 % 1 hour maximum yearly average. Although, following ADI review of the 2017 report, the comparative value was lowered to 4 OU/m^3.

3.1 Discussion on other sources of contaminants (negligible and neighbouring sources)

Local environment and land use nearby the site facility are mainly agricultural. Agricultural activities can be a source of odors in the environment. Similar to the Z-Best Facility secondary sources that were not included, and are predictably static, these activities are not considered in this study. Again, the focus was a comparison, not a total area analysis at a single snapshot in time.

[1] Amoore, J.E., The Perception of Hydrogen Sulfide odor in Relation to Setting an Ambient Standard, (1985), Prepared for the California Air Resources Board

[2] South Coast Air Quality Management District (1993). California Environmental Quality Act (CEQA) Air Quality Handbook.

4 Operating conditions, emission rates estimation & data quality

4.1 Operating conditions

4.1.1 Current operation process

Some MSW enters the reception building where it is screened/sorted to segregate recyclable materials. This sorted MSW is combined with pre-sorted MSW and transferred to the CTI bags for composting. After composting the bags are opened, left to air for a day and then screened and stockpiled in large blocks prior to final screening and glass removal.

The green waste process will not be discussed as it is not relevant and static in the baseline and upgraded facility.

4.1.2 Proposed expansion process

The main difference from the baseline scenario and the upgraded facility is the replacement of the CTI bags composting with two phases of ASP composting; the first phase with negative aeration capturing process air and scrubbing it with a biofilter and the second phase with positive aeration to maintain BMP conditions.

The upgraded facility has the capability to process close to four times the current CTI bag throughput, largely due to reduced retention time and substantially faster stabilization rates that accompany higher aeration rates, lower temperatures, higher oxygen concentrations, and more uniform aeration distribution.

4.2 Emission rates calculation & assumptions

All emission sources of this study are presented in Table 2-1 and 2-2 and on Maps 1 and 2 (Appendix B). Please note that all sources that were removed in this revision are shown in red.

5 Sources variable emission factors and operating hours

For both the CTI bags and the ASP biofilters systems, the emissions are considered to be constant over a 24h hour period.

5.1 Meteorological data

Dispersion models based on Gaussian plume equations need a complete set of meteorological data that covers an extended period to be able to consider specific meteorological conditions. A 6-year period prognostic-modeled meteorological data (MM5) was purchased from Lakes Environmental, the standard choice for dispersion modelling exercises such as this. Lakes Environmental are the maker of the AERMOD software. MM5 data is well accepted as a meteorological data by the USEPA Air Quality Group.[3]

There are several reasons why MM5 data are used as prognostic meteorological model data:

- there are no meteorological stations available in your area;
- there is no other representative meteorological station site available for your site;
- the available station data is out of date;
- the available station data does not cover enough years;
- the available station data does not meet data quality standards (e.g. poor treatment of calms).

In this study, MM5 data has been selected since the Gilroy meteorological station is no longer registered and does not record any more data.

The MM5 dataset is a limited-area, non-hydrostatic, terrain-following modelling system that solves the full set of physical and thermodynamic equations governing atmospheric motions. In this study, the sensitivity of the model to surface roughness length variations is higher for low level releases, thus passing MM5 data through AERMET with more localized surface characteristics is more appropriate (Journal of the Air & Waste Management Association, volume 57/2007, p.593). You will find hereafter all meteorological data input for this study:

[3] https://www.weblakes.com/services/met_data.html, consulted on February 21, 2017.

Table 5-1: Calculated Met Station Parameters for the Z-Best Facility, Gilroy (CA)

Met Data Type:	▪ AERMET-Ready (Surface & Upper Air Data) ▪ Lakes Pre-processed MM5
Start-End Date:	Jan 01, 2010 -Dec 31, 2015 (6 years)
Latitude:	36.948 N
Longitude:	121.524 W
Datum:	WGS 84
Site Time Zone:	UTC/GMT UTC -8 hour(s)
Closest City & Country:	Gilroy (USA)
Anemometer Height:	15 m
Station Base Elevation:	131 m
Upper Air Adjustment:	+8 hours

MM5-Processed Grid Cell

- Grid cell centre (Lat, Lon): 36.948 N, 121.524 W
- Grid cell dimension: 12 km x 12 km
- Output period: Jan 01, 2010 to Dec 31, 2015
- Type MM5 Mesoscale Model[4]

Hourly Surface Met Data (*.sam)

- Format: SAMSON (surface met data for preprocessing by AERMET)
- Anemometer height: 15 meters
- Base elevation above MSL: 131 meters
- Time Zone: UTC/GMT UTC -8 hour(s) (data reported in local time)
- Output interval: hourly

Sector and Surface Parameters

- 1 sector: 5km radius from site: Cultivated land
- Albedo: 0.28
- Bowen ratio: 0.78
- Surface Roughness : 0.0725

The wind rose associated with the meteorological data set is presented in Appendix B.

[4] http://www.mmm.ucar.edu/mm5/mm5-home.html

5.2 Topographical data

In order to model odor dispersion for the composting operations of the Z-Best facility, the primary data source that has been used was a 10 km x 10 km cell sourced from the National Elevation Dataset (NED)[5] of the United States Geological Survey (USGS). The NED is a seamless dataset of the best conterminous United States, Alaska, Hawaii, and territorial islands raster elevation data available. The NED is updated on a nominal two-month cycle to integrate newly available and improved elevation source data.

The NED is derived from diverse sources of data that are processed through a common coordinate system and elevation units. NED data is distributed in geographic coordinates (decimal degrees) in compliance with the 1983 North American Datum (NAD 83). All elevation values are in meters and, over the United States, are referenced to the 1988 North American Vertical Datum (NAVD 88). NED data used in this project has a resolution of one arc-second (about 30 meters).

A secondary treatment of terrain data has been performed to integrate elevations or summits that can affect odor dispersion around the Z-Best facility. Hence, all heights of stockpiles located on the northern portion of the site were integrated into the NED terrain model. It should be noted that these stockpiles may act as a natural barrier for other odor sources at the site.

[5] https://nationalmap.gov/elevation.html

5.3 Receptors grid & discrete receptors

One nested grid was defined using the parameters presented in Table 5-2.

Table 5-2: Receptors Grid & Discrete Receptors

Bounding Box (m from center of the site)	Receptor Spacing (m)
250	50
750	75
2,000	150
3,000	250
5,000	500

Another set of ten discrete receptors was added to the locations of the closest neighbouring properties located near the Z-Best facility.

Figures maps 3 to 6 illustrate all the discrete receptor locations.

5.4 Building considerations

To consider local building downwash effects, the model required information on the dimensions and location of the building located on the northern portion of the site, near the entrance. In addition, the adjacent office building was also considered. No other temporary building or structure was incorporated in the model. Table 5-3 presents the on-site building dimensions considered in the model.

In this study, the most dominant building for the downwash effects is the Processing building.

Table 5-3: Building Considerations

Building	X-length (m)	Y-length (m)	Height (m)
Building – Primary MWS Processing	60	30	8
Office Building	25	25	4

6 Emission summary tables, conclusion and recommendations

The main goal of this study was to compare the baseline and the proposed expansion in terms of odor dispersion. Table 6-1 presented below details the results for all discrete receptors, for both the baseline and proposed expansion processes.

As it can be observed in Table 6-1, all individual results for each of the 10 discrete receptors show reduced odor concentrations associated with the upgraded and expanded facility. Reduction in odor is consistent for the average as well as for the maximum (worst case) 1-hour results. These results suggest that the proposed facility improvements will improve the ambient air quality near the Z-Best facility.

Table 6-2 and 6-3 presents a comparison for maximum concentration between this model and the previous model. Finally, table 6-4 and 6-5 shows the contribution of each source for both the current and proposed systems.

6.1 Current operation results

Results for the current operation are summarized and presented on Map 1 and 2 in Appendix B.

Map 4 shows the average results over a 6-year period (2010-2015) for the baseline operation at the Z-Best facility. As it can be observed on this figure, five of the discrete receptors are located within the 4 OU/m^3 isopleth. This result suggests (and based on the guideline stated in section 3) that under the current operation process, some odors could be detected in the area. However, it is important to note that no odor complaints have been assigned to the Z-Best facility in recent years in history.

However, it should be noted that an average concentration is not the most representative form of human perception of odors. For this reason, Englobe also presented the maximum results over a 1-hour period 98 percentile.

Baseline Map 3 presents the 98 percentiles of the maximum results over a 1-hour period. This time, two of the discrete receptors are located within the 20 OU/m^3 isopleth. This is an indication that the maximum odor levels are limited to specific isolated meteorological conditions and could thus be considered as exceptional conditions.

6.2 Proposed expansion operation results

Results for the proposed expansion operation are summarized and presented on Map 5 and 6 in Appendix B.

Upgraded Facility Map 6 shows the average results over a 6-year period (2010-2015) for the proposed expansion operation at the Z-Best facility. As can be observed on this figure, none of the discrete receptors are located within the 4 OU/m^3 isopleth. This result suggests that under the proposed expansion operation process, the ambient air quality will be improved near the Z-Best Facility.

Upgraded Facility Map 5 represents the 98 percentiles of the maximum results over a 1-h period. This time, none of the discrete receptors are located within the 20 OU/m³ isopleth. This result can be interpreted as an indication that discrete receptors should not be affected by odor annoyance resulting from the proposed expansion at the Z-Best Facility.

The proposed expansion process was modelled and compared to the current process. The results should not be interpreted to show total site wide odor emitted currently or in the future. It shows distinctly improved results for odor dispersion for the ambient air near the site. If this process is to be implemented at the Z-Best Composting Facility, it is expected, since this study demonstrates an improvement by using the new composting technology, that no additional mitigation measures will be necessary to reduce odor impacts.

There are various activities that are not modelled because accurate data on odor emission rates are impossible to collect, including the pickup and movement of material by loader bucket between primary and secondary composting. But the surface area of a 10 yards loader bucket is insignificant at a site of this scale.

Table 6-1: Summary of Air Modelling Results

			CURRENT OPERATIONS PROCESS		PROPOSED EXPANSION PROCESS	
Discrete Receptors	X	Y	6-year average (100%)	1-hour max. (98%)	6-year average (100%)	1-hour max. (98%)
	m	m	OU/m³	OU/m³	OU/m³	OU/m³
1_1	630955,08	4090585,94	4	36	0.31	0.04
1_2	631089,96	4090774,34	4	48	0.46	0.03
1_3	633098,92	4089746,20	1	8	0.08	0.01
1_4	630682,84	4089085,47	1	1	0.01	0.01
1_5	630794,78	4090967,63	2	8	0.07	0.02
1_6	630710,34	4091021,18	2	6	0.06	0.02
1_7	630239,74	4092054,79	<1	1	0.00	0.00
1_8	629203,40	4092287,34	<1	<1	0.00	0.00
1_9	628867,38	4094021,74	<1	<1	0.00	0.00
1_10	627689,19	4092446,29	<1	<1	0.00	0.00

Table 6-2: Comparison with previous results (current CTI system)

Period	Method	Maximum Concentration 2019	Maximum Concentration 2017
		[OU/m³]	[OU/m³]
1 h	98 percentiles	681	631
6 years	average	118	110

Table 6-3: Comparison wtih previous results (proposed ECS system)

Period	Method	Maximum Concentration 2019	Maximum Concentration 2017
		[OU/m³]	[OU/m³]
1h	98 percentiles	6	159
6 years	average	1	47

Table 6-4: Source contribution for current CTI system

Source ID	Concentration	Contribution
	[OU/m³]	[%]
4	1278	100

Table 6-5: Source contribution for proposed ECS system

Source ID	Concentration	Contribution
	[OU/m³]	[%]
ASP4	8	45
ASP3	4	24
ASP2	4	24
ASP5	1	6
ASP1	<1	<1
BIO8	<1	<1
BIO7	<1	<1
BIO12	<1	<1
BIO1	<1	<1
BIO10	<1	<1
BIO11	<1	<1
BIO2	<1	<1
BIO3	<1	<1
BIO4	<1	<1
BIO5	<1	<1
BIO6	<1	<1
BIO9	<1	<1

Appendix A ECS Memo and odor assessment report

engineeredCOMPOSTsystems

Project Memo 251-8

DATE:	6/17/19	ECS PROJ. NO.:	P251
BY:	Geoff Hill	PROJECT NAME:	Odor model
TO:	John Doyle, ZBest	COPY TO:	
SUBJECT:	Explanation of changes to the re-issued ZBest odor model		

RESPONSE REQUESTED

Yes	X	No		Hard Copy		E-Mail	X	Phone Call	

Summary

In 2016 ECS was tasked to develop an improved odor report in order to update a document by Jones and Stokes, authored in 2007. This 2007 report contained no actual analysis or site specific data. ECS encouraged ZBest to select odor modelling as the most advanced means of odor analysis, as odor models were becoming more commonplace in eastern Canada (Ontario and Quebec specifically) where odor is regulated at the property line. ZBest approved and ECS selected Englobe (a Quebec Canada company) to conduct the odor modelling analysis. The odor model was completed and submitted in early 2017; its objective is summarized in the next section of this memo. Due to a rather extensive review in 2018 by ADI, the odor model was updated and resubmitted. This memo serves to accompany the updated odor model and provide context and a summary of why changes were made and what the changes were.

It is important to note that this facility does not have odor complaints filed against it, as other Bay Area composting facilities do.

The 2017 ZBest odor model

The objective of the 2017 odor model was to document the impact of changing from the CTI bag system to the ECS system within the context of a large greenwaste composting facility. The greenwaste windrow operation will not change with the facility upgrade. At the time of modelling, many of the emission sources odor flux rates were not actually known and numerous assumptions were made including:

- Emission rate of the windrows, which while not know, was held constant for both current and future operations due to the fact that no changes are proposed, and thus negated the need for a site specific odor flux rate.
- Emission rate of tipping building (same rational as above)
- Emission rates of the stockpiles of MSW and greenwaste (same rationale as above)
- Emission rate of the ECS negative CASPs venting to a permanent wood chip biofilter, which was assumed to emit at the same odor rate (pre biofilter) as the CTI system. This assumption was made in order to simplify the evaluation, knowing that the biofilter achieves ~90% reduction in odor, despite ECS knowledge that odor generation rates (per mass and time) are 1-2 orders of magnitude lower with the properly engineered process controls which accompany all ECS systems

(dynamic control of aeration supply rate, high dynamic range of CFM/cy, coupled with homogenous aeration distribution through our Low Friction Trench floor).

The 2019 ZBest odor model

Upon review of ADI's comments on the 2017 model, it became clear that what was needed was not a full facility odor model, but a much more accurate technology (system) specific odor model which evaluated *only* the change in composting equipment from the CTI bag to the ECS system. In the 2017 odor model it was impossible to isolate the impact of the technology change because of the influence of the greenwaste windrows and other (constant) emission sources. As the data for the greenwaste was not actually site specific data, and does not change with the CTI / ECS upgrade, it was decided to remove it entirely from the analysis so as to clarify exactly what the changes are to be in the odor plume between CTI and ECS equipment.

With the removal of all sources which do no change between current CTI operations and planned ECS equipment, it was possible to use only real source specific data for the odor model, thereby increasing its accuracy and value in this planning exercise. The odor flux data assigned to the CTI bags was collected in 2016 during VOC sampling and analyzed by IDES following EN13725 odor protocols (the only exception is that the number of odor analysts were fewer). The odor flux data assigned to the ECS negative CASP vented to permanent biofilters was collected in 2015 at representative ECS facilities in Washington processing food waste and sent to IDES following the same EN13725 with reduced odor analysts. The odor flux data assigned to the ECS positive ASP vented through its surface (unabated) was collected from the Mariposa facility where MSW is composted outdoors, following the same EN13725 procedures and analyzed by IDES. The IDES report containing the Mariposa and CTI bag odor values are included.

We are also providing a live version of the Excel file which was used to calculate the final odor emission rates for each surface source. The calculations were made in different ways, as is explained below.

CTI bag surface emission: measured odor value per IDES report (OU/volume) x airflow (volume/time)= OU/time. OU/time * Area of bags = odor flux rate (OU/Time/Area)

ECS primary CASP to Biofilter surface emission: the most representative data for odor generation from a negative ECS system is odor per mass aerated per time as the depth of a pile can vary considerably between sites and the aeration system aerates a volume (which has a density and mass), not a surface. The Excel file can be followed from reference facility odor values through to the final selected odor value (OU/min/mt). The value of 50 OU/min/mt, selected for the ECS facility at ZBest, was conservatively high based on data from two other ECS systems with same technology and similar feedstock. For reference, the CTI system's value for odor generation per unit mass and time was ~350 ou/min/mt, which is not quite 10x higher, but which was around what was expected (10x higher than the ECS system) given the lack of process control, severe heterogeneity (maldistribution). A peer reviewed literature reference (will full text download access) which gives further explanation of how odor can be 10-100x higher in an un-optimized process follows:
https://www.researchgate.net/publication/232810830_Effects_of_pH_and_microbial_composition_on_odour_in_food_waste_composting

ECS ASP vented unabated out surfcea: concentration from Mariposa odor sampling (data in IDES report) * flow rate (calculated based on mechanical design) * Area of ASP = OU/Time/Area.

Odor Assessment Report

Engineering Compost Systems

Sidarta S. Medina

SO1524

Disclaimer

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Although strenuous effort has been made to identify and assess all significant issues required by this brief we cannot guarantee that other issues outside of the scope of work undertaken by Scentroid (Scentroid) do not remain. An understanding of the project conditions depends on the integration of many pieces of information, some regional, some site specific, some structure specific and some experienced based.

Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client, their employees, subcontractors, agents or nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified except where expressly stated and, for the purposes of this report, it is assumed that the information provided to Scentroid (Scentroid) is both complete and accurate.

Document Reference

Customer:	Engineering Compost Systems
Customer contact	Geoff Hill
Customer address:	4220 24th Avenue West Seattle, Washington 98199
Project:	Odor Assessment – air compost samples.
Project number:	SO-1524
Reference:	SCENTROID, 2016. *Odor assessment - compost air samples for by Scentroid for ECS (2)., Jan 20th 2017, Markham ON., Canada.*
Version	Final
Revision number:	V.1.0
Author:	Sidarta E. Medina
Reviewed by:	Ardevan Bakhtari
Project director:	Ardevan Bakhtari

Approved for issue by: **Date:**

Ardevan Bakhtari

Jan 20th, 2017

Ardevan Bakhtari PhD.
President
Scentroid

Contents

1. Introduction. 6
2. Project description 6
Odor Concentration: 6
Instruments Used for the Assessment. 7
3. Results: 8

Tables

Table 2 Odour concentration results 9

Acronyms Used

Term	Definition
ASTM	American Society for Testing and Materials
EN	European Norm
LPM	Liters per Minute
MDL	Method Detection Limit
ORIS	Odor Reference Intensity Scale
PPBV	Parts per Billion by Volume
QA	Quality Assurance
QA/QC	Quality Control/Quality Assurance

Chemical nomenclature

OU_E/m^3	odor units – is the number of times that a sample of odor must be diluted to reduce its concentration to its detection threshold

1. Introduction.

Scentroid was commissioned by Engineering Compost Systems (ECS) to assess air samples sent by the customer. The assessment was carried out at Scentroid Research Center to evaluate odour concentration from the bag containing the sample. As per customer request, odour concentration was carried out by only one assessor partially following the EN13725:2003 standard, therefore the results only corresponds to the individual detection threshold.

2. Project description

The scope of the project consisted in the following objective:

- **Objective One:** To obtain odor concentration per each sample.

The analysis was performed on Jan 17th, 2017. Samples were conditioned at room temperature during 30 minutes at 22.5° Celsius with an average relative humidity of 35.5%.

Odor Concentration:

Odor concentration evaluation was performed according the EN13725:2003[1] modified standard. This approach involve a controlled mixture of odorous air with non-odorous air to achieve known discrete dilutions, which are presented to a human subjects for evaluation (assessors). The process starts with exposure of odor assessors to a highly diluted air sample, where odor-containing air cannot be distinguish from odorless air. The assessors are methodically presented with progressively lower dilution levels (greater odorous air content) in measured steps. The odor unit level of odor concentration (OU/m^3) correspond to an odor concentration in which the observer detects air is no longer the same as it was before. A total of 3 rounds were conducted to assess the odour concentration from the samples contained in the bags. The results of the 3 rounds are presented in Table 2

[1] C. (2013). EN13725:2003 Air Quality - Determination of odor concentration by dynamic Olfactometry.

The OU/m^3 is a unitless ratio calculated as:

$$OU/m^3 = \frac{\text{Volume of odorous air + Volume of filtered air}}{\text{Volume of odorous air}}$$

Detection of an odor at high dilution indicates the presence of a strong odor. Conversely, detection at low dilution indicates a relatively weak odor.

Odor assessor, was selected in accordance the methodology described in the EN 13725:2003 Standard. The sensitivity of the assessor met the quality criteria of sensitivity (0,020 µmol/mol a 0,080µmol/mol) and variability (<2.3). Special attention was given in the assessor selection regarding their age, gender and heath condition. The assessor was screened using the triangular force choice method in a SCENTORID SC300 mobile olfactometer on April 20th, 2016. The assessor was screened using a mixture of N-butanol (Sigma-Aldrich CAS-No. 71-36-3) evaporated in nitrogen to create a concentration of 40 ppm. A Teflon bag with stainless steel fitting SCENTROID Model BGF10 was used as a sample container.

Instruments Used for the Assessment.

A SM100i olfactometer was used for the assessment of odour concentration from the bag sent by ECS. This instrument has the capability to assess ambient odor samples or samples from a sampling bag. The instrument complies with the specifications of the 6.5.2 section “Dilution Apparatus” of the EN13725:2003 and the sections 6.5.1 “Olfactometer Construction,” 6.5.2, “Dilution range,” 6.5.3, “interface between the nose and olfactometer,” 6.5.4, “Decision limit,” and 6.5.5, “Calibration procedures”.

The instrument allows the administrator to conduct Yes/No tests according the EN13725:2003 presenting blanks randomly within the dilution series. The instrument is managed using the SM100i application developed by Studio Okolje that runs in Android OS. This application works with a Bluetooth interface that connects the instrument with the Android device. The Android device manages a servo controller that controls the dilutions and blanks presented to the assessor. Likewise, the equipment works using odorless air that is contained in a high pressure 4500 psi cylinder with 20 minutes duration to provide to the assessor with the necessary air flow to reach 20.0L/min. The air contained in the cylinder is filtered twice using an activated carbon filter to ensure 100% clean air.

3. Results:

Once all the specimens were conditioned and prepared. The samples were assessed finding the following:

Engineering Compost Systems

		ou_E/m^3									
Item No.	Description	Low D	High D	Z_{ITE} R1	Low D	High D	Z_{ITE} R2	Low D	High D	Z_{ITE} R3	$\bar{Z}_{ITE}$
1	MARIPOSA 2 REGULAR	47	83	62	47	83	62	47	83	62	62
2	MARIPOSA 1 FAST	83	162	116	47	83	62	83	162	116	94
3	CTI (1)	2926	4479	3620	2926	4479	3620	2926	4479	3620	3620
4	ZBEST DOWNWIND	390	625	494	264	390	321	264	390	321	370
5	ZBEST CTI 2	2926	4479	3620	2211	2926	2543	2211	2926	2543	2861

Table 1 Odour concentration results

Appendix B Figures

Project components

- Included source
- Excluded source
- Excluded ponctual source
- 4 — All three surfacic sources for the CTI bags were combined into one

ZBest Composting Facility

Atmospheric particle dispersion studies

Map 1

Excluded sources in current CTI System

Sources :

Base : Google Maps, @Google 2019

Inventories : Englobe, 2019
Cartography : Englobe

June 2019

Englobe

Projet manager : A. Milliard						Date : 2019-06-13		
Prepared by : C. Blanchet			Drawn by : J.F. Bazin			Verified by : L. Savoie		
Master Serv.	Project	Otp			Disc.	Type	N° drawing	Rev.
46	P-0018788	0	01	100	EN	D	0101	00

File : \\que7-fil-001\Projets\129\P-0018788_Zbest products\z5_CAD\GO\2_Carto\P18788_c1_ZBest_Current_190521.mxd

Project components

- Included source
- Excluded source
- Excluded ponctual source

ZBest Composting Facility

Atmospheric particle dispersion studies

Map 2
Excluded sources in proposed ECS System

Sources :

Base : Google Maps, @Google 2019

Inventories : Englobe, 2019

Cartography : Englobe

June 2019

Projet manager : A. Milliard | Date : 2019-06-13

Prepared by : C. Blanchet | Drawn by : J.F. Bazin | Verified by : L. Savoie

Master Serv.	Project	Otp			Disc.	Type	N° drawing	Rev.
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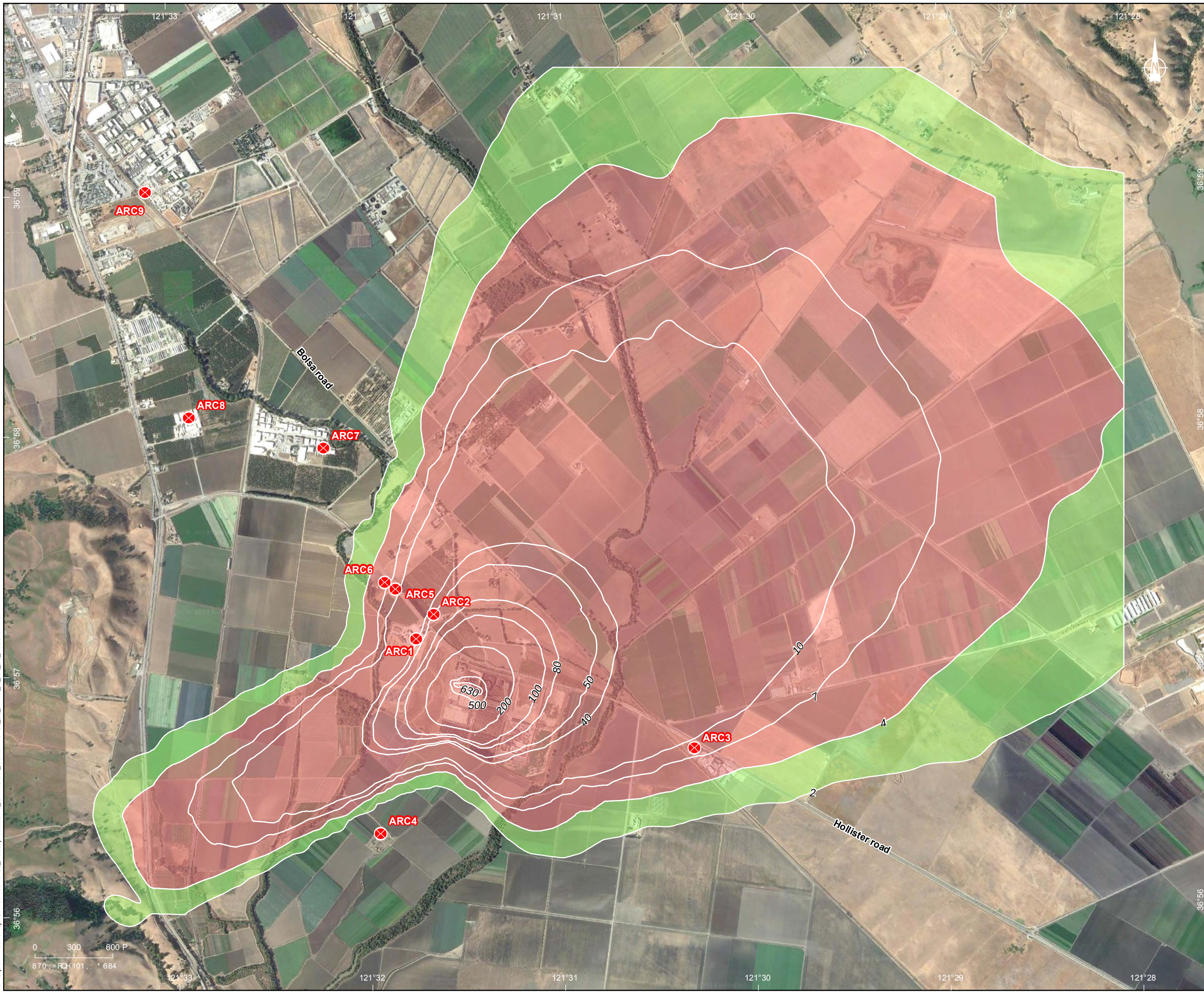


Project components

&RQFHQWUDWLRQ FRQWRXU(! 4 RX/P 3)

&RQFHQWUDWLRQ FRQWRXU(≤ 4 RX/P 3)

ARC1 ' LVFUHWH UHFHSWRU

Maximum concentration value : 681 ou/m^3

ZBest Composting Facility

$WPRVSKHULF SDUWLFOH GLVSHUVLRQ VWXGLHV

Map 3

Maximum 98 percentile odor concentration (ou/m^3) in current CTI System

Sources :

Base : Google Maps, @Google 2019

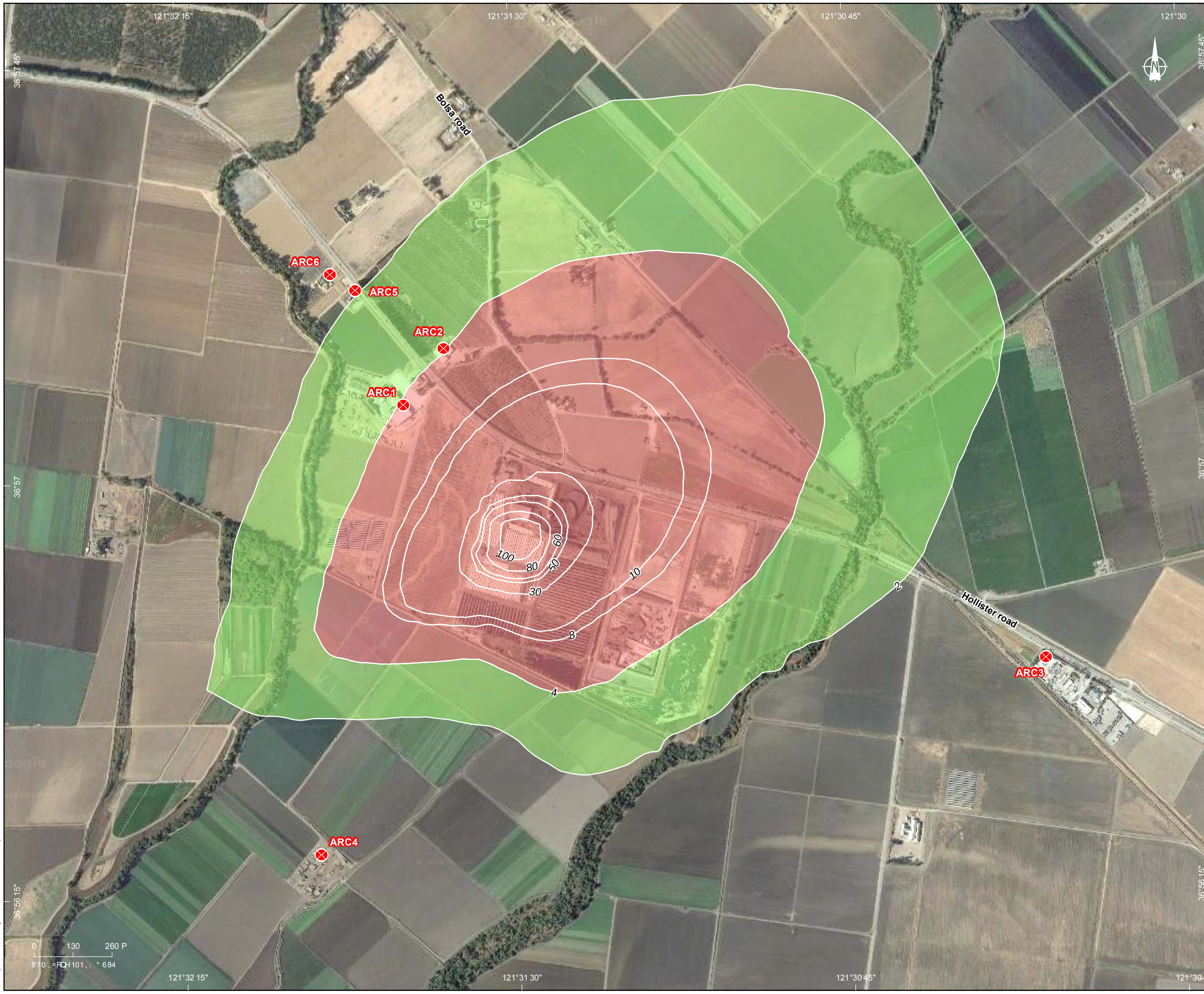
Inventories : Englobe, 2019

Cartography : Englobe

June 2019

Englobe

3URMHFW PDQDJHU: $. 0 LOODUG							' DWH: 2019-06-13
3UHSDUHG E\: &. %ODFKHWWH		' UDZQ E\: -.) . %HDXOLQ				9HULILHG E\: / . 6DYRLH	
0 DVWHU 6HT.	3URMHFW	2 VS		' LVF.	7\ SH	' UDZLQJ 1 XP	5HY.
46	P-0018788	0	01 100	EN	D	0301	00



Project components

ARC1

Maximum concentration value : 118 ou/m^3

ZBest Composting Facility

Map 4

Maximum averaging percentile odor concentration (ou/m^3) in current CTI System

Sources :

Base : Google Maps, @Google 2019

Inventories : Englobe, 2019

Cartography : Englobe

June 2019

Englobe

46	P-0018788	0	01	100	EN	D	0401	00

2019-06-13

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Project components

ARC1

Maximum concentration value : 6 ou/m³

ZBest Composting Facility

Map 5

Maximum 98 percentile odor concentration (ou/m³) in proposed ECS System

Sources :

Base : Google Maps, @Google 2019

Inventories : Englobe, 2019

Cartography : Englobe

June 2019

Englobe

2019-06-13

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Project components

ARC1

Maximum concentration value : 1 ou/m³

ZBest Composting Facility

Map 6

Maximum averaging percentile odor concentration (ou/m³) in proposed ECS system

Sources :

Base : Google Maps, @Google 2019

Inventories : Englobe, 2019

Cartography : Englobe

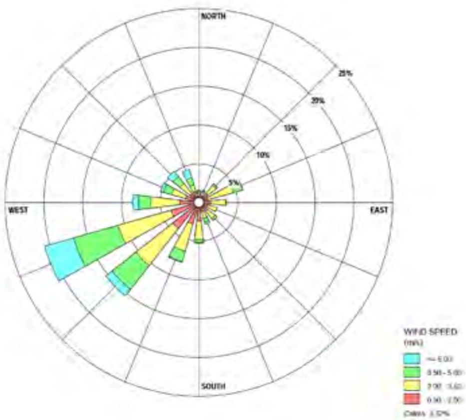
June 2019

Englobe

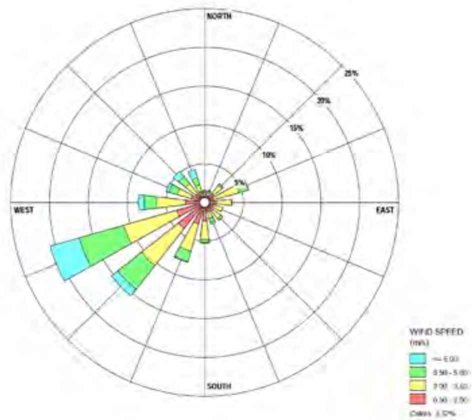
2019-06-13

46	P-0018788	0	01	100	EN	D	0601	00

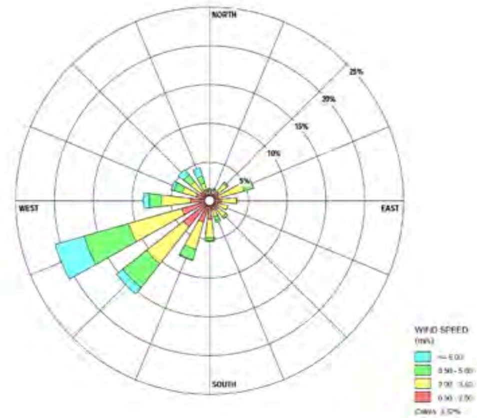
Wind rose (2010)



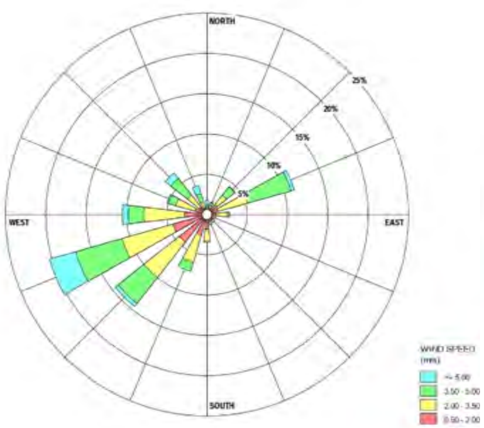
Wind rose (2011)



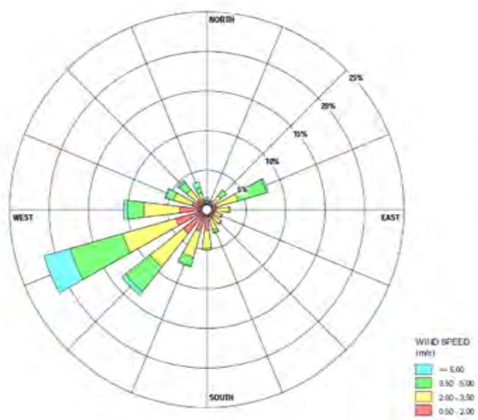
Wind rose (2012)



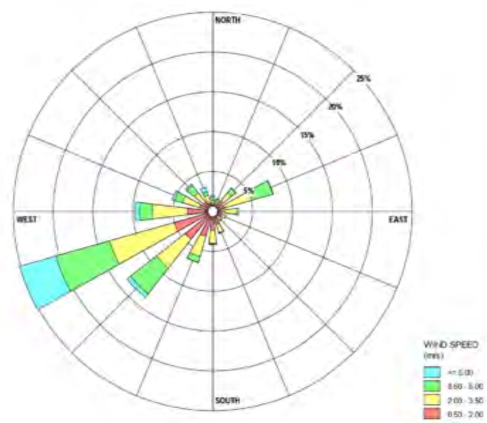
Wind rose (2013)



Wind rose (2014)



Wind rose (2015)



ZBest Composting Facility

Atmospheric particle dispersion studies

Map 7
Wind roses of the years used for modelisation

Sources :

Base : Google Maps, @Google 2019

Inventories : Englobe, 2019

Cartography : Englobe

June 2019

Projet manager : A. Milliard — Date : 2019-06-14

Prepared by : C. Blanchet — Drawn by : J.F. Bazin — Verified by : L. Savoie

Master Serv.	Project	Otp			Disc.	Type	Drawing Num	Rev.
46	P-0018788	0	01	100	EN	D	0701	00

File : G:\129\P-0018788_Zbest products\z5_CAD\GO\2_Carto\P18788_c6_ZBest_WR_190614.mxd

AECOM

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To: Mr. Sam Gutierrez
County of Santa Clara
Department of Planning and Development
70 West Hedding Street, 7th Floor
East Wing
San Jose, CA 95110

CC: Emmanuel Ursu
Valerie Negrete
Lizanne Reynolds

Project name: Z-Best Composting Facility – CEQA Services

Project ref: 60666256

From: Rob Larkin, GHG Emissions Assessment & Sustainability Specialist
Paola Pena, Air Quality Scientist
Emma Rawnsley, Project Manager

Date: January 6, 2023

Memorandum: Peer Review of Greenhouse Gas Emissions Study

This memorandum provides an evaluation of the October 9, 2020 “Emissions from Proposed Changes to Z-Best Facility in Gilroy, California” document completed by the project applicant’s consultant SCS Engineers (SCS October 2020 GHG Letter). This letter was submitted as a comment on the Draft Environmental Impact Report (DEIR) for the Z-Best Composting Facility Project (project) which was circulated for public review from January 15 to March 1, 2021.

The project greenhouse gas (GHG) emissions calculations used in the DEIR were conducted by SCS and reviewed by the County’s consultant, EMC Planning Group (EMC). The GHG emissions calculation methodology and results were initially summarized in a December 20, 2019, memorandum by SCS, included in Appendix B of the DEIR. Section 9 of the DEIR provides a summary and impact analysis of those SCS GHG calculations.

The DEIR assessed the project generation of GHG emissions in Impact 9-1 as Significant and Unavoidable. Mitigation Measure 9-1 addresses this impact by requiring purchase of GHG offset credits to offset the calculated project GHG emissions. Section 9.4 of the DEIR states: “Because it is not feasible to accurately quantify GHG reductions from diverting MSW from landfills and avoiding GHG (methane) emissions through more complete compost aeration, these benefits are not factored into the project GHG emissions inventory. These potential GHG emissions reductions are discussed for informational purposes only.”

Subsequent to this DEIR conclusion, the SCS October 2020 GHG Letter included updated calculations of project GHG emissions, along with calculations of GHG emissions reductions due to diversion of waste from landfill deposition.

AECOM has reviewed the SCS October 2020 GHG Letter, along with the calculation spreadsheets that were the basis of that letter, the underlying methodologies, and the relevant sections of the DEIR. Based on this review, we concur with the SCS October 2020 GHG Letter's assertion that the project will result in a net reduction of GHG emissions. Our concurrence is predicated upon the following overall considerations:

- ***Reasonableness*** – AECOM's review has confirmed that the SCS GHG calculations utilized standard, reputable methodologies and were based on reasonable selections of inventory boundaries, activity level inputs, and emission factors applied to those activity levels. The calculation assumptions used by SCS are generally conservative and tend towards providing a low estimate of net GHG reduction benefit.
- ***Scale*** – The estimated GHG reductions from waste diversion are approximately 21 times greater than the increase in operational GHG emissions from the proposed project. Key assumptions and calculation inputs would therefore have to change drastically in order to alter the assertion of a net GHG benefit from the project.

Based on these considerations, AECOM supports the SCS October 2020 GHG Letter's conclusion that the project will result in a net reduction of GHG emissions. This memorandum provides the details of the assessment AECOM conducted to evaluate this conclusion.

Summary

The "GHG Emissions" section of the SCS October 2020 GHG Letter shows the projected net change in GHG emissions due to the project. As summarized in AECOM's Table 1 below, SCS's letter estimated that the project would result in a net GHG reduction benefit of 82,167 $MTCO_2e$ per year.

Table 1. Net Total GHG Change Per Year ($MTCO_2e$)

GHG Reductions from Waste Diversion	Increase in Operational GHG Emissions	Net Change in GHG Emissions
-86,231	4,064	-82,167

Acronym: metric tons of carbon dioxide equivalent ($MTCO_2e$)
Notes: See discussion below for details

The SCS October 2020 GHG Letter's calculated increase in operational GHG emissions includes emissions from additional employee vehicles and haul trucks for composting, due to the expanded composting capacity resulting from the project. The calculations for these operational GHG emissions sources were conducted as part of the DEIR. Section 9.4 of the DEIR states: "GHG emissions from constructing and operating the proposed project were evaluated and quantified by SCS, the applicant's consultant, using the

California Emission Estimator Model (CalEEMod). This evaluation was reviewed by the County's EIR consultant, EMC Planning Group, for technical sufficiency."

As EMC has previously found the project GHG calculations to be consistent with acceptable methodologies and standards, AECOM's focus in this memorandum is to evaluate the key components of the SCS October 2020 GHG Letter's assertion of net GHG reduction benefit.

The following sections assess the calculations conducted for each GHG emission source included in the calculations of net GHG benefit, as well as the sources that were excluded from those calculations.

GHG Emissions Reduction from Waste Diversion

Table 2 summarizes the key components of the calculations for GHG reduction from waste diversion.

Table 2. Summary & Assessment of Waste Diversion GHG Avoidance Calculations

Key Components	Summary & Assessment
Calculation methodology	Appropriate methodology: benefits calculator tool, for the Organics Programs of the California Climate Investments initiative.
Input: additional tons per day (TPD) of composted MSW	875 TPD: assumes full capacity
Input: days of operation per year	365: assumes year-round operation
Input: composition of food waste in feedstock	50% food waste: conservative estimate

The following sub-sections provide further detail on the components summarized in Table 2 above.

Calculation Methodology

The SCS October 2020 GHG Letter calculated the GHG emissions reduction from waste diversion using the California Air Resources Board (CARB) "Benefits Calculator Tool for the Organics Program" (CARB Organics Tool)." [1,2] CARB is a reputable source for GHG assessment methodologies, and developed this tool based on an assessment of peer-reviewed literature. The CARB Organics Tool was first developed for entities applying for organics program grant funding through the California Climate Investments (CCI) initiative. CCI invests Cap-and-Trade revenue into projects that reduce GHG emissions in California, and waste diversion is one of the project types.[3] Use of this CARB Organics Tool is an appropriate methodology for estimating the GHG emissions avoided by diverting waste from landfill deposition to usage at the Z-Best Composting facility.

[1] The tool is available at https://ww2.arb.ca.gov/resources/documents/cci-quantification-benefits-and-reporting-materials
[2] The CARB calculation methodology document for the benefits calculator tool is available at: https://ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/auctionproceeds/calrecycle_organics_finalqm_6-15-20.pdf
[3] http://www.caclimateinvestments.ca.gov/

Input: Additional Tons Composted

Regardless of the exact amount of MSW feedstock increase, it would still remain a defensible conclusion that the project will represent a net decrease in GHG emissions. The conclusion is due to the scale of the estimated GHG reductions from waste diversion, compared with the increase in operational GHG emissions from the proposed project.

The SCS October 2020 GHG Letter's estimated MSW feedstock increase of 875 TPD represents the facility's increased MSW composting capacity due to the proposed technology upgrade. This estimated increase is less than the maximum permitted limit increase of 1,250 TPD (from the current 1,500 TPD limit to a new limit of 2,750 TPD).

Based on dialogue with County of Santa Clara and the project applicant, the initial increase of MSW feedstock will be an average of 250 to 400 TPD. Over time, the MSW intake will ramp up, and is estimated to reach that 875 TPD increase over current levels. For illustrative purposes of the most conservative estimate: If the MSW increase was 250 TPD, and all other inputs remained the same, the project would still generate a net GHG reduction of 20,574 $MTCO_2e$ per year. Table 3 summarizes this conservative scenario estimate.

Table 3. Net Total GHG Change Per Year ($MTCO_2e$)

GHG Reductions from Waste Diversion	Increase in Operational GHG Emissions	Net Change in GHG Emissions
-24,638	4,064	-20,574

Acronym: metric tons of carbon dioxide equivalent ($MTCO_2e$)

Furthermore, a lower amount of composting feedstock increase would mean a lesser increase of haul truck and employee vehicle mileage, and therefore a smaller associated increase in project GHG emissions related to those operational sources.

Input: Composition of Food Waste in Feedstock

The SCS calculations were based on an assumption that the MSW increase would be 50% food waste and 50% green waste. This is a conservative assumption; based on the DEIR, the SCS October 2020 GHG Letter, and follow up communication with the applicant, food waste is expected to represent the majority of the additional MSW feedstock, with a smaller fraction of wood, metal, rubber, textiles, cardboard, inert materials, and plastic (both film and solid). No increase in green waste volume is actually proposed to occur as a result of the project; however, the CARB Organics Tool only provides GHG emission reduction factors for food waste and green waste.

This estimate of waste stream percentages is relevant because the CARB Organics Tool's GHG emission reduction factor for aerated static pile food waste (0.36 $MTCO_2e$/short ton feedstock) is double the GHG emission reduction factor for aerated static pile green waste (0.18 $MTCO_2e$/short ton feedstock). Accordingly, assuming 50% food waste and 50% green waste is a conservative proxy for the expected feedstock composition described above. A low estimate of the food waste percentage leads to a low (conservative) estimate of GHG emissions reduction achieved per ton of MSW increased due to the project.

Operational Emissions from Employee Vehicles and Hauling Trucks

The key components of the operational GHG calculations are summarized in Table 4 and detailed in the sub-sections below.

Table 4. Summary & Assessment of Operational GHG Emissions Calculations

Key Components	Summary & Assessment
Calculation methodology	Standard methodology: vehicle miles traveled (VMT) multiplied by emission factors obtained from CARB's Emission Factor (EMFAC) model
Input: VMT from employee vehicles and hauling trucks	Provided by Hexagon Transportation Consultant
Emission factors	EMFAC: reputable source[4] Used emission factors from EMFAC 2017 EMFAC 2021 is now available, with updated emission factors

Calculation Methodology

EMFAC is a CARB-developed and approved model that CARB uses as a primary tool to assess emissions from on-road vehicles including cars and trucks. Sourcing emission factors from EMFAC is a standard methodology for CEQA and other air emissions assessments.

For haul trucks, the SCS October 2020 GHG Letter's Table 1 (Emissions Summary) uses the annual average emissions per day, as opposed to the higher GHG emissions calculated for trucks on peak days. AECOM concurs with this choice, which is explained in the SCS October 2020 GHG Letter as follows:

"GHG are a pollutant with impacts on the scale of years and which do not have associated ambient air standards, so it is appropriate to evaluate the GHG impacts of the project based on annual average emissions rather than peak daily emissions."

Input: VMT

As discussed in Section 12 of the DEIR, project increases in vehicle miles traveled (VMT) were estimated through a traffic analysis by Hexagon Transportation Consultant. AECOM has not evaluated this traffic analysis, but has evaluated the GHG calculations derived from the resulting VMT estimation.

[4] https://arb.ca.gov/emfac/

Emission Factors

SCS used EMFAC 2017 (v1.0.2), the most current version available at the time of DEIR preparation. The most recent version, EMFAC 2021, has updates to emission factors incorporating recent legislation and updated methodology, as appropriate. For purposes of the recirculated DEIR, the project applicant could consider updating the project GHG emissions calculations using emission factors from EMFAC 2021. However, this update would not lead to a substantially different emissions estimate, and the minor updates would not change the SCS October 2020 GHG Letter's conclusion that the project will result in a net reduction of GHG emissions because of waste diversion. The focus of this AECOM memorandum is vetting this overall conclusion. Specifics of DEIR project GHG emissions calculations are tangential and mentioned here for the sake of thoroughness. Recalculation would only be recommended for elements that would lead to substantial updates, and these emission factor updates would not.

Construction Emissions

The key components of the construction GHG calculations are summarized in Table 5.

Table 5. Summary & Assessment of Construction GHG Emissions Calculations

Key Components	Summary & Assessment
Calculation methodology	CalEEMod: reputable, standard methodology[5]
Input: construction vehicle and equipment usage	Provided by the project applicant
Input: haul truck VMT	Provided by Hexagon Transportation Consultant
Off-road emission factors	Unchanged in the most current version of CalEEMod
On-road emission factors	Updated in the most current version of CalEEMod

Construction emissions are discussed briefly in this AECOM memorandum, as they are minor relative to other emissions sources, and because these construction emissions are being recalculated by AECOM in a separate task. Based on current assumptions, the updated construction emissions estimate is 635 $MTCO_2e$, equating to an amortized amount of approximately 21 $MTCO_2e$ per year of operation over a 30-year project lifetime.

SCS calculated the construction emissions using the California Emissions Estimator Model (CalEEMod), which is an approved and standard best practice model. Those emission calculations were conducted in December 2019, utilizing the most current version of CalEEMod available at that time (version 2016.3.2). CalEEMod was updated in June 2022 to version 2022.1, which included updates to on-road vehicle emission factors as well as other sources not relevant to construction-related emissions (e.g., 2019 Title 24 Standards and utility intensity factors). AECOM's updates to the construction emissions are being conducted with the current version of CalEEMod, so that emission factors are updated along with other applicable assumptions.

[5] http://www.caleemod.com/

As stated in the DEIR, the construction GHG emissions should be amortized over the lifetime of the project, to derive the total GHG emission increase per year due to the project. The SCS October 2020 GHG Letter provided a summary of the construction emissions but did not include them in the project emissions total used to estimate the net GHG impact. Although these construction emissions are minor compared with the other sources, excluding the construction emissions leads to a lower estimate of project emissions. AECOM recommends that the updated construction GHG emissions be amortized over the project lifetime and incorporated into the project emissions total and determination of net GHG impact.

Global Warming Potentials

It is worth mentioning the global warming potentials (GWPs) applied to the GHG calculations discussed in this memorandum. The DEIR's calculations of project operational GHG emissions used methane (CH_4) and nitrous oxide (N_2O) GWPs from the IPCC 2nd Assessment Report; 21 and 310 respectively. Section 9 of the DEIR also refers to this CH_4 GWP of 21 when discussing the CH_4 emissions avoided due to waste diversion from landfill deposition, although this calculation was not conducted for the DEIR. However, the CARB Organics Tool's source for emission factors[6, 7] cites the IPCC 4th Assessment Report, with a CH_4 GWP of 25. The CARB Organics Tool applies this GWP of 25 to the CH_4 emissions avoided due to waste diversion from landfills. Furthermore, CalEEMod also uses the IPCC 4th Assessment Report GWPs (including the CH_4 GWP of 21) for construction GHG emissions.

For consistency, the Z-Best project GHG calculations would ideally apply the same GWP to each emission source included in the calculation of net GHG impact. However, further perspective is useful regarding on the impact of GWPs on the results.

- The only source for which the CH_4 GWP would make a significant difference is the GHG emissions avoided by waste diversion from landfill deposition. This significance is because the avoided GHG emissions from anaerobic decomposition of organic waste in a landfill are CH_4. Therefore, an approximate 20 percent difference in the CH_4 GWP (from 21 to 25) would represent a comparable difference in the associated emissions.
- However, CH_4 is only a trace emission from fuel combustion, representing less than 1 percent of the total GHG emissions. Therefore, the choice of CH_4 GWP makes a negligible impact on project GHG emissions associated with vehicle fuel combustion. Accordingly, this GWP consistency consideration does not make a noticeable impact on the determination of net GHG reduction benefit from the project.

This GWP consideration is noted here for thoroughness but does not require action for the purposes of this memorandum.

[6] https://ww2.arb.ca.gov/sites/default/files/classic/cc/waste/cerffinal.pdf
[7] http://ww2.arb.ca.gov/sites/default/files/auction-proceeds/ef_database_documentation.pdf

Emissions Sources Excluded from Calculation of Net Reductions

The following is a summary of the GHG emission sources that the SCS October 2020 GHG Letter excluded from the calculation of net GHG emissions impact due to the project.

Emissions at Composting Facility

Although the project increase in electricity consumption at the Z-Best Composting facility will create additional GHG emissions, these emissions have been excluded from the calculation of net GHG reductions. Specifically, the DEIR shows an estimated increase of 738.71 $MTCO_2e$ per year of operational emissions due to increased electricity demand at the Z-Best Composting facility. The rationale for this exclusion is that process energy emissions at the composting facility are approximately equivalent to the avoided process energy emissions at landfills due to waste diversion.

The CARB Organics Tool cites a CARB waste diversion GHG calculation methodology document[8] as its source for emission factors, and this CARB document states:

"Because process emissions from composting likely fall within the same range as process emissions from landfilling, and are relatively insignificant to the total emission reduction estimate, landfilling and composting are considered to be functionally equivalent in regards to process emissions. For this reason, the process emissions term is equal to zero for the composting emissions calculation."

Based on the logic of this CARB justification, AECOM concurs that composting facility operational emissions increases are a reasonable exclusion from the calculation of estimated net GHG benefit.

Avoided Emissions – Trucks Hauling Waste to Landfills

The SCS October 2020 GHG Letter and supporting project GHG spreadsheet includes calculations for the GHG emissions avoided from trucks that would otherwise be hauling waste to a landfill. However, these avoided emissions are not included in the calculation of net GHG reductions, and the SCS October 2020 GHG Letter does not state a reason. The CARB methodology document applies the same logic as discussed for process energy above: project transportation emissions are excluded from the calculation of net GHG emissions, as additional haul truck trips to a composting facility are assumed to be approximately equivalent to the displaced haul truck trips to landfills.

Excluding the avoided emissions for landfill haul trucks is potentially reasonable, as there are different scenarios for the VMT that would be avoided depending on which landfills would have been used. This exclusion is a conservative approach leading to a lower estimate of net GHG reductions, considering that the calculations do include the

[8] https://ww2.arb.ca.gov/sites/default/files/classic/cc/waste/cerffinal.pdf

project emissions from haul trucks to the Z-Best Composting facility. If maintaining this conservative approach, the recirculated DEIR should:

- Clearly state this decision to exclude avoided landfill haul truck emissions, along with the reasoning, and
- Note that including composting facility haul truck emissions, along with excluding landfill haul truck emissions, leads to a lower estimate of net GHG reductions.

However, it would also be reasonable to take a less conservative approach, and assume that the project's additional compost haul truck VMT would displace landfill haul truck VMT. The project GHG emissions increase due to compost haul truck trips and employee vehicles are estimated to be 4,064 $MTCO_2e$ per year. The DEIR estimates of displaced landfill haul trips were calculated for four scenarios, ranging from 2,485 $MTCO_2e$ per year to 7,777 $MTCO_2e$ per year.

- The mid-point of this estimated range is 5,131 $MTCO_2e$ per year, which is greater than the project operational GHG emissions increase of 4,064 $MTCO_2e$ per year. Accounting for the displacement of landfill haul truck VMT using this mid-point value (keeping all other assumptions the same as in the October 2020 GHG Letter) would result in a net GHG emissions of -87,298 $MTCO_2e$ per year from the project, as detailed in Table 5.
- If the displaced landfill haul truck GHG emissions equaled the lowest estimate (2,485 $MTCO_2e$ per year), the net GHG impact of the project would be -84,652 $MTCO_2e$ per year (see Table 5). Accordingly, SCS's current calculation of -82,167 $MTCO_2e$ per year is a conservative estimate of net GHG impact due to the project.

Table 5. Net Total GHG Change Per Year ($MTCO_2e$) accounting for displaced landfill haul trips

Landfill Haul Truck Scenario	GHG Reductions from Waste Diversion	GHG Reductions from displaced Landfill Haul Trucks	Increase in Operational GHG Emissions from Project	Net Change in GHG Emissions
Not accounted for	-86,231	0	4,064	-82,167
Mid-Point Estimate	-86,231	-5,131	4,064	-87,298
Lowest Estimate	-86,231	-2,485	4,064	-84,652

Acronym: metric tons of carbon dioxide equivalent ($MTCO_2e$)

Conclusion

AECOM has assessed the SCS October 2020 GHG Letter found its overall logic to be sound. Certain assumptions and inputs could potentially be clarified or reconsidered, as outlined in the preceding sections of this memorandum. However, recalculation is not warranted, due to two key considerations:

- ***Reasonableness*** – AECOM's review has confirmed that the SCS GHG calculations were appropriate and reasonable. Furthermore, the assumptions used by SCS were generally conservative and tend towards providing a low estimate of net GHG reduction benefit. In consideration of both the avoided landfill methane emissions as well as the displaced landfill haul truck trips, it is clear that the project will not create additional GHG emissions, and furthermore will have a net benefit of GHG reductions.

- ***Scale*** – The estimated GHG reductions from waste diversion, even with the conservative assumptions detailed in this memorandum, are approximately 21 times greater than the increase in operational emissions from the proposed project. Therefore, a moderate change in calculation assumptions and inputs would not alter the conclusion that the project will result in a net GHG benefit.

Based on these considerations identified through assessment of SCS's GHG calculations, AECOM supports the SCS October 2020 GHG Letter's overall conclusion of that the project would result in a net reduction in GHG emissions.

October 9, 2020
File No. 01219043.00

Mr. John Doyle
Operations Manager
Z-Best Products
980 State Highway 25
Gilroy, California

Subject: Emissions from Proposed Changes to Z-Best Facility in Gilroy, California

Dear Mr. Doyle:

Z-Best Composting (Z-Best) has prepared a Notice of Preparation (NOP) for proposed changes (Project) at the Z-Best facility at 980 State Highway 25, Gilroy (Site). SCS Engineers (SCS) has prepared this greenhouse gas (GHG) and criteria pollutant evaluation for use in the California Environmental Quality Act (CEQA) document prepared by County of Santa Clara Department of Planning and Development.

The project includes the removal of the existing municipal solid waste (MSW) and foodwaste in-vessel composting system (CTI bag system) and the construction of a primary covered aerated static pile (CASP) and a secondary (curing) aerated static pile composting for MSW and foodwaste composting. The CASP system would have negative aeration with emissions controlled by biofilters for primary (active) composting and positively aerated static piles for secondary (curing) composting. The Project also includes site improvements, such as modifications to the detention basin. The Project will result in the capacity to compost an additional 875 tons per day (tpd) of MSW and/or foodwaste.

This additional 875 tpd of composting capacity would be permitted as an increase in the monthly capacity for the site. Composting is an important component of the California Air Resources Board (CARB) Climate Change Scoping Plan Update (CARB 2017), which states that "[The State] can invest in and streamline in-state infrastructure development to support recycling, remanufacturing, **composting**, anaerobic digestion, and other beneficial uses of organic waste," (emphasis added). Composting is also part of California's strategy to reduce short-lived climate pollutants (Senate Bill 1383). It is clear from California climate strategy that state agencies view composting as a net reduction in GHG emissions. This reduction is achieved by reducing the amount of methane generated by waste that would be landfilled if it were not composted.

GHG Emissions

SCS has previously calculated the GHG emissions from the construction and operation of the new project in a letter from SCS to John Doyle of Z-Best dated December 19, 2019 (December 2019 Letter). Those GHG emissions are summarized in ***Table 1***. All GHG emissions are shown as metric tons of carbon dioxide equivalent (MTCO2e). GHG are a pollutant with impacts on the scale of years and which do not have associated ambient air standards, so it is appropriate to evaluate the GHG impacts of the project based on annual average emissions rather than peak daily emissions.

Table 1. Previously Evaluated GHG Emissions

Source	GHG (lb/day)	GHG (MTCO2e/year)
Construction Emissions	17,773	747
Employee Trip Emissions (baseline)	1,879	311
Trucks (baseline)	22,821	3,778
Baseline total	24,700	4,089
Employee Trip Emissions (project)	2,478	410
Trucks (project)	46,772	7,742
Project total	49,250	8,152
Net Change in Previously Calculated Operational Emissions	24,551	4,064

To calculate the composting emissions from the Project, SCS evaluated the project using the CARB "Benefits Calculator Tool for Organics" program[1]. The benefit calculator uses a GHG benefit from each ton of greenwaste composted in an aerated static pile (ASP) of 0.18 MTCO2e/ton of greenwaste and a benefit of 0.36 MTCO2e/ton of composted foodwaste. Most of the composted material would be foodwaste, but Z-Best expects that some composted material at the new facility would be other streams such as fiber organics (e.g. cardboard). Composting of foodwaste has greater GHG benefit than composting of other materials, so SCS has conservatively assumed that only 50 percent of the composted material is foodwaste. The evaluation of one year of the increased composting of material proposed by this project is shown in ***Attachment A***. This benefit is the potential composting benefit for each year the Z-Best facility operates at its composting capacity.

Based on the Benefits Calculator Tool evaluation, the project would result in a GHG reduction from composting of 86,231 MTCO2e per year. This benefit greatly exceeds the increase in GHG emissions from the increased number of truck trips shown in ***Table 1*** and the proposed project would result in a net GHG benefit of 82,167 MTCO2e per year.

On-Road Emissions

The proposed project is expected to result in a net decrease in the miles traveled by trucks hauling compostable materials. The Benefits Calculator Tool is capable of evaluating the change in the emission of pollutants other than GHG, but project-specific information is available to calculate the change in non-GHG pollutants for this project.

Z-Best indicated that compostable materials are currently transported past the Z-Best Gilroy facility and taken to the Marina Landfill in Monterey County, approximately 28 miles away. Currently there is about 217 tons per day going to Marina, an additional 77 tons per day will go to Marina in 2021 and an additional 88 tons per day in 2022 for a total of 382 tpd in 2022. Hexagon has estimated that the Project will generate an additional 200 trips carrying 875 tons of waste per day or 4.38 tons of

[1] User guide available at https://ww2.arb.ca.gov/sites/default/files/classic//cc/capandtrade/auctionproceeds/calrecycle_organics_finaluserguide_6-15-20.pdf

waste per trip. Based on this tonnage per trip, the additional 382 tpd of waste generate an additional 87 trips per day to the Marina Landfill.

The emissions from trucks were calculated for four scenarios.

- Scenario 1 – Existing baseline scenario. In this scenario, 173 truck trips compost greenwaste at the Z-Best Gilroy facility. The emission reduction calculations assume that the 173 truck trips would be routed to the Marina Landfill if the material were not composted at the Z-Best facility. Emission reductions shown reflect the current reduction in emissions based on this assumption. Only ten percent of the miles would be in Santa Clara County. The other 90 percent of the miles would be outside of Santa Clara County.
- Scenario 2 – In this scenario, trucks transport 382 tpd of compostable greenwaste that currently passes the Z-Best Gilroy facility is landfilled at the Marina Landfill to the Z-Best facility instead of the Marina Landfill. The 382 tpd of compostable material is estimated to be transported in 87 truck trips, which are combined with the current 173 truck trips and would result in an additional 14,550 VMT relative to the VMT that would result if that greenwaste was composted at the Z-Best Gilroy facility. Only ten percent of the miles would be in Santa Clara County. The other 90 percent of the miles would be outside of Santa Clara County.
- Scenario 3 – In this scenario, trucks transport the full 875 tpd of greenwaste to the Z-Best Gilroy facility. The number of trips in this scenario was determined by Hexagon to be 372 trips per day. The difference in the VMT is based on the assumption that the compostable materials would have to be composted due to state regulations, and that the most likely alternative compost facility is in Vernalis. There are additional concerns that may mean that the Vernalis facility is not a suitable destination, which would result in additional emissions from truck trips and that the shown emission reductions underestimate the benefit that would result from the Project. The trip distance to the Z-Best composting facility is estimated to be 31 miles per trip shorter than the distance to the Vernalis facility.
- Scenario 4 – This scenario is the same as Scenario 3 but emissions are shown for peak composting days at the Z-Best facility. These emission reductions are not representative of typical emission reductions and represent the greatest daily emission reductions that would result from the Project. Hexagon determined that peak days would have a total of 488 haul truck trips. In this scenario, trucks travel 14 fewer miles in Santa Clara County and 17 fewer miles outside of Santa Clara County than they would if the waste were not transported the Z-Best facility.

Using the pollutant emission factors from the December 2019 Letter and shown in ***Table 2***, SCS calculated the pollutant emissions from trucks. The emissions that are avoided from trucks that would transport compostable material to the Marina Landfill are shown in ***Table 3***. Emission reductions are shown as separate line items for emission reductions in Santa Clara County and emission reductions outside of Santa Clara County.

Table 2. Truck Emission Factors

Trip Type	Avoided trips/day	Avoided VMT/day	Emission Factors (g/VMT)						
			ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	GHG
Scenario 1									
Trucks	173	4,833	0.161	4.58	0.597	0.0133	0.0952	0.0911	1,410
Scenario 2									
Trucks (Currently going to Marina Landfill)	260	7,275	0.161	4.58	0.597	0.0133	0.0952	0.0911	1,410
Scenario 3									
Trucks (As alternative to composting in Vernalis)	372	11,544	0.161	4.58	0.597	0.0133	0.0952	0.0911	1,410
Scenario 4									
Trucks (As alternative to composting in Vernalis)	488	15,128	0.161	4.58	0.597	0.0133	0.0952	0.0911	1,410

Table 3. Avoided Truck Emissions

Trip Type	Emissions (lb/day)							Emissions (MTCO2e/year)
	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	GHG	GHG
Scenario 1								
Total	1.71	48.76	6.36	0.14	1.01	0.97	15,011	2,485
In Santa Clara County	0.17	4.88	0.64	0.01	0.10	0.10	1,501	248
Outside Santa Clara County	1.54	43.88	5.72	0.13	0.91	0.87	13,510	2,236
Scenario 2								
Total	2.58	73.39	9.57	0.21	1.53	1.46	22,595	3,740
In Santa Clara County	0.26	7.34	0.96	0.02	0.15	0.15	2,259	374
Outside Santa Clara County	2.32	66.05	8.61	0.19	1.37	1.31	20,335	3,366
Scenario 3								
Total	4.09	116.45	15.18	0.34	2.42	2.32	35,852	5,935
In Santa Clara County	1.85	52.59	6.86	0.15	1.09	1.05	16,191	2,680
Outside Santa Clara County	2.24	63.86	8.32	0.19	1.33	1.27	19,661	3,254
Scenario 4								
Total	5.36	152.61	19.89	0.44	3.17	3.04	46,983	7,777
In Santa Clara County	2.42	52.59	6.86	0.15	1.09	1.05	16,191	2,680
Outside Santa Clara County	2.94	63.86	8.32	0.19	1.33	1.27	19,661	3,254

Overall, the Project is expected to reduce emissions from the haul of compostable materials due to the decreased transport distance from material sources to the Z-Best composting facility.

CLOSING

This additional information was provided to address environmental benefits from the proposed modification of the Z-Best composting facility in Gilroy, California that would occur outside the facility boundary that have not been previously addressed. The increased composting capacity proposed by the project are expected to result in significant air pollution and GHG benefits outside of the facility boundary by providing additional composting capacity close to material sources and reducing transportation emissions. Increased composting capacity is also expected to lead to less compostable material being landfilled, where it would emit more GHG emissions, thus resulting in GHG reductions.

Composting is a critical component in the California Scoping Plan and SB 1383 strategy to reduce GHG emissions from the waste sector. This project is consistent with that GHG reduction strategy, and the calculated GHG reductions support the conclusion that the proposed project would be a net reduction in GHG.

If you have any questions or concerns about this evaluation, please contact the undersigned at 916-361-1297.

Sincerely,

John Henkelman
Air Quality and Greenhouse Gas Consultant

Patrick S. Sullivan
Senior Vice President
SCS Engineers

Attachments:

CARB Benefits Calculator Tool Output

California Air Resources Board

Benefits Calculator Tool
Organics Programs

California Climate Investments

Note to applicants:

A step-by-step **user guide**, including **project examples**, for this Benefits Calculator Tool is available here.

Organics Programs applicants must enter the applicable information in the table below before proceeding with the project-specific data on the Inputs tab.

Project Name:	Z-Best Gilroy Facility
Applicant ID:	*To be completed by CalRecycle*
Contact Name:	Patrick Sullivan
Contact Phone Number:	916-503-2956
Contact Email:	psullivan@scsengineers.com
Date Calculator Completed:	10/26/2020
Total Organics GGRF Funds Requested ($):	not applicable
Other GGRF Leveraged Funds ($):	not applicable
Non-GGRF Leveraged Funds ($):	not applicable
Total Funds ($):	$ -

Key for color-coded fields:	
Green	Required input field
Blue	Optional input field*
Grey	Output field / not modifiable
Yellow	Helpful hints / important tips
Black	Not applicable

*See "Documentation" tab for additional information

California Air Resources Board

Benefits Calculator Tool
Organics Programs

California Climate Investments

Note to applicants:

A step-by-step **user guide**, including **project examples**, for this Benefits Calculator Tool is available here.

Composting Worksheet

Year (January-December)	Feedstock Diverted for Windrow Composting (Short Tons)	Feedstock Diverted for Aerated Static PIle Composting (Short Tons)	Composition of Food Waste in Feedstock (%)	Composition of Green Waste in Feedstock (%)	Residual Material (Short Tons)	Net GHG Benefit ($MTCO_2e$)
Year 1		319,375	50%	50%		86,231
Year 2						0
Year 3						0
Year 4						0
Year 5						0
Year 6						0
Year 7						0
Year 8						0
Year 9						0
Year 10						0
SUBTOTAL	0	319,375	-	-	0	86,231

California Air Resources Board

Benefits Calculator Tool for the Organics Grant Program

California Climate Investments

Emission Reduction Factors Worksheet

Additional documentation on how the emission reduction factors used in the calculator were developed is available from:
http://www.arb.ca.gov/cci-resources

Compost			
Compost Process & Feedstock	**Emission Reduction Factor**	**Unit**	**Primary Source**
Windrow food waste	0.32	$MTCO_2e$/short ton feedstock	Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities
Windrow green waste	0.14	$MTCO_2e$/short ton feedstock	
Aerated static pile food waste	0.36	$MTCO_2e$/short ton feedstock	
Aerated static pile green waste	0.18	$MTCO_2e$/short ton feedstock	
Fugitive landfill emission factor food waste	0.39	$MTCO_2e$/short ton feedstock	
Fugitive landfill emission factor green waste	0.21	$MTCO_2e$/short ton feedstock	

Standalone Anaerobic Digestion			
Product	**Emission Reduction Factor**	**Unit**	**Primary Source**
Vehicle fuel - Landfill/Use for ADC	0.32	$MTCO_2e$/short ton feedstock	LCFS Pathway for the Production of Biomethane from High Solids Anaerobic Digestion of Organic (Food and Green) Waste
Vehicle fuel - Compost	0.39	$MTCO_2e$/short ton feedstock	
Vehicle fuel - Land Application	0.36	$MTCO_2e$/short ton feedstock	
Electricity Generation - Landfill/Use for ADC	0.17	$MTCO_2e$/short ton feedstock	LCFS Pathway for the Production of Biomethane from High Solids Anaerobic Digestion of Organic (Food and Green) Waste
Electricity Generation - Compost	0.24	$MTCO_2e$/short ton feedstock	
Electricity Generation - Land Application	0.21	$MTCO_2e$/short ton feedstock	
Injection in Utility Pipeline - Landfill/Use for ADC	0.23	$MTCO_2e$/short ton feedstock	LCFS Pathway for the Production of Biomethane from High Solids Anaerobic Digestion of Organic (Food and Green) Waste
Injection in Utility Pipeline - Compost	0.29	$MTCO_2e$/short ton feedstock	
Injection in Utility Pipeline - Land Application	0.27	$MTCO_2e$/short ton feedstock	
Fugitive landfill emission factor (assumes 40% food waste 60% green waste per LCFS pathway)	0.28	$MTCO_2e$/short ton feedstock	LCFS Pathway for the Production of Biomethane from High Solids Anaerobic Digestion of Organic (Food and Green) Waste Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities

Co-Digestion of Organics at Wastewater Treatment Plants			
Emission Source	**Emission Factor**	**Unit**	**Primary Source**
Fugitive landfill food waste emission factor	0.39	$MTCO_2e$/short ton feedstock	Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities
Small-Medium Facility - Landfill Digestate			
Vehicle Fuel - Small-Medium Facility	0.28	MTCO2e/short ton feedstock	LCFS Pathway for the Production of Biomethane from the Mesophilic Anaerobic Digestion of Wastewater Sludge at Publicly-Owned Treatment Works
Electricity Generation - Small-Medium Facility	0.15	MTCO2e/short ton feedstock	
Injection in Utility Pipeline - Small-Medium Facility	0.23	MTCO2e/short ton feedstock	
Medium-Large Facility - Landfill Digestate			
Vehicle Fuel - Medium-Large Facility	0.26	MTCO2e/short ton feedstock	LCFS Pathway for the Production of Biomethane from the Mesophilic Anaerobic Digestion of Wastewater Sludge at Publicly-Owned Treatment Works
Electricity Generation - Medium-Large Facility	0.28	MTCO2e/short ton feedstock	
Injection in Utility Pipeline - Medium-Large Facility	0.34	MTCO2e/short ton feedstock	
Small-Medium Facility - Compost Digestate			
Vehicle Fuel - Small-Medium Facility	0.30	MTCO2e/short ton feedstock	LCFS Pathway for the Production of Biomethane from the Mesophilic Anaerobic Digestion of Wastewater Sludge at Publicly-Owned Treatment Works
Electricity Generation - Small-Medium Facility	0.20	MTCO2e/short ton feedstock	
Injection in Utility Pipeline - Small-Medium Facility	0.28	MTCO2e/short ton feedstock	
Medium-Large Facility - Compost Digestate			

Vehicle Fuel - Medium-Large Facility	0.27	MTCO2e/short ton feedstock	LCFS Pathway for the Production of Biomethane from the Mesophilic Anaerobic Digestion of Wastewater Sludge at Publicly-Owned Treatment Works
Electricity Generation - Medium-Large Facility	0.33	MTCO2e/short ton feedstock	
Injection in Utility Pipeline - Medium-Large Facility	0.40	MTCO2e/short ton feedstock	
Small-Medium Facility - Land Apply Digestate			
Vehicle Fuel - Small-Medium Facility	0.29	MTCO2e/short ton feedstock	LCFS Pathway for the Production of Biomethane from the Mesophilic Anaerobic Digestion of Wastewater Sludge at Publicly-Owned Treatment Works
Electricity Generation - Small-Medium Facility	0.18	MTCO2e/short ton feedstock	
Injection in Utility Pipeline - Small-Medium Facility	0.26	MTCO2e/short ton feedstock	
Medium-Large Facility - Land Apply Digestate			
Vehicle Fuel - Medium-Large Facility	0.27	MTCO2e/short ton feedstock	LCFS Pathway for the Production of Biomethane from the Mesophilic Anaerobic Digestion of Wastewater Sludge at Publicly-Owned Treatment Works
Electricity Generation - Medium-Large Facility	0.31	MTCO2e/short ton feedstock	
Injection in Utility Pipeline - Medium-Large Facility	0.38	MTCO2e/short ton feedstock	

Food Waste Prevention			
	Emission Reduction Factor	**Unit**	**Primary Source**
Food waste prevention	1.78	$MTCO_2e$/short ton feedstock	The Climate Change and Economic Impacts of Food Waste in the United States
Refrigeration & Freezer Equipment			
Emissions from Energy Consumption			
Residential Refrigerator/Freezer Combination	8.46	kWh/year per ft^3 of volume	10 CFR 431.66 - Energy conservation standards and their effective dates
	335.7	kWh/year	
Residential Freezer Only	7.85	kWh/year by ft^3 of volume	
	172.3	kWh/year	
Residential Refrigerator Only	7.28	kWh/year by ft^3 of volume	
	206.7	kWh/year	
Commercial Refrigerator with solid doors	36.5	kWh/year per ft^3 of volume	
	744.6	kWh/year	
Commercial Refrigerator with transparent doors	43.8	kWh/year by ft^3 of volume	
	1,219.1	kWh/year	
Commercial Freezer with solid doors	146.0	kWh/year by ft^3 of volume	
	503.7	kWh/year	
Commercial Freezer with transparent doors	273.8	kWh/year by ft^3 of volume	
	1,496.5	kWh/year	
Commercial Refrigerator/freezer with solid doors	98.6	kWh/year by ft^3 of volume	
	-259.2	kWh/year	
	255.5	minimum value kWh/year	
Electricity emission factor	0.0002279	$MTCO_2e$/kWh	CARB California grid electricity emission factor for GGRF programs

Emission Reduction Factors for Organics Projects - Composting

Primary Source:

California Air Resources Board, Method for Estimating Greenhouse Gas Emission Reductions from Composting of Commercial Organic Waste (2017) (CERF)
http://www.arb.ca.gov/cc/waste/cerffinal.pdf

Additional sources used as appropriate and noted below

Material and Compost Method	Emission Reduction Factor ($MTCO_2e$/short ton)
Windrow food waste	0.32
Windrow green waste	0.14
Aerated static pile food waste[1]	0.36
Aerated static pile green waste[1]	0.18
Fugitive landfill emission factor food waste	0.39
Fugitive landfill emission factor green waste	0.21

Table 14. Summary of compost emission reduction factor (CERF)

Emissions		
Emission Type		Emission ($MTCO_2e$/ton of feedstock)
Transportation emissions		0
Process emissions		0
Fugitive CH4 emissions		0.049
Fugitive N2O emissions		0.021
	Total	0.070
Emission Reductions		
Emission reduction type		Emission reduction ($MTCO_2e$/ton of feedstock)
Decreased soil erosion[2]		0.15
Decreased fertilizer use[2]		0.15
Decreased herbicide use[2]		0.0
	Total	0.3
Avoided landfill methane	Food Waste	0.39
	Yard Trimmings	0.21
Overall		
Feedstock Type		Emission reduction ($MTCO_2e$/ton of feedstock)
Food Waste		0.62
Yard Trimmings		0.44

Table excerpted from California Air Resources Board, Method for Estimating Greenhouse Gas Emission Reductions from Composting of Commercial Organic Waste (2017) (CERF)
http://www.arb.ca.gov/cc/waste/cerffinal.pdf

[1] The source material assumes windrow composting. ASP composting produces less fugitive emissions. Fugitive emissions have been reduced for the ASP emission reduction factor based on the following sources:

San Joaquin Valley Air Pollution Control District, Greenwaste Compost Site Emissions Reductions from Solar-powered Aeration and Biofilter Layer
http://www.valleyair.org/Grant_Programs/TAP/documents/C-15636-ACP/C-15636_ACP_FinalReport.pdf

Climate Action Reserve Organic Waste Digestion Project Protocol Version 2.1 (2014)
http://www.climateactionreserve.org/wp-content/uploads/2009/10/Organic_Waste_Digestion_Project_Protocol_Version2.1.pdf

[2] Emission reductions resulting from the application of compost are outside of the GHG accounting boundary for this program and are excluded from the emission reduction factor.

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Project name: Z-Best Composting Facility – CEQA Services

Project ref: 60666256

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Date: December 9, 2022

Memorandum: Z-Best Composting Facility - Evaluation of potential bioaerosol emissions from proposed project operations compared to existing operations

In response to the Draft Environmental Impact Report (Draft EIR) for the Z-Best Composting Facility Project (Project) which was circulated for public review from January 15 to March 1, 2021, public comments were received which requested additional evaluation of the potential for bioaerosol emissions from the Z-Best facility and potential impacts of such emissions on agricultural workers on adjacent properties or on the viability of horticultural activities on adjoining parcels.

This memorandum provides an evaluation of the potential for bioaerosol emissions from the Z-Best Facility under existing and proposed conditions to determine whether implementation of the Project would have potential to result in an increase in emissions of fungal and bacterial organisms.

This scope of work was completed through the following tasks:

- Review of pertinent literature on bioaerosol emissions from composting and other similar land uses;
- Review of original Draft EIR, its appendices, and public comments received on the Draft EIR;
- Review of existing site conditions and surrounding land uses; and
- Review of existing and proposed composting processes, raw materials, agents, and environmental conditions.

Note that due to the complexity of these issues and the limited information regarding the risks of bioaerosols from composting facilities, this memorandum cannot, without speculating, reach definitive conclusions regarding the bioaerosol dispersion from sources at the site and whether there is potential for the Project to create significant health effects for agricultural workers on adjacent properties or other receptors, or whether bioaerosol emissions from the facility would significantly impact the viability of horticultural activities on adjoining parcels. However, based on an extensive review and analysis of the available literature and analysis of the changes in operations that would occur with the proposed Project, this memorandum represents our best effort to find out and disclose all we reasonably can regarding these issues. A summary of our conclusions and recommendations is provided at the end of this memorandum based on available information reviewed.

Summary

AECOM conducted a thorough literature review and analyzed Project components and processes that could affect the production and dispersal of bioaerosols. The question of bioaerosol production from composting facilities is nuanced and varies greatly depending on the circumstances including mechanical disturbance, wind direction, and distance from the compost. Although Project implementation could increase the amount of bioaerosols that are produced and dispersed due to the proposed increased volume of Municipal Solid Waste (MSW) that would be processed at the facility, and/or alter the type of bioaerosols that are produced due to the different composting method, the available science indicates that bioaerosols disperse over relatively short distances to the point at which they no longer exceed background levels. Bioaerosols including *A. fumigatus* are commonly present within compost and can be detected downwind of compost, but their quantities rapidly decrease with distance from the compost. Therefore, the risk due to exposure to bioaerosols to workers in neighboring fields or to neighboring residents would decrease with distance from the Z-best facility. The literature supports that the majority of enteric pathogens (e.g., *E. coli* or *Salmonella*) would become inactivated by the heat of the primary composting process, and would not be present in bioaerosols. Thus, the proposed Project is not expected to increase the risk to adjacent food crops from enteric pathogens. While the proposed Project would double the volume of MSW that would be processed, the understood risk from bioaerosols based on previous published studies appears to be distance-related and not volume-related. Because the distance between the Z-Best facility and adjacent uses would not change, the risk to neighboring areas is not expected to substantially change either.

Introduction to Bioaerosols

The term “bioaerosol” encompasses all particles having a biological source that are in suspension in the air and includes microorganisms (e.g., bacteria, fungi, virus, protozoa, algae, pollen) as well as biomolecules (e.g., toxins, debris from membranes) (Sykes et al 2011).

Bioaerosols occur naturally in the environment and are typically introduced into the air via wind turbulence over a surface, such as soil or water. However, the production and/or transmission of bioaerosols can also be accelerated by various human activities, e.g., through processes that increase the number of biological particulates in a medium (such as composting) or through processes that increase turbulence or the surface area of the medium (such as tilling of the soil).

Ambient bioaerosol concentrations vary significantly by season and are influenced by factors such as weather, temperature, precipitation, and air pressure. Most bioaerosols associated with composting facilities are ubiquitous to the environment and already exist in rural and agricultural areas. Bioaerosol concentrations decrease rapidly with distance from their source, and it is difficult to verify that measurements at a distance are related to a specific activity rather than to other background non-compost sources (Taha et al., 2005).

In addition, sampling and analytical methods for bioaerosol sampling have a number of significant limitations that may limit reliability. Most bioaerosol collection methods provide a snapshot of the environmental bioaerosols at a specific time. Temporal variations in bioaerosol concentrations are commonly observed, especially if the bioaerosol generation occurs during episodic events rather than continuously (NIOSH 2017).

There are a wide range of bioaerosol particles, which may cause varying degrees of human health impacts. Health effects from bioaerosol exposure can include infections, immuno-allergic, non-allergic inflammatory and toxic effects (Schlosser 2019). However, regulatory exposure limits have not been established for exposure to bioaerosols including occupational and ambient air exposures. Regarding bioaerosols, exposure-response relationship is lacking for most agents (Macher 1999; Eduard 2009; Searl et al. 2008; Walser et al. 2015). Voluntary numerical guidelines for most bioaerosol exposures have also not been established by the scientific community.

The Environment Agency for England (and Wales until 2013; now referred to as the Environment Agency) published a position statement with provisional guidance for composting operators when applying for an operating permit (Environment Agency 2010). It states that acceptable levels of bioaerosols, measured using the standardized sampling protocol (Association for Organics Recycling [AfOR] 2009), above upwind background concentrations, need to be maintained at 250 meters (820 feet) or at the nearest sensitive receptor (such as a dwelling or place of work), whichever is closer, to protect public health, as bioaerosol concentrations are considered to generally reduce to near-background levels within 250 meters (Wheeler et al. 2001). The acceptable levels are:

- 1000 cfu/m3 for total bacteria.
- 300 cfu/m3 for gram-negative bacteria.
- 500 cfu/m3 for Aspergillus fumigatus.

These levels are guidelines and are not based upon dose-response relationships or health measures. The Environmental Agency has not established guideline levels for endotoxins.[1]

Original Draft Environmental Impact Report, Appendices, and Comments

The Draft EIR and its appendices contain an analysis of air quality impacts including particulate matter (PM_{10} and $PM_{2.5}$) and odor. However, the analysis did not specifically address bioaerosols.

During the public review period for the Draft EIR, three comments were received relating to bioaerosols. Key issues raised in these comments include:

- Whether the Project would increase the potential for bioaerosol generation from the site;
- Whether the Project would increase inhalation exposure hazards for Z-Best workers, agricultural workers on neighboring properties, or neighboring residents; and
- Whether the Project would increase potential for deposition of bioaerosols on food crops grown on adjacent properties.

Literature Review

AECOM conducted and extensive literature search and reviewed numerous research papers providing evaluations of the potential impacts of bioaerosols associated with composting facilities throughout the world. However, these studies were conducted at a variety of different composting facilities that may utilize different raw feedstock, control methods, and/or composting processes, or which may be co-located with other bioaerosol-generating facilities such as wastewater treatment ponds, that limit direct comparison with the Z-Best facility. However, a brief summary of key findings from pertinent studies is reproduced here to provide background and context.

Studies of bioaerosol emissions from composting facilities largely test for the opportunistic pathogenic fungus *Aspergillus fumigatus* and mesophilic bacteria. *A. fumigatus* is commonly identified in composting bioaerosols (Wéry 2014) and is an allergen that has been linked to allergy and asthma symptoms in sensitive individuals (Chaudhary and Marr 2011). While enteric pathogens like *Salmonella* and shiga-toxin producing *E. coli* can possibly be found in raw materials entering municipal solid waste

[1] An endotoxin is a lipopoly-saccharide found in the cell wall of Gram-negative bacteria. It is a pyrogen which induces inflammation and fever as an immune response in higher organisms. Endotoxins can be found on the outer membranes of bacteria like *Escherichia coli*, *Salmonella*, *Shigella*, *Vibrio cholerae*, and *Haemophilus influenzae*.

composts, composts that are maintained at >55 °C demonstrate rapid inactivation of these enteric pathogens (Wichuk and McCartney 2007). Additionally, studies that characterized the species of bacteria present in MSW compost bioaerosols did not discover enteric pathogens in the bioaerosols by either culturing methods or a more sensitive DNA sequencing technique (Wéry 2014).

Bioaerosol emission rates and dispersal at composting sites are influenced by many factors, including compost temperature, sorting, shredding and turning of the piles, geographic area, topography, meteorological conditions (e.g., temperature, humidity, wind and weather), and the composition of the source organic material (Conza et al. 2013).

Pearson et al (2015) performed a systematic review of studies of bioaerosol exposures from waste composting and related health effects indexed in bibliographic databases up to July 2014. Robertson et al (2019) provided an updated review up to June 2018, which concluded that given the absence of any consistent evidence on the toxicity of bioaerosols from composting facilities, there is insufficient evidence to provide a quantitative comment on the risk to nearby residents from exposure to composting bioaerosols.

In a study of three Italian composting plants, Fracchia et al (2005) concluded that activities involving mechanical movement of the composting mass and processes occurring indoors represented the greatest potential risk for plant workers, which was consistent with other studies reviewed by that author (Epstein 1994; Millner et al. 1994; Marchand et al. 1995; Breum et al. 1997; Reinthaler et al. 1997; Folmsbee and Strevett 1999; Neef et al. 1999; Hryhorczuk et al. 2001).

The same study found that the quality and the quantity of treated raw material, as well as the level of activity at the facility, seemed to affect the bacterial contamination, with the highest levels of contamination detected in facilities that treated unsorted solid urban waste and/or that underwent high levels of composting activities. Lower levels of contamination were detected in the facility that had a low level of activity and only treated highly selected organic wastes (Fracchia et al 2005).

Some of the common exposure concerns from composting facilities include *A. fumigatus*, endotoxins, β-1,2 Glucans, and organic dust toxic syndrome (ODTS). Exposure to fungal spores was reported to be among the most significant outcomes although the risk of exposure was generally limited to general respiratory complaints rather than allergy or infection.

One study showed that compost could be a reservoir of *Legionella* bacteria but recommended that further studies are needed to evaluate the extent of the risk to humans deriving from the bioaerosol produced from composting facilities (Conza et al 2013).

Another study found that workers involved in manual sorting of unseparated domestic waste, as well as workers at compost plants, experience more or less frequent symptoms of ODTS (cough, chest-tightness, dyspnea, influenza-like symptoms such as chills, fever, muscle ache, joint pain, fatigue and headache), gastrointestinal problems such as nausea and diarrhea, irritation of the skin, eye and mucous membranes of the nose and upper airways, etc. In addition, cases of severe occupational pulmonary diseases (asthma, alveolitis, bronchitis) have been reported (Poulson et al 1995).

The distance at which airborne impacts related to composting facilities can affect neighboring areas has been reported to vary between approximately 200 and 500 meters downwind of the composting facilities. However, many of these studies were based on odor thresholds and not on the measurement or impacts of bioaerosols or fugitive dust emissions. Some studies that specifically addressed bioaerosols found that bioaerosol emissions generally reduced to background levels within approximately 75 to 300 meters (246 to 984 feet). For example:

- Milner et al. 1994 after reviewing published data concluded that "the data have indicated that at distances of 76-152 meters (249-499 feet) from the compost facility perimeters the airborne concentrations of Aspergillus fumigatus were at or below background concentrations".
- At the distance of 150 meters (492 feet) from the composting plant there is no increased risk of contamination due to bioaerosols in the air. (Vitězova and Vitěz 2013).
- Sanchez-Mondero et al. 2005 monitored airborne concentrations of *Aspergillus fumigatus* and mesophilic bacteria at various upwind and downwind locations from a greenwaste composting facility in the United Kingdom over a 12-month period. Results showed that concentrations of both microorganisms 40 meters (131 feet) downwind of the facility did not differ from background levels during periods when no composting activities were taking place, but that during periods of vigorous activity (such as shredding, screening and pile turning) airborne concentrations of both microorganisms were up to two logarithmic units higher at 25 and 40 meters (82–131 feet) downwind, but remained similar to background levels at locations 200 to 300 meters (656-984 feet) downwind.
- LeGoff et al. (2012) compiled data obtained from 12 different sampling campaigns carried out at 11 composting plants at distances from 30 to 500 meters (98–1,640 feet), with samples collected during a turning activity. For all campaigns, an impact was measurable up to distances of 100 meters (328 feet). Further away, the impact was not systematically observed as it depended on meteorological conditions (windspeed) and on levels of bioaerosol emissions. Beyond 200 meters (656 feet), the emissions were largely dispersed, falling to the background level.

Most of the above studies were conducted on windrow composts. The proposed composting process at the Z-Best facility would involve static aerated piles with negative airflow that will be blown through a shredded wood biofilter. Sanchez-Moderno et al. (2003) investigated commercial composting facilities that were systems similar to the Project and used static piles with forced aeration where the exhaust air was blown through biofilters for odor control. Bioaerosol samples were collected before the biofilter (within the composting hall) and 40 cm above the surface of the biofilter. They found that *A. fumigatus* concentrations before the biofilter (within the composting hall) were significantly higher than background levels. This was likely due to the release of material from the forced aeration and mechanical agitation of the compost. However, in all areas sampled, the *A. fumigatus* concentrations were reduced by more than 90%

after passing through the biofilter systems and the post biofilter concentrations were similar or only slightly higher than background levels. This demonstrates that the biofilter successfully filtered *A. fumigatus* and prevented the fungus from dispersing into the air.

There is little available literature on modeling the dispersal of bioaerosols emitted by composting facilities. Wery et al (2014) suggests that this is partly due to the fact that a facility's range of activities and fluctuations in temperature and weather lead to episodic or periodic changes in aerosol release from such facilities. These wide changes make modeling difficult. The same study goes on to note that in particular, the distance at which the bioaerosol concentration reverts to the level of the background noise is still under debate and different results in the literature are due notably to the variable nature of emissions as well as the influence of diverse factors on aerosol dispersal.

Review of existing and proposed composting processes, raw materials, agents, and environmental conditions at Z-Best facility

As explained above, bioaerosol emission rates and dispersal at composting sites are influenced by many factors, including compost temperature, sorting, shredding and turning of the piles, geographic area, topography, meteorological conditions (e.g., temperature, humidity, wind and weather), and the composition of the source organic material (Conza et al 2013).

Based on the findings of previous studies, emission of bioaerosols at the Z-Best Facility would be anticipated to occur during activities such as unloading/loading, sorting/grinding, turning of the greenwaste windrows, aeration of MSW compost piles, and screening/blending, as well as during movement of materials from one step of the process to another. The volume of emissions would be anticipated to vary based on the frequency and duration of such activities and the volume of feedstock being processed.

A comparison of composting processes, materials, and conditions at the existing Z-Best facility with those that would be part of the proposed Project is provided in Table 1 below.

Table 1. Comparison of Existing and Proposed Site Operations

Variables	Existing Operations (CTI system)	Proposed Operations (ECS system)
Greenwaste Compost Throughput	Approx. 700 TPD average	Approx. 700 TPD average
Greenwaste Compost Method	Initial processing: portable horizontal grinder Composting: 9-16 weeks in open windrows with turning on regular basis. Temperature and moisture controlled. Pre-screening stockpiles: 0-2 days Screening then trucked to Area 2 for blending with additives or amendments to create finished product.	Initial processing: new electric shredder and existing grinder Composting: unchanged from existing. Pre-screening stockpiles: unchanged from existing Screening: unchanged from existing, except that movement from Area 1 to Area 2 will occur using an open overland conveyor.

Variables	Existing Operations (CTI system)	Proposed Operations (ECS system)
		Blending: unchanged from existing.
Greenwaste Compost Location	Pre-processing: Area A1 Primary screening: Area 1 Primary windrows: Area 1C Screening stockpiles: Area 2 Woody waste grinding: Area 1 Compost overs grinding: Areas 1 and 2	Pre-processing: Area A1 Primary screening: Areas 1 and 2 Primary windrows: Area 1C Screening stockpiles: Area 2 Woody waste grinding: Areas 1 and 2 Compost overs grinding: Areas 1 and 2
MSW Compost Throughput	700 TPD average	1,575 TPD average
MSW Processing Stages and Durations	Composting via Compost Technologies Inc. (CTI) bagged system (14 weeks) Primary screening stockpile (10-14 days) Curing piles (up to 180 days max) Secondary screening to finished product.	Composting via Engineered Compost Systems (ECS) system (4-5 weeks) - Primary CASP bunkers - Secondary ASP bunkers Curing piles: unchanged from existing. Secondary screening to finished product: unchanged from existing, except that screening equipment will be replaced with new.
MSW Material Handling/Movement	Pre-screened MSW unloaded from trucks onto a feed table conveyor using truck or loader then fed into the compaction unit of the bagging machine. Composts within bags for 14 weeks. From bags, composted material is then hauled by trucks to primary screening stockpile for 10-14 days. Screened materials moved to curing piles by loaders and/or trucks for up to 180 days. Materials are then screened again then moved from secondary screening area to finished product storage area by trucks.	Pre-screened MSW unloaded from trucks and placed into primary phase CASP bunkers using front end loaders (1 new loader proposed). Primary composting within CASP bunkers for 3-4 weeks. From primary bunkers, material goes through primary (garbage) screening and is then moved to secondary phase ASP bunkers using front end loaders. Secondary composting within ASP bunkers for up to 17 days. From secondary bunkers materials moved to curing piles by loaders and/or trucks for up to 180 days. Materials are then screened again then moved from secondary screening area to finished product storage area by trucks.
MSW Composting Location	CTI Composting inside thermoplastic compost bags approximately 12-14 feet in diameter and 350 feet in length within Area 1B. Curing and screening: Area 1B. Blending & storage of finished product: Area 2.	Primary ECS composting phase – in concrete bunkers up to 9 feet depth capped by 6 inches of pre-composted material (biolayer) within Area 1B. Secondary ECS composting phase – in concrete bunkers up to 9.5 feet depth (uncapped) within Area 1B. Curing and screening Area 1B. Blending & storage of finished product in Area 2.
MSW Composting Aeration	Two blowers per bag. Fan aeration through HDPE pipes and holes on sides of bags (bags kept open for first 2 days). Estimated airflow of 45,000 cubic feet of air per ton of feedstock.	Primary phase – negative suction through floor with exhaust discharged upward through biofilter bed. Estimated airflow of 389,000 cubic feet of air per ton of feedstock.

Variables	Existing Operations (CTI system)	Proposed Operations (ECS system)
		Secondary phase – positive upward discharge. Estimated airflow of 389,000 cubic feet of air per ton of feedstock.
Duration to pathogen reduction temperature of 131 F	Approximately 5 to 6 days	Approximately 3 days
Leachate	Seepage from compost bags covered with mulch. Stormwater from pad directed to unlined drainage swales and ditches leading to sedimentation basin.	Leachate would be collected at primary and secondary locations and pumped to detention basin for reuse. Stormwater from pad would be collected by French drains and distributed to detention basin for reuse. The existing basin is proposed to be reconfigured and lined to prevent percolation into groundwater.

Source*: ECS Memo - Process BMPs and CompTroller Process Control Strategy, 9/21/21; Odor Impact Management Plan Z-Best Composting Facility, 10/1/13, Draft EIR Z-Best Composting Facility Modifications January 11, 2020, Z-Best CTI Temperature Data Sheet, May to August 2021; Z-Best Odor Model Metrics, June 2019. Power Use Comparison: ECS versus CTI Composting November 2022.*
Acronyms*:; F: Fahrenheit; MSW: municipal solid waste, TPD: tons per day.*

For the greenwaste processing activities, the volume and source composition of greenwaste feedstock would not change as a result of the Project and method of greenwaste composting would remain the same, except that an electric shredder will be added to the pre-processing system, which would reduce the volume of material that is ground by the existing portable diesel horizontal grinder; the location where woody waste grinding will occur would be expanded to include Area 2 (currently limited to Area 1 only); and an overland conveyor system would be used to transfer materials from Area 1 to Area 2 (currently trucks). These changes could affect bioaerosol emissions and dispersal in the following ways:

- Expanding the location of the primary screening and woody waste grinding activities to Area 2 would change the location of bioaerosols emitted during screening and grinding, which could affect dispersal patterns, but would not increase overall emissions.
- Use of an overland conveyor system to move greenwaste compost from Area 1 to Area 2 may be expected to increase bioaerosol emissions compared to the current use of trucks, due to the additional agitation of materials, which would increase the likelihood of biological particles becoming airborne. The use of a water misting system around the conveyor system may be an option for reducing the release of dusts and bioaerosols.

For MSW processing activities, the source composition of inbound materials is not anticipated to change, but the volume of materials processed would be increased substantially (more than double) as a result of the Project. If all other factors were held equal, then this increase in volume would be anticipated to result in a doubling of bioaerosol emissions at the facility. However, because the Project would also use a new process for MSW composting, other factors would also influence the quantity and type of bioaerosol emissions and their dispersal, as discussed below.

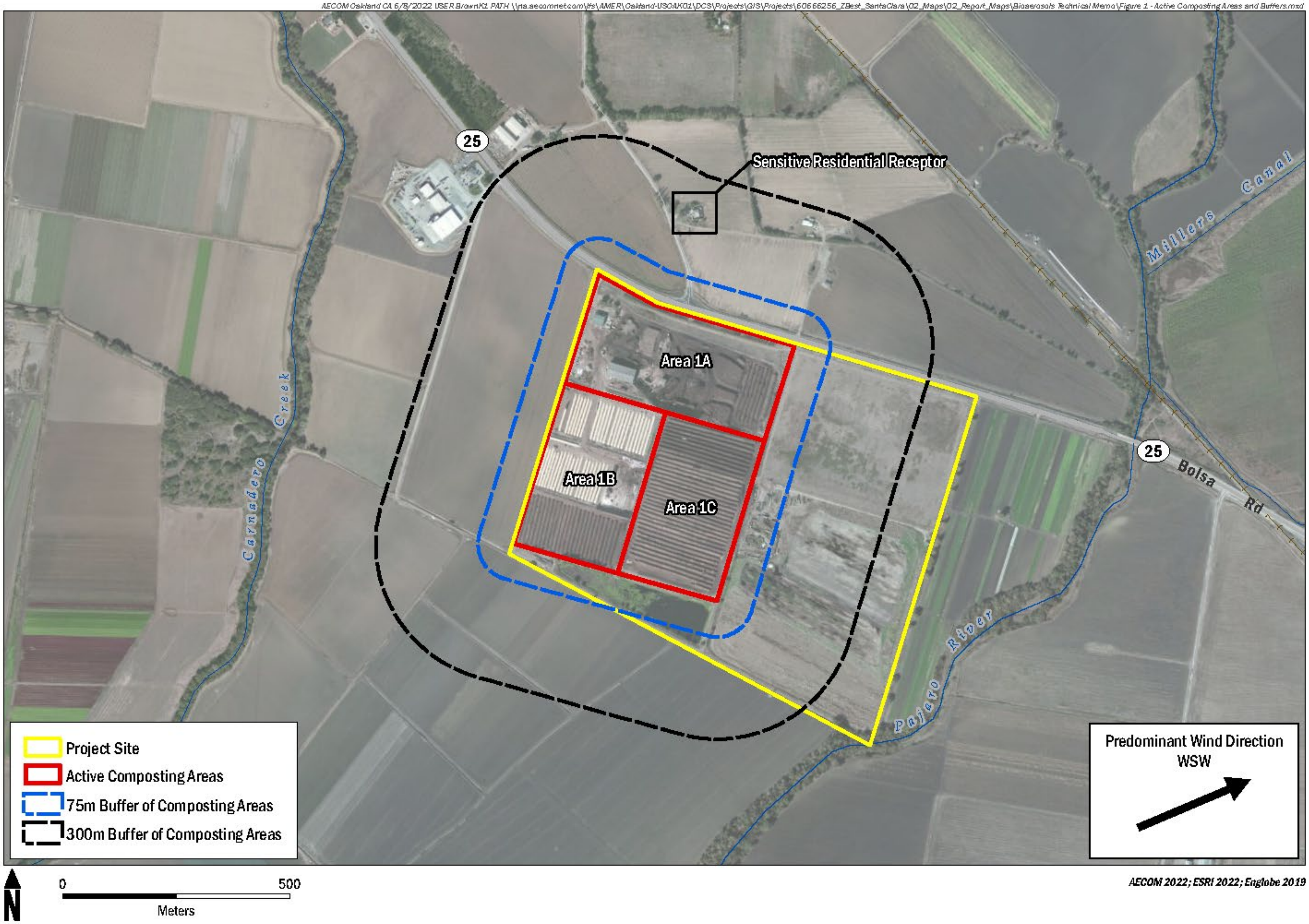
- The active composting phase of the existing CTI system occurs inside bags for the entire duration of the composting phase, whereas both the primary and secondary phases of the proposed ECS system would occur in three-sided concrete bunkers that are open to the air on the top surface and one side. The proposed Project would therefore increase the surface area of materials exposed to wind, which in turn would increase the potential for bioparticles to be dispersed. Although the primary phase CASP bunkers are capped with a bio-layer of finished compost material, such material could also be a source of bioaerosols that could be dispersed. The proposed irrigation system that would be installed on the bunkers would limit the amount of bioaerosols compared to if the bunkers were not watered regularly.
- The proposed aeration system for the ECS primary bunkers would utilize downward suction to draw air through the pile to a vent in the floor (negative aeration) with the exhaust passing through a biofilter consisting of a bed of shredded wood with a depth of 4 to 6 inches before being released into the air. The primary purpose of the biofilter is to capture larger particulate matter and odors associated with the primary compost phase. Similar biofilters have been demonstrated to reduce *A. fumigatus* bioaerosols to levels that are equivalent to background levels (Sanchez-Monedero et al 2003); however, the biofilter materials themselves could be an additional source of bioaerosols if bacteria and fungi are able to grow within the biofilter matrix (Muszyński et al 2021). Periodic removal and replacement of the biofilter materials would be anticipated to reduce the potential for such growth within the biofilter.
- The secondary bunkers would be positively aerated by air being pushed through the compost from the floor to the top of the pile, increasing the potential for bioaerosol emissions from the surface of the secondary bunkers.
- The bags used in the existing CTI system are aerated by blowers which feed into the bags via pipes. The air from the blowers exhausts through the bag openings for the first two days, and then through ventilation holes along the sides of the bags for the remainder of the composting phase. The volume of air passing through the CTI bags is relatively low (estimated at approximately 45,000 cubic feet of air per ton of feedstock) compared to the volume of air (389,000 cubic feet of air per ton of feedstock) that would flow through the bunkers during the primary and secondary phases of the proposed ECS system (ECS 2022).
- In addition, the new ECS system would include an extra step of material movement (from primary bunkers to secondary bunkers) that is not present within the current CTI system. This additional material handling would be expected to increase bioaerosol emissions, due to the additional agitation of materials, which would increase the likelihood of biological particles becoming airborne.
- The proposed ECS system is expected to reach pathogen reduction temperatures of 55 °C in the primary composting phase after 48 hours, whereas the existing CTI system has been documented to take up to 6 days to reach the same temperature. Attainment of pathogen reduction temperatures over a shorter period of time is expected to reduce the number of viable organisms, particularly pathogenic enteric bacteria that can cause intestinal illness.

- The leachate and stormwater capture improvements associated with the ECS system are expected to reduce bioaerosol production and distribution as more of the leachate will be captured and pumped to detention basins, rather than the current process of being covered with mulch and left to evaporate.
- The installation of a liner on the existing detention pond will reduce the potential risk of microbiological contamination of the groundwater. This could limit potential impacts to nearby agricultural crops if the groundwater is used for irrigation purposes.

Surrounding Area Review

The Z-Best facility is located in a sparsely populated area of Santa Clara County, California that is surrounded by agricultural lands that are used to produce food crops. **Figure 1** shows the active composting areas (Areas 1A, 1B, and 1C) of the Z-Best facility and outlines buffer zones of 75 m and 300 m from the edge of the active composting area. As noted above, data from the literature indicates that bioaerosols reduce to background levels within 75 to 300 m (246 to 984 feet) from composting areas. The greatest risk related to bioaerosols would be within the 75 m buffer, with the risk decreasing with distance away from the compost. The majority of the changes to the facility with the proposed Project would be within Area 1B, and therefore the actual likely impact from potential bioaerosol emissions would be smaller than that shown on the figure. The nearest sensitive residential receptor is understood to be approximately 225 meters (738 feet) away from the boundary of the Z-Best facility and approximately 400 meters (1,312 feet) away from the boundary of Area 1B. The nearest school is the Dr. TJ Owens Gilroy Early College Academy, located approximately 2.8 miles northeast of the Project site in Gilroy.

Several commercial buyers of produce have rules or guidelines concerning the growth of food crops in proximity to various activities, including required setback distances from composting facilities. The distances vary widely between guidelines, and none of the guidelines include an explanation of how the required setback distance was calculated. For example, Taylor Farms requires a setback of 1,200 feet (366 meters) from composting operations involving manure or animal products (Taylor Farms 2021); Dole Foods prohibits the storage of composted manure and/or compost within 1,200 feet of growing crops (Dole Foods 2019); and McDonalds requires a setback of 1 mile (5,280 feet or 1,609 meters) from any commercial composting facility or requires risk mitigation strategies if such a setback cannot be maintained (McDonalds 2012). As a result, it is understood that the farms adjacent to the Z-Best facility leave certain fields fallow and/or cannot supply certain buyers from fields closest to the Z-Best facility (Willoughby 2019; Taylor 2022). Since the proposed Project will not change the boundary of the facility, there will be no change to the produce farming setback requirements that currently apply to the Z-Best facility.



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BIOAEROSOLS TECHNICAL MEMO

FIGURE 1
Active Composting Areas and Buffers

Conclusions and Recommendations

Based on review of the Project and other information sources discussed above, AECOM offers the following conclusions regarding the potential for bioaerosol emissions to increase at the site as a result of Project implementation.

- It is AECOM's opinion that the total amount of bioaerosols emitted from the Z-Best facility's proposed ECS system could increase compared to existing conditions, largely due to the proposed doubling of MSW being processed. However, because the current and proposed composting systems operate so differently, there is not enough data to reach a definitive conclusion.
- Other variables that could potentially cause an increase in bioaerosol production include the use of an open conveyor system for transport of finished green waste compost and an increase in the amount of aeration for MSW composting.
- Some variables associated with the ECS system may cause a reduction in bioaerosol production and emissions and/or change the types of bioaerosols emitted, including achieving pathogen reduction temperatures after two days using the ECS system instead of 6 days using the CTI method, distributing air through a biofilter, and using an automated aeration control and monitoring system that adjusts aeration rates to maintain moisture. The improved control of leachate and storm water runoff may also be expected to reduce bioaerosol production.

A separate question which cannot be fully answered due to limitations on available information is whether the potential increased bioaerosol emissions from the Z-Best facility from the Project would have the potential to create significant health effects for nearby residents, agricultural workers on adjacent properties, or to impact the viability of horticultural activities on adjoining parcels. With respect to this question, are the following factors:

- Bioaerosol emissions from the Z-Best facility are expected to include a wide variety of microorganisms including but not limited to bacteria, fungi, viruses, protozoa, algae as well as their metabolic byproducts and toxins including β-1,2 Glucans, microbial volatile organic compounds (MVOCs), endotoxins, mycotoxins, other toxins. Most of these bioaerosols are ubiquitous to the environment and already exist in rural and agricultural areas.
- Composting operations fluctuate on a daily basis and potential bioaerosol exposures are periodic and irregular. Vigorous activities such as shredding, screening, and transporting feedstock or compost are likely to generate the highest volumes of bioaerosols.
- Multiple factors influence dispersion of bioaerosols including the wind direction, range of organism types and sizes; the quantity, location, frequency, and duration of emissions; and meteorological conditions.
- Due to the lack of exposure standards and dose-response data for most bioaerosols as well as the lack of existing bioaerosol sampling data at the Project site, it is not

clear whether the potential increase in MSW processing and attendant bioaerosol emissions would have a significant health impact to nearby receptors.

- Bioaerosol concentrations quickly reduce with distance, and previous studies at other facilities have found that concentrations typically reduce to background levels within approximately 75 to 300 meters (246 to 984 feet) downwind of composting activities. **Figure 1** shows the Z-Best facility and indicates the adjoining areas that are within 75 to 300 meters of the site.
- The closest residential sensitive receptor is 225 meters (735 feet) from the boundary of the Z-Best facility, and is approximately 400 meters (1312 feet) from the area of the site where the new ECS technology would be installed (Area 1B). The residential receptor is just within the 250 meters (820 feet) residential setback recommended by the Environment Agency of England and is beyond the distance where many of the cited studies were able to detect bioaerosols above background levels. Thus, the risk to residents within that home are expected to be minimal. All other residential dwellings are beyond 300 meters.
- The risk to workers on adjacent properties is expected to decrease with distance from the property boundaries and be highly dependent on wind direction and the amount of time that such workers would spend in close proximity to the facility during downwind conditions.
- The predominant wind direction in the vicinity of the site is from the west-southwest (Englobe 2019). Active MSW composting occurs within the southwest portion of the Z-Best facility; therefore, the majority of the time the rest of the Z-Best facility would act as a buffer between the areas of active MSW composting and adjacent properties. **Figure 1** also indicates the predominant wind direction in the vicinity of the Project site.
- The potential for aerial deposition of enteric pathogens on nearby food crops from MSW compost is not supported by the literature. It was noted that many of the research studies that have been conducted and that were cited in the public comments were based on water-based impacts from contaminated irrigation systems. Based on findings of other relevant studies, as detailed in the literature review section above, it is AECOM’s opinion that the majority of enteric pathogens will become inactivated by the heat of the primary composting process and thus it is not expected for there to be any increased risk of enteric pathogens to adjacent food crops with the proposed Project.
- The industry guidelines for setbacks of food crop production from composting facilities appear to be based on a fixed distance from the facility and not the quantity of material processed or the method of composting. Since the proposed Project would not increase the geographical size nor alter the boundaries of the facility, the industry required setbacks for food crops from the Z-Best composting facility would not change.

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Date: January 9, 2023

Memorandum: NOx and GHG Mitigation Assessment

Introduction

This memorandum provides an evaluation of the appropriateness, feasibility, and effectiveness of the suggested mitigation measures provided by the Bay Area Air Quality Management District (BAAQMD) in their February 26, 2021 comment letter on the Z-Best Composting Facility Modifications Draft Environmental Impact Report (DEIR). This letter was submitted as a comment on the DEIR for the Z-Best Composting Facility Project (project), which was circulated for public review from January 15 to March 1, 2021.

The BAAQMD letter provided comments and suggested additional mitigation measures for the following topics:

- Nitrogen oxides (NOx) construction emission reductions
- NOx operational emission reductions
- On-site operational greenhouse gas (GHG) emission reductions
- Off-site GHG emission reductions

Thus, the organization of this memorandum will be to summarize the DEIR's findings for NOx and GHG emissions under project construction and operations, update the construction emissions calculations for the project, and evaluate the feasibility and effectiveness of the suggested construction and operational emission reduction measures.

Summary of DEIR Findings Related to NOx and GHG Emissions

NOx Emissions – Construction

Construction of the project would generate NOx emissions from the exhaust of heavy-duty construction equipment and haul trucks. The DEIR utilized the California Emissions Estimator Model (CalEEMod, version 2016.3.2) to estimate the project's construction emissions. The maximum daily construction emissions of NOx were found to exceed the BAAQMD recommended threshold of significance. The DEIR included the following mitigation measure to reduce NOx emissions during construction:

> ***Mitigation Measure 6-1a.*** *Prior to issuance of a grading permit, the project applicant shall develop a plan demonstrating that off-road equipment (more than 50 horsepower) to be used during construction (i.e., owned, leased, and subcontractor vehicles) would achieve a project wide fleet-average 20 percent NOx reduction compared to the most recent California Air Resources Board fleet average. Acceptable options for reducing emissions include the use of newer model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filers, and/or other options as such become available. The plan shall be subject to review and approval by the County Planning Department.*

The DEIR concluded a significant and unavoidable impact stating that there is no feasible way to quantify all of the emissions reductions from the mitigation measure, and as a result there is no assurance that the mitigation measure would reduce NOx emissions to a level that is below the 54 pounds per day threshold.

NOx Emissions – Operation

Operation of the project would also generate NOx emissions associated with vehicle exhaust from employee commutes and haul trucks. The DEIR utilized the California Air Resources Board (CARB) on-road emissions inventory EMFAC model to estimate the project's operational emissions. The maximum daily and annual operational emissions of NOx were found to exceed the BAAQMD recommended thresholds of significance. The DEIR described that the primary source of increased NOx emissions is the increase in truck trips by contract waste haulers that are required to transport feedstock to the site and to transport finished products and unusable inert materials from the site. The DEIR included the following mitigation measure to reduce NOx emissions on-site during operation:

> ***Mitigation Measure 6-2.*** *The applicant shall require that the engines of on-road trucks operating within the project site be shut off while queuing for loading and unloading for time periods longer that two minutes. This requirement shall be incorporated by the project applicant into contract specifications for all operators of [municipal solid waste] MSW, finished material, and waste haul trucks and the applicant shall ensure that all contractors comply with this contractual requirement.*

The DEIR concluded a significant and unavoidable impact stating that since the majority of the emissions are from the contract waste haulers, and the applicant has no control over the on-road truck fleet of these contract waste haulers, NOx emissions would continue to exceed the thresholds of significance.

Update to the Construction Emissions

As described previously, the DEIR utilized CalEEMod 2016.3.2 to estimate the project's construction emissions. CalEEMod 2016.3.2 was the latest version of CalEEMod available at the time of the analysis. Construction, consisting of grading, trenching, and paving activities, were anticipated to begin in April 2020 and last approximately 200 days. The DEIR also compared the project's *maximum daily* construction emissions to the BAAQMD's recommended *average daily* threshold of significance.

As such, this memorandum provides an update to the construction emission calculations to incorporate the following items:

- In June 2022, an updated version of CalEEMod (version 2022.1) was released.
- The revised anticipated construction start date for the project is Quarter 1 of 2023.
- The comparison of the project's emissions to the BAAQMD thresholds of significance was revised to utilize the project's *average daily* construction emissions, consistent with BAAQMD guidance, which states, "…for construction projects that are less than one year duration, lead agencies should annualize impacts over the scope of actual days that peak impacts are to occur, rather than the full year" (BAAQMD 2017).

Consistent with the analysis presented in the December 20, 2019, SCS Engineers Memo ("Emissions from Proposed Changes to Z-Best facility in Gilroy, California), the updated construction emissions assumed that construction would consist of a 3-month grading phase, 2-month trenching phase, and a 3-month paving phase. Construction equipment is anticipated to include a grader, an off-highway truck (water truck), compactor, rubber tired dozer, scraper, tractors/loaders, concrete pump truck, concrete finisher, paver, and a paving equipment. It is anticipated that the grading, trenching, and paving phases would require approximately 12, 5, and 25 daily worker trips, respectively. Grading activities would result in a balanced cut/fill and there would be no import or export of material. Additional modeling assumptions and details are included in Attachment A of this memorandum. Table 1 below presents the updated construction emission estimates associated with implementation of the project.

Table 1. Unmitigated Construction Criteria Air Pollutant Emissions

Description	ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)
Total Emissions (tons)	0.31	2.91	0.12	0.11
Average Daily Emissions (lbs/day) [1]	3.10	29.10	1.20	1.10
BAAQMD Average Daily Threshold (lbs/day)	54	54	82	54

Source: Estimated by AECOM in 2023 (see Attachment A for detailed modeling assumptions and outputs). BAAQMD average daily thresholds provided in the BAAQMD 2017 CEQA Guidelines (BAAQMD 2017).

Acronyms: ROG = reactive organic gases; NOx = nitrogen oxides; PM_{10} = particulate matter less than 10 micrometers in diameter; $PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter; lbs/day = pounds per day; BAAQMD = Bay Area Air Quality Management District.

Notes: [1] Average daily emission estimates are based on 200 construction workdays.

As shown in Table 1, the updated construction emissions would not exceed the BAAQMD recommended thresholds of significance. Therefore, Mitigation Measure 6-1a would no longer be required. As described in the DEIR, the BAAQMD does not have quantitative mass emissions thresholds for fugitive coarse and fine particulate matter (PM_{10} and $PM_{2.5}$). Instead, the BAAQMD recommends that all projects, regardless of the level of average daily emissions, implement applicable best management practices (BMPs), including those listed as Basic Construction Measures in the BAAQMD CEQA Guidelines (BAAQMD 2017). Thus, the fugitive dust reduction measures included in Mitigation Measure 6-1b of the DEIR would still be required; however, these would be updated to include only the Basic Construction Measures since construction emissions would not exceed the BAAQMD recommended thresholds of significance and the "Additional Construction Mitigation Measures" would not be required.

Table 2 presents the updated estimate of the project's construction-related GHG emissions.

Table 2. Unmitigated Construction-Related GHG Emissions

Description	GHG Emissions (MT CO_2e)
Total Emissions	635

Source: Estimated by AECOM in 2023 (see Attachment A for detailed modeling assumptions and outputs).

Acronyms: GHG = greenhouse gas; MT CO_2e = metric tons of carbon dioxide equivalents

Evaluation of the Suggested Mitigation Measures

Additional NOx construction emission reductions

BAAQMD recommended the following emission reduction measures to reduce construction-related NOx emissions:

1. Zero-emissions construction equipment when available.
2. Interim Tier 4 engines for off-road equipment engines with less than 750 horsepower (hp). If Interim Tier 4 equipment are not available, use Tier 3 equipment with the Best Available Control Technology (BACT) for NOx emissions.
3. Final Tier 4 equipment for off-road equipment with engines greater than 750 hp. If Final Tier 4 equipment are not available, use Interim Tier 4 equipment with BACT for NOx emissions.
4. Grid power whenever possible, rather than relying on portable or back-up diesel generators. If grid power is not available, use alternative power such as battery storage, hydrogen fuel cells, or renewable fuels. If no other options are available, use Final Tier 4 diesel generators.

As shown in Table 1, the updated construction average daily emissions would not exceed the BAAQMD thresholds of significance. Therefore, the additional construction mitigation measures suggested by BAAQMD are not necessary to reduce NOx emissions.

Additional NOx operational emission reductions

BAAQMD recommended the following NOx emission reduction measures to reduce operational NOx emissions:

1. Encourage lower-emitting truck fleets by providing reduced entrance fees, line jumping, and other incentives to lower-emitting vehicles. A tiered system of reduced fees and other incentives can benefit operators with lower-emitting NOx trucks while providing the deepest discount to zero-emission vehicles.
2. Install Level 2 electric vehicle (EV) charging infrastructure in employee and visitor light-duty parking spots. This mitigation also will reduce NOx emissions from trips to the site.
3. In preparation for future zero-emission fleets, install conduit for EV charging stations at locations where trucks will be parked or idling. This mitigation also will reduce future NOx emissions from trips to the site.

As mentioned above, the primary source of increased NO_X emissions is the increase in truck trips by contract waste haulers that are required to transport feedstock to the site and to transport finished products and unusable inert materials from the site. This on-road truck fleet is independent of the Z-Best facility operations. For reference, the project's operational emissions presented in the DEIR are included in Table 3 below.

Table 3. Unmitigated Operational Criteria Air Pollutant Emissions

Description	ROG	NOx	PM_{10}	$PM_{2.5}$
Existing Conditions (lbs/day)	2.70	74.49	1.55	1.48
Post-Project Peak Day Conditions (lbs/day)	7.05	197.68	4.11	3.93
Net Increase with Peak Day Project Conditions (lbs/day)	4.35	123.19	2.56	2.45
BAAQMD Daily Thresholds (lbs/day)	54	54	82	54

Source: SCS Engineers 2019 (See Table 7-7 of the DEIR).

However, implementation of the proposed project, which would enable Z-Best to compost up to 875 tons per day more MSW than is possible under existing conditions, would also result in a decrease in vehicle miles traveled from trucks currently transporting this waste to other landfills or to other composting facilities in the region. In other words, this waste would continue to be generated in the region and would need to be disposed in a landfill or an alternate composting facility in the absence of the proposed project.

The October 2020 memorandum prepared by SCS Engineers, "Emissions from Proposed Changes to Z-Best Facility in Gilroy, California," (SCS October 2020 GHG

Letter) evaluated the potential avoided truck emissions under four scenarios in absence of the project, which included waste traveling to the Marina Landfill and an alternative composting facility in Vernalis.

As detailed in the SCS October 2020 GHG Letter, the potential avoided NOx emissions could range from approximately 49 pounds of NOx per day to approximately 153 pounds of NOx per day. When accounting for these potential avoided NOx emissions, the actual net increase in project emissions could range from 74 pounds of NOx per day or be entirely offset, resulting in a net reduction of 30 pounds of NOx per day. However, because the actual avoided vehicle miles traveled in the region due to implementation of the proposed project would vary on a daily basis based on the quantity of MSW and ultimate destination (landfill or alternate compost facility) in the region in the absence of the project, the DEIR analysis conservatively did not account for the avoided truck emissions.

Nonetheless, considering the unique nature of the proposed project's emissions and lack of feasibility in reducing emissions from independently owned truck fleets, the BAAQMD recommended on-site emission reduction measures were evaluated to consider reducing emissions to the extent feasible.

Since Z-Best facility operations implements fees based on material (i.e. feedstock) content, providing incentives such as reduced entrance fees and line jumping based on truck engine type would not be technically and operationally feasible and the facility would not have the operational control to collect information on independent truck fleet truck types and/or truck engine information. Furthermore, introducing a feature like line jumping, may potentially result in higher-emitting trucks idling for longer periods of time than necessary.

Since the proposed project would not change the parking capacity and configuration of the parking area is not anticipated to change, it would also be infeasible at this time to incorporate changes to the parking area at this time. Therefore, installation of Level 2 EV charging infrastructure in employee and visitor light-duty parking spots and/or installation of conduit for EV charging stations for trucks would not be possible under the current proposed project.

However, as described in the DEIR, the applicant does have control over how on-road vehicles are operated once on the project site; therefore, the truck idling limit per Mitigation Measure 6-2 above, would still be required.

Additional on-site operational GHG emission reductions

BAAQMD recommended the following additional on-site emission measures to reduce GHG emissions:

1. Invest in onsite renewable energy generation, such as rooftop solar at the existing operations building.
2. Join Silicon Valley Clean Energy's (SVCE) GreenPrime program and commit to purchasing 100 percent renewable energy or negotiating an electricity contract with SVCE for 100 percent renewable energy.

3. Encourage lower-emitting truck fleets by providing reduced entrance fees, line jumping, and other incentives to lower-emitting vehicles. A tiered system of reduced fees and other incentives can benefit operators with lower-emitting NOx trucks while providing the deepest discount to zero-emission vehicles.
4. Install Level 2 electric vehicle (EV) charging infrastructure in employee and visitor light-duty parking spots. This mitigation also will reduce NOx emissions from trips to the site.
5. In preparation for future zero-emission fleets, install conduit for EV charging stations at locations where trucks will be parked or idling. This mitigation also will reduce future NOx emissions from trips to the site.

The purpose of the project is to replace an existing composting technology at the Z-Best Facility with a newer technology that allows compost to be processed in a shorter amount of time, increasing the daily volume of municipal solid waste that may be accepted and processed at the facility. As described in the October 2020 memorandum prepared by SCS Engineers, “Emissions from Proposed Changes to Z-Best Facility in Gilroy, California,” (SCS October 2020 GHG Letter) composting is an important component of the CARB 2017 Climate Change Scoping Plan, the State’s strategy for achieving the California’s 2030 GHG target, which states that “[The State] can invest in and streamline in-state infrastructure development to support recycling, remanufacturing, composting, anaerobic digestion, and other beneficial uses of organic waste.” (CARB 2017) Compost diverts organic materials from landfills where they would break down and be emitted into the atmosphere as methane (CH_4), a potent GHG. Thus, by composting food waste and other organics, methane emissions are significantly reduced (USEPA 2021).

The SCS October 2020 GHG Letter, which was peer reviewed by AECOM in 2022, evaluated the GHG emissions benefit associated with implementation of the project. Since the project would result in an increase in the capacity of the facility to compost an additional 875 tons per day of municipal solid waste and/or foodwaste, implementation of the project would result in a GHG emissions reduction benefit by reducing the amount of methane generated by the waste that would have been landfilled if it were not composted. SCS utilized the CARB “Benefits Calculator Tool for Organics” program to calculate the GHG emission benefit from one year of the increased composting of material proposed by the project.

Due to waste diversion from landfill deposition, the project would provide a GHG reduction of approximately 86,231 metric tons of carbon dioxide equivalents ($MTCO_2e$) per year. After accounting for the currently estimated increase in operational GHG emissions of 4,064 $MTCO_2e$ at the facility due to an increase in employee vehicle and haul truck trips, it is estimated that the project would result in a net GHG benefit of 82,167 $MTCO_2e$ per year. Since the increased composting capacity proposed by the project would result in a significantly higher GHG emissions reduction benefit than the project’s increased operational GHG emissions, the project would result in a net reduction in GHG emissions. In addition, the project is consistent with one of the State’s strategy for achieving the 2030 GHG emissions target of increasing composting, anaerobic digestion, and other beneficial uses of organic waste in the State. Thus, the additional GHG emission reductions recommended by the BAAQMD are not required.

Off-site GHG emission reductions

BAAQMD recommended the following off-site GHG emission reduction program to further reduce GHG emissions:

> Once on-site GHG emission reductions measures have been exhausted, any remaining and necessary offset credits purchased to mitigate Project impacts should be real, permanent, quantifiable, verifiable, enforceable, and additional, and follow a hierarchy to prioritize benefits first within the community, city, region, or State (in order of location preference).

As described previously, the project would result in a net reduction in GHG emissions; therefore, an off-site GHG emission reduction program to reduce GHG emissions would not be required.

Summary

Based on the updated construction emissions analysis, construction of the project would not exceed the BAAQMD regional thresholds of significance. Therefore, the construction-related NOx emission reduction measures recommended by BAAQMD would not be required.

Regarding operational NOx emissions, as described above, given the unique nature of the proposed project's emissions and lack of feasibility in implementing changes to facility operations and reducing independently owned truck fleet emissions, the BAAQMD recommended on-site emission reduction measures would not be feasible to implement. However, the potential avoided NOx emissions from the reduced truck travel to other landfills or composting facilities could partially or entirely offset the on-road emissions associated with the proposed project. In addition, as fleets turn over older trucks per the CARB Truck and Bus Regulation and future developments under the Advanced Clean Trucks Regulation, the proposed project's on-road truck emissions would be expected to decrease. Therefore, additional onsite or offsite NOx emission reductions as recommended by BAAQMD would not be required.

As described previously, the project would result in a net reduction in GHG emissions; therefore, additional on-site or off-site GHG emissions reduction measures recommended by BAAQMD would not be required.

References

Bay Area Air Quality Management District (BAAQMD). 2017. California Environmental Quality Act: Air Quality Guidelines. Available online: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed October 2021.

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California Air Resources Board (CARB). 2017. California’s 2017 Climate Change Scoping Plan. Available online: https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf. Accessed October 2021.

United States Environmental Protection Agency (USEPA). 2021. Reducing the Impact of Wasted Food by Feeding the Soil and Composting. Available online: https://www.epa.gov/sustainable-management-food/reducing-impact-wasted-food-feeding-soil-and-composting. Accessed October 2021.

Emissions Summary

Annual Construction Emissions											
	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**CO2e**
Year	tons/year										MT/year
2023	0.31	2.91	2.4	1.00E-02	0.53	0.12	0.65	0.17	0.11	0.27	635
Total Emissions (tons)	0.31	2.91	2.40	0.01	0.53	0.12	0.65	0.17	0.11	0.27	635

Notes: ROG = reactive organic gases; NOx = nitrogen oxides; CO = carbon monoxide; SO2 = sulfur dioxide; PM10 = particulate matter equal or less than 10 micrometers in diameter; PM2.5 = particulate matter equal or less than 2.5 micrometers in diameter

Average Daily Construction Emissions										
	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**
Total Emissions (tons)	0.31	2.91	2.40	0.01	0.53	0.12	0.65	0.17	0.11	0.27
Average Daily Emissions (pounds/day)[1]	**3.10**	**29.10**	**24.00**	**0.10**	**5.30**	**1.20**	**6.50**	**1.70**	**1.10**	**2.70**
Threshold[2]	54	54				82			54	
Exceed Threshold?	No	No				No			No	

Notes:

[1]Average daily emission estimates are based on approximately 200 construction workdays.

[2] Thresholds from Table 2-1 of the BAAQMD CEQA Air Quality Guidelines (BAAQMD 2017)

ROG = reactive organic gases; NOx = nitrogen oxides; CO = carbon monoxide; SO2 = sulfur dioxide; PM10 = particulate matter equal or less than 10 micrometers in diameter; PM2.5 = particulate matter equal or less than 2.5 micrometers in diameter

Start Date	1/3/2023
End Date	8/23/2023
Total Days of Construction	200
lb/ton	2000

Unit Conversions	
tons	pounds
1	2000

CalEEMod Inputs and Assumptions - all information confirmed in "Z-Best_DataNeedsRequest_09-02-21_with_notes"

Project Characteristics	Input	Notes
Project Name	Z-Best Composting Facility Project Construction	
Project Location	Santa Clara County	Zip Code: 95110
Climate Zone	4	
Land Use Setting	Rural	
Construction Start Date	1/2/2023	Assumes construction start date in Q1 2023
Operational Year	2023	
Utility	PG&E	

Land Use

Component	Size	Square Feet	Acreage
General Light Industry	0	0	157.32

Construction Phases & Equipment **Notes**

Construction Work Days	6 days per week

Phase	CalEEMod Phase	Duration	Equipment	Quantity	Hours Per Day	Notes
Grading	Grading	78 days	Graders	1	8	
			Water Truck	1	8	modeled as off-highway truck
			Other Construction Equipment	1	8	Compactor (172 HP)
			Rubber Tired Dozer	1	8	
			Scraper	5	8	
Trenching	Trenching	53 days	Tractors/Loaders	2	8	
Paving	Paving	69 days	Concrete Pump Truck	1	8	250 hp, modeled as off-highway truck
			Concrete Finisher	1	8	37 hp, modeled as other construction equipment
			Paver	1	8	
			Paving Equipment	1	8	

Cut/Fill and Haul and Worker Trips

PD: Overall, the cut and fill volumes for the proposed project would be balanced, with no net import or export required

Paving	0.74		
Total Impervious Area	810,000.00	From 2022-04 Site Plan	18.60

CalEEMod Phase	Worker Trips	Vendor Trips	Trip Length	Notes
Grading	24		*default*	
Trenching	10	2	*default*	
Paving	50	100	*default*	

Construction Mitigation
Watering unpaved roads
Watering twice per day

Z-Best Composting Facility Project Construction Custom Report

Table of Contents

1. Basic Project Information

   1.1. Basic Project Information

   1.2. Land Use Types

   1.3. User-Selected Emission Reduction Measures by Emissions Sector

2. Emissions Summary

   2.2. Construction Emissions by Year, Unmitigated

   2.3. Construction Emissions by Year, Mitigated

3. Construction Emissions Details

   3.1. Grading (2023) - Unmitigated

   3.2. Grading (2023) - Mitigated

   3.3. Paving (2023) - Unmitigated

   3.4. Paving (2023) - Mitigated

   3.5. Trenching (2023) - Unmitigated

   3.6. Trenching (2023) - Mitigated

5. Activity Data

5.1. Construction Schedule

5.2. Off-Road Equipment

5.2.1. Unmitigated

5.3. Construction Vehicles

5.3.1. Unmitigated

5.7. Construction Paving

8. User Changes to Default Data

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Z-Best Composting Facility Project Construction
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	1.80
Precipitation (days)	29.8
Location	980 CA-25, Gilroy, CA 95020, USA
County	Santa Clara
City	Unincorporated
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	1938
EDFZ	1
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
General Light Industry	1.00	1000sqft	157	1,000	0.00	0.00	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-10-A	Water Exposed Surfaces

2. Emissions Summary

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	7.60	6.39	63.3	48.9	0.12	2.55	12.6	15.1	2.35	4.04	6.39	—	12,998	12,998	0.53	0.44	9.23	13,046
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	7.59	6.39	63.3	48.7	0.12	2.55	12.6	15.1	2.35	4.04	6.39	—	12,983	12,983	0.52	0.11	0.03	13,029
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	1.95	1.72	16.0	13.2	0.03	0.64	2.91	3.55	0.59	0.92	1.51	—	3,797	3,797	0.16	0.11	0.88	3,834
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	0.36	0.31	2.91	2.40	0.01	0.12	0.53	0.65	0.11	0.17	0.27	—	629	629	0.03	0.02	0.15	635

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

2023	7.60	6.39	63.3	48.9	0.12	2.55	5.03	7.58	2.35	1.61	3.96	—	12,998	12,998	0.53	0.44	9.23	13,046
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	7.59	6.39	63.3	48.7	0.12	2.55	5.03	7.58	2.35	1.61	3.96	—	12,983	12,983	0.52	0.11	0.03	13,029
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	1.95	1.72	16.0	13.2	0.03	0.64	1.30	1.93	0.59	0.40	0.99	—	3,797	3,797	0.16	0.11	0.88	3,834
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	0.36	0.31	2.91	2.40	0.01	0.12	0.24	0.35	0.11	0.07	0.18	—	629	629	0.03	0.02	0.15	635

3. Construction Emissions Details

3.1. Grading (2023) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	7.50	6.30	63.2	47.7	0.12	2.55	—	2.55	2.35	—	2.35	—	12,784	12,784	0.52	0.10	—	12,828
Dust From Material Movement	—	—	—	—	—	—	12.4	12.4	—	4.00	4.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	7.50	6.30	63.2	47.7	0.12	2.55	—	2.55	2.35	—	2.35	—	12,784	12,784	0.52	0.10	—	12,828
Dust From Material Movement	—	—	—	—	—	—	12.4	12.4	—	4.00	4.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.60	1.35	13.5	10.2	0.03	0.55	—	0.55	0.50	—	0.50	—	2,732	2,732	0.11	0.02	—	2,741
Dust From Material Movement	—	—	—	—	—	—	2.65	2.65	—	0.85	0.85	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	0.25	2.46	1.86	< 0.005	0.10	—	0.10	0.09	—	0.09	—	452	452	0.02	< 0.005	—	454
Dust From Material Movement	—	—	—	—	—	—	0.48	0.48	—	0.16	0.16	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	0.07	1.13	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	214	214	0.01	0.01	0.97	217
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.09	0.98	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	198	198	0.01	0.01	0.03	201
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.21	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	42.8	42.8	< 0.005	< 0.005	0.09	43.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	7.08	7.08	< 0.005	< 0.005	0.01	7.19
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.2. Grading (2023) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	7.50	6.30	63.2	47.7	0.12	2.55	—	2.55	2.35	—	2.35	—	12,784	12,784	0.52	0.10	—	12,828
Dust From Material Movement	—	—	—	—	—	—	4.83	4.83	—	1.56	1.56	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	7.50	6.30	63.2	47.7	0.12	2.55	—	2.55	2.35	—	2.35	—	12,784	12,784	0.52	0.10	—	12,828
Dust From Material Movement	—	—	—	—	—	—	4.83	4.83	—	1.56	1.56	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.60	1.35	13.5	10.2	0.03	0.55	—	0.55	0.50	—	0.50	—	2,732	2,732	0.11	0.02	—	2,741
Dust From Material Movement	—	—	—	—	—	—	1.03	1.03	—	0.33	0.33	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	0.25	2.46	1.86	< 0.005	0.10	—	0.10	0.09	—	0.09	—	452	452	0.02	< 0.005	—	454
Dust From Material Movement	—	—	—	—	—	—	0.19	0.19	—	0.06	0.06	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	0.07	1.13	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	214	214	0.01	0.01	0.97	217

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.09	0.98	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	198	198	0.01	0.01	0.03	201
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.21	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	42.8	42.8	< 0.005	< 0.005	0.09	43.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	7.08	7.08	< 0.005	< 0.005	0.01	7.19
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.3. Paving (2023) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.03	0.87	6.81	7.54	0.02	0.34	—	0.34	0.32	—	0.32	—	1,657	1,657	0.07	0.01	—	1,663
Paving	—	0.52	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	0.16	1.29	1.43	< 0.005	0.06	—	0.06	0.06	—	0.06	—	313	313	0.01	< 0.005	—	314
Paving	—	0.10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.23	0.26	< 0.005	0.01	—	0.01	0.01	—	0.01	—	51.9	51.9	< 0.005	< 0.005	—	52.0
Paving	—	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.20	0.18	0.15	2.36	0.00	0.00	0.03	0.03	0.00	0.00	0.00	—	446	446	0.02	0.02	2.03	453
Vendor	0.28	0.10	3.80	1.81	0.02	0.04	0.15	0.19	0.04	0.06	0.09	—	2,777	2,777	0.17	0.41	7.20	2,910
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.03	0.38	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	78.9	78.9	< 0.005	< 0.005	0.17	80.0
Vendor	0.05	0.02	0.74	0.35	< 0.005	0.01	0.03	0.04	0.01	0.01	0.02	—	525	525	0.03	0.08	0.59	549
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.01	0.01	0.01	0.07	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	13.1	13.1	< 0.005	< 0.005	0.03	13.3
Vendor	0.01	< 0.005	0.14	0.06	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	86.9	86.9	0.01	0.01	0.10	91.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.4. Paving (2023) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.03	0.87	6.81	7.54	0.02	0.34	—	0.34	0.32	—	0.32	—	1,657	1,657	0.07	0.01	—	1,663
Paving	—	0.52	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	0.16	1.29	1.43	< 0.005	0.06	—	0.06	0.06	—	0.06	—	313	313	0.01	< 0.005	—	314
Paving	—	0.10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.23	0.26	< 0.005	0.01	—	0.01	0.01	—	0.01	—	51.9	51.9	< 0.005	< 0.005	—	52.0
Paving	—	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.20	0.18	0.15	2.36	0.00	0.00	0.03	0.03	0.00	0.00	0.00	—	446	446	0.02	0.02	2.03	453
Vendor	0.28	0.10	3.80	1.81	0.02	0.04	0.15	0.19	0.04	0.06	0.09	—	2,777	2,777	0.17	0.41	7.20	2,910
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.03	0.38	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	78.9	78.9	< 0.005	< 0.005	0.17	80.0
Vendor	0.05	0.02	0.74	0.35	< 0.005	0.01	0.03	0.04	0.01	0.01	0.02	—	525	525	0.03	0.08	0.59	549
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.07	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	13.1	13.1	< 0.005	< 0.005	0.03	13.3
Vendor	0.01	< 0.005	0.14	0.06	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	86.9	86.9	0.01	0.01	0.10	91.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Trenching (2023) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.29	0.25	2.54	3.82	0.01	0.12	—	0.12	0.11	—	0.11	—	581	581	0.02	< 0.005	—	583
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.37	0.56	< 0.005	0.02	—	0.02	0.02	—	0.02	—	84.3	84.3	< 0.005	< 0.005	—	84.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.07	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	14.0	14.0	< 0.005	< 0.005	—	14.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.03	0.47	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	89.1	89.1	< 0.005	< 0.005	0.41	90.6
Vendor	0.01	< 0.005	0.08	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	55.5	55.5	< 0.005	0.01	0.14	58.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	< 0.005	0.06	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	12.1	12.1	< 0.005	< 0.005	0.03	12.3
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	8.07	8.07	< 0.005	< 0.005	0.01	8.44
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	2.01	2.01	< 0.005	< 0.005	< 0.005	2.04
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.34	1.34	< 0.005	< 0.005	< 0.005	1.40
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.6. Trenching (2023) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	0.25	2.54	3.82	0.01	0.12	—	0.12	0.11	—	0.11	—	581	581	0.02	< 0.005	—	583
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.04	0.37	0.56	< 0.005	0.02	—	0.02	0.02	—	0.02	—	84.3	84.3	< 0.005	< 0.005	—	84.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.07	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	14.0	14.0	< 0.005	< 0.005	—	14.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.03	0.47	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	89.1	89.1	< 0.005	< 0.005	0.41	90.6
Vendor	0.01	< 0.005	0.08	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	55.5	55.5	< 0.005	0.01	0.14	58.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	< 0.005	0.06	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	12.1	12.1	< 0.005	< 0.005	0.03	12.3
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	8.07	8.07	< 0.005	< 0.005	0.01	8.44
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	2.01	2.01	< 0.005	< 0.005	< 0.005	2.04
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.34	1.34	< 0.005	< 0.005	< 0.005	1.40
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Grading	Grading	1/3/2023	4/3/2023	6.00	78.0	—
Paving	Paving	6/4/2023	8/23/2023	6.00	69.0	—
Trenching	Trenching	4/4/2023	6/3/2023	6.00	53.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Scrapers	Diesel	Average	5.00	8.00	423	0.48
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
Grading	Plate Compactors	Diesel	Average	1.00	8.00	8.00	0.43
Grading	Off-Highway Trucks	Diesel	Average	1.00	8.00	376	0.38
Paving	Off-Highway Trucks	Diesel	Average	1.00	8.00	250	0.38
Paving	Other Construction Equipment	Diesel	Average	1.00	8.00	37.0	0.42
Trenching	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Grading	—	—	—	—
Grading	Worker	24.0	11.7	LDA,LDT1,LDT2
Grading	Vendor	—	8.40	HHDT,MHDT
Grading	Hauling	0.00	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	50.0	11.7	LDA,LDT1,LDT2
Paving	Vendor	100	8.40	HHDT,MHDT

Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Trenching	—	—	—	—
Trenching	Worker	10.0	11.7	LDA,LDT1,LDT2
Trenching	Vendor	2.00	8.40	HHDT,MHDT
Trenching	Hauling	0.00	20.0	HHDT
Trenching	Onsite truck	—	—	HHDT

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
General Light Industry	18.6	74%

8. User Changes to Default Data

Screen	Justification
Land Use	Acreage based on project site acreage. Unit amount of 1 entered as placeholder. Operational emissions estimated off-model.
Construction: Construction Phases	Construction specific schedule of a 78-day grading phase, 53-day trenching phase, and 69-day paving phase.
Construction: Off-Road Equipment	Project specific construction equipment. Compactor modeled as plate compactor. Water truck modeled as off-highway truck. Concrete finisher modeled as other construction equipment. Concrete pump truck modeled as off-highway truck.
Construction: Trips and VMT	Project specific worker and vendor truck trips. Cut/fill expected to be balanced.
Construction: Paving	Based on total impervious surface area and assumes site entrance is asphalt.

Z Best
Electricity Consumption
Indirect GHG Emisisons

	kWh/year	MWh/year	GHG Emisisons
Existing CTI Bag	851,862.00	851.86	38
Proposed (ECS CASP Primary & Curing)	8,151,000.00	8,151.00	362

Source: *Email Communication 20221116: ECS aerated composting system fans at Z-Best Facility*

0.05%

PG&E Power Content Label Base Plan

GHG Emissions Intensity (lbs CO2e/MWh) 98

Source: https://www.pge.com/pge_global/common/pdfs/your-account/your-bill/understand-your-bill/bill-inserts/2022/1022-Power-Content-Label.pdf

lbs/MT	2204.62