

# Appendix A

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Air Quality and Climate Change  
Modeling Results

Merced Landfill Gas to Energy Project - Merced County, Annual

**Merced Landfill Gas to Energy Project**  
**Merced County, Annual**

**1.0 Project Characteristics**

**1.1 Land Usage**

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	0.00		0.00	0.00	0

**1.2 Other Project Characteristics**

<b>Urbanization</b>	Rural	<b>Wind Speed (m/s)</b>	2.2	<b>Precipitation Freq (Days)</b>	49
<b>Climate Zone</b>	3			<b>Operational Year</b>	2020
<b>Utility Company</b>	Pacific Gas & Electric Company				
<b>CO2 Intensity (lb/MW hr)</b>	641.35	<b>CH4 Intensity (lb/MW hr)</b>	0.029	<b>N2O Intensity (lb/MW hr)</b>	0.006

**1.3 User Entered Comments & Non-Default Data**

Project Characteristics -

Land Use - Construction only emissions analysis: land use dummy value inputed

Construction Phase - 6 months for Phase 1 beginning in 2019, 6 months for Phase 2 beginning in 2019, 4 months for Phase 3 beginning in 2020. Overlapping Phase 1 and 2.

Off-road Equipment - Equipment from PD, conservative assumption of 8 hours per day.

Off-road Equipment - Equipment from PD, conservative assumption of 8 hours per day.

Off-road Equipment - Grout truck and concrete mixer assumed to be two cement and mortar mixers. Equipment from PD, conservative assumption of 8 hours per day.

Trips and VMT - Up to 15 construction workers at a time (30 trips per day) plus two pickup trucks on site per day (4 additional trips). Assuming two haul trips per day. Assuming one roundtrip per flatbed truck for vendor trip per day.

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Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	0.00	132.00
tblConstructionPhase	NumDays	0.00	132.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	4.00	8.00
tblOffRoadEquipment	UsageHours	4.00	8.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	0.00	164.00
tblTripsAndVMT	HaulingTripNumber	0.00	162.00
tblTripsAndVMT	HaulingTripNumber	0.00	176.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	0.00	34.00
tblTripsAndVMT	WorkerTripNumber	0.00	34.00
tblTripsAndVMT	WorkerTripNumber	13.00	34.00

## 2.0 Emissions Summary

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## Merced Landfill Gas to Energy Project - Merced County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-1-2019	8-31-2019	0.5722	0.5722
2	9-1-2019	11-30-2019	0.8283	0.8283
3	12-1-2019	2-29-2020	0.4753	0.4753
4	3-1-2020	5-31-2020	0.1989	0.1989
		Highest	0.8283	0.8283



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	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
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

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#### Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Phase 1: Highway 59 Terminus	Building Construction	6/30/2019	12/31/2019	5	132	
2	Phase 2: UC Merced Terminus	Building Construction	6/30/2019	12/31/2019	5	132	
3	Phase 3: Pipeline	Trenching	1/1/2020	5/1/2020	5	88	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

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

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Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Phase 1: Highway 59 Terminus	Concrete/Industrial Saws	0	0.00	81	0.73
Phase 1: Highway 59 Terminus	Cranes	1	8.00	231	0.29
Phase 1: Highway 59 Terminus	Forklifts	0	0.00	89	0.20
Phase 1: Highway 59 Terminus	Rubber Tired Dozers	0	0.00	247	0.40
Phase 1: Highway 59 Terminus	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Phase 2: UC Merced Terminus	Cranes	1	8.00	231	0.29
Phase 2: UC Merced Terminus	Forklifts	0	0.00	89	0.20
Phase 2: UC Merced Terminus	Graders	0	0.00	187	0.41
Phase 2: UC Merced Terminus	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Phase 3: Pipeline	Cement and Mortar Mixers	2	8.00	9	0.56
Phase 3: Pipeline	Concrete/Industrial Saws	0	0.00	81	0.73
Phase 3: Pipeline	Rollers	1	8.00	80	0.38
Phase 3: Pipeline	Rubber Tired Dozers	0	0.00	247	0.40
Phase 3: Pipeline	Tractors/Loaders/Backhoes	2	8.00	97	0.37

**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
Phase 1: Highway 59 Terminus	3	34.00	2.00	164.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2: UC Merced Terminus	3	34.00	2.00	162.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3: Pipeline	5	34.00	2.00	176.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

**3.1 Mitigation Measures Construction**



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**3.2 Phase 1: Highway 59 Terminus - 2019**

**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	0.0640	0.7050	0.4553	7.9000e-004		0.0374	0.0374		0.0344	0.0344	0.0000	71.0284	71.0284	0.0225	0.0000	71.5902
<b>Total</b>	<b>0.0640</b>	<b>0.7050</b>	<b>0.4553</b>	<b>7.9000e-004</b>		<b>0.0374</b>	<b>0.0374</b>		<b>0.0344</b>	<b>0.0344</b>	<b>0.0000</b>	<b>71.0284</b>	<b>71.0284</b>	<b>0.0225</b>	<b>0.0000</b>	<b>71.5902</b>

**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	7.2000e-004	0.0245	3.6000e-003	7.0000e-005	1.4000e-003	9.0000e-005	1.5000e-003	3.9000e-004	9.0000e-005	4.8000e-004	0.0000	6.3226	6.3226	4.5000e-004	0.0000	6.3338
Vendor	6.4000e-004	0.0167	3.8900e-003	4.0000e-005	7.9000e-004	1.2000e-004	9.1000e-004	2.3000e-004	1.1000e-004	3.4000e-004	0.0000	3.3630	3.3630	3.7000e-004	0.0000	3.3723
Worker	0.0156	0.0122	0.1224	2.9000e-004	0.0278	2.2000e-004	0.0280	7.4000e-003	2.0000e-004	7.6000e-003	0.0000	25.8623	25.8623	9.2000e-004	0.0000	25.8853
<b>Total</b>	<b>0.0170</b>	<b>0.0535</b>	<b>0.1299</b>	<b>4.0000e-004</b>	<b>0.0300</b>	<b>4.3000e-004</b>	<b>0.0305</b>	<b>8.0200e-003</b>	<b>4.0000e-004</b>	<b>8.4200e-003</b>	<b>0.0000</b>	<b>35.5479</b>	<b>35.5479</b>	<b>1.7400e-003</b>	<b>0.0000</b>	<b>35.5914</b>

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**3.2 Phase 1: Highway 59 Terminus - 2019**

**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	0.0640	0.7050	0.4553	7.9000e-004		0.0374	0.0374		0.0344	0.0344	0.0000	71.0283	71.0283	0.0225	0.0000	71.5901
<b>Total</b>	<b>0.0640</b>	<b>0.7050</b>	<b>0.4553</b>	<b>7.9000e-004</b>		<b>0.0374</b>	<b>0.0374</b>		<b>0.0344</b>	<b>0.0344</b>	<b>0.0000</b>	<b>71.0283</b>	<b>71.0283</b>	<b>0.0225</b>	<b>0.0000</b>	<b>71.5901</b>

**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	7.2000e-004	0.0245	3.6000e-003	7.0000e-005	1.4000e-003	9.0000e-005	1.5000e-003	3.9000e-004	9.0000e-005	4.8000e-004	0.0000	6.3226	6.3226	4.5000e-004	0.0000	6.3338
Vendor	6.4000e-004	0.0167	3.8900e-003	4.0000e-005	7.9000e-004	1.2000e-004	9.1000e-004	2.3000e-004	1.1000e-004	3.4000e-004	0.0000	3.3630	3.3630	3.7000e-004	0.0000	3.3723
Worker	0.0156	0.0122	0.1224	2.9000e-004	0.0278	2.2000e-004	0.0280	7.4000e-003	2.0000e-004	7.6000e-003	0.0000	25.8623	25.8623	9.2000e-004	0.0000	25.8853
<b>Total</b>	<b>0.0170</b>	<b>0.0535</b>	<b>0.1299</b>	<b>4.0000e-004</b>	<b>0.0300</b>	<b>4.3000e-004</b>	<b>0.0305</b>	<b>8.0200e-003</b>	<b>4.0000e-004</b>	<b>8.4200e-003</b>	<b>0.0000</b>	<b>35.5479</b>	<b>35.5479</b>	<b>1.7400e-003</b>	<b>0.0000</b>	<b>35.5914</b>

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**3.3 Phase 2: UC Merced Terminus - 2019**

**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	0.0640	0.7050	0.4553	7.9000e-004		0.0374	0.0374		0.0344	0.0344	0.0000	71.0284	71.0284	0.0225	0.0000	71.5902
<b>Total</b>	<b>0.0640</b>	<b>0.7050</b>	<b>0.4553</b>	<b>7.9000e-004</b>		<b>0.0374</b>	<b>0.0374</b>		<b>0.0344</b>	<b>0.0344</b>	<b>0.0000</b>	<b>71.0284</b>	<b>71.0284</b>	<b>0.0225</b>	<b>0.0000</b>	<b>71.5902</b>

**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	7.1000e-004	0.0243	3.5500e-003	7.0000e-005	1.3800e-003	9.0000e-005	1.4800e-003	3.8000e-004	9.0000e-005	4.7000e-004	0.0000	6.2455	6.2455	4.4000e-004	0.0000	6.2565
Vendor	6.4000e-004	0.0167	3.8900e-003	4.0000e-005	7.9000e-004	1.2000e-004	9.1000e-004	2.3000e-004	1.1000e-004	3.4000e-004	0.0000	3.3630	3.3630	3.7000e-004	0.0000	3.3723
Worker	0.0156	0.0122	0.1224	2.9000e-004	0.0278	2.2000e-004	0.0280	7.4000e-003	2.0000e-004	7.6000e-003	0.0000	25.8623	25.8623	9.2000e-004	0.0000	25.8853
<b>Total</b>	<b>0.0169</b>	<b>0.0532</b>	<b>0.1298</b>	<b>4.0000e-004</b>	<b>0.0300</b>	<b>4.3000e-004</b>	<b>0.0304</b>	<b>8.0100e-003</b>	<b>4.0000e-004</b>	<b>8.4100e-003</b>	<b>0.0000</b>	<b>35.4708</b>	<b>35.4708</b>	<b>1.7300e-003</b>	<b>0.0000</b>	<b>35.5141</b>

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**3.3 Phase 2: UC Merced Terminus - 2019**

**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	0.0640	0.7050	0.4553	7.9000e-004		0.0374	0.0374		0.0344	0.0344	0.0000	71.0283	71.0283	0.0225	0.0000	71.5901
<b>Total</b>	<b>0.0640</b>	<b>0.7050</b>	<b>0.4553</b>	<b>7.9000e-004</b>		<b>0.0374</b>	<b>0.0374</b>		<b>0.0344</b>	<b>0.0344</b>	<b>0.0000</b>	<b>71.0283</b>	<b>71.0283</b>	<b>0.0225</b>	<b>0.0000</b>	<b>71.5901</b>

**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	7.1000e-004	0.0243	3.5500e-003	7.0000e-005	1.3800e-003	9.0000e-005	1.4800e-003	3.8000e-004	9.0000e-005	4.7000e-004	0.0000	6.2455	6.2455	4.4000e-004	0.0000	6.2565
Vendor	6.4000e-004	0.0167	3.8900e-003	4.0000e-005	7.9000e-004	1.2000e-004	9.1000e-004	2.3000e-004	1.1000e-004	3.4000e-004	0.0000	3.3630	3.3630	3.7000e-004	0.0000	3.3723
Worker	0.0156	0.0122	0.1224	2.9000e-004	0.0278	2.2000e-004	0.0280	7.4000e-003	2.0000e-004	7.6000e-003	0.0000	25.8623	25.8623	9.2000e-004	0.0000	25.8853
<b>Total</b>	<b>0.0169</b>	<b>0.0532</b>	<b>0.1298</b>	<b>4.0000e-004</b>	<b>0.0300</b>	<b>4.3000e-004</b>	<b>0.0304</b>	<b>8.0100e-003</b>	<b>4.0000e-004</b>	<b>8.4100e-003</b>	<b>0.0000</b>	<b>35.4708</b>	<b>35.4708</b>	<b>1.7300e-003</b>	<b>0.0000</b>	<b>35.5141</b>

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**3.4 Phase 3: Pipeline - 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	0.0328	0.3092	0.3111	4.5000e-004		0.0188	0.0188		0.0174	0.0174	0.0000	38.1852	38.1852	0.0115	0.0000	38.4718
<b>Total</b>	<b>0.0328</b>	<b>0.3092</b>	<b>0.3111</b>	<b>4.5000e-004</b>		<b>0.0188</b>	<b>0.0188</b>		<b>0.0174</b>	<b>0.0174</b>	<b>0.0000</b>	<b>38.1852</b>	<b>38.1852</b>	<b>0.0115</b>	<b>0.0000</b>	<b>38.4718</b>

**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	7.2000e-004	0.0246	3.6500e-003	7.0000e-005	1.5000e-003	8.0000e-005	1.5900e-003	4.1000e-004	8.0000e-005	4.9000e-004	0.0000	6.7053	6.7053	4.6000e-004	0.0000	6.7168
Vendor	3.5000e-004	0.0103	2.2300e-003	2.0000e-005	5.3000e-004	5.0000e-005	5.8000e-004	1.5000e-004	5.0000e-005	2.0000e-004	0.0000	2.2222	2.2222	2.4000e-004	0.0000	2.2281
Worker	9.4100e-003	7.1500e-003	0.0723	1.9000e-004	0.0186	1.4000e-004	0.0187	4.9300e-003	1.3000e-004	5.0600e-003	0.0000	16.7121	16.7121	5.3000e-004	0.0000	16.7253
<b>Total</b>	<b>0.0105</b>	<b>0.0420</b>	<b>0.0782</b>	<b>2.8000e-004</b>	<b>0.0206</b>	<b>2.7000e-004</b>	<b>0.0209</b>	<b>5.4900e-003</b>	<b>2.6000e-004</b>	<b>5.7500e-003</b>	<b>0.0000</b>	<b>25.6395</b>	<b>25.6395</b>	<b>1.2300e-003</b>	<b>0.0000</b>	<b>25.6702</b>

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**3.4 Phase 3: Pipeline - 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	tons/yr										MT/yr					
Off-Road	0.0328	0.3092	0.3111	4.5000e-004		0.0188	0.0188		0.0174	0.0174	0.0000	38.1852	38.1852	0.0115	0.0000	38.4718
<b>Total</b>	<b>0.0328</b>	<b>0.3092</b>	<b>0.3111</b>	<b>4.5000e-004</b>		<b>0.0188</b>	<b>0.0188</b>		<b>0.0174</b>	<b>0.0174</b>	<b>0.0000</b>	<b>38.1852</b>	<b>38.1852</b>	<b>0.0115</b>	<b>0.0000</b>	<b>38.4718</b>

**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	7.2000e-004	0.0246	3.6500e-003	7.0000e-005	1.5000e-003	8.0000e-005	1.5900e-003	4.1000e-004	8.0000e-005	4.9000e-004	0.0000	6.7053	6.7053	4.6000e-004	0.0000	6.7168
Vendor	3.5000e-004	0.0103	2.2300e-003	2.0000e-005	5.3000e-004	5.0000e-005	5.8000e-004	1.5000e-004	5.0000e-005	2.0000e-004	0.0000	2.2222	2.2222	2.4000e-004	0.0000	2.2281
Worker	9.4100e-003	7.1500e-003	0.0723	1.9000e-004	0.0186	1.4000e-004	0.0187	4.9300e-003	1.3000e-004	5.0600e-003	0.0000	16.7121	16.7121	5.3000e-004	0.0000	16.7253
<b>Total</b>	<b>0.0105</b>	<b>0.0420</b>	<b>0.0782</b>	<b>2.8000e-004</b>	<b>0.0206</b>	<b>2.7000e-004</b>	<b>0.0209</b>	<b>5.4900e-003</b>	<b>2.6000e-004</b>	<b>5.7500e-003</b>	<b>0.0000</b>	<b>25.6395</b>	<b>25.6395</b>	<b>1.2300e-003</b>	<b>0.0000</b>	<b>25.6702</b>

**4.0 Operational Detail - Mobile**

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**4.1 Mitigation Measures Mobile**

**4.2 Trip Summary Information**

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Total					

**4.3 Trip Type Information**

Land Use	Miles			Trip %			Trip Purpose %		
	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

**4.4 Fleet Mix**

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Parking Lot	0.484945	0.031816	0.154973	0.120992	0.021332	0.005119	0.015709	0.151573	0.002377	0.002347	0.006486	0.001616	0.000714

**5.0 Energy Detail**

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Historical Energy Use: N

**5.1 Mitigation Measures Energy**

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**5.2 Energy by Land Use - Natural Gas**

**Mitigated**

	Natural Gas 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						
Parking Lot	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	0.0000
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**5.3 Energy by Land Use - Electricity**

**Unmitigated**

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>



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**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
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**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
<b>Total</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**7.0 Water Detail**

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**7.1 Mitigation Measures Water**

**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

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**8.2 Waste by Land Use**

**Unmitigated**

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
	0	0.0000	0.0000	0.0000	0.0000
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**Mitigated**

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
	0	0.0000	0.0000	0.0000	0.0000
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**9.0 Operational Offroad**

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

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**Fire Pumps and Emergency Generators**

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

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type
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**User Defined Equipment**

Equipment Type	Number
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**11.0 Vegetation**

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**Date:** March 28, 2019

**To:** Brooks Stayer  
Jerry Lawrie

**CC:** Paul Willman  
Helen Vesser  
Paul Stout

**From:** Ray Ramos  
Suzan Pankenier

**Subject:** Merced RWA Landfill Gas to Energy Project – Existing and Proposed Air Emissions

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Cornerstone Environmental Group, LLC, a Tetra Tech Company (Cornerstone), evaluated the change in projected emissions associated with the proposed landfill gas to energy (LFGTE) project at the Highway 59 Landfill (Landfill) owned and operated by the Merced County Regional Waste Management Authority (RWA). Cornerstone has shown two project scenarios. The first scenario includes installation of a new landfill gas (LFG) treatment system and thermal oxidizer at the Landfill (Scenario 1). The second scenario includes the same equipment as the first, but with the addition of a microturbine at the Landfill (Scenario 2). In both project scenarios, treated LFG will be sent via pipeline to the University of California Merced (UCM) where the gas will be used to fuel new microturbines, which will generate enough waste heat to replace the existing boilers. This analysis evaluates the net change in emissions at the Landfill as well as at UCM associated with the two project scenarios.

The Landfill generates LFG which is collected by RWA and is currently controlled by a 2,100 standard cubic feet per minute (scfm) enclosed flare.

For Scenario 1, the proposed project includes installation of an LFG treatment plant (1,200 scfm) and thermal oxidizer (180 scfm) at the Landfill. The remaining LFG, 720 scfm, would still go to the existing flare. For Scenario 2, the proposed project includes installation of an

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LFG treatment plant (1,200 scfm), thermal oxidizer (200 scfm), and a 400 kilowatt (kW) microturbine (150 scfm) at the Landfill. The remaining LFG, 550 scfm, would still go to the existing flare.

UCM currently has three hot water boilers, one rated at 8.4 million metric British Thermal Units per hour (MMBTU/hr) and two rated at 14.7 MMBTU/hr. The proposed project at UCM is the same for both scenarios and includes the installation of four 800 kW microturbines (up to 1,200 scfm), each with a heat input capacity of 9.1 MMBTU/hr, that will be fueled by the LFG from the Landfill.

The resulting change in projected emissions from the Landfill and UCM are summarized in Tables 1 and 2, respectively (see Attachment 1 for back-up calculations). Table 1 shows the net changes in emissions for Scenario 1. Table 2 shows the net changes in emissions for Scenario 2. As shown in both project scenarios, the net change is less than the California Environmental Quality Act (CEQA) significance thresholds for criteria pollutants. Emissions of hazardous air pollutants (HAPs) will decrease both at the Landfill and at UCM therefore there is a net positive impact from the project and a Health Risk Assessment has not been developed. Greenhouse gas (GHG) emissions do not have a CEQA significance threshold in the San Joaquin Valley Unified Air Pollution Control District.

It is important to note that the projected emissions presented in this analysis do not represent potential to emit calculations for permitting purposes. Potential emission calculations will be submitted separately in an air permit application for the project.

Below lists the justification for the emission factors utilized for the existing and proposed control equipment.

**Existing Boilers, one at capacity of 8.4 MMBTU/hr (Permit # N-5055-4-6), two at capacities of 14.7 MMBTU/hr (N-5055-5-6 and N-5055-6-6):**

- Criteria Pollutants
  - Nitrous Oxides (NO<sub>x</sub>) and Carbon Monoxide (CO) emission factors were obtained from the boilers most recent source testing events on July 11, 2018 (N-5055-4-6 and N-5055-6-6) and August 2, 2018 (N-5055-5-6).
  - Sulfur Oxides (SO<sub>x</sub>), Volatile Organic Compounds (VOCs), and Particulate Materials (PM) emission factors were obtained from the boilers permit conditions per San Joaquin Valley Air Pollutant Control District (SJVAPCD) Permit Numbers N-5055-4-6, N-5055-5-6, and N-5055-6-6.



- Hazardous Air Pollutant (HAPs)
  - HAPs emission factors were utilized from the United States Environmental Protection Agency (USEPA) AP-42 concentrations as stated in 5th Edition, "Compilation of Air Pollutant Emissions Factors, Vol. 1: Chapter 1: External Combustion Source," Section 1.4, November 1998.
- GHG
  - GHG emission factors were obtained from Title 40 Code of Federal Regulations (CFR) Section 98, Subpart A, Table A-1, Global Warming Potentials.

#### **Existing Flare, Capacity of 2,100 scfm:**

- Criteria Pollutants
  - NO<sub>x</sub>, CO, PM, SO<sub>x</sub> and VOC obtained from Permit Conditions per SJVAPCD Permit Number N-3696-2-13.
- HAPs
  - HAPs emissions are comprised of the LFG compounds. The LFG compounds detected during the April 10, 2018 LFG sampling were utilized (where LFG compounds were not detected during the April 10, 2018 testing), USEPA AP-42 concentrations were utilized.
  - Control efficiencies in accordance with USEPA AP-42 for halogenated and non-halogenated compounds range from 91 percent and 99 percent, and from 38 percent and 99 percent respectively. "Typical" control efficiencies for halogenated and non-halogenated compounds are 98 percent and 99.7 percent, respectively.
- GHG
  - GHG emission factors were obtained from Title 40 CFR Section 98, Subpart A, Table A-1, Global Warming Potentials.

#### **Proposed Microturbines, capacity of 9.1 MMBTU/hr each: (conservatively assuming 50 percent methane [CH<sub>4</sub>], 35 percent carbon dioxide [CO<sub>2</sub>] and less than one percent moisture):**

- Criteria Pollutants

- NO<sub>x</sub>, CO, and PM emission factors per emission guarantees from Capstone Microturbine System Emission Guarantees confirmed via e-mail October 11, 2018.
- SO<sub>x</sub> derived from Hydrogen Sulfide (H<sub>2</sub>S) results per the April 10, 2018 LFG samples and conversion rate of 100 percent to SO<sub>x</sub>.
- VOCs derived from HAPs LFG compounds detected at sample testing and USEPA AP-42 concentrations were utilized. Highest concentration, either from AP-42 or from LFG sample dated April 10, 2018, of each LFG compound utilized for all applicable for VOCs. Additional safety factor of ten percent added to the LFG concentrations to allow for fluctuation of the LFG composition to calculate the most conservative emissions. Refer to HAPs for further information on LFG compounds concentrations.
- HAPs
  - HAPs derived from HAPs LFG compounds detected at sample testing and USEPA AP-42 concentrations were utilized. Highest concentration, either from AP-42 or from LFG sample dated April 10, 2018, of each LFG compound utilized for all applicable for VOCs. Additional safety factor of ten percent added to the LFG concentrations to allow for fluctuation of the LFG composition to calculate the most conservative emissions. Refer to HAPs for further information on LFG compounds concentrations.
  - Control efficiencies in accordance with USEPA AP-42 for halogenated and non-halogenated compounds range from 98 percent and 99 percent and from 97 percent and 99 percent respectively. "Typical" control efficiencies for halogenated and non-halogenated compounds are 99.7 percent and 98.2 percent, respectively.
- GHG
  - GHG emission factors were obtained from Title 40 CFR Section 98, Subpart A, Table A-1, Global Warming Potentials.

**Proposed TOX, Capacity of 1.8 MMBTU/hr, (conservatively assuming 50 percent CH<sub>4</sub>, 35 percent CO<sub>2</sub> and less than one percent moisture):**

- Criteria Pollutants
  - NO<sub>x</sub> and CO emission factors derived from manufacturer guarantees, Perennial Energy (PEI).

- SOX derived from H<sub>2</sub>S results per the April 10, 2018 LFG samples and conversion rate of 99.7 percent to SO<sub>x</sub>.
  - PM emission factors derived from USEPA AP-42, 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-5, November 1998.
  - VOC derived from non-methane organic compounds (NMOC) detected from the April 10, 2018 LFG samples, with a VOC fraction of 39 percent.
  - HAPs
    - HAPs derived from HAPs LFG compounds detected at sample testing and USEPA AP-42 concentrations were utilized. Highest concentration, either from AP-42 or from LFG sample dated April 10, 2018, of each LFG compound utilized for all applicable for VOCs. Additional safety factor of ten percent added to the LFG concentrations to allow for fluctuation of the LFG composition to calculate the most conservative emissions. Refer to HAPs for further information on LFG compounds concentrations.
    - Control efficiencies in accordance with USEPA AP-42 for halogenated and non-halogenated compounds range from 91 percent and 99 percent and from 38 percent and 99 percent respectively. "Typical" control efficiencies for halogenated and non-halogenated compounds are 98 percent and 99.7 percent, respectively.
  - GHG
    - GHG emission factors were obtained from Title 40 CFR Section 98, Subpart A, Table A-1, Global Warming Potentials.
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**Table 1. Scenario 1 – Proposed LFG treatment system and thermal oxidizer at Landfill; four 800 kW microturbines at UCM.**

SUMMARY - Description	Criteria Pollutants						HAP		GHG			
	CO	NOx	PM10	PM2.5	SO2	VOC	HAP (T)	HAP (S)	CO2	CH4	N2O	CO2e
	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
<b>NET CHANGE UCM</b>	45.29	2.87	0.35	0.35	(0.16)	(0.67)	(5.76)	(0.62)	91,253.75	-	-	91,253.75
<b>NET CHANGE LANDFILL</b>	(26.01)	(8.72)	0.26	0.26	(9.15)	(29.94)	(1.33)	(1.30)	(125,096.26)	(1.24)	(0.24)	(125,203.25)
<b>TOTAL NET CHANGE (UCM + LF)</b>	19.28	(5.85)	0.61	0.61	(9.31)	(30.61)	(7.09)	(1.92)	(33,842.51)	(1.24)	(0.24)	(33,949.50)
<b>APCD CEQA Threshold</b>	100.00	10.00	15.00	15.00	27.00	10.00						

**Table 2. Scenario 2 – Proposed LFG treatment system, thermal oxidizer, and one 400 kW microturbine at Landfill; four 800 kW microturbines at UCM.**

UCM - SUMMARY - Description	Criteria Pollutants						HAP		GHG			
	CO	NOx	PM10	PM2.5	SO2	VOC	HAP (T)	HAP (S)	CO2	CH4	N2O	CO2e
	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
<b>NET CHANGE UCM</b>	45.29	2.87	0.35	0.35	(0.16)	(0.67)	(5.76)	(0.62)	91,253.75	-	-	91,253.75
<b>NET CHANGE LANDFILL</b>	(23.50)	(9.38)	0.50	0.50	(10.26)	(33.65)	(1.31)	(1.29)	(126,905.25)	(1.40)	(0.28)	(127,025.62)
<b>TOTAL NET CHANGE (UCM +LF)</b>	21.79	(6.51)	0.85	0.85	(10.42)	(34.32)	(7.07)	(1.91)	(35,651.50)	(1.40)	(0.28)	(35,771.87)
<b>APCD CEQA Threshold</b>	100.00	10.00	15.00	15.00	27.00	10.00						

Proposed Project - Scen. 1	
Available LFG	2100 scfm
UCM Microturbines	1200 scfm
LF Thermal Oxidizer	180 scfm
Flare	720 scfm

**ATTACHMENT 1  
EXISTING**

Description	Criteria Pollutants Firing on Natural Gas						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	lb/MMBtu lb/hr tpy	lb/MMBtu lb/hr tpy	lb/MMBtu lb/hr tpy	lb/MMBtu lb/hr tpy	lb/MMBtu lb/hr tpy	lb/MMBtu lb/hr tpy	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
UCM - Total Boilers	0.04	0.03	0.02	0.02	0.01	0.02	1.66	0.45	4,422.50	0.00	0.00	4,422.50
	0.18	0.13	0.29	0.29	0.11	0.21	140.42	107.60	106,139.95	0.00	0.00	106,139.95
	0.79	0.59	1.26	1.26	0.47	0.91	7.25	1.99	19,370.54	0.00	0.00	19,370.54

Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOCs	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
LANDFILL - Flare (2,100 scfm, 63.9 MMBTU)	9.59	3.20	0.00	0.00	3.19	10.44	0.53	0.50	44,222.17	0.45	0.09	44,262.96
	230.04	76.68	0.02	0.02	76.60	250.60	12.62	11.97	1,061,332.01	10.82	2.13	1,062,262.96
	41.98	13.99	0.00	0.00	13.98	45.73	2.3035	2.1851	193,693.09	1.97	0.39	193,862.99

**PROPOSED**

Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
UCM - Proposed Micro Turbines Total	10.52	0.79	0.37	0.37	0.07	0.06	0.341	0.31	25256.69	0.00	0.00	25256.69
	252.52	18.94	8.84	8.84	1.70	1.34	8.19	7.53	606160.51	0.00	0.00	606160.51
	46.08	3.46	1.61	1.61	0.31	0.24	1.4947	1.3735	110624.29	0.00	0.00	110624.29

Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
LANDFILL - Proposed TOX	0.54	0.16	0.09	0.09	0.01	0.04	0.06	0.05	749	0	0	751
	12.96	3.89	2.18	2.18	0.26	0.96	1.53	1.15	17981.69	0.46	0.09	18019.95
	1.58	0.47	0.27	0.27	0.03	0.12	0.1866	0.1403	2187.77	0.06	0.01	2192.43

Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOCs	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/day lbs/day tpy	lbs/day lbs/day tpy	lbs/day lbs/day tpy	lbs/day lbs/day tpy	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
LANDFILL - Flare (2,100 scfm, 63.9 MMBTU, limited to 720 scfm flow)	3.29	1.10	0.00	0.00	1.09	3.58	0.18	0.17	15161.89	0.15	0.03	15175.19
	78.87	26.29	0.01	0.01	26.26	85.92	4.33	4.11	363885.26	3.71	0.73	364204.44
	14.39	4.80	0.00	0.00	4.79	15.68	0.7898	0.7492	66,409.06	0.68	0.13	66,467.31

**SUMMARIES**

UCM - SUMMARY - Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
Existing Equipment	0.79	0.59	1.26	1.26	0.47	0.91	7.25	1.99	19370.54	0.00	0.00	19370.54
Proposed Equipment	46.08	3.46	1.61	1.61	0.31	0.24	1.49	1.37	110624.29	0.00	0.00	110624.29

<b>NET CHANGE UCM</b>	45.29	2.87	0.35	0.35	(0.16)	(0.67)	(5.76)	(0.62)	91,253.75	-	-	91,253.75
<b>APCD CEQA Threshold</b>	100.00	10.00	15.00	15.00	27.00	10.00						

LANDFILL - SUMMARY - Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
Existing Equipment	41.98	13.99	0.00	0.00	13.98	45.73	2.30	2.19	193693.09	1.97	0.39	193862.99
Proposed Equipment	15.97	5.27	0.27	0.27	4.82	15.80	0.98	0.89	68596.83	0.73	0.14	68659.74

<b>NET CHANGE LANDFILL</b>	(26.01)	(8.72)	0.26	0.26	(9.15)	(29.94)	(1.33)	(1.30)	(125,096.26)	(1.24)	(0.24)	(125,203.25)
<b>APCD CEQA Threshold</b>	100.00	10.00	15.00	15.00	27.00	10.00						

\*\* Maximum Incremental Cancer Risk ≥ 10 in 1 million, Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million), Chronic & Acute Hazard Index ≥ 1.0 (project increment)

Notes:  
 Boilers: Source Test Results from 2018 utilized for CO and NOx Calculations. PM10, PM2.5, SOx and VOC Permit Condition for each Boiler (Permit Conditions 12, 13 and 14 for each Boiler) utilized for calculations. For Hazardous Air Pollutants (HAPs) AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Chapter 1: External Combustion Source," Section 1.4, Nov. 1998, were utilized.  
 Existing Flare: Permit limits per permit conditions 34 through 36 utilized for CO, NOx, PM, SOx and VOC. HAPs AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-1, Nov. 1998, highlight components concentrations from Gas Sample Results Air Technologies, April 10, 2018, were utilized.  
 Proposed Microturbines: NOx, PM and CO per Capstone MicroTurbine System Emissions Guarantees confirmed via e-mail October 11, 2018. SOx, Gas Sample Results Air Technologies, April 10, 2018. HAPs AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-1, Nov. 1998, highlight components concentrations from Gas Sample Results Air Technologies, April 10, 2018, as highest concentration of LFG compound utilized. An additional ten percent safety factor added to LFG compounds concentration for conversation estimate of emissions.  
 Proposed TOX: NOx, CO and PM per manufacturer's guarantees, HAPs AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-1, Nov. 1998, highlight components concentrations from Gas Sample Results Air Technologies, April 10, 2018, as highest concentration of LFG compound utilized. An additional ten percent safety factor added to LFG compounds concentration for conversation

Proposed Project - Seen 2		
Available LFG	2100 scfm	
	Landfill Gas	
	Burned (scfm)	Power Output
UCM Microturbines	1200	3300
LF Microturbine	150	400
LF Thermal Oxidizer	202.5	NA
Flare	547.5	NA

**ATTACHMENT 1  
EXISTING**

Description	Criteria Pollutants Firing on Natural Gas						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	lb/MMBtu lb/hr tpy	lb/MMBtu lb/hr tpy	lb/MMBtu lb/hr tpy	lb/MMBtu lb/hr tpy	lb/MMBtu lb/hr tpy	lb/MMBtu lb/hr tpy	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
	0.04	0.03	0.02	0.02	0.01	0.02	1.66	0.45	4,422.50	0.00	0.00	4,422.50
	0.18	0.13	0.29	0.29	0.11	0.21	140.42	107.60	106,139.95	0.00	0.00	106,139.95
<b>UCM - Total Boilers</b>	<b>0.79</b>	<b>0.59</b>	<b>1.26</b>	<b>1.26</b>	<b>0.47</b>	<b>0.91</b>	<b>7.25</b>	<b>1.99</b>	<b>19,370.54</b>	<b>0.00</b>	<b>0.00</b>	<b>19,370.54</b>

Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOCs	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
	9.59	3.20	0.00	0.00	3.19	10.44	0.53	0.50	44,222.17	0.45	0.09	44,260.96
	230.04	76.68	0.02	0.02	76.60	250.60	12.62	11.97	1,061,332.01	10.82	2.13	1,062,262.96
<b>LANDFILL - Flare (2,100 scfm, 63.9 MMBTU)</b>	<b>41.98</b>	<b>13.99</b>	<b>0.00</b>	<b>0.00</b>	<b>13.98</b>	<b>45.73</b>	<b>2.3035</b>	<b>2.1851</b>	<b>193,693.09</b>	<b>1.97</b>	<b>0.39</b>	<b>193,862.99</b>

**PROPOSED**

Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
	10.52	0.79	0.37	0.37	0.07	0.06	0.341	0.31	25256.69	0.00	0.00	25256.69
	252.52	18.94	8.84	8.84	1.70	1.34	8.19	7.53	606160.51	0.00	0.00	606160.51
<b>UCM - Proposed Micro Turbines Total</b>	<b>46.08</b>	<b>3.46</b>	<b>1.61</b>	<b>1.61</b>	<b>0.31</b>	<b>0.24</b>	<b>1.4947</b>	<b>1.3735</b>	<b>110624.29</b>	<b>0.00</b>	<b>0.00</b>	<b>110624.29</b>

Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
	0.61	0.18	0.10	0.10	0.01	0.05	0.07	0.05	843	0	0	845
	14.58	4.37	2.45	2.45	0.30	1.08	1.73	1.30	20229.40	0.51	0.10	20272.44
<b>LANDFILL - Proposed TOX (202.5 scfm)</b>	<b>1.77</b>	<b>0.53</b>	<b>0.30</b>	<b>0.30</b>	<b>0.04</b>	<b>0.13</b>	<b>0.2099</b>	<b>0.1578</b>	<b>2461.24</b>	<b>0.06</b>	<b>0.01</b>	<b>2466.48</b>

Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
	1.32	0.10	0.05	0.05	0.01	0.01	0.043	0.04	3157.09	0.00	0.00	3157.09
	31.56	2.37	1.10	1.10	0.21	0.17	1.02	0.94	75770.06	0.00	0.00	75770.06
<b>Landfill - Proposed Micro Turbine</b>	<b>5.76</b>	<b>0.43</b>	<b>0.20</b>	<b>0.20</b>	<b>0.04</b>	<b>0.03</b>	<b>0.1868</b>	<b>0.1717</b>	<b>13828.04</b>	<b>0.00</b>	<b>0.00</b>	<b>13828.04</b>

Description	Criteria Pollutants						HAP		GHG			
	CO	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOCs	HAP (T)	HAP (S)	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	lbs/hr lbs/day tpy	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)	(lb/hr) (lb/day) (tpy)
	2.50	0.83	0.00	0.00	0.83	2.72	0.14	0.13	11529.35	0.12	0.02	11539.46
	59.97	19.99	0.01	0.01	19.97	65.34	3.29	3.12	276704.42	2.82	0.56	276947.13
<b>LANDFILL - Flare (2,100 scfm, 63.9 MMBTU, limited to 547.5 scfm annual average flow)</b>	<b>10.95</b>	<b>3.65</b>	<b>0.00</b>	<b>0.00</b>	<b>3.64</b>	<b>11.92</b>	<b>0.6005</b>	<b>0.5697</b>	<b>50,498.56</b>	<b>0.51</b>	<b>0.10</b>	<b>50,542.85</b>

**SUMMARIES**

UCM - SUMMARY - Description	Criteria Pollutants						HAP		GHG			
	CO (tpy)	NO <sub>x</sub> (tpy)	PM <sub>10</sub> (tpy)	PM <sub>2.5</sub> (tpy)	SO <sub>2</sub> (tpy)	VOC (tpy)	HAP (T) (tpy)	HAP (S) (tpy)	CO <sub>2</sub> (tpy)	CH <sub>4</sub> (tpy)	N <sub>2</sub> O (tpy)	CO <sub>2</sub> e (tpy)
Existing Equipment	0.79	0.59	1.26	1.26	0.47	0.91	7.25	1.99	19370.54	0.00	0.00	19370.54
Proposed Equipment	46.08	3.46	1.61	1.61	0.31	0.24	1.49	1.37	110624.29	0.00	0.00	110624.29
<b>NET CHANGE UCM</b>	<b>45.29</b>	<b>2.87</b>	<b>0.35</b>	<b>0.35</b>	<b>(0.16)</b>	<b>(0.67)</b>	<b>(5.76)</b>	<b>(0.62)</b>	<b>91,253.75</b>	<b>-</b>	<b>-</b>	<b>91,253.75</b>
<b>APCD CEQA Threshold</b>	<b>100.00</b>	<b>10.00</b>	<b>15.00</b>	<b>15.00</b>	<b>27.00</b>	<b>10.00</b>						

LANDFILL - SUMMARY - Description	Criteria Pollutants						HAP		GHG			
	CO (tpy)	NO <sub>x</sub> (tpy)	PM <sub>10</sub> (tpy)	PM <sub>2.5</sub> (tpy)	SO <sub>2</sub> (tpy)	VOC (tpy)	HAP (T) (tpy)	HAP (S) (tpy)	CO <sub>2</sub> (tpy)	CH <sub>4</sub> (tpy)	N <sub>2</sub> O (tpy)	CO <sub>2</sub> e (tpy)
Existing Equipment	41.98	13.99	0.00	0.00	13.98	45.73	2.30	2.19	193693.09	1.97	0.39	193862.99
Proposed Equipment	18.48	4.61	0.50	0.50	3.72	12.09	1.00	0.90	66787.84	0.58	0.11	66837.37
<b>NET CHANGE LANDFILL</b>	<b>(23.50)</b>	<b>(9.38)</b>	<b>0.50</b>	<b>0.50</b>	<b>(10.26)</b>	<b>(33.65)</b>	<b>(1.31)</b>	<b>(1.29)</b>	<b>(126,905.25)</b>	<b>(1.40)</b>	<b>(0.28)</b>	<b>(127,025.62)</b>
<b>APCD CEQA Threshold</b>	<b>100.00</b>	<b>10.00</b>	<b>15.00</b>	<b>15.00</b>	<b>27.00</b>	<b>10.00</b>						

\*\* Maximum Incremental Cancer Risk ≥ 10 in 1 million, Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million), Chronic & Acute Hazard Index ≥ 1.0 (project increment)

Notes:  
 Boilers: Source Test Results from 2018 utilized for CO and NOx Calculations. PM10, PM2.5, SOx and VOC Permit Condition for each Boiler (Permit Conditions 12, 13 and 14 for each Boiler) utilized for calculations. For Hazardous Air Pollutants (HAPs) AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Chapter 1: External Combustion Source," Section 1.4, Nov. 1998, were utilized.  
 Existing Flare: Permit limits per permit conditions 34 through 36 utilized for CO, NOx, PM, SOx and VOC. HAPs AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-1, Nov. 1998, highlight components concentrations from Gas Sample Results Air Technologies, April 10, 2018, were utilized.  
 Proposed Microturbines: NOx, PM and CO per Capstone MicroTurbine System Emissions Guarantees confirmed via e-mail October 11, 2018. SOx, Gas Sample Results Air Technologies, April 10, 2018. HAPs AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-1, Nov. 1998, highlight components concentrations from Gas Sample Results Air Technologies, April 10, 2018, as highest concentration of LFG compound utilized. An additional ten percent safety factor added to LFG compounds concentration for conversation estimate of emissions.  
 Proposed TOX: NOx, CO and PM per manufacturer's guarantees, HAPs AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-1, Nov. 1998, highlight components concentrations from Gas Sample Results Air Technologies, April 10, 2018, as highest concentration of LFG compound utilized. An additional ten percent safety factor added to LFG compounds concentration for conversation