

APPENDIX A

Equipment List and Air Emissions Calculations (December 2016)

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Equipment Type (1)	Number of Pieces	Operating Hours per Day	Total Days of Use	Engine Type	Engine HP (2)	Load Factor (3)	Model Year (4)
Horizontal Directional Drill							
DRILL RIG NWA 750,000 LB: Trip out and swab	1	12	4.5	Mustang/Cat C-18	630	50%	2015
DRILL RIG NWA Pilot hole	1	12	20	Mustang/Cat C-19	630	75%	
DRILL RIG NWA Pullback	1	12	2	Mustang/Cat C-20	630	95%	
DRILL RIG South Work Area- trip out and swab	1	12	1.5	Vermeer	540	50%	2015
DRILL RIG South Work Area- reaming	1	12	17	Vermeer	541	75%	
CAT POWER UNIT	1	11	0	Caterpillar 9.3L	173	50%	3011
R.T. CRANE- 50 TO 75 TON	1	8	30	Cummins 15L	275	50%	2015
BACKHOE- 420/430/C580	1	6	34	John Deere 4.5L	94	50%	2013
BACKHOE- 420/430/C580	1	6	26	John Deere 4.5L	124	50%	2012
FORKLIFT- 10,000# & OVER	1	4	22	Cummins 4.5L	130	25%	2014
FORKLIFT- 10,000# & OVER	1	8	4	Cummins 4.5L	130	25%	2014
R.T. CRANE- 25 TO 50 TON	1	10	4	Cummins 15L	275	50%	2012
Mud Rig	1	11	22	Cat C13	440	50%	2015
Mud Rig	1	11	22	Cummins 8.9L	433	50%	2008
TRIPLEX PUMP	1	6	12	Cat C15	540	50%	2008
EXCAVATOR- CAT 330 SIZE	1	6	13	Caterpillar 12.5L	316	50%	2012
3 AX WATER TRUCK 6X6	1	3	28	Cummins 11.9L	370	50%	2015
12 CY DUMP TRUCK	1	3	26	Cummins 8.9L	370	50%	2015
250 KW GENERATOR	1	11	4	Cummins 6.7L	433	50%	2015
GODWIN 6" PUMP	1	4	26	John Deere 4.5L	75	75%	2015
LIGHT TOWER	8	10	10	Kubota 3.77L	13.1	75%	2015
Pipeline							
PICKUP- 3/4 TON (4WD)	2	2	45	Ford 6.2L	316	25%	2015
VAN- 8 PASSENGER	3	2	45	Ford 6.2L	400	25%	2015
3 AX LOWBED TRACTOR	1	4	45	Cummins 14.9L	550	50%	2015
3 AX MATT HAULING TRACTOR	8	6	2	Cummins 14.9L	550	50%	2013
BACKHOE- 420/430/C580	1	8	10	John Deere 4.5L	94	50%	2013
RIDE ON COMPACTOR	1	8	10	Caterpillar 9.3L	46	50%	2007
3 AX WATER TRUCK 6X6	1	4	23	Cummins 11.9L	370	50%	2012
3 AX PIPE HAUL TRACTOR	10	4	1	Cummins 14.9L	550	50%	2015
1 TON WELD TRUCK	5	4	24	Ford 6.7L	400	50%	2015
WELD MACHINE- 200 AMP	5	10	24	Kubota 3.77L	495	50%	2015
R.T. CRANE- 50 TO 75 TON	1	6	20	Cummins 15L	275	50%	2015
PIPELAYER- 572 SIZE	1	6	10	Caterpillar 15.2L	249	50%	2013
1 TON FLATBED (4WD)	1	6	32	Ford 6.7L	400	50%	2015
AIR COMPRESSOR- 175 TO 475CFM	1	6	32	John Deere 4.5L	115	50%	2014
GODWIN 6" PUMP	1	24	4	John Deere 4.5L	75	75%	2015
PUMP- HYDRO/TEST	1	8	2	John Deere 4.5L	17.3	75%	2014
AIR COMP- 1500CFM	1	6	3	Komatsu 11L	580	50%	2015
Office							
PICKUP- 3/4 TON (4WD)	2	4	66	Ford 6.2L	316	25%	2015
GATOR 6X4 WORKSITE VEHICLE	2	6	66			50%	2015
250 KW GENERATOR	1	12	45	Cummins 6.7L	433	50%	2015
FORKLIFT- 10,000# & OVER	1	4	21	Cummins 4.5L	130	50%	2012
LIGHT TOWER	2	10	10	Kubota 3.77L	13.1	50%	2015
Dutra Group							
SPUD BARGE (196' LONG X 60' WIDE X 12' TALL) WITH RB 90 WINCHES	1	0.5	35		300	50%	2008
DERRICK BARGE (150' LONG X 54' WIDE X 12.5' TALL) WITH CLYDE DUTY CYCLE CRANE	1	10	5		500	50%	2008
MANITOWOC 4100 CRANE	1	8	35		500	30%	2011
TUG BOAT	1	12	10		1700	50%	2008
WORK BOAT	1	2	35		430	50%	2000
SKIFF (gas powered)	2	2	35		30	30%	2012
CREW BOAT - North Site	1	2	50		450	50%	2008
CREW BOAT - South Site	1	1	50		450	50%	2008
SURVEY BOAT (gas powered)	1	4	2		150	50%	2010
CAT D6 LGP DOZER	1	11	10		175	75%	1990
CAT D3 DOZER	1	11	15		62	75%	1988
CAT 966G WHEEL LOADER	1	11	10		235	75%	2004
CAT 140 BLADE	1	11	20		235	75%	2004
CAT 330 EXCAVATOR	1	11	20		270	75%	2013
TEN WHEEL DUMP TRUCK	11	11	20		380	50%	2010
WATER TRUCK	1	11	20		250	30%	2010
PICKUP - 3/4 TON	1	3	20		350	30%	2012
AIR COMPRESSOR - 185 CFM	1	6	35		60	50%	2010
GENERATOR - 175 KW	1	10	35		280	30%	2010
VIBRATORY HAMMER - APE 200	1	6	5		595	50%	2000

Mallard Farms HDD - Revised
Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	1.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	64
Climate Zone	4			Operational Year	2017
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	641.35	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Emissions from horizontal directional drill activities.

Land Use - Project-specific construction list used. Acreage based on North and South work areas.

Construction Phase - Project specific equipment list used. Calculations based on total equipment operating hours (modeled over a single day for calculation simplification).

Off-road Equipment - Project specific equipment list used. Calculations based on total equipment operating hours (modeled over a single day for calculation simplification).

Grading -

Trips and VMT - Worker trips based on pieces of equipment and days of operation. Construction on-site truck activities modeled as vendor and hauling trips, assuming 40 miles of travel per day.

Energy Use -

Construction Off-road Equipment Mitigation - Project specific engine tiers used.

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
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tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	8.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	4.00	1.00
tblLandUse	LotAcreage	0.00	1.60
tblOffRoadEquipment	HorsePower	97.00	94.00
tblOffRoadEquipment	HorsePower	205.00	630.00
tblOffRoadEquipment	HorsePower	171.00	540.00
tblOffRoadEquipment	HorsePower	226.00	275.00
tblOffRoadEquipment	HorsePower	97.00	124.00
tblOffRoadEquipment	HorsePower	89.00	130.00
tblOffRoadEquipment	HorsePower	89.00	130.00

tbloffRoadEquipment	HorsePower	226.00	275.00
tbloffRoadEquipment	HorsePower	84.00	440.00
tbloffRoadEquipment	HorsePower	84.00	433.00
tbloffRoadEquipment	HorsePower	84.00	540.00
tbloffRoadEquipment	HorsePower	162.00	316.00
tbloffRoadEquipment	HorsePower	84.00	433.00
tbloffRoadEquipment	HorsePower	84.00	75.00
tbloffRoadEquipment	HorsePower	6.00	13.00
tbloffRoadEquipment	LoadFactor	0.37	0.50
tbloffRoadEquipment	LoadFactor	0.50	0.72
tbloffRoadEquipment	LoadFactor	0.42	0.73
tbloffRoadEquipment	LoadFactor	0.29	0.50
tbloffRoadEquipment	LoadFactor	0.37	0.50
tbloffRoadEquipment	LoadFactor	0.20	0.25
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tbloffRoadEquipment	LoadFactor	0.74	0.75
tbloffRoadEquipment	LoadFactor	0.82	0.75
tbloffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tbloffRoadEquipment	OffRoadEquipmentType		Other Construction Equipment
tbloffRoadEquipment	OffRoadEquipmentType		Cranes
tbloffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tbloffRoadEquipment	OffRoadEquipmentType		Forklifts

tblOffRoadEquipment	OffRoadEquipmentType		Forklifts
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	7.00	204.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	7.00	156.00
tblProjectCharacteristics	OperationalYear	2014	2017
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripLength	20.00	40.00
tblTripsAndVMT	HaulingTripNumber	0.00	54.00
tblTripsAndVMT	WorkerTripNumber	55.00	860.00

2.0 Emissions Summary

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
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	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
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	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

	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

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Horizontal Directional Drill	Grading	1/1/2017	1/2/2017	5	1	

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 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Horizontal Drectional Drill	Bore/Drill Rigs	1	318.00	630	0.72
Horizontal Drectional Drill	Other Construction Equipment	1	222.00	540	0.73
Horizontal Drectional Drill	Cranes	1	240.00	275	0.50
Horizontal Drectional Drill	Tractors/Loaders/Backhoes	1	156.00	124	0.50
Horizontal Drectional Drill	Forklifts	1	88.00	130	0.25
Horizontal Drectional Drill	Forklifts	1	32.00	130	0.25
Horizontal Drectional Drill	Cranes	1	40.00	275	0.50
Horizontal Drectional Drill	Pumps	1	242.00	440	0.50
Horizontal Drectional Drill	Pumps	1	242.00	433	0.50
Horizontal Drectional Drill	Pumps	1	72.00	540	0.50
Horizontal Drectional Drill	Rubber Tired Dozers	0	0.00	255	0.40
Horizontal Drectional Drill	Excavators	1	78.00	316	0.50
Horizontal Drectional Drill	Generator Sets	1	44.00	433	0.50
Horizontal Drectional Drill	Tractors/Loaders/Backhoes	1	204.00	94	0.50
Horizontal Drectional Drill	Pumps	1	104.00	75	0.75
Horizontal Drectional Drill	Signal Boards	8	100.00	13	0.75
Horizontal Drectional Drill	Graders	0	0.00	174	0.41

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
Horizontal Directional Drill	22	860.00	0.00	54.00	12.40	6.60	40.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Clean Paved Roads

3.2 Horizontal Directional Drill - 2017

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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1006	1.1656	0.6463	2.0300e-003		0.0436	0.0436		0.0413	0.0413	0.0000	193.9654	193.9654	0.0372	0.0000	194.7466
Total	0.1006	1.1656	0.6463	2.0300e-003	0.0000	0.0436	0.0436	0.0000	0.0413	0.0413	0.0000	193.9654	193.9654	0.0372	0.0000	194.7466

3.2 Horizontal Drectional Drill - 2017

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	8.9000e-004	0.0139	8.3800e-003	4.0000e-005	9.1000e-004	1.8000e-004	1.0900e-003	2.5000e-004	1.7000e-004	4.2000e-004	0.0000	3.5990	3.5990	3.0000e-005	0.0000	3.5996
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	1.4500e-003	2.1200e-003	0.0204	5.0000e-005	3.9000e-003	3.0000e-005	3.9300e-003	1.0400e-003	3.0000e-005	1.0700e-003	0.0000	3.4049	3.4049	1.8000e-004	0.0000	3.4087
Total	2.3400e-003	0.0160	0.0287	9.0000e-005	4.8100e-003	2.1000e-004	5.0200e-003	1.2900e-003	2.0000e-004	1.4900e-003	0.0000	7.0040	7.0040	2.1000e-004	0.0000	7.0082

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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0382	0.7011	1.0632	2.0300e-003		0.0159	0.0159		0.0159	0.0159	0.0000	193.9652	193.9652	0.0372	0.0000	194.7464
Total	0.0382	0.7011	1.0632	2.0300e-003	0.0000	0.0159	0.0159	0.0000	0.0159	0.0159	0.0000	193.9652	193.9652	0.0372	0.0000	194.7464

4.2 Trip Summary Information

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.546114	0.062902	0.174648	0.122995	0.034055	0.004856	0.015640	0.024397	0.002087	0.003279	0.006673	0.000688	0.001667

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

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						
User Defined Industrial	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
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

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	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			
User Defined Industrial	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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	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			
User Defined Industrial	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			
User Defined Industrial	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			
User Defined Industrial	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
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10.0 Vegetation

Mallard Farms HDD - Pipeline
Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	1.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	64
Climate Zone	4			Operational Year	2017
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 - Emissions from pipeline activities.

Land Use - Project-specific construction list used. Acreage based on North and South work areas.

Construction Phase - Project specific equipment list used. Calculations based on total equipment operating hours (modeled over a single day for calculation simplification).

Off-road Equipment - Project specific equipment list used. Calculations based on total equipment operating hours (modeled over a single day for calculation simplification).

Trips and VMT - Worker trips based on pieces of equipment and days of operation. Construction on-site truck activities modeled as vendor and hauling trips, assuming 40 miles of travel per day.

Grading -

Energy Use -

Construction Off-road Equipment Mitigation - Project specific engine tiers.

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	4.00	1.00
tblLandUse	LotAcreage	0.00	1.60
tblOffRoadEquipment	HorsePower	97.00	94.00
tblOffRoadEquipment	HorsePower	78.00	115.00
tblOffRoadEquipment	HorsePower	78.00	580.00
tblOffRoadEquipment	HorsePower	226.00	275.00
tblOffRoadEquipment	HorsePower	226.00	249.00
tblOffRoadEquipment	HorsePower	84.00	75.00
tblOffRoadEquipment	HorsePower	84.00	17.00
tblOffRoadEquipment	HorsePower	80.00	46.00
tblOffRoadEquipment	HorsePower	46.00	495.00
tblOffRoadEquipment	LoadFactor	0.37	0.50
tblOffRoadEquipment	LoadFactor	0.48	0.50
tblOffRoadEquipment	LoadFactor	0.48	0.50
tblOffRoadEquipment	LoadFactor	0.29	0.50

tblOffRoadEquipment	LoadFactor	0.29	0.50
tblOffRoadEquipment	LoadFactor	0.74	0.75
tblOffRoadEquipment	LoadFactor	0.74	0.75
tblOffRoadEquipment	LoadFactor	0.38	0.50
tblOffRoadEquipment	LoadFactor	0.45	0.50
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	7.00	80.00
tblProjectCharacteristics	OperationalYear	2014	2017
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripLength	20.00	40.00
tblTripsAndVMT	HaulingTripNumber	0.00	246.00
tblTripsAndVMT	VendorTripLength	6.60	40.00
tblTripsAndVMT	VendorTripNumber	0.00	225.00
tblTripsAndVMT	VendorVehicleClass	HDT_Mix	MHDT
tblTripsAndVMT	WorkerTripNumber	33.00	528.00

2.0 Emissions Summary

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
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	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
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	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

	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

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Pipeline	Grading	1/1/2017	1/2/2017	5	1	

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 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Pipeline	Air Compressors	1	192.00	115	0.50
Pipeline	Air Compressors	1	18.00	580	0.50
Pipeline	Cranes	1	120.00	275	0.50
Pipeline	Cranes	1	60.00	249	0.50
Pipeline	Graders	0	0.00	174	0.41
Pipeline	Pumps	1	96.00	75	0.75
Pipeline	Pumps	1	16.00	17	0.75
Pipeline	Rollers	1	80.00	46	0.50
Pipeline	Rubber Tired Dozers	0	0.00	255	0.40
Pipeline	Tractors/Loaders/Backhoes	1	80.00	94	0.50
Pipeline	Welders	5	240.00	495	0.50

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
Pipeline	13	528.00	225.00	246.00	12.40	40.00	40.00	LD_Mix	MHDT	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

3.2 Pipeline - 2017**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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1250	1.1642	0.5448	1.9400e-003		0.0441	0.0441		0.0434	0.0434	0.0000	196.0764	196.0764	0.0134	0.0000	196.3572
Total	0.1250	1.1642	0.5448	1.9400e-003	0.0000	0.0441	0.0441	0.0000	0.0434	0.0434	0.0000	196.0764	196.0764	0.0134	0.0000	196.3572

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	4.0300e-003	0.0634	0.0382	1.8000e-004	4.1400e-003	8.4000e-004	4.9800e-003	1.1400e-003	7.7000e-004	1.9100e-003	0.0000	16.3956	16.3956	1.1000e-004	0.0000	16.3980
Vendor	2.4000e-003	0.0327	0.0172	1.1000e-004	4.1200e-003	7.7000e-004	4.8900e-003	1.2300e-003	7.0000e-004	1.9300e-003	0.0000	9.6581	9.6581	7.0000e-005	0.0000	9.6595
Worker	8.9000e-004	1.3000e-003	0.0125	3.0000e-005	2.3900e-003	2.0000e-005	2.4100e-003	6.4000e-004	2.0000e-005	6.5000e-004	0.0000	2.0905	2.0905	1.1000e-004	0.0000	2.0928
Total	7.3200e-003	0.0974	0.0679	3.2000e-004	0.0107	1.6300e-003	0.0123	3.0100e-003	1.4900e-003	4.4900e-003	0.0000	28.1441	28.1441	2.9000e-004	0.0000	28.1502

3.2 Pipeline - 2017

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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0249	0.1835	0.8946	1.9400e-003		3.3100e-003	3.3100e-003		3.3100e-003	3.3100e-003	0.0000	196.0762	196.0762	0.0134	0.0000	196.3569
Total	0.0249	0.1835	0.8946	1.9400e-003	0.0000	3.3100e-003	3.3100e-003	0.0000	3.3100e-003	3.3100e-003	0.0000	196.0762	196.0762	0.0134	0.0000	196.3569

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	4.0300e-003	0.0634	0.0382	1.8000e-004	4.1400e-003	8.4000e-004	4.9800e-003	1.1400e-003	7.7000e-004	1.9100e-003	0.0000	16.3956	16.3956	1.1000e-004	0.0000	16.3980
Vendor	2.4000e-003	0.0327	0.0172	1.1000e-004	4.1200e-003	7.7000e-004	4.8900e-003	1.2300e-003	7.0000e-004	1.9300e-003	0.0000	9.6581	9.6581	7.0000e-005	0.0000	9.6595
Worker	8.9000e-004	1.3000e-003	0.0125	3.0000e-005	2.3900e-003	2.0000e-005	2.4100e-003	6.4000e-004	2.0000e-005	6.5000e-004	0.0000	2.0905	2.0905	1.1000e-004	0.0000	2.0928
Total	7.3200e-003	0.0974	0.0679	3.2000e-004	0.0107	1.6300e-003	0.0123	3.0100e-003	1.4900e-003	4.4900e-003	0.0000	28.1441	28.1441	2.9000e-004	0.0000	28.1502

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

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.546114	0.062902	0.174648	0.122995	0.034055	0.004856	0.015640	0.024397	0.002087	0.003279	0.006673	0.000688	0.001667

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

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						
User Defined Industrial	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
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

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	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			
User Defined Industrial	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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	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	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005	
Total	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005	

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	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	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005	
Total	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005	

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/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	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			
User Defined Industrial	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			
User Defined Industrial	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			
User Defined Industrial	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
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10.0 Vegetation

Mallard Farms HDD - Office
Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	1.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	64
Climate Zone	4			Operational Year	2017
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 - Emissions from construction office activities.

Land Use - Project-specific construction list used. Acreage based on North and South work areas.

Construction Phase - Project specific equipment list used. Calculations based on total equipment operating hours (modeled over a single day for calculation simplification).

Off-road Equipment - Project specific equipment list used. Calculations based on total equipment operating hours (modeled over a single day for calculation simplification).

Trips and VMT - Worker trips based on pieces of equipment and days of operation. Additional on-site light duty automobile activity modeled as worker trips. Construction on-site truck activities modeled as vendor and hauling trips, assuming 40 miles of travel per day.

Grading -

Energy Use -

Construction Off-road Equipment Mitigation - Project specific engine tiers used.

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	4.00	1.00
tblLandUse	LotAcreage	0.00	1.60
tblOffRoadEquipment	HorsePower	89.00	130.00
tblOffRoadEquipment	HorsePower	84.00	433.00
tblOffRoadEquipment	HorsePower	6.00	13.00
tblOffRoadEquipment	LoadFactor	0.20	0.50
tblOffRoadEquipment	LoadFactor	0.74	0.50
tblOffRoadEquipment	LoadFactor	0.82	0.50
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	2.00
tblOffRoadEquipment	PhaseName		Office
tblOffRoadEquipment	PhaseName		Office
tblOffRoadEquipment	PhaseName		Office
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblProjectCharacteristics	OperationalYear	2014	2017

tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	VendorTripLength	6.60	40.00
tblTripsAndVMT	VendorTripNumber	0.00	132.00
tblTripsAndVMT	VendorVehicleClass	HDT_Mix	MHDT
tblTripsAndVMT	WorkerTripNumber	10.00	479.00

2.0 Emissions Summary

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
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	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
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	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

	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

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Office	Grading	1/1/2017	1/2/2017	5	1	

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 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Office	Forklifts	1	84.00	130	0.50
Office	Generator Sets	1	540.00	433	0.50
Office	Graders	0	0.00	174	0.41
Office	Rubber Tired Dozers	0	0.00	255	0.40
Office	Signal Boards	2	100.00	13	0.50
Office	Tractors/Loaders/Backhoes	0	0.00	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
Office	4	479.00	132.00	0.00	12.40	40.00	20.00	LD_Mix	MHDT	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

3.2 Office - 2017

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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0329	0.3706	0.1608	6.9000e-004		0.0118	0.0118		0.0117	0.0117	0.0000	69.8995	69.8995	3.2500e-003	0.0000	69.9678
Total	0.0329	0.3706	0.1608	6.9000e-004	0.0000	0.0118	0.0118	0.0000	0.0117	0.0117	0.0000	69.8995	69.8995	3.2500e-003	0.0000	69.9678

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	1.4100e-003	0.0192	0.0101	6.0000e-005	2.4200e-003	4.5000e-004	2.8700e-003	7.2000e-004	4.1000e-004	1.1300e-003	0.0000	5.6661	5.6661	4.0000e-005	0.0000	5.6669
Worker	8.1000e-004	1.1800e-003	0.0113	3.0000e-005	2.1700e-003	2.0000e-005	2.1900e-003	5.8000e-004	2.0000e-005	5.9000e-004	0.0000	1.8965	1.8965	1.0000e-004	0.0000	1.8986
Total	2.2200e-003	0.0203	0.0214	9.0000e-005	4.5900e-003	4.7000e-004	5.0600e-003	1.3000e-003	4.3000e-004	1.7200e-003	0.0000	7.5626	7.5626	1.4000e-004	0.0000	7.5654

3.2 Office - 2017

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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0107	0.1792	0.3573	6.9000e-004		1.0800e-003	1.0800e-003		1.0800e-003	1.0800e-003	0.0000	69.8995	69.8995	3.2500e-003	0.0000	69.9677
Total	0.0107	0.1792	0.3573	6.9000e-004	0.0000	1.0800e-003	1.0800e-003	0.0000	1.0800e-003	1.0800e-003	0.0000	69.8995	69.8995	3.2500e-003	0.0000	69.9677

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	1.4100e-003	0.0192	0.0101	6.0000e-005	2.4200e-003	4.5000e-004	2.8700e-003	7.2000e-004	4.1000e-004	1.1300e-003	0.0000	5.6661	5.6661	4.0000e-005	0.0000	5.6669
Worker	8.1000e-004	1.1800e-003	0.0113	3.0000e-005	2.1700e-003	2.0000e-005	2.1900e-003	5.8000e-004	2.0000e-005	5.9000e-004	0.0000	1.8965	1.8965	1.0000e-004	0.0000	1.8986
Total	2.2200e-003	0.0203	0.0214	9.0000e-005	4.5900e-003	4.7000e-004	5.0600e-003	1.3000e-003	4.3000e-004	1.7200e-003	0.0000	7.5626	7.5626	1.4000e-004	0.0000	7.5654

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

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.546114	0.062902	0.174648	0.122995	0.034055	0.004856	0.015640	0.024397	0.002087	0.003279	0.006673	0.000688	0.001667

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

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						
User Defined Industrial	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
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

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	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			
User Defined Industrial	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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	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			
User Defined Industrial	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			
User Defined Industrial	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			
User Defined Industrial	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
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10.0 Vegetation

Mallard Farms HDD - Revised
Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	1.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	64
Climate Zone	4			Operational Year	2017
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 - Emissions from Dutra Group activities.

Land Use - Project-specific construction list used. Acreage based on North and South work areas.

Construction Phase - Project specific equipment list used. Calculations based on total equipment operating hours (modeled over a single day for calculation simplification).

Off-road Equipment - Project specific equipment list used. Calculations based on total equipment operating hours (modeled over a single day for calculation simplification).

Trips and VMT - Worker trips based on pieces of equipment and days of operation. Construction on-site truck activities modeled as vendor and hauling trips, assuming 40 miles of travel per day.

Grading -

Energy Use -

Construction Off-road Equipment Mitigation - Project specific engine tiers used.

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 1
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstructionPhase	NumDays	4.00	1.00
tblLandUse	LotAcreage	0.00	1.60
tblOffRoadEquipment	HorsePower	174.00	235.00
tblOffRoadEquipment	HorsePower	255.00	175.00
tblOffRoadEquipment	HorsePower	97.00	235.00
tblOffRoadEquipment	HorsePower	78.00	60.00
tblOffRoadEquipment	HorsePower	226.00	500.00
tblOffRoadEquipment	HorsePower	162.00	270.00
tblOffRoadEquipment	HorsePower	84.00	280.00
tblOffRoadEquipment	HorsePower	84.00	595.00
tblOffRoadEquipment	HorsePower	199.00	62.00
tblOffRoadEquipment	LoadFactor	0.41	0.75
tblOffRoadEquipment	LoadFactor	0.40	0.75
tblOffRoadEquipment	LoadFactor	0.37	0.75
tblOffRoadEquipment	LoadFactor	0.48	0.50
tblOffRoadEquipment	LoadFactor	0.29	0.30
tblOffRoadEquipment	LoadFactor	0.38	0.75

tblOffRoadEquipment	LoadFactor	0.74	0.30
tblOffRoadEquipment	LoadFactor	0.74	0.50
tblOffRoadEquipment	LoadFactor	0.36	0.75
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Dutra Group
tblOffRoadEquipment	PhaseName		Dutra Group
tblOffRoadEquipment	PhaseName		Dutra Group
tblOffRoadEquipment	PhaseName		Dutra Group
tblOffRoadEquipment	PhaseName		Dutra Group
tblOffRoadEquipment	PhaseName		Dutra Group
tblOffRoadEquipment	UsageHours	6.00	220.00
tblOffRoadEquipment	UsageHours	6.00	110.00
tblOffRoadEquipment	UsageHours	7.00	110.00
tblProjectCharacteristics	OperationalYear	2014	2017
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripLength	20.00	40.00
tblTripsAndVMT	HaulingTripNumber	0.00	480.00
tblTripsAndVMT	VendorTripLength	6.60	40.00
tblTripsAndVMT	VendorTripNumber	0.00	40.00
tblTripsAndVMT	VendorVehicleClass	HDT_Mix	MHDT
tblTripsAndVMT	WorkerTripNumber	23.00	463.00

2.0 Emissions Summary

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
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	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
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	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

	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

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Dutra Group	Grading	1/1/2017	1/2/2017	5	1	

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 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Dutra Group	Air Compressors	1	210.00	60	0.50
Dutra Group	Cranes	1	280.00	500	0.30
Dutra Group	Excavators	1	220.00	270	0.75
Dutra Group	Generator Sets	1	350.00	280	0.30
Dutra Group	Generator Sets	1	30.00	595	0.50
Dutra Group	Graders	1	220.00	235	0.75
Dutra Group	Rubber Tired Dozers	1	110.00	175	0.75
Dutra Group	Rubber Tired Loaders	1	165.00	62	0.75
Dutra Group	Tractors/Loaders/Backhoes	1	110.00	235	0.75

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
Dutra Group	9	463.00	40.00	480.00	12.40	40.00	40.00	LD_Mix	MHDT	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Clean Paved Roads

3.2 Dutra Group - 2017**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					0.0256	0.0000	0.0256	0.0127	0.0000	0.0127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0869	1.0263	0.4847	1.1500e-003		0.0428	0.0428		0.0398	0.0398	0.0000	108.5791	108.5791	0.0266	0.0000	109.1386
Total	0.0869	1.0263	0.4847	1.1500e-003	0.0256	0.0428	0.0684	0.0127	0.0398	0.0526	0.0000	108.5791	108.5791	0.0266	0.0000	109.1386

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	7.8700e-003	0.1237	0.0745	3.6000e-004	8.0800e-003	1.6400e-003	9.7200e-003	2.2200e-003	1.5100e-003	3.7300e-003	0.0000	31.9913	31.9913	2.2000e-004	0.0000	31.9960
Vendor	4.3000e-004	5.8100e-003	3.0600e-003	2.0000e-005	7.3000e-004	1.4000e-004	8.7000e-004	2.2000e-004	1.3000e-004	3.4000e-004	0.0000	1.7170	1.7170	1.0000e-005	0.0000	1.7172
Worker	7.8000e-004	1.1400e-003	0.0110	2.0000e-005	2.1000e-003	2.0000e-005	2.1200e-003	5.6000e-004	2.0000e-005	5.7000e-004	0.0000	1.8331	1.8331	1.0000e-004	0.0000	1.8351
Total	9.0800e-003	0.1306	0.0885	4.0000e-004	0.0109	1.8000e-003	0.0127	3.0000e-003	1.6600e-003	4.6400e-003	0.0000	35.5415	35.5415	3.3000e-004	0.0000	35.5484

3.2 Dutra Group - 2017

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					0.0256	0.0000	0.0256	0.0127	0.0000	0.0127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0428	0.6738	0.6107	1.1500e-003		0.0220	0.0220		0.0216	0.0216	0.0000	108.5790	108.5790	0.0266	0.0000	109.1385
Total	0.0428	0.6738	0.6107	1.1500e-003	0.0256	0.0220	0.0475	0.0127	0.0216	0.0343	0.0000	108.5790	108.5790	0.0266	0.0000	109.1385

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	7.8700e-003	0.1237	0.0745	3.6000e-004	8.0800e-003	1.6400e-003	9.7200e-003	2.2200e-003	1.5100e-003	3.7300e-003	0.0000	31.9913	31.9913	2.2000e-004	0.0000	31.9960
Vendor	4.3000e-004	5.8100e-003	3.0600e-003	2.0000e-005	7.3000e-004	1.4000e-004	8.7000e-004	2.2000e-004	1.3000e-004	3.4000e-004	0.0000	1.7170	1.7170	1.0000e-005	0.0000	1.7172
Worker	7.8000e-004	1.1400e-003	0.0110	2.0000e-005	2.1000e-003	2.0000e-005	2.1200e-003	5.6000e-004	2.0000e-005	5.7000e-004	0.0000	1.8331	1.8331	1.0000e-004	0.0000	1.8351
Total	9.0800e-003	0.1306	0.0885	4.0000e-004	0.0109	1.8000e-003	0.0127	3.0000e-003	1.6600e-003	4.6400e-003	0.0000	35.5415	35.5415	3.3000e-004	0.0000	35.5484

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

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.546114	0.062902	0.174648	0.122995	0.034055	0.004856	0.015640	0.024397	0.002087	0.003279	0.006673	0.000688	0.001667

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

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					
User Defined Industrial	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			
User Defined Industrial	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			
User Defined Industrial	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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	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			
User Defined Industrial	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			
User Defined Industrial	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			
User Defined Industrial	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
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10.0 Vegetation

COMMERCIAL HARBOR CRAFT EMISSION INVENTORY

$E = EF0 \times F \times (1 + D \times A/UL) \times HP \times LF \times HR$

MAIN ENGINE EMISSIONS (tons)

Equipment Type (1)	Number of Pieces	Operating Hours per Day	Total Days of Use	Engine Type	Engine HP (2)	Load Factor (3)	Model Year (4)	Engine Tier (5)	Type	ROG	CO	NOx	PM	CO2 (metric tons)	CO2e (metric tons)
Dutra Group															
TUG BOAT	1	12	10		1700	0.5	2008	2	TUG	0.09	0.46	0.64	0.02	57.97	58.49
WORK BOAT	1	2	35		430	0.5	2000	0	WORK	0.02	0.04	0.14	0.01	8.55	8.63

FUEL CORRECTION FACTOR

Calendar Years	Horsepower Range	Model Years	ROG	CO	NOx	PM
1994-2006	<25 25-50 51-100 101-175 176+	Pre-1995 Pre-1999 Pre-1998 Pre-1997 Pre-1996	1.0	1.0	0.930	0.750
	<25 25-50 51-100 101-175 176+	1995+ 1999-2010 1998-2010 1997-2010 1996-2010	1.0	1.0	0.948	0.822
2007+	<25 25-50 51-100 101-175 176+	Pre-1995 Pre-1999 Pre-1998 Pre-1997 Pre-1996	1.0	1.0	0.930	0.720
	<25 25-50 51-100 101-175 176+	1995+ 1999-2010 1998-2010 1997-2010 1996-2010	1.0	1.0	0.948	0.800
	All	2011+	1.0	1.0	0.948	0.852

From OFFROAD Harborcraft Emissions Inventory Appendix B

DETERIORATION FACTOR

HP Range	HC	CO	NOx	PM
25-50	0.51	0.41	0.06	0.31
51-250	0.28	0.16	0.14	0.44
>251	0.44	0.25	0.21	0.67

From OFFROAD Harborcraft Emissions Inventory Appendix B

USEFUL LIFE

Vessel_Type	number of main	number auxilia	in Engine	Liary Engine	Annual Hours	Annual Ho	Main Engine Useful Life (years)	Auxiliary Engine Useful Life (years)
Tow Boats	2.1	1.17	0.68	0.43	1,993.00	2,964.62	26	25
Tug Boats	1.92	1.59	0.5	0.31	2,274.06	2,486.21	21	22.5
Ferries	2.01	1.23	0.42	0.43	1,842.64	1,254.17	20	20
Others	1.11	0.46	0.52	0.43	778.71	805.39	23	22
Work Boats	1.46	0.32	0.45	0.43	674.99	750.00	17	23
Pilot Vessels	1.7	0.14	0.51	0.43	1,030.71	994.00	19	25
Crew and Supply	2.5	1.1	0.45	0.43	787.52	3,035.80	22	22
Charter Fishing	1.77	0.75	0.52	0.43	1,622.28	2,077.00	16	15
Commercial Fishing	1.12	0.46	0.27	0.43	1,249.86	1,633.45	21	15

CO2 Emission Factor (g/hp-hr): 568.3

(From Barge and Dredge Inventory)

ZERO HOUR EMISSION FACTOR (g/hp-hr)

HP Range	Model Year	ME ROG	ME CO	ME NOx	ME PM	AE ROG	AE CO	AE NOx	AE PM	Fuel
- Implies 251-500 hp	2000	0.68	1.971	7.31	0.361	0.8092	2.781	7.31	0.3192	184.1585022
- Implies 751-1900 hp	2008	0.68	3.73	5.529	0.2	0.8092	3.73	5.529	0.2	184.1585022

CO2 to CO2e Conversion Factor

	CO2 g/gallon	CH4 g/gallon	N2O g/gallon	CO2e g/gallon	CO2e/CO2
Diesel Fuel	10210	0.58	0.26	10302	101%
GWP	1	25	298		

Sources:

The Climate Registry. 2013. 2013 Climate Registry Default Emission Factors. January 2, 2013.

The Climate Registry. 2014. General Reporting Protocol 2.0: Updates and Clarifications. June 30, 2014.

BARGE AND DREDGE EMISSIONS INVENTORY

$E = EF0 \times F \times (1 + D \times A/UL) \times HP \times LF \times HR$

MAIN ENGINE EMISSIONS (tons)

Equipment Type (1)	Number of Pieces	Operating Hours per Day	Total Days of Use	Engine Type	Engine HP (2)	Load Factor (3)	Model Year (4)	Engine Tier (5)	Type	ROG	CO	NOx	PM	CO2 (metric tons)	CO2e (metric tons)
Dutra Group															
SPUD BARGE (196' LONG)	1	0.5	35		300	0.5	2008		3 BARGE	0.000	0.003	0.012	0.000	1.492	1.505
DERRICK BARGE (150' LO)	1	10	5		500	0.5	2008		2 BARGE	0.002	0.014	0.058	0.002	7.104	7.168

FUEL CORRECTION FACTOR

Calendar Years	Horsepower Range	Model Years	ROG	CO	NOx	PM
1994-2006	<25	Pre-1995	1.0	1.0	0.930	0.750
	25-50	Pre-1999				
	51-100	Pre-1998				
	101-175	Pre-1997				
176+	Pre-1996					
2007+	<25	1995+	1.0	1.0	0.948	0.822
	25-50	1999-2010				
	51-100	1998-2010				
	101-175	1997-2010				
176+	1996-2010					
2007+	<25	Pre-1995	1.0	1.0	0.930	0.720
	25-50	Pre-1999				
	51-100	Pre-1998				
	101-175	Pre-1997				
176+	Pre-1996					
2007+	<25	1995+	1.0	1.0	0.948	0.800
	25-50	1999-2010				
	51-100	1998-2010				
	101-175	1997-2010				
176+	1996-2010					
All	2011+		1.0	1.0	0.948	0.852

From OFFROAD Harborcraft Emissions Inventory Appendix B

DETERIORATION FACTOR

HP Group	HP Range	ROG	CO	NOX	PM
1	10-15	0.51	0.41	0.06	0.31
2	15-25	0.51	0.41	0.06	0.31
3	25-50	0.51	0.41	0.06	0.31
4	51-120	0.28	0.16	0.14	0.44
5	121-175	0.28	0.16	0.14	0.44
6	176-250	0.28	0.16	0.14	0.44
7	251-500	0.44	0.25	0.21	0.67
8	501-750	0.44	0.25	0.21	0.67
9	>751	0.44	0.25	0.21	0.67
10	>751	0.44	0.25	0.21	0.67

USEFUL LIFE

Vessel Type	Yes	ME Load	AE Load	ME Useful Life	AE Useful Life
Compressor	Compressor		0.54		19.5
Crane	Crane		0.42		9
Deck_door_engine	Deck_door_engine		0.89		16
Dredger	Dredger		0.51		16
Generator	Generator		0.75		22.5
Hoist_swing_winch	Hoist_swing_winch		0.31		27
Other	Other		0.80		16
Pump	Pump		0.71		21
propulsion	propulsion	0.45		17	

CO2 Emission Factor (g/h) 568.3

ZERO HOUR EMISSION FACTOR (g/hp-hr)

HP Range	Model Year	ME ROG	ME CO	ME NOx	ME PM	AE ROG	AE CO	AE NOx	AE PM	Fuel	CO2
250<HP<=500	2008	0.12	0.92	4.00	0.11	0.12	0.92	4.00	0.11	185.97	568.30

CO2 to CO2e Conversion Factor

	CO2 g/gallon	CH4 g/gallon	N2O g/gallon	CO2e g/gallon	CO2e/CO2
Diesel Fuel	10210	0.58	0.26	10302	101%
GWP	1	25	298		

Sources:
 The Climate Registry. 2013. 2013 Climate Registry Default Emission Factors. January 2, 2013.
 The Climate Registry. 2014. General Reporting Protocol 2.0: Updates and Clarifications. June 30, 2014.

CREW AND SUPPLY EMISSION INVENTORY

$E = EF_0 \times F \times (1 + D \times A/U) \times HP \times LF \times HR$

MAIN ENGINE EMISSIONS (tons)

Equipment Type (1)	Number of Pieces	Operating Hours per Day	Total Days of Use	Engine Type	Engine HP (2)	Load Factor (3)	Model Year (4)	Engine Tier (5)	Type	ROG	CO	NOx	PM	CO2 (metric tons)	CO2e (metric tons)
Duties Group															
SKIFF	2	2	35		30	0.3	2012		0 SKIFF	0.00	0.01	0.01	0.00	0.72	0.72
CREW BOAT	1	2	50		450	0.5	2008		2 CREW	0.02	0.10	0.13	0.00	12.79	12.90
CREW BOAT	1	1	50		450	0.5	2008		2 CREW	0.01	0.05	0.07	0.00	6.39	6.45
SURVEY BOAT	1	4	2		150	0.5	2010		0 SURVEY	0.00	0.00	0.00	0.00	0.34	0.34

FUEL CORRECTION FACTOR

Calendar Years	Horsepower Range	Model Years	ROG	CO	NOx	PM
1994-2006	<25	Pre-1995	1.0	1.0	0.930	0.750
	25-50	Pre-1999				
	51-100	Pre-1998				
	101-175	Pre-1997				
	176+	Pre-1996				
	<25	1995+	1.0	1.0	0.948	0.822
	25-50	1999-2010				
	51-100	1998-2010				
	101-175	1997-2010				
	176+	1996-2010				
2007+	<25	Pre-1995	1.0	1.0	0.930	0.720
	25-50	Pre-1999				
	51-100	Pre-1998				
	101-175	Pre-1997				
	176+	Pre-1996				
	<25	1995+	1.0	1.0	0.948	0.800
	25-50	1999-2010				
	51-100	1998-2010				
	101-175	1997-2010				
	176+	1996-2010				
	All	2011+	1.0	1.0	0.948	0.852

From OFFROAD Harborcraft Emissions Inventory Appendix B

DETERIORATION FACTOR

HP Group	HP Range	ROG	CO	NOX	PM
1	25-50	0.51	0.41	0.06	0.31
2	51-120	0.28	0.16	0.14	0.44
3	121-175	0.28	0.16	0.14	0.44
4	176-250	0.28	0.16	0.14	0.44
5	251-500	0.44	0.25	0.21	0.67
6	501-750	0.44	0.25	0.21	0.67
7	>751	0.44	0.25	0.21	0.67
8	>751	0.44	0.25	0.21	0.67
9	>751	0.44	0.25	0.21	0.67

USEFUL LIFE

Vessel Type	Ves	ME Load	E Useful Li	AE Load	AE Useful Life
Commercial Fishing	COF	0.27	21	0.43	15
Charter Fishing	CHF	0.52	16	0.43	15
Ferries	FRY	0.42	20	0.43	20
Crew and Supply	CNS	0.38	28	0.32	28
Pilot Vessels	POV	0.51	19	0.43	25
Tug Boats	TUG	0.50	21	0.31	22.5
Tow Boats	TOW	0.68	26	0.43	25
Work Boats	WBT	0.45	17	0.43	23
Others	OTS	0.52	23	0.43	22

CO2 Emission Factor (g/hp) 568.3

(From Barge and Dredge Inventory)

ZERO HOUR EMISSION FACTOR (g/hp-hr)

HP Range	Model Year	ME ROG	ME CO	ME NOx	ME PM	AE ROG	AE CO	AE NOx	AE PM	Fuel
- Implies 25-50 hp	2012	2.18	3.73	5.32	0.22	2.59	3.73	5.32	0.22	184.16
- Implies 121-175 hp	2010	0.82	3.73	5.10	0.22	0.98	3.73	5.10	0.22	184.16
- Implies 251-500 hp	2008	0.82	3.73	5.10	0.15	0.98	3.73	5.10	0.15	184.16

CO2 to CO2e Conversion Factor

	CO2 g/gallon	CH4 g/gallon	N2O g/gallon	CO2e g/gallon	CO2e/CO2
Diesel Fuel	10210	0.58	0.26	10302	101%
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