APPENDICES

APPENDIX AIR AND GHG ANALYSIS

TABLE AIR AND GHG--1
AIR QUALITY MONITORING DATA

Pollutant Standard	2016	2017	2018
Ozone (O_3) Concord Monitoring Station			
Maximum 1-hour concentration (ppm)	0.095	0.082	0.077
Days above 1-hour state standard (0.09 ppm)	1	0	0
Maximum 8-hour concentration (ppm)	0.074	0.070	0.061
Days above 8-hour state standard (0.070 ppm)	2	0	0
Days above 8-hour federal standard (0.070 ppm)	2	0	0
Respirable Particulate Matter (PM_{10}) Concord Monitoring Station			
Maximum 24-hour concentration (µg/m^3)	19.0	41.0	105.0
Estimated Days above state standard (50 µg/m^3)	0.0	*	11.5
Estimated Days above federal standard (150 µg/m^3)	0.0	*	0.0
Fine Particulate Matter (PM2.5) Concord Monitoring Station			
Maximum 24-hour concentration (µg/m^3)	20.7	89.4	180.0
Estimated Days above federal standard (35 µg/m^3)	0.0	6.0	14.2
Nitrogen Dioxide (NO_2) Concord Monitoring Station			
Maximum 1-hour concentration (ppm)	33.6	40.6	38.3
Days above state 1-hour standard (180 ppb)	0	0	0

Source: CARB 2019.
*ppb = parts per billion; ppm = parts per million; µg/m3 = micrograms per cubic meter; * = insufficient data.*

TABLE AIR and GHG--2
BAAQMD SIGNIFICANCE THRESHOLDS

Pollutant	Construction	Operation	
	Average Daily Emissions (pounds per day)	Average Daily Emissions (pounds per day)	Maximum Annual Emissions (tons per year)
Reactive Organic Gases (ROG)	54	54	10
Nitrogen Oxides (NO_X)	54	54	10
Coarse Particulate Matter Exhaust (PM_{10})	82	82	15
Fine Particulate Matter Exhaust (PM2.5)	54	54	10
PM_{10} and $PM_{2.5}$ Fugitive Dust	BCMMs[1]	None	None
Local Carbon Monoxide (CO)	None	9.0 ppm (8-hour), 20 ppm (1-hour)	
Sulfur Oxides (SO_X)	None	None	None

Source: BAAQMD 2017b.
ppm = parts per million; BCMMs = Basic Construction Mitigation Measures
[1] For construction fugitive dust, rather than a numeric threshold, BAAQMD recommends that lead agencies consider that projects which implement the BCMMs to have a less than significant impact related to fugitive dust.

MIB-02 88 Sunnyside Lane

Contra Costa County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	3.00	Dwelling Unit	1.17	5,400.00	9
Other Asphalt Surfaces	11.50	1000sqft	0.26	11,500.00	0
Other Non-Asphalt Surfaces	11.50	1000sqft	0.26	11,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	5			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Residential development envelope = 1.17 acres.
Other asphalt surfaces = Sunnyside Lane widening and access driveways
Other non-asphalt surfaces = utilities, slope stabilization, and turnaround areas.

Construction Phase - Phasing per project applicant.
Trenching added for installation of underground utilities.
Phase 2 and Phase 3 grading includes piers for slope stablization walls and foundation support.

Off-road Equipment - Trenchers for undeeground utilities.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Bore/Drill Rigs for instalion of slope retention and foundation support piers.

Off-road Equipment - Wood-frame construction, no welders.
Limited use of cranes required.
Grid power to be used as soon a practical (limited generator use).

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Bore/Drill Rigs for instalion of slope retention and foundation support piers.

Off-road Equipment - Wood-frame construction, no welders.
Limited use of cranes required.
Grid power to be used as soon a practical (limited generator use).

Off-road Equipment -

Off-road Equipment -

Grading -

Trips and VMT - Max building crew size = 10, paint crew size = 4.

Vehicle Trips - Trip rate per ISMND Traffic Section (29 total project average daily trips).

Construction Off-road Equipment Mitigation - Dust mitigation per BAAQMD BCMMs (MM 4.3-1).
Tier-3 per MM 4.3-1.

Area Mitigation - No wordburning devices in new construction per BAAQMD Reg 6 Rule 3.

Energy Mitigation - On-site solar required per 2019 Title 24.

MIB-02 88 Sunnyside Lane - Contra Costa County, Summer

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	6
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	13
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	12.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3

MIB-02 88 Sunnyside Lane - Contra Costa County, Summer

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	2.00	10.00
tblConstructionPhase	NumDays	4.00	20.00
tblConstructionPhase	NumDays	10.00	44.00
tblConstructionPhase	NumDays	2.00	30.00
tblConstructionPhase	NumDays	4.00	30.00
tblConstructionPhase	NumDays	2.00	10.00
tblConstructionPhase	NumDays	4.00	30.00
tblConstructionPhase	PhaseEndDate	6/9/2021	12/16/2021
tblConstructionPhase	PhaseEndDate	5/12/2021	12/2/2021
tblConstructionPhase	PhaseEndDate	8/5/2020	9/8/2020
tblConstructionPhase	PhaseEndDate	5/26/2021	12/4/2020
tblConstructionPhase	PhaseEndDate	7/30/2020	8/11/2020
tblConstructionPhase	PhaseStartDate	5/27/2021	12/3/2021
tblConstructionPhase	PhaseStartDate	8/6/2020	2/26/2021
tblConstructionPhase	PhaseStartDate	7/31/2020	8/12/2020
tblConstructionPhase	PhaseStartDate	5/13/2021	10/6/2020
tblConstructionPhase	PhaseStartDate	7/29/2020	7/1/2020
tblLandUse	LotAcreage	0.97	1.17
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	UsageHours	8.00	1.00
tblOffRoadEquipment	UsageHours	6.00	1.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	1.00
tblOffRoadEquipment	UsageHours	8.00	1.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblTripsAndVMT	WorkerTripNumber	11.00	20.00
tblTripsAndVMT	WorkerTripNumber	2.00	8.00
tblTripsAndVMT	WorkerTripNumber	2.00	8.00
tblTripsAndVMT	WorkerTripNumber	11.00	20.00
tblVehicleTrips	ST_TR	9.91	9.66
tblVehicleTrips	SU_TR	8.62	9.66
tblVehicleTrips	WD_TR	9.52	9.66

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	1.8759	18.3638	15.8739	0.0236	5.8653	1.1054	6.6867	2.9711	1.0178	3.7268	0.0000	2,275.923 5	2,275.923 5	0.6753	0.0000	2,292.805 3
2021	8.8078	17.4358	9.1908	0.0205	5.8653	0.7658	6.6311	2.9711	0.7045	3.6757	0.0000	1,990.5118	1,990.5118	0.6195	0.0000	2,005.999 8
2022	8.7915	14.6416	9.1136	0.0205	5.8653	0.6229	6.4882	2.9711	0.5731	3.5442	0.0000	1,988.948 7	1,988.948 7	0.6198	0.0000	2,004.443 6
Maximum	**8.8078**	**18.3638**	**15.8739**	**0.0236**	**5.8653**	**1.1054**	**6.6867**	**2.9711**	**1.0178**	**3.7268**	**0.0000**	**2,275.923 5**	**2,275.923 5**	**0.6753**	**0.0000**	**2,292.805 3**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	0.6143	11.3185	16.6977	0.0236	2.6721	0.7121	3.0472	1.3458	0.7121	1.7209	0.0000	2,275.923 5	2,275.923 5	0.6753	0.0000	2,292.805 3
2021	8.6483	9.6483	11.3965	0.0205	2.6721	0.4145	3.0472	1.3458	0.4145	1.7209	0.0000	1,990.5118	1,990.5118	0.6195	0.0000	2,005.999 8
2022	8.6464	9.6463	11.3762	0.0205	2.6721	0.4145	3.0472	1.3458	0.4145	1.7208	0.0000	1,988.948 7	1,988.948 7	0.6198	0.0000	2,004.443 6
Maximum	**8.6483**	**11.3185**	**16.6977**	**0.0236**	**2.6721**	**0.7121**	**3.0472**	**1.3458**	**0.7121**	**1.7209**	**0.0000**	**2,275.923 5**	**2,275.923 5**	**0.6753**	**0.0000**	**2,292.805 3**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	8.04	39.31	-15.48	0.00	54.44	38.21	53.84	54.71	32.87	52.84	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	3.2638	0.0627	4.2708	7.5900e-003		0.5700	0.5700		0.5700	0.5700	61.1350	18.9801	80.1151	0.0760	4.3100e-003	83.3015
Energy	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687
Mobile	0.0434	0.1446	0.4381	1.6100e-003	0.1422	1.1700e-003	0.1433	0.0380	1.0900e-003	0.0391		162.2213	162.2213	5.1700e-003		162.3506
Total	**3.3109**	**0.2394**	**4.7225**	**9.4000e-003**	**0.1422**	**0.5737**	**0.7159**	**0.0380**	**0.5736**	**0.6117**	**61.1350**	**222.1269**	**283.2619**	**0.0820**	**5.0600e-003**	**286.8207**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1595	0.0424	0.2667	2.7000e-004		4.5700e-003	4.5700e-003		4.5700e-003	4.5700e-003	0.0000	50.8507	50.8507	1.4100e-003	9.2000e-004	51.1612
Energy	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687
Mobile	0.0434	0.1446	0.4381	1.6100e-003	0.1422	1.1700e-003	0.1433	0.0380	1.0900e-003	0.0391		162.2213	162.2213	5.1700e-003		162.3506
Total	**0.2066**	**0.2190**	**0.7185**	**2.0800e-003**	**0.1422**	**8.3300e-003**	**0.1505**	**0.0380**	**8.2500e-003**	**0.0463**	**0.0000**	**253.9975**	**253.9975**	**7.3600e-003**	**1.6700e-003**	**254.6805**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	93.76	8.51	84.79	77.87	0.00	98.55	78.98	0.00	98.56	92.43	100.00	-14.35	10.33	91.02	67.00	11.21

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Phase 1 - Site Preparation	Site Preparation	7/1/2020	8/11/2020	5	30	
2	Phase 1 - Grading	Grading	8/12/2020	9/8/2020	5	20	
3	Phase 1 - Utilities	Trenching	9/9/2020	10/6/2020	5	20	
4	Phase 1 - Paving	Paving	10/6/2020	12/4/2020	5	44	
5	Phase 2 - Site Preparation	Site Preparation	1/1/2021	1/14/2021	5	10	
6	Phase 2 - Grading	Grading	1/15/2021	2/25/2021	5	30	
7	Phase 2 - Building Construction	Building Construction	2/26/2021	12/2/2021	5	200	
8	Phase 2 - Architectural Coating	Architectural Coating	12/3/2021	12/16/2021	5	10	
9	Phase 2 - Paving	Paving	12/17/2021	12/30/2021	5	10	
10	Phase 3 - Site Preparation	Site Preparation	1/1/2022	1/14/2022	5	10	
11	Phase 3 - Grading	Grading	1/15/2022	2/25/2022	5	30	
12	Phase 3 - Building Construction	Building Construction	2/26/2022	12/2/2022	5	200	
13	Phase 3 - Architectural Coating	Architectural Coating	12/3/2022	12/16/2022	5	10	
14	Phase 3 - Paving	Paving	12/17/2022	12/30/2022	5	10	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.52

Residential Indoor: 10,935; Residential Outdoor: 3,645; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 1,380 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Phase 2 - Architectural Coating	Air Compressors	1	6.00	78	0.48
Phase 1 - Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Phase 2 - Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Phase 2 - Building Construction	Generator Sets	1	1.00	84	0.74
Phase 2 - Building Construction	Cranes	1	1.00	231	0.29
Phase 2 - Building Construction	Forklifts	1	6.00	89	0.20
Phase 1 - Site Preparation	Graders	1	8.00	187	0.41
Phase 1 - Paving	Pavers	1	6.00	130	0.42
Phase 1 - Paving	Rollers	1	7.00	80	0.38
Phase 2 - Grading	Graders	1	4.00	187	0.41
Phase 1 - Grading	Rubber Tired Dozers	1	6.00	247	0.40
Phase 2 - Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Phase 2 - Site Preparation	Graders	1	8.00	187	0.41
Phase 1 - Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Phase 1 - Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 1 - Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 1 - Grading	Graders	1	6.00	187	0.41
Phase 1 - Paving	Paving Equipment	1	8.00	132	0.36
Phase 1 - Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Phase 2 - Building Construction	Welders	0	8.00	46	0.45
Phase 2 - Paving	Pavers	1	6.00	130	0.42
Phase 2 - Paving	Paving Equipment	1	8.00	132	0.36
Phase 2 - Paving	Rollers	1	7.00	80	0.38

Phase 2 - Grading	Rubber Tired Dozers	1	4.00	247	0.40
Phase 2 - Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Phase 2 - Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Phase 2 - Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 2 - Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 3 - Architectural Coating	Air Compressors	1	6.00	78	0.48
Phase 3 - Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Phase 3 - Building Construction	Cranes	1	1.00	231	0.29
Phase 3 - Building Construction	Forklifts	1	6.00	89	0.20
Phase 3 - Building Construction	Generator Sets	1	1.00	84	0.74
Phase 3 - Grading	Graders	1	4.00	187	0.41
Phase 3 - Site Preparation	Graders	1	8.00	187	0.41
Phase 3 - Paving	Pavers	1	6.00	130	0.42
Phase 3 - Paving	Paving Equipment	1	8.00	132	0.36
Phase 3 - Paving	Rollers	1	7.00	80	0.38
Phase 3 - Grading	Rubber Tired Dozers	1	4.00	247	0.40
Phase 3 - Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Phase 3 - Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Phase 3 - Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Phase 3 - Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 3 - Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 3 - Building Construction	Welders	0	8.00	46	0.45
Phase 1 - Utilities	Trenchers	2	8.00	78	0.50
Phase 2 - Grading	Bore/Drill Rigs	1	8.00	221	0.50
Phase 3 - Grading	Bore/Drill Rigs	1	8.00	221	0.50
Phase 1 - Utilities	Tractors/Loaders/Backhoes	1	4.00	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 - Utilities	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Grading	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Building Construction	4	20.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Building Construction	4	20.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Clean Paved Roads

3.2 Phase 1 - Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.6299	18.3464	7.7093	0.0172		0.8210	0.8210		0.7553	0.7553		1,667.4119	1,667.4119	0.5393		1,680.8937
Total	**1.6299**	**18.3464**	**7.7093**	**0.0172**	**5.7996**	**0.8210**	**6.6205**	**2.9537**	**0.7553**	**3.7090**		**1,667.4119**	**1,667.4119**	**0.5393**		**1,680.8937**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0291	0.0174	0.2248	6.7000e-004	0.0657	4.2000e-004	0.0661	0.0174	3.9000e-004	0.0178		66.8871	66.8871	1.6400e-003		66.9280
Total	**0.0291**	**0.0174**	**0.2248**	**6.7000e-004**	**0.0657**	**4.2000e-004**	**0.0661**	**0.0174**	**3.9000e-004**	**0.0178**		**66.8871**	**66.8871**	**1.6400e-003**		**66.9280**

3.2 Phase 1 - Site Preparation - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.6098	0.0000	2.6098	1.3292	0.0000	1.3292			0.0000			0.0000
Off-Road	0.4212	8.4089	9.8221	0.0172		0.3747	0.3747		0.3747	0.3747	0.0000	1,667.4119	1,667.4119	0.5393		1,680.893 7
Total	**0.4212**	**8.4089**	**9.8221**	**0.0172**	**2.6098**	**0.3747**	**2.9845**	**1.3292**	**0.3747**	**1.7039**	**0.0000**	**1,667.411 9**	**1,667.411 9**	**0.5393**		**1,680.893 7**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0291	0.0174	0.2248	6.7000e-004	0.0623	4.2000e-004	0.0627	0.0166	3.9000e-004	0.0170		66.8871	66.8871	1.6400e-003		66.9280
Total	**0.0291**	**0.0174**	**0.2248**	**6.7000e-004**	**0.0623**	**4.2000e-004**	**0.0627**	**0.0166**	**3.9000e-004**	**0.0170**		**66.8871**	**66.8871**	**1.6400e-003**		**66.9280**

3.3 Phase 1 - Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9143	0.0000	4.9143	2.5256	0.0000	2.5256			0.0000			0.0000
Off-Road	1.3498	15.0854	6.4543	0.0141		0.6844	0.6844		0.6296	0.6296		1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**1.3498**	**15.0854**	**6.4543**	**0.0141**	**4.9143**	**0.6844**	**5.5986**	**2.5256**	**0.6296**	**3.1552**		**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0291	0.0174	0.2248	6.7000e-004	0.0657	4.2000e-004	0.0661	0.0174	3.9000e-004	0.0178		66.8871	66.8871	1.6400e-003		66.9280
Total	**0.0291**	**0.0174**	**0.2248**	**6.7000e-004**	**0.0657**	**4.2000e-004**	**0.0661**	**0.0174**	**3.9000e-004**	**0.0178**		**66.8871**	**66.8871**	**1.6400e-003**		**66.9280**

3.3 Phase 1 - Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.2114	0.0000	2.2114	1.1365	0.0000	1.1365			0.0000			0.0000
Off-Road	0.3450	6.9025	8.0841	0.0141		0.3106	0.3106		0.3106	0.3106	0.0000	1,365.718 3	1,365.718 3	0.4417		1,376.760 9
Total	**0.3450**	**6.9025**	**8.0841**	**0.0141**	**2.2114**	**0.3106**	**2.5220**	**1.1365**	**0.3106**	**1.4471**	**0.0000**	**1,365.718 3**	**1,365.718 3**	**0.4417**		**1,376.760 9**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0291	0.0174	0.2248	6.7000e-004	0.0623	4.2000e-004	0.0627	0.0166	3.9000e-004	0.0170		66.8871	66.8871	1.6400e-003		66.9280
Total	**0.0291**	**0.0174**	**0.2248**	**6.7000e-004**	**0.0623**	**4.2000e-004**	**0.0627**	**0.0166**	**3.9000e-004**	**0.0170**		**66.8871**	**66.8871**	**1.6400e-003**		**66.9280**

3.4 Phase 1 - Utilities - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9438	8.6414	6.4079	8.2900e-003		0.6348	0.6348		0.5840	0.5840		803.3988	803.3988	0.2598		809.8946
Total	**0.9438**	**8.6414**	**6.4079**	**8.2900e-003**		**0.6348**	**0.6348**		**0.5840**	**0.5840**		**803.3988**	**803.3988**	**0.2598**		**809.8946**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0291	0.0174	0.2248	6.7000e-004	0.0657	4.2000e-004	0.0661	0.0174	3.9000e-004	0.0178		66.8871	66.8871	1.6400e-003		66.9280
Total	**0.0291**	**0.0174**	**0.2248**	**6.7000e-004**	**0.0657**	**4.2000e-004**	**0.0661**	**0.0174**	**3.9000e-004**	**0.0178**		**66.8871**	**66.8871**	**1.6400e-003**		**66.9280**

3.4 Phase 1 - Utilities - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2029	4.6331	6.2563	8.2900e-003		0.3247	0.3247		0.3247	0.3247	0.0000	803.3988	803.3988	0.2598		809.8946
Total	**0.2029**	**4.6331**	**6.2563**	**8.2900e-003**		**0.3247**	**0.3247**		**0.3247**	**0.3247**	**0.0000**	**803.3988**	**803.3988**	**0.2598**		**809.8946**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0291	0.0174	0.2248	6.7000e-004	0.0623	4.2000e-004	0.0627	0.0166	3.9000e-004	0.0170		66.8871	66.8871	1.6400e-003		66.9280
Total	**0.0291**	**0.0174**	**0.2248**	**6.7000e-004**	**0.0623**	**4.2000e-004**	**0.0627**	**0.0166**	**3.9000e-004**	**0.0170**		**66.8871**	**66.8871**	**1.6400e-003**		**66.9280**

3.5 Phase 1 - Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8402	8.4514	8.8758	0.0135		0.4695	0.4695		0.4328	0.4328		1,296.946 1	1,296.946 1	0.4111		1,307.224 6
Paving	0.0155					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8556**	**8.4514**	**8.8758**	**0.0135**		**0.4695**	**0.4695**		**0.4328**	**0.4328**		**1,296.946 1**	**1,296.946 1**	**0.4111**		**1,307.224 6**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0473	0.0282	0.3654	1.0900e-003	0.1068	6.9000e-004	0.1075	0.0283	6.3000e-004	0.0290		108.6915	108.6915	2.6600e-003		108.7581
Total	**0.0473**	**0.0282**	**0.3654**	**1.0900e-003**	**0.1068**	**6.9000e-004**	**0.1075**	**0.0283**	**6.3000e-004**	**0.0290**		**108.6915**	**108.6915**	**2.6600e-003**		**108.7581**

3.5 Phase 1 - Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3195	6.6399	9.8512	0.0135		0.3864	0.3864		0.3864	0.3864	0.0000	1,296.9461	1,296.9461	0.4111		1,307.2246
Paving	0.0155					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.3350**	**6.6399**	**9.8512**	**0.0135**		**0.3864**	**0.3864**		**0.3864**	**0.3864**	**0.0000**	**1,296.9461**	**1,296.9461**	**0.4111**		**1,307.2246**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0473	0.0282	0.3654	1.0900e-003	0.1012	6.9000e-004	0.1019	0.0270	6.3000e-004	0.0276		108.6915	108.6915	2.6600e-003		108.7581
Total	**0.0473**	**0.0282**	**0.3654**	**1.0900e-003**	**0.1012**	**6.9000e-004**	**0.1019**	**0.0270**	**6.3000e-004**	**0.0276**		**108.6915**	**108.6915**	**2.6600e-003**		**108.7581**

3.6 Phase 2 - Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.5558	17.4203	7.5605	0.0172		0.7654	0.7654		0.7041	0.7041		1,666.5174	1,666.5174	0.5390		1,679.9920
Total	**1.5558**	**17.4203**	**7.5605**	**0.0172**	**5.7996**	**0.7654**	**6.5650**	**2.9537**	**0.7041**	**3.6578**		**1,666.5174**	**1,666.5174**	**0.5390**		**1,679.9920**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0269	0.0155	0.2055	6.5000e-004	0.0657	4.1000e-004	0.0661	0.0174	3.8000e-004	0.0178		64.5150	64.5150	1.4600e-003		64.5516
Total	**0.0269**	**0.0155**	**0.2055**	**6.5000e-004**	**0.0657**	**4.1000e-004**	**0.0661**	**0.0174**	**3.8000e-004**	**0.0178**		**64.5150**	**64.5150**	**1.4600e-003**		**64.5516**

3.6 Phase 2 - Site Preparation - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.6098	0.0000	2.6098	1.3292	0.0000	1.3292			0.0000			0.0000
Off-Road	0.4212	8.4089	9.8221	0.0172		0.3747	0.3747		0.3747	0.3747	0.0000	1,666.517 4	1,666.517 4	0.5390		1,679.992 0
Total	**0.4212**	**8.4089**	**9.8221**	**0.0172**	**2.6098**	**0.3747**	**2.9845**	**1.3292**	**0.3747**	**1.7039**	**0.0000**	**1,666.517 4**	**1,666.517 4**	**0.5390**		**1,679.992 0**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0269	0.0155	0.2055	6.5000e-004	0.0623	4.1000e-004	0.0627	0.0166	3.8000e-004	0.0170		64.5150	64.5150	1.4600e-003		64.5516
Total	**0.0269**	**0.0155**	**0.2055**	**6.5000e-004**	**0.0623**	**4.1000e-004**	**0.0627**	**0.0166**	**3.8000e-004**	**0.0170**		**64.5150**	**64.5150**	**1.4600e-003**		**64.5516**

3.7 Phase 2 - Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.2762	0.0000	3.2762	1.6837	0.0000	1.6837			0.0000			0.0000
Off-Road	1.1717	13.1295	6.9542	0.0197		0.5495	0.5495		0.5056	0.5056		1,909.868 1	1,909.868 1	0.6177		1,925.310 4
Total	**1.1717**	**13.1295**	**6.9542**	**0.0197**	**3.2762**	**0.5495**	**3.8257**	**1.6837**	**0.5056**	**2.1893**		**1,909.868 1**	**1,909.868 1**	**0.6177**		**1,925.310 4**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0336	0.0194	0.2569	8.1000e-004	0.0822	5.2000e-004	0.0827	0.0218	4.7000e-004	0.0223		80.6437	80.6437	1.8300e-003		80.6894
Total	**0.0336**	**0.0194**	**0.2569**	**8.1000e-004**	**0.0822**	**5.2000e-004**	**0.0827**	**0.0218**	**4.7000e-004**	**0.0223**		**80.6437**	**80.6437**	**1.8300e-003**		**80.6894**

3.7 Phase 2 - Grading - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.4743	0.0000	1.4743	0.7577	0.0000	0.7577			0.0000			0.0000
Off-Road	0.4860	9.6289	11.1396	0.0197		0.4140	0.4140		0.4140	0.4140	0.0000	1,909.868 1	1,909.868 1	0.6177		1,925.310 4
Total	**0.4860**	**9.6289**	**11.1396**	**0.0197**	**1.4743**	**0.4140**	**1.8883**	**0.7577**	**0.4140**	**1.1717**	**0.0000**	**1,909.868 1**	**1,909.868 1**	**0.6177**		**1,925.310 4**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0336	0.0194	0.2569	8.1000e-004	0.0779	5.2000e-004	0.0784	0.0207	4.7000e-004	0.0212		80.6437	80.6437	1.8300e-003		80.6894
Total	**0.0336**	**0.0194**	**0.2569**	**8.1000e-004**	**0.0779**	**5.2000e-004**	**0.0784**	**0.0207**	**4.7000e-004**	**0.0212**		**80.6437**	**80.6437**	**1.8300e-003**		**80.6894**

3.8 Phase 2 - Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3337	3.3081	3.2795	5.0200e-003		0.1922	0.1922		0.1785	0.1785		484.4198	484.4198	0.1355		487.8063
Total	**0.3337**	**3.3081**	**3.2795**	**5.0200e-003**		**0.1922**	**0.1922**		**0.1785**	**0.1785**		**484.4198**	**484.4198**	**0.1355**		**487.8063**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0128	0.4092	0.0980	1.0900e-003	0.0271	9.1000e-004	0.0280	7.7900e-003	8.7000e-004	8.6700e-003		115.2207	115.2207	5.0900e-003		115.3478
Worker	0.0672	0.0388	0.5138	1.6200e-003	0.1643	1.0300e-003	0.1653	0.0436	9.5000e-004	0.0445		161.2874	161.2874	3.6600e-003		161.3789
Total	**0.0800**	**0.4479**	**0.6117**	**2.7100e-003**	**0.1914**	**1.9400e-003**	**0.1933**	**0.0514**	**1.8200e-003**	**0.0532**		**276.5081**	**276.5081**	**8.7500e-003**		**276.7267**

3.8 Phase 2 - Building Construction - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.1194	2.6641	3.5188	5.0200e-003		0.1757	0.1757		0.1757	0.1757	0.0000	484.4198	484.4198	0.1355		487.8063
Total	**0.1194**	**2.6641**	**3.5188**	**5.0200e-003**		**0.1757**	**0.1757**		**0.1757**	**0.1757**	**0.0000**	**484.4198**	**484.4198**	**0.1355**		**487.8063**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0128	0.4092	0.0980	1.0900e-003	0.0259	9.1000e-004	0.0268	7.5100e-003	8.7000e-004	8.3800e-003		115.2207	115.2207	5.0900e-003		115.3478
Worker	0.0672	0.0388	0.5138	1.6200e-003	0.1557	1.0300e-003	0.1568	0.0415	9.5000e-004	0.0424		161.2874	161.2874	3.6600e-003		161.3789
Total	**0.0800**	**0.4479**	**0.6117**	**2.7100e-003**	**0.1817**	**1.9400e-003**	**0.1836**	**0.0490**	**1.8200e-003**	**0.0508**		**276.5081**	**276.5081**	**8.7500e-003**		**276.7267**

3.9 Phase 2 - Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.5620					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2189	1.5268	1.8176	2.9700e-003		0.0941	0.0941		0.0941	0.0941		281.4481	281.4481	0.0193		281.9309
Total	**8.7809**	**1.5268**	**1.8176**	**2.9700e-003**		**0.0941**	**0.0941**		**0.0941**	**0.0941**		**281.4481**	**281.4481**	**0.0193**		**281.9309**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0269	0.0155	0.2055	6.5000e-004	0.0657	4.1000e-004	0.0661	0.0174	3.8000e-004	0.0178		64.5150	64.5150	1.4600e-003		64.5516
Total	**0.0269**	**0.0155**	**0.2055**	**6.5000e-004**	**0.0657**	**4.1000e-004**	**0.0661**	**0.0174**	**3.8000e-004**	**0.0178**		**64.5150**	**64.5150**	**1.4600e-003**		**64.5516**

3.9 Phase 2 - Architectural Coating - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.5620					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0594	1.3570	1.8324	2.9700e-003		0.0951	0.0951		0.0951	0.0951	0.0000	281.4481	281.4481	0.0193		281.9309
Total	**8.6214**	**1.3570**	**1.8324**	**2.9700e-003**		**0.0951**	**0.0951**		**0.0951**	**0.0951**	**0.0000**	**281.4481**	**281.4481**	**0.0193**		**281.9309**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0269	0.0155	0.2055	6.5000e-004	0.0623	4.1000e-004	0.0627	0.0166	3.8000e-004	0.0170		64.5150	64.5150	1.4600e-003		64.5516
Total	**0.0269**	**0.0155**	**0.2055**	**6.5000e-004**	**0.0623**	**4.1000e-004**	**0.0627**	**0.0166**	**3.8000e-004**	**0.0170**		**64.5150**	**64.5150**	**1.4600e-003**		**64.5516**

3.10 Phase 2 - Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7739	7.7422	8.8569	0.0135		0.4153	0.4153		0.3830	0.3830		1,296.8664	1,296.8664	0.4111		1,307.1442
Paving	0.0681					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8420**	**7.7422**	**8.8569**	**0.0135**		**0.4153**	**0.4153**		**0.3830**	**0.3830**		**1,296.8664**	**1,296.8664**	**0.4111**		**1,307.1442**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0437	0.0252	0.3340	1.0500e-003	0.1068	6.7000e-004	0.1075	0.0283	6.2000e-004	0.0289		104.8368	104.8368	2.3800e-003		104.8963
Total	**0.0437**	**0.0252**	**0.3340**	**1.0500e-003**	**0.1068**	**6.7000e-004**	**0.1075**	**0.0283**	**6.2000e-004**	**0.0289**		**104.8368**	**104.8368**	**2.3800e-003**		**104.8963**

3.10 Phase 2 - Paving - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3195	6.6399	9.8512	0.0135		0.3864	0.3864		0.3864	0.3864	0.0000	1,296.8664	1,296.8664	0.4111		1,307.1442
Paving	0.0681					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.3876**	**6.6399**	**9.8512**	**0.0135**		**0.3864**	**0.3864**		**0.3864**	**0.3864**	**0.0000**	**1,296.8664**	**1,296.8664**	**0.4111**		**1,307.1442**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0437	0.0252	0.3340	1.0500e-003	0.1012	6.7000e-004	0.1019	0.0270	6.2000e-004	0.0276		104.8368	104.8368	2.3800e-003		104.8963
Total	**0.0437**	**0.0252**	**0.3340**	**1.0500e-003**	**0.1012**	**6.7000e-004**	**0.1019**	**0.0270**	**6.2000e-004**	**0.0276**		**104.8368**	**104.8368**	**2.3800e-003**		**104.8963**

3.11 Phase 3 - Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.3122	14.6277	7.0939	0.0172		0.6225	0.6225		0.5727	0.5727		1,666.1738	1,666.1738	0.5389		1,679.6457
Total	**1.3122**	**14.6277**	**7.0939**	**0.0172**	**5.7996**	**0.6225**	**6.4221**	**2.9537**	**0.5727**	**3.5264**		**1,666.1738**	**1,666.1738**	**0.5389**		**1,679.6457**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0250	0.0139	0.1893	6.2000e-004	0.0657	4.0000e-004	0.0661	0.0174	3.7000e-004	0.0178		62.1173	62.1173	1.3100e-003		62.1502
Total	**0.0250**	**0.0139**	**0.1893**	**6.2000e-004**	**0.0657**	**4.0000e-004**	**0.0661**	**0.0174**	**3.7000e-004**	**0.0178**		**62.1173**	**62.1173**	**1.3100e-003**		**62.1502**

3.11 Phase 3 - Site Preparation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.6098	0.0000	2.6098	1.3292	0.0000	1.3292			0.0000			0.0000
Off-Road	0.4212	8.4089	9.8221	0.0172		0.3747	0.3747		0.3747	0.3747	0.0000	1,666.1738	1,666.1738	0.5389		1,679.6457
Total	**0.4212**	**8.4089**	**9.8221**	**0.0172**	**2.6098**	**0.3747**	**2.9845**	**1.3292**	**0.3747**	**1.7039**	**0.0000**	**1,666.1738**	**1,666.1738**	**0.5389**		**1,679.6457**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0250	0.0139	0.1893	6.2000e-004	0.0623	4.0000e-004	0.0627	0.0166	3.7000e-004	0.0170		62.1173	62.1173	1.3100e-003		62.1502
Total	**0.0250**	**0.0139**	**0.1893**	**6.2000e-004**	**0.0623**	**4.0000e-004**	**0.0627**	**0.0166**	**3.7000e-004**	**0.0170**		**62.1173**	**62.1173**	**1.3100e-003**		**62.1502**

3.12 Phase 3 - Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.2762	0.0000	3.2762	1.6837	0.0000	1.6837			0.0000			0.0000
Off-Road	0.9943	10.7582	6.6512	0.0197		0.4439	0.4439		0.4084	0.4084		1,911.3021	1,911.3021	0.6182		1,926.7559
Total	**0.9943**	**10.7582**	**6.6512**	**0.0197**	**3.2762**	**0.4439**	**3.7201**	**1.6837**	**0.4084**	**2.0921**		**1,911.3021**	**1,911.3021**	**0.6182**		**1,926.7559**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0312	0.0174	0.2366	7.8000e-004	0.0822	5.0000e-004	0.0827	0.0218	4.6000e-004	0.0223		77.6466	77.6466	1.6400e-003		77.6877
Total	**0.0312**	**0.0174**	**0.2366**	**7.8000e-004**	**0.0822**	**5.0000e-004**	**0.0827**	**0.0218**	**4.6000e-004**	**0.0223**		**77.6466**	**77.6466**	**1.6400e-003**		**77.6877**

3.12 Phase 3 - Grading - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.4743	0.0000	1.4743	0.7577	0.0000	0.7577			0.0000			0.0000
Off-Road	0.4860	9.6289	11.1396	0.0197		0.4140	0.4140		0.4140	0.4140	0.0000	1,911.3021	1,911.3021	0.6182		1,926.7559
Total	**0.4860**	**9.6289**	**11.1396**	**0.0197**	**1.4743**	**0.4140**	**1.8883**	**0.7577**	**0.4140**	**1.1717**	**0.0000**	**1,911.3021**	**1,911.3021**	**0.6182**		**1,926.7559**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0312	0.0174	0.2366	7.8000e-004	0.0779	5.0000e-004	0.0784	0.0207	4.6000e-004	0.0212		77.6466	77.6466	1.6400e-003		77.6877
Total	**0.0312**	**0.0174**	**0.2366**	**7.8000e-004**	**0.0779**	**5.0000e-004**	**0.0784**	**0.0207**	**4.6000e-004**	**0.0212**		**77.6466**	**77.6466**	**1.6400e-003**		**77.6877**

3.13 Phase 3 - Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2966	2.9370	3.2398	5.0200e-003		0.1601	0.1601		0.1487	0.1487		484.6855	484.6855	0.1353		488.0672
Total	**0.2966**	**2.9370**	**3.2398**	**5.0200e-003**		**0.1601**	**0.1601**		**0.1487**	**0.1487**		**484.6855**	**484.6855**	**0.1353**		**488.0672**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0119	0.3868	0.0919	1.0800e-003	0.0271	7.9000e-004	0.0279	7.7900e-003	7.6000e-004	8.5500e-003		114.1363	114.1363	4.8200e-003		114.2569
Worker	0.0624	0.0348	0.4732	1.5600e-003	0.1643	1.0100e-003	0.1653	0.0436	9.3000e-004	0.0445		155.2933	155.2933	3.2800e-003		155.3754
Total	**0.0743**	**0.4215**	**0.5651**	**2.6400e-003**	**0.1914**	**1.8000e-003**	**0.1932**	**0.0514**	**1.6900e-003**	**0.0531**		**269.4296**	**269.4296**	**8.1000e-003**		**269.6323**

3.13 Phase 3 - Building Construction - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.1194	2.6641	3.5188	5.0200e-003		0.1757	0.1757		0.1757	0.1757	0.0000	484.6855	484.6855	0.1353		488.0672
Total	**0.1194**	**2.6641**	**3.5188**	**5.0200e-003**		**0.1757**	**0.1757**		**0.1757**	**0.1757**	**0.0000**	**484.6855**	**484.6855**	**0.1353**		**488.0672**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0119	0.3868	0.0919	1.0800e-003	0.0259	7.9000e-004	0.0267	7.5100e-003	7.6000e-004	8.2700e-003		114.1363	114.1363	4.8200e-003		114.2569
Worker	0.0624	0.0348	0.4732	1.5600e-003	0.1557	1.0100e-003	0.1567	0.0415	9.3000e-004	0.0424		155.2933	155.2933	3.2800e-003		155.3754
Total	**0.0743**	**0.4215**	**0.5651**	**2.6400e-003**	**0.1817**	**1.8000e-003**	**0.1834**	**0.0490**	**1.6900e-003**	**0.0507**		**269.4296**	**269.4296**	**8.1000e-003**		**269.6323**

3.14 Phase 3 - Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.5620					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**8.7665**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0250	0.0139	0.1893	6.2000e-004	0.0657	4.0000e-004	0.0661	0.0174	3.7000e-004	0.0178		62.1173	62.1173	1.3100e-003		62.1502
Total	**0.0250**	**0.0139**	**0.1893**	**6.2000e-004**	**0.0657**	**4.0000e-004**	**0.0661**	**0.0174**	**3.7000e-004**	**0.0178**		**62.1173**	**62.1173**	**1.3100e-003**		**62.1502**

3.14 Phase 3 - Architectural Coating - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.5620					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0594	1.3570	1.8324	2.9700e-003		0.0951	0.0951		0.0951	0.0951	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**8.6214**	**1.3570**	**1.8324**	**2.9700e-003**		**0.0951**	**0.0951**		**0.0951**	**0.0951**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0250	0.0139	0.1893	6.2000e-004	0.0623	4.0000e-004	0.0627	0.0166	3.7000e-004	0.0170		62.1173	62.1173	1.3100e-003		62.1502
Total	**0.0250**	**0.0139**	**0.1893**	**6.2000e-004**	**0.0623**	**4.0000e-004**	**0.0627**	**0.0166**	**3.7000e-004**	**0.0170**		**62.1173**	**62.1173**	**1.3100e-003**		**62.1502**

3.15 Phase 3 - Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6877	6.7738	8.8060	0.0135		0.3474	0.3474		0.3205	0.3205		1,297.378 9	1,297.378 9	0.4113		1,307.660 8
Paving	0.0681					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.7558**	**6.7738**	**8.8060**	**0.0135**		**0.3474**	**0.3474**		**0.3205**	**0.3205**		**1,297.378 9**	**1,297.378 9**	**0.4113**		**1,307.660 8**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0405	0.0226	0.3076	1.0100e-003	0.1068	6.5000e-004	0.1075	0.0283	6.0000e-004	0.0289		100.9406	100.9406	2.1300e-003		100.9940
Total	**0.0405**	**0.0226**	**0.3076**	**1.0100e-003**	**0.1068**	**6.5000e-004**	**0.1075**	**0.0283**	**6.0000e-004**	**0.0289**		**100.9406**	**100.9406**	**2.1300e-003**		**100.9940**

3.15 Phase 3 - Paving - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3195	6.6399	9.8512	0.0135		0.3864	0.3864		0.3864	0.3864	0.0000	1,297.3789	1,297.3789	0.4113		1,307.6608
Paving	0.0681					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.3876**	**6.6399**	**9.8512**	**0.0135**		**0.3864**	**0.3864**		**0.3864**	**0.3864**	**0.0000**	**1,297.3789**	**1,297.3789**	**0.4113**		**1,307.6608**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0405	0.0226	0.3076	1.0100e-003	0.1012	6.5000e-004	0.1019	0.0270	6.0000e-004	0.0276		100.9406	100.9406	2.1300e-003		100.9940
Total	**0.0405**	**0.0226**	**0.3076**	**1.0100e-003**	**0.1012**	**6.5000e-004**	**0.1019**	**0.0270**	**6.0000e-004**	**0.0276**		**100.9406**	**100.9406**	**2.1300e-003**		**100.9940**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0434	0.1446	0.4381	1.6100e-003	0.1422	1.1700e-003	0.1433	0.0380	1.0900e-003	0.0391		162.2213	162.2213	5.1700e-003		162.3506
Unmitigated	0.0434	0.1446	0.4381	1.6100e-003	0.1422	1.1700e-003	0.1433	0.0380	1.0900e-003	0.0391		162.2213	162.2213	5.1700e-003		162.3506

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	28.98	28.98	28.98	66,932	66,932
Total	28.98	28.98	28.98	66,932	66,932

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.590657	0.037535	0.185105	0.118290	0.015611	0.005013	0.010768	0.024764	0.001635	0.001742	0.005351	0.002726	0.000802
Other Non-Asphalt Surfaces	0.590657	0.037535	0.185105	0.118290	0.015611	0.005013	0.010768	0.024764	0.001635	0.001742	0.005351	0.002726	0.000802
Single Family Housing	0.590657	0.037535	0.185105	0.118290	0.015611	0.005013	0.010768	0.024764	0.001635	0.001742	0.005351	0.002726	0.000802

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687
NaturalGas Unmitigated	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	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
Other Non-Asphalt Surfaces	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
Single Family Housing	347.867	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687
Total		**3.7500e-003**	**0.0321**	**0.0136**	**2.0000e-004**		**2.5900e-003**	**2.5900e-003**		**2.5900e-003**	**2.5900e-003**		**40.9255**	**40.9255**	**7.8000e-004**	**7.5000e-004**	**41.1687**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	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
Other Non-Asphalt Surfaces	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
Single Family Housing	0.347867	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687
Total		**3.7500e-003**	**0.0321**	**0.0136**	**2.0000e-004**		**2.5900e-003**	**2.5900e-003**		**2.5900e-003**	**2.5900e-003**		**40.9255**	**40.9255**	**7.8000e-004**	**7.5000e-004**	**41.1687**

6.0 Area Detail

6.1 Mitigation Measures Area

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1595	0.0424	0.2667	2.7000e-004		4.5700e-003	4.5700e-003		4.5700e-003	4.5700e-003	0.0000	50.8507	50.8507	1.4100e-003	9.2000e-004	51.1612
Unmitigated	3.2638	0.0627	4.2708	7.5900e-003		0.5700	0.5700		0.5700	0.5700	61.1350	18.9801	80.1151	0.0760	4.3100e-003	83.3015

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0235					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1237					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	3.1090	0.0599	4.0209	7.5700e-003		0.5686	0.5686		0.5686	0.5686	61.1350	18.5294	79.6644	0.0756	4.3100e-003	82.8397
Landscaping	7.6800e-003	2.8800e-003	0.2499	1.0000e-005		1.3800e-003	1.3800e-003		1.3800e-003	1.3800e-003		0.4507	0.4507	4.4000e-004		0.4617
Total	**3.2638**	**0.0627**	**4.2708**	**7.5800e-003**		**0.5700**	**0.5700**		**0.5700**	**0.5700**	**61.1350**	**18.9801**	**80.1151**	**0.0760**	**4.3100e-003**	**83.3015**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0235					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1237					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	4.6200e-003	0.0395	0.0168	2.5000e-004		3.1900e-003	3.1900e-003		3.1900e-003	3.1900e-003	0.0000	50.4000	50.4000	9.7000e-004	9.2000e-004	50.6995
Landscaping	7.6800e-003	2.8800e-003	0.2499	1.0000e-005		1.3800e-003	1.3800e-003		1.3800e-003	1.3800e-003		0.4507	0.4507	4.4000e-004		0.4617
Total	**0.1595**	**0.0424**	**0.2667**	**2.6000e-004**		**4.5700e-003**	**4.5700e-003**		**4.5700e-003**	**4.5700e-003**	**0.0000**	**50.8507**	**50.8507**	**1.4100e-003**	**9.2000e-004**	**51.1612**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

MIB-02 88 Sunnyside Lane

Contra Costa County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	3.00	Dwelling Unit	1.17	5,400.00	9
Other Asphalt Surfaces	11.50	1000sqft	0.26	11,500.00	0
Other Non-Asphalt Surfaces	11.50	1000sqft	0.26	11,500.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 58

Climate Zone 5 **Operational Year** 2023

Utility Company Pacific Gas & Electric Company

CO2 Intensity (lb/MWhr) 641.35 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Residential development envelope = 1.17 acres.
Other asphalt surfaces = Sunnyside Lane widening and access driveways
Other non-asphalt surfaces = utilities, slope stabilization, and turnaround areas.

Construction Phase - Phasing per project applicant.
Trenching added for installation of underground utilities.
Phase 2 and Phase 3 grading includes piers for slope stablization walls and foundation support.

Off-road Equipment - Trenchers for undeeground utilities.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Bore/Drill Rigs for instalion of slope retention and foundation support piers.

Off-road Equipment - Wood-frame construction, no welders.
Limited use of cranes required.
Grid power to be used as soon a practical (limited generator use).

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Bore/Drill Rigs for instalion of slope retention and foundation support piers.

Off-road Equipment - Wood-frame construction, no welders.
Limited use of cranes required.
Grid power to be used as soon a practical (limited generator use).

Off-road Equipment -

Off-road Equipment -

Grading -

Trips and VMT - Max building crew size = 10, paint crew size = 4.

Vehicle Trips - Trip rate per ISMND Traffic Section (29 total project average daily trips).

Construction Off-road Equipment Mitigation - Dust mitigation per BAAQMD BCMMs (MM 4.3-1).
Tier-3 per MM 4.3-1.

Area Mitigation - No wordburning devices in new construction per BAAQMD Reg 6 Rule 3.

Energy Mitigation - On-site solar required per 2019 Title 24.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	6
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	13
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	12.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	2.00	10.00
tblConstructionPhase	NumDays	4.00	20.00
tblConstructionPhase	NumDays	10.00	44.00
tblConstructionPhase	NumDays	2.00	30.00
tblConstructionPhase	NumDays	4.00	30.00
tblConstructionPhase	NumDays	2.00	10.00
tblConstructionPhase	NumDays	4.00	30.00
tblConstructionPhase	PhaseEndDate	6/9/2021	12/16/2021
tblConstructionPhase	PhaseEndDate	5/12/2021	12/2/2021
tblConstructionPhase	PhaseEndDate	8/5/2020	9/8/2020
tblConstructionPhase	PhaseEndDate	5/26/2021	12/4/2020
tblConstructionPhase	PhaseEndDate	7/30/2020	8/11/2020
tblConstructionPhase	PhaseStartDate	5/27/2021	12/3/2021
tblConstructionPhase	PhaseStartDate	8/6/2020	2/26/2021
tblConstructionPhase	PhaseStartDate	7/31/2020	8/12/2020
tblConstructionPhase	PhaseStartDate	5/13/2021	10/6/2020
tblConstructionPhase	PhaseStartDate	7/29/2020	7/1/2020
tblLandUse	LotAcreage	0.97	1.17
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	UsageHours	8.00	1.00
tblOffRoadEquipment	UsageHours	6.00	1.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	1.00
tblOffRoadEquipment	UsageHours	8.00	1.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblTripsAndVMT	WorkerTripNumber	11.00	20.00
tblTripsAndVMT	WorkerTripNumber	2.00	8.00
tblTripsAndVMT	WorkerTripNumber	2.00	8.00
tblTripsAndVMT	WorkerTripNumber	11.00	20.00
tblVehicleTrips	ST_TR	9.91	9.66
tblVehicleTrips	SU_TR	8.62	9.66
tblVehicleTrips	WD_TR	9.52	9.66

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	1.8769	18.3678	15.8246	0.0234	5.8653	1.1054	6.6867	2.9711	1.0178	3.7268	0.0000	2,259.4219	2,259.4219	0.6749	0.0000	2,276.2950
2021	8.8081	17.4394	9.1617	0.0205	5.8653	0.7658	6.6311	2.9711	0.7045	3.6757	0.0000	1,982.9337	1,982.9337	0.6194	0.0000	1,998.4179
2022	8.7919	14.6448	9.0856	0.0205	5.8653	0.6229	6.4882	2.9711	0.5731	3.5442	0.0000	1,981.6552	1,981.6552	0.6197	0.0000	1,997.1465
Maximum	**8.8081**	**18.3678**	**15.8246**	**0.0234**	**5.8653**	**1.1054**	**6.6867**	**2.9711**	**1.0178**	**3.7268**	**0.0000**	**2,259.4219**	**2,259.4219**	**0.6749**	**0.0000**	**2,276.2950**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	0.6153	11.3292	16.6484	0.0234	2.6721	0.7121	3.0472	1.3458	0.7121	1.7209	0.0000	2,259.4219	2,259.4219	0.6749	0.0000	2,276.2950
2021	8.6487	9.6528	11.3741	0.0205	2.6721	0.4145	3.0472	1.3458	0.4145	1.7209	0.0000	1,982.9337	1,982.9337	0.6194	0.0000	1,998.4179
2022	8.6468	9.6504	11.3547	0.0205	2.6721	0.4145	3.0472	1.3458	0.4145	1.7208	0.0000	1,981.6552	1,981.6552	0.6197	0.0000	1,997.1465
Maximum	**8.6487**	**11.3292**	**16.6484**	**0.0234**	**2.6721**	**0.7121**	**3.0472**	**1.3458**	**0.7121**	**1.7209**	**0.0000**	**2,259.4219**	**2,259.4219**	**0.6749**	**0.0000**	**2,276.2950**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	8.04	39.28	-15.57	0.00	54.44	38.21	53.84	54.71	32.87	52.84	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	3.2638	0.0627	4.2708	7.5900e-003		0.5700	0.5700		0.5700	0.5700	61.1350	18.9801	80.1151	0.0760	4.3100e-003	83.3015
Energy	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687
Mobile	0.0353	0.1524	0.4319	1.4800e-003	0.1422	1.1700e-003	0.1433	0.0380	1.0900e-003	0.0391		149.7599	149.7599	5.2300e-003		149.8907
Total	**3.3028**	**0.2472**	**4.7163**	**9.2700e-003**	**0.1422**	**0.5737**	**0.7159**	**0.0380**	**0.5736**	**0.6117**	**61.1350**	**209.6654**	**270.8005**	**0.0820**	**5.0600e-003**	**274.3608**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1595	0.0424	0.2667	2.7000e-004		4.5700e-003	4.5700e-003		4.5700e-003	4.5700e-003	0.0000	50.8507	50.8507	1.4100e-003	9.2000e-004	51.1612
Energy	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687
Mobile	0.0353	0.1524	0.4319	1.4800e-003	0.1422	1.1700e-003	0.1433	0.0380	1.0900e-003	0.0391		149.7599	149.7599	5.2300e-003		149.8907
Total	**0.1985**	**0.2268**	**0.7123**	**1.9500e-003**	**0.1422**	**8.3300e-003**	**0.1505**	**0.0380**	**8.2500e-003**	**0.0463**	**0.0000**	**241.5360**	**241.5360**	**7.4200e-003**	**1.6700e-003**	**242.2206**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	93.99	8.24	84.90	78.96	0.00	98.55	78.98	0.00	98.56	92.43	100.00	-15.20	10.81	90.96	67.00	11.71

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Phase 1 - Site Preparation	Site Preparation	7/1/2020	8/11/2020	5	30	
2	Phase 1 - Grading	Grading	8/12/2020	9/8/2020	5	20	
3	Phase 1 - Utilities	Trenching	9/9/2020	10/6/2020	5	20	
4	Phase 1 - Paving	Paving	10/6/2020	12/4/2020	5	44	
5	Phase 2 - Site Preparation	Site Preparation	1/1/2021	1/14/2021	5	10	
6	Phase 2 - Grading	Grading	1/15/2021	2/25/2021	5	30	
7	Phase 2 - Building Construction	Building Construction	2/26/2021	12/2/2021	5	200	
8	Phase 2 - Architectural Coating	Architectural Coating	12/3/2021	12/16/2021	5	10	
9	Phase 2 - Paving	Paving	12/17/2021	12/30/2021	5	10	
10	Phase 3 - Site Preparation	Site Preparation	1/1/2022	1/14/2022	5	10	
11	Phase 3 - Grading	Grading	1/15/2022	2/25/2022	5	30	
12	Phase 3 - Building Construction	Building Construction	2/26/2022	12/2/2022	5	200	
13	Phase 3 - Architectural Coating	Architectural Coating	12/3/2022	12/16/2022	5	10	
14	Phase 3 - Paving	Paving	12/17/2022	12/30/2022	5	10	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.52

Residential Indoor: 10,935; Residential Outdoor: 3,645; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 1,380 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Phase 2 - Architectural Coating	Air Compressors	1	6.00	78	0.48
Phase 1 - Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Phase 2 - Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Phase 2 - Building Construction	Generator Sets	1	1.00	84	0.74
Phase 2 - Building Construction	Cranes	1	1.00	231	0.29
Phase 2 - Building Construction	Forklifts	1	6.00	89	0.20
Phase 1 - Site Preparation	Graders	1	8.00	187	0.41
Phase 1 - Paving	Pavers	1	6.00	130	0.42
Phase 1 - Paving	Rollers	1	7.00	80	0.38
Phase 2 - Grading	Graders	1	4.00	187	0.41
Phase 1 - Grading	Rubber Tired Dozers	1	6.00	247	0.40
Phase 2 - Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Phase 2 - Site Preparation	Graders	1	8.00	187	0.41
Phase 1 - Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Phase 1 - Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 1 - Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 1 - Grading	Graders	1	6.00	187	0.41
Phase 1 - Paving	Paving Equipment	1	8.00	132	0.36
Phase 1 - Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Phase 2 - Building Construction	Welders	0	8.00	46	0.45
Phase 2 - Paving	Pavers	1	6.00	130	0.42
Phase 2 - Paving	Paving Equipment	1	8.00	132	0.36
Phase 2 - Paving	Rollers	1	7.00	80	0.38

Phase 2 - Grading	Rubber Tired Dozers	1	4.00	247	0.40
Phase 2 - Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Phase 2 - Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Phase 2 - Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 2 - Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 3 - Architectural Coating	Air Compressors	1	6.00	78	0.48
Phase 3 - Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Phase 3 - Building Construction	Cranes	1	1.00	231	0.29
Phase 3 - Building Construction	Forklifts	1	6.00	89	0.20
Phase 3 - Building Construction	Generator Sets	1	1.00	84	0.74
Phase 3 - Grading	Graders	1	4.00	187	0.41
Phase 3 - Site Preparation	Graders	1	8.00	187	0.41
Phase 3 - Paving	Pavers	1	6.00	130	0.42
Phase 3 - Paving	Paving Equipment	1	8.00	132	0.36
Phase 3 - Paving	Rollers	1	7.00	80	0.38
Phase 3 - Grading	Rubber Tired Dozers	1	4.00	247	0.40
Phase 3 - Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Phase 3 - Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Phase 3 - Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Phase 3 - Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 3 - Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 3 - Building Construction	Welders	0	8.00	46	0.45
Phase 1 - Utilities	Trenchers	2	8.00	78	0.50
Phase 2 - Grading	Bore/Drill Rigs	1	8.00	221	0.50
Phase 3 - Grading	Bore/Drill Rigs	1	8.00	221	0.50
Phase 1 - Utilities	Tractors/Loaders/Backhoes	1	4.00	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 - Utilities	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Grading	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Building Construction	4	20.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Building Construction	4	20.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Clean Paved Roads

3.2 Phase 1 - Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.6299	18.3464	7.7093	0.0172		0.8210	0.8210		0.7553	0.7553		1,667.4119	1,667.4119	0.5393		1,680.8937
Total	**1.6299**	**18.3464**	**7.7093**	**0.0172**	**5.7996**	**0.8210**	**6.6205**	**2.9537**	**0.7553**	**3.7090**		**1,667.4119**	**1,667.4119**	**0.5393**		**1,680.8937**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0295	0.0214	0.2061	6.1000e-004	0.0657	4.2000e-004	0.0661	0.0174	3.9000e-004	0.0178		60.6008	60.6008	1.5100e-003		60.6384
Total	**0.0295**	**0.0214**	**0.2061**	**6.1000e-004**	**0.0657**	**4.2000e-004**	**0.0661**	**0.0174**	**3.9000e-004**	**0.0178**		**60.6008**	**60.6008**	**1.5100e-003**		**60.6384**

3.2 Phase 1 - Site Preparation - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.6098	0.0000	2.6098	1.3292	0.0000	1.3292			0.0000			0.0000
Off-Road	0.4212	8.4089	9.8221	0.0172		0.3747	0.3747		0.3747	0.3747	0.0000	1,667.4119	1,667.4119	0.5393		1,680.893 7
Total	**0.4212**	**8.4089**	**9.8221**	**0.0172**	**2.6098**	**0.3747**	**2.9845**	**1.3292**	**0.3747**	**1.7039**	**0.0000**	**1,667.411 9**	**1,667.411 9**	**0.5393**		**1,680.893 7**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0295	0.0214	0.2061	6.1000e-004	0.0623	4.2000e-004	0.0627	0.0166	3.9000e-004	0.0170		60.6008	60.6008	1.5100e-003		60.6384
Total	**0.0295**	**0.0214**	**0.2061**	**6.1000e-004**	**0.0623**	**4.2000e-004**	**0.0627**	**0.0166**	**3.9000e-004**	**0.0170**		**60.6008**	**60.6008**	**1.5100e-003**		**60.6384**

3.3 Phase 1 - Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9143	0.0000	4.9143	2.5256	0.0000	2.5256			0.0000			0.0000
Off-Road	1.3498	15.0854	6.4543	0.0141		0.6844	0.6844		0.6296	0.6296		1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**1.3498**	**15.0854**	**6.4543**	**0.0141**	**4.9143**	**0.6844**	**5.5986**	**2.5256**	**0.6296**	**3.1552**		**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0295	0.0214	0.2061	6.1000e-004	0.0657	4.2000e-004	0.0661	0.0174	3.9000e-004	0.0178		60.6008	60.6008	1.5100e-003		60.6384
Total	**0.0295**	**0.0214**	**0.2061**	**6.1000e-004**	**0.0657**	**4.2000e-004**	**0.0661**	**0.0174**	**3.9000e-004**	**0.0178**		**60.6008**	**60.6008**	**1.5100e-003**		**60.6384**

3.3 Phase 1 - Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.2114	0.0000	2.2114	1.1365	0.0000	1.1365			0.0000			0.0000
Off-Road	0.3450	6.9025	8.0841	0.0141		0.3106	0.3106		0.3106	0.3106	0.0000	1,365.718 3	1,365.718 3	0.4417		1,376.760 9
Total	**0.3450**	**6.9025**	**8.0841**	**0.0141**	**2.2114**	**0.3106**	**2.5220**	**1.1365**	**0.3106**	**1.4471**	**0.0000**	**1,365.718 3**	**1,365.718 3**	**0.4417**		**1,376.760 9**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0295	0.0214	0.2061	6.1000e-004	0.0623	4.2000e-004	0.0627	0.0166	3.9000e-004	0.0170		60.6008	60.6008	1.5100e-003		60.6384
Total	**0.0295**	**0.0214**	**0.2061**	**6.1000e-004**	**0.0623**	**4.2000e-004**	**0.0627**	**0.0166**	**3.9000e-004**	**0.0170**		**60.6008**	**60.6008**	**1.5100e-003**		**60.6384**

3.4 Phase 1 - Utilities - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9438	8.6414	6.4079	8.2900e-003		0.6348	0.6348		0.5840	0.5840		803.3988	803.3988	0.2598		809.8946
Total	**0.9438**	**8.6414**	**6.4079**	**8.2900e-003**		**0.6348**	**0.6348**		**0.5840**	**0.5840**		**803.3988**	**803.3988**	**0.2598**		**809.8946**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0295	0.0214	0.2061	6.1000e-004	0.0657	4.2000e-004	0.0661	0.0174	3.9000e-004	0.0178		60.6008	60.6008	1.5100e-003		60.6384
Total	**0.0295**	**0.0214**	**0.2061**	**6.1000e-004**	**0.0657**	**4.2000e-004**	**0.0661**	**0.0174**	**3.9000e-004**	**0.0178**		**60.6008**	**60.6008**	**1.5100e-003**		**60.6384**

3.4 Phase 1 - Utilities - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2029	4.6331	6.2563	8.2900e-003		0.3247	0.3247		0.3247	0.3247	0.0000	803.3988	803.3988	0.2598		809.8946
Total	**0.2029**	**4.6331**	**6.2563**	**8.2900e-003**		**0.3247**	**0.3247**		**0.3247**	**0.3247**	**0.0000**	**803.3988**	**803.3988**	**0.2598**		**809.8946**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0295	0.0214	0.2061	6.1000e-004	0.0623	4.2000e-004	0.0627	0.0166	3.9000e-004	0.0170		60.6008	60.6008	1.5100e-003		60.6384
Total	**0.0295**	**0.0214**	**0.2061**	**6.1000e-004**	**0.0623**	**4.2000e-004**	**0.0627**	**0.0166**	**3.9000e-004**	**0.0170**		**60.6008**	**60.6008**	**1.5100e-003**		**60.6384**

3.5 Phase 1 - Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8402	8.4514	8.8758	0.0135		0.4695	0.4695		0.4328	0.4328		1,296.946 1	1,296.946 1	0.4111		1,307.224 6
Paving	0.0155					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8556**	**8.4514**	**8.8758**	**0.0135**		**0.4695**	**0.4695**		**0.4328**	**0.4328**		**1,296.946 1**	**1,296.946 1**	**0.4111**		**1,307.224 6**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0479	0.0348	0.3349	9.9000e-004	0.1068	6.9000e-004	0.1075	0.0283	6.3000e-004	0.0290		98.4762	98.4762	2.4500e-003		98.5374
Total	**0.0479**	**0.0348**	**0.3349**	**9.9000e-004**	**0.1068**	**6.9000e-004**	**0.1075**	**0.0283**	**6.3000e-004**	**0.0290**		**98.4762**	**98.4762**	**2.4500e-003**		**98.5374**

3.5 Phase 1 - Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3195	6.6399	9.8512	0.0135		0.3864	0.3864		0.3864	0.3864	0.0000	1,296.946 1	1,296.946 1	0.4111		1,307.224 6
Paving	0.0155					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.3350**	**6.6399**	**9.8512**	**0.0135**		**0.3864**	**0.3864**		**0.3864**	**0.3864**	**0.0000**	**1,296.946 1**	**1,296.946 1**	**0.4111**		**1,307.224 6**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0479	0.0348	0.3349	9.9000e-004	0.1012	6.9000e-004	0.1019	0.0270	6.3000e-004	0.0276		98.4762	98.4762	2.4500e-003		98.5374
Total	**0.0479**	**0.0348**	**0.3349**	**9.9000e-004**	**0.1012**	**6.9000e-004**	**0.1019**	**0.0270**	**6.3000e-004**	**0.0276**		**98.4762**	**98.4762**	**2.4500e-003**		**98.5374**

3.6 Phase 2 - Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.5558	17.4203	7.5605	0.0172		0.7654	0.7654		0.7041	0.7041		1,666.517 4	1,666.517 4	0.5390		1,679.992 0
Total	**1.5558**	**17.4203**	**7.5605**	**0.0172**	**5.7996**	**0.7654**	**6.5650**	**2.9537**	**0.7041**	**3.6578**		**1,666.517 4**	**1,666.517 4**	**0.5390**		**1,679.992 0**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0272	0.0191	0.1876	5.9000e-004	0.0657	4.1000e-004	0.0661	0.0174	3.8000e-004	0.0178		58.4524	58.4524	1.3400e-003		58.4860
Total	**0.0272**	**0.0191**	**0.1876**	**5.9000e-004**	**0.0657**	**4.1000e-004**	**0.0661**	**0.0174**	**3.8000e-004**	**0.0178**		**58.4524**	**58.4524**	**1.3400e-003**		**58.4860**

3.6 Phase 2 - Site Preparation - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.6098	0.0000	2.6098	1.3292	0.0000	1.3292			0.0000			0.0000
Off-Road	0.4212	8.4089	9.8221	0.0172		0.3747	0.3747		0.3747	0.3747	0.0000	1,666.517 4	1,666.517 4	0.5390		1,679.992 0
Total	**0.4212**	**8.4089**	**9.8221**	**0.0172**	**2.6098**	**0.3747**	**2.9845**	**1.3292**	**0.3747**	**1.7039**	**0.0000**	**1,666.517 4**	**1,666.517 4**	**0.5390**		**1,679.992 0**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0272	0.0191	0.1876	5.9000e-004	0.0623	4.1000e-004	0.0627	0.0166	3.8000e-004	0.0170		58.4524	58.4524	1.3400e-003		58.4860
Total	**0.0272**	**0.0191**	**0.1876**	**5.9000e-004**	**0.0623**	**4.1000e-004**	**0.0627**	**0.0166**	**3.8000e-004**	**0.0170**		**58.4524**	**58.4524**	**1.3400e-003**		**58.4860**

3.7 Phase 2 - Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.2762	0.0000	3.2762	1.6837	0.0000	1.6837			0.0000			0.0000
Off-Road	1.1717	13.1295	6.9542	0.0197		0.5495	0.5495		0.5056	0.5056		1,909.868 1	1,909.868 1	0.6177		1,925.310 4
Total	**1.1717**	**13.1295**	**6.9542**	**0.0197**	**3.2762**	**0.5495**	**3.8257**	**1.6837**	**0.5056**	**2.1893**		**1,909.868 1**	**1,909.868 1**	**0.6177**		**1,925.310 4**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0341	0.0239	0.2345	7.3000e-004	0.0822	5.2000e-004	0.0827	0.0218	4.7000e-004	0.0223		73.0656	73.0656	1.6800e-003		73.1075
Total	**0.0341**	**0.0239**	**0.2345**	**7.3000e-004**	**0.0822**	**5.2000e-004**	**0.0827**	**0.0218**	**4.7000e-004**	**0.0223**		**73.0656**	**73.0656**	**1.6800e-003**		**73.1075**

3.7 Phase 2 - Grading - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.4743	0.0000	1.4743	0.7577	0.0000	0.7577			0.0000			0.0000
Off-Road	0.4860	9.6289	11.1396	0.0197		0.4140	0.4140		0.4140	0.4140	0.0000	1,909.868 1	1,909.868 1	0.6177		1,925.310 4
Total	**0.4860**	**9.6289**	**11.1396**	**0.0197**	**1.4743**	**0.4140**	**1.8883**	**0.7577**	**0.4140**	**1.1717**	**0.0000**	**1,909.868 1**	**1,909.868 1**	**0.6177**		**1,925.310 4**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0341	0.0239	0.2345	7.3000e-004	0.0779	5.2000e-004	0.0784	0.0207	4.7000e-004	0.0212		73.0656	73.0656	1.6800e-003		73.1075
Total	**0.0341**	**0.0239**	**0.2345**	**7.3000e-004**	**0.0779**	**5.2000e-004**	**0.0784**	**0.0207**	**4.7000e-004**	**0.0212**		**73.0656**	**73.0656**	**1.6800e-003**		**73.1075**

3.8 Phase 2 - Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3337	3.3081	3.2795	5.0200e-003		0.1922	0.1922		0.1785	0.1785		484.4198	484.4198	0.1355		487.8063
Total	**0.3337**	**3.3081**	**3.2795**	**5.0200e-003**		**0.1922**	**0.1922**		**0.1785**	**0.1785**		**484.4198**	**484.4198**	**0.1355**		**487.8063**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0136	0.4126	0.1133	1.0600e-003	0.0271	9.5000e-004	0.0280	7.7900e-003	9.0000e-004	8.7000e-003		112.2708	112.2708	5.5500e-003		112.4096
Worker	0.0681	0.0478	0.4690	1.4700e-003	0.1643	1.0300e-003	0.1653	0.0436	9.5000e-004	0.0445		146.1311	146.1311	3.3500e-003		146.2150
Total	**0.0817**	**0.4604**	**0.5823**	**2.5300e-003**	**0.1914**	**1.9800e-003**	**0.1934**	**0.0514**	**1.8500e-003**	**0.0532**		**258.4019**	**258.4019**	**8.9000e-003**		**258.6246**

3.8 Phase 2 - Building Construction - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.1194	2.6641	3.5188	5.0200e-003		0.1757	0.1757		0.1757	0.1757	0.0000	484.4198	484.4198	0.1355		487.8063
Total	**0.1194**	**2.6641**	**3.5188**	**5.0200e-003**		**0.1757**	**0.1757**		**0.1757**	**0.1757**	**0.0000**	**484.4198**	**484.4198**	**0.1355**		**487.8063**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0136	0.4126	0.1133	1.0600e-003	0.0259	9.5000e-004	0.0269	7.5100e-003	9.0000e-004	8.4100e-003		112.2708	112.2708	5.5500e-003		112.4096
Worker	0.0681	0.0478	0.4690	1.4700e-003	0.1557	1.0300e-003	0.1568	0.0415	9.5000e-004	0.0424		146.1311	146.1311	3.3500e-003		146.2150
Total	**0.0817**	**0.4604**	**0.5823**	**2.5300e-003**	**0.1817**	**1.9800e-003**	**0.1836**	**0.0490**	**1.8500e-003**	**0.0508**		**258.4019**	**258.4019**	**8.9000e-003**		**258.6246**

3.9 Phase 2 - Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.5620					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2189	1.5268	1.8176	2.9700e-003		0.0941	0.0941		0.0941	0.0941		281.4481	281.4481	0.0193		281.9309
Total	**8.7809**	**1.5268**	**1.8176**	**2.9700e-003**		**0.0941**	**0.0941**		**0.0941**	**0.0941**		**281.4481**	**281.4481**	**0.0193**		**281.9309**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0272	0.0191	0.1876	5.9000e-004	0.0657	4.1000e-004	0.0661	0.0174	3.8000e-004	0.0178		58.4524	58.4524	1.3400e-003		58.4860
Total	**0.0272**	**0.0191**	**0.1876**	**5.9000e-004**	**0.0657**	**4.1000e-004**	**0.0661**	**0.0174**	**3.8000e-004**	**0.0178**		**58.4524**	**58.4524**	**1.3400e-003**		**58.4860**

3.9 Phase 2 - Architectural Coating - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.5620					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0594	1.3570	1.8324	2.9700e-003		0.0951	0.0951		0.0951	0.0951	0.0000	281.4481	281.4481	0.0193		281.9309
Total	**8.6214**	**1.3570**	**1.8324**	**2.9700e-003**		**0.0951**	**0.0951**		**0.0951**	**0.0951**	**0.0000**	**281.4481**	**281.4481**	**0.0193**		**281.9309**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0272	0.0191	0.1876	5.9000e-004	0.0623	4.1000e-004	0.0627	0.0166	3.8000e-004	0.0170		58.4524	58.4524	1.3400e-003		58.4860
Total	**0.0272**	**0.0191**	**0.1876**	**5.9000e-004**	**0.0623**	**4.1000e-004**	**0.0627**	**0.0166**	**3.8000e-004**	**0.0170**		**58.4524**	**58.4524**	**1.3400e-003**		**58.4860**

3.10 Phase 2 - Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7739	7.7422	8.8569	0.0135		0.4153	0.4153		0.3830	0.3830		1,296.8664	1,296.8664	0.4111		1,307.1442
Paving	0.0681					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8420**	**7.7422**	**8.8569**	**0.0135**		**0.4153**	**0.4153**		**0.3830**	**0.3830**		**1,296.8664**	**1,296.8664**	**0.4111**		**1,307.1442**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0443	0.0311	0.3048	9.5000e-004	0.1068	6.7000e-004	0.1075	0.0283	6.2000e-004	0.0289		94.9852	94.9852	2.1800e-003		95.0397
Total	**0.0443**	**0.0311**	**0.3048**	**9.5000e-004**	**0.1068**	**6.7000e-004**	**0.1075**	**0.0283**	**6.2000e-004**	**0.0289**		**94.9852**	**94.9852**	**2.1800e-003**		**95.0397**

3.10 Phase 2 - Paving - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3195	6.6399	9.8512	0.0135		0.3864	0.3864		0.3864	0.3864	0.0000	1,296.8664	1,296.8664	0.4111		1,307.1442
Paving	0.0681					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.3876**	**6.6399**	**9.8512**	**0.0135**		**0.3864**	**0.3864**		**0.3864**	**0.3864**	**0.0000**	**1,296.8664**	**1,296.8664**	**0.4111**		**1,307.1442**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0443	0.0311	0.3048	9.5000e-004	0.1012	6.7000e-004	0.1019	0.0270	6.2000e-004	0.0276		94.9852	94.9852	2.1800e-003		95.0397
Total	**0.0443**	**0.0311**	**0.3048**	**9.5000e-004**	**0.1012**	**6.7000e-004**	**0.1019**	**0.0270**	**6.2000e-004**	**0.0276**		**94.9852**	**94.9852**	**2.1800e-003**		**95.0397**

3.11 Phase 3 - Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.3122	14.6277	7.0939	0.0172		0.6225	0.6225		0.5727	0.5727		1,666.1738	1,666.1738	0.5389		1,679.6457
Total	**1.3122**	**14.6277**	**7.0939**	**0.0172**	**5.7996**	**0.6225**	**6.4221**	**2.9537**	**0.5727**	**3.5264**		**1,666.1738**	**1,666.1738**	**0.5389**		**1,679.6457**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0253	0.0171	0.1721	5.6000e-004	0.0657	4.0000e-004	0.0661	0.0174	3.7000e-004	0.0178		56.2825	56.2825	1.2000e-003		56.3125
Total	**0.0253**	**0.0171**	**0.1721**	**5.6000e-004**	**0.0657**	**4.0000e-004**	**0.0661**	**0.0174**	**3.7000e-004**	**0.0178**		**56.2825**	**56.2825**	**1.2000e-003**		**56.3125**

3.11 Phase 3 - Site Preparation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.6098	0.0000	2.6098	1.3292	0.0000	1.3292			0.0000			0.0000
Off-Road	0.4212	8.4089	9.8221	0.0172		0.3747	0.3747		0.3747	0.3747	0.0000	1,666.173 8	1,666.173 8	0.5389		1,679.645 7
Total	**0.4212**	**8.4089**	**9.8221**	**0.0172**	**2.6098**	**0.3747**	**2.9845**	**1.3292**	**0.3747**	**1.7039**	**0.0000**	**1,666.173 8**	**1,666.173 8**	**0.5389**		**1,679.645 7**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0253	0.0171	0.1721	5.6000e-004	0.0623	4.0000e-004	0.0627	0.0166	3.7000e-004	0.0170		56.2825	56.2825	1.2000e-003		56.3125
Total	**0.0253**	**0.0171**	**0.1721**	**5.6000e-004**	**0.0623**	**4.0000e-004**	**0.0627**	**0.0166**	**3.7000e-004**	**0.0170**		**56.2825**	**56.2825**	**1.2000e-003**		**56.3125**

3.12 Phase 3 - Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.2762	0.0000	3.2762	1.6837	0.0000	1.6837			0.0000			0.0000
Off-Road	0.9943	10.7582	6.6512	0.0197		0.4439	0.4439		0.4084	0.4084		1,911.3021	1,911.3021	0.6182		1,926.7559
Total	**0.9943**	**10.7582**	**6.6512**	**0.0197**	**3.2762**	**0.4439**	**3.7201**	**1.6837**	**0.4084**	**2.0921**		**1,911.3021**	**1,911.3021**	**0.6182**		**1,926.7559**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0317	0.0214	0.2151	7.1000e-004	0.0822	5.0000e-004	0.0827	0.0218	4.6000e-004	0.0223		70.3531	70.3531	1.5000e-003		70.3906
Total	**0.0317**	**0.0214**	**0.2151**	**7.1000e-004**	**0.0822**	**5.0000e-004**	**0.0827**	**0.0218**	**4.6000e-004**	**0.0223**		**70.3531**	**70.3531**	**1.5000e-003**		**70.3906**

3.12 Phase 3 - Grading - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.4743	0.0000	1.4743	0.7577	0.0000	0.7577			0.0000			0.0000
Off-Road	0.4860	9.6289	11.1396	0.0197		0.4140	0.4140		0.4140	0.4140	0.0000	1,911.3021	1,911.3021	0.6182		1,926.7559
Total	**0.4860**	**9.6289**	**11.1396**	**0.0197**	**1.4743**	**0.4140**	**1.8883**	**0.7577**	**0.4140**	**1.1717**	**0.0000**	**1,911.3021**	**1,911.3021**	**0.6182**		**1,926.7559**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0317	0.0214	0.2151	7.1000e-004	0.0779	5.0000e-004	0.0784	0.0207	4.6000e-004	0.0212		70.3531	70.3531	1.5000e-003		70.3906
Total	**0.0317**	**0.0214**	**0.2151**	**7.1000e-004**	**0.0779**	**5.0000e-004**	**0.0784**	**0.0207**	**4.6000e-004**	**0.0212**		**70.3531**	**70.3531**	**1.5000e-003**		**70.3906**

3.13 Phase 3 - Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2966	2.9370	3.2398	5.0200e-003		0.1601	0.1601		0.1487	0.1487		484.6855	484.6855	0.1353		488.0672
Total	**0.2966**	**2.9370**	**3.2398**	**5.0200e-003**		**0.1601**	**0.1601**		**0.1487**	**0.1487**		**484.6855**	**484.6855**	**0.1353**		**488.0672**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0127	0.3896	0.1063	1.0500e-003	0.0271	8.2000e-004	0.0279	7.7900e-003	7.8000e-004	8.5800e-003		111.1967	111.1967	5.2600e-003		111.3283
Worker	0.0634	0.0428	0.4302	1.4100e-003	0.1643	1.0100e-003	0.1653	0.0436	9.3000e-004	0.0445		140.7062	140.7062	3.0000e-003		140.7813
Total	**0.0760**	**0.4325**	**0.5364**	**2.4600e-003**	**0.1914**	**1.8300e-003**	**0.1932**	**0.0514**	**1.7100e-003**	**0.0531**		**251.9029**	**251.9029**	**8.2600e-003**		**252.1096**

3.13 Phase 3 - Building Construction - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.1194	2.6641	3.5188	5.0200e-003		0.1757	0.1757		0.1757	0.1757	0.0000	484.6855	484.6855	0.1353		488.0672
Total	**0.1194**	**2.6641**	**3.5188**	**5.0200e-003**		**0.1757**	**0.1757**		**0.1757**	**0.1757**	**0.0000**	**484.6855**	**484.6855**	**0.1353**		**488.0672**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0127	0.3896	0.1063	1.0500e-003	0.0259	8.2000e-004	0.0267	7.5100e-003	7.8000e-004	8.2900e-003		111.1967	111.1967	5.2600e-003		111.3283
Worker	0.0634	0.0428	0.4302	1.4100e-003	0.1557	1.0100e-003	0.1567	0.0415	9.3000e-004	0.0424		140.7062	140.7062	3.0000e-003		140.7813
Total	**0.0760**	**0.4325**	**0.5364**	**2.4600e-003**	**0.1817**	**1.8300e-003**	**0.1835**	**0.0490**	**1.7100e-003**	**0.0507**		**251.9029**	**251.9029**	**8.2600e-003**		**252.1096**

3.14 Phase 3 - Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.5620					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**8.7665**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0253	0.0171	0.1721	5.6000e-004	0.0657	4.0000e-004	0.0661	0.0174	3.7000e-004	0.0178		56.2825	56.2825	1.2000e-003		56.3125
Total	**0.0253**	**0.0171**	**0.1721**	**5.6000e-004**	**0.0657**	**4.0000e-004**	**0.0661**	**0.0174**	**3.7000e-004**	**0.0178**		**56.2825**	**56.2825**	**1.2000e-003**		**56.3125**

3.14 Phase 3 - Architectural Coating - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.5620					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0594	1.3570	1.8324	2.9700e-003		0.0951	0.0951		0.0951	0.0951	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**8.6214**	**1.3570**	**1.8324**	**2.9700e-003**		**0.0951**	**0.0951**		**0.0951**	**0.0951**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0253	0.0171	0.1721	5.6000e-004	0.0623	4.0000e-004	0.0627	0.0166	3.7000e-004	0.0170		56.2825	56.2825	1.2000e-003		56.3125
Total	**0.0253**	**0.0171**	**0.1721**	**5.6000e-004**	**0.0623**	**4.0000e-004**	**0.0627**	**0.0166**	**3.7000e-004**	**0.0170**		**56.2825**	**56.2825**	**1.2000e-003**		**56.3125**

3.15 Phase 3 - Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6877	6.7738	8.8060	0.0135		0.3474	0.3474		0.3205	0.3205		1,297.378 9	1,297.378 9	0.4113		1,307.660 8
Paving	0.0681					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.7558**	**6.7738**	**8.8060**	**0.0135**		**0.3474**	**0.3474**		**0.3205**	**0.3205**		**1,297.378 9**	**1,297.378 9**	**0.4113**		**1,307.660 8**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0412	0.0278	0.2796	9.2000e-004	0.1068	6.5000e-004	0.1075	0.0283	6.0000e-004	0.0289		91.4590	91.4590	1.9500e-003		91.5078
Total	**0.0412**	**0.0278**	**0.2796**	**9.2000e-004**	**0.1068**	**6.5000e-004**	**0.1075**	**0.0283**	**6.0000e-004**	**0.0289**		**91.4590**	**91.4590**	**1.9500e-003**		**91.5078**

3.15 Phase 3 - Paving - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3195	6.6399	9.8512	0.0135		0.3864	0.3864		0.3864	0.3864	0.0000	1,297.378 9	1,297.378 9	0.4113		1,307.660 8
Paving	0.0681					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.3876**	**6.6399**	**9.8512**	**0.0135**		**0.3864**	**0.3864**		**0.3864**	**0.3864**	**0.0000**	**1,297.378 9**	**1,297.378 9**	**0.4113**		**1,307.660 8**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0412	0.0278	0.2796	9.2000e-004	0.1012	6.5000e-004	0.1019	0.0270	6.0000e-004	0.0276		91.4590	91.4590	1.9500e-003		91.5078
Total	**0.0412**	**0.0278**	**0.2796**	**9.2000e-004**	**0.1012**	**6.5000e-004**	**0.1019**	**0.0270**	**6.0000e-004**	**0.0276**		**91.4590**	**91.4590**	**1.9500e-003**		**91.5078**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0353	0.1524	0.4319	1.4800e-003	0.1422	1.1700e-003	0.1433	0.0380	1.0900e-003	0.0391		149.7599	149.7599	5.2300e-003		149.8907
Unmitigated	0.0353	0.1524	0.4319	1.4800e-003	0.1422	1.1700e-003	0.1433	0.0380	1.0900e-003	0.0391		149.7599	149.7599	5.2300e-003		149.8907

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	28.98	28.98	28.98	66,932	66,932
Total	28.98	28.98	28.98	66,932	66,932

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.590657	0.037535	0.185105	0.118290	0.015611	0.005013	0.010768	0.024764	0.001635	0.001742	0.005351	0.002726	0.000802
Other Non-Asphalt Surfaces	0.590657	0.037535	0.185105	0.118290	0.015611	0.005013	0.010768	0.024764	0.001635	0.001742	0.005351	0.002726	0.000802
Single Family Housing	0.590657	0.037535	0.185105	0.118290	0.015611	0.005013	0.010768	0.024764	0.001635	0.001742	0.005351	0.002726	0.000802

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687
NaturalGas Unmitigated	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	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
Other Non-Asphalt Surfaces	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
Single Family Housing	347.867	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687
Total		**3.7500e-003**	**0.0321**	**0.0136**	**2.0000e-004**		**2.5900e-003**	**2.5900e-003**		**2.5900e-003**	**2.5900e-003**		**40.9255**	**40.9255**	**7.8000e-004**	**7.5000e-004**	**41.1687**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	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
Other Non-Asphalt Surfaces	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
Single Family Housing	0.347867	3.7500e-003	0.0321	0.0136	2.0000e-004		2.5900e-003	2.5900e-003		2.5900e-003	2.5900e-003		40.9255	40.9255	7.8000e-004	7.5000e-004	41.1687
Total		**3.7500e-003**	**0.0321**	**0.0136**	**2.0000e-004**		**2.5900e-003**	**2.5900e-003**		**2.5900e-003**	**2.5900e-003**		**40.9255**	**40.9255**	**7.8000e-004**	**7.5000e-004**	**41.1687**

6.0 Area Detail

6.1 Mitigation Measures Area

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1595	0.0424	0.2667	2.7000e-004		4.5700e-003	4.5700e-003		4.5700e-003	4.5700e-003	0.0000	50.8507	50.8507	1.4100e-003	9.2000e-004	51.1612
Unmitigated	3.2638	0.0627	4.2708	7.5900e-003		0.5700	0.5700		0.5700	0.5700	61.1350	18.9801	80.1151	0.0760	4.3100e-003	83.3015

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0235					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1237					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	3.1090	0.0599	4.0209	7.5700e-003		0.5686	0.5686		0.5686	0.5686	61.1350	18.5294	79.6644	0.0756	4.3100e-003	82.8397
Landscaping	7.6800e-003	2.8800e-003	0.2499	1.0000e-005		1.3800e-003	1.3800e-003		1.3800e-003	1.3800e-003		0.4507	0.4507	4.4000e-004		0.4617
Total	**3.2638**	**0.0627**	**4.2708**	**7.5800e-003**		**0.5700**	**0.5700**		**0.5700**	**0.5700**	**61.1350**	**18.9801**	**80.1151**	**0.0760**	**4.3100e-003**	**83.3015**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0235					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1237					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	4.6200e-003	0.0395	0.0168	2.5000e-004		3.1900e-003	3.1900e-003		3.1900e-003	3.1900e-003	0.0000	50.4000	50.4000	9.7000e-004	9.2000e-004	50.6995
Landscaping	7.6800e-003	2.8800e-003	0.2499	1.0000e-005		1.3800e-003	1.3800e-003		1.3800e-003	1.3800e-003		0.4507	0.4507	4.4000e-004		0.4617
Total	**0.1595**	**0.0424**	**0.2667**	**2.6000e-004**		**4.5700e-003**	**4.5700e-003**		**4.5700e-003**	**4.5700e-003**	**0.0000**	**50.8507**	**50.8507**	**1.4100e-003**	**9.2000e-004**	**51.1612**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Attachment E

Appendix GHG

MIB-02 88 Sunnyside Lane

Contra Costa County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	3.00	Dwelling Unit	1.17	5,400.00	9
Other Asphalt Surfaces	11.50	1000sqft	0.26	11,500.00	0
Other Non-Asphalt Surfaces	11.50	1000sqft	0.26	11,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	5			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Residential development envelope = 1.17 acres.
Other asphalt surfaces = Sunnyside Lane widening and access driveways
Other non-asphalt surfaces = utilities, slope stabilization, and turnaround areas.

Construction Phase - Phasing per project applicant.
Trenching added for installation of underground utilities.
Phase 2 and Phase 3 grading includes piers for slope stablization walls and foundation support.

Off-road Equipment - Trenchers for undeeground utilities.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Bore/Drill Rigs for instalion of slope retention and foundation support piers.

Off-road Equipment - Wood-frame construction, no welders.
Limited use of cranes required.
Grid power to be used as soon a practical (limited generator use).

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Bore/Drill Rigs for instalion of slope retention and foundation support piers.

Off-road Equipment - Wood-frame construction, no welders.
Limited use of cranes required.
Grid power to be used as soon a practical (limited generator use).

Off-road Equipment -

Off-road Equipment -

Grading -

Trips and VMT - Max building crew size = 10, paint crew size = 4.

Vehicle Trips - Trip rate per ISMND Traffic Section (29 total project average daily trips).

Construction Off-road Equipment Mitigation - Dust mitigation per BAAQMD BCMMs (MM 4.3-1).
Tier-3 per MM 4.3-1.

Area Mitigation - No wordburning devices in new construction per BAAQMD Reg 6 Rule 3.

Energy Mitigation - On-site solar required per 2019 Title 24.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	6
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	13
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	12.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	2.00	10.00
tblConstructionPhase	NumDays	4.00	20.00
tblConstructionPhase	NumDays	10.00	44.00
tblConstructionPhase	NumDays	2.00	30.00
tblConstructionPhase	NumDays	4.00	30.00
tblConstructionPhase	NumDays	2.00	10.00
tblConstructionPhase	NumDays	4.00	30.00
tblConstructionPhase	PhaseEndDate	6/9/2021	12/16/2021
tblConstructionPhase	PhaseEndDate	5/12/2021	12/2/2021
tblConstructionPhase	PhaseEndDate	8/5/2020	9/8/2020
tblConstructionPhase	PhaseEndDate	5/26/2021	12/4/2020
tblConstructionPhase	PhaseEndDate	7/30/2020	8/11/2020
tblConstructionPhase	PhaseStartDate	5/27/2021	12/3/2021
tblConstructionPhase	PhaseStartDate	8/6/2020	2/26/2021
tblConstructionPhase	PhaseStartDate	7/31/2020	8/12/2020
tblConstructionPhase	PhaseStartDate	5/13/2021	10/6/2020
tblConstructionPhase	PhaseStartDate	7/29/2020	7/1/2020
tblLandUse	LotAcreage	0.97	1.17
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	UsageHours	8.00	1.00
tblOffRoadEquipment	UsageHours	6.00	1.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	1.00
tblOffRoadEquipment	UsageHours	8.00	1.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblTripsAndVMT	WorkerTripNumber	11.00	20.00
tblTripsAndVMT	WorkerTripNumber	2.00	8.00
tblTripsAndVMT	WorkerTripNumber	2.00	8.00
tblTripsAndVMT	WorkerTripNumber	11.00	20.00
tblVehicleTrips	ST_TR	9.91	9.66
tblVehicleTrips	SU_TR	8.62	9.66
tblVehicleTrips	WD_TR	9.52	9.66

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0681	0.6998	0.4538	8.2000e-004	0.1406	0.0359	0.1765	0.0708	0.0330	0.1038	0.0000	72.1904	72.1904	0.0220	0.0000	72.7405
2021	0.1153	0.7075	0.5865	1.2400e-003	0.0990	0.0341	0.1330	0.0456	0.0315	0.0772	0.0000	110.3957	110.3957	0.0259	0.0000	111.0437
2022	0.1066	0.6126	0.5705	1.2400e-003	0.0990	0.0281	0.1271	0.0456	0.0261	0.0717	0.0000	109.7702	109.7702	0.0258	0.0000	110.4163
Maximum	**0.1153**	**0.7075**	**0.5865**	**1.2400e-003**	**0.1406**	**0.0359**	**0.1765**	**0.0708**	**0.0330**	**0.1038**	**0.0000**	**110.3957**	**110.3957**	**0.0259**	**0.0000**	**111.0437**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0211	0.3889	0.5217	8.2000e-004	0.0655	0.0205	0.0860	0.0324	0.0205	0.0529	0.0000	72.1903	72.1903	0.0220	0.0000	72.7404
2021	0.0748	0.5392	0.6896	1.2400e-003	0.0549	0.0283	0.0832	0.0234	0.0283	0.0516	0.0000	110.3956	110.3956	0.0259	0.0000	111.0436
2022	0.0742	0.5364	0.6846	1.2400e-003	0.0549	0.0283	0.0832	0.0234	0.0282	0.0516	0.0000	109.7701	109.7701	0.0258	0.0000	110.4162
Maximum	**0.0748**	**0.5392**	**0.6896**	**1.2400e-003**	**0.0655**	**0.0283**	**0.0860**	**0.0324**	**0.0283**	**0.0529**	**0.0000**	**110.3956**	**110.3956**	**0.0259**	**0.0000**	**111.0436**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**41.34**	**27.50**	**-17.70**	**0.00**	**48.19**	**21.44**	**42.19**	**51.15**	**15.02**	**38.19**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**7-1-2020**	**9-30-2020**	0.5408	0.2445
2	**10-1-2020**	**12-31-2020**	0.2219	0.1617
3	**1-1-2021**	**3-31-2021**	0.3613	0.2374
4	**4-1-2021**	**6-30-2021**	0.1355	0.1076
5	**7-1-2021**	**9-30-2021**	0.1370	0.1088
6	**10-1-2021**	**12-31-2021**	0.1892	0.1605
7	**1-1-2022**	**3-31-2022**	0.3024	0.2369
8	**4-1-2022**	**6-30-2022**	0.1212	0.1066
9	**7-1-2022**	**9-30-2022**	0.1225	0.1077
		Highest	0.5408	0.2445

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	0.0452	6.5000e-004	0.0482	5.0000e-005		3.8300e-003	3.8300e-003		3.8300e-003	3.8300e-003	0.3813	0.1304	0.5118	7.6000e-004	2.0000e-005	0.5372
Energy	6.8000e-004	5.8500e-003	2.4900e-003	4.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	13.7423	13.7423	4.4000e-004	1.9000e-004	13.8098
Mobile	6.5800e-003	0.0271	0.0750	2.7000e-004	0.0250	2.1000e-004	0.0252	6.7100e-003	2.0000e-004	6.9000e-003	0.0000	25.0230	25.0230	8.4000e-004	0.0000	25.0441
Waste						0.0000	0.0000		0.0000	0.0000	0.7673	0.0000	0.7673	0.0454	0.0000	1.9010
Water						0.0000	0.0000		0.0000	0.0000	0.0620	0.4332	0.4952	6.3900e-003	1.5000e-004	0.7009
Total	**0.0525**	**0.0336**	**0.1257**	**3.6000e-004**	**0.0250**	**4.5100e-003**	**0.0295**	**6.7100e-003**	**4.5000e-003**	**0.0112**	**1.2107**	**39.3289**	**40.5395**	**0.0538**	**3.6000e-004**	**41.9930**

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	0.0276	4.8000e-004	0.0226	0.0000		1.4000e-004	1.4000e-004		1.4000e-004	1.4000e-004	0.0000	0.2915	0.2915	4.0000e-005	0.0000	0.2939
Energy	6.8000e-004	5.8500e-003	2.4900e-003	4.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	13.7423	13.7423	4.4000e-004	1.9000e-004	13.8098
Mobile	6.5800e-003	0.0271	0.0750	2.7000e-004	0.0250	2.1000e-004	0.0252	6.7100e-003	2.0000e-004	6.9000e-003	0.0000	25.0230	25.0230	8.4000e-004	0.0000	25.0441
Waste						0.0000	0.0000		0.0000	0.0000	0.7673	0.0000	0.7673	0.0454	0.0000	1.9010
Water						0.0000	0.0000		0.0000	0.0000	0.0620	0.4332	0.4952	6.3900e-003	1.5000e-004	0.7009
Total	**0.0348**	**0.0335**	**0.1001**	**3.1000e-004**	**0.0250**	**8.2000e-004**	**0.0258**	**6.7100e-003**	**8.1000e-004**	**7.5100e-003**	**0.8293**	**39.4899**	**40.3192**	**0.0531**	**3.4000e-004**	**41.7497**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**33.64**	**0.51**	**20.38**	**13.89**	**0.00**	**81.82**	**12.50**	**0.00**	**82.00**	**32.95**	**31.50**	**-0.41**	**0.54**	**1.34**	**5.56**	**0.58**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Phase 1 - Site Preparation	Site Preparation	7/1/2020	8/11/2020	5	30	
2	Phase 1 - Grading	Grading	8/12/2020	9/8/2020	5	20	
3	Phase 1 - Utilities	Trenching	9/9/2020	10/6/2020	5	20	
4	Phase 1 - Paving	Paving	10/6/2020	12/4/2020	5	44	
5	Phase 2 - Site Preparation	Site Preparation	1/1/2021	1/14/2021	5	10	
6	Phase 2 - Grading	Grading	1/15/2021	2/25/2021	5	30	
7	Phase 2 - Building Construction	Building Construction	2/26/2021	12/2/2021	5	200	
8	Phase 2 - Architectural Coating	Architectural Coating	12/3/2021	12/16/2021	5	10	
9	Phase 2 - Paving	Paving	12/17/2021	12/30/2021	5	10	
10	Phase 3 - Site Preparation	Site Preparation	1/1/2022	1/14/2022	5	10	
11	Phase 3 - Grading	Grading	1/15/2022	2/25/2022	5	30	
12	Phase 3 - Building Construction	Building Construction	2/26/2022	12/2/2022	5	200	
13	Phase 3 - Architectural Coating	Architectural Coating	12/3/2022	12/16/2022	5	10	
14	Phase 3 - Paving	Paving	12/17/2022	12/30/2022	5	10	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.52

Residential Indoor: 10,935; Residential Outdoor: 3,645; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 1,380 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Phase 2 - Architectural Coating	Air Compressors	1	6.00	78	0.48
Phase 1 - Paving	Cement and Mortar Mixers	1	6.00	9	0.56

Phase 2 - Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Phase 2 - Building Construction	Generator Sets	1	1.00	84	0.74
Phase 2 - Building Construction	Cranes	1	1.00	231	0.29
Phase 2 - Building Construction	Forklifts	1	6.00	89	0.20
Phase 1 - Site Preparation	Graders	1	8.00	187	0.41
Phase 1 - Paving	Pavers	1	6.00	130	0.42
Phase 1 - Paving	Rollers	1	7.00	80	0.38
Phase 2 - Grading	Graders	1	4.00	187	0.41
Phase 1 - Grading	Rubber Tired Dozers	1	6.00	247	0.40
Phase 2 - Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Phase 2 - Site Preparation	Graders	1	8.00	187	0.41
Phase 1 - Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Phase 1 - Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 1 - Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 1 - Grading	Graders	1	6.00	187	0.41
Phase 1 - Paving	Paving Equipment	1	8.00	132	0.36
Phase 1 - Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Phase 2 - Building Construction	Welders	0	8.00	46	0.45
Phase 2 - Paving	Pavers	1	6.00	130	0.42
Phase 2 - Paving	Paving Equipment	1	8.00	132	0.36
Phase 2 - Paving	Rollers	1	7.00	80	0.38
Phase 2 - Grading	Rubber Tired Dozers	1	4.00	247	0.40
Phase 2 - Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Phase 2 - Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Phase 2 - Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 2 - Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 3 - Architectural Coating	Air Compressors	1	6.00	78	0.48

Phase 3 - Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Phase 3 - Building Construction	Cranes	1	1.00	231	0.29
Phase 3 - Building Construction	Forklifts	1	6.00	89	0.20
Phase 3 - Building Construction	Generator Sets	1	1.00	84	0.74
Phase 3 - Grading	Graders	1	4.00	187	0.41
Phase 3 - Site Preparation	Graders	1	8.00	187	0.41
Phase 3 - Paving	Pavers	1	6.00	130	0.42
Phase 3 - Paving	Paving Equipment	1	8.00	132	0.36
Phase 3 - Paving	Rollers	1	7.00	80	0.38
Phase 3 - Grading	Rubber Tired Dozers	1	4.00	247	0.40
Phase 3 - Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Phase 3 - Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Phase 3 - Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Phase 3 - Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 3 - Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Phase 3 - Building Construction	Welders	0	8.00	46	0.45
Phase 1 - Utilities	Trenchers	2	8.00	78	0.50
Phase 2 - Grading	Bore/Drill Rigs	1	8.00	221	0.50
Phase 3 - Grading	Bore/Drill Rigs	1	8.00	221	0.50
Phase 1 - Utilities	Tractors/Loaders/Backhoes	1	4.00	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 - Utilities	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Grading	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Building Construction	4	20.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Architectural Coating	1	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Building Construction	4	20.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Clean Paved Roads

3.2 Phase 1 - Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0870	0.0000	0.0870	0.0443	0.0000	0.0443	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0245	0.2752	0.1156	2.6000e-004		0.0123	0.0123		0.0113	0.0113	0.0000	22.6898	22.6898	7.3400e-003	0.0000	22.8732
Total	**0.0245**	**0.2752**	**0.1156**	**2.6000e-004**	**0.0870**	**0.0123**	**0.0993**	**0.0443**	**0.0113**	**0.0556**	**0.0000**	**22.6898**	**22.6898**	**7.3400e-003**	**0.0000**	**22.8732**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0000e-004	2.9000e-004	3.0100e-003	1.0000e-005	9.5000e-004	1.0000e-005	9.6000e-004	2.5000e-004	1.0000e-005	2.6000e-004	0.0000	0.8350	0.8350	2.0000e-005	0.0000	0.8355
Total	**4.0000e-004**	**2.9000e-004**	**3.0100e-003**	**1.0000e-005**	**9.5000e-004**	**1.0000e-005**	**9.6000e-004**	**2.5000e-004**	**1.0000e-005**	**2.6000e-004**	**0.0000**	**0.8350**	**0.8350**	**2.0000e-005**	**0.0000**	**0.8355**

3.2 Phase 1 - Site Preparation - 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					
Fugitive Dust					0.0392	0.0000	0.0392	0.0199	0.0000	0.0199	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.3200e-003	0.1261	0.1473	2.6000e-004		5.6200e-003	5.6200e-003		5.6200e-003	5.6200e-003	0.0000	22.6897	22.6897	7.3400e-003	0.0000	22.8732
Total	**6.3200e-003**	**0.1261**	**0.1473**	**2.6000e-004**	**0.0392**	**5.6200e-003**	**0.0448**	**0.0199**	**5.6200e-003**	**0.0256**	**0.0000**	**22.6897**	**22.6897**	**7.3400e-003**	**0.0000**	**22.8732**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0000e-004	2.9000e-004	3.0100e-003	1.0000e-005	9.0000e-004	1.0000e-005	9.1000e-004	2.4000e-004	1.0000e-005	2.5000e-004	0.0000	0.8350	0.8350	2.0000e-005	0.0000	0.8355
Total	**4.0000e-004**	**2.9000e-004**	**3.0100e-003**	**1.0000e-005**	**9.0000e-004**	**1.0000e-005**	**9.1000e-004**	**2.4000e-004**	**1.0000e-005**	**2.5000e-004**	**0.0000**	**0.8350**	**0.8350**	**2.0000e-005**	**0.0000**	**0.8355**

3.3 Phase 1 - Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0491	0.0000	0.0491	0.0253	0.0000	0.0253	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0135	0.1509	0.0645	1.4000e-004		6.8400e-003	6.8400e-003		6.3000e-003	6.3000e-003	0.0000	12.3896	12.3896	4.0100e-003	0.0000	12.4898
Total	**0.0135**	**0.1509**	**0.0645**	**1.4000e-004**	**0.0491**	**6.8400e-003**	**0.0560**	**0.0253**	**6.3000e-003**	**0.0316**	**0.0000**	**12.3896**	**12.3896**	**4.0100e-003**	**0.0000**	**12.4898**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-004	1.9000e-004	2.0100e-003	1.0000e-005	6.3000e-004	0.0000	6.4000e-004	1.7000e-004	0.0000	1.7000e-004	0.0000	0.5566	0.5566	1.0000e-005	0.0000	0.5570
Total	**2.7000e-004**	**1.9000e-004**	**2.0100e-003**	**1.0000e-005**	**6.3000e-004**	**0.0000**	**6.4000e-004**	**1.7000e-004**	**0.0000**	**1.7000e-004**	**0.0000**	**0.5566**	**0.5566**	**1.0000e-005**	**0.0000**	**0.5570**

3.3 Phase 1 - Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0221	0.0000	0.0221	0.0114	0.0000	0.0114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.4500e-003	0.0690	0.0808	1.4000e-004		3.1100e-003	3.1100e-003		3.1100e-003	3.1100e-003	0.0000	12.3896	12.3896	4.0100e-003	0.0000	12.4898
Total	**3.4500e-003**	**0.0690**	**0.0808**	**1.4000e-004**	**0.0221**	**3.1100e-003**	**0.0252**	**0.0114**	**3.1100e-003**	**0.0145**	**0.0000**	**12.3896**	**12.3896**	**4.0100e-003**	**0.0000**	**12.4898**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-004	1.9000e-004	2.0100e-003	1.0000e-005	6.0000e-004	0.0000	6.1000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.5566	0.5566	1.0000e-005	0.0000	0.5570
Total	**2.7000e-004**	**1.9000e-004**	**2.0100e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.1000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.5566**	**0.5566**	**1.0000e-005**	**0.0000**	**0.5570**

3.4 Phase 1 - Utilities - 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	9.4400e-003	0.0864	0.0641	8.0000e-005		6.3500e-003	6.3500e-003		5.8400e-003	5.8400e-003	0.0000	7.2883	7.2883	2.3600e-003	0.0000	7.3472
Total	**9.4400e-003**	**0.0864**	**0.0641**	**8.0000e-005**		**6.3500e-003**	**6.3500e-003**		**5.8400e-003**	**5.8400e-003**	**0.0000**	**7.2883**	**7.2883**	**2.3600e-003**	**0.0000**	**7.3472**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-004	1.9000e-004	2.0100e-003	1.0000e-005	6.3000e-004	0.0000	6.4000e-004	1.7000e-004	0.0000	1.7000e-004	0.0000	0.5566	0.5566	1.0000e-005	0.0000	0.5570
Total	**2.7000e-004**	**1.9000e-004**	**2.0100e-003**	**1.0000e-005**	**6.3000e-004**	**0.0000**	**6.4000e-004**	**1.7000e-004**	**0.0000**	**1.7000e-004**	**0.0000**	**0.5566**	**0.5566**	**1.0000e-005**	**0.0000**	**0.5570**

3.4 Phase 1 - Utilities - 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	2.0300e-003	0.0463	0.0626	8.0000e-005		3.2500e-003	3.2500e-003		3.2500e-003	3.2500e-003	0.0000	7.2883	7.2883	2.3600e-003	0.0000	7.3472
Total	**2.0300e-003**	**0.0463**	**0.0626**	**8.0000e-005**		**3.2500e-003**	**3.2500e-003**		**3.2500e-003**	**3.2500e-003**	**0.0000**	**7.2883**	**7.2883**	**2.3600e-003**	**0.0000**	**7.3472**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-004	1.9000e-004	2.0100e-003	1.0000e-005	6.0000e-004	0.0000	6.1000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.5566	0.5566	1.0000e-005	0.0000	0.5570
Total	**2.7000e-004**	**1.9000e-004**	**2.0100e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.1000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.5566**	**0.5566**	**1.0000e-005**	**0.0000**	**0.5570**

3.5 Phase 1 - Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0185	0.1859	0.1953	3.0000e-004		0.0103	0.0103		9.5200e-003	9.5200e-003	0.0000	25.8845	25.8845	8.2100e-003	0.0000	26.0897
Paving	3.4000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0188**	**0.1859**	**0.1953**	**3.0000e-004**		**0.0103**	**0.0103**		**9.5200e-003**	**9.5200e-003**	**0.0000**	**25.8845**	**25.8845**	**8.2100e-003**	**0.0000**	**26.0897**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.6000e-004	6.9000e-004	7.1800e-003	2.0000e-005	2.2700e-003	2.0000e-005	2.2800e-003	6.0000e-004	1.0000e-005	6.2000e-004	0.0000	1.9900	1.9900	5.0000e-005	0.0000	1.9912
Total	**9.6000e-004**	**6.9000e-004**	**7.1800e-003**	**2.0000e-005**	**2.2700e-003**	**2.0000e-005**	**2.2800e-003**	**6.0000e-004**	**1.0000e-005**	**6.2000e-004**	**0.0000**	**1.9900**	**1.9900**	**5.0000e-005**	**0.0000**	**1.9912**

3.5 Phase 1 - Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	7.0300e-003	0.1461	0.2167	3.0000e-004		8.5000e-003	8.5000e-003		8.5000e-003	8.5000e-003	0.0000	25.8845	25.8845	8.2100e-003	0.0000	26.0896
Paving	3.4000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.3700e-003**	**0.1461**	**0.2167**	**3.0000e-004**		**8.5000e-003**	**8.5000e-003**		**8.5000e-003**	**8.5000e-003**	**0.0000**	**25.8845**	**25.8845**	**8.2100e-003**	**0.0000**	**26.0896**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.6000e-004	6.9000e-004	7.1800e-003	2.0000e-005	2.1500e-003	2.0000e-005	2.1700e-003	5.7000e-004	1.0000e-005	5.9000e-004	0.0000	1.9900	1.9900	5.0000e-005	0.0000	1.9912
Total	**9.6000e-004**	**6.9000e-004**	**7.1800e-003**	**2.0000e-005**	**2.1500e-003**	**2.0000e-005**	**2.1700e-003**	**5.7000e-004**	**1.0000e-005**	**5.9000e-004**	**0.0000**	**1.9900**	**1.9900**	**5.0000e-005**	**0.0000**	**1.9912**

3.6 Phase 2 - Site Preparation - 2021

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					0.0290	0.0000	0.0290	0.0148	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.7800e-003	0.0871	0.0378	9.0000e-005		3.8300e-003	3.8300e-003		3.5200e-003	3.5200e-003	0.0000	7.5592	7.5592	2.4400e-003	0.0000	7.6203
Total	**7.7800e-003**	**0.0871**	**0.0378**	**9.0000e-005**	**0.0290**	**3.8300e-003**	**0.0328**	**0.0148**	**3.5200e-003**	**0.0183**	**0.0000**	**7.5592**	**7.5592**	**2.4400e-003**	**0.0000**	**7.6203**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-004	9.0000e-005	9.2000e-004	0.0000	3.2000e-004	0.0000	3.2000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	0.2685	0.2685	1.0000e-005	0.0000	0.2686
Total	**1.2000e-004**	**9.0000e-005**	**9.2000e-004**	**0.0000**	**3.2000e-004**	**0.0000**	**3.2000e-004**	**8.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2685**	**0.2685**	**1.0000e-005**	**0.0000**	**0.2686**

3.6 Phase 2 - Site Preparation - 2021

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					0.0131	0.0000	0.0131	6.6500e-003	0.0000	6.6500e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.1100e-003	0.0420	0.0491	9.0000e-005		1.8700e-003	1.8700e-003		1.8700e-003	1.8700e-003	0.0000	7.5592	7.5592	2.4400e-003	0.0000	7.6203
Total	**2.1100e-003**	**0.0420**	**0.0491**	**9.0000e-005**	**0.0131**	**1.8700e-003**	**0.0149**	**6.6500e-003**	**1.8700e-003**	**8.5200e-003**	**0.0000**	**7.5592**	**7.5592**	**2.4400e-003**	**0.0000**	**7.6203**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-004	9.0000e-005	9.2000e-004	0.0000	3.0000e-004	0.0000	3.0000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.2685	0.2685	1.0000e-005	0.0000	0.2686
Total	**1.2000e-004**	**9.0000e-005**	**9.2000e-004**	**0.0000**	**3.0000e-004**	**0.0000**	**3.0000e-004**	**8.0000e-005**	**0.0000**	**8.0000e-005**	**0.0000**	**0.2685**	**0.2685**	**1.0000e-005**	**0.0000**	**0.2686**

3.7 Phase 2 - Grading - 2021

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					0.0491	0.0000	0.0491	0.0253	0.0000	0.0253	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0176	0.1969	0.1043	3.0000e-004		8.2400e-003	8.2400e-003		7.5800e-003	7.5800e-003	0.0000	25.9891	25.9891	8.4100e-003	0.0000	26.1992
Total	**0.0176**	**0.1969**	**0.1043**	**3.0000e-004**	**0.0491**	**8.2400e-003**	**0.0574**	**0.0253**	**7.5800e-003**	**0.0328**	**0.0000**	**25.9891**	**25.9891**	**8.4100e-003**	**0.0000**	**26.1992**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.4400e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.2000e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0067	1.0067	2.0000e-005	0.0000	1.0073
Total	**4.6000e-004**	**3.2000e-004**	**3.4400e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.2000e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**1.0067**	**1.0067**	**2.0000e-005**	**0.0000**	**1.0073**

3.7 Phase 2 - Grading - 2021

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					0.0221	0.0000	0.0221	0.0114	0.0000	0.0114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.2900e-003	0.1444	0.1671	3.0000e-004		6.2100e-003	6.2100e-003		6.2100e-003	6.2100e-003	0.0000	25.9890	25.9890	8.4100e-003	0.0000	26.1992
Total	**7.2900e-003**	**0.1444**	**0.1671**	**3.0000e-004**	**0.0221**	**6.2100e-003**	**0.0283**	**0.0114**	**6.2100e-003**	**0.0176**	**0.0000**	**25.9890**	**25.9890**	**8.4100e-003**	**0.0000**	**26.1992**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.4400e-003	1.0000e-005	1.1300e-003	1.0000e-005	1.1400e-003	3.0000e-004	1.0000e-005	3.1000e-004	0.0000	1.0067	1.0067	2.0000e-005	0.0000	1.0073
Total	**4.6000e-004**	**3.2000e-004**	**3.4400e-003**	**1.0000e-005**	**1.1300e-003**	**1.0000e-005**	**1.1400e-003**	**3.0000e-004**	**1.0000e-005**	**3.1000e-004**	**0.0000**	**1.0067**	**1.0067**	**2.0000e-005**	**0.0000**	**1.0073**

3.8 Phase 2 - Building Construction - 2021

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	0.0334	0.3308	0.3280	5.0000e-004		0.0192	0.0192		0.0179	0.0179	0.0000	43.9458	43.9458	0.0123	0.0000	44.2530
Total	**0.0334**	**0.3308**	**0.3280**	**5.0000e-004**		**0.0192**	**0.0192**		**0.0179**	**0.0179**	**0.0000**	**43.9458**	**43.9458**	**0.0123**	**0.0000**	**44.2530**

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	1.3100e-003	0.0414	0.0105	1.1000e-004	2.6300e-003	9.0000e-005	2.7200e-003	7.6000e-004	9.0000e-005	8.5000e-004	0.0000	10.3402	10.3402	4.8000e-004	0.0000	10.3522
Worker	6.1900e-003	4.3300e-003	0.0458	1.5000e-004	0.0159	1.0000e-004	0.0160	4.2200e-003	9.0000e-005	4.3100e-003	0.0000	13.4225	13.4225	3.0000e-004	0.0000	13.4301
Total	**7.5000e-003**	**0.0457**	**0.0563**	**2.6000e-004**	**0.0185**	**1.9000e-004**	**0.0187**	**4.9800e-003**	**1.8000e-004**	**5.1600e-003**	**0.0000**	**23.7627**	**23.7627**	**7.8000e-004**	**0.0000**	**23.7823**

3.8 Phase 2 - Building Construction - 2021

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	0.0119	0.2664	0.3519	5.0000e-004		0.0176	0.0176		0.0176	0.0176	0.0000	43.9458	43.9458	0.0123	0.0000	44.2530
Total	**0.0119**	**0.2664**	**0.3519**	**5.0000e-004**		**0.0176**	**0.0176**		**0.0176**	**0.0176**	**0.0000**	**43.9458**	**43.9458**	**0.0123**	**0.0000**	**44.2530**

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	1.3100e-003	0.0414	0.0105	1.1000e-004	2.5200e-003	9.0000e-005	2.6100e-003	7.3000e-004	9.0000e-005	8.2000e-004	0.0000	10.3402	10.3402	4.8000e-004	0.0000	10.3522
Worker	6.1900e-003	4.3300e-003	0.0458	1.5000e-004	0.0150	1.0000e-004	0.0151	4.0200e-003	9.0000e-005	4.1100e-003	0.0000	13.4225	13.4225	3.0000e-004	0.0000	13.4301
Total	**7.5000e-003**	**0.0457**	**0.0563**	**2.6000e-004**	**0.0176**	**1.9000e-004**	**0.0178**	**4.7500e-003**	**1.8000e-004**	**4.9300e-003**	**0.0000**	**23.7627**	**23.7627**	**7.8000e-004**	**0.0000**	**23.7823**

3.9 Phase 2 - Architectural Coating - 2021

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					
Archit. Coating	0.0428					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0900e-003	7.6300e-003	9.0900e-003	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	1.2766	1.2766	9.0000e-005	0.0000	1.2788
Total	**0.0439**	**7.6300e-003**	**9.0900e-003**	**1.0000e-005**		**4.7000e-004**	**4.7000e-004**		**4.7000e-004**	**4.7000e-004**	**0.0000**	**1.2766**	**1.2766**	**9.0000e-005**	**0.0000**	**1.2788**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-004	9.0000e-005	9.2000e-004	0.0000	3.2000e-004	0.0000	3.2000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	0.2685	0.2685	1.0000e-005	0.0000	0.2686
Total	**1.2000e-004**	**9.0000e-005**	**9.2000e-004**	**0.0000**	**3.2000e-004**	**0.0000**	**3.2000e-004**	**8.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2685**	**0.2685**	**1.0000e-005**	**0.0000**	**0.2686**

3.9 Phase 2 - Architectural Coating - 2021

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					
Archit. Coating	0.0428					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.0000e-004	6.7800e-003	9.1600e-003	1.0000e-005		4.8000e-004	4.8000e-004		4.8000e-004	4.8000e-004	0.0000	1.2766	1.2766	9.0000e-005	0.0000	1.2788
Total	**0.0431**	**6.7800e-003**	**9.1600e-003**	**1.0000e-005**		**4.8000e-004**	**4.8000e-004**		**4.8000e-004**	**4.8000e-004**	**0.0000**	**1.2766**	**1.2766**	**9.0000e-005**	**0.0000**	**1.2788**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-004	9.0000e-005	9.2000e-004	0.0000	3.0000e-004	0.0000	3.0000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.2685	0.2685	1.0000e-005	0.0000	0.2686
Total	**1.2000e-004**	**9.0000e-005**	**9.2000e-004**	**0.0000**	**3.0000e-004**	**0.0000**	**3.0000e-004**	**8.0000e-005**	**0.0000**	**8.0000e-005**	**0.0000**	**0.2685**	**0.2685**	**1.0000e-005**	**0.0000**	**0.2686**

3.10 Phase 2 - Paving - 2021

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	3.8700e-003	0.0387	0.0443	7.0000e-005		2.0800e-003	2.0800e-003		1.9100e-003	1.9100e-003	0.0000	5.8825	5.8825	1.8600e-003	0.0000	5.9291
Paving	3.4000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.2100e-003**	**0.0387**	**0.0443**	**7.0000e-005**		**2.0800e-003**	**2.0800e-003**		**1.9100e-003**	**1.9100e-003**	**0.0000**	**5.8825**	**5.8825**	**1.8600e-003**	**0.0000**	**5.9291**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-004	1.4000e-004	1.4900e-003	0.0000	5.2000e-004	0.0000	5.2000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.4362	0.4362	1.0000e-005	0.0000	0.4365
Total	**2.0000e-004**	**1.4000e-004**	**1.4900e-003**	**0.0000**	**5.2000e-004**	**0.0000**	**5.2000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.4362**	**0.4362**	**1.0000e-005**	**0.0000**	**0.4365**

3.10 Phase 2 - Paving - 2021

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	1.6000e-003	0.0332	0.0493	7.0000e-005		1.9300e-003	1.9300e-003		1.9300e-003	1.9300e-003	0.0000	5.8825	5.8825	1.8600e-003	0.0000	5.9291
Paving	3.4000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.9400e-003**	**0.0332**	**0.0493**	**7.0000e-005**		**1.9300e-003**	**1.9300e-003**		**1.9300e-003**	**1.9300e-003**	**0.0000**	**5.8825**	**5.8825**	**1.8600e-003**	**0.0000**	**5.9291**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-004	1.4000e-004	1.4900e-003	0.0000	4.9000e-004	0.0000	4.9000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4362	0.4362	1.0000e-005	0.0000	0.4365
Total	**2.0000e-004**	**1.4000e-004**	**1.4900e-003**	**0.0000**	**4.9000e-004**	**0.0000**	**4.9000e-004**	**1.3000e-004**	**0.0000**	**1.3000e-004**	**0.0000**	**0.4362**	**0.4362**	**1.0000e-005**	**0.0000**	**0.4365**

3.11 Phase 3 - Site Preparation - 2022

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					0.0290	0.0000	0.0290	0.0148	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.5600e-003	0.0731	0.0355	9.0000e-005		3.1100e-003	3.1100e-003		2.8600e-003	2.8600e-003	0.0000	7.5576	7.5576	2.4400e-003	0.0000	7.6187
Total	**6.5600e-003**	**0.0731**	**0.0355**	**9.0000e-005**	**0.0290**	**3.1100e-003**	**0.0321**	**0.0148**	**2.8600e-003**	**0.0176**	**0.0000**	**7.5576**	**7.5576**	**2.4400e-003**	**0.0000**	**7.6187**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-004	8.0000e-005	8.4000e-004	0.0000	3.2000e-004	0.0000	3.2000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	0.2585	0.2585	1.0000e-005	0.0000	0.2586
Total	**1.2000e-004**	**8.0000e-005**	**8.4000e-004**	**0.0000**	**3.2000e-004**	**0.0000**	**3.2000e-004**	**8.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2585**	**0.2585**	**1.0000e-005**	**0.0000**	**0.2586**

3.11 Phase 3 - Site Preparation - 2022

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					0.0131	0.0000	0.0131	6.6500e-003	0.0000	6.6500e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.1100e-003	0.0420	0.0491	9.0000e-005		1.8700e-003	1.8700e-003		1.8700e-003	1.8700e-003	0.0000	7.5576	7.5576	2.4400e-003	0.0000	7.6187
Total	**2.1100e-003**	**0.0420**	**0.0491**	**9.0000e-005**	**0.0131**	**1.8700e-003**	**0.0149**	**6.6500e-003**	**1.8700e-003**	**8.5200e-003**	**0.0000**	**7.5576**	**7.5576**	**2.4400e-003**	**0.0000**	**7.6187**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-004	8.0000e-005	8.4000e-004	0.0000	3.0000e-004	0.0000	3.0000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.2585	0.2585	1.0000e-005	0.0000	0.2586
Total	**1.2000e-004**	**8.0000e-005**	**8.4000e-004**	**0.0000**	**3.0000e-004**	**0.0000**	**3.0000e-004**	**8.0000e-005**	**0.0000**	**8.0000e-005**	**0.0000**	**0.2585**	**0.2585**	**1.0000e-005**	**0.0000**	**0.2586**

3.12 Phase 3 - Grading - 2022

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					0.0491	0.0000	0.0491	0.0253	0.0000	0.0253	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0149	0.1614	0.0998	3.0000e-004		6.6600e-003	6.6600e-003		6.1300e-003	6.1300e-003	0.0000	26.0086	26.0086	8.4100e-003	0.0000	26.2189
Total	**0.0149**	**0.1614**	**0.0998**	**3.0000e-004**	**0.0491**	**6.6600e-003**	**0.0558**	**0.0253**	**6.1300e-003**	**0.0314**	**0.0000**	**26.0086**	**26.0086**	**8.4100e-003**	**0.0000**	**26.2189**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	2.9000e-004	3.1600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.2000e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9693	0.9693	2.0000e-005	0.0000	0.9698
Total	**4.3000e-004**	**2.9000e-004**	**3.1600e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.2000e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9693**	**0.9693**	**2.0000e-005**	**0.0000**	**0.9698**

3.12 Phase 3 - Grading - 2022

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					0.0221	0.0000	0.0221	0.0114	0.0000	0.0114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.2900e-003	0.1444	0.1671	3.0000e-004		6.2100e-003	6.2100e-003		6.2100e-003	6.2100e-003	0.0000	26.0085	26.0085	8.4100e-003	0.0000	26.2188
Total	**7.2900e-003**	**0.1444**	**0.1671**	**3.0000e-004**	**0.0221**	**6.2100e-003**	**0.0283**	**0.0114**	**6.2100e-003**	**0.0176**	**0.0000**	**26.0085**	**26.0085**	**8.4100e-003**	**0.0000**	**26.2188**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	2.9000e-004	3.1600e-003	1.0000e-005	1.1300e-003	1.0000e-005	1.1400e-003	3.0000e-004	1.0000e-005	3.1000e-004	0.0000	0.9693	0.9693	2.0000e-005	0.0000	0.9698
Total	**4.3000e-004**	**2.9000e-004**	**3.1600e-003**	**1.0000e-005**	**1.1300e-003**	**1.0000e-005**	**1.1400e-003**	**3.0000e-004**	**1.0000e-005**	**3.1000e-004**	**0.0000**	**0.9693**	**0.9693**	**2.0000e-005**	**0.0000**	**0.9698**

3.13 Phase 3 - Building Construction - 2022

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	0.0297	0.2937	0.3240	5.0000e-004		0.0160	0.0160		0.0149	0.0149	0.0000	43.9699	43.9699	0.0123	0.0000	44.2767
Total	**0.0297**	**0.2937**	**0.3240**	**5.0000e-004**		**0.0160**	**0.0160**		**0.0149**	**0.0149**	**0.0000**	**43.9699**	**43.9699**	**0.0123**	**0.0000**	**44.2767**

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	1.2200e-003	0.0391	9.8500e-003	1.1000e-004	2.6300e-003	8.0000e-005	2.7100e-003	7.6000e-004	8.0000e-005	8.4000e-004	0.0000	10.2422	10.2422	4.6000e-004	0.0000	10.2536
Worker	5.7600e-003	3.8800e-003	0.0421	1.4000e-004	0.0159	1.0000e-004	0.0160	4.2200e-003	9.0000e-005	4.3100e-003	0.0000	12.9241	12.9241	2.7000e-004	0.0000	12.9310
Total	**6.9800e-003**	**0.0429**	**0.0519**	**2.5000e-004**	**0.0185**	**1.8000e-004**	**0.0187**	**4.9800e-003**	**1.7000e-004**	**5.1500e-003**	**0.0000**	**23.1663**	**23.1663**	**7.3000e-004**	**0.0000**	**23.1845**

3.13 Phase 3 - Building Construction - 2022

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	0.0119	0.2664	0.3519	5.0000e-004		0.0176	0.0176		0.0176	0.0176	0.0000	43.9699	43.9699	0.0123	0.0000	44.2767
Total	**0.0119**	**0.2664**	**0.3519**	**5.0000e-004**		**0.0176**	**0.0176**		**0.0176**	**0.0176**	**0.0000**	**43.9699**	**43.9699**	**0.0123**	**0.0000**	**44.2767**

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	1.2200e-003	0.0391	9.8500e-003	1.1000e-004	2.5200e-003	8.0000e-005	2.6000e-003	7.3000e-004	8.0000e-005	8.1000e-004	0.0000	10.2422	10.2422	4.6000e-004	0.0000	10.2536
Worker	5.7600e-003	3.8800e-003	0.0421	1.4000e-004	0.0150	1.0000e-004	0.0151	4.0200e-003	9.0000e-005	4.1100e-003	0.0000	12.9241	12.9241	2.7000e-004	0.0000	12.9310
Total	**6.9800e-003**	**0.0429**	**0.0519**	**2.5000e-004**	**0.0176**	**1.8000e-004**	**0.0177**	**4.7500e-003**	**1.7000e-004**	**4.9200e-003**	**0.0000**	**23.1663**	**23.1663**	**7.3000e-004**	**0.0000**	**23.1845**

3.14 Phase 3 - Architectural Coating - 2022

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					
Archit. Coating	0.0428					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0200e-003	7.0400e-003	9.0700e-003	1.0000e-005		4.1000e-004	4.1000e-004		4.1000e-004	4.1000e-004	0.0000	1.2766	1.2766	8.0000e-005	0.0000	1.2787
Total	**0.0438**	**7.0400e-003**	**9.0700e-003**	**1.0000e-005**		**4.1000e-004**	**4.1000e-004**		**4.1000e-004**	**4.1000e-004**	**0.0000**	**1.2766**	**1.2766**	**8.0000e-005**	**0.0000**	**1.2787**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-004	8.0000e-005	8.4000e-004	0.0000	3.2000e-004	0.0000	3.2000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	0.2585	0.2585	1.0000e-005	0.0000	0.2586
Total	**1.2000e-004**	**8.0000e-005**	**8.4000e-004**	**0.0000**	**3.2000e-004**	**0.0000**	**3.2000e-004**	**8.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2585**	**0.2585**	**1.0000e-005**	**0.0000**	**0.2586**

3.14 Phase 3 - Architectural Coating - 2022

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					
Archit. Coating	0.0428					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.0000e-004	6.7800e-003	9.1600e-003	1.0000e-005		4.8000e-004	4.8000e-004		4.8000e-004	4.8000e-004	0.0000	1.2766	1.2766	8.0000e-005	0.0000	1.2787
Total	**0.0431**	**6.7800e-003**	**9.1600e-003**	**1.0000e-005**		**4.8000e-004**	**4.8000e-004**		**4.8000e-004**	**4.8000e-004**	**0.0000**	**1.2766**	**1.2766**	**8.0000e-005**	**0.0000**	**1.2787**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-004	8.0000e-005	8.4000e-004	0.0000	3.0000e-004	0.0000	3.0000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.2585	0.2585	1.0000e-005	0.0000	0.2586
Total	**1.2000e-004**	**8.0000e-005**	**8.4000e-004**	**0.0000**	**3.0000e-004**	**0.0000**	**3.0000e-004**	**8.0000e-005**	**0.0000**	**8.0000e-005**	**0.0000**	**0.2585**	**0.2585**	**1.0000e-005**	**0.0000**	**0.2586**

3.15 Phase 3 - Paving - 2022

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	3.4400e-003	0.0339	0.0440	7.0000e-005		1.7400e-003	1.7400e-003		1.6000e-003	1.6000e-003	0.0000	5.8848	5.8848	1.8700e-003	0.0000	5.9315
Paving	3.4000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.7800e-003**	**0.0339**	**0.0440**	**7.0000e-005**		**1.7400e-003**	**1.7400e-003**		**1.6000e-003**	**1.6000e-003**	**0.0000**	**5.8848**	**5.8848**	**1.8700e-003**	**0.0000**	**5.9315**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.3000e-004	1.3700e-003	0.0000	5.2000e-004	0.0000	5.2000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.4200	0.4200	1.0000e-005	0.0000	0.4203
Total	**1.9000e-004**	**1.3000e-004**	**1.3700e-003**	**0.0000**	**5.2000e-004**	**0.0000**	**5.2000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.4200**	**0.4200**	**1.0000e-005**	**0.0000**	**0.4203**

3.15 Phase 3 - Paving - 2022

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	1.6000e-003	0.0332	0.0493	7.0000e-005		1.9300e-003	1.9300e-003		1.9300e-003	1.9300e-003	0.0000	5.8848	5.8848	1.8700e-003	0.0000	5.9314
Paving	3.4000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.9400e-003**	**0.0332**	**0.0493**	**7.0000e-005**		**1.9300e-003**	**1.9300e-003**		**1.9300e-003**	**1.9300e-003**	**0.0000**	**5.8848**	**5.8848**	**1.8700e-003**	**0.0000**	**5.9314**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.3000e-004	1.3700e-003	0.0000	4.9000e-004	0.0000	4.9000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4200	0.4200	1.0000e-005	0.0000	0.4203
Total	**1.9000e-004**	**1.3000e-004**	**1.3700e-003**	**0.0000**	**4.9000e-004**	**0.0000**	**4.9000e-004**	**1.3000e-004**	**0.0000**	**1.3000e-004**	**0.0000**	**0.4200**	**0.4200**	**1.0000e-005**	**0.0000**	**0.4203**

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	6.5800e-003	0.0271	0.0750	2.7000e-004	0.0250	2.1000e-004	0.0252	6.7100e-003	2.0000e-004	6.9000e-003	0.0000	25.0230	25.0230	8.4000e-004	0.0000	25.0441
Unmitigated	6.5800e-003	0.0271	0.0750	2.7000e-004	0.0250	2.1000e-004	0.0252	6.7100e-003	2.0000e-004	6.9000e-003	0.0000	25.0230	25.0230	8.4000e-004	0.0000	25.0441

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	28.98	28.98	28.98	66,932	66,932
Total	28.98	28.98	28.98	66,932	66,932

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.590657	0.037535	0.185105	0.118290	0.015611	0.005013	0.010768	0.024764	0.001635	0.001742	0.005351	0.002726	0.000802
Other Non-Asphalt Surfaces	0.590657	0.037535	0.185105	0.118290	0.015611	0.005013	0.010768	0.024764	0.001635	0.001742	0.005351	0.002726	0.000802
Single Family Housing	0.590657	0.037535	0.185105	0.118290	0.015611	0.005013	0.010768	0.024764	0.001635	0.001742	0.005351	0.002726	0.000802

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	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					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	6.9666	6.9666	3.2000e-004	7.0000e-005	6.9939
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	6.9666	6.9666	3.2000e-004	7.0000e-005	6.9939
NaturalGas Mitigated	6.8000e-004	5.8500e-003	2.4900e-003	4.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	6.7757	6.7757	1.3000e-004	1.2000e-004	6.8159
NaturalGas Unmitigated	6.8000e-004	5.8500e-003	2.4900e-003	4.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	6.7757	6.7757	1.3000e-004	1.2000e-004	6.8159

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	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
Other Non-Asphalt Surfaces	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
Single Family Housing	126971	6.8000e-004	5.8500e-003	2.4900e-003	4.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	6.7757	6.7757	1.3000e-004	1.2000e-004	6.8159
Total		**6.8000e-004**	**5.8500e-003**	**2.4900e-003**	**4.0000e-005**		**4.7000e-004**	**4.7000e-004**		**4.7000e-004**	**4.7000e-004**	**0.0000**	**6.7757**	**6.7757**	**1.3000e-004**	**1.2000e-004**	**6.8159**

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					
Other Asphalt Surfaces	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
Other Non-Asphalt Surfaces	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
Single Family Housing	126971	6.8000e-004	5.8500e-003	2.4900e-003	4.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	6.7757	6.7757	1.3000e-004	1.2000e-004	6.8159
Total		**6.8000e-004**	**5.8500e-003**	**2.4900e-003**	**4.0000e-005**		**4.7000e-004**	**4.7000e-004**		**4.7000e-004**	**4.7000e-004**	**0.0000**	**6.7757**	**6.7757**	**1.3000e-004**	**1.2000e-004**	**6.8159**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	23947.5	6.9666	3.2000e-004	7.0000e-005	6.9939
Total		**6.9666**	**3.2000e-004**	**7.0000e-005**	**6.9939**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	23947.5	6.9666	3.2000e-004	7.0000e-005	6.9939
Total		**6.9666**	**3.2000e-004**	**7.0000e-005**	**6.9939**

6.0 Area Detail

6.1 Mitigation Measures Area

Use only Natural Gas Hearths

	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	0.0276	4.8000e-004	0.0226	0.0000		1.4000e-004	1.4000e-004		1.4000e-004	1.4000e-004	0.0000	0.2915	0.2915	4.0000e-005	0.0000	0.2939
Unmitigated	0.0452	6.5000e-004	0.0482	5.0000e-005		3.8300e-003	3.8300e-003		3.8300e-003	3.8300e-003	0.3813	0.1304	0.5118	7.6000e-004	2.0000e-005	0.5372

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	4.2800e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0226					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0177	3.9000e-004	0.0257	5.0000e-005		3.7100e-003	3.7100e-003		3.7100e-003	3.7100e-003	0.3813	0.0936	0.4750	7.2000e-004	2.0000e-005	0.4995
Landscaping	6.9000e-004	2.6000e-004	0.0225	0.0000		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	0.0368	0.0368	4.0000e-005	0.0000	0.0377
Total	**0.0452**	**6.5000e-004**	**0.0482**	**5.0000e-005**		**3.8300e-003**	**3.8300e-003**		**3.8300e-003**	**3.8300e-003**	**0.3813**	**0.1304**	**0.5118**	**7.6000e-004**	**2.0000e-005**	**0.5372**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	4.2800e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0226					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.0000e-005	2.2000e-004	9.0000e-005	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.2547	0.2547	0.0000	0.0000	0.2562
Landscaping	6.9000e-004	2.6000e-004	0.0225	0.0000		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	0.0368	0.0368	4.0000e-005	0.0000	0.0377
Total	**0.0276**	**4.8000e-004**	**0.0226**	**0.0000**		**1.4000e-004**	**1.4000e-004**		**1.4000e-004**	**1.4000e-004**	**0.0000**	**0.2915**	**0.2915**	**4.0000e-005**	**0.0000**	**0.2939**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.4952	6.3900e-003	1.5000e-004	0.7009
Unmitigated	0.4952	6.3900e-003	1.5000e-004	0.7009

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0.195462 / 0.123226	0.4952	6.3900e-003	1.5000e-004	0.7009
Total		**0.4952**	**6.3900e-003**	**1.5000e-004**	**0.7009**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0.195462 / 0.123226	0.4952	6.3900e-003	1.5000e-004	0.7009
Total		**0.4952**	**6.3900e-003**	**1.5000e-004**	**0.7009**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.7673	0.0454	0.0000	1.9010
Unmitigated	0.7673	0.0454	0.0000	1.9010

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	3.78	0.7673	0.0454	0.0000	1.9010
Total		**0.7673**	**0.0454**	**0.0000**	**1.9010**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	3.78	0.7673	0.0454	0.0000	1.9010
Total		**0.7673**	**0.0454**	**0.0000**	**1.9010**

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Attachment F

Appendix NOI

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2019
Case Description: Grading Sunnyside Lane

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Residence	Residential	60	50	40

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer	No	40		81.7	25	0
Grader	No	40	85		25	0
Backhoe	No	40		77.6	25	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		87.7	83.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader		91	87	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		83.6	79.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	91	89.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2019
Case Description: Trenching Underground Utilities

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Residence	Residential	60	50	40

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Backhoe	No	40		77.6	25	0
Backhoe	No	40		77.6	25	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Backhoe		83.6	79.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		83.6	79.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	83.6	82.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2019
Case Description: Grading Parcel A

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residence	Residential	60	50	40

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	230	0
Dozer	No	40		81.7	230	0
Grader	No	40	85		230	0
Backhoe	No	40		77.6	230	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		71.1	64.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		68.4	64.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader		71.7	67.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		64.3	60.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	71.7	70.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2019
Case Description: Grading Parcel C

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residence	Residential	60	50	40

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	230	0
Dozer	No	40		81.7	230	0
Grader	No	40	85		230	0
Backhoe	No	40		77.6	230	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		71.1	64.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		68.4	64.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader		71.7	67.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		64.3	60.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	71.7	70.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2019
Case Description: Grading Parcel D

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Residence	Residential	60	50	40

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Auger Drill Rig	No	20		84.4	200	0
Dozer	No	40		81.7	200	0
Grader	No	40	85		200	0
Backhoe	No	40		77.6	200	0

				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		72.3	65.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		69.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader		73	69	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		65.5	61.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	73	72.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

APPENDIX BIO

88 Sunnyside Lane Residential Project, City of Orinda

Alameda Whipsnake Habitat Assessment

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Executive Summary

This report has been prepared to document the potential presence of suitable habitat for Alameda whipsnake (= Alameda striped racer; *Masticophis lateralis euryxanthus*) on the proposed 88 Sunnyside Lane residential development project site. The project proposes to add three new single-family residences to the lot by subdividing the 24.02-acre parcel into four newly designated parcels, ranging in size from 5.32 to 7.44 acres. The Alameda whipsnake was listed as threatened by the U.S. Fish and Wildlife Service (USFWS) on December 5, 1997 and by the California Department of Fish and Wildlife on June 27, 1971. A final rule on designated critical habitat for the species was issued on October 2, 2006 and a recovery plan that includes the species was completed in 2002. Habitat fragmentation and loss through urban development represents a major threat to the species survival. Feral cats and dogs also have been shown to have an effect on Alameda whipsnake populations.

Primary constituent elements (PCEs) that characterize suitable Alameda whipsnake habitat include east, south, southeast, and southwest facing slopes in chaparral vegetation communities, which includes coastal sage scrub, coastal sage, and other shrub communities with and rocky outcrops and a suitable prey base consisting of lizard or small mammal species. The species has a home range of approximately 12 acres and may range up to 100 meters from preferred open chaparral/scrub vegetation communities.

Rincon performed background research on the historical and currently potential present of the Alameda whipsnake on the project site in preparation for this report and conducted fieldwork in accordance with established standards. Before conducting the site visit, Rincon conducted a review of background literature and queried agency databases for information on known locations of the species on or adjacent to the project site. Rincon biologists conducted a habitat assessment survey of the project site using Global Positioning System (GPS) technology and aerial imagery on October 26, 2017.

The project site is located less than one mile south of the designated Alameda whipsnake population critical habitat unit, Tilden-Briones. This critical habitat coincides with Recovery Unit 1 from the species recovery plan. The Tilden-Briones critical habitat unit and Recovery Unit 1 include the Tilden Regional Park, which represents a critical protected area for the species preservation. The project site is surrounded by suburban residential development and open space consisting of oak woodland, oak savannah, and non-native annual grassland. The site itself contains coast live oak woodland, coyote brush scrubland, and non-native annual grassland communities. The project site is topographically diverse with slopes of greater than 30 percent in some places and contains few rock outcrops and a low abundance of prey species.

Suitable habitat for the Alameda whipsnake is limited to 7.4 acres of the project site. The project site in total represents poor quality habitat, but given the status of the species and recovery need, all areas that represent potentially suitable habitat or the potential for restoration to suitable habitat are considered as potential habitat for the Alameda whipsnake.

1 Introduction

Rincon Consultants, Inc. (Rincon) prepared this report on behalf of Michael Baker International to document the potential presence of suitable habitat for Alameda whipsnake (= Alameda striped racer; *Masticophis lateralis euryxanthus*) on the proposed 88 Sunnyside Lane Residential Project (Project) site, in the City of Orinda. The Alameda whipsnake was listed as threatened by the U.S. Fish and Wildlife Service (USFWS) on December 5, 1997 (USFWS 1997) and by the California Department of Fish and Wildlife on June 27, 1971 (California Dept. of Fish and Game Commission 1971). A final rule on designated critical habitat for the species was issued on October 2, 2006 (USFWS 2006) and a recover plan that included the species was completed in 2002 (USFWS 2002). Habitat fragmentation and loss through urban development represents a major threat to the species survival (USFWS 2011), and interactions with feral cats and dogs has also been shown to have an adverse effect on Alameda whipsnake populations (USFWS 2011).

Rincon has conducted this habitat assessment to determine the potential for Alameda whipsnake to occur on the project site, and support the California Environmental Quality Act (CEQA) environmental review process as it relates to this species.

1.1 Project Description and Location

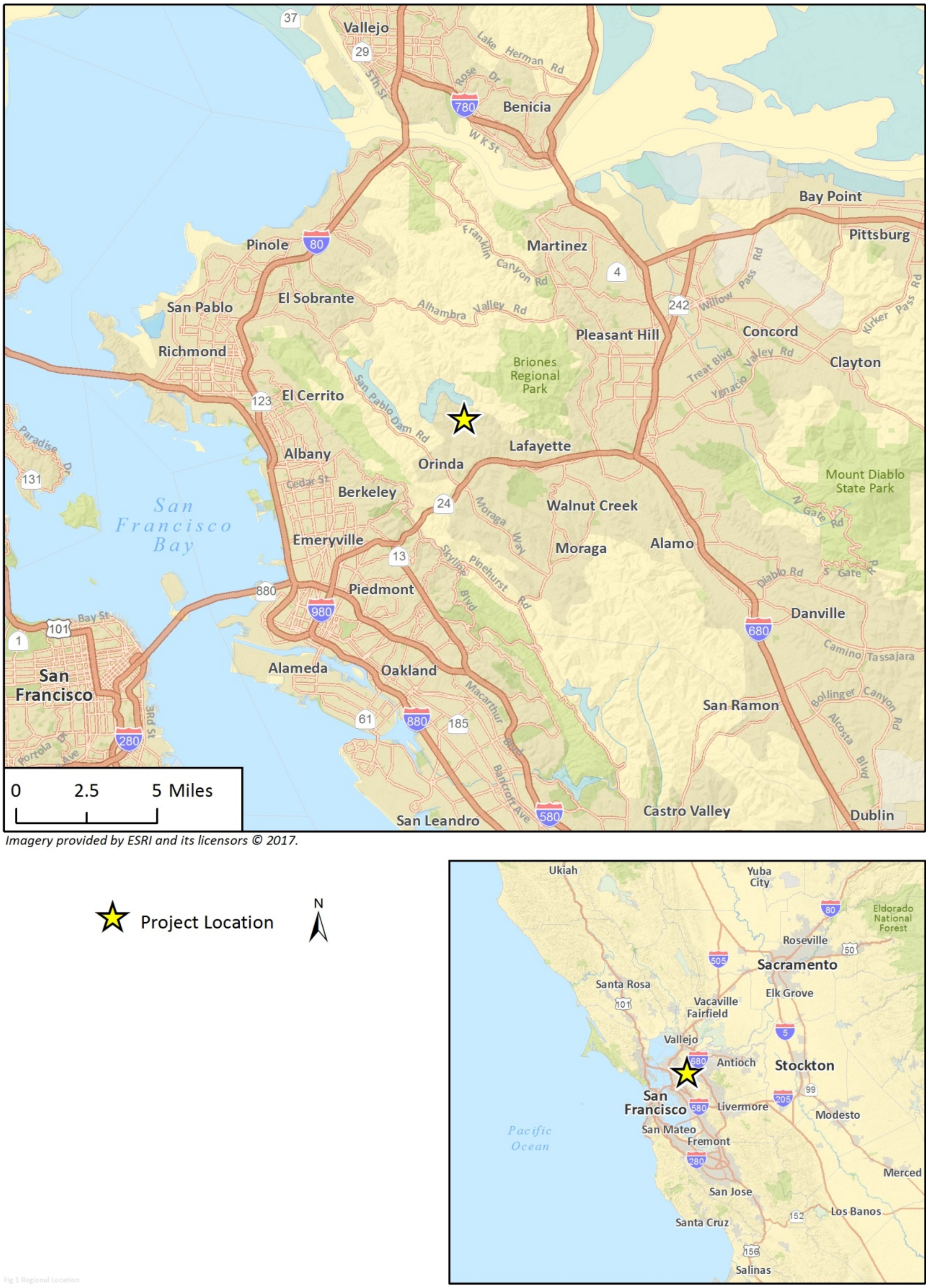
The project proposes to add three new single-family residences to the lot by subdividing the 24.02-acre parcel into four newly designated parcels, ranging in size from 5.32 to 7.44 acres. The existing residence would not be renovated or demolished during the project. The City would be granted 8.1 acres of development rights on three of the parcels. The project, projected to occur over 2.5 years, involves the construction of driveways to access the three new residences, additional utilities installed in an existing utility easement, and widening of Sunnyside Lane to allow fire truck access.

The property consists of Accessor Parcel Number (APN) 266-270-029 in the City of Orinda (Figure 1) in the U.S. Geological Survey (USGS) *Briones Valley, California* 7.5-minute topographic quadrangle. The site is located on a ridgetop with elevation ranging between 835 to 1,025 feet above mean sea level. The property currently includes a developed (existing residence) and open space areas consisting of mixed coast live oak woodland, coyote bush scrub, and non-native grassland vegetation communities (Leitner 2015). Most of the property consists of steeply sloped hill sides (between 30 to 50 percent) that drain towards Lauterwasser Creek, while a smaller portion in the northern part of the property drains towards Bear Creek and Briones Reservoir.

1.2 Ecology and Distribution

The Alameda whipsnake is a subspecies of the more common California Striped Racer and is endemic to the San Francisco Bay region, occurring in Contra Costa and Alameda counties, and in parts of San Joaquin and Santa Clara counties (Stebbins and McGinnis 2012). The species is listed as federally and State Threatened with primary threats to the species survival including habitat loss and fragmentation as a result of urban and suburban growth (USFWS 2002).

Figure 1 Project Location



Imagery provided by ESRI and its licensors © 2017.

Primary constituent elements (PCEs) for Alameda whipsnake habitat have been defined as:

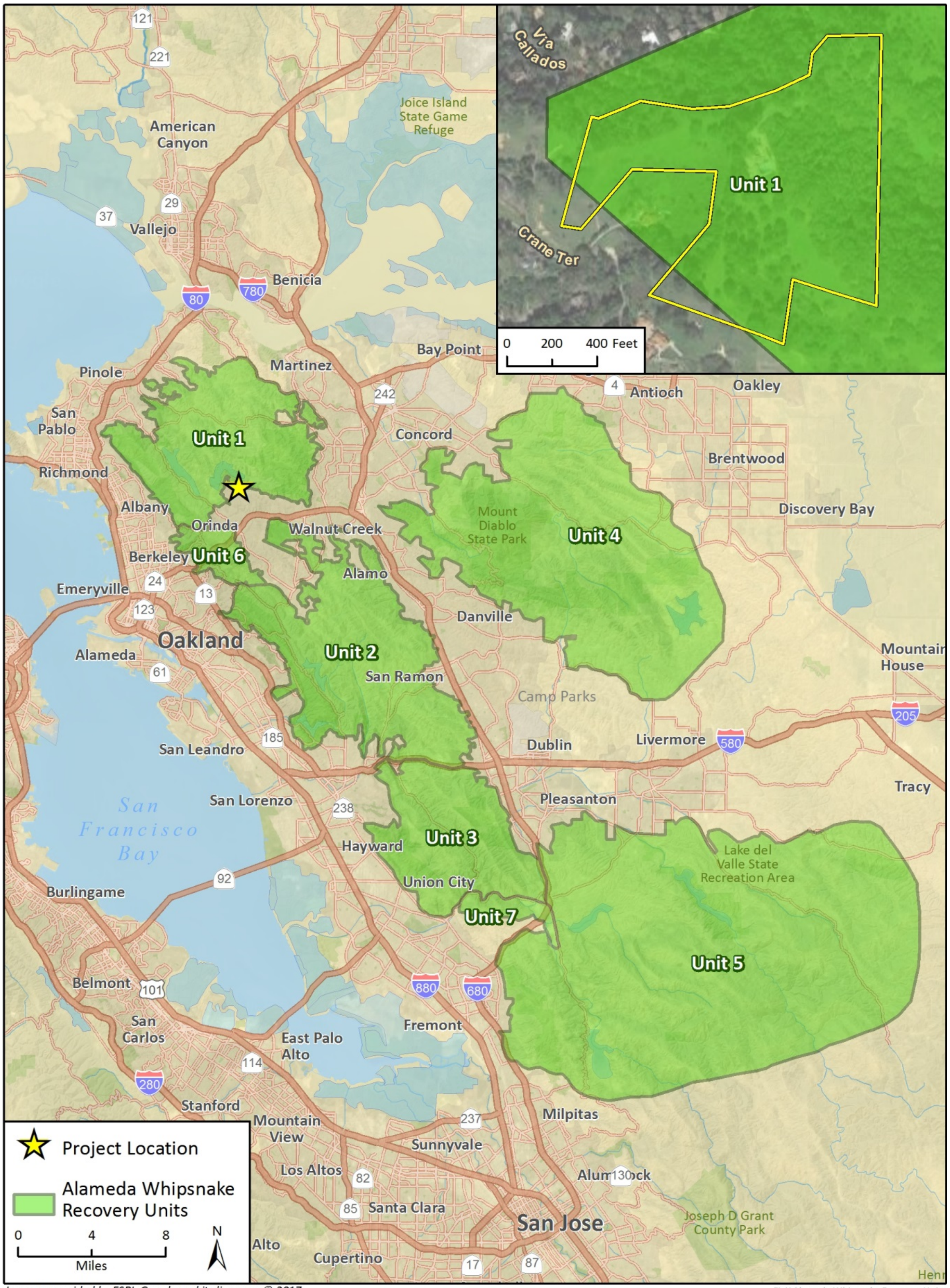
- Vegetation communities consisting of coastal scrub and chaparral, and grassland and open woodland adjacent to coastal scrub and chaparral (Swaim 1994; USFWS 2006).
- Rock outcrops with deep crevices or abundant rodent burrows (Swaim 1994; USFWS 2006).
- Grassland areas that are linked to scrub by rock outcrops or river corridors (USFWS 2006)

The Alameda whipsnake occurs most frequently on terrain with an east, south, southeast, and southwest aspect in chaparral vegetation communities, including coastal sage scrub, coastal sage, and other shrub communities (Stebbins and McGinnis 2012). The species has been documented along the edges of ponds and streams, and may forage in nearby grasslands, open woodlands, canyons, and rocky hillsides (Alvarez et. al 2005). Those PCEs that characterize suitable Alameda whipsnake habitat may also be found where any combination of these communities come together (USFWS 2006). Alameda whipsnake habitat includes a mix of shaded and sunny areas that allow individuals to regulate their body temperature (USFWS 2006). Areas that contain these specific habitat features also provide high quality habitat for western fence lizard (*Sceloporus occidentalis*), the whipsnake's primary prey. Alternative prey species such as small birds, other snakes, small rodents, frogs, salamanders, and large insects are also supported where these PCEs occur.

The Alameda whipsnake has a home range of approximately 12 acres (Stebbins and McGinnis 2012) and may range up to 100 meters from preferred open chaparral/scrub vegetation communities (Alvarez et al. 2005; USFWS 2005), with males moving most extensively during the spring mating season and females ranging primarily after the mating season in search of egg-laying sites. The Alameda whipsnake enters estivation beginning in November, and the species is mostly inactive during the winter months until reemergence in March, when breeding commences (Stebbins and McGinnis 2012). The mating season extends from March through mid-June and represents the species' most active period of the year; a notable spike in activity also occurs in late summer and early fall prior to winter estivation.

Research has currently identified five distinct alameda whipsnake populations, referred to by USFWS as Recovery Units 1 through 5 (Figure 2). These populations collectively form a regionally fragmented metapopulation present throughout the four counties in which the species occurs (USFWS 2002). Connectivity corridors that allow gene flow between populations are few; estimated at only two or three linkages remaining (USFWS 2002) among all populations. It has been suggested that Recovery Unit 1 may currently be connected to Recovery Unit 2 (the Oakland-Las Trampas population) via a northern habitat corridor comprising Recovery Unit 6 (the Caldecott Tunnel Corridor)(see Figure 2); however, studies have not yet been undertaken to confirm the viability of this putative connectivity corridor. Studies evaluating the effect of major highways and surface streets on Alameda whipsnake movement corridors are lacking, and the current extent of population connectivity is unclear (USFWS 2002). Suboptimal vegetation communities may provide or may be restored to provide habitat for the Alameda whipsnake. As such, these features have been deemed desirable by resource agencies for achieving the goals of the species recovery and long-term management (Carroll et al. 1996; USFWS 2002).

Figure 2. Alameda Whipsnake Recovery Units and Corridors



Imagery provided by ESRI, Google and its licensors © 2017.
Additional data provided by USFWS, 2002.

FigX Alameda Whipsnake Recovery Units

2 Methods

Rincon performed background research on the historical and current potential for the present of the Alameda whipsnake on the project site in preparation for this report. Methods employed for this habitat assessment are provided below.

2.1 Literature Review

Rincon conducted a review of background literature and queried agency databases for information on known occurrences of the species on or adjacent to the project site. Rincon reviewed the following agency databases and general and project specific background literature:

- California Department of Fish and Wildlife (CDFW) California Natural Diversity Data Base (CNDDB) (CDFW, 2017a) and Biogeographic Information and Observation System (CDFW, 2017b)
- U.S. Fish and Wildlife Service (USFWS) Critical Habitat Portal (USFWS, 2017a), and Information for Planning and Consultation (IPaC) System (USFWS, 2017c)
- he United States Department of Agriculture, Natural Resources Conservation Service (USDA, NRCS) Web Soil Survey (USDA, NRCS, 2017)
- the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California (CNPS, 2017)
- Biological Resources Assessment, 88 Sunnyside Lane (Leitner 2015)
- East Bay Regional Park District Biological Assessment of the Effects of Routine Maintenance Activities on Fifteen Federally Listed Species (Bobzien 2014)
- East Contra Costa County Habitat Conservation Plan/Natural Communities Conservation Plan (Jones & Stokes 2006)
- Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay (USFWS 2002)

Other sources of information about the site included aerial photographs, topographic maps, geologic maps, climatic data, and project plans.

2.2 Habitat Assessment Survey

Rincon biologists, Eric Schaad and Lindsay DeCosta, conducted a reconnaissance survey of the project site on October 26, 2017. The primary objective of the field survey was to determine if suitable Alameda whipsnake habitat is present on the project site and to make an assessment of the potential for occurrence of the species.

Weather conditions on the day of the survey were conducive to Alameda whipsnake and other reptile activity, including air temperature between 72 and 82 degrees Fahrenheit and wind speed less than three miles per hour. Biologists conducted pedestrian transects across the project site documenting vegetation, mapping boundaries between vegetation communities, and documenting any PCEs necessary to support Alameda whipsnake. Biologists also documented the types and abundance of suitable prey for the species. The survey was conducted in a manner to ensure 100 percent visual coverage of the project site.

3 Results

The results discussed in the following section cover information collected during literature review and the field survey relevant to the project. A discussion based on these results is provided regarding the presence of PCEs representing suitable Alameda whipsnake habitat on the project site.

3.1 Literature Review

The project site is located 0.2 mile south of designated Alameda whipsnake Tilden-Briones population critical habitat (USFWS 2006), a California Protected Area Special District boundary, and the Briones Reservoir (Figure 3). Recovery Unit 1 (USFWS 2002; see Figure 2) mostly coincides with the Tilden-Briones critical habitat unit and includes the Tilden Regional Park, which represents a critical protected area for the species preservation. The project site lies just within the very southern boundary of Recovery Unit 1 (see Figure 2), where the recovery unit boundary expands beyond the critical habitat boundary. Specific occurrence data for the Alameda whipsnake in the CNDDB is suppressed; however, as noted in the Biological Resources Assessment for the project, six occurrences are reported within 2.5 miles of the project site, with the nearest occurrence approximately 0.75 mile to the west (Leitner 2015).

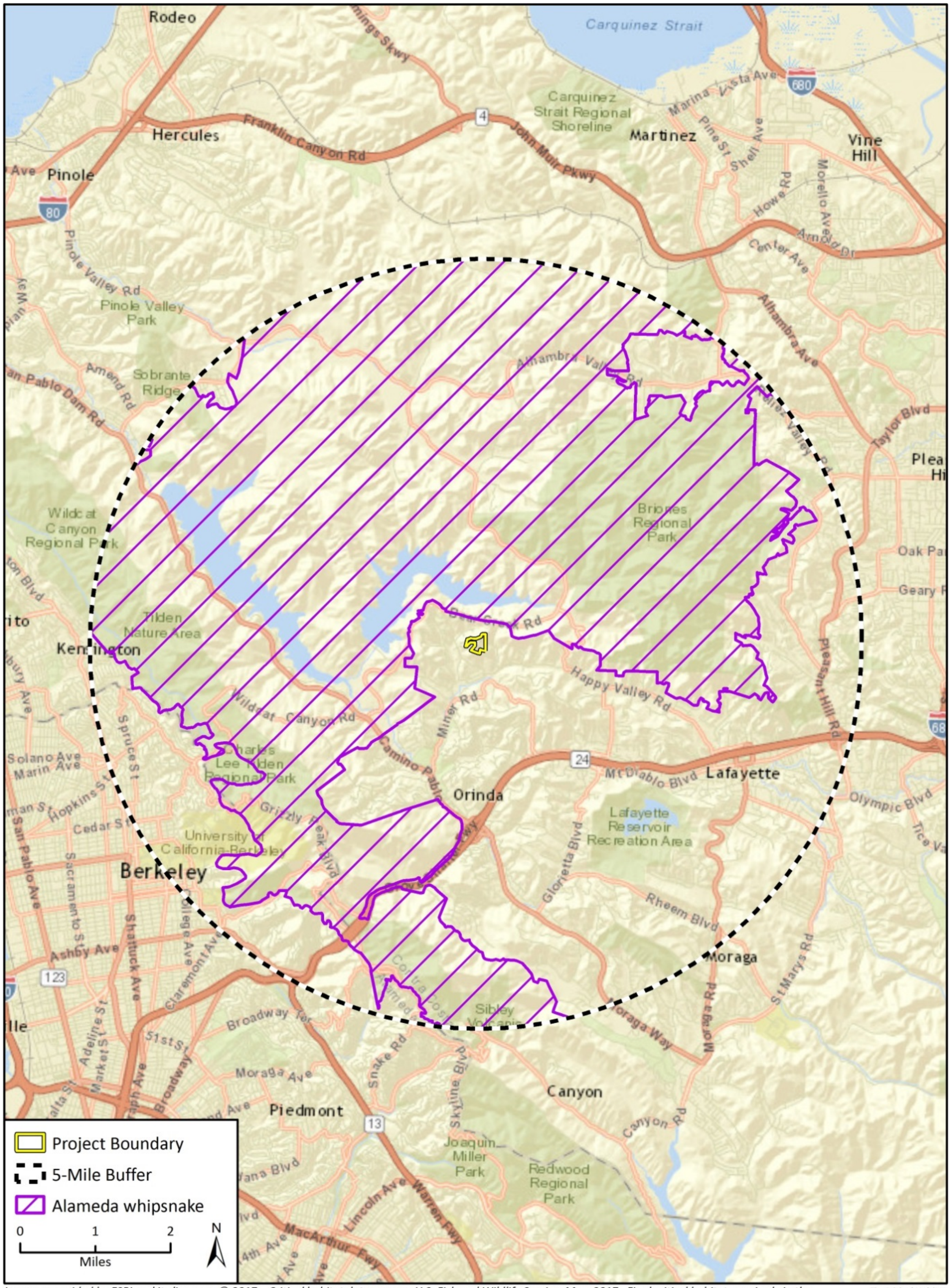
The project site lies in an area consisting of low density residential development and shared community facilities amid a landscape of abundant open space with high topographic diversity. No wetlands or streams have been documented on the project site. A preliminary overview of topographic and geologic resources showed that the project site features a mosaic of open grassland and woodland consistent with the surrounding landscape. Soils on the project site consist of Lodo clay loam with 30 to 50 percent slopes (USDA, NRCS 2017).

3.2 Habitat Assessment Survey

Land use within a 2 miles (3.21 km) radius of the project site consists of low density residential development on the northern outskirts of the City of Orinda and abundant open space within a topographically diverse landscape surrounding the Briones Reservoir. The project site is representative of the surrounding landscape with a residential development occupying 0.75 acre in the center of the parcel and the remaining 23.25 acres consisting of undeveloped open space with high topographic variability.

The project site consists of a convergence of ridge tops with steeply sloping side (30 to 50 percent) and slope aspects facing in all directions. During the field survey, a mosaic of three vegetation community types were documented throughout the project site, consistent with the project BRA (see Leitner 2015) including non-native annual grassland, coast live oak woodland, and coyote brush scrub (Figure 4, Table 1). Coast live oak woodland predominates on the north, northwest, and northeast facing slopes, with non-native annual grassland predominating on the ridge tops and south, southwest, and southeast facing slopes. Coyote brush scrub occurs on a southeast facing slope to the west of the residence. A small stand of Monterey pine (*Pinus radiate*) was also noted directly south of the residence on a short, steep south-facing slope. Most of the oak woodland areas

Figure 3 Alameda Whipsnake Critical Habitat



Imagery provided by ESRI and its licensors © 2017. Critical habitat data source: U.S. Fish and Wildlife Service, May, 2017. Final critical habitat acquired via the USFWS Critical Habitat Portal. It is only a general representation of the data and does not include all designated critical habitat. Contact USFWS for more specific data.

Fig Critical Habitat

Figure 4 Vegetation Communities at and Adjacent to the Project Site

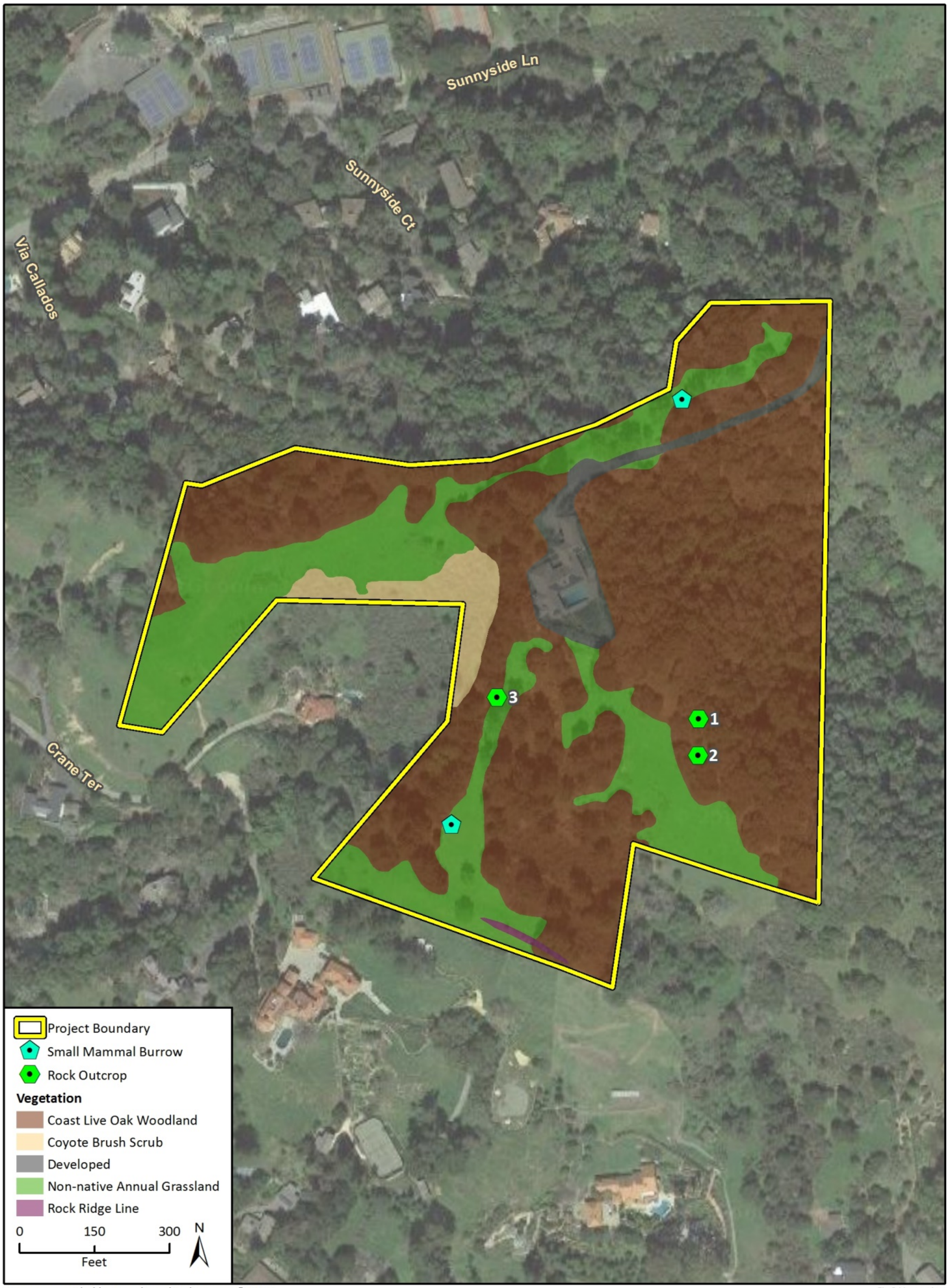


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Fig 3 Vegetation

Table 1 Vegetation Communities Mapped on the Project

Vegetation Community	Acres
Developed*	0.75
Coyote Brush Scrubland	0.66
Mixed Oak Woodland	13.88
Non-Native Annual Grassland	8.67
Rock Ridge Line	0.05
Total	24.02

* Developed area consists of single family residence.

occur on steep slopes around the periphery of the site with the grassland community occurring along the ridge tops (see Figure 4).

Non-native annual grassland community on the project site was dominated by species of foxtail (*Bromus* sp.), rye (*Elymus* sp.), and oat (*Avena* sp.) with few herbaceous species intermixed including sticky monkey flower (*Mimulus aurantiacus*) and thistle (*Cirsium* sp.). The coyote brush scrubland was dominated by coyote brush (*Baccharis pilularis*) with little else growing on the hill side other than a grassy understory with species consistent with the grassland community on site.

Oak woodland community on the project site was dominated by coast live oak (*Quercus agrifolia*), with California black oak (*Quercus kelloggii*), California laurel (*Umbellularia californica*), Big leaf maple (*Acer macrophyllum*), Coast redwood (*Sequoia sempervirens*), and Monterey pine intermixed. Understory in the woodland portions of the project site were a mix of open to densely overgrown and consisted of chamise (*Adenostoma fasciculatum*), mahogany (*Cercocarpus betuloides*), oceanspray (*Holodiscus discolor*), California coffeeberry (*Fragile californica* ssp. *californica*), toyon (*Heteromeles arbutifolia*), gold back fern (*Pentagramma triangularis*), and California sagebrush (*Artemisia californica*).

Toward the very southern edge of the property, a rocky outcrop stretches approximately 250 feet along the length of the top of a steeply sloped south-facing ridgeline (Attachment A, Photos 9 and 10; see Figure 4). The rock ridge offers deep crevices and connects shaded woodland areas with open grassland areas (Attachment A, Photos 11 and 12). Three other isolated rock outcrops were identified on the project site (Attachment A, Photos 7, 8 and 9; see Figure 4). Rock outcrop #1 consists of a collection of two small boulders (< 2 feet diameter or smaller). A small mammal burrow was present at the base of the larger rock, but no sign of mammal or reptile activity was observed. Rocks are located individually and no crevices are present. Rock outcrop #2 occurs at the top of a steep grassy slope and is surrounded by scrub brush and grassy vegetation. Crevices are present within the outcrop deep enough to provide suitable refugia for snakes and lizards. A single western fence lizard was observed at rock outcrop #2, which disappeared into a crevice upon detection. Rock outcrop #3 consists of small collection of rocks deeply embedded in the ground and partially covered in pine needle leaf litter. No crevices or small mammal burrows were observed.

Small mammal (e.g., rodent) burrows were predominantly absent from the project site, with a single small area containing only two small mammal burrows south of the residence (Figure 4). No sign of mammal or reptile activity was observed. Gopher mounds were noted to the northeast of the residence in an area between non-native grassland and open oak woodland; however, no open burrows were observed in this area and no fresh sign of gopher activity was observed around the burrows.

During the survey, three western fence lizards were observed at two of the four rock outcrops, outcrop #1 and the rock ridgeline at the southern end of the project site (see Figure 4). Given the season and weather conditions at the time of the reconnaissance survey, this documents relatively low abundance of observations for this species, and may indicate a low abundance of this species at the site. Other wildlife observed on the project site includes two northern pacific rattlesnakes (*Crotalus oreganus*), and a variety of bird species including chestnut-backed chickadee (*Poecile rufescens*), lesser goldfinch (*Spinus psaltria*), red-breasted nuthatch (*Sitta canadensis*), dark-eyed junco (*Junco hyemalis*), northern flicker (*Colaptes auratus*), white-crowned sparrow (*Zonotrichia leucophrys*), Steller's jay (*Cyanocitta stelleri*), turkey vulture (*Cathartes aura*), and red-tailed hawk (*Buteo jamaicensis*). Abundant scat was observed throughout the project site consistent with bobcat (*Lynx rufus*), small canid (e.g., red fox [*Vulpes vulpes*] or grey fox [*Urocyon cinereoargenteus*]), skunk (*Mephitis* sp.), and mule deer (*Odocoileus hemionus*). San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*) middens were observed in oak woodlands and game trails were observed in grassland areas; however, no sign of recent activity (e.g., tracks, fresh scat) was apparent.

4 Assessment of Alameda Whipsnake Habitat

Studies of Alameda whipsnake show that the species' preferred habitat consists of chaparral, coastal scrub, and open woodland vegetation communities with small mammal burrows, rock outcrops, and the presence of a suitable prey base (Swaim 1994, USFWS 2006). These habitat elements are necessary PCEs of which some minimum suitable combination must be present for the species to survive at a given location (Alvarez et al. 2005). Chaparral and coastal sage scrub communities are preferred by the Alameda whipsnake presumably because the moderate density of vegetation allows for suitable cover and yet still provides open ground for easy movement and foraging (Jones & Stokes 2006). Heavily vegetated areas are generally avoided as movement and foraging is restricted and more energetically costly (Stebbins and McGinnis 2012). The species is known to venture as much as 500 feet (150 meters) or more from core shrub community areas into grassland, oak savanna, and occasionally oak woodland (Alvarez et al. 2005; USFWS 2005). Although suboptimal vegetation communities may provide suitable habitat, research shows that activity is significantly lower in suboptimal areas (Alvarez et al. 2005). Rock outcrops containing crevices with sufficient depth to provide refuge to snakes are a critical component of Alameda whipsnake habitat as they provide place to shelter from heat or cold, escape from predation, and basking areas for thermoregulation (Swaim 1994, Jones & Stokes 2006). Rock outcrops are also the preferred habitat for lizard species that are the primary prey of Alameda whipsnakes (USFWS 2005).

Ground cover on most of the project site is a buildup of dense grass from previous growing seasons and layers of leaf litter consisting of pine needles and deciduous leaves. Few patches of bare earth were present, primarily around the residence and to the northeast of the residence. Much of the oak woodland areas had dense canopy limiting sunlight reaching the ground. Rock outcrops are few and sparsely located throughout the project and do not provide any deep crevices.

Based on the presence of identified PCEs (USFWS 2006), approximately 7.4 acres of suitable habitat are present on the project site (Figure 5). Suitable habitat areas include the coyote brush scrub community area southeast of the residence and open grasslands community and open to moderately dense oak woodland community portions of the project site where the terrain was relatively free of dense understory and grassy ground cover characteristic of the majority of the project site. Four rock outcrops are present in this area and are within proximity to each other consistent with the standard home range size of the Alameda whipsnake (see Figure 5). Included in the total 7.4 acres of suitable habitat is 1.4 acres of poor quality habitat to the northeast of the residence were open to moderately dense oak woodland occurs. This area lacks rock outcrops and is likely farther away from more suitable areas and rock outcrops where an individual snakes would typically forage and shelter. The area northeast of the residence does have sign of a potential prey sources, namely gophers, and the Alameda whipsnake could occasionally forage in the area.

The rock outcrop along the ridgeline toward the southern end of the project site does consist of features suitable for Alameda whipsnake. This rock outcrop is predominantly exposed (i.e., no shade) and surrounded by non-native grassland with dense ground cover, but the southeastern end of the ridgeline is under oak tree canopy and is partly shaded with open ground. A northern Pacific rattlesnake was observed in this area and the individual quickly moved away when detected and

Figure 5 Suitable Alameda Whipsnake Habitat on the Project Site

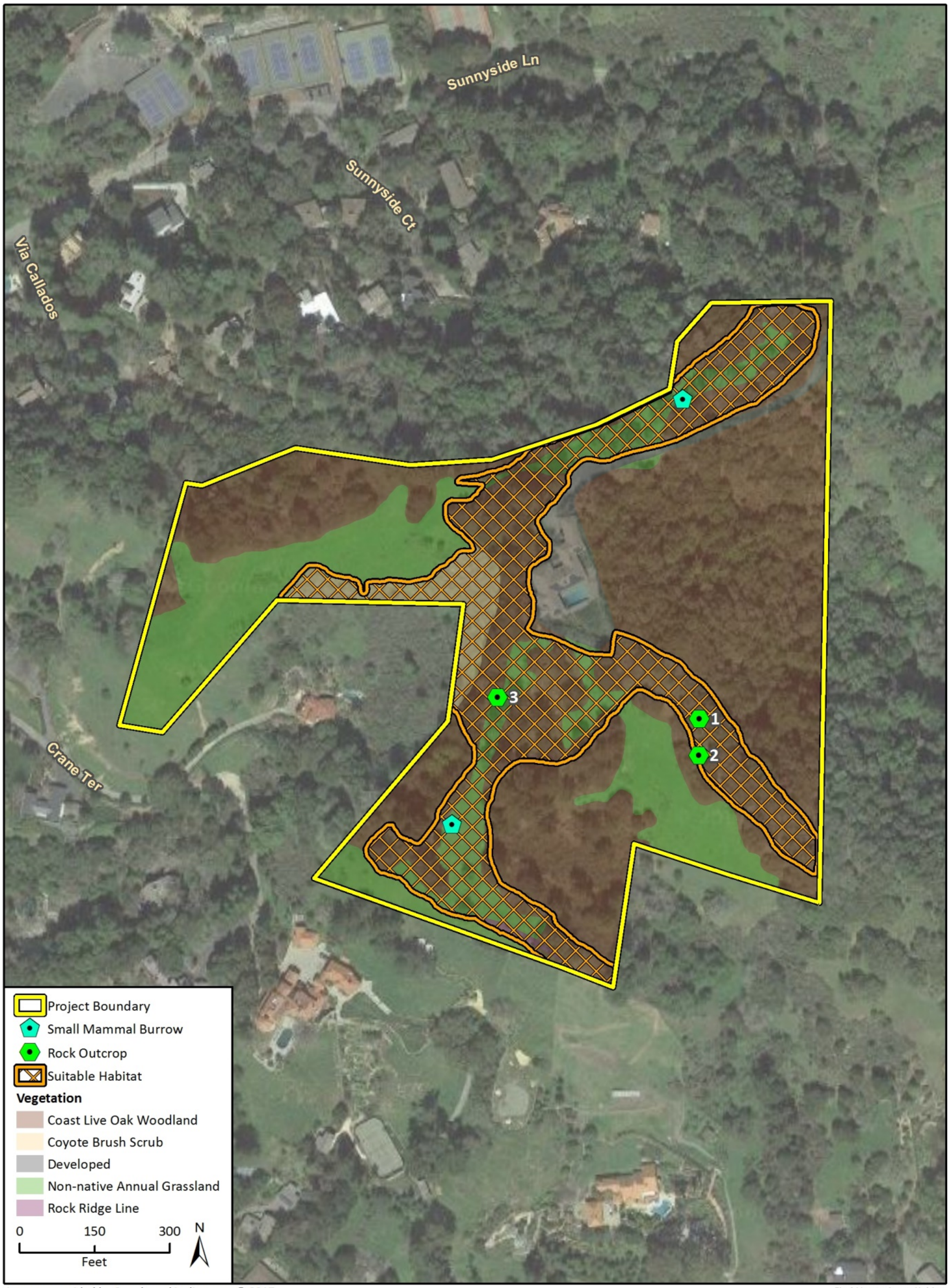

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Fig 4 Vegetation w Habitat

disappeared into a rock crevice, indicating that suitable refugia for snakes is present within the rock outcrop. A lack of observed prey species or their sign (e.g., scat, track, burrows) suggests that the site may not support a suitable prey base for Alameda whipsnake.

The remaining approximately 16.5 acres of the project site is not considered suitable Alameda whipsnake habitat based on the presence of dense ground cover and dense understory vegetation growth, closed canopy woodland with no opportunity for thermoregulation, lack of rock outcrops or small mammal burrows for suitable refugia, and lack of available prey. These portions of the site do not constitute suitable foraging or breeding habitat for the species; however, these areas have some moderate potential to function as dispersal or migratory corridor habitat. Movement through the area in search of mating opportunities or as young move away from nests is possible; however, the site is unlikely to function as a critical movement corridor among populations of this species. Given the location, size, and available open space of the project site, disruption of Alameda whipsnake dispersal is not expected. Future development of residences on the project site is anticipated to follow the design of existing residential developments in the area by leaving considerable undeveloped open space. This open space would allow for the Alameda whipsnake to move through the environment if the species is or becomes present in the area.

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Appendix A

Site Photographs

Photograph 1. View of the northeast potion of the project site facing northeast along ridge extending from the residence to the northeastern property boundary. This area of mixed open oak and pine woodland with non-native annual grasses represents poor quality suitable habitat.

Photograph 2. Gopher activity northeast of residence on ridge in open oak woodland. This area of open oak woodland with bare ground cover lacks rock out crops and represents poor quality suitable habitat.

Photograph 3. View of grassland slope approximately 50 yards east of residence with west facing slope in the background. Slope is dominated by coyote bush, scattered oaks, and dense understory of non-native annual grasses. This area is not considered suitable habitat.

Photograph 4. East facing view from approximately the same location as Photo 3 showing ridge extending east from residence. Steep south facing slope (left) with non-native annual grasses and scattered oaks. Steep north facing slope (right) contains mixed laurel and oak woodland with coyote bush, sticky monkey flower, and fern understory. This area is not considered suitable habitat.

Photograph 5. View of project site southwest of residence facing northeast showing dense ground cover of non-native annual grasses. This area is not considered suitable habitat.

Photograph 6. North by northeast view of project site taken from bottom of slope east of residence. Dense oak woodland with dense leaf litter and no rock outcroppings dominate landscape. This area is not considered suitable habitat.

Photograph 7. Rock outcrop #1 southeast of former chicken coop, one with small mammal burrow at base. This rock outcrop is within an area determined to be suitable habitat.

Photograph 8. Rock outcropping #2 located along ridge extending southeast from residence. Mixed oak woodland and non-native annual grasses predominate. This rock outcropping provides some refuge and crevices and a norther Pacific rattlesnake was observed here. This area was determined to provide suitable habitat.

Photograph 9. Rock outcrop #3 located southwest of residence along edge of non-native annual grassland and oak woodland vegetation community area of the project site. No crevices or small mammal burrows present; however, this rock outcrop occurs in an area determined to be suitable habitat.

Photograph 10. South facing view of old road located west of residence and extending southwest showing steep west facing slope (right) and pine woodland stand with intermittent open non-native annual grassland. Based on proximity to rock outcrops and small mammal burrows this area was determined to suitable habitat.

Photograph 11. Rock outcrop atop cliff edge at south-most end of project site. Western fence lizard sighted. Rock out cropping provides best available habitat potential for Alameda whipsnake.

Photograph 12. View of rock outcrop (same as photo 9) taken from southeastern end of ridgeline and showing larger rocks and deeper crevices with opportunity for Alameda whipsnake refugia. Northern Pacific rattlesnake observed in this area.

MEMORANDUM

To: Mayank Patel, Assistant Planner, City of Orinda

CC: Darcy Kremin

From: Brendan Cohen

Date: December 19, 2016

Subject: Diamond Construction Four-Lot Subdivision Project

A Biological Resource Assessment (BRA) was prepared by Barbara Leitner and a Tree Preservation Report was prepared by Traverso Tree Service for the Diamond Construction four-lot subdivision project in December and August 2015, respectively. Michael Baker International biologist Brendan Cohen reviewed the reports and conducted a site visit on December 13, 2016, to ensure site conditions remained consistent with the reports.

The BRA includes a discussion of special-status plant and animal species and vegetation communities that occur or have the potential to occur on the project site. The arborist report discussed the identity, health, diameter at breast height (DBH), and other details of the trees on the project site.

Michael Baker International performed a search of the US Fish and Wildlife Service (USFWS) Sacramento Office's Information for Planning and Conservation Database, the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB), and the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants. The search was conducted using the Briones Valley US Geological Survey (USGS) 7.5-minute quadrangle. In addition, a search was completed of the USFWS Critical Habitat portal for designated habitat in the vicinity. Biologist Brendan Cohen also conducted a reconnaissance-level survey of the project site on December 13, 2016, to review the accuracy of prior environmental reports and identify vegetation, habitat communities, and the suitability of the site to support special-status species.

The results of the site survey found that the vegetation, habitat communities, and site characteristics are generally consistent with the previous environmental reports. We agree that there are no state or federally protected wetlands or waters of the United States on the project site and no aquatic features protected under the City's creek protection ordinance.

Minor changes to the site conditions since preparation of the previous reports were noted, including trees with worsening health conditions due to drought and/or the red turpentine beetle, and some of the trees had fallen down. The original arborist report indicated that the two coast live oak trees numbered 139 and 129 on parcel D would be retained; however, these trees are now slated for removal. In addition, several coast live oaks and a Monterey pine on parcel A are within a utility easement and will likely need to be removed. These trees will be mitigated for based on the requirements stipulated in the City of Orinda's tree protection ordinance.

In addition, according to the database search results, several special-status species came up in our search that were not included in the initial BRA. These include several special-status bird species and the Coast Range newt (*Taricha torosa*). The recommendations in the BRA for nesting birds will sufficiently reduce potential impacts to these additional bird species to less than significant levels. However, the Coast Range newt has the potential to occur on the project site, and we recommend additional measures to ensure impacts to this species are reduced to a less than significant level under CEQA.

Recommendations for Coast Range Newt

Due to the presence of suitable habitat and nearby water sources, Michael Baker International recommends including the following mitigation measure to reduce impacts to Coast Range newt.

MM-BIO-1 Within 48 hours prior to ground-disturbing activities, the project site shall be surveyed by a qualified biologist for the presence of Coast Range newt. If evidence of the species is not detected, no further measures are required. If the species is detected, avoidance and minimization measures will be implemented. These measures may include, but are not limited to, moving egg masses or individuals outside of the work area and relocating them to nearby suitable sites outside of potential construction areas.

Timing/Implementation: *Prior to ground-disturbing activities*

Enforcement/Monitoring: *City planning department*

Please feel free to contact me any questions or concerns at (916) 517-4412 or bcohen@mbakerinlt.com.

BIOLOGICAL RESOURCE ASSESSMENT

88 SUNNYSIDE LANE

ORINDA, CALIFORNIA

APN 266-270-029

Barbara M. Leitner
2 Parkway Court
Orinda, CA 94563
December 15, 2015

Summary

This report presents the results of an assessment of existing or potentially-occurring biological resources that could present constraints in the subdivision and subsequent development of 88 Sunnyside Lane, Orinda. The report provides background and site-specific information pertaining to special-status species, sensitive natural communities, mature native oaks, and wetlands or watercourses that could be protected under the Orinda creek protection ordinance (Orinda Municipal Code Section 17.4.6), and assesses their actual extent or potential to occur on the parcel. Recommendations for further investigation and protective measures are described.

No sensitive natural communities were noted on the parcel, and no wetlands were present. Drainages possibly meeting criteria for protection under the Orinda creek protection ordinance were noted on Parcels A and C, generally in the areas proposed for open space. No special-status plants were observed during site surveys in November 2015, but potential habitat for several species was noted, in particular Diablo helianthella (*Helianthella castanea*), bent-flowered fiddleneck (*Amsinckia lunaris*), western leatherwood (*Dirca occidentalis*) and Mt. Diablo fairy lantern (*Calochortus pulchellus*), all known from nearby occurrences and all assigned Rank 1B.2, rare and endangered, by the California Native Plant Society (CNPS). It is recommended that suitably-timed surveys be carried out to determine whether these species are present in the project area.

Several special-status animals were observed or could be present. Stick nests of San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*, California Species of Special Concern) were observed at three locations in the project area. The project area is within Critical Habitat Unit 6 of the state- and federally-Threatened Alameda whipsnake (*Masticophis lateralis euryxanthus*). Although suitable habitat is limited and of moderate quality, the project area is near known records for the species and habitat on the project area is more or less contiguous with larger areas of suitable habitat. This species should be assumed to be present and recommended protective and avoidance measures implemented. The

project area also contains many large, mature oaks and other trees that may provide roosting habitat for special-status bats. Protection and avoidance measures are recommended for these species.

With respect to more common habitats and species, it was noted that the parcels contain many large mature oaks of several species protected under Orinda Municipal Code (Section 17.21.3 *et seq*.). Further, the slopes on most of the project area are quite steep and erodible. Natural vegetation should be retained in all areas proposed for open space and large-scale removal of vegetation for landscaping or vineyards should be prohibited there. Nearby vineyards on similarly steep slopes have experienced significant soil loss.

Introduction and Setting

The project area, 88 Sunnyside Lane (APN 266-270-029), is situated in the Sleepy Hollow neighborhood of Orinda and is accessed from Van Tassel Lane (see Figure 1 at the back of the report). It is at the eastern end of Sunnyside Lane, with Lombardy Lane to the south, Bear Creek Road to the north, and Dalewood Drive to the east. The property is 24.02 acres in size and is situated on a ridgetop with an elevation range from 835 to 1025 feet. The parcel is oddly-shaped, following ridgelines in several directions. The project proposes to subdivide the existing 24.02 acre parcel into four smaller parcels ranging in size from 5.32 acres to 7.44 acres (gross) and identifies three additional building sites in addition to the existing single family dwelling located at the highest point of the ridgeline. The soils on the site are Lodo clay loam, 30 to 50 percent slopes (U.S. Dept. Agriculture, 1977), with fossil-bearing marine sandstone outcrops visible along the ridges. A small portion of the northern part of the property drains toward Bear Creek and Briones Reservoir, while most of the property drains toward Lauterwasser Creek. Both Bear Creek and Lauterwasser Creek are tributaries of San Pablo Creek.

Methods

The City of Orinda provided the investigator with a map of the property and the project (DeBolt Civil Engineering, tentative map dated August 11, 2015). Prior to field surveys, the California Natural Diversity Database (CNDDB) and CNPS Electronic Inventory were consulted to determine the special-status biological resources on the Briones Valley 7.5-minute U.S. Geologic Survey quadrangle on which the property is located (CNDDB, 2015a and CNPS, 2015) (see Appendix A). The site was visited by Barbara M. Leitner and Sandy Greenwald on November 25 and 29, 2015. All parts of the parcel were covered on foot, with particular attention given to the possible building sites, outdoor living space, and driveways as shown on the tentative map (DeBolt, 2015). Attention was also given to potential watercourses, areas of ponded water, if any, as well as seeps, springs, rock outcrops, and areas of unusual habitat. All plant species observed were noted, and those that could not be identified to species were brought back to the laboratory for identification to the extent possible. The list of plant species observed was compared with the list of unusual and significant plants for Alameda and Contra Costa counties (Lake, 2010). Vegetation types were described and mapped over Google Earth imagery. Where appropriate, terminology for sensitive natural communities follows CDFW (2010). All animal observations and sign were noted, and specific habitat features for special-status animals were noted as they were encountered.

Results

Vegetation, including Sensitive Natural Communities

The project area supports four vegetation types: developed, coast live oak, coyote brush scrub, and non-native grassland (see Figure 2 at the back of this report). Appendix B presents a list of plant species observed. The site visits took place in early winter, a time when the previous year's vegetation was somewhat deteriorated, and the new year's annual growth was mostly in seedling form. As a result, some plants could only be identified to genus. The paragraphs that follow describe the vegetation types observed.

Developed. Areas were mapped as developed where natural vegetation has been completely replaced or is dominated by species not native to the region. The existing residence in Parcel B, with building, pool, lawn, and other landscaping were mapped as developed. Outside of this area, trees have been planted along some of the graded drives; a row of Monterey pines (*Pinus radiata*) has been planted along the drive to the west of the existing residence. Monterey pines are visually dominant in the constructed pad and slope comprising the possible building site in Parcel C; therefore, this area was mapped as developed, although the understory contains many native species. A few other trees have been planted elsewhere, such as along the drive and the possible building site in Parcel A, where some Monterey pines and coast redwoods (*Sequoia sempervirens*) are present.

Coast live oak. This vegetation type is dominated by coast live oak (*Quercus agrifolia*), an evergreen tree growing up to 80 feet in height. It is typically found on north-facing slopes and shaded or protected sites. It may grow as open woodland with a grassy understory or as a dense, closed-canopy forest. Frequent associates are California bay (*Umbellularia californica*), big-leaf maple (*Acer macrophyllum*), black oak (*Quercus kelloggii*), and California buckeye (*Aesculus californica*). Coast live oak is not considered a sensitive natural community (Sawyer *et a*l., 2009). This is the most extensive vegetation type in the project area, occupying much of the east-facing lower slopes of Parcels A and C and the north-facing slopes of Parcels A and B.

Coyote brush scrub. Coyote brush scrub is a common and widespread scrub community, consisting of shrubs up to 10 feet tall, dominated by coyote brush (*Baccharis pilularis*), often with poison-oak (*Toxicodendron diversilobum*), and sometimes bush monkeyflower (*Mimulus aurantiacus*), blue elderberry *(Sambucus nigra* ssp*. caerulea*) and coastal sage (*Artemisia californica*). The understory is highly variable, consisting of dense grasses, annual and perennial herbs. In the project area, typical understory species include California blackberry (*Rubus ursinus*), sanicle (*Sanicula* sp.), goldback fern (*Pentagramma triangularis*), and yerba buena (*Clinopodium douglasii*). In the absence of fire, coyote brush scrub invades grasslands, and in turn is invaded by coast live oak forest. Seedling, sapling, and even medium-sized coast live oaks are a common feature of coyote brush scrub in the project area. The coyote brush scrub is not considered a sensitive natural community (Sawyer *et a*l., 2009). Coyote brush scrub occupies the southeast-facing slope below the possible building sites on Parcel D and C, the lower south-facing slopes on the western portion of Parcel B, and a small area below and south of the main driveway in Parcel A.

Non-native grassland. Non-native grassland is common on fine-textured soils in valleys and foothills of coastal California. Dominant species are mainly annual grasses of Mediterranean origin, such as wild oats (*Avena* spp.), ripgut brome (*Bromus diandrus*), soft chess (*B. hordeaceus),* annual fescues (*Festuca* spp.), and non-native herbs such as filaree (*Erodium* spp.), bur-clover (*Medicago polymorpha*), cut-leaf geranium (*Geranium dissectum*), and vetch (*Vicia* spp.), among others. Invasive species such as yellow star-thistle (*Centaurea solstitialis*) may also be present. Native species frequently occurring in non-native grassland include annual lupines (*Lupinus* spp.), California poppy (*Eschscholzia californica*), blue-eyed grass (*Sisyrinchium bellum*), and the native California brome (*Bromus carinatus*). Remnants of native grasslands may be seen in rocky places with less competition. In the absence of fire, coyote brush scrub tends to invade non-native grassland. Because it is dominated by non-native species, this vegetation type is not considered a sensitive natural community. Non-native grassland occupies much of the western open space portion of Parcel B, and the steep south-facing slope on Parcel C.

Wetlands and Watercourses

No ponded water, seeps, or springs were noted in the project area. In Parcel A, a corrugated metal pipe collects stormwater runoff from the existing driveway at a low spot, then discharges it from a T-shaped outfall (for energy dissipation) about 50 feet below the driveway. An eroded gully extends for some distance below this, eventually emptying into a natural drainage. The eroded gully feature would not be protected under the City of Orinda's creek protection ordinance, since it is the result of concentrated runoff where an incised gully would not have existed otherwise. Nevertheless, if the site is developed the impervious surfaces will be increased and the potential for further erosion will be increased as well.

A number of flexible PVC pipes originated at the existing residence and landscaping (on Parcel B), evidently collecting stormwater runoff and discharging it into a swale on Parcel A, perhaps 100 feet downslope. Because the slope is relatively gentle and each of the pipes appeared to discharge a relatively small amount of runoff, no erosion features were observed in this area and no incised watercourse was observed. Runoff moves as sheet flow for several hundred feet farther, eventually developing into an incised drainage well into the proposed open space in Parcel A.

The possible building site in Parcel C is constructed in a declivity or swale where some time ago fill was used to create a stepped slope. A galvanized corrugated metal pipe outfall was noted well downslope from the building site, and appeared likely to collect stormwater runoff from near the possible building site. The intake for this drainage could not be located in the dense brush.

Wildlife

Because the habitats in the project area are common and abundant, the wildlife species observed and expected are also typical for the region. Evidence of pocket gopher (*Thomomys bottae*), black-tailed deer (*Odocoileus hemionus)*, raccoon (*Procyon lotor*), western fence lizard (*Sceloporus occidentalis*), gopher snake (*Pituophis catenifer*), red-breasted nuthatch (*Sitta canadensis*) and scrub jay (*Aphelocoma californica*) was observed, with many other common and widespread species also expected.

Special-status Biological Resources

Special-status species are defined as species meeting one or more of the following criteria:

- Listed or proposed for listing under the federal Endangered Species Act
- Listed or candidate for listing by the State of California under the California Endangered Species Act
- Listed as rare under the California Native Plant Protection Act (plants only)
- Meet the definition of rare or endangered under the California Environmental Quality Act. In addition to the preceding definitions, species may meet this criterion in the following ways:
    - Plants ranked by the California Native Plant Society (CNPS) as 1 or 2 (CNPS, 2015)
    - Plants considered locally significant (CNPS ranks 3 or 4, or listed in the East Bay list of unusual and significant plants (Lake, 2010))
    - Animals listed by CNDDB as Special Animals (CNDDB, 2015b)
    - Animals listed by the California Department of Fish and Wildlife as Species of Special Concern or Fully Protected (CNDDB, 2015b)
    - Animals protected under the Migratory Bird Treaty Act

Special-status Plants

A query of CNDDB records for the Briones Valley quadrangle revealed 13 special-status plant species; a CNPS query revealed 20 (see Appendix A). Although the occurrence of many could be ruled out for the project area due to lack of suitable habitat, several have been reported from similar habitat within a mile or two of the project area. Since these could not be detected reliably during the November surveys, focused surveys are recommended during the appropriate season. Species with at least moderate potential to occur are briefly described below.

Bent-flowered fiddleneck (*Amsinckia lunaris*; CNPS Rank 1B.2) is an annual member of the borage family (Boraginaceae). It is known from grassland and woodland openings in the Central Coast of California at an elevation range of 150 to 1500 feet. This species typically flowers in April-May. The nearest records to the project area are along Bear Creek Road, 1.5 mile east of San Pablo Dam Road, southwest of Russell Peak, and several records in the vicinity of Briones Reservoir. Potentially suitable habitat was observed at the edges of brush and oak woodland and in the grasslands on the project area.

Mt. Diablo fairy lantern (*Calochortus pulchellus*; CNPS Rank 1B.2) is a perennial member of the lily family (Liliaceae). It is known from wooded and brush slopes in chaparral, oak woodland, riparian woodland and grasslands in Contra Costa and Solano counties at an elevation range of 100 to 3,000 feet. This species typically flowers in April-May. The nearest records to the project area at the north edge of Lafayette above Laurel Drive, and the Briones Hills about two miles to the north. Potentially suitable habitat was observed at the edges of oak woodland, coyote brush scrub, and small patches of chamise (*Adenostoma fasciculatum*) scrub in the project area.

Western leatherwood (*Dirca occidentalis*; CNPS Rank 1B.2) is a deciduous shrub in the daphne family (Thymeliaceae). The only member of its family in California, western leatherwood is known from the central coast of California from Santa Clara County northward to Marin and Sonoma counties. Its elevation range is 80 to 1,400 feet. It typically is found on moist brushy slopes and filtered woodland under partial shade of trees. It is one of the earliest-flowering species, blooming from January to April. The nearest records for this species are along Miner Road in Orinda, near the junction of San Pablo Dam

Road and Bear Creek Road, and just west of the intersection of Camino Pablo and Camino Sobrante, in Orinda. Although this species is potentially detectable in late November, it would be difficult to observe if fully deciduous. Potentially suitable habitat was observed in coyote brush scrub and oak woodland in the project area.

Diablo helianthella (*Helianthella castanea*; CNPS Rank 1B.2) is a perennial herb in the daisy family (Asteraceae). It is usually found in partial shade, often on north-facing or sheltered sites, frequently in rocky soils in many brushy or woodland situations. It ranges from San Mateo to Contra Costa and Marin counties, with an elevation range of 80 to 3,500 feet. It flowers from April to June. CNDDB reports 22 records for Diablo helianthella on the Briones Valley quadrangle, with several quite near the project area in the Happy Valley neighborhood of Lafayette, the junction of San Pablo Dam Road and Bear Creek Road, and the south side of Bear Creek Road in Orinda. Suitable habitat was present in many parts of the project area in openings in oak woodland or brush.

Special-status Animals

A query of CNDDB records for the Briones Valley quadrangle revealed 15 special-status animal species. Although the occurrence in the project area of many could be ruled out due to lack of suitable habitat, several have been reported from similar habitat within a mile or two of the project area. Species with at least moderate potential to occur are briefly described below.

Pallid bat (*Antrozous pallidus*; CDFW Species of Special Concern) forages over grassland and roosts in rocky areas. This species ranges throughout California. Pallid bats form nursery colonies which are reportedly very sensitive to loss and modification of foraging habitat, especially from urban development (Northern California Bats, 2015). CNDDB reports three occurrence records of pallid bats from the Briones Valley quadrangle, from Orinda, Lafayette Terrace, and Russell Tree Farm, but all are 50 years old or more. This suggests that while suitable habitat has been present historically, the degree of human disturbance and development makes the occurrence of this species less likely than in the past.

Hoary bat (*Lasiurus cinereus*; CNDDB Special Animal) forages for moths over open habitats or forest edges. It roosts in dense foliage of medium to large trees. This species can be found in suburbs in large, old trees. It migrates in flocks to warmer climates for the winter (Northern California Bats, 2015). Jays are a significant predator of this species. The only record for hoary bat from the Briones Valley quadrangle is a group of fairly non-specific records from the Berkeley area, all from at least 50 years ago. However, because this species is solitary and moves over a wide range annually, it could occur in the project area on occasion.

Alameda whipsnake (*Masticophis lateralis euryxanthus* or AWS; federal- and state-Threatened) is found in a variety of habitats, typically chaparral and scrub habitat, but will also use adjacent grassland, oak savanna and woodland habitats. It is most often found on south-facing slopes and ravines with rock outcrops, deep crevices or rodent burrows where it can sun itself and forage on fence lizards, its preferred food. The project area is within U.S. Fish and Wildlife Service Critical Habitat Unit 6 for AWS. CNDDB reports 18 occurrence records for this species from the Briones Valley quadrangle. Although specific occurrence data is suppressed in the CNDDB online inventory, CNDDB wildlife biologist Brian

Acord confirmed that 6 occurrences of AWS have been reported within 2.5 miles of the project area, and the nearest locality to the project area is only 0.75 miles to the west (B. Acord, CDFW, pers. comm., December 11, 2015). Since the project area contains suitable mosaic of grassland, rocky sites, brush and oak woodland, and is adjacent to extensive areas of potentially suitable habitat, AWS should be assumed to be present and avoidance measures implemented.

San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*; CDFW Species of Special Concern) is a medium-sized nocturnal rodent in the family Cricetidae. Dusky-footed woodrats build large, dome-shaped stick nests up to 6 feet in height that can be inhabited by several generations of woodrats over many years. Woodrats are found in many types of woodland, forest, and shrubland, and their distribution ranges throughout the San Francisco Bay Area and nearby coastal regions. Woodrats are generally solitary. They consume a wide variety of nuts, fruits, fungi, foliage and some forbs (Endangered Species Recovery Program, 2015). Although habitat appeared suitable in much of the coyote brush scrub and coast live oak habitats, only three stick nests were observed, one each in Parcels A, C and D.

Discussion and Recommendations

Special-status plants. The 24-acre project area at 88 Sunnyside Lane contains suitable habitat for several special-status species. Suitable habitat was noted for four CNPS Rank 1B.2 plants. Focused surveys are recommended at suitable times to more fully evaluate the potential occurrence of these species in the project area. This would consist of surveys in late January, April and May.

Alameda whipsnake. The state- and federally-listed Alameda whipsnake is known to occur nearby in similar habitat. Although high-quality habitat is not extensive in the project area, presence should be assumed; the project area is within a designated Critical Habitat Unit for the species. The following avoidance and mitigation measures are recommended for AWS:

- Construction activities should occur during the period of greatest AWS activity, mid-March through the end of October, so that animals are able to escape harm.
- A qualified biologist should present an environmental awareness training for all construction personnel. This training should include a description of special-status species that could be encountered, their habitats, protective measures, work boundaries, reporting requirements, and implications of violation of applicable laws.
- The outside edges of the construction areas should be delineated with standard orange barrier safety fencing to prevent encroachment of construction personnel and equipment beyond the approved limits of work. The fencing should be at least 4 feet tall. Wildlife exclusion fencing should be installed inside the orange barrier safety fencing. Acceptable fencing materials include plywood sheets, corrugated metal, and silt fencing. Wildlife exclusion fencing should be buried to prevent animals passing under the fence and should be high enough to deter reptiles, amphibians and small mammals from climbing or jumping over the fence. All seams should be tightly sealed. Overhanging and adjacent vegetation should be cut back to avoid bridging the barrier. Fencing must isolate the work area from adjacent scrub habitat. Fencing must remain in

place and be properly maintained for the duration of construction. Fencing and all stakes must be completely removed upon completion of construction.

- No more than 48 hours prior to the initiation of site clearing or the stockpiling of equipment and construction materials, a qualified biologist should survey the work area for wildlife. If AWS is detected, work may not commence until it is out of the work area.
- If AWS is detected at any time during construction, all work must immediately cease. Without an Incidental Take Permit and CDFW Section 2081 permit, it is not legal to handle or relocate an Alameda whipsnake; individuals must be left alone and permitted to move about freely. Barrier panels may be removed in hopes that an individual snake will exit the site. If an Alameda whipsnake is detected, the US Fish and Wildlife Service and CDFW must be contacted and consultation initiated. Work may not proceed until the appropriate authorization and mitigation measures have been implemented. Injury or mortality of AWS could result in significant delays in construction.

San Francisco dusky-footed woodrat. The San Francisco dusky-footed woodrat has been documented at three locations in the project area. New locations can occur as animals move in and out of the site. The following measures are recommended to avoid and minimize impacts on this species, if development occurs at one or more sites:

- Conduct a preconstruction survey of identified construction areas to search for woodrat nests. If no nests are detected, no further avoidance measures are needed.
- Any woodrat nests detected should be mapped and avoided if possible. If they are within 50 feet of the construction area, wildlife exclusion fencing is recommended to discourage their entry into the work area.
- If a woodrat nest is in the work zone and cannot be avoided, site clearing should be performed during the non-breeding season (September 1-November 30). During the non-breeding season, the nest should be disassembled by hand and the nest materials (sticks) removed and scattered well away from the work area. Any adult animals will be passively relocated into the adjacent woodland habitat. This work should be supervised by a qualified biologist in coordination with CDFW. This step could avoid project delays, as described next.
- If destruction of a woodrat nest during the breeding season is unavoidable, a qualified biologist will determine whether the nest is occupied. If the nest is not occupied, it may be disassembled and scattered as described in the preceding point. If live animals are encountered, nest materials should be replaced on top of the nest and the effort abandoned. Nests may not be disassembled if young woodrats are present. Removal of the nest may be resumed after the young woodrats have left the nest.

Raptors and migratory birds. Several actions are recommended to protect raptors and migratory birds:

- Prior to the removal or significant pruning of any trees during any season, they should be inspected by a qualified biologist for the presence of raptor nests. If a suspected raptor next is discovered, CDFW should be notified. Pursuant to Fish and Game Code Section 3503.5, raptor nests, whether or not they are occupied, may not be removed until approval is granted by CDFW.

- If clearing, grubbing, or tree removal/pruning are conducted outside the breeding season (i.e., September 1-January 31), no preconstruction surveys for nesting migratory birds are required. If clearing, grubbing or tree removal/pruning is conducted during the breeding season (i.e., February 1-August 31), a preconstruction nesting bird survey should be conducted. The survey should be performed by a qualified biologist no more than two weeks prior to the initiation of work. If no nesting or breeding activity is observed within 250 feet of the construction area, work may proceed without restrictions. Active nests of raptors should be mapped within 250 feet for raptors and within 50 feet for passerines (songbirds).
- For any active nests found near the construction limits (250 feet for raptors and 50 feet for passerines), a qualified biologist should make a determination as to whether or not construction activities are likely to disrupt reproductive behavior. If it is determined that construction is unlikely to disrupt breeding behavior, construction may proceed. If construction may disrupt breeding, the buffer zone should be expanded; avoidance is the only mitigation available. The ultimate size of the no-construction buffer zone may be adjusted by the project biologist based on the species involved, topography, lines of sight between the work area and the nest, physical barriers, and the ambient level of human activity. Buffer adjustments should be made in consultation with the CDFW. If it is determined that construction activities are likely to disrupt raptor breeding, construction activities within the no-construction buffer zone may not proceed until the Project Biologist determines that the nest is no longer occupied.
- If maintenance of a no-construction buffer zone is not feasible, the Project Biologist should monitor the nests to document breeding and rearing behavior of the adult birds. If it is determined that construction activities are likely to cause nest abandonment, work should cease immediately and the CDFE and/or USFWS Division of migratory Bird Management should be contacted for guidance.

<u>Bats</u>. Not more than one week before removal of trees, a qualified biologist (i.e., one familiar with bat identification and sign) should survey the trees to be removed for the presence of roosting special-status bats. If no roosting bats or evidence of bats are found, tree removal may proceed. If bats are found or evidence of use by bats is present, the biologist should map and mark the trees with flagging. CDFW will be consulted for guidance on measures to avoid and minimize disturbance of the bats. Measures may include: excluding bats from the tree(s) to be removed; timing tree removal to minimize disturbance to bats; and/or use of a construction buffer to avoid disturbance of young before they are able to fly (for pallid bats, this period is between April and August).

<u>Oak trees and creek protection.</u> Large, mature oak trees belonging to several species are present throughout the parcel. Areas protected by the Orinda creek protection ordinance are generally in areas proposed for open space, well away from the identified possible building sites. The three areas shown as possible building sites are somewhat disturbed by prior grading and the presence of non-native tree species, but the boundaries of these sites as shown most likely do not encompass the full extent of habitat disturbance should the sites be developed for residences.

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Figures

Figure 1. Site location map, 88 Sunnyside Lane

Figure 2. Vegetation Types and San Francisco Dusky-footed Woodrat Nests, 88 Sunnyside Lane, Orinda

Appendix A. Results of Queries, California Natural Diversity Database and California Native Plant Society Electronic Inventory

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad is (Briones Valley (3712282))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Amsinckia lunaris bent-flowered fiddleneck	PDBOR01070	None	None	G2?	S2?	1B.2
Antrozous pallidus pallid bat	AMACC10010	None	None	G5	S3	SSC
Archoplites interruptus Sacramento perch	AFCQB07010	None	None	G2G3	S1	SSC
Arctostaphylos pallida pallid manzanita	PDERI04110	Threatened	Endangered	G1	S1	1B.1
Bombus caliginosus obscure bumble bee	IIHYM24380	None	None	G4?	S1S2	
Branta hutchinsii leucopareia cackling (=Aleutian Canada) goose	ABNJB05035	Delisted	None	G5T3	S2	
California macrophylla round-leaved filaree	PDGER01070	None	None	G3?	S3?	1B.2
Calochortus pulchellus Mt. Diablo fairy-lantern	PMLIL0D160	None	None	G2	S2	1B.2
Cicuta maculata var. bolanderi Bolander's water-hemlock	PDAPI0M051	None	None	G5T3T4	S2	2B.1
Cirsium andrewsii Franciscan thistle	PDAST2E050	None	None	G3	S3	1B.2
Corynorhinus townsendii Townsend's big-eared bat	AMACC08010	None	Candidate Threatened	G3G4	S2	SSC
Dipodomys heermanni berkeleyensis Berkeley kangaroo rat	AMAFD03061	None	None	G3G4T1	S1	
Dirca occidentalis western leatherwood	PDTHY03010	None	None	G2	S2	1B.2
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Fissidens pauperculus minute pocket moss	NBMUS2W0U0	None	None	G3?	S2	1B.2
Haliaeetus leucocephalus bald eagle	ABNKC10010	Delisted	Endangered	G5	S2	FP
Helianthella castanea Diablo helianthella	PDAST4M020	None	None	G2	S2	1B.2
Helminthoglypta nickliniana bridgesi Bridges' coast range shoulderband	IMGASC2362	None	None	G3T1	S1	
Holocarpha macradenia Santa Cruz tarplant	PDAST4X020	Threatened	Endangered	G1	S1	1B.1
Isocoma arguta Carquinez goldenbush	PDAST57050	None	None	G1	S1	1B.1

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Lasiurus cinereus hoary bat	AMACC05030	None	None	G5	S4	
Masticophis lateralis euryxanthus Alameda whipsnake	ARADB21031	Threatened	Threatened	G4T2	S2	
Meconella oregana Oregon meconella	PDPAP0G030	None	None	G2G3	S1	1B.1
Melospiza melodia maxillaris Suisun song sparrow	ABPBXA301K	None	None	G5T3	S3	SSC
Northern Maritime Chaparral Northern Maritime Chaparral	CTT37C10CA	None	None	G1	S1.2	
Nyctinomops macrotis big free-tailed bat	AMACD04020	None	None	G5	S3	SSC
Rana draytonii California red-legged frog	AAABH01022	Threatened	None	G2G3	S2S3	SSC
Taxidea taxus American badger	AMAJF04010	None	None	G5	S3	SSC
Viburnum ellipticum oval-leaved viburnum	PDCPR07080	None	None	G4G5	S3?	2B.3

Record Count: 29

RESULTS OF CALIFORNIA NATIVE PLANT SOCIETY QUERY FOR RECORDS, BRIONES VALLEY 7.5' QUADRANGLE

13-Dec-15

Scientific Name	Common Name	Family	CNPS Rank	CESA	FESA	Elevation High (m)	Low (m)
Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	1B.2	None	None	500	3
Androsace elongata ssp. acuta	California androsace	Primulaceae	4.2	None	None	1200	150
Arctostaphylos pallida	pallid manzanita	Ericaceae	1B.1	CE	FT	465	185
Calochortus pulchellus	Mt. Diablo fairy-lantern	Liliaceae	1B.2	None	None	840	30
Calochortus umbellatus	Oakland star-tulip	Liliaceae	4.2	None	None	700	100
Castilleja ambigua var. ambigua	johnny-nip	Orobanchaceae	4.2	None	None	435	0
Cirsium andrewsii	Franciscan thistle	Asteraceae	1B.2	None	None	150	0
Dirca occidentalis	western leatherwood	Thymelaeaceae	1B.2	None	None	425	25
Fissidens pauperculus	minute pocket moss	Fissidentaceae	1B.2	None	None	1024	10
Helianthella castanea	Diablo helianthella	Asteraceae	1B.2	None	None	1300	60
Holocarpha macradenia	Santa Cruz tarplant	Asteraceae	1B.1	CE	FT	220	10
Iris longipetala	coast iris	Iridaceae	4.2	None	None	600	0
Juglans californica	S. California black walnut	Juglandaceae	4.2	None	None	900	50
Lathyrus jepsonii var. jepsonii	Delta tule pea	Fabaceae	1B.2	None	None	5	0
Meconella oregana	Oregon meconella	Papaveraceae	1B.1	None	None	620	250
Micropus amphibolus	Mt. Diablo cottonweed	Asteraceae	3.2	None	None	825	45
Monardella antonina ssp. antonina	San Antonio Hills monardella	Lamiaceae	3	None	None	1000	320
Ranunculus lobbii	Lobb's aquatic buttercup	Ranunculaceae	4.2	None	None	470	15
Streptanthus albidus ssp. peramoenus	most beautiful jewelflower	Brassicaceae	1B.2	None	None	1000	95
Viburnum ellipticum	oval-leaved viburnum	Adoxaceae	2B.3	None	None	1400	215

Appendix B.
List of Plant Species Observed

SCIENTIFIC NAME	***SYNONYMY***	**COMMON NAME**
ADOXACEAE		MUSKROOT FAMILY
Sambucus nigra ssp. *caerulea*	*Sambucus mexicana*	Blue elderberry
AGAVACEAE		AGAVE FAMILY
Chlorogalum pomeridianum var. *pomeridianum*		Common soaproot
ANACARDIACEAE		SUMAC FAMILY
Toxicodendron diversilobum		Poison oak
APIACEAE		CARROT FAMILY
Conium maculatum		Poison hemlock
Heracleum maximum	*Heracleum lanatum*	Common cowparsnip
Sanicula crassicaulis		Pacific sanicle
Torilis sp.		Hedge parsley
ASTERACEAE		SUNFLOWER FAMILY
Achillea millefolium		Yarrow
Artemisia californica		Coastal sage brush
Artemisia douglasiana		California mugwort
Baccharis pilularis		Coyote brush
Carduus pycnocephalus ssp. *pycnocephalus*		Italian thistle
Centaurea solstitialis		Yellow starthistle
Cirsium sp.		Thistle
Cirsium vulgare		Bullthistle
Eurybia radulina	*Aster r.*	Roughleaf aster
Grindelia hirsutula		Gumweed
Hemizonia congesta		Hayfield tarweed
Lactuca sp.		Prickly lettuce
Pseudognaphalium californicum	*Gnaphalium c.*	California cudweed
Wyethia angustifolia		Narrow leaved mule ears
BORAGINACEAE		BORAGE FAMILY
Phacelia californica		Rock phacelia

SCIENTIFIC NAME	***SYNONYMY***	**COMMON NAME**
CAPRIFOLIACEAE		HONEYSUCKLE FAMILY
Lonicera hispidula	*L. h. var. vacillans*	Pink honeysuckle
Symphoricarpos albus var. *laevigatus*		Snowberry
Symphoricarpos mollis		Creeping snowberry
CUPRESSACEAE		CYPRESS FAMILY
Sequoia sempervirens		Coast redwood
DENNSTAEDTIACEAE		BRACKEN FAMILY
Pteridium aquilinum var. *pubescens*		Western bracken fern
DRYOPTERIDACEAE		WOOD FERN FAMILY
Dryopteris arguta		Wood fern
FABACEAE		PEA FAMILY
Acmispon glaber	*Lotus scoparius*	Deerweed, california broom
Lupinus albifrons var. *albifrons*		Silver bush lupine
Lupinus formosus var. *formosus*		Summer lupine
Trifolium sp.		Clover
Trifolium hirtum		Rose clover
Vicia americana		American vetch
FAGACEAE		OAK FAMILY
Quercus agrifolia var. *agrifolia*		Coast live oak
Quercus kelloggii		California black oak
Quercus lobata		Valley oak
GERANIACEAE		GERANIUM FAMILY
Erodium botrys		Big heron bill
Geranium molle		Crane's bill geranium
GROSSULARIACEAE		GOOSEBERRY FAMILY
Ribes sp.		Gooseberry
JUNCACEAE		RUSH FAMILY
Juncus patens		Rush
LAMIACEAE		MINT FAMILY
Clinopodium douglasii	*Satureja douglasii*	Yerba buena
Monardella villosa ssp. *villosa*		Coyote mint
Stachys ajugoides		Hedge nettle

SCIENTIFIC NAME	SYNONYMY	COMMON NAME
LAURACEAE		LAUREL FAMILY
Umbellularia californica		California laurel
MELANTHIACEAE		FALSE-HELLEBORE FAMILY
Toxicoscordion fremontii	*Zigadenus f.*	Fremont's star lily
ONAGRACEAE		EVENING PRIMROSE FAMILY
Epilobium brachycarpum		Willow herb
Epilobium canum ssp. *canum*		California fuchsia
OROBANCHACEAE		BROOMRAPE FAMILY
Castilleja sp.		Paintbrush
OXALIDACEAE		OXALIS FAMILY
Oxalis pes-caprae		Bermuda buttercup
PAPAVERACEAE		POPPY FAMILY
Eschscholzia californica		California poppy
PHRYMACEAE		LOPSEED FAMILY
Mimulus aurantiacus		Sticky monkeyflower
PINACEAE		PINE FAMILY
Pinus radiata		Monterey pine
POACEAE		GRASS FAMILY
Agrostis sp.		Bentgrass
Avena barbata		Slim oat
Bromus carinatus var. *carinatus*		California brome
Bromus diandrus		Ripgut brome
Bromus hordeaceus		Soft chess
Cynosurus echinatus		Dogtail grass
Elymus glaucus ssp. *glaucus*		Blue wild rye
Elymus triticoides		Beardless wild rye
Melica torreyana		Torrey's melica
Stipa pulchra	*Nassella pulchra*	Purple needle grass
POLYGONACEAE		BUCKWHEAT FAMILY
Eriogonum nudum var. *auriculatum*		Nude buckwheat
PTERIDACEAE		BRAKE FAMILY
Pellaea mucronata var. *mucronata*		Bird's foot fern

SCIENTIFIC NAME	***SYNONYMY***	**COMMON NAME**
PTERIDACEAE (contd.)		BRAKE FAMILY (contd.)
Pentagramma triangularis ssp. *triangularis*		Gold back fern
RHAMNACEAE		BUCKTHORN FAMILY
Frangula californica ssp. *californica*	*Rhamnus californica ssp. californica*	California coffeeberry
ROSACEAE		ROSE FAMILY
Adenostoma fasciculatum		Chamise
Cercocarpus betuloides		Birch leaf mountain mahogany
Drymocallis glandulosa	*Potentilla g.*	Potentilla
Heteromeles arbutifolia		Toyon
Holodiscus discolor var. *discolor*		Oceanspray
Rubus ursinus		California blackberry
RUBIACEAE		BEDSTRAW FAMILY
Galium aparine		Cleavers
Galium californicum ssp. *californicum*		California bedstraw
SAPINDACEAE		SOAPBERRY FAMILY
Acer macrophyllum		Bigleaf maple
Aesculus californica		Buckeye
SCROPHULARIACEAE		FIGWORT FAMILY
Scrophularia californica		California bee plant

TRAVERSO TREE SERVICE
WHEN IT HAS TO BE DONE RIGHT

Tree Preservation Report August 26, 2015
Three New Home Subdivision
Parcels A, B, & C, 88 Sunnyside Lane, Orinda

Prepared for:

Kieth Stone
Diamond Construction Inc.

By

John C Traverso
Consulting Arborist
BCMA #0206-B

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Assignment
The property owner of 88 Sunnyside Lane, consisting of one developed and 3 undeveloped parcels, would like to develop the three remaining residential parcels (parcels A, C & D), with a portion of parcel B being used for an access driveway. I was asked to provide an arborist report for the proposed improvements. As required by the City of Orinda's Tree Management Ordinance Chapter 17.21.5 for undeveloped property, this report shall include the following.

1. Tag all "Protected Trees" on site. To consist of all trees with trunk diameters of 6" or greater, or riparian trees with a trunk or combined multi trunk diameters of 4" at 4.5' above grade.
2. Assess tree condition, and retain-ability.
3. Assess potential impacts from proposed construction.
4. Based on proposed construction and tree condition, make recommendations for tree preservation.

Site Summary
The site is located at the end of Sunnyside Lane where the existing home owner plans on building three new homes on the adjacent parcels. A total of 183 trees were inventoried consisting of 114 Monterey pines, 52 coast live oaks, 6 birch, 6 redwoods, 2 valley oaks, 2 bays, and 1 magnolia. Based on existing tree conditions, the preliminary grading and road improvement plans, along with the proposed home sites, it is my opinion that approximately 56 trees will need to be removed, 39 of which are mature Monterey pines that are in declining condition. Not all trees recommended for removal are related to the construction. Several of the pines were severely drought stressed and infested with red turpentine beetle. At least one was dead at the time of this report.

Assumptions and Limitations
The observations and discussion in this report are based on site visits in the first and second weeks of August 2015, and the Tentative Map by DeBolt Engineering. It was assumed that the home and trees were adequately surveyed. Addendums to this report may be required based on the final location and grading for the new homes.

The health and structure of the trees were assessed visually from ground level. No drilling, root excavation, or aerial inspections were performed. Internal or non-detectable defects may exist, and could lead to part or whole tree failures. Due the dynamic nature of trees and their environment, it is not possible for arborists to guarantee that trees will not fail in the future.

Tree Inventory & Assessment Table
All 183 trees were tagged with square numerical aluminum tags with #'s ranging from 1 - 185.
NOTE: Tree #'s 6 & 101 do not exist.

"DBH" Trunk diameter was calculated using a diameter tape that converts the circumference (measured at 4.5' above grade) into the diameter. Tree health and structural conditions were rated as follows.

***Poor Condition**:* Stunted or declining canopy, poor foliar color, possible disease or insect issues. Severe structural defects that may or may not be correctable. Usually not a reliable specimen for preservation.
***Fair Condition**:* Fair to moderate vigor. Minor structural defects that can be correctable. More susceptible to construction impacts than a tree in good condition
***Good Condition**:* Good vigor, and color, with no obvious problems or defects. Generally more resilient to impacts.

Driplines: Dripline measurements were calculated as a radius out from the trunk to the furthest branch tips to the north, east, south, and west.

Age:
"Y" **=** Young or up to 20% of anticipated life-span. Usually more resilient to impacts.
"M" **=** Mature, or from 20%-80% of anticipated life-span. Not as resilient as a young tree.
"OM" **=** Over-mature, or from 80% -100% of anticipated life-span. Very sensitive to impacts.

"DI" **=** Dripline encroachment
"***CI"*** **=** *Const. Impact:* L-Low, M-Moderate, or H-High potential for impact to tree.

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
1	Monterey Pine (*Pinus radiata*)	30.5	F	F	23	20	25	23	OM	X	H	Turpentine beetle; in proposed driveway	Remove
2	Monterey Pine (*Pinus radiata*)	21.5	F	F	13	13	20	18	OM	X	H	Impacted by roadway widening (11' from base of tree). Drought stressed.	Remove
3	Monterey Pine (*Pinus radiata*)	28, 17	F	P	23	22	25	15	OM	X	H	Multiple codominant leaders; partly uprooted approximately 20 years ago; in proposed driveway	Remove
4	Monterey Pine (*Pinus radiata*)	32	F-P	F-P	20	30	25	25	OM	X	M-H	Impacted by roadway widening (16' from base of tree)	Remove
5	Monterey Pine (*Pinus radiata*)	30	F-P	P	20	20	28	25	OM		L	Codominant leaders	Retain
7	Monterey Pine (*Pinus radiata*)	19	P	F	22	22	18	5	OM	X	M	Impacted by roadway widening (16' from base of tree)	Remove
8	Monterey Pine (*Pinus radiata*)	31	F-P	F	23	24	25	23	OM	X	H	Sequoia pitch moth; 5' from proposed driveway	Remove
9	Coast Live Oak (*Quercus agrifolia*)	26	F-P	F	15	15	23	23	M		L	Sparse canopy; epicormic sprouts	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline				Age	DI	CI	Comments	Action
					N	E	S	W					
10	Coast Live Oak (*Quercus agrifolia*)	33 (at 24")	F	F	25	35	38	30	M		L	Low, self-propping branch to the south	Retain
11	Monterey Pine (*Pinus radiata*)	20	P	F	20	18	18	20	OM		L	Declining tree	Remove
12	Coast Live Oak (*Quercus agrifolia*)	27.5	F	F	21	28	18	25	M	X	M	Stunted growth with 1" shoots ; epicormic sprouts	Retain
13	Coast Live Oak (*Quercus agrifolia*)	23.5, 23	G	F	15	20	30	35	M	X	H	Codominant trunks at 2'; impacted by roadway widening (3' from base of tree)	Remove
14	Monterey Pine (*Pinus radiata*)	20	P	P	6	10	16	20	OM		L-M	Canker at 10'; codominant leaders starting at 25'; flagging branches at base	Remove
15	Monterey Pine (*Pinus radiata*)	17	P	F	15	8	15	12	OM		L	Declining tree	Remove
16	Monterey Pine (*Pinus radiata*)	24	F	F	15	22	22	18	OM		L	Clear of const.	Retain
17	Monterey Pine (*Pinus radiata*)	17	P	P	3	10	15	10	OM		L	Not surveyed	Remove
18	Monterey Pine (*Pinus radiata*)	27.5	F	P	25	20	22	25	OM		L	Clear of const.	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline				Age	DI	CI	Comments	Action
					N	E	S	W					
19	Monterey Pine (*Pinus radiata*)	14.5, 24	F-P	F	30	20	40	20	OM	X	M-H	11' from proposed driveway	Remove
20	Monterey Pine (*Pinus radiata*)	28	G	F	20	20	25	22	OM		L	Clear of const.	Retain
21	Monterey Pine (*Pinus radiata*)	30	P	P	30	30	30	30	OM	X	M-H	15' from proposed driveway	Remove
22	Coast Live Oak (*Quercus agrifolia*)	13.5	P	P	20	0	0	20	Y		L	35° lean to northwest; sparse canopy with stunted and epicormic growth; not surveyed	Retain
23	Coast Live Oak (*Quercus agrifolia*)	20	G	F	0	0	30	15	M	X	M	25° lean to southwest over street; impacted by roadway widening (12' from base of tree)	Retain
24	California Bay (*Umbellularia californica*)	5.5, 5.5, 7	F	F	15	12	15	20	Y		L	Codominant trunks at base; not surveyed	Retain
25	Coast Live Oak (*Quercus agrifolia*)	20	P	P	0	0	0	0	OM		L-M	12' stump; *Hypoxylon*. Driveway 15' down slope from tree.	Remove
26	Coast Live Oak (*Quercus agrifolia*)	18, 20	G	F	0	0	30	30	M	X	L-M	Codominant leaders; 15° lean to southwest; impacted by roadway widening (21' from base of tree)	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
27	Coast Live Oak (*Quercus agrifolia*)	24	F-P	F	25	20	22	30	M		L	Not surveyed	Retain
28	Coast Live Oak (*Quercus agrifolia*)	18	G	F	0	0	35	0	M	X	L	45° lean to south over road; impacted by roadway widening (25' from base of tree)	Retain
29	Coast Live Oak (*Quercus agrifolia*)	20	F	F	0	15	30	10	M	X	L	Dog-leg to south; impacted by roadway widening (28' from base of tree)	Retain
30	Coast Live Oak (*Quercus agrifolia*)	34	F	F	30	35	35	0	M		L	Codominant leaders at 6'	Retain
31	Coast Live Oak (*Quercus agrifolia*)	19, 42	F-P	F	30	20	30	35	OM		L	Heavy horizontal scaffold with decay; no targets	Retain
32	Coast Live Oak (*Quercus agrifolia*)	19, 22	F	F	10	22	22	25	M	X	H	Buried trunk; impacted by proposed driveway (11' from base of tree). Consider removing to adjust home and save #56 & #59.	Remove
33	Coast Live Oak (*Quercus agrifolia*)	27	F	F	23	25	23	18	M		L	Epicormic sprouts	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline				Age	DI	CI	Comments	Action
					N	E	S	W					
34	Coast Live Oak (*Quercus agrifolia*)	26	F	F	0	0	25	15	M		L	Codominant leaders at 5'	Retain
35	Coast Live Oak (*Quercus agrifolia*)	24	G-F	F	10	20	25	5	M		L	Codominant leaders at 5'	Retain
36	Coast Live Oak (*Quercus agrifolia*)	23	G-F	F	0	18	25	20	M		L	Clear of const.	Retain
37	Coast Live Oak (*Quercus agrifolia*)	16, 10	F	F	10	15	15	15	M		L	Codominant at base; stunted growth; decay from old failure at base	Retain
38	Monterey Pine (*Pinus radiata*)	25	F-P	F-P	20	18	18	20	OM		L	Large girdling root at south side of base	Retain
39	Monterey Pine (*Pinus radiata*)	24	F	F	18	20	18	15	OM		L	Clear of const.	Retain
40	Monterey Pine (*Pinus radiata*)	18	F	F	5	15	15	10	OM		L	Poison oak	Retain
41	Monterey Pine (*Pinus radiata*)	16	F	F	0	10	20	15	M		L	Clear of const.	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
42	Coast Live Oak (*Quercus agrifolia*)	33	F	F	35	20	30	35	M		L	Large self-propping scaffold branch	Retain
43	Monterey Pine (*Pinus radiata*)	20	F	F	8	15	15	15	OM		L	Clear of const.	Retain
44	Monterey Pine (*Pinus radiata*)	18	F	F	0	8	20	20	M		L	Clear of const.	Retain
45	Monterey Pine (*Pinus radiata*)	20, 19	F	P	12	15	15	15	OM		L	Codominant leaders at base with included bark	Retain
46	Monterey Pine (*Pinus radiata*)	20	P	F	15	20	15	12	OM		L	Clear of const.	Retain
47	Monterey Pine (*Pinus radiata*)	17	F	P	15	12	8	8	OM		L	Codominant leaders at top; poor taper	Retain
48	Monterey Pine (*Pinus radiata*)	14, 16	F	P	10	20	15	10	OM		L	Codominant trunks at base at 1'; poor taper	Retain
49	Monterey Pine (*Pinus radiata*)	20	P	P	18	30	12	5	OM		L	45° non-correcting lean over driveway	Retain
50	Redwood (*Sequoia sempervirens*)	7	F	G	6	6	6	6	Y	X	M-H	Drought stressed; concrete wire embedded in trunk; 4' away from potential building site	Remove
51	Monterey Pine (*Pinus radiata*)	26	P	F	12	15	25	30	OM	X	H	10' away from potential building site	Remove

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
52	Monterey Pine (*Pinus radiata*)	18	F-P	P	8	12	18	8	OM		L	Sparse canopy; codominant leaders at top; red turpentine beetle	Retain
53	Monterey Pine (*Pinus radiata*)	20	F	F	18	15	8	10	OM		L	Red turpentine beetle	Retain
54	Monterey Pine (*Pinus radiata*)	28										Dead	Remove
55	Coast Live Oak (*Quercus agrifolia*)	21	P	F	18	15	10	17	M	X	M	Sparse canopy; tree fort; 11' away from potential building site	Retain
56	Coast Live Oak (*Quercus agrifolia*)	20	F	F	12	10	22	17	M	X	M-H	Within potential building site. This also would be a nice tree to save if possible. Adjust home for minimum of 20 ft. clearance from trunk.	Retain ???
57	Coast Live Oak (*Quercus agrifolia*)	32, 21	F	F	25	15	39	37	OM	X	M-H	Within potential building site . Adjust home for minimum 30 ft. clearance from trunk. This is a very nice tree. Tree fort in tree.	Retain ???
58	Coast Live Oak (*Quercus agrifolia*)	10	P	P	0	12	25	0	Y	X	L	Declining understory tree; 20' from proposed driveway	Retain
59	Coast Live Oak (*Quercus agrifolia*)	16, 17, 21, 12, 21	F	F-P	16	19	33	23	M	X	L	Multiple codominant leaders; 21' from proposed driveway	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
60	Coast Live Oak (*Quercus agrifolia*)	20	F	F	20	10	34	27	M	X	L	19' from proposed driveway	Retain
61	Coast Live Oak (*Quercus agrifolia*)	13, 17, 14	F	F	0	0	30	36	M	X	L	Dog-leg to the south; 21' from proposed driveway	Retain
62	Redwood (*Sequoia sempervirens*)	27.5	G	G	17	17	15	15	M	X	H	2' from proposed driveway	Remove
63	Redwood (*Sequoia sempervirens*)	23	G	G	13	13	15	15	M	X	H	3' from proposed driveway	Remove
64	Monterey Pine (*Pinus radiata*)	25	F	F	22	20	24	10	M	X	H	No root flare on southwest side of tree, possible girdling root; shaded canopy; 4' from proposed driveway	Remove
65	Monterey Pine (*Pinus radiata*)	40.5	F	F	37	23	28	28	OM	X	M	Large scaffold about 1/2 the size of trunk at 16'; codominant leaders; sparse canopy; 14' from proposed driveway	Retain
66	Monterey Pine (*Pinus radiata*)	28	F-P	F	25	22	16	17	OM		M	Sparse canopy; past turpentine beetle activity; 24' from proposed driveway	Retain
67	Monterey Pine (*Pinus radiata*)	25.5	F	F	23	18	18	18	OM	X	H	3' from proposed driveway	Remove

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
68	Monterey Pine (*Pinus radiata*)	25	F	F	17	17	22	15	OM		M	Sparse canopy; 20' from proposed roadway	Retain
69	Monterey Pine (*Pinus radiata*)	18.5	F	F	10	18	6	18	OM	X	H	In proposed roadway	Remove
70	Monterey Pine (*Pinus radiata*)	27	F	F	14	22	25	28	OM	X	H	Small girdling root on west side; in proposed roadway	Remove
71	Monterey Pine (*Pinus radiata*)	28	F	F	23	12	6	23	OM	X	H	In proposed roadway	Remove
72	Monterey Pine (*Pinus radiata*)	30	F	F	11	14	16	25	OM	X	H	In proposed roadway	Remove
73	Monterey Pine (*Pinus radiata*)	17	F	P	0	16	14	0	OM	X	H	Slightly corrected lean to east; 2' from proposed roadway	Remove
74	Monterey Pine (*Pinus radiata*)	24	F	F	10	30	11	23	OM	X	H	Moderate deadwood; 5' from proposed driveway	Remove
75	Monterey Pine (*Pinus radiata*)	30	P	F	8	23	16	22	OM	X	H	Sparse canopy; 6' from proposed driveway	Remove
76	Monterey Pine (*Pinus radiata*)	17	F	P	4	5	10	22	OM	X	H	Lean to southwest; 8' from proposed driveway	Remove
77	Redwood (*Sequoia sempervirens*)	12	G	G	5	7	7	7	Y		L-M	Clear of const.	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline				Age	DI	CI	Comments	Action
					N	E	S	W					
78	Monterey Pine (*Pinus radiata*)	15.5	F	F	10	7	6	18	M		M	Twisted trunk; sparse canopy	Retain
79	Monterey Pine (*Pinus radiata*)	14	F	P	12	0	9	20	M		M	Canker encompassing about half of circumference at grade; lean to west; 14' from proposed driveway	Retain
80	Monterey Pine (*Pinus radiata*)	17	F	F	12	12	5	15	OM		L-M	Canker encompassing about 25% circumference at grade	Retain
81	Monterey Pine (*Pinus radiata*)	28	F	F	8	13	11	11	OM		L-M	Red turpentine beetle; 23' from proposed driveway	Retain
82	Monterey Pine (*Pinus radiata*)	6	F	F	2	2	3	3	Y		L	Shaded by larger pines	Retain
83	Monterey Pine (*Pinus radiata*)	29	F	F	11	15	22	22	OM		L	Large canker to southwest, encompassing half of circumference at grade and 4' long	Retain
84	Coast Live Oak (*Quercus agrifolia*)	9	G	G	11	13	11	11	Y	X	H	Staining at base to northeast; in proposed driveway	Remove
85	Coast Live Oak (*Quercus agrifolia*)	16	F	G	12	16	10	10	M	X	H	In proposed driveway	Remove

Tag #	Species	DBH (inches)	Health	Structure	Dripline				Age	DI	CI	Comments	Action
					N	E	S	W					
86	Coast Live Oak (*Quercus agrifolia*)	7	G	P	6	0	5	5	Y	X	H	Phototropic lean to west; in proposed driveway	Remove
87	Coast Live Oak (*Quercus agrifolia*)	12.5	G	G	6	19	13	13	Y	X	H	In proposed driveway	Remove
88	Monterey Pine (*Pinus radiata*)	17	F-P	F	12	17	7	7	M	X	H	In proposed driveway	Remove
89	Coast Live Oak (*Quercus agrifolia*)	6	G	G	7	5	5	5	Y	X	H	Understory tree; self-correcting twist in lower trunk; in proposed driveway	Remove
90	Monterey Pine (*Pinus radiata*)	31	F	P	18	28	13	13	OM	X	H	Very large, nearly codominant scaffold branch at 12' with included bark; 5' from proposed driveway	Remove
91	Monterey Pine (*Pinus radiata*)	11.5	P	P	4	4	4	4	M	X	H	Live canopy concentrated at top 10% of height	Remove
92	Monterey Pine (*Pinus radiata*)	15	F	P	5	7	13	13	M	X	H	Small canker to west at 16' high	Remove
93	Monterey Pine (*Pinus radiata*)	23	P	F	6	24	26	26	OM	X	H	Sparse canopy; red turpentine beetle; self-corrected twist at grade	Remove

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
94	Monterey Pine (*Pinus radiata*)	23	F	P	0	24	14	14	OM	X	H	6' from proposed driveway	Remove
95	Monterey Pine (*Pinus radiata*)	24	F	F	23	29	21	21	OM		L	Clear of const.	Retain
96	Monterey Pine (*Pinus radiata*)	14, 15	F	P	6	26	15	15	OM		L	Codominant leaders at 2' with second split at 12'	Retain
97	White Birch (*Betula pendula*)	9.5	P	F	8	8	8	8	OM		M	Sparse canopy; 7' from proposed driveway	Remove
98	White Birch (*Betula pendula*)	8.5	P	F	6	6	6	6	M		M	Sparse canopy; 7' from proposed driveway	Remove
99	Southern Magnolia (*Magnolia grandiflora*)	19.5	F	F	12	16	15	15	M	X	M	Within 10' of proposed driveway (will need to be irrigated)	Retain
100	White Birch (*Betula pendula*)	11	F	P	7	5	10	10	M	X	M	Codominant leaders; sparse canopy without many branches on lower and mid canopy; 5' from proposed driveway	Retain
102	White Birch (*Betula pendula*)	9	F	F	6	5	5	6	M	X	H	In proposed driveway	Remove

Tag #	Species	DBH (inches)	Health	Structure	Dripline				Age	DI	CI	Comments	Action
					N	E	S	W					
103	White Birch (*Betula pendula*)	12.5	F	F	12	13	15	10	M	X	M	Buttress on northwest side slightly decayed; 10' from proposed driveway	Retain
104	White Birch (*Betula pendula*)	7	P	P	3	2	7	10	M	X	H	One of trunks dead; 3' from proposed driveway	Remove
105	Coast Live Oak (*Quercus agrifolia*)	13	G	F	20	12	8	5	Y		M	Phototropic lean to north; 5' from proposed driveway	Retain
106	Valley Oak (*Quercus lobata*)	27.5	G	F	30	26	30	26	M		L	Codominant leaders at 10'	Retain
107	Monterey Pine (*Pinus radiata*)	24.5	F	F-P	10	25	19	30	OM	X	L	Codominant leaders; 24' from proposed driveway	Retain
108	Monterey Pine (*Pinus radiata*)	24	F	F	11	24	23	28	OM	X	L	Canker on north side encompassing half of trunk circumference; 20' from proposed driveway	Retain
109	Monterey Pine (*Pinus radiata*)	13	F	F	2	12	10	12	M		L	Shaded by adjacent tree; cankers on east side of trunk	Retain
110	Monterey Pine (*Pinus radiata*)	17	F	P	16	23	20	15	OM	X	H	Large scaffolds relative to trunk; in proposed driveway	Remove
111	Monterey Pine (*Pinus radiata*)	16	F	F	13	18	25	3	OM	X	M	Sparse canopy; 15' from proposed driveway	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
112	Monterey Pine (*Pinus radiata*)	22.5	F-P	P	18	19	19	23	OM		L	Clear of const.	Retain
113	Monterey Pine (*Pinus radiata*)	25.5	F	F	23	25	14	30	OM		L	Clear of const.	Retain
114	Monterey Pine (*Pinus radiata*)	25	F	P	13	30	12	25	OM		L	Codominant leaders at 6' with included bark	Retain
115	Monterey Pine (*Pinus radiata*)	23	F	F	13	21	11	21	OM		L	Clear of const.	Retain
116	Monterey Pine (*Pinus radiata*)	19.5	F	F	10	23	11	20	OM		L	Clear of const.	Retain
117	Monterey Pine (*Pinus radiata*)	13, 13, 12	F	P	16	28	15	28	OM		L	Codominant trunks	Retain
118	Monterey Pine (*Pinus radiata*)	20	F	F	13	17	20	16	OM		L	Clear of const.	Retain
119	Monterey Pine (*Pinus radiata*)	17	F	F	11	16	14	13	OM		L	Clear of const.	Retain
120	Monterey Pine (*Pinus radiata*)	24	F	F	18	26	20	18	OM		L	15° lean to east; canker on south side of trunk	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline				Age	DI	CI	Comments	Action
					N	E	S	W					
121	Monterey Pine (*Pinus radiata*)	13.5	F	F	6	5	6	10	M		L	Clear of const.	Retain
122	Monterey Pine (*Pinus radiata*)	11, 11	F	P	10	18	6	8	OM		L	Codominant trunks; ips beetle	Retain
123	Monterey Pine (*Pinus radiata*)	24	F	F	16	25	16	30	OM		L	Codominant leaders at 5'	Retain
124	Monterey Pine (*Pinus radiata*)	20, 6	F	F	16	25	23	23	OM		L	Clear of const.	Retain
125	Redwood (*Sequoia sempervirens*)	8	G	G	5	5	5	6	Y		L	Clear of const.	Retain
126	Monterey Pine (*Pinus radiata*)	24	F	F	15	23	17	15	OM		L	Clear of const.	Retain
127	Monterey Pine (*Pinus radiata*)	19	F	F	10	14	15	18	OM		L	Ips beetle; cankers at 4' and 6'	Retain
128	Monterey Pine (*Pinus radiata*)	24	F	F	13	30	22	25	OM		L	Clear of const.	Retain
129	Coast Live Oak (*Quercus agrifolia*)	13	G	G	7	8	7	8	Y		L	Clear of const.	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline				Age	DI	CI	Comments	Action
					N	E	S	W					
130	Monterey Pine (*Pinus radiata*)	30	F	F	26	30	20	30	OM		L	Clear of const.	Retain
131	Monterey Pine (*Pinus radiata*)	21	F	F	3	27	17	23	OM		L	Codominant leaders at 10'; corrected lean at base of trunk	Retain
132	Monterey Pine (*Pinus radiata*)	27	F	F	18	28	30	30	OM		L	Clear of const.	Retain
133	Monterey Pine (*Pinus radiata*)	24	F	F	19	18	15	13	OM		L	Canker at base on north side of trunk	Retain
134	Redwood (*Sequoia sempervirens*)	8.5	G	G	10	9	9	10	Y		L	Clear of const.	Retain
135	Monterey Pine (*Pinus radiata*)	31	F	F	25	25	28	25	OM		L	Large trunk canker at 2' approximately 2' long	Retain
136	Monterey Pine (*Pinus radiata*)	20	F	F	21	22	18	15	OM		L	Original leader lost; canker on north side of trunk encompassing half of circumference at grade	Retain
137	Monterey Pine (*Pinus radiata*)	21	F	F	12	16	17	16	OM		L	Clear of const.	Retain
138	Monterey Pine (*Pinus radiata*)	26	G	F	20	17	19	18	OM		L	Clear of const.	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
139	Coast Live Oak (*Quercus agrifolia*)	15	G	F-G	13	14	12	15	Y	X	L-M	Codominant leaders at 7'; possible building site at edge of dripline	Retain
140	Monterey Pine (*Pinus radiata*)	17	F	P	15	13	15	15	OM		L	Codominant leaders at 4.5'; trunk canker	Retain
141	Coast Live Oak (*Quercus agrifolia*)	9	G	F	6	0	20	13	Y		L	Not surveyed	Retain
142	Monterey Pine (*Pinus radiata*)	26	F	F	25	28	25	25	OM	X	L	19' from possible building site	Retain
143	Monterey Pine (*Pinus radiata*)	18	F	F	20	18	10	20	OM	X	L	19' from possible building site	Retain
144	Monterey Pine (*Pinus radiata*)	12	G	G	10	12	10	11	Y	X	H	In possible building site	Remove
145	Monterey Pine (*Pinus radiata*)	27.5	F	F	30	18	18	26	OM	X	H	5' from proposed driveway	Remove
146	Monterey Pine (*Pinus radiata*)	28	F	F	18	27	29	23	OM	X	H	Codominant leaders at 10'; in proposed driveway	Remove

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	E	S	W	Age	DI	CI	Comments	Action
147	Monterey Pine (*Pinus radiata*)	18	F	G	18	22	16	21	OM	X	M	10' from proposed driveway	Retain
148	Monterey Pine (*Pinus radiata*)	12, 12	P	P	18	23	20	10	OM		L	Codominant leaders at 3'; corrected lean at grade	Retain
149	Monterey Pine (*Pinus radiata*)	18.5	F	P	17	21	15	13	OM	X	H	Codominant leaders at 6'; 9' from proposed driveway	Remove
150	Monterey Pine (*Pinus radiata*)	36	F	P	25	32	35	32	OM	X	H	Self-propping limbs; in possible building site	Remove
151	Monterey Pine (*Pinus radiata*)	24	F	G	5	26	23	19	OM	X	H	In proposed driveway	Remove
152	Monterey Pine (*Pinus radiata*)	28	F	F	26	31	23	23	OM		L	Clear of const.	Retain
153	Monterey Pine (*Pinus radiata*)	26	F-P	F	30	30	18	30	OM		L	Clear of const.	Retain
154	Monterey Pine (*Pinus radiata*)	15, 16	G-F	F	11	20	18	25	OM		L	Codominant leaders at 4'; canker on south stem at 4'	Retain
155	Monterey Pine (*Pinus radiata*)	27	F	P	20	18	20	25	OM		L	Codominant leaders at 6'	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
156	Monterey Pine (*Pinus radiata*)	15	F	F	12	13	26	19	OM		L	Corrected lean at grade	Retain
157	Coast Live Oak (*Quercus agrifolia*)	10	G	G	12	10	10	9	Y		L	Clear of const.	Retain
158	Coast Live Oak (*Quercus agrifolia*)	14	G	F	23	18	15	23	M	X	L	No root flare on south side, trunk is depressed indicating possible root girdling; phototropic lean to north; codominant leaders at 5.5'; 21' from possible building site	Retain
159	Coast Live Oak (*Quercus agrifolia*)	5, 6	G	F	10	10	10	7	Y		L	Codominant trunks	Retain
160	Coast Live Oak (*Quercus agrifolia*)	10	G	G	15	14	15	12	M		L	Clear of const.	Retain
161	Coast Live Oak (*Quercus agrifolia*)	15	G	F-G	15	22	23	12	M	X	L-M	Codominant leaders at 7'; base buried, no root flare to west; 14' from possible building site	Retain
162	Monterey Pine (*Pinus radiata*)	31	F	F	23	25	28	15	OM		L	Small girdling root to east	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline				Age	DI	CI	Comments	Action
					N	E	S	W					
163	Monterey Pine (*Pinus radiata*)	22	F	F	20	28	18	28	OM		L	Clear of const.	Retain
164	Coast Live Oak (*Quercus agrifolia*)	6, 5.5	G	P	11	9	10	9	Y		L	Codominant trunks	Retain
165	Coast Live Oak (*Quercus agrifolia*)	10	G	G	12	10	10	10	Y		L	Clear of const.	Retain
166	Monterey Pine (*Pinus radiata*)	23, 22	F	P	25	25	22	23	OM		L	Codominant leaders at 3'	Retain
167	Monterey Pine (*Pinus radiata*)	15, 18	F	P	22	20	23	14	OM		L	Codominant leaders at 6'	Retain
168	Monterey Pine (*Pinus radiata*)	30	F	F	25	32	30	30	OM		L	30° lean to south with slight correction at top of tree	Retain
169	Monterey Pine (*Pinus radiata*)	28	F	F	5	25	28	28	OM		L	Not surveyed	Retain
170	Monterey Pine (*Pinus radiata*)	24	F	F	20	25	32	5	OM		L	Not surveyed; 20° lean to east	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
171	Monterey Pine (*Pinus radiata*)	17	F-P	P	0	28	32	10	OM		L	Not surveyed; 30° phototropic lean to east	Retain
172	Monterey Pine (*Pinus radiata*)	23	F	P	0	38	45	0	OM		L	Not surveyed; 45° uncorrected lean to southeast	Retain
173	Valley Oak (*Quercus lobata*)	26.5	F	G-F	23	23	25	18	M		L	Sparse canopy; opposite side of road widening	Retain
174	Coast Live Oak (*Quercus agrifolia*)	26.5	F	P	0	20	20	20	M		L	Canker on north side with good woundwood growth; codominant leaders at 8'; no root flare on north side, possibly buried; opposite side of road widening	Retain
175	Coast Live Oak (*Quercus agrifolia*)	20.5, 26.5	F	F	22	24	25	25	M	X	L	Large u-shaped attachment of codominant leaders, at 2'; fill soil on north side; decay in south stem; road widening just outside dripline to north (22' from base of tree)	Retain
176	Coast Live Oak (*Quercus agrifolia*)	24.5	F	F	5	20	25	0	M		L	Codominant leaders at 10'; opposite side of road widening	Retain
177	Coast Live Oak (*Quercus agrifolia*)	23	F	P	5	12	20	23	M		L	Lower stems and scaffolds broken; remaining trunk with 90° phototropic lean to the south; opposite side of road widening	Retain

Tag #	Species	DBH (inches)	Health	Structure	Dripline N	Dripline E	Dripline S	Dripline W	Age	DI	CI	Comments	Action
178	Coast Live Oak (*Quercus agrifolia*)	23	P	P	0	2	20	32	M	X	H	Sparse canopy; impacted by roadway widening (6' from base of tree)	Remove
179	Coast Live Oak (*Quercus agrifolia*)	21	F	P	23	21	0	15	M	X	H	40° phototropic lean in main trunk; impacted by roadway widening (3' from base of tree)	Remove
180	California Bay (*Umbellularia californica*)	10, 7, 6	F	F	15	20	15	0	Y	X	M-H	Codominant trunks; not surveyed; impacted by roadway widening (5' from base of tree) WILL NEED HAY BALES TO PROTECT TRUNK	Retain
181	Coast Live Oak (*Quercus agrifolia*)	14.5, 21.5	F-P	F	9	10	19	16	OM		L	Sparse epicormic sprouts along scaffolds; fungal fruiting bodies at union of codominant trunks, at 1'	Retain
182	Coast Live Oak (*Quercus agrifolia*)	23, 13, 20, 17.5	P	P	23	21	20	26	OM		L	3 codominant trunks; poor shoot growth with epicormic shoots; sparse canopy	Retain
183	Coast Live Oak (*Quercus agrifolia*)	15	F	F	15	17	13	10	Y		L	Clear of const.	Retain
184	Monterey Pine (*Pinus radiata*)	22.5	F	F	5	23	18	13	OM	X	H	10° lean to east; impacted by roadway widening (2' from base of tree)	Remove

Tag #	Species	DBH (inches)	Health	Structure	Dripline				Age	DI	CI	Comments	Action
					N	E	S	W					
185	Monterey Pine (*Pinus radiata*)	29.5	F	F	20	22	22	13	OM	X	H	25° lean to northeast; impacted by roadway widening (5' from base of tree)	Remove

Anticipated Removals: #'s 1-4, 7, 8, 11, 13, 14, 15, 17, 19, 21, 25, 32, 50, 51, 54, 62, 63, 64, 67, 69-76, 84-94, 97, 98, 102, 104, 110, 144, 145, 146, 149, 150, 151, 178, 179, 184, & 185 (56 total). Based on adjusting home for at least 20' clearance from tree #56, and 30' clearance from tree #37, which will require tree #32 to be removed.

Anticipated Dripline Encroachments on Trees to be Saved: #'s 12, 23, 26, 28, 29, 55-61, 65, 99, 100, 103, 107, 108, 111, 139, 142, 143, 147, 158, 161, 175, 180 (27 total).

Trees to be Saved That are Clear of Construction: #'s 5, 9, 10, 16, 18, 20, 22, 24, 27, 30, 31, 33-49, 52, 53, 66, 68, 77-83, 95, 96, 105, 106, 109, 112-138, 140, 141, 148, 152-157, 159, 160, 162-174, 176, 177, 181-183 (100 total)

Discussion
There are large oaks #'s 56 & 57 that are shown within the proposed home site that are beautiful low branching trees. To save these trees the home will need to be plotted no closer than 30' from tree #57, and 20' from #56. This may require the removal of #32, another large oak but less desirable to save due to structure.

Several of the mature pines are drought stressed and have been attacked by beetles. Although I have targeted the weaker trees in decline, I suspect, given our severe 4 year drought, that additional pines will succumb to beetle attacks over the next several years, regardless of construction.

Recommendations for Tree Protection
Based on the preliminary Tentative Map, the following are some generic recommendations that will need to be followed to protect the retained trees. These will need to be amended once the final grading and construction plans are developed.

Pre-construction
- Remove trees that are not to be retained (see arborist report), and spread resulting mulch under trees to be saved, prioritizing those with dripline encroachments first. Apply mulch 3"-4" thick under driplines. Keep mulch 12" back from trunks.
- Set up a Tree Protection Zone TPZ by installing 6' heavy duty construction fencing around tree driplines separating those to be retained from proposed improvements. Project Arborist to direct fence placement. Fencing shall be attached to metal stakes driven firmly into the ground on no more than 6' spacing to insure fencing remains upright and sturdy.
- Trees #179 & 180 downslope from road widening, will need straw bales wrapped around trunks to protect during improvements.
- Should any pruning be deemed necessary for clearance, the scope of work shall be outlined by the Project Arborist, shall be performed by ISA certified tree workers or arborists adhering to ISA pruning standards and best management practices.

Construction phase
- Contractor shall insure that tree protection zones are kept clear of equipment, supplies, debris or fill soils.
- No trenching or grade changes shall be allowed within the TPZ without consulting with the project arborist.
- Any grading within tree driplines, shall require the grading contractor to meet with the project arborist prior to encroachment to discuss limitations.
- Protection fencing shall not be adjusted or removed without project arborist consent. A site meeting will be required.

Landscaping phase
- Landscaping under native oaks should remain natural with just mulch. Mulch 2-3" deep out to dripline and keep 12" back from trunks. Tree chipping mulch works good and is generally free from tree services.
- Avoid trenching and grading within driplines.

- Any planting within the driplines of the oaks shall be Oak Compatible and require very little irrigation. A list of such plants can be found in a publication from the Calif. Oak Foundation on line at www.californiaoaks.org/ExtAssets/CompatiblePlantsUnder&AroundOaks,pdf
- Absolutely no planting or soil wetting from irrigation shall be allowed within 10' of any oak. Frequent summer irrigation within the root zone of our native oaks can promote attacks from aggressive root fungi and eventually lead to the death or failure of the tree.
- I recommend having an arborist review plans for landscape.

Thank you for the opportunity to provide this report, and please feel free to contact me if you have any questions or concerns.

Sincerely,

John C Traverso
ISA Board Certified Master Arborist #0206-B
ISA Qualified Tree Risk Assessor #994

70 (not on Sheet 4)

99 (not on Sheet 4)

TENTATIVE MAP

88 SUNNYSIDE LANE

CITY OF ORINDA — CONTRA COSTA COUNTY — CALIFORNIA

JAMES E. DIGGINS R.C.E. 27818
RENEWAL DATE: 03/31/16

#	REVISIONS	DATE

DeBolt Civil Engineering
811 San Ramon Valley Boulevard
Danville, California 94526
Tel: 925/837-3780
Fax: 925/837-4378

Date: 8/11/2015
Scale: 1" = 20'
By: JED / kl
Job No.: 07275

TENTATIVE MAP

88 SUNNYSIDE LANE

CITY OF ORINDA | CONTRA COSTA COUNTY | CALIFORNIA

JAMES E. DIGGINS R.C.E. 27818
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APPENDIX GEO

Peters & Ross

Geotechnical & Geoenvironmental Consultants

Geotechnical Investigation
88 Sunnyside Lane

88 Sunnyside Lane, Orinda, California

Project No. 15178.001 January 2019

Peters & Ross

Geotechnical & Geoenvironmental Consultants

January 28, 2019
Project No. 15178.001

Mr. Keith B. Stone
Diamond Construction, Inc.
P.O. Box 477
Lafayette, CA 94549

Preliminary Geotechnical & Geological Study – 88 Sunnyside Lane, Orinda, California

Dear Mr. Stone:

In accordance with your authorization, Peters & Ross and Earth Focus Geologic Services, Inc. have completed a preliminary geotechnical and geological study to provide the data required by the City of Orinda in support of the proposed vesting Tentative Map prepared by DeBolt Civil Engineering, dated November 20, 2017 with latest revision dated January 5, 2018. The accompanying report presents the results of our field investigation, laboratory testing, and engineering analyses. Based on this information, it is Peters & Ross' and Earth Focus Geologic Services, Inc. opinion that the site is suitable for the proposed subdivision.

Peters & Ross and Earth Focus Geologic Services, Inc. should also be retained:

- to review geotechnical aspects of project plans and specifications,
- to provide supplemental recommendations should significant changes in the planned improvements be made, and
- to provide geotechnical and geological engineering observation and testing services during construction, in order to check that the recommendations presented in this report are properly implemented into the completed project.

We appreciate the opportunity to provide geotechnical and geological engineering services to you. If you have any questions, please call.

Very truly yours,
PETERS & ROSS

Peter K. Mundy, P.E., G.E.
Geotechnical Engineer 2217

EARTH FOCUS GEOLOGICAL SERVICES

Patrick L. Drumm, P.G., C.E.G., C.H.G.
Senior Engineering Geologist 1916

114 Hopeco Road, Pleasant Hill, CA 94523 Phone: (925) 942-3629 Fax: (925) 665-1700 Email: PetersRoss@aol.com

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INTRODUCTION

This report presents the results of a preliminary geotechnical and geologic investigation performed by Peters & Ross and Earth Focus Geological Services of a 24-acre parcel located in hilly terrain at 88 Sunnyside Lane in the Sleepy Hollow section of Orinda, California. The current work summarized in this report supersedes our previous studies for the project site. Earth Focus Geological Services prepared a reconnaissance-level Engineering Geologic Hazards Evaluation of the property, dated September 30, 2015, to assess the potential geologic and seismic hazards that might adversely impact the project, and a subsequent Site Slope Characterization Map, dated October 23, 2017. The proposed Tentative Map for the site was prepared by DeBolt Civil Engineering, dated November 20, 2017, with latest revision dated January 5, 2018. The approximate location of the site is shown on the Site Vicinity Map, Figure 1. The topography of the site is shown on Figure 2. The regional geology, previously mapped landslides, local watersheds, and nearby major faults relative to the site are shown on Figures 3, 4, 5, and 6, respectively.

1. Referenced Review Documents

Our previous work at the site included the preparation of technical letters, a report, and associated geologic and relative site slope stability maps that were reconnaissance-level products intended to be part of a general construction feasibility study of the proposed project. Since no subsurface exploration, laboratory testing of soil/rock materials, or engineering analyses had been conducted as part of our previous work, no site-specific design criteria and no site recommendations for proposed improvements were provided. The previous information was reviewed by the City of Orinda and their CEQA reviewer, Michael Baker International, and a list of technical review comments were generated as a result. We have addressed the review comments and issues raised in the following referenced documents and incorporated our responses to these items into our most recent work presented in this report. For clarity, our response to each of the five main outstanding issues are located in Appendix C of this report.

- City of Orinda, 2017, Project Update, 88 Sunnyside Lane, Orinda, California: Initial Study/Mitigated Declaration ((IS/MND) Review Letter by Mayank Patel, Associate Planner, MNS-2015-001, Dated June 2, 2017, 4 p.

- Michael Baker International, Memorandum, 88 Sunnyside Lane Geotechnical and Hydrologic Study Review and Recommendations: California Environmental Quality Act (CEQA) Peer Review Letter by Kit H. Custis, Engineering Geologist – Hydrogeologist, Attachment A, Dated February 27, 2018, 10 p., 3 figs.

2. Background Site Development Information

Portions of the site were previously graded in 1977. Hallenbeck-McKay & Associates performed an initial study for the only existing house within the property dated June 29, 1977. At that time 88 Sunnyside Lane consisted of a 39-acre parcel located at the east terminus of Sunnyside Lane. Grading for the existing house pad and the long access driveway began in 1977. A southeast-draining canyon located south of the existing house was backfilled with the excavation materials generated from lowering the natural hilltop to create a level building pad (see Plate 1). Field compaction test results during the placement of the canyon fill were recorded from August through September of 1977. These activities are documented in a report by Hallenbeck-McKay & Associates dated December 9, 1977.

On December 15, 1977, Hallenbeck-McKay & Associates issued an initial report for Subdivision 5279 to subdivide the 39-acre parcel into ten lots. The existing house within the property was constructed on Lot 7 in 1979. In addition, two of the ten were deeded to adjacent land owners. Hallenbeck-McKay & Associates further noted that access roads to each of the proposed sites would be completed as part of the 1977 grading operations. The grading for each lot was to be done on an individual basis to accommodate custom home design.

Hallenbeck & Associates issued a letter on November 26, 1984, addressing site grading activities for 88 Sunnyside Lane. They report that two notable mudflows occurred within the site during the heavy winter rain storms of 1981/1982. These were located on the northwest-facing slope supporting the cul-de-sac north of the existing house and on the west-facing slope below the access roadway west of the existing house. We were unable to obtain any documentation or details of the actual repair in 1982 of these previous slope failure areas. These features are labeled Landslide Repair A and Landslide Repair B on Plate 1.

Hallenbeck & Associates stated that the site grading was completed in October 12, 1977. In November 1977, Hallenbeck & Associates visited the site after some winter rain storms to observe site conditions. They noted that the existing house was under construction, but the cul-de-sac located just north of the house had not been constructed at that time. Hallenbeck & Associates investigated both mudflow areas in May 27, 1982 and found that about 5 feet of loose fill materials had been placed in the cul-de-sac that had not been observed or documented by them.

3. Project Description

The site generally consists of three prominent ridgelines that originate near the center of the property at the location of the existing house (see Figure 2). The three ridge tops slope down to the south, west, and northeast. There are several drainages that flow away from the prominent ridgelines in all directions. Elevations within the site range from approximately 1,025 feet at the highest point at the existing house pad to approximately 750 feet at the beginning of the paved access roadway at the north end of the property. The slopes flanking the ridges and descending into the drainages vary considerably in steepness with gradients ranging from 1.6:1 to 2.1:1 (horizontal to vertical). The high points of the three prominent ridgelines have been leveled to varying degrees from past grading activities.

Current plans are to subdivide the remaining 24-acre parcel into four single family residential lots. The Tentative Map prepared by DeBolt Civil Engineering shows that the parcel is to be subdivided into three 5+ acre lots, labelled Parcels A, C, and D, and one 7+ acre lot, labelled Parcel B (see Plate 1). The proposed building pad for Parcel A is located on northeast sloping ridgeline at the north end of the property. Parcel B includes the existing residence that sits atop a previously graded and leveled hilltop near the center of the property. The proposed building pad for Parcel C is within the old canyon fill just south of the existing house. The proposed building pad for Parcel D includes the south sloping ridgeline at the south end of the property. Access to parcels A, C, and D is along the original roads that were graded in 1977. The existing paved access driveway linked to Sunnyside Lane and the original dirt roadways are to be upgraded and widened as part of the current plan. No development is planned for the west sloping ridgeline that covers the western one third of the property within Parcel B (see Plate 1).

4. Purpose and Scope of Services

The purpose of this investigation was to provide a more detailed characterization of the site geologic/geotechnical conditions, potential hazards, and variations throughout the property that were identified in our previous work beginning in 2015. Our site-specific data presented in this report is for evaluation of possible subdivision improvements in order to provide data required by the City of Orinda and their CEQA consultant to support the proposed Tentative Map prepared by DeBolt Civil Engineering, and revised January 5, 2018. Peters & Ross and Earth Focus Geological Services scope of work for the project was presented in a proposal dated October 24, 2018. Our services were limited to the following:

1. Review of published and unpublished geologic/geotechnical documents and maps with data relevant to the site and a review of our engineering geologic information collected from our previous work;

2. Review of available unpublished geotechnical reports previously conducted by other consultants for the subject parcel during previous grading activities;

3. Logging 12 exploratory test borings to explore landslide and artificial fill depths, and 3 shallow auger probes to evaluate roadway design;

4. Perform laboratory index, classification, and strength tests on surface and subsurface native soil, artificial fill, landslide, and bedrock samples from the site as necessary, to evaluate the general properties of the materials recovered;

5. Conduct geotechnical engineering analyses of the collected data and provide construction and grading recommendations for proposed improvements; and

6. Preparation of this report and supporting figures and maps.

Our scope of services did not include an environmental assessment or investigation of the site for the presence of hazardous or toxic materials in the soil, groundwater, or air. Nor did our scope include an evaluation of the potential presence of sulfates in the soil, or other possibly corrosive, naturally-occurring elements. We also did not inspect or evaluate the performance of the existing house or associated adjacent landscape areas surrounding the existing house.

REVIEW OF PUBLISHED GEOLOGIC MAPS

1. Regional Geology

The site is located within the San Francisco Bay portion of the Coast Ranges geomorphic province of California, a region characterized by northwest-trending ridges and valleys that parallel the San Andreas and related faults. The hills in the vicinity of the site are underlain by a variety of bedrock types of Tertiary age (Dibblee, 1980 and 2005; Ellen and Wentworth, 1995; Graymer and others, 1994; and Haydon, 1995). The underlying geologic structure of the area is severely complicated by Quaternary folding and faulting. The slopes are blanketed with Holocene soil and thicker colluvial deposits prone to debris flows, and several landslides have been mapped along the slopes within and near the property. The natural landscape with the site vicinity was initially modified by agricultural practices and more recently by residential development and associated grading.

2. Bedrock

According to published geologic maps, the site and surrounding hills are underlain by predominately marine sandstone of Miocene age. The sandstone bedrock has been variously assigned to the Briones Formation, the Monterey Formation, and the Neroly Formation as shown on different published geologic maps (Dibblee, 1980 and 2005; Ellen and Wentworth, 1995; Graymer and others, 1994; and Haydon, 1995). Our geologic mapping of rock outcrops and rock samples collected from our recent exploratory borings within the property suggests that the underlying bedrock is consistent with published descriptions of the upper and lower members of the Briones Sandstone (Haydon, 1995; see Figure 3).

3. Bedrock Structure

The major fold axis for the northwest-plunging Happy Valley Syncline has been mapped as passing through the center of the property from southeast to northwest (see Figure 3). Bedrock bedding planes on the northeast limb of the syncline has generally been mapped as northwest-striking and southwest-dipping from 60 to 88 degrees. Bedrock bedding planes on the southwest limb of the syncline has generally been mapped as northwest-striking and northeast-dipping from 30 to 55 degrees (Dibblee, 1980 and 2005; Graymer and others, 1994; and Haydon, 1995). We have measured similar bedrock bedding plane orientations within natural bedrock outcrops and exposures throughout the site. Based on our geologic field mapping, we have approximated the synclinal axis along the north side of the existing house (see Plate 1).

4. Landslides

Published landslide maps by both the California Geological Survey and the U.S. Geological Survey have identified several landslides along the flanks of the various ridgelines within and adjacent to the property boundaries as shown on Figure 4 (Haydon, 1995; and Nilsen, 1975). Unpublished landslide maps commissioned specifically for the City of Orinda also identify several landslides and associated thick colluvial soils within and adjacent to the site (Rogers, 1993). These and other similar published and unpublished landslide maps are generally considered to be guideline studies conducted over large areas, based predominately on a review of aerial photographs, and without the benefit of geologic field reconnaissance to check for the presence of actual landslide debris. Other landslide publications utilized in our research have documented relatively small landslides and minor debris flows along the flanks of the same ridgelines resulting from heavy rainfall events from 1950 through 1971 (Nilsen and Turner, 1975) and those triggered from the widespread January 3-5, 1982 rainstorm that affected many areas of the San Francisco Bay area (Ellen and Wieczorek, 1988). The entire property is classified as being most susceptible to landslide hazards by the California Geological Survey due to generally rugged terrain and steep slopes (Haydon, 1995). From our site-specific review of historic aerial photographs, previous geologic reconnaissance mapping, and more recent geologic reconnaissance mapping combined with site-specific exploratory drilling, we have confirmed the presence, approximate lateral extent, material classification and quality, and depth of landslide debris within and adjacent to the site. The individual landslides and previous landslide repairs within the site are labeled for clarity on Plate 1.

5. Hydrology

The site and surrounding areas receive an average annual precipitation of approximately 25 inches (Nilsen and Turner, 1975). With the exception of the existing paved driveway that leads downslope to Sunnyside Lane, surface drainage from the site is mainly uncontrolled sheetflow from ridgetop areas into the various ravines and drainages that surround the property. Past grading activities within the site, beginning in the late 1970s, flattened some of the prominent ridgelines likely increasing infiltration directly into the exposed sedimentary bedrock. Since the site generally occupies the highest elevations of the surrounding area, there are several minor ravines leading to larger drainages that flow away from the site in all directions.

The paved access roadway leading from the existing house down to Sunnyside Lane at the north end of the property has some berms along the downslope shoulders and also some surface drainage inlets. We observed that these drainage inlets are connected to metal pipes that pass under the roadway and discharge into nearby ravines within the site. Beginning below the proposed building site for Parcel A, runoff from the paved access roadway generally flows toward the northwest and into a watershed that drains into a natural southwest-flowing canyon along the entire alignment of Sunnyside Lane to the north and northwest of the site. This natural drainage eventually flows south to join Lauterwasser Creek in the Sleepy Hollow area approximately 0.5 miles to the south of the site. Most of the runoff from the paved access roadway flows into this watershed northwest of the property.

There are three major drainages that originate within the central portion of the site near the existing house. The existing house site occupies the highest point of the surrounding area and forms the top of the three local watersheds. One of these drainages flows to the southwest near Landslide Repair B, located west of the existing house. Another broader canyon flows east away from the existing house and into an unnamed tributary located farther to the east. Lastly, there is a southeast-flowing canyon located south of the existing house that has been partially backfilled by the large canyon fill constructed in 1977. We have defined the local watershed boundaries for these major drainages as shown on Figure 5.

Groundwater levels are anticipated to be relatively deep within the site and therefore, groundwater is not expected to adversely affect the proposed site development. We have not observed ponding or flowing water in any of the drainages within the property during our geologic reconnaissance. Groundwater was not encountered in any of the exploratory borings recently drilled within the site.

6. Faulting and Seismicity

The San Francisco Bay area is dominated by the northwest-striking, strike-slip San Andreas fault and related seismically active faults, such as the Calaveras, Concord – Green Valley, Greenville – Marsh Creek – Clayton, Hayward – Rodgers Creek, and Seal Cove – San Gregorio fault zones as shown on Figure 6 (Jennings and Bryant, 2010). The site is not within an Alquist-Priolo Earthquake Fault Zone as designated by the State of California for faults that have been active in Holocene time (Hart and Bryant, 1997). No faults have been mapped as passing through the property (Dibblee, 1980 and 2005; and Haydon, 1995). The closest State of California Alquist-Priolo Earthquake Fault Zone is located approximately 4.5 miles to the west for the Holocene active Hayward fault (Jennings and Bryant, 2010). The closest major non-Holocene active fault to the property is the Pinole fault, located approximately 0.75 miles to the southwest (Dibblee, 1980 and 2005; and Haydon, 1995).

The site is located within the seismically active San Francisco Bay area where small earthquakes are frequent, and moderate to large earthquakes are sometimes felt. From 1800 to 2000, approximately 656 moderate earthquakes (Magnitude 4-6) and 16 large earthquakes (Magnitude >6) occurred within 100 miles of the site. The closest of these was the Hayward Earthquake of October 21, 1868 (Magnitude 6.8) with epicenter located approximately 15.5 miles to the southeast. The largest historic earthquake was the San Francisco Earthquake of April 18, 1906 (Magnitude 8.25) that occurred approximately 23 miles to the west (EQSEARCH, 2004; Stover and Coffman, 1993; and Toppozada and others, 2000). The most recent earthquake to cause widespread damage was the Napa Earthquake of August 24, 2014 with epicenter in American Canyon located approximately 23 miles to the north of the site.

REVIEW OF AERIAL PHOTOGRAPHS

We have reviewed three single vertical historic aerial photographs and eleven sets of vertical stereo pairs of historic aerial photographs of the site and vicinity for the years 1939, 1946, 1953, 1957, 1959, 1968, 1978, 1982, 1984, 1986, 1988, 1990, and 1998 to observe the development history of the site and evaluate the natural slopes for possible geomorphic features indicative of landsliding prior to development of the property. The horizontal scales of the selected imagery ranged from 1:9,600 to 1:23,600. A complete list of aerial photographs reviewed is provided in the back of this report.

1. Chronology of Development

The pre-development aerial photographs from the late 1930s to the late 1960s show the natural slopes within the site as generally grass-covered with stands of trees concentrated in the north and east facing drainages. The existing house location, site of the large canyon fill to the south of the existing house location, and the prominent ridgeline for proposed Parcel D can be seen in their natural state prior to modification from grading.

Between 1968 and 1978, significant changes occurred at the site, based on our review of aerial photographs. Comparison of the pre-development and post-development aerial photographs suggest that a significant amount of materials were removed from the existing house site and existing Parcel D ridgeline areas. These excavated materials were placed in the large canyon fill to the south of the existing house site (see Plate 1). The 1978 aerial photographs show that the large canyon fill for the proposed building site on Parcel C was originally placed with three narrow transverse surface drainage benches and a berm along the top of the slope. We did not review any aerial photographs that were taken during grading of the canyon fill.

2. Landscape Geomorphology

In terms of landslide identification on the pre-development aerial photographs, we observed two relatively small debris flows along the south-facing flank of the prominent hilltop that is now occupied by the existing house on the 1959 and 1968 aerial photographs. These surficial slope failures are seen as circular barren areas along the grass-covered slope with a narrow flow path of debris extending down the slope toward the old canyon that was later backfilled to create the large fill for the proposed Parcel C building site. The locations of these small debris flows are now masked by the current development area for the existing house. These debris flows are not specifically shown on the published landslide maps reviewed for this study (Haydon, 1995; Nilsen, 1975; and Rogers, 1993) because they were either too small for the scale of the map or they were not recognized.

The 1982 aerial photographs show the presence of the two slope failures reported at the site by Hallenbeck & Associates, Inc. (1984) located at the downslope edge of the driveway cul-de-sac and along the narrow roadway on the west side of the existing house. These are labeled Landslide Repair A and Landslide Repair B on Plate 1. Both failures occur within or adjacent to areas modified by the late 1970s grading activities. They appear to involve the upper portion of the soil materials with runout flow paths of soil debris clearly visible extending down to the slopes. These slope failures were repaired sometime between May 1982 and May 1984, based on our review of aerial photographs. At least one of these slope failures was attributed to undocumented fill placed on the slope (Hallenbeck & Associates, 1984). The published landslide maps reviewed for this study are not in agreement as to the presence and areal extent of these slides. Additionally, some erosion of the graded slope along the southeast side of the existing house was observed on the 1982 aerial photographs as well.

On nearly all of the aerial photographs reviewed, including both pre- and post-development, a large landslide is identified entirely within the property. This large landslide is located on the south-facing slope below the existing house location. The same landslide is also shown on published and unpublished landslide maps (Haydon, 1995; Nilsen, 1975; and Rogers, 1993; see Figure 3). The landslide extends into the natural southeast-draining canyon as seen on the pre-development aerial photographs. The lower portion of the landslide is now concealed by the large canyon fill. The approximate location of the upper portion of this landslide is plotted on Plate 1 and labeled Landslide 2 adjacent to the upslope side of the proposed building site for Parcel C.

This landslide is characterized by a general bowl- shaped outline and hummocky ground surface. We did not observe any obvious signs of activity such as barren scarps or displaced ground within the landslide mass.

Another relatively large landslide was identified on the aerial photographs along the south-facing slope of the prominent ridgeline that is to the west of the existing house. Only the uppermost portion of the landslide is within the subject property that is seen on the aerial photographs as a hollow or bowl-shaped depression along the slope as shown on Plate 1 as Landslide 3. The remainder of the landslide is offsite and down the slope. The published landslide maps reviewed for this study are not in agreement as to the aerial extent of the landslide (Haydon, 1995; Nilsen, 1975; and Rogers, 1993). The landslide does not affect any of the proposed building sites and no development is planned in this area. We did not observe any obvious signs of activity within the landslide mass on the aerial photographs reviewed.

The natural ridgeline for Parcel D prior to excavation appears as a narrow prominent ridge south of the existing house site. The natural ridge expands to the south near the south end of the property where a rocky outcrop trending nearly east-west is present as seen on the pre-development aerial photographs. Some relatively small erosional scars were observed below the rocky outcrop offsite to the south. We did not observe any obvious signs of landsliding within or adjacent to the proposed building site for Parcel D on the aerial photographs reviewed.

On the 1957, 1959, and 1982 aerial photographs, we observed some relatively shallow debris flows at the west end of the prominent ridgeline located to the west of the existing house. This appears to be offsite and does not affect any of the proposed building sites. These debris flows were identified as small barren scars along the slope with a narrow debris trail leading down the slope away from the scar. Some of the published and unpublished landslides maps show variations of these small landslides (Nilsen, 1975; and Rogers, 1993).

RECONNAISSANCE AND GEOLOGIC MAPPING

Since the completion of our original 2015 study, we have conducted additional geologic mapping of the project site to observe bedrock exposures, previously mapped landslide deposits, significant native colluvial soil deposits, and fill areas from past grading activities. From our recent geologic reconnaissance, we have confirmed the presence of four landslide areas within or adjacent to the project site, many of which were initially identified from our review of historic aerial photographs. These are labeled Landslides 1 through 4 on Plate 1. We have again hiked the slope areas surrounding the large canyon fill that was constructed in 1977 south of the existing house. We have also revisited and mapped the approximate areal extent of two 1982 landslide repair areas near the existing house that were reported in an unpublished geotechnical letter by Hallenbeck & Associates in 1984. We have labeled these Landslide Repairs A and B on Plate 1. These repair areas were described as mudflow slides that occurred within the site from the heavy rains of 1981/1982 and they were associated with roadway improvements within the site. The Hallenbeck & Associates letter suggests that at least one of these slope failures, located north of the existing house along the downslope side of the cul-de-sac, was likely the result of placement of undocumented fill. The native colluvial soils, scattered pockets of artificial fill, mapped landslides, landslide repairs, and large canyon fill have been labeled on the Site Geologic Map of Plate 1 and discussed below.

1. Native Colluvial Soils

The most significant and extensive accumulations of native soils or colluvium were mapped at the north end of the site where the existing paved driveway winds up the hill, and along both flanks of the southeast-flowing drainage below the large canyon fill at the southeast portion of the site as shown on Plate 1. The areal extent of the two colluvial areas were generally identified in the field where the natural slopes changed gradient. We have also mapped a colluvial-filled swale south of the proposed building site for Parcel A that crosses the existing paved roadway and extends down the slope to the west property boundary.

2. Scattered Pockets of Artificial Fill

We have mapped eleven isolated minor pockets of artificial fill throughout the site that were either intentionally placed or left over from the overall grading activities that began in the late 1970s. Most of these isolated fill areas are along the major ridgeline areas, but some were placed to bridge low-lying areas to support the existing paved access roadway. We have identified the most obvious fill areas based on landscape geomorphology and we have subsequently explored four the minor fill areas during our recent exploratory drilling program. However, there may be other pockets of artificial fill not yet observed.

3. Mapped Landslides

Landslide 1 has not been identified on any of the published or unpublished geologic maps reviewed for this report. This is a relatively small landslide that was mapped along the lower extent of the large canyon fill south of the existing house along the major southeast-flowing drainage. The mapped limits of the landslide suggest that approximately the upper half is within the property and the lower half is outside of the property as shown on Plate 1. Given the location of the landslide, it likely failed after the large canyon fill was constructed within the drainage. The landslide appears as a sunken elongated feature near the base of the slope with a small bulge near the closest to the drainage channel. The landslide appears to be relatively shallow (up to 5 feet deep) and is associated with the significant colluvial deposits mapped along the northeast side of the drainage. We observed at least one debris flow scar within the same colluvial deposit located downstream from Landslide 1 and offsite as shown on Plate 1.

Landslide 2, located within the prominent southeast-flowing drainage and affecting the proposed building site for Parcel C, is the most extensive landslide deposit mapped within the site and it is only landslide identified that is located entirely within the property. The presence of Landslide 2 is shown on all of the published and unpublished geologic maps reviewed for this study (Haydon, 1995; Nilsen, 1975; and Rogers, 1993) and therefore, the existence of the landside is not in question. The original landslide has been modified from past grading activities at the site created a segmented upper portion where an access roadway was cut into the slide mass. We did not observe signs of renewed landslide movement within the upper portion of the landslide, such as scarps or barren ground. The lower portion of the landslide was buried by the 1977 Canyon Fill.

The areal limits of the landslide shown on Plate 1 were determined from our review of historic aerial photographs and confirmed from field mapping and drilling exploration.

Landslide 3 was mapped during our original geologic reconnaissance and revisited during our most recent mapping effort along the south-facing side of the prominent ridgeline that extends to the west of the existing house within Parcel B. As suggested from published and unpublished landslide maps reviewed for this study (Nilsen, 1975 and Rogers, 1993), the landslide may be part of a larger landslide that extends down the slope into offsite properties. Within the property boundaries, the upper portion generally appears as a sunken feature forming the head of a swale. We did not observe signs of renewed activity during our geologic reconnaissance. No development is planned within this area of the site nor does it impact the roadway.

Landslide 4 was mapped during our recent geologic reconnaissance, and is located at the north end of the property near the proposed building site for Parcel A, mostly offsite along the west property boundary as shown on Plate 1. The upper portion of the landslide can be characterized as a relatively narrow evacuation scar where a debris flow had removed soils from the slope. This scar leads down the slope into a larger area of generally hummocky topography supporting a grove of mature trees. Eventually, the landslide feature funnels into one of the two significant colluvial areas near the site as discussed above. Of all of the four landslides identified near the site, the evacuation scar appears to relatively recent and may have occurred during the 2017 heavy rainfall season.

4. 1982 Landslide Repairs

Landslide Repair A is located north of the existing house and within Parcel B along the downslope side of the cul-de-sac. Many of the utilities for the existing house are concentrated in this area. The old slope repair forms a slight bulge on the slope and the areal limits of the old repair were approximated in the field based on the contrast in the landscape as shown on Plate 1. During our geologic reconnaissance, we located a 4-inch diameter plastic drain pipe protruding from near the base of the repair surrounded by rip rap. It appears that at least the lower portion of the old landslide repair contained rip rap. We did not observe any scarps or sunken areas along the repaired slope that might suggest that the old landslide repair was failing.

Landslide Repair B is along the west or downslope side of the narrow dirt road to the west of the existing house with Parcel B. A row of pine trees has been planted along the outside shoulder of the dirt road. The extent of the landslide repair observed in the field is not as obvious as those for Landslide Repair A. We have approximated the areal limits of the repair on Plate 1. We did not locate a drain outlet for the repair anywhere along the lower portion of the slope. The old repair supports that existing and future access to proposed building sites for Parcels C and D.

5. 1977 Canyon Fill

The large canyon fill, placed in the prominent southeast-flowing drainage in the late 1970s, is overgrown with vegetation and large trees. The areal limits of the fill are clearly defined in the field as shown on Plate 1. Drainage benches have been incorporated into the outer slope face and three surface drain inlets with metal grates were installed as part of the original construction. We observed a 16-inch diameter metal outlet pipe near the base of the fill that discharges the surface flow collected from the upper surface drain inlets into the natural channel. Also, we observed that some rip rap had been placed near the drain outlet, but the rip rap appears to have been scattered over the years. We did not observe any failure of the outer fill slope face.

6. Bedrock Exposures

Sedimentary bedrock was observed in several areas throughout the site in both natural and artificial exposures as shown on Plate 1. The rocks encountered are consistent with published descriptions of the Briones Sandstone by the California Geological Survey (Haydon, 1995). The contact between the upper and lower members of the Briones Sandstone has been mapped as passing through the south end of the site as shown on Figure 3 and Plate 1. Bedding attitudes measured within the various bedrock exposures are generally consistent with the published geologic maps for the area, and the axis of a major synclinal fold passes through the center of the site as shown on Figure 3 and Plate 1.

There is a prominent outcrop of well-cemented fossiliferous sandstone crossing the ridge near the proposed building site for Parcel D at the south end of the property (see Plate 1). This is the surface expression of a relatively thick resistant sandstone bed assigned to the lower member of the Briones Sandstone. Bedding attitudes measured within the outcrop were northwest-striking from N45W to N71W and northeast-dipping from 43 to 72 degrees.

Another nearby bedrock exposure to the north along the same ridgeline on Parcel D generally consisting of thin-bedded mudstone and sandstone units appears to be a remnant of past grading activities within the site. Bedding within this bedrock exposure was measured as northwest-striking from N54W to N60W and northeast-dipping from 56 to 57 degrees (see Plate 1). These rocks appear to be related to the upper member of the Briones Sandstone. Similarly, we observed thin-bedded mudstone and sandstone in the incised channel for the major southeast-flowing drainage offsite to the east of Parcel D. Here the bedding was northwest-striking from N25W to N30W and northeast-dipping from 45 to 59 degrees as shown on Plate 1.

At the far west end of the property, we observed two bedrock outcrops of generally thin-bedded mudstone and tuffaceous sandstone. These rock types are consistent with descriptions of the upper member of the Briones Sandstone (Haydon, 1995). One of these outcrops was exposed near the top of a prominent bedrock ridge at the northwest end of the property and the other at the southwest end of the property where an evacuation scar from a small debris flow formed a steep-sides ravine as shown on Plate 1. The bedding attitudes collected were generally striking north-south to N20E and dipping to the west from 45 to 65 degrees.

At the north portion of the property, a small cut slope near the bend in the paved access road to the north of Parcel A, exposed generally sandstone bedrock. Bedding attitudes measured within the bedrock exposure were striking from N70W to N85E and south-dipping from 42 to 48 degrees. These rocks are consistent with the upper member of the Briones Sandstone and they are along the north side of the synclinal fold axis as shown on Figure 3 and Plate 1.

FIELD EXPLORATION AND LABORATORY TESTING

Subsurface conditions for this investigation were explored by drilling twelve test borings to a maximum depth of 43 feet. The borings were drilled using a track-mounted CME-55 drill rig equipped with 6-inch diameter solid stem augers, operated by Britton Exploration of Los Gatos, California. After logging and sampling, all of the test borings were backfilled with cement grout under the supervision of a representative from Contra Costa County Environmental Health Department.

The approximate locations of the exploratory test borings are shown on Plate 1. Samples of the materials encountered in the investigation borings were obtained at frequent depth intervals for field classification and laboratory testing. The borings located within the large canyon fill were nearly continuously sampled for the entire depth. A description of the drilling and sampling equipment used and other details of the subsurface exploration, as well as the logs of the test borings, are presented in Appendix A. The laboratory tests performed on the collected samples are discussed in Appendix B.

1. Subsurface Conditions

As mentioned previously, portions of the site have been graded in the past resulting in bedrock cut areas along the prominent ridgelines, scattered isolated pockets of artificial fill, the construction of a long access roadway, the repair of two past slope failures, and placement of a large canyon fill. There are also mapped landslides within and adjacent to the site. We have explored areas of concern for the proposed development. Landslides 1 and 3 shown on Plate 1 were not targeted for drilling exploration either because these features were located off-site and/or no development was planned in these areas. The following is a brief summary of the various subsurface conditions encountered with the site.

2. Native Colluvial Soils

We identified native colluvial soils within a ravine in Borings B-9 and B-12 located on Parcel A. The colluvial materials generally consisted of brown sandy fat clay approximately 1.5 to 2.0 feet thick. The laboratory test results for moisture content and dry density were 16 percent and 90 pounds per cubic foot (pcf), respectively. The liquid limit (LL) and plasticity index (PI) was tested to be 63 percent and 41 percent, respectively. We believe that these laboratory test results are not necessarily representative of the all of the onsite native soils. As researched in the Earth Focus Geological Services report (2015), the Soil Survey of Contra Costa County suggests that values for native soils are somewhat lower than those of our test results and range from a LL of 30 to 40 percent and a PI of 15 to 20 percent (Welch, 1977).

3. Scattered Pockets of Artificial Fill

Borings B-4, B-7, B-9, B-10, and B-12 were drilled within the various isolated pockets of artificial fill that were generated from the previous grading activities at the site. Generally, these materials consisted of mottled yellow brown and dark orange brown silty to clayey sand from 2.0 to 3.0 feet thick. Deeper fill areas were encountered along the downslope shoulder of the paved access road north of the existing house in Borings B-10 and B-12. The fill materials explored were described as moist with moisture laboratory test results ranging from 11 to 20 percent. The fill soils logged were considered to be medium dense to dense with dry density laboratory test results ranging from 92 to 102 pounds per cubic foot (pcf).

4. Landslide 2

Borings B-3, B-4, and B-11 were positioned to explore the upper portions of Landslide 2 while Boring B-5 encountered the lower portion of Landslide 2 buried below the large canyon fill. The landslide was absent in Boring B-4 where it was thought that landside debris had been removed by excavation during past grading activities to construct a dirt access roadway down to the level area at the top of the canyon fill. The materials in the upper portion of the landslide were generally described as mottled yellow brown silty sand with rock fragments up to 2 inches. These materials were 5.5 to 6.0 feet thick and characterized as moist and medium dense with moisture and dry density laboratory test results of 15 percent and 92 to 95 pounds per cubic foot (pcf), respectively. The lower portion of the landslide buried under the large canyon fill was approximately 16 feet thick as explored in Boring B-5. The lower landslide debris was described as mottled dark grayish brown fat clay with sand. The buried landslide debris was described as wet and stiff with moisture laboratory test results and dry densities ranging from 27 to 28 percent and 93 to 94 pounds per cubic foot (pcf), respectively.

5. Landslide Repair A

The 1982 landslide repair along the downslope side of the cul-de-sac north of the existing house was explored by drilling Boring B-8. The artificial fill materials encountered consisted of mottled light gray brown silty sand with gravel up to 1.0 inch. The depth of fill extended approximately 7.0 feet below the existing ground surface at the location drilled. The materials were described in the field as moist and medium dense. Laboratory test results on collected samples indicate moisture contents ranging from 9 to 15 percent and dry densities ranging from 90 to 97 pounds per cubic foot (pcf). As mentioned previously, we have been unable to locate any details of the landslide repair other that the original failure was reported to be a mudflow (Hallenbeck & Associates, 1984).

6. Landslide Repair B

The other slope failure that was repaired in 1982, Landslide Repair B, is located along the downslope side of the previously graded access roadway west of the existing house. This landslide repair was explored by drilling Borings B-1 and B-2 along outside shoulder or the existing roadway. The thickness of fill at the locations drilled ranged from approximately 5.5 feet to almost 8.0 feet below the existing ground surface. The fill materials were generally described as light-yellow brown silty sand with fine gravel in a moist and medium dense condition. Roots were encountered in both borings from the line of pine trees planted along the top of the slope. Laboratory test results indicated that the moisture content of the fill materials ranged from 15 to 16 percent and the dry densities ranged from 91 to 101 pounds per cubic foot (pcf). As with Landslide Repair A, we were unable to locate any details of the repair other than the fact that the original slope failure was reported to be a mudflow (Hallenbeck & Associates, 1984).

7. 1977 Canyon Fill

The artificial fill materials located near the top of the slope were explored in Borings B-5 and B-6 for the large canyon fill. These borings were nearly continuously sampled to evaluate the fill soils throughout and to determine how the fill was placed on the native materials. The fill generally consisted of mottled yellow brown, dark yellowish brown, orange brown, dark brown, light gray, and dark green gray silty to clayey sand with scattered sandstone rock fragments. The maximum explored depths of the fill at the boring locations were approximately 25 to 27 feet below the existing ground surface. The fill soils were moist to wet with moisture laboratory test results ranging from 14 to 28 percent. The fill was described as medium dense to dense with dry density laboratory test results ranging from 92 to 108 pounds per cubic foot (pcf). These values are generally consistent with compaction field test data reported by Hallenbeck-McKay & Associates (1977b). We should note that 6.5 to 7.0 feet of loose sand and gravel, thought to be Caltrans Class II permeable drain rock, was encountered at the base of the fill in both borings. The Hallenbeck-McKay & Associates report (1977b) mentioned that the subdrains were installed prior to fill placement by excavating a trench and placing a drain pipe surrounded by drain rock. Our borings likely drilled into these subdrain trenches.

8. Bedrock

Intact bedrock was encountered in all of the exploratory borings drilled at the site. The bedrock samples collected from our subsurface exploration generally consisted of well-bedded to massive silty to clayey sandstone. We were able to measure bedding planes on bedrock samples retrieved from Boring B-11 that were dipping 30, 40, and 50 degrees. The sandstone was typically mottled light gray and yellow to orange brown, poorly to moderately cemented, and generally moderately cemented. Laboratory test results indicate that the moisture content of the bedrock was highly variable depending upon the clay content from 9 to 29 percent. Laboratory test results of the dry densities of the bedrock ranged from 93 to 111 pounds per cubic foot (pcf).

GEOLOGIC HAZARDS

The potential geologic hazards identified during this study include the following:

1. Surface Fault Rupture

Since there are no known seismically active faults mapped crossing the property and the site is not located within a State of California Alquist-Priolo Earthquake Fault Zone, it is our opinion that ground rupture from active faulting is unlikely at the subject property.

2. Seismic Shaking

The site is located in a region of high seismicity. As for all sites in the San Francisco Bay Area, the site should be expected to experience at least one moderate to large earthquake during the lifespan of the development. According to the USGS Design Maps Summary Report, the peak ground acceleration for a CBC Site Class C is 0.582g at the site.

3. Liquefaction

Liquefaction is the temporary transformation of saturated, loose sandy soils into viscous liquid during strong ground shaking from a major earthquake. No loose saturated sands have been mapped on the property and none were encountered in the exploratory test borings. Therefore, the risk of liquefaction is considered to be low. It is our opinion that the risk of lateral spreading or seismic compression are also low at this site.

4. Landslides

The entire property has been classified as being most susceptible to landsliding due to the rugged terrain and steep slopes (Haydon, 1995). The landslides identified from our study and the major onsite artificial fill areas along with their impacts on the proposed development are briefly summarized in the table below:

Identified Landslides and Major Fill Areas	Approximate Thickness	Parcels Impacted	Recommended Mitigation
Landslide 1	Estimated <5 Feet	None	None
Landslide 2	Upper Portion Determined to be 6 Feet in Borings B-3 and B-11, and Lower Portion Determined to be 16 Feet in Boring B-5	Parcel C	Remove Upper Portion of Landslide and Restore Slope
Landslide 3	Estimated to be <5 Feet within Site	None	None
Landslide 4	Estimated to be <5 Feet within Site	None	None
1982 Landslide Repair A	Determined to be 7 Feet Near the Top of Slope in Boring B-8	Parcel B	Construct Stitch Pier Wall
1982 Landslide Repair B	Determined to be 5 to 8 Feet Near the Top of Slope in Borings B-1 and B-2	Parcel B and Access to Parcels C and D	Remove and Recompact Upper Half of Old Repair
1977 Canyon Fill	Determined to be 25 to 27 Feet in Borings B-5 and B-6	Parcels C and D	Install Rows of Pin Piers at Lower Bench and at Toe of Fill Slope

5. Expansive Soils

The clayey soils and underlying bedrock that blanket the site have a moderate to high expansion potential. When expansive soils are subjected to increases in moisture content, such as during the rainy season, they swell if unconfined. If concrete slabs or shallow foundations confine the expansive soils, they can exert significant pressures when subjected to moisture increases. These pressures can cause slabs and shallow foundations to heave and crack. When the soils dry, they shrink, causing slabs and shallow foundations to settle.

Expansive clays are common in the San Francisco Bay Area. Over the past several decades, expansive soil movements have caused extensive damage to residential and commercial structures, slabs, and pavements throughout the Bay Area. The local climate, with its pronounced wet and dry seasons, is a main cause of significant seasonal moisture changes that cause the expansive soils to shrink and swell.

There are a number of methods available for reducing the adverse effects of expansive soils. These include removing the expansive soils, replacing expansive soils with non-expansive engineered fill, deepening foundations to develop support below the zone of significant seasonal moisture change (about 32 to 48 inches), designing foundation/slab systems to resist uplift pressures generated by swelling soils, and/or providing drainage and landscaping to minimize seasonal moisture fluctuations in the near-surface soils. Drainage and landscaping improvements adjacent to slabs and foundations should be designed to promote efficient runoff during the rainy season and provide occasional sprinkling during the summer.

6. Corrosive Soils

The materials placed at the finished pad grade may be different from the on-site soils. Therefore, representative samples should be collected after site grading for future corrosivity testing.

7. Flooding

The project site is not within a FEMA flood Zone A. Therefore, Peters & Ross judges this site to have a low potential for flooding.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

Based on the field investigation, site observations, geologic mapping, and laboratory testing, it is our opinion that the site is suitable for the construction of the proposed subdivision from a geologic/geotechnical standpoint. However, all the conclusions and preliminary design recommendations presented in this report should be incorporated in the design and construction of the project to minimize possible geotechnical problems. The primary considerations for geotechnical design at the site are outlined in the following report sections. The preliminary geotechnical design recommendations provided below are intended to assist in the general planning and layout of the proposed subdivision improvements. As the subdivision plans develop, our office should be consulted for additional detailed project plan-specific design recommendations.

1. Seismic Concerns

In accordance with Section 1613 of the 2016 CBC, Peters & Ross classifies the site as a C Site Class with a latitude of 37.914 degrees and a longitude of -122.184 degrees. The CBC parameters presented in the following table should be used for seismic design.

PERIOD (sec)	0.2	1.0
SPECTRAL RESPONSE Ss, Sl	1.517	0.603
SITE COEFFICIENT Fa, Fv (SITE CLASS C)	1.0	1.3
MAXIMUM SPECTRAL RESPONSE Sms, Sml	1.517	0.784
DESIGN SPECTRAL RESPONSE SDs, SDl	1.011	0.523

Peters & Ross recommends that the planned residences be supported on drilled pier foundations that are embedded into the underlying bedrock. Based on our experience in the area, construction in accordance with the recommendations contained in this report should reduce the risk of earthquake-induced landslide displacement impacting the planned residences to low.

2. Engineering Properties of Soil and Bedrock

Peters & Ross estimated geotechnical soil and bedrock parameters based on the results of our subsurface investigation, and our engineering judgment. The soil and bedrock parameters used in our analysis are summarized in the following table:

Material	Unit Weight (pcf)	Undrained Strength Parameters	
		Cohesion, c (psf)	Friction, ǿ (degrees)
Engineered Fill	125	100	30
Landslide Debris	120	50	26
Bedrock	130	500	32

We recommend that site excavations and pier drilling be monitored by our representative, during construction to verify that the exposed materials meet or exceed the above values.

3. Static and Seismic Stability Analysis

Based on the guidance provided in the California Division of Mines and Geology Special Publication 117A (2008), Peters & Ross used the USGS Earthquake Ground Motion Tool (2016) to find the maximum horizontal acceleration in rock (MHA) of 0.582g. Based on the guidance of Special Publication 117A, a seismic coefficient of 0.20g was used in a pseudo static stability analysis.

Slide 8, a computer assisted two-dimensional limit equilibrium program was used in this analysis. All methods divide the potential sliding mass into slices of finite width; then several trial potential sliding surfaces are investigated to determine which is most critical. The primary method used for this project was the Spencer’s method. Spencer’s method is based on equilibrium equations that satisfy both force and moment equilibrium of a sliding mass.

Two loading conditions were considered in the analysis: (1) static loading, which compares the driving forces due to the weight of the potential sliding mass to the resisting forces due to the material shear strength (cohesion and friction angle); and (2) static plus dynamic loading due to earthquake ground motion. The dynamic loading due to earthquake motion was approximated using the pseudo-static method. The pseudo-static method incorporates an additional driving force in the system of equilibrium equations to represent a horizontal earthquake induced force which is applied at the center of mass of the potential sliding surface. The force is the resultant of the average acceleration acting at the center of mass of the potential sliding surface.

4. Site Preparation and Grading

4.1 Clearing and Site Preparation

The site of the planned improvements should initially be cleared of selected trees and bushes and then stripped to sufficient depth to remove surface vegetation and weeds; these materials should be removed from the site. Holes resulting from the removal of any obstructions that extend below the proposed finished grade should be cleared and backfilled with suitable material compacted to the requirements given below under Compaction. We recommend that the excavations to remove deleterious material be carried out under the observation of the soil engineer, so that these excavations will be properly backfilled.

4.2 Subgrade Preparation

After the site has been properly cleared and stripped and any necessary excavations made, the exposed soils to receive structural fill, slabs-on-grade or pavements should be scarified to a depth of 6 inches, moisture conditioned to slightly above optimum water content and compacted to the requirements for structural fill.

4.3 Material for Fill

Generally, the underlying soils that have an organic content of less than 3 percent by volume are suitable for use as engineered fill. Fill placed at the site, should not contain rocks or lumps larger than 6 inches in greatest dimension with not more than 15% larger than 2.5 inches. In addition, any required import fill should be predominantly granular with a plasticity index of 15 percent or less.

4.4 Compaction

All structural fill less than 5 feet thick should be compacted to at least 90% relative compaction as determined by ASTM Test Designation D 1557, except for the upper 6 inches of subgrade soils under pavements or concrete flat work which should be compacted to at least 95% relative compaction. Structural fill or wall backfill greater than 5 feet high should be compacted to at least 95% relative compaction. Fill material should be spread and compacted in lifts not exceeding 8 inches in uncompacted thickness. We should note that if construction proceeds during or immediately after the wet winter months, it may require time to dry the on-site soils to be used as fill since their moisture content will probably be appreciably above optimum.

4.5 Trench Backfill

Pipeline trenches should be backfilled with fill placed in lifts not exceeding 8 inches in uncompacted thickness. If imported granular soil is used, sufficient water should be added during the trench backfilling operations to prevent the soil from "bulking" during compaction. In all of the cases outlined above, we recommend that the upper 6 inches of subgrade under pavement and baserock be compacted to at least 95% relative compaction. All compaction operations should be performed by mechanical means only. We recommend against jetting unless the backfill material is granular (sand or gravel) and the water used in jetting is able to rapidly flow out of the trench.

If granular backfill is used for utility trenches, we recommend that an impermeable plug or mastic sealant be used where utilities enter the building to minimize the potential for free water or moisture to enter below the building. Finally, because of the potential for catastrophic collapse of trench walls we recommend that the contractor carefully evaluate the stability of all trenches and use temporary shoring where appropriate. The design and installation of the temporary shoring should be wholly the responsibility of the contractor. In addition, all state and local regulations governing safety around such excavations should be carefully followed.

The following table presents our recommendations for compaction requirements.

Condition	Trench Depth	Compaction Requirements*	
		Native Soils	Granular Import
Non-Improved Area	Any Depth	85%	90%
Improved Area	Less than 5 feet	Upper 3 feet -90% Lower 2 feet 85%	Entire backfill 90%
	5 feet or greater but less than 8 feet	Entire backfill 90%	Entire backfill 95%
	8 feet or greater	Entire backfill 95%	Entire backfill 95%

* Assumes a reasonable "cushion" layer around the pipe.

4.6 Slope Inclinations

The Briones Sandstone bedrock that underlies the subject property is friable clay-rich material that generally exhibits moderate slope stability in both cut and fill slopes. For this reason, we recommend that un-reinforced slopes be limited to a maximum inclination of 2.5:1 (horizontal to vertical) and that planned cut slopes in excess of 5 feet high be re-built as geogrid-reinforced engineered fill slopes or a retaining wall such as a mechanically stabilized earth (MSE) wall system. Specific design recommendations should be prepared for each area where geogrid is used.

4.7 Drainage

Positive surface drainage should be provided adjacent to the new residences to direct surface water away from the foundations into closed pipes that discharge to the site storm drain system designed by DeBolt Civil Engineering or an appropriate energy dissipater (location and configuration of dissipater to be approved by the project soil engineer). Concentrated flows of water should not be allowed across the slopes as erosion or weakening of the slope could occur. Surface drainage benches/ditches should be incorporated into the design of slopes of 30 feet or more in height as required by the current version of the California Building Code (CBC). However, in consideration of the proposed grading approach with varying slope inclinations to create a more natural appearance, consideration could be given to J-ditch construction or other methods of creating drainage terraces with a reduced visual impact.

5. Specific Parcel Recommendations

5.1 Parcel A

Parcel A is a 5-acre lot located in the northeast corner of the site. The paved site access road enters the parcel in the northeast corner and cuts diagonally across the central portion of the parcel and connects to a cul-de-sac located in the northeast corner of Parcel B. The proposed building pad is in the northern portion of Parcel A. A long dirt driveway had been graded from the cul-de-sac to the proposed building pad in 1977. A small amount of fill was placed in a topographic saddle to raise the grade of the driveway near the proposed pad as shown on Plate 1. Peters & Ross recommends that the fill materials be supported by a retaining wall to facilitate site drainage and extend the life of the driveway.

Landslide 4 shown on Plate 1 lies outside of the proposed development area and is mostly offsite. The existence of this landslide has not been confirmed by subsurface investigations because it is located offsite. To mitigate this landslide, we recommend that the northwest side of the driveway hammer head be supported by a row of stitch piers as described below for the recommended 1982 Landslide Repair A mitigation. In addition, we recommend that all drainage for the development area and driveway be directed toward the major east-flowing drainage as shown in Figure 5.

5.2 Parcel B

Parcel B is a 7+-acre lot located in the northwest portion of the site and it includes the existing house. No additional residences are planned for this parcel. However, a cul-de-sac and access road to Parcels C and D are located on Parcel B. The existing house which was completed in 1979 is in the southeast corner of Parcel B. The cul-de-sac is in the northeast corner. The access road to Parcels C and D extends southwest from the cul-de-sac and along the west side of the existing residence.

During the heavy rains of 1981/1982 landslides occurred on the northwest side of the cul-de-sac and on the west side of the access road to Parcels C and D. Both landslides occurred in the upper 4 to 6 feet of artificial fill materials and are noted to have been repaired at that time. Since no documentation was available regarding the slope repairs, we recommend that the northwest side of the cul-de-sac, labelled 1982 Landslide Repair A on Plate 1, be supported by a stitch pier wall. The stitch piers should have a minimum diameter of 16 inches and extend a minimum of 10 feet into competent bedrock. A grade beam should be used at the top to tie the piers together. Care should be taken to avoid utilities serving the existing house. Drilled piers should be designed using an allowable skin friction of 500 pounds per square foot (psf) for dead plus live loads and 750 psf for total loads, including wind and seismic forces. Allowable skin friction values should be used starting at the bottom of fill.

The piers should be spaced 3 pier diameters apart and be designed to resist an ultimate, uniform lateral pressure of 350 pounds per square foot acting against the projected diameter of the pier in the fill materials. Lateral loads on the stitch piers may be resisted by passive pressures acting against the sides of the piers. We recommend an allowable passive pressure equal to an equivalent fluid weighing 400 pounds per square foot per foot of depth to a maximum value of 4000 pounds per square foot. This value can be assumed to be acting against 1.5 times the diameter of the individual pier shafts starting at the bottom of the fill.

The bottom of pier excavations should be reasonably free of loose cuttings prior to installing reinforcing steel and placing concrete. If more than 6 inches of water accumulates at the bottom of the pier holes and the water cannot be pumped out prior to concrete placement, the concrete should be tremied from the bottom of the hole. Pier excavations should be filled with concrete as soon as practical after drilling, to reduce potential caving and/or groundwater infiltration problems. Excess concrete around the tops of piers should be cleared away before the concrete sets, to avoid “mushrooming”.

Peters & Ross recommends that the 1982 Landslide Repair B Area shown on Plate 1 be removed down to Elevation 965 and rebuilt with geogrid reinforced engineered fill. The engineered fill should be keyed and benched into the underlying bedrock with subsurface drainage as part of the project grading. A typical key and bench detail is included on the attached Figure 7.

Landslide 3 shown on Plate 1 lies outside of the proposed development area. The existence of this landslide within the site boundary has not been confirmed by subsurface investigations. However, publish and unpublished landslide maps suggest that a larger landslide may be present downslope from this area. The landslide lies outside the proposed development area and does not threaten the proposed facilities. Therefore, no mitigation is proposed for Landslide 3 at this time.

5.3 Parcel C

Parcel C is a 5.8-acre lot located in the southeast corner of the site. The proposed building site is in the western portion of the parcel. The proposed building site also corresponds to the top flat area of a large canyon fill that was placed in 1977 as documented by Hallenbeck-McKay & Associates and shown on Plate 1. The 1977 Hallenbeck-McKay & Associates December 9, 1977 report states that the fill was keyed into stiff clays while subsequent benches were cut into bedrock. Our exploratory testing borings drilled along the upper bench of the fill showed that the benches were also underlain by stiff clays which were classified as landslide debris by our engineering geologist. Cross-Section C-2 shows our findings. Based on this section Peters & Ross performed a slope stability analysis and computed a static factor of safety of 1.33 as summarized in Figure 8. We also computed a seismic yield acceleration of 0.124 which results in a seismic factor of safety of 0.62 as shown in Figure 9. The fill materials appear to be well compacted and match the data reported by Hallenbeck-McKay.

The possible development area for Lot C as shown on Plate 1 includes the top of the canyon fill and the middle portion of Landslide 2. Both the 1977 Canyon Fill and Landslide 2 must be stabilized. Since the 1977 Canyon Fill is well compacted and drained Peters & Ross recommends that either shear pin piers or anchored reaction block walls be used to stabilize the fill so that the static factor of safety exceeds 1.5 and the seismic factor of safety exceeds 1.0. Peters & Ross recommends that the existing subdrain and surface drain lines be TV inspected and surveyed prior to and after the construction of the slope stabilization measures to ensure that the existing drains were not damaged during construction.

For shear pin piers Peters & Ross recommends that the existing canyon fill be stabilized using three rows of piers. One row of stitch piers should be placed along the lowest surface bench of the fill. The second row of piers should be located at the toe of the fill above the keyway drain. And the last rock of stitch piers should be located at the midpoint between the above two rows. Care must be exercised to identify the existing subdrain locations to not damage any of the existing subdrains during construction.

The stitch piers should have a minimum diameter of 24 inches and extend a minimum of 10 feet into competent bedrock and 15 feet into the 1977 engineered fill. Each pier should be designed to resist a shear force of 40 kips located at the top of competent bedrock. The piers should be spaced 3 pier diameters on center. In bedrock, lateral loads on the stitch piers may be resisted by passive pressures acting against the sides of the piers. We recommend an allowable passive pressure equal to an equivalent fluid weighing 800 pounds per square foot per foot of depth to a maximum value of 8000 pounds per square foot. This value can be assumed to be acting against 2 times the diameter of the individual pier shafts starting at the bottom of the fill. In the engineered fill lateral loads can be resisted by an allowable passive pressure equal to an equivalent fluid weighing 600 pounds per square foot.

The bottom of pier excavations should be reasonably free of loose cuttings prior to installing reinforcing steel and placing concrete. If more than 6 inches of water accumulates at the bottom of the pier holes and the water cannot be pumped out prior to concrete placement, the concrete should be tremied from the bottom of the hole. Pier excavations should be filled with concrete as soon as practical after drilling, to reduce potential caving and/or groundwater infiltration problems. Excess concrete around the tops of piers should be cleared away before the concrete sets, to avoid "mushrooming".

The anchored reaction block wall would consist of 5-foot by 5-foot reaction block spaced at 8 feet on center. The reaction block would be anchored using a 200-kip capacity tieback with a 30-foot bonded length in bedrock

Landslide 2 located above and below the access driveway is relatively shallow, less than 10 feet deep, and within an area of proposed development. Therefore, Peters & Ross recommends that the landslide be completely removed and verified in the field by a certified engineering geologist. Subsurface drainage improvements should be installed, and the excavation backfilled with engineered fill. This corrective earthwork should include the construction of a keyway (at least 15 feet wide) at the downslope boundary of the work. A typical key and bench detail is included on the attached Figure 7.

The proposed development area on Parcel C is to be built over the 1977 Canyon Fill area. Peters & Ross recommends that it be supported on drilled piers that extend through the fill materials, landslide debris, and into the underlying competent bedrock materials. The piers should have a minimum diameter of 24 inches and extend a minimum of 10 feet into competent bedrock. Each pier should be designed to resist a shear force of 20 kips applied at the top of the competent rock.

5.4 Parcel D

Parcel D is a 5.3-acre lot located in the southwest corner of the site. The proposed building site is in the southwest corner of the lot. Parcel D is also impacted by Landslide 2 and the 1977 Canyon Fill discussed above in the Parcel C Section. In order to build the home on Parcel D both Landslide 2 and the 1977 Canyon Fill shown on Plate 1 will need to be stabilized. In addition, a hard sandstone outcrop is exposed along nearly the entire southern property line as shown on Plate 1. Even though the bedding inclination of the natural outcrop dips into the slope, the exposure includes some relatively loose blocks of bedrock. During an earthquake these blocks will be susceptible to toppling. Peters & Ross recommends that the exposed blocky rocks be secured with a Geobrugg Spider S3-130 system.

6. Building Foundations and Slabs

The soils and weathered bedrock that underlie this site are moderately to highly expansive and are prone to significant volume changes (shrinkage and swelling) with seasonal fluctuations in moisture within the near-surface soils. Such shrink/swell behavior can damage shallow foundation elements such as footings that are supported by these materials. Therefore, we recommend that the proposed homes be supported on drilled, cast-in-place friction piers that are supported in the underlying materials where shrinkage and swelling of the soil/weathered bedrock due to seasonal changes in moisture does not occur. It is also recommended that the grade beams be designed to resist a substantial uplift pressure. Since the proposed homes will be built on sloping terrain, Peters & Ross recommends that foundation piers be designed to resist lateral creep forces. Specific recommendations for foundation design should be developed for individual parcels, once preliminary house plans have been prepared. However, for preliminary planning purposes, it can be assumed that house foundation piers will be a minimum of 16 inches in diameter, drilled to at least 15 feet in depth and reinforced with a steel reinforcing cage.

Seasonal shrink and swell of expansive soils can also cause movement and distress in slabs constructed on grade. We therefore recommend against the use of interior building slabs for this project. In order to minimize tilting and cracking of exterior or garage slabs we recommend that the slabs be underlain by a minimum of 12-inches of non-expansive fill materials. Thicker layers of non-expansive fill may be appropriate for flatwork that is covered with movement-sensitive materials, such as tile or slate.

7. Pavement Sections

The pavement analyses are based upon an R-value of 5 for the subgrade soil, the Caltrans Design Method for Flexible Pavement, and traffic indices (TI), which are indications of load and frequency and intensity. Three R-value tests were performed by Construction Materials Testing, Inc. and are included in Appendix D. The design pavement sections are as follows:

TRAFFIC INDEX (TI)	DESIGN METHOD	ASPHALTIC CONCRETE (IN)	AGGREGATE BASE (IN)	COMPACTED SUBGRADE (IN)
4.0	Full Depth AC	6.5		6.0
	Layered	2.0	8.5	6.0
4.5	Full Depth AC	7.0		6.0
	Layered	2.5	9.0	6.0
5.0	Full Depth AC	8.0		6.0
	Layered	2.5	11.0	6.0

LIMITATIONS

Peters & Ross and Earth Focus Geological services consist of professional opinions and recommendations that are made in accordance with generally accepted geotechnical and geological engineering principles and practices. The opinions and recommendations presented in this report are based on a site reconnaissance, review of published and unpublished geologic maps, twelve exploratory test borings, three auger probes, laboratory testing, engineering analyses, and preliminary information provided by DeBolt Civil Engineering regarding the proposed construction. This warranty is in lieu of all other warranties either expressed or implied.

Although not anticipated for the site, we did not perform an evaluation or assessment or review any documents pertaining to any potential environmental hazards, such as hazardous materials or groundwater contamination that may be present within the property.

Subsurface conditions commonly vary significantly from those encountered at the test boring locations. Unanticipated, adverse soil conditions encountered during construction often require additional expenditures to achieve a properly constructed project. It is advised that a contingency fund be established to accommodate possible consulting and construction cost increases due to unanticipated conditions.

LIST OF FIGURES

LIST OF PLATES

APPENDICES

Appendix A Field Investigation
Appendix B Laboratory Testing
Appendix C Referenced Review Documents and Our Response to Issues
City of Orinda, June 2, 2017
Michael Baker International Memorandum, February 27, 2018

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AERIAL PHOTOGRAPHS REVIEWED

Date	Flight Line	Frames	Scale	Type
08-02-39	BUU	289-38 & 39	1:20,000	B & W Stereo
07-22-46	GS-CP	4-33 & 34	1:23,600	B & W Stereo
08-17-53	AV-119	14-09 & 10	1:10,000	B & W Stereo
08-17-53	AV-119	15-11 & 12	1:10,000	B & W Stereo
05-04-57	AV-253	12-14 & 15	1:12,000	B & W Stereo
07-02-59	AV-334	12-25 & 26	1:9,600	B & W Stereo
07-02-68	AV-858	04-14 & 15	1:12,000	B & W Stereo
06-06-78	AV-1515	09-20 & 21	1:12,000	B & W Stereo
05-18-82	AV-2145	09-19 & 20	1:12,000	B & W Stereo
05-17-84	AV-2480	09-20	1:12,000	B & W Single
04-20-86	AV-2861	9-20 & 21	1:12,000	B & W Stereo
08-03-88	AV-3368	11-17	1:12,000	B & W Single
06-12-90	AV-3845	11-18	1:12,000	B & W Single
08-24-98	AV-6100	118-19 & 20	1:12,000	B & W Stereo

All aerial photographs listed are available for review at Quantum Spatial, Inc., in Novato, California with the exception of the 1939 and 1946 imagery that was on loan from a private collection.

DISTRIBUTION

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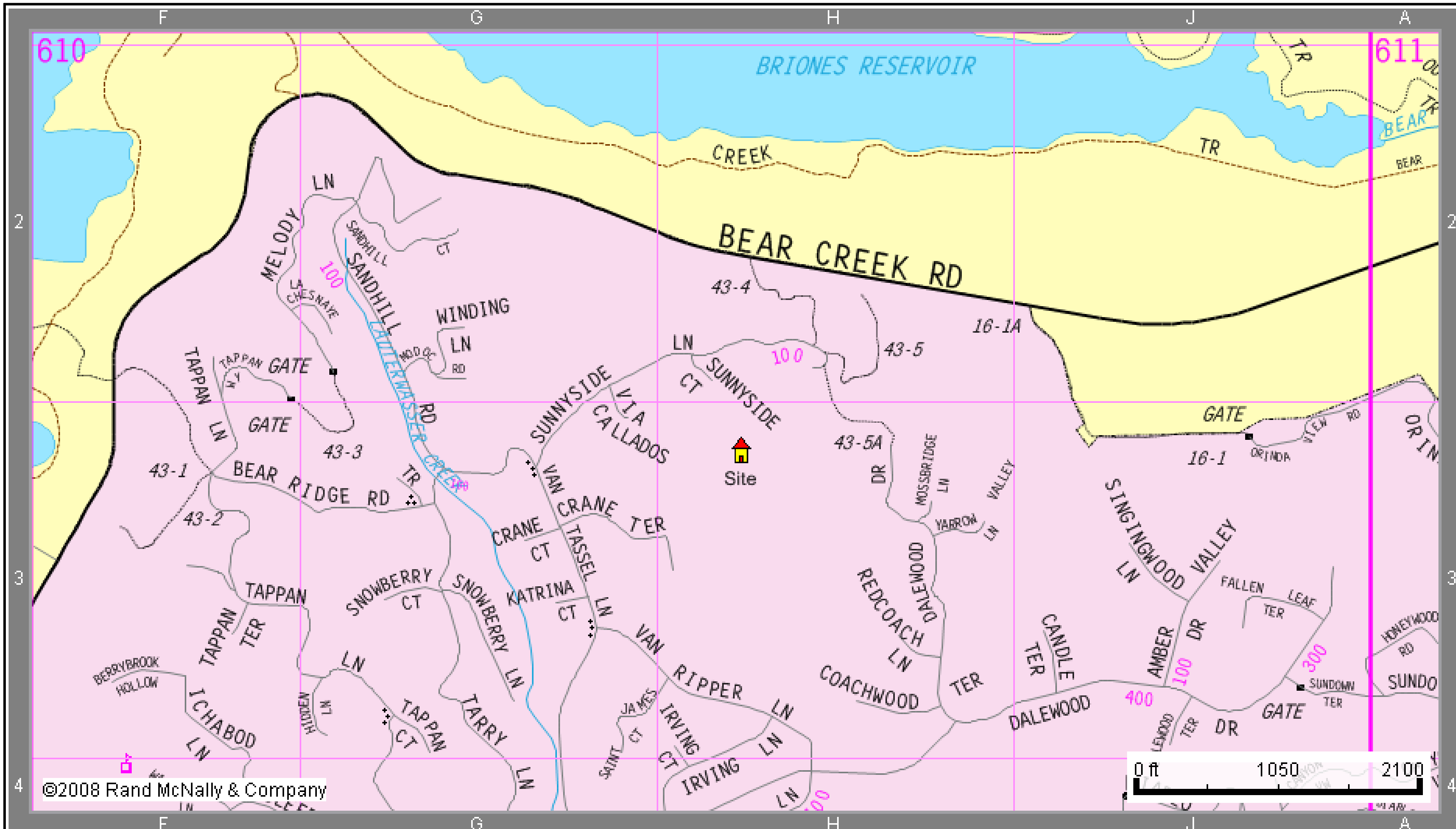

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Figure 1 - Site Vicinity Map

PROJECT No.	Residential Development 88 Sunnyside Lane Orinda, California
15178.001	
DATE	
January 2019	

Map Source: U.S. Geological Survey, 1995, Briones Valley, California, 7.5' Quadrangle: Map Scale 1:24,000.

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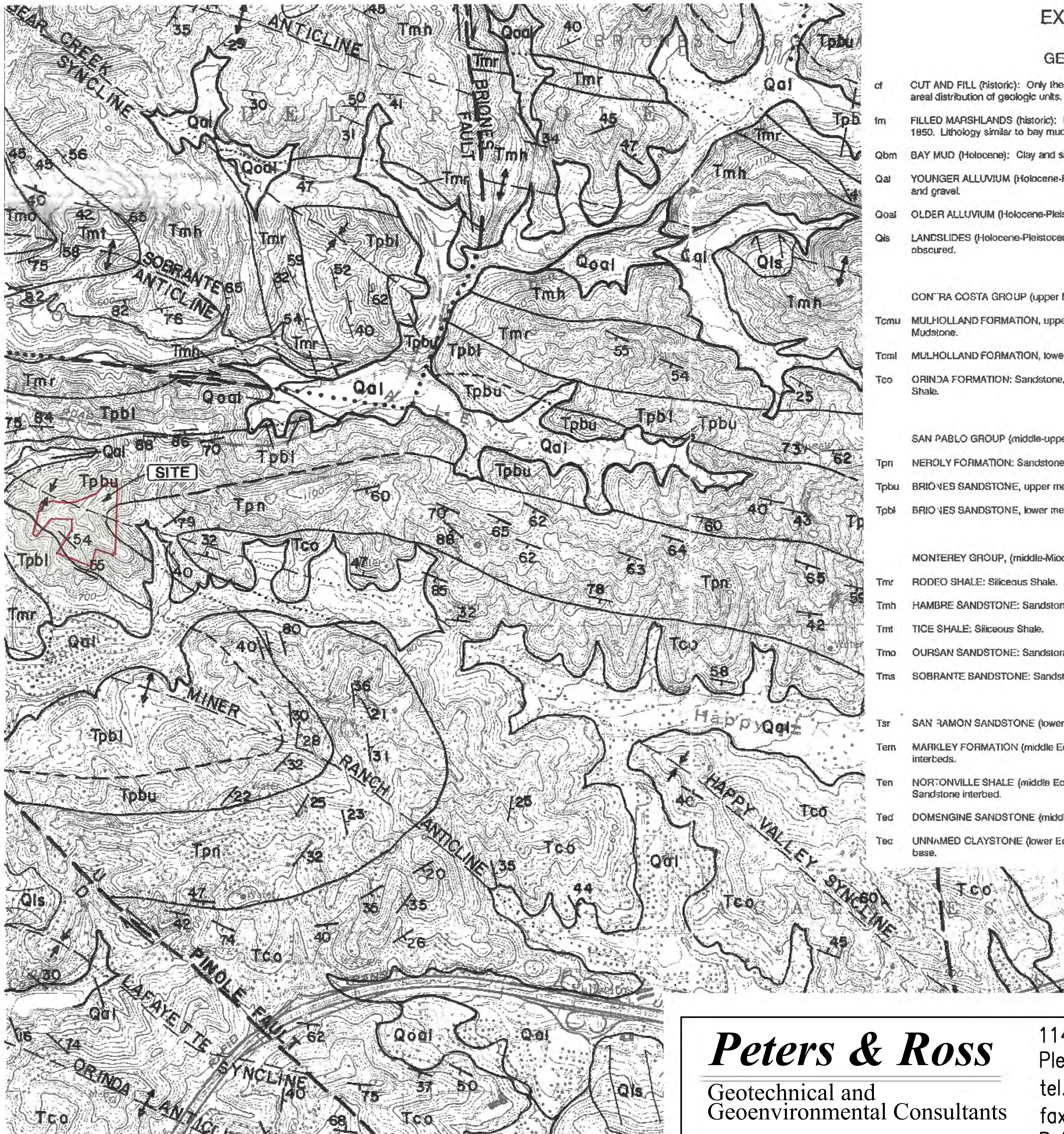
Figure 2 - Site Topography

PROJECT No.	Residential Development 88 Sunnyside Lane Orinda, CA
15178.001	
DATE	
January 2019	



EXPLANATION

GEOLOGIC UNITS

cf — CUT AND FILL (historic): Only the large embankment dams are shown to avoid obscuring the areal distribution of geologic units.

fm — FILLED MARSHLANDS (historic): Portions of San Francisco Bay filled since approximately 1850. Lithology similar to bay mud.

Qbm — BAY MUD (Holocene): Clay and silty clay with high organic matter content, fine sand and peat.

Qal — YOUNGER ALLUVIUM (Holocene-Pleistocene): Sand, silt and clayey silt with occasional sand and gravel.

Qoal — OLDER ALLUVIUM (Holocene-Pleistocene): Clay, sand, silt, and gravel.

Qls — LANDSLIDES (Holocene-Pleistocene): Indicated only where underlying geologic relations are obscured.

CONTRA COSTA GROUP (upper Miocene, nonmarine-continental)

Tcmu — MULHOLLAND FORMATION, upper member: Sandstone, Conglomerate, Andesite, and Mudstone.

Tcml — MULHOLLAND FORMATION, lower member: Sandstone and Claystone.

Tco — ORINDA FORMATION: Sandstone, Gravelly Sandstone, Conglomerate, Andesite and Clay Shale.

SAN PABLO GROUP (middle-upper Miocene, marine)

Tpn — NEROLY FORMATION: Sandstone and Mudstone.

Tpbu — BRIONES SANDSTONE, upper member: Sandstone, Mudstone and Tuff.

Tpbl — BRIONES SANDSTONE, lower member: Sandstone.

MONTEREY GROUP, (middle-Miocene, marine)

Tmr — RODEO SHALE: Siliceous Shale.

Tmh — HAMBRE SANDSTONE: Sandstone and Claystone.

Tmt — TICE SHALE: Siliceous Shale.

Tmo — OURSAN SANDSTONE: Sandstone.

Tms — SOBRANTE SANDSTONE: Sandstone.

Tsr — SAN RAMON SANDSTONE (lower Oligocene, marine): Sandstone.

Tem — MARKLEY FORMATION (middle Eocene, marine): Sandstone with Sandy Carbonaceous Shale interbeds.

Ten — NORTONVILLE SHALE (middle Eocene, marine): Clay Shale with an Argillaceous, Feldspathic Sandstone interbed.

Ted — DOMENGINE SANDSTONE (middle Eocene, marine): Sandstone.

Tec — UNNAMED CLAYSTONE (lower Eocene, marine): Claystone with thin Sandstone interbeds near base.

Tmgu — MEGANOS FORMATION, upper member (lower Eocene, marine): Claystone.

Tmgl — MEGANOS FORMATION, lower member (lower Eocene, marine): Sandstone.

Tmz — MARTINEZ FORMATION, undifferentiated (upper Paleocene, marine): Sandstone and Claystone.

Tmzu — MARTINEZ FORMATION, upper member (upper Paleocene, marine): Sandstone and Claystone.

Tmzl — MARTINEZ FORMATION, lower member (upper Paleocene, marine): Sandstone.

GREAT VALLEY SEQUENCE (Cretaceous, marine)

Ku — Undifferentiated: Sandstone, Siltstone, Clay Shale, and minor Conglomerate, interbedded in approximately equal amounts.

Kcs — Sandstone.

Kus — Sandstone, Siltstone, and Clay Shale, interbedded in approximately equal amounts.

Kuh — Sandstone with minor Clay Shale.

Note: An expanded description of the geologic units and their slope stability characteristics is presented in the accompanying booklet

SYMBOLS

CONTACTS: Solid where well located; dashed where approximately located; dotted where concealed.

40 — STRIKE AND DIP OF BEDDING

40 — STRIKE AND DIP OF OVERTURNED BEDDING

STRIKE OF VERTICAL BEDDING

AXIS OF ANTICLINAL FOLD: Solid where well located; dashed where approximately located; dotted where concealed.

AXIS OF SYNCLINAL FOLD: Solid where well located; dashed where approximately located; dotted where concealed.

AXIS OF OVERTURNED SYNCLINAL FOLD: Solid where well located; dashed where approximately located; dotted where concealed.

D / U — FAULT: Solid where well located; dashed where approximately located; dotted where concealed. Arrows show apparent relative movement. U-upthrown side, D-downthrown side.

1 .5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

N

Map Source: Haydon, W.D., 1995, Landslide Hazards in the Martinez-Orinda-Walnut Creek Area, Contra Costa County, California: California Geological Survey Open-File Report 95-12, 4 pls.

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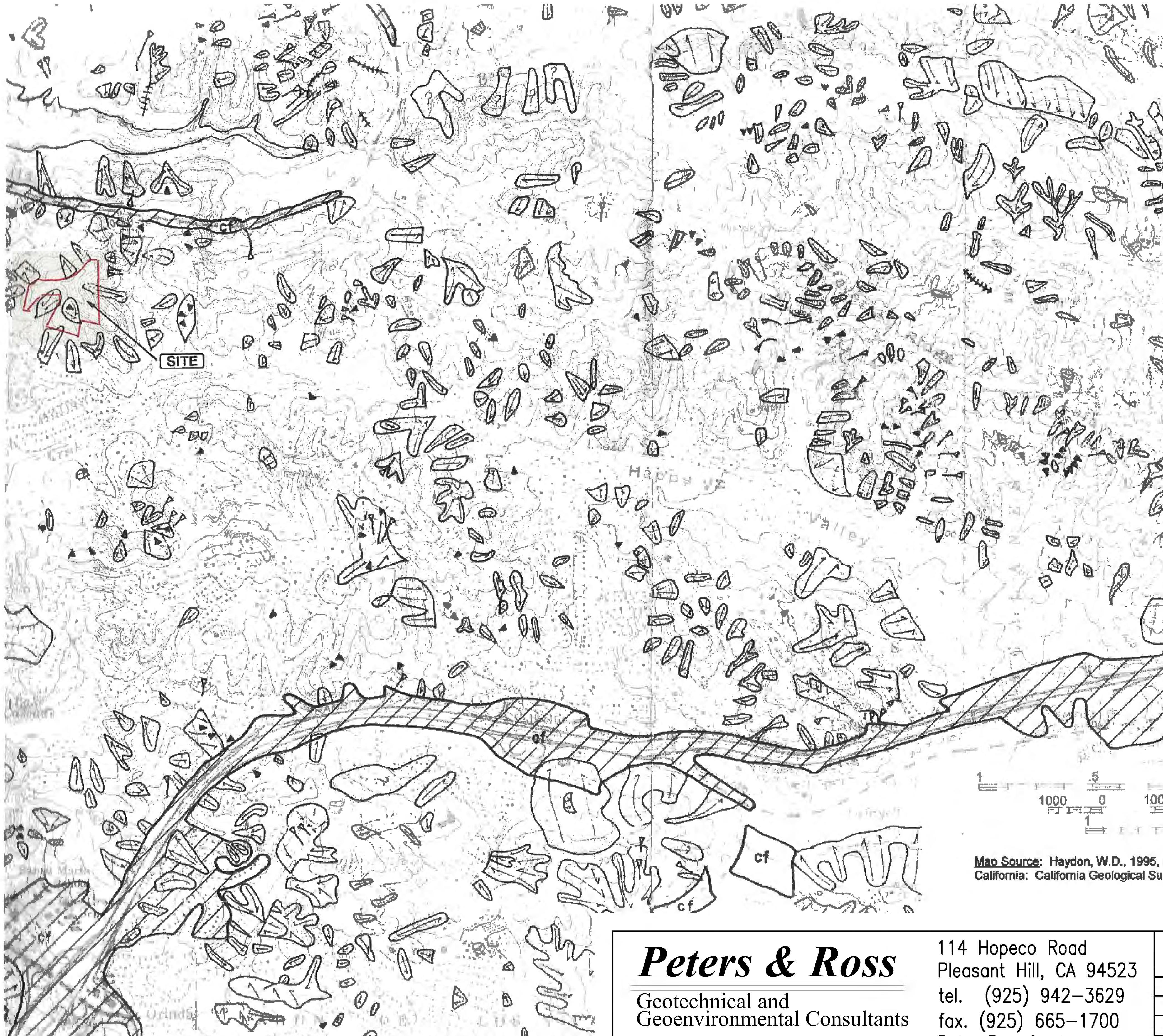
Figure 3 - Regional Geology

PROJECT No.	Residential Development
15178.001	88 Sunnyside Lane
DATE	Orinda, CA
January 2019	



EXPLANATION

LANDSLIDE DEPOSITS

A landslide is a mass of rock, soil, and debris that has been displaced downslope by sliding, flowing, or falling. Landslides include cohesive block glides and disrupted slumps that have formed by translation or rotation of the slope materials along one or more planar or curviplanar slip surfaces. Most of the landslides whose boundaries are delineated on the map are greater than 10 feet thick. Also shown are selected surficial features that typically involve only soil, colluvium, or other superficial debris that covers bedrock. The rates of movement of slope failures range from almost imperceptibly slow (as in earthflows) to extremely, even dangerously, rapid (as in debris flows).

SLOPE MOVEMENT SYMBOLS

DEFINITE OR PROBABLE LANDSLIDE: Exhibits all or many of the diagnostic features, including but not limited to headwall scarps, cracks, rounded toes, well-defined benches, closed depressions, springs, and irregular or hummocky topography, that are common to landslides and indicative of downslope movement. Continuous, single-barbed arrows indicate general direction of movement. Scarp (headwall of slump or block glide) is indicated by hachures where mapped.

?

QUESTIONABLE LANDSLIDE: Exhibits one or a few, generally very subdued, diagnostic features that commonly are associated with landslides. Typically lacks distinct landslide morphology but may exhibit disrupted terrain or other abnormal features that strongly to vaguely imply the occurrence of downslope movement. Possible scarp (headwall of slump or block glide) is indicated by hachures where mapped. Question mark signifies the uncertainty in the existence of the landslide.

SMALL LANDSLIDE: Filled arrowhead indicates a landslide too small to delineate at the scale of the map. Center of arrowhead corresponds to the location of the landslide; arrowhead points in the direction of movement (downhill). Question mark used where existence of the landslide is uncertain.

EARTHFLOW. A relatively shallow deposit of soil or other colluvial material that has oozed downslope, commonly at a rate too slow to observe except over long duration. Head scarp is shown by hachures where mapped. The area immediately upslope of failure typically unravels due to successive small slumps that occur in the oversteepened banks left by movement of the main body away from the source area. arrow shows general direction of movement.

DEBRIS FLOW: A short-lived phenomenon resulting from the rapid failure of surficial slope materials. Also called mudflow, soil slip, or debris avalanche. Typically leaves a train of debris in a scoured channel following runout of the flow. Curved line delineates channel. Scarp depicted by triangle.

GULLY: Upland drainage channel where colluvium and alluvium underlying channel floor has been incised. Indicated by elongated outlined areas, where channel sides are slumping or sliding. Slumps and slides on channel sides retain vegetation and are generally steeper than upslope areas above the gully, without slumps or slides. Where indicated by single track, channel sides have few, if any, slides or slumps, they are nearly vertical and largely lack vegetation.

cf

Areas not classified. These areas have been significantly modified by grading for development, road construction, filling of marshlands or mining.

1 .5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

N

Map Source: Haydon, W.D., 1995, Landslide Hazards in the Martinez-Orinda-Walnut Creek Area, Contra Costa County, California: California Geological Survey Open-File Report 95-12, 4 pls.

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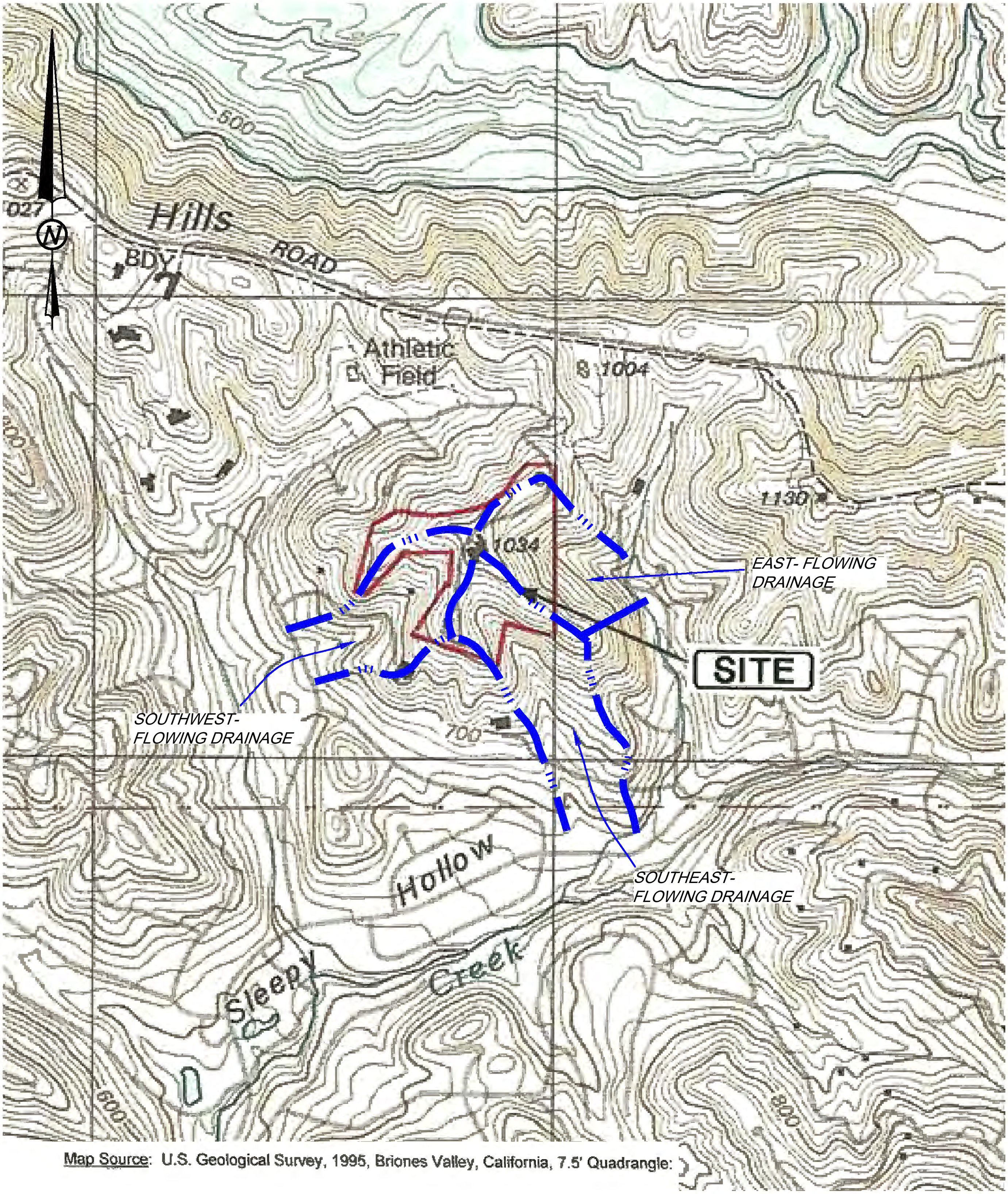
Figure 4 - Regional Landslide Map

PROJECT No.	Residential Development 88 Sunnyside Lane Orinda, CA
15178.001	
DATE	
January 2019	



Map Source: U.S. Geological Survey, 1995, Briones Valley, California, 7.5' Quadrangle:

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Figure 5 - Local Watershed Map

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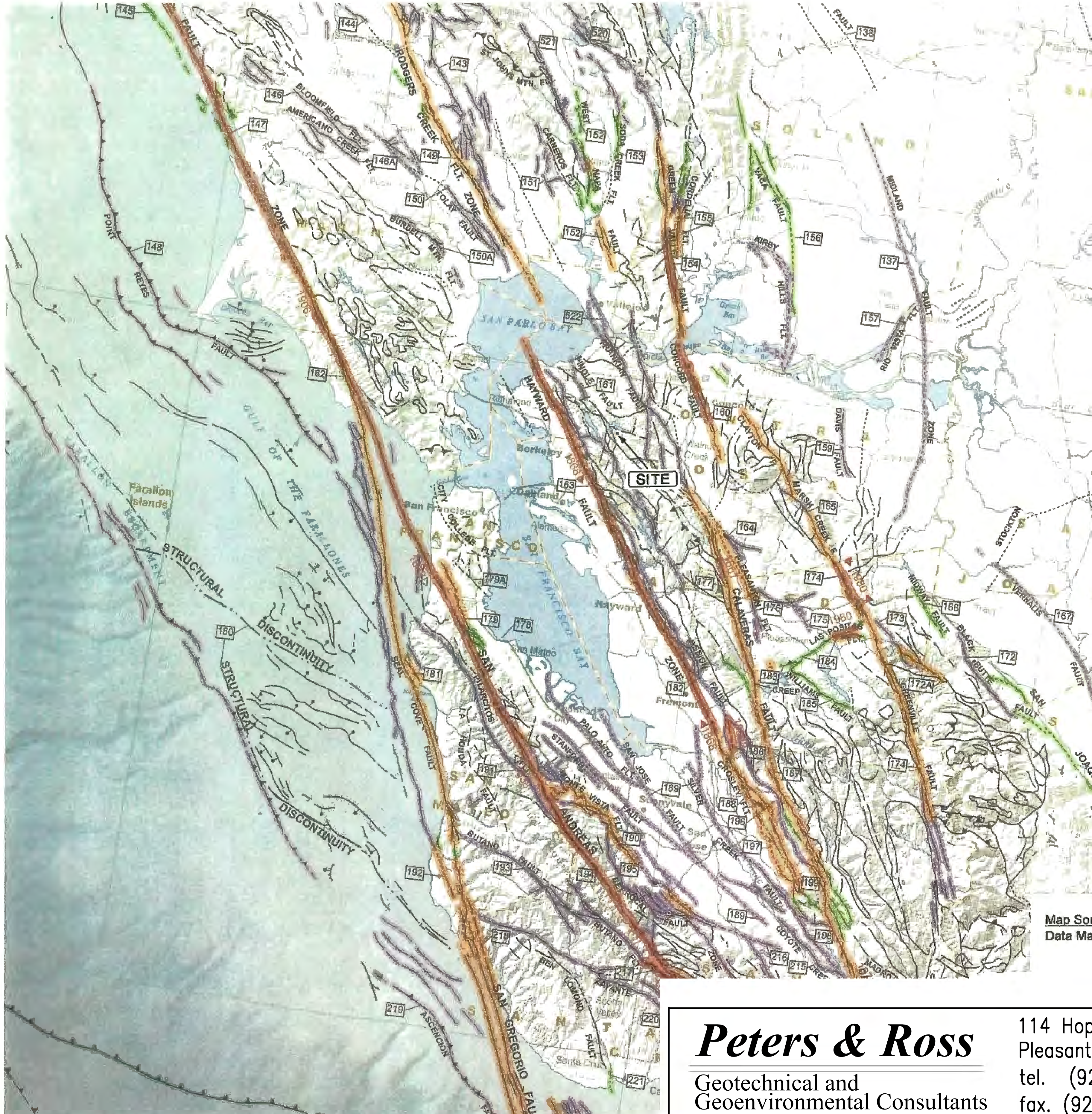
January 2019	



Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION: ON LAND	DESCRIPTION: OFFSHORE
Quaternary	Late Quaternary	Historic	200			Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
		Holocene	11,700			Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
		Pleistocene	700,000			Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
	Early Quaternary		1,600,000*			Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
Pre-Quaternary			4.5 billion (Age of Earth)			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion.

N

0 12 24

MILES

Map Source: Jennings, C.W., and Bryant, W.A., compilers, 2010, Fault Activity Map of California: California Geological Survey Data Map No. 6, Map Scale 1:750,000.

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Figure 6 - Regional Fault Map

PROJECT No.	
15178.001	Residential Development 88 Sunnyside Lane Orinda, CA
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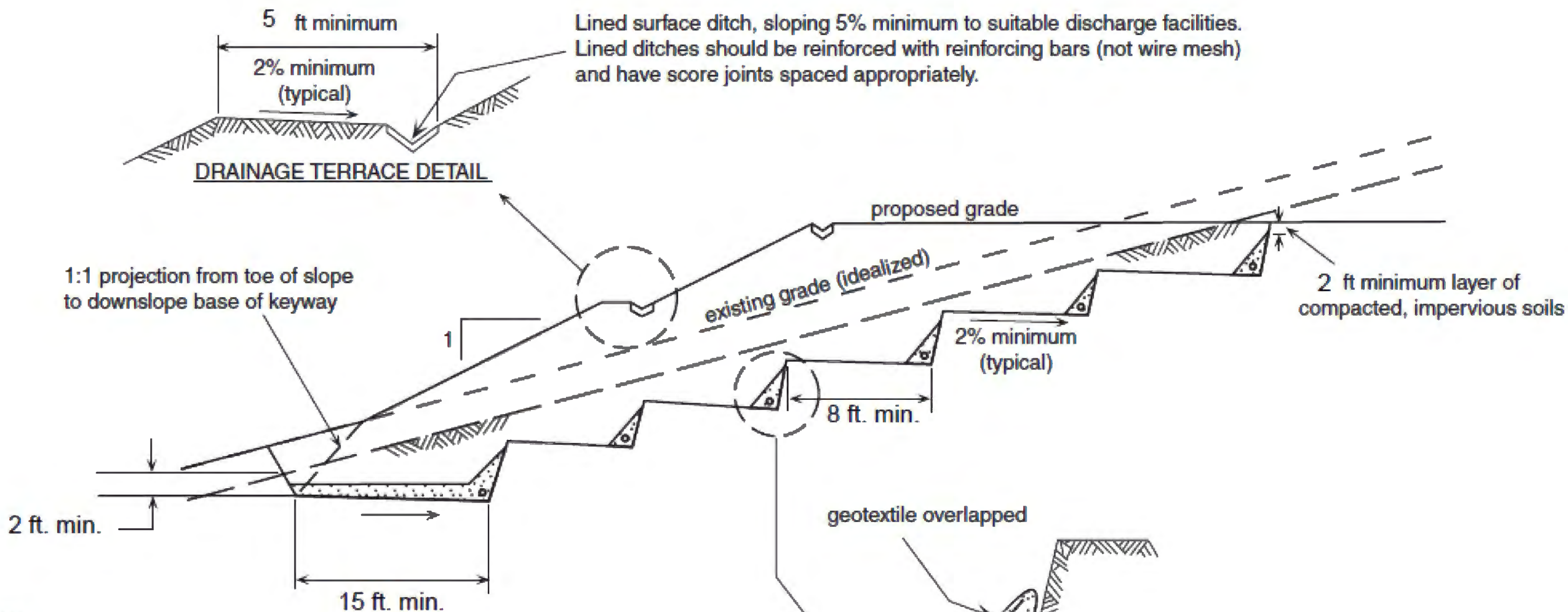
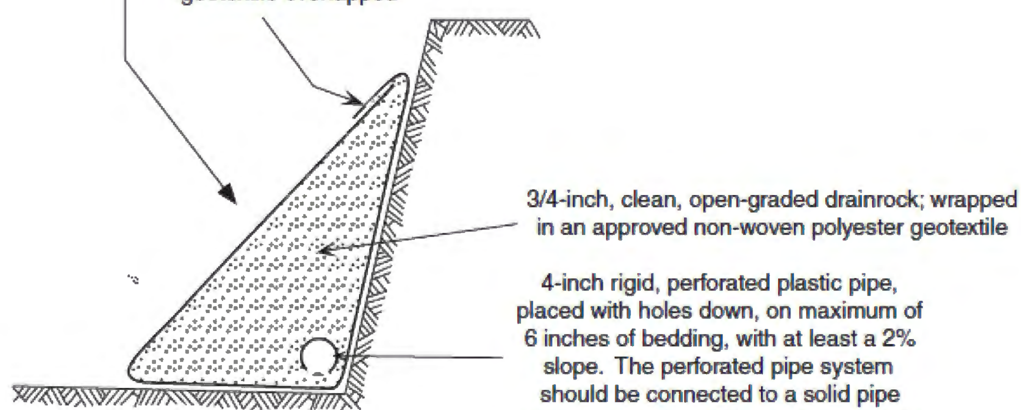
January 2019	





NOT TO SCALE

NOTES:

1. This is an idealized cross-section through a typical fill slope, representing idealized subsurface conditions. It is not to scale and has not been developed from site specific information. Significant variations may be encountered during construction.

2. Dimensions of keyways and benches are subject to approval in the field by the geotechnical engineer's representative.

3. Subdrains may not be needed on each bench; number and location of subdrain (s) should be determined in the field by the geotechnical engineer's representative at the time of construction.

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Figure 7 - Fill Placement on Slopes

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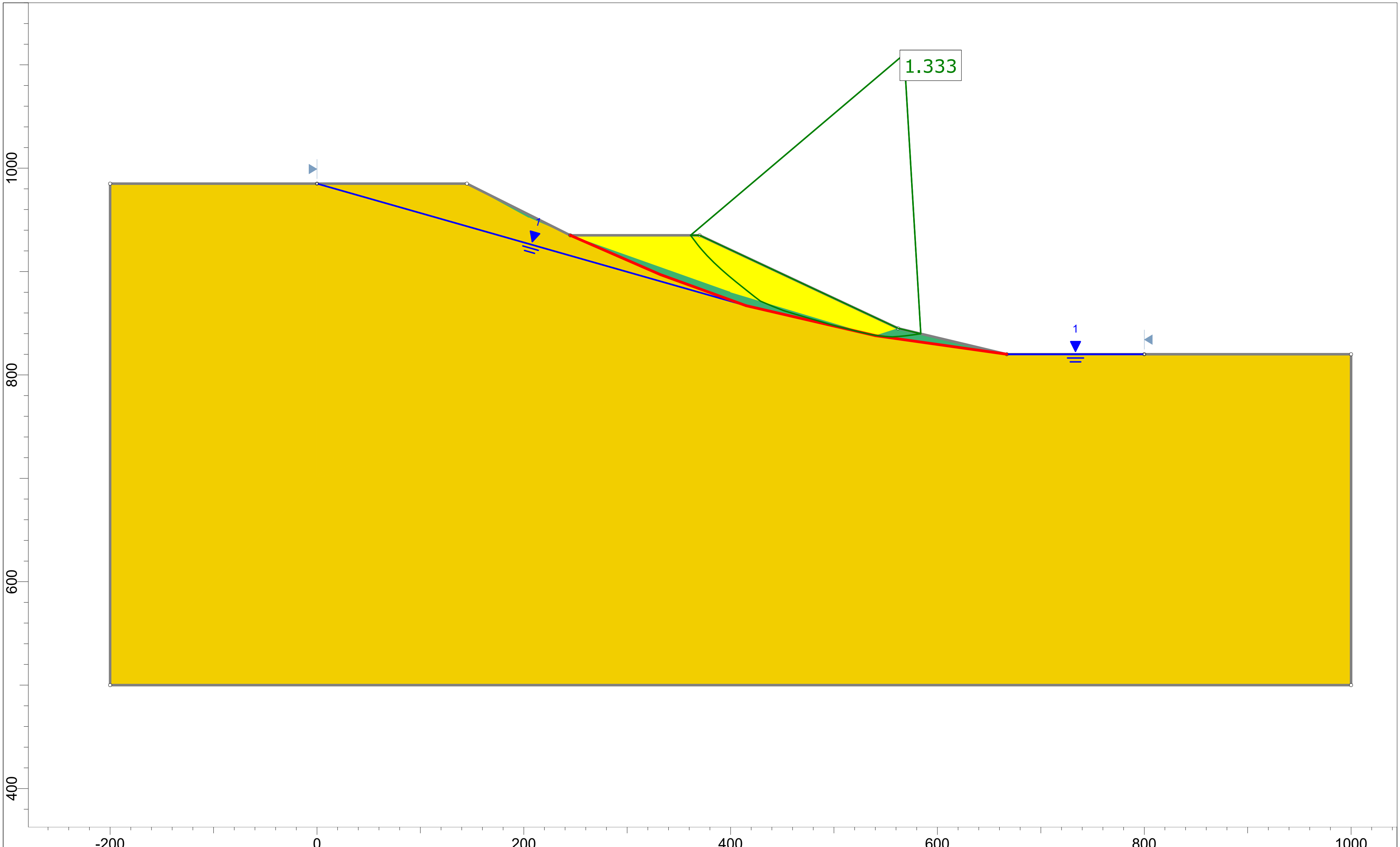
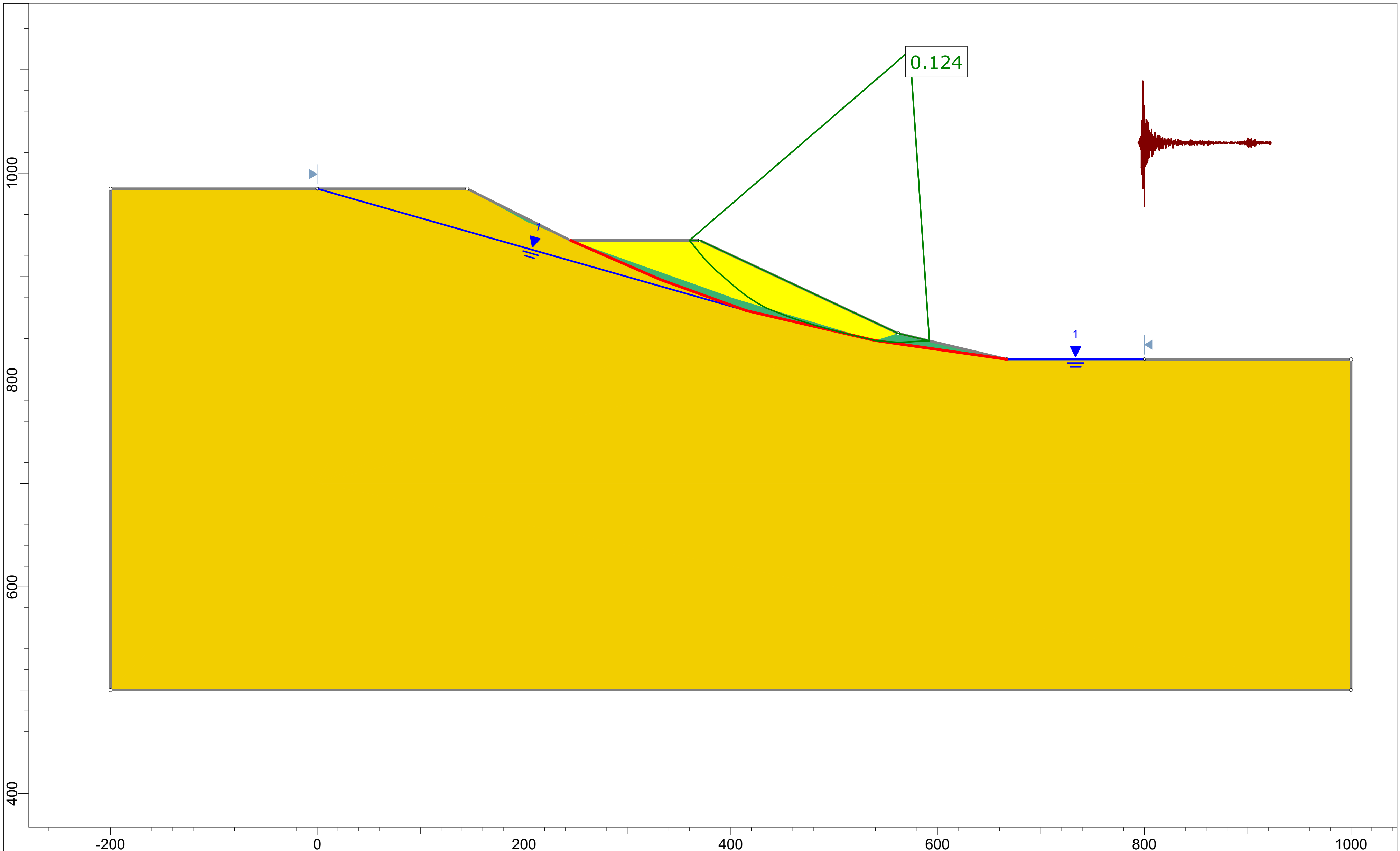


Peters & Ross Geotechnical & Geoenvironmental Consultants	Project: 88 Sunnyside Lane	FIGURE 8 - Static Stability Analysis	
	Analysis Description: Lot C 1977 Canyon Fill		
	Drawn By: Peter Mundy	Scale: 1:1541	Company: Peters & Ross
SLIDEINTERPRET 8.021	Date: 1/25/2019		File Name: Lot C Existing Fill.slim



Peters & Ross

Geotechnical & Geoenvironmental Consultants

SLIDEINTERPRET 8.021

Project	88 Sunnyside Lane FIGURE 9 - Seismic Stability Analysis		
Analysis Description	Lot C 1977 Canyon Fill		
Drawn By Peter Mundy	*Scale* 1:1541	*Company*	Peters & Ross
Date 1/25/2019		*File Name*	Lot C Existing Fill.slim

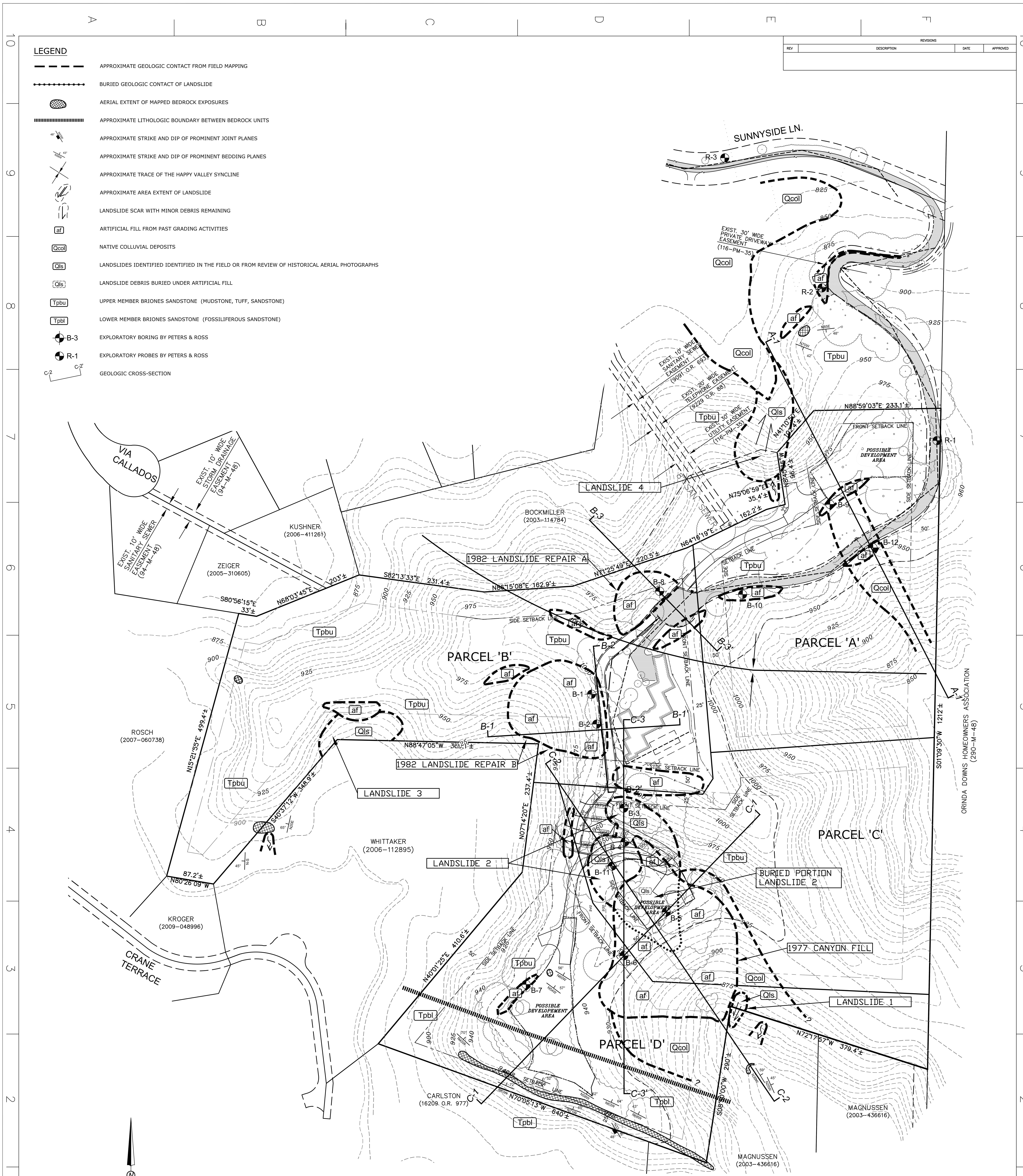


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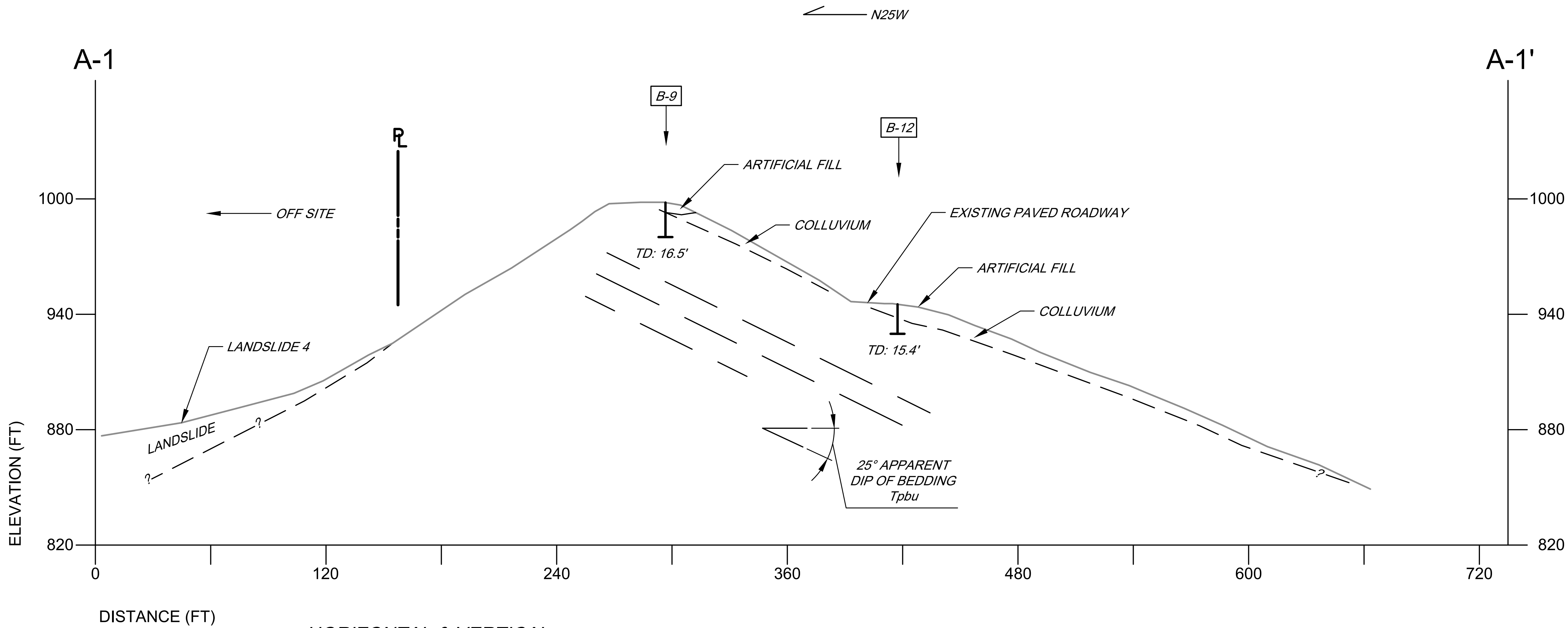
PLATE 1

SITE GEOLOGIC MAP
88 SUNNYSIDE LANE, ORINDA CA 94563

Designed By: P. Mundy	Project No.: 15178.001	Prepared For: Mr. Keith B. Stone, Diamond Construction, Inc	
Drawn By: C. Flores			
Checked By: P. Mundy	Scale: AS NOTED	Date: 1/25/19	Sheet: 1 of 1



HORIZONTAL & VERTICAL SCALES ARE THE SAME

0 60' 120'

LEGEND

B-1 EXPLORATORY BORING (P&R)

TD: 18.4 TOTAL DEPTH OF BORING, FT BELOW SURFACE

GEOLOGIC CONTACT

(CONTACTS ARE APPROXIMATE WHERE PROJECTED BETWEEN BORINGS)

NOTE: SEE SITE PLAN (PLATE 1) FOR LOCATION OF CROSS–SECTIONS

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Plate 2 - Cross Sections A-1 - A-1'

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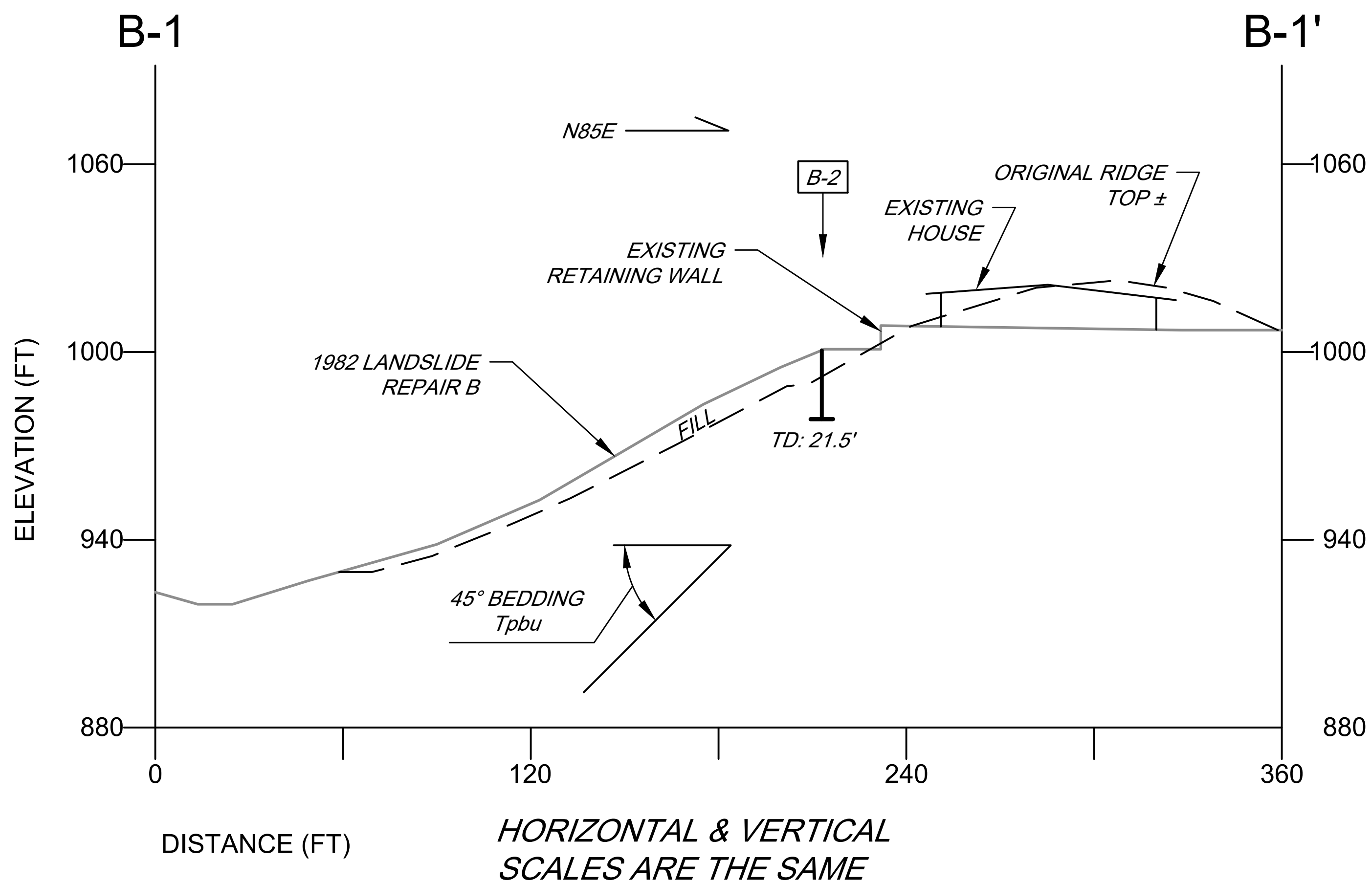
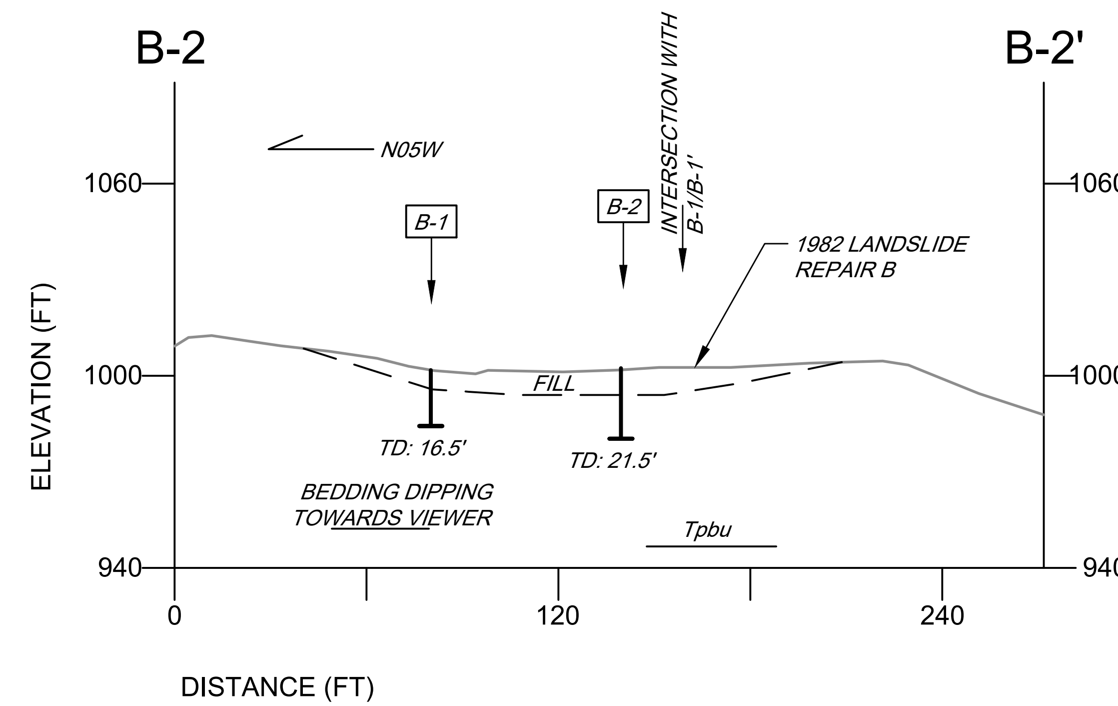
DATE January 2019	





LEGEND

B-1 EXPLORATORY BORING (P&R)

TD: 18.4 TOTAL DEPTH OF BORING, FT BELOW SURFACE

(CONTACTS ARE APPROXIMATE WHERE PROJECTED BETWEEN BORINGS)

NOTE: SEE SITE PLAN (PLATE 1) FOR LOCATION OF CROSS-SECTIONS

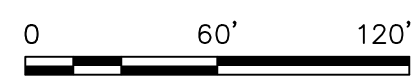


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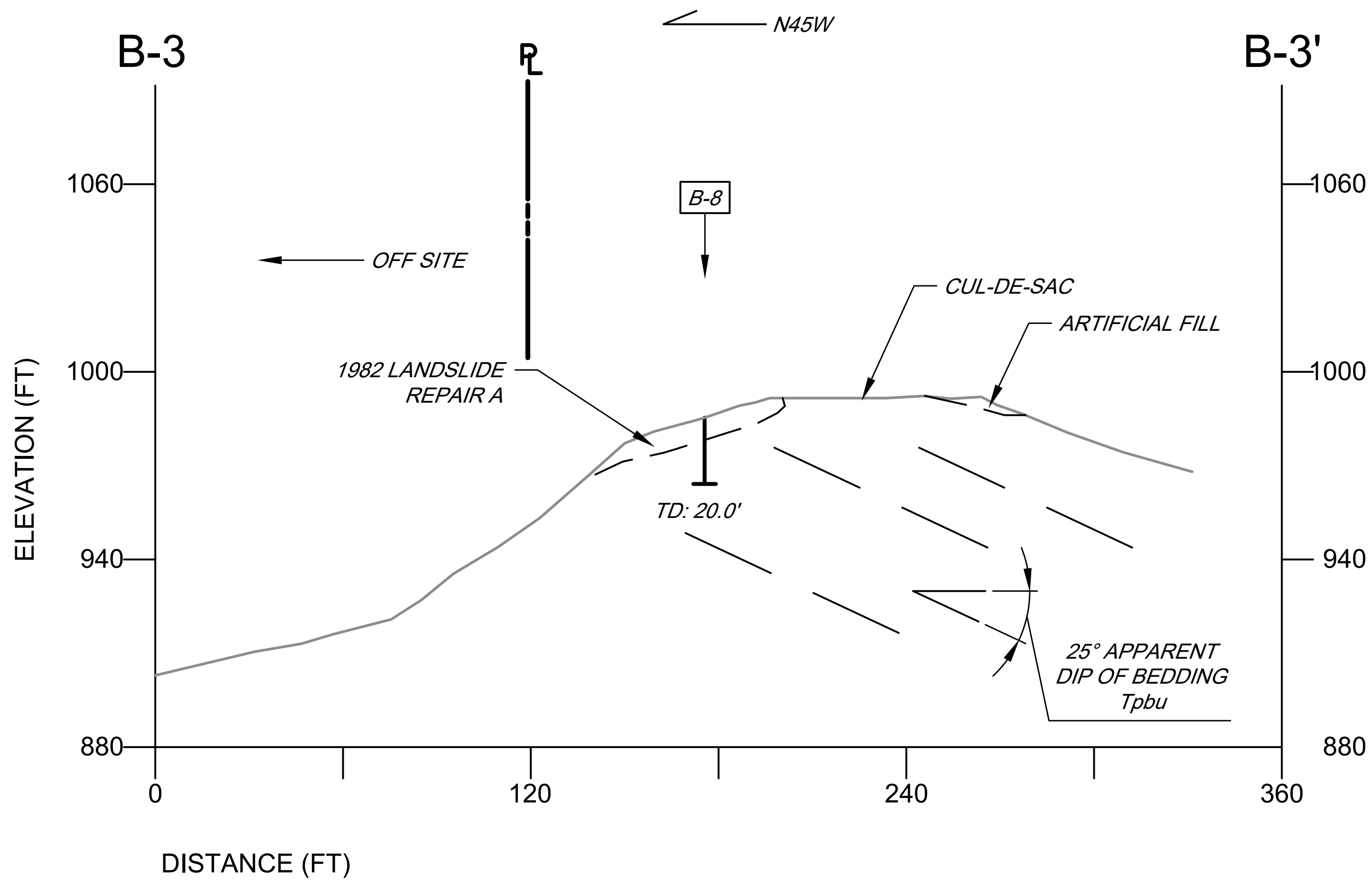
Plate 3 - Cross Sections B-1 - B-1' & B-2 - B-2'	
PROJECT No. 15178.001	Residential Development 88 Sunnyside Lane Orinda, CA
DATE January 2019	



HORIZONTAL & VERTICAL SCALES ARE THE SAME

LEGEND

B-1 EXPLORATORY BORING (P&R)

TD: 18.4 TOTAL DEPTH OF BORING, FT BELOW SURFACE

— — — GEOLOGIC CONTACT

(CONTACTS ARE APPROXIMATE WHERE PROJECTED BETWEEN BORINGS)

NOTE: SEE SITE PLAN (PLATE 1) FOR LOCATION OF CROSS–SECTIONS

0 60' 120'

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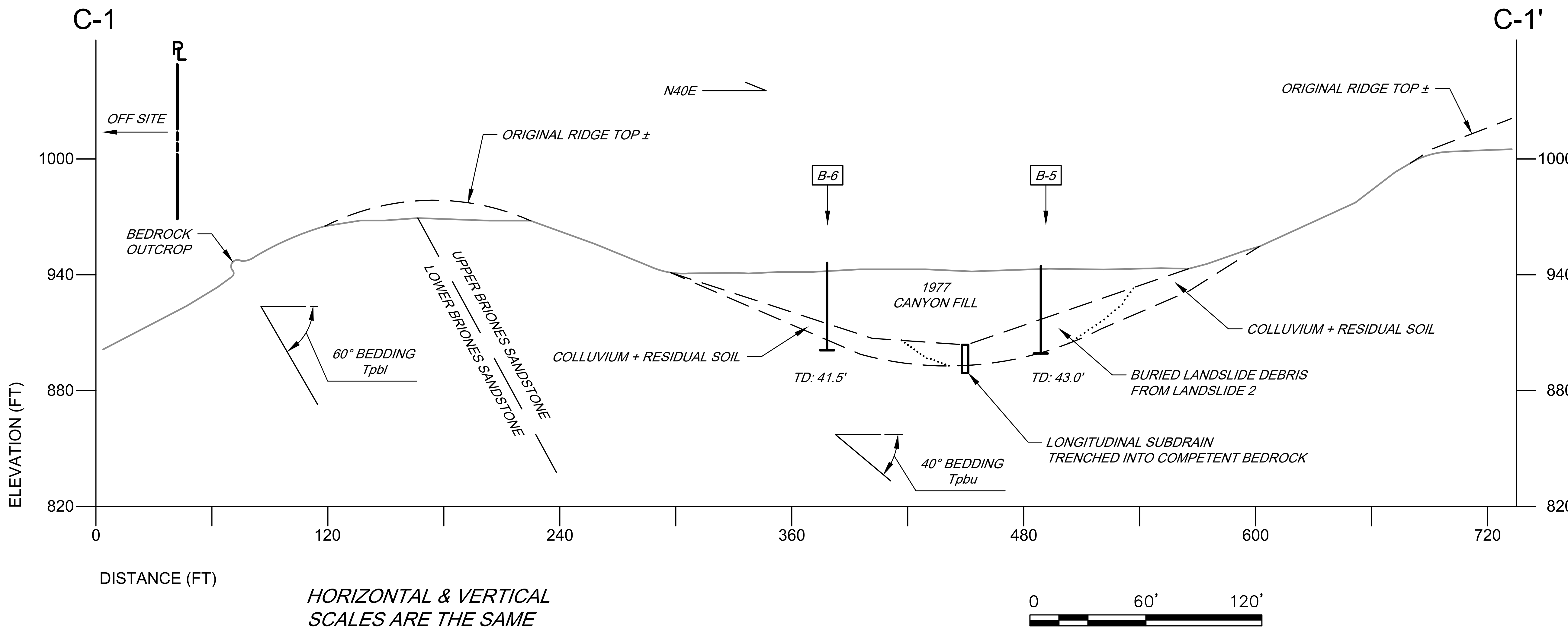
Plate 4 - Cross Sections B-3 - B-3'

PROJECT No.	Residential Development 88 Sunnyside Lane Orinda, CA
15178.001	
DATE	
January 2019	



LEGEND

B-1 EXPLORATORY BORING (P&R)

TD: 18.4 TOTAL DEPTH OF BORING, FT BELOW SURFACE

.... BURIED CONTACT AT BASE OF LANDSLIDE

— — — — GEOLOGIC CONTACT

(CONTACTS ARE APPROXIMATE WHERE PROJECTED BETWEEN BORINGS)

NOTE: SEE SITE PLAN (PLATE 1) FOR LOCATION OF CROSS-SECTIONS

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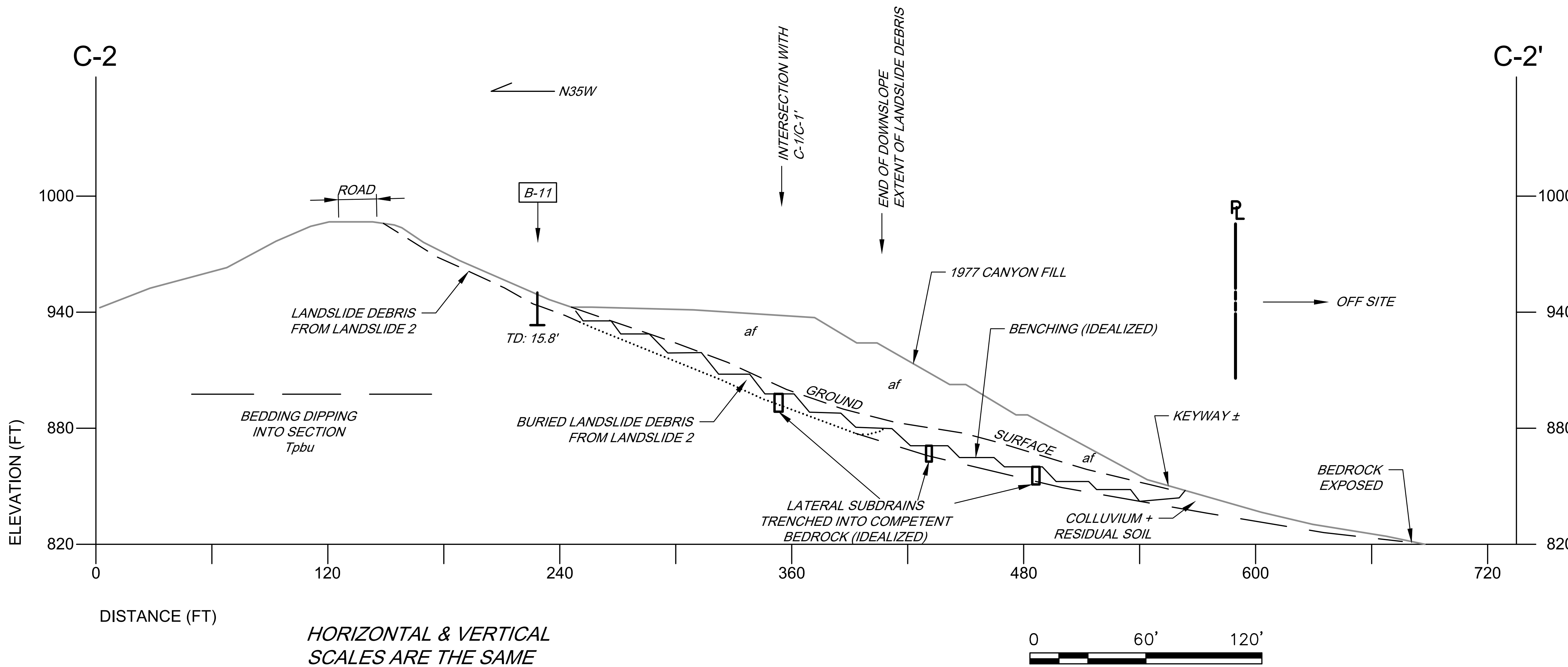
Plate 5 - Cross Section C-1 - C-1'

PROJECT No.	15178.001
DATE	January 2019

Residential Development
88 Sunnyside Lane
Orinda, CA



LEGEND

B-1 EXPLORATORY BORING (P&R)

TD: 18.4 TOTAL DEPTH OF BORING, FT BELOW SURFACE

.... BURIED CONTACT AT BASE OF LANDSLIDE

— — — — GEOLOGIC CONTACT

(CONTACTS ARE APPROXIMATE WHERE PROJECTED BETWEEN BORINGS)

NOTE: SEE SITE PLAN (PLATE 1) FOR LOCATION OF CROSS–SECTIONS

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Plate 6 - Cross Section C-2 - C-2'

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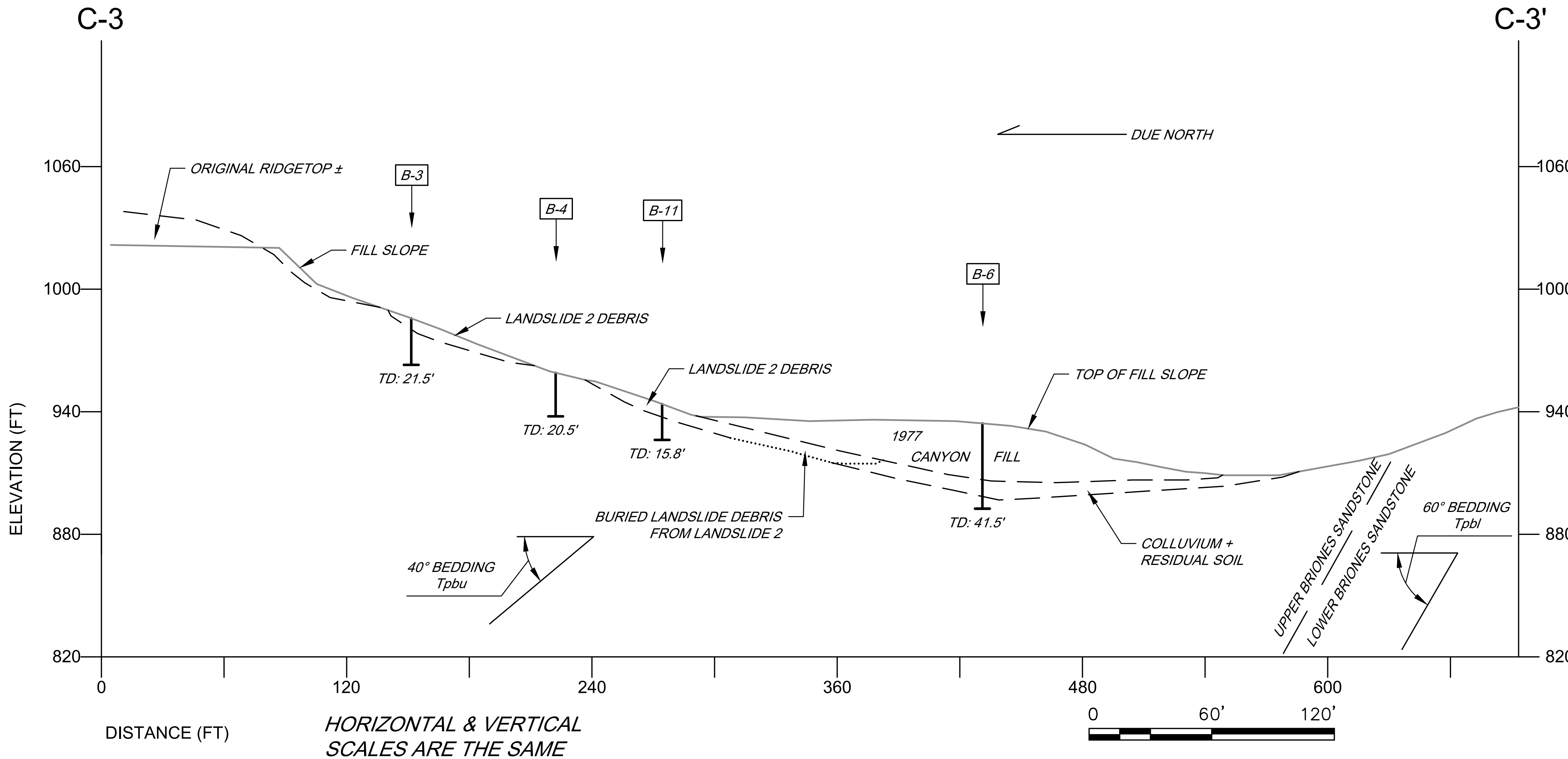
January 2019	



LEGEND

B-1 EXPLORATORY BORING (P&R)

TD: 18.4 TOTAL DEPTH OF BORING, FT BELOW SURFACE

.... BURIED CONTACT AT BASE OF LANDSLIDE

— — — — GEOLOGIC CONTACT

(CONTACTS ARE APPROXIMATE WHERE PROJECTED BETWEEN BORINGS)

NOTE: SEE SITE PLAN (PLATE 1) FOR LOCATION OF CROSS-SECTIONS

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Plate 7 - Cross Section C-3 - C-3'

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DATE	
January 2019	

APPENDIX A – FIELD INVESTIGATION

Peters & Ross explored subsurface conditions at the site by drilling twelve exploratory test borings to a maximum depth of 43 feet and three 5-foot-deep auger probes. The locations of the exploratory test borings are shown on Plate 1.

Britton Exploration of Los Gatos, California, using a track mounted CME-55 drill rig with 6-inch-diameter solid flight augers, drilled the borings. Our field engineer continuously logged the materials encountered. The boring logs show the materials encountered and are included in this Appendix. Soils are classified in accordance with the Unified Soil Classification System.

The boring logs indicate Peters & Ross interpretation of subsurface conditions encountered at the location and time the boring was drilled, and may not be representative of subsurface conditions at other locations and times. Stratification lines represent the approximate boundaries between soil and rock types. The transitions between soil and rock layers are often gradual.

Samples of the materials encountered were obtained at frequent depth intervals, for visual classification and laboratory testing. Samples were obtained using a Modified California sampler (outer diameter of 3.0 inches, inner diameter of 2.5 inches) with thin-wall brass sampler liners, and a Standard Penetration Test sampler (outer diameter of 2.0 inches, inner diameter of 1.375 inches). The samplers were driven using a 140-pound automatic hammer using a 30-inch drop.

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Project Name: 88 Sunnyside Lane
Project No.: 15178.001
Location: 88 Sunnyside Ln., Orinda, CA
Client: Jamal Nafis
Drilling Method: Track mounted CMe55 drill rig
Date Drilled: 11/12/2018
Elevation: 0
Water Level: Not Encountered
Remarks: Samplers driven with 140 lb. automatic hammer using a 30 inch drop

ELEVATION	DESCRIPTION	SYMBOL	DEPTH (ft)	SAMPLE TYPE	BLOWS/FT.	MOISTURE (%)	DRY DENSITY (pcf)	UNCONFINED STRENGTH (tsf)	REMARKS
	Ground Surface								
	Silty SAND (SM-FILL) light yellowish brown, moist, medium dense, some roots and fine gravel		0–2						
			2–3.5	MC	16	15	101	>4.5	
			3.5–5						
	Silty SANDSTONE (Bedrock) mottled light gray and yellow brown, moist, dense, poorly cemented, moderately weathered, fine grained, occasional very thin bedded siltstone		5–6.5	MC	26	17	103	>4.5	
			7–8.5	SS	30	24			
			10–11.5	SS	28	24			
			15–16.5	MC	71	20	99	>4.5	
	End of Log		17–20						

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4. The unconfined compressive strength values were obtained using a pocket penetrometer.

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	Ground Surface								
	Silty SAND (SM-FILL) light yellowish brown, moist, medium dense, some roots and clay		0						
			2–3.5	MC	25	16	95	>4.5	
			5–6.5	MC	20	16	91	>4.5	
	Silty SANDSTONE (Bedrock) mottled light gray and yellow brown, moist, dense, moderately cemented, moderately weathered, medium grained		7–8.5	MC	50	20	98	>4.5	
			10–11.5	SS	26	17			
			15–16.5	MC	93	16	98	>4.5	
			19						

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	Same as above		20						
			21	SS	25	18			
	End of Log		22						
			23						
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						

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Elevation: 0 | Water Level: Not Encountered

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ELEVATION	DESCRIPTION	SYMBOL	DEPTH (ft)	SAMPLE TYPE	BLOWS/FT.	MOISTURE (%)	DRY DENSITY (pcf)	UNCONFINED STRENGTH (tsf)	REMARKS
	Ground Surface								
	Silty SAND with Rock Fragments(SM-LANDSLIDE DEBRIS) mottled yellowish brown, moist, medium dense, rock fragments consist of moderately cemented sandstone		0						
			2	MC	13	15	92	>4.5	
			5	MC	27	20	98	>4.5	
	Silty SANDSTONE (Bedrock) mottled light gray and yellow brown, moist, dense, moderately cemented, moderately weathered, fine to medium grained		6						
			7	MC	70	17	108	>4.5	
			10	MC	85	20	104	>4.5	
			15	SS	53	19			
			19						

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	Same as above		20–21	SS	80	20			
	End of Log		22–39						

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	Ground Surface								
	Silty SAND (SM-FILL) mottled yellowish brown, moist, medium dense		0						
			1						
	Silty SANDSTONE (Bedrock) mottled light gray and yellow brown, moist, dense, moderately cemented, moderately weathered, fine to medium grained		2	MC	50 6"	16	111	>4.5	
			3						
			4						
			5	MC	83 11"	18	106	>4.5	
			6						
			7	MC	50 6"	17	110	>4.5	
			8						
			9						
			10	SS	70	16			
			11						
			12						
			13						
			14						
	color change at 15.3 feet to olive brown		15	SS	*	18			* = 50/6"
			16						
			17						
			18						
			19						

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	Same as above		20	SS	*	16			* = 50/6"
	End of Log		21						
			22						
			23						
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						

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	Ground Surface		0						
	Clayey SAND to Silty SAND (SM-FILL) mottled yellowish brown, moist, dense, rock fragments		1						
			2–3	MC	37	16	103	>4.5	
			4	SS	34	16			
			5						
			6	MC	43	14	108	>4.5	
	Clayey to Silty SAND (SC-SM FILL) mottled dark green gray and dark yellow brown, moist to wet, dense, lage sandstone fragment with some woody debris		7–8	SS	37	20			
			9–10	MC	32	28 24	92 99	>4.5 >4.5	
	Clayey to Silty SAND (SC-SM FILL) mottled yellowish brown, moist, dense, some rock fragments		11	SS	25	23			
			12						
			13	MC	51	24	99	>4.5	
			14–15	SS	25	20			
			16–17	MC	42	23	100	>4.5	
			18	SS	24	23			
			19						

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	Same as above		20–21	MC	16	23	99	>4.5	
	Clayey SAND (SC-FILL) very dark brown, wet, medium dense, some rock fragments		22–23	SS	8	28			
			24						
	SAND with GRAVEL (SW to GW) mottled dark gray, moist, loose (Caltrans Class II permeable)		25	MC	6	4			
			26	SS	2	3			
			27						
			28–29	MC	20	3			
			30	SS	17	9			
	Fat CLAY with Sand (CH-RESIDUAL SOIL) mottled dark grayish brown, wet, stiff		31–32						
	TxUU = 2849 psf @ 4000 psf TxUU = 2766 psf @ 4500 psf		33–34	MC	20	28 27	93 94	2.5 2.5	LL=59%, PI=36% -200 = 80 percent
			35	SS	13	28			
			36–39						

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ELEVATION	DESCRIPTION	SYMBOL	DEPTH (ft)	SAMPLE TYPE	BLOWS/FT.	MOISTURE (%)	DRY DENSITY (pcf)	UNCONFINED STRENGTH (tsf)	REMARKS
	Same as above		40						
	Clayey SANDSTONE (Bedrock) mottled light gray and orange brown, wet, dense, moderately cemented, severely weathered		41	MC	19	29	93	2.0	LL=50%, PI=29% -200 = 79 percent
	TxUU = 2491 psf @ 5000		42	SS	49	28			
	End of Log		43						
			44						
			45						
			46						
			49						
			50						
			51						
			52						
			53						
			54						
			55						
			56						
			57						
			58						
			59						

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	Ground Surface								
	Clayey SAND to Silty SAND (SM-FILL) mottled yellowish brown, moist, dense, rock fragments		0–2						
			2–3.5	MC	35	16	100	>4.5	
			5–6.5	SS	40	17			
	Clayey to Silty SAND (SC-SM FILL) mottled dark brown and orange brown, moist to wet, dense, large sandstone fragments		7–8.5	MC	43	23	101	>4.5	
			10–11.5	SS	26	22			
	Clayey to Silty SAND (SC-SM FILL) mottled yellowish brown and light gray, moist, dense, some rock fragments		13						
			15–16.5	SS	27	23			
			17–20						

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	Same as above		20–21	MC	27	20	103	4.0	
			22	SS	22	25			
			23–24						
	TxUU = 1682 psf @ 2500 psf		25–26	MC	14	26	93	2.0	LL=40%, PI=19% -200 = 53 percent
	SAND with GRAVEL (SW to GW) mottled dark gray, moist, loose (Caltrans Class II permeable)		27	SS	6	3			
			28–29						
			30–31	MC	14	-	-		
			32	SS	11	9			
	Fat CLAY with Sand (CH-RESIDUAL SOIL) mottled dark grayish brown, wet, stiff		34–36	MC	35	29 25	92 98	3.0 >4.5	
	Clayey SANDSTONE (Bedrock) mottled light gray and orange brown, wet, dense, moderately cemented, severely weathered		37–39						

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	Same as above		40						
			41	MC	54	25	100	>4.5	
	End of Log		42						
			43						
			44						
			45						
			46						
			49						
			50						
			51						
			52						
			53						
			54						
			55						
			56						
			57						
			58						
			59						

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	Ground Surface		0						
	Silty SAND (SM-FILL) mottled dark orange brown, moist, dense		0–2						
	Silty SANDSTONE (Bedrock) mottled gray, white and orange brown, moist, dense, moderately cemented, moderately weathered, medium grained, massive		2–11.5						
			2–3	MC	50 6"	14	96	>4.5	
			5–6.5	SS	28	15			
			10–11.5	SS	83 11"	15			
	End of Log		11.5						

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	Ground Surface								
	Silty SAND (SM-FILL) mottled light gray brown, moist, medium dense, gravel up to 1 inch, some roots and clay		0–7						
			2–3.5	MC	13	9	97	>4.5	
			5–6.5	MC	16	15	90	>4.5	
	Silty SANDSTONE (Bedrock) mottled yellow brown and orange brown, wet, dense, poorly to moderately cemented, moderately weathered, fine grained		7–						
			7–8.5	SS	19	15			
			10–11.5	SS	22	17			
			15–16.5	SS	51	19			

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	Same as above		20	SS	50 6"	22			
	End of Log		21						
			22						
			23						
			26						
			27						
			28						
			29						
			30						
			31						
			32						
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			34						
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	Ground Surface								
	Silty SAND (SM-FILL) mottled dar orange brown, moist, dense		0 – 3	MC	19	16	90	>4.5	
	Sandy Fat CLAY (CL-COLLVIUM) brown, wet, stiff, some roots		3 – 5						LL=63%, PI=41% -200 = 65 percent
	Silty SANDSTONE (Bedrock) mottled gray, white and orange brown, moist, dense, moderately cemented, moderately weathered, medium grained, massive		5 – 6.5	SS	47	11			
			7 – 8.5	SS	35	17			
			10 – 11.5	SS	42	18			
			15 – 16.5	SS	49	16			
	End of Log		17 – 20						

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	Ground Surface		0						
	Silty SAND with rock fragments (SM-FILL) mottled yellow brown, moist, dense								
			2–3.5	MC	22	15	95	>4.5	
			5–6.5	MC	36	13	102	>4.5	
	rock fragments up to 1 inch								
			7–8.5	MC	15	20	99	>4.5	
	rock fragments up to 3 inches								
	Silty SANDSTONE (Bedrock) mottled light gray, and dark orange brown, moist, dense, poorly to moderately cemented, moderately weathered, fine grained		9						
			10–11.5	SS	25	23			
			15–16	SS	50 6"	18			
	End of Log		16						
			20						

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	Ground Surface								
	Silty SAND with rock fragments (SM-LANDSLIDE DEBRIS) mottled yellow brown, moist, medium dense, sandstone fragments up to 2 inches		0–2						
			2–3.5	MC	15	15	95	>4.5	
			3.5–5.5						
	Silty SANDSTONE (Bedrock) mottled dark gray, dark yellow brown, and dark red brown, moist, dense, moderately cemented, moderately weathered, fine grained		5.5–6.5	MC	31	13	102	>4.5	
			6.5–7						
	Bedding plane dipping 40 degrees @ 7.5' Bedding plane dipping 30 degrees @ 7.8'		7–8.5	MC	85	20	99	>4.5	
			8.5–10						
			10–11.5	SS	75 11"	23			
			11.5–15						
	Bedding plane dipping 50 degrees @ 15'		15–16	SS	50 4"	18			
	End of Log		16–20						

Notes:
1. Penetration resistance values are not standard N values, they are teh raw values measured in the field.
2. Stratification lines represent the approximate boundaries between material types, the transitions may be gradual.
3. Groundwater was not encountered amd the boring was backfilled with grout.
4. The unconfined compressive strength values were obtained using a pocket penetrometer.

Peters & Ross Geotechnical Services
114 Hopeco Road, Pleasant Hill, CA 94523
925-942-3629 PetersRoss@aol.com

Project Name: 88 Sunnyside Lane
Project No.: 15178.001
Location: 88 Sunnyside Ln., Orinda, CA
Client: Jamal Nafis
Drilling Method: Track mounted CMe55 drill rig
Date Drilled: 11/14/2018
Elevation: 0
Water Level: Not Encountered
Remarks: Samplers driven with 140 lb. automatic hammer using a 30 inch drop

ELEVATION	DESCRIPTION	SYMBOL	DEPTH (ft)	SAMPLE TYPE	BLOWS/FT.	MOISTURE (%)	DRY DENSITY (pcf)	UNCONFINED STRENGTH (tsf)	REMARKS
	Ground Surface								
	Silty SAND with gravel (SM-FILL) mottled yellow brown, moist, medium dense		0						
			2	MC	17	11	94	>4.5	
	Clayey SAND with Gravel (SC-FILL) mottled yellow brown, moist, medium dense		5	SS	14	12			
			7	MC	30	14	92	>4.5	
	Sandy Fat CLAY (CL-COLLUVIUM) brown, moist, stiff, some gravel		10.5	SS	20	14			
	Silty SANDSTONE (Bedrock) mottled dark gray, dark yellow brown, and dark red brown, moist, dense, moderately cemented, moderately weathered, fine grained		12						
			15	SS	*	9			
	End of Log		15.5						

Notes:
1. Penetration resistance values are not standard N values, they are teh raw values measured in the field.
2. Stratification lines represent the approximate boundaries between material types, the transitions may be gradual.
3. Groundwater was not encountered amd the boring was backfilled with grout.
4. The unconfined compressive strength values were obtained using a pocket penetrometer.

APPENDIX B - LABORATORY TESTING

Laboratory tests were performed on representative samples of the materials encountered in the test borings, to achieve a quantitative and qualitative evaluation of the physical and mechanical properties of the materials that underlie the site. The tests were performed in B. Hillebrandt Soils Testing, Inc. lab located in Alamo, California. The tests included moisture content determinations, #200 washed sieve tests, Atterberg limits tests, and unconsolidated-undrained triaxial tests. The test results are presented on the boring log in Appendix A. Test reports provided by the testing laboratory are included in this Appendix. Brief descriptions of the tests performed follow.

Moisture Content/Dry Density (ASTM 2937): Performed on undisturbed samples to determine the moisture content (the ratio of the weight of water to the weight of solids in the field sample, expressed as a percentage) and dry density (the ratio of the weight of solids in the field sample to its volume, expressed in pounds per cubic foot).

#200 Washed Sieve Test (ASTM D-1140): Performed on undisturbed or disturbed samples to determine the fine-grained (silt and clay) fraction of the materials. The fine-grained fraction is used to classify the soils according to the Unified Soils Classification System.

Atterberg Limits Test (ASTM D-4318): Performed on undisturbed or disturbed samples to determine the liquid limit (LL) and plastic limit (PL) of the samples. These limits are used to classify fine-grained soils and to evaluate the plasticity index (PI), the moisture content range over which the material exhibits plasticity. Atterberg limits correlations also provide an indication of the compressibility and expansion potential of the sample.

Unconsolidated-Undrained Triaxial Compression Test (ASTM 3080): Performed on undisturbed samples to determine the compressive strength of a soil in terms of the total stress.

B. HILLEBRANDT SOILS TESTING, INC.

29 Sugarloaf Terrace, Alamo, CA 94507 - Tel: (510) 409-2916 - Fax: (925) 891-9267 - Email: soiltesting@aol.com

LAB RESULTS SUMMARY FORM

Project Number: 15178.001 **Project Name:** 88 Sunnyside Lane **Results Due By:**
Requested By: PM **Request Date:** 11/24/18 **Throw Samples Out On:**

					Atterberg			-200			Compaction				
Boring #	Sample Depth (feet)	Dry Density (pcf)	Moisture Content (%)	TxUU Shear Strength (psf)	Liquid Limit	Plastic Limit	Plasicity Index	Passing #4 Sieve (%)	Passing #40 sieve (%)	Passing #200 sieve (%)	Maximum Dry Density (pcf)	Optimum Moisture (%)	Pocket Penetrometer (tsf)	Torvane (tsf)	Remarks
B-1	3.0	101	15.0												
B-1	6.5	103	17.0												
B-1	8.5		23.9												
B-1	11.5		24.3												
B-1	16.5	99	19.8												
B-2	3.5	95	15.7												
B-2	6.5	91	16.0												
B-2	8.5	98	20.1												
B-2	11.5		16.5												
B-2	16.5	98	15.7												
B-2	21.5														
B-3	3.5	92	14.6												
B-3	6.5	98	20.2												
B-3	8.5	108	17.4												
B-3	11.5	104	19.9												
B-3	16.5		19.1												
B-3	21.5		19.8												
B-4	3.0	111	15.9												
B-4	6.5	106	18.3												
B-4	8.0	110	16.5												
B-4	11.5		16.1												
B-4	15.5		17.6												
B-4	20.5		16.4												
B-5	3.5	103	15.9												
B-5	5.0		15.9												
B-5	7.0	108	14.4												
B-5	8.5		19.9												
B-5	10.0	92	27.7												
B-5	10.5	99	23.6												
B-5	12.0		22.6												
B-5	14.0	99	24.4												
B-5	15.5		20.0												
B-5	17.5	100	23.4												

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LAB RESULTS SUMMARY FORM

Project Number: 15178.001 **Project Name:** 88 Sunnyside Lane **Results Due By:**
Requested By: PM **Request Date:** 11/24/18 **Throw Samples Out On:**

					Atterberg			-200			Compaction				
Boring #	Sample Depth (feet)	Dry Density (pcf)	Moisture Content (%)	TxUU Shear Strength (psf)	Liquid Limit	Plastic Limit	Plasicity Index	Passing #4 Sieve (%)	Passing #40 sieve (%)	Passing #200 sieve (%)	Maximum Dry Density (pcf)	Optimum Moisture (%)	Pocket Penetrometer (tsf)	Torvane (tsf)	Remarks
B-5	19.0		22.5												
B-5	21.5	99	23.3												
B-5	23.0		27.9												
B-5	25.5		3.7												
B-5	27.0		2.9												
B-5	29.5		3.3												
B-5	31.0		8.7												
B-5	34.0	93	27.6	2849	59	23	36	100	95	80					
B-5	34.5	94	26.9	2766											
B-5	36.0		27.9												
B-5	41.5	93	29.1	2491	50	21	29	100	96	79					
B-5	43.0		27.9												
B-6	3.5	100	15.5												
B-6	6.5		17.2												
B-6	8.5	101	22.8												
B-6	11.5		22.4												
B-6	16.5		23.0												
B-6	21.5	103	20.4												
B-6	23.0		24.7												
B-6	26.5	93	26.2	1682	40	21	19	97	86	53					
B-6	28.0		3.2												
B-6	31.5	81	45.9												
B-6	33.0		9.1												
B-6	36.0	92	28.5												
B-6	36.5	98	25.2												
B-6	41.5	100	24.8												

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MOISTURE CONTENT/DRY DENSITY

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/24/18
Tested by: Brad Hillebrandt

Additional Tests:						
Boring #:	B-1	B-1	B-1	B-2	B-2	B-2
Depth:	3.0	6.5	16.5	3.5	6.5	8.5
Sample Description:	Olive brown sandy CLAY	Yellowish brown sandy CLAY	Yellowish brown silty SANDSTONE	Dark olive brown sandy CLAY	Olive brown silty SAND	Light olivebrown sandy MUDSTONE
Can #:	362	346	506	352	323	343
Wet Sample + can	310.6	279.5	278.7	255.2	261.8	301.5
Dry Sample + can	274.4	244.5	238.9	225.3	230.9	257.4
Weight can	33.2	39.1	37.5	34.5	37.9	37.7
Weight water	36.2	35	39.8	29.9	30.9	44.1
Weight Dry Sample	241.2	205.4	201.4	190.8	193	219.7
WATER CONTENT (%)	**15.0%**	**17.0%**	**19.8%**	**15.7%**	**16.0%**	**20.1%**
Weight Sample + Liner	1009.9	1079.4	1098.7	1006.3	998.6	1074.3
Weight Liner	230.9	243.8	275.7	229.0	275.7	240.3
Sample Length	5.7	5.9	5.9	6.0	5.85	6.0
Sample Diameter	2.39	2.39	2.39	2.39	2.39	2.39
DRY DENSITY (pcf)	**100.9**	**102.8**	**98.9**	**95.1**	**90.5**	**98.3**

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MOISTURE CONTENT/DRY DENSITY

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/24/18
Tested by: Brad Hillebrandt

Additional Tests:						
Boring #:	B-2	B-3	B-3	B-3	B-3	B-4
Depth:	16.5	3.5	6.5	8.5	11.5	3.0
Sample Description:	Yellowish brown silty SANDSTONE	Light olive brown silty SAND	Brown silty SANDSTONE	Dark brown silty SANDSTONE	Dark brown silty SANDSTONE	Dark brown silty SANDSTONE
Can #:	316	342	313	326	345	337
Wet Sample + can	306.7	261.3	284.2	308.8	298.7	270.7
Dry Sample + can	270.2	233.3	242.9	268.8	255.5	238.7
Weight can	37.4	41.3	38.3	38.5	38.2	37.6
Weight water	36.5	28	41.3	40	43.2	32
Weight Dry Sample	232.8	192	204.6	230.3	217.3	201.1
WATER CONTENT (%)	**15.7%**	**14.6%**	**20.2%**	**17.4%**	**19.9%**	**15.9%**
Weight Sample + Liner	1078.3	983.5	1103.9	1160.3	1136.4	1168.7
Weight Liner	275.5	276.8	274.7	276.2	275.3	276.9
Sample Length	6.0	5.7	6.0	5.95	5.85	5.9
Sample Diameter	2.39	2.39	2.39	2.39	2.39	2.39
DRY DENSITY (pcf)	**98.2**	**91.9**	**97.6**	**107.5**	**104.3**	**110.7**

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MOISTURE CONTENT/DRY DENSITY

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/24/18
Tested by: Brad Hillebrandt

Additional Tests:						
Boring #:	B-4	B-4	B-5	B-5	B-5	B-5
Depth:	6.5	8.0	3.5	7.0	10.0	10.5
Sample Description:	Dark brown silty SANDSTONE	Dark brown silty SANDSTONE	Light brown sandy CLAY	Olive brown silty SAND	Dark greenish gray sandy SILT	Brownish gray silty SAND
Can #:	305	414	400	326	318	337
Wet Sample + can	291.5	211.2	208.8	305.9	299.7	327.0
Dry Sample + can	252.4	186.0	184.7	272.2	243.0	271.8
Weight can	38.8	33.0	32.9	38.6	38.6	37.5
Weight water	39.1	25.2	24.1	33.7	56.7	55.2
Weight Dry Sample	213.6	153	151.8	233.6	204.4	234.3
WATER CONTENT (%)	**18.3%**	**16.5%**	**15.9%**	**14.4%**	**27.7%**	**23.6%**
Weight Sample + Liner	1166.2	1179.8	1103.7	1145.5	1074.7	1130.1
Weight Liner	276.5	276.1	276.5	276.6	274.0	275.2
Sample Length	6.0	6.0	5.9	6.0	5.8	5.95
Sample Diameter	2.39	2.39	2.39	2.39	2.39	2.39
DRY DENSITY (pcf)	**106.4**	**109.8**	**102.7**	**107.5**	**91.8**	**98.7**

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MOISTURE CONTENT/DRY DENSITY

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/24/18
Tested by: Brad Hillebrandt

Additional Tests:						
Boring #:	B-5	B-5	B-5	B-6	B-6	B-6
Depth:	14.0	17.5	21.5	3.5	8.5	21.5
Sample Description:	Yellowish brown and olive gray silty SAND	Dark gray sandy CLAY	Olive brown sandy SILT	Light brown sandy CLAY	Brown silty SAND	Olive brown sandy CLAY
Can #:	323	506	319	425	401	423
Wet Sample + can	324.9	364.9	321.9	259.9	233.5	274.8
Dry Sample + can	268.7	302.9	268.3	229.5	196.3	233.9
Weight can	37.9	37.4	38.4	33.0	33.1	33.1
Weight water	56.2	62	53.6	30.4	37.2	40.9
Weight Dry Sample	230.8	265.5	229.9	196.5	163.2	200.8
WATER CONTENT (%)	**24.4%**	**23.4%**	**23.3%**	**15.5%**	**22.8%**	**20.4%**
Weight Sample + Liner	1137.6	1148.4	1111.9	1092.7	1140.2	1153.0
Weight Liner	275.5	275.0	274.5	276.1	278.1	275.9
Sample Length	5.95	6.0	5.8	6.0	5.9	6.0
Sample Diameter	2.39	2.39	2.39	2.39	2.39	2.39
DRY DENSITY (pcf)	**98.9**	**100.2**	**99.4**	**100.1**	**101.0**	**103.1**

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MOISTURE CONTENT/DRY DENSITY

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/24/18
Tested by: Brad Hillebrandt

Additional Tests:						
Boring #:	B-6	B-6	B-6	B-6		
Depth:	31.5	36.0	36.5	41.5		
Sample Description:	Olive brown gravelly SAND	Olive brown sandy CLAY	Olive brown sandy CLAY	Olive brown weathered sandy MUDSTONE		
Can #:	367	603	354	331		
Wet Sample + can	397.2	253.6	306.9	290.8		
Dry Sample + can	282.9	204.9	251.8	240.6		
Weight can	33.9	33.8	33.4	37.8		
Weight water	114.3	48.7	55.1	50.2		
Weight Dry Sample	249	171.1	218.4	202.8		
WATER CONTENT (%)	**45.9%**	**28.5%**	**25.2%**	**24.8%**		
Weight Sample + Liner	1079.7	1110.6	1139.9	1125.4		
Weight Liner	283.0	278.2	277.8	274.4		
Sample Length	5.7	6.0	5.95	5.8		
Sample Diameter	2.39	2.39	2.39	2.39		
DRY DENSITY (pcf)	**81.3**	**91.7**	**98.2**	**99.9**		

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MOISTURE CONTENT WORKSHEET

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/24/18
Tested by: B. Hillebrandt

Additional Tests:									
Boring #:	B-1	B-1	B-2	B-2	B-3	B-3	B-4	B-4	B-4
Depth:	8.5	11.5	11.5	21.5	16.5	21.5	11.5	15.5	20.5
Sample Description:	Olive brown sandy CLAY	Light olive brown sandy MUDSTONE	Light olive brown silty SANDSTONE	Light olive brown silty SANDSTONE	Dark brown silty SANDSTONE	Brown silty SANDSTONE	Olive brown silty SANDSTONE	Grayish brown silty SANDSTONE	Dark gray silty SANDSTONE
Can #:	423	336	318	425	400	402	398	415	378
Wet Sample + can	206.5	249.2	287.8	213.3	198.0	224.2	213.9	205.6	224.5
Dry Sample + can	173.0	208.2	252.5	186.4	171.5	192.6	188.9	179.7	197.5
Weight can	33.0	39.2	38.6	33.0	32.9	33.3	33.4	32.7	33.0
Weight water	33.5	41	35.3	26.9	26.5	31.6	25	25.9	27
Weight Dry Sample	140	169	213.9	153.4	138.6	159.3	155.5	147	164.5
WATER CONTENT (%)	**23.9%**	**24.3%**	**16.5%**	**17.5%**	**19.1%**	**19.8%**	**16.1%**	**17.6%**	**16.4%**

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MOISTURE CONTENT WORKSHEET

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/24/18
Tested by: B. Hillebrandt

Additional Tests:									
Boring #:	B-5	B-5	B-5	B-5	B-5	B-5	B-5	B-5	B-5
Depth:	5.0	8.5	12.0	15.5	19.0	23.0	25.5	27.0	29.5
Sample Description:	Light brown sandy CLAY	Brown silty SAND	Olive gray silty SAND	Brown silty SAND	Yellowish brown clayey SAND	Dark brown sandyCLAY	Olive brown gravelly SAND	Olive brown gravelly SAND	Olive brown gravelly SAND
Can #:	414	316	313	352	305	378	389	402	398
Wet Sample + can	207.8	311.6	293.4	310.4	263.6	236.7	314.2	295.9	307.3
Dry Sample + can	183.8	266.2	246.4	264.4	222.3	192.3	304.3	288.5	298.6
Weight can	33.0	37.5	38.2	34.3	38.7	33.0	33.4	33.1	33.0
Weight water	24	45.4	47	46	41.3	44.4	9.9	7.4	8.7
Weight Dry Sample	150.8	228.7	208.2	230.1	183.6	159.3	270.9	255.4	265.6
WATER CONTENT (%)	**15.9%**	**19.9%**	**22.6%**	**20.0%**	**22.5%**	**27.9%**	**3.7%**	**2.9%**	**3.3%**

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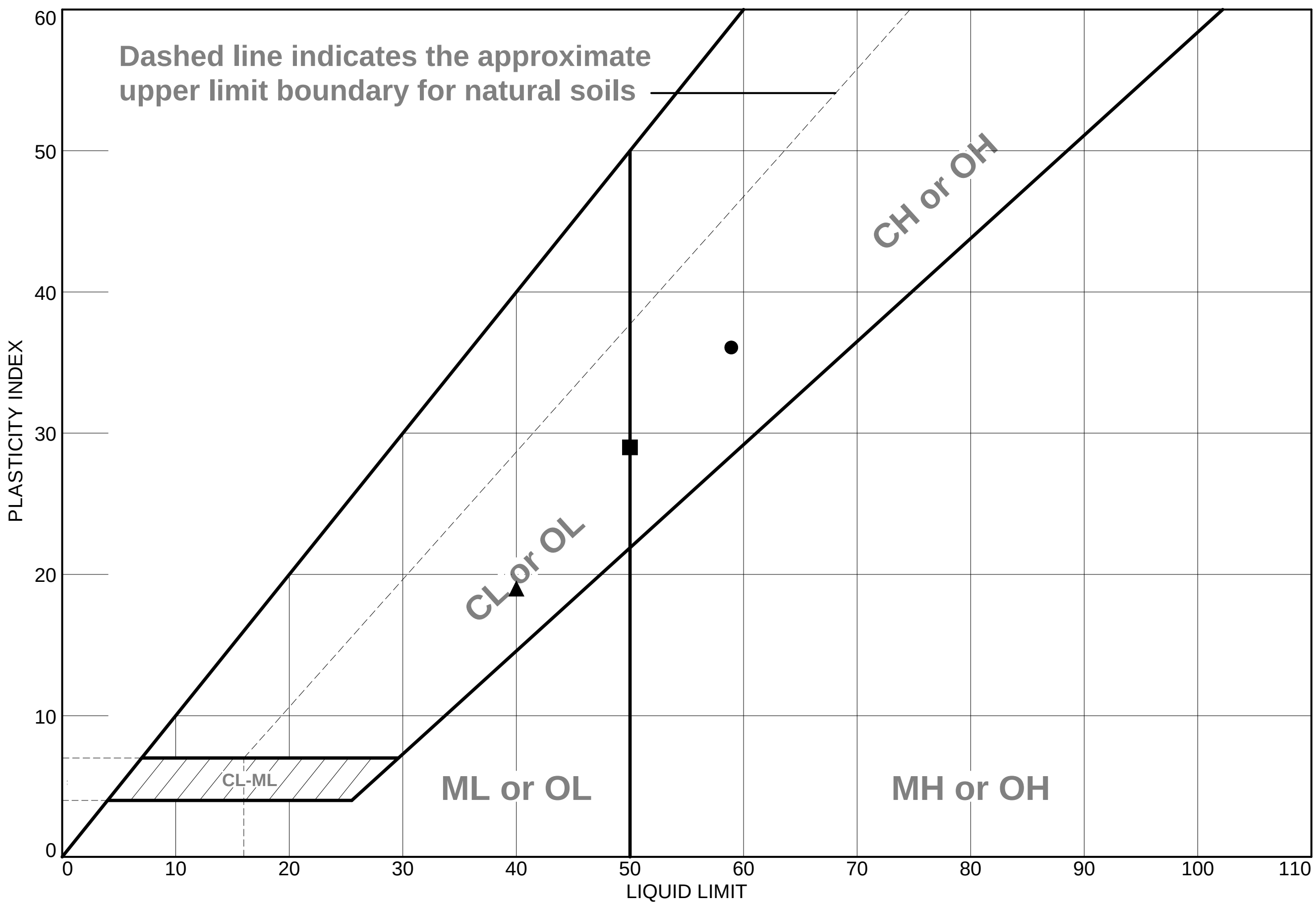
MOISTURE CONTENT WORKSHEET

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/24/18
Tested by: B. Hillebrandt

Additional Tests:									
Boring #:	B-5	B-5	B-5	B-6	B-6	B-6	B-6	B-6	B-6
Depth:	31.0	36.0	43.0	6.5	11.5	16.5	23.0	28.0	33.0
Sample Description:	Brown gravelly SAND with clay	Brown CLAY with some sand	Olive brown sandy CLAY	Brown sandy CLAY	Brown silty SAND	Olive brown silty SAND	Olive brown sandy SILT	Olive brown gravelly SAND	Olive gray clayey SAND with gravel
Can #:	415	419	412	303	346	342	336	343	362
Wet Sample + can	173.0	245.5	261.0	263.5	225.3	235.3	244.7	384.0	90.7
Dry Sample + can	161.8	199.2	211.4	230.5	191.2	199.0	203.9	373.4	85.9
Weight can	32.8	33.1	33.5	38.6	39.1	41.1	38.8	37.5	33.1
Weight water	11.2	46.3	49.6	33	34.1	36.3	40.8	10.6	4.8
Weight Dry Sample	129	166.1	177.9	191.9	152.1	157.9	165.1	335.9	52.8
WATER CONTENT (%)	**8.7%**	**27.9%**	**27.9%**	**17.2%**	**22.4%**	**23.0%**	**24.7%**	**3.2%**	**9.1%**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark olive brown fat CLAY with sand	59	23	36	95.4	80.3	CH
■	Dark olive brown fat CLAY with sand	50	21	29	95.7	78.6	CH
▲	Dark olive brown sandy lean CLAY	40	21	19	85.8	53.3	CL

Project No. 15178.001 **Client:** Peters & Ross

Project: 88 Sunnyside Lane

●**Source of Sample:** B-5 **Depth:** 34.0'
■**Source of Sample:** B-5 **Depth:** 41.5'
▲**Source of Sample:** B-6 **Depth:** 26.5'

Remarks:

B. HILLEBRANDT SOILS TESTING, INC.
+1 510-409-2816
SoilTesting@aol.com

Figure

Tested By: BH

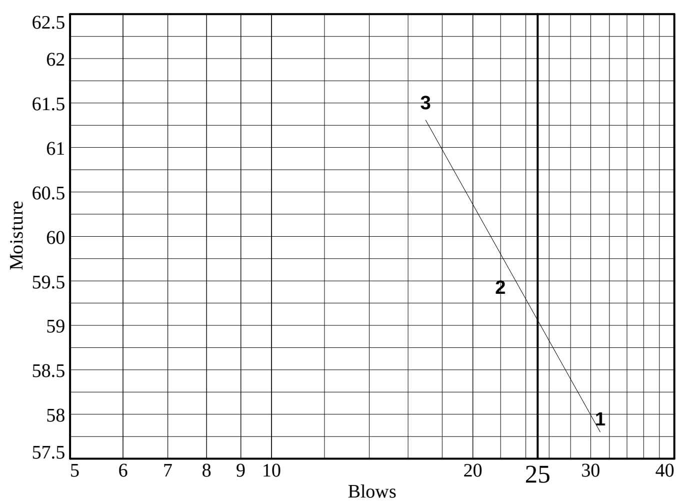
LIQUID AND PLASTIC LIMIT TEST DATA

12/4/2018

Client: Peters & Ross
Project: 88 Sunnyside Lane
Project Number: 15178.001
Location: B-5
Depth: 34.0'
Material Description: Dark olive brown fat CLAY with sand
%<#40: 95.4 **%<#200:** 80.3 **USCS:** CH **AASHTO:** A-7-6(30)
Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.34	26.06	28.37			
Dry+Tare	21.44	20.55	21.88			
Tare	11.26	11.28	11.33			
# Blows	31	22	17			
Moisture	58.0	59.4	61.5			



Liquid Limit= 59
Plastic Limit= 23
Plasticity Index= 36
Natural Moisture= 27.6
Liquidity Index= 0.1

Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	18.57	17.72		
Dry+Tare	17.17	16.48		
Tare	11.16	11.05		
Moisture	23.3	22.8		

LIQUID AND PLASTIC LIMIT TEST DATA

12/4/2018

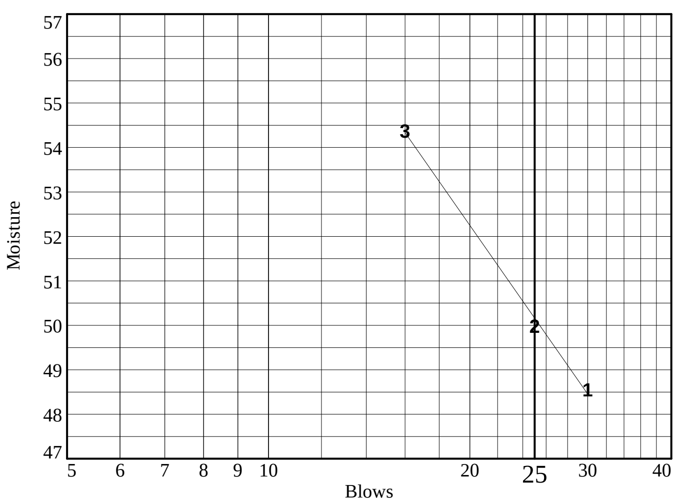
Client: Peters & Ross
Project: 88 Sunnyside Lane
Project Number: 15178.001
Location: B-5
Depth: 41.5'
Material Description: Dark olive brown fat CLAY with sand

%<#40: 95.7 **%<#200:** 78.6 **USCS:** CH **AASHTO:** A-7-6(23)

Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.36	25.29	28.36			
Dry+Tare	22.11	20.58	22.34			
Tare	11.30	11.16	11.27			
# Blows	30	25	16			
Moisture	48.6	50.0	54.4			



Liquid Limit= 50
Plastic Limit= 21
Plasticity Index= 29
Natural Moisture= 29.1
Liquidity Index= 0.3

Plastic Limit Data

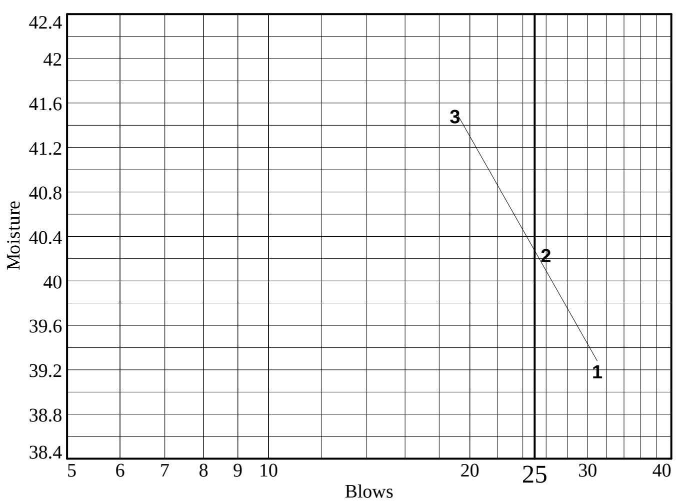
Run No.	1	2	3	4
Wet+Tare	17.04	17.90		
Dry+Tare	16.02	16.76		
Tare	11.16	11.30		
Moisture	21.0	20.9		

LIQUID AND PLASTIC LIMIT TEST DATA **12/4/2018**

Client: Peters & Ross
Project: 88 Sunnyside Lane
Project Number: 15178.001
Location: B-6
Depth: 26.5'
Material Description: Dark olive brown sandy lean CLAY
%<#40: 85.8 **%<#200:** 53.3 **USCS:** CL **AASHTO:** A-6(7)
Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	29.57	28.25	29.56			
Dry+Tare	24.44	23.39	24.20			
Tare	11.35	11.31	11.28			
# Blows	31	26	19			
Moisture	39.2	40.2	41.5			

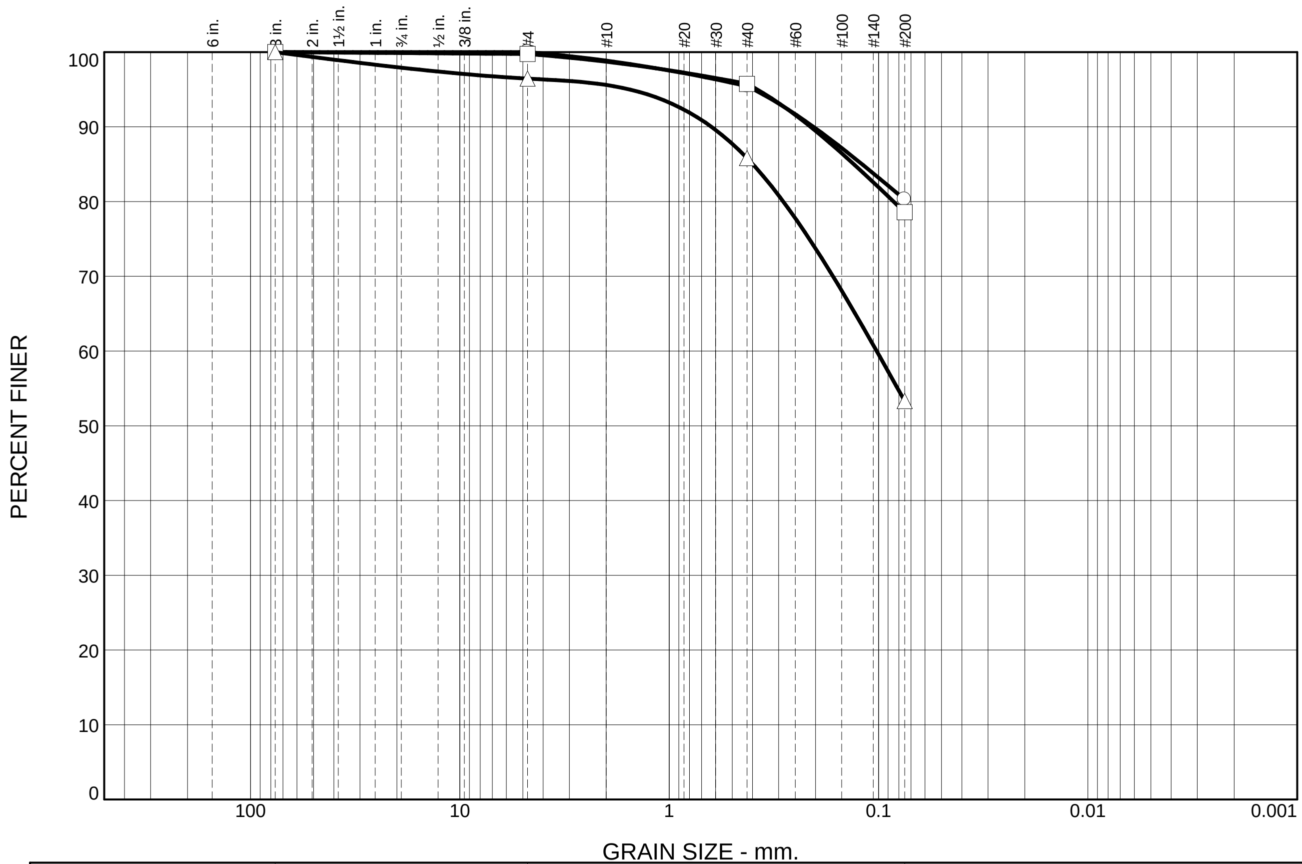


Liquid Limit= 40
Plastic Limit= 21
Plasticity Index= 19
Natural Moisture= 26.19
Liquidity Index= 0.3

Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	17.46	18.16		
Dry+Tare	16.38	16.95		
Tare	11.30	11.27		
Moisture	21.3	21.3		

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	1.1	3.5	15.1	80.3	
□	0.0	0.1	0.2	1.0	3.0	17.1	78.6	
△	0.0	2.1	1.4	0.9	9.8	32.5	53.3	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	B-5		34.0'	Dark olive brown fat CLAY with sand	CH
□	B-5		41.5'	Dark olive brown fat CLAY with sand	CH
△	B-6		26.5'	Dark olive brown sandy lean CLAY	CL

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Client: Peters & Ross
Project: 88 Sunnyside Lane

Project No.: 15178.001 **Figure**

Tested By: BH

GRAIN SIZE DISTRIBUTION TEST DATA

12/4/2018

Client: Peters & Ross
Project: 88 Sunnyside Lane
Project Number: 15178.001
Location: B-5
Depth: 34.0'
Material Description: Dark olive brown fat CLAY with sand
USCS: CH
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
206.12	36.42	0.00	3"	0.00	100.0
			#4	0.00	100.0
			#40	7.74	95.4
			#200	33.48	80.3

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.1	3.5	15.1	19.7			80.3

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
									0.1199	0.2044	0.3952

Fineness Modulus
0.26

GRAIN SIZE DISTRIBUTION TEST DATA

12/4/2018

Client: Peters & Ross
Project: 88 Sunnyside Lane
Project Number: 15178.001
Location: B-5
Depth: 41.5'
Material Description: Dark olive brown fat CLAY with sand
USCS: CH
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
208.71	37.88	0.00	3"	0.00	100.0
			#4	0.43	99.7
			#40	7.27	95.7
			#200	36.59	78.6

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.1	0.2	0.3	1.0	3.0	17.1	21.1			78.6

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
								0.0847	0.1312	0.2112	0.3803

Fineness Modulus
0.28

GRAIN SIZE DISTRIBUTION TEST DATA

12/4/2018

Client: Peters & Ross
Project: 88 Sunnyside Lane
Project Number: 15178.001
Location: B-6
Depth: 26.5'
Material Description: Dark olive brown sandy lean CLAY
USCS: CL
Tested by: BH

Sieve Test Data

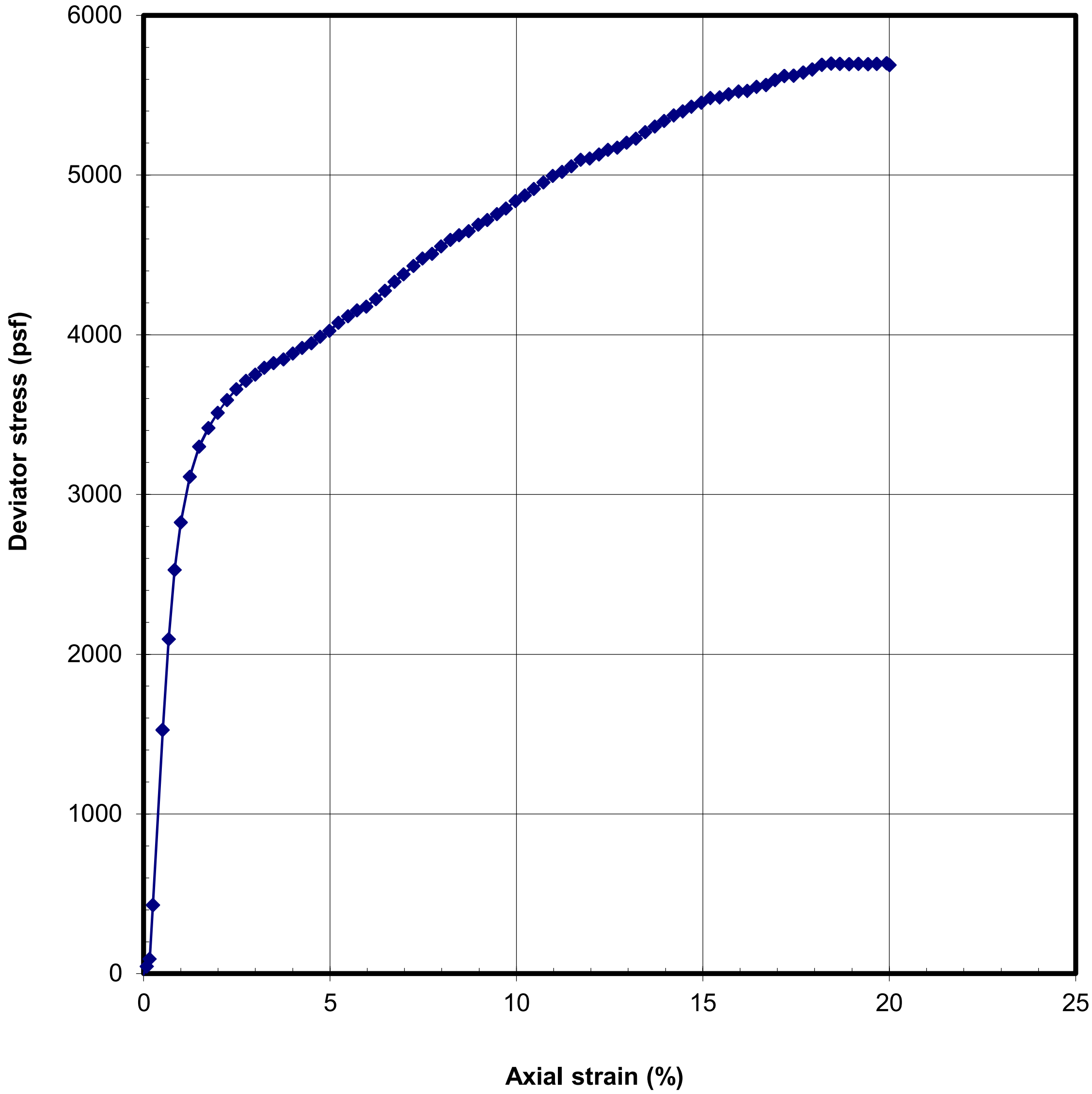
Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
269.02	38.82	0.00	3"	0.00	100.0
			#4	8.17	96.5
			#40	32.64	85.8
			#200	107.47	53.3

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	2.1	1.4	3.5	0.9	9.8	32.5	43.2			53.3

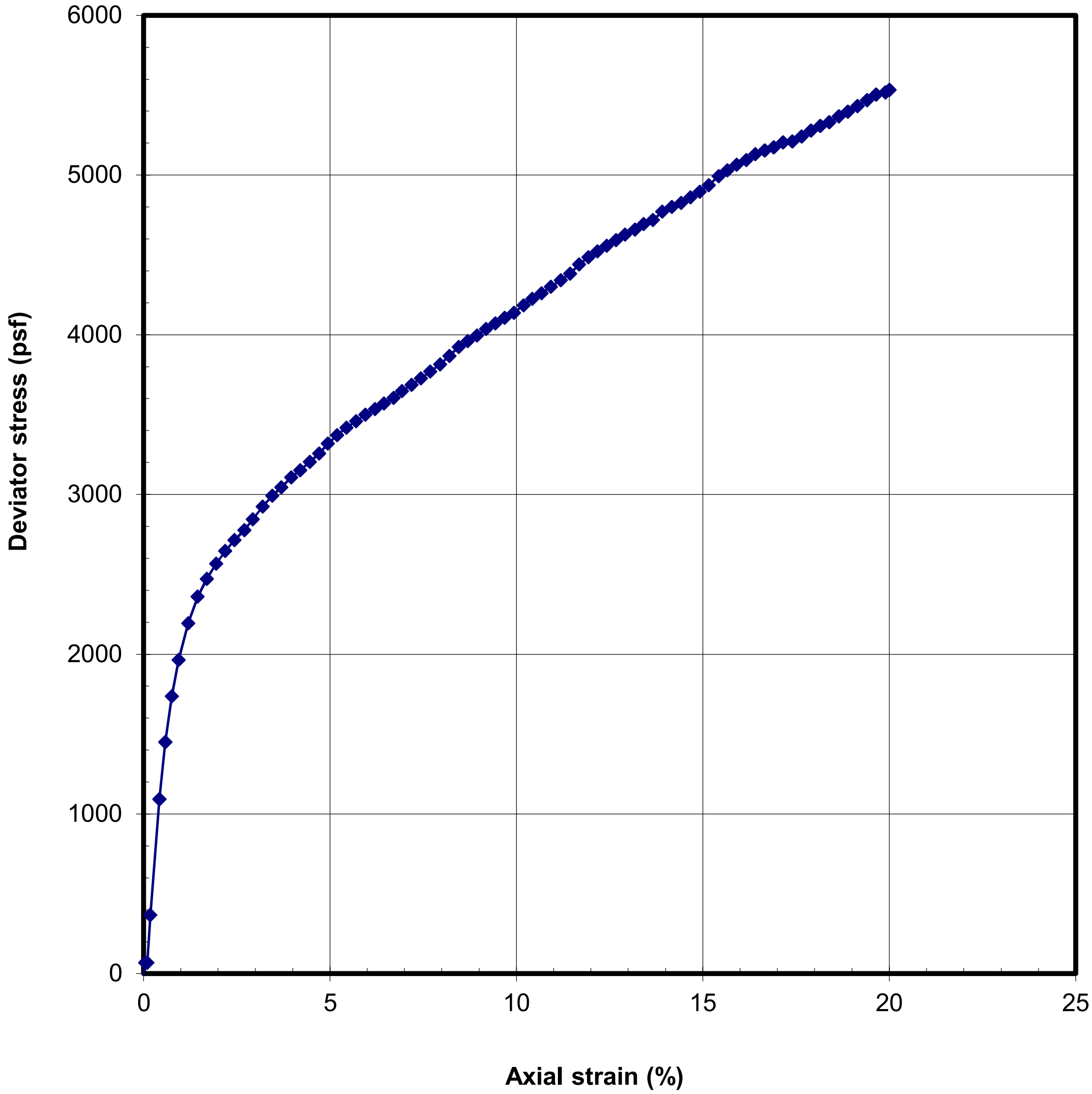
D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
							0.1021	0.2851	0.3989	0.6283	1.5442

Fineness Modulus
0.81



Sampler Type: Mod Cal		Shear Strength:	2849 psf
Diameter (in): 2.40	Height (in): 5.9	Strain at Failure:	20.0%
Moisture Content:	27.6 %	Confining Pressure:	4000 psf
Dry Density:	93.3 pcf	Strain Rate:	1%/min
Source:	B-5 at 34.0 feet		
Description:	Dark olive brown fat CLAY with sand		

88 SUNNYSIDE LANE	**UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST**		
B. HILLEBRANDT SOILS TESTING, INC	Date: 11/29/18	Project #: 15178.001	Figure



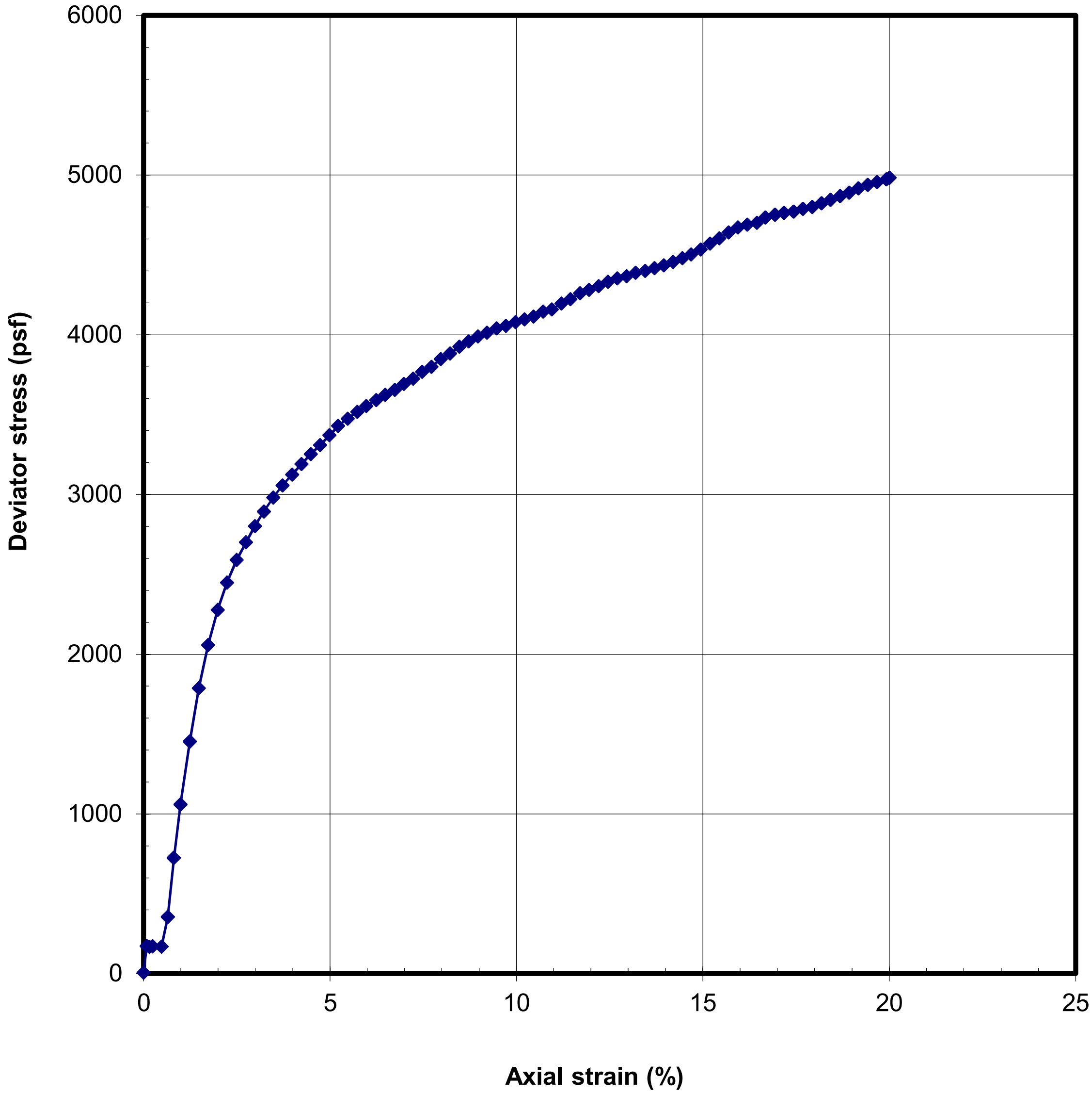
Sampler Type: Mod Cal		Shear Strength:	2766 psf
Diameter (in): 2.40	Height (in): 5.58	Strain at Failure:	20.0%
Moisture Content:	26.9 %	Confining Pressure:	4500 psf
Dry Density:	94.3 pcf	Strain Rate:	1%/min
Source:	B-5 at 34.5 feet		
Description:	Dark olive brown fat CLAY with sand		

88 SUNNYSIDE LANE

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

B. HILLEBRANDT SOILS TESTING, INC

Date: 11/29/18 | Project #: 15178.001 | Figure



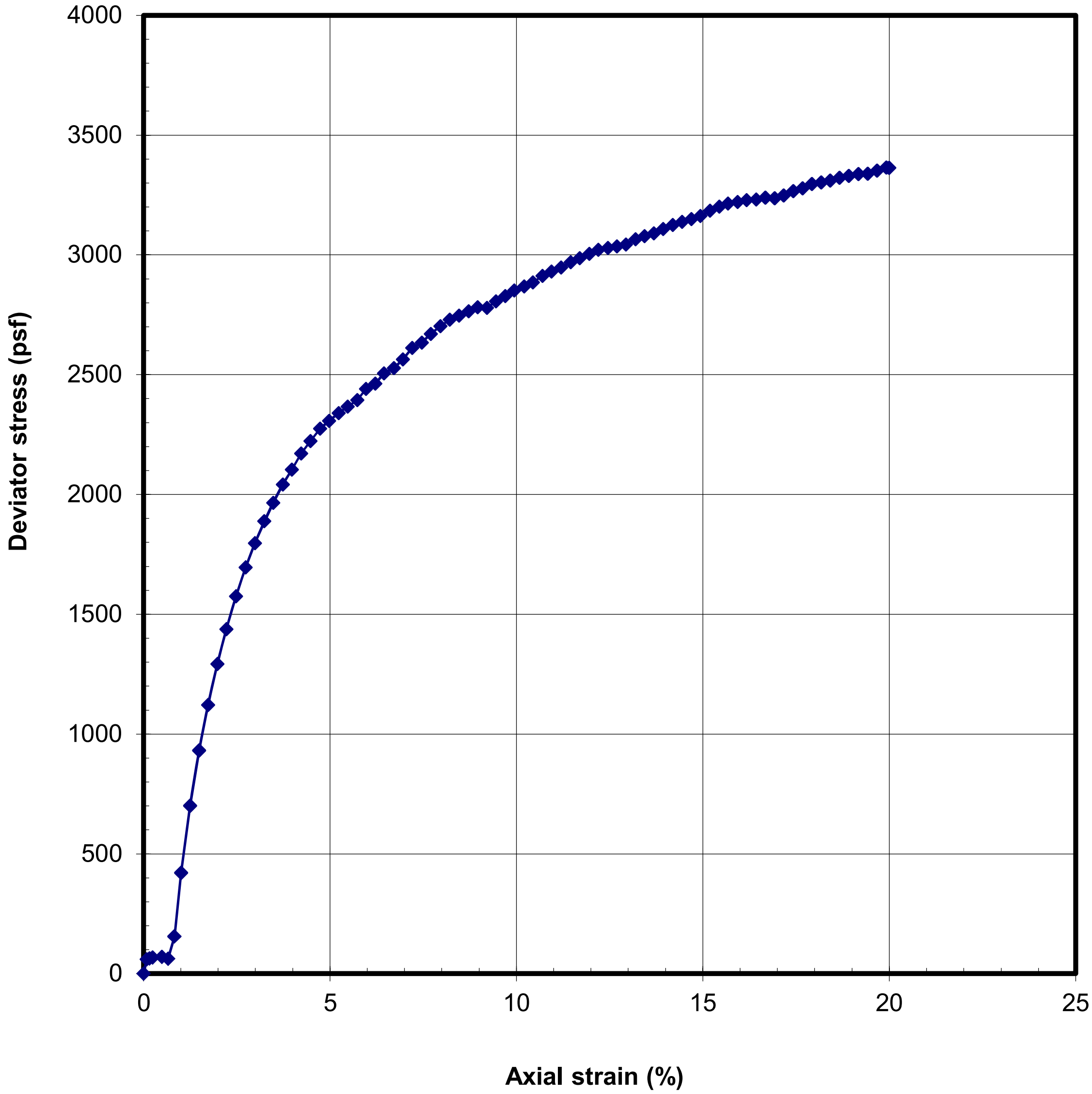
Sampler Type: Mod Cal		Shear Strength:	2491 psf
Diameter (in): 2.40	Height (in): 5.51	Strain at Failure:	20.0%
Moisture Content:	29.1 %	Confining Pressure:	5000 psf
Dry Density:	92.9 pcf	Strain Rate:	1%/min
Source:	B-5 at 41.5 feet		
Description:	Dark olive brown fat CLAY with sand		

88 SUNNYSIDE LANE

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

B. HILLEBRANDT SOILS TESTING, INC

Date: 11/29/18 | Project #: 15178.001 | Figure



Sampler Type: Mod Cal		Shear Strength:	1682 psf
Diameter (in): 2.39	Height (in): 5.4	Strain at Failure:	20.0%
Moisture Content: 26.2 %		Confining Pressure:	2500 psf
Dry Density: 93.1 pcf		Strain Rate:	1%/min
Source: B-6 at 26.5 feet			
Description: Dark olive brown sandy lean CLAY			

88 SUNNYSIDE LANE	**UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST**		
B. HILLEBRANDT SOILS TESTING, INC	Date: 11/29/18	Project #: 15178.001	Figure

B. HILLEBRANDT SOILS TESTING, INC.

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LAB RESULTS SUMMARY FORM

Project Number: 15178.001	**Project Name:** 88 Sunnyside Lane		**Results Due By:**
Requested By: PM	**Request Date:** 11/25/18		**Throw Samples Out On:**

					Atterberg			-200			Compaction				
Boring #	Sample Depth (feet)	Dry Density (pcf)	Moisture Content (%)	TxUU Shear Strength (psf)	Liquid Limit	Plastic Limit	Plasicity Index	Passing #4 Sieve (%)	Passing #40 sieve (%)	Passing #200 sieve (%)	Maximum Dry Density (pcf)	Optimum Moisture (%)	Pocket Penetrometer (tsf)	Torvane (tsf)	Remarks
B-7	3.0	96	13.7												
B-7	6.5		15.3												
B-7	11.5		15.2												
B-8	3.5	97	8.6												
B-8	6.5	90	14.7												
B-8	8.5		14.5												
B-8	11.5		17.2												
B-8	16.5		18.5												
B-8	21.0		21.5												
B-9	3.5	90	16.4		63	22	41	100	90	65					
B-9	6.5		11.2												
B-9	8.5		17.4												
B-9	11.5		17.6												
B-9	16.5		16.3												
B-10	3.5	95	14.6												
B-10	6.5	102	12.9												
B-10	8.5	99	19.8												
B-10	11.5		23.3												
B-10	16.0		17.9												
B-11	3.5	92	15.0												
B-11	6.5		17.4												
B-11	8.5	101	25.4												
B-11	11.5		18.6												
B-11	15.8		17.3												
B-12	3.5	94	11.2												
B-12	6.5		12.2												
B-12	8.5	92	13.5												
B-12	11.5		14.0												
B-12	15.5		9.0												

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MOISTURE CONTENT/DRY DENSITY

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/25/18
Tested by: Brad Hillebrandt

Additional Tests:				PI, -200		
Boring #:	B-7	B-8	B-8	B-9	B-10	B-10
Depth:	3.0	3.5	6.5	3.5	3.5	6.5
Sample Description:	Light brown SANDSTONE	Light brown silty SAND	Light brown silty SAND	Drk brown sandy fat CLAY	Light brown silty SAND	Light brown silty SAND
Can #:	318	313	332	342	316	302
Wet Sample + can	259.2	310.6	235.9	259.9	286.4	319.3
Dry Sample + can	232.7	289.1	210.6	229.1	254.7	287.2
Weight can	38.7	38.2	38.8	41.1	37.4	37.5
Weight water	26.5	21.5	25.3	30.8	31.7	32.1
Weight Dry Sample	194	250.9	171.8	188	217.3	249.7
WATER CONTENT (%)	**13.7%**	**8.6%**	**14.7%**	**16.4%**	**14.6%**	**12.9%**
Weight Sample + Liner	1014.5	1006.3	994.3	979.0	1033.4	1085.5
Weight Liner	279.4	275.3	277.9	279.2	275.5	275.3
Sample Length	5.7	5.9	5.9	5.7	5.9	6.0
Sample Diameter	2.39	2.39	2.39	2.39	2.39	2.39
DRY DENSITY (pcf)	**96.3**	**96.9**	**89.9**	**89.6**	**95.2**	**101.6**

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MOISTURE CONTENT/DRY DENSITY

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/25/18
Tested by: Brad Hillebrandt

Additional Tests:						
Boring #:	B-10	B-11	B-11	B-12	B-12	
Depth:	8.5	3.5	8.5	3.5	8.5	
Sample Description:	Olive brown sandy CLAY	Olive brown silty SAND	Brown silty SANDSTONE	Light brown silty SAND	Olive brown silty SAND	
Can #:	603	341	331	326	346	
Wet Sample + can	320.4	318.4	312.2	277.8	265.8	
Dry Sample + can	273.1	281.8	256.6	253.8	238.8	
Weight can	33.8	38.2	37.9	38.7	39.2	
Weight water	47.3	36.6	55.6	24	27	
Weight Dry Sample	239.3	243.6	218.7	215.1	199.6	
WATER CONTENT (%)	**19.8%**	**15.0%**	**25.4%**	**11.2%**	**13.5%**	
Weight Sample + Liner	1102.6	1030.0	1169.0	928.3	988.5	
Weight Liner	276.5	281.2	279.4	275.5	275.1	
Sample Length	5.9	6.0	5.95	5.3	5.8	
Sample Diameter	2.39	2.39	2.39	2.39	2.39	
DRY DENSITY (pcf)	**99.3**	**92.1**	**101.2**	**94.1**	**92.0**	

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MOISTURE CONTENT WORKSHEET

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/25/18
Tested by: B. Hillebrandt

Additional Tests:									
Boring #:	B-7	B-7	B-8	B-8	B-8	B-8	B-9	B-9	B-9
Depth:	6.5	11.5	8.5	11.5	16.5	21.0	6.5	8.5	11.5
Sample Description:	Light brown SANDSTONE	Yellowish brown SANDSTONE	Yellowish brown silty SANDSTONE	Yellowish brown silty SANDSTONE	Yellowish brown silty SANDSTONE	Yellowish brown silty SANDSTONE	Yellowish brown silty SANDSTONE	Olive brown SANDSTONE	Olive brown SANDSTONE
Can #:	506	337	502	601	352	343	322	307	310
Wet Sample + can	276.5	264.8	278.6	269.4	334.4	283.2	264.6	274.5	254.7
Dry Sample + can	244.7	234.8	247.7	234.8	287.6	239.7	241.8	239.7	222.3
Weight can	36.9	37.2	35.2	33.9	34.4	37.5	39.1	39.2	37.8
Weight water	31.8	30	30.9	34.6	46.8	43.5	22.8	34.8	32.4
Weight Dry Sample	207.8	197.6	212.5	200.9	253.2	202.2	202.7	200.5	184.5
WATER CONTENT (%)	**15.3%**	**15.2%**	**14.5%**	**17.2%**	**18.5%**	**21.5%**	**11.2%**	**17.4%**	**17.6%**

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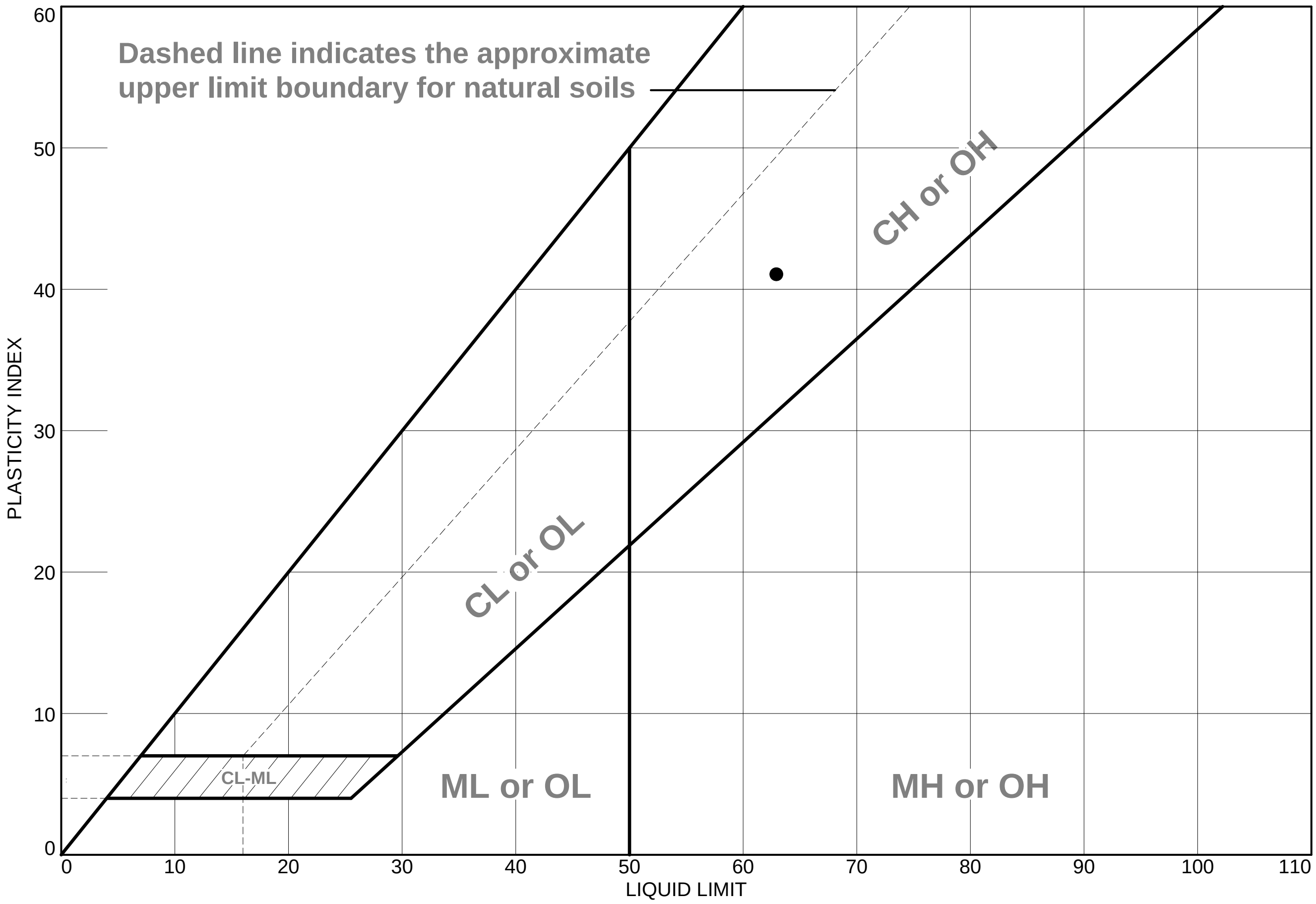
MOISTURE CONTENT WORKSHEET

Job #: 15178.001
Job Name: 88 Sunnyside Lane
Date: 11/25/18
Tested by: B. Hillebrandt

Additional Tests:									
Boring #:	B-9	B-10	B-10	B-11	B-11	B-11	B-12	B-12	B-12
Depth:	16.5	11.5	16.0	6.5	11.5	15.8	6.5	11.5	15.5
Sample Description:	Yellowish brown silty SANDSTONE	Olive brown silty SANDSTONE	Olive brown silty SANDSTONE	Yellowish brown silty SANDSTONE	Yellowish brown silty SANDSTONE	Brown silty SANDSTONE	Light brown silty SAND	Brown sandy CLAY	Yellowish brown silty SANDSTONE
Can #:	323	348	319	367	354	606	327	338	362
Wet Sample + can	266.2	293.2	249.7	287.3	307.0	285.2	282.8	246.1	199.4
Dry Sample + can	234.2	245.1	217.6	249.8	264.0	248.4	256.3	220.3	185.7
Weight can	37.8	38.7	38.4	33.9	33.3	35.4	38.5	36.5	33.1
Weight water	32	48.1	32.1	37.5	43	36.8	26.5	25.8	13.7
Weight Dry Sample	196.4	206.4	179.2	215.9	230.7	213	217.8	183.8	152.6
WATER CONTENT (%)	**16.3%**	**23.3%**	**17.9%**	**17.4%**	**18.6%**	**17.3%**	**12.2%**	**14.0%**	**9.0%**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark brown sandy fat CLAY	63	22	41	89.9	65.0	CH

Project No. 15178.001 **Client:** Peters & Ross

Project: 88 Sunnyside Lane

● **Source of Sample:** B-9 **Depth:** 3.5'

Remarks:

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SoilTesting@aol.com

Figure

Tested By: BH

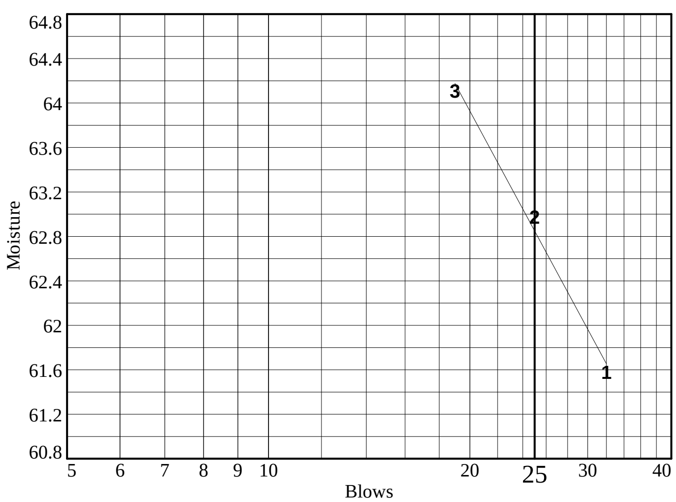
LIQUID AND PLASTIC LIMIT TEST DATA

12/19/2018

Client: Peters & Ross
Project: 88 Sunnyside Lane
Project Number: 15178.001
Location: B-9
Depth: 3.5'
Material Description: Dark brown sandy fat CLAY
%<#40: 89.9 **%<#200:** 65.0 **USCS:** CH **AASHTO:** A-7-6(25)
Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.54	24.16	29.05			
Dry+Tare	21.32	19.09	22.10			
Tare	11.22	11.04	11.26			
# Blows	32	25	19			
Moisture	61.6	63.0	64.1			



Liquid Limit= 63
Plastic Limit= 22
Plasticity Index= 41
Natural Moisture= 16.4
Liquidity Index= -0.1

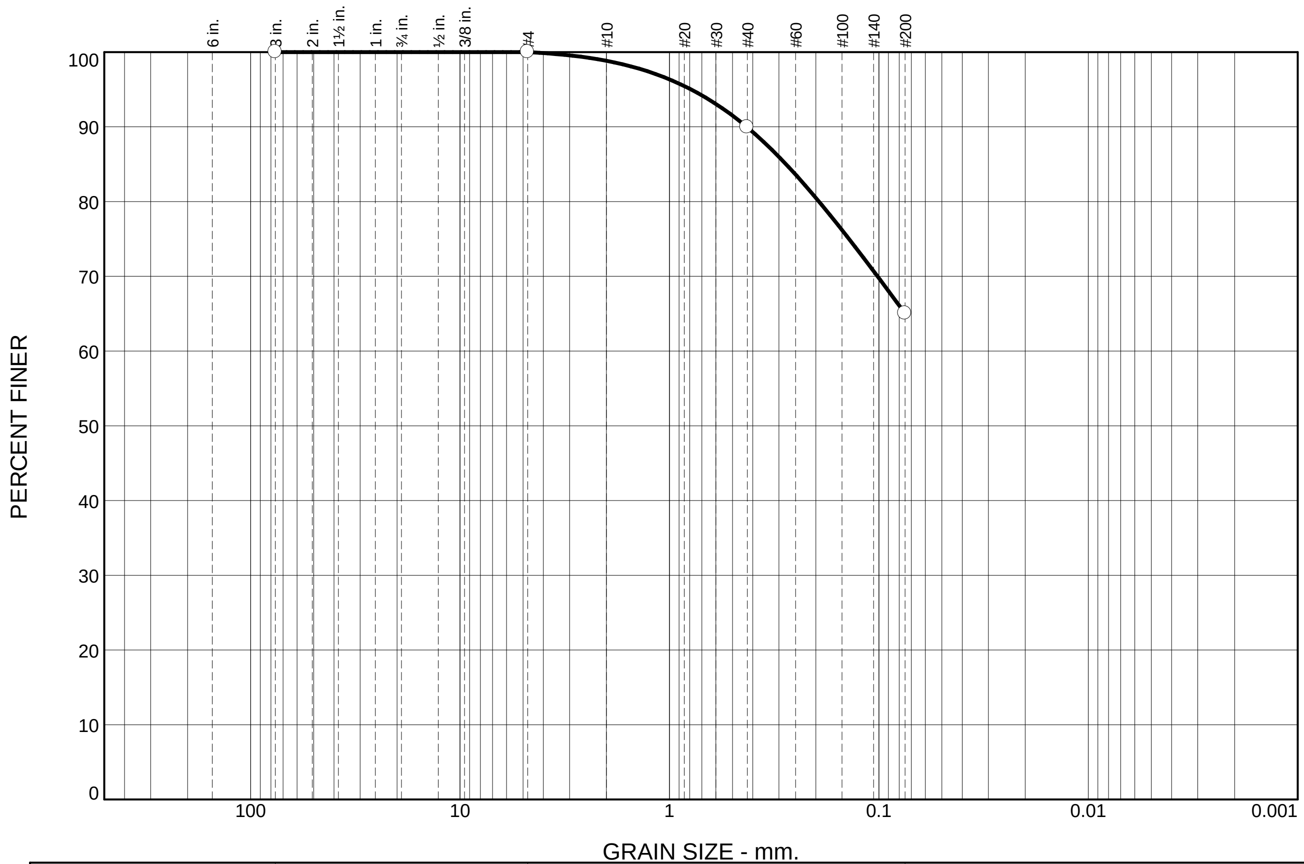
Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	18.59	17.69		
Dry+Tare	17.26	16.57		
Tare	11.32	11.26		
Moisture	22.4	21.1		

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
259.9	229.1	41.1	16.4

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	1.2	8.9	24.9	65.0	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	B-9		3.5'	Dark brown sandy fat CLAY	CH

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Client: Peters & Ross
Project: 88 Sunnyside Lane

Project No.: 15178.001 **Figure**

Tested By: BH

GRAIN SIZE DISTRIBUTION TEST DATA

12/19/2018

Client: Peters & Ross
Project: 88 Sunnyside Lane
Project Number: 15178.001
Location: B-9
Depth: 3.5'
Material Description: Dark brown sandy fat CLAY
USCS: CH
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
229.10	41.10	0.00	3"	0.00	100.0
			#4	0.00	100.0
			#40	18.91	89.9
			#200	65.71	65.0

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.2	8.9	24.9	35.0			65.0

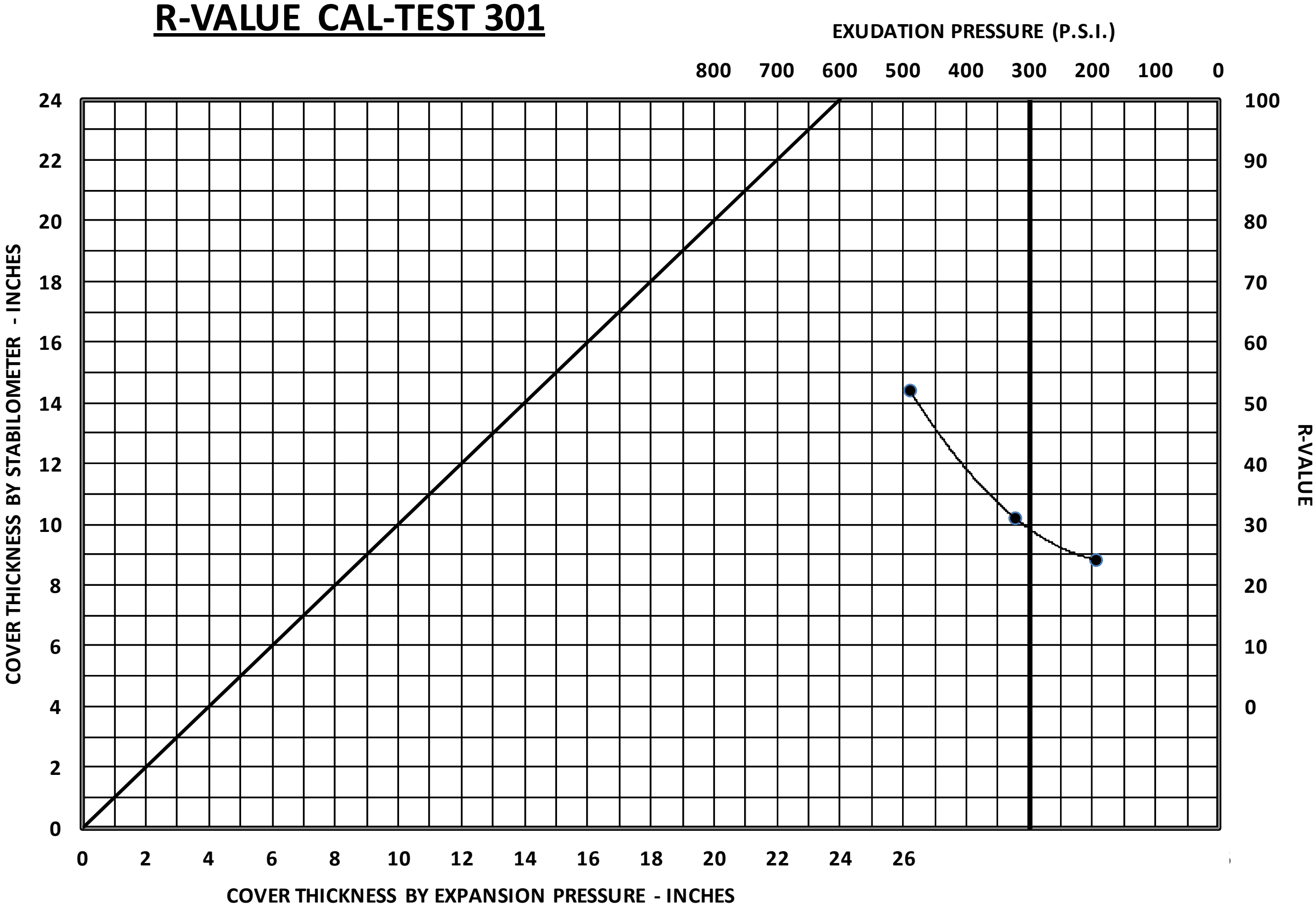
D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
								0.1932	0.2777	0.4274	0.7890

Fineness Modulus
0.48

CMT CONSTRUCTION MATERIALS TESTING, INC.

Job Name: 88 Sunnyside Lane | Job No: 10089
Sample Description: Dark yellowish brown fine silty sand | Sample No: R-1
Source: | Date: 2018.11.19
Client Name: Petters & Ross, Project No. 15178.001 | Sampled: client Tested: BR/MR

R-VALUE CAL-TEST 301



Exudation psi	Compaction (psi)	Expansion (0.0001”)	Expansion (psf)	Moisture %	Dry Density	Resistance Value
490	333	17	74	9.8	112.0	52
323	257	2	9	10.5	110.0	31
195	172	0	0	11.5	108.7	24

Remarks:

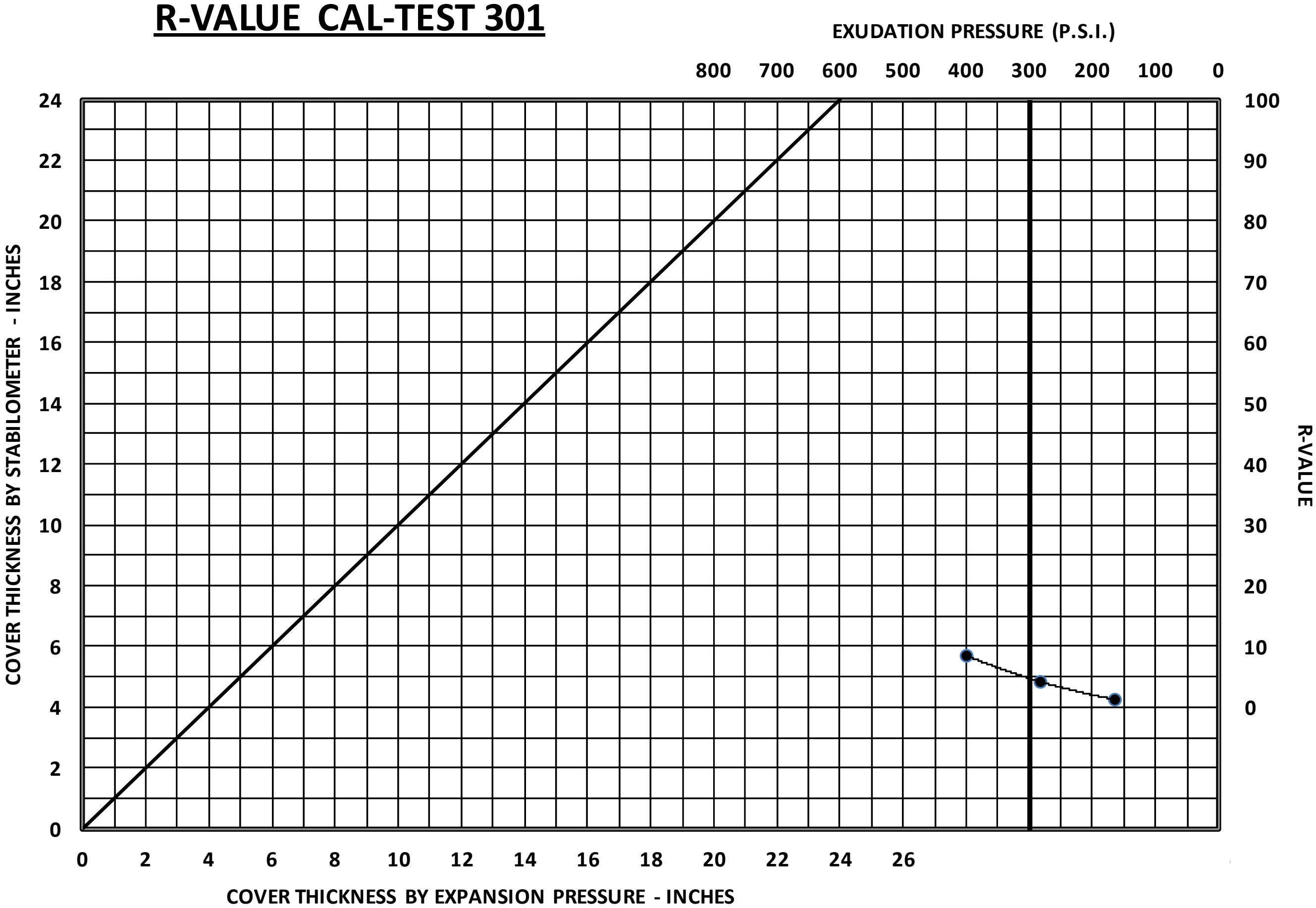
Resistance Value
29

1033 Shary Circle, Suite E • Concord, CA 94518
(925) 825-2840 • FAX (925) 682-7953

CMT
CONSTRUCTION MATERIALS TESTING, INC.

Job Name: 88 Sunnyside Lane
Job No: 10089
Sample Description: Dark Grayish-Brown Clay
Sample No: R-2
Source:
Date: 2018.11.19
Client Name: Peters & Ross, Project No. 15178.001
Sampled: client Tested: BR/MR

R-VALUE CAL-TEST 301



Exudation psi	Compaction (psi)	Expansion (0.0001”)	Expansion (psf)	Moisture %	Dry Density	Resistance Value
400	119	0	0	25.5	96.8	9
283	101	0	0	28.6	91.7	4
165	106	0	0	33.7	85.4	1

Remarks:

Resistance Value
5

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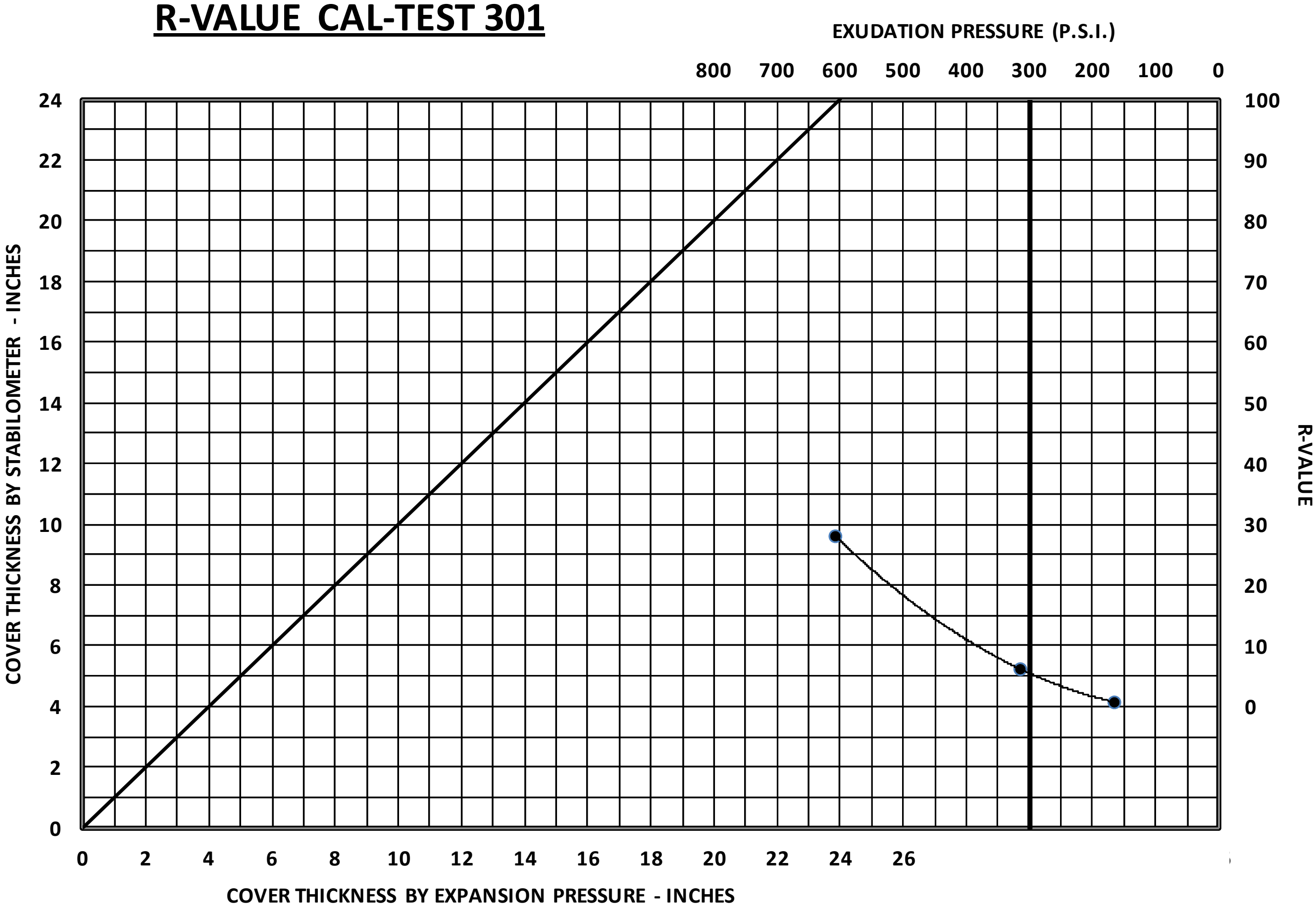
CONSTRUCTION MATERIALS TESTING, INC.

Job Name: 88 Sunnyside Lane
Job No: 10089
Sample Description: Very dark brown silty clay
Sample No: R-3
Source:
Date: 2018.11.19
Client Name: Peters & Ross, Project No. 15178.001
Sampled: client Tested: BR/MR

R-VALUE CAL-TEST 301



Exudation psi	Compaction (psi)	Expansion (0.0001")	Expansion (psf)	Moisture %	Dry Density	Resistance Value
608	196	5	22	18.9	108.4	28
315	112	0	0	22.3	99.6	6
166	103	0	0	27.8	91.0	1

Remarks:

Resistance Value
5

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APPENDIX C - RESPONSE TO REVIEW COMMENTS

The following is in response to the City of Orinda's March 16, 2018, project update letter. In Item 4 the City identified three items that needed to be addressed: 1) A Memorandum prepared by Michael Baker International and dated February 27, 2018, titled *88 Sunnyside Lane Geotechnical and Hydrologic Study Review and Recommendations*; 2) A previous City of Orinda project update letter dated June 2, 2017; and 3) A Michael Baker International report dated December 4, 2017, titled *Alameda Whipsnake Habitat Assessment*. The focus of our response is the five issues listed in the Michael Baker February 27, 2018 memorandum and the need for an updated geotechnical and geologic report as requested by the City in their project update letters.

The Michael Baker International review memorandum asserts that a published landslide map prepared by the California Geological Survey (Haydon, 1995) shows many more and much larger landslides, including the one associated with the recent 62 Van Tassel Lane mudflow, than those that were depicted on site-specific geologic maps prepared by Earth Focus Geological Services in the report dated September 30, 2015. Rather than siting a single landslide source for reference, we have used multiple published and unpublished landslide maps, reports, and documents to evaluate the landslide and geologic conditions at the site. In addition, we developed a focused photointerpretive map of potential landslides that impact the site by reviewing historic aerial photographs that date back to 1939 of the site and surrounding areas. This work was ground-truthed with onsite geologic mapping by a Certified Engineering Geologist during our recent field investigation. Additionally, since the primary site grading for this development and access road occurred in 1977, we do not anticipate that soil will need to be off-hauled. The results of this effort are summarized on Plate 1 and presented in our report dated January 28, 2019.

ISSUE 1: PARCEL B

Michael Baker International requested information on the two mudflow landslides on Parcel B that occurred in 1982 and were subsequently repaired. These two landslides are labelled 1982 Landslide Repair A and 1982 Landslide Repair B on Plate 1. Potential causes of these landslides are discussed in our report in the section titled *Reconnaissance and Geologic Mapping*, with further comments and recommendations in Section 5.2 under *Preliminary Conclusions and Recommendations*.

We are recommending that the 1982 Landslide Repair A be supported by a row of stitch piers. We recommend that a portion of the 1982 Landslide Repair B be removed and recompacted as geogrid-reinforced engineered fill. Upon completion of the placement of the geogrid reinforced fill, all disturbed areas will be planted with a native grass blend.

ISSUE 2: PARCEL C

Michael Baker International asked about the stability of both a landslide that had been mapped by Haydon (1995) in the southwest corner of Parcel C, and the large area of Canyon Fill that was placed in 1977 on the lower half of this mapped landslide.

In order to evaluate the presence, areal extent, and depth of the Haydon mapped landslide and to address the stability of the 1977 Canyon Fill, our Certified Engineering Geologist logged five exploratory test borings in the area. The results of this work indicate that the Haydon mapped landslide is not as extensive as shown and is limited to the area shown on Plate 1 and labelled as Landslide 2. Intact bedrock was identified in all of the exploratory borings logged in this area and bedrock was mapped in the natural channel downstream from the large Canyon Fill as shown on Plate 1. The upper portion of Landslide 2 will be removed and recompacted with engineered fill as discussed in Section 5.3 under *Preliminary Conclusions and Recommendations*. The proposed development area of Parcel C will be used to stage the earthwork required to stabilize the upper portion of Landslide 2. We do not believe that the fill wedge located on Parcel B near the south side of the house will need to be removed.

We determined that the 1977 Canyon Fill is well compacted and drained, but the fill is not fully founded into bedrock and will need to be stabilized. We noted that the 1977 Canyon Fill has both surface and subsurface drains appear to be in relatively good shape, and that exit into a riprap discharge area located at the bottom of the Canyon Fill in the northeast corner of Parcel D. As discussed in Section 5.3 under *Preliminary Conclusions and Recommendations*, we recommend that the existing Canyon Fill be stabilized to current static and seismic codes with a structural approach that will minimize the amount of grading work and overall impact to the site. The slope stabilization measures can be fully installed on Parcels C and D, so no offsite work is anticipated in this area.

ISSUE 3: CONSISTENCY WITH DMG OFR 95-12

The Michael Baker International Memorandum mentioned three areas of possible slope instability directly adjacent to the site, and three more possible slope instability areas that are outside of and downslope from the site that should be addressed. All of these possible instability areas have been mapped as landslides on the sited published regional landslide map prepared by the California Geological Survey (Haydon, 1995; aka DMG OFR 95-12). We should note that, with the exception of the site-specific source documents researched and reviewed us, all of the published and unpublished regional landslide maps for the site area have relied solely on aerial photographic analysis to identify possible landslides that may be present within, near, and far away from the site. The California Geologic Survey map (Haydon, 1995; aka DMG OFR 95-12) and other similar landslide maps are intended to be used as guideline maps that warrant field checking by a geologist. From our geologic reconnaissance visits to the site beginning in 2015, our Certified Engineering Geologist has field checked these various landslide source references listed in our report and mapped the potential landslide hazards on Plate 1.

The three directly adjacent possible slope instability areas include a series of ravines that drain to the northwest from the proposed building site on Parcel A, the major east-flowing drainage to the southeast of the proposed building site on Parcel A, and the slopes south of the proposed building site for Parcel D. We address each of these in the following discussion:

Ravines Draining Northwest from Parcel A: There are several ravines that drain to the northwest from the proposed building site on Parcel A toward the lower portion of Sunnyside Lane and into offsite areas. We have mapped Landslide 4 and a significant accumulation of colluvial soils downslope from Landslide 4 along this flank of the hillside. Landslide 4 is mapped adjacent to the west property boundary as shown on Plate 1 and it does not affect the proposed building site. From discussions with DeBolt Civil Engineering, we have recommended that no new runoff from the proposed building site on Parcel A is to flow to the northwest into this area. Instead all new runoff is to be directed into the major east-flowing drainage located south of Parcel A and away from Landslide 4.

Major East-Flowing Drainage South of Parcel A: The published landslide map by the California Geological Survey mentioned by Michael Baker International is the only reference that has suggested the presence of a landslide along the bottom of the canyon (Haydon, 1995; aka DMG OFR 95-12). Other landslide references reviewed for this study do not show a landslide in the bottom of this canyon (Nilsen, 1975 and Rogers, 1993). Further, we have not identified any geomorphic features that could be attributed to landslide terrain in this area from our review of historic aerial photographs. Since there is no evidence of a landslide in this area, we are recommending that new runoff from the proposed building site on Parcel A be transmitted into this major east-flowing drainage in appropriately placed energy dissipators.

Slopes South of Parcel D: The various landslide maps reviewed for our study do not agree on the presence or extent of any possible landslides along the south-facing slope below the proposed building site for Parcel D (Haydon, 1995; Nilsen, 1975; and Rogers, 1993). We did not identify any geomorphic characteristics along the slope that would suggest landsliding, nor did we observe any slope failures in this area during our geologic reconnaissance. The prominent hard sandstone outcrop that crosses the top of the ridgeline from southeast to northwest on Parcel D is inclined into the slope. Bedding planes are dipping toward the northeast from 43 to 72 degrees as measured during our geologic mapping (see Plate 1). This geologic condition is generally favorable for gross slope stability. Since there are some relatively loose rocks associated with the outcrop, we have recommended that some type of rockfall catchment fence be constructed below the outcrop or that the outcrop be wrapped with a wire mesh secured to the rock face to reduce the chance of any loose boulders rolling down the slope to offsite areas.

The three possible slope instability areas outside of and downslope of the site include the 2017 slope failure at 62 Van Tassel Lane to the west of the site, a possible landslide mapped offsite to the northwest near the south terminus of Via Callados, and a possible landslide mapped the downslope and to the west of the 1982 Landslide Repair B. We address each of these in the following discussion:

62 Van Tassel Lane Slope Failure: The slope failure occurred near the end of a western extension of the prominent west ridgeline that originates within the center of the Sunnyside property. This Van Tassel property is well to the west of the westernmost property boundary for the site. We acknowledge that this area was previously mapped as a landslide on most of the published and unpublished landslide maps reviewed for our study (Nilsen,

1975; and Rogers, 1993). We have also identified this area as a landslide from the strong geomorphic characteristics consistent with landslide terrain observed during our review of pre-development historic aerial photographs that covered the site and surrounding areas. However, we did not field check this area for the presence of a landslide debris because of the significant distance from the site. No new development has been proposed along the prominent west ridgeline associated with the existing house on Parcel B.

Possible Landslide near Via Callados: The published landslide map by the California Geological Survey mentioned by Michael Baker International is the only reference that has suggested the presence of a landslide along the northwest-facing slope at the northwest end of the prominent west ridgeline (Haydon, 1995; aka DMG OFR 95-12). Other landslide references reviewed for this study do not show a landslide in this area, rather relatively thick accumulations of colluvium (Nilsen, 1975 and Rogers, 1993). Further, we have not identified any geomorphic features that could be attributed to landslide terrain in this area from our review of historic aerial photographs. We observed a grove of mature trees and steep slopes in this area during our geologic reconnaissance. No development has been proposed along the prominent west ridgeline associated with the existing house on Parcel B.

Possible Landslide Downslope of the 1982 Landslide Repair B: All of the various landslide maps reviewed for our study suggest that there are one or more landslides associated with the major southwest-flowing drainage. However, the various landslide sources referenced do not agree on size and extent of landsliding in this area (Haydon, 1995; Nilsen, 1975; and Rogers, 1993). Landslide 3 and the 1982 Landslide Repair B are located near the head of the major southwest-flowing drainage. We have recommended that the 1982 Landslide Repair B located in this area be mitigated by removing the upper portion and restoring the slope. We have recommended to DeBolt Civil Engineering that any new runoff from the proposed development of the access roadway and proposed building site for Parcels C and D be transmitted away from this area.

ISSUE 4: ROADWAY DRAINAGE

The 1977 construction of the existing paved access road is well documented, and our recent subsurface exploration and laboratory testing program confirmed that the fills were well constructed. As shown in the Vesting Tentative Map prepared by DeBolt Civil Engineering and dated November 20, 2017, with latest revision January 5, 2018, the major portion of the roadway widening will occur along the lower 25 percent near Sunnyside Lane, where surface drainage will be directed to ditches and stormdrains.

ISSUE 5: STORMWATER IMPACTS

Storm water from the access road across Parcel B will be collected and conveyed to a bio-swale which then discharges to the major southeast-flowing drainage as shown on Figure 5. Storm water from the Parcel D driveway and hammer head parking area will be collected and conveyed to a separate bio-swale which then discharges to the major southeast-flowing drainage. Stormwater from the proposed development area of Parcel D will be collected and conveyed to a separate bio-swale and discharged to the major southeast-flowing drainage. Storm water from the proposed development area of Parcel C will be collected and conveyed to a bioswale which then drains to the 1977 Canyon Fill surface drainage system.

Drainage from the access road to Parcels C and D, and the development areas on Parcels C and D will be treated in 4 separate bio-swale prior to discharging to the major southeast-flowing drainage. The discharge locations were reviewed by our Certified Engineering Geologist and were determined to have the least impact to the major southeast-flowing drainage. Calculations by DeBolt Civil Engineering show that cumulative runoff for the major southeast drainage may increase by 5 percent spread over four discharge locations.

Stormwater flow from the cul-de-sac and the upper portion of the paved access road will discharge to the existing 15-inch culvert that drains into the major east-flowing drainage as shown in Figure 5. Storm water from the proposed development area of Parcel A will be collected and conveyed to a bio-swale which then discharges to the major east-flowing drainage. Calculations by DeBolt Civil Engineering show that cumulative runoff for the major east-flowing drainage may increase by 7 percent spread over two discharge locations.

Project No. E9134-04-01
August 30, 2019

Michael Baker International, Inc.
2729 Prospect Park Drive, Suite 220
Rancho Cordova, California 95670

Attention: Ms. Katrina Hardt-Holoch

Subject: 88 SUNNYSIDE LANE
ORINDA, CALIFORNIA
GEOTECHNICAL PEER REVIEW

References:
1. *Geotechnical Investigation, 88 Sunnyside Lane, Orinda, California,* prepared by Peters & Ross, Inc. dated January 28, 2019 (P&R Project No. 15178.001)
2. *Vesting Tentative Map, 88 Sunnyside Lane, City of Orinda, Contra Costa County, California,* prepared by DeBolt Civil Engineering, Δ4 dated April 18, 2019 (DCE Job No. 07275).

Dear Ms. Hardt-Holoch:

In accordance with your authorization of our proposal dated February 4, 2019, we have prepared this correspondence to present the results of our geotechnical peer review for the subdivision planned at the subject site in Orinda, California. We understand the planned residential subdivision is in environmental planning stages and the City of Orinda requested that the referenced geotechnical report be peer reviewed to evaluate the adequateness of the report with respect to the geotechnical feasibility of the project, project conditions, regulatory requirements, and industry standards of practice. Our scope of geotechnical services for the peer review consisted of:

- Performing a site visit to observe current site conditions.
- Reviewing the referenced geotechnical report and vesting tentative map, and published documents, geologic maps and other geological and geotechnical literature pertaining to the site to aid in evaluating soil and geologic conditions.
- Preparing the correspondence

SITE AND PROJECT DESCRIPTION

The project site is an approximately 24-acre parcel designated as Contra Costa County APN 266-270-029. Topography throughout the irregularly shaped parcel is dominated by three prominent ridgelines that generally trend from the existing home site at the center of the property outward to the northeast, west and south. The flanks of each ridgeline slope moderately to steeply downward to intervening canyon drainages that continue offsite.

Original grading at the site was performed in the late 70s and early 80s and generally resulted in the current site configuration with a long winding access driveway that climbs from an existing subdivision, flattened ridge tops, a building pad for the existing single-story home, and canyon fills in a south trending drainage to the south of the residence. Materials for the canyon fill were reportedly generated by cuts elsewhere onsite, including those to flatten the ridgelines.

Based on the referenced tentative map, the 24-acre site will be subdivided to create four new parcels identified as Parcels A through D (see attached excerpt from referenced tentative map). Parcels A, C and D will range from 5.32 to 5.89 acres and will be developed as single-family residences. New access driveways for Parcels A, C and D will originate from the existing cul-de-sac and follow the site ridgelines to the potential development area within each parcel. Potential development areas are generally situated within level areas established during prior grading at the site. Parcel B will be a 7.44-acre parcel that includes the existing home. No new structures are planned on Parcel B and development will be limited to the new access driveway for Parcels C and D.

GEOLOGIC SUMMARY

Background geologic references indicate sandstone bedrock underlies the site. Selected mapping the USGS (Dibblee, 2005) maps Miocene age Monterey Formation throughout most of the site, with Miocene age Briones Sandstone along the northeast-trending ridgeline and in the broad east-flowing drainage east of the existing home. Several geologic references map a northwest-southeast trending syncline axis across the site and passing near the existing home. It should be noted that formation (bedrock) unit names and the extent of each unit vary amongst available geologic references.

Landslides are mapped at/near the site in various geologic publications and the referenced geotechnical report identifies four existing landslides that are denoted as Landslides 1 through 4. Landslide 1 is a small shallow slide located at the margin of Parcel D and continuing offsite to the bordering Magnussen property. Landslide 2 is the largest landslide mapped onsite and is situated within and below the south-facing slope south of the existing residence. Landslide 2 was partially buried by the canyon fill mentioned in the preceding section. Landslide 3 is situated on the southern flank of the Parcel B ridgeline and extends into the adjacent Whittaker property below. The geotechnical report discusses geologic references that indicate Landslide 3 may be part of larger slide that extends offsite to the south. Landslide 4 is mapped just north of the driveway hammerhead turnaround planned for Parcel A. Most of Landslide 4 is generally mapped offsite but a small portion extends into the northwest margin of Parcel A.

Two landslide repairs from the early 1980s are described in the referenced geotechnical report – Landslide Repairs A and B. Details of each repair are somewhat unknown. Landslide Repair A is just north of the existing cul-de-sac. Landslide Repair B is just west (downslope) of the unpaved access that trends north-south on the western side of the existing residence.

DISCUSSION

The project geotechnical report provides a history of site grading activities and the resultant (current) site configuration. Key geotechnical considerations are slope stability and the presence of existing and repaired landslides onsite. The geotechnical report provides preliminary quantitative slope stability analyses for the canyon fill and underlying Landslide 2 deposits in the planned development area for Parcel C and consequently recommends stabilization of this area using pin piers. In addition, the report recommends that a future home in this area utilize drilled shaft foundations that extend into bedrock and that the drilled shafts be designed for potential shear forces. Aside from these recommended mitigation measures, the report also recommends feasible mitigation measures for the upper portion of Landslide 2 (where not buried by former fills), Landslide 4 and the prior Landslide Repairs A and B – mitigation measures range from removal and recompaction to stitch pier walls.

Landslide 3 is located more than 200 feet from any proposed grading or site improvement. It does not appear the planned subdivision will impact Landslide 3 from a geotechnical standpoint.

Based on our peer review, it is our opinion the referenced report adequately addresses significant geotechnical aspects pertaining to project feasibility with the following exceptions.

1. A storm water bio-retention area (basin) is planned at the southeastern margin of the Parcel C development area. The bio-retention basin includes an outlet that connects to an existing catch basin down slope. The tentative map suggests that storm drain continues down slope from the catch basin via 15-inch corrugated metal pipe to the vicinity of Landslide 1. It is unclear if the storm drain outlets onto the existing slope or continues downslope past Landslide 1. The geotechnical engineer should review and comment on the potential for planned development to exacerbate or impact Landslide 1.

2. The planned subdivision proposes several bio-retention basins near the top of existing slopes. The basin outlets either connect to existing storm drain or energy dissipation devices are proposed where storm drain outlets onto slope faces. The geotechnical engineer should review and comment on the potential for infiltration from the storm water treatment system to affect the stability of slopes.

3. The project proposes to widen Sunnyside Lane at various locations from approximately 200 east of Sunnyside Court to the existing cul-de-sac. The geotechnical engineer should review and provide comment regarding the feasibility of the proposed roadway widening with respect to the slope stability and any other geotechnical aspects.

The following items are noted for future design-level geotechnical studies:

1. Prior to future grading or construction of structures at each parcel, an updated geotechnical report should be prepared to provide conclusions and recommendations for the design and construction of the proposed structures and grading. The report should consider the design-level grading plans and detailed recommendations for remedial grading and/or other mitigation measures (pin piers, etc.) should be provided. Consideration may be given to showing remedial grading and keyway areas on the grading plans. In addition, the geotechnical engineer should review project civil and structural plans prior to finalization to confirm project geotechnical recommendations are properly incorporated.

2. Updated geotechnical reports that accompany the detailed grading plans for each parcel should include quantitative slope stability analyses that demonstrates minimum factors of safety are met for the proposed project slopes. Where/if planned slopes do not meet applicable factor of safety requirements for static and seismic conditions, recommendations for additional mitigation measures should be provided. The reports should provide basis to substantiate the assigned material properties – unit weight and shear strength, in particular. Additional laboratory shear strength testing may be required. The laboratory strength testing in the referenced report is limited to triaxial compression tests performed at single confining pressures. As such, shear strength envelopes to determine internal angle of friction (ø) and cohesion were not generated. These are critical parameters in any slope stability analysis.

LIMITATIONS AND CLOSURE

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices used in the site area at this time. No warranty is provided, express or implied.

Should you have any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

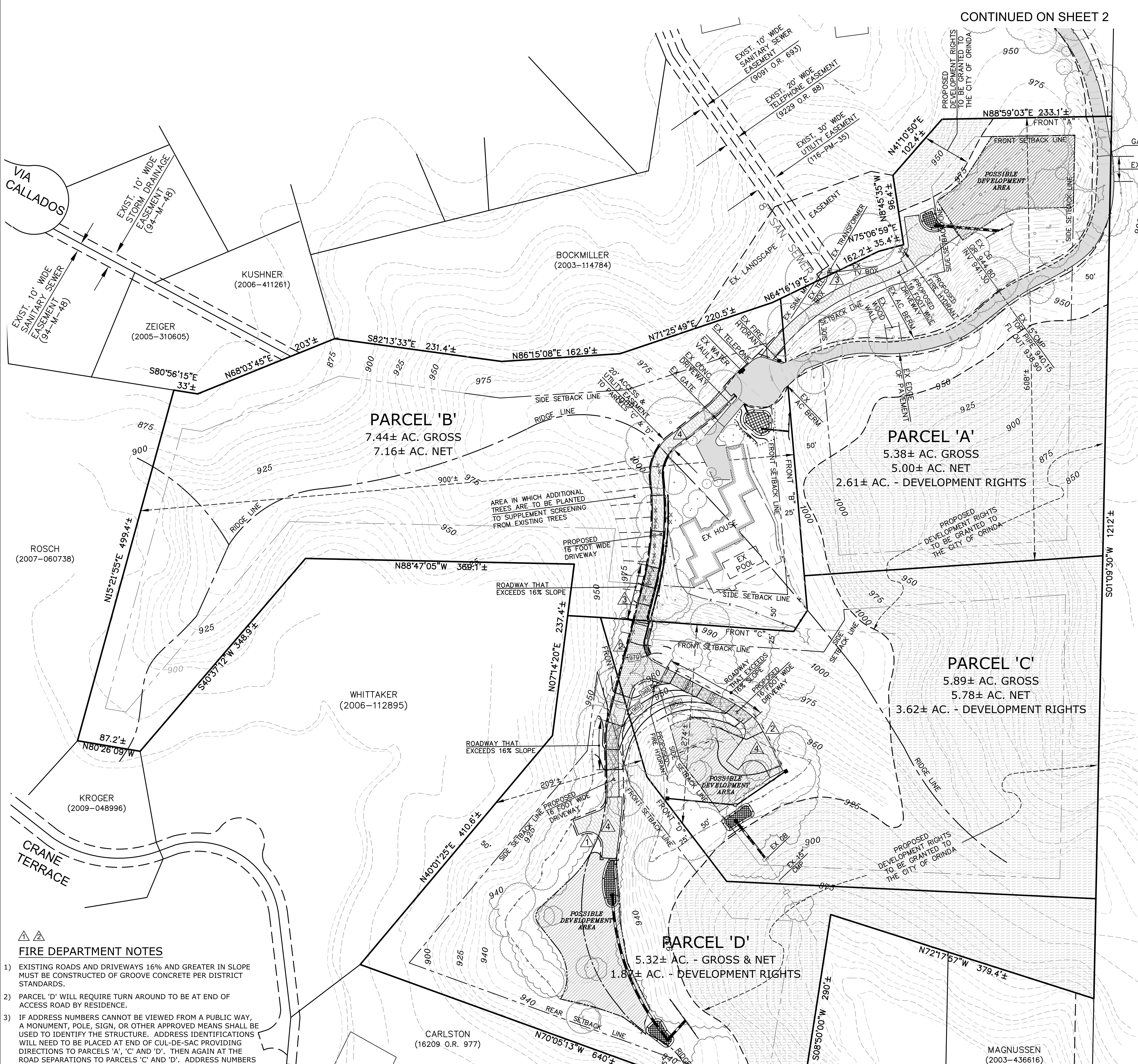
DRAFT

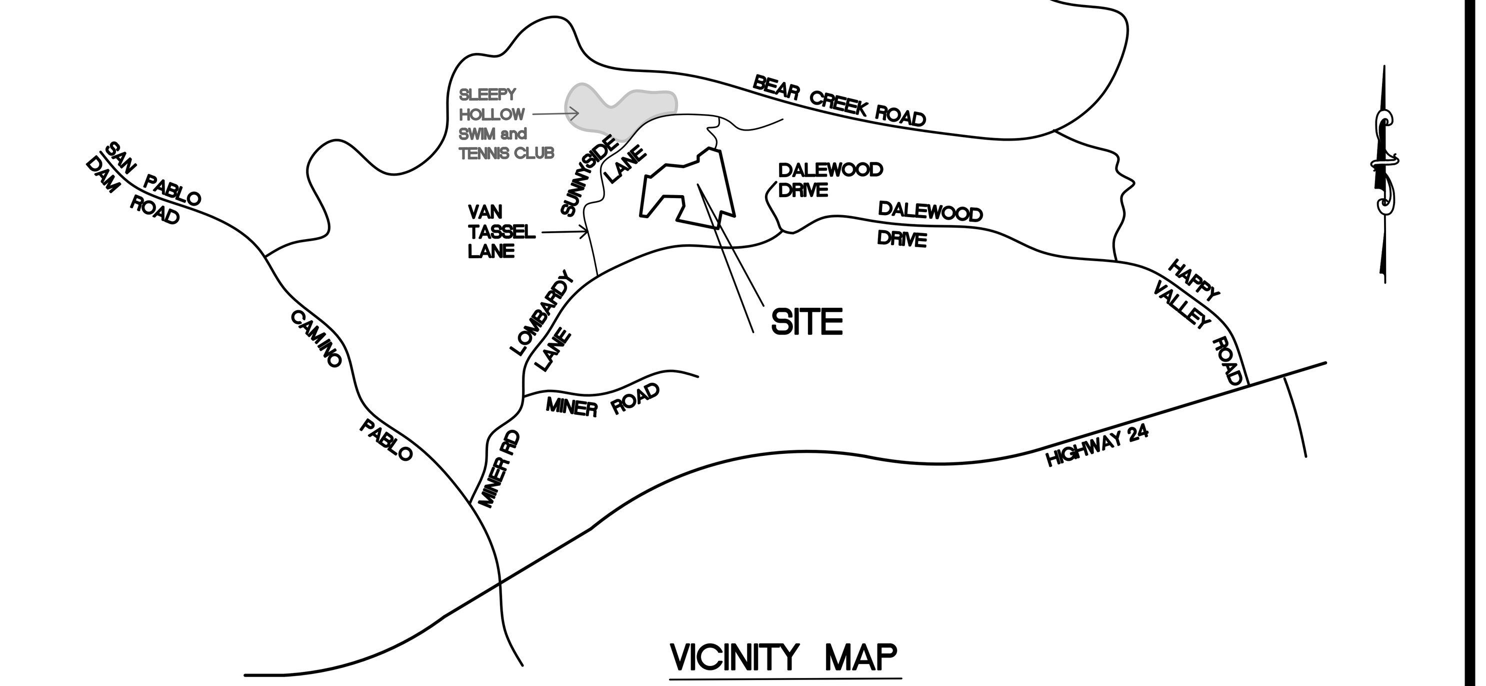
Shane Rodacker, GE
Senior Engineer

(1/e-mail) Addressee

Attachment: Vesting Tentative Map, Sheet 1 (DeBolt Civil Engineering, April 2019).

CONTINUED ON SHEET 2





VICINITY MAP

N.T.S.

TENTATIVE MAP NOTES:

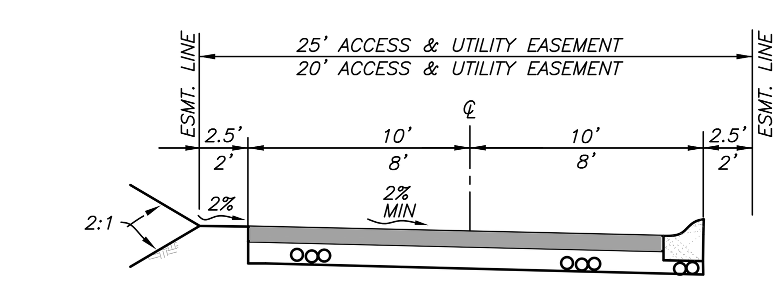
OWNER:	NAFIS JAMAL 88 SUNNYSIDE LANE ORINDA, CA 94563
ENGINEER:	DEBOLT CIVIL ENGINEERING 811 SAN RAMON VALLEY BLVD. DANVILLE, CA 94526
ASSESSOR'S PARCEL NUMBER:	266-270-029
AREA:	24.02± ACRES
ZONING:	RVL ~ RESIDENTIAL VERY LOW DENSITY - 5 ACRE NET SIZE
AVERAGE SLOPE:	42.4±
UTILITIES:	GAS & ELECTRIC - P.G.& E. TELEPHONE - S.B.C. SEWER - C.C.C.S.D. WATER - E.B.M.U.D. UTILITY LOCATIONS SHOWN ARE BASED ON UTILITY COMPANY RECORDS AND ARE APPROXIMATE ONLY.
EXISTING LAND USE:	RESIDENTIAL
PROPOSED LAND USE:	RESIDENTIAL SINGLE FAMILY 5-10 ACRES PER UNIT
GRADING:	EACH LOT WILL BE GRADED ON AN INDIVIDUAL BASIS TO FIT A CUSTOM HOME.
FLOOD ZONE:	THERE ARE NO AREAS SUBJECT TO PONDING OR INUNDATION
TOPOGRAPHIC INFORMATION:	TOPOGRAPHIC INFORMATION IS BASED UPON AN AERIAL SURVEY PREPARED BY BRYAN & MURPHY AND SUPPLEMENTED WITH INFORMATION PER MILLS ASSOCIATES.
PHASING:	THE PROPERTY WILL BE DEVELOPED AS ONE PHASE.
APPLICABLE REQUIREMENTS:	THE PROPERTY IS WITHIN A RIDGELINE OVERLAY/ENVIRONMENTAL PRESERVATION ZONE AND THE NORTH ORINDA SPECIFIC PLAN.

LEGEND

- 975 CONTOUR
- EASEMENT
- ENVIRONMENTAL OVERLAY DISTRICT
- POSSIBLE DEVELOPMENT AREA
- RIDGE LINE
- PROPOSED IMPERVIOUS DRIVEWAY
- ROADWAY THAT EXCEEDS 16% SLOPE
- PROPOSED PERVIOUS PAVER DRIVEWAY
- PROPOSED DEVELOPMENT RIGHTS

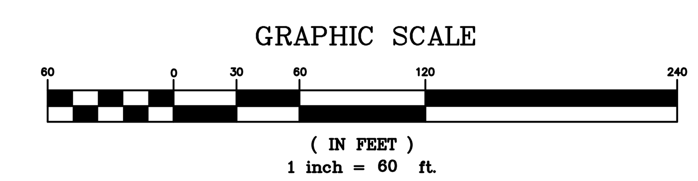
REQUIRED SETBACKS

MINIMUM FRONT WIDTH	~ 250 FEET
MINIMUM FRONT DEPTH	~ 200 FEET
FRONT YARD	~ 25 FEET
REAR YARD	~ 25 FEET
SIDE YARD	~ 50 FEET MIN



TYPICAL ROADWAY SECTION

N.T.S.



SHEET INDEX

SHEET NO.	DESCRIPTION
1	TENTATIVE MAP & NOTES
2	ACCESS ROAD DETAIL
3	PARCEL "A" DETAIL
4	PARCEL "C" AND "D" DETAIL

FIRE DEPARTMENT NOTES

1) EXISTING ROADS AND DRIVEWAYS 16% AND GREATER IN SLOPE MUST BE CONSTRUCTED OF GROOVE CONCRETE PER DISTRICT STANDARDS.
2) PARCEL 'D' WILL REQUIRE TURN AROUND TO BE AT END OF ACCESS ROAD BY RESIDENCE.
3) IF ADDRESS NUMBERS CANNOT BE VIEWED FROM A PUBLIC WAY, A MONUMENT, POLE, SIGN, OR OTHER APPROVED MEANS SHALL BE USED TO IDENTIFY THE STRUCTURE. ADDRESS IDENTIFICATIONS WILL NEED TO BE PLACED AT END OF CUL-DE-SAC PROVIDING DIRECTIONS TO PARCELS 'A', 'C' AND 'D'. THEN AGAIN AT THE ROAD SEPARATIONS TO PARCELS 'C' AND 'D'. ADDRESS NUMBERS WILL CONFORM WITH CONDITION #5058351 LISTED IN LETTER DATED NOVEMBER 8, 2017.
4) THE PLAN SHALL INCLUDE DEDICATED EASEMENTS FOR EMERGENCY AND MAINTENANCE ACCESS TO WILDLAND OR OPEN SPACE AREAS AND SHALL BE MAINTAINED IN PERPETUITY.
5) THESE RESPONSIBILITIES SHALL BE DISCLOSED TO PROPERTY OWNER(S) BY WAY OF DEED RESTRICTIONS AND/OR COVENANTS, CONDITIONS AND RESTRICTIONS.

NOTES

A) RIDGELINE IS DEFINED AS THE GROUND LINE LOCATED AT THE HIGHEST ELEVATION OF AND RUNNING PARALLEL TO THE LONG AXIS OF THE RIDGE.
B) BUILDING SITES WITHIN RIDGE LOTS, OR LOTS IN WHICH ANY PORTION OF THE PARCEL LIES WITHIN THE ENVIRONMENTAL PRESERVATION ZONE WILL REQUIRE DESIGN REVIEW APPROVAL. THIS APPLIES TO ALL PROPOSED PARCELS.

VESTING TENTATIVE MAP

88 SUNNYSIDE LANE

CITY OF ORINDA CONTRA COSTA COUNTY CALIFORNIA

JAMES E. DIGGINS R.C.E. 27818
RENEWAL DATE: 03/31/20

#	REVISIONS	DATE
1	INCORPORATED FIRE COMMENTS	11/29/17
2	INCORPORATED FIRE COMMENTS	1/05/18
3	INCORPORATED CITY COMMENTS	3/15/19
4	INCORPORATED CITY COMMENTS	4/18/19

DeBolt Civil Engineering
811 San Ramon Valley Boulevard
Danville, California 94526
Tel: 925/837-3780
Fax: 925/837-4378

Date: 11/20/17
Scale: 1" = 60'
By: JED / kl
Job No.: 07275

Earth Focus Geological Services, Inc.
www.earthfocusgeology.com
115 Orchard Drive • Fremont, CA 94536
Tel/Fax (510) 794-7495

September 30, 2015
Project No: S15-01449

Keith B. Stone
Diamond Construction, Inc.
P.O. Box 477
Lafayette, CA 94549

RE: Engineering Geologic Hazards Evaluation
Proposed Residential Development
24-Acre Property at 88 Sunnyside Lane
Orinda, California

APN: 266-270-029

Latitude: 37.9143 Longitude: 122.1838 (Existing House Location)

Dear Mr. Stone:

As requested, we have prepared this evaluation to assess the potential for geologic and seismic hazards to adversely impact the property located at 88 Sunnyside Lane, California (Figure 1). Our work presented here is based on observations from a geologic reconnaissance; geologic mapping of bedrock exposures within the site; mapping of surficial materials within the property; review of published and unpublished geologic maps, reports, and documents for the site; review of selected aerial photographs of the site area; and professional judgments made from such information. We did not perform any subsurface exploration, such as drilling of borings or excavations of test pits, nor did we conduct any materials testing of soil or bedrock samples from the site as part of our work. A list of the geologic references and aerial photographs utilized for this research is included at the end of this report.

We understand that you have retained Peters & Ross, a geotechnical engineering firm in Pleasant Hill, California, to conduct the necessary subsurface exploration and materials testing for the property; and to provide foundation recommendations for the geotechnical aspects of the project.

SCOPE OF WORK

Our scope of work for this project was limited to the following tasks.

- Perform a geologic reconnaissance
- Conduct geologic mapping of bedrock exposures and surficial deposits
- Review published geologic, fault, and landslide maps of the site and vicinity
- Review unpublished reports and documents for the property
- Review selected historic aerial photographs of the site and vicinity
- Evaluate the collected data
- Prepare this report of our findings and conclusions

SITE DESCRIPTION

Geography

The property consists of approximately 24 acres of hilly terrain in the Sleepy Hollow portion of Orinda, Contra Costa County. The site is south of the Briones Reservoir and north of Highway 24. Access to the site is along a private paved roadway connected to Sunnyside Lane at the north end of the property. The private roadway winds up the slope to service a single residence located near the center of the property on the highest hilltop. Neighboring properties have been developed with a mix of older ranch-style homes and more recent large multi-story residences in the canyons and slope areas along the east, west, and south flanks of the site. The neighboring lands to the north are relatively undeveloped and crossed with a series of fire trails.

Development History

The property has been somewhat modified by past grading activities to create the existing access roadway and current building site. Hallenbeck-McKay & Associates, Inc., (1977a; 1977c; and 1978) a now defunct geotechnical firm based in Emeryville, California, provided initial planning and grading recommendations for the property in the late 1970s, and later conducted a soil and geologic study for the then proposed subdivision of the property. Construction of the single residence located near the center of the property and improvements to the access roadway began in 1977 (Hallenbeck-McKay & Associates, 1977b). The prominent ridgelines throughout the site have been leveled or widened by excavation and/or by the placement of relatively small side fills in the late 1970s and early 1980s, based on our review of historic aerial photographs.

A southeast-draining canyon located south of the existing residence was backfilled with excavation materials generated from the lowering of natural hilltop for the existing building site. Additional fill materials were also likely generated from the excavation and lowering the prominent ridgeline to the south of the existing building area. The filling of the large canyon was observed and compaction tests recorded on fill placed from August through September 1977 as reported by Hallenbeck-McKay & Associates, Inc., (1977b). However, we were unable to find any plans showing as-constructed locations of bench and keyway excavations, or locations of subdrains placed prior to fill placement. Later observations at the site by Hallenbeck-Mckay & Associates noted that concrete-lined bench drains along the fill slope for the large canyon fill had not been installed as intended and that runoff from a recent rain storm had damaged the unprotected benches and caused significant erosion along the face of the fill slope (1977b).

Two notable slope failures occurred after initial development of the property resulting from the 1981–1982 rain season (Hallenbeck-McKay & Associates, Inc., 1984). One of these slope failures was located along the downslope edge of the cul-de-sac north of the existing house, and the other occurred along the downslope side of the narrow dirt road at the west side of the existing house as observed on the aerial photographs taken in May 1982. Both of these slope failures were repaired by earthwork grading methods. The approximate locations of these landslide repairs are shown on the Site Geologic Map (see Plate 1).

Topography

The existing residence is located within a graded building pad at the highest point within the property at approximate elevation 1,025 feet. By comparison, the beginning of the paved access roadway at the north end of the property is at approximate elevation 750 feet. There are three prominent ridgelines that originate near the existing building pad and extend to the south, west, and northeast within the property boundaries. The high points of these prominent ridgelines have been leveled to varying degrees from past grading activities so that the level areas range in elevation from approximately 950 to 1,000 feet (see Plate 1).

There are several ravines and drainages that flow away from the prominent ridgelines within the site in all directions (see Plate 1). The most prominent of these drainages is located at the north end of the property near the beginning of the paved access roadway. The slopes flanking the ridges and descending into the canyons vary considerably in steepness with gradients ranging from 1.6:1 to 2.1:1 (horizontal to vertical).

PROPOSED DEVELOPMENT

We understand that the property is to be subdivided into four parcels, each approximately five acres or greater is size, and that the existing paved roadway is to be widened to serve as the main access to the sites. Proposed Parcel B will include the existing residence. The remaining three parcels, labeled as A, C, and D, are to be developed with residential building sites. The proposed subdivision layout and possible building sites for the proposed parcels are shown on the tentative map prepared by DeBolt Civil Engineering, dated June 8, 2015 (see Plate 1).

GEOLOGY

Regional Geologic Setting

The site is located within the San Francisco Bay portion of the Coast Ranges geomorphic province of California, a region characterized by northwest-trending ridges and valleys that parallel the San Andreas and related faults. The hills in the vicinity of the site are underlain by a variety of bedrock types of Tertiary age (Dibblee, 1980 and 2005; Ellen and Wentworth, 1995; Graymer and others, 1994; and Haydon, 1995). The geologic structure of the site area is severely complicated by Quaternary folding and faulting. The landscape within the site vicinity was initially modified by agricultural practices and more recently by residential development.

Site Geology

Bedrock

According to published geologic maps, the site and surrounding hills are underlain by predominately marine sandstone of Miocene age (see Figure 2). The various geologic maps reviewed for this evaluation are not in general agreement as to the formation name for the bedrock. The sandstone has been variously assigned to the Briones Formation, the Monterey Formation, and the Neroly Formation (Dibblee, 1980 and 2005; Ellen and Wentworth, 1995; Graymer and others, 1994; and Haydon, 1995). Our geologic mapping of rock outcrops within the property suggests that the sandstone is consistent with published descriptions of both the upper and lower members of the Briones Sandstone (Haydon, 1995) as shown on Plate 1.

Published geologic maps suggest that the northwest-southeast trending Happy Valley Syncline passes through the center of the property (see Plate 1). Bedrock on the northeast limb of synclinal axis has been generally mapped as northwest-striking and southwest dipping from 60 to 88 degrees. Bedrock on the southwest limb of the synclinal axis has been generally mapped as northwest-striking and northeast dipping from 30 to 55 degrees (Dibblee, 1980 and 2005; Graymer and others, 1994; and Haydon, 1995). We have measured similar bedrock attitudes within outcrops and bedrock exposures at the site as plotted on Plate 1.

Landslides

Landslide maps published by both the California Geological Survey and the U.S. Geological Survey show several landslides along the flanks of the various ridgelines within and adjacent to the property boundaries (Haydon, 1995; and Nilsen, 1995). All of these mapped landslides are failing into the canyons and ravines that surround the high points and ridges within the site (see Figure 3). The entire property is classified as being most susceptible to landslide hazards by the California Geological Survey due to the generally rugged terrain and steep slopes (Haydon, 1995). From our review of historic aerial photographs, we have identified two significant landslides within or adjacent to the property as shown on Plate 1. One of these landslides affects the proposed building site for Parcel C.

Several relatively small landslides and debris flows have been identified along the flanks of the site ridgelines triggered by previous rainfall events from 1950-71 (Nilsen and Turner, 1975). This was confirmed from our review of aerial photographs for the years 1957 and 1959. Similarly, several debris flows been mapped along the slopes within and adjacent to the property resulting from the widespread January 3-5, 1982 rainstorm that affected many areas of the San Francisco Bay Area (Ellen and Wieczorek, 1988). The two slope failures that occurred within the property in 1982 and were subsequently repaired likely happen during the 1982 raiunstorm (see Plate 1).

Surficial Native Soils

The native site soils have been approximately assigned to the Lodo soil series, generally a clay loam forming on sandstone. In areas where the ground surface has not been modified by cutting and filling for development, the native soils are generally characterized by a liquid limit (LL) ranging from 30 to 40 and a plastic index (PI) ranging from 15 to 20. The Lodo soil is generally considered to have a moderate shrink-swell potential and a moderate corrosivity to uncoated steel (Welch, 1981).

Artificial Fill

There are relatively small isolated pockets of fill materials identified along the flanks of the prominent ridgelines throughout the property, presumably to widen the natural narrow ridges as shown on Plate 1. Two landslide repairs using artificial fill materials have been reported near the existing house in the early 1980s as shown on Plate 1. Lastly, a southeast-draining ravine located south of the existing house was backfilled by native materials generated from the excavation of the existing house site and the Parcel D ridge area in the late 1970s. This canyon fill is the proposed building site for Parcel C. The fill materials tested for the canyon fill generally consisted of a mixture of silty clay to silty fine sand (Hallenbeck-McKay & Associates, 1977b).

FAULTING AND SEISMICITY

Faults

The San Francisco Bay area is dominated by the northwest-striking, strike-slip San Andreas fault and related major faults, such as the Calaveras, Concord – Green Valley, Greenville – Marsh Creek – Clayton, Hayward – Rodgers Creek, and Seal Cove – San Gregorio faults (Jennings and Bryant, 2010; see Figure 4). In the global context of plate tectonics, the San Andreas and related faults work as a major shear system up to 50 miles (80 km) wide, accommodating approximately 32 mm/yr of slip between the Pacific and North American tectonic plates, with most of this movement occurring along the San Andreas fault. The San Andreas fault system is unique in that it is one of the few locations in the world where a major transform plate tectonic boundary occurs on land.

The site is not located within an Earthquake Fault Zone as designated by the State of California for active[1] faults (Hart and Bryant, 1997) and no faults have been mapped as passing through the property (Dibblee, 1980 and 2005; and Haydon, 1995). The closest State of California Earthquake Fault Zone is located approximately 2.3 miles (3.7 km) northwest of the site for the Holocene active Concord fault zone (Jennings and Bryant, 2010). The closest major non-Holocene active fault to the property is the Pinole fault, located approximately 0.75 miles (1.2 km) to the southwest (Dibblee, 1980 and 2005; and Haydon, 1995). Table 1 below lists the major active faults closest to the project site and their characteristics.

Table 1: San Francisco Bay Area Faults Near the Site (FRISKSP, 2004)

Earthquake Generating Fault	Fault Length (km/mi)	Distance* to Nearest Fault Segment (km/mi)	Upper Bound Earthquake Mw_{max}	Slip Rate (mm/yr)
Northern Hayward	35 / 22	7.5 / 4.7	6.9	9.0
Northern Calaveras	45 / 28	14.5 / 9.0	6.8	6.0
Concord – Green Valley	56 / 35	14.8 / 9.2	6.9	6.0
Southern Hayward	53 / 33	20.7 / 12.9	6.9	9.0
Greenville	42 / 26	22.1 / 13.7	6.9	2.0
Rodgers Creek	62 / 39	23.7 / 14.7	7.0	9.0
West Napa	30 / 19	28.3 / 17.6	6.5	1.0
San Andreas	190 / 118	37.1 / 23.1	7.9	24.0
Great Valley 6	85 / 53	37.6 / 23.4	6.7	1.5
Great Valley 5	28 / 17	42.4 / 26.4	6.5	1.5
Monte Vista – Shannon	45 / 28	53.3 / 33.1	6.8	0.4
Hayward (SE Extension)	26 / 16	55.8 / 34.7	6.4	3.0
Point Reyes	47 / 29	57.1 / 35.5	6.8	0.3
Great Valley 7	45 / 28	61.2 / 38.0	6.7	1.5
Southern Calaveras	59 / 37	63.4 / 39.4	6.2	15.0

*Distances to earthquake epicenters are based on latitude and longitude of existing house

[1] An "active" fault is defined as one that has had surface displacement within Holocene time or about the last 11,000 years (California Code of Regulations, Title 14, Division 2, Appendix B, Section 3601).

Historic Earthquakes

The site is within the seismically active San Francisco Bay area where small earthquakes (Magnitude <4) are frequent, moderate earthquakes (Magnitude 4–6) are sometimes felt, and large earthquakes (Magnitude >6) occur, but are rare. The record of documented earthquakes in California exists for only about the last 245 years, or since 1769 when the Spanish began to construct missions throughout the state. From 1800 to 2000, approximately 656 moderate earthquakes and 16 large earthquakes have occurred within 100 miles (161 km) of the site (EQSEARCH, 2004; Stover and Coffman, 1993; and Toppozada and others, 2000). Table 2 below lists the large earthquakes that have occurred near the site.

Table 2: Large Earthquakes (M>6.0) in Close Proximity to the Site (EQSEARCH, 2004)

Epicenter Location	Date	Moment Magnitude	Distance* (mi/km)	Compass Direction to Epicenter
Hayward	October 21, 1868	6.8	15.5 / 24.9	Southeast
San Francisco	June 21, 1808	6.3	19.0 / 30.5	West
San Francisco	April 18, 1906	8.25	22.7 / 36.6	West
Mare Island	March 31, 1898	6.2	23.0 / 36.9	Northwest
SF Peninsula	June 1, 1838	7.0	24.7 / 39.7	Southwest
San Jose	Nov 26, 1858	6.1	32.5 / 52.4	South
Vacaville	April 19, 1892	6.4	35.0 / 56.3	North
Winters	April 21, 1892	6.2	43.3 / 69.6	Northeast
S Santa Cruz Mt	October 8, 1865	6.3	45.2 / 72.7	South
Morgan Hill	April 24, 1984	6.2	48.9 / 78.7	South
Morgan Hill	July 1, 1911	6.6	51.6 / 83.1	South
Loma Prieta	October 18, 1989	7.0	62.8 / 101.1	South
Gilroy	June 20, 1897	6.2	73.4 / 118.1	Southeast
Pajaro Gap	October 18, 1800	7.0	82.1 / 132.1	South
Pacific Ocean	October 22, 1926	6.1 (two events)	90.5 / 145.7	Southwest

*Distances to earthquake epicenters are based on latitude and longitude of existing house

Future Earthquakes

Studies by the U.S. Geological Survey's Working Group on California Earthquake Probabilities (WGCEP, 2008) suggest that there is a 63% chance of at least a Magnitude 6.7 or greater earthquake occurring in the San Francisco Bay area in the next 30 years. Of all of the major Bay Area faults, the highest probability for this earthquake is thought to be from the Hayward fault. There is a 31% chance that this predicted earthquake will occur on the Hayward fault zone located approximately 4.7 miles (7.5 km) away.

REVIEW OF AERIAL PHOTOGRAPHS

We have reviewed selected vertical stereo pairs of historic aerial photographs of the site vicinity for the years 1939, 1946, 1953, 1957, 1959, 1968, 1978, 1982, 1984, 1986, 1988, 1990, and 1998. The horizontal scales of the selected imagery ranged from 1:9,600 to 1:23,600. A complete list of photographs reviewed is provided in the back of this report. The following paragraphs are a brief chronology of development for the site and our analysis of any landslide-related features potentially affecting the site, based on historic aerial photographs.

Chronology of Development

The 1939, 1946, and 1953 aerial photographs show the site as undeveloped and generally grass covered with stands of trees concentrated in the north and east facing canyons. The existing house location, site of the large canyon fill to the south of the existing house location, and the prominent ridgeline for proposed Parcel D can be seen in their natural state prior to modification from grading. In these early aerial photographs, there is a dirt trail from the north that winds up the north-facing slopes crossing the proposed building site for Parcel A, and continuing south along the central ridgeline. The dirt trail passes along the west side of the existing house location and drops down the slope to the west of the proposed building site for Parcel D. The 1957, 1959, and 1968 aerial photographs show that the dirt access trail later branched to the west at the existing house location and also crossed the prominent ridgeline to the west. The site remained undeveloped during this time period.

Between 1968 and 1978, significant changes occurred at the site. These changes generally included the construction of the current alignment and widening of the access roadway, the excavation and lowering of both the existing house pad and the natural ridgeline for proposed Parcel D, construction of the existing residence, and the filling of the canyon south of the existing house pad as seen for the first time on the 1978 aerial photographs. The access roadway now swings to the east of the proposed building site for Parcel A following the current alignment and does not pass through the proposed building site as was observed in the older aerial photographs. It appears that the existing house is still under construction in the 1978 aerial photographs with several vehicles/equipment and construction supplies stored along the cul-de-sac area near the front of the house. Also, the utility corridor that begins near the current cul-de-sac and extends down the slope to the north to reach the lower portion of the access roadway appears as a bright narrow strip without vegetation and was likely installed at this time.

Comparison of the pre-development and post-development aerial photographs suggests that a significant amount of materials were removed from the existing house site and ridgeline areas to the south. These excavated materials were placed in the large canyon fill to the south of the existing house site (see Plate 1). The 1978 aerial photographs show that the large canyon fill was originally placed with three narrow transverse drainage benches and a berm along the top of the slope. We did not review any aerial photographs that were taken during fill placement of the canyon fill.

Landscape Geomorphology and Landslide Recognition

The pre-development aerial photographs reviewed from the late 1930s, middle 1940s, and late 1950s were useful in analyzing the site area prior to landscape modification and assessing the general slope stability of the property. For example, landslides have distinct geomorphic features such as uneven or hummocky ground, scarps or voids, presence of springs, and vegetation changes. These early aerial photographs provide an opportunity to observe the natural slopes and identify possible landslide-related features. The post-development aerial photographs, mainly those from 1978 and 1982, reveal the extent of grading within the site and observations of reported slope failures related to grading activities within the property.

The pre-development aerial photographs show that the existing house location generally consisted of a prominent hilltop where three narrow ridgelines came together forming the highest location within the property. Two relatively small debris flows were observed along the southeast-facing flank of the prominent hilltop on the 1959 and 1968 aerial photographs. These surficial slope failures are seen as circular barren areas along the grass-covered slope with a narrow flow path of debris extending down the slope toward the canyon that was later backfilled to create the large fill for the proposed Parcel C building site. The locations of these small debris flows are now masked by the current development area for the existing house.

The 1982 aerial photographs show the presence of the two slope failures reported at the site by Hallenbeck-McKay & Associates (1984) located at the downslope edge of the driveway cul-de-sac and along the narrow roadway on the west side of the existing house. Both failures occur within or adjacent to areas modified by the late 1970s grading activities. They appear to involve the near surface soil materials with flow paths of soil debris extending downhill to the lower streets in both events. These failures were repaired between May 1982 and May 1984, based on our review of aerial photographs. Additionally, we observed some erosion of the graded slope along the southeast side of the existing house on the 1982 aerial photographs as well.

On nearly all of the aerial photographs reviewed, including both pre- and post-development, a large landslide is identified entirely within the property. This large landslide is located on the southeast-facing slope below the existing house location. The same landslide is also shown on published landslide maps (Haydon, 1995; and Nilsen, 1975; see Figure 3). The landslide extends into the natural canyon as seen on the pre-development aerial photographs and the lower portion of the landslide is now concealed by the large canyon fill. The approximate location of the upper portion of this landslide is plotted on Plate 1 adjacent to the upslope side of the proposed building site for Parcel C. This landslide is characterized with a general bowl-shaped outline and hummocky ground surface. We did not observe any obvious signs of activity such as barren scarps or displaced ground within the landslide mass.

Another relatively large landslide was identified on the aerial photographs along the south-facing slope of the prominent west ridgeline. Only the upper portion of the landslide is within the property as seen on the aerial photographs as a hollow or bowl-shaped depression along the slope as shown on Plate 1. The remainder of the landslide is offsite and down the slope. The landslide does not affect any of the proposed building sites. We did not observe any obvious signs of activity within the landslide mass on the aerial photographs reviewed.

The natural ridgeline for Parcel D prior to excavation appears as a narrow prominent ridge south of the existing house site. The natural ridge expands to the south near the south end of the property where a rocky outcrop trending nearly east-west is present as seen on the pre-development aerial photographs. Some relatively small erosional scars were observed below the rocky outcrop offsite to the south. We did not observe any obvious signs of landsliding within or adjacent to the proposed building site for Parcel D on the aerial photographs reviewed.

On the 1957, 1959, and 1982 aerial photographs, we observed some relatively shallow debris flows at the west end of the prominent west ridgeline. This appears to be offsite and does not affect any of the proposed building sites. These debris flows were identified as small barren scars along the slope with a narrow debris trail leading down the slope away from the scar. Lastly, we did not observe any of these obvious signs of landsliding within or adjacent to the proposed building site for Parcel A on the aerial photographs reviewed.

GEOLOGIC RECONNAISSANCE

We initially visited the site on July 8, 2015 to observe the general site conditions and later returned to the site on July 31, 2015 to conduct a more thorough reconnaissance and geologic mapping of the property. The paved access roadway leads up the slope from the north end of the property and ends at a cul-de-sac in front of the existing house. The existing house within Parcel B occupies the highest elevation within the property and is the only permanent structure within the site. Generally, the ground surfaces throughout the property were covered with grasses. Oak trees were scattered along the slopes and pine trees had been planted along the fringes of the previously graded areas.

From the cul-de-sac, the proposed building site and access street alignment for Parcel A can be seen to the northeast. We did not observe any obvious signs of landsliding along the prominent ridgeline that leads to the proposed building site for Parcel A. Bedding attitudes from a rock exposure below the proposed building site west of the paved access roadway was measured as striking N70W to N85E and dipping 42 to 48 degrees to the south as shown on Plate 1.

We hiked along the prominent ridgeline that extends to the west from the existing house site and mapped isolated pockets of artificial fill, presumably from past grading activities to widen the ridgeline. We also mapped the approximate location of the upper portion of a large landslide that extends offsite. This large landslide was identified along the south flank of the prominent ridge from our review of historic aerial photographs (see Plate 1). We understand that no future building sites are proposed along this prominent west ridgeline.

Along the west side of the existing house, there is a narrow dirt road that passes between the top of the descending slope and a privacy wall for the existing house. The narrow dirt road sits atop of an old landslide repair from the early 1980s (see Plate 1). Pine trees have been planted along the outside shoulder of the dirt road. The dirt road leads down the slope to the south to access the proposed building sites for Parcels C and D.

The proposed Parcel C building site is nearly level because it is at the crest of the large canyon fill that was placed in the late 1970s. The proposed building pad is overgrown with trees and brush. The upper portion of a large landslide is mapped along the upslope side of the proposed building site as shown on Plate 1. The landslide has an uneven surface, but we did not observe any obvious signs of reactivation. The upper limit of this large landslide may encroach into the dirt access road leading to both proposed Parcels C and D. However, the presence and extend of the landslide would have to be confirmed by future subsurface exploration.

Further south, the proposed building site for Parcel D is located within a bedrock cut area that was excavated in the late 1970s. The area is unnaturally level with bedrock fragments and bedrock debris scattered along the ground surface. All of the native soils have been removed from the excavation area. A natural rock outcrop of well-cemented fossiliferous sandstone was observed along the south side of the proposed building site. The outcrop is topographically below the proposed building site and strikes northwest across the extreme south portion of the property. Bedding attitudes collected along the sandstone outcrop were striking from N45W to N71W and dipping 43 to 70 degrees to the northeast as shown on Plate 1. The exposed sandstone is consistent with published descriptions of the Lower Member of the Briones Sandstone (Haydon, 1995).

EVALUATION OF POTENTIAL GEOLOGIC AND SEISMIC HAZARDS

The potential geologic hazards identified during this evaluation that affect the site include debris flows and landslides, settlement of previously placed fill materials, and naturally expansive soils. We have also identified potential seismic hazards that may affect the property. These would be triggered from an earthquake on the Hayward fault or other nearby faults and they generally include ground shaking, fault-rupture, earthquake-induced landslides, and liquefaction. The potential hazards are briefly discussed below.

Geologic Hazards

Debris Flows

Several relatively small shallow debris flows were observed on the aerial photographs within and near the property. These were identified offsite near the west end of the prominent ridge, and along the natural undeveloped southeast-facing slope below the existing house site. Debris flows have also been documented on or near the site during previous heavy rainstorms (Nilsen and Turner, 1975; and Ellen and Wieczorek, 1988). Therefore, the native surficial materials that include soil and the upper weathered portion of bedrock are likely prone to debris flow hazard. This would likely also include the various isolated pockets of artificial fill that have been placed along the fringes of the prominent ridgelines throughout the property. As a reminder, the two documented slope failures that were subsequently repaired involved fill materials that failed during a particularly heavy winter rainstorm in 1982.

Landslides

The entire property has been classified as being most susceptible to landsliding due to the general rugged terrain and steep slopes (Haydon, 1995). From our research, we conclude that only two significant landslides are present within and adjacent to the site. These occur to the west of the existing house along the prominent ridgeline, and to the south of the existing house above the proposed building site for Parcel C. Of the two landslides identified within the property, the landslide south of the existing house site may affect the proposed Parcel C building site and the narrow access corridor leading to both proposed Parcels C and D. The presence and extent of the landslide would have to be confirmed by future subsurface exploration and mitigated as necessary. The landslide likely underlies the old canyon fill in the vicinity of the proposed Parcel C building site (Plate 1).

Settlement of Previously Placed Fill Materials within the Old Canyon Fill

The fill materials that were placed in the natural southeast-draining ravine south of the existing house may be subject to settlement and/or lateral movements, especially after prolonged periods of heavy rain and earthquake shaking.

Expansive Soils

The native soils have been described as being moderately expansive with a liquid limit (LL) ranging from 30 to 40 and a plastic index (PI) ranging from 15 to 20 (Welch, 1981). These soils were generated from sandstone bedrock. However, there may be other natural and/or artificial soils within the property that have a higher plastic index and a greater shrink-swell potential that have not yet been identified.

Seismic Hazards

Ground Shaking

The Intensity of ground shaking during an earthquake depends on many variables, including size of earthquake, depth to rock, and distance from causative fault. Several large earthquakes have occurred within 100 miles of the project site over the last approximately 245 years (see Table 2). Even though, the Hayward fault has the highest probability of producing the next major earthquake in the San Francisco Bay Area, other seismic sources should not be discounted. Any future structures constructed at the site will likely experience ground shaking during the lifetime of the structure from any of the nearby faults.

Fault-Rupture

Surface rupture hazard is a direct effect of large earthquakes that can occur when the ground surface is offset vertically and/or laterally displaced due to fault movement. In an attempt to reduce ground rupture hazard to residential structures, the State of California has identified and mapped “active” faults or those that have the potential for ground rupture and they have established Earthquake Fault Zones along these active faults (Hart and Bryant, 1997). The project site is not located within a State of California Earthquake Fault Zone. The closest active fault trace is located approximately 4.7 miles (7.5 km) to the west along the Hayward fault zone (FRISKSP, 2004; and Jennings and Bryant, 2010). According to the U.S. Geological Survey, no ground rupture has occurred within or adjacent to the project site as a result of historic earthquakes (Youd and Hoose, 1978).

Earthquake-Induced Landslides

Landslides generated by earthquake shaking have been well documented. In the Santa Cruz Mountains and along a 150-mile (240-km) stretch of the central California coastline, several landslides occurred as a result of the 1989 Loma Prieta Earthquake, epicenter located approximately 62.8 miles (101.1 km) south of the site (Keefer and Manson, 1998). No seismically-induced landslides have been mapped or reported within or adjacent to the project site during historic earthquakes (Youd and Hoose, 1978). However, the two landslides identified within and adjacent to the property as shown on Plate 1 could reactivate during an earthquake on any of the faults within close proximity to the site. This is of particular concern for the landslide mapped above the proposed building area for Parcel C. Similarly, earthquake shaking could trigger shallow debris flows along the slopes within the property affecting the proposed building site for Parcel C. Future subsurface exploration and mitigation measures would have to address these potential hazards.

Liquefaction

Liquefaction is an indirect effect of earthquake shaking and occurs when the underlying soil structure collapses and the ground water table is relatively shallow (within the upper 50 feet). Unconsolidated or relatively loose, silty, sandy, and even gravelly soils can liquefy and settle. According to the U.S. Geological Survey, liquefaction has not occurred within or adjacent to the project site from historic earthquakes such as the 1906 San Francisco Earthquake (Youd and Hoose, 1978). The potential for liquefaction hazard at the site is considered to be nonexistent.

DISCUSSIONS AND CONCLUSIONS

Based on the information collected, reviewed, and evaluated for this geologic research, we conclude that the site is suitable for the proposed four-lot subdivision and subsequent residential development from an engineering geologic standpoint. We have listed some general characteristics regarding development for the proposed building sites as shown in Table 3. The geologic and seismic hazards with potential to impact the proposed development are summarized in Table 4. The existing house site on Parcel B is not included in our assessment.

Table 3: Planning Considerations for Site Development

General Characteristics for Development Sites	A	C	D
Anticipated Underlying Earth Materials	Bedrock at Shallow Depths	Unknown thickness of Artificial Fill Resting on Old Landslide	Bedrock Near the Ground Surface
Proposed Access to Sites	Isolated Fill Pockets Including an old Landslide Repair	Crosses Both Old Landslide Repair and Unrepaired Landslide	Crosses Both Old Landslide Repair and Unrepaired Landslide
Slope Gradients	Natural Slopes Up to 1.6:1 Drain Away from the Proposed Building Site	Natural Slopes Up to 2:1 Drain Toward the Site; Graded Slopes Up to 2:1 Drain Away from Building Site	Natural Slopes Up to 2:1 Drain Away from the Proposed Building Site

Table 4: Potential Geologic and Seismic Hazards to Impact the Site Development

Type of Geologic/Seismic Hazards	Proposed Building Sites		
	A	C	D
Potential Geologic Hazards			
Debris Flows	Low	High	Low
Landslides	Low	High	Low
Settlement of Old Fill Materials	None	High	None
Expansive Soils	Moderate	Moderate	None
High Groundwater Conditions	None	None	None
Potential Seismic Hazards			
Earthquake Shaking	High	High	High
Fault Rupture	None	None	None
Earthquake-Induced Landslides	Low	High	Low
Liquefaction	None	None	None

LIMITATIONS

The contents of this report are based upon a review of available published and unpublished data referenced in this report; a review of selected aerial photographs referenced in this report; geologic mapping of bedrock exposures within the site; and professional judgment based on such information. Although they are not anticipated for the subject site, we did not perform an evaluation or assessment or review any documents pertaining to any potential environmental hazards, such as hazardous materials or groundwater contamination that may be present within the property.

The proposed construction at the site should be designed, observed, and built by qualified professionals. We have no control over future development and construction on this property, and we make no representations regarding future conditions at the site. Changes in site conditions and standard of practice can occur over time; consequently, the conclusions in this report should be reviewed after two years, and updated by this office, if necessary.

Thank you for providing us with the opportunity to provide our services on this project. If you have any questions regarding the contents of this report, please do not hesitate to call us at (510) 794-7495.

Sincerely,

EARTH FOCUS GEOLOGICAL SERVICES, INC.

Patrick L. Drumm, PG, CEG, CHG
Senior Engineering Geologist

Enclosures:

Figure 1 – Site Location Map
Figure 2 – Regional Geologic Map
Figure 3 – Regional Landslide Map
Figure 4 – Regional Fault Map

Plate 1 – Site Geologic Map

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AERIAL PHOTOGRAPHS REVIEWED

Date	Flight Line	Frames	Scale	Type
08-02-39	BUU	289-38 & 39	1:20,000	B & W Stereo
07-22-46	GS-CP	4-33 & 34	1:23,600	B & W Stereo
08-17-53	AV-119	14-09 & 10	1:10,000	B & W Stereo
08-17-53	AV-119	15-11 & 12	1:10,000	B & W Stereo
05-04-57	AV-253	12-14 & 15	1:12,000	B & W Stereo
07-02-59	AV-334	12-25 & 26	1:9,600	B & W Stereo
07-02-68	AV-858	04-14 & 15	1:12,000	B & W Stereo
06-06-78	AV-1515	09-20 & 21	1:12,000	B & W Stereo
05-18-82	AV-2145	09-19 & 20	1:12,000	B & W Stereo
05-17-84	AV-2480	09-20	1:12,000	B & W Single
04-20-86	AV-2861	9-20 & 21	1:12,000	B & W Stereo
08-03-88	AV-3368	11-17	1:12,000	B & W Single
06-12-90	AV-3845	11-18	1:12,000	B & W Single
08-24-98	AV-6100	118-19 & 20	1:12,000	B & W Stereo

Map Source: U.S. Geological Survey, 1995, Briones Valley, California, 7.5' Quadrangle: Map Scale 1:24,000.

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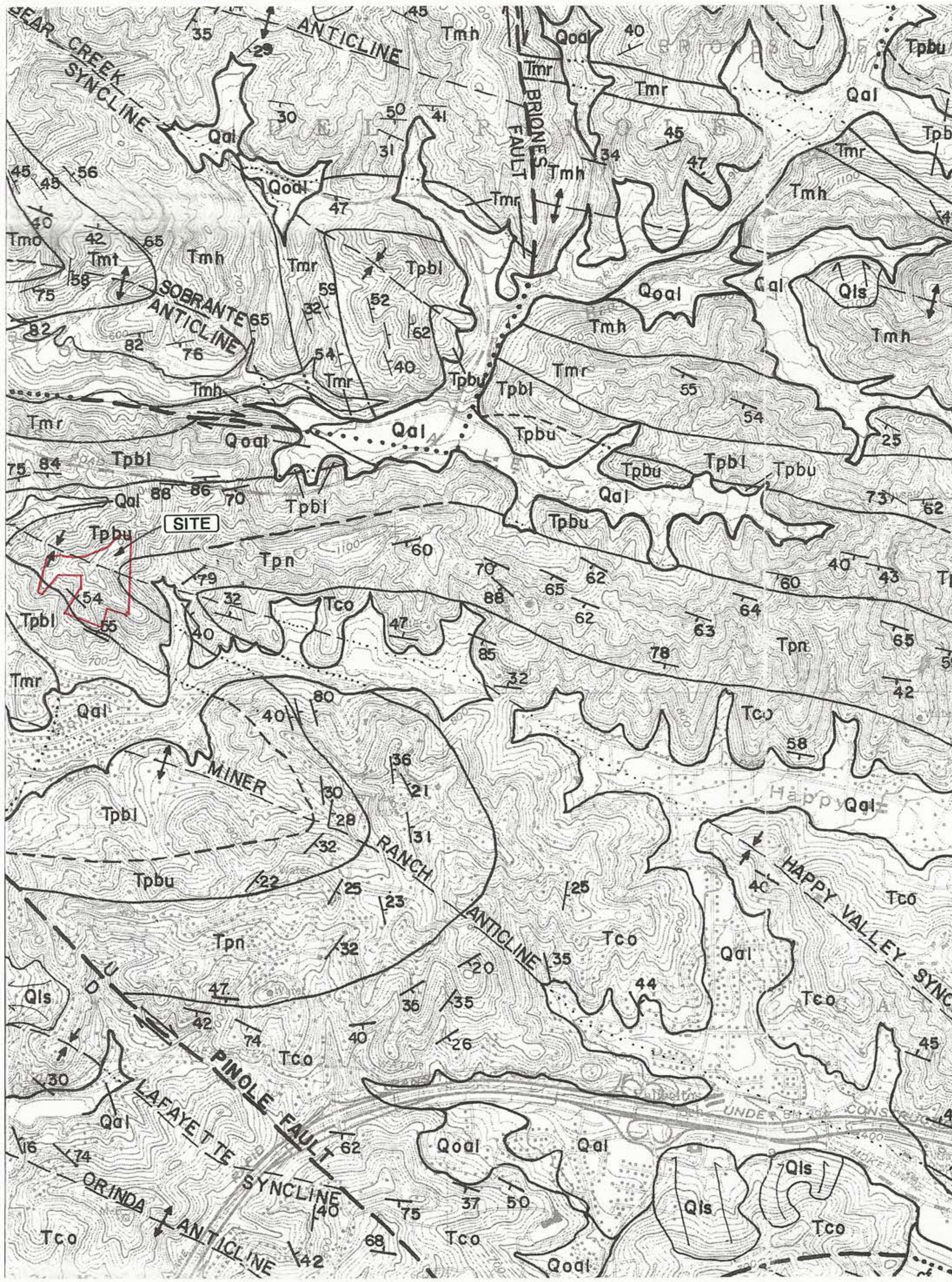
SITE LOCATION MAP

Engineering Geologic Hazards Evaluation
24-Acre Property at 88 Sunnyside Lane
San Francisco, California

Project No. S15-01449	September 2015	Figure 1



EXPLANATION

GEOLOGIC UNITS

cf	CUT AND FILL (historic): Only the large embankment dams are shown to avoid obscuring the areal distribution of geologic units.
fm	FILLED MARSHLANDS (historic): Portions of San Francisco Bay filled since approximately 1850. Lithology similar to bay mud.
Qbm	BAY MUD (Holocene): Clay and silty clay with high organic matter content, fine sand and peat.
Qal	YOUNGER ALLUVIUM (Holocene-Pleistocene): Sand, silt and clayey silt with occasional sand and gravel.
Qoal	OLDER ALLUVIUM (Holocene-Pleistocene): Clay, sand, silt, and gravel.
Qls	LANDSLIDES (Holocene-Pleistocene): Indicated only where underlying geologic relations are obscured.
	CONTRA COSTA GROUP (upper Miocene, nonmarine-continental)
Tcmu	MULHOLLAND FORMATION, upper member: Sandstone, Conglomerate, Andesite, and Mudstone.
Tcml	MULHOLLAND FORMATION, lower member: Sandstone and Claystone.
Tco	ORINDA FORMATION: Sandstone, Gravelly Sandstone, Conglomerate, Andesite and Clay Shale.
	SAN PABLO GROUP (middle-upper Miocene, marine)
Tpn	NEROLY FORMATION: Sandstone and Mudstone.
Tpbu	BRIONES SANDSTONE, upper member: Sandstone, Mudstone and Tuff.
Tpbl	BRIONES SANDSTONE, lower member: Sandstone.
	MONTEREY GROUP, (middle-Miocene, marine)
Tmr	RODEO SHALE: Siliceous Shale.
Tmh	HAMBRE SANDSTONE: Sandstone and Claystone.
Tmt	TICE SHALE: Siliceous Shale.
Tmo	OURSAN SANDSTONE: Sandstone.
Tms	SOBRANTE SANDSTONE: Sandstone.
Tsr	SAN RAMON SANDSTONE (lower Oligocene, marine): Sandstone.
Tem	MARKLEY FORMATION (middle Eocene, marine): Sandstone with Sandy Carbonaceous Shale interbeds.
Ten	NORTONVILLE SHALE (middle Eocene, marine): Clay Shale with an Argillaceous, Feldspathic Sandstone interbed.
Ted	DOMENGINE SANDSTONE (middle Eocene, marine): Sandstone.
Tec	UNNAMED CLAYSTONE (lower Eocene, marine): Claystone with thin Sandstone interbeds near base.
Tmgu	MEGANOS FORMATION, upper member (lower Eocene, marine): Claystone.
Tmgl	MEGANOS FORMATION, lower member (lower Eocene, marine): Sandstone.
Tmz	MARTINEZ FORMATION, undifferentiated (upper Paleocene, marine): Sandstone and Claystone.
Tmzu	MARTINEZ FORMATION, upper member (upper Paleocene, marine): Sandstone and Claystone.
Tmzl	MARTINEZ FORMATION, lower member (upper Paleocene, marine): Sandstone.
	GREAT VALLEY SEQUENCE (Cretaceous, marine)
Ku	Undifferentiated: Sandstone, Siltstone, Clay Shale, and minor Conglomerate, interbedded in approximately equal amounts.
Kcs	Sandstone.
Kus	Sandstone, Siltstone, and Clay Shale, interbedded in approximately equal amounts.
Kuh	Sandstone with minor Clay Shale.

Note: An expanded description of the geologic units and their slope stability characteristics is presented in the accompanying booklet

SYMBOLS

CONTACTS: Solid where well located; dashed where approximately located; dotted where concealed.

40 STRIKE AND DIP OF BEDDING

40 STRIKE AND DIP OF OVERTURNED BEDDING

STRIKE OF VERTICAL BEDDING

AXIS OF ANTICLINAL FOLD: Solid where well located; dashed where approximately located; dotted where concealed.

AXIS OF SYNCLINAL FOLD: Solid where well located; dashed where approximately located; dotted where concealed.

AXIS OF OVERTURNED SYNCLINAL FOLD: Solid where well located; dashed where approximately located; dotted where concealed.

D U FAULT: Solid where well located; dashed where approximately located; dotted where concealed. Arrows show apparent relative movement. U-upthrown side, D-downthrown side.

1 .5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

N

Map Source: Haydon, W.D., 1995, Landslide Hazards in the Martinez-Orinda-Walnut Creek Area, Contra Costa County, California: California Geological Survey Open-File Report 95-12, 4 pls.

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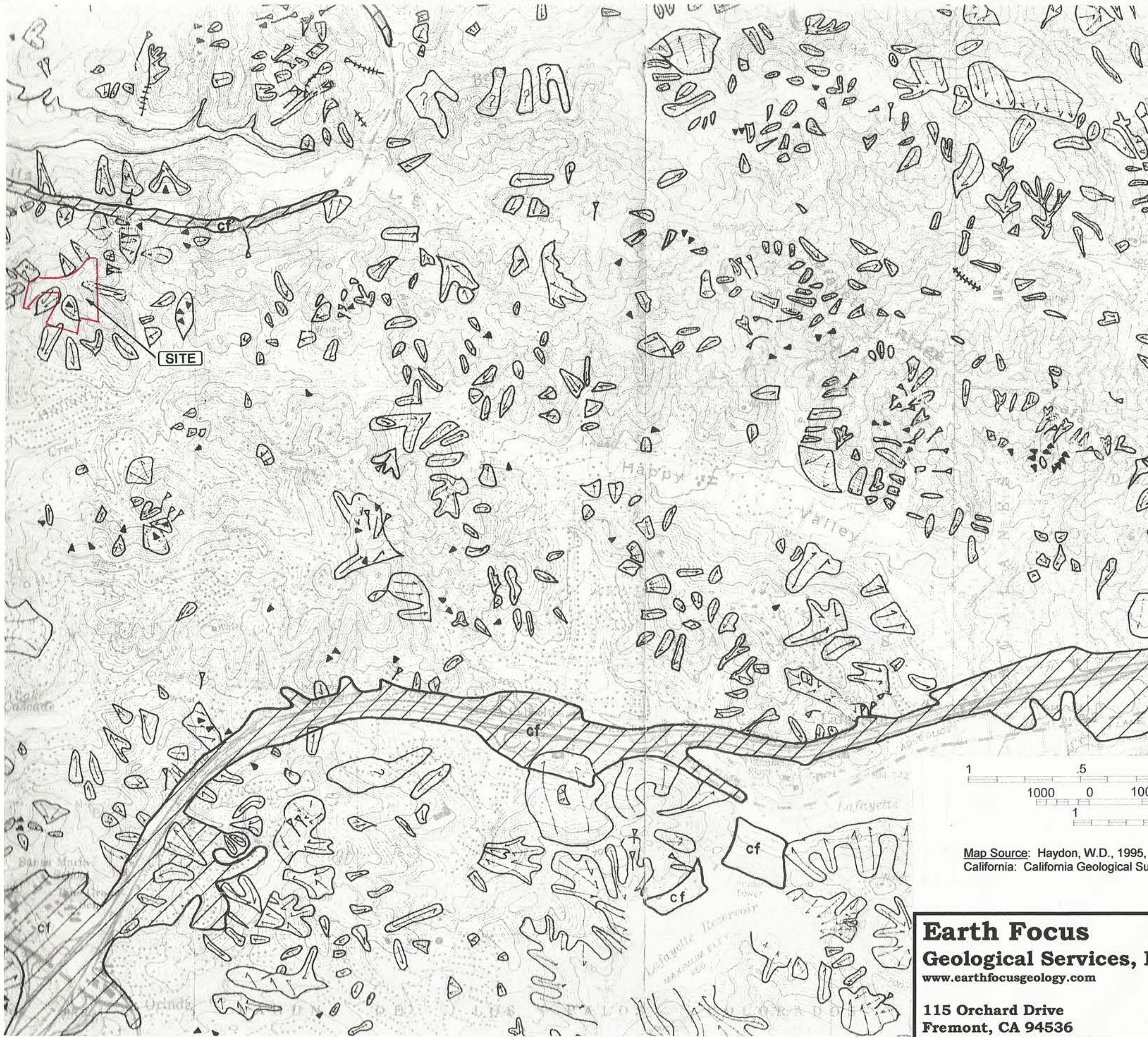
REGIONAL GEOLOGIC MAP

Engineering Geologic Hazards Evaluation
24-Acre Property at 88 Sunnyside Lane
Orinda, California

Project No.	September	
S15-01449	2015	Figure 2



EXPLANATION

LANDSLIDE DEPOSITS

A landslide is a mass of rock, soil, and debris that has been displaced downslope by sliding, flowing, or falling. Landslides include cohesive block glides and disrupted slumps that have formed by translation or rotation of the slope materials along one or more planar or curviplanar slip surfaces. Most of the landslides whose boundaries are delineated on the map are greater than 10 feet thick. Also shown are selected surficial features that typically involve only soil, colluvium, or other superficial debris that covers bedrock. The rates of movement of slope failures range from almost imperceptibly slow (as in earthflows) to extremely, even dangerously, rapid (as in debris flows).

SLOPE MOVEMENT SYMBOLS

DEFINITE OR PROBABLE LANDSLIDE: Exhibits all or many of the diagnostic features, including but not limited to headwall scarps, cracks, rounded toes, well-defined benches, closed depressions, springs, and irregular or hummocky topography, that are common to landslides and indicative of downslope movement. Continuous, single-barbed arrows indicate general direction of movement. Scarp (headwall of slump or block glide) is indicated by hachures where mapped.

?

QUESTIONABLE LANDSLIDE: Exhibits one or a few, generally very subdued, diagnostic features that commonly are associated with landslides. Typically lacks distinct landslide morphology but may exhibit disrupted terrain or other abnormal features that strongly to vaguely imply the occurrence of downslope movement. Possible scarp (headwall of slump or block glide) is indicated by hachures where mapped. Question mark signifies the uncertainty in the existence of the landslide.

SMALL LANDSLIDE: Filled arrowhead indicates a landslide too small to delineate at the scale of the map. Center of arrowhead corresponds to the location of the landslide; arrowhead points in the direction of movement (downhill). Question mark used where existence of the landslide is uncertain.

EARTHFLOW: A relatively shallow deposit of soil or other colluvial material that has oozed downslope, commonly at a rate too slow to observe except over long duration. Head scarp is shown by hachures where mapped. The area immediately upslope of failure typically unravels due to successive small slumps that occur in the oversteepened banks left by movement of the main body away from the source area. arrow shows general direction of movement.

DEBRIS FLOW: A short-lived phenomenon resulting from the rapid failure of surficial slope materials. Also called mudflow, soil slip, or debris avalanche. Typically leaves a train of debris in a scoured channel following runout of the flow. Curved line delineates channel. Scarp depicted by triangle.

GULLY: Upland drainage channel where colluvium and alluvium underlying channel floor has been incised. Indicated by elongated outlined areas, where channel sides are slumping or sliding. Slumps and slides on channel sides retain vegetation and are generally steeper than upslope areas above the gully, without slumps or slides. Where indicated by single track, channel sides have few, if any, slides or slumps, they are nearly vertical and largely lack vegetation.

cf

Areas not classified. These areas have been significantly modified by grading for development, road construction, filling of marshlands or mining.

1 .5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

N

Map Source: Haydon, W.D., 1995, Landslide Hazards in the Martinez-Orinda-Walnut Creek Area, Contra Costa County, California: California Geological Survey Open-File Report 95-12, 4 pls.

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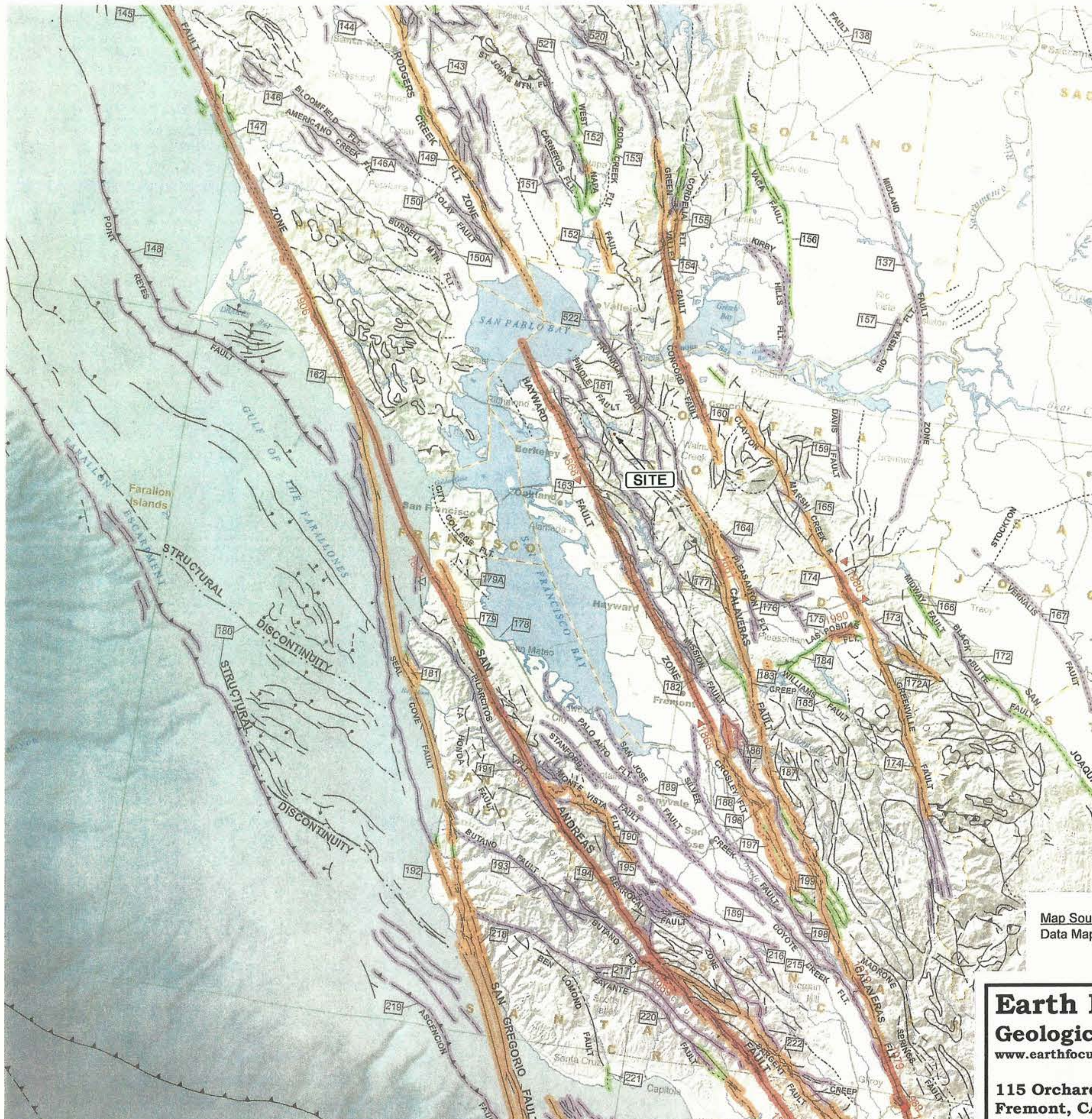
REGIONAL LANDSLIDE MAP

Engineering Geologic Hazards Evaluation
24-Acre Property at 88 Sunnyside Lane
Orinda, California

Project No.	September	Figure 3
S15-01449	2015	



Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION: ON LAND	DESCRIPTION: OFFSHORE
Quaternary	Late Quaternary	Historic				Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
		Holocene	200		?	Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
		Pleistocene	11,700		?	Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
	Early Quaternary		700,000		?	Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
Pre-Quaternary			1,600,000*			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.
			4.5 billion (Age of Earth)				

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion.

N

0 12 24
MILES

Map Source: Jennings, C.W., and Bryant, W.A., compilers, 2010, Fault Activity Map of California: California Geological Survey Data Map No. 6, Map Scale 1:750,000.

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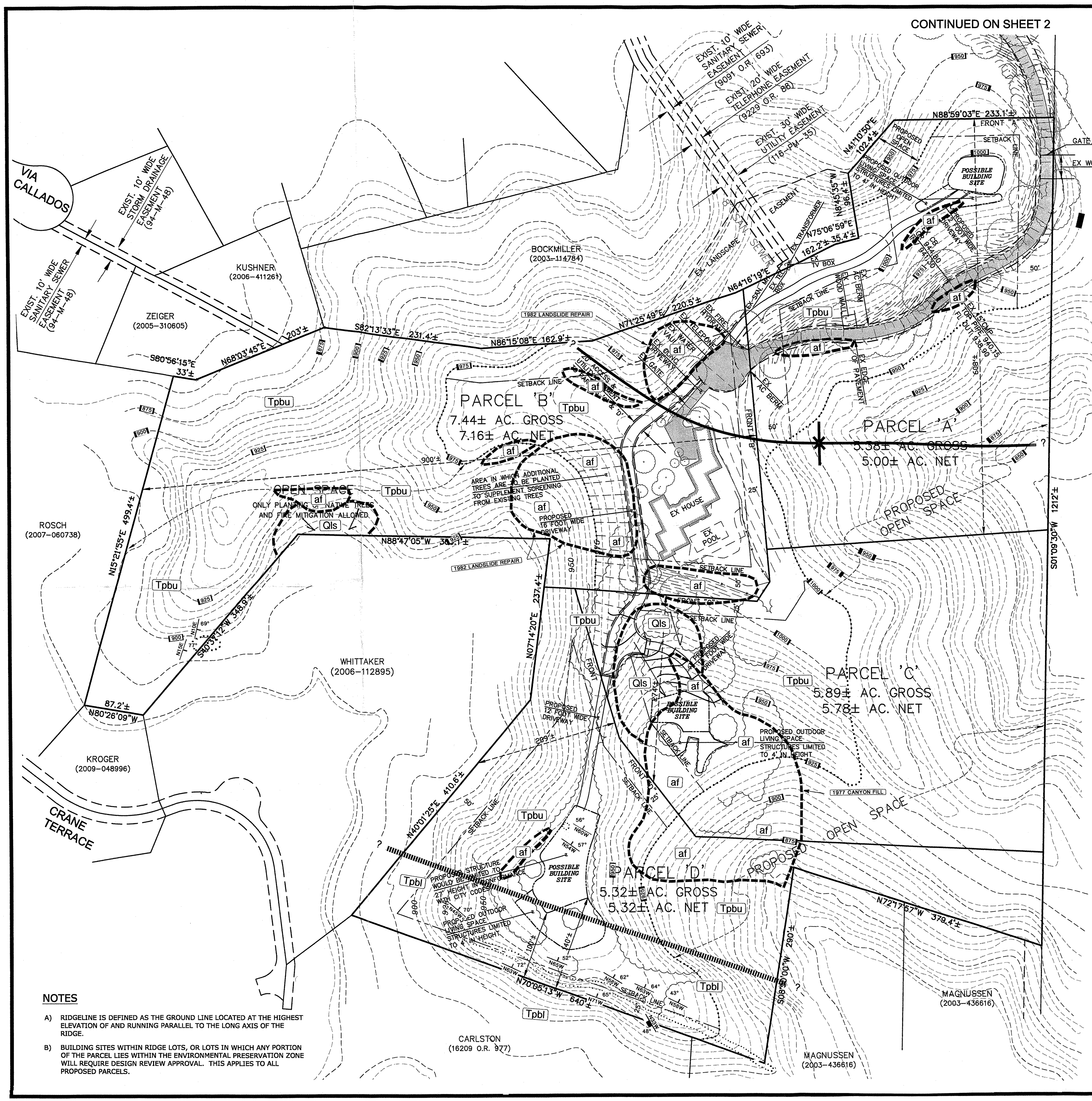
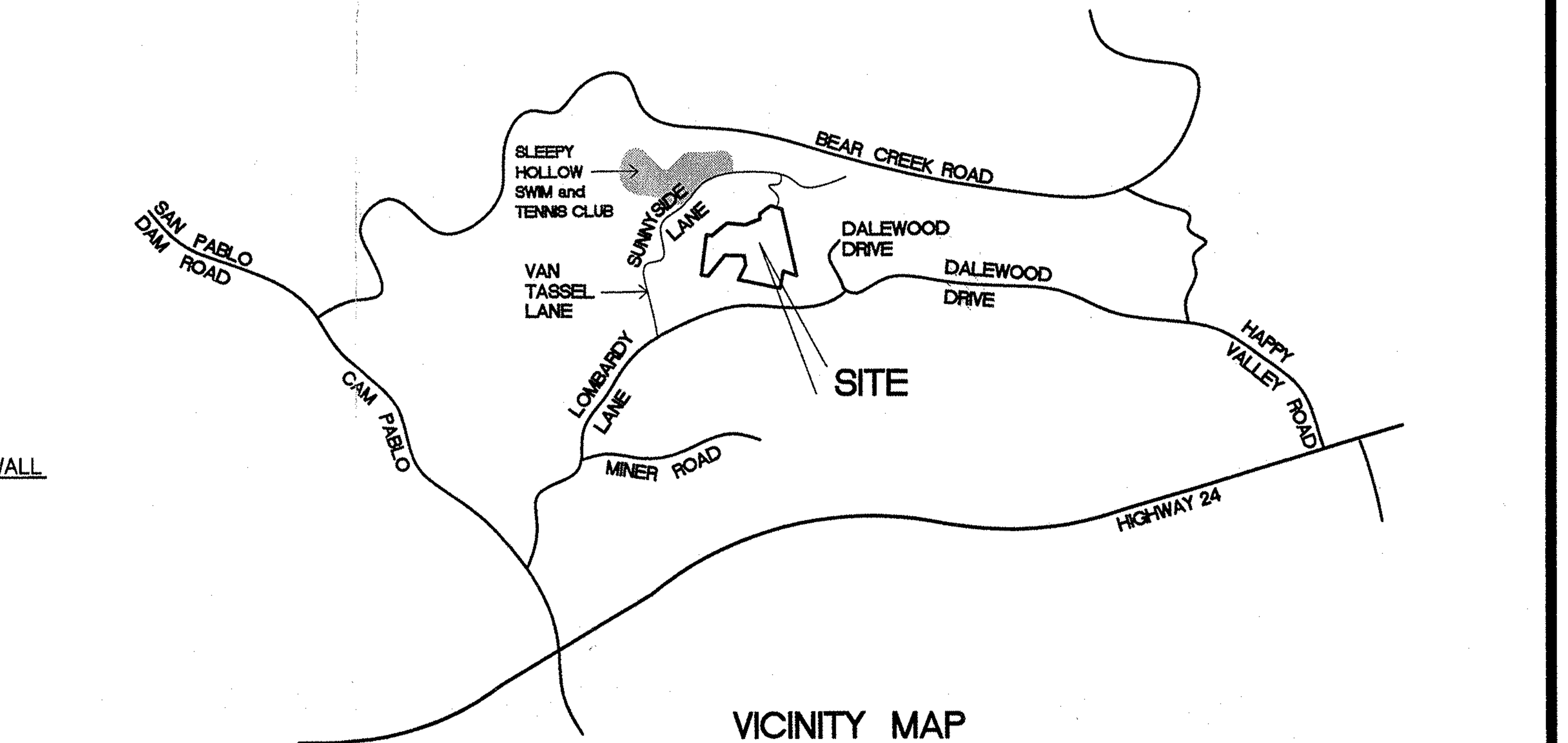
REGIONAL FAULT MAP

Engineering Geologic Hazards Evaluation
24-Acre Property at 88 Sunnyside Lane
San Francisco, California

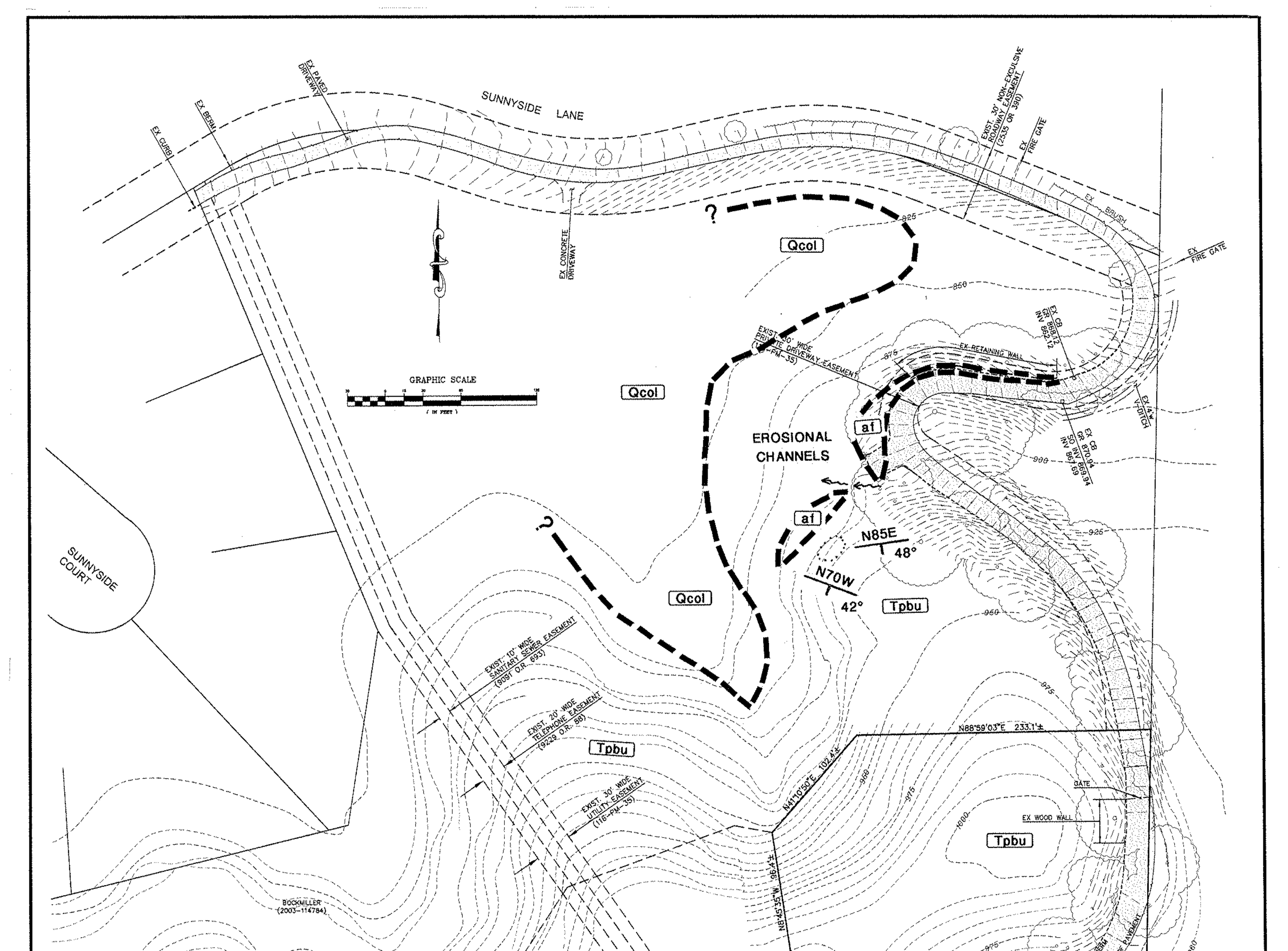
Project No.	September	Figure 4
S15-01449	2015	

Plate 1 – Site Geologic Map





VICINITY MAP
N.T.S.



SHEET 2

MAP EXPLANATION OF GEOLOGIC SYMBOLS

- Approximate Geologic Contact from Field Mapping
- Aerial Extent of Mapped Bedrock Exposures
- Approximate Lithologic Boundary Between Bedrock Units
- 48° N53W Approximate Strike and Dip of Prominent Joint Planes
- 52° N68W Approximate Strike and Dip of Prominent Bedding Planes
- Approximate Trace of the Happy Valley Syncline
- af Artificial Fill from Past Grading Activities
- Qcol Native Colluvial Deposits
- Qls Landslides Identified from Review of Historic Aerial Photographs
- Tpbu Upper Member Briones Sandstone (Mudstone, Tuff, Sandstone)
- Tpbl Lower Member Briones Sandstone (Fossiliferous Sandstone)

GRAPHIC SCALE 30 0 15 30 60 120 (IN FEET)

NOTES

A) RIDGELINE IS DEFINED AS THE GROUND LINE LOCATED AT THE HIGHEST ELEVATION AND RUNNING PARALLEL TO THE LONG AXIS OF THE RIDGE.

B) BUILDING SITES WITHIN RIDGE LOTS, OR LOTS IN WHICH ANY PORTION OF THE PARCEL LIES WITHIN THE ENVIRONMENTAL PRESERVATION ZONE WILL REQUIRE DESIGN REVIEW APPROVAL. THIS APPLIES TO ALL PROPOSED PARCELS.

Map Source: DeBolt Civil Engineering, 2015, Tentative Map, 88 Sunnyside Lane, City of Orinda, Contra Costa County, California: Unpublished Topographic Survey, Job No. 07275, Dated June 8, 2015, 2 Sheets.

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SITE GEOLOGIC MAP		
Engineering Geologic Hazards Evaluation 88 Sunnyside Lane Orinda, California		
Project No. S15-01449	September 2015	Plate 1

APPENDIX HYDRO

STORMWATER CONTROL PLAN

for

88 Sunnyside Drive
Orinda, CA

April 2019

prepared by:

DeBolt Civil Engineering
811 San Ramon Valley Boulevard
Danville, CA 94526
925-837-3780

TABLE OF CONTENTS

Tables

Attachments

I. PROJECT DATA

Table 1. Project Data

Project Name/Number	Minor Subdivision – APN 266-270-029
Application Submittal Date	
Project Location	88 Sunnyside Lane
Name of Owner	Mr. Nafis Jamal
Project Phase No.	Only one phase
Project Type and Description	Residential
Project Watershed	Property drains to multiple watersheds
Total Project Site Area (acres)	24.02 Acres
Total Area of Land Disturbed (acres)	0.90 acres
Total New Impervious Surface Area (sq. ft.)	28,150 SF
Total Replaced Impervious Surface Area	0
Total Pre-Project Impervious Surface Area	56,700 SF
Total Post-Project Impervious Surface Area	74,525 SF
50% Rule[*]	Does not apply
Project Density	Not applicable
Applicable Special Project Categories [Complete even if all treatment is LID]	Not Applicable
Percent LID and non LID treatment	All treatment is LID
HMP Compliance [†]	Does not apply

[*50% rule applies if:
Total Replaced Impervious Surface Area > 0.5 x Pre-Project Impervious Surface Area]

[†HMP applies if:
(Total New Impervious Surface Area + Total Replaced Impervious Surface Area) ≥ 1 acre]

II. SETTING

II.A. Project Location and Description

The project site is located at the end of Sunnyside Lane, approximately 1,200 feet beyond the tennis club. Sunnyside Lane is a Public Road until just beyond Sunnyside Court, where it converts to a private roadway, which terminates at the subject property.

The property is zoned and used as residential. The site is 24.02 acres in size, and currently contains one residence with a pool. The roadway which serves the existing residence will need to be widened in some locations as required by the fire department.

The property's Contra Costa County Assessor's Parcel Number is 266-270-029. It is zoned Residential Very Low Density, and the general Plan designation is Residential Single Family 5-10 acres per unit.

The proposed project proposes subdividing the property into four (4) single-family residential parcels of five acres minimum. The existing roadway will be widened, and existing fire access driveways constructed to serve the three new parcels.

II.B. Existing Site Features and Conditions

The existing site is irregular in shape, and is subject to the Ridgeline Overlay District, the Hillside and Ridgeline guidelines, the Environmental Preservation Zone, and the North Orinda Specific Plan.

The site slopes down in all directions, with historic flow being sheet flow down the slopes.

The soil is expected to be Type 'D', and the site is covered with native vegetation and trees. The surrounding areas are characterized as rural/ residential , with large residential homes.

The project area has been previously disturbed with the construction of the existing road , residences, and pool..

There are a large number of trees on the site, and the project is proposing to save almost all of them.

There are no areas on the site which are subject to inundation or ponding. The site is also located in an area designated as 'Zone X' shown on the FEMA maps

II.C. Opportunities and Constraints for Stormwater Control

There are two types of soils likely to be found on the site. These are classified as Type C and Type D soils. This storm water control plan has assumed that the entire site consists of the more restrictive soil type, Type D. The increase in the impervious area which is associated with the development of this property has less effect on the timing and volume of runoff when using Type D soils. These soils have moderate to low infiltration rates and higher runoff coefficients. Because of this, the project's post-development runoff will be only marginally increased over the pre-development levels with the additional of impervious areas. The project will construct a 20 foot wide roadway and fire department turnaround. The roadway has been designed to adhere to both horizontal and vertical fire department requirements. The roadway was also designed with the minimum impact on the property The fire department has reviewed and approved the alignment

The site has historically drained in numerous directions. This allows the opportunity for the site design to divide the runoff from the new residences and roadways to multiple locations on the site.

The Stormwater Control Plan has classified the soils on the site as Type D soils. This makes utilization of direct infiltration unfeasible because of the slow infiltration rates of the soil. The treatment facilities proposed will require the use of underdrains to allow for proposed drainage.

The roadways are a significant portion of the impervious area of the site. This roadway drainage typically generates quick runoff. The proposal is to direct this runoff down the roadway and discharge into the bio-retention area. The vegetated bio-retention facilities to be installed will provide filtration and treatment of the runoff from the new roadways.

Stormwater controls are being proposed for the project to the maximum extent practical. Stormwater runoff from the three new residences and the new driveways are being fully treated. Due to constraints in treating the widened areas of the off-site roadway, runoff from an alternate compliance site on Parcel 'B' will be treated in lieu of treating the areas of pavement widening.

III. LOW IMPACT DEVELOPMENT DESIGN STRATEGIES

III.A. Optimization of Site Layout

III.A.1. Limitation of development envelope

The proposed residences have been located such that there will be a minimal amount of grading .The owner has limited the development of the parcels to minimize impacts.

III.A.2. Preservation of natural drainage features

There are no drainage features on site. The project will maintain the historic drainage patterns. Setbacks from creeks, wetlands, and riparian habitats are not applicable.

III.A.3. Minimization of imperviousness

The proposed roadways have been designed with the minimal widths allowed by the fire department to minimize the impervious surface.

III.A.4. Use of drainage as a design element

Existing drainage patterns will remain unchanged with the development.

III.B. Use of Permeable Pavements

The driveway serving Parcel 'A' is proposed to be pervious pavers. Portions of the driveways to Parcels 'C' and 'D' are also proposed to be pervious pavers in those areas which meet the slope requirement. Because the slope of the portions of the other roadways exceed the 5% maximum slope typically required for pervious pavers, they have not been specified for those areas of driveways.

III.C. Dispersal of Runoff to Pervious Areas

The runoff from the driveways will be directed to the bio-retention (pervious) areas.

III.D. Feasibility Assessment of Harvesting and Use for Treatment and Flow-Control

III.D.1. Permeability of Site Soils

The site soils are classified as 'clay', and do not meet the saturated hydraulic permeability required. As such, harvesting is not an option.

III.D.2. Potential Opportunities for Harvesting and Use

Not applicable in this project.

III.D.3. Harvesting and Use Feasibility Calculations

Not applicable in this project

Table 2. Harvesting and Use Feasibility

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Building or other Impervious Area Description	*Square feet of impervious surface*	*Acres*	*Uses and User Units*	*Toilet and Urinal Water Usage (gal/day)*	*Water Use per Acre (gal/day/acre)*	*Required demand (gal/day /acre).*	*Is Projected Use > Required Demand? (Column F > Column G?)*	*Can runoff be piped to an irrigated area 2.5x the impervious area (Column B)?*	*Is there any other consistent, reliable demand for the quantity in Column G?*
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

III.E. Integrated Management Practices

IV. DOCUMENTATION OF DRAINAGE DESIGN

IV.A. Descriptions of each Drainage Management Area

IV.A.1. Table of Drainage Management Areas

DMA Name	*Surface Type*	*Area (square feet)*
DMA-1	*Roof*	*6,300*
DMA-2	*Pervious Pavers*	*6,605*
DMA-3	*Asphalt*	*6,670*
DMA-4	*Roof*	*5,100*
DMA-5	*Pervious Pavers*	*2,800*
DMA-6	*Pervious Pavers*	*4,392*
DMA-7	*Asphalt*	*2,580*
DMA-8	*Pervious Pavers*	*2,875*
DMA-9	*Roof*	*7,500*
DMA-10	*Asphalt*	*2,675*
DMA-11	*Roof*	*7,650*
DMA-12	*Self-Treating*	*263,300*

DMA-13	*Self Treating*	*105,210*
DMA-14	*Self-Treating*	*69,550*
DMA-15	*Self-Treating*	*553,100*

IV.A.2. Drainage Management Area Descriptions

DMA -1 totaling 6,500 sq ft; drains the roof of proposed residence on Parcel A. DMA -1 drains to IMP-1.

DMA -2 totaling 6,605 sq ft; drains the proposed pervious paver driveway on Parcel A. DMA-2 drains to IMP-1.

DMA-3 totaling 6,670 sq feet; drains the proposed driveway to Parcel C. DMA-3 drains to IMP-2.

DMA-4 totaling 5,100 sq ft drains the roof of the proposed residence on Parcel C. DMA-4 drains to IMP-2.

DMA-5 totaling 2,800 square feet drains the shared portion of the pervious paver driveway serving Parcels C and D. DMA-5 drains to IMP-3.

DMA-6 totaling 4,392 square feet drains the pervious paver portion of the driveway to Parcel C. DMA-6 drains to IMP-3.

DMA-7 totaling 2,580 square feet drains a portion of the asphalt driveway serving Parcel D. DMA-7 drains to IMP-3.

DMA-8 totaling 2,875 square feet drains the pervious paver driveway leading to Parcel D. DMA-8 drains to IMP-3.

DMA-9 totaling 7,500 square feet drains the f roof areas of the existing residence on Parcel B. DMA-9 drains to IMP-4.

DMA-10 totaling 2,675 square feet: drains a portion of the existing asphalt driveway on Parcel B. DMA-10 drains to IMP-5.

DMA-11 totaling 7,650 square feet; drains a portion of the roof of the existing residence on Parcel 'B'. DMA-11drains to IMP-5

DMA-12 totaling 263,300 square feet is self-treating.

DMA-13 totaling 105,210 square feet is self-treating.

DMA-14 totaling 69,550 square feet is self-treating.

DMA-15 totaling 553,100 square feet is self-treating.

IV.B. Tabulation and Sizing Calculations

IV.B.1. Information Summary for IMP Design

Total Project Area (Square Ft)	1,046,311 SF
Mean Annual Precipitation	25 inches

IMPs Designed For:	Treatment Only

IV.B.2. Self- Treating Areas

There are four self-treating areas proposed.

Table 3- Self -Treating Areas

DMA	*Area (square feet)*
DMA-12	*263,300 SF*
DMA- 13	*105,210 SF*
DMA-14	*69,550 SF*
DMA -15	*553,100 SF*

IV.B.3. Self-Retaining Areas

No Self-retaining areas proposed with this project

Table 4- Self Retaining Areas

DMA Name	*Area (square feet)*
N/A	*N/A*

IV.B.4. Areas Draining to Self-Retaining Areas

There are no Self-retaining areas in this project

Table 5 – Areas Draining to Self-Retaining Areas

DMA Name	*Area (square feet)*	*Post-project surface type*	*Runoff factor*	*Product (Area × runoff factor)[A]*	*Receiving self-retaining DMA*	*Receiving self-retaining DMA Area (square feet) [B]*	*Ratio [A]/[B]*
N/A	*N/A*	*Natural Vevegetation*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

Project Name: 88 Sunnyside Drive
Project Type: Treatment Only
Location: City of Orinda
APN: 266-270-029
Drainage Area: 1048495 sf
Mean Annual Precipitation: 25 in

I. Self-Treating Areas

DMA Name	Area (sq ft)
DMA12	263300
DMA13	105210
DMA14	69660
DMA16	553100

IV. Areas Draining to IMPs

IMP Name: IMP1 (Soil Type: D)

IMP Type: Bioretention Facility
Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor
DMA1	6,300	Conventional Roof	1.00	6,300
DMA2	6,605	Pervious Concrete	0.10	661
			Total	6,961

	IMP Sizing			
	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
Area	0.040	1.000	278	350

IMP Name: IMP2 (Soil Type: D)

IMP Type: Bioretention Facility
Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor
DMA3	6,670	Concrete or Asphalt	1.00	6,670
DMA4	5,100	Conventional Roof	1.00	5,100
DMA5	2,600	Pervious Concrete	0.10	260
DMA6	4,392	Pervious Concrete	0.10	439
			Total	12,469

	IMP Sizing			
	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
Area	0.040	1.000	500	500

IMP Type: Bioretention Facility
Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA7	2,660	Concrete or Asphalt	1.00	2,660				
DMA8	2,876	Pervious Concrete	0.10	288				
			Total	2,888				
				Area	0.040	1.000	115	640

IMP Name: IMP4 (Soil Type: D)

IMP Type: Bioretention Facility
Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA9	7,500	Conventional Roof	1.00	7,500				
			Total	7,500				
				Area	0.040	1.000	300	370

IMP Name: IMP5 (Soil Type: D)

IMP Type: Bioretention Facility
Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA10	2,676	Concrete or Asphalt	1.00	2,676				
DMA11	7,650	Conventional Roof	1.00	7,650				
			Total	10,326				
				Area	0.040	1.000	413	416

Table 6 **Areas Draining to Non-LID Treatment**

There are no areas draining to Non-LID treatment areas in this project.

Table 7 – Non-LID Treatment Measures

DMA Name	*Area (square feet)*	*Non-LID Treatment System*	*Minimum Design Criteria Referenced*
N/A	*N/A*	*N/A*	*N/A*

Table 6 **Areas Draining to Non-LID Treatment**

There are no areas draining to Non-LID treatment areas in this project.

Table 7 – Non-LID Treatment Measures

DMA Name	*Area (square feet)*	*Non-LID Treatment System*	*Minimum Design Criteria Referenced*
N/A	*N/A*	*N/A*	*N/A*

V. SOURCE CONTROL MEASURES

V.A. Site activities and potential sources of pollutants

The proposed roadway will create very few potential sources of pollutants. Once the roadway has been constructed, only occasional oil drops from the vehicles

V.B. Source Control Table 8

POTENTIAL SOURCE	PERMANENT CONTROL BMPs	OPERATIONAL BMPs
On-Site Storm Drain Inlets (dumping to area drains)	All area drains will be marked with the words "No Dumping! Flows to Bay"	Markings will be periodically repainted or replaced. Inlets and pipes conveying Stormwater to BMPs will be inspected and maintained as part of BMP Operation and Maintenance Plan.
Need for future indoor and structural pest control.		Integrated Pest Management (IPM) information will be provided to new homeowners.
Landscape/outdoor pesticide use	Landscape plans are designed to minimize irrigation and runoff and to minimize use of fertilizers and pesticides that can contribute to Stormwater pollution. Specify plantings within infiltration planters that are tolerant of the sandy loam soils and periodic inundation.	Landscape will be maintained using minimum or no pesticides. IPM information will be provided to new homeowners.
Vehicle washing	Driveways & parking areas drain to bio-retention areas.	Distribute Stormwater Pollution Prevention Information to new homeowners.
Roof areas	Roof downspouts drain to bio-retention areas.	Roof gutters will be cleaned periodically. Distribute Stormwater Pollution Prevention Information to new homeowners.
Refuse areas	All garbage containers will be marked with "Do not dump hazardous materials."	Adequate litter receptacles will be provided outside the residential area. Groundskeeping crew or contractor will inspect and clean up daily. Spills will be cleaned up using dry methods.

Plazas, patios, and walkways	Plaza, patio, and walkway areas drain to bio-retention areas and not directly to storm drains.	Plazas, sidewalks, parking areas, and common areas shall be swept regularly to prevent accumulation of litter and debris. Debris from pressure washing shall be collected and not allowed to enter the storm drain system.

V.C. Features, Materials, and Methods of Construction of Source Control BMPs

VI. STORMWATER FACILITY MAINTENANCE

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

The property owner will execute any necessary agreements, and or agree to participate in or annex to a fee mechanism per local requirements, and issue a statement accepting responsibility for operation and maintenance of facilities until that responsibility is formally transferred.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

- Inspect drainage inlets for channels, exposure of soils, or erosion and correct as necessary.
- Inspect outlets for erosion or plugging.
- Inspect planters and swale for channels, exposure of soils, or other evidence of erosion. Clear any obstructions and remove any accumulation of sediment. Soils and plantings must be maintained.
- Remove any debris or accumulations of sediment. If portions of the planter do not drain within 24 hours, the planter should be inspected and maintained to reduce the ponding duration. Such maintenance may consist of removing blockage to drainage inlets or reducing the silt accumulation at the bottom of the planter or filter.
- Examine the vegetation to insure that it is healthy Replenish mulch as necessary, remove fallen leaves and debris, prune large shrubs or trees, and mow turf areas. Confirm that irrigation is adequate and not excessive. Replace dead plants and remove invasive vegetation.
- Apply pesticides and herbicides sparingly and only under the guidance of a licensed pest control specialist trained in Integrated Pest Management.

VII. CONSTRUCTION PLAN C.3 CHECKLIST

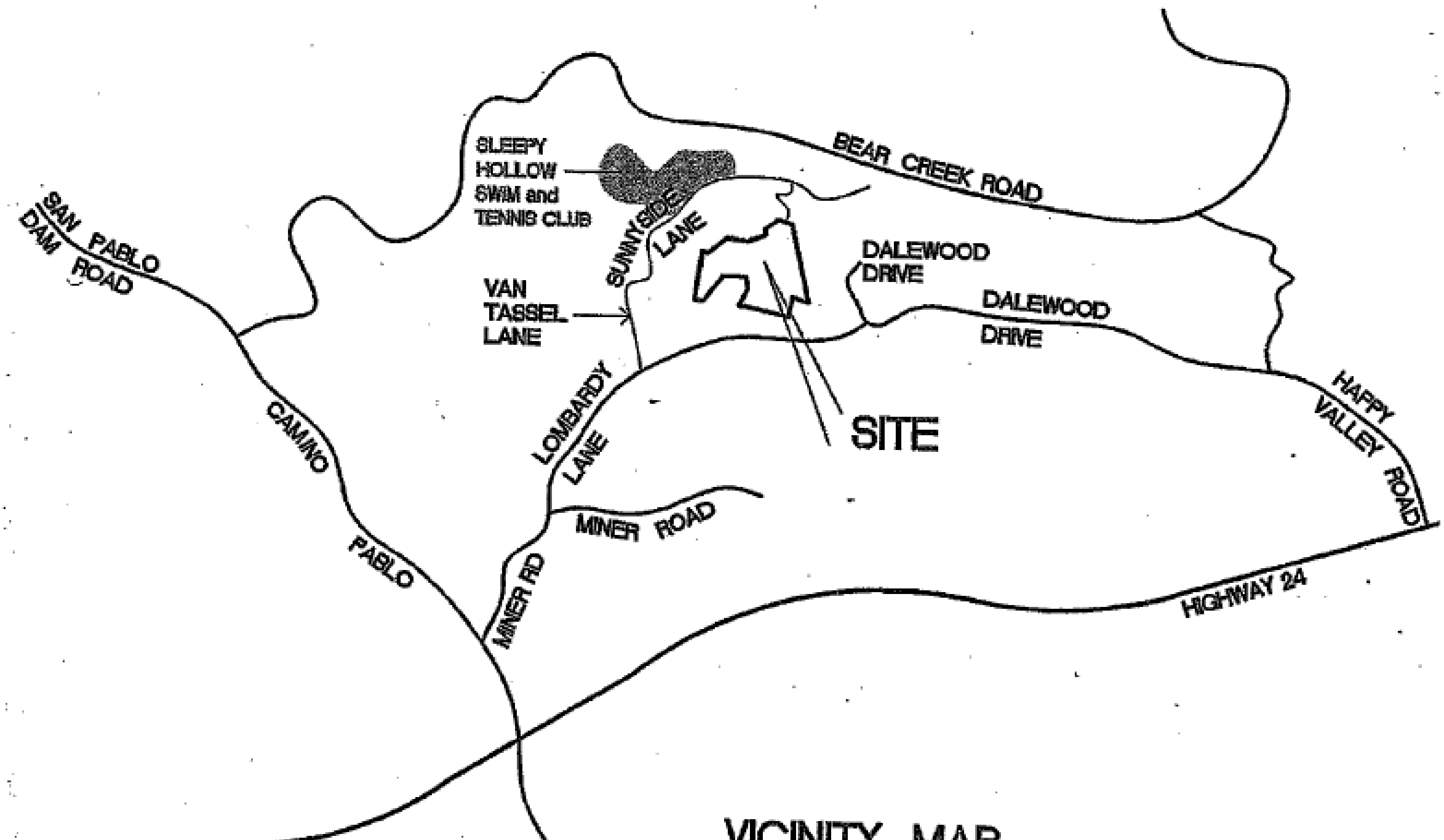
Table 9 – Construction Plan C.3 Checklist

Stormwater Control Plan Page #	*BMP Description*	*See Plan Sheet #s*

4	DMA-1 Asphalt roadway	Sheet 6
4	DMA-2 Asphalt Roadway	Sheet 6

VIII. CERTIFICATIONS

The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan meet the requirements of Regional Water Quality Control Board Order R2-2009-0074 and Order R2-2011-0083.



VICINITY MAP

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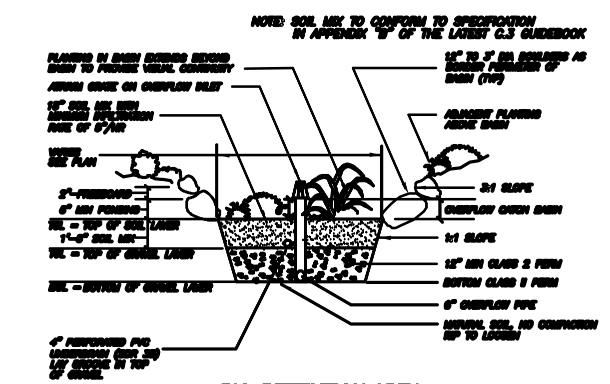

BIO-RETENTION AREA

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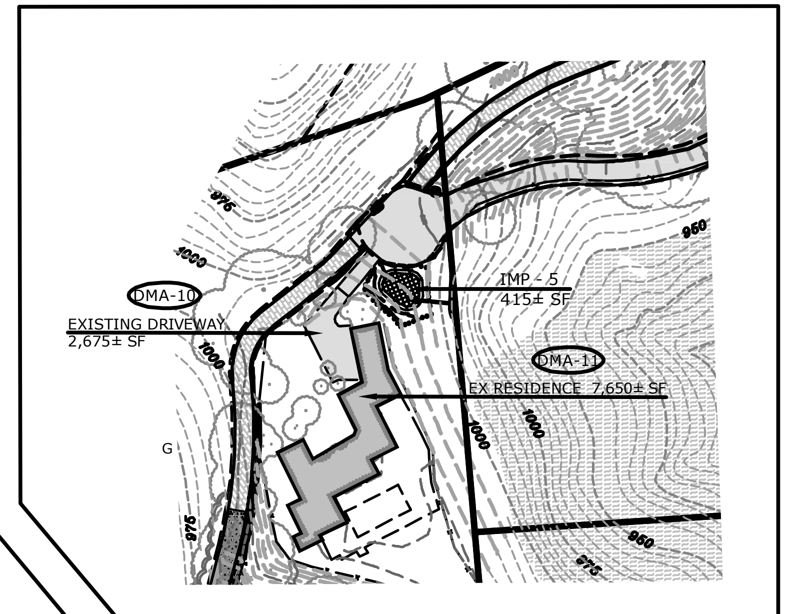
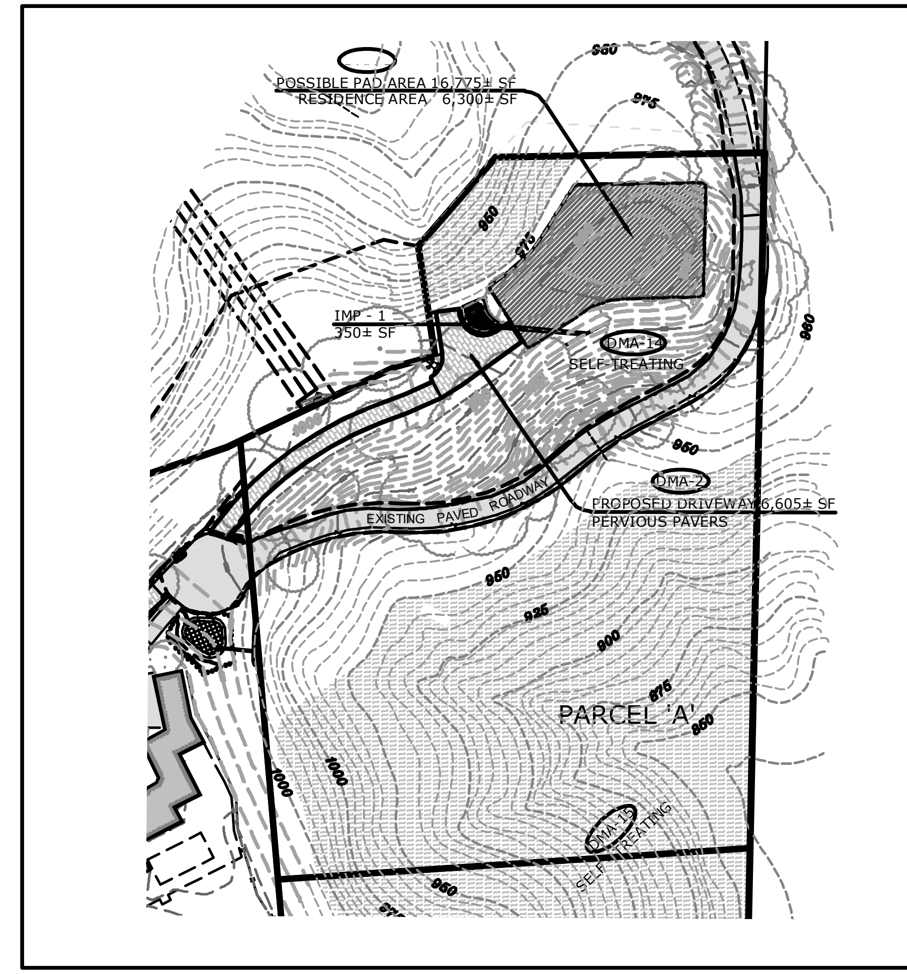


ALTERNATE COMPLIANCE AREA

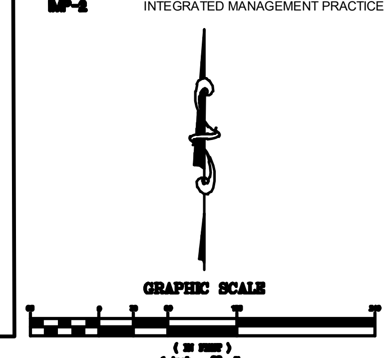


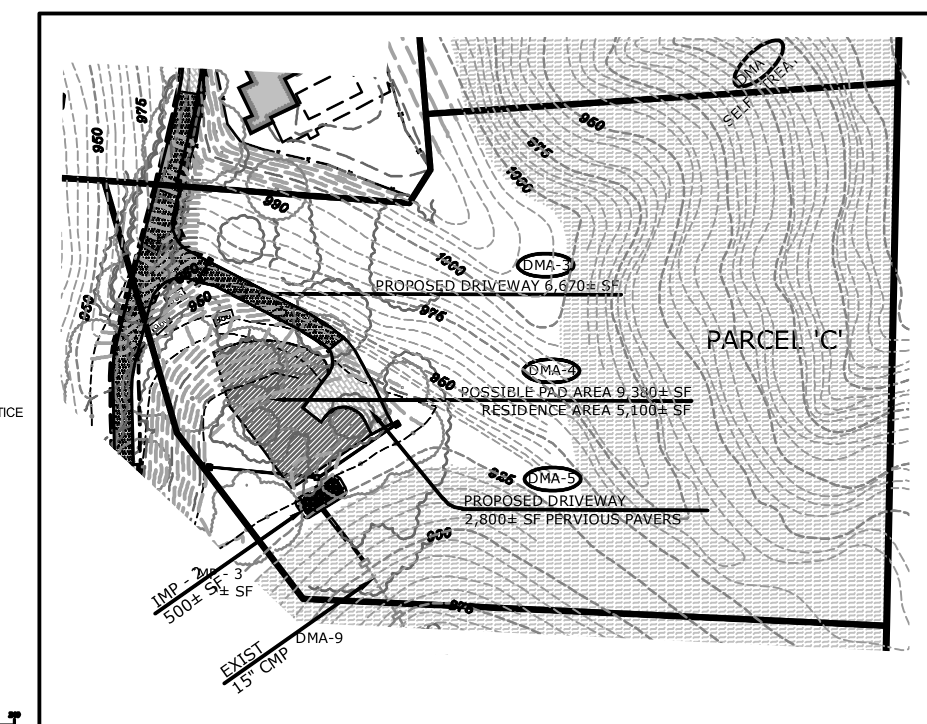
DMA	AREA	SURFACE	MIN. TREATMENT AREA	DRAINS TO IMP
1	6,300± SF	ROOF	252± SF	1
2	6,605± SF	PERVIOUS PAVERS	26± SF	1
3	6,670± SF	ASPHALT	267± SF	2
4	5,100± SF	ROOF	204± SF	2
5	2,800± SF	PERVIOUS PAVERS	11± SF	2
6	4,392± SF	PERVIOUS PAVERS	18± SF	2
7	2,580± SF	ASPHALT	103± SF	3
8	2,875± SF	PERVIOUS PAVERS	12± SF	3
9	7,500± SF	ROOF	300± SF	4
10	2,675± SF	ASPHALT	107± SF	5
11	7,650± SF	ROOF	306± SF	5
12	263,300± SF	SELF-TREATING	~	~
13	105,210± SF	SELF-TREATING	~	~
14	69,550± SF	SELF-TREATING	~	~
15	553,100± SF	SELF-TREATING	~	~

IMP	SIZE
IMP - 1	350± SF
IMP - 2	500± SF
IMP - 3	640± SF
IMP - 4	370± SF
IMP - 5	415± SF

LEGEND

- BIO-RETENTION AREA
- IMPERVIOUS PAVEMENT
- PERVIOUS PAVERS
- CATCH BASINS
- STORM DRAIN LINE
- DMA-2 DENOTES AREA (DMA) DRAINAGE MANAGEMENT AREA
- IMP-2 INTEGRATED MANAGEMENT PRACTICE





STORM WATER CONTROL PLAN

88 SUNNYSIDE LANE

CITY OF ORINDA | CONTRA COSTA COUNTY | CALIFORNIA

JAMES E. DIGGINS R.C.E. 27818
RENEWAL DATE: 03/31/20

#	REVISIONS	DATE

DeBolt Civil Engineering
811 San Ramon Valley Boulevard
Danville, California 94526
Tel: 925/837-3780
Fax: 925/837-4378

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Date: 04/18/19
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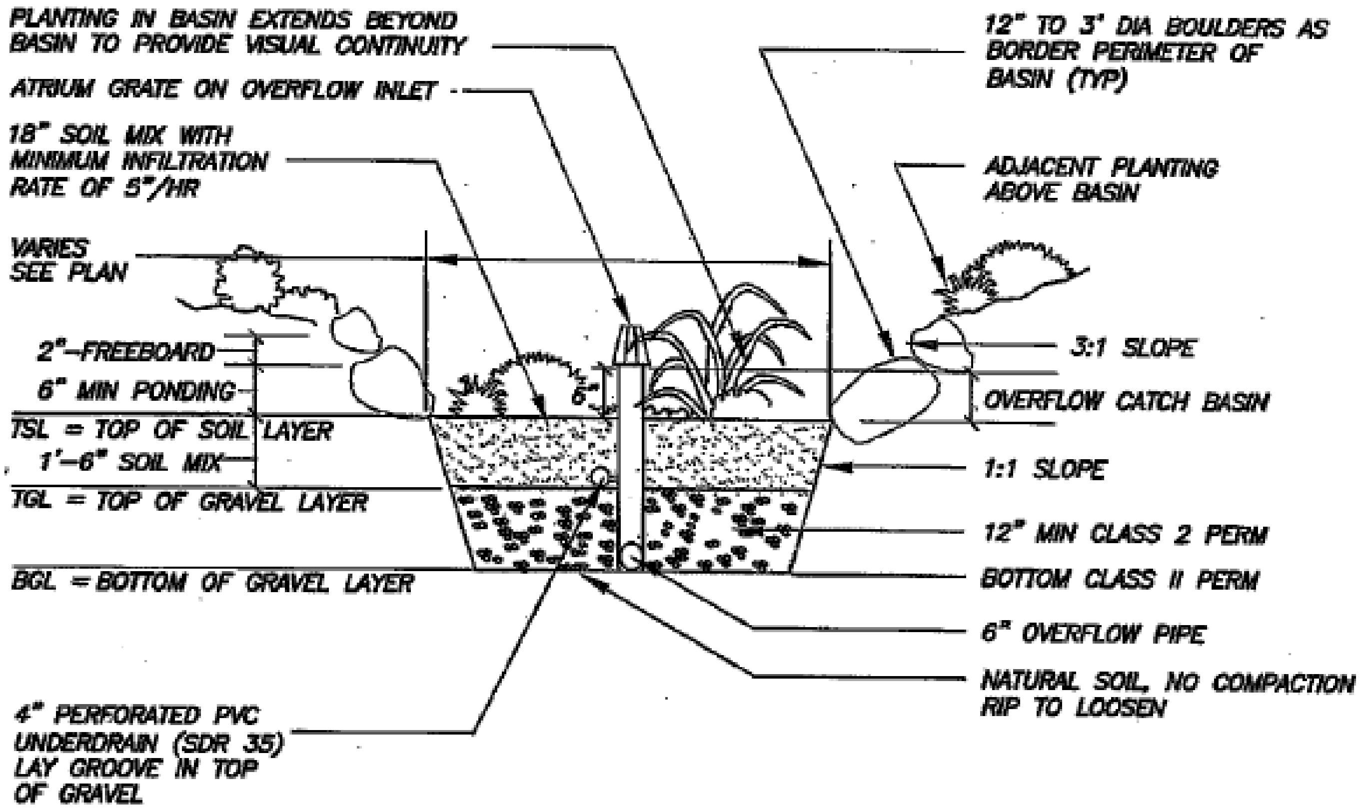
Job No.: 07275

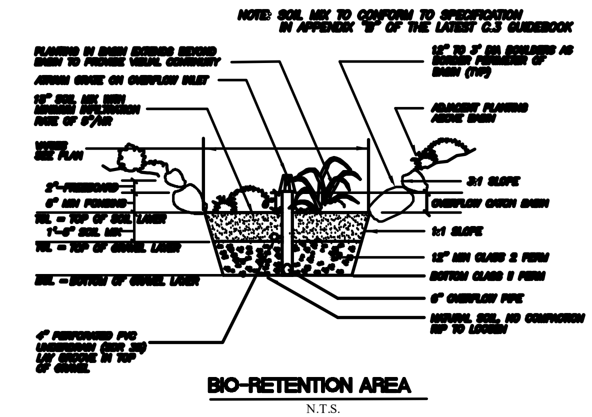
NOTE: SOIL MIX TO CONFORM TO SPECIFICATION
IN APPENDIX "B" OF THE LATEST C.3 GUIDEBOOK

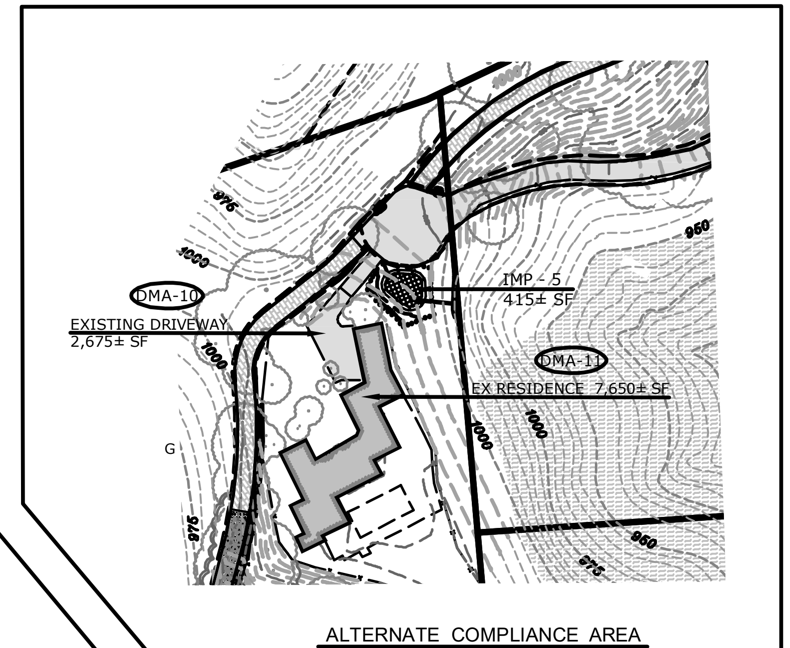


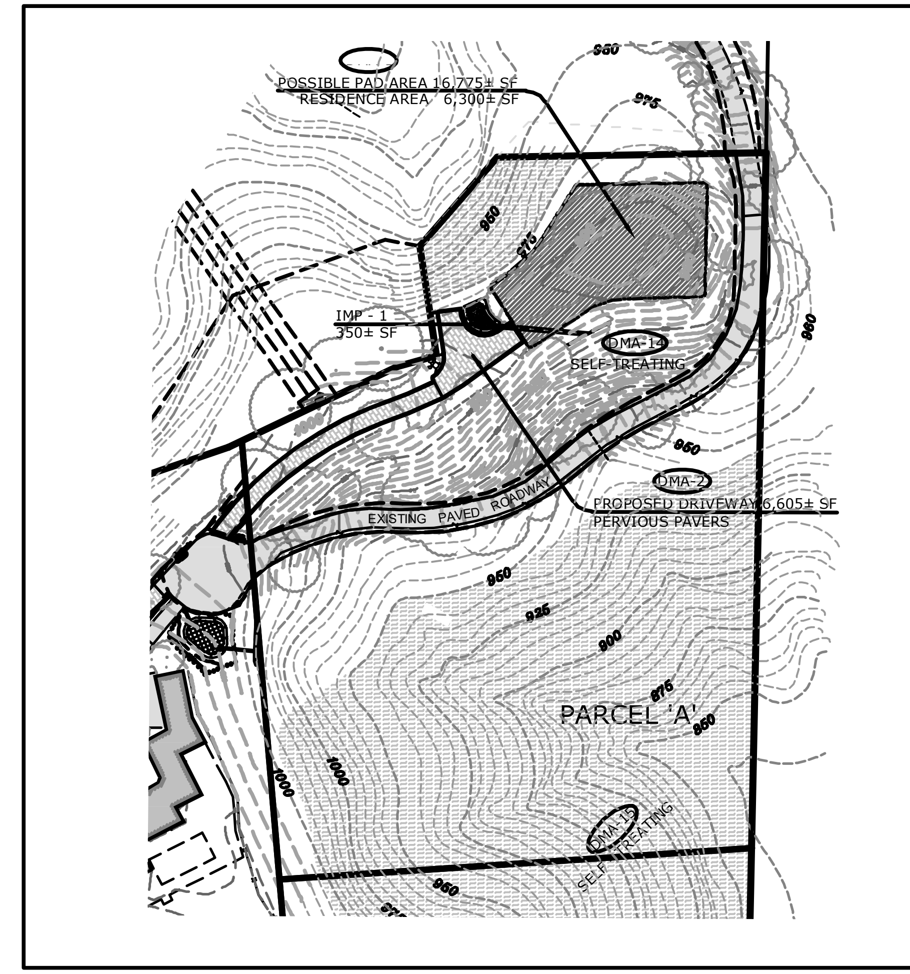
BIO-RETENTION AREA

N.T.S.

STORM WATER CONTROL PLAN







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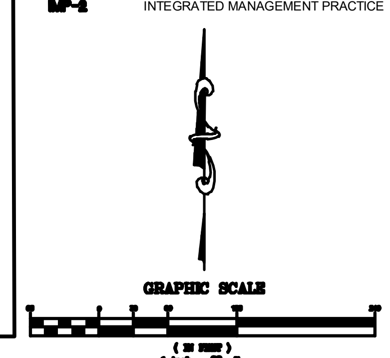
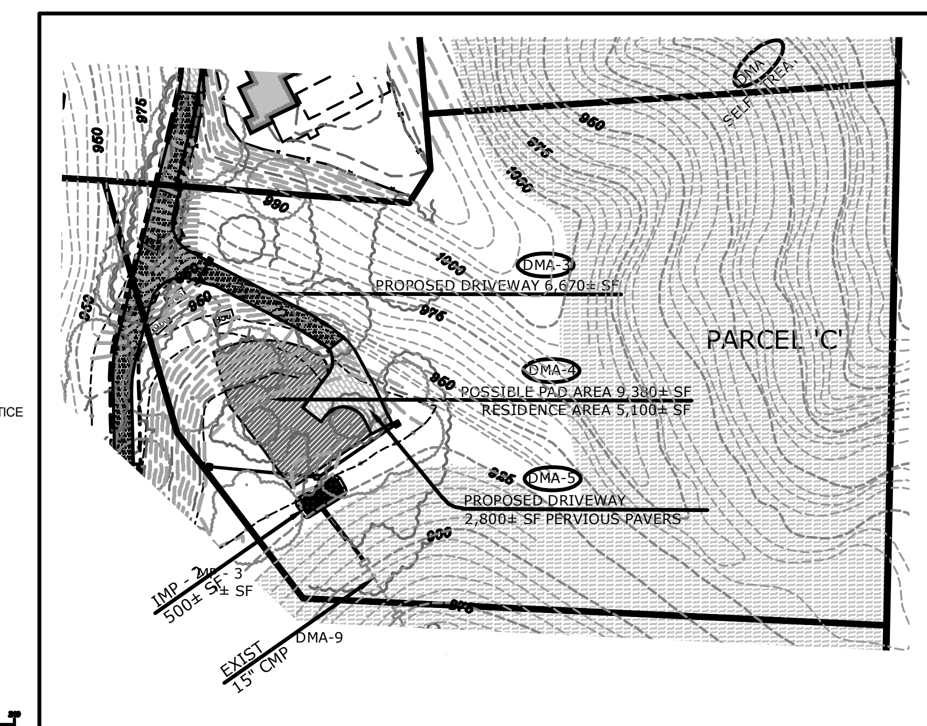
5	2,800± SF	PERVIOUS PAVERS	11± SF	2
6	4,392± SF	PERVIOUS PAVERS	18± SF	2
7	2,580± SF	ASPHALT	103± SF	3
8	2,875± SF	PERVIOUS PAVERS	12± SF	3
9	7,500± SF	ROOF	300± SF	4
10	2,675± SF	ASPHALT	107± SF	5
11	7,650± SF	ROOF	306± SF	5
12	263,300± SF	SELF-TREATING	~	~
13	105,210± SF	SELF-TREATING	~	~
14	69,550± SF	SELF-TREATING	~	~
15	553,100± SF	SELF-TREATING	~	~

IMP	SIZE
IMP - 1	350± SF
IMP - 2	500± SF
IMP - 3	640± SF
IMP - 4	370± SF
IMP - 5	415± SF

LEGEND

- BIO-RETENTION AREA
- IMPERVIOUS PAVEMENT
- PERVIOUS PAVERS
- CATCH BASINS
- STORM DRAIN LINE
- DMA-2 DENOTES AREA (DMA) DRAINAGE MANAGEMENT AREA
- IMP-2 INTEGRATED MANAGEMENT PRACTICE





STORM WATER CONTROL PLAN

88 SUNNYSIDE LANE

CITY OF ORINDA | CONTRA COSTA COUNTY | CALIFORNIA

JAMES E. DIGGINS R.C.E. 27818
RENEWAL DATE: 03/31/20

#	REVISIONS	DATE

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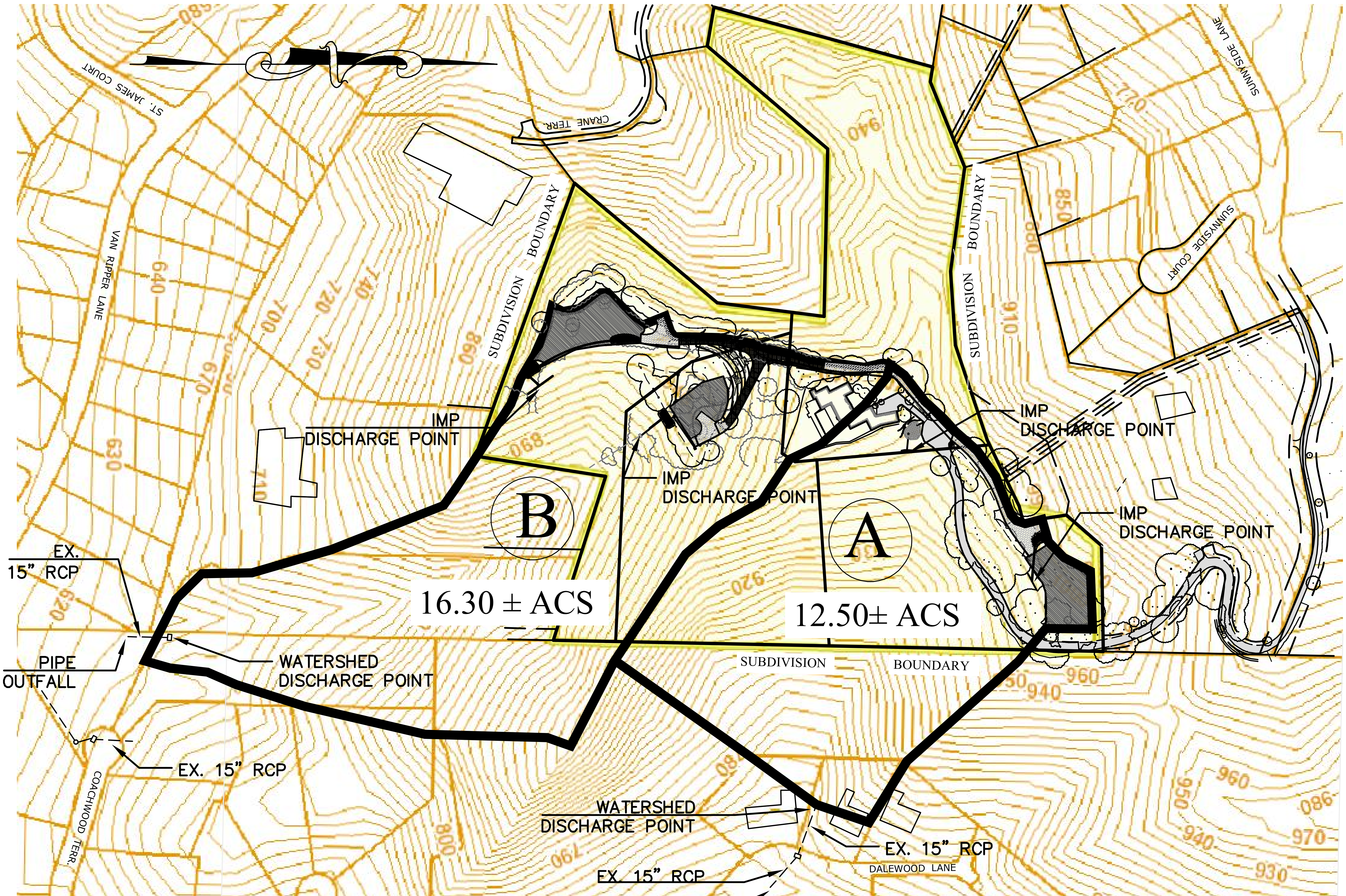
SHEET 1 OF 1 SHEET



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CALIFORNIA

HYDROLOGY MAP
88 SUNNYSIDE LANE

CONTRA COSTA COUNTY

CITY OF ORINDA

Revisions

No.	
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Job No.	07275
Drawing Number:	

1 OF **1**

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PLOT DATE: 07-08-19 PLOTTED BY: DeBoltEng

88 Sunnyside Lane
City of Orinda
Contra Costa County
California

Storm Drainage Calculation

Prepared By:

DeBolt Civil Engineering

811 San Ramon Valley Boulevard
Danville, CA 94526

April 29, 2019
Job No. 07275

Storm Drainage Calculations

88 Sunnyside Lane
City of Orinda

The runoff discharge will be determined using the rational formula:

$$Q = C\ I\ A$$

Q = design discharge, cubic feet per second

C = coefficient of runoff

I = intensity of rainfall, in inches/hour

A = tributary watershed area, in acres

These calculations are prepared with the following assumptions:

a) The rainfall intensity is uniformly distributed over the entire watershed
b) The runoff rate resulting from any rainfall intensity is a maximum when this rainfall intensity lasts as long or longer that t_c
c) The maximum runoff resulting from a rainfall intensity is a simple fraction of such rainfall intensity
d) The frequency of peak runoff is the same as that of the rainfall intensity for a given t_c
e) The runoff coefficient is the same for various frequencies and durations

There are two separate watershed drainage areas for this project.

Drainage area A – 12.50 Acres
Drainage area B – 16.30 Acres

Time of Concentration

The time required for runoff to flow from the most remote portion of the watershed to the watershed discharge point downstream. For this project, the total time of concentration is determined to be the sum of roof-to-gutter from the existing house and the overland flow to the watershed discharge point. Roof-to-gutter time of concentration is assumed to be 5 minutes.

Overland flow is estimated using the Kerby equation: $T_c^{2.14} = 2\ Ln/3s^{1/2}$ where:
L = Length in feet
n = surface retardant factor = 0.4
s = slope in feet/feet

Please refer to “Time of Concentration Calculation” sheet attached hereto.

Runoff Coefficient

Impervious surface /Asphalt roadway = 0.90
Landscape/ natural ground (pervious surface) = 0.40

Since both drainage areas A and B are partially landscape/natural and partially impervious surface, weighed runoff coefficients have been calculated for both. Please refer to “Runoff Coefficient Calculation” sheet attached hereto.

Intensity- Duration Curves

Based upon drawing # B-166 of the Contra Costa County Flood Control and Water Conservation District Mean Season Isohyets, the mean seasonal precipitation is 29 inches.

Using drawing B-159 for a 10-year recurrence interval, the precipitation depth is determined, given corresponding time of concentration. Rainfall intensity is then calculated as:

$$I = \frac{\text{precipitation depth (inch)}}{T_c \text{ (hr)}}$$

Please refer to “Hydrology Computations” sheet attached hereto.

Runoff Discharge:

Please refer to “Hydrology Computations” sheet attached hereto.

* Drainage Area A: Runoff discharges for pre and post development have been calculated to be 9.08cfs and 9.21cfs, respectively. Runoff is being collected by an existing 15” RCP, which has a capacity of 15.1cfs. The discharge points from the treatment areas are approximately 700 lineal feet upstream for the nearest residence.

*Drainage Area B: Runoff discharges for pre and post development have been calculated to be 10.17cfs and 10.55cfs, respectively. Runoff is being collected by an existing 15” RCP, which has a capacity of 12.0cfs. The discharge points from the treatment areas are approximately 1,200 lineal feet from the nearest downstream residence.

The soils engineer has reviewed the locations of the proposed discharge points, and has indicated that they would not adversely affect the stability of the slopes.

HYDROLOGY COMPUTATIONS

LOCATION: ORINDA, CA
SUBDIVISION: 88 SUNNYSIDE LANE
AVG. ANN. RAINFALL: 29.0"
RECURRENCE INT.: 10 YR

D
DeBolt Civil Engineering
811 San Ramon Valley Boulevard
Danville, California 94526
925-837-3780

Date: 4/29/19
By: VST
Job No.: 07275

DRAINAGE AREA	AREA (acres)	C	AXC	Σ AC	t_c (min.)	PRECIP (in.)	I	Q (c.f.s.)	STRUCT. NO.	PIPE					
										SLOPE	SIZE (in.)	TYPE	Q_{CAP} (c.f.s)	% FULL	VEL (ft/sec)
A - PRE DEV	12.50	0.417	5.21	5.21	21	0.6	1.74	9.08	1	0.063	15"	RCP	15.1	56.00	12.84
B - PRE DEV	16.30	0.405	6.60	6.60	28	0.73	1.54	10.17	2	0.04	15"	RCP	12.0	70.70	10.97
A - POST DEV.	12.50	0.423	5.29	5.29	21	0.6	1.74	9.21	3	0.063	15"	RCP	15.1	57.00	12.92
B - POST DEV	16.30	0.420	6.85	6.85	28	0.73	1.54	10.55	4	0.04	15"	RCP	12.0	72.70	11.03

TIME OF CONCENTRATION

LOCATION: ORINDA, CA
SUBDIVISION: 88 SUNNYSIDE LANE
AVG. ANN. RAINFALL: 29.0"
RECURRENCE INT.: 10 YR

D
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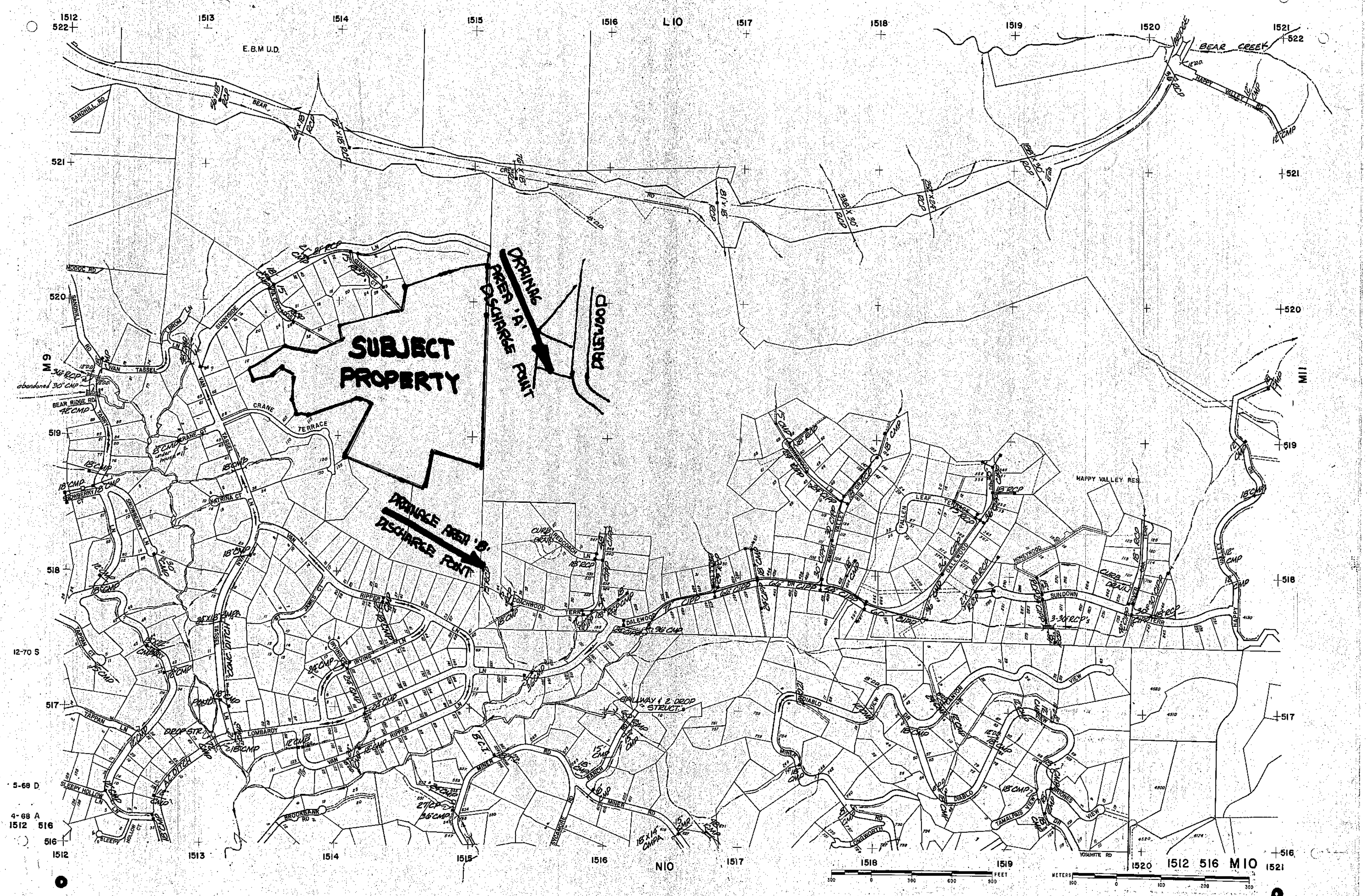
DRAINAGE AREA	OVERLAND FLOW				CHANNEL OR GUTTER FLOW			ROOF TO GUTTER		PIPE FLOW			
	DIST. (ft)	N	S	t_c (min.)	DIST. (ft)	VEL (ft/sec)	t_c (min.)	ZONE	t_c (min.)	DIST. (ft)	VEL (ft/sec)	t_c (min.)	Σt_c (min.)
A - PRE DEV	800	0.4	0.35	16					5				21
B - PRE DEV	1600	0.4	0.25	23					5				28
A - POST DEV.	800	0.4	0.35	16					5				21
B - POST DEV	1600	0.4	0.25	23					5				28

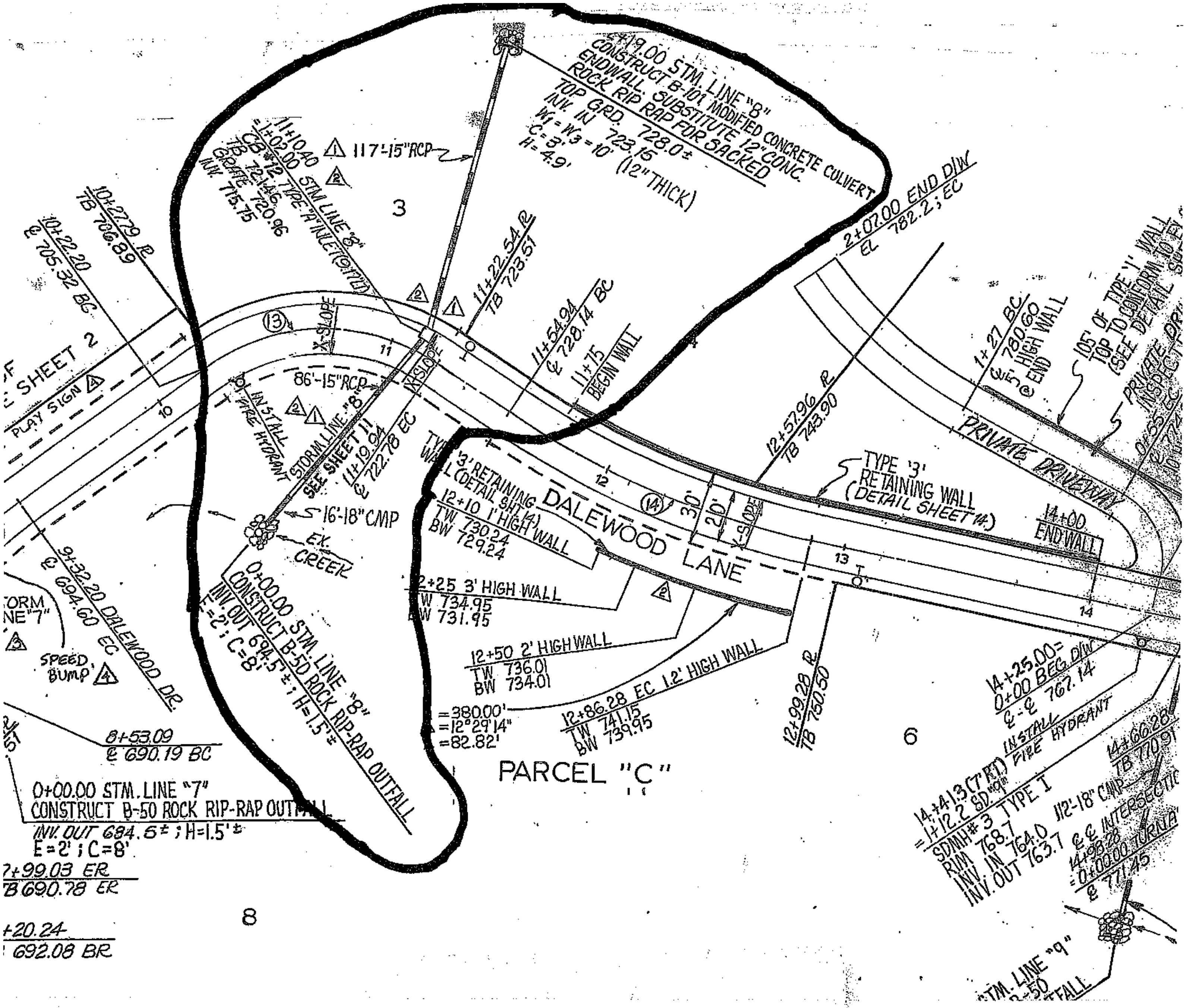
RUNNOFF COEFFICIENT CALCULATION

DRAINAGE AREA	TOTAL AREA (SF)	EXIST. PERVIOUS (SF)	EXIST. IMPERVIOUS (SF)	NEW (ADDED) IMPERVIOUS (SF)	POST-DEVELOPMENT PERVIOUS (SF)	POST-DEVELOPMENT IMPERVIOUS	WEIGHED PRE-DEVELOPMENT C	WEIGHED POST-DEVELOPMENT C
A	544,500	525,860	18,640	6,300	519,560	24,940	0.417	0.423
B	711,140	704,530	6,610	21,850	682,680	28,460	0.405	0.420

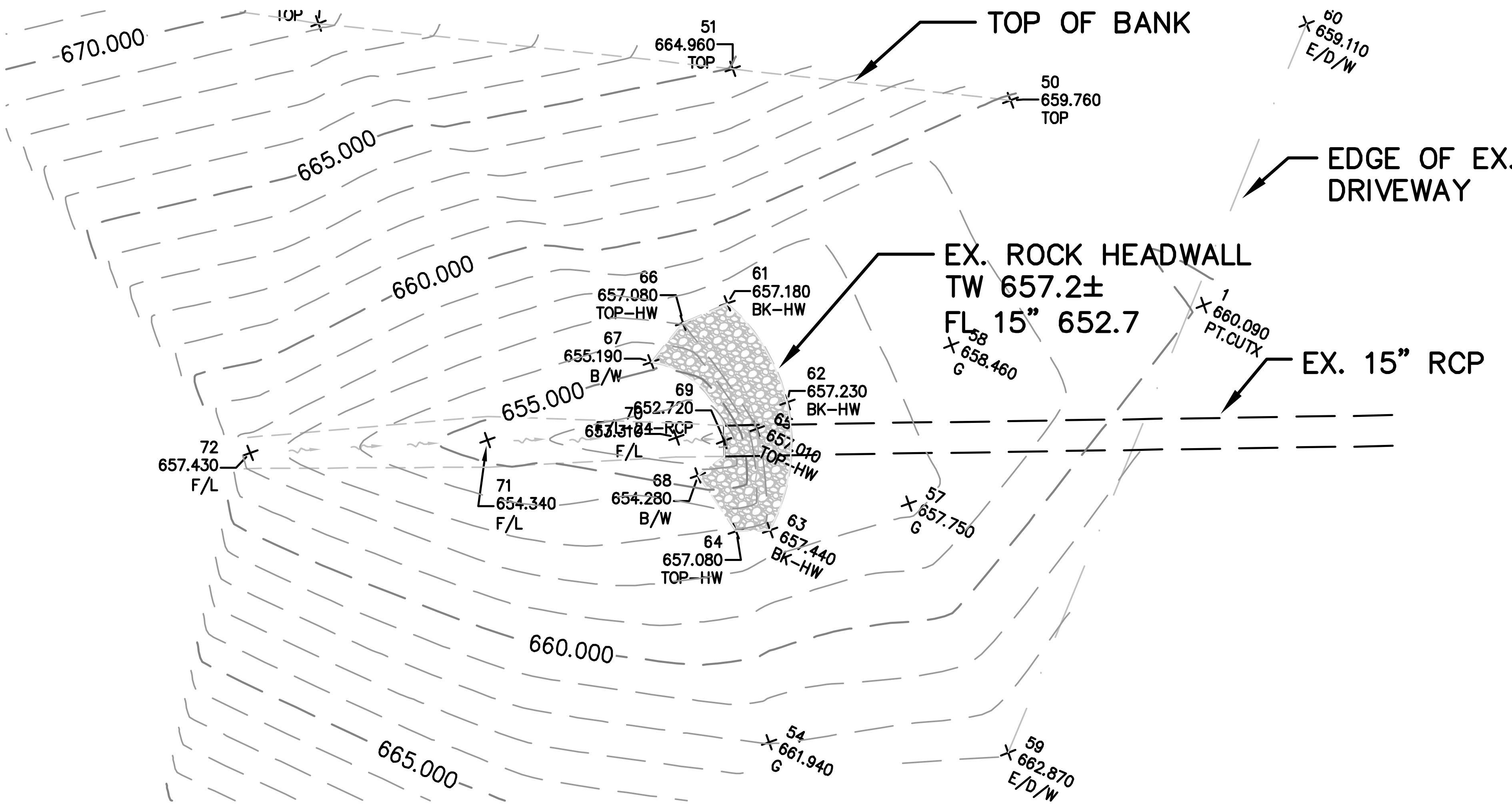
PERVIOUS RUNNOFF COEFF. = 0.40
IMPERVIOUS RUNNOFF COEFF. = 0.90



SUBJECT PROPERTY
DRAINAGE AREA 'A' DISCHARGE POINT
DRAINAGE AREA 'B' DISCHARGE POINT
DALEWOOD
BEAR CREEK
HAPPY VALLEY RES.
E.B.M.U.D.
L10
N10
M9
M11
1512 516 M10



DETAIL
of
POINT of DISCHARGE
from
DRAINAGE AREA 'A'



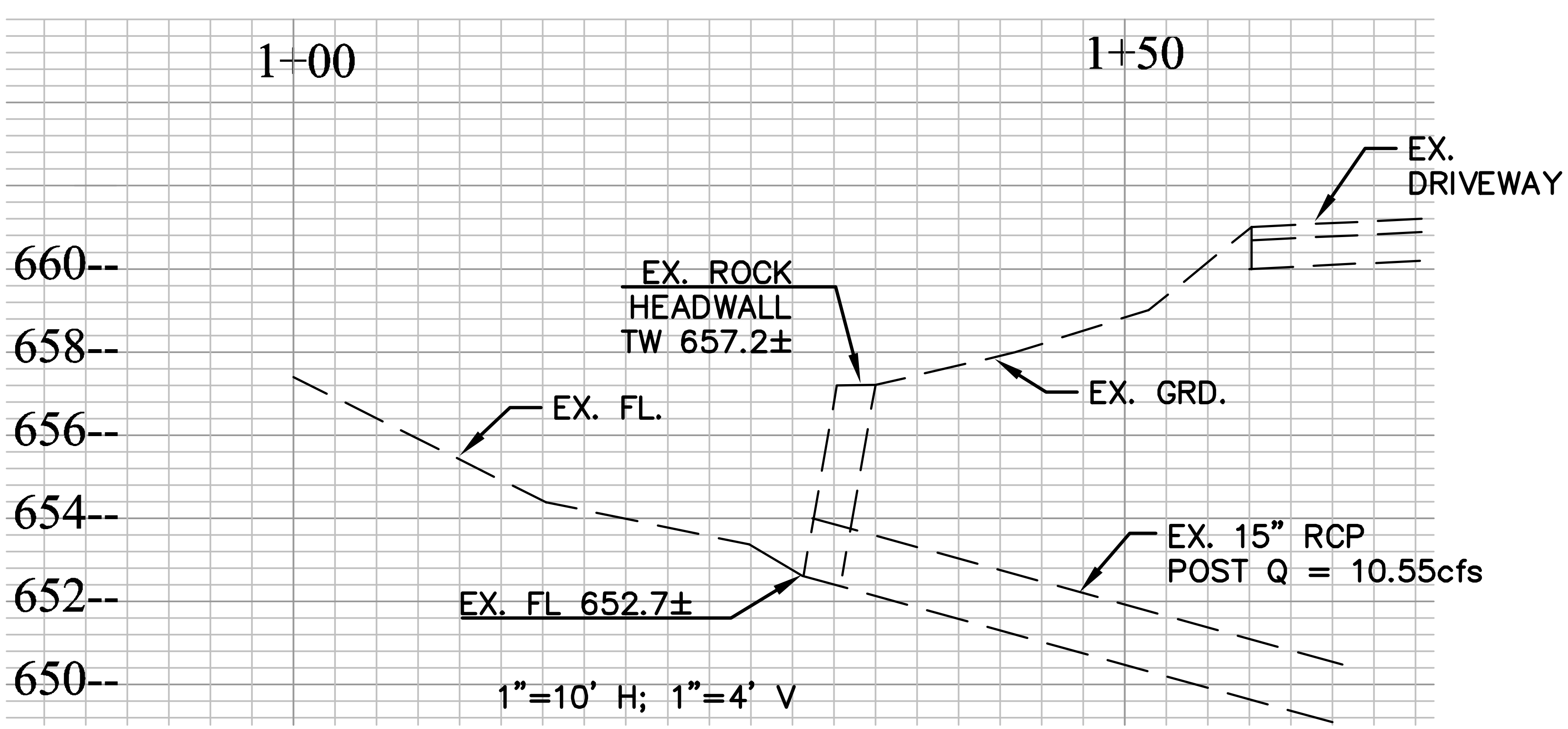
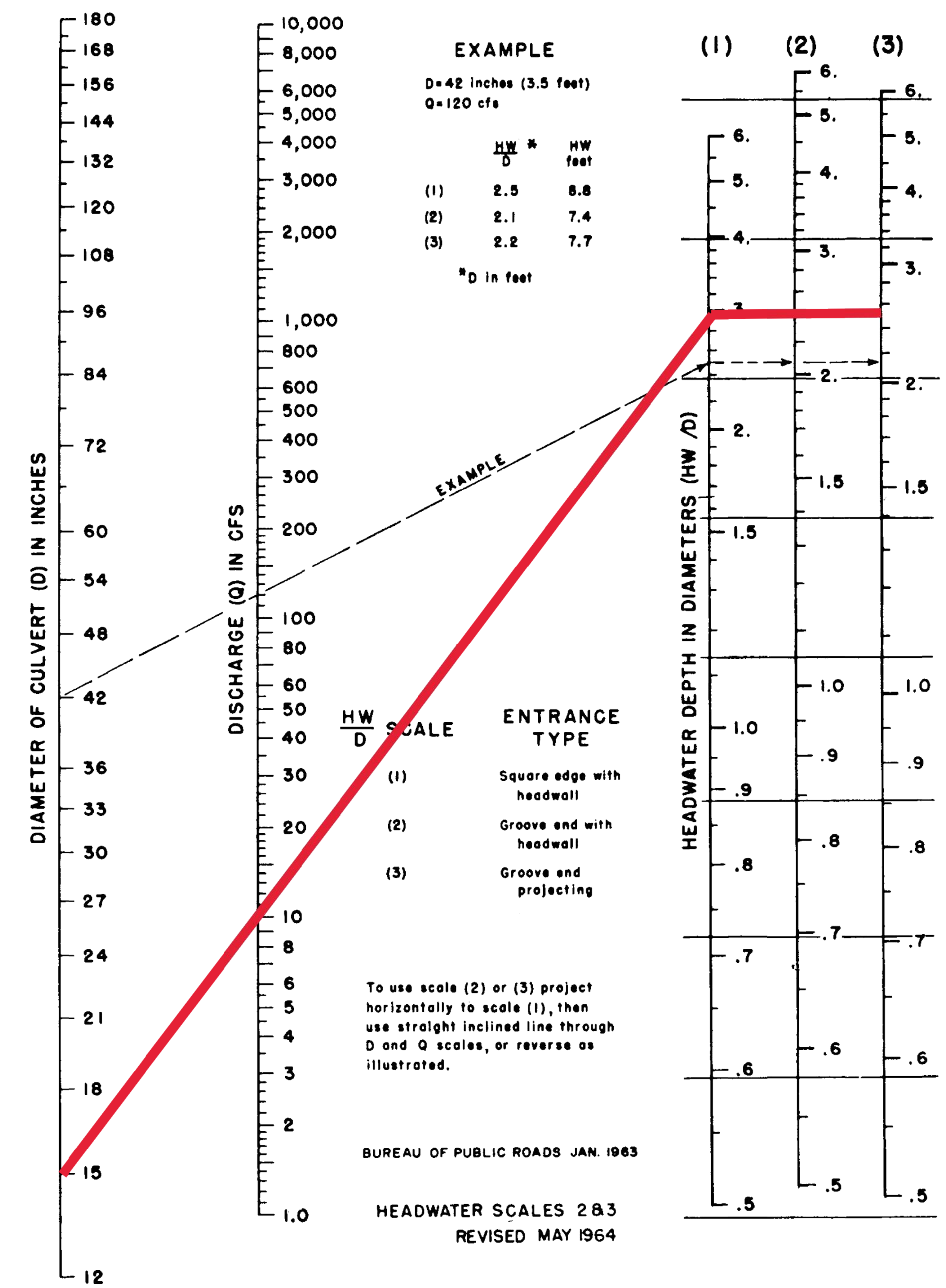


CHART 28B



Headwater Water Depth for Concrete Pipe Culverts
with Inlet Control - English Units

A - 49

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Danville, California 94526
925/837-3780

DRAINAGE AREA "B" - WATERSHED DISCHARGE POINT
88 SUNNYSIDE LANE

CITY OF ORINDA
CONTRA COSTA COUNTY
CALIFORNIA

Revisions

No.	
Date	06/20/19
Scale	1" = 10'
Job No.	07275
Drawing Number:	

1 OF 1

Appendix Threshold

Threshold	Section Location and Comments on Updates
Aesthetics**. Except as provided in Public Resources Code Section 21099**, ~~W~~ would the project:	The project is not within a transit priority area, so PRC Section 21099 does not apply in regard to aesthetics and parking.[1]
a. Have a substantial adverse effect on a scenic vista?	No Change
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	No Change
c. **In non-urbanized areas, s**~~S~~ubstantially degrade the existing visual character or quality of **public views of** the site and its surroundings? **(Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?**	See Section 4.1 c)
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	No Change
Agriculture and Forestry Resources. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:	No Change

[1] *See* "Transit Priority Areas (2017)." Metropolitan Transportation Commission. Accessed August 05, 2019. http://opendata.mtc.ca.gov/datasets/d97b4f72543a40b2b85d59ac085e01a0_0?geometry=-127.361,36.246,-106.454,39.285.

a. Convert Prime Farmland, Unique Farmland, or Farmland of State Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	No Change
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	No Change
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	No Change
d. Result in the loss of forest land or conversion of forest land to non-forest use?	No Change
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	No Change
Air Quality. Where available, the significance criteria established by the applicable air quality management **district** or air pollution control district may be relied upon to make the following determinations. Would the project:	
a. Conflict with or obstruct implementation of the applicable air quality plan?	No Change
~~**b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?**~~	Addressed, although not required under the most recent update to Appendix G
~~c.~~ **b.** Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard ~~**(including releasing emissions which**~~	See Section 4.3 c)

~~exceed quantitative thresholds for ozone precursors)~~?	
~~d.~~ **c.** Expose sensitive receptors to substantial pollutant concentrations?	See Section 4.3 d)
~~e.~~ **d.** ~~Create objectionable~~ **Result in other emissions (such as those leading to** odors ~~or dust~~**)** **adversely** affecting a substantial number of people?	See Sections 4.3 b) and 4.3 e)
Biological Resources. Would the project:	
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	No Change
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	No Change
c. Have a substantial adverse effect on **state or** federally protected wetlands ~~as defined by Section 404 of the Clean Water Act~~ (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	See Section 4.4 c)
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	No Change
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	No Change
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	No Change and 4.10 c)
Cultural Resources. Would the project:	

a. Cause a substantial adverse change in the significance of a historical resource **<u>pursuant to</u>** ~~**as defined**~~ in § 15064.5?	See Section 4.5 a)
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	No Change
~~**c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?**~~	Is now under Geology and Soils Section 4.5 f)
~~**d.**~~ **c.** Disturb any human remains, including those interred outside of dedicated cemeteries?	See Section 4.5 d)
<u>Energy. Would the project:</u>	
a. **<u>Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?</u>**	See Section 4.7 a); b)
b. **<u>Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?</u>**	See Section 4.7 a); b)
<u>Geology and Soils.</u> Would the project:	
a. ~~**Expose people or structures to**~~ **<u>Directly or indirectly cause</u>** potential substantial adverse effects, including the risk of loss, injury, or death involving:	See 4.6 a)
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	See 4.6 a) i.
ii. Strong seismic ground shaking?	See 4.6 a) ii.
iii. Seismic-related ground failure, including liquefaction?	See 4.6 a) iii.
iv. Landslides?	See 4.6 a) iv.
b. Result in substantial soil erosion or the loss of topsoil?	No Change
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site	No Change

landslide, lateral spreading, subsidence, liquefaction or collapse?	
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial **<u>direct or indirect</u>** risks to life or property?	See 4.6 d)
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	No Change
f. <u>Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?</u>	See 4.5 c)
<u>Greenhouse Gas Emissions.</u> Would the project:	
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	No Change
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	No Change
<u>Hazards and Hazardous Materials</u>. Would the project:	
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	No Change
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	No Change
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	No Change
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	No Change

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard **or excessive noise** for people residing or working in the project area?	No Change
~~**f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?**~~	
~~**g.**~~ **f.** Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	See 4.8 g)
~~**h.**~~ **g.** Expose people or structures**, either directly or indirectly,** to a significant risk of loss, injury or death involving wildland fires~~**, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands**~~?	See 4.8 h)
Hydrology and Water Quality. Would the project:	
a. Violate any water quality standards or waste discharge requirements **or otherwise substantially degrade surface or ground water quality**?	See 4.9 a)
b. Substantially ~~**deplete**~~ **decrease** groundwater supplies or interfere substantially with groundwater recharge such that **the project may impede sustainable groundwater management of the basin** ~~**there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)**~~?	See 4.9 b)
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river **or through the addition of impervious surfaces**, in a manner which would**:**	See 4.9 c)

i. result in substantial erosion or siltation on- or off-site;	See 4.9 c)
ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	See 4.9 a)
iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	See 4.9 a); 4.9 d); 4.9 e)
iv. impede or redirect flood flows?	See 4.9 g); 4.9 h); 4.9 i)
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	See 4.9 g); 4.9 j)
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	See 4.9 a)
~~d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?~~	
~~e. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?~~	
~~f. Otherwise substantially degrade water quality?~~	
~~g. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?~~	
~~h. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?~~	
~~i. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?~~	

~~**j. Inundation by seiche, tsunami, or mudflow?**~~	
Land Use and Planning. Would the project:	
a. Physically divide an established community?	No Change
b. **Cause a significant environmental impact due to a conflict** with any ~~**applicable**~~ land use plan, policy, or regulation ~~**of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance)**~~ adopted for the purpose of avoiding or mitigating an environmental effect?	See 4.10 b)
~~**c. Conflict with any applicable habitat conservation plan or natural community conservation plan?**~~	
Mineral Resources. Would the project:	
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	No Change
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	No Change
Noise. Would the project result in:	
a. ~~**Exposure of persons to or g**~~ Generation of **a substantial temporary or permanent increase in ambient** noise levels **in the vicinity of the project** in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	See 4.12 a)
b. ~~**Exposure of persons to or g**~~ Generation of excessive groundborne vibration or groundborne noise levels?	See 4.12 b)
~~**c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?**~~	
~~**d. A substantial temporary or periodic increase in ambient noise levels in the**~~	

~~**project vicinity above levels existing without the project?**~~	
c. ~~**e**~~. For a project located within **the vicinity of a private airstrip or** an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	See 4.12 e); 4.12 f)
~~**f. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?**~~	
Population and Housing. Would the project:	
a. Induce substantial **unplanned** population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	See 4.13 a)
b. Displace substantial numbers of existing **people or** housing, necessitating the construction of replacement housing elsewhere?	See 4.13 b); 4.13 c)
~~**c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?**~~	
Public Services.	
a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: Fire protection? Police protection? Schools? Parks? Other public facilities?	No Change

Recreation.	
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	No Change
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	No Change
Transportation~~/Traffic~~. Would the project:	
a. Conflict with a~~n applicable~~ **program** plan, ordinance or policy ~~**establishing measures of effectiveness for the performance of**~~ addressing the circulation system, **including transit, roadway, bicycle and pedestrian facilities?** ~~**taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?**~~	See 4.16 a); 4.16 f)
b. **Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)**~~**(1)**~~? ~~**Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?**~~	See 4.16 b); 4.16 f)
c. ~~**Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?**~~	
~~**d.**~~ c. Substantially increase hazards due to a **geometric** design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	See 4.16 d)

~~e.~~ **d.** Result in inadequate emergency access?	See 4.16 e)
~~**f. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?**~~	
Tribal Cultural Resources.	
a. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:	No Change
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	No Change
ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	No Change
Utilities and Service Systems. Would the project:	
a. ~~**Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?**~~	
~~b.~~ Require or result in the **relocation or** construction of new **or expanded** water, ~~or~~ wastewater treatment **or storm water drainage, electric power, natural gas, or telecommunications** facilities ~~or expansion of existing facilities~~, the	See 4.17 a); 4.17 b); 4.17 c)

construction **<u>or relocation</u>** of which could cause significant environmental effects?	
~~c.~~ ~~**Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?**~~	
~~d.~~ **<u>b.</u>** Have sufficient water supplies available to serve the project **<u>and reasonably foreseeable future development during normal, dry and multiple dry years</u>** ~~**from existing entitlements and resources, or are new or expanded entitlements needed**~~?	See 4.17 d)
~~e.~~ **<u>c.</u>** Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	See 4.17 e)
~~f.~~ **<u>d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?</u>** ~~**Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?**~~	See 4.17 f)
~~g.~~ **<u>e.</u>** Comply with federal, state, and local **<u>management and reduction</u>** statutes and regulations related to solid waste?	See 4.17 g)
<u>Wildfire – If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:</u>	See 4.8 "Emergency Response"; 4.8 g); 4.8 h) – project is in and surrounded by local responsibility area and is not VHFHSZ
a. **<u>Substantially impair an adopted emergency response plan or emergency evacuation plan?</u>**	See 4.8 g)
b. **<u>Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?</u>**	See 4.8 h)
c. **<u>Require the installation or maintenance of associated infrastructure (such as</u>**	See 4.8 g); 4.8 h);

<u>roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?</u>	
d. **<u>Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?</u>**	See 4.8 h); 4.9 a); 4.9 d; 4.9 e; 4.9 j);
Mandatory Findings of Significance	
a. Does the project have the potential to **<u>substantially</u>** degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, **<u>substantially</u>** reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	See 4.18 a)
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	No Change
c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	No Change

Legend	
Bolded Text	Altered from previous checklist
<u>Bolded and Underlined</u>	New text
~~**Strikethrough**~~	Text that has been removed

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