Appendix A
California Emissions Estimator Model Data

Palo Alto Flood Basin Tide Gate Replacement Project

Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	14.00	Acre	14.00	609,840.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	5			**Operational Year**	2025
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 -

Construction Phase - Dates set by project schedule.

Off-road Equipment - Based on Project equipment use.

Off-road Equipment - Based on Project equipment use. Other equipment is the Giken Silent Piler.

Off-road Equipment - Based on Project equipment use.

Off-road Equipment - Based on Project equipment use.

Off-road Equipment - Based on Project equipment use.

Off-road Equipment - Based on Project equipment use.

Off-road Equipment - Based on Project equipment use.

Off-road Equipment - Based on Project equipment use.

Off-road Equipment - Based on Project equipment use.

Off-road Equipment - Based on Project equipment use.

Demolition - Levee removal in P1Y1; concrete tide gate removal in P2Y1

Trips and VMT - Estimates provided by engineers.

On-road Fugitive Dust -

Vehicle Trips - No change in operational emissions from baseline.

Vehicle Emission Factors - Disregard. No change in operational emissions.

Vehicle Emission Factors - Disregard. No change in operational emissions.

Vehicle Emission Factors - Disregard. No change in operational emissions.

Fleet Mix - Disregard. No change in operational emissions.

Road Dust - Disregard. No change in operational emissions.

Consumer Products - Disregard. No change in operational emissions.

Area Coating - Disregard. No change in operational emissions.

Landscape Equipment - Disregard. No change in operational emissions.

Water And Wastewater - Disregard. No change in operational emissions.

Solid Waste - Disregard. No change in operational emissions.

Operational Off-Road Equipment - Disregard. No change in operational emissions.

Stationary Sources - Emergency Generators and Fire Pumps - Disregard. No change in operational emissions.

Land Use Change -

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_EF_Nonresidential_Exterior	150	0
tblAreaCoating	Area_EF_Nonresidential_Interior	100	0
tblAreaCoating	Area_EF_Parking	150	0

tblAreaCoating	Area_EF_Residential_Exterior	150	0
tblAreaCoating	Area_EF_Residential_Interior	100	0
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	0.5
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	40
tblConstructionPhase	NumDays	10.00	13.00
tblConstructionPhase	NumDays	10.00	13.00
tblConstructionPhase	NumDays	10.00	27.00
tblConstructionPhase	NumDays	30.00	52.00
tblConstructionPhase	NumDays	30.00	118.00
tblConstructionPhase	NumDays	20.00	52.00
tblConstructionPhase	NumDays	20.00	66.00
tblConstructionPhase	NumDays	30.00	52.00
tblConstructionPhase	NumDays	10.00	12.00
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tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	PhaseEndDate	3/14/2023	9/15/2023
tblConstructionPhase	PhaseEndDate	1/17/2023	9/15/2022

tblConstructionPhase	PhaseEndDate	9/28/2021	10/1/2021
tblConstructionPhase	PhaseEndDate	11/23/2021	1/31/2022
tblConstructionPhase	PhaseEndDate	2/14/2023	1/31/2023
tblConstructionPhase	PhaseEndDate	10/12/2021	12/1/2021
tblConstructionPhase	PhaseStartDate	2/15/2023	9/1/2023
tblConstructionPhase	PhaseStartDate	11/24/2021	9/1/2022
tblConstructionPhase	PhaseStartDate	10/13/2021	12/2/2021
tblConstructionPhase	PhaseStartDate	1/18/2023	9/16/2022
tblConstructionPhase	PhaseStartDate	9/29/2021	10/2/2021
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tblOffRoadEquipment	HorsePower	402.00	81.00
tblOffRoadEquipment	HorsePower	84.00	158.00

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tblOffRoadEquipment	OffRoadEquipmentType	Cranes	Off-Highway Trucks
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tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType	Pavers	Off-Highway Trucks
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tblOffRoadEquipment	OffRoadEquipmentType	Rubber Tired Dozers	Pumps
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tblOffRoadEquipment	OffRoadEquipmentType	Graders	Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType	Paving Equipment	Bore/Drill Rigs

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tblOffRoadEquipment	OffRoadEquipmentType	Pavers	Off-Highway Trucks
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tblOffRoadEquipment	OffRoadEquipmentType	Paving Equipment	Cement and Mortar Mixers
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tblOffRoadEquipment	OffRoadEquipmentType		Pumps
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tblTripsAndVMT	WorkerTripNumber	23.00	15.00
tblVehicleTrips	CC_TL	7.30	0.00
tblVehicleTrips	CC_TTP	48.00	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	CW_TTP	33.00	0.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	PB_TP	6.00	0.00

tblVehicleTrips	PR_TP	66.00	0.00
tblVehicleTrips	ST_TR	22.75	0.00
tblVehicleTrips	SU_TR	16.74	0.00
tblVehicleTrips	WD_TR	1.89	0.00
tblWater	OutdoorWaterUseRate	16,680,738.90	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.2280	2.3277	1.4838	3.3300e-003	1.1056	0.1061	1.2117	0.2937	0.0987	0.3925	0.0000	293.1801	293.1801	0.0649	0.0000	294.8027
2022	0.3092	3.1445	2.4277	5.3700e-003	0.7085	0.1372	0.8457	0.2870	0.1280	0.4150	0.0000	472.2081	472.2081	0.1189	0.0000	475.1815
2023	0.2667	2.4719	2.2779	5.0700e-003	0.5182	0.1085	0.6267	0.1778	0.1024	0.2803	0.0000	442.3882	442.3882	0.0896	0.0000	444.6285
2024	0.2709	2.6326	2.4028	5.2100e-003	0.7039	0.1106	0.8145	0.2839	0.1032	0.3871	0.0000	456.3439	456.3439	0.1182	0.0000	459.2995
2025	0.0512	0.4842	0.4807	1.0800e-003	0.2413	0.0197	0.2610	0.0623	0.0184	0.0807	0.0000	94.5059	94.5059	0.0240	0.0000	95.1056
Maximum	**0.3092**	**3.1445**	**2.4277**	**5.3700e-003**	**1.1056**	**0.1372**	**1.2117**	**0.2937**	**0.1280**	**0.4150**	**0.0000**	**472.2081**	**472.2081**	**0.1189**	**0.0000**	**475.1815**

2.1 Overall Construction

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					
2021	0.2280	2.3277	1.4838	3.3300e-003	1.1056	0.1061	1.2117	0.2937	0.0987	0.3925	0.0000	293.1798	293.1798	0.0649	0.0000	294.8023
2022	0.3092	3.1445	2.4277	5.3700e-003	0.7085	0.1372	0.8457	0.2870	0.1280	0.4150	0.0000	472.2075	472.2075	0.1189	0.0000	475.1809
2023	0.2667	2.4719	2.2779	5.0700e-003	0.5182	0.1085	0.6267	0.1778	0.1024	0.2803	0.0000	442.3877	442.3877	0.0896	0.0000	444.6280
2024	0.2709	2.6325	2.4028	5.2100e-003	0.7039	0.1106	0.8145	0.2839	0.1032	0.3871	0.0000	456.3434	456.3434	0.1182	0.0000	459.2990
2025	0.0512	0.4842	0.4807	1.0800e-003	0.2413	0.0197	0.2610	0.0623	0.0184	0.0807	0.0000	94.5057	94.5057	0.0240	0.0000	95.1055
Maximum	**0.3092**	**3.1445**	**2.4277**	**5.3700e-003**	**1.1056**	**0.1372**	**1.2117**	**0.2937**	**0.1280**	**0.4150**	**0.0000**	**472.2075**	**472.2075**	**0.1189**	**0.0000**	**475.1809**

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

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**9-1-2021**	**11-30-2021**	1.6466	1.6466
2	**12-1-2021**	**2-28-2022**	1.6656	1.6656
5	**9-1-2022**	**11-30-2022**	1.9835	1.9835
6	**12-1-2022**	**2-28-2023**	1.3412	1.3412
9	**9-1-2023**	**11-30-2023**	1.4933	1.4933
10	**12-1-2023**	**2-29-2024**	1.2421	1.2421

13	**9-1-2024**	**11-30-2024**	1.7005	1.7005
14	**12-1-2024**	**2-28-2025**	1.1262	1.1262
		Highest	1.9835	1.9835

2.2 Overall Operational

Note: the project will not change operational emissions from baseline conditions, therefore information pertaining to operational emissions should be disregarded in these model results.

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	5.7500e-003	0.0000	1.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5000e-004	2.5000e-004	0.0000	0.0000	2.7000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**5.7500e-003**	**0.0000**	**1.3000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.5000e-004**	**2.5000e-004**	**0.0000**	**0.0000**	**2.7000e-004**

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	5.7500e-003	0.0000	1.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5000e-004	2.5000e-004	0.0000	0.0000	2.7000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**5.7500e-003**	**0.0000**	**1.3000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.5000e-004**	**2.5000e-004**	**0.0000**	**0.0000**	**2.7000e-004**

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

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Prep - P1Y1	Site Preparation	9/1/2021	10/1/2021	6	27	
2	Demo - P1Y1	Demolition	10/2/2021	12/1/2021	6	52	
3	Construction - P1Y1	Grading	12/2/2021	1/31/2022	6	52	
4	Site Prep - P1Y2	Site Preparation	9/1/2022	9/15/2022	6	13	
5	Construction - P1Y2	Grading	9/16/2022	1/31/2023	6	118	
6	Site Prep - P2Y1	Site Preparation	9/1/2023	9/15/2023	6	13	
7	Demo - P2Y1	Demolition	9/16/2023	12/1/2023	6	66	
8	Construction - P2Y1	Grading	12/2/2023	1/31/2024	6	52	
9	Site Prep - P2Y2	Site Preparation	9/1/2024	9/15/2024	6	12	
10	Construction - P2Y2	Grading	9/16/2024	1/31/2025	6	119	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

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

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Construction - P1Y2	Graders	1	8.00	187	0.41
Construction - P2Y1	Graders	1	8.00	187	0.41
Demo - P1Y1	Rubber Tired Dozers	2	8.00	247	0.40
Demo - P2Y1	Rubber Tired Dozers	2	8.00	247	0.40
Construction - P2Y2	Rubber Tired Dozers	1	8.00	247	0.40
Construction - P1Y1	Rubber Tired Dozers	1	8.00	247	0.40

Construction - P1Y2	Rubber Tired Dozers	1	8.00	247	0.40
Construction - P2Y1	Rubber Tired Dozers	1	8.00	247	0.40
Site Prep - P1Y1	Rubber Tired Dozers	3	8.00	247	0.40
Site Prep - P1Y2	Rubber Tired Dozers	3	8.00	247	0.40
Site Prep - P2Y1	Rubber Tired Dozers	3	8.00	247	0.40
Site Prep - P2Y2	Rubber Tired Dozers	3	8.00	247	0.40
Construction - P2Y2	Scrapers	2	8.00	367	0.48
Construction - P1Y1	Scrapers	2	8.00	367	0.48
Construction - P1Y2	Scrapers	2	8.00	367	0.48
Construction - P2Y1	Scrapers	2	8.00	367	0.48
Construction - P2Y2	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Construction - P1Y1	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Construction - P1Y2	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Construction - P2Y1	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Site Prep - P1Y1	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Prep - P1Y2	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Prep - P2Y1	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Prep - P2Y2	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Prep - P2Y1	Off-Highway Trucks	1	8.00	78	0.48
Site Prep - P1Y1	Paving Equipment	1	8.00	158	0.38
Site Prep - P1Y1	Off-Highway Trucks	1	8.00	81	0.73
Construction - P1Y1	Off-Highway Trucks	1	4.00	158	0.38
Site Prep - P1Y2	Off-Highway Trucks	1	8.00	231	0.29
Construction - P1Y2	Cement and Mortar Mixers	1	5.50	81	0.73
Construction - P1Y2	Off-Highway Trucks	1	1.00	402	0.38
Construction - P1Y2	Off-Highway Trucks	1	4.00	130	0.42
Construction - P1Y2	Cranes	1	7.00	80	0.38

Demo - P1Y1	Off-Highway Trucks	1	1.00	81	0.38
Construction - P1Y1	Pumps	1	17.00	247	0.40
Construction - P1Y2	Pumps	1	17.00	84	0.74
Construction - P1Y1	Bore/Drill Rigs	1	3.50	187	0.41
Construction - P1Y2	Generator Sets	1	4.00	84	0.74
Construction - P1Y2	Bore/Drill Rigs	1	0.30	132	0.36
Demo - P1Y1	Excavators	1	6.00	97	0.37
Demo - P1Y1	Generator Sets	1	4.00	247	0.40
Construction - P1Y1	Generator Sets	1	4.00	367	0.48
Construction - P1Y2	Excavators	1	4.00	158	0.38
Demo - P1Y1	Off-Highway Trucks	1	8.00	81	0.73
Demo - P2Y1	Off-Highway Trucks	1	4.00	81	0.73
Demo - P1Y1	Pumps	1	17.00	158	0.38
Demo - P2Y1	Pumps	2	17.00	158	0.38
Construction - P2Y2	Off-Highway Trucks	1	4.00	130	0.42
Construction - P1Y1	Cranes	1	7.00	130	0.42
Construction - P2Y1	Off-Highway Trucks	2	4.00	130	0.42
Construction - P2Y2	Cranes	1	7.00	132	0.36
Construction - P1Y1	Cement and Mortar Mixers	1	5.50	132	0.36
Construction - P2Y1	Bore/Drill Rigs	1	1.00	132	0.36
Construction - P2Y2	Off-Highway Trucks	1	1.00	80	0.38
Construction - P1Y1	Off-Highway Trucks	1	1.00	80	0.38
Construction - P2Y1	Off-Highway Trucks	1	1.00	80	0.38
Demo - P2Y1	Generator Sets	1	4.00	247	0.40
Construction - P1Y2	Plate Compactors	1	1.00	8	0.43
Demo - P2Y1	Excavators	1	4.00	158	0.38
Site Prep - P2Y2	Off-Highway Trucks	2	8.00	247	0.40

Demo - P1Y1	Other Construction Equipment	1	3.50	316	0.42
Demo - P2Y1	Off-Highway Trucks	1	1.00	402	0.38
Construction - P2Y2	Pumps	1	17.00	84	0.74
Demo - P2Y1	Other General Industrial Equipment	1	3.50	316	0.34
Demo - P2Y1	Concrete/Industrial Saws	2	4.00	81	0.73
Demo - P2Y1	Air Compressors	2	9.50	78	0.48
Demo - P2Y1	Cranes	1	7.00	231	0.29
Construction - P2Y1	Pumps	1	17.00	84	0.74
Construction - P2Y1	Generator Sets	1	4.00	84	0.74
Construction - P2Y2	Generator Sets	1	4.00	84	0.74
Construction - P2Y2	Excavators	1	4.00	158	0.38
Construction - P2Y2	Plate Compactors	1	1.00	8	0.43
Demo - P1Y1	Concrete/Industrial Saws	1	8.00	81	0.73
Construction - P1Y1	Excavators	2	8.00	158	0.38
Construction - P2Y1	Excavators	2	8.00	158	0.38
Construction - P2Y2	Graders	1	8.00	187	0.41
Construction - P1Y1	Graders	1	8.00	187	0.41

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Prep - P1Y1	9	15.00	5.00	15.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demo - P1Y1	9	15.00	5.00	15.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Construction - P1Y1	15	15.00	5.00	15.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Prep - P1Y2	8	15.00	5.00	20.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Construction - P1Y2	15	15.00	5.00	20.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Prep - P2Y1	8	15.00	5.00	15.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demo - P2Y1	14	15.00	5.00	15.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Construction - P2Y2	13	15.00	5.00	25.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Construction - P2Y1	14	15.00	5.00	15.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Prep - P2Y2	9	15.00	5.00	25.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Prep - P1Y1 - 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					0.2439	0.0000	0.2439	0.1341	0.0000	0.1341	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0558	0.5798	0.3289	5.8000e-004		0.0292	0.0292		0.0269	0.0269	0.0000	51.2419	51.2419	0.0166	0.0000	51.6562
Total	**0.0558**	**0.5798**	**0.3289**	**5.8000e-004**	**0.2439**	**0.0292**	**0.2731**	**0.1341**	**0.0269**	**0.1610**	**0.0000**	**51.2419**	**51.2419**	**0.0166**	**0.0000**	**51.6562**

3.2 Site Prep - P1Y1 - 2021

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	6.0000e-005	2.0100e-003	4.4000e-004	1.0000e-005	1.3000e-004	1.0000e-005	1.3000e-004	3.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.5648	0.5648	3.0000e-005	0.0000	0.5654
Vendor	2.2000e-004	6.9400e-003	1.8500e-003	2.0000e-005	4.4000e-004	2.0000e-005	4.6000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.7485	1.7485	8.0000e-005	0.0000	1.7504
Worker	6.2000e-004	4.3000e-004	4.6300e-003	1.0000e-005	1.6100e-003	1.0000e-005	1.6200e-003	4.3000e-004	1.0000e-005	4.4000e-004	0.0000	1.3295	1.3295	3.0000e-005	0.0000	1.3303
Total	**9.0000e-004**	**9.3800e-003**	**6.9200e-003**	**4.0000e-005**	**2.1800e-003**	**4.0000e-005**	**2.2100e-003**	**5.9000e-004**	**3.0000e-005**	**6.2000e-004**	**0.0000**	**3.6427**	**3.6427**	**1.4000e-004**	**0.0000**	**3.6460**

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					0.2439	0.0000	0.2439	0.1341	0.0000	0.1341	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0558	0.5798	0.3289	5.8000e-004		0.0292	0.0292		0.0269	0.0269	0.0000	51.2418	51.2418	0.0166	0.0000	51.6562
Total	**0.0558**	**0.5798**	**0.3289**	**5.8000e-004**	**0.2439**	**0.0292**	**0.2731**	**0.1341**	**0.0269**	**0.1610**	**0.0000**	**51.2418**	**51.2418**	**0.0166**	**0.0000**	**51.6562**

3.2 Site Prep - P1Y1 - 2021

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	6.0000e-005	2.0100e-003	4.4000e-004	1.0000e-005	1.3000e-004	1.0000e-005	1.3000e-004	3.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.5648	0.5648	3.0000e-005	0.0000	0.5654
Vendor	2.2000e-004	6.9400e-003	1.8500e-003	2.0000e-005	4.4000e-004	2.0000e-005	4.6000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.7485	1.7485	8.0000e-005	0.0000	1.7504
Worker	6.2000e-004	4.3000e-004	4.6300e-003	1.0000e-005	1.6100e-003	1.0000e-005	1.6200e-003	4.3000e-004	1.0000e-005	4.4000e-004	0.0000	1.3295	1.3295	3.0000e-005	0.0000	1.3303
Total	**9.0000e-004**	**9.3800e-003**	**6.9200e-003**	**4.0000e-005**	**2.1800e-003**	**4.0000e-005**	**2.2100e-003**	**5.9000e-004**	**3.0000e-005**	**6.2000e-004**	**0.0000**	**3.6427**	**3.6427**	**1.4000e-004**	**0.0000**	**3.6460**

3.3 Demo - P1Y1 - 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					0.7062	0.0000	0.7062	0.1069	0.0000	0.1069	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0929	0.9114	0.5878	1.2800e-003		0.0433	0.0433		0.0407	0.0407	0.0000	111.5666	111.5666	0.0204	0.0000	112.0764
Total	**0.0929**	**0.9114**	**0.5878**	**1.2800e-003**	**0.7062**	**0.0433**	**0.7495**	**0.1069**	**0.0407**	**0.1476**	**0.0000**	**111.5666**	**111.5666**	**0.0204**	**0.0000**	**112.0764**

3.3 Demo - P1Y1 - 2021

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	6.0000e-005	2.0100e-003	4.4000e-004	1.0000e-005	1.3000e-004	1.0000e-005	1.3000e-004	3.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.5648	0.5648	3.0000e-005	0.0000	0.5654
Vendor	4.2000e-004	0.0134	3.5600e-003	4.0000e-005	8.6000e-004	3.0000e-005	8.8000e-004	2.5000e-004	3.0000e-005	2.8000e-004	0.0000	3.3674	3.3674	1.5000e-004	0.0000	3.3711
Worker	1.2000e-003	8.3000e-004	8.9200e-003	3.0000e-005	3.0900e-003	2.0000e-005	3.1100e-003	8.2000e-004	2.0000e-005	8.4000e-004	0.0000	2.5605	2.5605	6.0000e-005	0.0000	2.5620
Total	**1.6800e-003**	**0.0162**	**0.0129**	**8.0000e-005**	**4.0800e-003**	**6.0000e-005**	**4.1200e-003**	**1.1000e-003**	**6.0000e-005**	**1.1600e-003**	**0.0000**	**6.4927**	**6.4927**	**2.4000e-004**	**0.0000**	**6.4984**

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					0.7062	0.0000	0.7062	0.1069	0.0000	0.1069	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0929	0.9114	0.5878	1.2800e-003		0.0433	0.0433		0.0407	0.0407	0.0000	111.5665	111.5665	0.0204	0.0000	112.0763
Total	**0.0929**	**0.9114**	**0.5878**	**1.2800e-003**	**0.7062**	**0.0433**	**0.7495**	**0.1069**	**0.0407**	**0.1476**	**0.0000**	**111.5665**	**111.5665**	**0.0204**	**0.0000**	**112.0763**

3.3 Demo - P1Y1 - 2021

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	6.0000e-005	2.0100e-003	4.4000e-004	1.0000e-005	1.3000e-004	1.0000e-005	1.3000e-004	3.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.5648	0.5648	3.0000e-005	0.0000	0.5654
Vendor	4.2000e-004	0.0134	3.5600e-003	4.0000e-005	8.6000e-004	3.0000e-005	8.8000e-004	2.5000e-004	3.0000e-005	2.8000e-004	0.0000	3.3674	3.3674	1.5000e-004	0.0000	3.3711
Worker	1.2000e-003	8.3000e-004	8.9200e-003	3.0000e-005	3.0900e-003	2.0000e-005	3.1100e-003	8.2000e-004	2.0000e-005	8.4000e-004	0.0000	2.5605	2.5605	6.0000e-005	0.0000	2.5620
Total	**1.6800e-003**	**0.0162**	**0.0129**	**8.0000e-005**	**4.0800e-003**	**6.0000e-005**	**4.1200e-003**	**1.1000e-003**	**6.0000e-005**	**1.1600e-003**	**0.0000**	**6.4927**	**6.4927**	**2.4000e-004**	**0.0000**	**6.4984**

3.4 Construction - P1Y1 - 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					0.1472	0.0000	0.1472	0.0505	0.0000	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0759	0.8028	0.5408	1.3200e-003		0.0334	0.0334		0.0310	0.0310	0.0000	116.9899	116.9899	0.0275	0.0000	117.6764
Total	**0.0759**	**0.8028**	**0.5408**	**1.3200e-003**	**0.1472**	**0.0334**	**0.1806**	**0.0505**	**0.0310**	**0.0815**	**0.0000**	**116.9899**	**116.9899**	**0.0275**	**0.0000**	**117.6764**

3.4 Construction - P1Y1 - 2021

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	3.0000e-005	1.0000e-003	2.2000e-004	0.0000	1.1000e-004	0.0000	1.1000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.2824	0.2824	1.0000e-005	0.0000	0.2827
Vendor	2.1000e-004	6.6800e-003	1.7800e-003	2.0000e-005	4.3000e-004	1.0000e-005	4.4000e-004	1.2000e-004	1.0000e-005	1.4000e-004	0.0000	1.6837	1.6837	7.0000e-005	0.0000	1.6855
Worker	6.0000e-004	4.2000e-004	4.4600e-003	1.0000e-005	1.5500e-003	1.0000e-005	1.5600e-003	4.1000e-004	1.0000e-005	4.2000e-004	0.0000	1.2803	1.2803	3.0000e-005	0.0000	1.2810
Total	**8.4000e-004**	**8.1000e-003**	**6.4600e-003**	**3.0000e-005**	**2.0900e-003**	**2.0000e-005**	**2.1100e-003**	**5.6000e-004**	**2.0000e-005**	**5.9000e-004**	**0.0000**	**3.2463**	**3.2463**	**1.1000e-004**	**0.0000**	**3.2492**

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					0.1472	0.0000	0.1472	0.0505	0.0000	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0759	0.8028	0.5408	1.3200e-003		0.0334	0.0334		0.0310	0.0310	0.0000	116.9897	116.9897	0.0275	0.0000	117.6762
Total	**0.0759**	**0.8028**	**0.5408**	**1.3200e-003**	**0.1472**	**0.0334**	**0.1806**	**0.0505**	**0.0310**	**0.0815**	**0.0000**	**116.9897**	**116.9897**	**0.0275**	**0.0000**	**117.6762**

3.4 Construction - P1Y1 - 2021

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	3.0000e-005	1.0000e-003	2.2000e-004	0.0000	1.1000e-004	0.0000	1.1000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.2824	0.2824	1.0000e-005	0.0000	0.2827
Vendor	2.1000e-004	6.6800e-003	1.7800e-003	2.0000e-005	4.3000e-004	1.0000e-005	4.4000e-004	1.2000e-004	1.0000e-005	1.4000e-004	0.0000	1.6837	1.6837	7.0000e-005	0.0000	1.6855
Worker	6.0000e-004	4.2000e-004	4.4600e-003	1.0000e-005	1.5500e-003	1.0000e-005	1.5600e-003	4.1000e-004	1.0000e-005	4.2000e-004	0.0000	1.2803	1.2803	3.0000e-005	0.0000	1.2810
Total	**8.4000e-004**	**8.1000e-003**	**6.4600e-003**	**3.0000e-005**	**2.0900e-003**	**2.0000e-005**	**2.1100e-003**	**5.6000e-004**	**2.0000e-005**	**5.9000e-004**	**0.0000**	**3.2463**	**3.2463**	**1.1000e-004**	**0.0000**	**3.2492**

3.4 Construction - P1Y1 - 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					0.1472	0.0000	0.1472	0.0505	0.0000	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0670	0.6787	0.5156	1.3200e-003		0.0279	0.0279		0.0259	0.0259	0.0000	117.0465	117.0465	0.0274	0.0000	117.7323
Total	**0.0670**	**0.6787**	**0.5156**	**1.3200e-003**	**0.1472**	**0.0279**	**0.1751**	**0.0505**	**0.0259**	**0.0764**	**0.0000**	**117.0465**	**117.0465**	**0.0274**	**0.0000**	**117.7323**

3.4 Construction - P1Y1 - 2022

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	3.0000e-005	9.2000e-004	2.1000e-004	0.0000	1.1000e-004	0.0000	1.1000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.2786	0.2786	1.0000e-005	0.0000	0.2789
Vendor	2.0000e-004	6.3100e-003	1.6700e-003	2.0000e-005	4.3000e-004	1.0000e-005	4.4000e-004	1.2000e-004	1.0000e-005	1.4000e-004	0.0000	1.6676	1.6676	7.0000e-005	0.0000	1.6693
Worker	5.6000e-004	3.7000e-004	4.1000e-003	1.0000e-005	1.5500e-003	1.0000e-005	1.5600e-003	4.1000e-004	1.0000e-005	4.2000e-004	0.0000	1.2338	1.2338	3.0000e-005	0.0000	1.2344
Total	**7.9000e-004**	**7.6000e-003**	**5.9800e-003**	**3.0000e-005**	**2.0900e-003**	**2.0000e-005**	**2.1100e-003**	**5.6000e-004**	**2.0000e-005**	**5.9000e-004**	**0.0000**	**3.1799**	**3.1799**	**1.1000e-004**	**0.0000**	**3.1826**

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					0.1472	0.0000	0.1472	0.0505	0.0000	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0670	0.6787	0.5156	1.3200e-003		0.0279	0.0279		0.0259	0.0259	0.0000	117.0463	117.0463	0.0274	0.0000	117.7322
Total	**0.0670**	**0.6787**	**0.5156**	**1.3200e-003**	**0.1472**	**0.0279**	**0.1751**	**0.0505**	**0.0259**	**0.0764**	**0.0000**	**117.0463**	**117.0463**	**0.0274**	**0.0000**	**117.7322**

3.4 Construction - P1Y1 - 2022

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	3.0000e-005	9.2000e-004	2.1000e-004	0.0000	1.1000e-004	0.0000	1.1000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.2786	0.2786	1.0000e-005	0.0000	0.2789
Vendor	2.0000e-004	6.3100e-003	1.6700e-003	2.0000e-005	4.3000e-004	1.0000e-005	4.4000e-004	1.2000e-004	1.0000e-005	1.4000e-004	0.0000	1.6676	1.6676	7.0000e-005	0.0000	1.6693
Worker	5.6000e-004	3.7000e-004	4.1000e-003	1.0000e-005	1.5500e-003	1.0000e-005	1.5600e-003	4.1000e-004	1.0000e-005	4.2000e-004	0.0000	1.2338	1.2338	3.0000e-005	0.0000	1.2344
Total	**7.9000e-004**	**7.6000e-003**	**5.9800e-003**	**3.0000e-005**	**2.0900e-003**	**2.0000e-005**	**2.1100e-003**	**5.6000e-004**	**2.0000e-005**	**5.9000e-004**	**0.0000**	**3.1799**	**3.1799**	**1.1000e-004**	**0.0000**	**3.1826**

3.5 Site Prep - P1Y2 - 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					0.1174	0.0000	0.1174	0.0646	0.0000	0.0646	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0223	0.2275	0.1379	2.8000e-004		0.0110	0.0110		0.0101	0.0101	0.0000	25.0074	25.0074	8.0900e-003	0.0000	25.2096
Total	**0.0223**	**0.2275**	**0.1379**	**2.8000e-004**	**0.1174**	**0.0110**	**0.1284**	**0.0646**	**0.0101**	**0.0746**	**0.0000**	**25.0074**	**25.0074**	**8.0900e-003**	**0.0000**	**25.2096**

3.5 Site Prep - P1Y2 - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.0000e-005	2.4600e-003	5.7000e-004	1.0000e-005	1.7000e-004	1.0000e-005	1.8000e-004	5.0000e-005	1.0000e-005	5.0000e-005	0.0000	0.7429	0.7429	3.0000e-005	0.0000	0.7437
Vendor	1.0000e-004	3.1600e-003	8.4000e-004	1.0000e-005	2.1000e-004	1.0000e-005	2.2000e-004	6.0000e-005	1.0000e-005	7.0000e-005	0.0000	0.8338	0.8338	4.0000e-005	0.0000	0.8347
Worker	2.8000e-004	1.9000e-004	2.0500e-003	1.0000e-005	7.7000e-004	0.0000	7.8000e-004	2.1000e-004	0.0000	2.1000e-004	0.0000	0.6169	0.6169	1.0000e-005	0.0000	0.6172
Total	**4.5000e-004**	**5.8100e-003**	**3.4600e-003**	**3.0000e-005**	**1.1500e-003**	**2.0000e-005**	**1.1800e-003**	**3.2000e-004**	**2.0000e-005**	**3.3000e-004**	**0.0000**	**2.1936**	**2.1936**	**8.0000e-005**	**0.0000**	**2.1956**

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					0.1174	0.0000	0.1174	0.0646	0.0000	0.0646	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0223	0.2275	0.1379	2.8000e-004		0.0110	0.0110		0.0101	0.0101	0.0000	25.0074	25.0074	8.0900e-003	0.0000	25.2096
Total	**0.0223**	**0.2275**	**0.1379**	**2.8000e-004**	**0.1174**	**0.0110**	**0.1284**	**0.0646**	**0.0101**	**0.0746**	**0.0000**	**25.0074**	**25.0074**	**8.0900e-003**	**0.0000**	**25.2096**

3.5 Site Prep - P1Y2 - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.0000e-005	2.4600e-003	5.7000e-004	1.0000e-005	1.7000e-004	1.0000e-005	1.8000e-004	5.0000e-005	1.0000e-005	5.0000e-005	0.0000	0.7429	0.7429	3.0000e-005	0.0000	0.7437
Vendor	1.0000e-004	3.1600e-003	8.4000e-004	1.0000e-005	2.1000e-004	1.0000e-005	2.2000e-004	6.0000e-005	1.0000e-005	7.0000e-005	0.0000	0.8338	0.8338	4.0000e-005	0.0000	0.8347
Worker	2.8000e-004	1.9000e-004	2.0500e-003	1.0000e-005	7.7000e-004	0.0000	7.8000e-004	2.1000e-004	0.0000	2.1000e-004	0.0000	0.6169	0.6169	1.0000e-005	0.0000	0.6172
Total	**4.5000e-004**	**5.8100e-003**	**3.4600e-003**	**3.0000e-005**	**1.1500e-003**	**2.0000e-005**	**1.1800e-003**	**3.2000e-004**	**2.0000e-005**	**3.3000e-004**	**0.0000**	**2.1936**	**2.1936**	**8.0000e-005**	**0.0000**	**2.1956**

3.6 Construction - P1Y2 - 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					0.4334	0.0000	0.4334	0.1692	0.0000	0.1692	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2160	2.1994	1.7439	3.5900e-003		0.0983	0.0983		0.0919	0.0919	0.0000	313.9353	313.9353	0.0829	0.0000	316.0067
Total	**0.2160**	**2.1994**	**1.7439**	**3.5900e-003**	**0.4334**	**0.0983**	**0.5317**	**0.1692**	**0.0919**	**0.2611**	**0.0000**	**313.9353**	**313.9353**	**0.0829**	**0.0000**	**316.0067**

3.6 Construction - P1Y2 - 2022

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	6.0000e-005	1.9100e-003	4.5000e-004	1.0000e-005	1.6000e-004	1.0000e-005	1.7000e-004	4.0000e-005	1.0000e-005	5.0000e-005	0.0000	0.5792	0.5792	3.0000e-005	0.0000	0.5799
Vendor	7.0000e-004	0.0223	5.9300e-003	6.0000e-005	1.5100e-003	5.0000e-005	1.5600e-003	4.4000e-004	4.0000e-005	4.8000e-004	0.0000	5.9007	5.9007	2.5000e-004	0.0000	5.9069
Worker	1.9800e-003	1.3200e-003	0.0145	5.0000e-005	5.4700e-003	3.0000e-005	5.5100e-003	1.4600e-003	3.0000e-005	1.4900e-003	0.0000	4.3656	4.3656	9.0000e-005	0.0000	4.3679
Total	**2.7400e-003**	**0.0256**	**0.0209**	**1.2000e-004**	**7.1400e-003**	**9.0000e-005**	**7.2400e-003**	**1.9400e-003**	**8.0000e-005**	**2.0200e-003**	**0.0000**	**10.8455**	**10.8455**	**3.7000e-004**	**0.0000**	**10.8546**

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					0.4334	0.0000	0.4334	0.1692	0.0000	0.1692	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2160	2.1994	1.7439	3.5900e-003		0.0983	0.0983		0.0919	0.0919	0.0000	313.9349	313.9349	0.0829	0.0000	316.0063
Total	**0.2160**	**2.1994**	**1.7439**	**3.5900e-003**	**0.4334**	**0.0983**	**0.5317**	**0.1692**	**0.0919**	**0.2611**	**0.0000**	**313.9349**	**313.9349**	**0.0829**	**0.0000**	**316.0063**

3.6 Construction - P1Y2 - 2022

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	6.0000e-005	1.9100e-003	4.5000e-004	1.0000e-005	1.6000e-004	1.0000e-005	1.7000e-004	4.0000e-005	1.0000e-005	5.0000e-005	0.0000	0.5792	0.5792	3.0000e-005	0.0000	0.5799
Vendor	7.0000e-004	0.0223	5.9300e-003	6.0000e-005	1.5100e-003	5.0000e-005	1.5600e-003	4.4000e-004	4.0000e-005	4.8000e-004	0.0000	5.9007	5.9007	2.5000e-004	0.0000	5.9069
Worker	1.9800e-003	1.3200e-003	0.0145	5.0000e-005	5.4700e-003	3.0000e-005	5.5100e-003	1.4600e-003	3.0000e-005	1.4900e-003	0.0000	4.3656	4.3656	9.0000e-005	0.0000	4.3679
Total	**2.7400e-003**	**0.0256**	**0.0209**	**1.2000e-004**	**7.1400e-003**	**9.0000e-005**	**7.2400e-003**	**1.9400e-003**	**8.0000e-005**	**2.0200e-003**	**0.0000**	**10.8455**	**10.8455**	**3.7000e-004**	**0.0000**	**10.8546**

3.6 Construction - P1Y2 - 2023

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					0.2347	0.0000	0.2347	0.0599	0.0000	0.0599	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0563	0.5591	0.4795	1.0200e-003		0.0243	0.0243		0.0227	0.0227	0.0000	88.7223	88.7223	0.0233	0.0000	89.3053
Total	**0.0563**	**0.5591**	**0.4795**	**1.0200e-003**	**0.2347**	**0.0243**	**0.2590**	**0.0599**	**0.0227**	**0.0827**	**0.0000**	**88.7223**	**88.7223**	**0.0233**	**0.0000**	**89.3053**

3.6 Construction - P1Y2 - 2023

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	1.0000e-005	3.6000e-004	1.1000e-004	0.0000	1.4000e-004	0.0000	1.4000e-004	3.0000e-005	0.0000	4.0000e-005	0.0000	0.1574	0.1574	1.0000e-005	0.0000	0.1575
Vendor	1.5000e-004	4.7900e-003	1.5000e-003	2.0000e-005	4.3000e-004	1.0000e-005	4.3000e-004	1.2000e-004	1.0000e-005	1.3000e-004	0.0000	1.6202	1.6202	6.0000e-005	0.0000	1.6217
Worker	5.2000e-004	3.4000e-004	3.7700e-003	1.0000e-005	1.5500e-003	1.0000e-005	1.5600e-003	4.1000e-004	1.0000e-005	4.2000e-004	0.0000	1.1869	1.1869	2.0000e-005	0.0000	1.1875
Total	**6.8000e-004**	**5.4900e-003**	**5.3800e-003**	**3.0000e-005**	**2.1200e-003**	**2.0000e-005**	**2.1300e-003**	**5.6000e-004**	**2.0000e-005**	**5.9000e-004**	**0.0000**	**2.9644**	**2.9644**	**9.0000e-005**	**0.0000**	**2.9667**

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					0.2347	0.0000	0.2347	0.0599	0.0000	0.0599	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0563	0.5591	0.4795	1.0200e-003		0.0243	0.0243		0.0227	0.0227	0.0000	88.7222	88.7222	0.0233	0.0000	89.3052
Total	**0.0563**	**0.5591**	**0.4795**	**1.0200e-003**	**0.2347**	**0.0243**	**0.2590**	**0.0599**	**0.0227**	**0.0827**	**0.0000**	**88.7222**	**88.7222**	**0.0233**	**0.0000**	**89.3052**

3.6 Construction - P1Y2 - 2023

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	1.0000e-005	3.6000e-004	1.1000e-004	0.0000	1.4000e-004	0.0000	1.4000e-004	3.0000e-005	0.0000	4.0000e-005	0.0000	0.1574	0.1574	1.0000e-005	0.0000	0.1575
Vendor	1.5000e-004	4.7900e-003	1.5000e-003	2.0000e-005	4.3000e-004	1.0000e-005	4.3000e-004	1.2000e-004	1.0000e-005	1.3000e-004	0.0000	1.6202	1.6202	6.0000e-005	0.0000	1.6217
Worker	5.2000e-004	3.4000e-004	3.7700e-003	1.0000e-005	1.5500e-003	1.0000e-005	1.5600e-003	4.1000e-004	1.0000e-005	4.2000e-004	0.0000	1.1869	1.1869	2.0000e-005	0.0000	1.1875
Total	**6.8000e-004**	**5.4900e-003**	**5.3800e-003**	**3.0000e-005**	**2.1200e-003**	**2.0000e-005**	**2.1300e-003**	**5.6000e-004**	**2.0000e-005**	**5.9000e-004**	**0.0000**	**2.9644**	**2.9644**	**9.0000e-005**	**0.0000**	**2.9667**

3.7 Site Prep - P2Y1 - 2023

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					0.1174	0.0000	0.1174	0.0646	0.0000	0.0646	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0173	0.1789	0.1186	2.5000e-004		8.2300e-003	8.2300e-003		7.5700e-003	7.5700e-003	0.0000	21.7430	21.7430	7.0300e-003	0.0000	21.9188
Total	**0.0173**	**0.1789**	**0.1186**	**2.5000e-004**	**0.1174**	**8.2300e-003**	**0.1257**	**0.0646**	**7.5700e-003**	**0.0721**	**0.0000**	**21.7430**	**21.7430**	**7.0300e-003**	**0.0000**	**21.9188**

3.7 Site Prep - P2Y1 - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.2100e-003	3.9000e-004	1.0000e-005	1.3000e-004	0.0000	1.3000e-004	3.0000e-005	0.0000	4.0000e-005	0.0000	0.5357	0.5357	2.0000e-005	0.0000	0.5363
Vendor	7.0000e-005	2.3900e-003	7.5000e-004	1.0000e-005	2.1000e-004	0.0000	2.2000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.8101	0.8101	3.0000e-005	0.0000	0.8108
Worker	2.6000e-004	1.7000e-004	1.8900e-003	1.0000e-005	7.7000e-004	0.0000	7.8000e-004	2.1000e-004	0.0000	2.1000e-004	0.0000	0.5934	0.5934	1.0000e-005	0.0000	0.5937
Total	**3.7000e-004**	**3.7700e-003**	**3.0300e-003**	**3.0000e-005**	**1.1100e-003**	**0.0000**	**1.1300e-003**	**3.0000e-004**	**0.0000**	**3.1000e-004**	**0.0000**	**1.9392**	**1.9392**	**6.0000e-005**	**0.0000**	**1.9408**

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					0.1174	0.0000	0.1174	0.0646	0.0000	0.0646	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0173	0.1789	0.1186	2.5000e-004		8.2300e-003	8.2300e-003		7.5700e-003	7.5700e-003	0.0000	21.7429	21.7429	7.0300e-003	0.0000	21.9187
Total	**0.0173**	**0.1789**	**0.1186**	**2.5000e-004**	**0.1174**	**8.2300e-003**	**0.1257**	**0.0646**	**7.5700e-003**	**0.0721**	**0.0000**	**21.7429**	**21.7429**	**7.0300e-003**	**0.0000**	**21.9187**

3.7 Site Prep - P2Y1 - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.2100e-003	3.9000e-004	1.0000e-005	1.3000e-004	0.0000	1.3000e-004	3.0000e-005	0.0000	4.0000e-005	0.0000	0.5357	0.5357	2.0000e-005	0.0000	0.5363
Vendor	7.0000e-005	2.3900e-003	7.5000e-004	1.0000e-005	2.1000e-004	0.0000	2.2000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.8101	0.8101	3.0000e-005	0.0000	0.8108
Worker	2.6000e-004	1.7000e-004	1.8900e-003	1.0000e-005	7.7000e-004	0.0000	7.8000e-004	2.1000e-004	0.0000	2.1000e-004	0.0000	0.5934	0.5934	1.0000e-005	0.0000	0.5937
Total	**3.7000e-004**	**3.7700e-003**	**3.0300e-003**	**3.0000e-005**	**1.1100e-003**	**0.0000**	**1.1300e-003**	**3.0000e-004**	**0.0000**	**3.1000e-004**	**0.0000**	**1.9392**	**1.9392**	**6.0000e-005**	**0.0000**	**1.9408**

3.8 Demo - P2Y1 - 2023

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					0.0115	0.0000	0.0115	1.7400e-003	0.0000	1.7400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1345	1.1617	1.1361	2.5800e-003		0.0526	0.0526		0.0503	0.0503	0.0000	223.9811	223.9811	0.0341	0.0000	224.8322
Total	**0.1345**	**1.1617**	**1.1361**	**2.5800e-003**	**0.0115**	**0.0526**	**0.0641**	**1.7400e-003**	**0.0503**	**0.0521**	**0.0000**	**223.9811**	**223.9811**	**0.0341**	**0.0000**	**224.8322**

3.8 Demo - P2Y1 - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.2100e-003	3.9000e-004	1.0000e-005	1.3000e-004	0.0000	1.3000e-004	3.0000e-005	0.0000	4.0000e-005	0.0000	0.5357	0.5357	2.0000e-005	0.0000	0.5363
Vendor	3.8000e-004	0.0122	3.8200e-003	4.0000e-005	1.0900e-003	1.0000e-005	1.1000e-003	3.1000e-004	1.0000e-005	3.3000e-004	0.0000	4.1127	4.1127	1.5000e-004	0.0000	4.1165
Worker	1.3300e-003	8.5000e-004	9.5800e-003	3.0000e-005	3.9300e-003	2.0000e-005	3.9500e-003	1.0400e-003	2.0000e-005	1.0700e-003	0.0000	3.0129	3.0129	6.0000e-005	0.0000	3.0144
Total	**1.7500e-003**	**0.0142**	**0.0138**	**8.0000e-005**	**5.1500e-003**	**3.0000e-005**	**5.1800e-003**	**1.3800e-003**	**3.0000e-005**	**1.4400e-003**	**0.0000**	**7.6613**	**7.6613**	**2.3000e-004**	**0.0000**	**7.6672**

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					0.0115	0.0000	0.0115	1.7400e-003	0.0000	1.7400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1345	1.1617	1.1361	2.5800e-003		0.0526	0.0526		0.0503	0.0503	0.0000	223.9808	223.9808	0.0341	0.0000	224.8320
Total	**0.1345**	**1.1617**	**1.1361**	**2.5800e-003**	**0.0115**	**0.0526**	**0.0641**	**1.7400e-003**	**0.0503**	**0.0521**	**0.0000**	**223.9808**	**223.9808**	**0.0341**	**0.0000**	**224.8320**

3.8 Demo - P2Y1 - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.2100e-003	3.9000e-004	1.0000e-005	1.3000e-004	0.0000	1.3000e-004	3.0000e-005	0.0000	4.0000e-005	0.0000	0.5357	0.5357	2.0000e-005	0.0000	0.5363
Vendor	3.8000e-004	0.0122	3.8200e-003	4.0000e-005	1.0900e-003	1.0000e-005	1.1000e-003	3.1000e-004	1.0000e-005	3.3000e-004	0.0000	4.1127	4.1127	1.5000e-004	0.0000	4.1165
Worker	1.3300e-003	8.5000e-004	9.5800e-003	3.0000e-005	3.9300e-003	2.0000e-005	3.9500e-003	1.0400e-003	2.0000e-005	1.0700e-003	0.0000	3.0129	3.0129	6.0000e-005	0.0000	3.0144
Total	**1.7500e-003**	**0.0142**	**0.0138**	**8.0000e-005**	**5.1500e-003**	**3.0000e-005**	**5.1800e-003**	**1.3800e-003**	**3.0000e-005**	**1.4400e-003**	**0.0000**	**7.6613**	**7.6613**	**2.3000e-004**	**0.0000**	**7.6672**

3.9 Construction - P2Y1 - 2023

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					0.1442	0.0000	0.1442	0.0488	0.0000	0.0488	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0551	0.5432	0.5162	1.0600e-003		0.0232	0.0232		0.0217	0.0217	0.0000	92.4203	92.4203	0.0247	0.0000	93.0387
Total	**0.0551**	**0.5432**	**0.5162**	**1.0600e-003**	**0.1442**	**0.0232**	**0.1674**	**0.0488**	**0.0217**	**0.0705**	**0.0000**	**92.4203**	**92.4203**	**0.0247**	**0.0000**	**93.0387**

3.9 Construction - P2Y1 - 2023

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	2.0000e-005	5.8000e-004	1.9000e-004	0.0000	1.1000e-004	0.0000	1.1000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.2576	0.2576	1.0000e-005	0.0000	0.2578
Vendor	1.4000e-004	4.6000e-003	1.4500e-003	2.0000e-005	4.1000e-004	1.0000e-005	4.2000e-004	1.2000e-004	1.0000e-005	1.2000e-004	0.0000	1.5579	1.5579	6.0000e-005	0.0000	1.5593
Worker	5.0000e-004	3.2000e-004	3.6300e-003	1.0000e-005	1.4900e-003	1.0000e-005	1.5000e-003	4.0000e-004	1.0000e-005	4.0000e-004	0.0000	1.1412	1.1412	2.0000e-005	0.0000	1.1418
Total	**6.6000e-004**	**5.5000e-003**	**5.2700e-003**	**3.0000e-005**	**2.0100e-003**	**2.0000e-005**	**2.0300e-003**	**5.5000e-004**	**2.0000e-005**	**5.5000e-004**	**0.0000**	**2.9567**	**2.9567**	**9.0000e-005**	**0.0000**	**2.9589**

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					0.1442	0.0000	0.1442	0.0488	0.0000	0.0488	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0551	0.5432	0.5162	1.0600e-003		0.0232	0.0232		0.0217	0.0217	0.0000	92.4202	92.4202	0.0247	0.0000	93.0385
Total	**0.0551**	**0.5432**	**0.5162**	**1.0600e-003**	**0.1442**	**0.0232**	**0.1674**	**0.0488**	**0.0217**	**0.0705**	**0.0000**	**92.4202**	**92.4202**	**0.0247**	**0.0000**	**93.0385**

3.9 Construction - P2Y1 - 2023

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	2.0000e-005	5.8000e-004	1.9000e-004	0.0000	1.1000e-004	0.0000	1.1000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.2576	0.2576	1.0000e-005	0.0000	0.2578
Vendor	1.4000e-004	4.6000e-003	1.4500e-003	2.0000e-005	4.1000e-004	1.0000e-005	4.2000e-004	1.2000e-004	1.0000e-005	1.2000e-004	0.0000	1.5579	1.5579	6.0000e-005	0.0000	1.5593
Worker	5.0000e-004	3.2000e-004	3.6300e-003	1.0000e-005	1.4900e-003	1.0000e-005	1.5000e-003	4.0000e-004	1.0000e-005	4.0000e-004	0.0000	1.1412	1.1412	2.0000e-005	0.0000	1.1418
Total	**6.6000e-004**	**5.5000e-003**	**5.2700e-003**	**3.0000e-005**	**2.0100e-003**	**2.0000e-005**	**2.0300e-003**	**5.5000e-004**	**2.0000e-005**	**5.5000e-004**	**0.0000**	**2.9567**	**2.9567**	**9.0000e-005**	**0.0000**	**2.9589**

3.9 Construction - P2Y1 - 2024

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					0.1502	0.0000	0.1502	0.0521	0.0000	0.0521	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0572	0.5491	0.5531	1.1400e-003		0.0231	0.0231		0.0216	0.0216	0.0000	99.7915	99.7915	0.0267	0.0000	100.4581
Total	**0.0572**	**0.5491**	**0.5531**	**1.1400e-003**	**0.1502**	**0.0231**	**0.1734**	**0.0521**	**0.0216**	**0.0737**	**0.0000**	**99.7915**	**99.7915**	**0.0267**	**0.0000**	**100.4581**

3.9 Construction - P2Y1 - 2024

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	2.0000e-005	6.2000e-004	2.0000e-004	0.0000	1.1000e-004	0.0000	1.1000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.2761	0.2761	1.0000e-005	0.0000	0.2764
Vendor	1.5000e-004	4.9100e-003	1.5100e-003	2.0000e-005	4.4000e-004	1.0000e-005	4.5000e-004	1.3000e-004	1.0000e-005	1.3000e-004	0.0000	1.6712	1.6712	6.0000e-005	0.0000	1.6728
Worker	5.1000e-004	3.2000e-004	3.6300e-003	1.0000e-005	1.6100e-003	1.0000e-005	1.6200e-003	4.3000e-004	1.0000e-005	4.4000e-004	0.0000	1.1841	1.1841	2.0000e-005	0.0000	1.1847
Total	**6.8000e-004**	**5.8500e-003**	**5.3400e-003**	**3.0000e-005**	**2.1600e-003**	**2.0000e-005**	**2.1800e-003**	**5.9000e-004**	**2.0000e-005**	**6.0000e-004**	**0.0000**	**3.1314**	**3.1314**	**9.0000e-005**	**0.0000**	**3.1338**

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					0.1502	0.0000	0.1502	0.0521	0.0000	0.0521	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0572	0.5491	0.5531	1.1400e-003		0.0231	0.0231		0.0216	0.0216	0.0000	99.7914	99.7914	0.0267	0.0000	100.4580
Total	**0.0572**	**0.5491**	**0.5531**	**1.1400e-003**	**0.1502**	**0.0231**	**0.1734**	**0.0521**	**0.0216**	**0.0737**	**0.0000**	**99.7914**	**99.7914**	**0.0267**	**0.0000**	**100.4580**

3.9 Construction - P2Y1 - 2024

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	2.0000e-005	6.2000e-004	2.0000e-004	0.0000	1.1000e-004	0.0000	1.1000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.2761	0.2761	1.0000e-005	0.0000	0.2764
Vendor	1.5000e-004	4.9100e-003	1.5100e-003	2.0000e-005	4.4000e-004	1.0000e-005	4.5000e-004	1.3000e-004	1.0000e-005	1.3000e-004	0.0000	1.6712	1.6712	6.0000e-005	0.0000	1.6728
Worker	5.1000e-004	3.2000e-004	3.6300e-003	1.0000e-005	1.6100e-003	1.0000e-005	1.6200e-003	4.3000e-004	1.0000e-005	4.4000e-004	0.0000	1.1841	1.1841	2.0000e-005	0.0000	1.1847
Total	**6.8000e-004**	**5.8500e-003**	**5.3400e-003**	**3.0000e-005**	**2.1600e-003**	**2.0000e-005**	**2.1800e-003**	**5.9000e-004**	**2.0000e-005**	**6.0000e-004**	**0.0000**	**3.1314**	**3.1314**	**9.0000e-005**	**0.0000**	**3.1338**

3.10 Site Prep - P2Y2 - 2024

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					0.1084	0.0000	0.1084	0.0596	0.0000	0.0596	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0202	0.1914	0.1363	3.3000e-004		8.5100e-003	8.5100e-003		7.8300e-003	7.8300e-003	0.0000	28.9731	28.9731	9.3700e-003	0.0000	29.2074
Total	**0.0202**	**0.1914**	**0.1363**	**3.3000e-004**	**0.1084**	**8.5100e-003**	**0.1169**	**0.0596**	**7.8300e-003**	**0.0674**	**0.0000**	**28.9731**	**28.9731**	**9.3700e-003**	**0.0000**	**29.2074**

3.10 Site Prep - P2Y2 - 2024

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	6.0000e-005	1.9800e-003	6.5000e-004	1.0000e-005	2.1000e-004	0.0000	2.2000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.8862	0.8862	4.0000e-005	0.0000	0.8871
Vendor	7.0000e-005	2.1800e-003	6.7000e-004	1.0000e-005	2.0000e-004	0.0000	2.0000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.7428	0.7428	3.0000e-005	0.0000	0.7435
Worker	2.3000e-004	1.4000e-004	1.6100e-003	1.0000e-005	7.1000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.5263	0.5263	1.0000e-005	0.0000	0.5265
Total	**3.6000e-004**	**4.3000e-003**	**2.9300e-003**	**3.0000e-005**	**1.1200e-003**	**0.0000**	**1.1400e-003**	**3.1000e-004**	**0.0000**	**3.1000e-004**	**0.0000**	**2.1552**	**2.1552**	**8.0000e-005**	**0.0000**	**2.1571**

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					0.1084	0.0000	0.1084	0.0596	0.0000	0.0596	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0202	0.1914	0.1363	3.3000e-004		8.5100e-003	8.5100e-003		7.8300e-003	7.8300e-003	0.0000	28.9731	28.9731	9.3700e-003	0.0000	29.2073
Total	**0.0202**	**0.1914**	**0.1363**	**3.3000e-004**	**0.1084**	**8.5100e-003**	**0.1169**	**0.0596**	**7.8300e-003**	**0.0674**	**0.0000**	**28.9731**	**28.9731**	**9.3700e-003**	**0.0000**	**29.2073**

3.10 Site Prep - P2Y2 - 2024

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	6.0000e-005	1.9800e-003	6.5000e-004	1.0000e-005	2.1000e-004	0.0000	2.2000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.8862	0.8862	4.0000e-005	0.0000	0.8871
Vendor	7.0000e-005	2.1800e-003	6.7000e-004	1.0000e-005	2.0000e-004	0.0000	2.0000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.7428	0.7428	3.0000e-005	0.0000	0.7435
Worker	2.3000e-004	1.4000e-004	1.6100e-003	1.0000e-005	7.1000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.5263	0.5263	1.0000e-005	0.0000	0.5265
Total	**3.6000e-004**	**4.3000e-003**	**2.9300e-003**	**3.0000e-005**	**1.1200e-003**	**0.0000**	**1.1400e-003**	**3.1000e-004**	**0.0000**	**3.1000e-004**	**0.0000**	**2.1552**	**2.1552**	**8.0000e-005**	**0.0000**	**2.1571**

3.11 Construction - P2Y2 - 2024

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					0.4348	0.0000	0.4348	0.1693	0.0000	0.1693	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1901	1.8626	1.6870	3.5700e-003		0.0789	0.0789		0.0737	0.0737	0.0000	311.8781	311.8781	0.0817	0.0000	313.9209
Total	**0.1901**	**1.8626**	**1.6870**	**3.5700e-003**	**0.4348**	**0.0789**	**0.5137**	**0.1693**	**0.0737**	**0.2430**	**0.0000**	**311.8781**	**311.8781**	**0.0817**	**0.0000**	**313.9209**

3.11 Construction - P2Y2 - 2024

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	5.0000e-005	1.5300e-003	5.1000e-004	1.0000e-005	2.0000e-004	0.0000	2.0000e-004	5.0000e-005	0.0000	6.0000e-005	0.0000	0.6851	0.6851	3.0000e-005	0.0000	0.6858
Vendor	5.1000e-004	0.0167	5.1400e-003	6.0000e-005	1.5100e-003	2.0000e-005	1.5300e-003	4.4000e-004	2.0000e-005	4.6000e-004	0.0000	5.6946	5.6946	2.1000e-004	0.0000	5.6998
Worker	1.7500e-003	1.0700e-003	0.0124	4.0000e-005	5.4700e-003	3.0000e-005	5.5000e-003	1.4600e-003	3.0000e-005	1.4900e-003	0.0000	4.0348	4.0348	7.0000e-005	0.0000	4.0367
Total	**2.3100e-003**	**0.0193**	**0.0180**	**1.1000e-004**	**7.1800e-003**	**5.0000e-005**	**7.2300e-003**	**1.9500e-003**	**5.0000e-005**	**2.0100e-003**	**0.0000**	**10.4145**	**10.4145**	**3.1000e-004**	**0.0000**	**10.4223**

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					0.4348	0.0000	0.4348	0.1693	0.0000	0.1693	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1901	1.8626	1.6870	3.5700e-003		0.0789	0.0789		0.0737	0.0737	0.0000	311.8777	311.8777	0.0817	0.0000	313.9205
Total	**0.1901**	**1.8626**	**1.6870**	**3.5700e-003**	**0.4348**	**0.0789**	**0.5137**	**0.1693**	**0.0737**	**0.2430**	**0.0000**	**311.8777**	**311.8777**	**0.0817**	**0.0000**	**313.9205**

3.11 Construction - P2Y2 - 2024

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	5.0000e-005	1.5300e-003	5.1000e-004	1.0000e-005	2.0000e-004	0.0000	2.0000e-004	5.0000e-005	0.0000	6.0000e-005	0.0000	0.6851	0.6851	3.0000e-005	0.0000	0.6858
Vendor	5.1000e-004	0.0167	5.1400e-003	6.0000e-005	1.5100e-003	2.0000e-005	1.5300e-003	4.4000e-004	2.0000e-005	4.6000e-004	0.0000	5.6946	5.6946	2.1000e-004	0.0000	5.6998
Worker	1.7500e-003	1.0700e-003	0.0124	4.0000e-005	5.4700e-003	3.0000e-005	5.5000e-003	1.4600e-003	3.0000e-005	1.4900e-003	0.0000	4.0348	4.0348	7.0000e-005	0.0000	4.0367
Total	**2.3100e-003**	**0.0193**	**0.0180**	**1.1000e-004**	**7.1800e-003**	**5.0000e-005**	**7.2300e-003**	**1.9500e-003**	**5.0000e-005**	**2.0100e-003**	**0.0000**	**10.4145**	**10.4145**	**3.1000e-004**	**0.0000**	**10.4223**

3.11 Construction - P2Y2 - 2025

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					0.2391	0.0000	0.2391	0.0617	0.0000	0.0617	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0506	0.4787	0.4758	1.0500e-003		0.0197	0.0197		0.0184	0.0184	0.0000	91.5096	91.5096	0.0239	0.0000	92.1072
Total	**0.0506**	**0.4787**	**0.4758**	**1.0500e-003**	**0.2391**	**0.0197**	**0.2587**	**0.0617**	**0.0184**	**0.0801**	**0.0000**	**91.5096**	**91.5096**	**0.0239**	**0.0000**	**92.1072**

3.11 Construction - P2Y2 - 2025

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	1.0000e-005	4.4000e-004	1.5000e-004	0.0000	1.7000e-004	0.0000	1.7000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1996	0.1996	1.0000e-005	0.0000	0.1998
Vendor	1.5000e-004	4.8400e-003	1.4700e-003	2.0000e-005	4.4000e-004	1.0000e-005	4.5000e-004	1.3000e-004	1.0000e-005	1.3000e-004	0.0000	1.6604	1.6604	6.0000e-005	0.0000	1.6619
Worker	4.9000e-004	2.9000e-004	3.3700e-003	1.0000e-005	1.6100e-003	1.0000e-005	1.6200e-003	4.3000e-004	1.0000e-005	4.4000e-004	0.0000	1.1362	1.1362	2.0000e-005	0.0000	1.1367
Total	**6.5000e-004**	**5.5700e-003**	**4.9900e-003**	**3.0000e-005**	**2.2200e-003**	**2.0000e-005**	**2.2400e-003**	**6.0000e-004**	**2.0000e-005**	**6.1000e-004**	**0.0000**	**2.9962**	**2.9962**	**9.0000e-005**	**0.0000**	**2.9984**

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					0.2391	0.0000	0.2391	0.0617	0.0000	0.0617	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0506	0.4787	0.4758	1.0500e-003		0.0197	0.0197		0.0184	0.0184	0.0000	91.5095	91.5095	0.0239	0.0000	92.1071
Total	**0.0506**	**0.4787**	**0.4758**	**1.0500e-003**	**0.2391**	**0.0197**	**0.2587**	**0.0617**	**0.0184**	**0.0801**	**0.0000**	**91.5095**	**91.5095**	**0.0239**	**0.0000**	**92.1071**

3.11 Construction - P2Y2 - 2025

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	1.0000e-005	4.4000e-004	1.5000e-004	0.0000	1.7000e-004	0.0000	1.7000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1996	0.1996	1.0000e-005	0.0000	0.1998
Vendor	1.5000e-004	4.8400e-003	1.4700e-003	2.0000e-005	4.4000e-004	1.0000e-005	4.5000e-004	1.3000e-004	1.0000e-005	1.3000e-004	0.0000	1.6604	1.6604	6.0000e-005	0.0000	1.6619
Worker	4.9000e-004	2.9000e-004	3.3700e-003	1.0000e-005	1.6100e-003	1.0000e-005	1.6200e-003	4.3000e-004	1.0000e-005	4.4000e-004	0.0000	1.1362	1.1362	2.0000e-005	0.0000	1.1367
Total	**6.5000e-004**	**5.5700e-003**	**4.9900e-003**	**3.0000e-005**	**2.2200e-003**	**2.0000e-005**	**2.2400e-003**	**6.0000e-004**	**2.0000e-005**	**6.1000e-004**	**0.0000**	**2.9962**	**2.9962**	**9.0000e-005**	**0.0000**	**2.9984**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.616749	0.035330	0.181430	0.103378	0.013121	0.005016	0.012828	0.021913	0.002183	0.001508	0.005219	0.000634	0.000691

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

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

5.2 Energy by Land Use - NaturalGas

Unmitigated

	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					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

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

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	5.7500e-003	0.0000	1.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5000e-004	2.5000e-004	0.0000	0.0000	2.7000e-004
Unmitigated	5.7500e-003	0.0000	1.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5000e-004	2.5000e-004	0.0000	0.0000	2.7000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	5.7300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5000e-004	2.5000e-004	0.0000	0.0000	2.7000e-004
Total	**5.7400e-003**	**0.0000**	**1.3000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.5000e-004**	**2.5000e-004**	**0.0000**	**0.0000**	**2.7000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	5.7300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.3000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5000e-004	2.5000e-004	0.0000	0.0000	2.7000e-004
Total	**5.7400e-003**	**0.0000**	**1.3000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.5000e-004**	**2.5000e-004**	**0.0000**	**0.0000**	**2.7000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

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

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

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

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

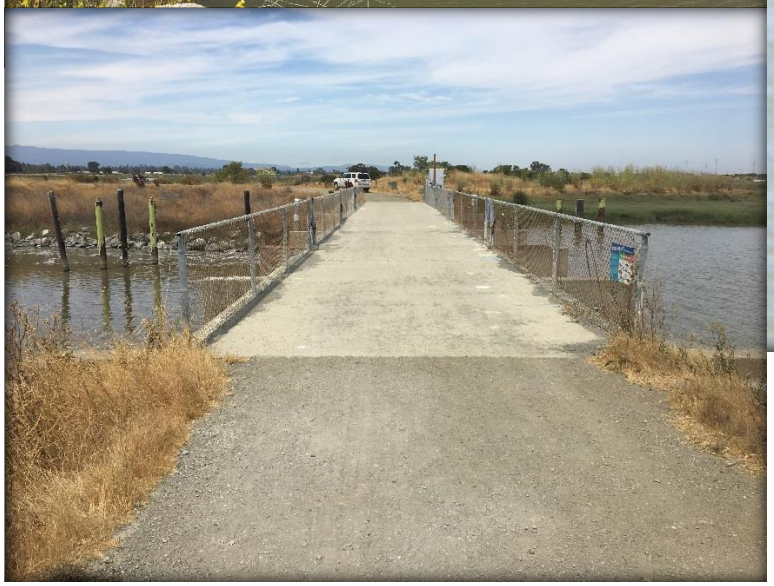
Equipment Type	Number

11.0 Vegetation

Appendix B
Biological Site Assessment

Palo Alto Tide Gate Structure Improvements

Biological Site Assessment



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September 2020

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Introduction

The purpose of this document is to assess the effects of the proposed Palo Alto Tide Gate Structure Replacement Project (Project) on sensitive biological resources within or adjacent to the Project Area, described below. Throughout this document, the "Project Area" is the area directly affected by the project, while the term "Study Area" is the larger area analyzed during this assessment. The biological Study Area includes the work area (i.e., new and existing tide gates and levee, and dewatering limits), staging areas, and a 100-foot buffer around the work and staging areas. Indirect impacts on special-status species may occur beyond the limits of the study area (i.e., noise disturbance to birds), as considered in the impact analysis. The study area is approximately 25.5 acres. Conditions occurring in the study area include: a maintained and functioning levee and pedestrian path along the shoreline; undeveloped interior managed/muted-tidal waters and open space areas; the existing tide gate structure; and undeveloped tidal waters seaward of the levee. The existing tide gate structure is located along the levee and hydrologically connects the Bay to the PAFB on the inboard side of the levee. Sensitive biological resources may include plants or animals listed as rare, threatened, endangered, or state species of special concern; critical habitat or habitat essential to special-status plants or wildlife; rare or threatened natural communities; wetlands, streams, and surrounding riparian vegetation. The objectives of this document are to 1) determine whether there are any sensitive biological resources in proximity to the proposed Project, 2) accurately map any biological constraints on the Project, 3) determine whether the Project would result in potentially significant adverse biological impacts.

Project Background

The proposed Project is located along the Bay shoreline within the Palo Alto Baylands Nature Preserve, east of the Palo Alto Municipal (Figure 1). Prior to the construction of the Palo Alto Flood Basin (PAFB, or flood basin) and tide gate structure, Matadero, Adobe, and Barron Creeks discharged directly into the San Francisco Bay (Bay) through Mayfield Slough. Flooding of the lowlands occurred as floodwaters of these creeks backed up against the Bay during high tides. The flooding was intensified due to ground subsidence, which averaged approximately 6 feet along the Bay shoreline. The levees forming the PAFB and tide gate structure were constructed in 1957 by Valley Water with support from the City of Palo Alto to prevent flooding in the lower creek reaches and avoid coastal flooding and future loss in the level of service of flood protection (Figure 2).

The floodwaters stored in the PAFB are released to the Bay through 8 cells with 16 tide gates that comprise the overall tide gate structure. The purpose of the tide gates are to regulate flows through the flood basin such that when the water surface elevation in the basin is higher than the tidal elevation of the Bay, the flap gates are pushed open by water pressure and discharge water from the basin to the Bay. When the water surface elevation in the flood basin is lower than the Bay, the flap gates are held shut by water pressure from the Bay, to prevent full tidal inundation (muted tidal influence occurs via a single, manually operated sluice gate).

The tide gate is regularly inspected and maintained by Valley Water. In 2011, Valley Water discovered that water was flowing beneath the structure, undermining the function of the tide gates and potentially, its structural stability. Temporary emergency repairs to arrest flow were completed in 2012.

While the temporary emergency repairs arrested significant under flow, Valley Water noted that future, permanent improvements would ensure continued function of the tide gate structure and the PAFB. In 2017, Valley Water attempted additional repairs to extend use of the structure; however, construction was suspended due to challenges faced while dewatering the work area and discovery of additional structural damage from aging.

The tide gate structure is currently operating beyond its designed 50-year lifespan, and may not function as designed in the long-term, due to predicted sea-level rise, seismic vulnerabilities, and further aging-related deterioration. Following the attempted repairs in 2017, a structural assessment report recommended that the structure be replaced and added that the structure should continue to function for a couple of years (Mark Thomas 2017). A follow-up structural assessment was performed again in January 2020 and extended the structure's service life for "another couple years" (Mark Thomas 2020).

In January 2018, Valley Water met with the City of Palo Alto to coordinate ongoing planning efforts along the Bay and to discuss how a tide gate replacement project would fit into existing plans. During the meeting, Valley Water and the City of Palo Alto discussed coordination with other on-going planning efforts in the vicinity including the San Francisquito Creek Joint Powers Authority's (SFCJPA) Strategy to Advance Flood Protection, Ecosystems and Recreation Project (SAFER Bay Project), the South Bay Salt Pond Restoration Project's (SBSPRP) Mountain View Ponds Project (Mountain View Ponds Project), and the USACE's South Bay Shoreline Levee Project (Shoreline Project). Valley Water coordinated with the City of Palo Alto to prepare an emergency action plan for the PAFB to provide guidance for potential flooding emergencies.

In October 2018, Valley Water met with the City of Palo Alto, City of Mountain View, and SFCJPA to promote interagency coordination during planning, design, and construction of a new tide gate structure. As a result of the meeting, Valley Water learned that the SAFER Bay Project, which could involve shoreline improvements that would preclude the need for tide gate replacement, expects to complete planning in eight years (beyond the expected functionality of the existing tide gate structure) and the Mountain View Ponds Project expects to begin construction in 2021.[1] As of March 2019, the new tide gate structure is included in one of the three SAFER Bay Project's conceptual alternatives to protect the communities of East Palo Alto, Menlo Park, Palo Alto, Mountain View, and surrounding infrastructure (i.e., U.S. Highway 101 [US-101]) from flooding. Given the short-term risk of tide gate structure failure, the interagency group agreed Valley Water should proceed with planning, design, and construction of a new tide gate structure rather than wait for the issue to be addressed by a future project. Valley Water plans to continue coordinating with the SAFER Bay, South Bay Shoreline, and Mountain View Ponds projects to maximize efficiencies of long-term Bay shoreline planning.

[1] The elevation of levees constructed as part of the Mountain View Ponds Project would need to match those constructed as part of this tide gate project.

Figure 1. Project Location

Figure 2. Palo Alto Flood Basin and Vicinity

Palo Alto Flood Basin Background

Prior to levee and tide gate installation, the flood basin area was composed of tidal salt marsh. The PAFB was closed off to normal tidal action in 1959, resulting in a loss of periodic tidal inundation with associated reductions in water circulation and natural salinity variations throughout the basin. Levees were installed along with tide gates which allowed outflow to the Bay, but eliminated tidal inflow to the basin. As one of the few remnants of relatively undisturbed wetland in the Bay Area, the PAFB was designated as a wetland preserve by the City of Palo Alto in 1973. They determined that the plant community present provided habitat and nesting areas for several species of waterfowl, shorebirds, and mammals, as well as wintering grounds for migratory waterfowl and shorebird species (Kibler et al. 1975). However, flood control is the primary purpose of the PAFB.

As mitigation for the City of Palo Alto's refuse disposal and landfilling operation, the PAFB was opened to limited tidal flow (through the installation of a slide gate) to improve circulation and restore salt marsh to approximately 1/3 of the basin (Kibler et al. 1975, USACE 1975). The inflow of tidal waters buffers abrupt changes in salinity during periods of freshwater inflow in the winter and hyper-salinity in the summer, and also improves water circulation (and therefore water quality), improving conditions for fish and wildlife. It was determined that in addition to providing adequate tidal circulation, this modification of the existing tide gate would maintain flood protection and preserve salt marsh plants and upland grass areas in the PAFB (Kibler et al. 1975).

The tide gate structure still allows limited exchange with Bay waters, creating muted tidal marsh habitat in the PAFB. The flood basin now contains a diversity of habitats including freshwater, brackish, and salt marsh. The flood basin is exposed to saline conditions at the northern end due to influence from the Bay, and because the creeks dry back in the summer and experience low flows, seasonal marsh pond habitat is supported at the southern end (AECOM 2017). Conditions in the basin provide wintering habitat for migratory waterfowl and shorebirds as well as nesting habitat for species such as California gull (*Larus californicus*), black-necked stilt (*Himantopus mexicanus*), American avocet (*Recurvirostra americana*), Forster's tern (*Sterna forsteri*), and black skimmer (*Rynchops niger*). While salt marsh harvest mice (*Reithrodontomys raviventris*) are largely considered a tidal marsh species, there is evidence of the species using diked/muted marshes, and trapping records indicate the species has used the PAFB.

If the tide gate became ineffective, the basin would be subject to increased tidal action and more saline conditions throughout, resulting in changes in habitat types, the species supported, and their use of the area. Reversion to tidal saltmarsh throughout the basin would favor species presence and use adapted to that habitat, such as the federally and state endangered and fully protected California Ridgway's rail (*Rallus obsoletus obsoletus*). It would also create a more natural transition from saline to freshwater habitat, which could provide valuable nursery habitat for fish; however, creeks upstream of the PAFB are currently of low value to fish. It could also reduce the availability of existing avian nesting and roosting habitat available in the basin or high tide refugia, as the increased tidal exchange would likely decrease time periods where land in the PAFB was above water. It would also increase the risk of flooding in the lower creek reaches, which could result in impacts to Highway 101 and residential or commercial structures.

Project Description

The Project would involve construction of a new 132-foot-wide tide gate structure slightly inboard (upstream) and southeast of the existing 113-foot-wide deteriorating tide gate structure, removal of the existing tide gate structure and levee, and construction of a new levee that ties into the new tide gate structure. Construction of the Project would occur in two phases, based largely on the dewatering approach:

- Phase 1:) Installation of the first dewatering system and construction of the new tide gate structure, new east levee approach (including ground improvements), removal of the existing levee in front of the new structure, and removal of the first dewatering system.

- Phase 2:) Installation of the second dewatering system and construction of the west levee approach (including ground improvements), removal of the existing tide gate structure, and removal of the second dewatering system.

The Project site limits would include the area of construction (new tide gate structure and levee), demolition (existing tide gate structure and levee), and two staging areas. The work footprint would total approximately 8.9 acres in the vicinity of the tide gate structure replacement work, but an additional 4.8 acres of existing access road would be improved to allow for adequate equipment access, as described below. An overview of the Project is included in Figure 3.

Site Mobilization, Staging, and Access

Initial mobilization would include closing the Adobe Creek Loop Trail, which occurs along the top of the existing levee and tide gate structure. The trail would be closed approximately 0.2 mile to the west and 2.1 miles to the east of the existing tide gate structure (total of 2.3 miles) during the construction work window (September 1 to January 31) annually; outside of the construction work window, the trail would be closed closer to the tide gate structure, approximately 300 feet to the west and 2,300 feet east of the structure (total of 0.5 miles), aside from the nine month period between the trail resurfacing work and the start of Phase 1 when the entire trail would be open (Figure 4). Pedestrian and bicycle access to the trail would be restricted by installing a chain link fence, swing gates, and signage. This portion of trail would be closed during the entire duration of the Project, for four consecutive years. A detour route along the south side of the PAFB would be marked with signs to direct pedestrians and cyclists around the closed section of the Adobe Creek Loop Trail.

After the trail has been closed, the existing road/trail would be resurfaced along the entire 2.5 miles of trail length to allow for adequate vehicle and equipment access. The limits of resurfacing would extend from the trail junction 0.2 mile west of the existing tide gate to the trail junction 2.1 miles east of the tide gate near the Coast Casey Pump Station, covering a total area of approximately 3.9 acres. The levee access road surface improvements would involve placing geogrid or geotextile fabric across the existing 14-foot wide road surface and then adding an approximately 8-inch thick layer of gravel on top of the fabric. The gravel would be delivered to the site with haul trucks and motor graders would smooth the gravel to the finished grade. While the average thickness would be approximately 8 inches, some areas may be thicker to fill existing holes and dips to create a smooth finished surface. The work would be limited to the existing dirt/gravel levee road/trail and would not extend into any undeveloped areas.

Two staging areas would be established to support construction activities (Figure 5). Staging Area 1 would be approximately 0.4 acre and located just west of the existing tide gate in a previously disturbed area northwest of the Adobe Creek Trail. Staging Area 2 would be approximately 6.2 acres and would be located starting approximately 260 feet east of the existing tide gate structure and extending approximately an additional 2,100 feet into an area where a small borrow ditch is circled by the levee (creating a large turnaround area). Staging Area 2 would utilize temporary shoring installed on the basin-side slope of the levee (outside of any waters or wetlands) and temporary fill placed to create a level staging area extending up to 30 feet from the basin-side edge of the levee trail to the shoring. The staging areas would be enclosed with chain link fence. Staging areas would occur in uplands, on barren ground, or on the existing levee trail only.

Construction vehicle and equipment access would occur from both directions along the levee (Adobe Creek Trail), including from Embarcadero Road to the west (0.6 mile to work area) and from San Antonio Road to the south and east (approximately 2.2 miles to work area).

Figure 3. Project Overview

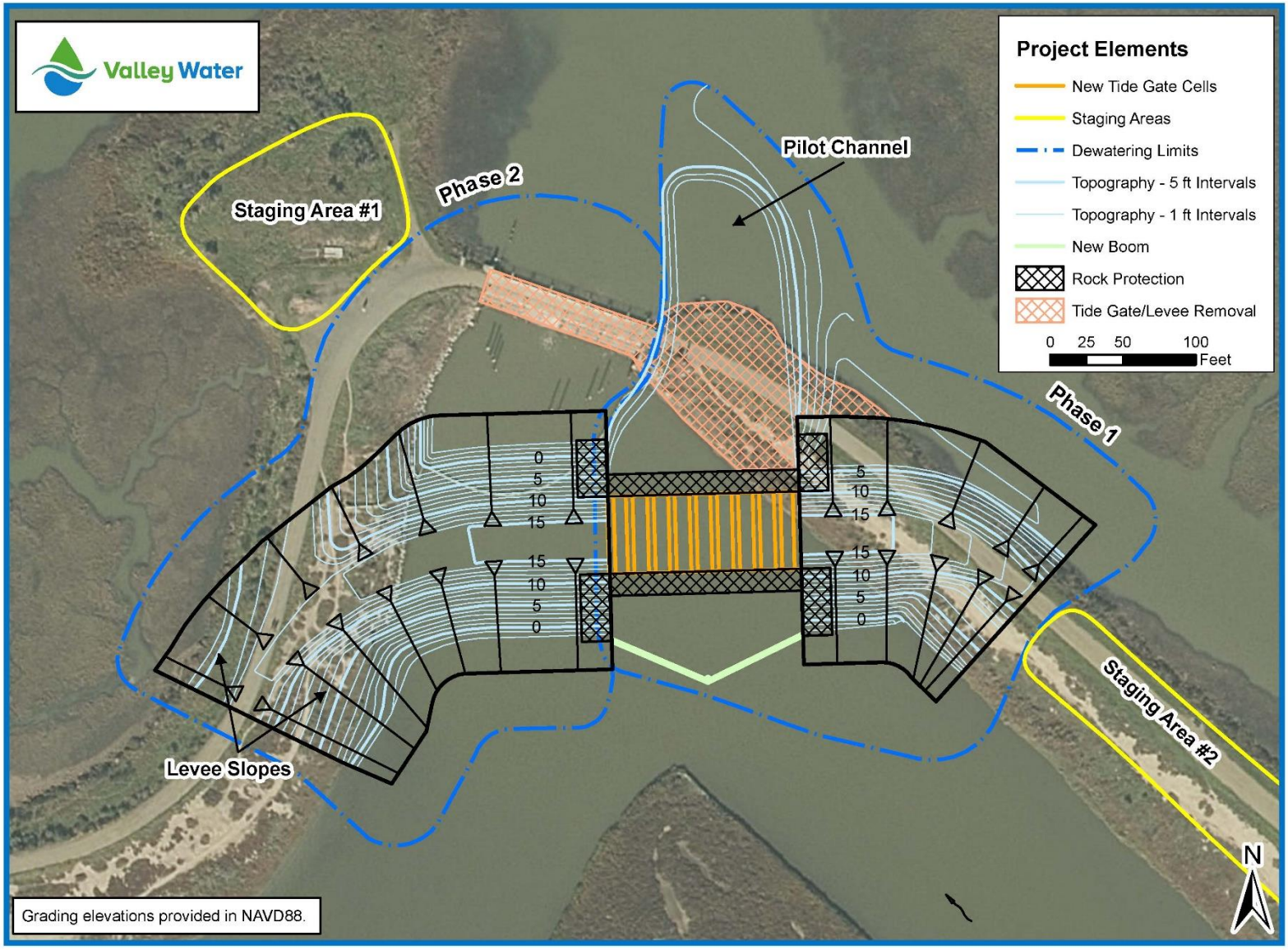


Figure 4. Trail Closure

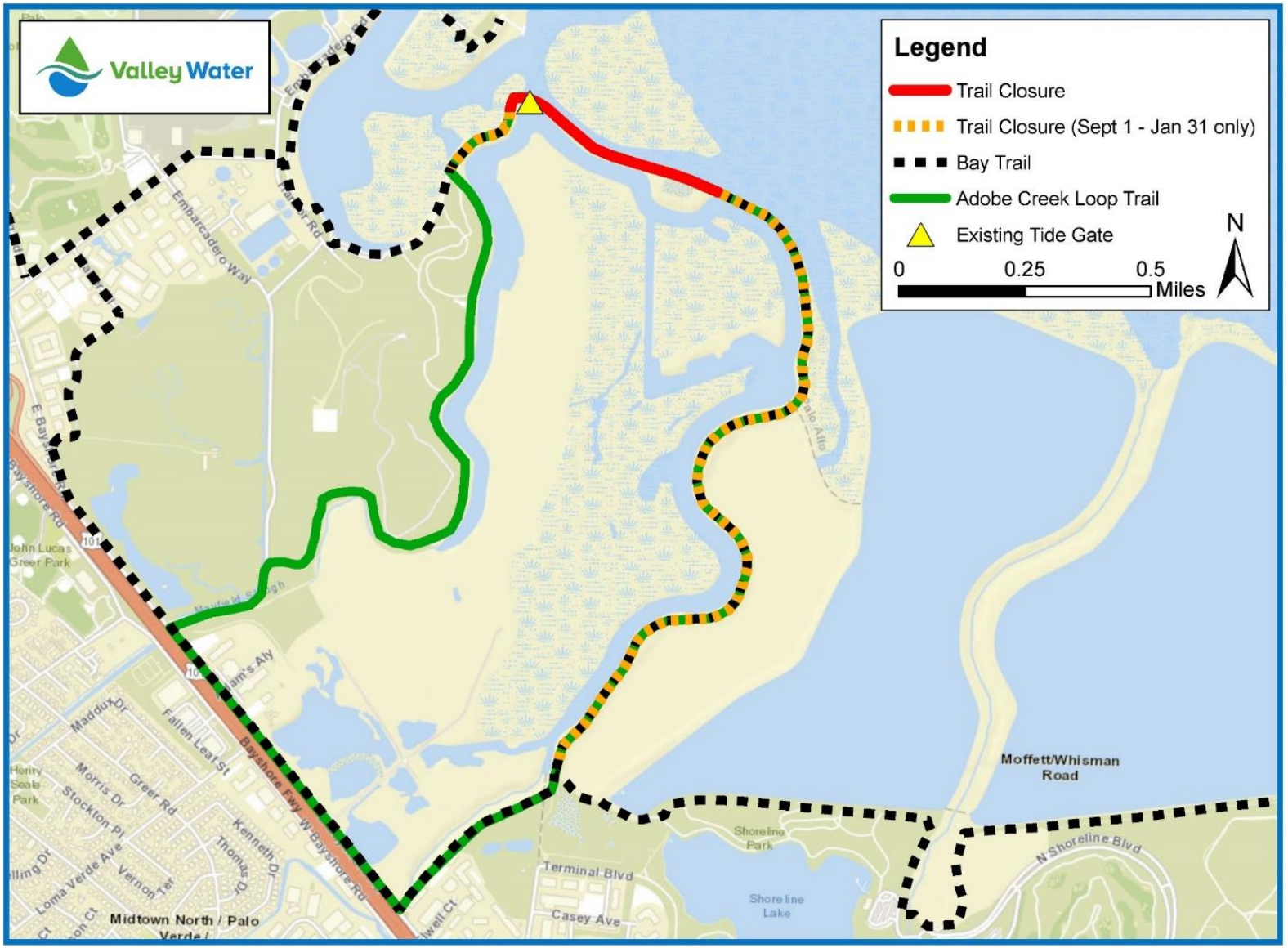
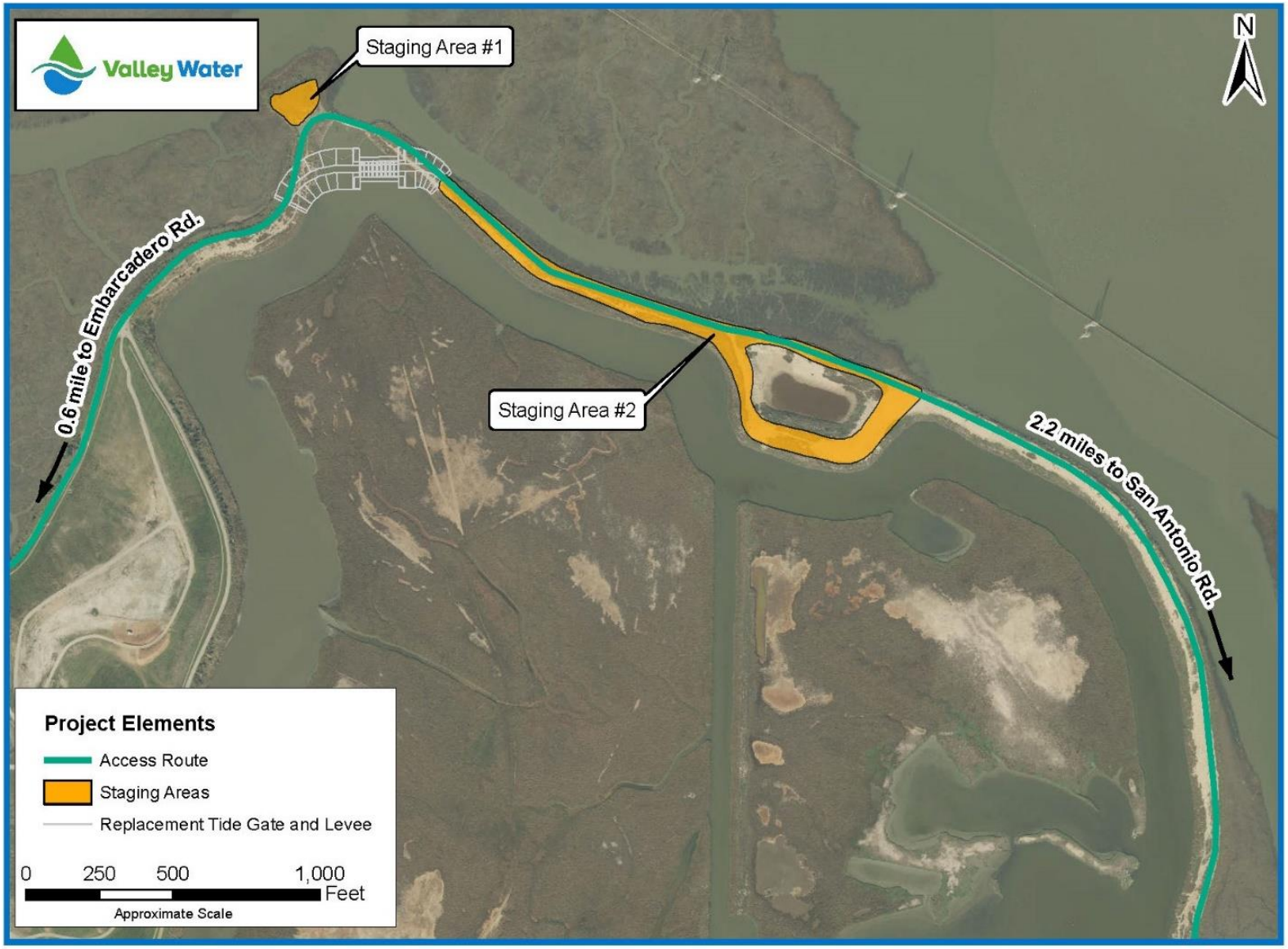


Figure 5. Staging and Access



Dewatering

Prior to the start of work, the work area would be dewatered to facilitate construction and demolition. Dewatering would occur in two phases, consistent with the construction phasing described below and depicted in Figure 3. For each dewatering phase, dewatering would consist of installing steel sheet pile walls at low tide around the work area for that phase to exclude water from entering, and pumping the remaining water out of the enclosed area into a holding tank to allow for sediment settlement, then into either the Bay or PAFB to facilitate a dry working area. Sheet piles would be pressed into place with an excavator, vibrated into place with a Giken system, or installed with a barge. Sheet piles would extend to a depth of approximately 60 feet. After Phase 1 work is completed, the sheet piles would be removed and the sheet piles for Phase 2 would be installed. The dewatered area would total approximately 4.6 acres, including 2.3 acres during Phase 1, and 2.3 acres during Phase 2.

Construction of the New Tide Gate Structure

Construction of the new tide gate structure would be phased to maintain operation of the existing tide gate structure until the new structure is installed and operational. The new tide gate structure would be similar to the existing tide gate structure and would consist of concrete bays housing aluminum flap gates; however, the new tide gate structure would be 132 feet wide and include nine 10-foot by 10-foot cells, as opposed to the existing tide gate structure which is 113 feet wide and has eight cells with sixteen 5-foot by 5-foot openings. In addition, the new tide gates would utilize modern side-hinges for increased hydraulic efficiency compared to the existing top-hinged tide gates. The new tide gate would increase the hydraulic conveyance capacity between the PAFB and Bay in order to accommodate future sea-level rise and be compatible with other projects currently in planning (i.e., SAFER Bay).

Phase 1

Following site mobilization and dewatering of the Phase 1 area, Phase 1 work would begin with clearing and grubbing of the levee surface east of the existing tide gate structure. A working platform would be created with fill and compacted gravel to accommodate construction equipment for installation of the new reinforced concrete pile foundation to support the new structure. The foundation would consist of approximately sixty 36-inch diameter cast-in-drilled-hole (CIDH) reinforced concrete piles. The anticipated typical CIDH pile construction would be carried out as follows:

1. A drill rig and crane would drill each 36-inch diameter CIDH pile hole individually with use of a temporary steel casing to prevent caving of surrounding native soil.

2. Water in the drilled hole would be displaced by pouring a bentonite slurry mix into the hole. The water would be pumped to a holding tank for filtration before discharge to the Bay or basin.

3. Steel reinforcement would then be lowered into the CIDH pile hole with a crane.

4. Concrete would then be piped to the bottom of the CIDH pile hole. As the concrete fills the CIDH pile hole, the bentonite slurry is displaced upward and collected at the top of the hole. The temporary steel casing is slowly removed as the concrete is placed.

5. Plastic inspection pipes would then be installed within the CIDH steel reinforcement and used to test the concrete for any anomalies. Any anomalies would be repaired (if needed), and the inspection pipes would be filled with grout.

Following installation of the piles, a sheet pile cut-off wall would be installed on both front and back sides of the new tide gate structure. Next, the reinforced concrete pile caps and slab would be constructed, followed by the reinforced concrete walls and deck. The completed reinforced concrete tide gate structure would have nine 10-foot by 10-foot cells with eight 10-foot by 10-foot side-hinged gates, and one cell utilizing a motor-driven 10-foot by 10-foot sluice gate. A rip-rap apron (15 feet wide and 6 feet deep) would occur on both the Bay and basin sides along the 132-foot length of the proposed tide gate structure; the existing rip-rap apron is 14 feet wide and 4 feet deep along the 113-foot length of the structure. Additional rip-rap (approximately 6 feet deep) would be placed along the outside face of the tide gate structure wingwalls, and extend approximately 30 feet beyond the end of the wingwalls.

A portion of the existing levee would be excavated prior to constructing the new levee east of the new tide gate structure. Ground improvements would be implemented within the footprint of the new levee to mitigate against anticipated excessive ground settlement. The ground improvements would utilize Deep-Soil-Mix (DSM), which consists of a multi-auger drill rig that mixes the native in situ soil locally with a cement milk to increase the strength properties of the existing soil. A cement silo, water tank, and mixer would be setup onsite to supply the cement milk to the multi-auger drill rig. The installed DSM cement milk would be mixed into the native in situ material and would not leach into the surrounding waters. The DSM material becomes hard once cured. Following the ground improvements, the foundation of the new levee east of the new tide gate structure would be constructed by importing engineered fill material with dump trucks and compacting. The levee slopes would be 3:1 and the top width of the levee would be approximately 24 feet wide. A maintenance road would be added to the top of the levee and would be composed of Class II aggregate base. The levee fill material and construction method would follow USACE standards such that the completed levee would meet Federal Emergency Management Agency (FEMA) certification requirements.

A pilot channel measuring approximately 200-feet long with a varying width of 132-feet wide at the outlet of the proposed tide gate structure and tapering to 60-feet wide at the end would be constructed to facilitate outward flow from the new tide gate structure to the existing channel.

Similar to the existing tide gate structure, corrosion resistant metallic trash racks would be installed within each concrete bay on the Bay and basin side of the new tide gate structure, and an approximately 140-foot long debris boom would be installed up to approximately 75 feet upstream of the new structure within the basin. The debris boom would be attached to the tide gate structure's sheet pile wingwalls at the ends and a CIDH pile about midway to anchor the shape of the boom. Materials used in construction of the new tide gate are included in Table 1 (quantities are estimates).

Table 1. Import Materials

Item	Quantity	Units	Construction Activity
Class 2 aggregate base	6,500	Cubic yards	Levee trail resurfacing
Steel sheet pile shoring	1,600	Square yards	Dewatering
Concrete piles	1,000	Cubic yards	Tide gate
Reinforced concrete	1,400	Cubic yards	Tide gate
Steel gates	9	Each	Tide gate
Rock rip-rap	2,000	Cubic yards	Tide gate
Chain link fence	350	Linear feet	Tide gate, staging
Debris fenders	1	Each	Tide gate
Electrical motor and vault	1	Each	Tide gate
SCADA system	1	Each	Tide gate
Ground improvements[1]	12,000	Cubic yards	Levee
Levee fill	48,000	Cubic yards	Levee

[1] Ground improvements involve deep soil mixing (DSM).

Phase 2

Phase 2 would begin with installation of a second sheet pile dewatering system that would be installed around the original tide gate to isolate the structure, while simultaneously removing the first sheet pile dewatering system. The new tide gate structure would begin operation as designed, while the original tide gate structure is removed. The original tide gate structure would be cut into pieces with concrete saws, removed with one or more cranes, and loaded onto trucks for off-site disposal. The invert slab would remain in place and all remaining components would be disposed of. With the removal of the existing tide gate structure, the embankment immediately west of the structure would be regraded to slope back at an approximately 3:1 slope to create a smooth transition between the Bay-side levee and basin-side levee. The timber piles occurring upstream of the existing tide gate structure would be cut two feet below the ground surface and disposed of. Materials to be hauled offsite for disposal are summarized in Table 2.

Table 2. Disposal Materials

Item	Quantity	Units	Exported or Reused	Source
Steel sheet pile shoring	188	Square yards	Reused	Existing tide gate
Timber piles	63	Each	Exported	Existing tide gate
Reinforced concrete	538	Cubic yards	Exported	Existing tide gate
Steel gates	16	Each	Exported	Existing tide gate
Rock rip-rap	519	Cubic yards	Reused	Existing tide gate, levee
Chain link fence	216	Linear feet	Exported	Existing tide gate
Debris fenders	1	Each	Exported	Existing tide gate
Electrical motor and vault	1	Each	Exported	Existing tide gate
SCADA system	1	Each	Exported	Existing tide gate
Clear and grubbing	1.6	Acres	Exported	Levee
Levee excavation	44,000	Cubic yards	Exported	Levee

Excavated soils generated in either Phase 1 or Phase 2 would be tested and then removed from the site and transported to the SBSPRP's ponds in Alviso (Pond A8) or Mountain View for use in restoration efforts. However, if the soil does not meet testing standards, the material will be taken to the Newby Island Landfill in Milpitas. Excavated soils include soils generated during pile drilling, excavation of the pilot channel, excavation of the existing levee, and other native soils generated during construction. Prior to transporting excavated soils to any SBSPRP ponds, testing and handling of the soil must comply with the RWQCB's Master Quality Assurance Project Plan for Don Edwards San Francisco Bay National Wildlife Refuge. Valley Water or its contractor would be required to submit a Soil Handling Plan to the Water Board for approval prior to transporting the material to the SBSPRP ponds. If approved, acceptable material would be transported to one or more of the ponds, stockpiled, and protected per the Soil Handling Plan. Any soil that does not meet the acceptance criteria for use at the ponds would be disposed of at the Newby Island Landfill.

Similar to the new levee east of the new tide gate structure, the new levee west of the new structure would require ground improvements utilizing the DSM method to reduce anticipated ground settlement. This portion of the levee and underlying ground improvements would be constructed in the same manner as the levee east of the new tide gate structure described under Phase 1 above.

After the levee is constructed to the specified grade and the dewatering system is removed, the levee slope would be revegetated, as appropriate. Educational signage would be installed along the Adobe Creek Loop Trail near the new tide gate to inform visitors about the area's natural features (i.e., endangered species).

Workers and Equipment

Approximately 15 workers are anticipated to be present during all phases of construction. Table 3 includes equipment that is anticipated to be utilized during construction.

Table 3. List of Equipment and Estimated Operation

Name of Equipment	Equipment Purpose	Hours Per Day	Total Days
Crane	Installing CIDH piles and sheet piles	8	280
Drill rig	Drilling CIDH piles and Ground Improvements	8	30
Sheet piling machine	Installing temporary sheet piling	8	44
Pumps	Dewatering	24	280
Trucks (flatbed)	Materials delivery	4	280
Generators	Power source	8	280
Concrete trucks	Materials delivery	8	140

Name of Equipment	Equipment Purpose	Hours Per Day	Total Days
Concrete hopper and pump	Pumping concrete into a tremie pipe	8	140
Excavator or backhoe loader	Levee/bay mud excavation	8	140
Compactors	Installation of subgrade fill	8	21
Cement silo, water tank, mixer	To supply DSM cement milk to the drill rig	8	10
Concrete saw	Demolition of existing concrete structure	8	56
Pneumatic power tools	General construction	8	56
Air compressors	Power blasting to clean rebar and concrete	4	280
Dump trucks	Export and import of soils	8	140
Water trucks	Dust control	3	140

Operations and Maintenance

Standard testing for materials strength (i.e., concrete) and performance testing of the tide gate would be performed by the construction contractor prior to operation. Eight of the nine tide gate cells would be opened or closed by the opposing hydrostatic forces of the water surface level in the PAFB and tide level of the Bay. The remaining tide gate would be mechanically driven and operated by Supervisory Control and Data Acquisition data or by the City of Palo Alto. The sluice gate on the existing structure must be opened and closed manually by an operator physically at the sluice gate. The new sluice gate would be improved such that it can also be operated remotely from the City's Regional Water Quality Control Plant (RWQCP). Should the new sluice gate require repairs, any of the passive tide gates can be manually opened to provide the function of the sluice gate during the time of repairs. The new sluice gate would allow water to flow both directions between the PAFB and Bay to allow for muted tidal influence in the PAFB, maintaining the existing operational condition. In case of a power outage, the new sluice gate would include connection for a generator, and support for fully manual gate operation. In addition, the passive tide gates would have the ability to be manually hoisted if needed for maintenance.

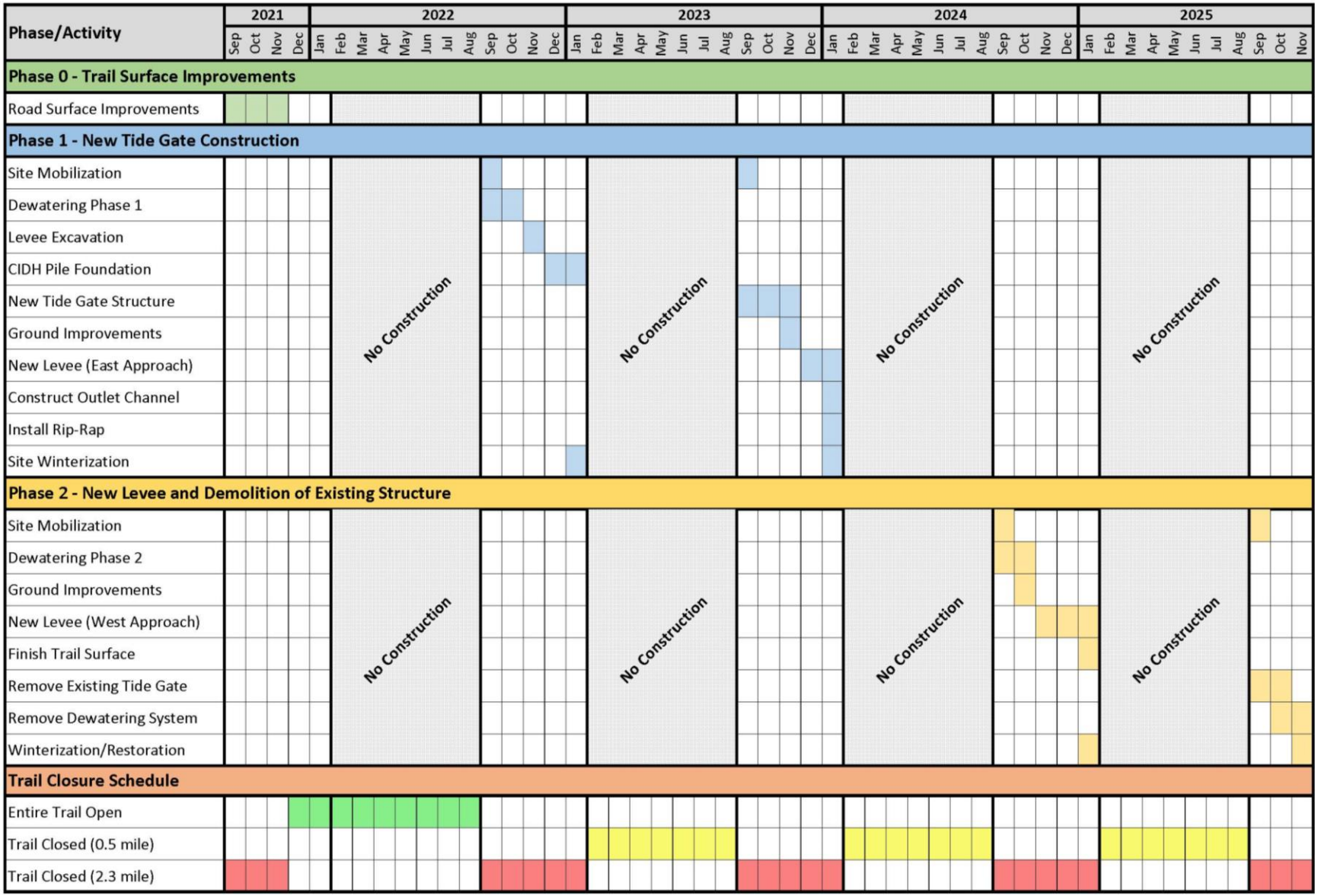
Maintenance of the new tide gate structure and levees would occur less frequently or similar to the existing conditions. Regular maintenance inspections would continue to be performed by Valley Water and the City of Palo Alto maintenance staff following construction of the Project. Maintenance of the tide gate structure typically involves clearing of debris from the trash racks, debris boom, or removal of debris that gets stuck in the tide gates. Following construction of the Project, maintenance activities would be easier, safer, and faster with reduced risk from current practice. The trash racks and debris boom could be cleaned by a small boat in the water, with mechanical tools, or by crane. The trash racks can be lifted out with a crane and temporarily replaced with a solid bulkhead panel if needed to dewater the concrete bay for maintenance on the tide gates, sluice gate, or the concrete structure.

Construction Phasing and Schedule

Work would be restricted to occur from September 1 through January 31 to avoid and minimize impacts on biological resources. Construction is expected to require four or five work seasons including an initial short season to perform trail surface improvements in 2021, followed by four years of construction to replace the tide gate structure in (2022/2023, 2023/2024, 2024/2025 and short final work season in Fall 2025). Due to the limited work period and potential weather-related delays expected during the construction season, work would take place Monday through Saturday from 7:00 AM to 6:00 PM, though work would be limited to civil twilight hours to avoid use of lighting on the Project site.

As described above, work would occur in two phases to maintain tide gate operation throughout construction. Phase 1 would involve dewatering and installation of the new tide gate structure inboard and southeast of existing tide gate structure and construction of the new levee east of the new structure. Once the new tide gate structure is operational, Phase 2 would commence with dewatering of the area around the existing tide gate structure, removal of the existing structure, and installation of a new levee west of the new tide gate structure. Table 4 depicts the construction sequence by month, year, and phase.

Table 4. Project Schedule and Phasing



Conservation Measures

Best Management Practices (BMPs) are standard operating procedures that prevent, avoid, or minimize effects associated with construction and other project-related activities. Project BMPs are listed in Table 5. Additional conservation measures developed to mitigate specific impacts associated with Project implementation and not avoidable through standard construction BMPs are identified later on, in Table 16. All BMPs would be incorporated into the Project construction documents (plans and specifications) so contractors employed on the Project would be contractually required to adhere to them.

Table 5. Best Management Practices to be incorporated into the Project

BEST MANAGEMENT PRACTICES	
Air Quality	
AQ-1 **Use Dust Control Measures**	The following Bay Area Air Quality Management District (BAAQMD) Dust Control Measures will be implemented: 1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day; 2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered; 3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vac street sweepers at least once per day. The use of dry power sweeping is prohibited; 4. Water used to wash the various exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, etc.) will not be allowed to enter waterways; 5. All vehicle speeds on unpaved roads shall be limited to 15 mph; 6. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used; 7. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations), and this requirement shall be clearly communicated to construction workers (such as verbiage in contracts and clear signage at all access points). Idling shall also remain consistent with the City of Palo Alto Idling Ordinance (see Chapter 10.62 of the City Municipal Code), which requires idling not exceed 3 minutes on public property unless specific circumstances are met; 8. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications, and all equipment shall be checked by a certified visible emissions evaluator;

	9. Correct tire inflation shall be maintained in accordance with manufacturer's specifications on wheeled equipment and vehicles to prevent excessive rolling resistance; and, 10. Post a publicly visible sign with a telephone number and contact person at the lead agency to address dust complaints; any complaints shall be responded to and take corrective action within 48 hours. In addition, a BAAQMD telephone number with any applicable regulations will be included.
AQ-2 **Avoid Stockpiling Odorous Materials**	Materials with decaying organic material, or other potentially odorous materials, will be handled in a manner that avoids impacting residential areas and other sensitive receptors, including: 1. Avoid stockpiling potentially odorous materials within 1,000 feet of residential areas or other odor sensitive land uses; and 2. Odorous stockpiles will be disposed of at an appropriate landfill.
AQ-3 **Reduce Construction-related NO_X Emissions**	Nitrogen oxide (NO_X) construction mitigation measures recommended by BAAQMD will be implemented, including the following: ● Minimize idling time either by shutting equipment off when not in use or by reducing the time of idling to 5 minutes [required by 13 CCR Sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the entrances to the site. ● Maintain all construction equipment in proper working condition in accordance with manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated. ● Provide a plan for approval by Valley Water demonstrating that the construction contractors' heavy-duty off-road vehicles (50 horsepower or more) to be used in Project construction, including owned, leased, and subcontractor vehicles, will achieve a Project-wide fleet-average 20 percent NO_X reduction and 45 percent particulate reduction compared to the most recent California Air Resources Board fleet average. Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available. ● Ensure that emissions from Valley Water's construction contractors' off-road diesel-powered equipment used on the Project site do not exceed 40 percent opacity for more than three minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) will be repaired immediately. ● A visual survey of all in-operation equipment will be made at least weekly.
Biological Resources	

BI-1 **Remove Temporary Fill**	Temporary fill materials, such as for work pads or dewatering, will be removed upon finishing the work or as appropriate. The work area will be re-contoured to match pre-construction conditions to the extent possible.
BI-2 **Avoid Impacts to Nesting Migratory Birds**	Nesting birds are protected by State and federal laws. Valley Water will protect nesting birds and their nests from abandonment, loss, damage, or destruction. Nesting bird surveys will be performed by a qualified biologist during the bird nesting season (January 15 to September 1) prior to any activity that could result in the abandonment, loss, damage, or destruction of birds, bird nests, or nesting migratory birds. If a lapse in Project-related work of 15 days or longer occurs, another survey would be conducted. Inactive bird nests may be removed with the exception of raptor nests. Birds, nests with eggs, or nests with hatchlings will be left undisturbed.
BI-3 **Avoid Impacts to Nesting Migratory Birds from Pending Construction**	Nesting exclusion devices may be installed to prevent potential establishment or occurrence of nests in areas where construction activities would occur. All nesting exclusion devices will be maintained throughout the nesting season or until completion of work in an area makes the devices unnecessary. All exclusion devices will be removed and disposed of when work in the area is complete.
BI-4 **Choose Local Ecotypes Of Native Plants and Appropriate Erosion-Control Seed Mixes**	Whenever native species are prescribed for installation the following steps will be taken by a qualified biologist or vegetation specialist: 1. Evaluate whether the plant species currently grows wild in Santa Clara County; and, 2. If so, the qualified biologist or vegetation specialist will determine if any need to be local natives, i.e. grown from propagules collected in the same or adjacent watershed, and as close to the Project site as feasible. Also, consult a qualified biologist or vegetation specialist to determine which seeding option is ecologically appropriate and effective, specifically: 1. For areas that are disturbed, an erosion control seed mix may be used consistent with the Valley Water *Guidelines and Standards for Land Use Near Streams, Design Guide 5, 'Temporary Erosion Control Options.'* 2. In areas with remnant native plants, the qualified biologist or vegetation specialist may choose an abiotic application instead, such as an erosion control blanket or seedless hydro-mulch and tackifier to facilitate passive revegetation of local native species. If a gravel has been used to prevent soil compaction, this material may be left in place [if ecologically appropriate] instead of seeding. 3. Seed selection shall be ecologically appropriate as determined by a qualified biologist, per *Guidelines and Standards for Land Use Near Streams, Design Guide 2: Use of Local Native Species*.

BI-5 **Avoid Animal Entry and Entrapment**	All pipes, hoses, or similar structures less than 12 inches diameter will be closed or covered to prevent animal entry. All construction pipes, culverts, or similar structures, greater than 2-inches diameter, stored at a construction site overnight, will be inspected thoroughly for wildlife by a qualified biologist or properly trained construction personnel before the pipe is buried, capped, used, or moved. If inspection indicates presence of sensitive or State- or federally listed species inside stored materials or equipment, work on those materials will cease until a qualified biologist determines the appropriate course of action. To prevent entrapment of animals, all excavations, steep-walled holes or trenches more than 6-inches deep will be secured against animal entry at the close of each day. Any of the following measures may be employed, depending on the size of the hole and method feasibility: 1. Hole to be securely covered (no gaps) with plywood, or similar materials, at the close of each working day, or any time the opening will be left unattended for more than one hour; or 2. In the absence of covers, the excavation will be provided with escape ramps constructed of earth or untreated wood, sloped no steeper than 2:1, and located no farther than 15 feet apart; or 3. In situations where escape ramps are infeasible, the hole or trench will be surrounded by filter fabric fencing or a similar barrier with the bottom edge buried to prevent entry.
BI-6 **Minimize Predator-Attraction**	Remove trash daily from the worksite to avoid attracting potential predators to the site.
BI-7 **Avoid Relocating Mitten Crabs**	Sediment potentially containing Chinese Mitten Crabs will not be transported between San Francisco Bay Watersheds and Monterey Bay Watersheds, specifically: 1. Sediment removed from the San Francisco Bay watersheds will not be transported south of Coyote Creek Golf Drive in south San Jose, and the intersection of McKean and Casa Loma Roads; and, 2. Earth moving equipment used in the San Francisco Bay watershed will be cleaned before being moved to, and used in, the Pajaro Watershed.
BI-8 **Minimize Spread of Invasive Plants**	The spread of invasive nonnative plant species and plant pathogens will be avoided or minimized by implementing the following measures: 1. Construction equipment will arrive at the Project clean and free of soil, seed, and plant parts to reduce the likelihood of introducing new weed species.

	2. Any imported fill material, soil amendments, gravel, etc., required for construction activities that will be placed within the upper 12 inches of the ground surface will be free of vegetation and plant material. 3. Certified weed-free imported erosion control materials (or rice straw in upland areas) will be used exclusively.
Hazards and Hazardous Materials	
HM-1 **Prepare a Soil Management Plan**	Prior to grading and excavation, Valley Water will retain a qualified professional to prepare a Soil Management Plan. The Soil Management Plan will address the concerns associated with releases of contaminated soil within and adjacent to the Project area. The Plan will include specifications for procedures to manage affected soil during construction and shall include engineering controls to minimize human exposure to potential contaminants. During construction activities, Valley Water or its contractor shall employ engineering controls and BMPs to minimize human exposure to potential contaminants and potential negative effects from an accidental release to groundwater and soils. Engineering controls and construction BMPs shall include, but not be limited to, the following: • Contractor employees working on-site shall be certified in OSHA's 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training program. • Contractor shall monitor the area around the construction site for fugitive vapor emissions with appropriate field screening instrumentation. • Contractor shall water/mist soil as it is being excavated and loaded onto trucks. • Contractor shall place any stockpiled soil in areas that are shielded from prevailing winds. • Contractor shall cover the bottom of excavated areas with sheeting when work is not being performed.
HM-2 **Restrict Vehicle and Equipment Cleaning to Appropriate Locations**	Vehicles and equipment may be washed only at approved areas. No washing of vehicles or equipment will occur in the Project area.
HM-3 **Ensure Proper Vehicle and Equipment**	No fueling or servicing will be done in a waterway or immediate flood plain, unless equipment stationed in these locations is not readily relocated (i.e., pumps, generators).

Fueling and Maintenance	1. For stationary equipment that must be fueled or serviced on site, containment will be provided in such a manner that any accidental spill will not be able to come in direct contact with soil, surface water, or the storm drainage system. 2. All fueling or servicing done at the site will provide containment to the degree that any spill will be unable to enter any waterway or damage riparian vegetation. 3. All vehicles and equipment will be kept clean. Excessive build-up of oil and grease will be prevented. 4. All equipment used in the Bay or flood basin will be inspected for leaks each day prior to initiation of work. Maintenance, repairs, or other necessary actions will be taken to prevent or repair leaks, prior to use. 5. If emergency repairs are required in the field, only those repairs necessary to move equipment to a more secure location will be done in a waterway or flood plain.
HM-4 **Ensure Proper Hazardous Materials Management**	Measures will be implemented to ensure that hazardous materials are properly handled and the quality of water resources is protected by all reasonable means. 1. Prior to entering the work site, all field personnel will know how to respond when toxic materials are discovered. 2. Contact of chemicals with precipitation will be minimized by storing chemicals in watertight containers with appropriate secondary containment to prevent any spillage or leakage. 3. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials will not contact soil and not be allowed to enter surface waters or the storm drainage system. 4. All toxic materials, including waste disposal containers, will be covered when they are not in use, and located as far away as possible from a direct connection to the storm drainage system or surface water. 5. Quantities of toxic materials, such as equipment fuels and lubricants, will be stored with secondary containment that is capable of containing 110 percent of the primary container(s). 6. The discharge of any hazardous or non-hazardous waste as defined in Division 2, Subdivision 1, Chapter 2 of the California Code of Regulations will be conducted in accordance with applicable State and federal regulations. 7. In the event of any hazardous material emergencies or spills, personnel will call the Chemical Emergencies/Spills Hotline at 1-800-510-5151.

HM-5 **Utilize Spill Prevention Measures**	Prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water following these measures: 1. Field personnel will be appropriately trained in spill prevention, hazardous material control, and cleanup of accidental spills; 2. Equipment and materials for cleanup of spills will be available on site, and spills and leaks will be cleaned up immediately and disposed of according to applicable regulatory requirements; 3. Field personnel will ensure that hazardous materials are properly handled and natural resources are protected by all reasonable means; 4. Spill prevention kits will always be in close proximity when using hazardous materials (e.g., at crew trucks and other logical locations), and all field personnel will be advised of these locations; and, 5. The work site will be routinely inspected to verify that spill prevention and response measures are properly implemented and maintained.
HM-6 **Incorporate Fire Prevention Measures**	1. All earthmoving and portable equipment with internal combustion engines will be equipped with spark arrestors. 2. During the high fire danger period (April 1–December 1), work crews will have appropriate fire suppression equipment available at the work site. 3. An extinguisher shall be available at the project site at all times when welding or other repair activities that can generate sparks (such as metal grinding) is occurring. 4. Smoking shall be prohibited except in designated staging areas and at least 20 feet from any combustible chemicals or vegetation.
Hydrology and Water Quality	
WQ-1 **Limit Impact of Pump and Generator Operation and Maintenance**	Pumps and generators will be maintained and operated in a manner that minimizes impacts to water quality and aquatic species. 1. Pumps and generators will be maintained according to manufacturers' specifications to regulate flows to prevent dry-back or washout conditions. 2. Pumps will be operated and monitored to prevent low water conditions, which could pump muddy bottom water, or high-water conditions, which creates ponding. 3. Pump intakes will be screened to prevent uptake of fish and other vertebrates. Pumps will be screened according to NMFS criteria.

	4. Sufficient back-up pumps and generators will be on site to replace defective or damaged pumps and generators.
WQ-2 **Limit Impacts from Staging and Stockpiling Materials**	1. To protect on site vegetation and water quality, staging areas should occur on access roads, surface streets, or other disturbed areas that are already compacted and only support ruderal vegetation. Similarly, all equipment and materials (e.g., road rock and spoils) will be contained within the existing access roads or other pre-determined staging areas. 2. Building materials and other Project-related materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into water bodies. 3. No runoff from the staging areas may be allowed to enter water ways without being subjected to adequate filtration (e.g., vegetated buffer, swale, hay wattles or bales, silt screens). 4. The discharge of decant water to water ways from any on site temporary sediment stockpile or storage areas is prohibited. 5. During the wet season, no stockpiled soils will remain exposed, unless surrounded by properly installed and maintained silt fencing or other means of erosion control. During the dry season; exposed, dry stockpiles will be watered, enclosed, covered, or sprayed with non-toxic soil stabilizers.
WQ-3 **Limit Impact of Concrete Near Waterways**	Concrete that has not been cured is alkaline and can increase the pH of the water; fresh concrete will be isolated until it no longer poses a threat to water quality. Poured concrete will be excluded from the wetted channel for a period of four weeks after it is poured. During that time, the poured concrete will be kept moist, and runoff from the wet concrete will not be allowed to enter waterways. Commercial sealants (e.g., Deep Seal, Elasto-Deck Reservoir Grade) may be applied to the poured concrete surface where difficulty in excluding water flow for a long period may occur. If a sealant is used, water will be excluded from the site until the sealant is dry. An area outside of the channel and floodplain will be designated to clean out concrete transit vehicles.
WQ-4 **Isolate Work in Tidal Areas with Use of Coffer Dam**	For work in tidal areas, it is preferable to isolate one side of the channel with a cofferdam and allow flows to continue on the other side of the creek. If downstream flows cannot be diverted around the project site, the creek waters will be transmitted around the site through cofferdam bypass pipes. By isolating the work area from tidal flows, water quality impacts are minimized. 1. Installation of coffer dams will begin at low tide. 2. Waters discharged through tidal coffer dam bypass pipes or from pumping will not exceed 10 percent in areas where natural turbidity is greater than 50 NTU over the background levels of the tidal waters into which they are discharged. Cofferdams and

	bypass pipes will be removed as soon as possible. Flows will be restored at a reduced velocity to minimize erosion, turbidity, or harm to habitat.
WQ-5 **Use Seeding for Erosion Control, Weed Suppression, and Site Improvement**	Disturbed areas shall be seeded with native seed as soon as is appropriate after activities are complete. An erosion control seed mix will be applied to exposed soils down to the ordinary high water mark of the flood basin and the mean higher high tide line on the Bay side of the work area. The seed mix should consist of California native species suitable to the area.
WQ-6 **Maintain Clean Conditions at Work Sites**	The work site, areas adjacent to the work site, and access roads will be maintained in an orderly condition, free and clear from debris and discarded materials on a daily basis. Personnel will not sweep, grade, or flush surplus materials, rubbish, debris, or dust into storm drains or waterways. Materials or equipment left on the site overnight will be stored as inconspicuously as possible and will be neatly arranged. Any materials and equipment left on the site overnight will be stored to avoid erosion, leaks, or other potential impacts to water quality Upon completion of work, all building materials, debris, unused materials, concrete forms, and other construction-related materials will be removed from the work site.
WQ-7 **Manage Drilling Materials**	All materials or waters generated during drilling, CIDH pile construction, or levee ground improvements will be safely handled, properly managed, and disposed of according to all applicable federal, State, and local statutes regulating such. In no case will these materials and/or waters be allowed to enter, or potentially enter waterways. Such materials/waters must not be allowed to move off the property where the work is being completed.
WQ-8 **Protect Groundwater from Contaminates via Drilling**	Any substances or materials that may degrade groundwater quality will not be allowed to enter any boring. Lubricants used on drill bits, drill pipe, or tremie pipe will not be comprised of oily or greasy substances or other materials that may degrade groundwater quality. Well openings or entrances will be sealed or secured in such a way as to prevent the introduction of contaminants.

WQ-9 **Prevent Water Pollution**	Oily, greasy, or sediment laden substances or other material that originate from the Project and may degrade the quality of surface water or adversely affect aquatic life, fish, or wildlife will not be allowed to enter, or be placed where they may later enter, any waterway. The Project will not increase the turbidity of any watercourse flowing past the construction site by taking all necessary precautions to limit the increase in turbidity as follows: 1. Where natural turbidity is between 0 and 50 Nephelometric Turbidity Units (NTU), increases will not exceed 5 percent; and 2. Where natural turbidity is greater than 50 NTU, increases will not exceed 10 percent. Water turbidity changes will be monitored. The discharge water measurements will be made at the point where the discharge water exits the water control system. Natural watercourse turbidity measurements will be made in the receiving water at least 100 feet from discharge site. Natural watercourse turbidity measurements will be made prior to initiation of Project discharges, preferably at least 2 days prior to commencement of work.
WQ-10 **Prevent Stormwater Pollution**	To prevent stormwater pollution, the applicable measures from the following list will be implemented: 1. Soils exposed due to Project activities will be seeded and stabilized using hydroseeding, straw placement, mulching, and/or erosion control fabric. These measures will be implemented such that the site is stabilized, and water quality protected prior to significant rainfall. Areas below the ordinary high water mark of the flood basin and below the mean high tide line of the Bay are exempt from this BMP. 2. The preference for erosion control fabrics will be to consist of natural fibers; however, steeper slopes and areas that are highly erodible may require more structured erosion control methods. No non-porous fabric will be used as part of a permanent erosion control approach. Plastic sheeting may be used to temporarily protect a slope from runoff, but only if there are no indications that special-status species would be impacted by the application. 3. Erosion control measures will be installed according to manufacturer's specifications. 4. To prevent stormwater pollution, the appropriate measures from, but not limited to, the following list will be implemented: • Silt Fences • Straw Bale Barriers • Brush or Rock Filters

	• Storm Drain Inlet Protection • Sediment Traps or Sediment Basins • Erosion Control Blankets and/or Mats • Soil Stabilization (i.e. tackified straw with seed, jute or geotextile blankets, etc.) • Straw mulch. 5. All temporary construction-related erosion control methods shall be removed at the completion of the Project (e.g. silt fences).
WQ-11 **Manage Sanitary and Septic Waste**	Temporary sanitary facilities will be located in compliance with California Division of Occupational Safety and Health (Cal/OSHA) regulation 8 California Code of Regulations 1526. All temporary sanitary facilities will be located where overflow or spillage will not enter a watercourse directly (overbank) or indirectly (through a storm drain).

Study Area

The Project Area includes the immediate Project footprint, including work areas, staging areas, and access areas. The Study Area includes areas immediately adjacent to areas affected directly by Project activities. For the purposes of this report, the biological Study Area includes the work area (i.e., new and existing tide gates and levee and dewatering limits), staging areas, plus a 100-foot buffer around the work and staging areas. With implementation of BMPs, direct and indirect effects on adjacent areas outside the action area will be insignificant (i.e., temporary, minimal, and localized).

Environmental Setting

The Project site is in Santa Clara County, which has a Mediterranean climate with warm summers and cool, wet winters. Most rain falls between November and April. The proposed Project Area is located at the existing Palo Alto tide gate structure and adjacent levee forming the northern boundary of the Palo Alto Flood Basin in Palo Alto, CA. The existing tide gate is situated at the outlet of the PAFB to South San Francisco Bay, which separates Mayfield Slough from the Bay (Figure 1). The Bay is subject to tidal influence. Normally one or two tide gates are left partially open to allow some tidal flow into the basin. Currently, significant leakage under the existing structure is also occurring. Water levels on the inboard side of the levee are controlled with tide gates for flood control and habitat functions. When there is more water in the basin than the Bay, water is released to the Bay at low tide to prevent flooding upstream.

The PAFB was historically tidal marsh but has since been converted to diked salt marsh cut off from tidal influence, yet it maintains wetland characteristics. Land within the basin can experience inundation infrequently during the wet season when heavy rain events occur during king tides, which may have seasonal effects on some wildlife populations. Surrounding land use is primarily open space. West of the

PAFB is the Harriet Mundy Marsh and Byxbee Park (located ~0.2 mile northwest and southwest, respectively) and associated trails at the Baylands Nature Preserve, and the Palo Alto Airport (located ~0.5 mile west). The Baylands Nature Preserve is one of the largest tracts of undisturbed marshland remaining in the San Francisco Bay and offers recreational activities including trails for walking, running and biking, bird watching, and boating. A popular 12-foot wide public-use bicycle and pedestrian trail (the Adobe Creek Trail) is located along the top of the levee. Hooks Island and the Harriet Mundy Marsh remain as tidal salt marsh. The Palo Alto airport, the tenth busiest airport in California, is approximately one-half mile west of the existing tide gate structure. It operates Monday through Sunday from 7am to 9pm, creating consistent visual and auditory disturbance in the area throughout the day. The Baylands Sailing Station, a small dock and boat launch, is located approximately 0.15 mile north of the Project Area. Hooks Island, a small island consisting primarily of pickleweed habitat and slough channels, is located approximately 250 feet northeast of the tide gate. It is mostly undeveloped, except for a few transmission towers and a PG&E access boardwalk cutting across the center of the island. Immediately east of the PAFB is Charleston Slough and salt pond A1, which is directly north of Shoreline Park. Charleston Slough was formerly tidal salt marsh, but now is controlled by a tide gate at the downstream end. Currently, the City of Mountain View withdraws water from Charleston Slough to supply Shoreline Lake at Shoreline Park. South of the basin is Highway 101 and commercial or residential development.

Matadero Creek, on the east side of the basin, and Adobe Creek, on the west side, transition to Mayfield Slough downstream, grading from riverine to estuarine and marine deepwater habitats downstream of Highway 101. Adobe Creek is a highly modified channel, consisting of concrete bed and banks from Highway 101 to El Camino Real; a mixture of hardened and natural features from El Camino Real to the foothills; and a natural bottom for the two most upstream miles. It is a perennial stream upstream of Foothill Expressway; ephemeral from Foothill Expressway to El Camino Real; and wet in the lower reaches from urban runoff (Valley Water 2006).

Matadero Creek is one of the most heavily modified channels in the Lower Peninsula Watershed, with ~50% of the total length hardened, from Highway 101 to Foothill Expressway, including a long stretch that flows through a pipe culvert. Upstream of Foothill is three miles of natural channel bed. Arastradero Creek is a tributary to Matadero Creek. The eastern segment of Arastradero Creek does not maintain dry season flows, while the remainder of the creeks that supply water to Matadero Creek do. Matadero is connected to and receives water from Barron Creek via the Barron Diversion Channel. Water in Barron Creek is diverted to the Barron Creek Bypass, which extends from Barron Creek to the Matadero Bypass at Bol Park. The Matadero Bypass then carries water to the Stanford Channel and back to Matadero Creek at El Camino Real. The Stanford Channel is essentially an underground storm drain (Valley Water 2006).

Barron Creek has the most modified channel in the Lower Peninsula watershed, with ~67% of the total length of creek bed hardened. Downstream of Foothill Expressway is almost exclusively hard bottom. Upstream of Foothill the channel is a uniform mix of hard-bottom channels and slopes. Upstream of El Camino Real the creek is contained in a pipe for much of its length. Natural channel sections occur immediately adjacent to Arastradero Road and the Barron Creek Debris Basin. Downstream of El Camino

Real the creek is contained in a concrete trapezoidal channel. Barron Creek is an ephemeral creek with the lower section kept wet by tidal inflows from the PAFB, water backing up Adobe Creek, and urban runoff. The bypass can be closed or the amount of water decreased based upon the capacity of Matadero Creek to receive the added flow (Valley Water 2006).

Methods

The Study Area was assessed for potential impacts to biological resources by referencing available local literature, historical occurrences, and actual site conditions by conducting a biological site assessment of the area and using best professional judgment of the biologists. All genera of special-status species were considered in the analysis.

The assessment began with a desktop survey of the Study Area. Searches of the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB), United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC), California Native Plant Society (CNPS) Rare Plant Inventory, and professional judgment were used to generate a list of sensitive species that could potentially occur within the Study Area. The CNDDB records were searched at a 2 mile radius around the Project Area. Lists generated by the IPaC and CNPS databases are broader, as specific locations of occurrences are not included. National Oceanic and Atmospheric Administration (NOAA) West Coast Region Critical Habitat was reviewed to verify whether critical habitat occurs in the Study Area, and the National Wetlands Inventory (NWI) Wetlands Mapper was reviewed to verify wetland habitat types in the Study Area.

The desktop survey was followed by multiple onsite field surveys. Valley Water Associate Biologist Jennifer Watson, B.S., and Senior Biologist Clayton Leal, M.S., conducted field surveys at the project site on July 12, 2018 and May 7, 2019. Assistant Biologist Sarah Gidre, B.S., assisted with the survey on May 7. Ms. Watson again visited the site on February 24, 2020. Senior Biologist Zooey Diggory, M.S., conducted a vegetation survey on July 18, 2018. Associate Biologist Laura Garrison, M.S., and Assistant Biologist Josh Weinik, M.S., conducted a rare plant survey on May 23, 2019. Mr. Weinik conducted an additional rare plant survey on July 18, 2019. A wetland delineation was conducted by the Huffman-Broadway Group, Inc. on April 25, 2019. The purpose of these surveys was to determine the presence of and potential impacts to biological resources within the Study Area. These surveys documented the physical habitat characteristics, assessed the potential for occurrence of sensitive species, and determined the potential impacts to sensitive communities in the Study Area.

Biological Resources

Desktop Survey Results

A CNDDB search was conducted on April 26, 2019. Fourteen animal species were identified within a 2 mile radius of the Project Area (Table 6, Figure 6). Each of these animal species is presumed extant within a 2 mile radius of the Project Area (CNDDB 2019). The CNDDB identified five plant species with occurrences within a 2 mile radius of the Project Area (Table 6, Figure 7). Only Congdon's tarplant is presumed extant. Northern Coastal Salt Marsh was also identified within a 2 mile radius (CNDDB 2019).

Table 6. CNNDB occurrences within a 2 mile radius buffer of the Project Area, indicating the most recent year of reported observation of the species (CNDDB ELMDATE 2019)

Common Name	Scientific Name	Year	Presence	Status*
ANIMAL				
Alameda song sparrow	*Melospiza melodia pusillula*	2004	Presumed Extant	SSC
black skimmer	*Rynchops niger*	2015	Presumed Extant	SSC
burrowing owl	*Athene cunicularia*	2008	Presumed Extant	SSC
California black rail	*Laterallus jamaicensis coturniculus*	2008	Presumed Extant	ST, FP
California least tern	*Sternula antillarum browni*	1987	Presumed Extant	FE, SE, FP
California Ridgway's rail	*Rallus obsoletus obsoletus*	2006	Presumed Extant	FE, SE, FP
longfin smelt	*Spirinchus thaleichthys*	1995	Presumed Extant	FCT, ST
northern harrier	*Circus hudsonius*	2004	Presumed Extant	SSC
saltmarsh common yellowthroat	*Geothlypis trichas sinuosa*	2016	Presumed Extant	SSC
salt-marsh harvest mouse	*Reithrodontomys raviventris*	1990	Presumed Extant	FE, SE, FP
snowy egret	*Egretta thula*	2005	Presumed Extant	NCP
western bumble bee	*Bombus occidentalis*	1974	Presumed Extant	USFS:S[2]
western snowy plover	*Charadrius alexandrinus nivosus*	2002	Presumed Extant	FT, SSC
yellow rail	*Coturnicops noveboracensis*	1988	Presumed Extant	SSC
PLANT				
alkali milk-vetch	*Astragalus tener var. tener*	1905	Possibly Extirpated	1B.2
California seablite	*Suaeda californica*	1971	Possibly Extirpated	FE, 1B.1
Congdon's tarplant	*Centromadia parryi ssp. congdonii*	2018	Presumed Extant	1B.1
Hoover's button-celery	*Eryngium aristulatum var. hooveri*	1909	Possibly Extirpated	1B.1
northern coastal salt marsh	-	1977	Presumed Extant	-
Point Reyes salty bird's-beak	*Chloropyron maritimum ssp. palustre*	1915	Possibly Extirpated	1B.2

***Status:** FE: federally endangered; FT: federally threatened; FCT: federal candidate threatened; SE: state endangered; ST: state threatened; FP: state fully protected; SSC: state species of special concern; NCP: nesting colony protected; USFS:S: U.S. Forest Service sensitive

[2] Also considered "imperiled" by the Xerces Society, and currently undergoing status review by CDFW.

The USFWS IPaC (Appendix A) returned six additional animal species not included in the CNDDB accounts: FT and SSC California red-legged frog (*Rana draytonii*); FT and ST California tiger salamander (*Ambystoma californiense*); FT and SE delta smelt (*Hypomesus transpacificus*); FT bay checkerspot butterfly (*Euphydryas editha bayensis*); and FE San Bruno elfin butterfly (*Callophrys mossii bayensis*) and vernal pool tadpole shrimp (*Lepidurus packardi*). A number of migratory birds were returned, including SE and FP bald eagle (*Haliaeetus leucocephalus*), FP golden eagle (*Aquila chrysaetos*), and SSC (and state candidate endangered) tricolored blackbird (*Agelaius tricolor*). Migratory birds are protected under the Migratory Bird Treaty Act, and eagles are covered under the Bald and Golden Eagle Protection Act, both enforced by the USFWS. There are no CNDDB occurrences of any of these species within a 2 mile radius of the Project Area.

The Study Area was assessed for special-status species' critical habitat. Critical habitat includes areas occupied by a species at the time of listing that contain physical or biological features essential to conservation of the species and that may require special management considerations, as well as specific areas outside the area occupied by the species if NOAA determines the area is essential. All tidally influenced areas of San Francisco Bay, up to the elevation of mean higher high water (MHHW), have been designated as critical habitat for the FT southern distinct population segment (DPS) of green sturgeon (*Acipenser medirostris*). Approximately 6.8 acres of green sturgeon estuarine critical habitat and 1.5 acres marsh critical habitat fall within the Study Area, for a total of 8.3 acres of green sturgeon critical habitat in the Study Area (Figure 8). Tidally influenced areas of the Bay to mean higher high water (MHHW) are critical habitat for Central California Coast (CCC) steelhead. Approximately 8.3 acres of steelhead critical habitat occurs in the Study Area.

EFH is also present in the study area for West Coast Salmon (which includes all West Coast salmon species and stocks), Pacific groundfish, coastal pelagic species (CPS), and finfish. Essential fish habitat (EFH) includes waters and substrate necessary for spawning, breeding, feeding, or growth to maturity. EFH is designated for anadromous Pacific salmon stocks managed by the Pacific Fishery Management Council (PFMC) under the Pacific Coast Salmon Fishery Management Plan (FMP). The geographic extent of freshwater EFH is identified as all water bodies currently or historically occupied by PFMC-managed salmon, including aquatic areas above all artificial barriers that are not specifically excluded. Estuarine and marine areas extending from the extreme high tide line (HTL) in nearshore and tidal submerged environments within state waters out to the full extent of the exclusive economic zone (200 nautical miles offshore) and north of Point Conception are also covered under the FMP. All aquatic habitats in the study area, except for the borrow ditch, are within West Coast Salmon EFH (NOAA 2018a, Figure 9).

EFH for Pacific Coast groundfish includes all waters and substrate within areas less than or equal to 3,500 m deep shoreward to the MHHW level or the upriver extent of saltwater intrusion (upstream and landward to where ocean-derived salts measure less than 0.5 parts per thousand (ppt) during the period of average annual low flow), which in the study area includes all aquatic habitats other than the borrow ditch. The east-west geographic boundary of EFH for CPS finfish and market squid is defined to be all marine and estuarine waters from the shoreline along the coasts of California, Oregon, and Washington offshore to the limits of the exclusive economic zone (200 miles) and above the thermocline where sea surface temperatures range between 10°C and 26° C. The southern extent of EFH for CPS finfish is the

U.S.-Mexico maritime boundary. The northern boundary of the range of CPS finfish is more variable; it is the position of the 10°C isotherm, which varies both seasonally and annually.

Habitat Areas of Particular Concern (HAPC) are subsets of EFH that are rare, stressed by development, provide important ecological functions for federally managed species, or are especially vulnerable to anthropogenic degradation. HAPCs do not carry specific habitat protections, but they can focus habitat conservation efforts to high priority areas for conservation, management, or research (NOAA 2018b). San Francisco Bay is designated as estuary HAPC.

Figure 6. CNDDB animal occurrences within a 2 mile radius buffer of the Project Area

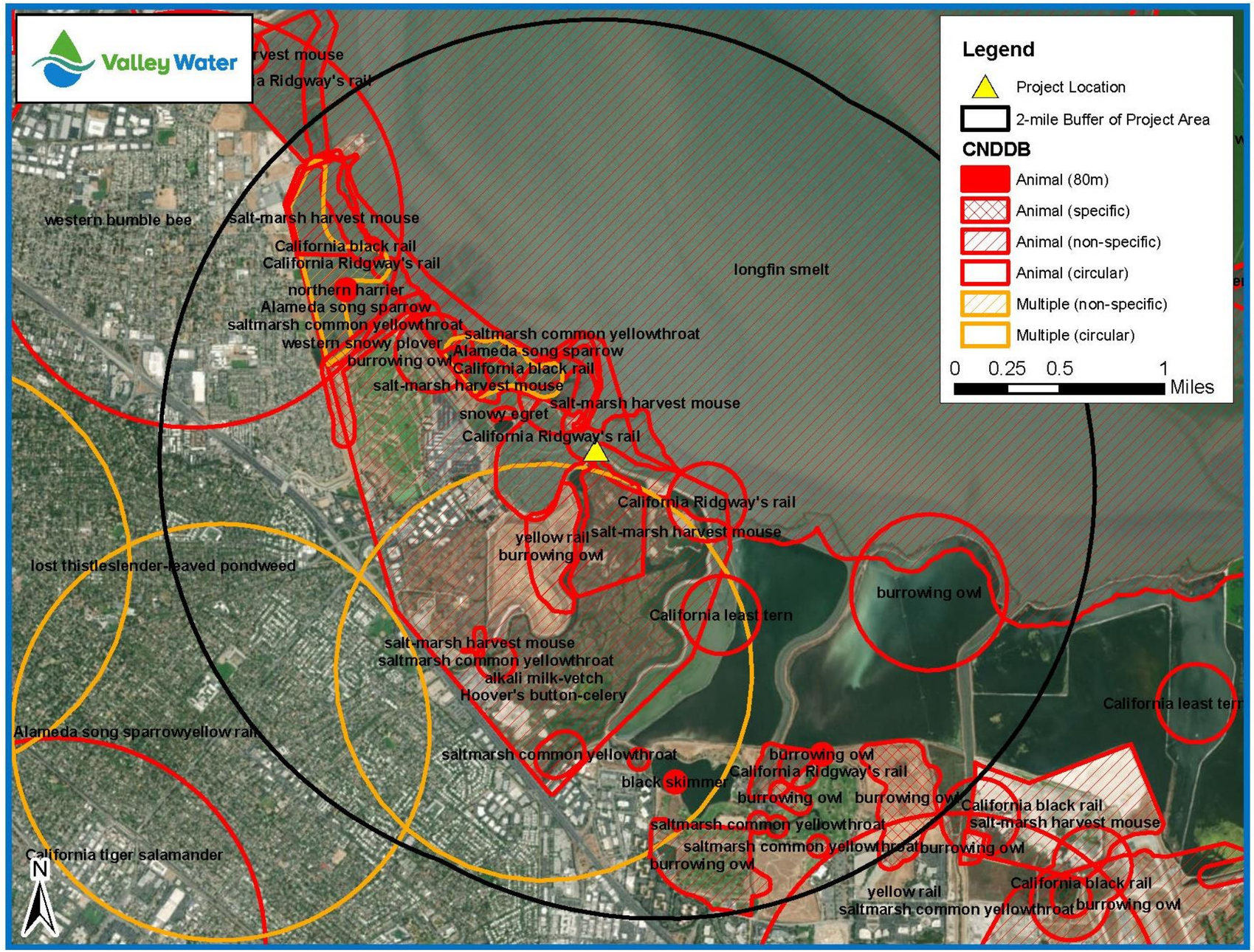


Figure 7. CNDDB plant occurrences within a 2 mile radius buffer of the Project Area

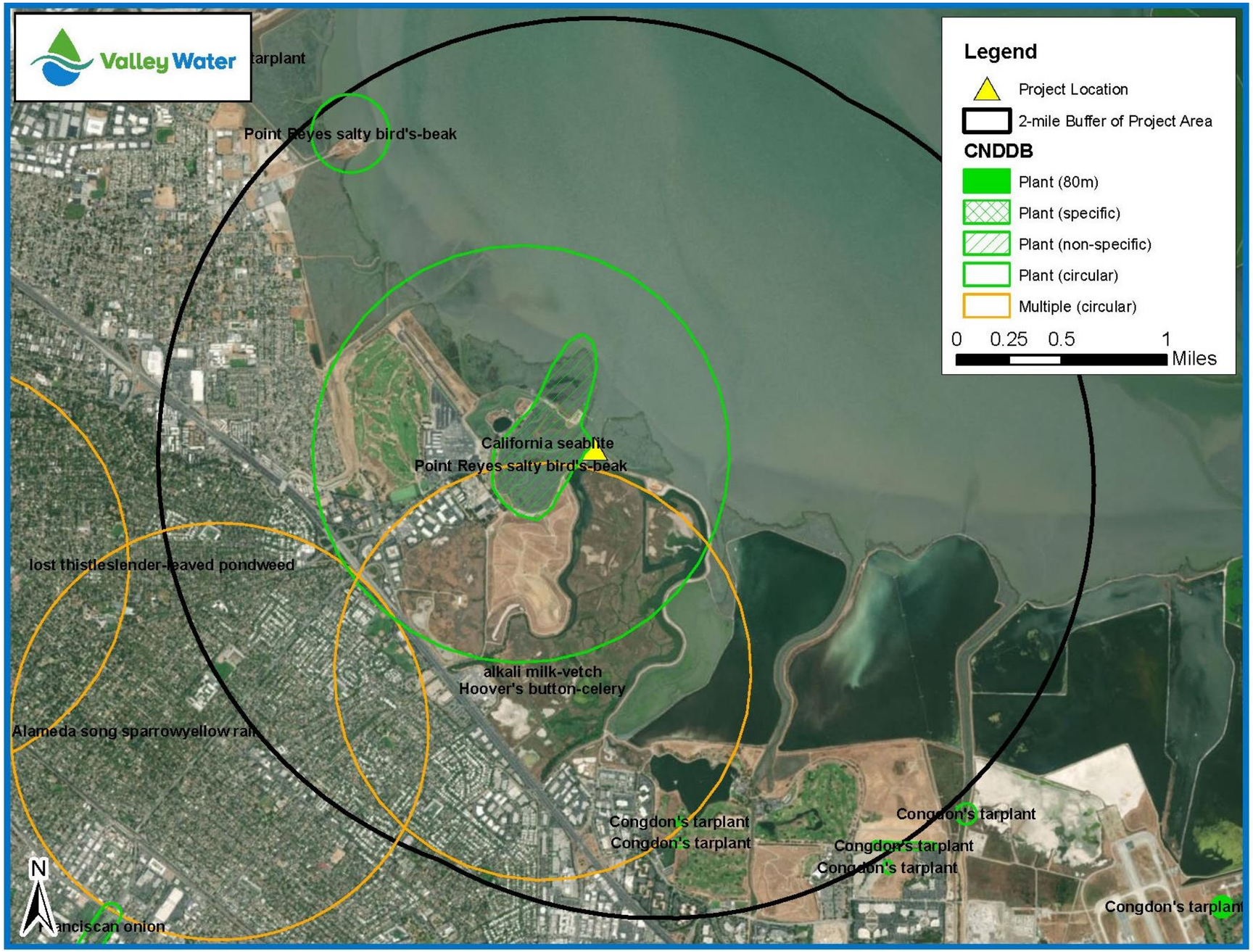


Figure 8. Green sturgeon critical habitat in the vicinity of the proposed Project Area

Document Name: PAFB_GSCH

Figure 9. West Coast region salmonid Essential Fish Habitat occurs throughout the proposed Project Area

Document Name: PAFB_WCRsalmonidEFH

No plant species or critical habitats were returned by the IPaC database that were not included in the CNDDB search (Appendix A, Figure 3). A nine-quad search of the CNPS Rare Plant Inventory was conducted on April 23, 2019 (Appendix B). Forty-five plants with rare plant ranks were returned (four of which were also returned by the CNDDB search, for a total of 41 new plants). Two plants were ranked 1A; twelve were ranked 1B.1; twenty 1B.2; two 2B.2; two 3; one 3.2; five 4.2; and one 4.3. The CNPS rank definitions are included in Table 7 below. The NWI (2019) returned estuarine and marine deepwater, estuarine and marine wetland, and freshwater pond habitats in the Study Area.

Table 7. CNPS rare plant rank definitions (CNPS 2018)

Rank	Definition
1A	Plants presumed extirpated in California and either rare or extinct elsewhere
1B	Plants rare, threatened, or endangered in California and elsewhere
2A	Plants presumed extirpated in California but common elsewhere
2B	Plants rare, threatened, or endangered in California but more common elsewhere
3	Review List: Plants about which more information is needed
4	Watch List: Plants of limited distribution
0.1	Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
0.2	Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
0.3	Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

Field Survey Results

Habitat Conditions

An Aquatic Resources Delineation was conducted by the Huffman-Broadway Group, Inc. in April 2020. It was determined that conditions occurring within the Study Area include: (1) a maintained and functioning levee and pedestrian path along the shoreline; (2) undeveloped interior managed/muted-tidal waters and open space areas; (3) functioning tide gates; and (4) undeveloped tidal waters seaward of the levee (Huffman-Broadway Group 2019). The tide gates are located along the levee and connect the full tidal wetlands to the managed wetland area on the inboard side of the levee.

The levee road (the Adobe Creek Loop Trail) is wide and barren, and no burrows were observed on the main levee road in the Project Area during the initial field surveys (Photo 1). A secondary barren path runs through the vegetation starting near the existing tide gate along the length of the Adobe Creek Loop Trail within the Project Area, southwest of the trail (Photo 2). The vegetated edge and upland slope of the levee road was lined primarily with non-native upland plant species (Photo 3). Ruderal non-native grasses transitioned into native halophytes closer to the water's edge (Photo 3). There is a borrow ditch south of the levee road, approximately 503 meters east of the existing tide gate. This is commonly known as "the bowl" by bicyclists who like to ride through it. The area around the ditch is mostly barren, with some ruderal vegetation on the side slopes and predominately pickleweed at the edge of the water. The ditch was dry at the time of the site visit in July 2018, but was holding water at the site visit

in May 2019 (Photo 4). The ditch is classified as freshwater by the NWI; however, salt was visible at the edge of the water and pickleweed was evident around the ditch edges. An attempt was made to check the salinity of the ditch, but levels were too high for the instrument (Hanna HI 98311 waterproof EC/TDS & Temperature Meter) to read. The instrument maxes at 10 parts per thousand (ppt), which indicates the ditch is not freshwater.

North and east of the levee road and southwest of Staging Area 1 (Photo 5), there is expansive habitat dominated by pickleweed and tidal sloughs (Photo 6). At the northeast corner of the existing tide gate there is also a smaller, disconnected area of dense pickleweed (Photo 7).

During the site visits, moderate foot traffic was observed on the Adobe Creek Trail including walkers, runners, dog walkers, and bicyclists. The trail is popular and may at times experience a high-level of human use. Heavy to moderate air traffic was observed, likely due to proximity of the Project Area to the Palo Alto Airport.

Photo 1. Adobe Creek Loop Trail, looking toward the existing tide gate, where the improved tide gate structure would be installed (July 2018).

Photo 2. Secondary barren path (right) running along the Adobe Creek Loop Trail to the southwest within the Project Area (July 2018).

Photo 3. Upland ruderal vegetation transitioning to native and non-native halophytes at lower elevation (July 2018).

Photo 4. Borrow ditch at the center of the levee road circling Staging Area 2 (May 2019).

Photo 5. Levee road veers off to Staging Area 1 on the left side, heading north (May 2019).

Photo 6. Pickleweed habitat southwest of Staging Area 1.

Photo 7. Pickleweed habitat at northeast corner of existing tide gate.

Aquatic Resources

The Huffman-Broadway Group conducted an aquatic resource delineation in 2019 (Figure 10). The results are summarized as follows:

Tidal Aquatic Resources: are located outboard of the levee and are subject to the daily tidal action. The levee bank is generally at a 1:1 to 2:1 slope downward into the Bay. Two types of aquatic resource areas under USACE jurisdiction are present in the aquatic resources delineation area, including (i) 6.35 acres of Estuarine Intertidal Emergent Wetland, and (ii) 4.01 acres of Estuarine Intertidal Unconsolidated Shore.

Muted-tidal Aquatic Resources: are located on the inboard side of the levee and are not influenced by the ebb and flow of the tides on a daily basis; rather, the hydrology is managed by the use of tide gates. The topographic relief is generally at a 2:1 to 3:1 slope downward toward Mayfield Slough and Adobe Creek. Two types of aquatic resource areas under USACE jurisdiction are present in the aquatic resources delineation area, including (i) 7.51 acres of Palustrine Unconsolidated Bottom, and (ii) 3.10 acres of Palustrine Emergent Wetland (Hoffman-Broadway Group 2019).

Estuarine Intertidal Unconsolidated Shore: exists on the outboard side of the levee. This area is typically flooded during high tide and at low tide may still contain some surface water or consist of unvegetated or sparsely vegetated mudflats.

Palustrine Unconsolidated Bottom: habitat is present on the inboard side of the levee. It is typically flooded all year round and nearly devoid of vegetation.

Estuarine Intertidal Emergent Wetland: extends from mean high water (MHW) to the HTL on the outboard side of the levee and is dominated by pickleweed, alkali heath, salt grass, gumplant, and California cordgrass. The plant community consists of tidally influenced, low lying wetlands characterized by species tolerant of wet, saline soils. The dominant plant species, and the apparent tidal regime and water salinity, are indicative of northern coastal salt marsh (pickleweed mats), a sensitive natural community.

Other species present on the outboard side of the levee, downslope from the levee road where upland plants transition to a mix of native and non-native halophytes, include iceplant (*Carpobrotus edulis*), New Zealand spinach (*Tetragonia tetragonioides*), small-flowered ice plant (*Mesembryanthemum nodiflorum*), saltmarsh dodder (*Cuscuta salina*), and common reed (*Phragmites australis*) (Photo 6).

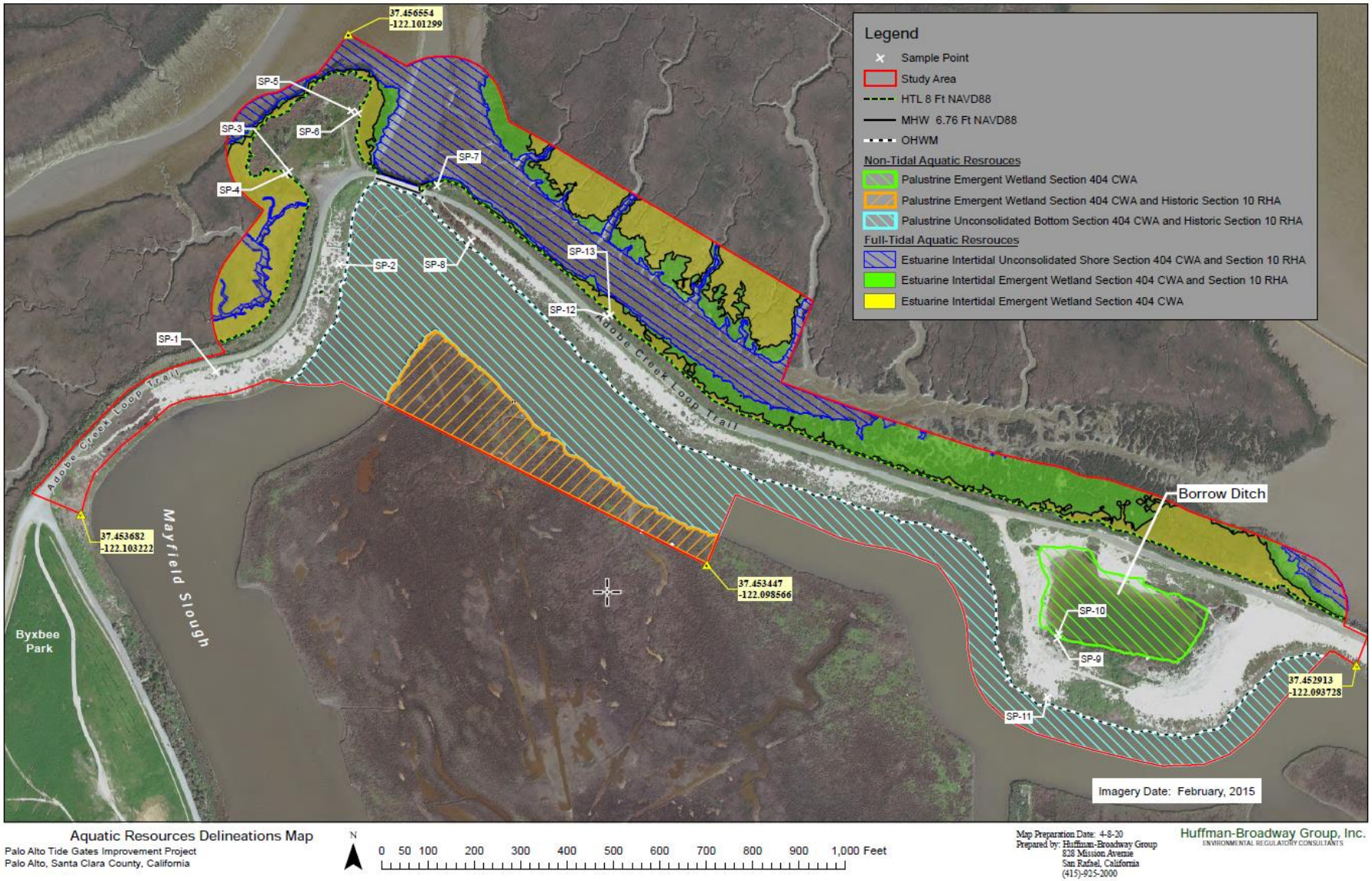
Palustrine Emergent Wetland: offshore from the inboard levee bank is dominated by pickleweed, alkali heath, and salt grass. In the borrow ditch near Staging Area 2 (1.28 acres) the dominant vegetation is the same, and it supports unvegetated open water habitat below 0-feet NAVD88.

A total of 20.97 acres of aquatic resources fall within the aquatic resources delineation area. The detailed results of the Aquatic Resources Delineation are provided in Figure 10. A summary of the total acres of each type of aquatic resources present within the proposed Project Area and a description of their federal regulatory jurisdiction, taken from Hoffman-Broadway (2019), is provided in Table 8.

Table 8. Summary of aquatic resources within the aquatic resources delineation area (Hoffman-Broadway Group 2020)

Wetland/Water Type	Federal Regulatory Jurisdiction	Area (acres)
Outboard Side of Levee / Full Tidal Aquatic Resources		
Estuarine Intertidal Emergent Wetland	Section 404 CWA	3.54
Estuarine Intertidal Emergent Wetland	Section 404 CWA and Section 10 RHA	2.81
Estuarine Intertidal Unconsolidated Shore	Section 404 CWA and Section 10 RHA	4.01
Inboard Side of Levee / Muted-Tidal Aquatic Resources		
Palustrine Emergent Wetland	Section 404 CWA	1.28
Palustrine Emergent Wetland	Section 404 CWA and "Historical" Section 10 RHA	1.82
Palustrine Unconsolidated Bottom	Section 404 CWA and "Historical" Section 10 RHA	7.51
Total		20.97

Figure 10. Results of the wetland delineation conducted by the Hoffman-Broadway Group in June 2020



Vegetative Communities

Vegetative communities and developed landscapes (access roads/barren ground, paved trails) were assessed, and a description of what each habitat contains follows. Existing habitats are mapped in Figures 11 and 12.

Upland: habitat exists from the HTL up to the top of the outboard levee slope and part of Staging Area 1. Native marsh species grade into a fringe of ruderal species at higher elevation, with dominant species including rip-gut brome (*Bromus diandrus*), wild oat (*Avena fatua*), wild radish (*Raphanus sativus*), Italian ryegrass (*Festuca perenne*), soft brome (*Bromus hordeaceus*), and broadleaved perennial pepperweed (*Lepidium latifolium*). The southern bank of the levee is heavily impacted by non-native invasive species including mustards *(Brassica* spp.), Italian thistle (*Carduus pycnocephalus*), wild radish, rattlesnake grass (*Briza maxima*), creeping wild rye (*Elymus triticoides*), rip-gut brome, and soft brome. The majority of Staging Area 1 is disturbed ground, consisting primarily of bare ground or with ruderal upland vegetation including wild oat, Italian thistle, black mustard, and bitter dock (*Rumex obtusifolius*). Native upland species including elderberry (*Sambucus* sp.), California sagebrush (*Artemisia californica*), coyote brush (*Baccharis pilularis*), and gumplant (*Grindelia camporum*) occur around the edges of the Staging Area 1. Other species observed in the upland area along the levee road include sweet fennel (*Foeniculum vulgare*), Australian saltbush (*Atriplex semibaccata*), and curly dock (*Rumex crispus*). Native salt grass (*Distichlis spicata*), alkali heath (*Frankenia salina*), and coyote brush are also mixed in the upland area.

Upland habitat in the study area totals approximately 7.1 acres.

Barren ground: makes up the existing levee roads, and from 11- 12 feet NAVD88 the trail is devoid of vegetation and consists of a hardpacked gravel. West of the Project area barren ground runs from Embarcadero Way to the existing tide gate; it also makes up a portion of Staging Area 1. East of the existing tide gate, mostly barren ground and some hardscape (pavement) runs from San Antonio Road to the Project site; these trails would provide access routes to the Project site. The levee road circling the borrow ditch at Staging Area 2 also consists of barren ground.

Barren ground in the study area totals approximately 3.1 acres.

Hardscape: is limited to the existing concrete tide gate structure, which also serves as a trail along the top of the levee. Rip-rap aprons (Photo 10) are present underwater along the tide gate but were categorized as aquatic habitats for the purposes of this analysis.

Hardscape in the study area totals approximately 0.1 acre.

Figure 11. Habitats in the western portion of the Study Area

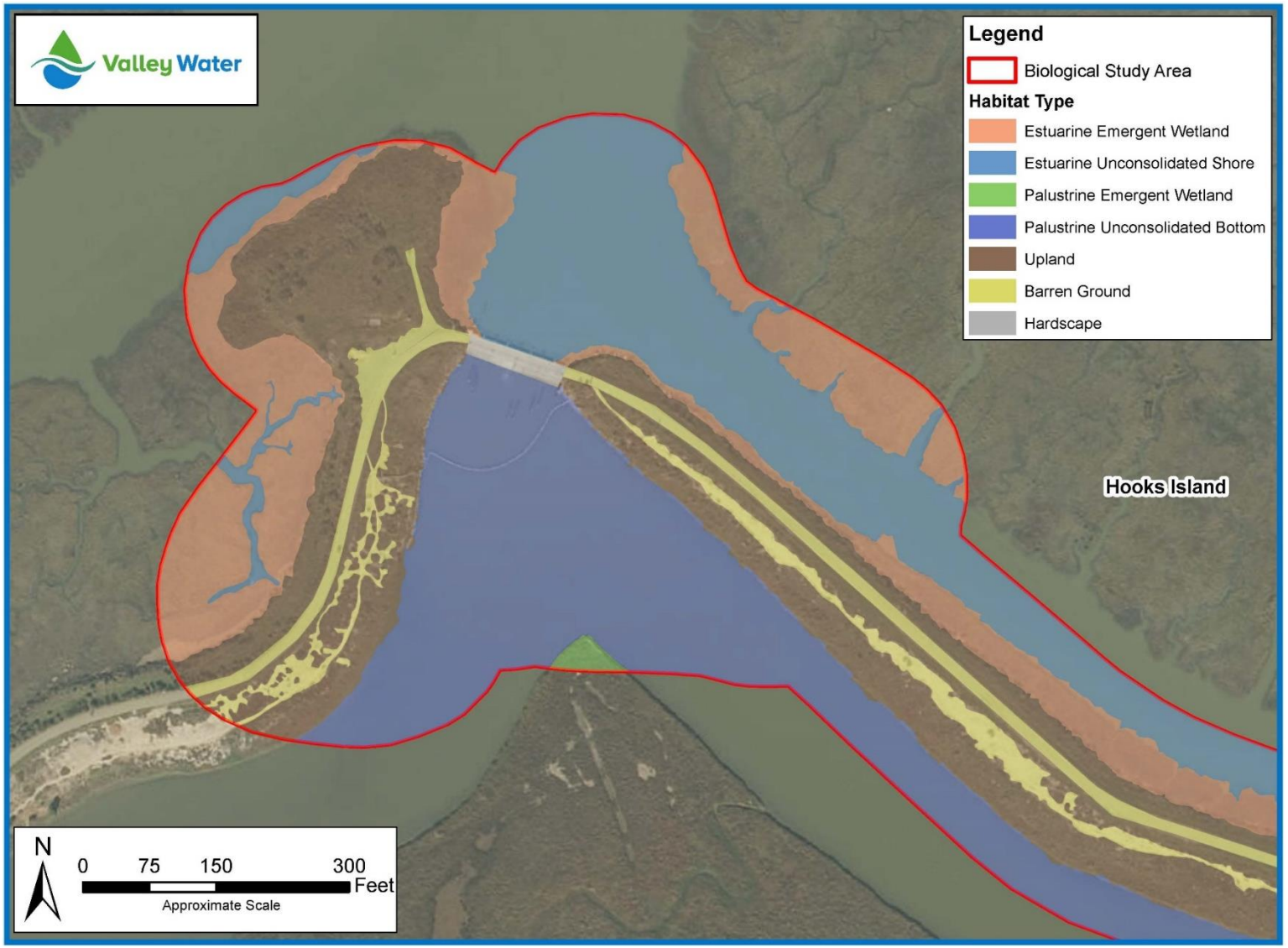
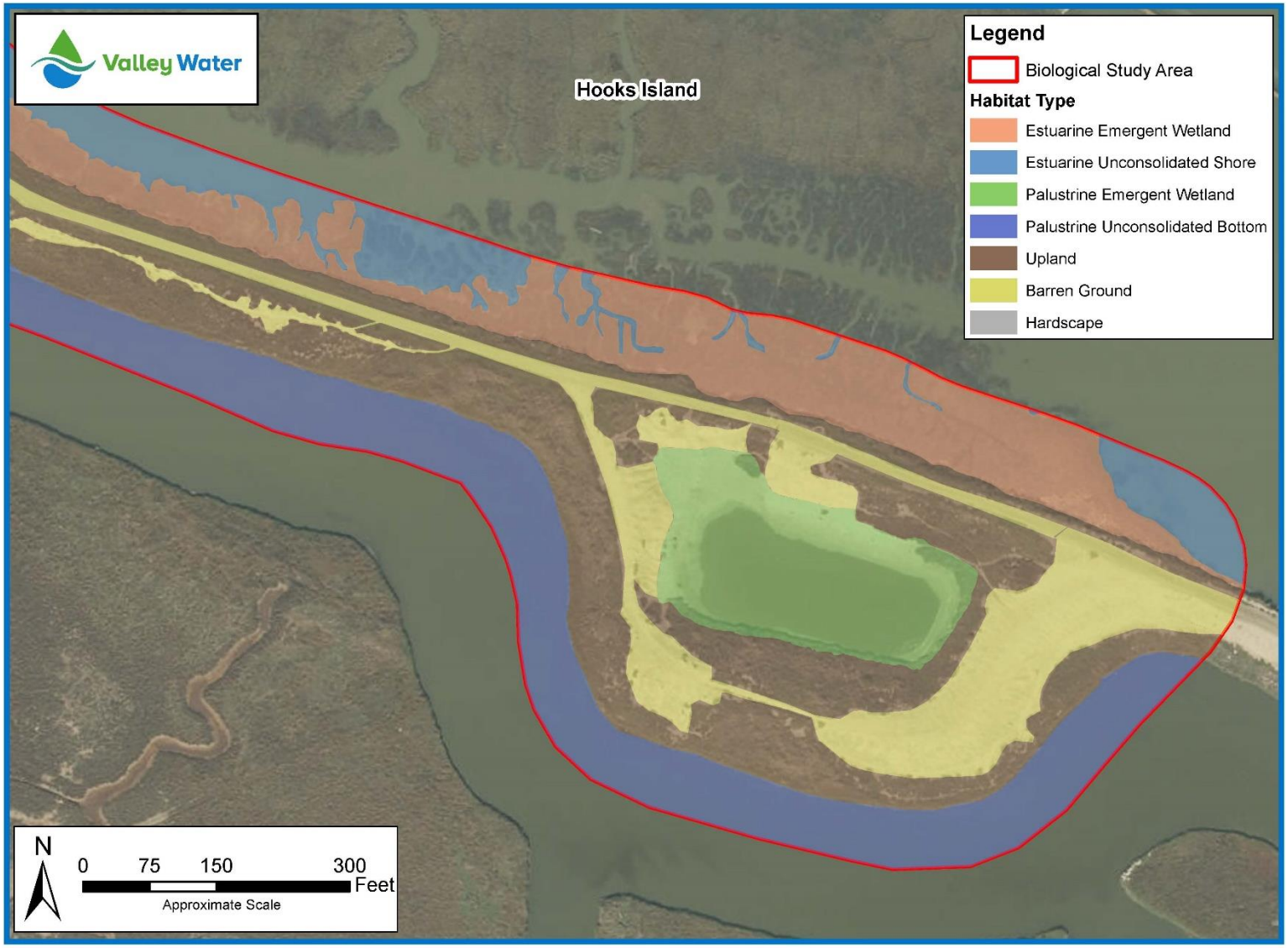


Figure 12. Habitats in the eastern portion of the Study Area



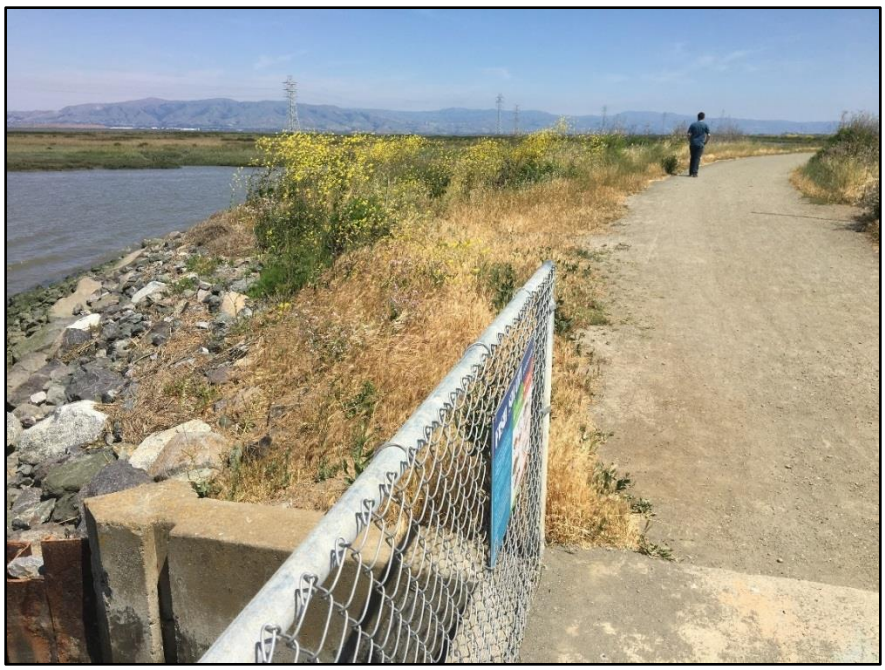


Photo 10. Part of the rip-rap apron lining the Bay side of the levee is visible on the left-hand side of this photo.

Plant Resources

At the time of the Aquatic Resources Delineation conducted in April 2020, the inboard and outboard levees were dominated by native halophytes, as detailed above. Upland vegetation along the levee roads was dominated by non-native ruderal species as described above. A rare plant survey was conducted on May 23, 2019 to determine if any protective or mitigation measures may be necessary to fully avoid impacts to special-status plants by the Project. Work areas, including Staging Areas 1 and 2, were surveyed. The first survey was conducted during the recorded bloom period for alkali milk-vetch (ASTETE), when this species would have been visible and identifiable, as well as hairless popcorn flower (PLGL) and saline clover (TRHY). A nearby population of ASTETE was reported to be at approximately 25% flower, 75% fruit on May 22 (pers. comm. David Thomson and Matt Hinshaw). No current local phenology information was available for PLGL (presumed extinct) or TRHY. The majority of herbarium specimens of both ASTETE and TRHY suggest an average flowering date in April, and the cool and wet spring weather in 2019, coupled with the phenology information for ASTETE, suggests that TRHY would also have been visible at this survey date, if present.

Salt marsh was surveyed from dry ground. The majority of Staging Area 1 was disturbed road verge, with bare ground or ruderal upland vegetation. Staging Area 1 was bordered on the outskirts by native upland species including elderberry, sagebrush, coyote brush, and gumplant. It is possible that Congdon's tarplant or San Joaquin spearscale (*Atriplex joaquiniana*) could occur in these upland areas. The vast majority of Staging Area 2 was compacted bare ground. Some non-native small-flowered iceplant and New Zealand spinach persist in this area, and at the edges of the proposed staging area there is an occasional pickleweed or *Frankenia* sp. There is no suitable habitat in this staging area for any of the special-status plant species with potential to occur at the Project site.

Some suitable salt marsh habitat was present on the northern bank of levee. No alkali flats or open meadow areas were present within the pickleweed; all open areas consisted of mudflat. Potential habitat exists here for California seablite and Point Reyes salty bird's-beak. The southern bank of the levee was heavily impacted by non-native invasive species. Rip-rap was present and the banks were steeper than the outboard side. Special-status plants are unlikely to persist here.

No suitable alkali flat, alkali meadow, wet meadow, vernal pool, or swale habitat for ASTETE, TRHY, or PLGL was observed in any work area. While there was a small amount of potential alkali flat habitat on the margin of the borrow ditch adjacent to Staging Area 2, no special-status species were observed there, and the area is regularly disturbed by foot and bicycle traffic; therefore, it is unlikely that a rare species would be able to persist there. There was no suitable microhabitat for ASTETE, TRHY, or PLGL present at the site, and none plants of these species were observed at the time of the survey. No other rare plants were observed at the time of the survey.

An additional rare plant survey was conducted on July 18, 2019 to cover the peak bloom period for Point Reyes salty bird's beak, which is not identifiable outside of its bloom period, and to survey for California seablite, Hoover's button celery, Congdon's tarplant, and San Joaquin spearscale, which would all also be identifiable at that time, if present. No rare plant species were observed at the time of the survey in July.

Based on results from the CNDDB, IPaC, site surveys conducted during periods when special-status species with potential to occur would be identifiable, and best professional judgment, a list of plant species with state or federal listings or rare plant ranks with potential to occur at the project site was generated and their potential to occur was assessed (Table 9).

Table 9. List of plant occurrences within a 2 mile radius of the Project Area

Common Name	Scientific Name	Status	Habitat	Potential to Occur
Plants				
alkali milk-vetch	*Astragalus tener var. tener*	1B.2	Occurs in alkaline flats and vernally moist meadows at elevations <60m. Blooms March-June (Jepson 2019).	**None:** considered possibly extirpated. There is a historic record from the town of Mayfield near a salt marsh in 1905, but Mayfield Slough is now lined with concrete. In 2002 no plants were present and it was determined the habitat was probably too wet to support the species (CNDDB 2019). A rare plant survey conducted in May 2019 determined no suitable microhabitat was present in the Project Area and the species was not observed at the time of the rare plant surveys.
California seablite	*Suaeda californica*	FE, 1B.1	Occurs in wetlands and at the margins of coastal salt marsh at elevations <5m. Blooms July-October (Jepson 2019).	**Low:** one historical record exists of the species occurring near Mayfield Slough in the PAFB (CCH 1906), and one on the salt flats near Palo Alto Yacht Harbor (CCH 1971); however, the USFWS 2010 five-year review states the site is likely extirpated (USFWS 2010b). Some potentially suitable salt marsh habitat was present on the northern bank of levee; however, none were observed during the rare plant surveys.
Congdon's tarplant	*Centromadia parryi ssp. congdonii*	1B.1	Occurs in grasslands, swales, floodplains, and disturbed sites in wetlands and non-wetlands <300m. Bloom period is from June-October (Jepson 2019).	**Low:** potential to occur in grasslands and disturbed sites. The most recent records of the species occurrence in the area are near Shoreline Amphitheatre and the Golf Club at Moffett Field (CCH 2013). It is possible the species could occur in some upland areas near Staging Area 1; however, the species was not observed during the rare plant surveys.
hairless popcorn flower	*Plagiobothrys glaber*	1A	Occurs in wet, saline, and alkaline soils in valleys and coastal marshes at elevations <100m. Blooms April-May (Jepson 2019).	**None:** the species is presumed to be extinct (Jepson 2019). A rare plant survey determined no suitable microhabitat was present in the Project area and the species was not observed at the time of the surveys.
Hoover's button-celery	*Eryngium aristulatum var. hooveri*	1B.1	Occurs in vernal pools, seasonal wetlands, and occasionally alkaline soils <50m. Blooms in July (Jepson 2019).	**Low:** possibly extirpated; there is one historical record in the PAFB and one near the Palo Alto Airport, both from the 1900s (CCH 2012). There was a small amount of potential alkali flat habitat on the margin of the borrow ditch adjacent to Staging Area 2, but no special-status species were observed there, and because the area is regularly disturbed it is unlikely the species would be able to persist there. None were detected during the rare plant surveys.
Point Reyes salty bird's-beak	*Chloropyron maritimum ssp. palustre*	1B.2	Occurs in coastal salt marsh at elevations <10 meters. Blooms May-October (Jepson 2019).	**Low:** the species is considered possibly extirpated. One record exists in the PAFB from 1903 (CCH). Some potentially suitable salt marsh habitat was present on the northern bank of levee; however, the species was not observed during rare plant surveys.
saline clover	*Trifolium hydrophilum*	1B.2	Occurs in salt marshes and open areas in alkaline soils at elevations <300m. Blooms April-June (Jepson 2019).	**Low:** five records exist in Santa Clara County: one record from Alviso in 1892; two records from downtown San Jose from 1903; one east of Las Animas Creek from 1892; and one from the southeast boundary of the county in 1998 at a pond adjacent to the railroad tracks on the west side of US 101, one mile north of the Pajaro River. There was a small amount of potential alkali flat habitat on the margin of the borrow ditch adjacent to Staging Area 2, but no special-status species were observed there, and because the area is regularly disturbed it is unlikely the species would be able to persist there. None were detected during the rare plant surveys. The species was not observed at the time of the rare plant surveys.
San Joaquin spearscale	*Atriplex joaquiniana*	1B.2	Occurs in alkaline soils in meadows; more common in non-wetlands than wetlands. Blooms April-September (Jepson 2019).	**Low:** two records exist in Santa Clara County, both from 1896; one from Gilroy Valley, and one at Soap Lake near San Felipe on Hollister Road. It is possible the species could occur in some upland areas near Staging Area 1; however, the species was not observed during rare plant surveys.

Animal Resources

Animal species observed during the July 12, 2018, May 7, 2019, and February 24, 2020 site visits included snowy egret (*Egretta thula*), great egret (*Ardea alba*), mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), American avocet (*Recurvirostra americana*), black-necked stilt (*Himantopus mexicanus*), short-billed dowitcher (*Limnodromus griseus*), least sandpiper (*Calidris minutilla*), Forster's tern (*Sterna forsteri*), gulls (*Larus* spp.), grebes (*Aechmophorus* sp.), barn swallow (*Hirundo rustica*), black phoebe (*Sayornis nigricans*), turkey vulture (*Cathartes aura*), common raven (*Corvus corax*), gadwall (*Mareca strepera*), American crow (*Corvus brachyrhynchos*), ruddy duck (*Oxyura jamaicensis*), northern shoveler (*Spatula clypeata*), dunlin (*Calidris alpina*), long-billed curlew (*Numenius americanus*), double-crested cormorant (*Phalacrocorax auritus*), red-tailed hawk (*Buteo jamaicensis*), muskrat, and state species of special concern American white pelican (*Pelecanus erythrorhynchos*), northern harrier (*Circus cyaneus hudsonius*), and Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*). The land southwest of the Embarcadero Road levee, where one wintering adult was observed in 2008 (CNDDB 2009), was surveyed for evidence of use by burrowing owl. At the time of the field assessments, the vegetation was tall and overgrown, making the habitat unsuitable for use by burrowing owl. It is unknown if or how the vegetation here is managed; however, it has been overgrown during each site visit conducted by Valley Water biologists in 2018, 2019, and 2020.

Adobe Creek supports a mix of native and introduced warm-water fish In 2007, Leidy reported fish species present in Adobe Creek as native California roach (*Lavinia symmetricus*), Sacramento sucker (*Catostomus occidentalis occidentalis*), three-spined stickleback (*Gasterosteus aculeatus*), and prickly sculpin (*Cottus asper*). Rainbow trout were reported as native but extinct in the watershed. Non-native fish were reported to include common carp (*Cyprinus carpio*), rainwater killifish (*Lucania parva*), and western mosquitofish (*Gambusia affinis*). In 2007 and 2008, Valley Water biologists captured Sacramento sucker, three-spined stickleback, and California roach on Adobe Creek downstream of O'Keefe Lane during a fish relocation. In 2010 three-spined stickleback were observed on Adobe Creek downstream of El Monte Road. Limiting factors for native warm-water fish communities in Adobe Creek include low streamflow, lack of deep pools, and fish passage barriers. Low flow conditions during the summer, high water temperatures, and low dissolved oxygen make conditions unsuitable for anadromous fish species requiring cool freshwater (Valley Water 2006).

Matadero/Barron was reported by Leidy (2007) to have the same fish as Adobe Creek with the exception of common carp, and also supported native Sacramento blackfish (*Orthodon microlepidotus*) and non-native species green sunfish (*Lepomis cyanellus*), redear sunfish (*Lepomis microlophus*), and bluegill (*Lepomis macrochirus*). On Matadero Creek, three-spined stickleback and California roach were observed by Valley Water biologists during a fish relocation upstream of Page Mill Road in 2011. Western mosquitofish were found on Matadero Creek from Lewis Road downstream to Grier Road in 2013. Other species which have been captured in Matadero Creek include California roach, Sacramento sucker, three-spined stickleback, bluegill, green sunfish, and goldfish (*Carassius auratus*). Channelization, flood control, and fish passage barriers have drastically reduced fish habitat in Matadero Creek, and the conditions in Barron Creek and the extent of channel modifications do not provide favorable conditions for fish (Valley Water 2006).

While fish sampling data from the PAFB is not available, a fish die-off was reported in the PAFB in November 2002 where approximately 100 striped bass, five bat rays, and two leopard sharks, all adults, were collected from around the tide gates and to about one mile upstream on both Adobe and Matadero Creeks (Hughes 2002). The species and numbers present suggest that ample prey species (ex., mollusks, crustaceans, and/or small fish) are present in the vicinity of the tide gates. Fish species captured during sampling efforts in the nearby Alviso Marsh Complex, just east of the proposed Project Area, (Mejia et al. 2008, Hobbs and Moyle 2009*)* are reported in Table 10. The Alviso Marsh Complex has the ability to support a greater number of freshwater species than elsewhere in the South Bay, likely due to its proximity to the San Jose-Santa Clara Regional Wastewater Facility discharge site, which releases tertiary treated sewage throughout the year (Hobbs and Moyle 2009).

Table 10. List of fish species which have been captured in the Alviso Marsh Complex (Mejia et al. 2008, Hobbs and Moyle 2009)

NATIVE			
Common Name	**Latin Name**	**Common Name**	**Latin Name**
arrow goby	*Clevelandia ios*	Pacific herring	*Clupea pallasii*
barred surfperch	*Amphistichus argenteus*	Pacific lamprey*	*Entosphenus tridentatus*
bay goby	*Lepidogobius lepidus*	Pacific staghorn sculpin	*Leptocottus armatus*
bay pipefish	*Syngnathus leptorhynchus*	plainfin midshipman	*Porichthys notatus*
California bat ray	*Myliobatis californica*	prickly scuplin	*Cottus asper*
California halibut	*Paralichthys californicus*	Sacramento sucker	*Catostomus occidentalis*
diamond turbot	*Hypsopsetta guttulata*	shiner perch	*Cymatogaster aggregata*
English sole	*Parophrys vetulus*	speckled sanddab	*Citharichthys stigmaeus*
jacksmelt	*Atherinopsis californiensis*	starry flounder	*Platichthys stellatus*
leopard shark	*Triakis semifasciata*	surf smelt	*Hypomesus pretiosus*
longfin smelt*	*Spirinchus thaleichthys*	three-spined stickleback	*Gasterosteus aculeatus*
longjaw mudsucker	*Gillichthys mirabilis*	topsmelt	*Atherinops affinis*
northern anchovy	*Engraulis mordax*	white sturgeon*	*Acipenser transmontanus*
NON-NATIVE			
Common Name	**Latin Name**	**Common Name**	**Latin Name**
American shad	*Alosa sapidissima*	shimofuri goby	*Tridentiger bifasciatus*
Chinook salmon*[3]	*Oncorhynchus tshawytscha*	shokihaze goby	*Tridentiger barbatus*
common carp	*Cyprinus carpio*	striped bass	*Morone saxatilis*
Mississippi silverside	*Menidia audens*	threadfin shad	*Dorosoma petenense*
rainwater killifish	*Lucania parva*	yellowfin goby	*Acanthogobius flavimanus*

* indicates species of special status

3 While Chinook salmon are native to California, there is limited credible data suggesting they were historically present in Santa Clara County. Genetic analysis indicates that Chinook salmon in Santa Clara County are of hatchery origin (Garcia-Rossi and Hedgecock 2002). For this analysis, Chinook salmon were considered a non-native species.

A few marine mammals including Pacific harbor seal (*Phoca vitulina richardsi*), California sea lion (*Zalophus californianus*), harbor porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), gray whale (*Eschrichtius robustus*), and humpback whale (*Megaptera novaeangliae*) have potential to occur in the Bay. However, most of these species are only likely to occur at the mouth of the Bay or in the Central Bay. For example, California sea lions forage in the Central Bay seasonally. Whales may occur at the mouth of the Bay or enter the Bay sporadically during their migration, but they are very unlikely to occur in the South Bay. The most common and abundant marine mammal in the Bay is the harbor seal, and this is the only species that would typically occur in the South Bay. They are also the only marine mammal known to be a permanent resident of San Francisco Bay. Though most marine mammals occurring in the Bay are not special-status species, all marine mammals are protected under the Marine Mammal Protection Act (MMPA). The MMPA prohibits take of marine mammals in U.S. waters. "Take" is defined by regulation as 'to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal.' Under the MMPA, harassment is any act of pursuit, torment, or annoyance which has the potential to: a) injure a marine mammal or marine mammal stock in the wild (Level A harassment), or b) has the potential to disturb by causing disruption of behavioral patterns such as migration, breathing, nursing, breeding, feeding, or sheltering, but not the potential to injure (Level B harassment). Jurisdiction for the MMPA is shared by NOAA and USFWS. NOAA is responsible for the protection of whales, dolphins, porpoises, seals, and sea lions, while USFWS is responsible for the protection of walrus, manatees, sea otters, and polar bears.

Based on results from the CNDDB, IPaC, site visits, and best professional judgment, a list of animal species with state or federal listings, fully protected, state species of special concern, or listed as moderate or high concern with the Western Bat Working Group (WBWG) with potential to occur at the Project site was generated and their likelihood of occurrence was assessed (Table 11).

Table 11. List of species generated from the CNDDB, USFWS, and best professional judgment including habitat requirements, status, and potential to occur during the work window

Common Name	Scientific Name	Status	Habitat	Potential to Occur in the Study Area
Amphibians and Reptiles				
California red-legged frog	*Rana draytonii*	FT, SSC	Aquatic breeding areas adjacent to upland dispersal habitats with suitable microhabitat (rodent burrows, crevices, fallen logs, etc.) for cover. Breeding sites include pools and backwaters within streams, ponds, and marshes with both open water and emergent vegetation.	**Absent:** the lack of suitable microhabitat, freshwater breeding areas, and presence of predatory fish at the proposed Project site limits suitability of the site for the species, which has a low tolerance for salinity (Cook 1997). There is no critical habitat in the Study Area. There are no known records of the species occurrence within 2 miles of the Project Area.
California tiger salamander	*Ambystoma californiense*	FT, ST	Live mostly underground in small mammal burrows, emerging in the rainy season to breed. Restricted to vernal pools and temporary freshwater ponds for breeding in grassland, oak savannah, or edges of mixed woodland habitat containing well-maintained burrows, especially those of California ground squirrels (USFWS 2003).	**Absent:** the lack of suitable microhabitat, active burrowing rodents, and temporary freshwater pools at the Project site, and presence of predatory fish, limits suitability of the site for the species. There is no critical habitat in the Study Area. There are no known records of the species occurrence within 2 miles of the Project Area.
western pond turtle	*Emys marmorata*	SSC	Permanent to nearly permanent freshwater ponds, lakes, rivers, creeks, wetlands, and marshes with rocky or muddy substrate, suitable basking habitat, and aquatic vegetation in woodland, forest, or grassland habitats. Prefer slow-moving water with deep pools and woody debris, rocks, vegetation mats, or exposed banks for basking. Use terrestrial upland sites for refuge during droughts, floods, and for nesting. Dig a nest on land ~April-August in sunny, low grass covered areas near water (CalHerps 2019).	**Absent**: while considered a freshwater turtle, populations of the species may inhabit brackish water tidal sloughs, which may be a result of drought-induced isolation and local adaptation. A small, isolated population was observed ~3.5 miles southeast of the Project Area along the Bay Trail near the Sunnyvale Water Pollution Control Plant in 2012, where the primary water source is surface runoff and groundwater infiltration. Observations occurred ~4 miles upstream on Matadero and Deer Creeks in 2016 (CNDDB 2019). These habitats have freshwater input, and therefore are more suitable for the species. There are no known occurrences of the species within 2 miles of the Study Area. Due to elevated salinity in the Project Area (greater than>10 ppt), lack of suitable offshore basking sites, and lack of known occurrences (and therefore no locally adapted population), suitability of the site is limited for the species.
Birds				
Alameda song sparrow	*Melospiza melodia pusillula*	SSC	Prefer tidally influenced habitats. Forage on vegetation or open ground, including paths through pickleweed created by small mammal movement or tidal action. Nest in tall salt marsh vegetation, primarily marsh gumplant and cordgrass adjacent to tidal sloughs, or bulrush in brackish marshes (Shuford and Gardali 2008).	**Present:** there are recent observations of the species at Palo Alto Baylands (CNDDB 2004), and suitable nesting and foraging habitat is present in the Study Area.
American peregrine falcon	*Falco peregrinus anatum*	FP	Open areas near water. May nest on remote cliffs, tall buildings in urban areas, bridges, or transmission towers. Perch or fly over managed ponds to forage mainly for birds such as ducks, shorebirds, passerines, or occasionally small mammals.	**Likely:** typically rare to uncommon in the Bay area, but are more common in the winter around estuaries, marshes, and coastal shores with numbers increasing from August/early September to April. The nearest potential nesting structure to the Project Area would be the PG&E towers to the north, which is over 700’ away. Foraging habitat is present in the PAFB.
American white pelican	*Pelecanus erythrorhynchos*	SSC	Shallow wetlands in the Bay area where they can forage for fish in waters <8' deep. May roost on sandspits in coastal estuaries or utilize levees in managed wetlands.	**Present:** the species regularly occurs at Soap Pond, ~1 mile southeast of the Study Area along the Adobe Creek Trail, and was observed at Soap Pond during the July site visit. The species may be present year-round, with numbers peaking from July to October at the South Bay salt ponds and decreasing in the winter (Lukas 2012). The species is not known to breed in Santa Clara County, but may be present as a forager in shallow waters in the vicinity of the Study Area.
bald eagle	*Haliaeetus leucocephalus*	SE, FP	Large bodies of water with abundant fish and waterfowl prey adjacent to snags or other structures for perching. Nest in tall trees or structures near permanent water sources (Sibley 2016).	**Likely:** the nearest potential nesting habitat would be the PG&E towers over 700’ north of the Project Area, but the species has typically been considered a rare winter visitor to Santa Clara County. In recent years, a pair has nested at Curtner Elementary School in Milpitas, ~10 miles east of the Project Area. Foraging habitat could be available in the Study Area; however, suitable perching structures are limited in the Project area. Could occur in the vicinity as a transient or forager in the Bay.
bank swallow (nesting)	*Riparia riparia*	ST	Low areas along rivers, streams, ocean coasts, and reservoirs. Nest in colonies in burrows in steep sand, earthen, or gravel banks. May forage over any habitat type, but prefers marshes, meadows, and water.	**Absent:** there have been no nesting records in the county since the early 1930s, but could occur in Santa Clara County as a very rare migrant from ~April to September. Work will not be occurring at the time the species would be present in the area. The species is not known or expected to breed in the Study Area during the work window.
Barrow’s goldeneye (nesting)	*Bucephala islandica*	SSC	Open rivers, lakes, and bays. Nest in tree cavities near water. Dive for aquatic invertebrates, and occasionally small fish or vegetation.	**Unlikely:** could occur as a rare winter visitor (~November-March), but the species is not known to breed in Santa Clara County, and suitable nesting habitat is not present in the Project area. The species could occur in the basin or Bay as a forager.
black skimmer (nesting colony)	*Rynchops niger*	SSC	Open sandy or gravel bars with sparse vegetation or wrack at coastal beaches, estuaries, or salt marsh habitat. Nest is a scrape on the ground, often adjacent to Forster's tern colonies. Feed on small fish and crustaceans.	**Likely:** an uncommon resident first observed in the South Bay in the 1970s, the species has nested there since 1994. Known nesting sites have included within the PAFB (in the northeast corner) and salt ponds in Alviso, Moffet Field, and Ravenswood (Bousman 2007, Schacter et al. 2008). The typical nesting season for the species is May to mid-August. While rare in the county, in recent years the species has been observed at salt pond SF2, Shoreline Lake, and Charleston Slough. Could occur in the Study Area as a forager.
Bryant's savannah sparrow	*Passerculus sandwichensis alaudinus*	SSC	Pickleweed-dominant habitat and adjacent grasses in salt marshes and open grasslands lacking tree cover. May nest in vegetation such as pickleweed, grasses on the ground, or low in shrubs.	**Present:** suitable habitat is present to support the species, and the species was observed in the Study Area during site visits in July and February.

burrowing owl	*Athene cunicularia*	SSC	Nest and roost in open grasslands with short vegetation and gently sloping terrain or ruderal habitats with unobstructed views, suitable foraging habitat, and burrows, typically those made by California ground squirrels. Forage for invertebrates and small vertebrates such as lizards, birds, or mammals such as mice, voles, and shrews over grasslands. May hunt day or night.	**Likely:** The species has been observed in Byxbee Park (<1 mile southwest) and Shoreline Park (~2 miles southeast), and nesting east of the Embarcadero Way access road (~0.2 mile southwest of the tide gate) from 1998 to 2003, and one wintering adult was observed here in 2008. The Study Area lacks suitable ground squirrel burrows for nest sites, and at the time of the site visits vegetation along the levee at Embarcadero Way was overgrown, making the habitat unsuitable for BUOW nesting. The species may be present in the vicinity of the Study Area and could therefore occur as a transient or forager.
California black rail	*Laterallus jamaicensis coturniculus*	ST, FP	Saltwater or brackish tidal marshes dominated by pickleweed, often with salt grass, alkali bulrush, or cattails. Adjacent vegetated upland habitat is required for escape cover from predators during high tides. Nests are built in mature marsh plants above the high tide line. May forage on terrestrial insects, aquatic invertebrates, and seeds.	**Likely:** an individual was detected in mid-March 2008 just east of the Palo Alto airport in the Palo Alto Baylands Reserve. The species was also detected at Shoreline Park in 2014. In August 2015, two adults were observed brooding chicks at Alviso Slough and Alviso Marina County Park, ~7 miles southeast of the PAFB tide gate. While unlikely to nest regularly in the South Bay due to limited suitable vegetated upland habitat, can occur as a rare winter visitor.
California brown pelican	*Pelecanus occidentalis californicus*	FP	Found along the coast, coastal estuaries, and bays. Forage by diving for fish, particularly northern anchovy, and roost on beaches, rocks, pilings or other anthropogenic structures. Nest on small islands.	**Likely:** the species tends to be rare in the South Bay; however, suitable foraging habitat may be available in the Bay. The species is not known to breed in Santa County.
California least tern	*Sternula antillarum browni*	FE, SE, FP	Coastal areas, beaches, bays, estuaries, lagoons, lakes, and rivers. Nest in scrapes on sandy or gravel areas lacking vegetation near water. Forage for fish over water.	**Unlikely:** may occur in Alviso in low numbers foraging over managed salt ponds or the open Bay. The species was reported using Charleston Slough as a post-breeding foraging area in July 1987, but no more recent records are available (CNDDB 2019). The species is rare in the county, but may be present in the Bay area ~April-August (Lukas 2012). It could occur as a vagrant in October-November (Bousman 2005). It is not known to breed in the county.
California Ridgway's rail	*Rallus obsoletus obsoletus*	FE, SE, FP	Salt marshes, tidal and brackish marshes, and wetland areas with tidal sloughs and access to mudflats or shallow waters with abundant invertebrates for foraging, and adjacent to high marsh for refugia during high tides. Occur in cordgrass-pickleweed dominant habitats, often with gumplant and salt grass. Nest in the lower areas of marshes in dense vegetation such as cordgrass, pickleweed, and gumplant. Nesting season is from February 1 to August 31.	**Present:** the species is a resident known to occur in the marshes of the Palo Alto Baylands. It has been documented west of the tide gate structure in the Baylands Nature Preserve, Hooks Island to the north, and the downstream end of Charleston Slough to the east. SCVWD biologists have observed the species in the immediate vicinity of the Project Area (ex., Hooks Island, 2011), in the channel north of the Byxbee Park parking lot (2019), and Faber Marsh (2019). There are known CNDDB occurrences within 1 mile of the Study Area (CNDDB 2019).
common loon (nesting)	*Gavia immer*	SSC	Freshwater lakes and reservoirs, coastal estuaries, lagoons, bays, harbors, and river mouths. Prefer calm waters with abundant forage fish. Nest in protected areas on lakeshores close to the bank with easy access from water.	**Unlikely:** while somewhat common in the Central San Francisco Bay, the species is uncommon in the South Bay. Could occur as a rare migrant or vagrant in the fall or spring (~September-May). However, the species is not known to breed in Santa Clara County, and the species only has special status at nest sites.
golden eagle	*Aquila chrysaetos*	FP	Open or mountainous areas away from human disturbance. Nest primarily on cliff edges, and also tall trees. Hunt mammals from perches, and may also take birds or carrion.	**Unlikely:** breeding records occur in the foothills of Santa Clara County, but the species is not known to nest in the PAFB Study Area (Bousman 2007) as suitable perching and nesting habitat is limited. The species may occur in the area as a transient or nonbreeding forager.
grasshopper sparrow (nesting)	*Ammodramus savannarum*	SSC	Open, dry grasslands, fields, and pastures with little to no scrub cover and some bare ground. Prefer ungrazed grasslands ~1-3' high. Nest on the ground in depressions at the base of grass tufts by weaving a dome nest with a side-entrance. Forage for insects and seeds on exposed soil between clumps of grass (Lukas 2012).	**Unlikely:** while the subspecies *A. s. perpallidus* is a regular breeder in grasslands and low-lying foothills of Santa Clara County, they are rare in September and October and only likely to occur as a vagrant from November-March.
loggerhead shrike (nesting)	*Lanius ludovicianus*	SSC	Open habitats with scattered shrubs and trees, or open areas around salt marshes. Nest in clumps of dense trees or shrubs near open foraging areas and hunt small mammals, birds, insects, and lizards from low perches.	**Likely:** the species is known to nest along the salt evaporation ponds in northern Santa Clara County, with numbers increasing from ~September-March (Lukas 2012). The species could nest in shrubs near Staging Area 1 or be present as a forager in the Study Area. The typical nesting period for the species is March to August. Could occur as a forager in the Study Area.
northern harrier (nesting)	*Circus cyaneus*	SSC	Open grasslands, wetlands, and salt marshes dominated by pickleweed, or brackish marsh dominated by bulrush. Nest on the ground in tall vegetation, such as grass or cattails, in freshwater marshes or wet meadows.	**Present:** while considered uncommon in the county in the summer, the species is known to nest in undeveloped grasslands and marshes along the edge of the South Bay, and numbers peak in the Bay area in the winter. Potential nesting habitat is present at Hooks Island or in the PAFB .
purple martin (nesting)	*Progne subis*	SSC	Open habitats near lakes or ponds with large decaying trees. Forage over open areas such as meadows, grasslands, or lakes. Nest in tree cavities, often high on ridges, in areas with abundant insect prey.	**Unlikely:** a rare but regular breeder in the Santa Cruz Mountains of Santa Clara County, breeding birds are typically present here from mid-March to the end of August. The species is considered a rare migrant elsewhere in the county and typically only present from ~April to May and August to September. Suitable nesting trees are absent from the Study Area.
Redhead (nesting)	*Aythya americana*	SSC	Freshwater ponds and lakes, or where river mouths enter bays. Forage on submerged aquatic plants and invertebrates. Nest in cattails or bulrushes on or near water.	**Unlikely:** an irregular breeder in Santa Clara County, but may occur as a rare winter visitor in the South Bay. There are confirmed nesting records from the mid-1970s and early 1980s in the PAFB (Bousman 2007), as well as observations from Charleston Slough. No evidence of breeding has been reported since 1984 and it is unclear what factors are required for successful breeding in the South Bay.
saltmarsh common yellowthroat (nesting)	*Geothlypis trichas sinuosa*	SSC	Brackish or freshwater marshes and wetlands. Nest in dense herbaceous vegetation or shrubs such as bulrush, cattails, willows, coyote brush, or poison hemlock. Forage on the ground, primarily for insects and spiders.	**Present:** the species is considered common in South Bay salt marshes and is more common in the winter. There are breeding records from Palo Alto, with most occurring in brackish or freshwater marshes at the edge of the South Bay. The typical nesting period for the species is from ~March to late August (Bousman 2007). Potential for nesting exists in shrubs near Staging Area 1, dense ruderal vegetation along access roads, or in taller vegetation in surrounding marshes.
short-eared owl (nesting)	*Asio flammeus*	SSC	Open grasslands and marshes with abundant small mammal prey, and occasionally take birds. Roost on the ground in weedy habitat or grass. Associated with California voles (Bousman 2007, Lukas 2012).	**Unlikely:** the species was documented nesting in the PAFB in the early 1970s and was observed in the Palo Alto Baylands in the 1980s. Now considered a rare to uncommon winter visitor, numbers appear to be declining (Bousman 2007, Lukas 2012). Breeding is most regular in northeastern California and Suisun Marsh, and irregular elsewhere (Shuford and Gardali 2008). The species could be present as a forager in the PAFB, and there is low potential for nesting in weedy or grass habitats in the PAFB (outside of the Study Area).
tricolored blackbird	*Agelaius tricolor*	SCE, SSC	Freshwater marshes and agricultural lands. Forage on seeds and invertebrates in grasslands, agricultural lands, and shallow wetlands. Nest near freshwater marshes with dense emergent vegetation such as cattails, tules, willow, blackberry, thistles, or wild rose.	**Unlikely:** absent or occurs as a nonbreeder in most of Santa Clara County, except for a few small, scattered colonies (Bousman 2007, Bonham 2018). The nearest CNDDB occurrence is ~7 miles SE of the Study Area at the San Jose-Santa Clara County Waste Facility outfall in freshwater tule marsh, and was last recorded active in 1993. None were observed during the 1994 or 1995 surveys. A lack of suitable nesting and preferred foraging habitat in the Study Area limits site suitability for the species. Low potential to occur as an uncommon, nonbreeding transient.

Vaux's swift (nesting)	*Chaetura vauxi*	SSC	Redwood, Douglas fir, or other coniferous, usually old-growth, forests along the California Coast from Del Norte to Santa Cruz counties. Known to breed in Marin, San Mateo, Santa Cruz, and Santa Clara Counties, and the Sierra Nevada. May nest in large hollow trees or chimneys. Feeds on flying insects over meadows, forests, or water edges.	**Unlikely:** the species is most common in the coastal redwood zone in the northwestern portion of California (Shuford and Gardali 2008). It is considered a vagrant in Santa Clara County from November to January, and uncommon from April to September. Largely considered a migrant, though small numbers may breed in a limited portion of the Santa Cruz Mountains near Los Gatos and Saratoga. All known Santa Clara County breeders nest in residential chimneys (Bousman 2007). Could occur as a forager, but the Study Area lacks suitable breeding habitat.
western snowy plover	*Charadrius alexandrinus nivosus*	FT, SSC	Sandy beaches on marine and estuarine shores. Nest is a scrape on the ground, typically next to driftwood or other debris in a fairly barren landscape, in San Francisco Bay managed salt ponds, dried out ponds, or levees with suitable substrate. May forage on beaches, tidal flats, river mouths, salt flats, or salt ponds for terrestrial, freshwater, brackish, or marine invertebrates in shallow water, wet mud, or sand.	**Likely:** ~250 adults breed at the salt ponds around San Francisco Bay, mostly in the South Bay-Hayward area, and the species is more common in the Bay area in the winter (Lukas 2012). There is no critical habitat in the Study Area. While suitable nesting substrate is not available in the Study Area, the species may occur nearby in managed salt ponds. There is potential for the species to occur as a forager on tidal flats in the Study Area.
white-tailed kite	*Elanus leucurus*	FP	Coastal and valley lowlands. Forage in open grasslands, meadows, agricultural, and marsh habitats with abundant small mammal prey. Nest high in isolated trees, shrubs, or forest edges near foraging habitat.	**Present:** a year-round resident known to nest along the South Bay and in the foothills. Moderate-sized shrubs (ex., coyote brush) could provide structure for nesting, but the height of available vegetation in the Study Area and adjacency to the Adobe Creek Trail limit nesting suitability for the species. Foraging habitat is present in the surrounding marshes and interior PAFB.
yellow-headed blackbird (nesting)	*Xanthocephalus xanthocephalus*	SSC	Wetlands, marshes, ponds, and rivers. Nest in freshwater marshes with dense vegetation such as reeds, bulrushes, and cattails. Forage in open habitats such as fields.	**Absent:** historically the species bred regularly in freshwater marshes of the Santa Clara Valley floor; however, there have been no records of breeding in the county since most of these marshes were drained for agriculture in the early 20th century. The species is not known to breed in the county, and could occur only as a rare spring migrant (~April-May) outside the proposed work window.
yellow rail	*Coturnicops noveboracensis*	SSC	Shallow freshwater or brackish emergent wetlands, marshes, or wet meadows with dense vegetation, often dominated by sedges or grasses. May occur in coastal salt marshes with dense stands of *Spartina* in the winter. Nest in sedge marshes or wet meadows, sometimes among grasses. Avoid exposed areas and sunlight (Sibley 2016). Forage for small snails, aquatic insects, or vegetation in areas with dense vegetation. Nest is a shallow cup of sedges and grasses on damp soil or shallow water under a canopy of dead plants for cover (Audubon 2019).	**Unlikely:** occurs as a very local breeder in the northeastern interior of California and as a winter visitor (early October to mid-April) on the coast and Suisun Marsh region. The species is considered rare in the county. One individual was captured in the vicinity of Palo Alto Baylands in mid-January 1988 and 1993. There was a CNDDB report of an individual foraging in California fuchsia plantings in a parking lot at Don Edwards National Wildlife Refuge, ~7 miles southeast of the PAFB, in October 2013. The species is not known to breed in the county, but may occur as a rare winter visitor.
Crustaceans				
conservancy fairy shrimp	*Branchinecta conservatio*	FE	Typically found in large, clay-bottomed, turbid vernal pools with cold fresh water.	**Absent:** there is no critical or suitable habitat in the Study Area, and there are no known populations in Santa Clara County. There are eight known populations occurring in Butte and Tehama, Glenn, Yolo, Solano, Stanislaus, Merced, and Ventura Counties (USFWS 2017a).
vernal pool tadpole shrimp	*Lepidurus packardi*	FE	Restricted to ephemeral freshwater habitats such as alkaline pools, clay flats, vernal lakes, pools, swales, and other seasonal wetlands (USFWS 2007).	**Absent:** there is no suitable habitat in the Project Area, and the species is not known to occur in Santa Clara County. Known to occur in Alameda, Butte, Colusa, Contra Costa, Fresno, Glenn, Kings, Merced, Placer, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Yolo, and Yuba Counties. Three occurrences of vernal pool tadpole shrimp are documented on the Don Edwards San Francisco Bay NWR and private land in Alameda County (USFWS 2007). There is no critical habitat in the Study Area.
Fish				
Central California Coast steelhead	*Oncorhynchus mykiss*	FT	Riverine, estuarine, and marine habitats. Anadromous fish which requires perennial streams, estuaries, and marine systems where it is possible to migrate from riverine spawning habitats to marine foraging areas. Require cool, well-oxygenated streams with suitable spawning gravel and habitat complexity in the form of cover, deep pools, riffles, and runs.	**Unlikely:** upstream adult migration usually occurs from ~December-May (peaks February-April). Juvenile outmigration occurs ~December-June. However, Matadero, Adobe, and Barron Creeks are not known to support steelhead runs, and therefore the species is not expected to occur in proximity of or in the PAFB. Small numbers may migrate through the Bay between riverine spawning and marine foraging habitats. Tidally influenced areas of San Francisco Bay to mean higher high water are designated as critical habitat for the species.
Central Valley fall-run Chinook salmon	*Oncorhynchus tshawytscha*	SSC	Riverine, estuarine, and marine habitats. Anadromous fish which requires perennial streams, estuaries, and marine systems to migrate from riverine spawning habitats to marine foraging areas. Require cool, well-oxygenated streams with suitable spawning gravel and habitat complexity in the form of cover, deep pools, riffles, and runs.	**Unlikely:** migration in Santa Clara County is flow-based, and upstream adult migration usually occurs from ~September-December (peaks end of October-December). Juvenile outmigration occurs ~December-June. The species is not known to occur in the creeks upstream of the Project Area, but low numbers may occur in the Bay during migration. The San Francisco Bay is designated as EFH for all life stages of Chinook salmon.
delta smelt	*Hypomesus transpacificus*	FT, SE	Open water bays and tidal river channels and sloughs with various degrees of salinity. Typically spawn at night during low tide in freshwater sloughs and shallow edge waters (University of California 2019).	**Absent**: endemic to the upper San Francisco Estuary, primarily the Sacramento-San Joaquin Delta and Suisun Bay, and may occasionally be washed into San Pablo Bay. The species congregates in the Sacramento River and Suisun Bay, and spawns in channels and sloughs of the Delta (Moyle 2002). There is no critical habitat in the Study Area. No historical occurrences of the species are known for Santa Clara County, which is outside of the species' known range.
green sturgeon	*Acipenser medirostris*	FT, SSC	Riverine, estuarine, and marine habitats. Anadromous fish species with adults spending most of their life in nearshore marine waters and returning to freshwater to spawn in deep, turbulent water on a variety of substrates, but preferably large cobble (Moyle 2002). The Sacramento River is the southern extent of spawning for the southern DPS. Spawning occurs in the Sacramento River between spring and early summer. Larvae develop in freshwater, moving to estuaries early in their first year and remaining for ~ three years before migrating to the ocean. Sub-adults typically remain in the Estuary at depths <10 m from spring through fall (Kelly et al. 2007). Bottom-feeders that generally eat invertebrates.	**Unlikely:** adults are primarily marine, while sub-adults or non-spawning adults may spend more time in estuaries foraging and growing. Adults or sub-adults typically enter the Bay between mid-February and early May and migrate quickly up the Sacramento River. The species is uncommon in the San Francisco Estuary, and rare in the South Bay. Low numbers have been reported near the Dumbarton Bridge from CDFW trawl surveys, and the species has been captured in recent years in Alviso Slough and the downstream end of Coyote Creek (UC Davis 2017). Suitable foraging habitat may be present in the Study Area, and low numbers may transition through the Bay. All tidally influenced areas of San Francisco Bay, up to the elevation of mean higher high water, are designated as critical habitat for the southern DPS of green sturgeon (NOAA 2009).

longfin smelt	*Spirinchus thaleichthys*	FC, ST	Riverine, estuarine, and marine habitats. Anadromous fish typically found in open water away from shorelines and in-water structures. Prefer deep- to mid-water habitat and rarely occur in temperatures over 22°C. Adults prefer 15-30 ppt, and larvae have a lower tolerance to salinity, presumably <6 ppt, average 2 ppt (Robinson and Greenfield 2011). Spawn in freshwater with sandy or gravel substrate from ~January-March (CDFW 2009).	**Unlikely:** primarily a pelagic open water species, but adult distribution may extend into the South Bay in wet winters and spring, with the greatest concentrations in San Pablo Bay, Suisun Bay, and the West Delta. The Bay is the southern extent of the species' range, but distribution varies annually with numbers tending to be lower in drought years and higher in wet years (Moyle 2002). In the Lower South Bay, the species has been documented east of the PAFB tide gate in Alviso and Artesian Sloughs, the restored Island Ponds, and the downstream end of Coyote Creek (Hobbs 2019). The larger size of the Coyote and Guadalupe watersheds provide more freshwater input, which likely makes conditions in those areas more suitable for the species. While adults may be present in the Bay in wet winters, due to the shallow water and presence of the tide gate structure in the Project Area would likely not be preferred by the species.
Pacific lamprey	*Entosphenus tridentatus*	SSC	Riverine, estuarine, and marine habitats. Anadromous fish requiring passage from riverine spawning habitats to marine areas. Adults migrate upstream from late fall-spring to spawn in low gradient, gravel-bottomed streams. Macropthalmia (juveniles) move downstream to the ocean between late fall and spring; the estuarine and nearshore habitat requirements for macropthalmia are unknown. Adults are parasitic on fishes and marine mammals; feed on body fluids and blood (Goodman and Reid 2012).	**Unlikely:** in Santa Clara County, historical freshwater records support presence of the species in only Coyote Creek and Guadalupe River, and they probably did not occupy most smaller streams entering the Bay (USFWS 2019). Due to lack of historical or current records and passage barriers upstream, habitat in the creeks in the Study Area is likely unsuitable for the species. However, small numbers may be present in the Bay during migration between riverine and marine habitats from fall through spring.
white sturgeon	*Acipenser transmontanus*	SSC	Riverine, estuarine, and marine habitats. Anadromous fish typically found in estuaries of large rivers, in deep waters with soft bottoms. May move to intertidal areas at high tide to feed. Return to freshwater to spawn from ~February-May in riffles or pools with rocky and gravel substrate in water temperatures 8-19°C (University of California 2019).	**Likely**: most abundant in Suisun and San Pablo Bays and the West Delta, but also found in the Central and South Bays. Adults are primarily estuarine. The species is locally common in the open waters of the San Francisco Estuary and most abundant in brackish waters. In Santa Clara County, may occasionally be found in tidal riverine and estuarine habitats of larger tributary streams such as Coyote Creek and the Guadalupe River (Moyle 2007). In California, spawning populations are only known to occur in the Sacramento-San Joaquin River system (Moyle 2002).
Invertebrates				
bay checkerspot butterfly	*Euphydryas editha bayensis*	FT	Open grasslands with serpentine soil outcrops and host plants. Serpentine plants (*Plantago erecta* and/or *Castilleja exserta* or *C. densiflora*) serve as larval host plants. Adult nectar plants include *Layia platyglossa, Lasthenia californica, and Lomatium* spp.	**Absent:** the lack of suitable habitat (serpentine soils and host plants) limits potential for the species to persist in the Study Area. There is no critical habitat in the Study Area.
San Bruno elfin butterfly	*Callophrys mossii bayensis*	FE	Rocky outcrops and cliffs in coastal scrub habitat within the fog belt on steep north-facing slopes with low sunlight. Broadleaf stonecrop (*Sedum spathulifolium*) serves as the larval host plant (USFWS 2010a).	**Absent:** occurs in coastal mountains near San Francisco Bay; however, all records are restricted to San Mateo County, including San Bruno Mountain, Milagra Ridge, and Montara Mountain (USFWS 2017b). The species' distribution is dependent on that of its host plant. The larval host plant was not observed in the Study Area during biological surveys.
Western bumble bee	*Bombus occidentalis*	-/SCE/-	Grasslands and meadows with adequate nectar and pollen sources from February through November and undisturbed nest and overwintering sites. Generalist forager, but feed most commonly on *Melilotus, Cirsium, Trifolium, Centaurea, Chrysothamnus, Eriogonum* genera. Nest primarily in underground cavities and in open west-southwest facing slopes bordered by trees; may nest above ground in logs. Overwintering sites are probably in friable soil or under plant litter or debris (CDFW 2019).	**Absent:** populations have declined sharply since the 1990s, especially in the western portion of its range, and the species is no longer present across much of its historic range. It is now largely restricted to high elevation meadows in the Sierra Nevada and a few scattered locations along the California coast (CDFW 2019). Lack of burrows and slopes bordered by trees in the Study Area limit suitability of the site for the species, and the majority of flowering plants present in the Study Area do not bloom for the entirety of the colony phenology. The Project Area is disturbed, further limiting site suitability for the species.
Mammals				
hoary bat	*Lasiurus cinereus*	WBWG:M	Forest habitats with access to trees for cover and open areas or habitat edges for feeding. Hang singly in tree foliage by day, usually at the edge of a clearing, usually 7-20' above ground in a tree with a leafed canopy above and open air below. Insectivore with a strong preference for moths, but also known to eat beetles, flies, grasshoppers, termites, dragonflies, and wasps.	**Unlikely**: the species is present in the county in the winter, but trees or shrubs with suitable roosting structure are lacking in the Study Area. They may forage for insects over the Bay late at night. Due to lack of suitable roosting habitat in the Study Area and nocturnal behavior of the species, they are not expected to be present in the Study Area when work would be occurring.
saltmarsh harvest mouse	*Reithrodontomys raviventris raviventris*	FE, SE, FP	Restricted to tidal and brackish marsh habitats of San Francisco Bay and its tributaries; may occur in diked and muted marshes. Dense pickleweed for cover and food, and other salt and brackish marsh vegetation such as salt grass and alkali bulrush, and adjacent grasslands where there is suitable cover to avoid predation during high tides is considered preferred habitat. Build nests out of dry grasses in grass, sedge, or other vegetation on the ground. Breed from spring through autumn, with females reproductively active from March-November. Does not use burrows.	**Present:** there are four CNDDB occurrences within a 2 mile radius of the Study Area from the period of 1975-1990s. There are trapping records from the Palo Alto Baylands adjacent to and north/northwest of the tide gate in the Harriet Mundy Marsh from that same timeframe (Shellhammer 2005), and a population is known at the Emily Renzel Marsh (<1 mile south of the tide gate). Suitable habitat is present in the Study Area and in surrounding areas.
saltmarsh wandering shrew	*Sorex vagrans halicoetes*	SSC	Pickleweed-dominant tidal and diked salt marshes with dense, low-lying vegetation, continuously moist soils, and abundant driftwood. Occur on the ecotone between tidal marsh and upland vegetation. Forage for insects and vegetation under moist driftwood and wrack (USFWS 2013). Breed from ~February-June, with most young born in April. Construct domed breeding nests from dead plant material (*Spartina, Distichlis, Salicornia*) above ground among driftwood above the higher tide line, and open resting nests above the ground in *Salicornia*. Most active at night (Collins 1998).	**Unlikely:** populations may be very low, and they would occur in low densities. The species was captured at Don Edwards NWR in 2006 and at Triangle Marsh in the 1980s; captures have occurred in tidal and diked marshes (Estrella and Shellhammer 2015), but it is likely tidal marsh habitat is preferred due to increased prey availability. Limited suitable habitat may be available in pickleweed marshes along the edges of the South Bay; however, abundant driftwood was not observed at the time of the site visits, indicating limited site suitability for the species.
western red bat	*Lasiurus blossevillii*	SSC, WBWG:H	Generally roost independently in tree and shrub foliage, and sometimes leaf litter. Tend to be associated with mature trees such as cottonwood/sycamore riparian, eucalyptus, orchards or other non-native trees. May forage in riparian woodland habitats, forest-edges, orchards, and agricultural lands, or around urban/residential areas and streetlights. Reported prey items include homopterans, coleopterans, hymenopterans, dipterans, and lepidopterans.	**Unlikely:** known to winter in the San Francisco Bay and may forage over the Bay, but is generally a solitary rooster and not known to breed in Santa Clara County. Due to lack of suitable roosting habitat in the Study Area and nocturnal behavior of the species, they are not expected to be present when work would be occurring.

Marine Mammals				
Pacific harbor seal	*Phoca vitulina richardsi*	MMPA	Bays and estuaries with accessible haul out sites and abundant prey. Benthic foragers, generally at shallow depths. Local prey species primarily include Pacific herring, northern anchovy, and other fish species. Foraging location is associated with prey abundance and proximity to their haul out site (typically within ~6 miles). Rest onshore daily on islands, tidal rocks, mudflats, sandbars. Pupping occurs from March-May; molting in June-July.	**Unlikely:** The closest pupping areas to the Project Area include Newark Slough (3.4 miles north) and Mowry Slough (3.5 miles NE); smaller numbers occur at Bair Island (7.5 miles NW).); these sites have been used for decades and the species exhibits site fidelity. Could occur as a forager in the Study Area, although the species is not regularly observed in the Study Area.

Status Codes:

FE	listed as endangered under FESA.	SE	listed as endangered under CESA.	MMPA	covered under the Marine Mammal Protection Act
FT	listed as threatened under FESA.	ST	listed as threatened under CESA.	SSC	listed as a Species of Special Concern by the State of California.
		SCE	candidate for state endangered listing under CESA..	WBWG	Western Bat Working Group listed species.
		FP	California fully protected species.		

Effects of the Project

Special-status species with potential to occur in the Project Area were considered in the following effects determination. Effects as a result of Project activities may have direct or indirect effects on species and/or critical habitats. The following section describes the potential direct and indirect effects of the Project on state- and/or federally-listed species and sensitive habitats (aquatic resources, rare plant resources, and critical or essential habitat) with potential to occur in the Project Area. Direct effects are immediate effects of the Project on the species or its habitat. Indirect effects are those that are caused by or will result from the proposed Project at a later time, but are reasonably certain to occur.

To assess the potential effects of the Project on biological resources, a significance criterion was developed. The Project would have a significant impact to biological resources if the Project were to:

- Substantially reduce the number or restrict the range of a rare or special-status plant or animal,
- Cause fish or wildlife populations to drop below self-sustaining levels,
- Significantly reduce available or essential habitat of rare or special-status plants or animals, or
- Adversely affect significant riparian lands, wetlands, marshes, and other significant wildlife habitat.

Aquatic Resources

Wetlands are productive environments which provide habitat and support an abundant and diverse food web for a wide variety of species. There are three general types of wetlands: marine, tidal, and non-tidal. Marine wetlands occur in coastal shallows. Tidal wetlands also occur in coastal areas but inland from the ocean; these are often referred to as estuaries and are influenced by the tides. Non-tidal wetlands occur inland and are not subject to tidal action. In the Project Area, tidal aquatic resources are located outboard of the levee, and muted tidal aquatic resources are located inboard of the levee. Estuarine intertidal emergent wetland extends from MHW to the HTL on the outboard side of the levee. The dominant plant species, and the apparent tidal regime and water salinity, are indicative of northern coastal salt marsh (pickleweed mats), a sensitive natural community. Estuarine intertidal unconsolidated shore is also present on the outboard side of the levee. This area is typically flooded during high tide and at low tide may still contain some surface water or consist of unvegetated or sparsely vegetated mudflats. Palustrine unconsolidated bottom is present on the inboard side of the levee. It is typically flooded all year and nearly devoid of vegetation.

The first legal protection for wetlands began with a presidential executive order in 1977, which requires federal government agencies to avoid impacts to wetlands unless no practical alternative is available. In 1989, the national “no net loss of wetlands” policy was adopted, which requires replacing each newly impacted wetland with a wetland of the same size and providing the same functions and values. Wetlands in California are protected by many federal and state laws, regulations, and policies enforced by a number of different agencies to prevent further degradation and loss of wetlands. As a result,

impacts to wetlands are mitigated through the creation, restoration, enhancement, or preservation of wetlands.

Construction of the Project would have temporary and permanent impacts on aquatic resource types within the Study Area (Table 12). The Project would result in a net loss of 0.09 estuarine intertidal emergent wetland (northern coastal salt marsh) and 1.12 acre of palustrine unconsolidated bottom (open waters of the PAFB), but an increase of 0.7 acre of estuarine intertidal unconsolidated shore (open waters of the Bay) (Table 13). It is expected that the area to the west of the new tide gate (between the tide gate and existing levee to the west) will eventually fill in with bay muds and support intertidal emergent wetland habitat, potentially up to 0.3 acre (Figure 13); therefore, the loss of 0.09 acre of salt marsh habitat is likely an overestimate. For the same reason, the net increase in estuarine intertidal unconsolidated shore may be overestimated. Due to the uncertainty in the size and timeline for this wetland formation, it is not included in these estimates.

Table 12. Construction impacts on aquatic resource~~land cover~~ types in the Study Area

Habitat Type	Permanent Impact (acres)	Temporary Impact (acres)
Estuarine Intertidal Emergent Wetland	0.09	0.16
Estuarine Intertidal Unconsolidated Shore	0.00	0.88
Palustrine Unconsolidated Bottom	0.97	0.86
Total	1.06	1.90

Table 13. Conversions of aquatic resource types in the Study Area

Land Cover Type	Pre-Project Area (acres)	Post-Project Area (acres)	Net Change (acres)
Estuarine Intertidal Emergent Wetland	0.25	0.16	-0.09
Estuarine Intertidal Unconsolidated Shore	0.88	1.94	+1.06
Palustrine Unconsolidated Bottom	1.84	0.87	-0.97

These aquatic resource impacts will be mitigated for by purchasing credits from an appropriate approved mitigation bank, re-establishing a sufficient amount of tidal marsh habitat onsite or nearby, or habitat enhancement. Without conservation measures, impacts to water quality could be significant. For example, chemicals, sediments, or materials could spill into waterbodies, degrading aquatic habitats; stockpiled soils could runoff into waterbodies in the wet season; uncured concrete could alter water pH; erosion and turbidity as a result of restoring flows to dewatered areas can harm habitats. However, implementation of the Hydrology and Water Quality BMPs incorporated into the Project (Table 5) would minimize changes to water quality by reducing erosion, controlling sediment, and preventing spills, reducing these effects to less than significant.

Plant Resources

Project activities have potential to disturb or degrade other habitats. For example, creation of access and staging areas have the potential to disturb habitats, and disturbed areas can be impacted by invasive, non-native plant species. Construction equipment and personnel have the potential to spread non-native species and plant pathogens. There would be temporary and permanent impacts to other habitats (upland, barren ground, and hardscape) in the Study Area as a result of the Project. There would also be conversions in habitat types present onsite (Table 15). These impacts are detailed in Table 14. Post-project impacts are mapped in Figure 13.

Table 14. Number of acres of impacts to each habitat type in the proposed Project Area

Landscape	Permanent Impact (acres)	Temporary Impact (acres)
Upland	0.78	2.61
Barren ground	0.26	2.16
Hardscape	0.06	0
Total	**1.1**	**4.77**

Table 15. Conversions of aquatic resource types in the Study Area

Land Cover Type	Pre-Project Area (acres)	Post-Project Area (acres)	Net Change (acres)
Upland	3.39	3.60	+0.21
Barren	2.42	2.07	-0.35
Hardscape	0.06	0.20	+0.14

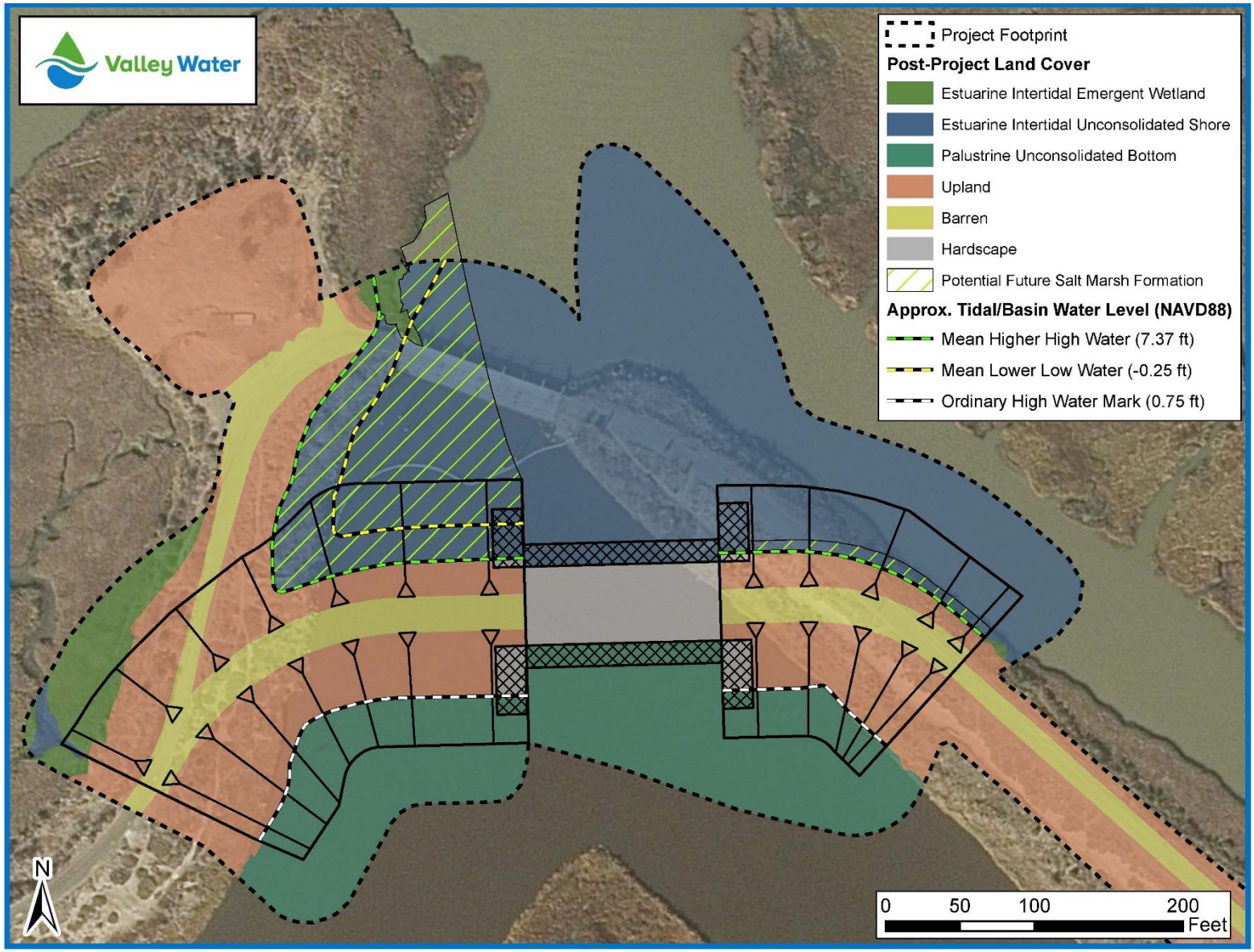
BMPs and mitigation measures have been incorporated into the Project to reduce potential impacts to onsite vegetation (MM-BIO-1, Table 16). Staging areas would occur on existing levee roads or disturbed areas that are already compacted and only support ruderal vegetation (WQ-2, Table 5). Similarly, all equipment and materials would be contained within existing access roads or staging areas. Pickleweed should reestablish quickly given suitable conditions are present. Further, the spread of invasive nonnative plant species and plant pathogens would be avoided or minimized (BI-8, Table 5). Given the practices incorporated into the Project, effects to plant resources will be less than significant.

Rare and Special-status Plants

Project activities have the potential to disturb or reduce habitat for rare and special-status plant species. However, given the Project site conditions and the level of regional disturbance, and development since historical observations were made, the likelihood of rare plant occurrence is extremely low. No rare or special-status plants were observed during the site visits by Valley Water biologists, which were conducted at times when these plants would have been identifiable. For most species with potential to occur (Table 9), the Project Area does not support the soil and/or hydrology necessary for suitable

habitat. The amount of potentially suitable habitat for the upland species (Congdon's tarplant, Hoover's button celery, San Joaquin spearscale) is extremely small and disturbed. Prior to initial ground disturbance, one preconstruction survey will be conducted in spring (May-June) for Point Reyes bird's beak and one in summer (July-August) for Congdon's tarplant, Hoover's button celery, San Joaquin spearscale, and California seablite to ensure none of these species are present immediately prior to construction (see MM-BIO-1).

Figure 13. Post-project habitat types



Based on this assessment, which included CNDDB and CNPS searches, rare plant surveys, and best professional judgment, the Project would not have a significant impact on special-status plant species, which are largely not likely to occur at the Project site due to lack of suitable microhabitat, lack of known occurrences, and absence of any special-status plant species in the Study Area at the times biological surveys were conducted.

Animal Resources and Critical Habitat

Based on this assessment, which included searches of the CNDDB and IPaC, site visits, and best professional judgment, a list of special-status animal species with potential to occur at the Project site during the work window has been generated. Degraded habitat, urbanization, lack of suitable habitat, species' range, or lack of historical occurrences within Study Area limit the potential for occurrence of some of the listed species described above (Table 11). Although potential for occurrence of some of these special-status species was limited, efforts were made during the site surveys to locate these species and their potential habitats. Based on the potential to occur and suitable habitat determinations, mitigation measures would be incorporated into the Project to reduce potential effects to certain special-status species (Table 16).

Species that could occur in the Study Area but only have special status at nest sites or are not expected to breed in the Study Area during the work window (due to lack of suitable habitat, lack of known occurrences, or the timing of their typical nesting season or occurrence in the area) include bank swallow, Barrow's goldeneye, black skimmer, common loon, grasshopper sparrow, loggerhead shrike, purple martin, redhead, saltmarsh common yellowthroat, short-eared owl, Vaux's swift, and yellow-headed blackbird. These species are not discussed in further detail. However, a nesting bird survey would be conducted during the 17 day window (January 15 – January 31) when work would be occurring during the general nesting bird season (January 15 - August 31), and any nesting bird discovered would be protected with an appropriate no-work buffer (BI-2, Table 5). Disturbance to avian species would largely be reduced by restricting construction during Ridgway's rail nesting season. Further, the Project would implement BMPs to reduce noise, dust, gaseous emissions, chemical materials, water and air pollution, and spillage, and preserve all vegetation which is not desired to be removed, to protect habitats for fish and wildlife species (Table 5). Erosion and visual disruption will be mitigated by revegetating as soon as possible after construction is completed. Western red bat and hoary bat could occur in the Study Area as nocturnal foragers, but roosting habitat (i.e., mature trees) is absent from the Study Area. Because these species would only occur in the Study Area outside of working hours, potential impacts on these species are not evaluated further in this analysis. Following are potential effects of the Project on special-status animal species with potential to occur at the Project site during the work window.

Table 16. Mitigation Measures to be incorporated into the Project to reduce effects to special-status species

MITIGATION MEASURES	
Special-status Species	
MM-BIO-1 Pre-Construction Surveys for Special-Status Plants	A qualified botanist will conduct preconstruction surveys for special-status plant species in the Project area during the appropriate species-specific identification periods and within one year of ground disturbance in any given area (i.e., Phase 1 dewatering limits and Phase 2 dewatering limits). The survey(s) will be in accordance with the appropriate State and federal survey protocols for the special-status species (i.e., time of year for survey). If the survey(s) demonstrates absence of special-status plant species in the Project area, no further actions will be required. If the botanical surveys reveal the presence of special-status plants in the Project area, Valley Water or its contractor will retain a qualified botanist or restoration ecologist who will prepare a salvage, relocation, or propagation and monitoring plan prior to construction to address monitoring, salvage, relocation, and propagation of special-status plant species. Documentation will include provisions that address the techniques, location, and procedures required for the successful establishment of the plant populations. The plan will include provisions for performance that address survivability requirements, maintenance, monitoring, implementation, and the annual reporting requirements. All directly impacted stands of special-status plants will be documented by a qualified botanist. Documentation will include density and percent cover; key habitat characteristics, including soil type, associated species, hydrology, and topography; and photo documentation of preconstruction conditions.
MM-BIO-2 Qualified Biologist and Biological Monitoring	A qualified biologist will conduct a survey of appropriate habitat for RIRA within the work area, including all staging and access routes, immediately prior to initiation of construction activities. If individuals are observed within or near the work area, the biologist will remain onsite to monitor for unusual or stressed behavior as a result of project activities and maintain an appropriate no-disturbance buffer. No work will occur within the buffer until a qualified biologist verifies that the individuals have left the area. If an appropriate buffer cannot be maintained, work shall be stopped immediately and the individual will be allowed to leave the area of its own volition. If the individual does not leave the area, the qualified biologist will coordinate with USFWS and CDFW on how to proceed with work activities. A qualified biologist will be present during the installation of exclusion fencing and will determine on a daily basis which areas need to be monitored during construction activities to avoid harm to listed species. If a special-status species is found within the excluded area during a project activity that may

	result in take of a federally or state listed species, work will cease in that area until the individual has left the area of its own volition or been relocated out of the area by a qualified biologist. Relocation will follow all applicable USFWS or CDFW protocols, as appropriate. Work will not resume until the biological monitor has determined that the animal has safely left the work area. The qualified biologist shall have the authority to halt construction if determined necessary to avoid or minimize adverse impacts on special-status species at any point.
MM-BIO-3 Worker Environmental Awareness Training Program	A Worker Environmental Awareness Training Program for construction personnel shall be prepared and provided by a qualified biologist retained by Valley Water or its contractor. All construction personnel shall receive the training prior to working on the Project site. The training program shall provide workers with information on their responsibilities with regard to the special-status species and sensitive habitats in the Project area; a physical description of each special-status species that has potential to occur; each species' habitat and legal protections; photographs to assist in identification of the species; as well as an overview of BMPs and applicable terms and conditions in the Project's permits.
MM-BIO-4 Environmentally Sensitive Area Fencing	ESA fencing shall be identified in the Project plans around sensitive habitats (i.e., wetlands and non-wetland waters, special-status species habitat) not identified to be impacted, as appropriate, in coordination with a qualified biologist. The construction contractor, in coordination with the qualified biologists, shall install the fencing on the Project site prior to construction activities to ensure these areas are avoided. ESA fencing shall be constructed consistent with other fencing requirements (i.e., related to salt marsh harvest mouse). The fencing shall be brightly colored for ease of visibility and maintained in good conditions for the duration of construction activities. A designated individual will inspect and maintain the integrity of the exclusion fencing during each working day to ensure there are no holes or rips and the base remains buried.
MM-BIO-5 Install Raptor Perching Deterrents	Any temporary chain-link fencing on the Project site that could provide perching opportunities for avian predators of special-status species will be modified to include perch deterrents along the top of the fencing (i.e., repellent spikes). Perch deterrents will be maintained for the duration of the Project in a condition that deters predator access and raptor perching.
MM-BIO-6 Conduct Preconstruction Surveys for Wintering Burrowing Owl	To avoid impacts to burrowing owl, a pre-construction burrowing owl survey shall be conducted by a qualified biologist no more than seven days prior to the initiation of Project activities occurring within 250 feet of suitable habitat areas. If a wintering burrowing owl is detected on the site, a 250-foot no-disturbance buffer around the active burrow shall be implemented and maintained until work is finished or a qualified biologist confirms the burrow is no longer in use. If work within the no-disturbance buffer cannot be avoided, Valley Water shall coordinate with CDFW to determine the appropriate course of action to ensure wintering burrowing owls are not impacted.

MM-BIO-7 Salt Marsh Harvest Mouse and Salt Marsh Wandering Shrew Protection Measures	Valley Water shall develop and implement avoidance and minimization measures specific to salt marsh harvest mice and salt marsh wandering shrew. Measures shall include, but not limited to, the following: • Prior to initiation of work within or adjacent to suitable habitat for salt marsh harvest mouse or salt marsh wandering shrew, a qualified biologist shall be conduct a preconstruction surveys for mice and shrews in areas where disturbance is planned such that salt marsh harvest mice or wandering shrews could be impacted by Project activities. . Surveys shall take place no more than 48 hours before the onset of work in habitats capable of supporting these species. • A qualified biologist shall survey for salt marsh harvest mice and salt marsh wandering shrew individuals or nests in all areas with suitable habitat prior to removal of vegetation. Once the site is cleared, the biologist will supervise the hand (i.e., non-mechanized) removal of any vegetation that could support salt marsh harvest mice and wandering shrews (i.e., salt marsh and immediately adjacent uplands) to avoid impacts to the species. Such monitoring will occur for the duration of all clearing work within suitable habitat. Vegetation clearing should begin at the existing tide gate structure and continue away from the structure to encourage any salt marsh harvest mice and wandering shrews in the area to move into suitable habitat outside of the Project area. Vegetation clearing should extend 2 to 3 feet beyond the ESA fence to discourage salt marsh harvest mice and wandering shrews from returning to the Project area. All brush resulting from vegetation clearing will immediately be moved offsite so as not to provide habitat for salt marsh harvest mice and wandering shrews in the Project area. • Prior to construction, ESA fencing shall be installed by hand along the limits of disturbance to prevent salt marsh harvest mice and wandering shrews from entering the active work area; to protect habitat within the marsh from earthmoving activities or accidental spills; and to exclude workers from the marsh outside of the impact area. A qualified biologist shall be present onsite to monitor for salt marsh harvest mice and wandering shrews during ESA fence installation. • If individuals are observed in the active work area, all activities in that area shall cease until the qualified biologist determines any individuals have safely left the area. USFWS and CDFW will be notified if work is stopped due to such an observation. Additional avoidance (e.g., allowing individuals to leave of their own volition), protection (e.g., implementation of no-work buffer zones), or relocation measures may be implemented in coordination with USFWS and CDFW, as appropriate. Workers may move to a new area and continue work if the qualified biologist determines work can occur without causing harm to the species.

MM-BIO-8 Implement Fish Exclusion and Relocation	A qualified fisheries biologist shall develop a Fish Exclusion or Relocation Plan to exclude and/or relocate fish from the Project area to avoid direct fish mortality from stranding during dewatering. The Fish Exclusion or Relocation Plan shall be reviewed and approved by NMFS and CDFW prior to implementation. The plan shall at a minimum identify methods for fish capture and/or exclusion, temporary holding methods, and appropriate release locations.

Birds

Alameda song sparrow: Two endemic subspecies of song sparrow (*Melospiza melodia*) are residents (non-migratory) of Santa Clara County. *M. m. gouldii* occurs on the Central California Coast, except for San Francisco Bay, and is common to freshwater marshes and riparian areas. *M. m. pusillula* is common throughout tidally influenced salt marshes at the southern edge of San Francisco Bay. As such, *M. m. pusillula* is known to occur in the Study Area. Historically the population was declining due to habitat loss; however, it appears that in recent years the species has benefited from ongoing wetland restoration activities. Alameda song sparrow can be found throughout the entirety of the marsh plain and into the upland–marsh transition zone. Preferred habitat consists of large areas of tidal salt marsh with gumplant, cordgrass, pickleweed, or coyote brush near tidal sloughs for cover. The species' breeding season in the county generally occurs from April to August.

Vegetation on the levee to be removed includes pickleweed, gumplant, and cordgrass, which has the potential to provide foraging and/or nesting habitat for Alameda song sparrow. Potential direct effects which could occur to the species as a result of the Project may include injury or mortality from vehicles driving on the access road to individuals on the levee, or impacts from vegetation removal or construction work to individuals or nests in the marsh or upland habitats. However, individuals would be expected to flush from an impact area before injury or mortality could occur, and no work would be occurring during the typical nesting season of the species. As a result, no direct disturbance of nesting birds, eggs, or young would occur. Ground disturbance, noise, movement, and vibrations caused by equipment or personnel could potentially disturb foraging by the species and cause them to move away from the work area. However, such impacts would have minimal effects due to habituation to the existing human activity in the area and containment of the Project footprint to primarily low-quality habitat (compared to surrounding habitats). Such effects would not result in substantial harassment or disturbance and would not result in a reduction in the population of the species. BMPs including nesting bird surveys (BI-2, Table 5), vehicle speed limits (AQ-1, Table 5), hand removal of vegetation (MM-BIO-7, Table 16), and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for these effects. Therefore, impacts to the species would be less than significant.

American peregrine falcon: Pesticide bans have contributed to the slow recovery of the species since populations crashed in the 1950s-1970s due to high levels of DDT poisoning. Peregrine falcons occur in open landscapes including mudflats, coastlines, wetlands, and urban areas. Tall structures suitable for nesting by the species are not available in the Study Area. However, foraging habitat is available in and around the PAFB and presence of the species increases in the winter months, during the time work would be occurring. Peregrine falcons are typically aerial hunters but may also forage on the ground or take prey from the water surface. Most commonly they search for prey from a perch (ex., fence post, utility pole, tree) where they can swoop down on prey, but may also scan open areas during flight. Prey items primarily include birds, occasionally bats and other small mammals, and rarely amphibians, fish, or insects. They may steal fish or rodents from other raptors. Existing timber piles in the Study Area located upstream and downstream of the existing tide gate could provide perches for foraging by the species.

Some or all of these piles may be cut below the ground surface as part of the Project to reduce the potential for leaching of wood preservatives (ex., creosote) into the environment. Creosote and pentachlorophenol have historically been widely used to protect poles, pilings, and timbers in areas where potential for contact with humans or sensitive environments is low. If preservatives such as these were to leach into groundwater, it could adversely affect water quality and the ecosystem.

The loss of potential perching habitat (timber piles) would not have a substantial effect on the species or their ability to forage. Further, it could benefit the ecosystem overall, including prey quality, and reduce losses of sensitive species such as rails, saltmarsh harvest mice, and salt marsh wandering shrew to raptor predation. Potential direct effects which could occur to peregrine falcons as a result of the Project may include injury or mortality from vehicles driving on the access road to individuals flying over the levee, or impacts from construction work to individuals in the marsh or upland habitats. Individuals are mobile and would be expected to flush from an impact area before injury or mortality could occur, and no suitable nesting structures are present in the Project Area. As a result, no direct disturbance of nesting birds, eggs, or young would occur. Ground disturbance, noise, movement, and vibrations caused by equipment or personnel could potentially disturb foraging by the species and cause them to move away from the work area. However, such impacts would have minimal effects due to habituation to the existing level of human activity in the area and containment of the Project footprint to primarily low-quality habitat (compared to surrounding habitats). Such effects would not result in substantial harassment or disturbance and would not result in a reduction in the population of the species. BMPs and mitigation measures including nesting bird surveys (BI-2, Table 5), vehicle speed limits (AQ-1, Table 5), and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for these effects. Therefore, impacts would be less than significant.

American white pelican: The species has been affected by losses of foraging and nesting habitat, as well as increased human disturbance. Individuals may be present in Santa Clara County year-round, with numbers peaking from July to October (Lukas 2012). The species is not known to breed in Santa Clara County, but may be present as a forager in the Study Area. White pelicans forage for fish in shallow waters (typically <8’ deep) of open marshes or coastal marine areas. The species regularly roosts at Soap Pond, south of the Project Area along the Adobe Creek Trail. Individuals are mobile and would be expected to move away from an impact area before injury or mortality could occur. The species does not nest in the county; as a result, no direct disturbance of nesting birds, eggs, or young would occur. Ground disturbance, noise, and vibrations caused by proposed equipment or vehicles could potentially disturb foraging by the species and cause them to move away from the work area. Quality foraging habitat is available in abundance in the larger Baylands area, and the Project Area currently experiences moderate to high volume foot traffic, occasional vehicle traffic, and regular noise from the Palo Alto airport; therefore, these effects would not be substantial or result in a decline of the species. BMPs and mitigation measures including vehicle speed limits (AQ-1, Table 5) and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for these effects. Therefore, impacts would be less than significant.

Bald eagle: Bald eagles have historically been affected by habitat loss and degradation, illegal shooting, and the contamination of prey items by DDT. Conservation efforts such as habitat protections and banning of DDT have contributed to the species' recovery. Because populations have largely rebounded, bald eagles were removed from the federal endangered species list in August 2007. However, the species remains listed as state endangered and full protected in California. The species is associated with aquatic areas where they conduct most of their hunting, and generally choose open habitats with abundant prey resources located along migration pathways. In areas with abundant prey they will tolerate some disturbance, but bald eagles tend to avoid developed areas. Individuals typically hunt for prey from a perch, but may scan for prey while soaring. In Santa Clara County, the species has been recorded nesting at inland reservoirs, but is relatively rare along the southern edge of the Bay. There are no structures suitable for nesting in the Study Area; as a result, no direct disturbance of nesting birds, eggs, or young would occur. Suitable foraging habitat may be available in the Study Area, but bald eagles are not expected to occur here regularly or in large numbers. Therefore, the Project is expected to result in the disturbance of few, if any, individuals. Project construction would not result in direct injury or mortality of any individuals, which are mobile enough to avoid impacts with construction equipment. Ground disturbance, noise, and vibrations caused by construction equipment or personnel could potentially disturb foraging by the species and cause them to avoid or move away from the work area; however, this would result in temporary disturbance of a very small amount of foraging habitat available for the species. The Project Area is currently habituated to regular pedestrian and air traffic, and occasional foot traffic. Thus, impacts on the species and their foraging habitats resulting from the proposed Project would be very limited. BMPs including nesting bird surveys (BI-2, Table 5), vehicle speed limits (AQ-1, Table 5), and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for these effects. Therefore, Project activities would not result in substantial reduction of the species and would temporarily affect only a very small percentage of regionally available habitat. Effects of the Project would be less than significant.

Bryant's savannah sparrow: Habitat loss, degradation, and fragmentation, often associated with coastal development, have impacted the species. In the South Bay, savannah sparrows commonly nest in pickleweed-dominant areas of muted salt marsh habitats or adjacent ruderal habitats. Suitable nesting habitat is available in the Study Area; however, the typical nesting period for the species is around mid-March to August, and no work would be occurring at that time. The habitat within the Project footprint is fragmented and experiences regular anthropogenic disturbance, making it lower quality than surrounding habitats (outside the Study Area), and suitable higher quality nesting habitat is abundant in surrounding areas. The species was observed in the Study Area during site visits, and could occur as a forager in the Study Area during the work period.

The vegetation on the levee to be removed includes pickleweed, gumplant, cordgrass, and grasses which have the potential to provide foraging habitat for Bryant's savannah sparrow during the work window. Potential direct effects which could occur to the species as a result of the Project may include injury or mortality from vehicles driving on the access road to individuals on the levee, or impacts from vegetation removal or construction work to individuals or nests in the marsh or upland habitats.

However, individuals would be expected to flush from an impact area before injury or mortality could occur, and no work would be occurring during the typical nesting season of the species. As a result, no direct disturbance of nesting birds, eggs, or young would occur. Ground disturbance, noise, movement, and vibrations caused by equipment or personnel could potentially disturb foraging by the species and cause them to move away from the work area. However, such impacts would have minimal effects due to habituation to the existing human activity in the area and containment of the Project footprint to primarily low-quality habitat (compared to surrounding habitats). Such effects would not result in substantial harassment or disturbance and would not result in a reduction in the population of the species. BMPs including nesting bird surveys (BI-2, Table 5), vehicle speed limits (AQ-1, Table 5), hand removal of vegetation (MM-BIO-7, Table 16), and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for these effects. Therefore, impacts would be less than significant.

Burrowing owl: Habitat loss and degradation, often associated with urbanization or conversion of grasslands, has impacted burrowing owl populations. The species is known to occur in areas surrounding the Study Area (ex., Shoreline Park) and was known to occur along the access road at Embarcadero Way from 1998 - 2003, and one wintering adult was observed here in 2008. Nesting activity for the species generally occurs between February or March through August. Prior to 2005, eight to ten pairs were known at the ITT property and Byxbee Park; however, there have been no known nests since 2005 (AECOM 2017). The immediate Project Area lacks ground squirrel burrows for nest sites, and upland vegetation along the levee roads is tall, ruderal grass which does not provide suitable nesting or foraging habitat for burrowing owls. At the time of each of the site visits, vegetation along the levee at Embarcadero Way was overgrown, making the habitat unsuitable for burrowing owl nesting. Yet, individuals are still observed in Byxbee Park and burrowing owls could occur as a forager in the Study Area. Prey is taken from the ground or flying from a perch or burrow mound. Timber piles upstream and downstream of the existing tide gate have potential to serve as perching habitat; however, due to human disturbance along the Adobe Creek Trail it is unlikely these would be used commonly, if at all.

Potential direct effects which could occur to the species as a result of the Project may include collision with vehicles driving on the access road causing injury or mortality. Individuals would be expected to avoid an active construction site; however, BMPs including vehicle speed limits (AQ-1, Table 5) and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would reduce the potential for these effects. No work would occur during burrowing owl nesting season, precluding impacts to eggs or young. Disturbance or harassment of individuals could occur if construction activities were to occur too close to an occupied burrow, burrows were destroyed, or foraging habitat was reduced or degraded. However, no suitable burrows were observed in the Study Area, which currently experiences moderate to high disturbance from pedestrian traffic on the Adobe Creek Trail, occasional vehicle traffic, and air traffic associated with the Palo Alto Airport. Ground disturbance, noise, and vibrations caused by proposed construction could potentially disturb individuals and cause them to move away from the work area. However, abundant and more suitable foraging habitat is available outside of the Project footprint. Such effects would not result in substantial harassment or disturbance and would not result in a reduction in the population of the species.

Mitigation measures including pre-construction surveys for burrowing owl (MM-BIO-6, Table 16) would further reduce the potential for these effects. Therefore, impacts would be less than significant.

California black rail: It is estimated that the majority (80-90%) of the northern California population of black rails occurs in tidal marshes of the San Francisco Bay. The population experienced a sudden decline starting in the 1900s, due to fragmentation and loss of historical tidal marsh habitat, as well as a decrease in available upland refugia habitat. Breeding rails are almost always found in mature, fully tidal pickleweed and tule marshes; however, younger cordgrass-dominant marshes can support non-breeding rails. Black rails exhibit strong site fidelity and select for tall vegetation, to avoid predation or nest inundation at high tide, near channels and upland areas. Levees lined with tall vegetation, such as gumplant or coyote brush, can provide refugia during extreme high tides; however, this habitat is considered only marginal where it is present in narrow strips and lacking natural surrounding areas. Therefore, sea-level rise and extreme tide events will likely continue to reduce the limited available high tide refugia habitat suitable for the species.

In the South Bay, levees have reduced the availability of suitable upland transition habitat required by the species. Black rails are generally restricted to the mid- and high-marsh plain; running within wetland vegetation is preferred to flying. Potential use of ruderal habitat on the levee slopes in the Study Area is limited by moderate to high levels of human disturbance in adjacent areas and its narrow size. The species has generally been classified as a rare winter visitor and is unlikely to breed regularly in Santa Clara County (Bousman 2007), including the Study Area. An individual was detected in mid-March 2008 just east of the Palo Alto airport in the Palo Alto Baylands Preserve. Two individuals were also heard here in April 2004 (CNDDB 2017). The species was detected at Moffett Airfield in 2011 and 2012, and at Shoreline Park in 2014. In August 2015, two adults were observed brooding chicks at Alviso Slough and Alviso Marina County Park, approximately seven miles southeast of the Study Area, indicating that on occasion black rails may nest in the county. While the species may be present in areas surrounding the Project Area where fully tidal marsh exists (ex., Hooks Island, the Baylands Preserve, or Shoreline Park), they are unlikely to occur in the Project Area due to limited suitable habitat and proximity to the Adobe Creek Trail.

The marsh vegetation on the outboard side of the levee, land offshore and interior of the PAFB, and Hooks Island include pickleweed, salt grass, and alkali bulrush which have the potential to provide foraging habitat for the species. No work would occur during black rail nesting season (typically March to July). No direct effects to individuals, nesting birds, eggs, or young are expected to occur because work would occur outside black rail breeding season and the species is unlikely to utilize habitat in the Project Area adjacent to the Adobe Creek Trail. Ground disturbance, noise, movement, and vibrations caused by equipment or personnel could potentially disturb foraging by the species and cause them to move away from the work area. However, if black rails were to occur in the area, it is more likely they would already utilize areas farther away from the Adobe Creek Trail or have habituated to higher levels of disturbance. Such effects would not result in substantial disturbance and would not result in a reduction in the population of the species. Therefore, Project activities would not result in substantial reductions of the species. BMPs and mitigation measures including vehicle speed limits (AQ-1, Table 5), pre-activity surveys and biological monitoring (MM-BIO-2, Table 16), implementation of worker

awareness training (MM-BIO-3, Table 16) for all construction personnel, and hand removal of vegetation (MM-BIO-7, Table 16) would further reduce the potential for these effects. Therefore, impacts would be less than significant.

California brown pelican: California brown pelican were also impacted by the use of DDT, which led to population declines. As a result of the positive effects of the DDT ban, the species was removed from the federal endangered species list in 2009. They remain fully protected in the State of California. The species occurs in coastal marine and estuarine environments year-round. While not known to breed in Santa Clara County, it may occur in the Bay as an occasional forager. They typically plunge-dive for fish in waters <500' deep. While they may occasionally forage in open-water habitat in the Bay near the Study Area, the species tends to be rare in the South Bay and is not expected to occur in large numbers. Because brown pelicans do not nest in the area and the species is mobile enough to avoid collisions with construction-related equipment, direct impacts to any life stages would not occur as part of the Project. Ground disturbance, noise, and vibrations caused by equipment and personnel could potentially disturb foraging by the species, causing them to move away from the work area. However, the Project Area currently experiences moderate to high volume pedestrian traffic, occasional vehicle traffic, and regular noise from the Palo Alto airport. Project activities would affect a very small percentage of regionally available habitat, and quality foraging habitat is available in abundance in the larger Baylands area. Because the species is rare in the South Bay, few if any individuals would experience only indirect, temporary impacts. BMPs and mitigation measures including vehicle speed limits (AQ-1, Table 5) and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for effects to the species. Harassment or disturbance resulting in a reduction in the population as a result of Project activities would not occur, and effects to the species would be less than significant.

California least tern: Primary threats to California least tern include habitat loss and disturbance at nesting sites, such as beaches. The species would only be expected to occur in the Study Area as a vagrant in October-November, if at all. While foraging habitat may be available in the Study Area, the species is rare in the county and known to occur more frequently in the Hayward area. Suitable nesting substrate is not available in the Study Area.

In the event the species were to occur in the Study Area during the work window, potential direct effects which could occur as a result of the Project may include collision with vehicles driving on the access road causing injury or mortality. Individuals would be mobile enough to avoid impact areas, and BMPs including vehicle speed limits (AQ-1, Table 5) and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would reduce the potential for these effects. Therefore, no direct impacts to any life stages are expected as part of the Project. Ground disturbance, noise, and vibrations caused by equipment and personnel could potentially disturb foraging by the species, causing them to move away from the work area. However, the species is not expected to occur frequently or in large numbers, and quality foraging habitat is available in abundance in the larger Baylands area. Additionally, the Project Area currently experiences moderate to high volume pedestrian traffic, occasional vehicle traffic, and regular noise from the Palo Alto airport. Substantial harassment or

disturbance resulting in a reduction in the population would not occur as a result of the Project, and effects to the species would be less than significant.

California Ridgway's rail: Loss, fragmentation, and degradation of tidal marsh habitat has been the primary cause for the species' decline. Due to the status of RIRA populations and limited available habitat, any additional impacts to habitat could potentially be significant. Non-native mammalian predators also pose a significant threat to the species. Contaminants, particularly methylmercury, are a significant factor affecting viability of Ridgway's rail eggs. In 1984, the USFWS approved a recovery plan for saltmarsh harvest mouse and Ridgway's rail, and released the Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California in 2013. The species is now restricted almost entirely to the marshes of the San Francisco Bay Estuary, where the only known breeding populations occur. The highest population densities are in the South Bay. They can be found in large tidal marshes fringing the South Bay outboard of salt evaporation pond levees and along major tidal sloughs. Ridgway's rail occurs almost exclusively in marshes with unrestricted tidal flows, adequate food supply, well-developed tidal channel networks, and suitable nesting and escape cover for refugia during extreme high tides. The species is typically found in the intertidal zone and sloughs of salt and brackish marshes dominated by pickleweed, Pacific cordgrass, marsh gumplant, salt grass, and adjacent upland habitat. Ridgway's rails have rarely been recorded in nontidal marsh areas, but may occur in brackish marshes in the South Bay. Use of brackish marshes is largely restricted to major sloughs and rivers of San Pablo Bay and western Suisun Marsh, and along portions of Coyote Creek in the South Bay. The species forages primarily on benthic fauna within marsh channels at low tide.

Ridgway's rail is a year-round resident of Santa Clara County. Rails are known to occur along Alviso and Charleston Sloughs and outboard marshes of Moffett Field and Guadalupe Slough. They are also found in the Palo Alto Baylands, with moderate to high densities (0.04-0.45 birds/acre) at Hooks Island, the Harriet Mundy Marsh, and Laumeister and Faber Marshes. In 2019, Ridgway's rail was detected at the Harriet Mundy Marsh, Byxbee Park, Hooks Island, and downstream of the Charleston Slough tide gate to the northwestern corner of salt pond A1 (Olofson Environmental 2020).

The levee trail in the Study Area is void of vegetation and is primarily hardpacked gravel; it does not provide habitat for the species. Potential habitat that would be permanently removed includes a narrow band of estuarine intertidal emergent wetland on the outboard side of the levee, which is predominately pickleweed and extends from MHW to the HTL. The inboard and outboard levee slope is dominated by upland vegetation from the HTL up to the top of the levee slope. Species present include rip-gut brome (*Bromus diandrus*), wild oat (*Avena fatua*), wild radish (*Raphanus sativa*), Italian ryegrass (*Festuca perenne*), soft brome (*Bromus hordeaceus*), and broadleaved pepperweed (*Lepidium latifolium*). Pickleweed-dominant habitat with adjacent uplands has the potential to provide foraging and/or nesting habitat for Ridgway's rail. However, because Ridgway's rail typically occur in large, contiguous marshes, the narrow, disconnected levee slopes in the Project Area do not provide high-quality habitat. The levee provides access for terrestrial predators and receives a moderate to high volume of pedestrian traffic. This makes the habitat within the Project footprint marginal compared to surrounding habitats and it is unlikely rails would choose to nest or forage in the Project footprint. They are known to forage and may nest at Hooks Island, and the expansive area of pickleweed to the

southwest of the existing tide gate could provide similar habitat. It is likely they would only occur in the Project Area when passing through to more suitable habitat or if there were limited suitable options for refugia at an extreme high tide.

There would be temporary impacts to 0.16 acre of pickleweed habitat, including a portion of the expansive area southwest of the existing tide gate, the smaller pickleweed patch just northwest of the existing tide gate (on the Bay-side), and a narrow band just east of the existing tide gate; these areas are all close to the toe of the existing levee (Adobe Creek Trail). These areas would be revegetated, either actively or passively, as appropriate. The Project would result in a net loss of 0.09 acre of estuarine intertidal emergent wetland (salt marsh), which includes a narrow band of marginal habitat on the outboard side of the levee. ESA fencing would be installed to protect sensitive habitats outside the Project footprint (MM-BIO-4, Table 16), limiting direct disturbance to suitable habitat. No direct effects to individuals, nesting birds, eggs, or young are expected to occur because the species is unlikely to regularly utilize habitat adjacent to the Adobe Creek Trail and no work would occur during RIRA breeding season (February 1 to September 1). Ground disturbance, noise, movement, and vibrations caused by equipment or personnel could disturb foraging by the species and cause them to move away from the work area. However, such impacts would have minimal effects due to habituation to the existing level of human activity in the area and containment of the Project footprint to primarily low-quality habitat (compared to surrounding habitats). Such effects would not result in substantial harassment or disturbance and would not result in a reduction in the population of the species. Chain-link fencing will be used to close off the work area to the public, which could create perching habitat for avian predators; therefore, perching deterrents would be used on these fences to minimize opportunities for avian predators (MM-BIO-5, Table 16). BMPs and mitigation measures including vehicle speed limits (AQ-1, Table 5), pre-activity surveys and biological monitoring (MM-BIO-2, Table 16), and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for these effects. Therefore, impacts would be reduced to less than significant.

Golden eagle: Historically, golden eagle populations have been affected by a variety of factors including loss and degradation of habitat, disturbance at roost sites, illegal shooting, electrocution by power lines, prey contamination by DDT, and lead ingestion. While DDT has been banned, many of these threats still exist. Breeding records occur in the foothills of Santa Clara County, but the species is not known or expected to nest in the PAFB Study Area (Bousman 2007). The species may occur infrequently in open habitats of the Study Area as a transient and may forage adjacent to the Study Area. Project construction would not result in the injury or mortality of any individuals of the species, which are mobile enough to avoid construction equipment. The species is not expected to occur in the Study Area in large numbers or use the site regularly, and thus the Project is expected to result in the disturbance of few, if any, individuals of the species. Ground disturbance, noise, movement, and vibrations caused by equipment or personnel could potentially disturb foraging by the species and cause them to avoid the work area. However, the Study Area is not used regularly or by large numbers of the species. Thus, impacts on the species and their foraging habitats resulting from the proposed Project would be very limited. BMPs including nesting bird surveys (BI-2, Table 5), vehicle speed limits (AQ-1, Table 5), BMPs

and mitigation measures including vehicle speed limits (AQ-1, Table 5) and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for these effects. Therefore, Project activities would not result in substantial reductions in local or regional populations of the species, and would affect a very low proportion of regionally available habitat. Effects of the Project would be less than significant.

Northern harrier: The species has been affected by loss and degradation of nesting and foraging habitat, disturbance at nest sites, and predation pressure. While considered uncommon in the county in the summer, the species is known to nest in undeveloped grasslands and marshes along the edge of the South Bay and numbers peak in the Bay area in the winter. Nesting potential in the Project footprint is limited due to moderate to high levels of human disturbance. However, individuals may nest and forage in surrounding marsh habitats (ex., Hooks island, interior land of the PAFB), although they are expected to occur in low numbers. BMPs including vehicle speed limits (AQ-1, Table 5) and nesting bird surveys (BI-2, Table 5) limit potential for direct impacts to individuals. ESA fencing would reduce potential for trampling of nests outside the Project footprint (MM-BIO-3, Table 16). These BMPs and mitigation measures, in combination with the reduced work period, reduce potential for direct impacts to nesting birds, their eggs, or young. Ground disturbance, noise, and vibrations caused by proposed construction could disturb foraging by individuals and cause them to avoid the work area. However, only a small proportion of available habitat would be affected, and quality foraging habitat is available in abundance in the general area; therefore, Project activities would not have a significant effect on the species' foraging ability. Thus, impacts on the species and their foraging habitats resulting from the proposed Project would be very limited. Implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for these effects. Project activities would not result in substantial reductions in populations of the species, and therefore effects of the Project would be less than significant.

Tricolored blackbird: Tricolored blackbirds are closely related and visually similar to red-winged blackbirds (*Agelaius phoeniceus*), which are abundant and widespread. The tricolored blackbird was listed as threatened under CESA in 2019, largely due to loss of and disturbance to grassland and agricultural habitats, including disturbance at nest sites, which have led to decline of the species. Other threats to colonies may include severe weather or predation. Tricolored blackbirds have typically been associated with freshwater marshes with dense vegetation such as cattails (*Typha* spp.), bulrushes (*Scirpus* or *Schoenoplectus* spp.), willows (*Salix* spp.), and nettles (*Urtica* spp.). Since the 1980s, the largest colonies have formed in grain fields in the San Joaquin Valley; the species is uncommon in Santa Clara County. A colony of 20-30 was reported in poison hemlock and coyote brush in 1992 just northwest of the intersection of Highway 237 and I-880, and a colony of twelve pairs was reported just southwest of this intersection in Russian thistle the same year, but none were observed at either location from 1993-1995 (CNDDB 2019). A lack of nesting and foraging habitat in the Study Area limits site suitability for the species; it would only be likely to occur as a non-breeding transient. Project construction would not result in the injury or mortality of any individuals, which are mobile enough to avoid construction equipment. The species is not expected to occur onsite in large numbers or use the site regularly, and thus the Project is expected to result in the disturbance of few, if any, individuals of

these species. Ground disturbance, noise, and vibrations caused by proposed construction could potentially disturb foraging by the species and cause them to avoid the work area. However, the Project site does not provide foraging habitat that is used regularly or by large numbers of individuals. Thus, Project activities would not result in substantial reductions of the species. Therefore, effects to the species as a result of the Project would be less than significant.

Western snowy plover: The species' decline can be attributed to habitat loss and alteration, human disturbance to nesting sites, and increased predation pressure. Western snowy plovers breed near tidal waters, and in Santa Clara County nest almost exclusively in dry salt panne habitat provided by former salt evaporation ponds, as well as on pond berms and levees. They mostly breed at salt ponds in the Eden Landing Ecological Reserve, although the species has been confirmed nesting at Crittenden Marsh in Alviso, approximately two miles southeast of the Study Area. Suitable nesting substrate is not available in the Study Area, but the species could occur nearby at managed salt ponds. Individuals are mobile enough to avoid impacts with construction equipment. As a result, no direct disturbance of nesting birds, eggs, or young would occur. The species is more common in the Bay area in the winter, and could occur as a forager on tidal flats in the Study Area. Ground disturbance, noise, and vibrations caused by proposed equipment or vehicles could potentially disturb foraging by the species and cause them to move away from the work area. However, suitable foraging habitat is available nearby at managed salt ponds and in the wider Alviso area. The Project Area currently experiences moderate to high volume pedestrian traffic, occasional vehicle traffic, and regular noise from the Palo Alto airport; therefore, any such effects would not be substantial. Accordingly, Project activities would not result in substantial reductions of the species, and impacts would be less than significant.

White-tailed kite: White-tailed kites came close to extinction in the 1930s due to loss of nesting and foraging habit, disturbance at nest sites, and shooting. Populations began to rebound from the 1940s to 1970s following protections from shooting. Since the 1980s populations have been increasing in some areas and decreasing in others, but these trends have not been significant. Threats to the species still exist, such as reduced foraging and nesting opportunities as prey habitats are urbanized and competition for nest sites has increased with the reduction of riparian corridors and wooded grassland habitat. White-tailed kites are a year-round resident known to nest along the South Bay and in the foothills. Moderate-sized shrubs (ex., coyote brush) are present in the Study Area near Staging Area 1 which could provide structure for nesting, but this is unlikely as the shrubs are relatively low and in a disturbed area. Project construction would not result in the direct injury or mortality of any individuals of these species, which are mobile enough to avoid construction equipment. BMPs including vehicle speed limits (AQ-1, Table 5), nesting bird surveys (BI-2, Table 5), and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further limit the potential for these effects. Foraging habitat is limited in the Study Area, but is available in surrounding marshes. Individuals may forage in adjacent marsh habitats year-round. Ground disturbance, noise, and vibrations caused by proposed construction could disturb foraging by the species and cause them to move away from the work area. Due to the existing level of disturbance in the Project area, these effects would not be substantial. The species is not expected to occur onsite in large numbers or use the site regularly, and thus the Project is expected to result in the disturbance of few, if any, individuals of the species. Project

activities would result in the temporary disturbance of a very small amount of foraging habitat for the species. However, high-quality foraging habitat is abundant in surrounding marshes. Thus, impacts on the species and their foraging habitats resulting from the proposed Project would not be significant. Project activities would not result in substantial reductions of the species; therefore, impacts would be less than significant.

Yellow rail: Habitat loss, loss of high tide refugia, and increased predation pressure have all contributed to the decline of the species. Information on the yellow rail is limited due to the secretive nature of the species. It is a very local breeder to interior northeastern California, but the winter range extends to Central California. At that time, yellow rail may occur in coastal salt marshes with dense stands of *Spartina*. The species is not known to breed in Santa Clara County, but may occur rarely as a forager in the winter. The species would be most likely to occur in large areas with dense pickleweed in the interior of the PAFB, Hooks Island, or the Harriet Mundy Marsh. No direct effects to individuals, nesting birds, eggs, or young are expected to occur because the species is unlikely to utilize habitat adjacent to the Adobe Creek Trail and it does not nest in the Study Area. Ground disturbance, noise, movement, and vibrations caused by equipment or personnel could potentially disturb foraging by the species and cause them to move away from the work area. However, such impacts would have minimal effects due to habituation to the existing human activity in the area and containment of the Project footprint to primarily low-quality habitat (compared to surrounding habitats). Such effects would not result in substantial harassment or disturbance and would not result in a reduction in the population of the species. BMPs including vehicle speed limits (AQ-1, Table 5), pre-activity surveys and biological monitoring (MM-BIO-1, Table 16), hand removal of vegetation (MM-BIO-7, Table 16), and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for these effects. Therefore, impacts would be less than significant.

Fish

Central California Coast steelhead: CCC steelhead, an anadromous and iteroparous form of rainbow trout, are relatively rare in the Project region as a result of habitat loss and degradation due to urbanization, channelization, barriers to movement, and loss of spawning and rearing habitat (Leidy et al. 2005). Salmonid use of the South Bay is limited, with spawning runs only in Guadalupe River and Coyote, Stevens, and San Francisquito Creeks. Adults leave the ocean to migrate up freshwater rivers to spawn from approximately December to May, peaking in February to April. However, the timing and rate of migration depends on multiple factors, including stream discharge rates and water temperatures.

Tide gates modify tidal migratory cues for fish as well as flow velocities and temperature and salinity gradients; all of these factors can impede fish passage. Studies indicate that top-hinged tide gates delay migration, potentially increasing the risk of predation and energy expenditure. A side-hinged gate typically remains open for a longer portion of the tidal cycle and at a wider angle than a similarly-sized top-hinged gate, creating conditions which can improve fish passage. While installation of side-hinged gates has potential to improve passage conditions for fish, habitat upstream of the PAFB tide gate structure is currently of low value to fish. Water temperatures are often increased and dissolved oxygen decreased upstream of tide gates, conditions which are not favorable for cold-water anadromous fish.

Because the tide gate has been experiencing significant seepage, some of these effects may be buffered in current conditions. Operation of the sluice gate can also be conducted in a way that buffers these effects. The presence of striped bass at the tide gate structure further reduces the quality of this habitat for steelhead smolt rearing. Additionally, the existing PAFB tide gate structure separates the PAFB from the Bay, forming a partial (temporal) physical barrier to movement of fish between the Bay and the basin (i.e., when the gates are closed or flows are not conducive to passage). The existing trash rack may also impede passage of large fish; however, an opening was cut in the trash rack in the early 2000s to address this issue. On Adobe Creek upstream of the tide gate, concrete channel, box culverts, road crossings, and intermittent hydrology create barriers to anadromy. Barron Creek was assessed by the California Department of Fish and Wildlife in 2002 and determined to be of low fishery value for steelhead due to a concrete trapezoidal channel and intermittent hydrology. The downstream reaches of Matadero are also concrete trapezoidal, and road crossings and culverts further impede passage. Adobe, Barron, and Matadero Creeks are not known to support steelhead, and therefore the species is not expected to occur in the PAFB. Because they do not spawn in creeks in the Project area, presence in the Study Area is expected to be infrequent and limited to a small number. Creeks upstream of the tide gate are not designated critical habitat for steelhead.

Tidally influenced areas of San Francisco Bay to MHHW are designated critical habitat for CCC steelhead. Work would occur during a portion, although not the peak, of steelhead migration season. Therefore, small numbers may be migrating through the Bay between marine and riverine habitats during the construction period. A study on hatchery steelhead in the San Francisco Bay Estuary from the Benicia Bridge to the Golden Gate Bridge indicated that smolts used the Bay as a migratory corridor, taking only two to four days to move through, and utilizing deep flows in the main channel as opposed to shallow water edges (Chapman et al. 2014). Similar results were seen for hatchery late-fall run Chinook (Hearn et al. 2013). Therefore, the species is not expected to occur in the Study Area regularly or in large numbers.

Direct impacts that could occur to the species, in the absence of conservation measures, would be injury, stranding, or mortality during dewatering, or injury or mortality due to acoustic impacts or water quality impacts. A qualified biologist would design and implement an exclusion or relocation plan so that all fish would be excluded or moved out of the work area prior to dewatering (MM-BIO-8, Table 16), reducing the potential for stranding or mortality. Underwater sound and acoustic pressure resulting from construction and demolition activities have the potential to affect fish by causing avoidance of the Project Area and/or injury. Acoustic criteria intended to protect fish from harm and mortality were adopted by the California Department of Transportation (Caltrans), the Federal Highway Administration, CDFW, USFWS, and NMFS in 2008. These “interim injury criteria” are now routinely used to evaluate the effects of impact pile driving sound on fish. While these criteria do not apply to drilled piles and the DSM method for ground improvements being utilized by this Project, which are considered methods for avoiding and minimizing effects on fish, they are instructive of potential impacts to fish from underwater sound.

Valley Water evaluated potential hydroacoustic impacts on fish and in coordination with hydroacoustic experts made modifications to Project construction methods to remain below these injury criteria

thresholds. Pile driving would be avoided to reduce acoustic impacts to marine life. Sheet piles would be pushed in by hand at low tide, excluding all water from the work area. If this is not possible, any remaining water would be pumped out of the Project Area and pumps would be screened according to NMFS criteria to prevent impacts to fish (WQ-1, Table 5). Rather than using pneumatic hammers (impact hammers) for demolition of the existing tide gate, the tide gate would be cut into pieces with a concrete saw and removed in sections via crane. Noise and vibration caused by Project activities have potential to cause fish to move away from the work area. However, the dewatered area would attenuate underwater effects, and such effects would not be substantial. With these modifications in place, the in-water noise analysis concluded that fish were not at risk of injury from Project activities (ICF 2019). Therefore, the impact from underwater sound on fish would be less than significant. Impacts to water quality as a result of the Project would be reduced by following the Best Management Practices listed under "Hydrology/Water Quality (WQ)" in Table 5. With the implementation of the measures described herein, impacts to the species as a result of Project activities are reduced to less than significant levels.

Approximately 1.08 acre of Central California Coast steelhead designated critical habitat would be temporarily impacted as part of the Project (Figure 4). It is expected that the effects of this action would be passively remediated in the short-term by tidal action Further, due to the new configuration of the tide gate and levees, the post-Project area would result in a net increase of approximately 0.70 acre of estuarine intertidal unconsolidated shore (open Bay waters). Localized increases in turbidity and suspended sediment during installation of the sheet piles would cause short-term effects to water quality. Short-term increases in turbidity and suspended sediment could disrupt feeding activities or cause displacement of fish from preferred habitat. However, the Study Area does not provide high quality habitat for CCC steelhead due to water quality conditions and the presence of striped bass. The rest of the work would occur within the dewatered work area. Project construction would require implementation of a SWPPP, providing further oversight. As a result, there would be temporary, less than significant impacts to the species' critical habitat due to Project activities.

Central Valley fall-run Chinook salmon: The NMFS Species of Special Concern designation applies to "…all naturally spawned populations of fall-run Chinook salmon in the Sacramento and San Joaquin River Basin and their tributaries, east of Carquinez Strait, California (NMFS 2009)." Occurrences of the species in the county began in some streams in the 1980s. Genetic analysis has indicated that fish sampled in the Santa Clara Valley are closely related to Central Valley fall-run hatchery stock and do not have distinct haplotypes (Garcia-Rossi and Hedgecock 2002). CDFW and NOAA state that the species is found within Central Valley rivers and streams (Sacramento and San Joaquin River Basins), and maps of historical distribution do not include Santa Clara County (Schick et al. 2005, CDFW 2015). Further, the historical hydrologic conditions of Santa Clara County streams do not favor the life cycle of Chinook salmon in most years, indicating that these fish are likely not endemic to these drainages or used the habitat only intermittently. Nonetheless, effects to the species would be minimized or avoided through the same protection measures implemented for CCC steelhead (above). The species is not known to occur in the creeks upstream of the Project Area, but small numbers may migrate quickly (likely within two to four days) through the Bay using deep channels between marine and riverine habitats during the time work would be occurring. Potential effects and applicable BMPs and mitigation measures to reduce

effects to the species are the same as for CCC steelhead (above). Similarly, effects to the species would be less than significant.

The geographic extent of freshwater EFH is defined as all water bodies currently or historically occupied by PFMC-managed salmon in Washington, Oregon, Idaho, and California, including aquatic areas above all artificial barriers that are not specifically excluded. Estuarine and marine areas extending from the extreme HTL in nearshore and tidal submerged environments within state waters out to the full extent of the exclusive economic zone offshore of California north of Point Conception are covered under the FMP. The entire Project footprint (3.1 acres), including the PAFB and the Bay, is within West Coast Salmon EFH, which includes all West Coast salmon species and stocks (NOAA 2018a, Figure 5). It is expected that effects to habitat as a result of Project activities would be passively remediated in the short-term by tidal action. Due to the new configuration of the tide gate and levees, the post-Project area would result in a net increase of approximately 0.70 acre of estuarine intertidal unconsolidated shore (open Bay waters).

The Magnuson-Stevens Fishery Conservation and Management Act mandates that federal agencies conduct an EFH consultation with NOAA regarding any actions that may adversely affect EFH. An adverse effect means any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components (NOAA 2012).

Green sturgeon: The species is long-lived, and therefore vulnerable to overfishing. Green sturgeon have also suffered from habitat degradation. They inhabit nearshore coastal waters along the west coast of North America from Alaska to Baja California. Green sturgeon are anadromous but tend to spend more time in the ocean than most sturgeon species. There are two populations of green sturgeon in California: a northern DPS and a southern DPS. The northern DPS spawns in the Rogue, Klamath, and historically the Eel and Umpqua Rivers. The southern DPS spawns in the Sacramento, Feather, and possibly the Yuba Rivers. The southern DPS has potential to occur in Santa Clara County; a total population of approximately 1,000 adults has been estimated during spawning ground surveys on the mainstem Sacramento River. San Francisco Bay is designated as critical habitat for the southern DPS of green sturgeon. Adults enter the Bay between mid-February and early May and migrate quickly up the Sacramento River (CalFish 2018). However, there is only one confirmed record of a green sturgeon individual occurring south of the Dumbarton Bridge. The species is uncommon, and rare in the South Bay. While suitable foraging habitat may be present in the Bay during migration, this does not coincide with the period when work would be occurring. The species is not known to use the creeks upstream of the tide gate and does not spawn in Santa Clara County streams. The species is not expected to occur in the area when work would be occurring; as such, there would be no effects to the species as a result of Project activities.

The Bay-side of the Project footprint is designated critical habitat for green sturgeon. Approximately 1.04 acre of green sturgeon critical habitat would be temporarily impacted as part of the Project, including 0.88 acre of estuarine critical habitat and 0.16 acre of marsh critical habitat (Figure 4). Marsh

critical habitat also occurs at Hooks Island, north of the tide gate, but the island is not anticipated to be affected by Project activities. It is expected that the effects to habitat would be remediated in the short-term by tidal action and restoration of temporarily impacted marsh areas along the levee (southwest of the tide gate). Short-term increases in turbidity and suspended sediment could disrupt feeding activities or result in displacement of fish from preferred habitat. However, the species is rare in the South Bay, suggesting potential foraging habitat in the Study Area is not important foraging habitat; therefore, they are not expected to use the area regularly or in large numbers. Thus, Project activities would not result in substantial reductions of the species, and would affect a very low proportion of regionally available habitat. Potential impacts to water quality as a result of the Project would be reduced by following the Best Management Practices listed under "Hydrology/Water Quality (WQ)" in Table 5. The majority of the work would occur in the dewatered work area. Project construction would require implementation of a SWPPP, providing further oversight. Further, due to the new configuration of the tide gate and levees, the post-Project area would result in a net increase of approximately 0.70 acre of estuarine intertidal unconsolidated shore (open Bay waters). As a result, there would be temporary, less than significant impacts to the species' critical habitat due to Project activities.

Longfin smelt: Declines of the species are attributed to the expansion of dams and freshwater diversion projects for agricultural, industrial, and residential use in the early 1980s, as well as degradation of freshwater spawning areas. Longfin smelt is an anadromous, primarily pelagic open-water species. As such, they occur in freshwater to saltwater throughout their life cycle. Adults spend most of their time in bays, estuaries, and nearshore coastal areas, and are most commonly found in salinities of 15-30 ppt. Larvae have a lower tolerance to salinity. They occur in freshwater to brackish habitats and are presumed to prefer salinities less than 6 ppt; the average salinity where they occur is estimated at 2 ppt. Adults spawn in freshwater with sandy or gravel substrate. Spawning occurs from January through February or March. The species is typically documented in open water away from shorelines and in-water structures in deep- to mid-water habitat. The greatest concentrations of longfin smelt occur in San Pablo Bay, Suisun Bay, and the West Delta. The Bay is the southern extent of the species' range, but adult distribution extends into the South Bay in wet winters. Distribution varies annually with numbers tending to be lower in drought years and higher in wet years. Fisheries sampling has documented the species in lower salinity areas of the South Bay during the spawning season including Alviso Slough (downstream of Guadalupe River), Artesian Slough (which receives freshwater input as treated effluent from the San Jose/Santa Clara Water Pollution Control Plant), the restored Island Ponds (ponds A19 and A21), and the downstream end of Coyote Creek (Hobbs 2019). These areas receive higher freshwater inflow, which appears to be associated with longfin smelt presence.

The species is not known to occur in creeks upstream of the Project Area, and water in the Study Area would be too saline to support larvae. Due to the shallow water and presence of the tide gate structure, the Project area is not consistent with suitable habitat for longfin smelt. However, adults may be present in the Bay in wet winters, so potential for occurrence in the Bay in the timeframe work would occur cannot be ruled out. Potential effects and applicable BMPs and mitigation measures to reduce effects to the species are the same as for CCC steelhead (above). Thus, effects to the species would be less than significant.

Pacific lamprey: Primary threats to the species in the San Francisco Bay Regional Management Unit include passage barriers, water quality, and in the southern tributaries illegal harvest by homeless populations. Historical freshwater records support Pacific lamprey presence in only seven drainages: Sonoma and Napa rivers (San Pablo Bay); Pacheco/Walnut-San Ramon creeks and possibly northern Suisun creeks (Suisun Bay); Alameda Creek (San Francisco Bay); and Coyote and Guadalupe creeks (USFWS 2019). Downstream migrations are associated with high winter and spring flows. The species' habitat requirements are similar to those of Pacific salmonids. Therefore, potential for occurrence is similar to that of CCC steelhead (above). As such, habitat is not suitable for Pacific lamprey in creeks upstream of the Project Area. However, lamprey could occur seasonally in the Bay, and during the time work would be occurring. Potential effects and applicable BMPs and mitigation measures to reduce effects to the species are the same as for CCC steelhead (above). Thus, effects to the species would be less than significant.

White sturgeon: Dams, water diversions, and water quality have impacted white sturgeon populations. Similar to green sturgeon, white sturgeon are vulnerable to overfishing. They are a long-lived, late-maturing diadromous species found in estuaries and major rivers with soft bottoms along the west coast of North America. Because of their biology, populations are slow to recover from declines. Early life stages of white sturgeon are highly sensitive to environmental variables such as water temperature, dissolved oxygen, sunlight, river flow, and salinity. In California, the species is most abundant in brackish waters of the San Francisco Estuary. Adults spend most of their lives in brackish and seawater estuary habitats and may move into intertidal areas at high tide to feed. They occasionally are found in tidal riverine and estuarine habitats of larger tributary streams such as Coyote Creek and Guadalupe River in the South Bay. They are known to spawn in the Sacramento and Feather Rivers in California and may spawn in large rivers north of the Sacramento-San Joaquin Delta (Moyle 2002). White sturgeon return to freshwater to spawn in the Sacramento and San Joaquin Rivers from February through May. The species is not known to use the creeks upstream of the Project Area, and work would not occur during the species' spawning season, but adults could occur in the Bay as a forager year-round in shallow water habitats that provide opportunities for benthic feeding when work would be occurring. Potential effects and applicable BMPs and mitigation measures to reduce effects to the species are the same as for CCC steelhead (above). Thus, effects to the species would be less than significant.

Mammals

Salt-marsh harvest mouse (SMHM): Many of the marshes suitable for SMHM have been altered, degraded, fragmented, or have lost adjacent upland habitat required by the species. Sediment deposition has been reduced in the Bay due to upstream dams and water diversions; this in combination with sea-level rise will likely contribute to the increased loss of suitable salt marsh habitat. Due to the status of SMHM populations and suitable habitat availability, any additional habitat loss could potentially be significant. In 1984, the USFWS approved a recovery plan for saltmarsh harvest mouse and Ridgway's rail, and released the updated Tidal Marsh Species Recovery Plan in 2013. The SMHM is endemic to saline and brackish marshes surrounding the San Francisco Estuary. There are two subspecies of *Reithrodontomys raviventris*: *R. r. halicoetes*, the northern SMHM, and *R. r. raviventris*, the southern SMHM. The northern subspecies is found primarily around San Pablo, Suisun, and Grizzly Bays.

The southern subspecies occurs primarily around the South San Francisco Bay. Salt marshes that support dense stands of pickleweed adjacent to upland vegetation, for escape during high tides, have been considered ideal habitat for the species. SMHM feed primarily on pickleweed. Reproduction occurs from March to November; their nest is a loose ball of grasses on the ground. SMHM do not burrow.

Suitable habitat is present adjacent to the Study Area and there are historical occurrence records in surrounding marshes; therefore, it is likely SMHM could be present in the Study Area. There are four CNDDB occurrences within a 1 mile radius of the Project Area from 1975-1990, including one record of a capture in pickleweed at the northeast corner of the Palo Alto Flood Basin, on the interior island south of the existing tide gate. Work would be occurring during the latter half of the species' breeding season. Direct impacts such as injury or mortality could occur to SMHM or their nests during removal of vegetation and the levee, from vehicle or pedestrian traffic in the Project Area, or from vehicles or personnel entering suitable habitats outside of the Project footprint. Indirectly, individuals may be exposed to increased risk of predation if forced from cover by Project activities.

To prevent impacts to individuals or nests, a qualified biologist will survey all areas with suitable habitat for SMHM individuals and nests prior to removal of vegetation. Once the site is cleared, the biologist will supervise the non-mechanized hand removal of any vegetation that could support SMHM (i.e., salt marsh and immediately adjacent uplands). Vegetation clearing should begin at the existing tide gate structure and continue away from the structure to encourage any SMHM in the area to move into suitable habitat outside of the Project Area and reduce increased potential for predation. Vegetation clearing should extend two to three feet beyond the ESA fencing to discourage SMHM from returning to the Project Area. All brush resulting from vegetation clearing will immediately be moved offsite so as not to provide habitat for SMHM in the Project Area. If SMHM individuals are observed in the active work area, construction activities shall cease in that area until the USFWS and CDFW can be contacted and appropriate avoidance, protection, or relocation measures can be developed, approved, and implemented (MM-BIO-7). Avoidance or protection activities may include establishment of a buffer zone, ongoing active monitoring, and/or delay of certain work activities or areas.

Ground disturbance, noise, movement, and vibrations caused by equipment or personnel could cause individuals to move away from the work area. However, such impacts would have minimal effects due to habituation to the existing human activity in the area and containment of the Project footprint to primarily low-quality habitat (compared to surrounding habitats). Such effects would not result in substantial harassment or disturbance and would not result in a reduction in the population of the species. Chain-link fencing will be used to close off the work area to the public, which could create perching habitat for avian predators; therefore, perching deterrents would be used on the fences to minimize opportunities for avian predators (MM-BIO-5, Table 16). BMPs and mitigation measures including vehicle speed limits (AQ-1, Table 5), pre-activity surveys and biological monitoring (MM-BIO-2, Table 16), and implementation of worker awareness training (MM-BIO-3, Table 16) for all construction personnel would further reduce the potential for these effects. Therefore, impacts would be reduced to less than significant.

Potential habitat that would be permanently removed includes a narrow band of estuarine intertidal emergent wetland on the outboard side of the levee, which extends from MHW to the HTL and is predominately pickleweed. The inboard and outboard levee slope is dominated by upland vegetation from the HTL up to the top of the levee slope. Species present include rip-gut brome (*Bromus diandrus*), wild oat (*Avena fatua*), wild radish (*Raphanus sativa*), Italian ryegrass (*Festuca perenne*), soft brome (*Bromus hordeaceus*), and broadleaved pepperweed (*Lepidium latifolium*). A qualified biologist or vegetation specialist would determine which native seed mix or planting options are ecologically appropriate and effective for the area to provide erosion control and suitable upland habitat in disturbed areas (BI-4, Table 5). This would be an improvement upon the existing upland habitat, which is primarily ruderal, non-native and/or invasive species. Pickleweed-dominant habitat with adjacent uplands has the potential to provide foraging and/or nesting habitat for SMHM. The levee trail is void of vegetation and is primarily hardpacked gravel; it does not provide habitat for the species. The narrow, disconnected levee slopes are unlikely to provide high quality habitat. Uphill from the levee slope is a wide, barren levee road with moderate to high pedestrian traffic. Downhill grades into a wide tidal channel on the Bay-side, and a wide muted tidal channel on the PAFB-side. Hooks Island and the expansive area of pickleweed to the southwest of the existing tide gate could provide quality habitat for the species, but the possibility that individuals could occur in the Study Area as a transient or forager in pickleweed marsh habitats cannot be ruled out There would be temporary impacts to 0.16 acre of pickleweed habitat, including a portion of the expansive area southwest of the existing tide gate, the smaller pickleweed patch just northwest of the existing tide gate (on the Bay-side), and a narrow band just east of the existing tide gate; these areas are all close to the toe of the existing levee (Adobe Creek Trail). These areas would be revegetated, either actively or passively, as appropriate. The Project would result in a net loss of 0.09 acre of estuarine intertidal emergent wetland (salt marsh). ESA fencing would be installed to protect sensitive habitats outside the Project footprint from Project activities (MM-BIO-4, Table 16). With the implementation of these BMPs and mitigation measures, impacts to habitats would be less than significant.

Salt-marsh wandering shrew: The species can be found in pickleweed-dominant tidal and diked salt marshes, typically on the ecotone between tidal marsh and upland vegetation, in areas with abundant driftwood and wrack which creates moist conditions where they can forage and seek cover. Salt-marsh wandering shrew construct two different types of nests, both on the ground above the HTL: a dome-shaped breeding nest made of dead plant material such as *Spartina*, *Distichlis*, or *Salicornia*; and a resting nest which is open on top and usually found in *Salicornia*. They are most active at night. The species has been documented east of the Study Area in Don Edwards National Wildlife Refuge and at Triangle Marsh (Estrella and Shellhammer 2015). Suitable pickleweed habitat may be available along the edges of the Bay or in the PAFB; however, abundant driftwood was not observed in the Study Area at the time of the site visits, which could limit suitability of the site for the species. There are no known occurrences of the species within two miles of the Study Area.

Potentially, direct effects could occur to individuals or nests during levee removal, if present. Work would not occur during the species' breeding season. Work would occur during the day when the species is less likely to be active, and a qualified biologist would conduct pre-activity surveys and

biological monitoring (MM-BIO-2, Table 16) and monitor non-mechanized hand removal of vegetation (MM-BIO-7). Other potential effects and the BMPs and mitigation measures addressed for SMHM (above) would also apply to salt-marsh wandering shrew. Thus, effects would be less than significant.

Marine Mammals

Pacific harbor seal: Harbor seals are non-migratory and use bays and estuaries for resting, foraging, and reproduction. Pacific harbor seals were numerous in San Francisco Bay before the 1800s, but hunting was likely the cause of the decline of the species in the 1920s. Habitat loss, degradation, and food web contamination also impact the species. The population stabilized at around 400-500 individuals in the 1970s-1980s, and has remained stable following the passage of the MMPA in 1972.

Harbor seals are benthic foragers and generally forage at relatively shallow depths. Local prey species primarily include Pacific herring, northern anchovy, plainfin midshipman, Pacific staghorn sculpin, white croaker, yellowfin goby, jacksmelt, and petrale sole. Foraging location is associated with prey abundance and proximity to their haul out site. Harbor seals rest onshore (ex., islands, tidal rocks, mudflats, sandbars) daily. Hauling out reduces energy expenditure from swimming. Harbor seals generally show site fidelity to one or a few haul out sites. Seals spend more time hauling out during reproductive (spring) and molt (summer) seasons than at other times of the year. Pupping occurs from March to May; molting occurs in June and July. The closest pupping sites to the Project Area include Newark Slough (3.4 miles north) and Mowry Slough (3.5 miles northeast). Smaller numbers occur at Bair Island (7.5 miles northwest).

Harbor seals could occur in Bay waters of the Study Area as foragers, although harbor seals are rarely observed in this area. Human disturbance, noise, or vibrations associated with construction could cause individuals to avoid the area. However, individuals in this area would be habituated to some level of human disturbance. Underwater noise has the potential to cause injury to harbor seals. In 2018, NMFS published criteria for assessing in-water impacts on marine mammals due to construction sources (NMFS 2018). Level A thresholds relate to physical injury to marine mammals (e.g., hearing loss or permanent hearing threshold shift) and Level B thresholds relate to behavioral disruption (non-injurious). NMFS's in-water Level A acoustic threshold for Phocid pinnipeds is 201 dB. Level B thresholds for non-impulsive noise are the same across all marine mammal hearing groups at 120 dB_{RMS} (decibels root-mean-squared). The in-air level B threshold (behavioral disruption for harbor seals) is 90 dB_{RMS}. No in-air Level A permanent hearing threshold shift has been established.

As part of the Project, CIDH piles/DSM and concrete saws were identified for use in construction rather than driven piles and pneumatic hammers, respectively, as a means to reduce hydroacoustic impacts to marine mammals. No construction activities other than installation of the sheet pile dewatering system (pressed-in piles with silent piling equipment) would occur in-water. The Project has no potential to cause physical injury (Level A threshold) to marine mammals. Noise level estimates for the Project were calculated to exceed the Level A threshold up to 141 feet away from the source for Phocid pinnipeds. The Level A threshold limits only include a small area on the Bay-side of the Project Area and this area would be dewatered during construction (including installation of sheet piles for dewatering), precluding physical injury to marine mammals.

Behavioral disruptions (Level B thresholds, in-water) have the potential to extend well beyond the Project Area, dissipating the further the location is from the Project site. Based on underwater noise modeling, and not accounting for the higher baseline noise anticipated in the South Bay, marine mammals may experience behavioral harassment at up to approximately 10 miles (52,000 feet) from the Project Area during CIDH pile drilling and DSM, and approximately 1 mile (5,200 feet) during tide gate demolition. While the noise would not cause injury to marine mammals, it may temporarily affect their behavior, causing them to avoid the area during construction activities that generate in-water noise (i.e., CIDH pile drilling, DSM, and saw-cutting for removal of the existing tide gate). However, baseline underwater noise conditions in the Bay are typically high due to surface waves, marine vessels, and other activities. In its compendium of underwater sound measurements, Caltrans (2015) reported baseline ambient underwater sound levels averaging 133 dB_{RMS} (range 120-155 dB_{PEAK}) in open waters of San Francisco Bay (Oakland outer harbor), meeting or exceeding NMFS's in-water Level B threshold. This indicates marine mammals in the Bay are adapted to a high baseline level of noise and only minor behavioral disruption would be anticipated. As a result, the impact on marine mammals from underwater noise would be less than significant.

Construction activities would generate airborne noise that could potentially result in behavioral disturbance to Phocid pinnipeds which are hauled-out or at the water's surface. Based on the construction activity type, the furthest distance to any behavioral disruption (Level B threshold) would be 89 feet. These activities would be temporary. As described previously, marine mammals are rarely observed in the Project Area and no marine mammals would be expected to occur within 89 feet of the work area given the existing habitat, dewatering limits, lack of haul out sites, and baseline activity and disturbance in the area. No work would occur during pupping or molting season, when the species spends more time hauled out on land. Therefore, the impact on marine mammals from airborne noise impacts would be less than significant.

Conclusion

This assessment has considered sensitive biological resources including plants or animals listed as rare, threatened, endangered, or state species of special concern; critical habitat or habitat essential to special-status plants or wildlife; rare or threatened natural communities; wetlands, streams, and surrounding riparian vegetation.

With the BMPs and mitigation measures described in this assessment incorporated into the Project, the Project will not substantially reduce the number or restrict the range of a rare or special-status plant or animal; cause fish or wildlife populations to drop below self-sustaining levels; significantly reduce available or essential habitat of rare or special-status plants or animals, or adversely affect significant riparian lands, wetlands, marshes, and other significant wildlife habitat. Therefore, Project impacts would not rise to the CEQA standard of having a substantial adverse effect.

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Appendix A.

United States Fish and Wildlife Service Information for Planning and Consultation

IPaC **U.S. Fish & Wildlife Service**

Last login April 16, 2019 02:24 PM MDT

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Project information

NAME

PAFB tide gate

LOCATION

Santa Clara County, California

Local office

San Francisco Bay-Delta Fish And Wildlife

(916) 930-5603
(916) 930-5654

650 Capitol Mall
Suite 8-300
Sacramento, CA 95814

http://kim_squires@fws.gov

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

NOT FOR CONSULTATION

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Salt Marsh Harvest Mouse Reithrodontomys raviventris — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/613

Birds

NAME	STATUS
California Clapper Rail Rallus longirostris obsoletus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4240	Endangered
California Least Tern Sterna antillarum browni No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8104	Endangered
Western Snowy Plover Charadrius nivosus nivosus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8035	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander Ambystoma californiense There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt Hypomesus transpacificus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS

NOT FOR CONSULTATION

Bay Checkerspot Butterfly Euphydryas editha bayensis There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2320	Threatened
San Bruno Elfin Butterfly Callophrys mossii bayensis There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/3394	Endangered

Crustaceans

NAME	STATUS
Vernal Pool Tadpole Shrimp Lepidurus packardi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2246	Endangered

Flowering Plants

NAME	STATUS
California Seablite Suaeda californica No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6310	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

NOT FOR CONSULTATION

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NOT FOR CONSULTATION

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Allen's Hummingbird Selasphorus sasin This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9637	Breeds Feb 1 to Jul 15

Bald Eagle Haliaeetus leucocephalus — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Black Oystercatcher Haematopus bachmani — Breeds Apr 15 to Oct 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9591

Black Rail Laterallus jamaicensis — Breeds Mar 1 to Sep 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/7717

Black Skimmer Rynchops niger — Breeds May 20 to Sep 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5234

Black Turnstone Arenaria melanocephala — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Burrowing Owl Athene cunicularia — Breeds Mar 15 to Aug 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9737

Clark's Grebe Aechmophorus clarkii — Breeds Jan 1 to Dec 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Yellowthroat Geothlypis trichas sinuosa — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

NOT FOR CONSULTATION

Lawrence's Goldfinch Carduelis lawrencei — Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Long-billed Curlew Numenius americanus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5511

Marbled Godwit Limosa fedoa — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

Rufous Hummingbird selasphorus rufus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Short-billed Dowitcher Limnodromus griseus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480

Song Sparrow Melospiza melodia — Breeds Feb 20 to Sep 5
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Spotted Towhee Pipilo maculatus clementae — Breeds Apr 15 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/4243

NOT FOR CONSULTATION

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910

Whimbrel Numenius phaeopus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9483

Willet Tringa semipalmata — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wrentit Chamaea fasciata — Breeds Mar 15 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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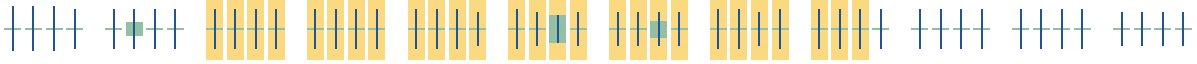
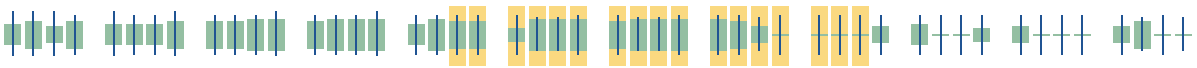
Black Rail
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

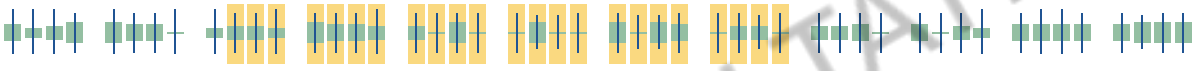


Black Skimmer
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

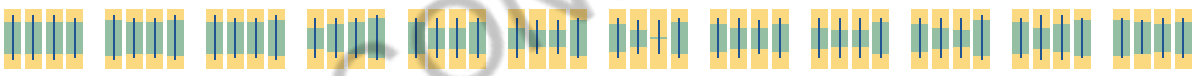


Black Turnstone
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

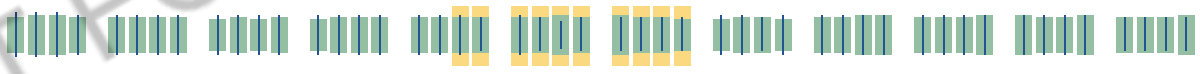
Burrowing Owl
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Common Yellowthroat
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

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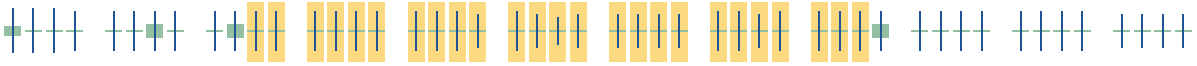
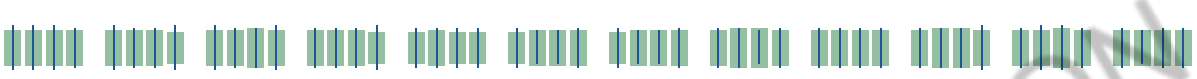
Lawrence's Goldfinch
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



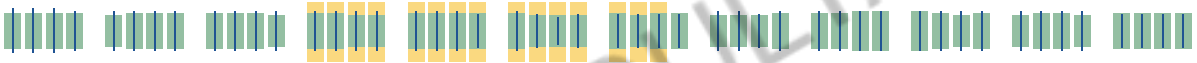
Long-billed Curlew
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Marbled Godwit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Nuttall's Woodpecker
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Oak Titmouse
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Rufous Hummingbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Short-billed Dowitcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

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Song Sparrow
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

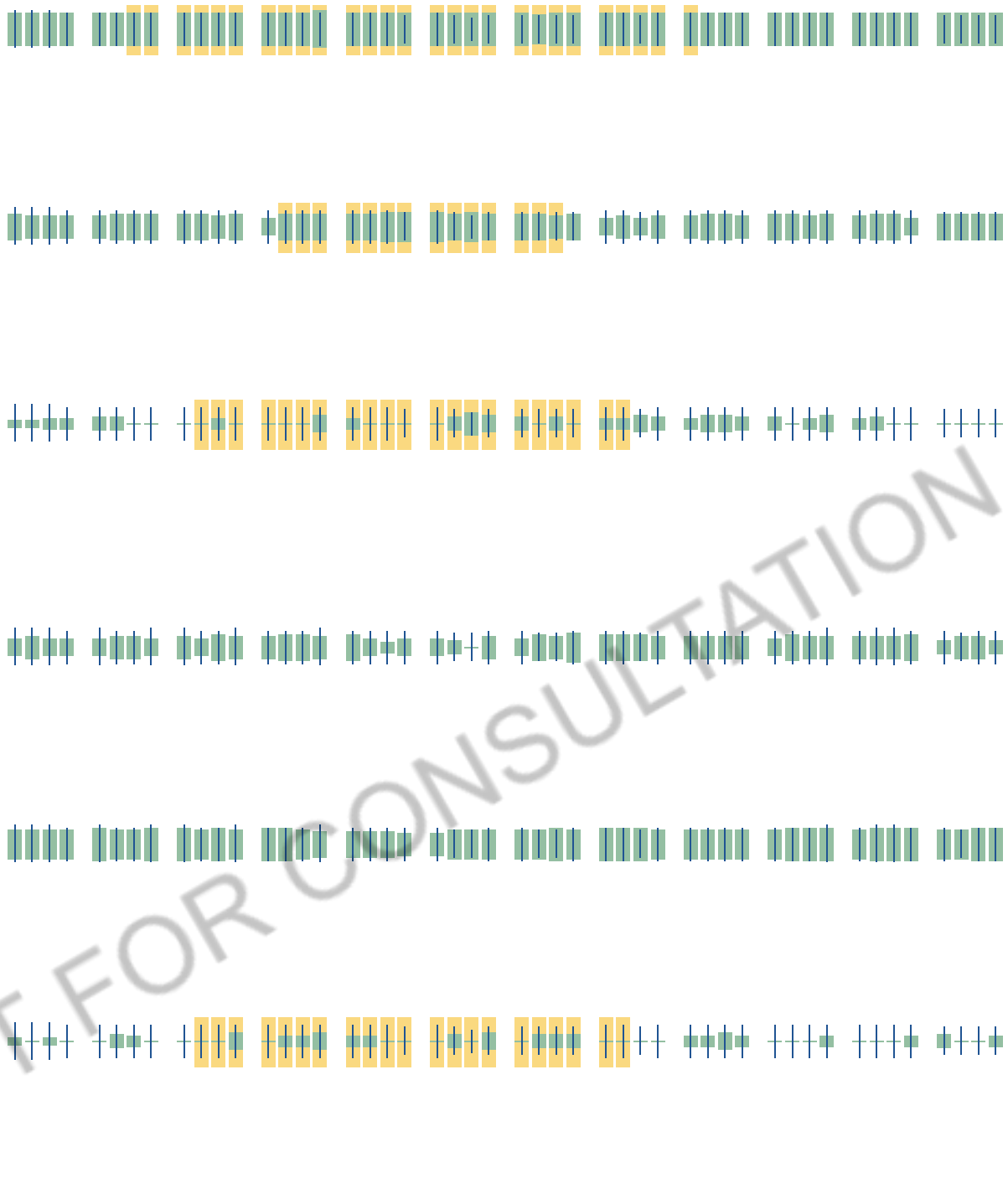
Spotted Towhee
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Tricolored Blackbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Whimbrel
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Willet
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Wrentit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review.

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Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

- E1UBL

ESTUARINE AND MARINE WETLAND

- E2USN
- E2EM1N
- E2SBN
- E2SBNx

FRESHWATER POND

- PUBHh3

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

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Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Appendix B.

California Native Plant Society Rare Plant Inventory

CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

Plant List

45 matches found. *Click on scientific name for details*

Search Criteria

California Rare Plant Rank is one of [1A, 1B, 2A, 2B, 3, 4],
FESA is one of [Endangered, Threatened, Candidate, Not Listed],
CESA is one of [Endangered, Threatened, Rare, Not Listed], Found in Santa Clara County, Found in Quads 3712252, 3712251, 3712158, 3712242, 3712241, 3712148, 3712232, 3712231 and 3712138;
Lifeform is one of [Tree, Shrub, Herb, Vine, Stem succulent, Lichen, Moss, Liverwort], Duration is one of [ann, per, ephem],
Bloom Time is one of [January, February, March, April, May, June, July, August, September, October, November, December]

Modify Search Criteria | Export to Excel | Modify Columns | Modify Sort | Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Allium peninsulare var. franciscanum	Franciscan onion	Alliaceae	perennial bulbiferous herb	(Apr)May-Jun	1B.2	S2	G5T2
Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	annual herb	Mar-Jun	1B.2	S3	G3
Androsace elongata ssp. acuta	California androsace	Primulaceae	annual herb	Mar-Jun	4.2	S3S4	G5?T3T4
Arctostaphylos regismontana	Kings Mountain manzanita	Ericaceae	perennial evergreen shrub	Dec-Apr	1B.2	S2	G2
Astragalus tener var. tener	alkali milk-vetch	Fabaceae	annual herb	Mar-Jun	1B.2	S1	G2T1
Calandrinia breweri	Brewer's calandrinia	Montiaceae	annual herb	(Jan)Mar-Jun	4.2	S4	G4
Campanula exigua	chaparral harebell	Campanulaceae	annual herb	May-Jun	1B.2	S2	G2
Centromadia parryi ssp. congdonii	Congdon's tarplant	Asteraceae	annual herb	May-Oct(Nov)	1B.1	S1S2	G3T1T2
Chloropyron maritimum ssp. palustre	Point Reyes bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Oct	1B.2	S2	G4?T2
Chorizanthe robusta var. robusta	robust spineflower	Polygonaceae	annual herb	Apr-Sep	1B.1	S1	G2T1
Cirsium praeteriens	lost thistle	Asteraceae	perennial herb	Jun-Jul	1A	SX	GX
Clarkia concinna ssp. automixa	Santa Clara red ribbons	Onagraceae	annual herb	(Apr)May-Jun(Jul)	4.3	S3	G5?T3
Collinsia corymbosa	round-headed Chinese-houses	Plantaginaceae	annual herb	Apr-Jun	1B.2	S1	G1
Collinsia multicolor	San Francisco collinsia	Plantaginaceae	annual herb	(Feb)Mar-May	1B.2	S2	G2
Cypripedium fasciculatum	clustered lady's-slipper	Orchidaceae	perennial rhizomatous herb	Mar-Aug	4.2	S4	G4
Dirca occidentalis	western leatherwood	Thymelaeaceae	perennial deciduous shrub	Jan-Mar(Apr)	1B.2	S2	G2
Eriogonum nudum var. decurrens	Ben Lomond buckwheat	Polygonaceae	perennial herb	Jun-Oct	1B.1	S1	G5T1
Eryngium aristulatum var. hooveri	Hoover's button-celery	Apiaceae	annual / perennial herb	(Jun)Jul(Aug)	1B.1	S1	G5T1
Extriplex joaquinana	San Joaquin	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2

	spearscale						
Fritillaria liliacea	fragrant fritillary	Liliaceae	perennial bulbiferous herb	Feb-Apr	1B.2	S2	G2
Hoita strobilina	Loma Prieta hoita	Fabaceae	perennial herb	May-Jul(Aug-Oct)	1B.1	S2?	G2?
Iris longipetala	coast iris	Iridaceae	perennial rhizomatous herb	Mar-May	4.2	S3	G3
Lasthenia conjugens	Contra Costa goldfields	Asteraceae	annual herb	Mar-Jun	1B.1	S1	G1
Legenere limosa	legenere	Campanulaceae	annual herb	Apr-Jun	1B.1	S2	G2
Leptosiphon acicularis	bristly leptosiphon	Polemoniaceae	annual herb	Apr-Jul	4.2	S4?	G4?
Lessingia hololeuca	woolly-headed lessingia	Asteraceae	annual herb	Jun-Oct	3	S3?	G3?
Malacothamnus arcuatus	arcuate bush-mallow	Malvaceae	perennial evergreen shrub	Apr-Sep	1B.2	S2	G2Q
Malacothamnus davidsonii	Davidson's bush-mallow	Malvaceae	perennial deciduous shrub	Jun-Jan	1B.2	S2	G2
Malacothamnus hallii	Hall's bush-mallow	Malvaceae	perennial evergreen shrub	(Apr)May-Sep(Oct)	1B.2	S2	G2
Micropus amphibolus	Mt. Diablo cottonweed	Asteraceae	annual herb	Mar-May	3.2	S3S4	G3G4
Monardella antonina ssp. antonina	San Antonio Hills monardella	Lamiaceae	perennial rhizomatous herb	Jun-Aug	3	S1S3	G4T1T3Q
Monolopia gracilens	woodland woolythreads	Asteraceae	annual herb	(Feb)Mar-Jul	1B.2	S3	G3
Navarretia prostrata	prostrate vernal pool navarretia	Polemoniaceae	annual herb	Apr-Jul	1B.1	S2	G2
Piperia candida	white-flowered rein orchid	Orchidaceae	perennial herb	(Mar)May-Sep	1B.2	S3	G3
Plagiobothrys chorisianus var. chorisianus	Choris' popcornflower	Boraginaceae	annual herb	Mar-Jun	1B.2	S1	G3T1Q
Plagiobothrys glaber	hairless popcornflower	Boraginaceae	annual herb	Mar-May	1A	SH	GH
Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3
Senecio aphanactis	chaparral ragwort	Asteraceae	annual herb	Jan-Apr(May)	2B.2	S2	G3
Streptanthus albidus ssp. peramoenus	most beautiful jewelflower	Brassicaceae	annual herb	(Mar)Apr-Sep(Oct)	1B.2	S2	G2T2
Stuckenia filiformis ssp. alpina	slender-leaved pondweed	Potamogetonaceae	perennial rhizomatous herb (aquatic)	May-Jul	2B.2	S2S3	G5T5
Suaeda californica	California seablite	Chenopodiaceae	perennial evergreen shrub	Jul-Oct	1B.1	S1	G1
Trifolium amoenum	two-fork clover	Fabaceae	annual herb	Apr-Jun	1B.1	S1	G1
Trifolium buckwestiorum	Santa Cruz clover	Fabaceae	annual herb	Apr-Oct	1B.1	S2	G2
Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	1B.2	S2	G2
Tropidocarpum capparideum	caper-fruited tropidocarpum	Brassicaceae	annual herb	Mar-Apr	1B.1	S1	G1

Suggested Citation

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The Consortium of California Herbaria
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Questions and Comments
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Appendix C
Aquatic Resources Delineation Report

AQUATIC RESOURCE DELINEATION

Palo Alto Tide Gates Improvement Project

Palo Alto, Santa Clara County, California

Huffman-Broadway Group, Inc.
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Huffman Broadway Group, Inc., is a California Certified Small Business and a Veteran-Owned Small Business.

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ACRONYMS	DEFINITION
Arid West Manual	Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0
CWA	Clean Water Act
CFR	Code of Federal Regulations
Corps 1987 Manual	Corps of Engineers Wetland Delineation Manual
FGDC	Federal Geographic Data Committee
GPS	Global Positioning System
HBG	Huffman-Broadway Group, Inc.
HTL	High Tide Line
MHW	Mean High Water
NAVD88	North American Vertical Datum of 1988
NRCS	National Resources Conservation Service
OHWM	Ordinary High Water Mark
RAPANOS	Rapanos v. United States and Carabell v. United States
RHA	Rivers and Harbors Act of 1899
SWANCC	Solid Waste Agency of Northern Cook County (SWANCC) v. U.S. Army Corps of Engineers
US	United States
USACE	U.S. Army Corps of Engineers
US EPA	U.S. Environmental Protection Agency
WETS Tables	Climate Analysis for Wetlands Tables
WOUS	Waters of the U.S.

This report should be cited as: Huffman-Broadway Group, Inc. 2019. *Aquatic Resource Delineation, Palo Alto Tide Gates Improvement Project, Palo Alto, Santa Clara County, California. June 2019, Updated April 8, 2020.* 16 pp. plus appendices.

EXECUTIVE SUMMARY

At the request of Valley Water[1], in support of the Palo Alto Tide Gates Improvement Project, Huffman-Broadway Group, Inc. (HBG) investigated the presence or absence of aquatic resources that may be subject to: (1) U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (US EPA) regulation under Section 404 of the Clean Water Act (CWA); and/or (2) USACE jurisdiction under Section 10 of the Rivers and Harbors Act of 1899 (RHA) within an approximately 32-acre Study Area.

The Study Area is in the City of Palo Alto, Santa Clara County, California. The Study Area encompasses an existing levee, full tidal wetlands on the outboard side of the levee, managed wetlands on the inboard side of the levee, and tide gates. The tide gates, which are the subject of the Palo Alto Tide Gates Improvement Project, are located along the levee and connect the full tidal wetlands to the managed wetland area on the inboard side of the levee. The top of the levee is used as a public trial and referred to as the Adobe Creek Loop Trail. The Adobe Creek Loop Trail is associated with Byxbee Park/Palo Alto Baylands Park.

Tidal Aquatic Resource Areas (Outboard Side of Levee):

The aquatic resources located on the outboard of the levee are subject to the daily ebb and flow of the tides. In the Study Area the plane of the mean high water line (MHW) extends up to 6.76[2]-feet North American Vertical Datum of 1988 (NAVD88). The high tide line (HTL) on the outboard side of the levee extends up to elevation 8-feet NAVD88. HTL was typically located up to the extent of the tidal wetlands, where wetlands were present. Two types of aquatic resource areas under USACE jurisdiction were determined to be present. According to the Federal Geographic Data Committee (FGDC) Classification of Wetlands and Deep Water Habitats of the U.S., 2nd. Edition[3] these areas included (i) 6.35 acres of Estuarine Intertidal Emergent Wetland, and (ii) 4.01 acres of Estuarine Intertidal Unconsolidated Shore.

Of the 6.35 acres of Estuarine Intertidal Emergent Wetland approximately 3.54 acres are above MHW and subject to Section 404 CWA jurisdiction and 2.81 acres are below MHW and subject to Section 404 CWA and Section 10 RHA jurisdiction. The 4.01 acres of Estuarine Intertidal Unconsolidated Shore are subject to Section 404 CWA and Section 10 RHA jurisdiction.

Muted-Tidal Aquatic Resource Areas (Inboard Side of Levee):

The aquatic resources located inboard of the levee are not influenced by the ebb and flow of the tide on a daily basis. The hydrology is managed by Valley Water using the existing tide gates. Based on visual observations along the shoreline the water level appears to be kept at a relatively constant elevation fluctuating approximately ±1-foot. The ordinary high water mark (OHWM) was typically at elevation 1-foot NAVD88. Two types of aquatic resource areas under USACE jurisdiction were determined to be present. According to the FGDC Classification of Wetlands

1 Formerly called the "Santa Clara Valley Water District".

2 For mapping the MHW an elevation of 7-feet NAVD88 was used.

3 Federal Geographic Data Committee, 2013

and Deep Water Habitats of the U.S., 2nd. Edition these areas included (i) 7.51 acres of Palustrine Unconsolidated Bottom and (ii) 3.10 acres of Palustrine Emergent Wetland.

The 7.51 acres of Palustrine Unconsolidated Bottom aquatic resources and 1.82 acres of the 3.09 acres of Palustrine Emergent Wetland are situated below the MHW and, therefore, may be subject to Section 404 CWA and Section 10 RHA jurisdiction.

The remaining 1.28 acres of Palustrine Emergent Wetland is located within what appears to be a "borrow ditch". Based on elevations surrounding this borrow ditch HBG has determined the borrow ditch was likely above MHW prior to being excavated, therefore, the 1.28 acres of Palustrine Emergent Wetland within the borrow ditch would be Subject to Section 404 CWA jurisdiction but not Section 10 RHA jurisdiction.

1.0 INTRODUCTION

1.1 Purpose and Scope of Work

This report provides a detailed aquatic resource delineation conducted in accordance with Department of Defense Code of Federal Regulations (CFR) definitions of Waters of the U.S.[4] (WOUS), the Corps of Engineers Wetland Delineation Manual[5] (Corps 1987 Manual), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0[6] (Arid West Manual) and supporting USACE guidance documents[7].

1.2 General Site Description

The Study Area is in the City of Palo Alto, Santa Clara County, California. It is situated along an existing levee referred to as the Adobe Creek Loop Trail which is associated with Byxbee Park/Palo Alto Baylands Park. On the inboard side of the levee the dominant aquatic feature is an historic tidal slough referred to as "Mayfield Slough" and Adobe Creek. The Study Area on the outboard side of includes a portion of Hook Island and the San Francisco Bay.

The latitude and longitude of the tide gates are at approximately 37.455661 N and -122.100919 W and the Study Area encompasses U.S. Geological Survey (USGS) 7.5 min Mountain View Quadrangle map. Refer to Appendix A, Figure 1 for the Location Map, Figure 2 for the USGS Topographic Map and Figure 3 for Satellite Imagery of the Study Area. Refer to Appendix A, Figure 6 for Topographic Map, Figure 7 for Photo Point Location map and Appendix D for Study Area Photographs.

1.3 Contact Information

Applicant Contact	Authorized Agent
Valley Water 5750 Almaden Expressway San Jose, CA 95118 **Contact**: Ms. Zooey Elsa Diggory 408.630.2851 • Zdiggory@valleywater.org	Huffman-Broadway Group, Inc. 828 Mission Avenue San Rafael, CA 94901 **Contact***:* Robert Perrera 415.385.4106 • rperrera@h-bgroup.com

4 Department of Defense, 1986
5 US Army Corps of Engineers, 1987
6 US Army Corps of Engineers, 2008
7 US Army Corps of Engineers, 1992a, & 1992b

1.4 Driving Directions to Study Area from USACE Office

***From*:** 1455 Market Street, San Francisco, CA 94103-1398

***To*:** Byxbee Park/Palo Alto Baylands Park, Palo Alto, CA (Study Area)

Directions	Miles
Take I-280 S from 10th St and Brannan St toward San Jose	1.9 mi
Take US-101 S to Embarcadero Rd in Palo Alto.	30 mi
Take the Embarcadero Rd/Oregon Expwy exit from US-101 S	0.2 mi
Merge onto Embarcadero Rd	0.9 mi
Turn Right on Embarcadero Road	0.1 mi
Park in the parking lot.	0.1
Walk out to Adobe Creek Loop Trail end at Tide Gates	0.2
About 30 Minutes	**21.8 miles**

1.5 Environmental Setting

1.5.1 Soils

A review of the Natural Resources Conservation Service (NRCS) Soil Survey maps for Santa Clara County[8] shows three soil types occurring in the Study Area. A soils map of the Study Area is shown in Figure 4.

Soils on the outboard side of the levee are classified as Novato Clay, 0 to 1% slopes, tidally flooded and Water. The majority of soils within the managed wetland area on the inboard side of the levee are Novato Clay, 0 to 1% slopes, protected. The levee itself is comprised of fill material. Field investigations confirmed that the NRCS soils mapping is reasonably accurate throughout the Study Area. Pertinent soil characteristics are summarized in Table 1 below:

Table 1 Pertinent Characteristics of Soils Mapped within the Study Area by NRCS

Map Unit and Soil Name	Landform / Landform Position	Depth to Restrictive Feature	Slope	Natural Drainage Class	Depth to Water Table	Frequency of Flooding/Ponding
155 - Novato clay, 0 to 1 percent slopes, tidally flooded	Marshes / Talf	0 inches	0-1% t	Very poorly drained	0 inches	Very Frequent / None
127 - Novato clay, 0 to 1 percent slopes, protected	Marshes / Talf	0 inches	0-1%	Very poorly drained	0 inches	None / Frequent
Water	NA	NA	NA	NA	NA	NA

8 US Department of Agriculture, 2019

1.5.2 Topography

The topographic relief on the outboard side of the levee bank is typically at a 1:1 – 2:1 slope downward into the San Francisco Bay. Elevations range from 10-12-feet NAVD88 at top of the levee down to approximately 1-foot NAVD88 on the bayside in the slough channel. The MHW extends up to 6.76[9]-feet NAVD88 and the HTL extends up to elevation 8-feet NAVD88.

The topographic relief on the inboard side of the levee bank is typically at a 2:1 – 3:1 slope downward toward Mayfield Slough and Adobe Creek. Elevations range from 10-12-feet NAVD88 at top of the levee down to approximately -4 feet NAVD88 in the lowest elevations within Mayfield Slough and Adobe Creek. On the inboard side the levee the OHWM is located at approximately 1-foot NAVD88.

Elevations encompassing the "borrow ditch" range from 10-12 feet NAVD88 along the top down to -2 feet near the bottom of the borrow ditch. The upper end of the 1.28 acres of Palustrine Emergent Wetland mapped within the borrow ditch is at approximately 1.5-feet NAVD88.

1.5.3 Hydrology

According to the USGS National Hydrography Dataset the Study Area is in Hydrologic Unit Code (HUC) 1805000410 San Francisco Bay watershed. Appendix A, Figure 5 shows the HUC watershed boundaries near the Study Area.

Water levels on the inboard side of the levee are controlled by tide gates for flood control and habitat functions. When San Francisco Bay tides are high, the tide gates are closed to prevent tidal flow from inundating the inboard sloughs and marsh habitat. When tides are low, the tide gates are opened to allow surface flow from the sloughs to the bay. The primary source of water on the inboard side of the levee enters through the tide gates from the San Francisco Bay. Secondary sources include water flows entering the Study Area from Mayfield Slough and Adobe Creek.

1.5.4 Vegetation

Outboard Side of Levee:

The Estuarine Intertidal Emergent Wetland habitat extends from the MHW to the HTL. Between the MHW and HTL vegetation is dominated by pickleweed (*Salicornia pacifica*), alkali sea-heath (*Frankenia salina*), coastal salt grass (*Distichlis spicata*), Oregon gumweed (*Grindelia stricta*), and California cordgrass (*Spartina foliosa*).

Vegetation from the HTL up to elevation 10-11 feet NAVD88 (i.e., the top of the outboard levee slope) is dominated by upland vegetation including rip-gut brome *(Bromus diandrus*), wild oat (*Avena fatua*), wild radish (*Raphanus sativa*), Italian ryegrass (*Festuca perenne),* soft brome (*Bromus hordeaceus), and* broadleaved pepperweed *(Lepidium latifolium*). From elevation 11-12 feet NAVD88 the levee trail is void of vegetation and consists of a hardpacked gravel trail.

9 For mapping the MHW an elevation of 7-feet NAVD88 was used.

Inboard Side of Levee:
The Palustrine Emergent Wetland habitat type located offshore from the inboard levee bank begins at approximately elevation 1-foot NAVD88. Dominant vegetation in this habitat type is pickleweed, alkali sea-heath, and coastal salt grass. The Palustrine Emergent Wetland habitat type located in the borrow ditch begins at approximately 1.5-feet NAVD88. Dominant vegetation in this habitat type is pickleweed, alkali sea-heath, and coastal salt grass, and supports unvegetated open water habitat below 0-feet NAVD88.

Vegetation along the levee slope from the OHWM up to the top of the levee is dominated by creeping wildrye (*Elymus triticoides),* Italian thistle (*Carduus pycnocephalus),* rip-gut brome, wild radish, and soft brome.

Refer to Appendix C, Table 1 for a complete list of plants observed during the site visit.

1.5.5 Growing Season and Precipitation

Growing Season:
HBG acquired USDA Natural Resources Conservation Service historical temperature data for the Study Area using the Climate Analysis for Wetlands Tables[10] (WETS Tables) station for Palo Alto. The historical WETS Tables indicate the average 50% probability of temperatures to occur at 28 Fahrenheit or higher does not occur, therefore the growing season in Palo Alto is 365 days.

Precipitation:
A WETS Tables analysis for precipitation was not applicable for this aquatic resource delineation. Hydrology is full tidal or "managed" and not influenced by direct precipitation.

1.5.6 Land Use

The Study Area includes portions of the Adobe Creek Loop Trail which is associated with Byxbee Park (also referred to as Palo Alto Baylands Park) and the Bay Trail system. The levee trail acts as a flood control structure and provides recreational uses such as walking, bird watching, and cycling. The tide gates are operated by Valley Water and provide flood protection and managed hydrology for aquatic habitat inboard of the levee system.

10 National Resources Conservation Service, 2000

2.0 DELINEATION METHODS

The focus of HBG's investigation was to identify and map areas meeting the definition of wetlands and other WOUS under the CWA in accordance with CFR definitions of WOUS, the Corps 1987 Manual, the Arid West Manual and supporting guidance documents. Data used to verify the extent and location of WOUS included: (1) high resolution aerial imagery; (2) topographic survey data; (3) direct observations through ground truthing; and (4) collection of soil, vegetation, and hydrology field data. High resolution satellite imagery used in the analysis was sourced from Digital Globe and Google Earth Pro. Point data was documented using a hand-held Trimble Geo XH Global Positioning System (GPS) unit with sub-meter accuracy after geoprocessing and topographic data was provided by Valley Water and incorporated into an HBG project specific database using ESRI ArcGIS software.

Ground-truthing and detailed field studies were conducted on April 25, 2019 to:

(1) Determine the extent and location of the MHW;

(2) Determine the extent and location of the HTL;

(3) Determine if indicators of an OHWM were present and document the location(s) of the OHWM within the inboard side of the levee;

(4) Determine the presence or absence of vegetation, hydric soil, and hydrology indicators of wetland conditions and determine if field indicators of wetland conditions may be "significantly disturbed" or "naturally problematic"; and

(5) Determine the extent and location of "Historical Navigable Waters of the U.S."

Aquatic resources on the outboards side of the levee are subject to the ebb and flow of the tide, therefore the MHW and HTL elevations were used to delineate the jurisdictional boundaries between Section 404 CWA and Section 10 RHA jurisdiction.

Mean High Water:

Tidal data and topographic data provided by Valley Water were used to determine the location of the MHW. Based on tidal data provided by Valley Water, MHW elevation is at elevation 6.76-feet NAVD88. The topographic survey data provided contour lines at 1.0-foot intervals. Based on the accuracy of the topographic survey HBG mapped MHW at the 7-foot contour line along the shoreline.

High Tide Line:

Along the outboard side of the levee the HTL was determined by the observation of a continuous deposit of debris and other physical markings such as water staining along the rip-rap. Points were documented in several locations and geo-referenced in overlay fashion onto orthorectified satellite imagery along with the Valley Water topographic survey data. The HTL was found to be

at the approximate landward limit of the tidal wetlands and coincided to a topographic elevation along the shoreline at 8-feet NAVD88.

Ordinary High Water Mark:
Given the fact that the aquatic resources located on the inboard side of the levee are "managed" and less subject to the ebb and flow of the tide, the extent of aquatic resources along the inboard levee bank was determined by the location the OHWM, not the HTL elevation. The OHWM was determined by the observation of physical markings such as erosion, water staining on rip-rap, and abrupt shifts along the banks from open water to upland vegetation. Points were documented in several locations and geo-referenced in overlay fashion onto orthorectified satellite imagery along with the Valley Water topographic survey data. The OHWM point locations were then tied to a topographic elevation and mapped along the shoreline at elevation 1-foot NAVD88.

Wetlands:
To determine the landward extent of wetlands along the levee, thirteen (13) soil pits were excavated within representative landform areas. Soil pit locations were selected based on site topography and landscape and drainage features. The pits were dug by shovel to a depth of at least 12 inches where permissible. Vegetation and hydrologic conditions were observed within 5-foot radius sampling plots surrounding the pits. Sample point locations were geo-referenced in overlay fashion onto orthorectified satellite imagery along with topographic data. Soil, vegetation, and hydrology observations were recorded on Wetland Determination Data Forms – Arid West Region, Version 2.0 (Appendix B).

Areas that could not be accessed on foot were assessed using satellite imagery, topographic data and from the levee top using Nikon Monarch 3 binoculars.

Historical Navigable Waters of U.S.:
The term "navigable waters" has been judicially defined by the U.S. Supreme Court to cover: (1) nontidal waters which were navigable in the past or which could be made navigable in fact by "reasonable improvements."[11] In addition, according to USACE San Francisco District policy[12], Section 10 RHA jurisdiction may extend over areas behind dikes if all the following criteria are met:

1. The area is presently at or below MHW;
2. The area was historically at or below MHW in its "unobstructed, natural state" (i.e. the area was at or below MHW before the levees/dikes were built); and
3. There is no evidence (elevation data) that the area was ever above MHW.

The extent and location of "Historical Navigable Waters of U.S." was determined by (1) overlaying

11 *United States, 1940 and Economy Light* & *Power Co,* 1921
12 US Army Corps of Engineers, 1983

the MHW elevation on the inboard side of the levee to determine which areas are presently at or below MHW; and (2) reviewing Google Earth Pro imagery extending back to 1948 to determine (a) if the area was at or below MHW before the levee was built and (b) to determine if there is any evidence these areas may have been filled to an elevation above MHW at some point in time.

3.0 TECHNICAL FINDINGS

The following sections discuss hydrophytic vegetation, hydric soil, and wetland hydrology conditions observed at the Study Area during the field survey and indicators used to map the HTL and OHWM. Wetland Determination Data Forms for the Arid West Region documenting this information are in Appendix B. Sample Point locations and the extent and location of aquatic resources are shown on Appendix A, Figure 8.

3.1 Land Use Conditions

Normal circumstances occur within the Study Area and include: (1) a maintained and functioning levee and pedestrian path along the shoreline; (2) undeveloped interior managed / muted-tidal waters and open space areas; (3) functioning tide gates; and (4) undeveloped tidal waters seaward of the levee.

3.2 Field Indicators of Hydrophytic Vegetation Conditions

Vegetation conditions were not significantly disturbed, were not problematic, and normal circumstances were present.

Outboard Side of Levee:

The Estuarine Intertidal Emergent Wetland habitat was dominated by pickleweed, alkali sea-heath, coastal salt grass, Oregon gumweed, and California cordgrass. The Estuarine Intertidal Unconsolidated Shore habitat is nearly void of vegetation and typically flooded during high tides and provides mudflat habitat during low tides.

Inboard Side of Levee:

The Palustrine Emergent Wetland habitat was dominated by pickleweed, alkali sea-heath, and coastal salt grass. The Palustrine Unconsolidated Bottom habitat is nearly void vegetation and typically flooded all year round.

The indicator status of the dominant wetland plant species observed within the Study Area, according to the USACE's National Wetland Plant List for the Arid West Region,[13] is as follows:

Table 2. Dominant Plant Species Observed in the Study Area

Common Name	Scientific Name	USACE Wetland Indicator Status [1]
Pickleweed	*Salicornia pacifica*	OBL
California Cordgrass	*Spartina foliosa*	OBL
Oregon Gumweed	*Grindelia stricta*	FACW
Alkali Sea-Heath	*Frankenia salina*	FACW

13 Lichvar, 2016

Table 2. Dominant Plant Species Observed in the Study Area		
Common Name	**Scientific Name**	**USACE Wetland Indicator Status [1]**
Coastal Salt Grass	*Distichlis spicata*	FAC
Italian Rye Grass	*Festuca (Lolium) perenne*	FAC
Seaside Barley	*Hordeum marinum*	FAC
Soft Brome	*Bromus hordeaceus*	FACU
Italian Thistle	*Carduus pycnocephalus*	UPL
Rip-gut Brome	*Bromus diandrus*	UPL
Wild Radish	*Raphanus sativus*	UPL
Creeping Wildrye	*Elymus triticoides*	UPL
Wild Oat	*Avena fatua*	UPL
[1] Source: USACE's National Wetland Plant List (Lichvar 2014)		

3.3 Field Indicators of Hydric Soil Conditions

Soil conditions were not significantly disturbed, conditions were not problematic, and normal circumstances were present.

Soils found with hydric field indicators on the outboard and inboard side of the levee were typically depleted mineral soils with brownish redox concentrations along the ped face. Soil texture varied from silty clay to sandy clay loam. Soils along the levee bank typically had inclusions of gravel and pebbles. Within all wetland sample points the hydric soil indicator was a depleted matrix (F3) and colors ranged from 10YR4/1 to 10YR6/1 with redoximorphic concentrations on the ped face.

3.4 Field Indicators of Wetland Hydrology Conditions

Hydrology conditions were not significantly disturbed, conditions were not problematic, and normal circumstances were present.

Primary hydrology indicators identified in the outboard and inboard side of the levee included Surface Water (A1), High Water Table (A2), and Sediment Deposits (B2).

3.5 Mean High Water

Based on tidal data provided by Valley Water, MHW is at elevation 6.76-feet NAVD88 along the outboard levee slope. Based on the accuracy of the topographic survey HBG mapped MHW at the 7-foot contour line along the shoreline.

3.6 High Tide Line

Based on field observations, the HTL was found to be at the approximate landward limit of the tidal wetlands and coincided to a topographic elevation along the shoreline at 8-feet NAVD88.

Refer to Appendix D Study Area Photographs, PP-4 for an example of water staining and debris along the rip-rap delineating the HTL.

3.7 Ordinary High Water Mark

Based on field observations, the OWHM on the inboard side of the levee is at elevation 1-foot NAVD88.

Refer to Appendix D Study Area Photographs, PP-1 and PP-3 South for examples of water staining on rip-rap, and abrupt vegetation shifts along the banks from rip-rap/open water to upland vegetation delineating the OHWM.

3.8 Historical Navigable Waters of the U.S.

Based on Google Earth Pro imagery and existing elevations, HBG determined the upland areas and aquatic resources mapped below the MHW within the inboard side of the levee/muted-tidal area may be subject to Section 10 RHA jurisdiction. With the exception of the 1.28 acre Palustrine Emergent Wetland located within what appears to be a “borrow ditch”, the areas mapped below MHW are (1) presently at or below MHW; (2) were historically at or below MHW in its “unobstructed, natural state”; and (3) were never above MHW.

Based on Google Earth Pro imagery, and existing elevations surrounding the borrow ditch, HBG determined the borrow ditch area was likely filled to an elevation similar to the surrounding levee prior to being excavated. Dredge material was likely placed within the aquatic area sometime after 1948 when the adjacent slough channel was excavated and widened. This raised the elevation from at or below MHW to 10-12 feet NAVD88. Prior to 1991, it is likely soil was excavated for use for improving the outer levee resulting in the deep borrow ditch which exist today and supports the 1.28 acre Palustrine Emergent Wetland.

4.0 WETLANDS AND OTHER WATERS

This section presents the findings of this delineation with respect to the identification and geographic extent of habitat areas found that meet the USACE and US EPA technical criteria as wetlands and /or other waters subject to Section 404 CWA and Section 10 RHA jurisdiction.

This determination is based on an analysis of the technical findings in Section 3.0, which describe the collective presence of hydric soil, wetland hydrology, and hydrophytic vegetation indicators as required by the Corps' 1987 Manual, the Arid West Manual, USACE guidance documents. It was also determined that there are locations within the Study Area that are at or below the MHW and therefore subject to Section 10 RHA jurisdiction. Refer to Appendix A, Figure 8 for the Aquatic Resource Delineation Map, and Table 3 below for a summary of aquatic resources.

Table 3. Aquatic Resources Within the Study Area

Wetland/Water Type	Federal Regulatory Jurisdiction	Area (acres)
Outboard Side of Levee / Full Tidal Aquatic Resources		
Estuarine Intertidal Emergent Wetland	Section 404 CWA	3.54
Estuarine Intertidal Emergent Wetland	Section 404 CWA and Section 10 RHA	2.81
Estuarine Intertidal Unconsolidated Shore	Section 404 CWA and Section 10 RHA	4.01
Inboard Side of Levee / Muted-Tidal Aquatic Resources		
Palustrine Emergent Wetland	Section 404 CWA	1.28
Palustrine Emergent Wetland	Section 404 CWA and "Historical" Section 10 RHA	1.82
Palustrine Unconsolidated Bottom	Section 404 CWA and "Historical" Section 10 RHA	7.51
Total		20.97

5.0 CWA SECTION 404 & SECTION 10 JURISDICTIONAL ANALYSIS

This section analyzes the potential for the aquatic resources identified within the Study Area to be subject to USACE / US EPA jurisdiction under Section 404 of the CWA and Section 10 RHA.

Aquatic resources within the Study Area were also examined with respect to guidance provided by the US EPA and USACE[14] following the Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers (SWANCC), and Rapanos v. United States and Carabell v. United States (RAPANOS) Supreme Court decisions. No areas were found that could either potentially be exempted or excluded from regulation in accordance with the SWANCC or RAPANOS decisions.

Table 4 below provides a summary of aquatic resources found potentially subject to Section 404 CWA and Section 10 RHA jurisdiction, and the rationale for determining they have the potential for being considered jurisdictional waters by the USACE / US EPA.

Table 4. Rationale for Inclusion as Waters of the US

Habitat Type	Regulatory Jurisdiction	CFR Definition of WOUS
Palustrine Emergent Wetland	Section 404 CWA	§ 328.3(a)(7): Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in 33 CFR § 328.3 (a)(1) through (6).
Palustrine Emergent Wetland	Section 404 CWA and Historical Section 10 RHA	§ 328.3(a)(7): Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in 33 CFR § 328.3 (a)(1) through (6). And § 328.3(a)(1): All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide.
Palustrine Unconsolidated Bottom	Section 404 CWA and Historical Section 10 RHA	
Estuarine Intertidal Emergent Wetland	Section 404 CWA	§ 328.3(a)(7): Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in 33 CFR § 328.3 (a)(1) through (6).
Estuarine Intertidal Emergent Wetland	Section 404 CWA and Section 10 RHA	§ 328.3(a)(1): All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide.
Estuarine Intertidal Unconsolidated Shore	Section 404 CWA and Section 10 RHA	

14 US Environmental Protection Agency, 2008

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APPENDIX A

FIGURES

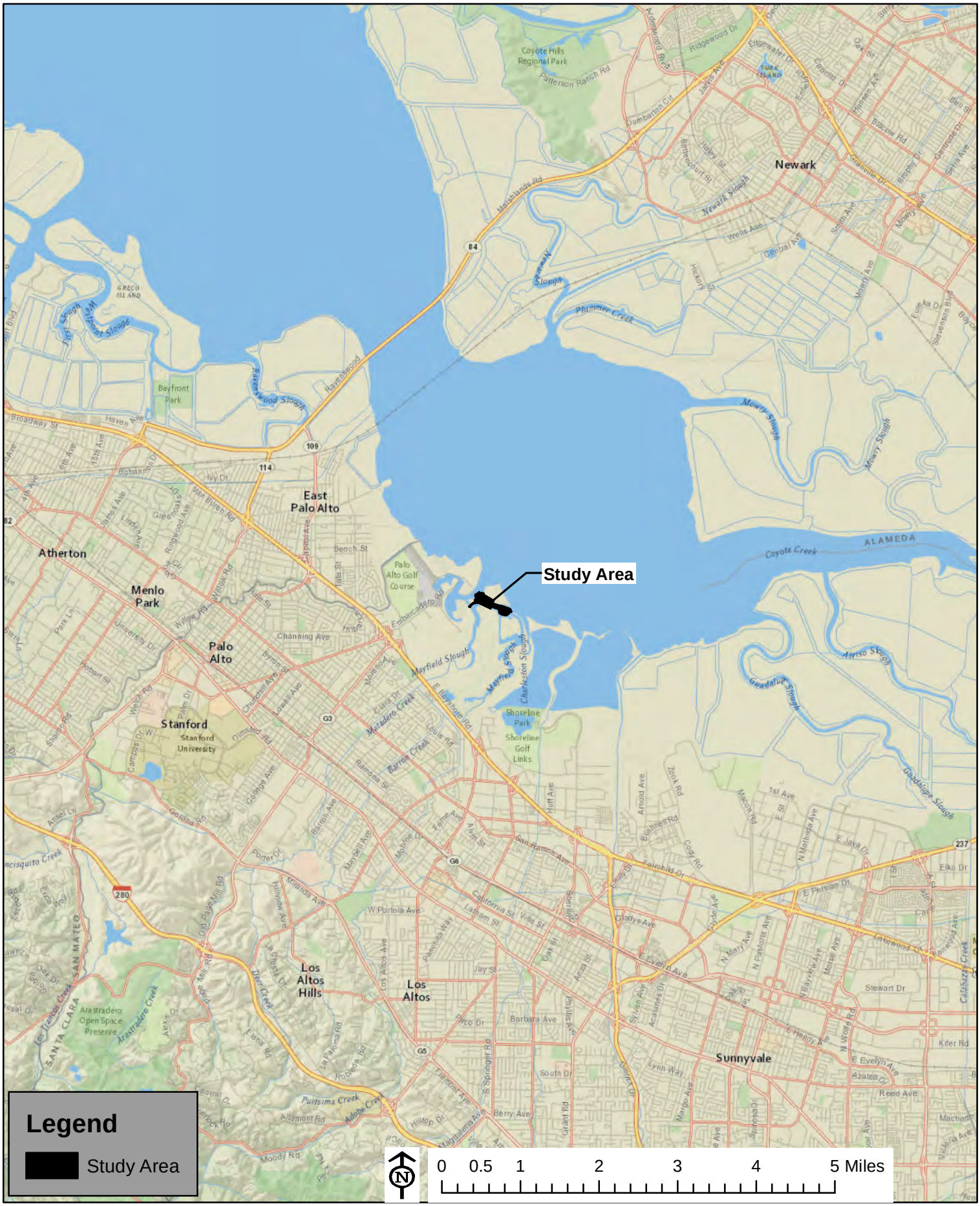

Figure 1. Location Map

Palo Alto Tide Gates Improvement Project
Palo Alto, Santa Clara County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Map Preparation Date: 4-8-20
Prepared by: Huffman-Broadway Group
828 Mission Avenue
San Rafael, California
(415)-925-2000

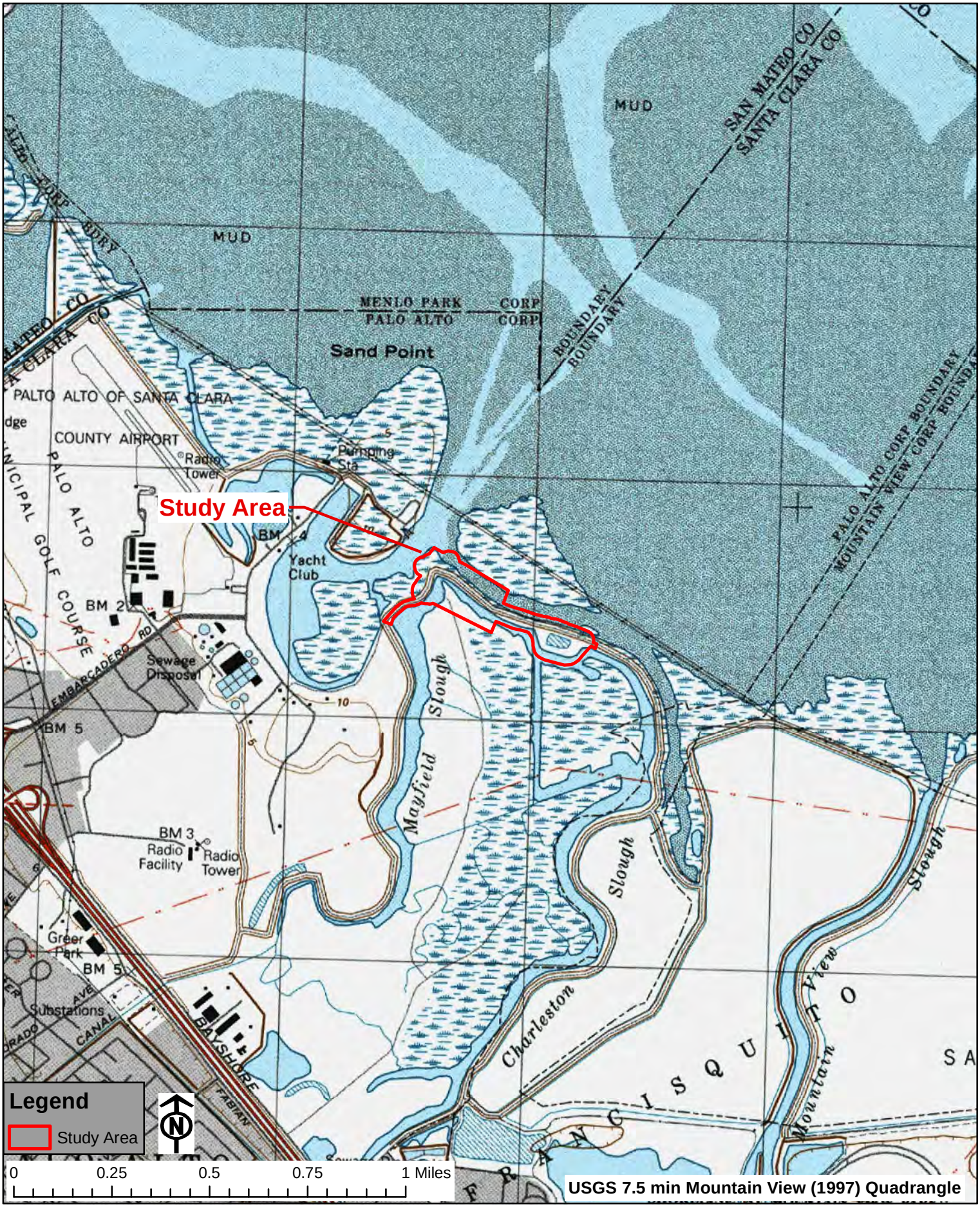

Figure 2. USGS Topographic Map
Palo Alto Tide Gates Improvement Project
Palo Alto, Santa Clara County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS
Map Preparation Date: 4-8-20
Prepared by: Huffman-Broadway Group
828 Mission Avenue
San Rafael, California
(415)-925-2000

Figure 3. Satellite Imagery
Palo Alto Tide Gates Improvement Project
Palo Alto, Santa Clara County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Map Preparation Date: 4-8-20
Prepared by: Huffman-Broadway Group
828 Mission Avenue
San Rafael, California
(415)-925-2000

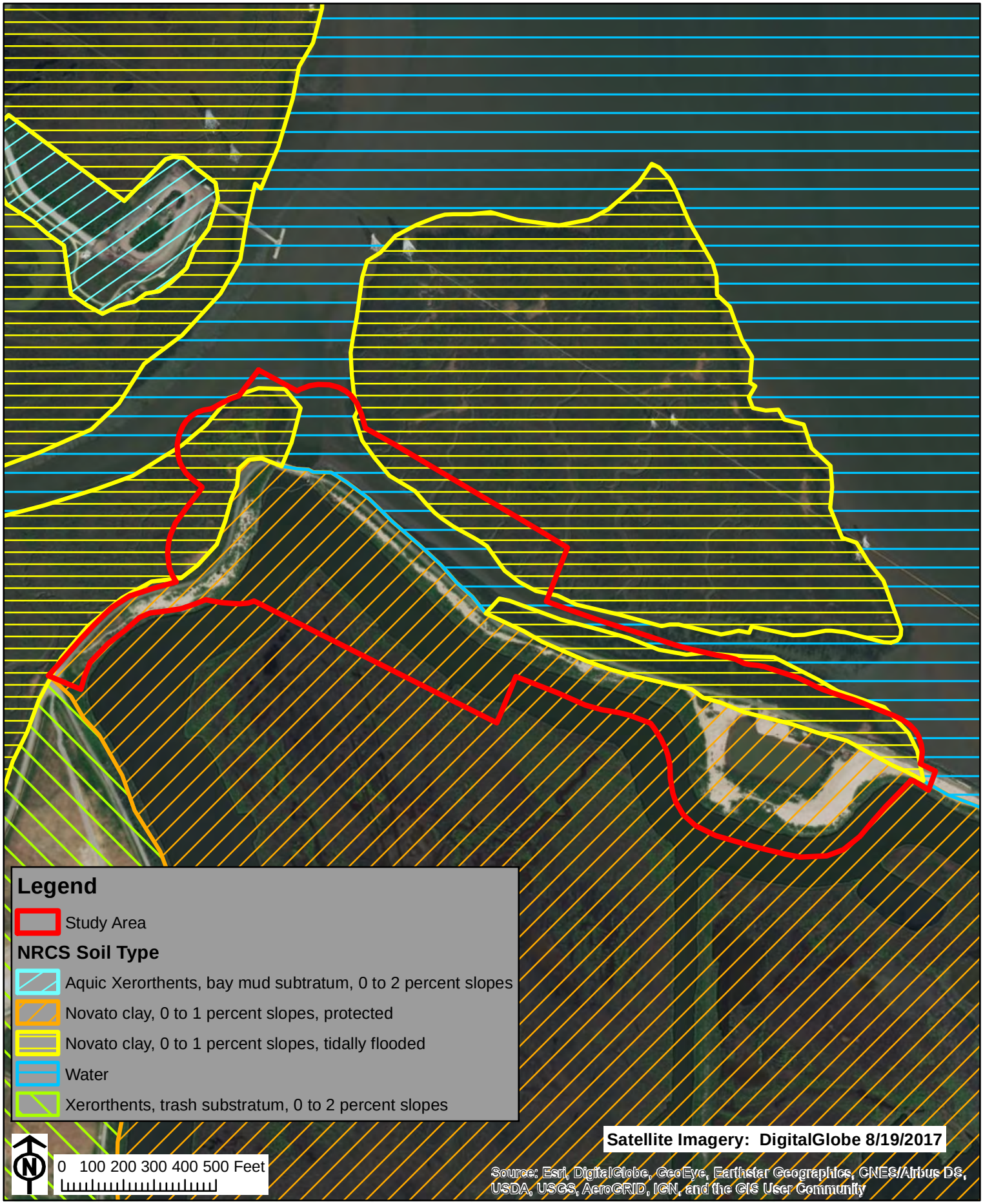

Figure 4. Soils Map
Palo Alto Tide Gates Improvement Project
Palo Alto, Santa Clara County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Map Preparation Date: 4-8-20
Prepared by: Huffman-Broadway Group
828 Mission Avenue
San Rafael, California
(415)-925-2000

Figure 5. USGS NHD HUC 10 Watershed Boundaries

Palo Alto Tide Gates Improvement Project
Palo Alto, Santa Clara County, California

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Map Preparation Date: 4-8-20
Prepared by: Huffman-Broadway Group
828 Mission Avenue
San Rafael, California
(415)-925-2000

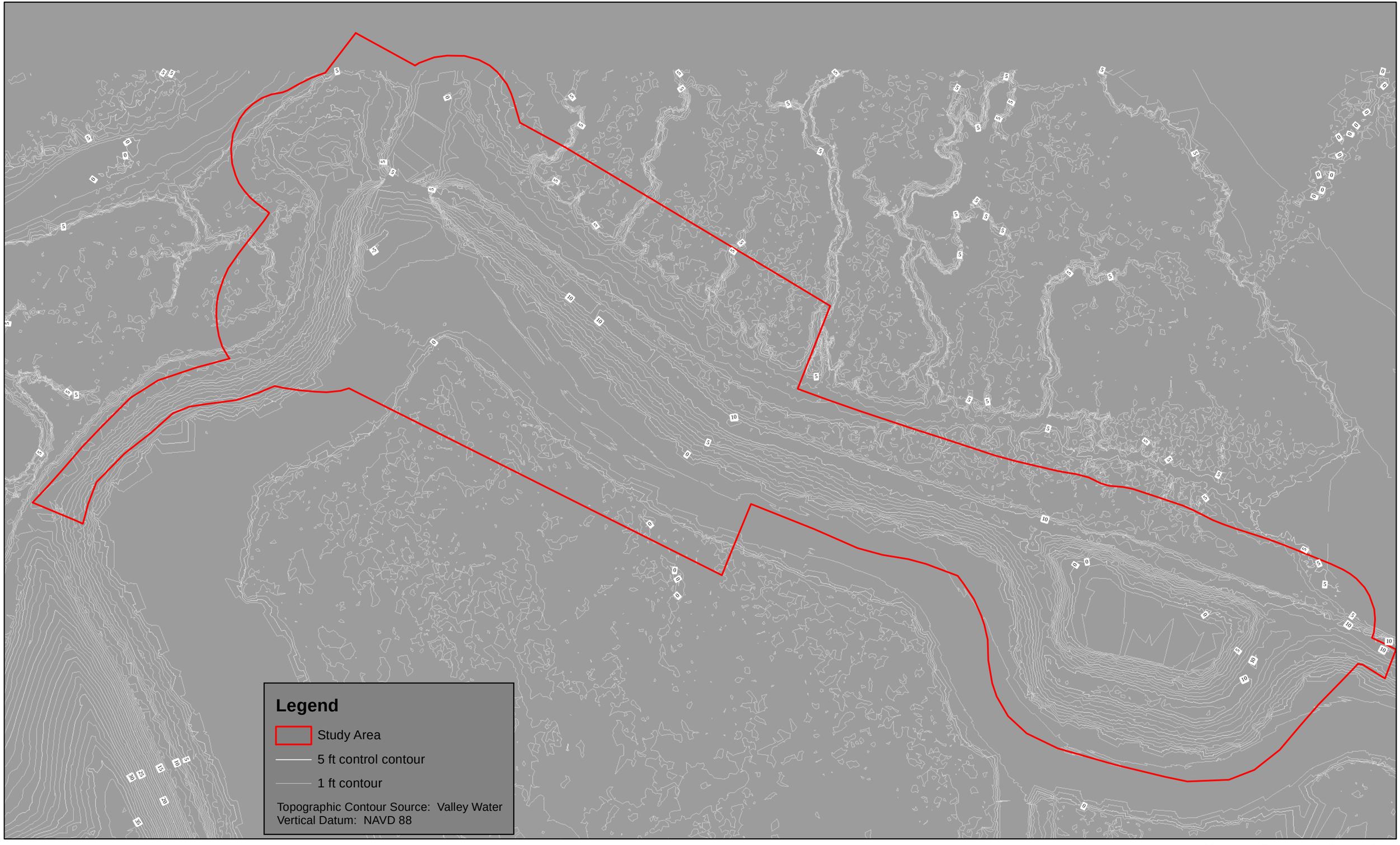

Figure 6. Topographic Map
Palo Alto Tide Gates Improvement Project
Palo Alto, Santa Clara County, California

Map Preparation Date: 4-8-20
Prepared by: Huffman-Broadway Group
828 Mission Avenue
San Rafael, California
(415)-925-2000

Huffman-Broadway Group, Inc.
ENVIRONMENTAL REGULATORY CONSULTANTS

Figure 7. Photo Pont Location Map

Palo Alto Tide Gates Improvement Project
Palo Alto, Santa Clara County, California

N

0 50 100 200 300 400 500 600 700 800 900 1,000 Feet

Map Preparation Date: 4-8-20
Prepared by: Huffman-Broadway Group
828 Mission Avenue
San Rafael, California
(415)-925-2000

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ENVIRONMENTAL REGULATORY CONSULTANTS

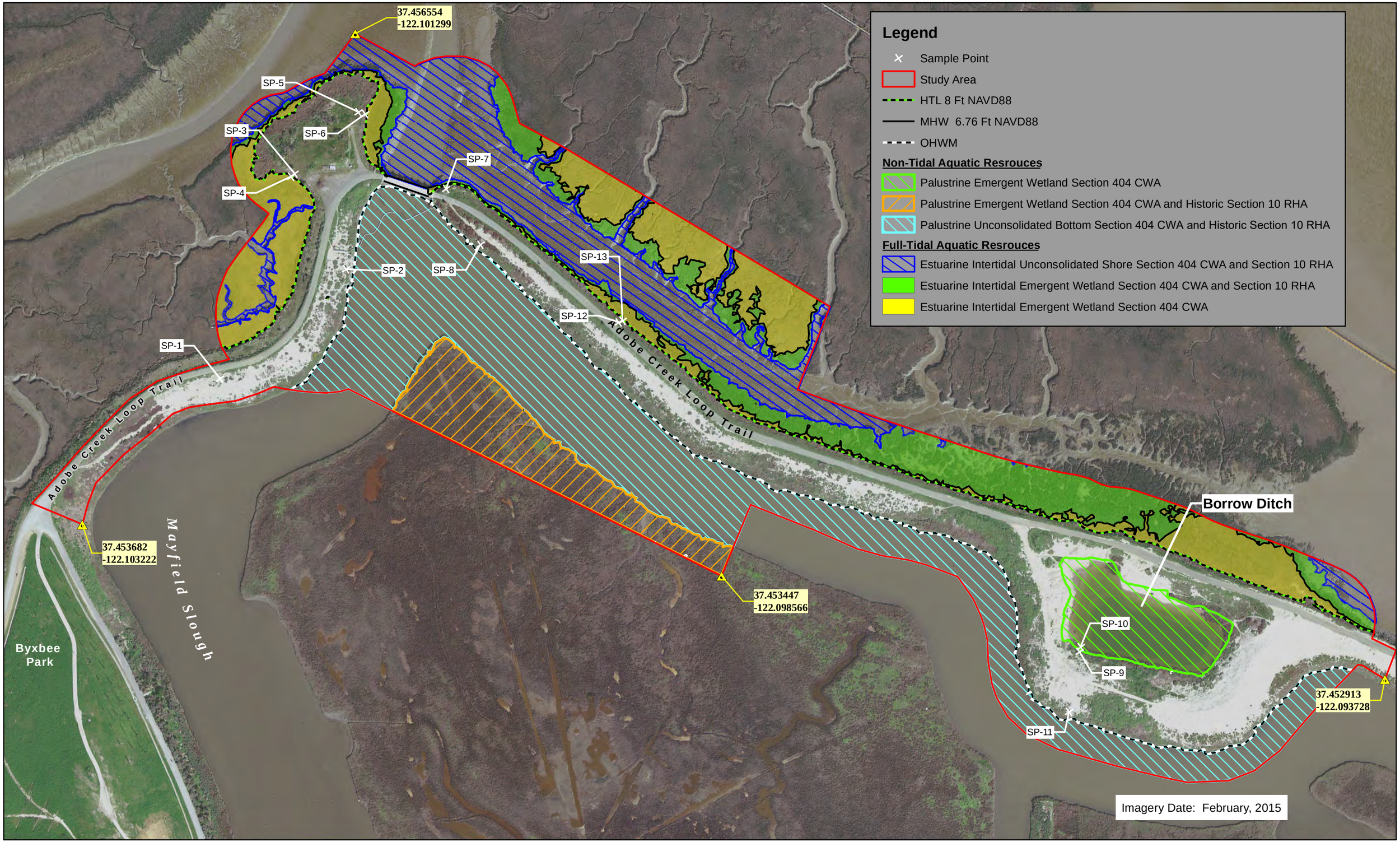

Figure 8. Aquatic Resources Delineations Map
Palo Alto Tide Gates Improvement Project
Palo Alto, Santa Clara County, California

N

0 50 100 200 300 400 500 600 700 800 900 1,000 Feet

Map Preparation Date: 4-8-20
Prepared by: Huffman-Broadway Group
828 Mission Avenue
San Rafael, California
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ENVIRONMENTAL REGULATORY CONSULTANTS

APPENDIX B

Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-1

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): convex Slope (%): 5

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, protected NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____ No ✔	
Wetland Hydrology Present?	Yes _____ No ✔	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Hordeum marinum	40	Yes	FAC
2. Avena fatua	30	Yes	UPL
3. Frankenia salina	5	No	FACW
4. Carduus pycnocephalus	5	No	UPL
5. Bromus hordeaceus	10	No	FACU
6. Festuca bromoides	10	No	FACU
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: 100 (A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR6/1	100	7.5YR4/6	2	C	M	Silty Clay	
5-12	10YR6/1	100	7.5YR4/6	5	C	M	Silty Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

With the current managed hydrologic regime, soils at this elevation do not become flooded, ponded or saturated to effect anaerobic conditions . Redoximorphic and low-chroma features are likely relict.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-2

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): convex Slope (%): 5

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, protected NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____ No ✔	
Wetland Hydrology Present?	Yes _____ No ✔	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Elymus triticoides	20	Yes	UPL
2. Carduus pycnocephalus	5	No	UPL
3. Brassica nigra	5	No	UPL
4. Bromus sp.	20	Yes	UPL
5. Bromus diandrus	20	Yes	UPL
6. Bromus hordeaceus	20	Yes	FACU
7. Raphanus sativus	5	No	UPL
8. Frankenia salina	5	No	FACW
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 100 (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 4/1	100	10YR3/6	1	C	M	Sandy Clay Loam	
5-12	10YR 5/1	100	10YR3/6	5	C	M	Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ **No** ✓

Remarks:

With the current managed hydrologic regime, soils at this elevation do not become flooded, ponded or saturated to effect anaerobic conditions . Redoximorphic and low-chroma features are likely relict. Woody debris found in soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___

Water Table Present? Yes ___ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? Yes ___ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-3

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): convex Slope (%): 10

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, tidally flooded NWI classification: Estuarine and Marine Wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ✔	**Is the Sampled Area within a Wetland?** Yes ____ No ✔
Hydric Soil Present?	Yes ____ No ✔	
Wetland Hydrology Present?	Yes ____ No ✔	

Remarks:

Located on slope of fill material.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Avena fatua	80	Yes	UPL
2. Carduus pycnocephalus	20	Yes	UPL
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: 100 (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✔

Remarks:

SOIL

Sampling Point: SP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR3/2	100	10YR3/6	1	C	PL	clay loam	gravel fill mixed with soil

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-4

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, tidally flooded NWI classification: Estuarine and Marine Wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔ No ____	**Is the Sampled Area within a Wetland?** Yes ✔ No ____
Hydric Soil Present?	Yes ✔ No ____	
Wetland Hydrology Present?	Yes ✔ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Salicornia pacifica	60	Yes	OBL
2. Distichlis spicata	40	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: 100 (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

✔ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No ____

Remarks:

SOIL

Sampling Point: SP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5	10YR5/1	100					silty clay	
5-12	10YR5/1	100					silty clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ✓ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ✓ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 7

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 7

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-5

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): convex Slope (%): 5

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, tidally flooded NWI classification: Estuarine and Marine Wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes ✔ No _____	
Wetland Hydrology Present?	Yes _____ No ✔	

Remarks:

Located on slope of upland fill.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Bromus diandrus	40	Yes	UPL
2. Carduus pycnocephalus	5	No	UPL
3. Avena fatua	20	Yes	UPL
4. Festuca perenne	20	Yes	FAC
5. Foeniculum vulgare	5	No	UPL
6. Frankenia salina	10	No	FACW
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: 100 (A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR4/2	100	10YR3/6	1	C	M	Sandy clay loam	with gravel fill
6-12	10YR4/2	100	10YR3/6	2	C	M	sandy clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-6

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): flat Slope (%): 1

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, tidally flooded NWI classification: Estuarine and Marine Wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔ No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔ No _____	
Wetland Hydrology Present?	Yes ✔ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Salicornia pacifica	50	Yes	OBL
2. Distichlis spicata	40	Yes	FAC
3. Grindelia stricta	10	No	FACW
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 100 (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✔ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks:

SOIL

Sampling Point: SP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5	10YR6/1	100					Sandy clay loam	
5-8	10YR6/1	100					Loamy sand	with clay and silt
8-13	10YR6/1	100					Silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes ✓ No _____ Depth (inches): [11]

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): [11]

Wetland Hydrology Present? Yes ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-7

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): convex Slope (%): 1

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, tidally flooded NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____ No ✔	
Wetland Hydrology Present?	Yes _____ No ✔	

Remarks:

Located on upland portion of levee on out-board side near HTL.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Avena fatua	10	Yes	UPL
2. Raphanus sativus	10	Yes	UPL
3. Hordeum marinum	10	Yes	FAC
4. Festuca perenne	10	Yes	FAC
5. Bromus hordeaceus	10	Yes	FACU
6. Brassica nigra	5	No	UPL
7. Foeniculum vulgare	5	No	UPL
8. Grindelia stricta	5	No	FACW
	65 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 65 (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR4/1	100	10YR3/6	1	C	M	Clay loam	rock and gravel fill

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

Could not dig past 8 inches due to hard-packed gravel, and rock/boulder fill material. Based on the elevation of SP-7 it would not become flooded, ponded or saturated to effect anaerobic conditions . Low-chroma features are likely relict.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-8

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): convex Slope (%): 2

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, protected NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____ No ✔	
Wetland Hydrology Present?	Yes _____ No ✔	

Remarks:

Located on upland portion of levee slope above OHWM.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Frankenia salina	10	No	FACW
2. Carduus pycnocephalus	10	No	UPL
3. Raphanus sativus	30	Yes	UPL
4. Brassica nigra	20	Yes	UPL
5. Elymus triticoides	30	Yes	UPL
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: 100 (A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR5/1	100	7.5YR3/6	1	C	M	Sandy clay loam	with gravel
5-12	10YR6/1	100					Silty clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ **No** ✓

Remarks:

With the current managed hydrologic regime, soils at this elevation do not become flooded, ponded or saturated to effect anaerobic conditions . Low-chroma features are likely relict.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? Yes ___ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-9

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): convex Slope (%): 10

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, protected NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes ✔ No _____	
Wetland Hydrology Present?	Yes _____ No ✔	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Avena fatua	10	No	UPL
2. Bromus diandrus	30	Yes	UPL
3. Hordeum marinum	30	Yes	FAC
4. Frankenia salina	10	No	FACW
5. Salicornia pacifica	5	No	OBL
6. Carduus pycnocephalus	5	No	UPL
7. Bromus sp.	10	No	UPL
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: 100 (A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10YR4/2	100					Silty clay loam	
4-14	10YR4/1	100	10YR3/6	10	C	M	Silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-10

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): concave Slope (%): 2

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, protected NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔ No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔ No _____	
Wetland Hydrology Present?	Yes ✔ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Salicornia pacifica	100	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species _____	x 1 =	_____
FACW species _____	x 2 =	_____
FAC species _____	x 3 =	_____
FACU species _____	x 4 =	_____
UPL species _____	x 5 =	_____
Column Totals: 100 (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✔ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks:

SOIL

Sampling Point: SP-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR4/1	100	10YR3/6	2	C	M	silty clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 2

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-11

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): convex Slope (%): 10

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, protected NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____ No ✔	
Wetland Hydrology Present?	Yes _____ No ✔	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Carduus pycnocephalus	20	Yes	UPL
2. Brassica nigra	10	No	UPL
3. Bromus diandrus	20	Yes	UPL
4. Bromus hordeaceus	20	Yes	FACU
5. Festuca bromoides	5	No	FACU
6. Hordeum marinum	20	Yes	FAC
7. Frankenia salina	5	No	FACW
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 100 (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP-11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR4/2	100	10YR3/6	1	C	M	Sandy clay loam	
5-12	10YR5/1	100	10YR3/6	2	C	M	Sandy clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

With the current managed hydrologic regime, soils at this elevation do not become flooded, ponded or saturated to effect anaerobic conditions . Low-chroma features are likely relict.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-12

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): convex Slope (%): 10

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, tidally flooded NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes ✔ No _____	
Wetland Hydrology Present?	Yes _____ No ✔	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Bromus hordeaceus	60	Yes	FACU
2. Hordeum marinum	10	No	FAC
3. Festuca perenne	20	Yes	FAC
4. Lepidium latifolium	10	No	FAC
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 100 (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP-12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR4/2	100	10YR3/6	1	C	M	silty clay loam	
4-13	10YR4/1	100	10YR3/6	2	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Palo Alto Tide Gates Improvement Project City/County: Palo Alto / Santa Clara County Sampling Date: April 25, 2019

Applicant/Owner: Valley Water State: CA Sampling Point: SP-13

Investigator(s): Robert F. Perrera Section, Township, Range:

Landform (hillslope, terrace, etc.): Talf Local relief (concave, convex, none): flat Slope (%): 0

Subregion (LRR): C - Mediterranean California Lat: 37.455661 N Long: -122.100919 W Datum: NGVD88

Soil Map Unit Name: Novato clay, 0-1% slopes, tidally flooded NWI classification: Estuarine & Marine Wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔ No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔ No _____	
Wetland Hydrology Present?	Yes ✔ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5-foot radius)			
1. Salicornia pacifica	50	Yes	OBL
2. Frankenia salina	20	Yes	FACW
3. Grindelia stricta	30	Yes	FACW
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species _____	x 1 =	_____
FACW species _____	x 2 =	_____
FAC species _____	x 3 =	_____
FACU species _____	x 4 =	_____
UPL species _____	x 5 =	_____
Column Totals: 100 (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✔ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks:

SOIL

Sampling Point: SP-13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10YR6/1	100	10YR3/6	1	C	M	Silty clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ✓ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX C
Plant List

Table 1. Plant Species Observed in the Study Area on April 25, 2019		
Scientific Name	**Common Name**	**USACE Wetland Indicator Status [A15]**
Achillea millefolium	Yarrow	UPL
Artemisia californica	Coastal sage	UPL
Avena fatua	Wild oat	UPL
Baccharis pilularis	Coyote bush	UPL
Brassica nigra	Black mustard	UPL
Bromus sp.[16]	unknown	UPL
Bromus diandrus	Ripgut brome	UPL
Bromus hordeaceus	Soft brome	FACU
Carduus pycnocephalus	Italian thistle	UPL
Cotula coronopifolia	Common brassbuttons	OBL
Diplacus aurantiacus (formerly *Mimulus aurantiacus)*	Sticky monkey flower	UPL
Distichlis spicata	Coastal salt grass	FAC
Elymus triticoides	Creeping wildrye	UPL
Festuca bromoides (formerly *Vulpia bromoides)*	Brome six-weeks grass	FACU
Festuca perenne (formerly *Lolium perenne)*	Italian rye grass	FAC
Foeniculum vulgare	Sweet fennel	UPL
Frankenia salina	Alkali sea-heath	FACW
Geranium dissectum	Wild geranium	UPL
Grindelia stricta	Oregon gumweed	FACW
Helminthotheca echioides	Bristly ox-tongue	FAC
Hordeum marinum	Seaside barley	FAC
Lepidium latifolium	Broadleaved pepperweed	FAC

15 Source: USACE's National Wetland Plant List, Arid West Region (Lichvar et al. 2016)
16 It may be *Bromus berteroanus* or *Bromus madritensis*.

Table 1. Plant Species Observed in the Study Area on April 25, 2019		
Scientific Name	**Common Name**	**USACE Wetland Indicator Status [A15]**
Ligustrum sp.	Privet tree	UPL
Raphanus sativus	Wild radish	UPL
Rumex crispus	Curly dock	FAC
Salicornia pacifica	Pickleweed	OBL
Spartina foliosa	California cordgrass	OBL

APPENDIX D

Study Area Photographs

Appendix E. Study Area Photographs

PP-1 Inboard of Levee Looking at OHWM Boundary

PP-2 Looking at upper limits of the HTL and toward SP-6

PP-3 Looking north toward tidal slough channel.

PP-3 Looking south toward muted-tidal/managed slough channel.

PP-4 Looking at tide gates and HTL indicators.

PP-5 Looking east.

PP-5 Looking north toward tidal slough channel.

PP-5 Looking south toward muted-tidal/managed wetlands.

PP-5 Looking west toward tide gates.

PP-6 Looking at muted-tidal/managed slough channel near SP-11.

PP-7 Looking at SP-9 soil redox on ped face. Looking toward borrow ditch.

Appendix D
In-Water and Airborne Noise Analysis

Memorandum

To:	Alex Hunt Valley Water
From:	David Buehler, P.E. ICF
Date:	April 15, 2020
Re:	**Palo Alto Tide Gate In-Water and Airborne Noise Analysis**

Introduction

The Palo Alto Flood Basin and tide gate structure were constructed in 1957 to control water discharged into San Francisco Bay from Matadero, Adobe, and Barron Creeks through Mayfield and Charleston Sloughs. Valley Water is proposing to replace the existing tide gate primarily because it is operating beyond its designed 50-year lifespan and the tide gate is subject to future loss of function due to sea-level rise. Figure 1 shows the existing tide gate and levee.

Figure 1. Existing Palo Alto Tide Gate Structure

This memo summarizes calculations related to the effects of in-water and airborne sound on fish and marine mammals from construction activity associated with the proposed project.

Project Description

The new tide gate will be constructed upstream of the existing tide gate in the interior of the Palo Alto Flood Basin (Figure 2).

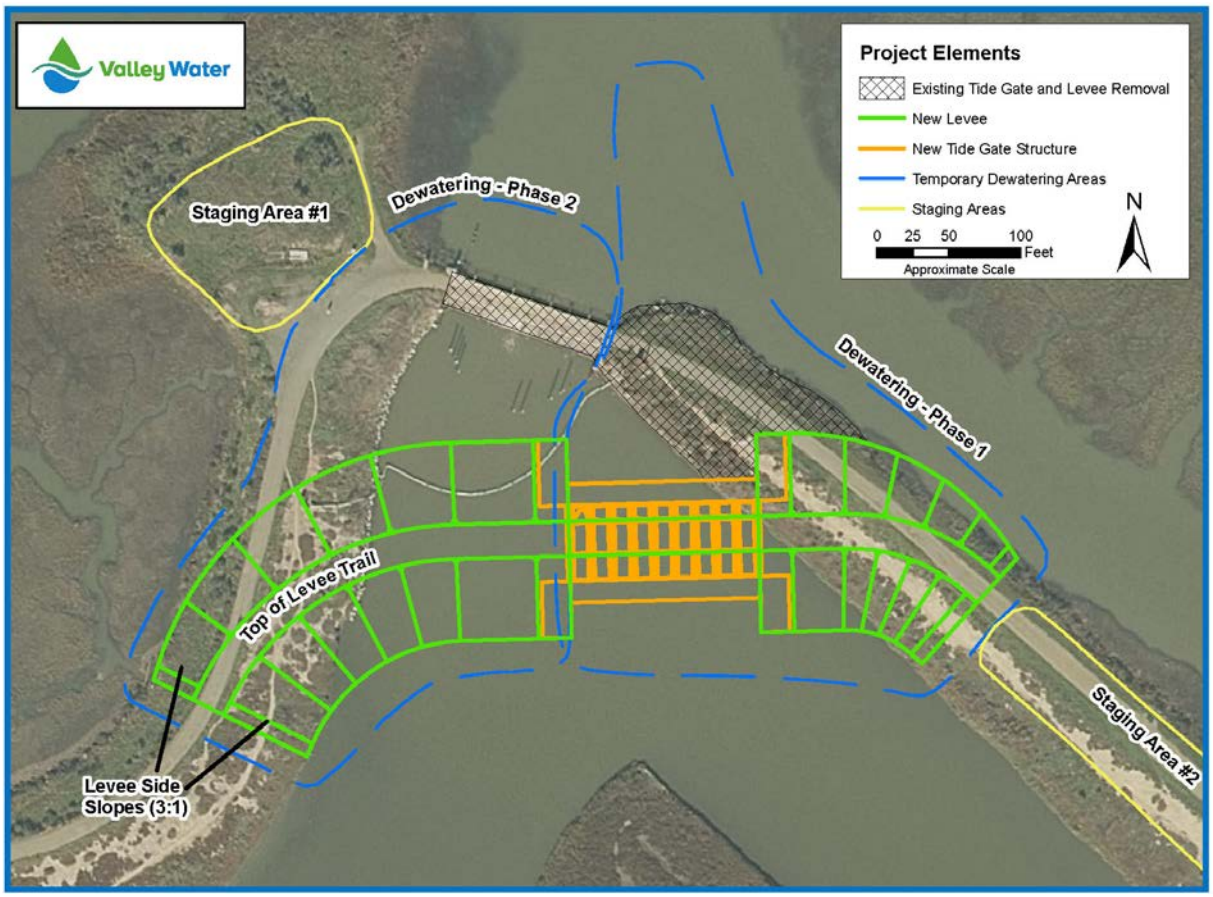

Figure 2. Work Area (Phase 1 and Phase 2)

Construction of the project would occur in two phases: 1) construction of the new tide gate structure and removal of the levee in front of the new tide gate, and 2) removal of the existing tide gate structure and construction of the levee upstream of the removed tide gate (ties into new tide gate). Phase 1 will begin with clearing and grubbing of the existing levee surface. Sheet piles will then be installed with a Giken press-in system around the dewatering limits shown in Figure 2. This system presses the piles into place and does not involve any impact or vibratory driving. Consequently, no underwater noise effects are associated with the use of this system. The area within the sheet piles will be dewatered. Following dewatering, the existing levee will be excavated using an excavator or backhoe and the new tide gate will be installed within the Palo Alto Flood

Basin. Excavation will occur along the existing levee and involve removal of 24,500 cubic yards of levee material for off-site disposal with dump trucks.

After excavation of the levee to allow water to move through the new tide gate, the new tide gate would be installed. A reinforced concrete pile system, reinforced concrete slab, and cut-off wall will be installed to support the new tide gate. Piles will be cast-in-drilled hole (CIDH) piles.

To create each pile, a 36-inch-diameter steel casing will be rotated into the substrate. After the soil is removed from within the casing, steel reinforcing and concrete will be placed in the hole. The casing will be rotated out as the concrete is poured in. Temporary timber formwork will be installed, steel reinforcement placed, and then concrete will be poured and allowed to cure for approximately 28 days or less for each concrete pour. Nine concrete bays will be constructed, with eight cells utilizing a 10-foot by 10-foot side-hinged tide gate, and one cell utilizing a motor driven sluice gate. A rip-rap apron (15 feet wide and 6 feet deep) will be placed on both the Bay and basin sides along the 132-foot length of the structure. Once installation of the new tide gate structure is complete, the sheet piles will be pulled out with the Giken system and the tide gate will begin operation as designed.

The levee to the east of the new tide gate will be reconstructed. Prior to installation of the new levee, ground improvements would be implemented to reduce anticipated ground settlement. The ground improvements are anticipated to utilize Deep-Soil-Mix (DSM) method ground improvements. DSM ground improvements consist of a multi-auger drill rig which mixes the native in situ soil locally with a cement milk to increase the strength properties of the existing soil. The cement milk is contained locally within the existing in situ soil on all sides. The DSM material becomes hard once cured. Following the ground improvements, the foundation of the new levee would be constructed by importing engineered fill material with dump trucks and compacting. A maintenance road will be added to the top of the levee.

Phase 2 will begin with installation of a second sheet pile dewatering system around the original tide gate to isolate the structure and the area where the new levee will connect to the new tide gate. The area within the sheet pile system will then be dewatered. The original tide gate structure will be taken apart either with hoe ram pneumatic hammers (Demo Option 1) or saw cutting (Demo Option 2), removed with one or more cranes, and loaded onto trucks for off-site disposal.

The second section of new levee will be constructed adjacent to the west side of the new tide gate. Prior to installation of new levee to the west of the new tide gate, ground improvements utilizing the DSM method would be implemented to reduce ground settlement, consistent with the approach for the levee east of the new tide gate. Following the ground improvements, the foundation of the new levee would be constructed with engineered fill material and compacted, and the maintenance road will be built along the top of the levee.

After the levee is constructed on both sides of the new tide gate, the dewatering sheet piles will be removed and the levee slopes will be revegetated.

Figure 3 shows where the CIDH piles will be installed for the new tide gate and where DSM will occur under the new levee.

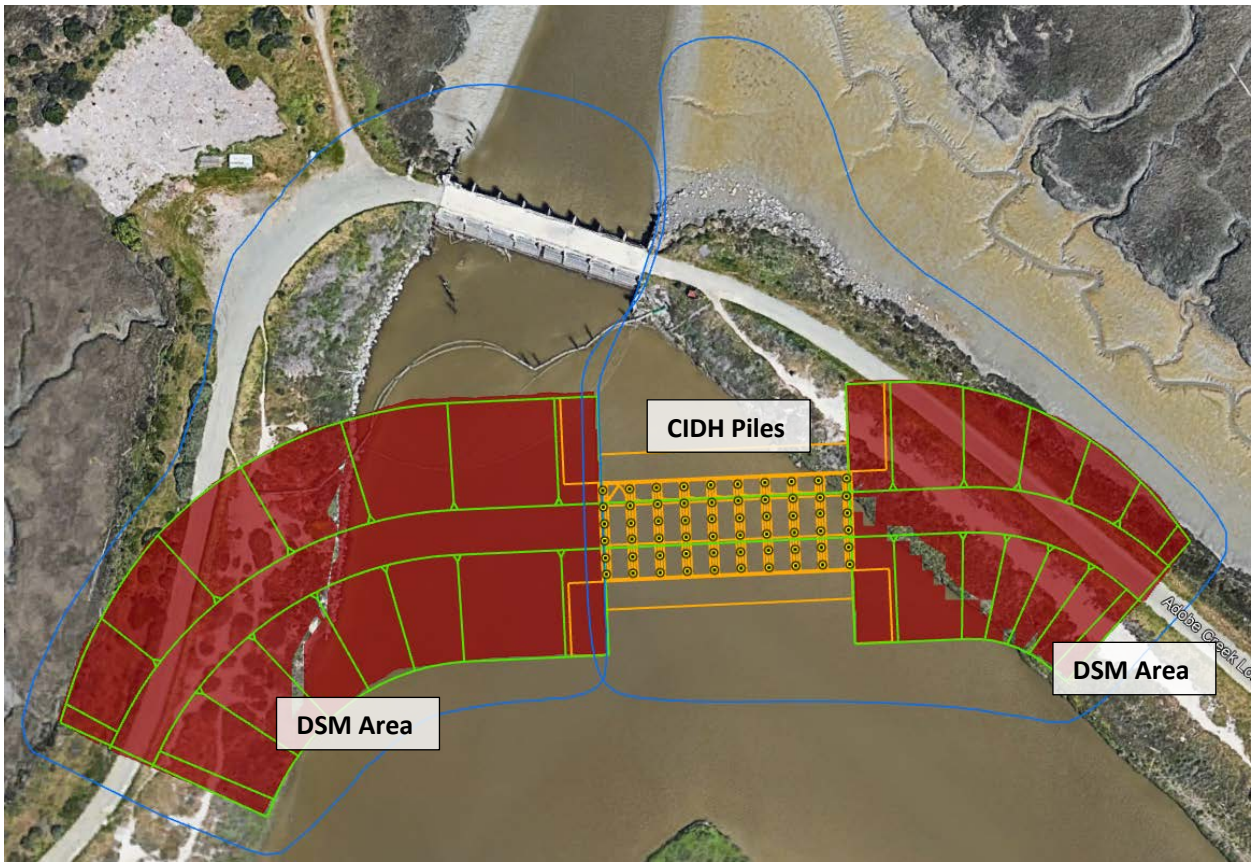

Figure 3. CIDH Pile and DSM Locations

Fundamental Concepts of Sound

Sound is a vibratory disturbance created by a vibrating source in a gaseous or liquid medium that is capable of being detected by hearing organs. Sound may be thought of as the mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. For this analysis, sound in both air and water is considered.

The amplitude of sound can be quantified by directly measuring the pressure increase above the background atmospheric pressure. The peak pressure and the root-mean-squared (RMS) pressure are two common ways to characterize the sound pressure. The RMS pressure is basically the average pressure considering the fact that the modulating pressure wave has both positive and negative excursions above and below atmospheric pressure. Figure 4 depicts a modulating sound pressure wave and the peak and RMS pressures.

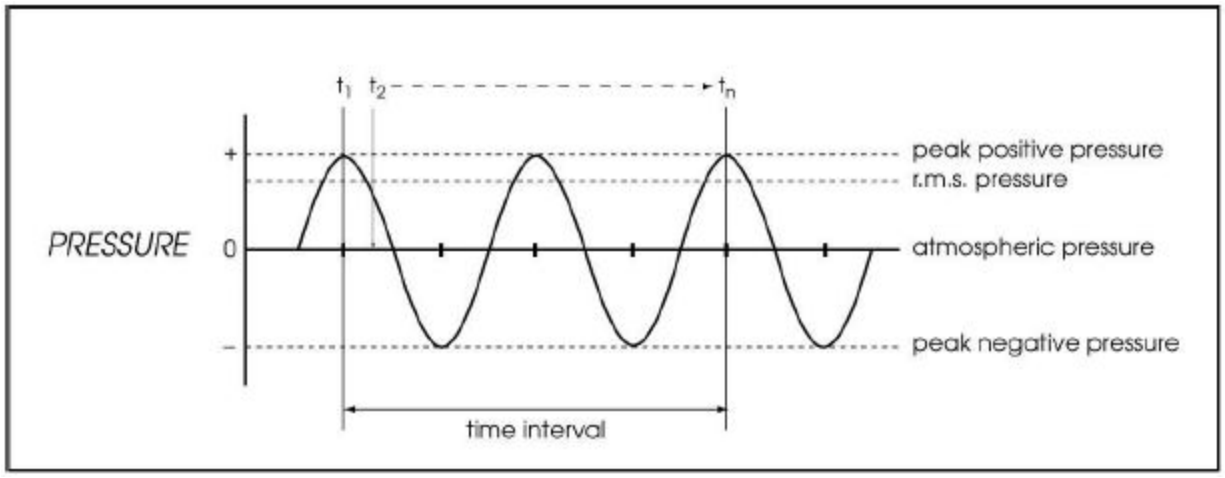

Figure 4. Peak and Root-Mean-Squared Sound Pressure (Source: Caltrans 2013)

Human and animal hearing is sensitive to an extremely wide range of sound pressures. Expressing sound in terms of pressure is very cumbersome because of this wide range. Sound pressure levels (SPLs) are therefore described in logarithmic units of ratios of actual sound pressures to a reference pressure squared called bels. To provide a finer resolution, a bel is divided into tenths, or decibels (dB). In its simplest form, SPL in decibels is expressed as follows:

$$SPL = 10\log(P_1/P_2)^2 \text{ dB}$$

Where: P_1 = the measured sound pressure
P_2 = standardized reference pressure*
*20 micro-pascals for air and 1 micro-pascal for water

The response of human hearing is not equal across all frequencies. Human hearing is most sensitive to frequencies in the range of human speech and less sensitive to low frequency energy. To account for this, a weighting function called A-weighting is typically applied to measured sound levels. The abbreviation "dBA" is used to refer to A-weighted decibels. Airborne sound level criteria for disturbance of marine mammals adopted by the fisheries division of National Oceanic and Atmospheric Administration (NOAA Fisheries) are based on unweighted sound levels. These criteria are discussed in the next section.

When the sound levels from two or more sound sources are combined, the addition must be done on a logarithmic basis rather than an arithmetic basis. For example, if a grader produces a sound level of 85 dBA at 50 feet, the combined sound level of two graders is 88 dBA at 50 feet, not 170 dBA. Sound from a point source such as a grader attenuates at a rate of 6 dB per doubling of distance. This rate of attenuation may increase by 1 to 2 dB if the sound is traveling over an acoustically soft surface such as grass.

Refer to the *Technical Noise Supplement to the Caltrans Traffic Noise Analysis Protocol* (Caltrans 2013) for a detailed discussion of airborne sound metrics.

The following discussion provides a brief introduction into the fundamental concepts and terminology used in underwater sound analysis. Refer to the following documents for more detailed information:

- *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish* (Caltrans 2015)
- *Caltrans Engineering Technical Brief: Overview of the Evaluation of Pile Driving Impacts on Fish for the Permitting Process* (Caltrans 2018)

When a pile is struck with an impact hammer, the pile vibrates and radiates sound energy into the water. Figure 5 shows the pressure modulations associated with a single pile strike. The peak sound pressure occurs immediately after the pile is struck. The pile will then continue to ring for a few hundred milliseconds. One way to characterize the sound produced by the pile strike is to measure the peak sound pressure expressed in decibels relative to 1 micro-pascal. This is called the Peak Sound Pressure Level or L_{PEAK}.

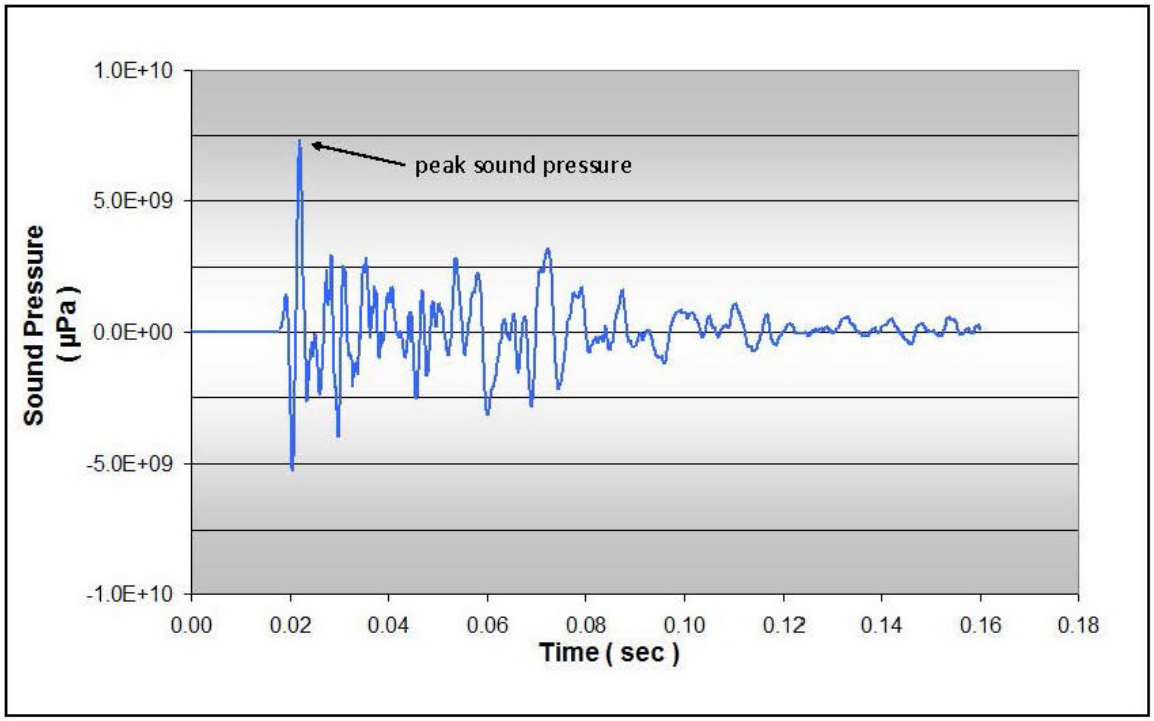

Figure 5. Sound Pressure Resulting from Pile Strike

Another way to quantify the sound associated with a pile strike is to measure the total energy associated with the pile strike. This is commonly expressed as the Sound Exposure Level or SEL. The total sound energy associated with the pile strike is summed and normalized to 1 second. Figure 6 shows how sound energy from a single strike accumulates over time to reach a maximum value. For a given pile and pile strike, the SEL value is typically 25 dB less than the peak level.

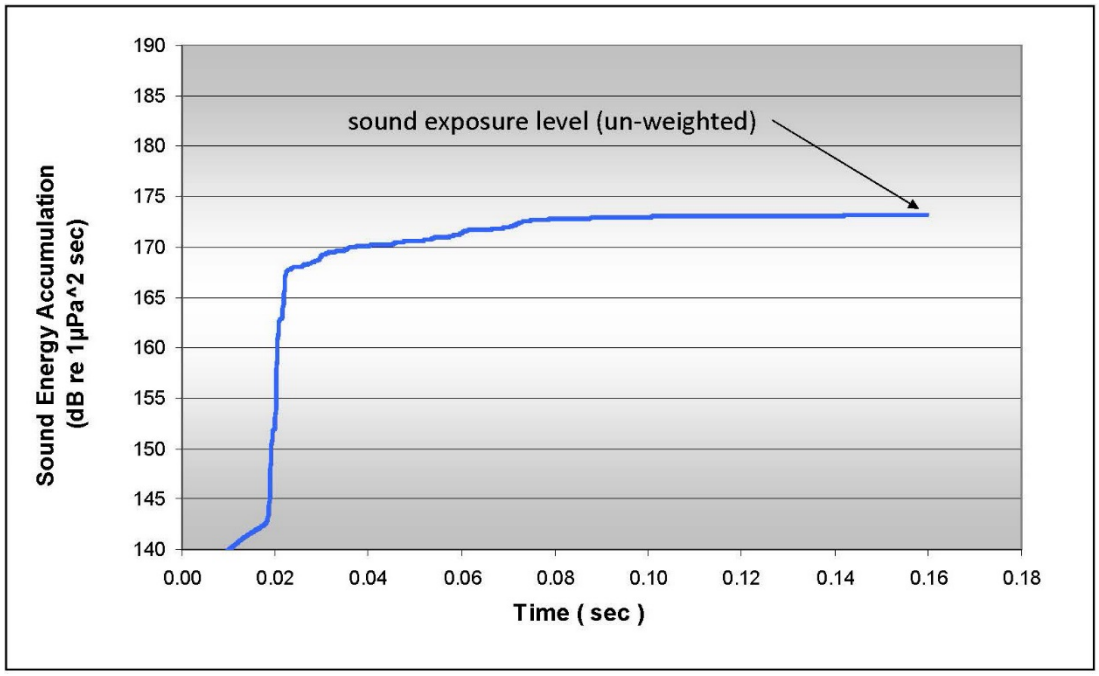

Figure 6. Sound Energy Accumulation Resulting from Pile Strike

Note: This is an "unweighted" sound energy scale and does not use the A-weighting scale normally applied to human hearing.

Because impact pile driving involves a series of pile strikes throughout the day, the cumulative sound energy associated with the pile strikes that occur in 1 day is also used. The cumulative SEL or $SEL_{CUMULATIVE}$ is determined by adding up the sound energy associated with all pile strikes that occur over a given day. If the single strike SEL and the number of daily strikes are known, the cumulative SEL can be calculated with the following equation:

$$SEL_{CUMULATIVE} = SEL_{SINGLESTRIKE} + 10Log\ (number\ of\ strikes)$$

A final metric that is used to characterize pile driving sound is the RMS level. As discussed above, this is essentially an average of the sound energy associated with a single strike.

Underwater sound generated by vibratory driving and rotational installation is similar with the exception that sound pressure is continuous rather than intermittent over the driving period. With vibratory driving, SEL and RMS values are equal. The calculation of cumulative SEL is also different:

$$SEL_{CUMULATIVE} = SEL + 10Log\ (duration\ of\ driving\ in\ seconds)$$

Sound levels diminish over distance as a result of many complex factors. For the purposes of this analysis, a simplified approach is taken. Sound is assumed to diminish at a rate of 4.5 dB per doubling of distance. This is generally a conservative approach and should be used unless there is site-specific information indicating that a different attenuation rate is appropriate. Attenuation is calculated with the following equation:

$$dB_2 = dB_1 - F*\log (D_2/D_1)$$

where: dB_1 is the sound level at a distance of D_1 from the pile
dB_2 is the sound level at a distance of D_2 from the pile
F = attenuation factor (attenuation is 4.5 dB per doubling of distance where F = 15)

EXAMPLE: If pile driving produces a sound level of 206 dB_{PEAK} at a distance of 10 meters, the sound level at a distance of 200 meters can be calculated as follows:

$$dB_{200} = dB_{10} - 15\log(200/10) = 206 - 19.5 = 186.5 \sim 187 \text{ dB}$$

If it is desired to know how much distance is needed for a pile driving sound level to diminish to a specific sound level, the following equation can be used:

$$D_2 = D_1 * 10^{((dB2-dB1)/15)}$$

EXAMPLE: If pile driving produces a cumulative sound level of 214 dB at 10 meters, the distance at which the sound level diminishes to 187 dB can be calculated as follows:

$$D_{187dB} = 10 * 10^{((214-187)/15)} = 10 * 631 = 631 \text{ meters}$$

Interim Injury Criteria

Fish

Acoustic criteria intended to protect fish from harm and mortality caused by pile driving activities were adopted by the California Department of Transportation (Caltrans), the Federal Highway Administration (FHWA), the California Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, and the NOAA Fisheries Northwest and Southwest Regions in 2008. These "interim injury criteria" are now routinely used to evaluate the effects of impact pile driving sound on fish. These criteria do not apply to vibratory pile driving. Vibratory pile driving is considered to be an avoidance and minimization measure for reducing effects on fish from impact pile driving and is not assessed for potential injury to fish. The same line of thinking is also applied to pile drilling and deep soil mixing. Vibratory driving, pile drilling, and deep soil mixing however, may affect marine mammals, and so vibratory driving, pile drilling, and deep soil mixing must be considered when marine mammals are present. Table 1 summarizes the adopted interim criteria for fish.

Table 1. Interim Injury Criteria for Fish

Interim Injury Criteria	Agreement in Principal
Peak	206 dB
Cumulative SEL	187 dB – for fish size of two grams or greater 183 dB – for fish size of less than two grams

dB = decibels; SEL = Sound Exposure Level.

Additional guidance provided by NOAA Fisheries states that a level of 150 decibels root-mean-squared (dB_{RMS}) should be used to assess potential behavioral effects on fish. The accumulation period for the cumulative SEL is 1 day of activity. In other words, the accumulative energy resets each day.

Marine Mammals

In 2018, NOAA Fisheries published criteria for assessing in-water impacts on marine mammals from pile driving and other construction sources (NOAA 2018). These thresholds relate to the onset of permanent hearing threshold shift (PTS) and have frequency weighting functions that are applied to overall measured unweighted sound levels based on the type of activity (e.g., drilling, pile driving) and the potentially affected species. Background and details on these criteria can be found here:

https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance

In-water and in-air acoustic thresholds for behavioral disruption were previously reported on the NOAA Fisheries Westcoast Region website at:

https://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html

Tables 2, 3, and 4 summarize these various criteria. Level A thresholds (Table 2) relate to physical injury and Level B thresholds (Table 3) relate to behavioral disruption. As with fish, the accumulation period for the cumulative SEL is 1 day of activity and the accumulative energy resets each day.

Table 2. NOAA Fisheries In-water Level A Acoustic Thresholds (PTS Onset)

Criterion Level A Hearing Groups	PTS Onset (Received Sound Level)	
	Impulsive Sound Source	Non-Impulsive Sound Source
Low-frequency Cetaceans (LF) *(baleen whales)*	Peak: 219 dB_{LF} SEL_{CUM}: 183 dB_{LF}	SEL_{CUM}: 199 dB_{LF}
Mid-frequency Cetaceans (MF) *(dolphins, toothed whales, beaked whales, bottlenose whales)*	Peak: 230 dB_{MF} SEL_{CUM}: 185 dB_{MF}	SEL_{CUM}: 198 dB_{MF}
High-frequency Cetaceans (HF) *(true porpoises, Kogia, river dolphins, cephalorhynchid, Lagenorhynchous cruciger and australis)*	Peak: 202 dB_{HF} SEL_{CUM}: 155 dB_{HF}	SEL_{CUM}: 173 dB_{HF}
Phocid Pinnipeds (PW) *(true seals)*	Peak: 218 dB_{HF} SEL_{CUM}: 185 dB_{HF}	SEL_{CUM}: 201 dB_{HF}
Otariid Pinnipeds (OW) *(sea lions and fur seals)*	Peak: 232 dB_{HF} SEL_{CUM}: 203 dB_{HF}	SEL_{CUM}: 219 dB_{HF}

Notes: Dual Thresholds (impulsive): Use one resulting in largest effect distance (isopleth); SEL thresholds incorporate frequency weighting functions; all decibels referenced to 1 micro-pascal (re: 1uPa); the recommended accumulation period is 24 hours.
dB = decibels; PTS = permanent hearing threshold shift SEL_{CUM} = cumulative Sound Exposure Level.

Table 3. NOAA Fisheries In-Water Level B Acoustic Thresholds (Behavioral Disruption)

Criterion	Criterion Definition	Threshold
Level B	Behavioral disruption for impulsive noise	160 dB_{RMS}
Level B	Behavioral disruption for continuous noise	120 dB dB_{RMS}[a]

Note: All decibels referenced to 1 micro-pascal (re: 1uPa).
[a] The 120 dB threshold may be slightly adjusted if background noise levels are at or above this level.
dB_{RMS} = decibels root-mean-squared.

Table 4. NOAA Fisheries Current In-Air Level A and Level B Acoustic Thresholds

Criterion	Criterion Definition	Threshold
Level A	PTS (injury) conservatively based on TTS	None established
Level B	Behavioral disruption for harbor seals	90 dB_{RMS}
Level B	Behavioral disruption for non–harbor seal pinnipeds	100 dB_{RMS}

Note: All decibels referenced to 20 micro-pascals (re: 20uPa).
dB_{RMS} = decibels root-mean-squared; PTS = permanent hearing threshold shift; TTS = temporary hearing threshold shift.

Analysis Methods

Fish

NOAA Fisheries has published a Microsoft Excel spreadsheet that facilities the assessment of underwater sound impacts from pile driving on fish. Data inputs to the spreadsheet include sound source levels for the pile being evaluated, the number of pile strikes per day, and the sound attenuation rate (typically 4.5 dB per doubling of distance). Source levels are typically taken from the database of pile driving sound levels reported in Caltrans 2015. This is commonly referred to as the pile driving "compendium." The spreadsheet determines the distances within which the various injury criteria are exceeded. These distances are often referred to as "injury isopleths."

An important concept related to the analysis of underwater sound impacts on fish is the concept of "effective quiet." Effective quiet relates to the calculation of cumulative SEL. As discussed above, the cumulative SEL value is calculated using the single strike SEL value and the anticipated number of daily pile strikes. The sound level generated by pile driving diminishes with distance from the pile. At a certain distance, the pile driving sound level is so low that it is no longer expected to result in injury to fish even when the energy is accumulated from multiple pile strikes. The area beyond this distance is called the area of effective quiet and is considered to be located at the point where the single strike SEL value drops to 150 decibels or less. Accordingly, the distance at which the single strike SEL drops to less than 150 dB is the maximum distance within which injury is assumed to result. This means that at about 5,000 strikes, the injury isopleth relative to the 187 dB criterion does not increase. This occurs at about 2,000 strikes relative to the 183 dB criterion.

Concrete in the existing tide gate will be demolished with pneumatic hammers (Demo Option 1) or with saw cutting (Demo Option 2). Demolition with pneumatic hammers would be faster than saw cutting but it results in substantially higher in-water sound levels. The saw cutting is included as an option to reduce in-water sound from demolition activities.

There is very limited information on assessing underwater sound from in-water concrete demolition activities using pneumatic hammers. However, Caltrans has published a technical advisory that provides guidance on the assessment of underwater sound levels from pneumatic hammer demolition activities (Caltrans 2016). The advisory suggests that a conservative approach for an analysis is to assume single strike peak, RMS, and SEL values of 206 dB, 186 dB, and 174 dB, respectively at 10 meters. Data collected on one project indicates that a full day of demolition work (10 hours) resulted in more than 11,000 strikes. For this analysis, it is assumed that a full day of demolition activity with one device will result in 11,000 strikes and the two devices operating at the same time will result in 22,000 strikes per day.

Information on underwater sound generated by concrete cutting is also very limited. The U.S. Army Corps of Engineers has reported on underwater sound levels produced by diamond wire cutting machines cutting through concrete (USCOE 2018). The reported underwater sound levels are as follows:

- 154 dB at 1 meter
- 147 dB at 1 meter

- 174 dB at 1.2 meters

Assuming an underwater attenuation rate of 4.5 dB per doubling of distance these sound levels correspond to the following:

- 139 dB at 10 meters
- 132 dB at 10 meters
- 160 dB at 10 meters

For a continuous source such as saw cutter the RMS and SEL values would be the same. These sound levels are substantially less that the sound levels produced by pneumatic impact demolition. For this analysis it is assumed that the duration of a full day of saw cutting would be the same as pneumatic demolition (10 hours). If two cutters are used the equivalent daily duration of cutting would be 20 hours.

Marine Mammals

Underwater Sound

NOAA Fisheries has also published a Microsoft Excel spreadsheet that facilities the assessment of underwater sound impacts on marine mammals from non-impulsive sources (e.g. drilling, vibratory pile driving, and tactical sonar) and impulsive sources (e.g. impact pile driving, explosives, seismic exploration). The spreadsheet provides default Weight Factor Adjustments (WFAs) to account for variations in hearing responses from the various marine mammal hearing groups. The default WFAs are used if the frequency spectrum from the source is not available. For most typical analyses, source levels are taken from the compendium of pile driving source levels in the Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish (Caltrans 2015). Because spectra are not available for these source levels, the default WFAs are used.

The analysis process assumes that marine mammals remain stationary during the sound generating activity. In addition, recovery between intermittent sounds is not considered for sound energy that occurs with the accumulation period of 24 hours. The spreadsheet uses inputs that are similar to the fish spreadsheet and calculates the distance within which the PTS criterion is predicted to be exceeded. This distance is called the “PTS isopleth.”

The concept of effective quiet is not applied to marine mammal analysis.

Airborne Sound

As shown in Table 4, the airborne Level B behavioral disruption criterion is 90 dB_{RMS} for harbor seals and 100 dB_{RMS} for non-harbor seal pinnipeds. These are unweighted sound pressure levels. Unweighted sound pressure levels are commonly expressed as dBZ. Sound levels for environmental noise impact analysis are most commonly measured using A-weighting, which is a frequency modification based on how humans hear sound. To make a construction noise assessment relative to the unweighted criteria, unweighted construction noise source levels are needed. The FHWA Roadway Construction Noise Model (RCNM) is a commonly accepted reference for noise levels

generated by construction equipment. These reference sound levels, however, are A-weighted. The unweighted sound levels can be estimated from these A-weighted sound levels with conversion factors developed from measured sound level spectra. Table 5 summarizes typical A-weighted to Z-weighted conversions that can be used to estimate Z-weighted sound levels from typical RCNM A-weighted source levels. These are typical values and do not necessarily represent equipment to be used on this project.

Table 5. Development of dBA to dBZ Conversion

Equipment	Distance (feet)	dBA-L_{MAX}	dBZ-L_{MAX}	Difference (dB)	Difference Rounded Up (dB)
Compressor[a]	50	67.5	81.3	13.8	14
Street Sweeper[a]	50	85.1	91.6	6.5	7
Blasting[a]	50	89.9	99.7	9.8	10
Rock Drill[a]	50	90.2	92.4	2.2	3
Deep Foundation Drilling[a]	50	95.7	100.0	4.3	5
Concrete Saw[a]	50	88.4	89.3	0.9	1
Vibratory Pile Driver[b]	50	86.8	96.1	9.3	10
Front-end loader, backhoe, crane, concrete mixer, grader, paver[c]	50	88.7	95.7	7.0	7
Compactor[c]	50	75.0	79.3	4.3	5
Jackhammer[c]	50	88.9	93.5	4.6	5
Generator[c]	50	82.8	85.2	2.4	3

Sources:
[a] Carpenter 2018.
[b] Gill 1983.
[c] EPA 1971.
dB = decibels; dBA-L_{MAX} = maximum A-weighted sound level; dBZ-L_{MAX} = maximum unweighted sound level.

Project engineers have provided details on the types of construction equipment that will be used during each activity within each phase. Cumulative noise levels produced by all equipment that will be used during each activity within each phase have been calculated using reference noise levels from the RCNM and the dBA to dBZ conversions provided in Table 5.

General

Technical information on the size, type and number of piles along with assumptions for drilling duration was provided by Alex Hunt of Valley Water.

There is very little measured underwater sound level data on drilling installation of piles. For a 24-inch round steel pile, JASCO 2016 reports an RMS sound level of 168 dB at 10 meters. The compendium has no sound level data for drilling operations. The compendium does however report vibratory driven RMS sound levels for 12-inch, 36-inch, and 72-inch steel piles of 155 dB, 170 dB,

and 180 dB, respectively. Although there are no data on vibratory driving of 36-inch steel piles, the data on the 12-inch, 36-inch, and 72-inch piles suggests that the sound level for drilling installation of a 36-in pile would be similar to the sound level generated by vibratory driving. Accordingly, the analysis of pile drilling assumes that the source sound level for drilling is the same as for vibratory driving.

There are no data on underwater sound levels produced by deep soil mixing. However, because deep soil mixing involves a drilling process that is similar to pile drilling, underwater sound levels produced by deep soil mixing operational assumptions are assumed to be the same as pile drilling.

Bubble curtain systems are often applied to reduce underwater sound produced by piles driven in water. The effectiveness of a bubble curtain system in reducing underwater sound can vary significantly depending on how the system is designed and operated. Site conditions can also affect the noise reduction. For example, a location with high current can reduce the effectiveness of the bubble curtain because the bubbles can be swept away by the current. Caltrans 2015 indicates that a properly operating bubble curtain system can provide 5 to 20 dB of noise reduction. For the purposes of this analysis, a bubble curtain is presumed to provide 7 dB of noise reduction. This assumption has been applied and accepted in recent Incidental Harassment Authorizations published by NOAA Fisheries (83 Federal Register 53217–53231 and 84 Federal Register 28474–28489). Bubble curtain systems cannot be applied to sheet pile installations because the bubble ring needs to completely surround the pile to be effective. Cofferdam sheet piles are connected to create a linear wall as they are installed, which precludes surrounding the piles with a bubble ring.

Piles for this project will be installed within dewatered cofferdams. For the purposes of this analysis, it is assumed that the decoupling of the pile surface from the water provided by a dewatered cofferdam will provide noise reduction similar to noise reduction provided by a bubble curtain (7 dB).

Analysis Results

Tables 6 and 7 summarize the results of the hydroacoustic assessment. Table 6 addresses the drilling of the CIDH piles. Tables 7 and 8 address the demolition of the existing gate. Table 9 summarizes the results of the airborne noise assessment.

Table 6. Hydroacoustic Assessment for CIDH Piles and Marine Mammals

			Isopleth Distance to Cumulative SEL Marine Mammal Level A Thresholds (feet)					Distance to Level B Threshold for Continuous Sound (feet)
Location	Material	Pile Size	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	
New Tide Gate	CIDH Steel Pile	36-inch diameter	264	15	231	141	10	52,000
New Levee	DSM	NA	264	15	231	141	10	52,000

CIDH = cast-in-drilled hole; SEL = Sound Exposure Level.

Table 7. Pneumatic Hammer Demolition Hydroacoustic Assessment for Marine Mammals (Demo Option 1)

Location	Number of Concurrent Hoe Rams	Cumulative SEL (dB)	Distance to Level A Cumulative SEL for Marine Mammals (feet)					Distance to Level B Threshold for Impulsive Sound (feet)
			Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	
Tide Gate Demo	1	207	1,390	49	1,656	744	54	606
Tide Gate Demo	2	210	2,206	78	2,628	1,181	86	606

dB= decibels; SEL = Sound Exposure Level.

Table 8. Saw Cutting Demolition Hydroacoustic Assessment for Marine Mammals (Demo Option 2)

Location	Number of Concurrent Saw Cutters	Distance to Level A Cumulative SEL for Marine Mammals (feet)					Distance to Level B Threshold for Continuous Sound (feet)
		Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	
Tide Gate Demo	1	31	2	27	16	1	5200
Tide Gate Demo	2	49	3	43	26	2	5200

Table 9. Demolition Hydroacoustic Assessment for Fish (Option 1 Pneumatic Hammer)

Location	Number of Concurrent Hoe Rams	Cumulative SEL (dB)	Distance to Injury Isopleth for Fish (feet)			Distance to Disturbance Threshold (feet) (all fish)
			Peak (all fish)	Cumulative SEL (fish > 2 grams)	Cumulative SEL (fish < 2 grams)	
Tide Gate Demo	1	207	33	446	446	8,241
Tide Gate Demo	2	210	33	446	446	8,241

dB= decibels; SEL = Sound Exposure Level.

Under Option 2 saw cutting there would be no impact to fish because saw cutting is a continuous activity similar to vibratory pile driving.

Table 10. Airborne Noise Assessment for Construction Activity (Demo Option 1 Pneumatic Hammers)

Phase	Activity	Cumulative Sound Level at 50 feet by Activity (dBZ)	Distance to Level B Behavior Criterion (90 dB_{RMS}) for Harbor Seals (feet)	Distance to Level B Behavior Criterion (100 dB_{RMS}) for Non-Harbor Seal Pinnipeds (feet)
1	Clearing and grubbing	95	89	28
	Install sheet pile dewatering system[1]	70	5	2
	Dewater sheet pile system	95	89	28
	Excavate existing Levee	93	71	22
	Install 36-inch diameter CIDH piles	92	63	20
	Place rip-rap	91	56	18
	Pour concrete	95	89	28
	Remove sheet piles	93	71	22
2	Install sheet pile dewatering system[1]	70	5	2
	Dewater sheet pile system	95	89	28
	Demo existing tide gate (pneumatic hammers)	99	141	45
	DSM	92	63	20
	Import fill	93	71	22
	Construction maintenance road	91	56	18
	Remove sheet piles	90	50	16

CIDH = cast-in-drilled hole; dB_{RMS} = decibels root-mean-squared; dBZ = unweighted decibels;
[1] Based on source level of 62.3 dBA at 16 meters from Giken. This is equivalent to 63 dBA and 70 dBZ at 50 feet.

Table 11. Airborne Noise Assessment for Construction Activity (Demo Option 2 Saw Cutting)

Phase	Activity	Cumulative Sound Level at 50 feet by Activity (dBZ)	Distance to Level B Behavior Criterion (90 dB_{RMS}) for Harbor Seals (feet)	Distance to Level B Behavior Criterion (100 dB_{RMS}) for Non-Harbor Seal Pinnipeds (feet)
1	Clearing and grubbing	95	89	28
	Install sheet pile dewatering system[1]	70	5	2
	Dewater sheet pile system	95	89	28
	Excavate existing Levee	93	71	22
	Install 36-inch diameter CIDH piles	92	63	20
	Place rip-rap	91	56	18
	Pour concrete	95	89	28
	Remove sheet piles	93	71	22
2	Install sheet pile dewatering system[1]	70	5	2
	Dewater sheet pile system	95	89	28
	Demo existing tide gate (saw cutting)	94	75	25
	DSM	92	63	20
	Import fill	93	71	22
	Construction maintenance road	91	56	18
	Remove sheet piles	90	50	16

CIDH = cast-in-drilled hole; dB_{RMS} = decibels root-mean-squared; dBZ = unweighted decibels;
[1] Based on source level of 62.3 dBA at 16 meters from Giken. This is equivalent to 63 dBA and 70 dBZ at 50 feet.

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Appendix E
Potential Erosional Impacts Report

FINAL

AECOM Imagine it. Delivered.

Potential Erosion Impact at PAFB

Valley Water

Project number: 60625637

January 28, 2021

Quality information

Prepared by	Checked by	Verified by	Approved by
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1. Introduction

AECOM performed a numerical modeling study for Valley Water (VW) to assess potential erosion impacts due to construction of a new tide gate near Palo Alto to replace the existing gate.

Figure 1-1 Overview of study area in South San Francisco Bay near Palo Alto.

AECOM has considered the gate alternative layout as shown in Figure 1-2. The main question is whether this new location and alignment will lead to erosion of the marsh directly to the northeast of the gate at Hooks Island. The marsh is critical to habitat and to protection of power line facilities located on the marsh. Additionally, there is a secondary concern of whether the main Bay channel could move position and impact a floating dock facility north of the gate. Figure 1-3 shows the location of the dock facility.

Numerical hydrodynamic modeling was performed to predict instantaneous velocities, discharges and water levels of the system. The hydrodynamic model was also used to compute bottom shear stresses. The study relied on existing data for bathymetry, topography, gate flows and bay wide tidal forcing.

Horizontal CA State Plane Zone 3 and vertical NAVD88 datums, both in feet, are used throughout the study, unless noted otherwise.

This report has been updated from a previously released version dated April 1, 2020, to include additional analysis to assess impacts of a dewatering cofferdam that will be placed in the channel separating Hooks Island and Mayfield Slough during a 2-year long construction phase. The location of the cofferdam is shown in Figure 1-4. The impacts of the cofferdam will be presented in a separate chapter, Section 3.

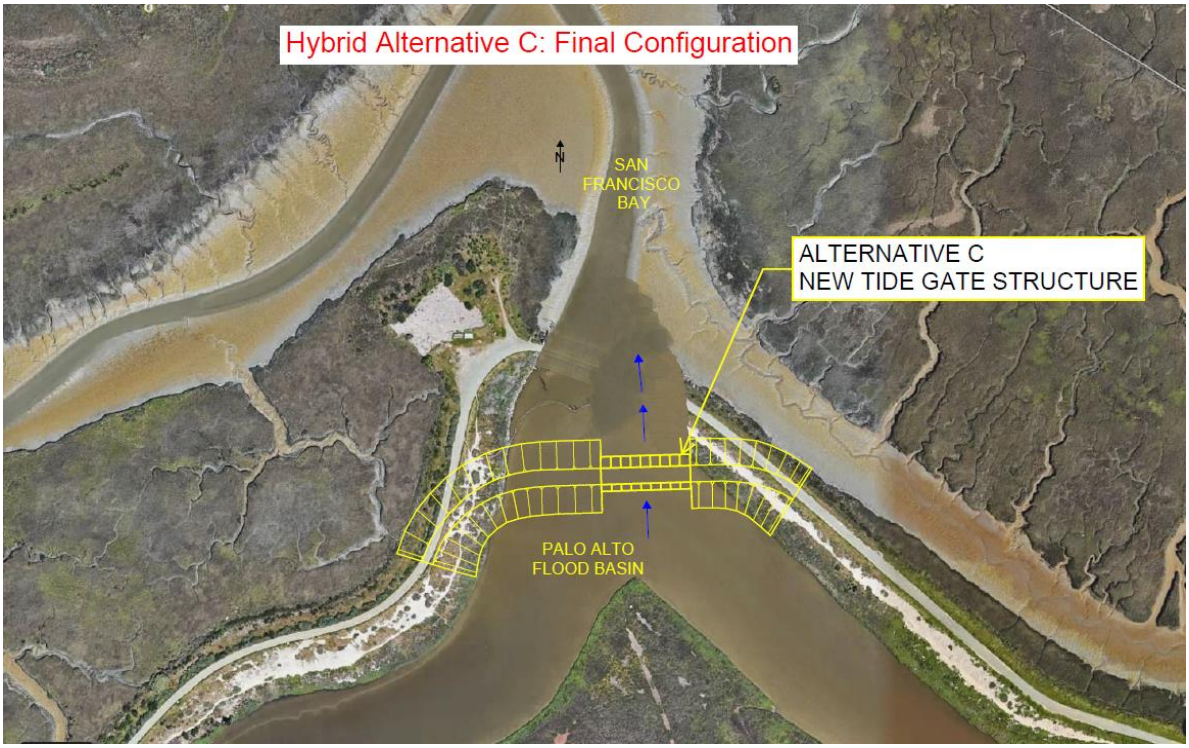

Figure 1-2 Layout of proposed new gate.

Figure 1-3 Location of floating dock relative to the tide gage within the Bay channel.

Figure 1-4 Location of construction dewatering cofferdam.

2. Modeling of Tidal Hydrodynamics

2.1 The Numerical Model – MIKE 21 FM HD

AECOM utilized the MIKE 21 FM HD (Flexible Mesh Hydrodynamic) model. The numerical model includes important physical processes to predict tidal hydrodynamics (water levels, flow velocities and discharges) for non-stratified flows.

The MIKE 21 HD FM modeling system is based on the numerical solution of the two-dimensional shallow water equations - the depth-integrated incompressible Reynolds averaged Navier-Stokes equations. Thus, the model consists of continuity, momentum, temperature, salinity and density equations. In the horizontal domain both Cartesian and spherical coordinates can be used.

The model can include the following physical features:

- bottom shear stress
- wind shear stress
- barometric pressure gradients
- Coriolis force
- momentum dispersion
- sources and sinks
- evaporation
- flooding and drying
- wave radiation stresses

Hydrographic boundary conditions can be specified as

- a constant or variable (in time and space) water level, velocity or discharge at each open model boundary,
- as a constant or variable source or sink anywhere within the model,
- and as an initial free surface level map applied over the entire model.

The model also has the capability to include a number of internal structures, including gates, weirs, culverts, dikes, etc.

Outputs from the model can include spatially varying water levels, water depths, fluxes, velocities, discharges and bottom shear stress, to name a few.

2.2 Modeling Methodology and Setup

Two model mesh versions were created. The first model represents the existing gate conditions. The existing gate scenario is used to establish a baseline to compare to the proposed alternative gate layout. The second mesh is for the proposed new gate layout. A new channel and new levee sections were created at and around the new tide gate location. The second mesh relies on drawings supplied from VW.

Various bathymetric data sources were evaluated for use in this study. The USGS seamless 2-meter DEM of the San Francisco Bay was selected for use and is shown in Figure 2-1, zoomed in around the study area. The DEM was obtained from the following link:

https://topotools.cr.usgs.gov/topobathy_viewer/dwndata.htm

Based on the metadata file that can also be obtained from the above link, the DEM is a combination of many topographic (LiDAR) and bathymetric surveys performed over various periods of time and depends on the region of the bay considered. LiDAR data is typically from the period between 2010 to 2012. Bathymetry survey data varies, and LiDAR is used to the low tide level. Most of this area was collected in 2004 by USGS. The DEM is used to represent model mesh bed elevations as-is without performing any field validation. There are some concerns that the DEM may be underestimating water depths in some areas. For example, at the gates the DEM reports a depth of -1.71 feet (NAVD88), while the bottom of the existing gate is minimally at -2.2 feet (NAVD88). We would expect the ground level to be level or below the bottom of the gate flaps. Also, the bed level of the channel downstream of the gate rapidly rises to a level of about +0.3 feet (NAVD88), which is likely also somewhat higher than reality since these channels don't typically completely dry out at low tide. If future phases of this project are carried out, requiring more detailed analysis, then it is recommended to perform field bathymetric surveys for the channel areas. Considering that the model bathymetry in the channels may be higher than exists in the field, the study places more emphasis on qualitative comparisons between model simulations of alternatives versus quantitative comparisons. Also, more weight is placed on comparison of flow velocities versus bed shear stresses, as the bed shear stresses are also sensitive to uncertainties of the bottom bathymetry levels in the channels and comparing to typical soil shear strengths is not practical at this stage of the investigation. Note that no data was available to perform a calibration/validation of the model, thus model inputs were based on best available data and engineering judgement from previous studies performed in the Bay. The regional San Francisco Bay model used for providing boundary conditions into this model was thoroughly calibrated for the FEMA studies.

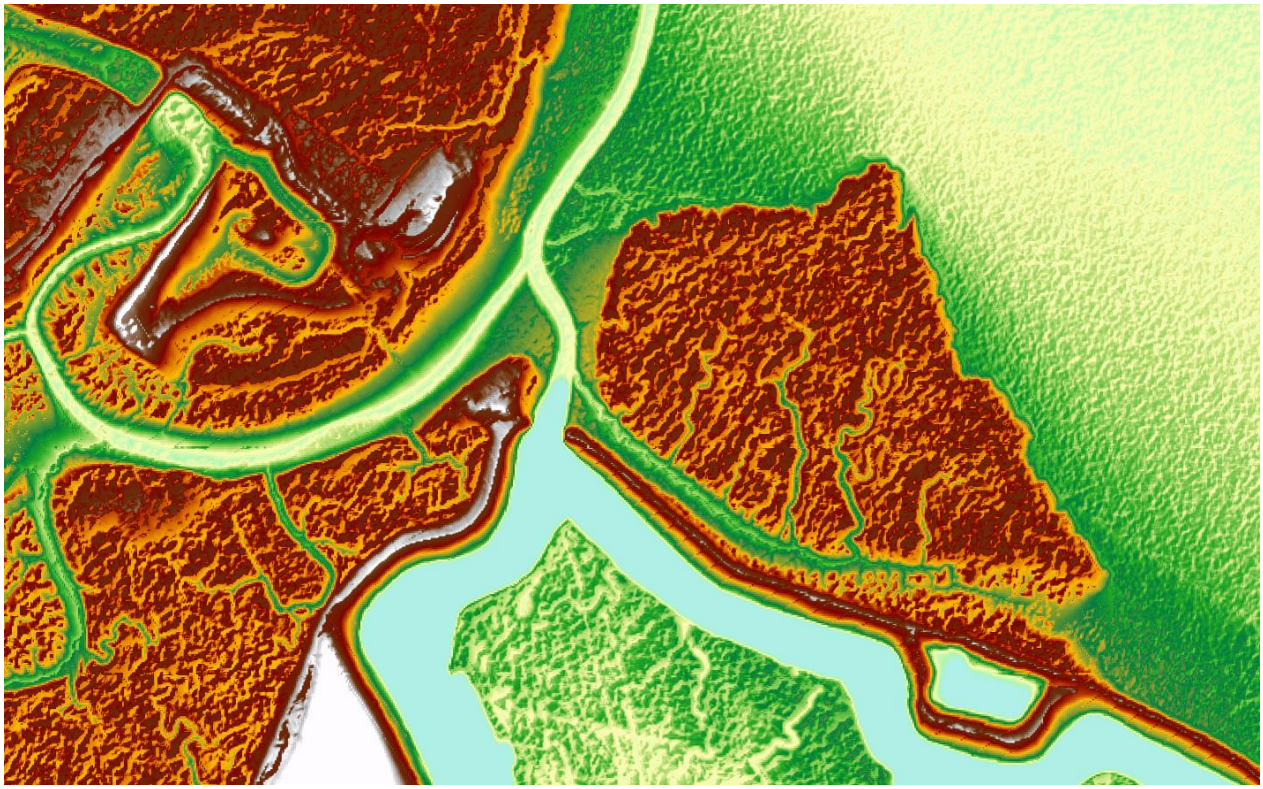

Figure 2-1 Screen shot of USGS 2m seamless DEM covering the model area.

2.2.1 Model Domain and Computational Mesh

The MIKE 21 model bathymetric domain is shown in Figure 2-2 below. The model extends into the Dumbarton Bay about one mile from shore, and includes about 2.7 miles of bay shoreline, to avoid model open boundaries being too close to the area of interest.

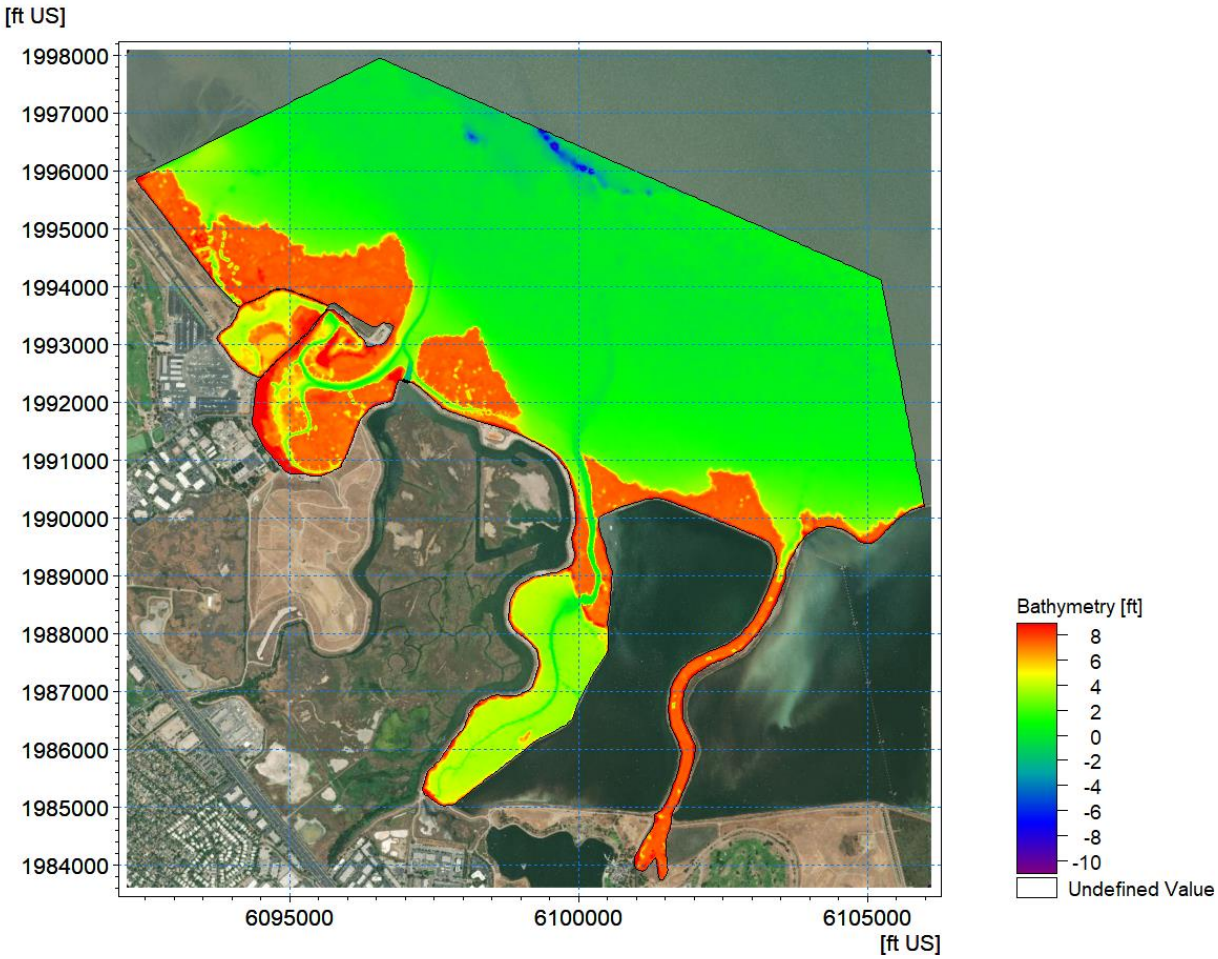

Figure 2-2 MIKE 21 model domain and bathymetry. Elevations in feet relative to NAVD88.

The MIKE 21 model mesh is constructed of triangular elements of variable sizes, placing smaller triangles in the main channels and near the area of interest and coarser elements in marshes and further away from the area of interest. Element side length sizes range from about 15 feet to 100 feet in size. The USGS bathy/topo DEM is used to interpolate elevations to the mesh nodes. It is evident that the USGS DEM in the area around the gate is generally shallower than what is expected at the location of the existing gates. The bottom of the gate flaps is at elevation -2.2 ft, NAVD88. The mesh elevations were adjusted (deepened) to -2.2 feet at the gates and transitioned north of the gates for a distance of about 600 feet.

Figure 2-3 and Figure 2-4 show the model meshes zoomed in around the area of interest for the existing gate and proposed gate scenarios, respectively.

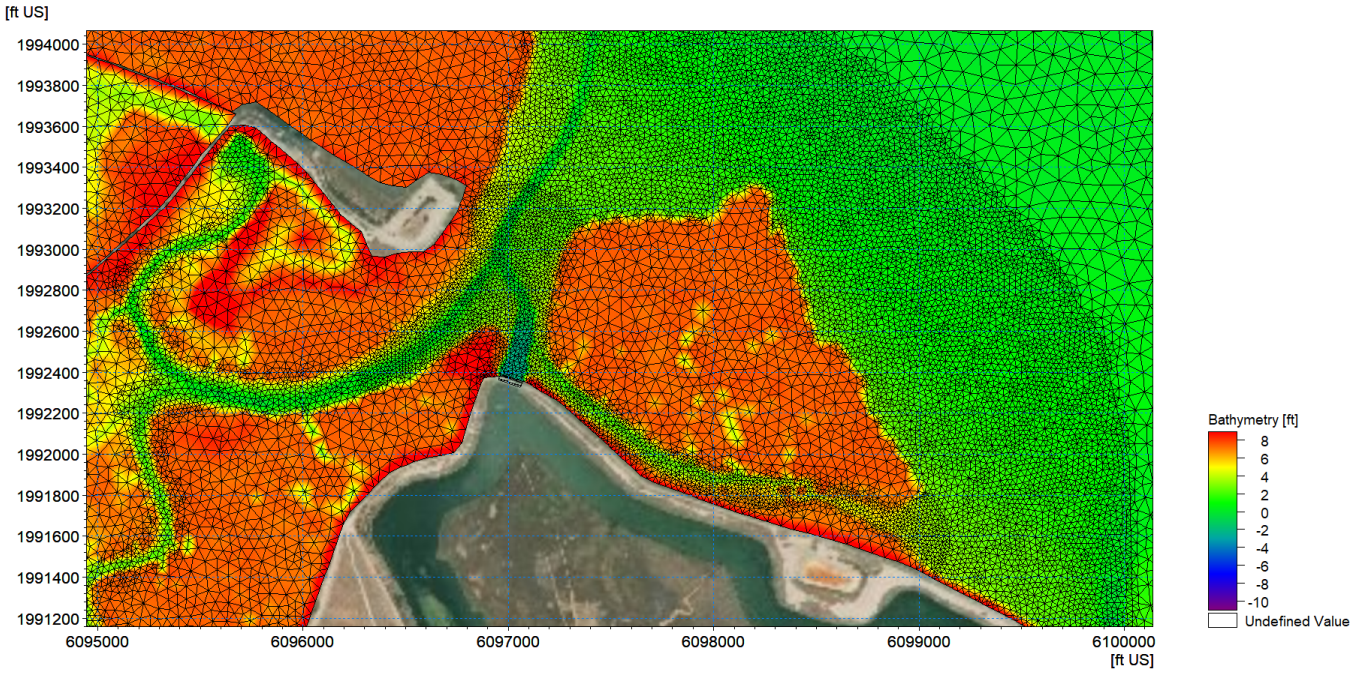

Figure 2-3 Existing Gate MIKE 21 model mesh zoomed in around gate area.

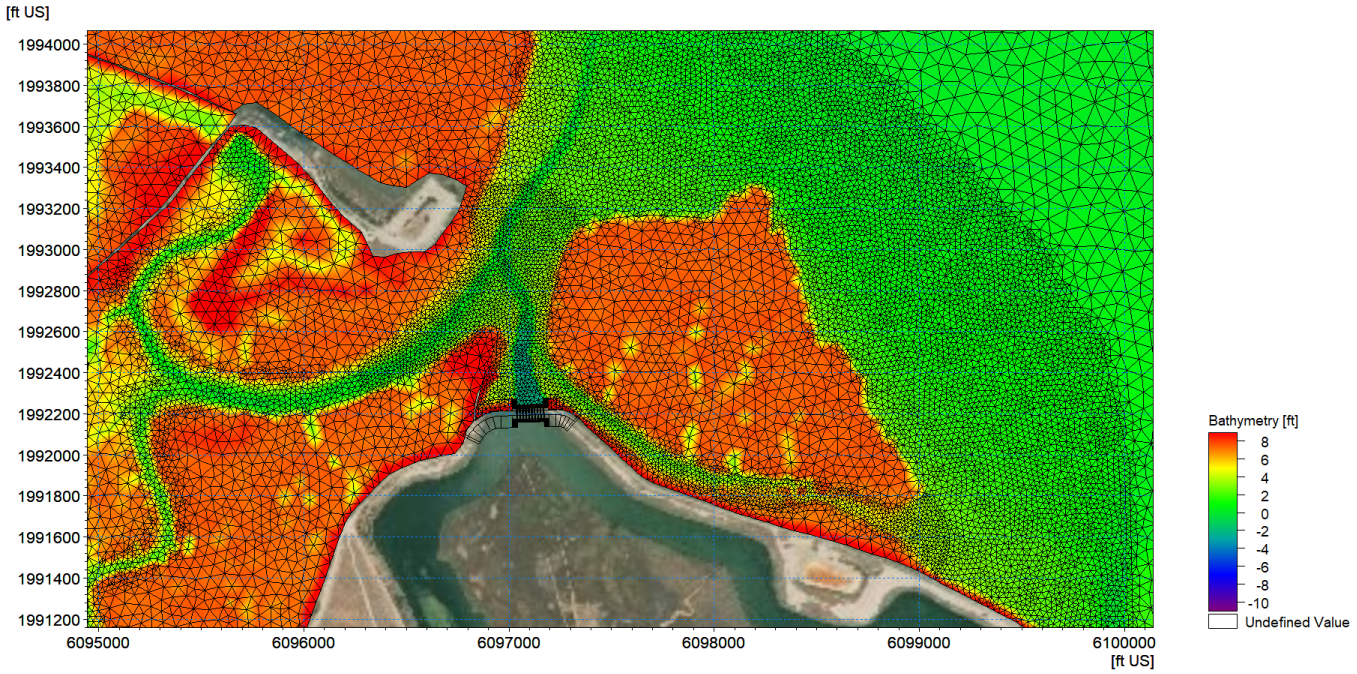

Figure 2-4 Proposed Gate MIKE 21 model mesh zoomed in around gate area.

2.2.2 Open Boundary Conditions

Each model layout was simulated for a 10-day tidal cycle that matches conditions for VW's return period gate discharge analysis. The period modeled was from 12/10/1998 to 12/21/1998. Wind stress and the impact of wind waves were not included in this study. The tidal water level and velocity conditions at the bay side of the model were obtained from the FEMA Regional South Bay model, re-run without wind, and saving more detailed information along the VW model boundaries. Water levels and currents at the boundaries vary in both space in time along the boundary lines. Figure 2-5 shows the location of the model open boundaries. Figure 2-6 shows the time varying water level and current at the midway point of the north boundary.

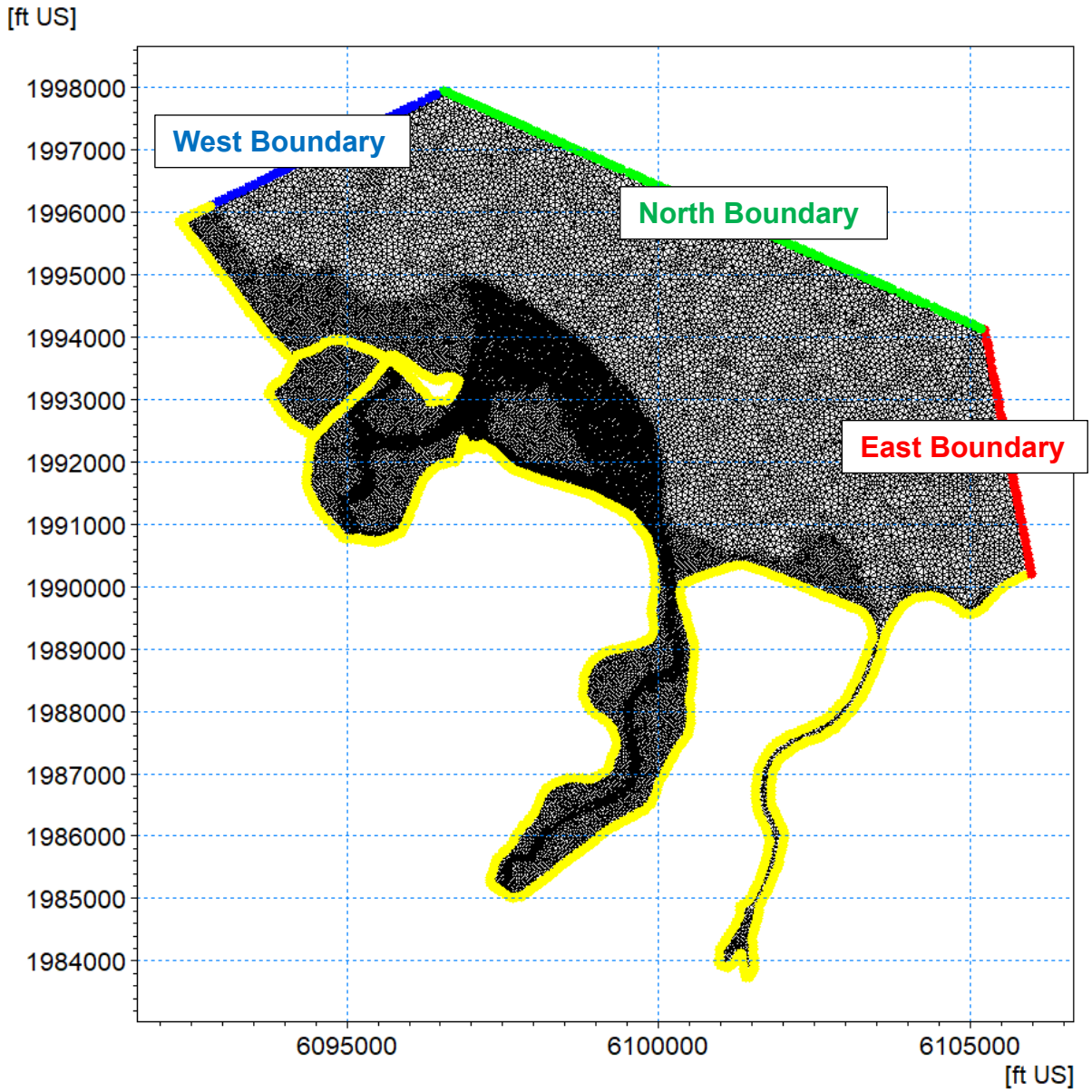

Figure 2-5 Location of model open boundaries.

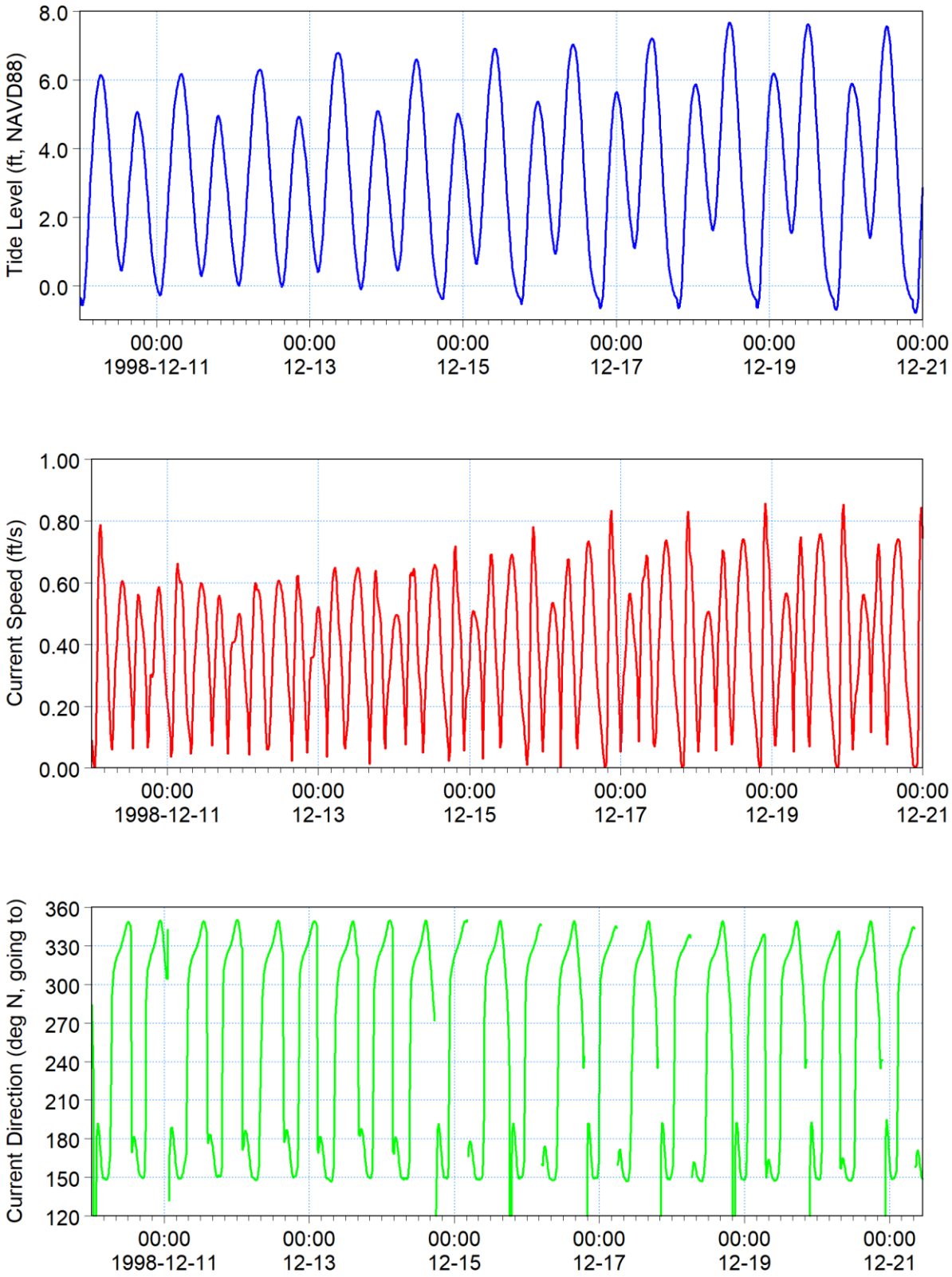

Figure 2-6 Offshore tidal boundary conditions for model simulation period.

2.2.3 Freshwater Discharges

Time series of freshwater discharges from the existing and proposed tide gates were obtained from HEC-RAS modeling performed and provided by VW. Four boundary cases were simulated. The first condition was for zero flow through the gates (tide only) and three other gate outflow conditions for 1.5, 10 and 100-year return periods. Figure 2-7 shows the gate discharges comparing for both gates and all three return periods.

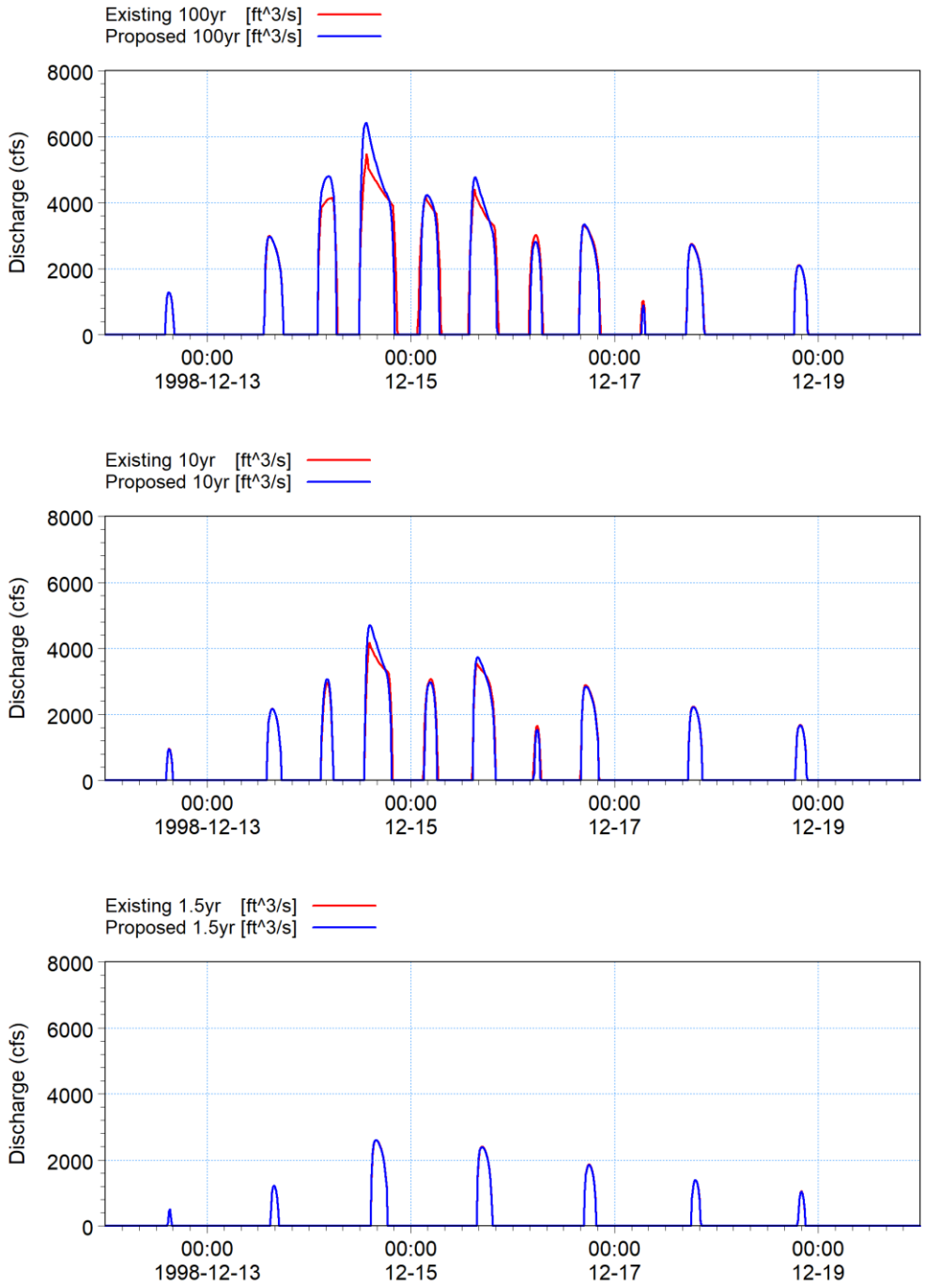

Figure 2-7 Time series of 100-year (top), 10-year (middle) and 1.5-year (bottom) existing and proposed gate discharges

Note that the proposed gate discharges are slightly higher than the existing discharges, especially for the longer return periods. VW has reported that the higher discharges for the proposed new gate are due to efficiencies of the new structure compared to the existing gate. The difference is very small for the 1.5-year discharges. The time scale on the plots was manually shifted to match up with a real tide period that best matched conditions from VW's HEC-RAS model, which used an arbitrary time scale, but was reportedly based on a period of time in 1998. The gate discharges were introduced as source terms internal to the model and spread out uniformly across 8 elements along the length of the structure.

2.3 Model Output

The MIKE 21 model creates time varying outputs of 2D water surface elevations and velocities for the entire model domain.

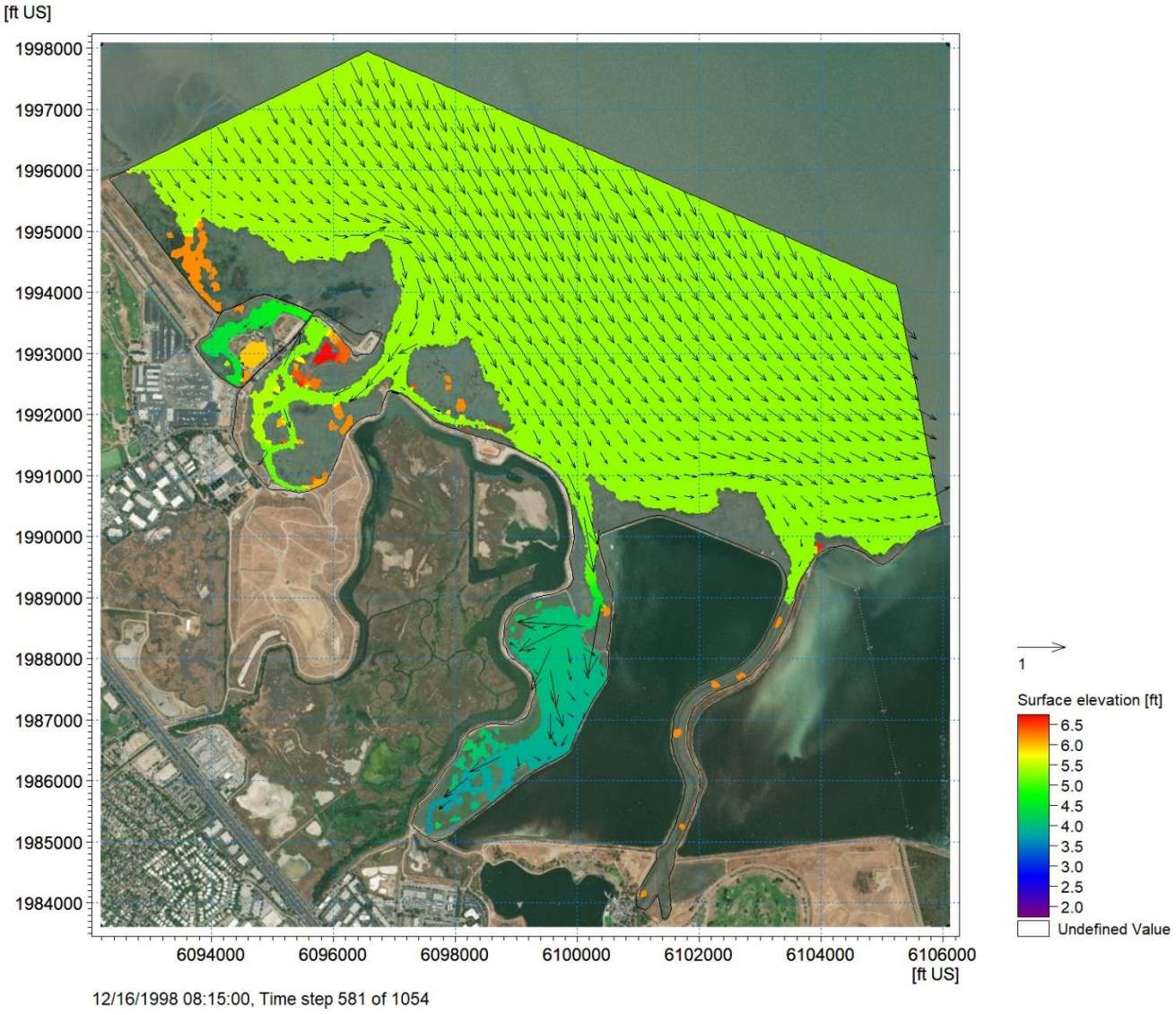

Figure 2-8 Example snapshot of 2D contours of water surface elevation (ft, NAVD88) and vectors of current speed (feet/sec) during incoming tide for entire model domain.

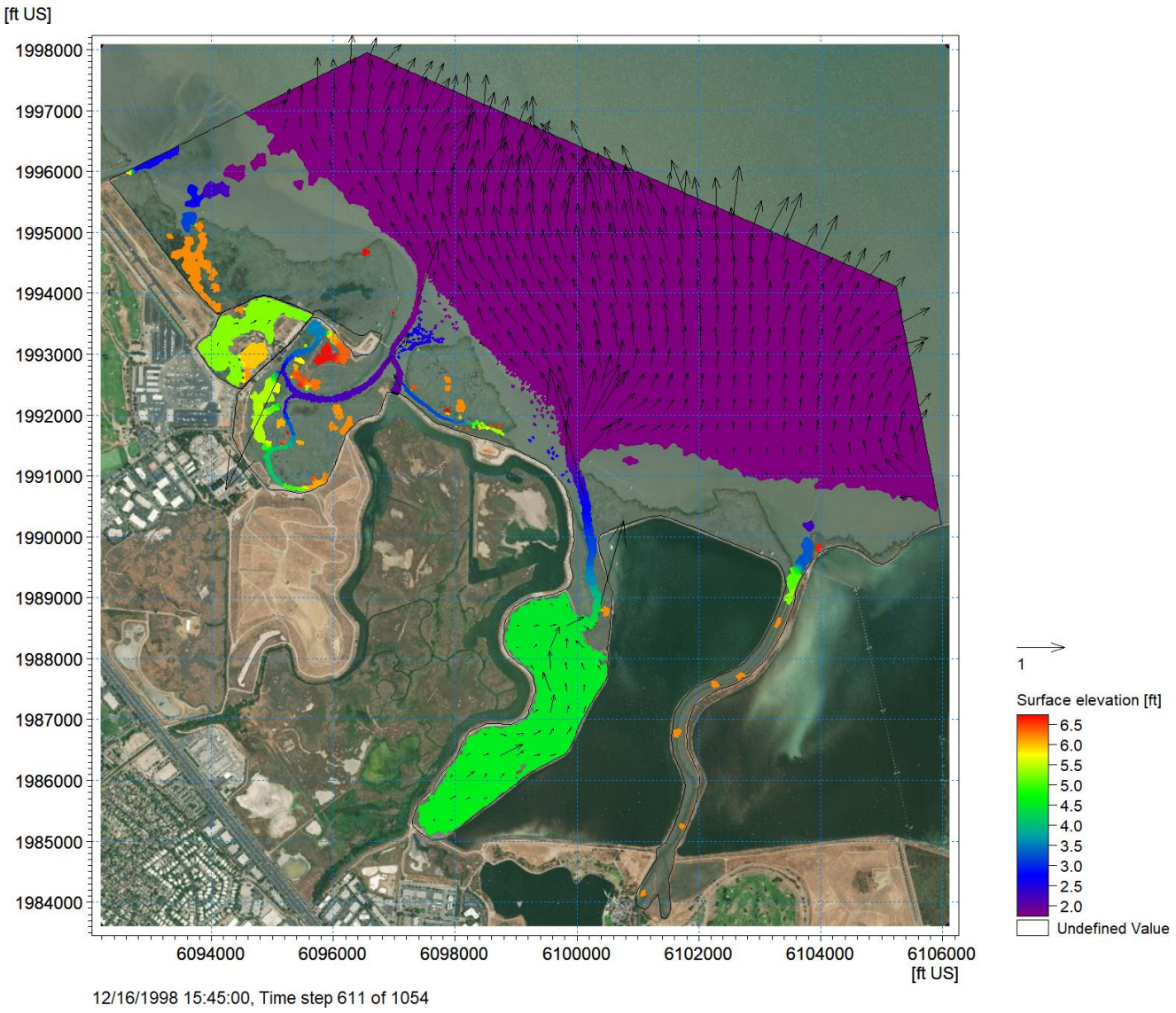

Figure 2-9 **Example snapshot of 2D contours of water surface elevation (ft, NAVD88) and vectors of current speed (feet/sec) during outgoing tide and zero discharge from gates, for entire model domain.**

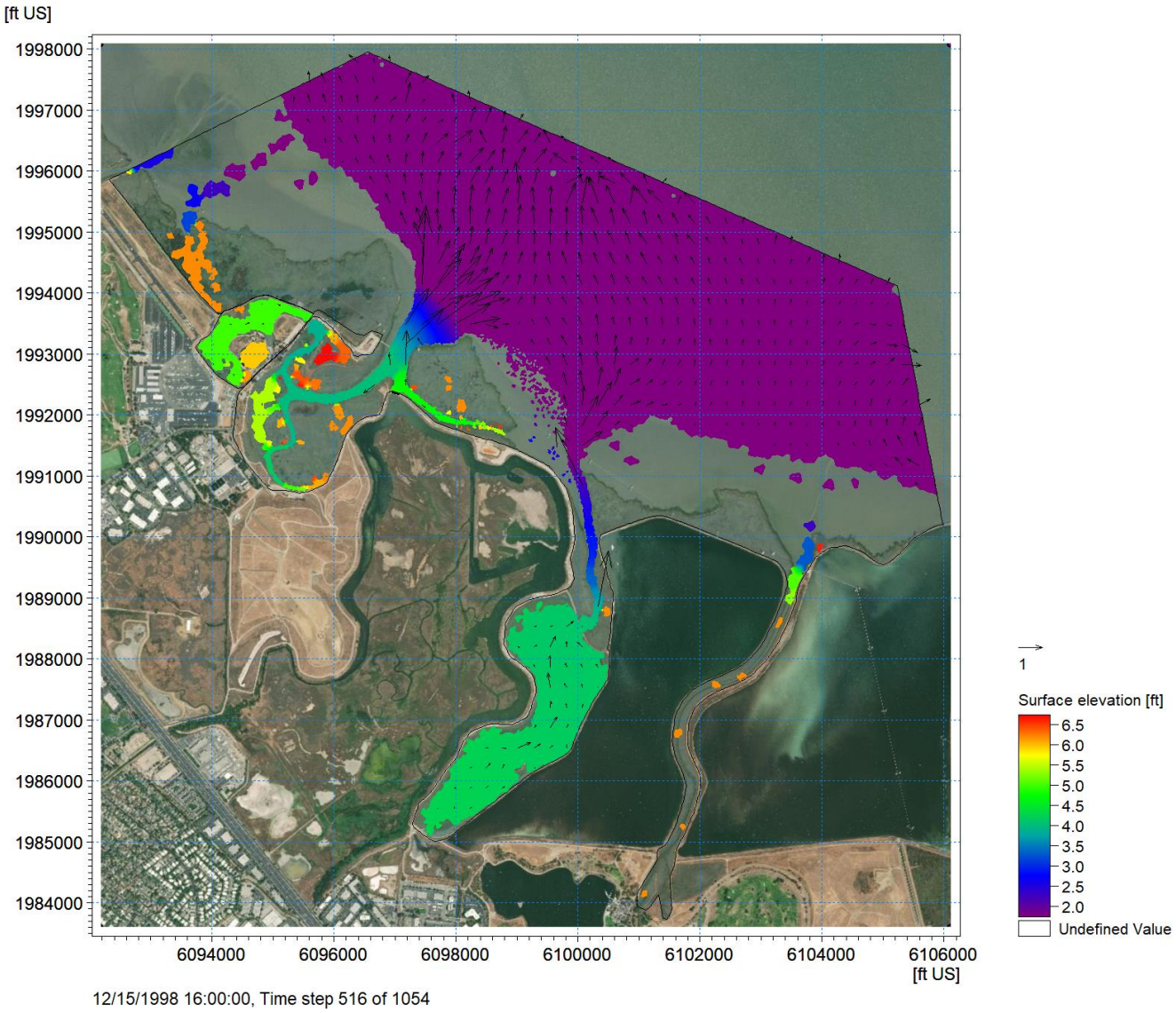

Figure 2-10 Example snapshot of 2D contours of water surface elevation (ft, NAVD88) and vectors of current speed (feet/sec) during outgoing tide with 1.5-year gate discharge, for entire model domain.

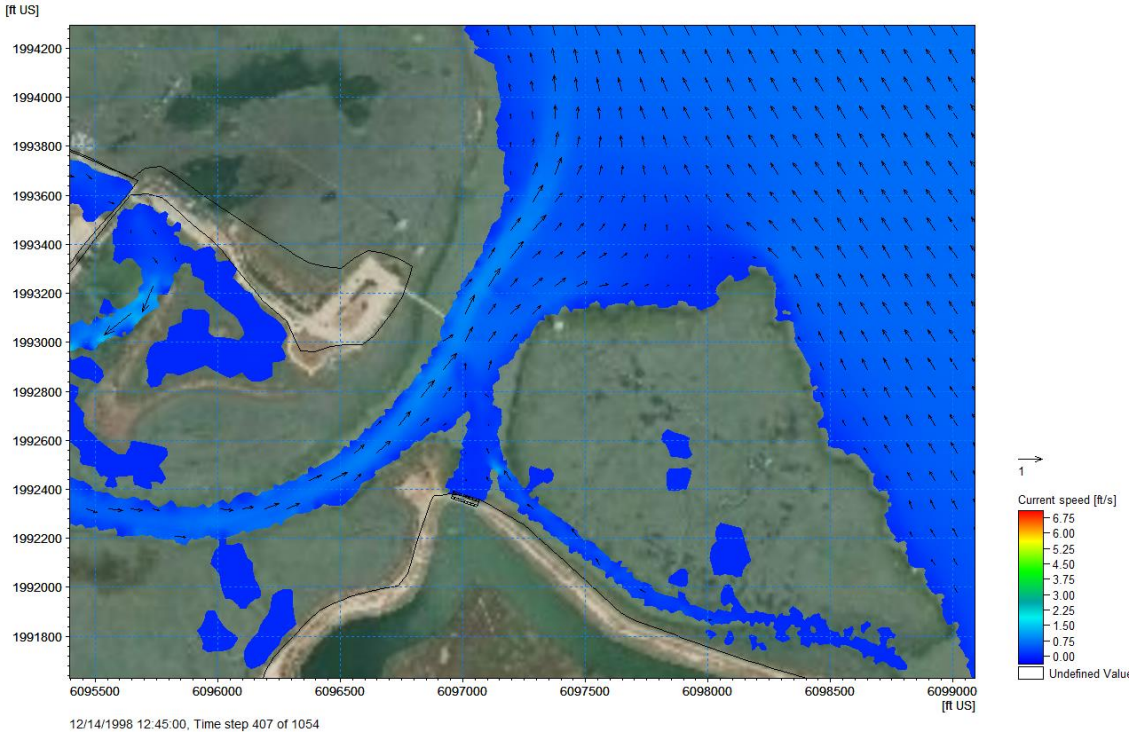

Figure 2-11 Example snapshot of 2D contours and vectors of current speed (feet/sec) for outgoing tide with zero gate discharge, existing gate, zoomed in around area of interest.

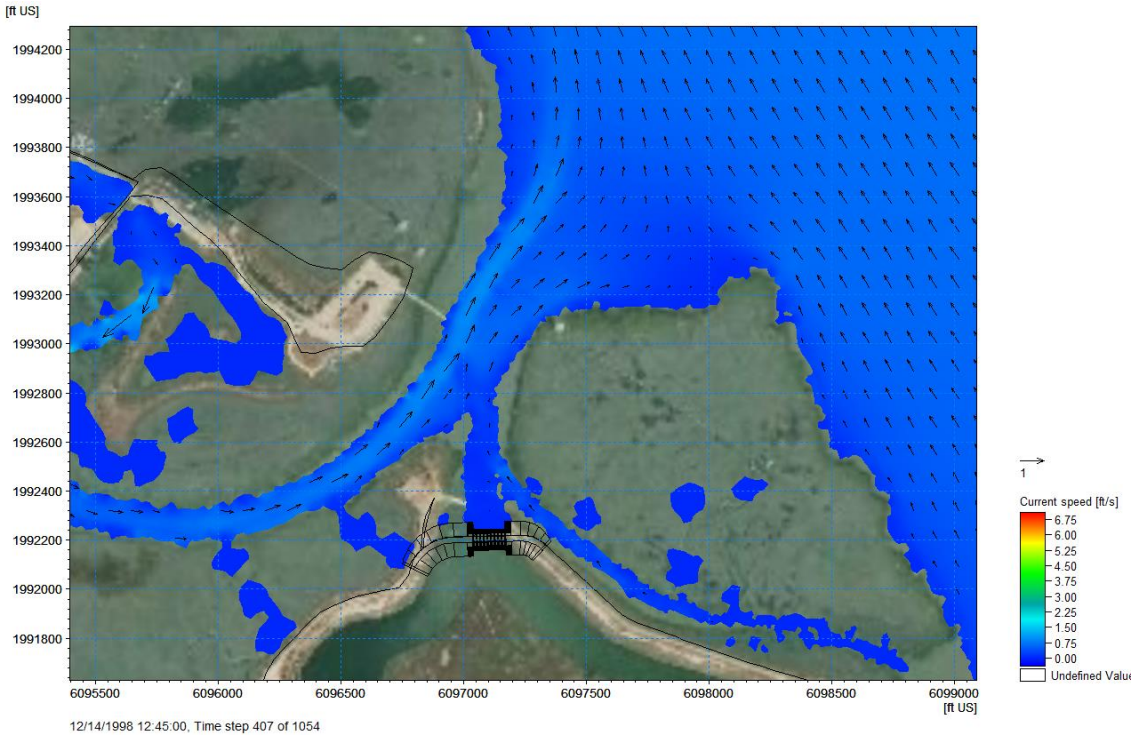

Figure 2-12 Example snapshot of 2D contours and vectors of current speed (feet/sec) for outgoing tide with zero gate discharge, proposed gate, zoomed in around area of interest.

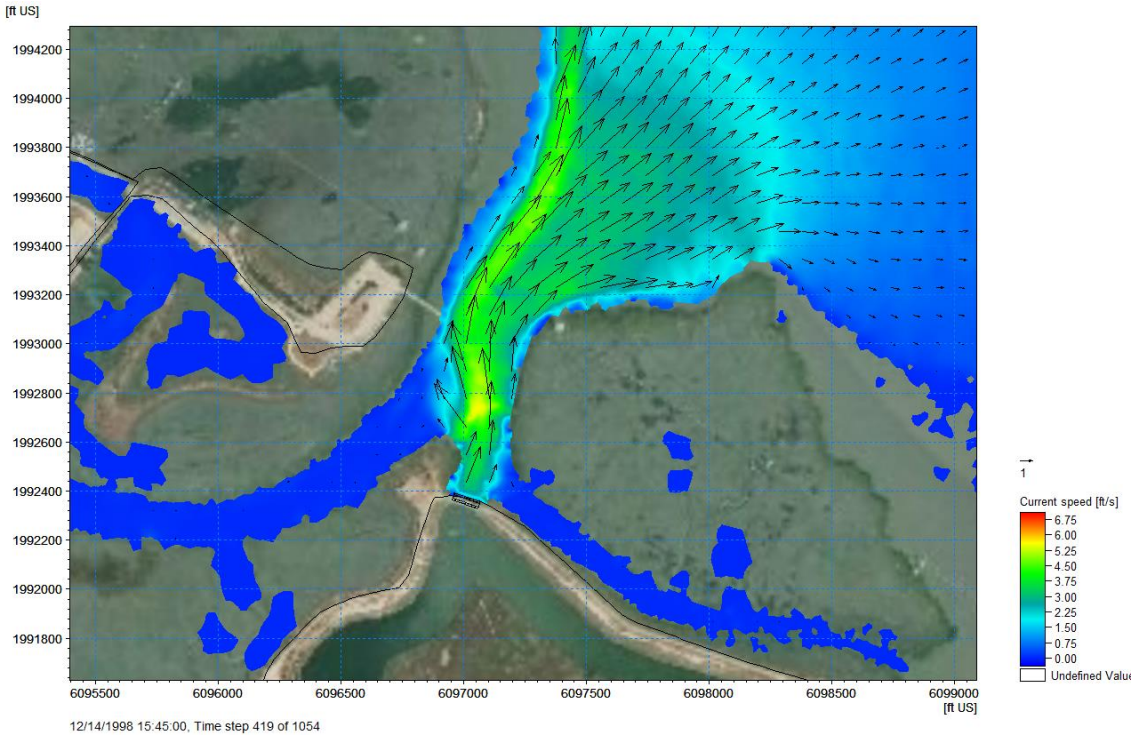

Figure 2-13 Example snapshot of 2D contours and vectors of current speed (feet/sec) for outgoing tide with 1.5-year gate discharge, existing gate, zoomed in around area of interest.

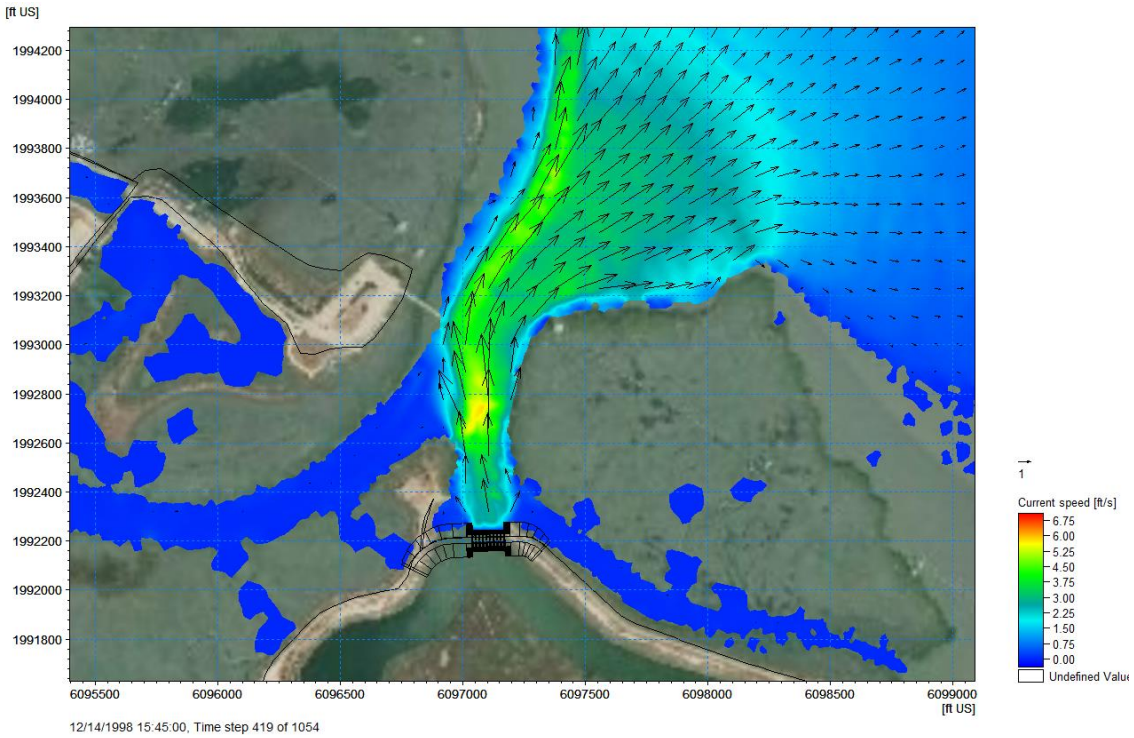

Figure 2-14 Example snapshot of 2D contours and vectors of current speed (feet/sec) for outgoing tide with 1.5-year gate discharge, proposed gate, zoomed in around area of interest.

Additional model outputs are presented as 2-dimensional statistics of maximum current speeds and differences in maximum currents for each simulation, shown in Figure 2-15 through Figure 2-27. Two main comparisons are made of these model outputs. The first main comparison is to compare the baseline zero discharge case to the other three return period discharge cases, to put in perspective how local extremes are dominated by times with gate discharges compared to zero gate discharge and normal tide conditions. The second main comparison is to compare the existing gate versus proposed gate cases for each of the three discharge conditions. One additional comparison case is included since proposed gate discharges are somewhat higher than existing discharges. The proposed gate case was also simulated with the existing gate discharges for the 10-year and 100-year return period cases. These were done so that a closer to apples to apples comparison of differences between the two layouts could be compared using the same gate discharges. The same for the 1.5-year discharge was not simulated since the existing and proposed discharges are nearly the same for this return period. Comparisons of maximum bed shear stress are presented in Appendix A.

Figure 2-15 compares maximum current speeds between the existing gate and proposed gate layouts for the baseline condition with zero gate discharge. Figure 2-16 shows the difference of subtracting the existing gate case from the proposed gate case. Generally current speeds are very similar, but slightly higher for the proposed gate case. It is not obvious what may be contributing to these slightly higher velocities but could be due slight changes in channel alignments, or it could also be small differences in the location of model mesh elements centers, leading to slightly different interpolation of bottom elevations. Figure 2-17 shows the same plot as Figure 2-15 but with the same color contour scale as the following plots that present the maximum current speeds for the gate discharge conditions. This is provided to give a sense of how much larger the velocities are during a gate discharge condition than just a normal tide with no discharge. This is important to consider, since most of the times the speeds will be more representative of normal tide conditions. High discharge events are typically of short durations, lasting for a few days only.

Figure 2-18 compares maximum velocities between the 1.5-year discharge conditions, and Figure 2-19 presents the difference between the maximum speeds, proposed minus existing. Differences in velocities are small, but somewhat higher for the proposed gate case.

Figure 2-20 compares maximum velocities between the 10-year discharge conditions, and Figure 2-21 presents the difference between the maximum speeds, proposed minus existing. Differences in velocities near the gates are highest but can be explained by the fact that the channel alignment and flow direction is different through this area. Further downstream of the gate, difference range from around 0.2 to 0.6 feet/sec, and higher for the proposed gate case. It should be expected that velocities are higher for the proposed gate case since imposed gate discharges are higher than for the existing gate discharges. For this reason, a comparison of the 10-year case using the existing discharge at the proposed gate was made so that differences due to only the gate alignment could be isolated and assessed. These comparison are shown in Figure 2-22 and Figure 2-23. This results in a much smaller difference but remaining slightly higher for the proposed gate case.

Figure 2-24 compares maximum velocities between the 100-year discharge conditions, and Figure 2-25 presents the difference between the maximum speeds, proposed minus existing. Similar to the 10-year discharge case, differences in velocities near the gates are highest, but can be explained by the fact that the channel alignment and the flow direction is different for the two cases. Further downstream of the gate, difference range from around 0.2 to 0.8 feet/sec, and higher for the proposed gate case. It should be expected that velocities are higher for the proposed gate case since imposed gate discharges are higher than for the existing gate discharges. For this reason, a comparison of the 100-year case using the existing discharge at the proposed gate was made so that differences due to only the gate alignment could be isolated and assessed. These comparisons are shown in Figure 2-26 and Figure 2-27. This results in a much smaller difference but remains slightly higher for the proposed gate case.

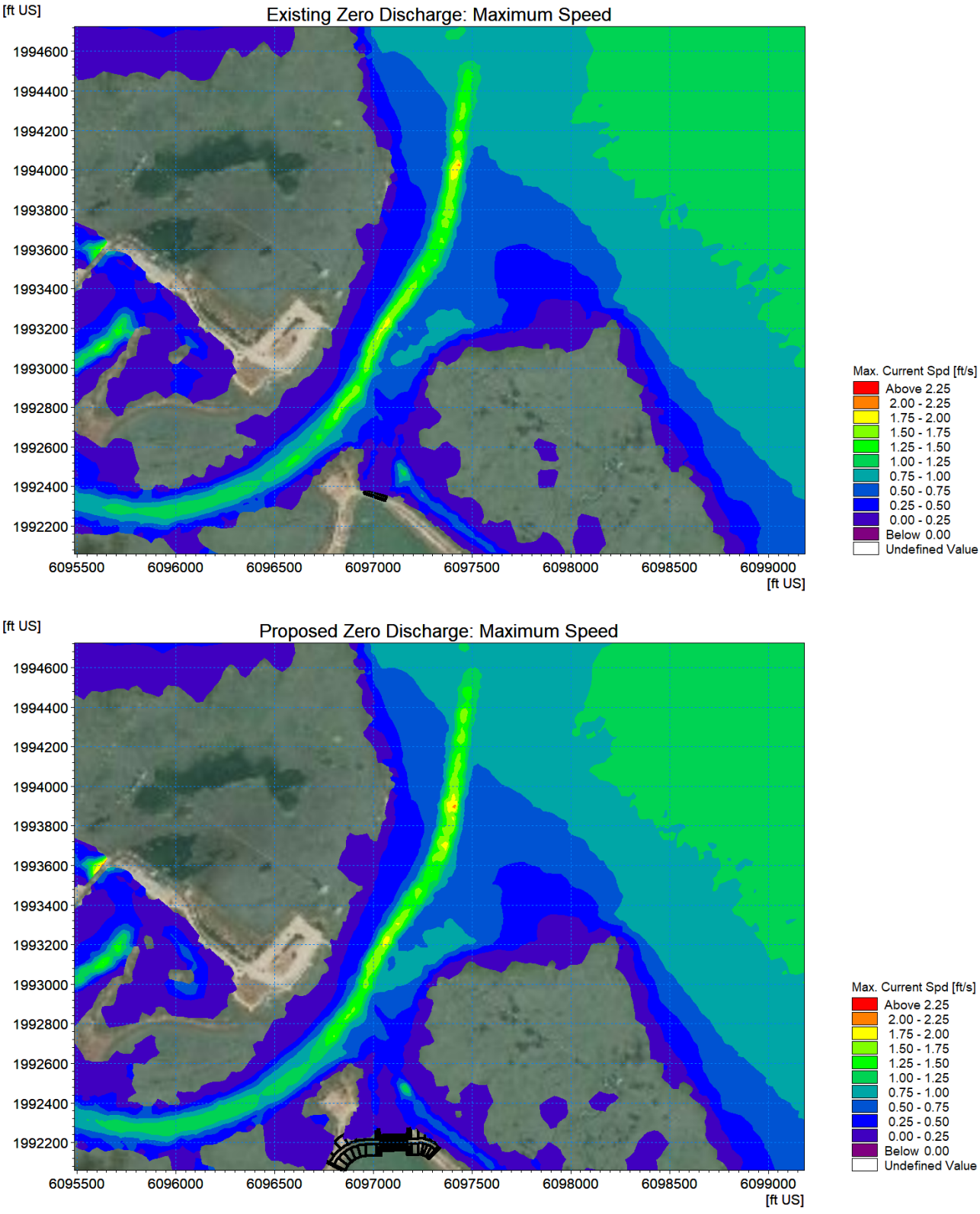

Figure 2-15 Maximum current speed for existing gate (top) and proposed gate (bottom) for zero discharge condition.

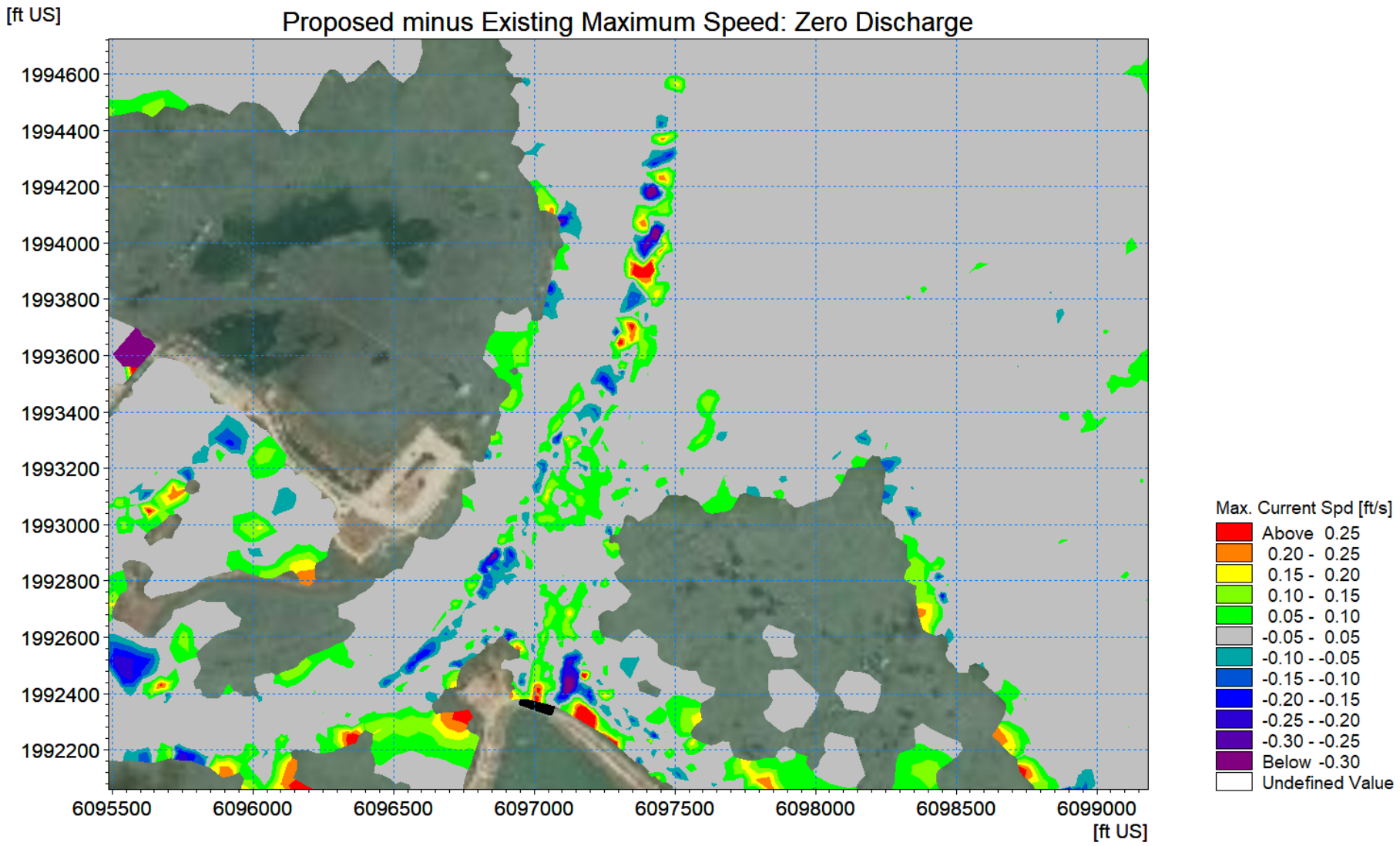

Figure 2-16 Proposed minus Existing maximum current speed for zero discharge condition.

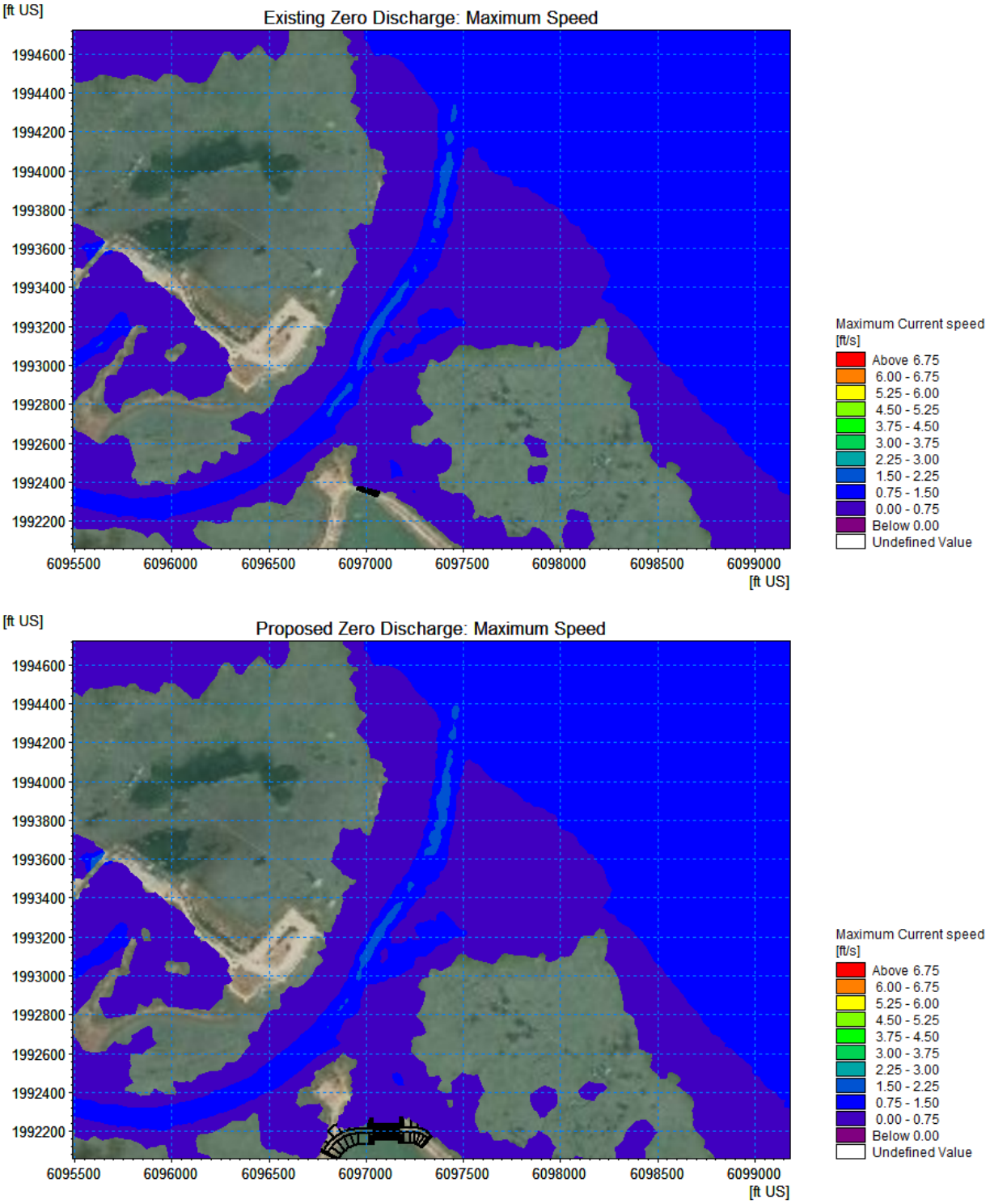

Figure 2-17 Maximum current speed for existing gate (top) and proposed gate (bottom) for zero discharge condition.

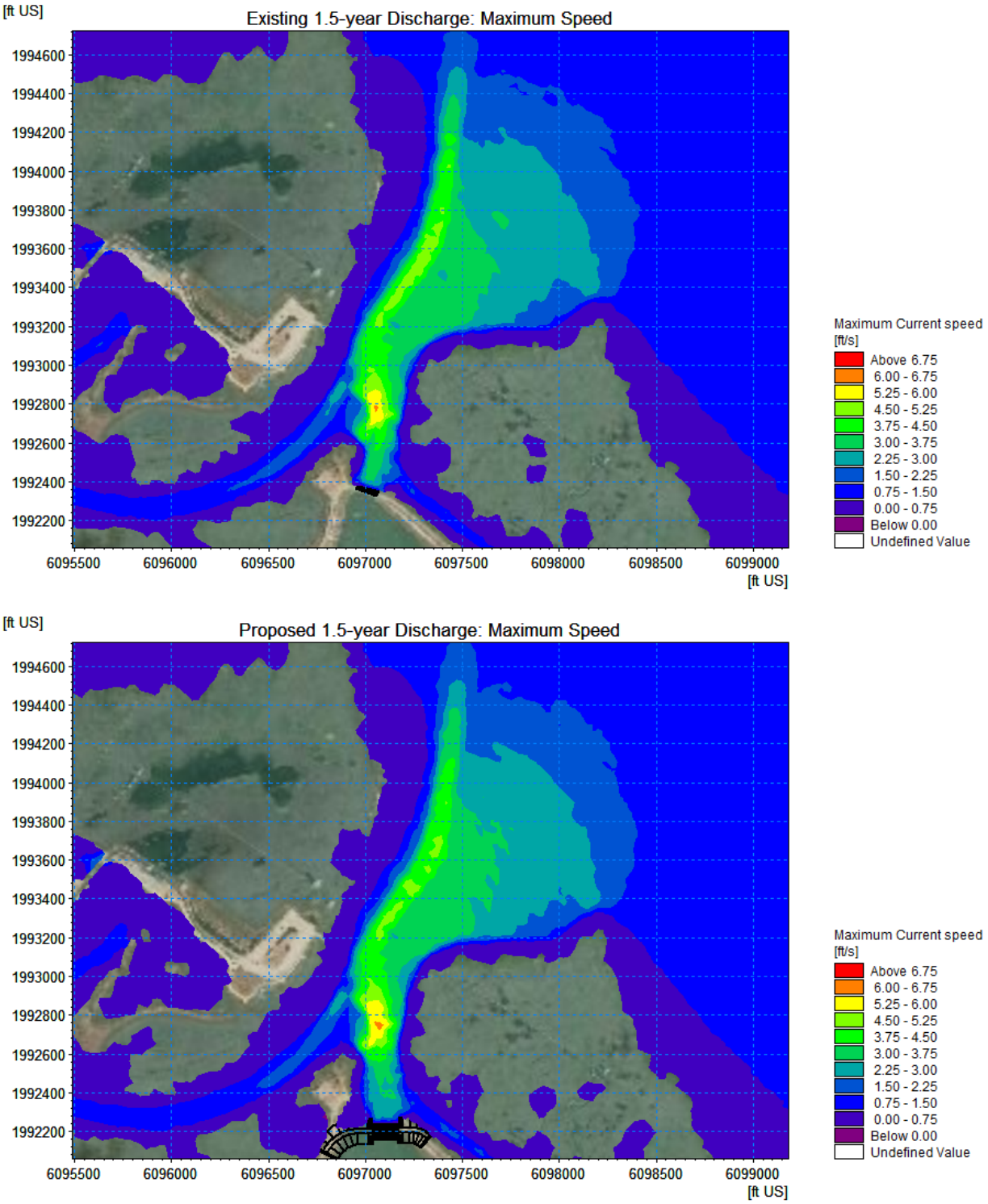

Figure 2-18 Maximum current speed for existing gate (top) and proposed gate (bottom) for 1.5-year return period discharge condition.

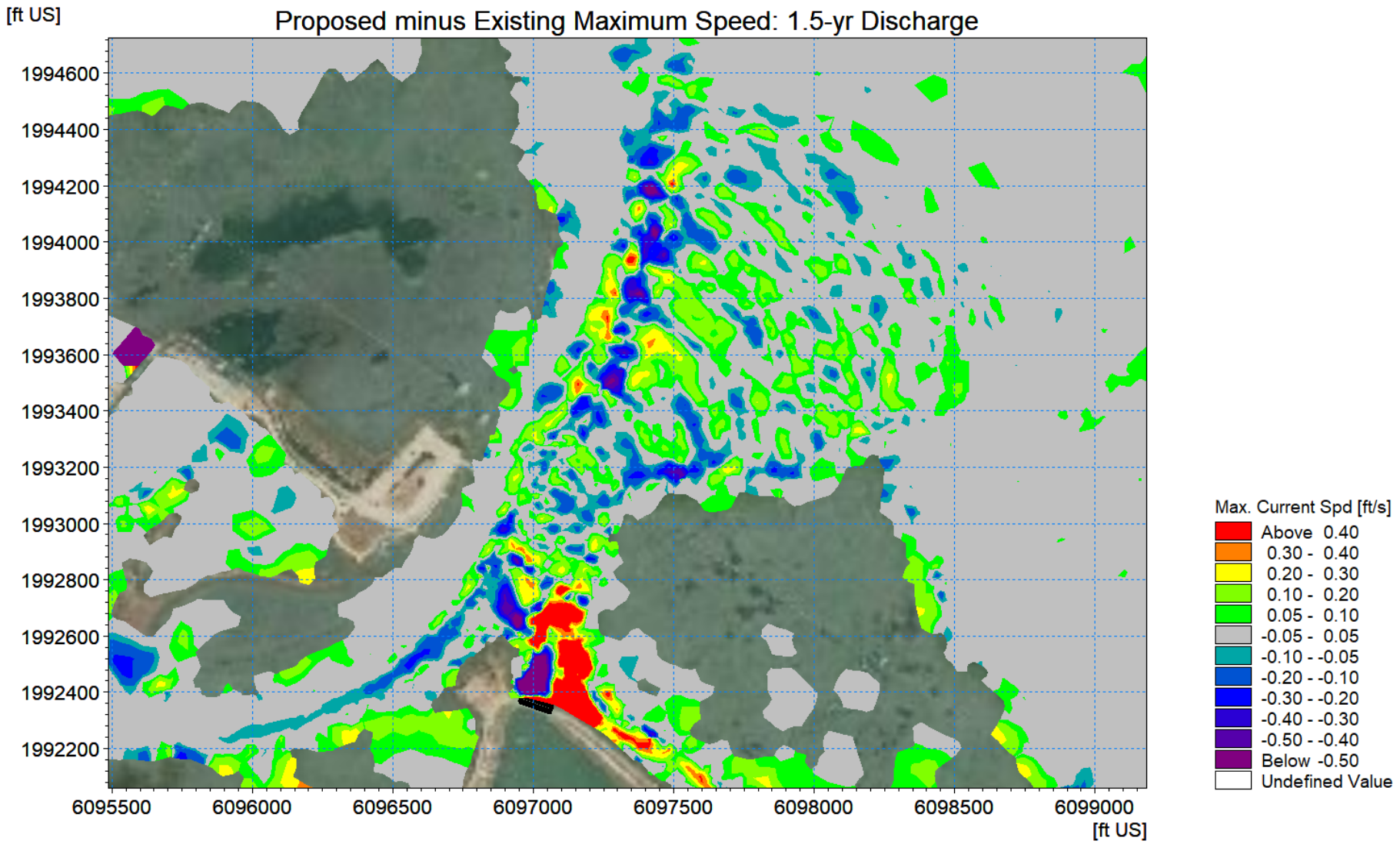

Figure 2-19 Proposed minus Existing maximum current speed for 1.5-year discharge condition.

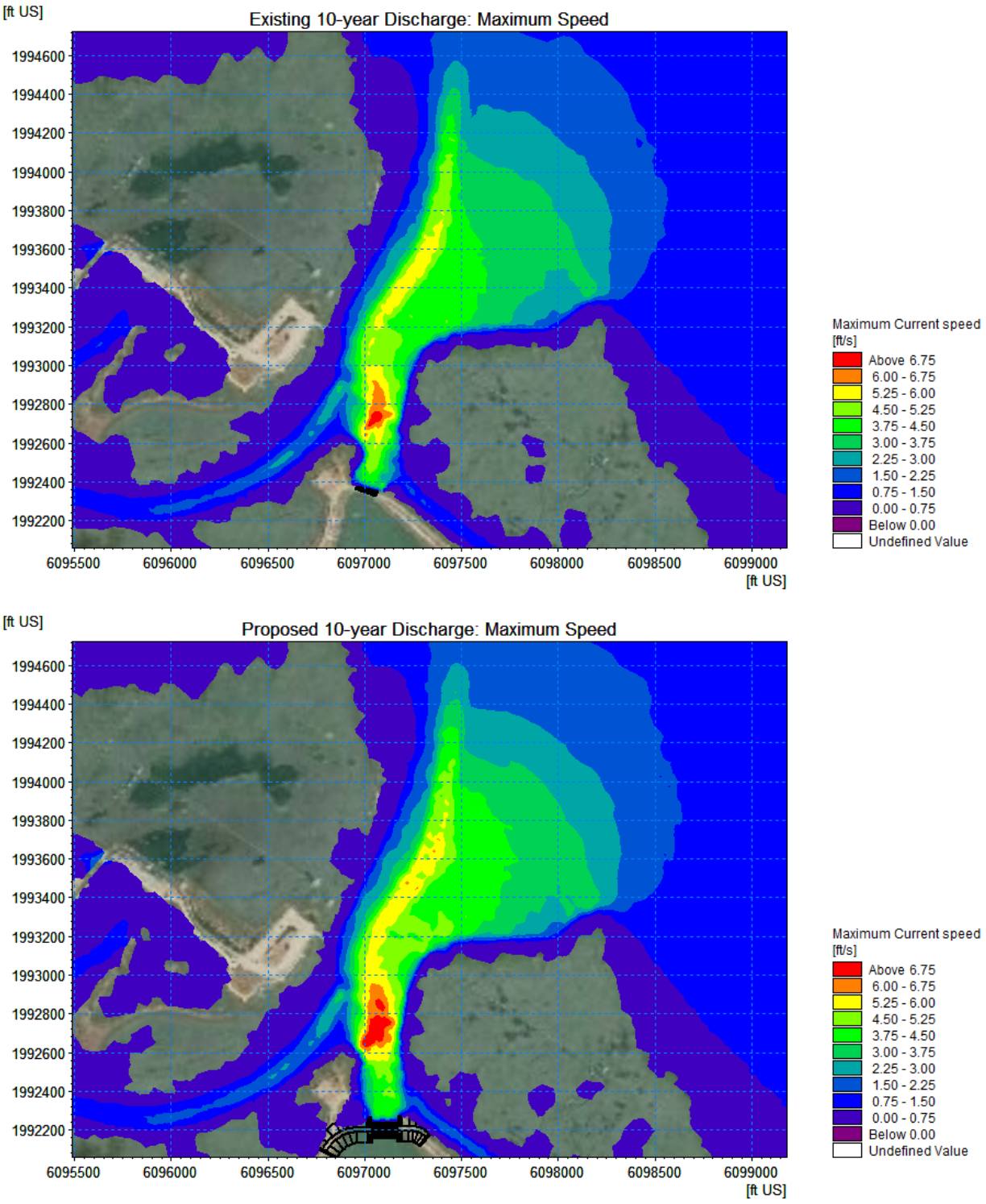

Figure 2-20 Maximum current speed for existing gate (top) and proposed gate (bottom) for 10-year return period discharge condition.

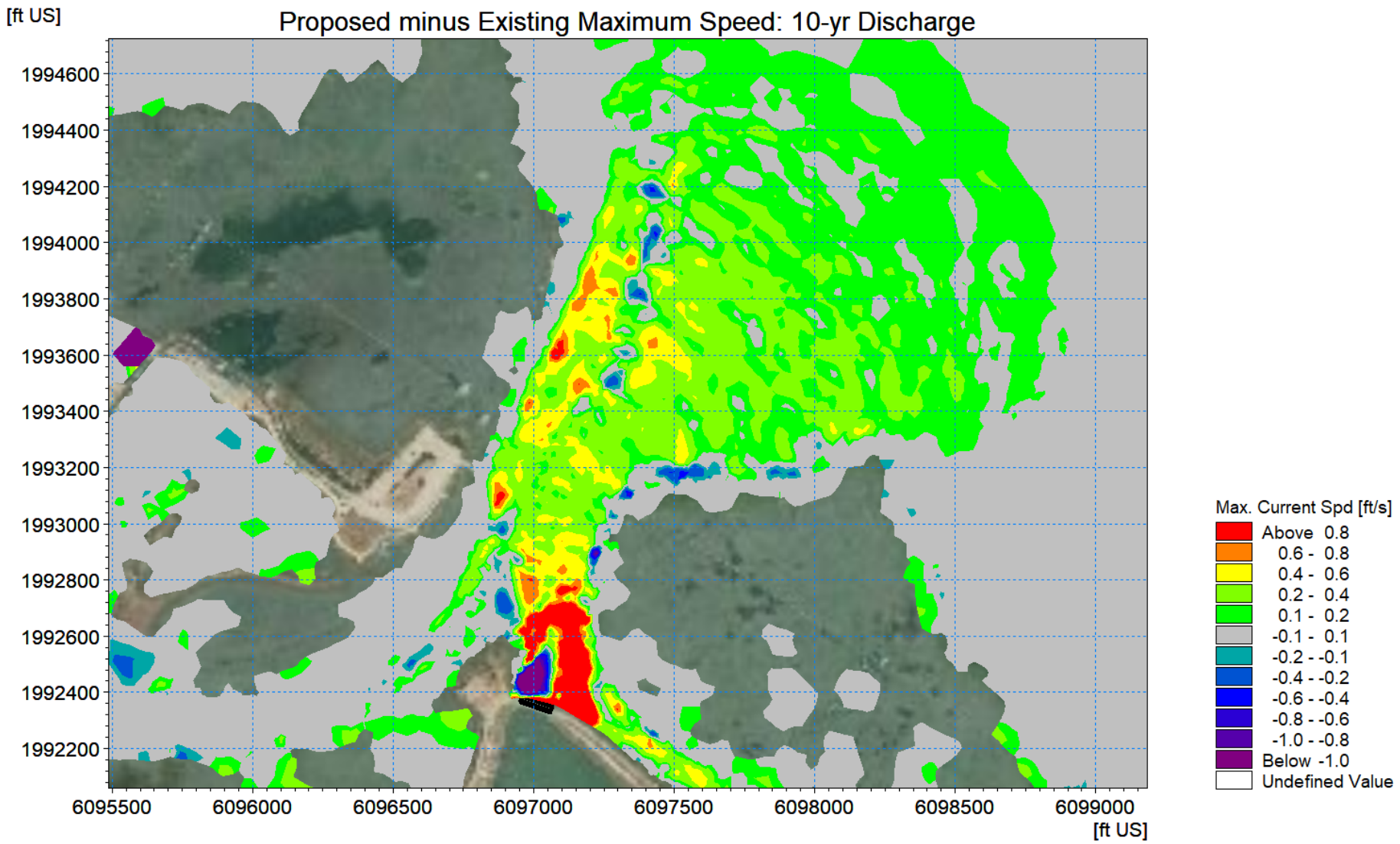

Figure 2-21 Proposed minus Existing maximum current speed for 10-year discharge condition.

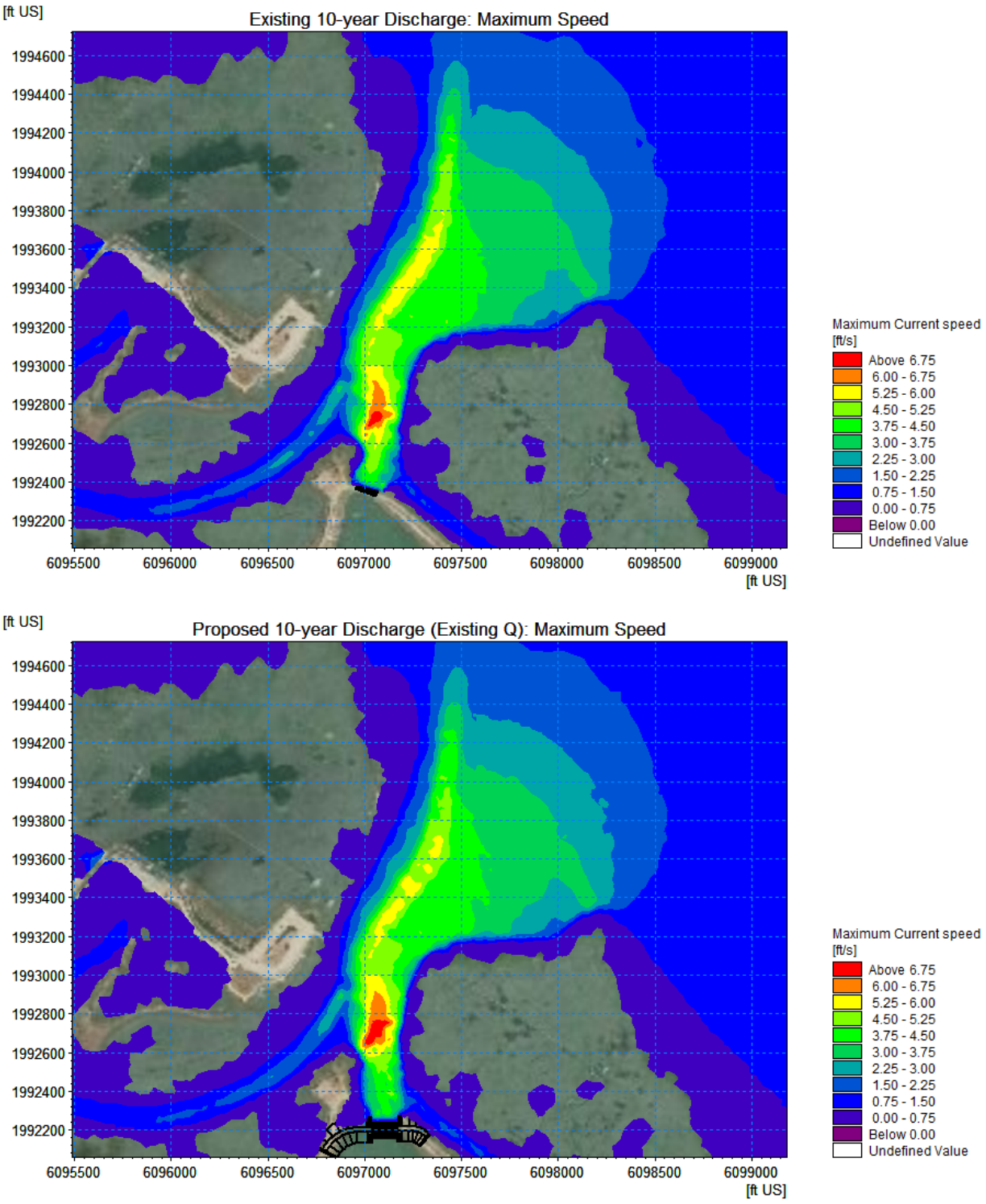

Figure 2-22 Maximum current speed for existing gate (top) and proposed gate using existing gate discharge (bottom) for 10-year return period discharge condition. Both simulations are using the same existing gate discharge.

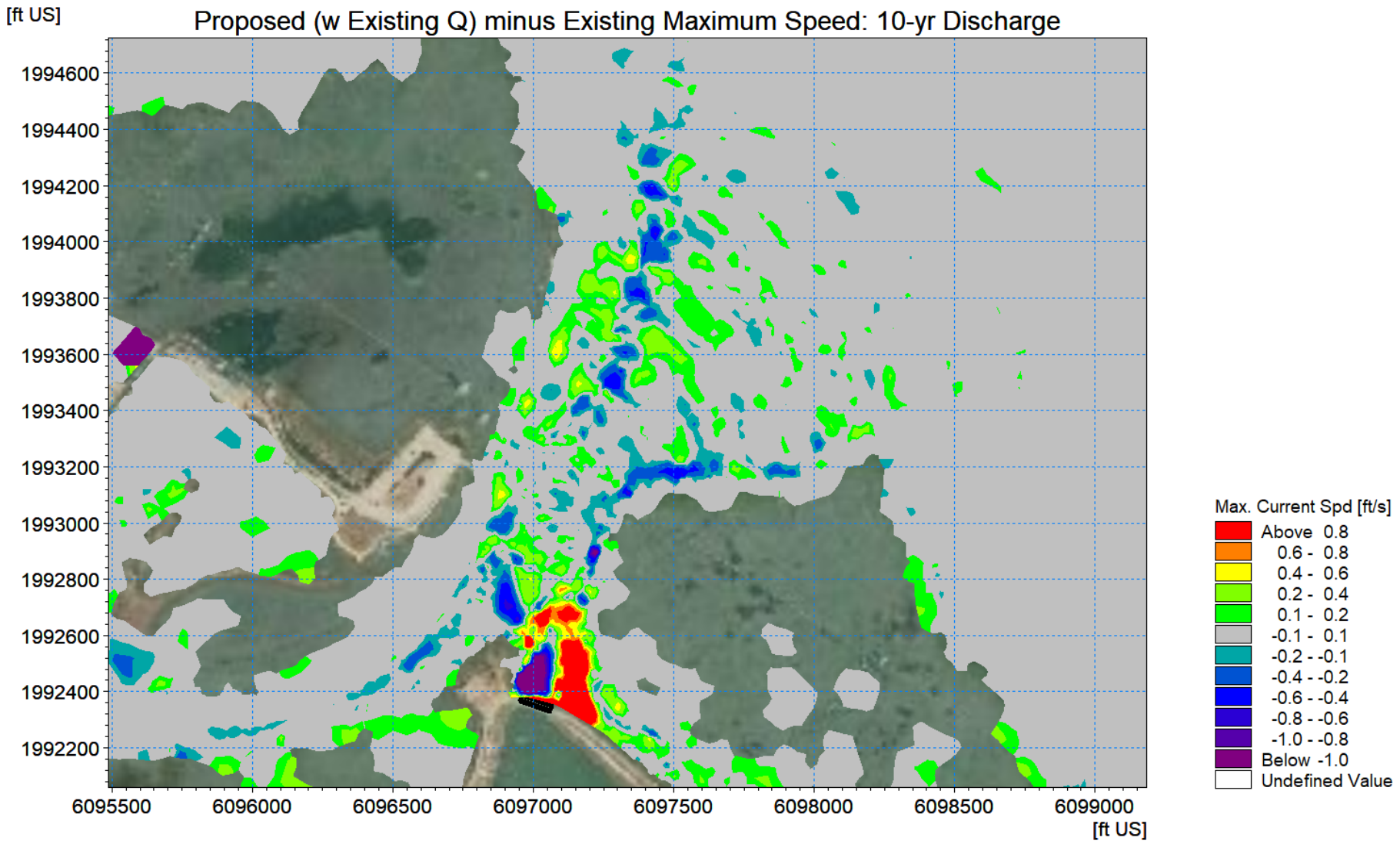

Figure 2-23 Proposed (using Existing Q) minus Existing maximum current speed for 10-year discharge condition.

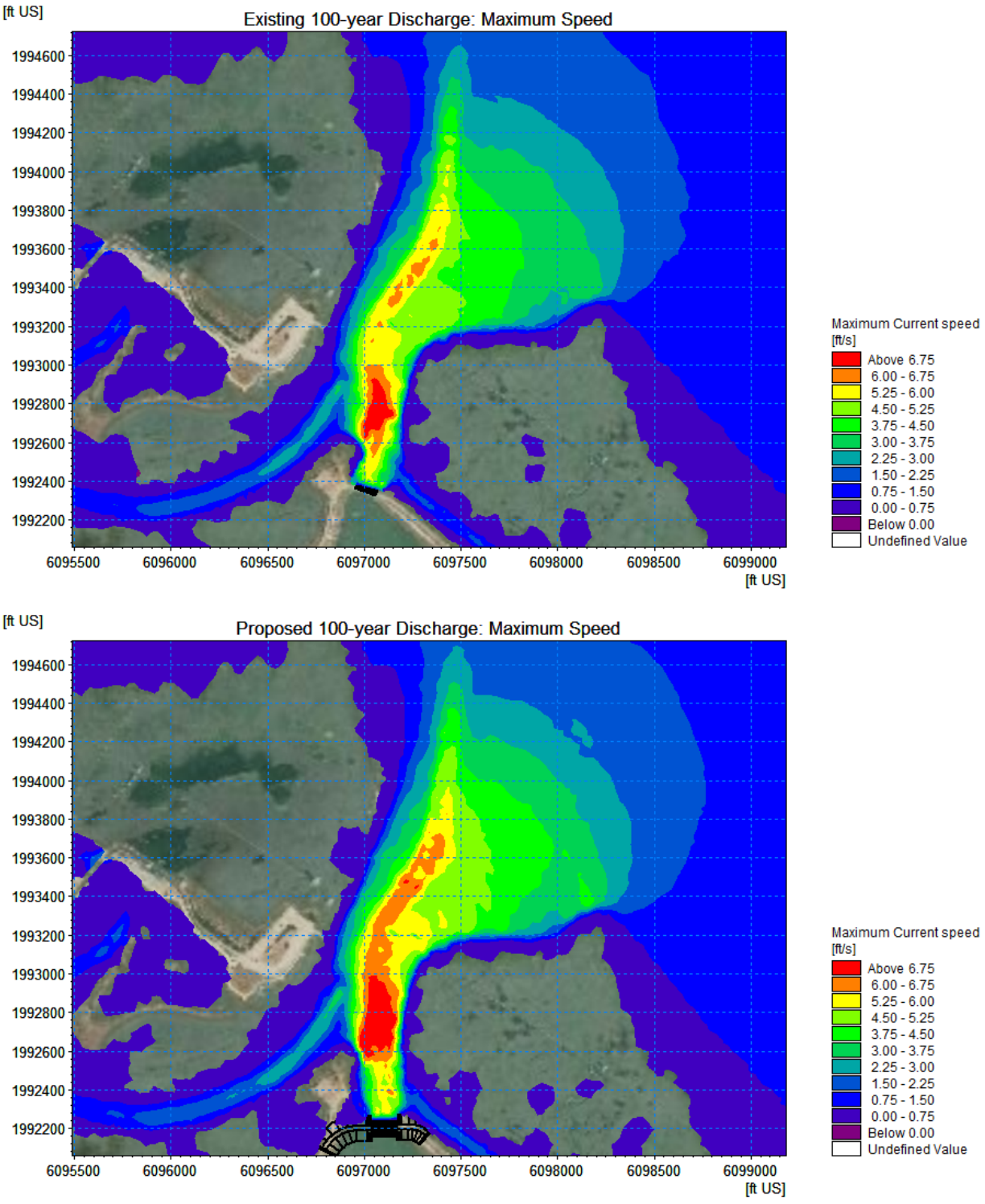

Figure 2-24 Maximum current speed for existing gate (top) and proposed gate (bottom) for 100-year return period discharge condition.

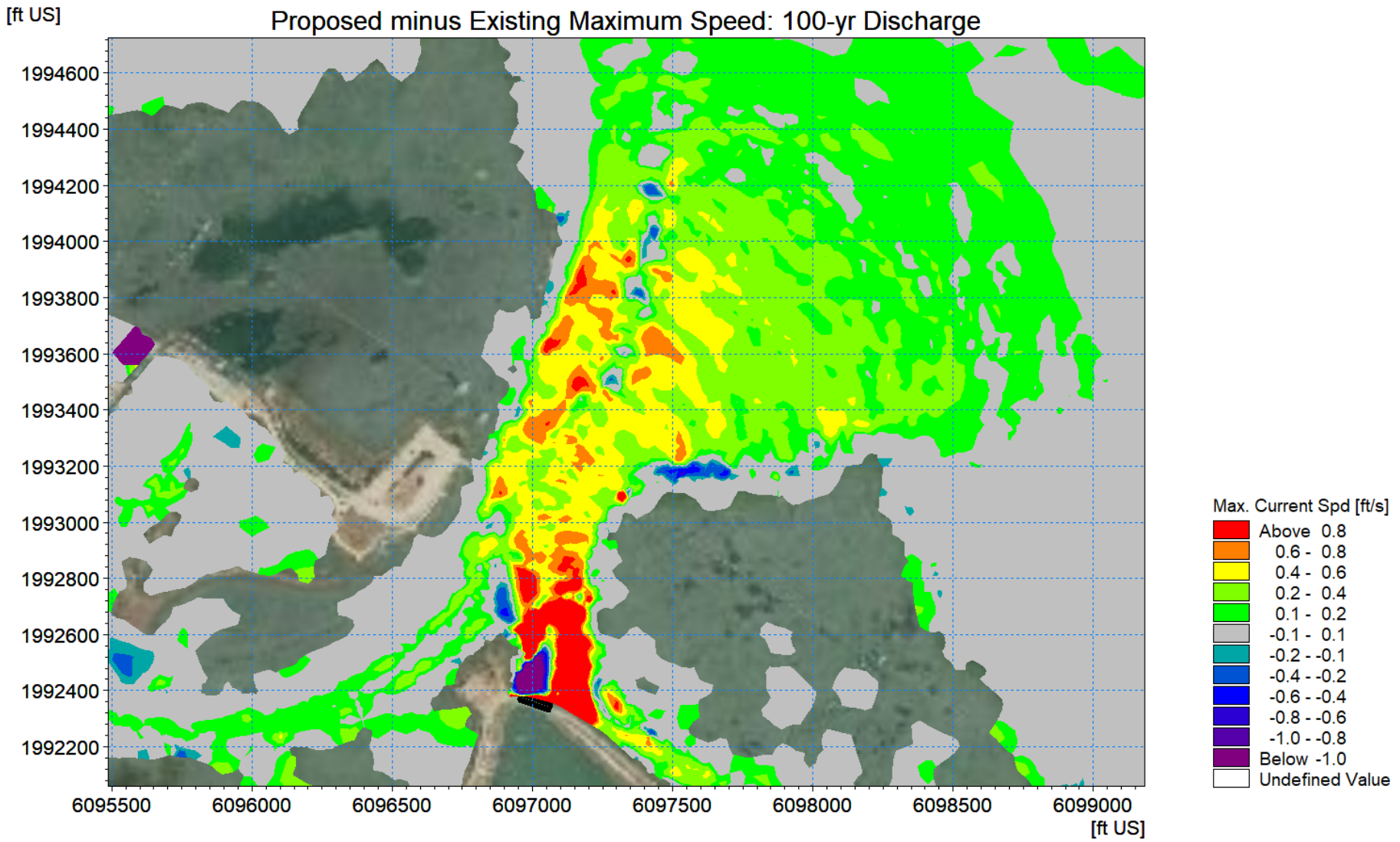

Figure 2-25 Proposed minus Existing maximum current speed for 100-year discharge condition.

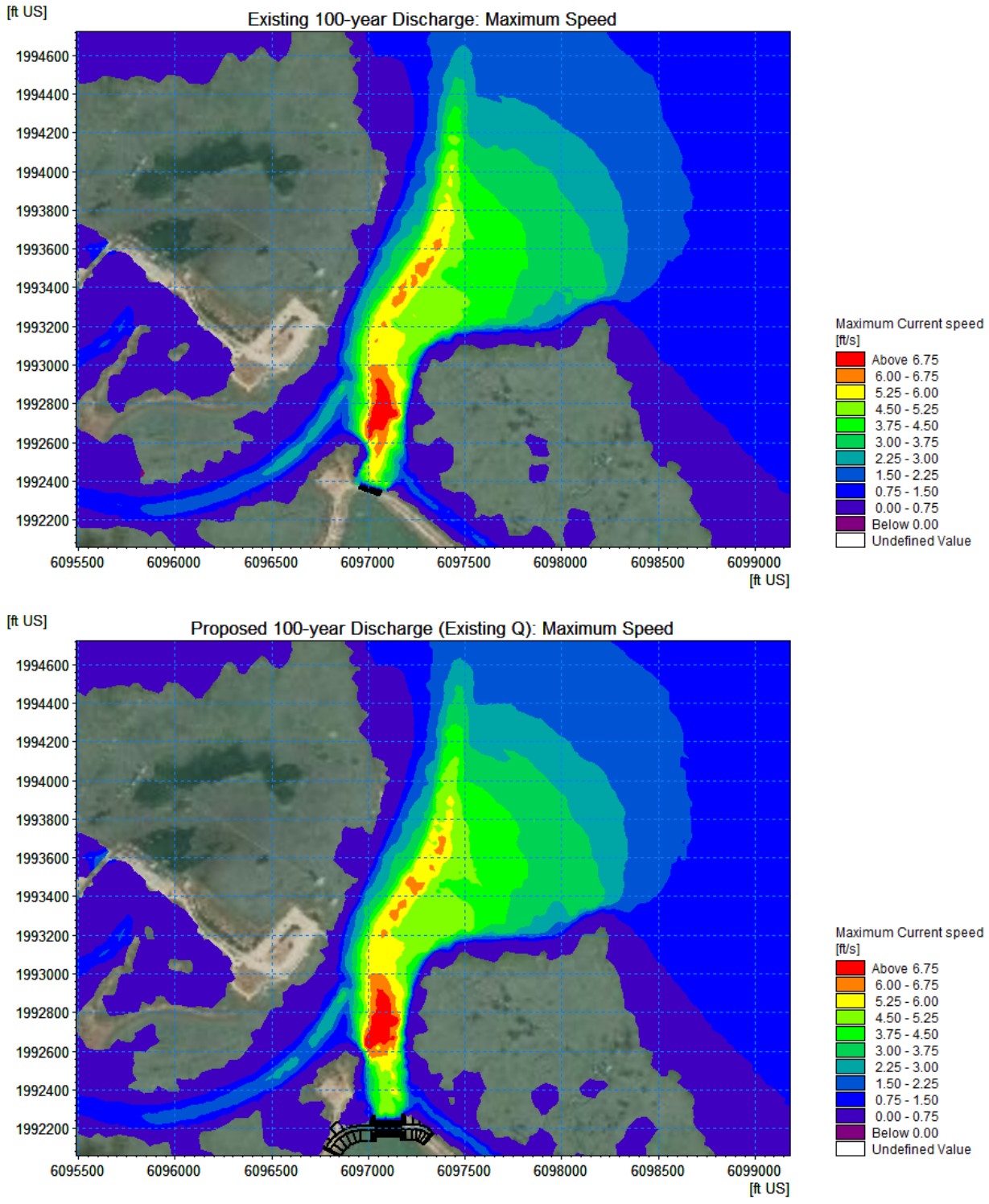

Figure 2-26 Maximum current speed for existing gate (top) and proposed gate using existing gate discharge (bottom) for 100-year return period discharge condition. Both simulations use the existing gate discharges.

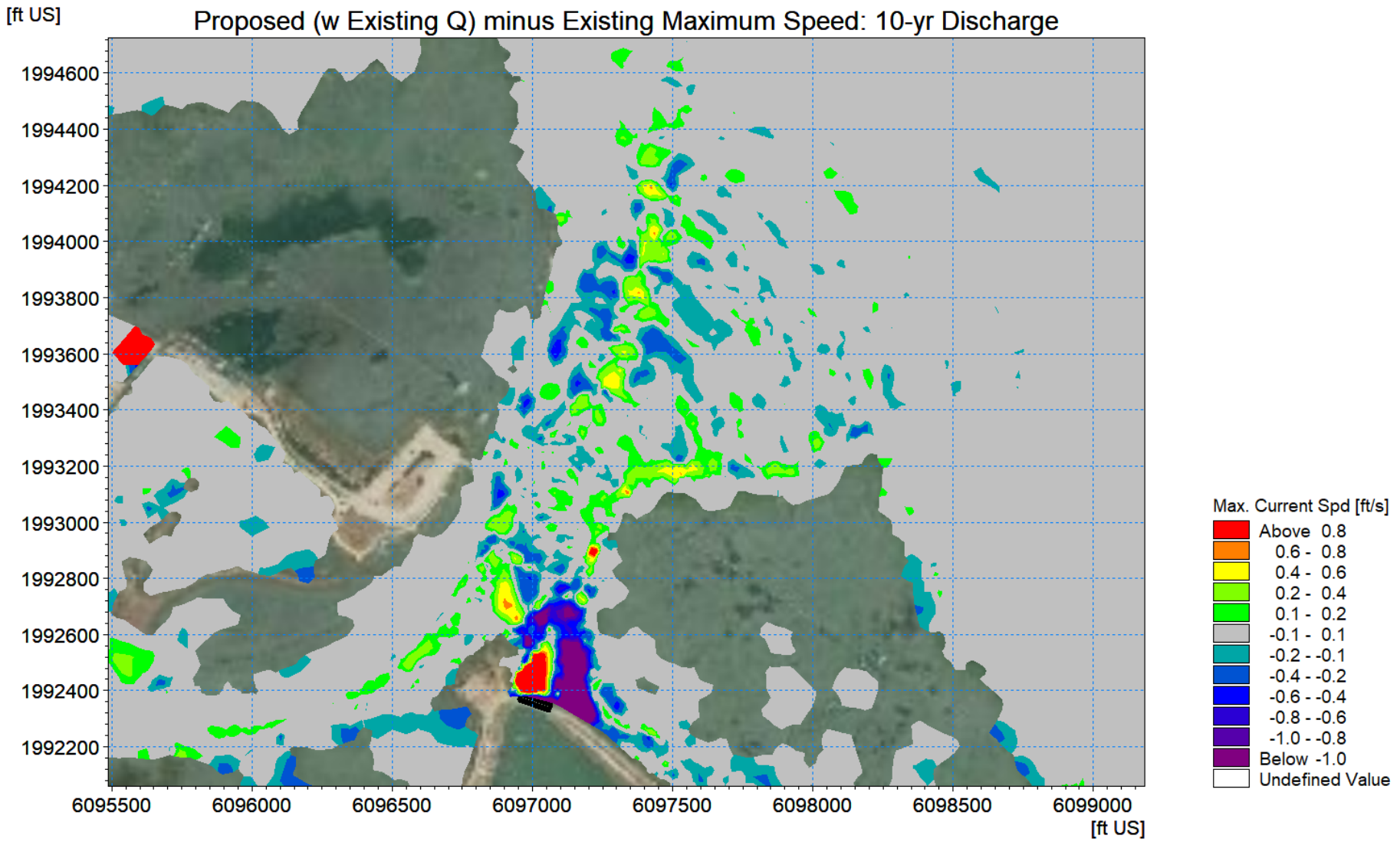

Figure 2-27 Proposed minus Existing maximum current speed for 100-year discharge condition.

3. Impact from Dewatering Phase

This section presents additional analysis of potential erosion impacts due to the placement of a dewatering cofferdam during construction, shown in Figure 3-1. The cofferdam will impose a constriction on the channel width and will be positioned at this location for a duration of two years. The analysis includes numerical modeling similar to what has been presented in Section 2, with modification made to the model mesh to include the sheet wall cofferdam.

Figure 3-1 Location of cofferdam, showing proximity to Hooks Island and partial blockage of channel.

3.1 Numerical Modeling of Impacts due to Cofferdam

The MIKE 21 model mesh that was developed for the modeling analysis described in Section 2 was modified to include the sheet wall cofferdam. The mesh with cofferdam is shown in Figure 3-2. The figure also shows increased mesh element resolution in the channel between the cofferdam and Hooks Island. The black outline around Hooks Island represents the approximate edge of vegetation on the marsh.

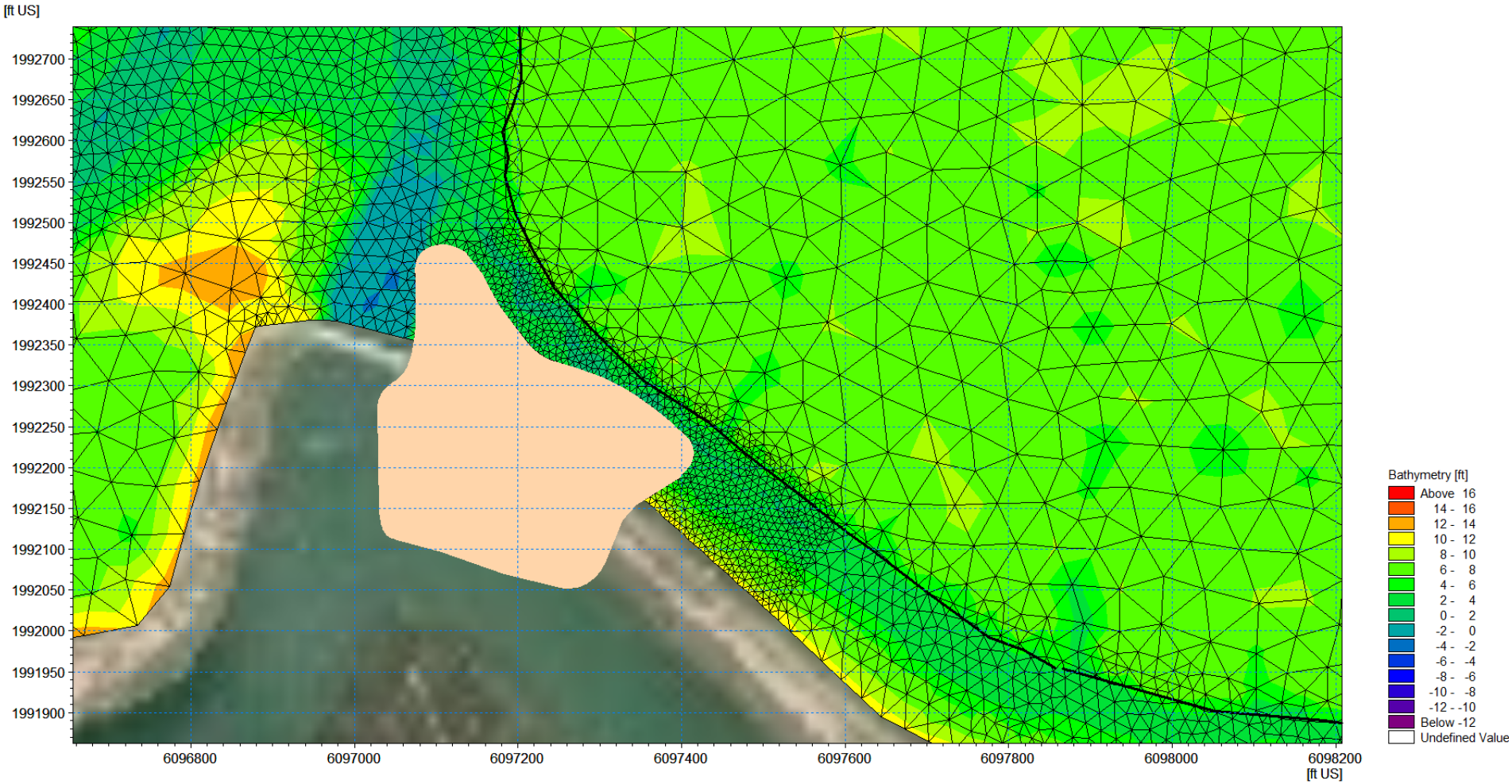

Figure 3-2 Model mesh including cofferdam and increased resolution of elements in the channel. The black outline around Hooks Island is the approximate edge of vegetation of the marsh.

Note that in the previous modeling analysis comparing the existing conditions to the constructed tide gate, the resolution in the channel was made without consideration that the cofferdam would eventually be added to the model. The original mesh resolution in the channel for existing conditions is shown in Figure 3-3. In order to compare impacts of placing the cofferdam in the channel, it was not clear if the coarser channel resolution in the existing mesh would be sufficient for impact comparison. With this in mind, a second existing condition mesh with increased channel resolution was created and used for a limited number of simulations, and is shown in Figure 3-4.

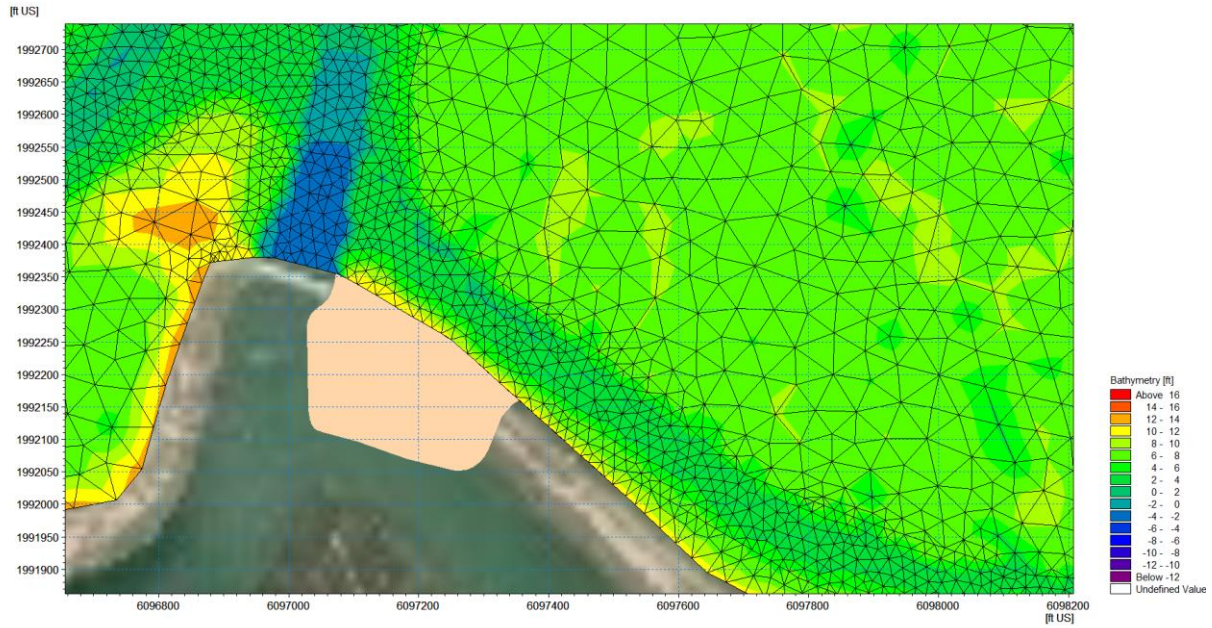

Figure 3-3 Existing conditions mesh showing original coarser resolution in channel compared to the mesh with cofferdam.

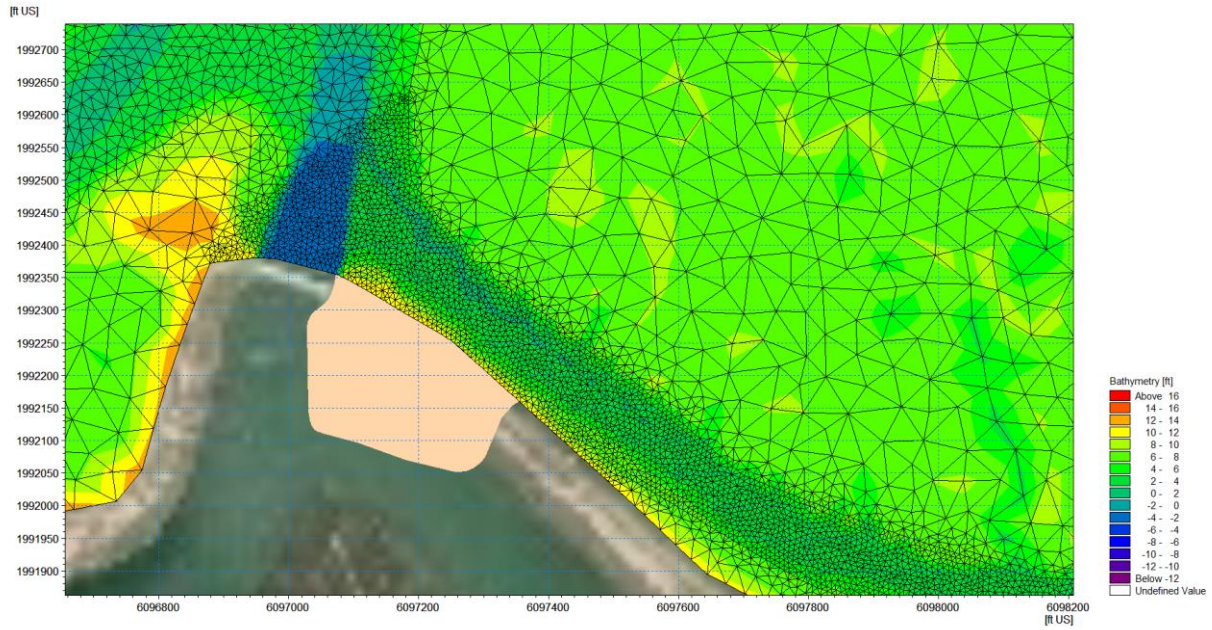

Figure 3-4 Existing conditions mesh with increased resolution in the channel for comparison with cofferdam model runs.

The same four conditions from Section 2 were simulated with the cofferdam, 1) no gate discharge, tide only, 2) 1.5-year gate discharge, 3) 10-year gate discharge, and 4) 100-year gate discharge. The tide only condition would be more representative of what would be expected as normal conditions occurring over the 2-year construction lifetime. The gate discharge cases, as discussed previously, are episodic events with short duration spikes that last only a few hours, spread over a few days. The 1.5-year discharge is a similar frequency to what could be expected to occur about once in the 2-year construction period, but realizing the possibility of the lower frequency return period discharges also occurring with a lower probability.

Figure 3-5 through Figure 3-12 present various comparisons at the zero discharge, or tide only, flow condition of the existing gate condition to the cofferdam conditions.

Figure 3-5 through Figure 3-6 show 2D color contours of maximum current speed at two different scales. Direct comparisons show small variations in current speed except near the narrowest part of the channel where the cofferdam constriction exists.

Figure 3-7 is a 2D color contour plot of the difference in the maximum current speed, showing a general increase in current speed in the channel with the cofferdam, and a maximum occurring near the narrowest part of the channel. Note, the difference is calculated by first subtracting the 2D current fields for both cases at each time step of the time series, and then calculating the maximum speed from all the time steps. Figure 3-8 makes the same 2D comparison, but based on the existing condition model with the higher resolution mesh in the channel. It can be observed that the maximum difference is slightly reduced when using the higher resolution mesh in the channel for existing conditions.

Figure 3-9 shows a reference point and transect where further detailed analysis and comparison is made. Point 1 is located along the face of the sheet pile dewatering system and is close to the point of maximum current speed in the channel. The transect is used to show the lateral variation of the current speed across the channel including the marsh. Figure 3-10 shows the time series comparison of current speed and difference in current speed. It can be observed that the maximum instantaneous current speed differences (cofferdam minus existing condition) are slightly more than 1.2 ft/sec. This comparison is based on the existing gate model with the original mesh as applied in Section 2. To assess the sensitivity to the mesh resolution in the channel, the same time comparison plot is shown running the existing model with the increased mesh resolution in the channel, and is shown in Figure 3-11. It can be observed that the maximum difference in speed is slightly reduced to about 1.0 ft/sec using the finer mesh, but still showing the same general trends. It should also be noted that these peaks occur for a short duration during incoming or outgoing tides, when the tide current is near the maximum rate. Figure 3-12 shows the maximum current speed along the transect shown Figure 3-9. Vertical dashed lines indicate the location of the sheet pile wall and the edge of the marsh for reference. The figure shows the higher velocities near the cofferdam with the structure included in the model, but also shows the rapid decrease in velocity close to the edge of the marsh. It should be noted that the model assumes a fixed bed elevation throughout the duration of the model simulations, and that when the cofferdam was placed into the mesh, no adjustment was made to the existing channel cross section. It is highly likely that this channel cross section will adjust to the changes in flow conditions. This could result in a deepening or widening of the channel, or both.

All further analysis presented in this report will be based on using the original existing conditions mesh, realizing that it may be somewhat conservative compared to using the refined mesh model.

Figure 3-13 through Figure 3-30 show similar comparison plots of 2D maximum speed, 2D difference in maximum speed and time series of current speed for the 1.5, 10 and 100-year discharge cases. As was presented in Section 2, these high discharges are short duration peaks and the infrequency of the these events may not be as impactful as the tide only case which occurs on a daily basis for the entire two years of construction.

Table 3-1 summarized the maximum current speeds and differences in current speed for each discharge condition. The difference based on instantaneous calculation can be slightly higher than the difference based on absolute maximums.

Color contour plots of differences in maximum bed shear stress are included in Appendix A, and typically show the same trends of increases as with the velocity analysis.

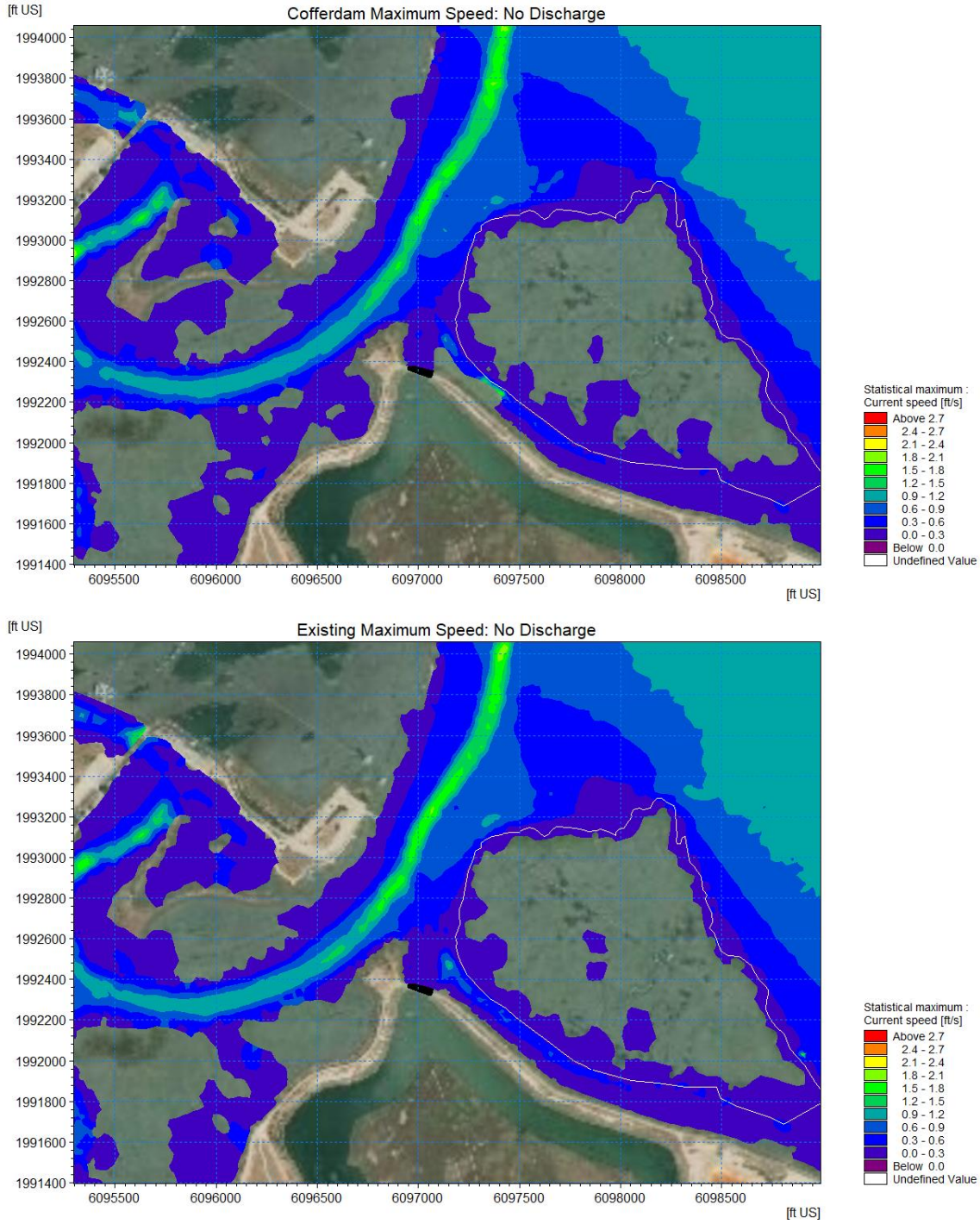

Figure 3-5 Maximum current speed with cofferdam (top) and without (bottom). Tide only case.

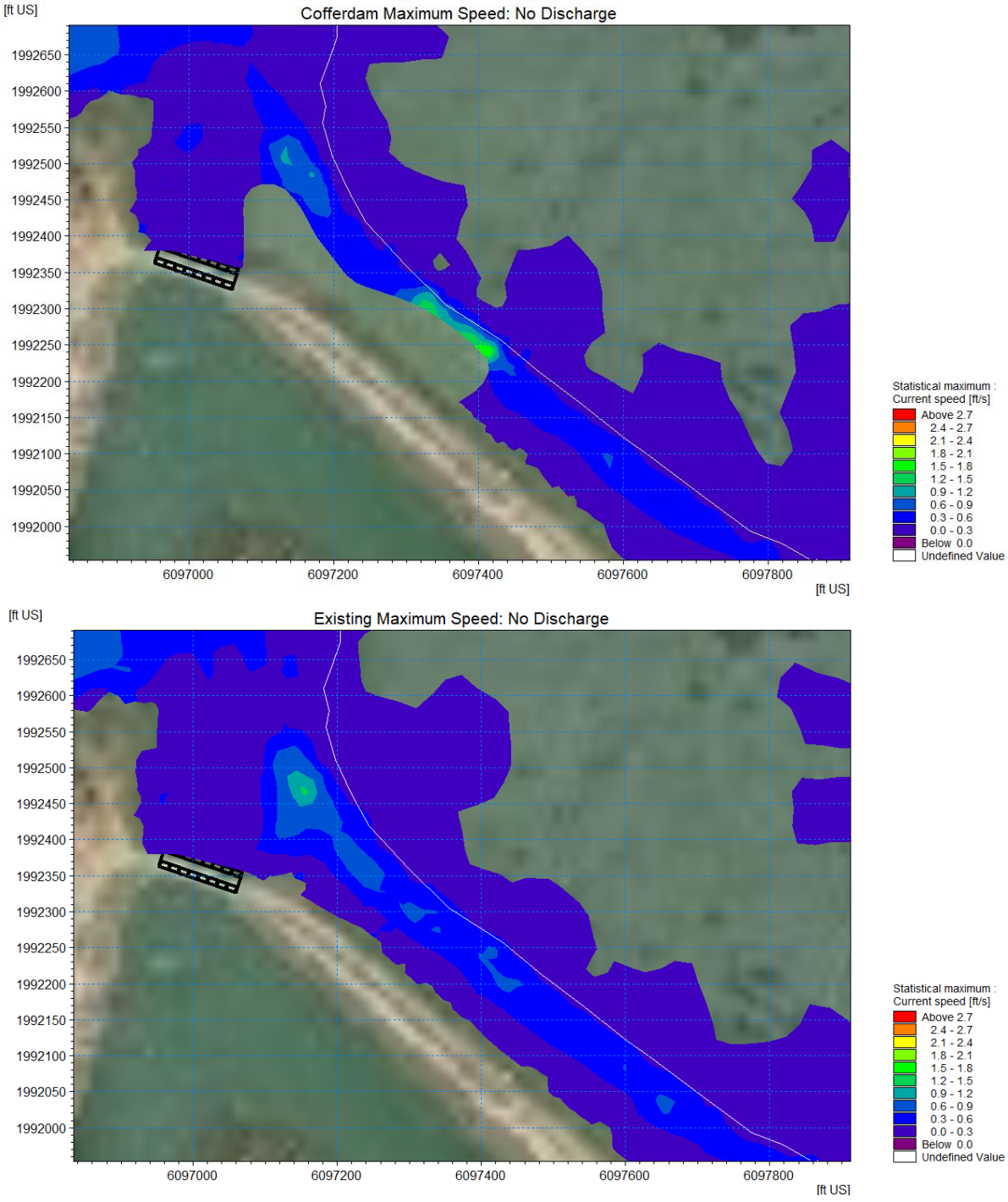

Figure 3-6 Maximum current speed with cofferdam (top) and without (bottom). Tide only case.

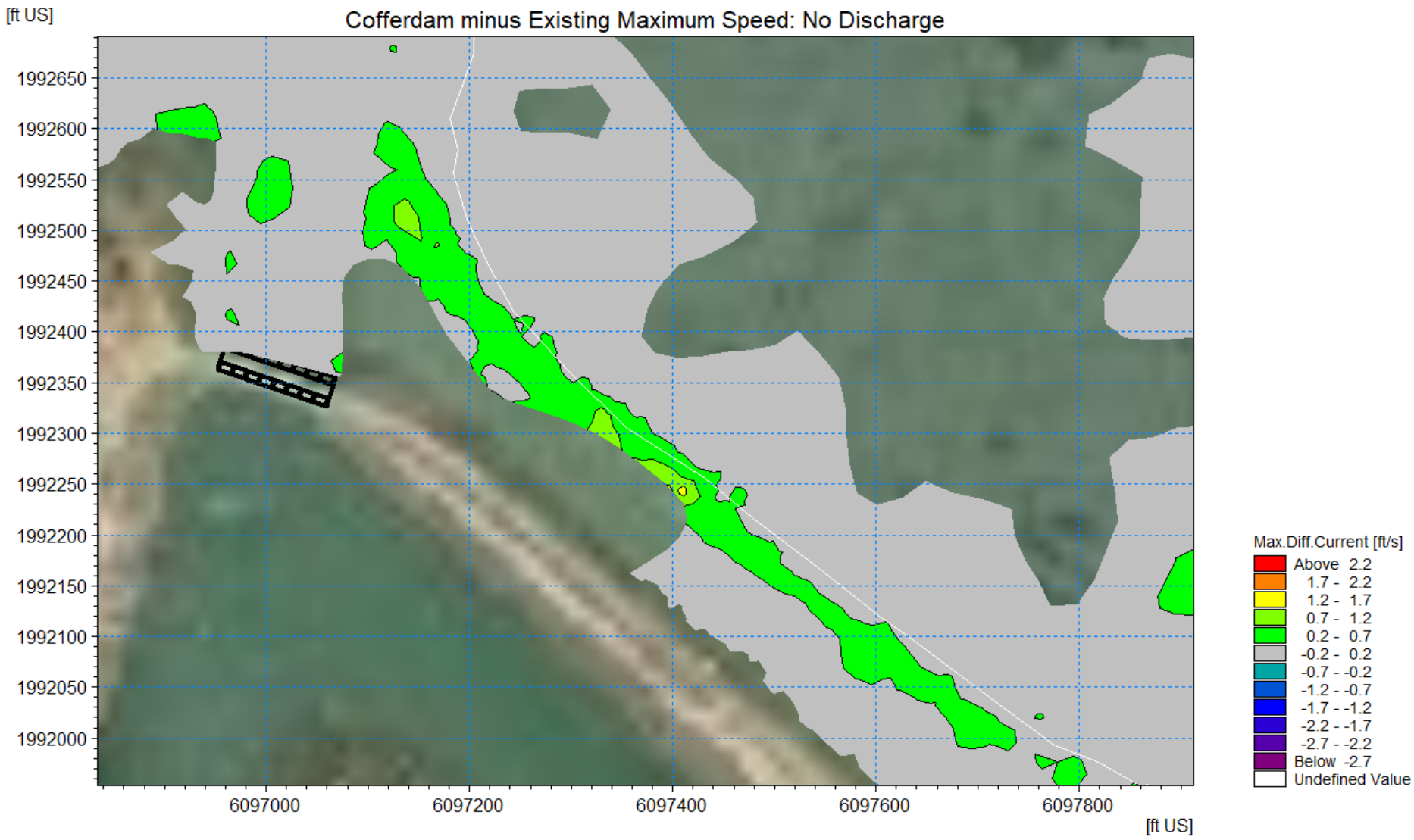

Figure 3-7 Difference in Maximum Speed, Cofferdam minus Existing. No discharge case.

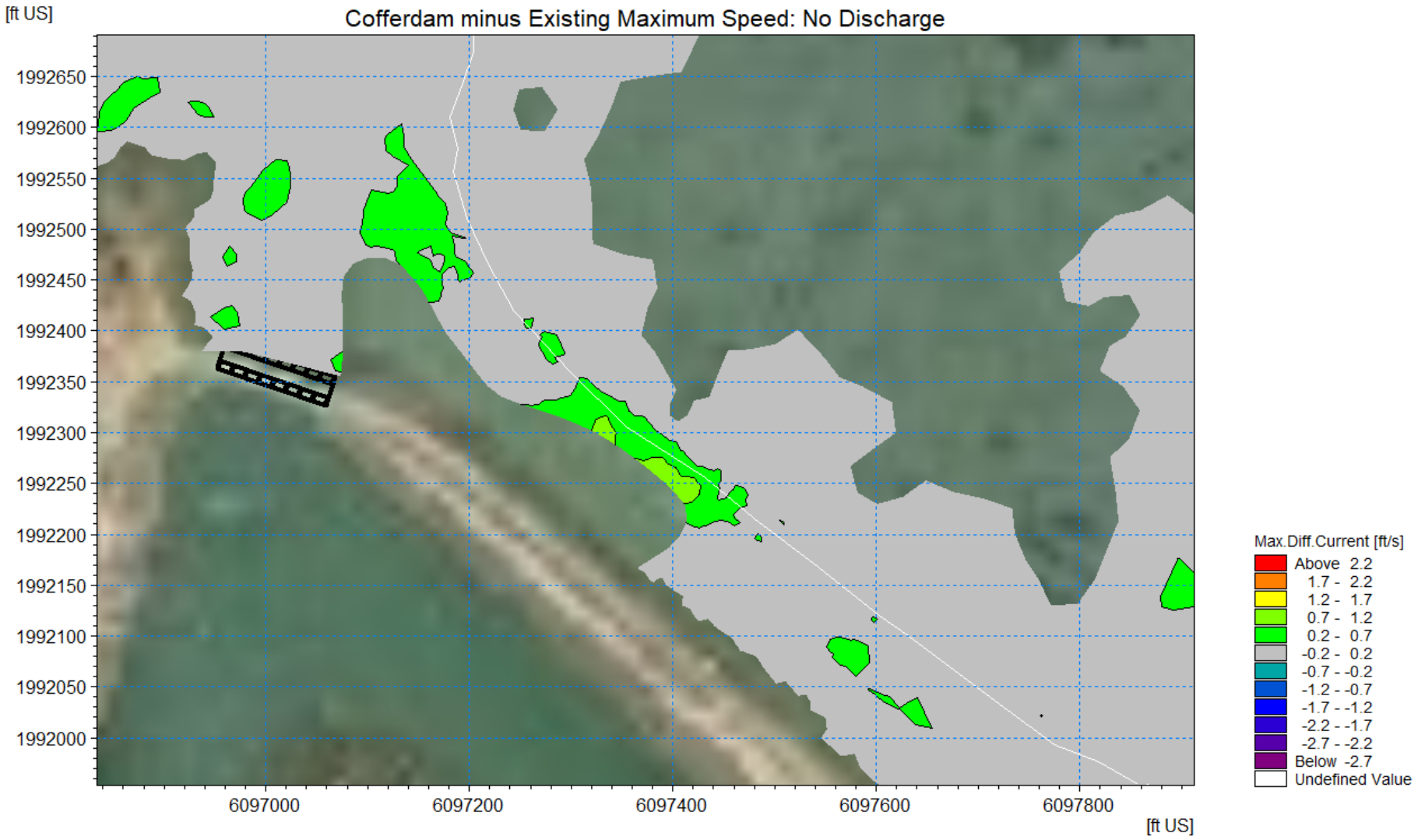

Figure 3-8 Difference in Maximum Speed, Cofferdam minus Existing with higher resolution mesh in channel. No discharge case.

Figure 3-9 Location of time series extraction point and transect for comparison

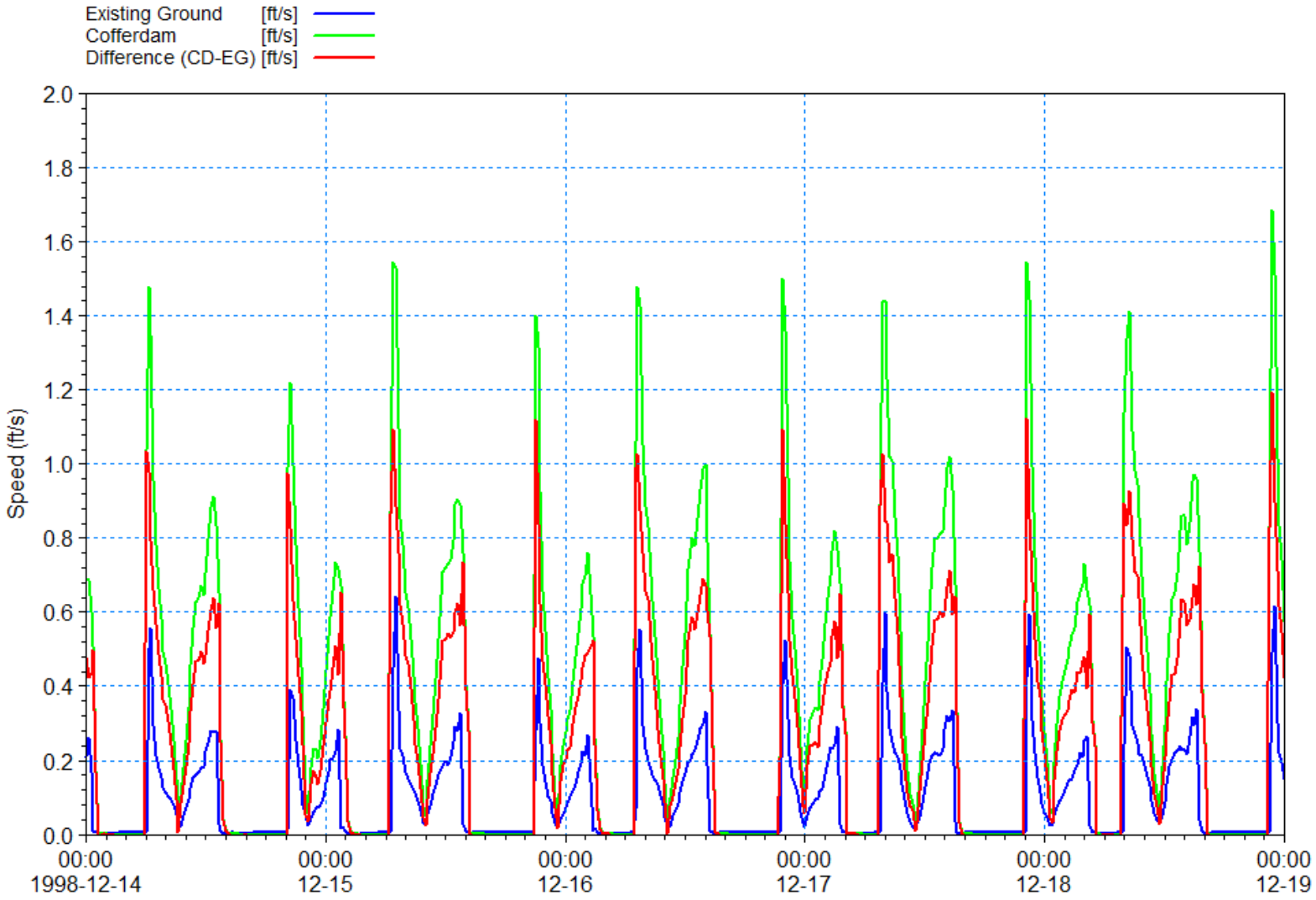

Figure 3-10 Time series comparison of current speeds and instantaneous difference in speed (cofferdam minus existing) for the no discharge case at Point 1. Existing condition model using the original mesh.

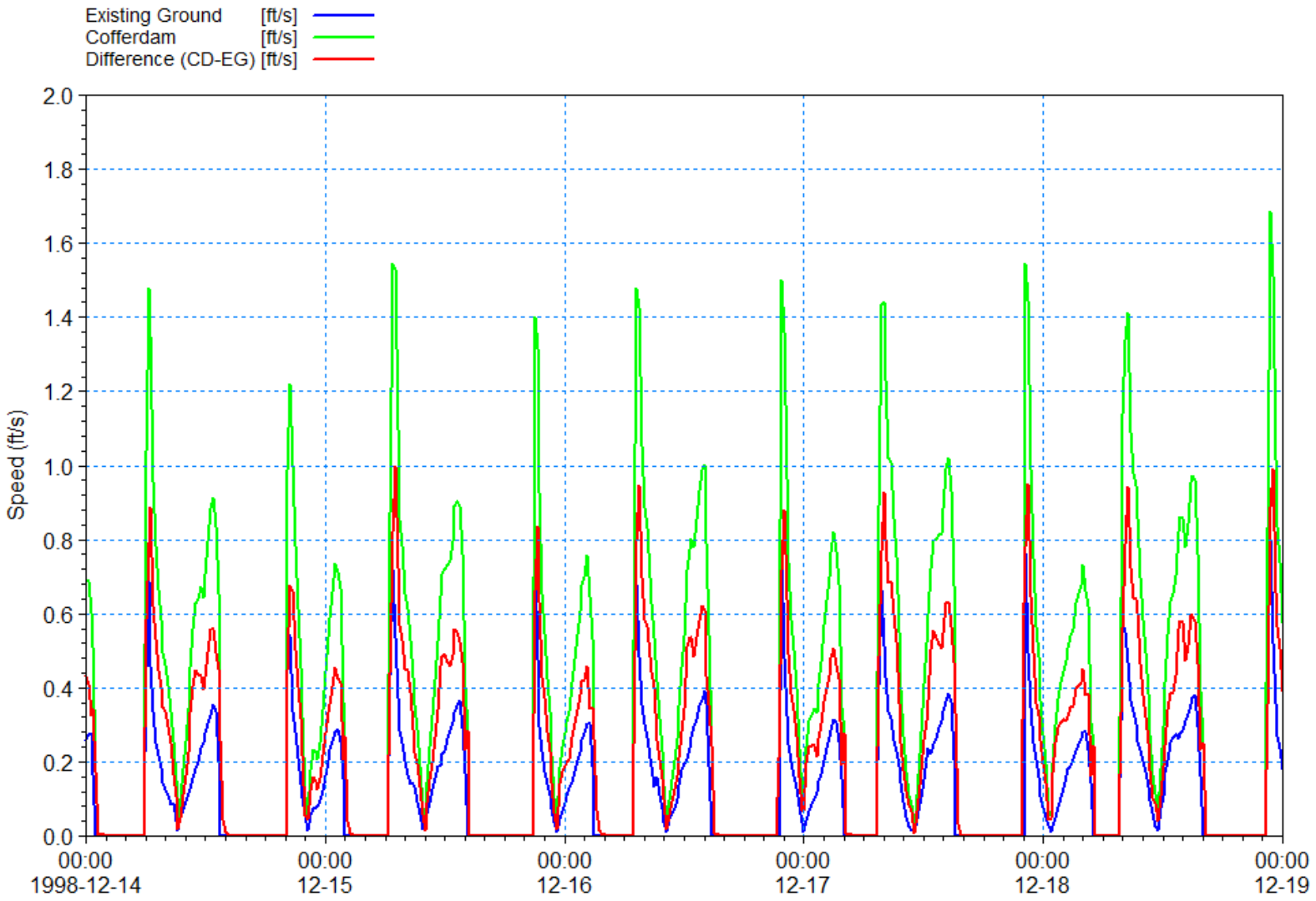

Figure 3-11 **Time series comparison of current speeds and instantaneous difference in speed (cofferdam minus existing) for the no discharge case at Point 1. The existing conditions model is using the refined mesh shown in Figure 3-4.**

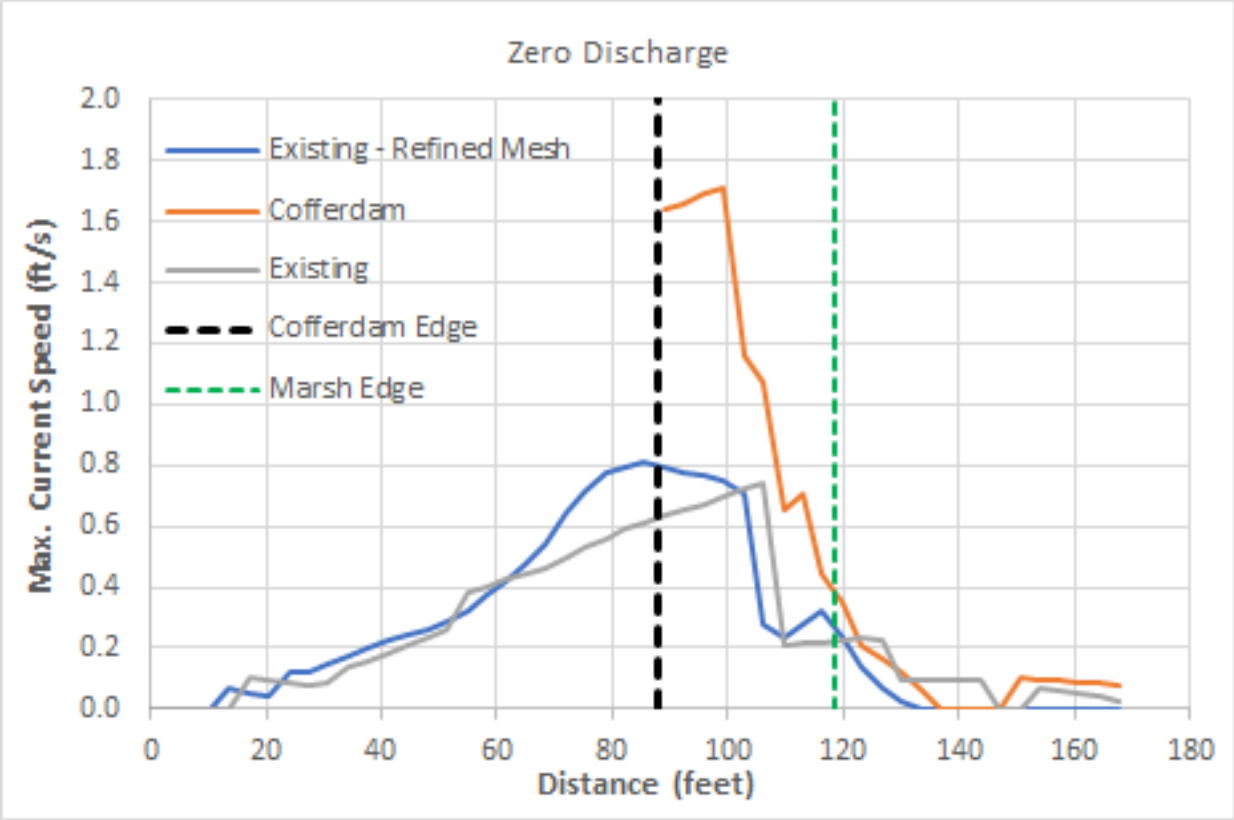

Figure 3-12 Comparison of maximum current speed along the transect shown in Figure 3-9 for the no discharge case.

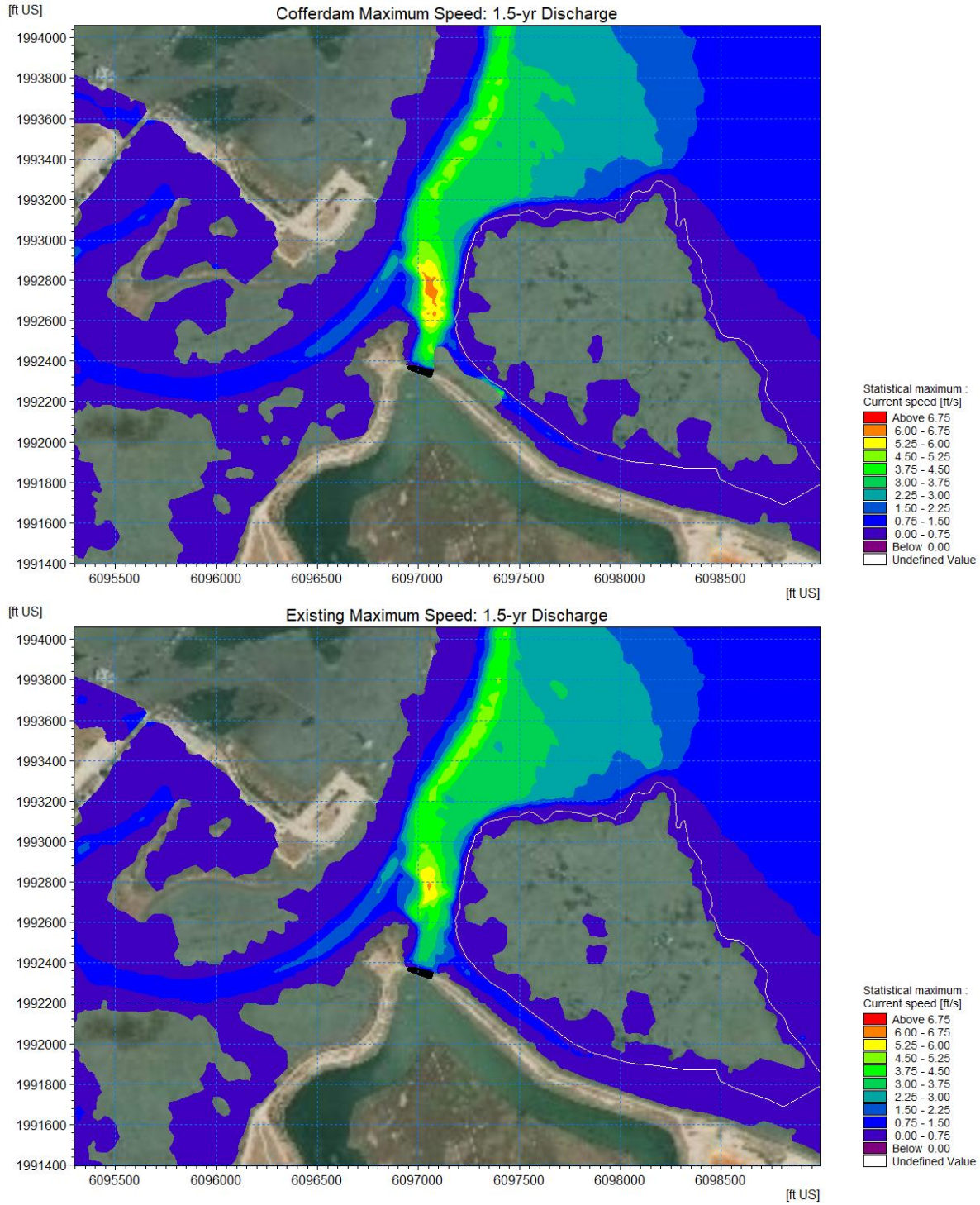

Figure 3-13 Maximum current speed with cofferdam (bottom) and without (top). 1.5-year discharge case

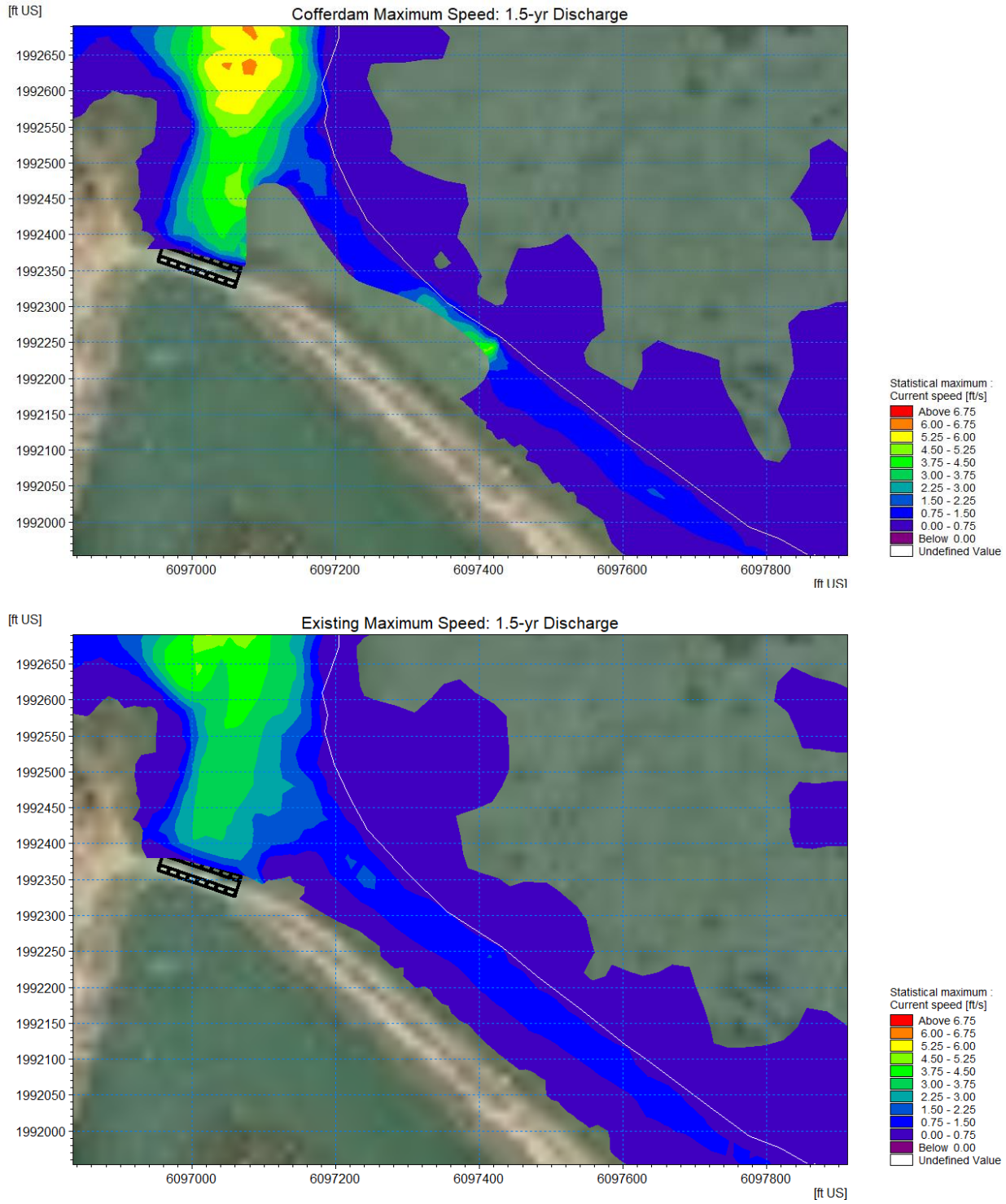

Figure 3-14 Maximum current speed with cofferdam (bottom) and without (top). 1.5-year discharge case.

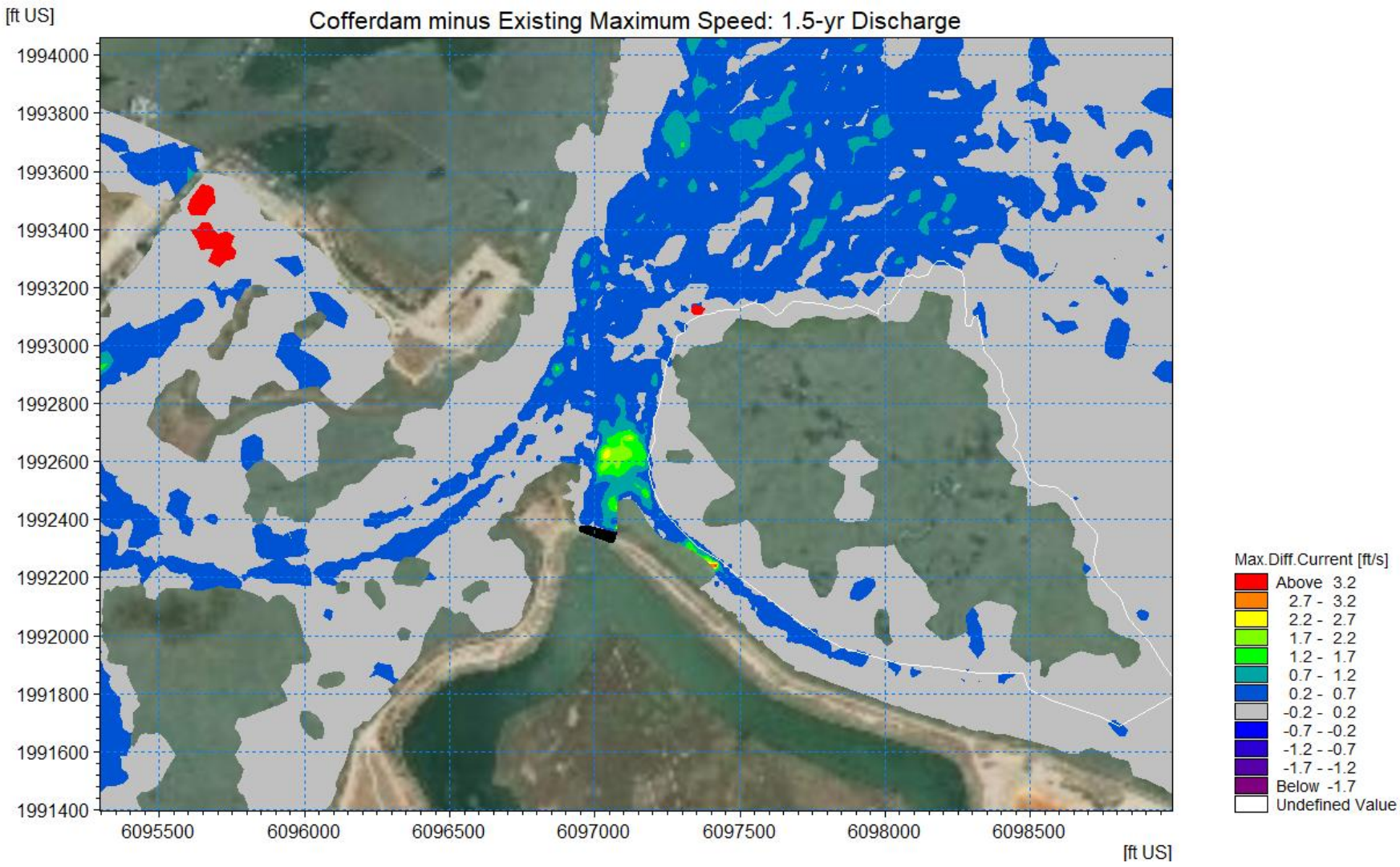

Figure 3-15 Difference in Maximum Speed. Cofferdam minus Existing. 1.5 year discharge case.

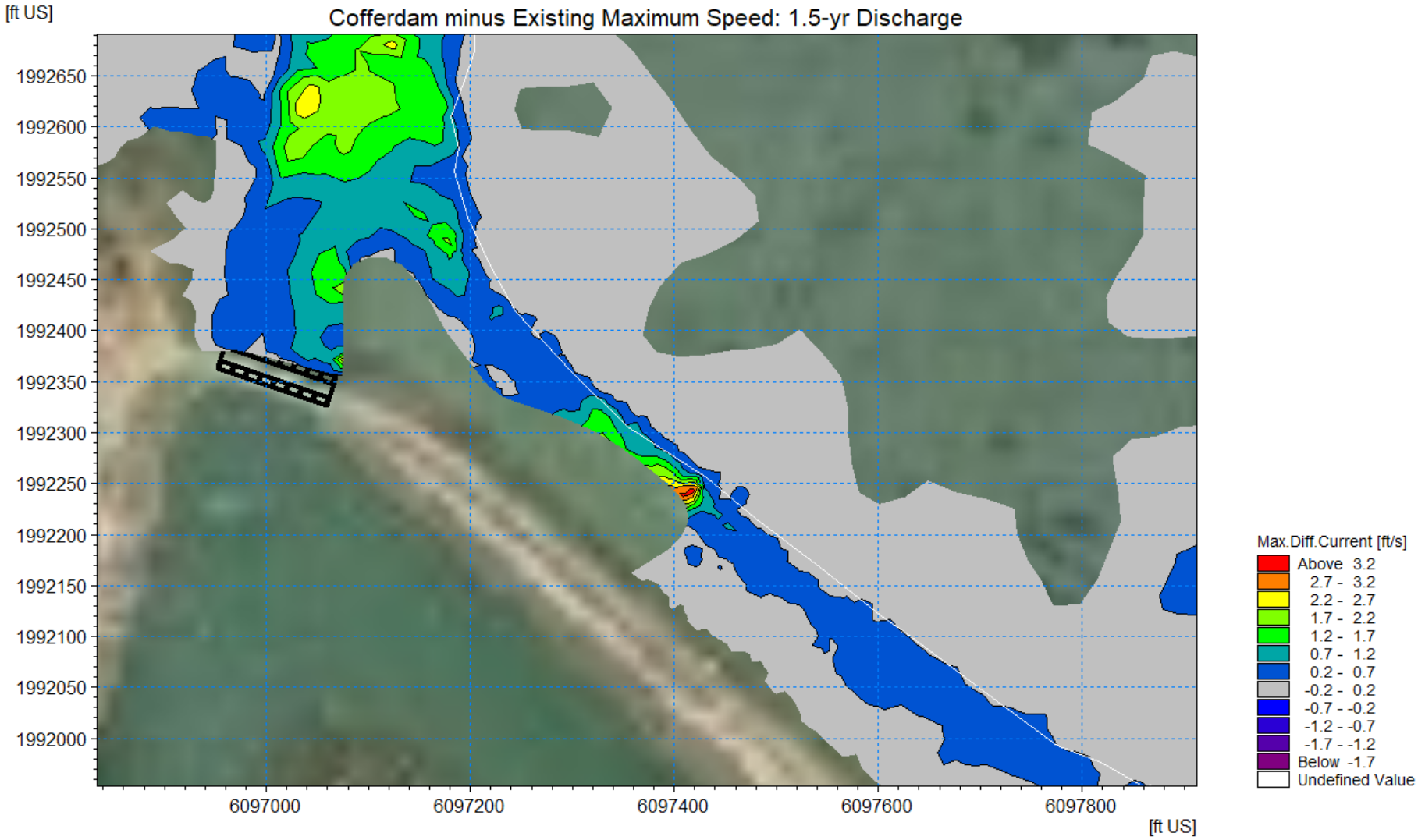

Figure 3-16 Difference in Maximum Speed. Cofferdam minus Existing. 1.5 year discharge case.

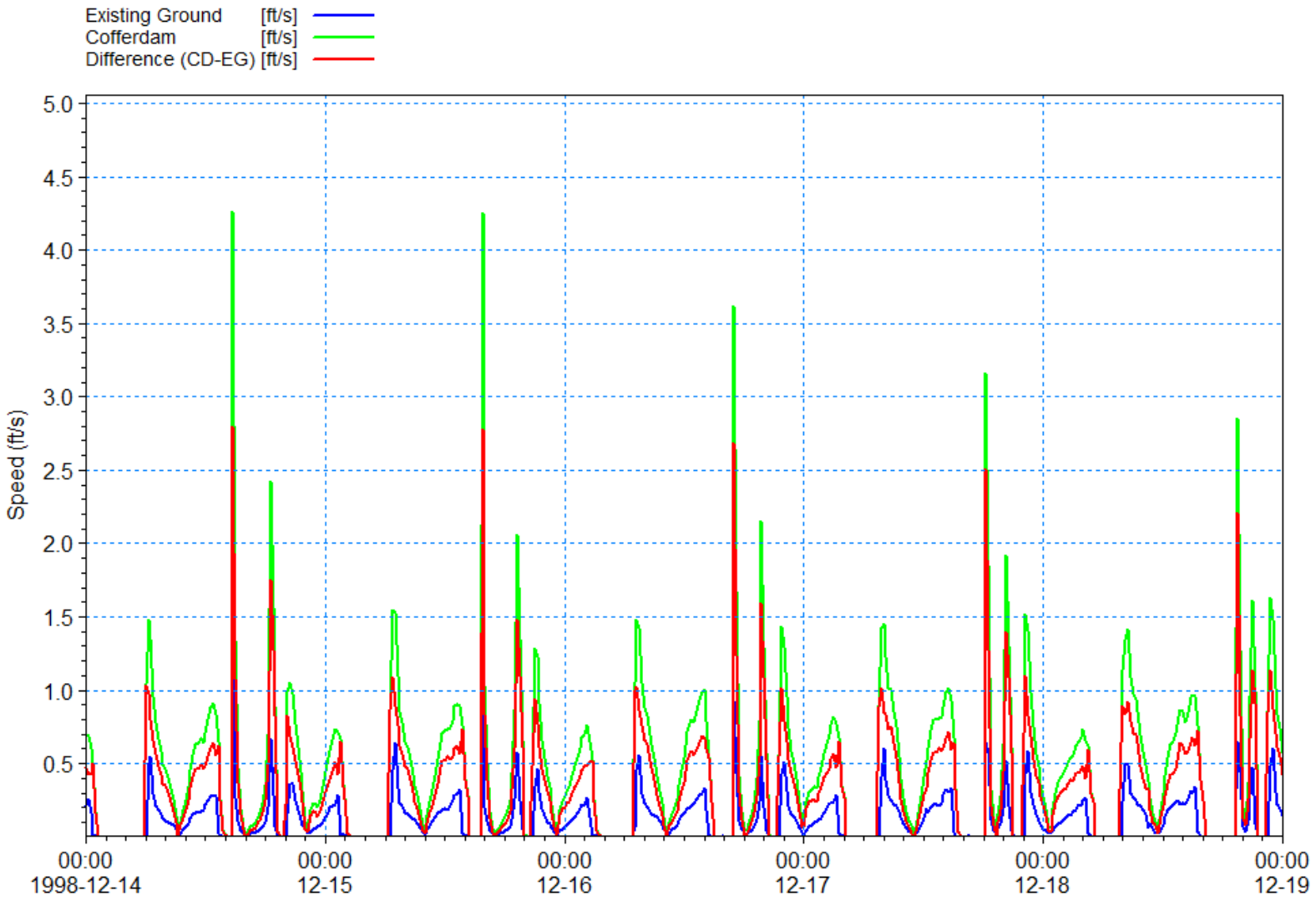

Figure 3-17 Time series comparison of current speeds and instantaneous difference in speed (cofferdam minus existing) for the 1.5-year discharge case at Point 1.

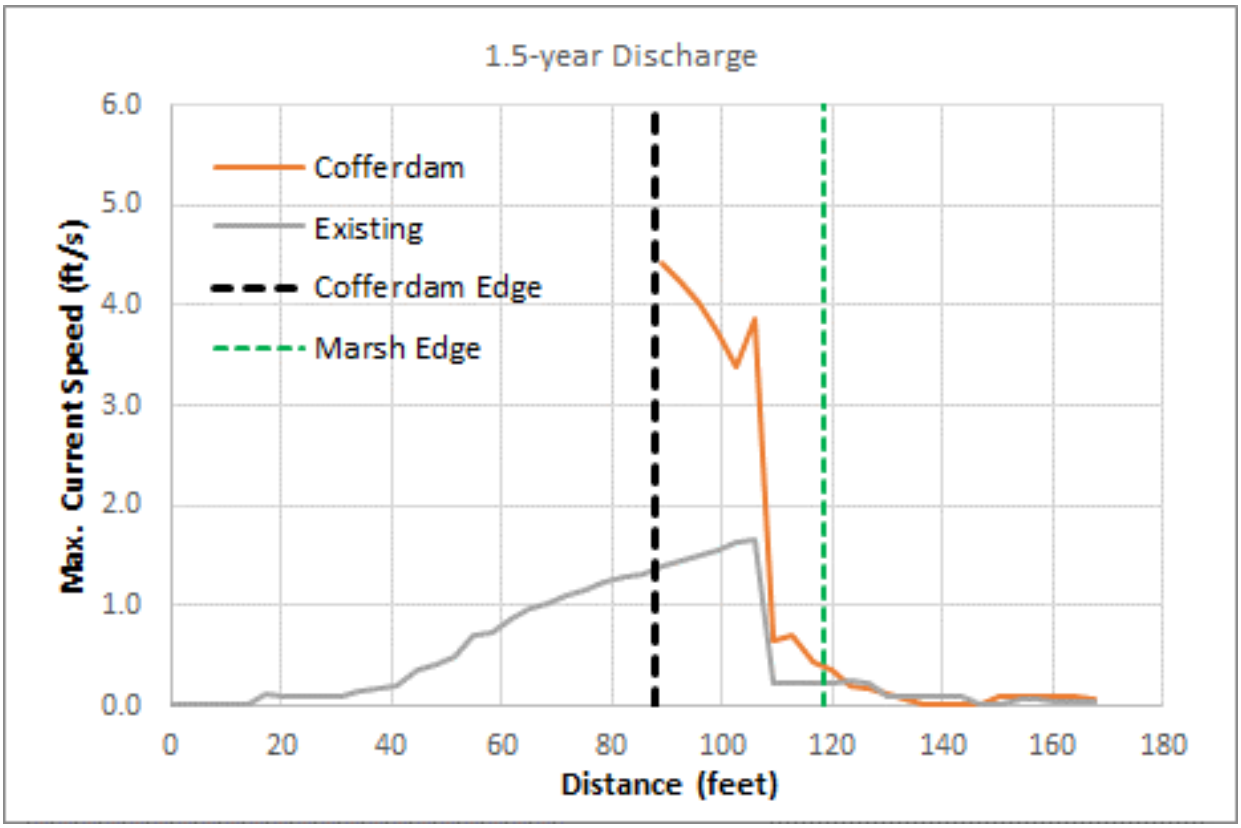

Figure 3-18 Comparison of maximum current speed along the transect shown in Figure 3-9 for the 1.5-year discharge case.

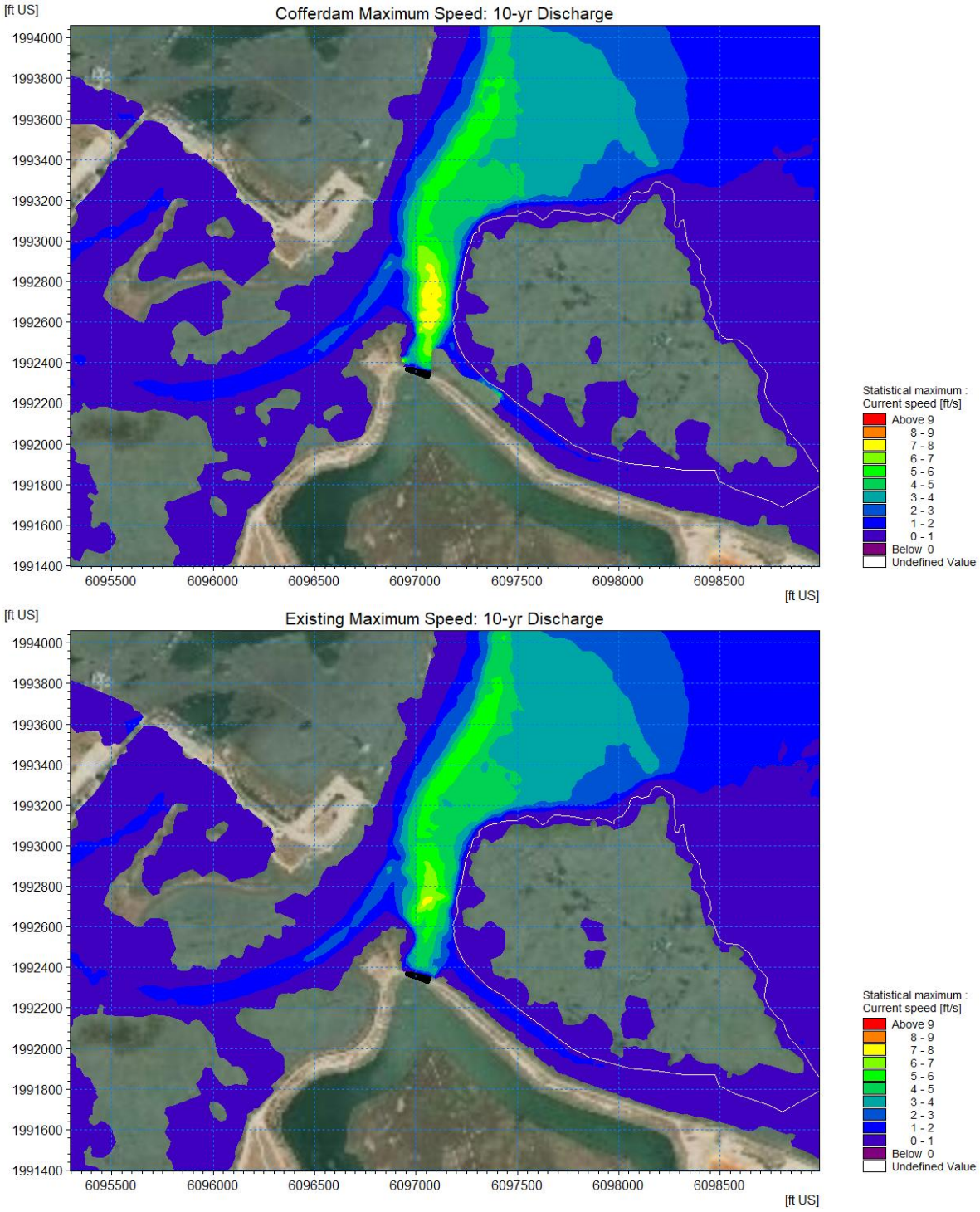

Figure 3-19 Maximum current speed with cofferdam (top) and without (bottom). 10-year discharge case.

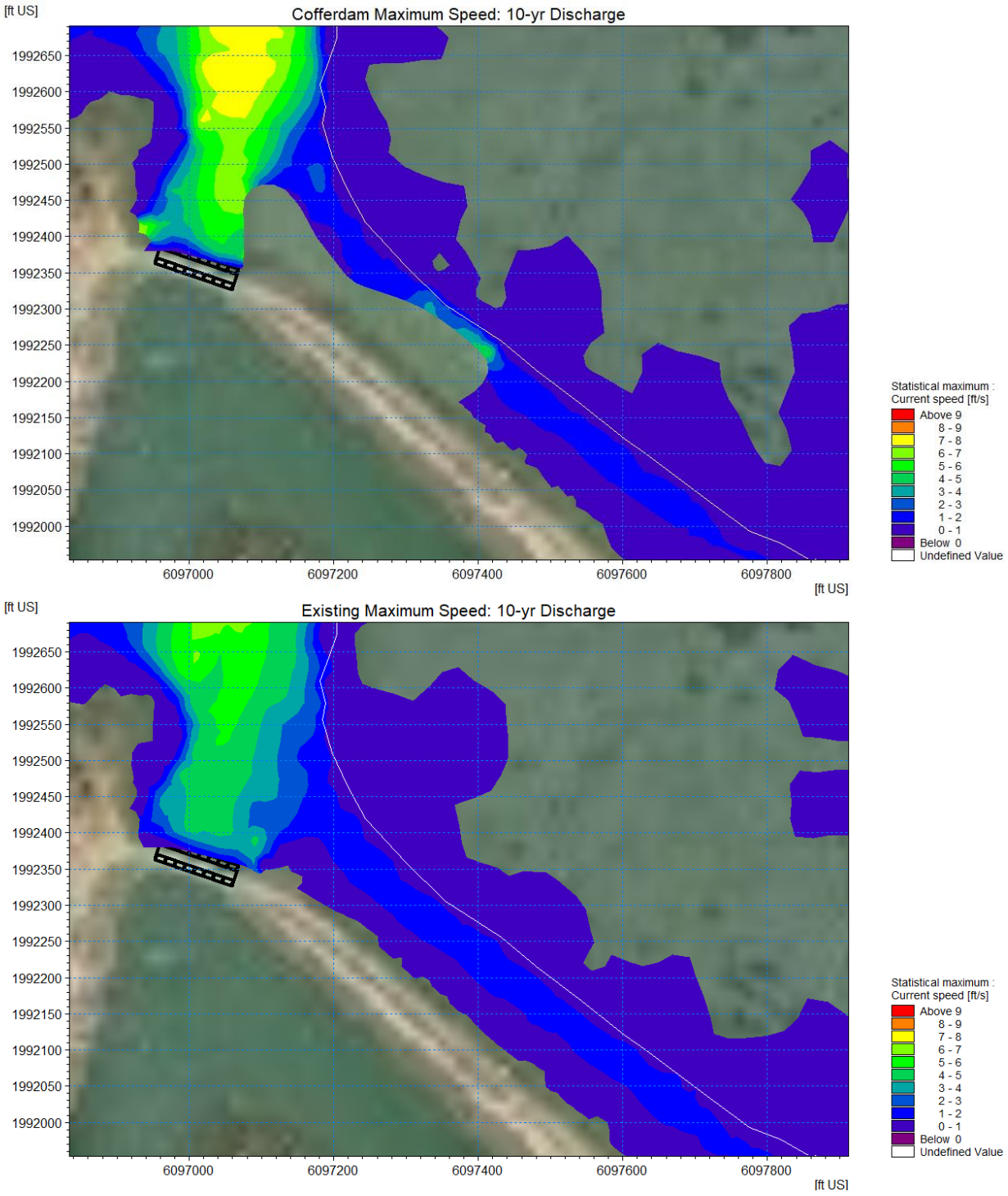

Figure 3-20 Maximum current speed with cofferdam (top) and without (bottom). 10-year discharge case.

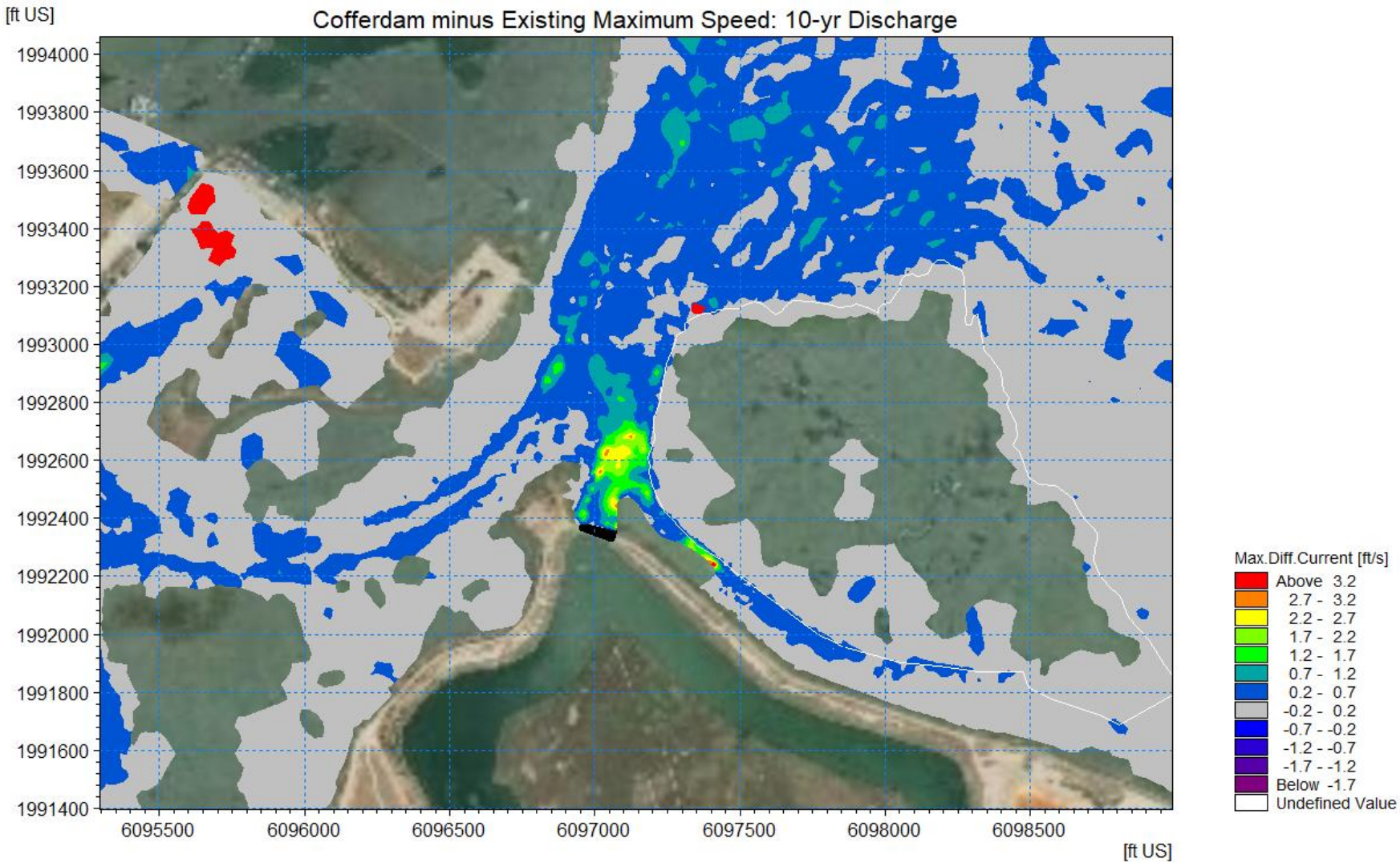

Figure 3-21 Difference in Maximum Speed. Cofferdam minus Existing. 10-year discharge case.

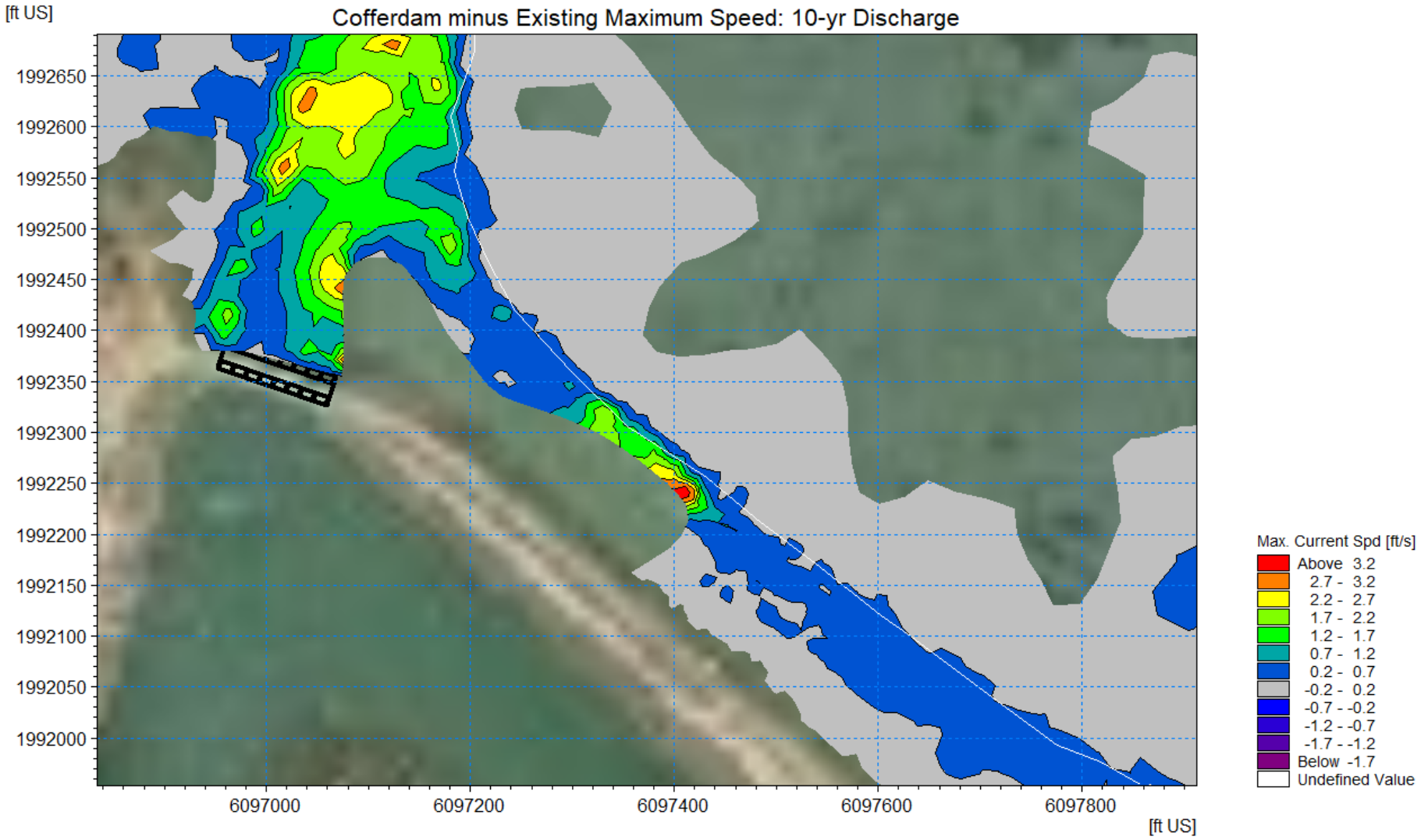

Figure 3-22 Difference in Maximum Speed. Cofferdam minus Existing. 10-year discharge case.

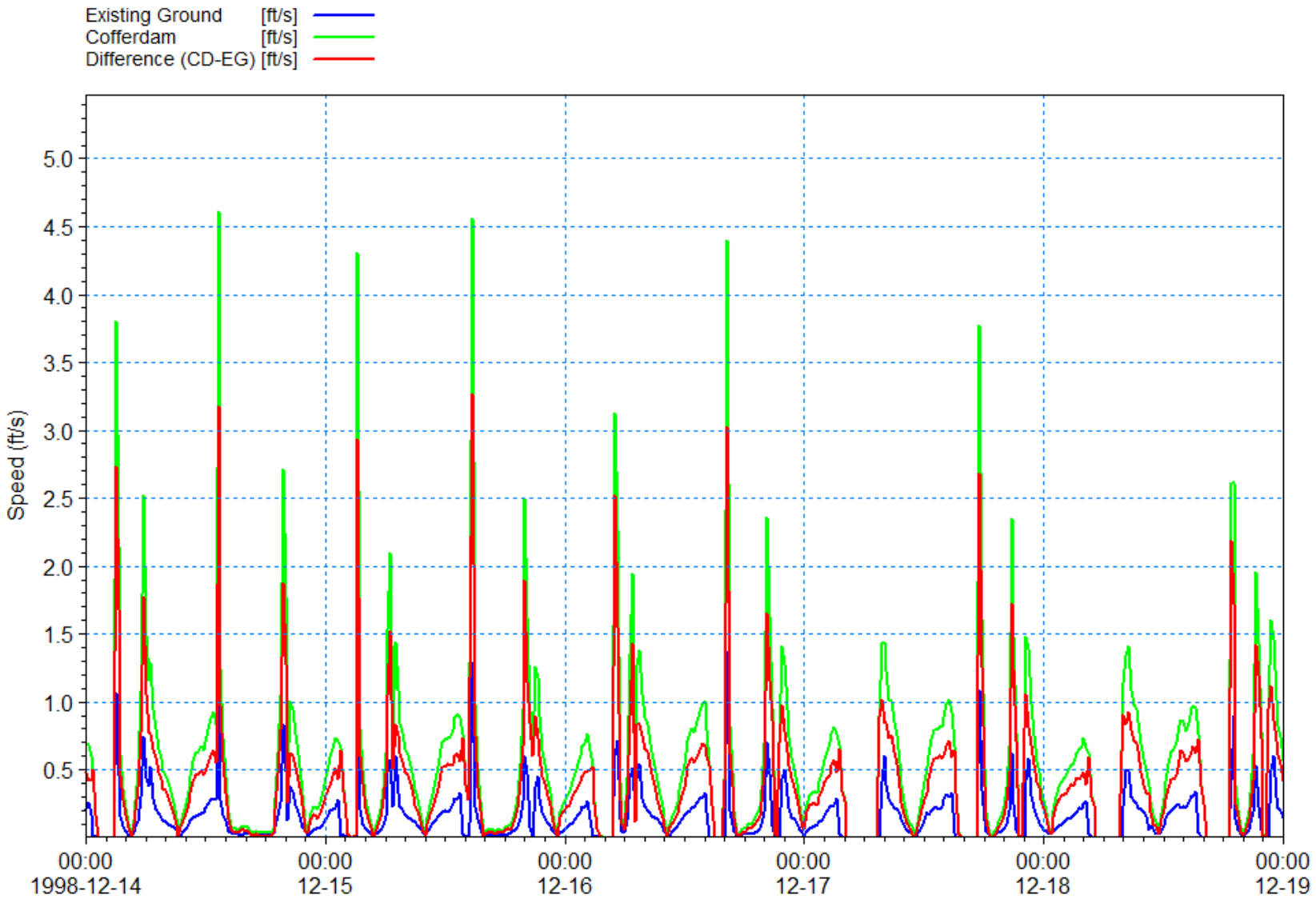

Figure 3-23 Time series comparison of current speeds and instantaneous difference in speed (cofferdam minus existing) for the 10-year discharge case at Point 1.

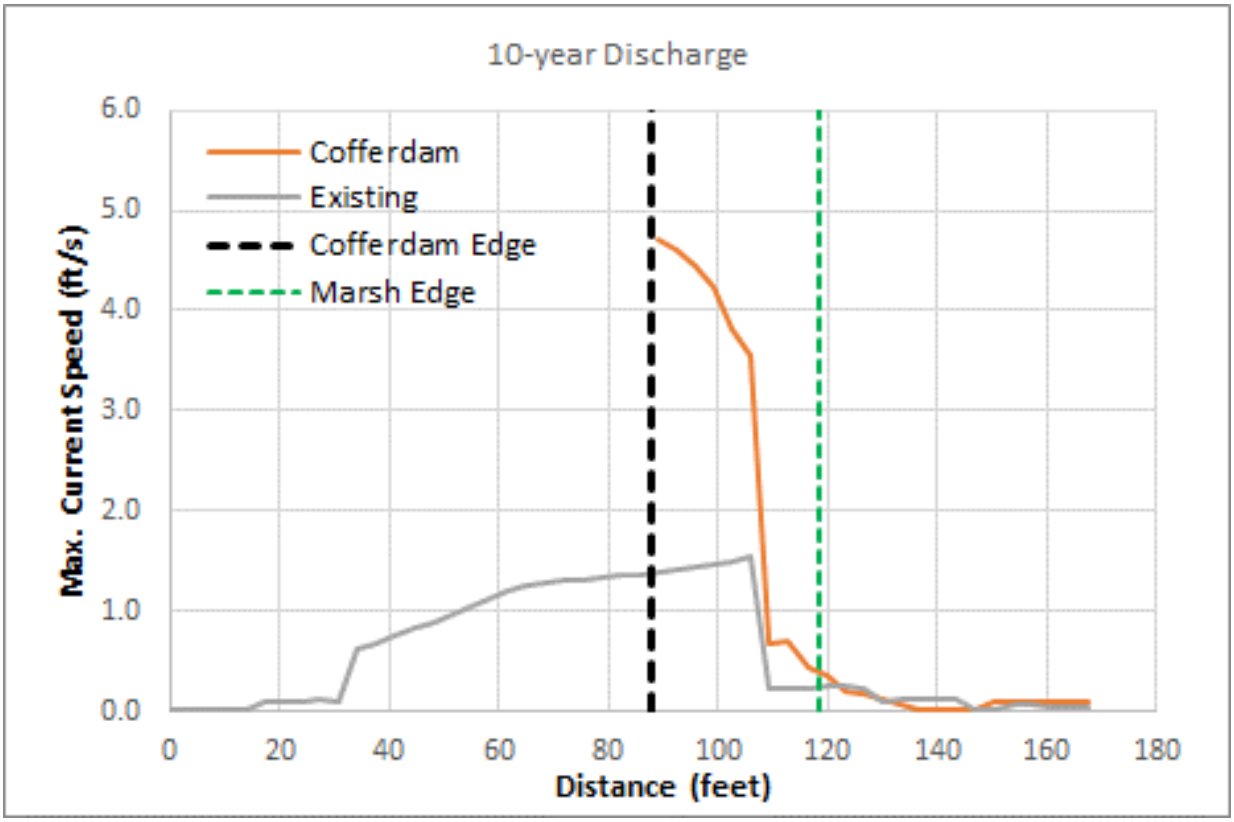

Figure 3-24 Comparison of maximum current speed along the transect shown in Figure 3-9 for the 10-year discharge case.

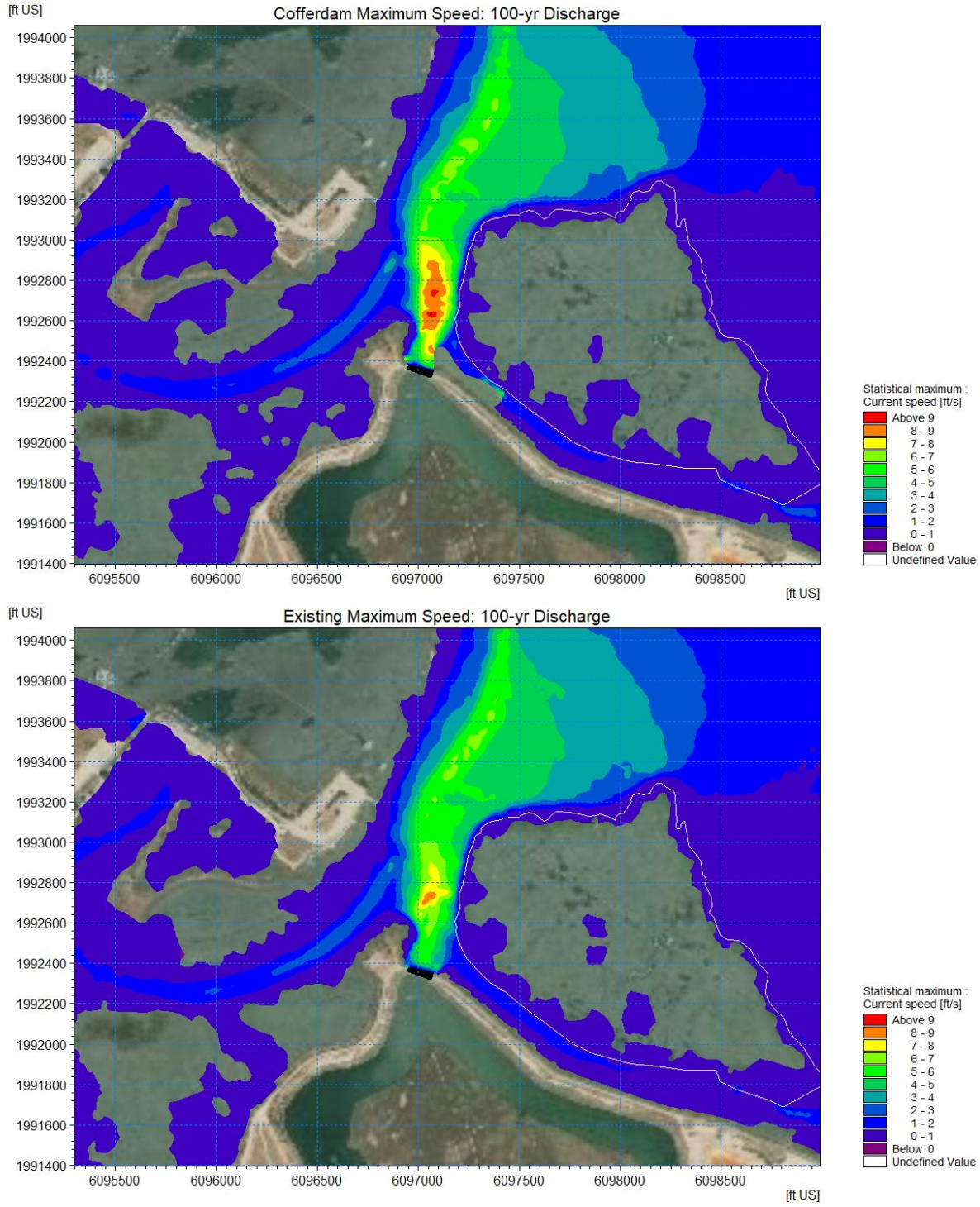

Figure 3-25 Maximum current speed with cofferdam (top) and without (bottom). 100-year discharge case.

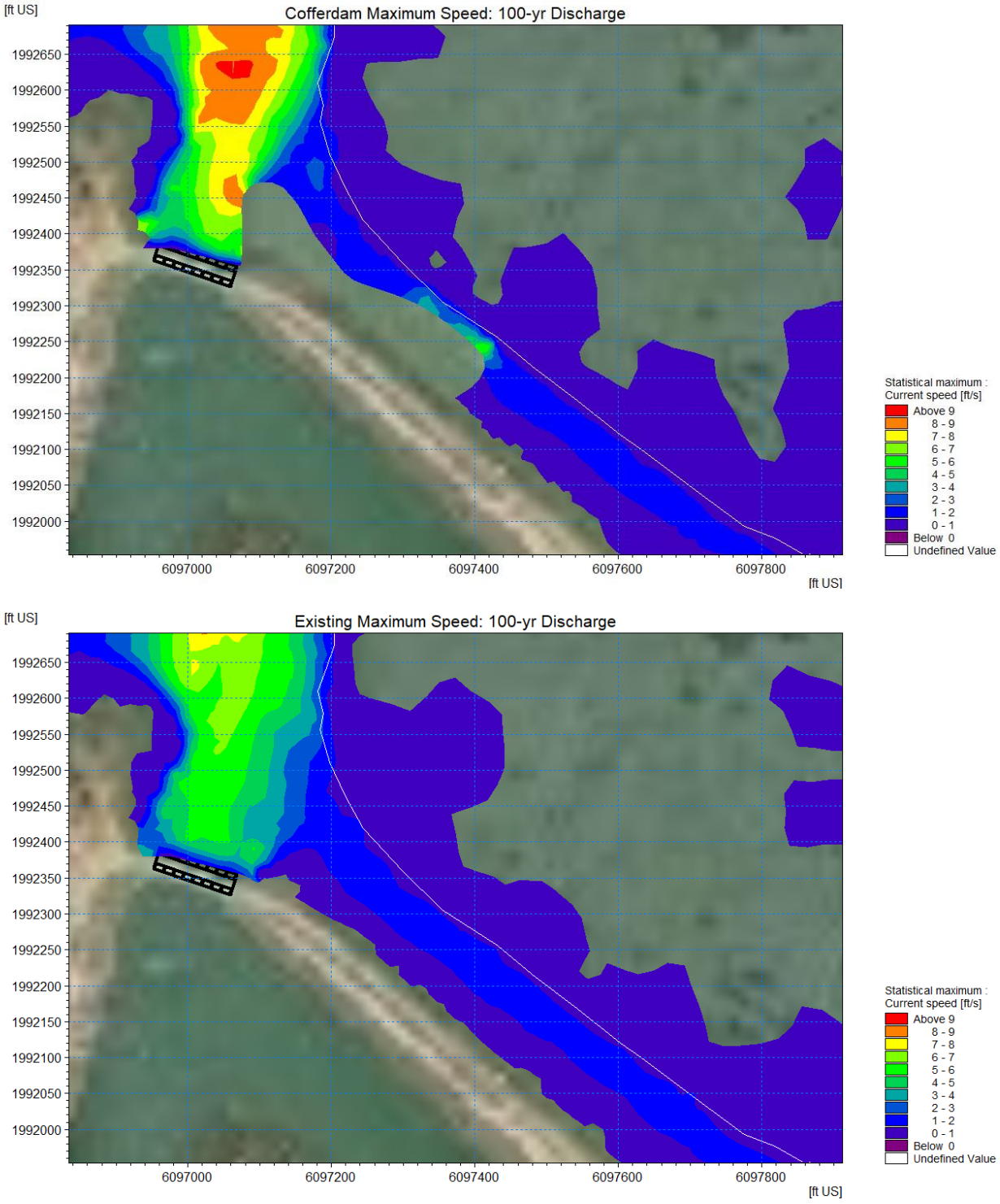

Figure 3-26 Maximum current speed with cofferdam (top) and without (bottom). 100-year discharge case.

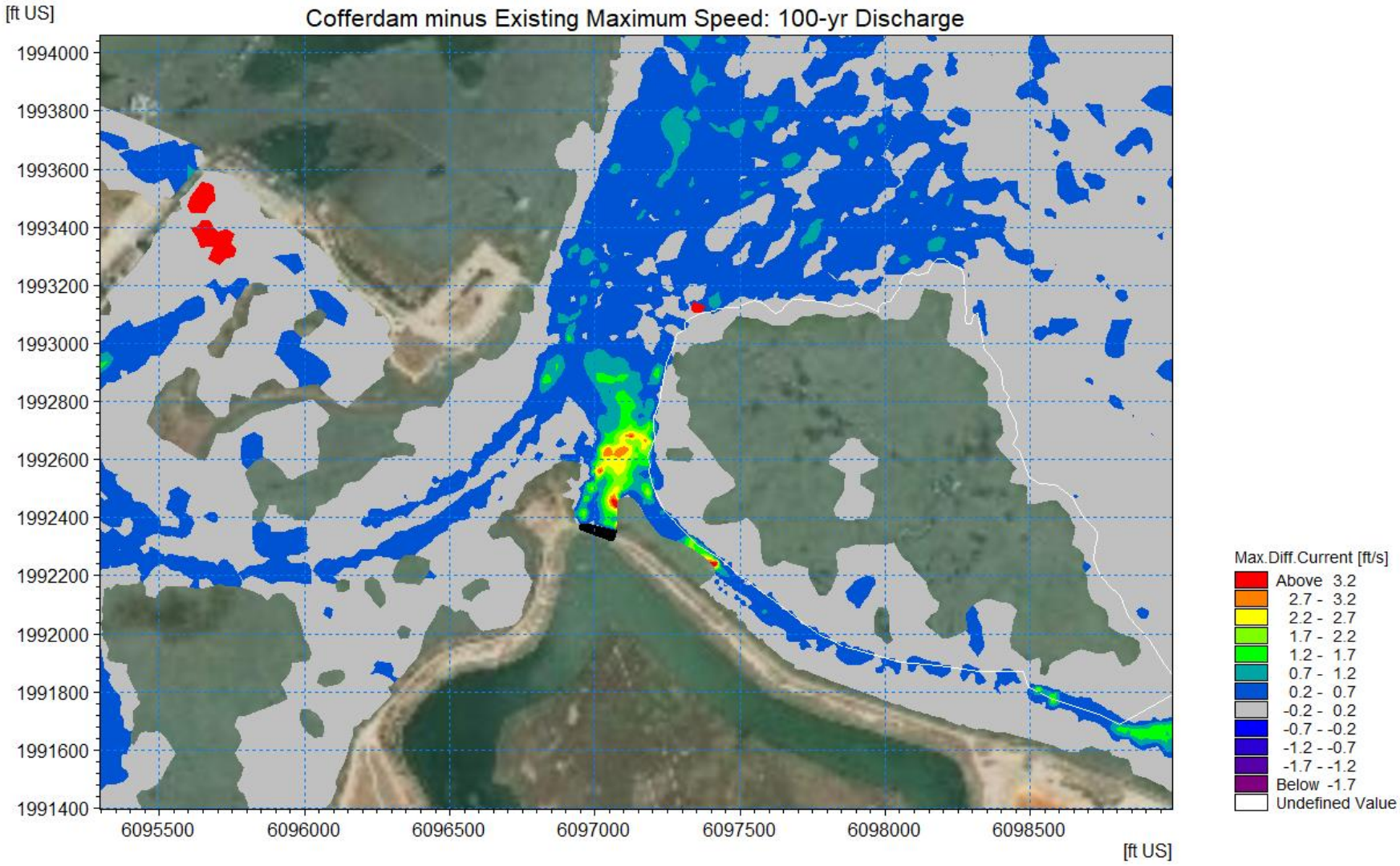

Figure 3-27 Difference in Maximum Speed. Cofferdam minus Existing. 100-year discharge case.

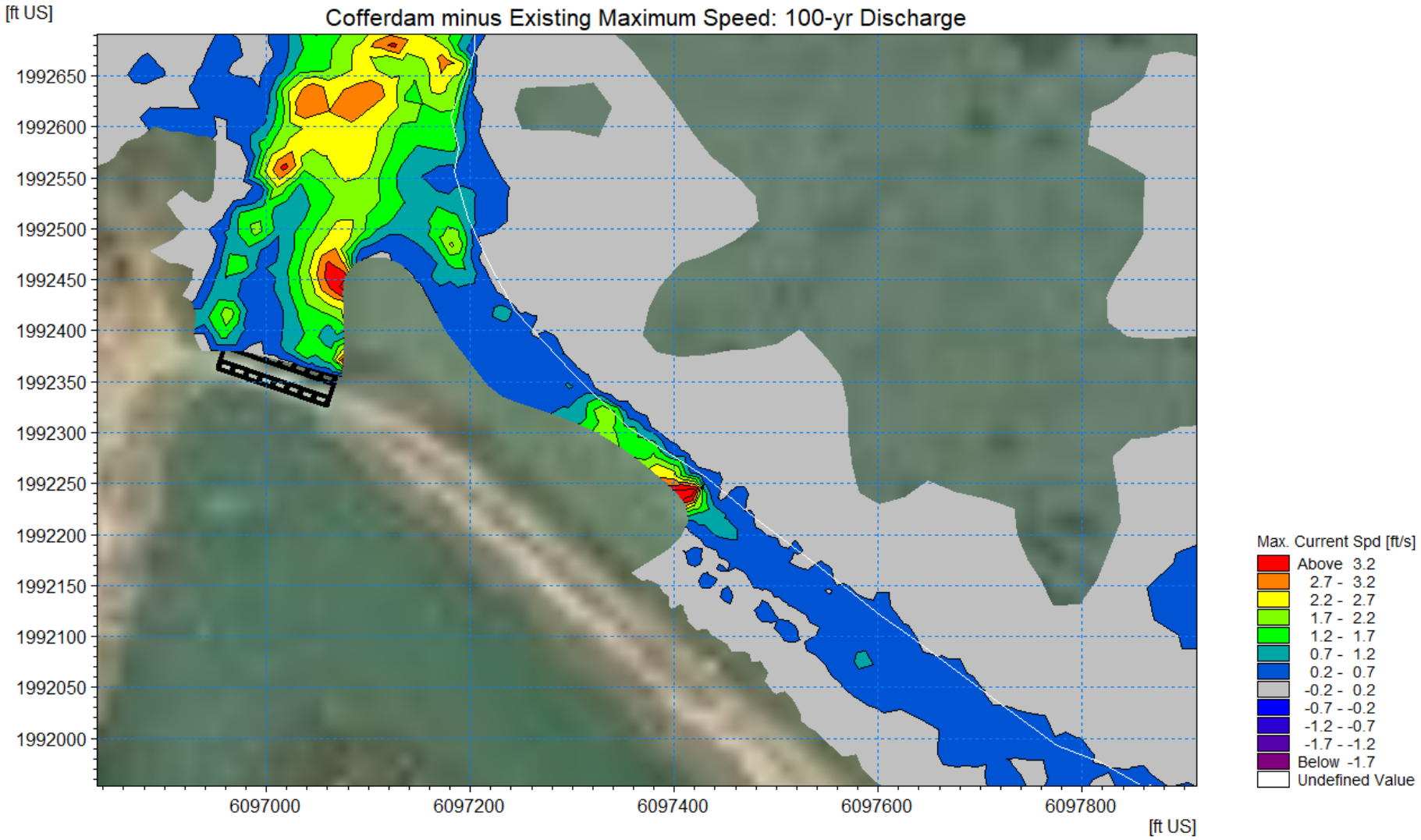

Figure 3-28 Difference in Maximum Speed. Cofferdam minus Existing. 100-year discharge case.

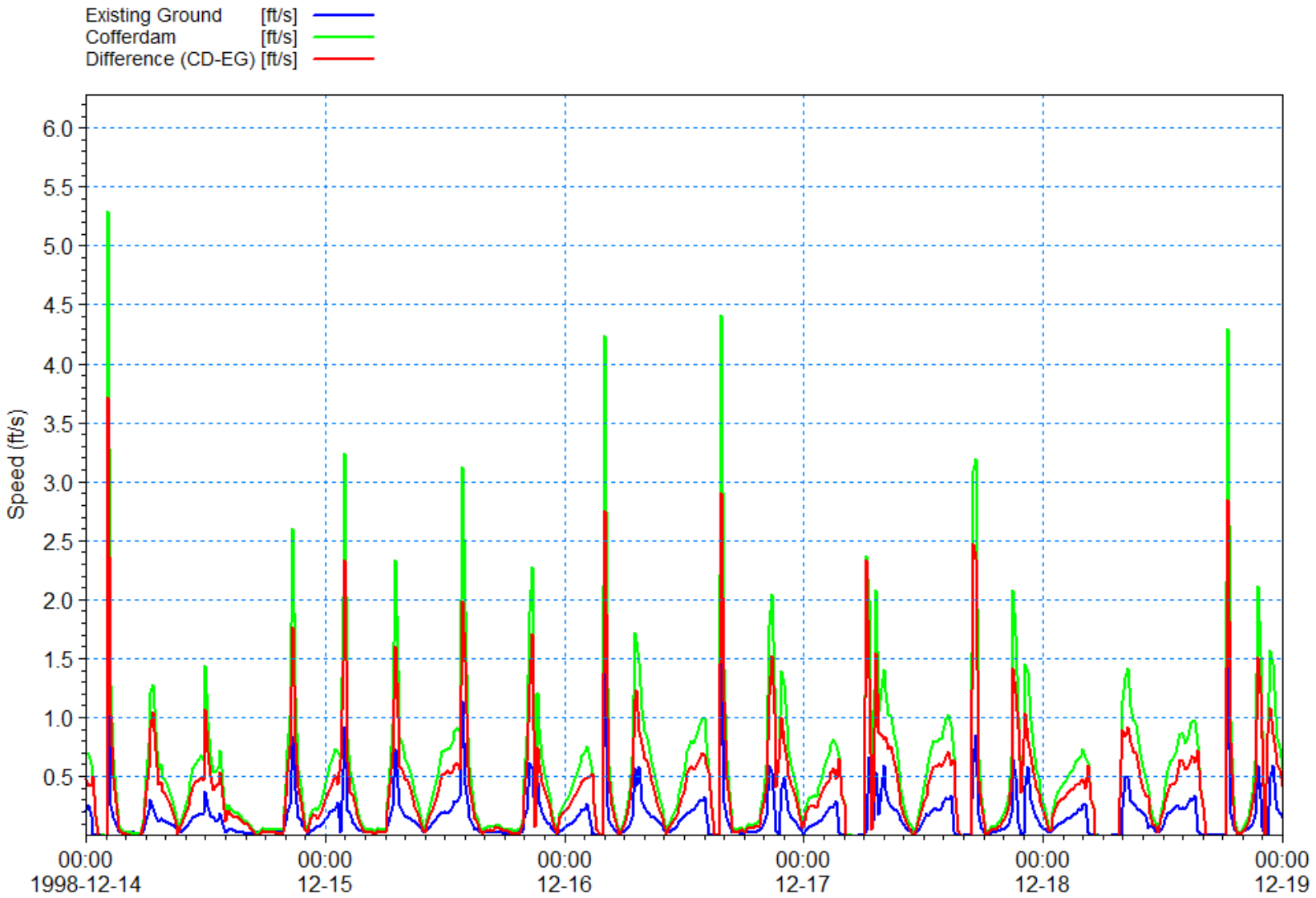

Figure 3-29 Time series comparison of current speeds and instantaneous difference in speed (cofferdam minus existing) for the 100-year discharge case at Point 1.

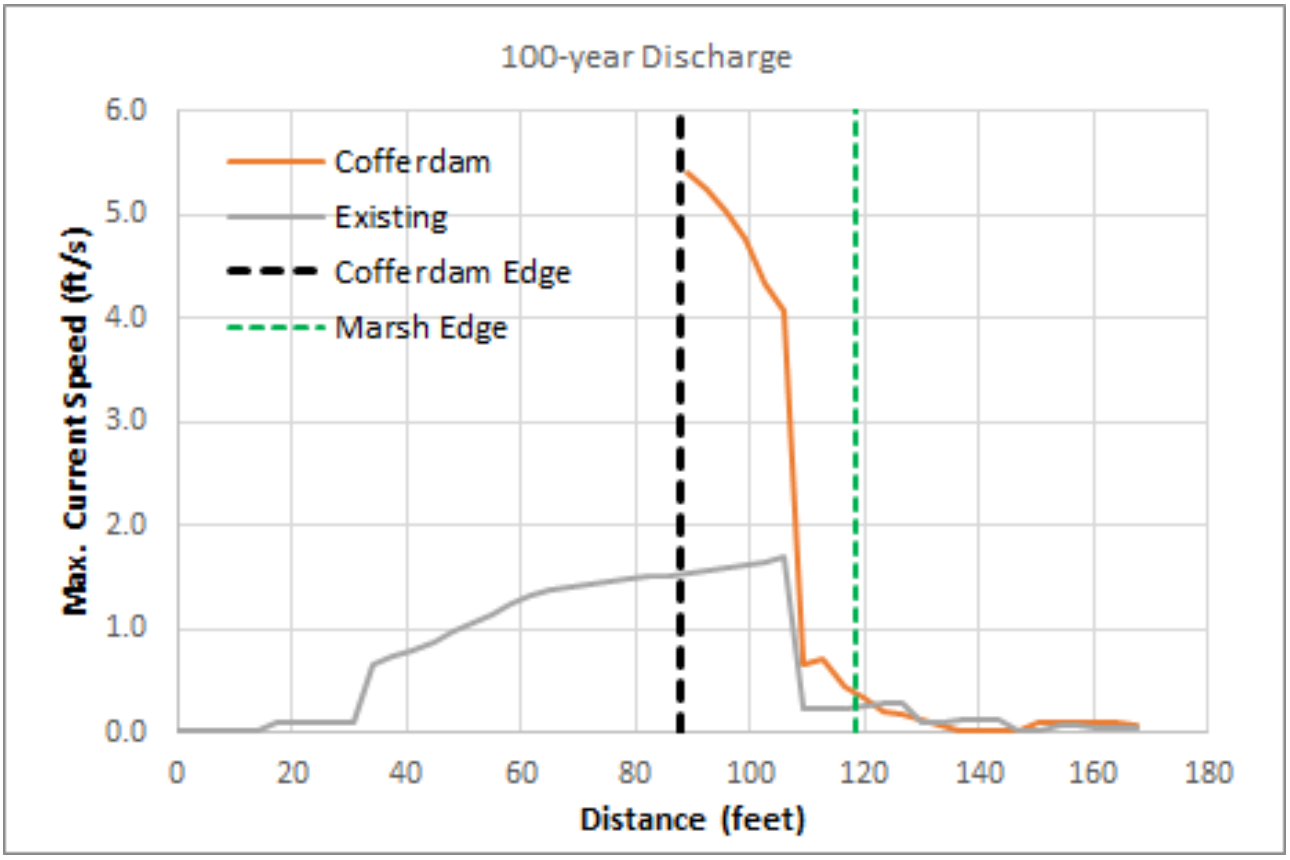

Figure 3-30 **Comparison of maximum current speed along the transect shown in Figure 3-9 for the 100-year discharge case.**

Table 3-1 **Summary of maximum current speed and difference in maximum current speed (absolute and instantaneous) for all discharge conditions at the point of maximum velocity at the face of the cofferdam..**

	Max Speed Existing (ft/s)	*Max Speed Cofferdam (ft/s)*	*Max Absolute Speed Diff (ft/s)*	*Max Inst Speed Diff (ft/s)*
No Discharge	*0.66*	*1.69*	*1.02*	*1.19*
No Discharge - Refined Mesh	*0.81*	*1.69*	*0.88*	*1.00*
1.5-year	*1.47*	*4.26*	*2.79*	*2.80*
10-year	*1.43*	*4.61*	*3.18*	*3.27*
100-year	*1.58*	*5.30*	*3.72*	*3.72*

4. Summary and Conclusions

4.1 Existing Conditions versus new Proposed Gate

A numerical MIKE 21 flow model was built for the area around the PAFB to predict tidal water levels and currents throughout the area. The model extends a sufficient distance into the bay to develop suitable tidal boundary conditions to propagate into the study area. An 11-day model simulation was made for each tide gate configuration, for 4 gate discharge conditions (0 flow, 1.5-year, 10-year, 100-year). Two additional simulations were performed with the proposed gate model but using existing gate discharges for the 10-year and 100-year discharge conditions, for a total of 10 model simulations. Gate discharges are modeled as source inflows internal to the model.

The model mesh was interpolated to bathymetric and topographic elevations using the USGS 2m seamless DEM of the San Francisco Bay. It was observed that the DEM might be too shallow in areas around the gate structure and in the channel that leads from the gate into the Bay. Some manual deepening was performed around the gate consistent with bottom gate flap elevations, but it is generally believed that bed elevations are somewhat high in some of the channels.

Open boundary conditions were generated from the FEMA MIKE 21 regional model of the San Francisco Bay.

The output from the 10 model simulations was processed and presented as 2D contour maps of maximum current speed, difference in maximum speed (proposed minus existing), and maximum bed shear stresses (see Appendix A for bed shear stress plots).

Generally, the results show that impacts of the new proposed gate compared to the existing gate will be similar to what would be anticipated for the existing gate, especially for normal tide conditions and low gate discharges. Higher levels of difference are observed for the 10-year and 100-year gate discharge but are mainly due to the higher discharge rates imposed by the efficiencies of the new gate. Also, given that these are very extreme and infrequent events, with very high velocities both for the existing and proposed gate configurations, and given that the differences are small, the impacts are likely to be negligible when compared to the existing gate. Given the new flow alignment for the new gate, it is also likely that the channel from the gate could migrate slightly to the west, further relieving impacts at Hooks Island. Historical images going back to around the time the gate was built show little to no adverse morphological impacts at Hooks Island or at the boat dock. Considering extreme events have occurred, but infrequently, the small changes to the already extreme events due to the proposed structure are not likely to create any additional adverse effects. It is possible that some short term impacts occur during an extreme discharge event, but the fact that these are very infrequent, and don't show in long term historical imagery suggests that either 1) no significant erosion occurs, and/or 2) conditions quickly recover back to "normal" conditions if erosion does occur.

Future detailed studies could potentially quantify these impacts further, but would require further collection of field data, including but not limited to, bathymetric surveys of channels, and for calibration and validation, measurements of water levels, currents, suspended sediment contractions, and morphological change surveys after a high gate discharge event.

4.2 Existing Condition versus Dewatering Cofferdam

The MIKE 21 flow model was updated to include the cofferdam structure with the existing gate in place and operating. The same four flow conditions were modeled with the cofferdam in place, and compared to existing conditions simulations to assess potential erosion impacts of the marsh on Hooks Island. The model mesh with the cofferdam included has increased mesh resolution within the channel to resolve flows in the constricted space between the cofferdam and the marsh.

Generally, the modeling results indicate that higher velocities and bottom shear stresses increase in the channel where the cofferdam has constricted the channel. The differences in maximum velocities are around 1 ft/sec increase at the face of the cofferdam for the tide only (zero gate discharge) condition, which would be fairly representative of normal day conditions expected over the 2-year construction period, and occurring for a short duration during the maximum flow rate during incoming and outgoing tides. The high discharge cases are short duration events and are fairly infrequent. So it is possible that even if some short term erosion occurs, there may be enough time between events for the channel to recover. But this cannot be stated with complete certainty.

Appendix A

2D plots of Bed Shear Stress

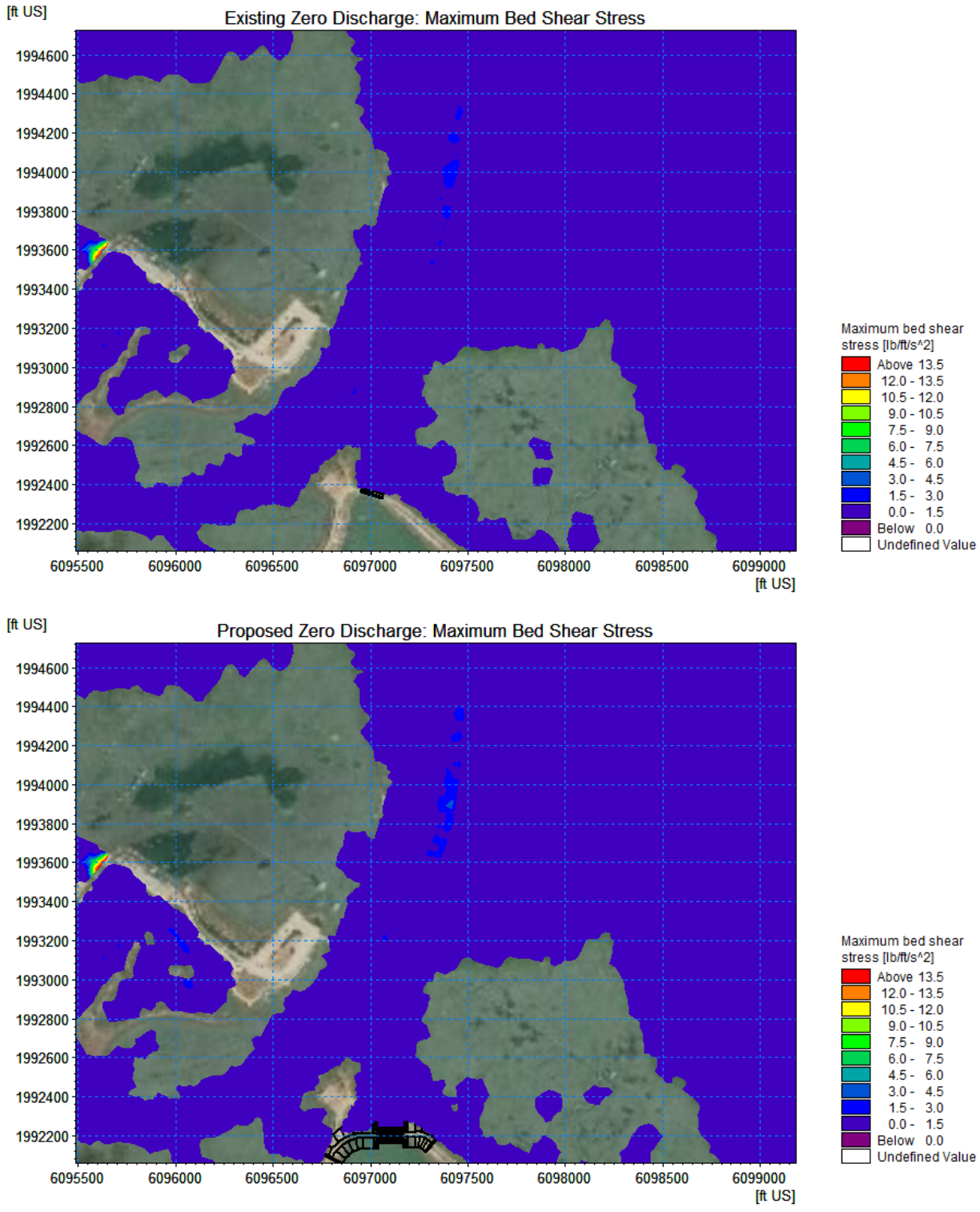

Figure A-1 Maximum bed shear stress for existing gate (top) and proposed gate (bottom) for zero discharge condition.

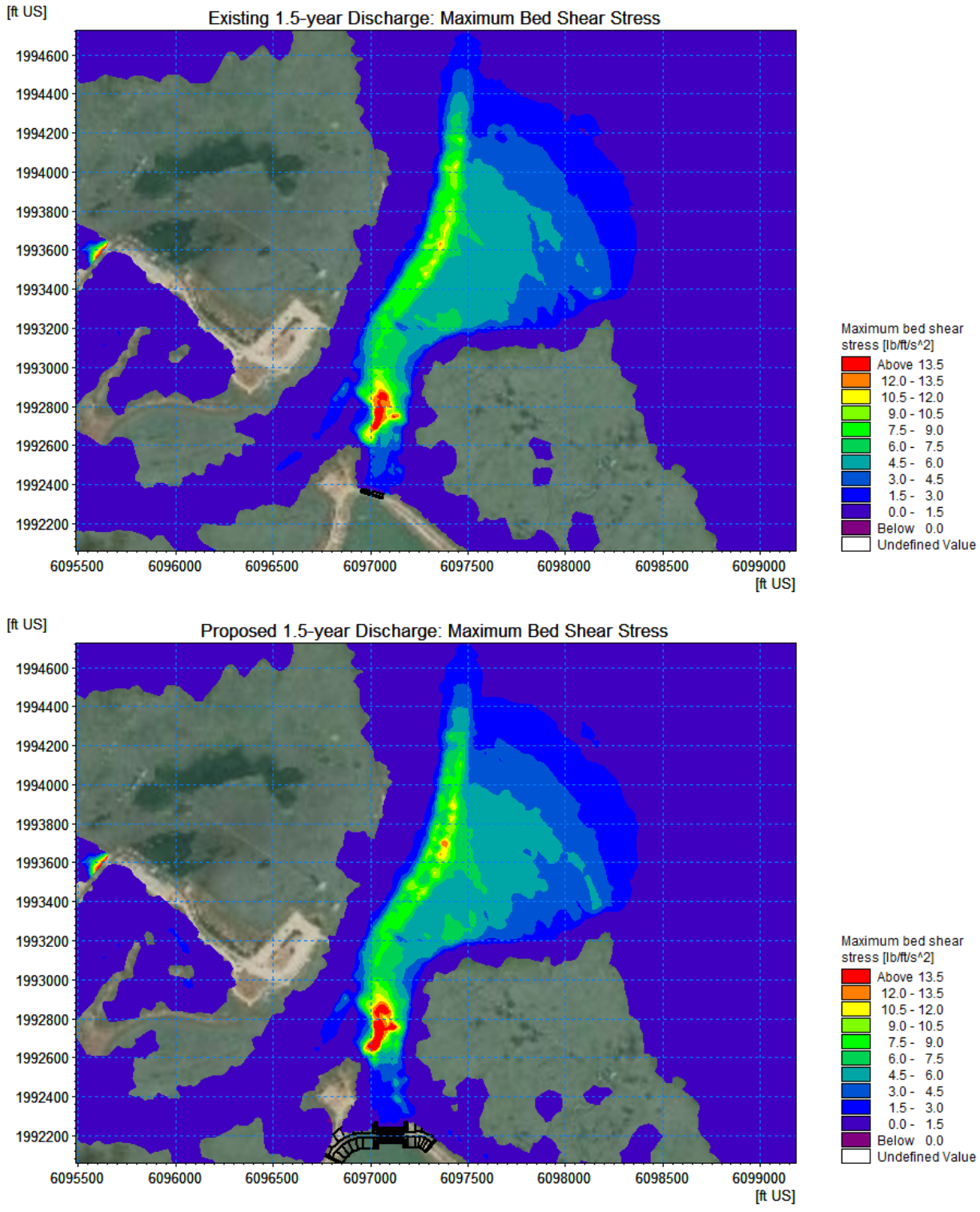

Figure A-2 Maximum bed shear stress for existing gate (top) and proposed gate (bottom) for 1.5-year discharge condition.

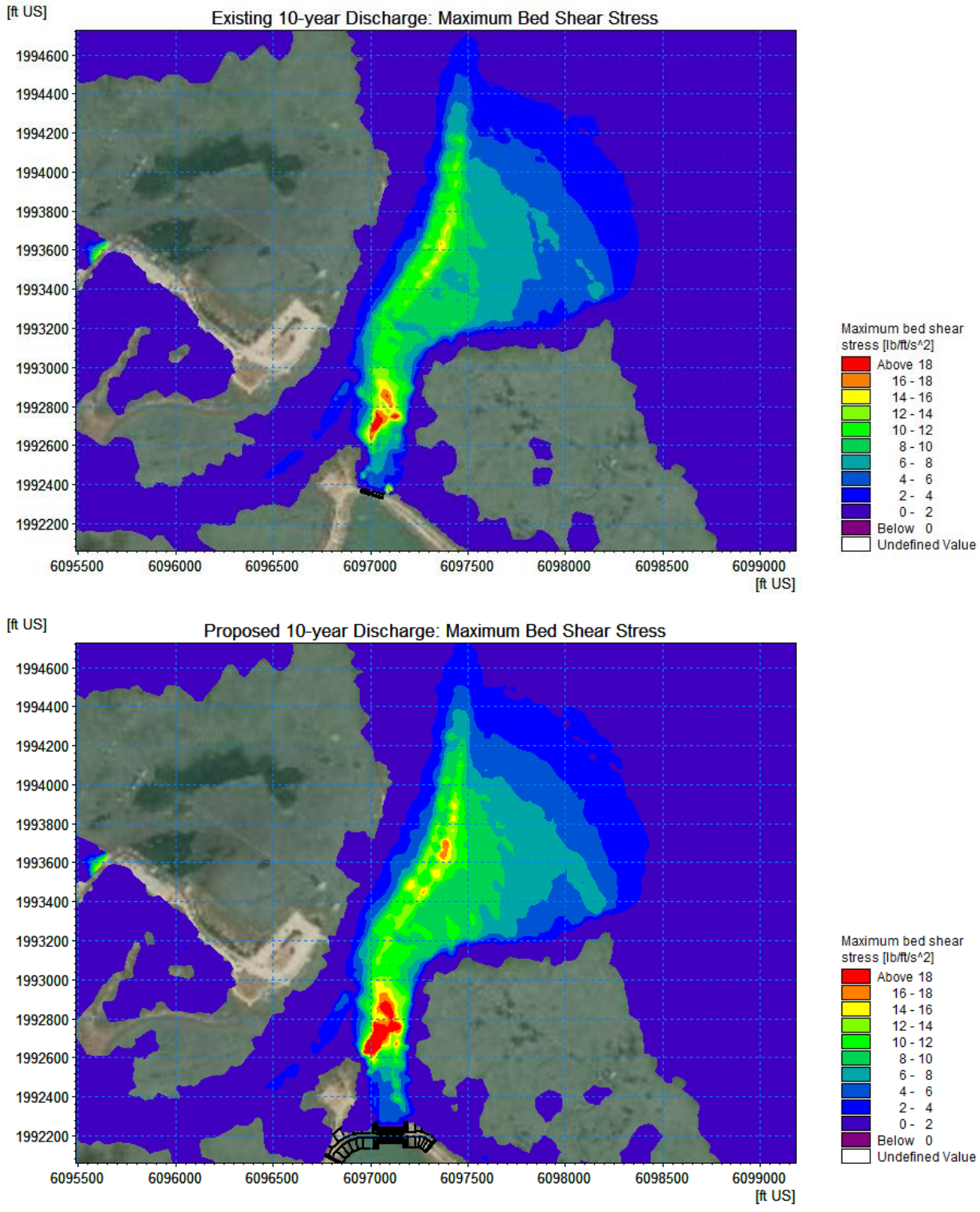

Figure A-3 Maximum bed shear stress for existing gate (top) and proposed gate (bottom) for 10-year discharge condition.

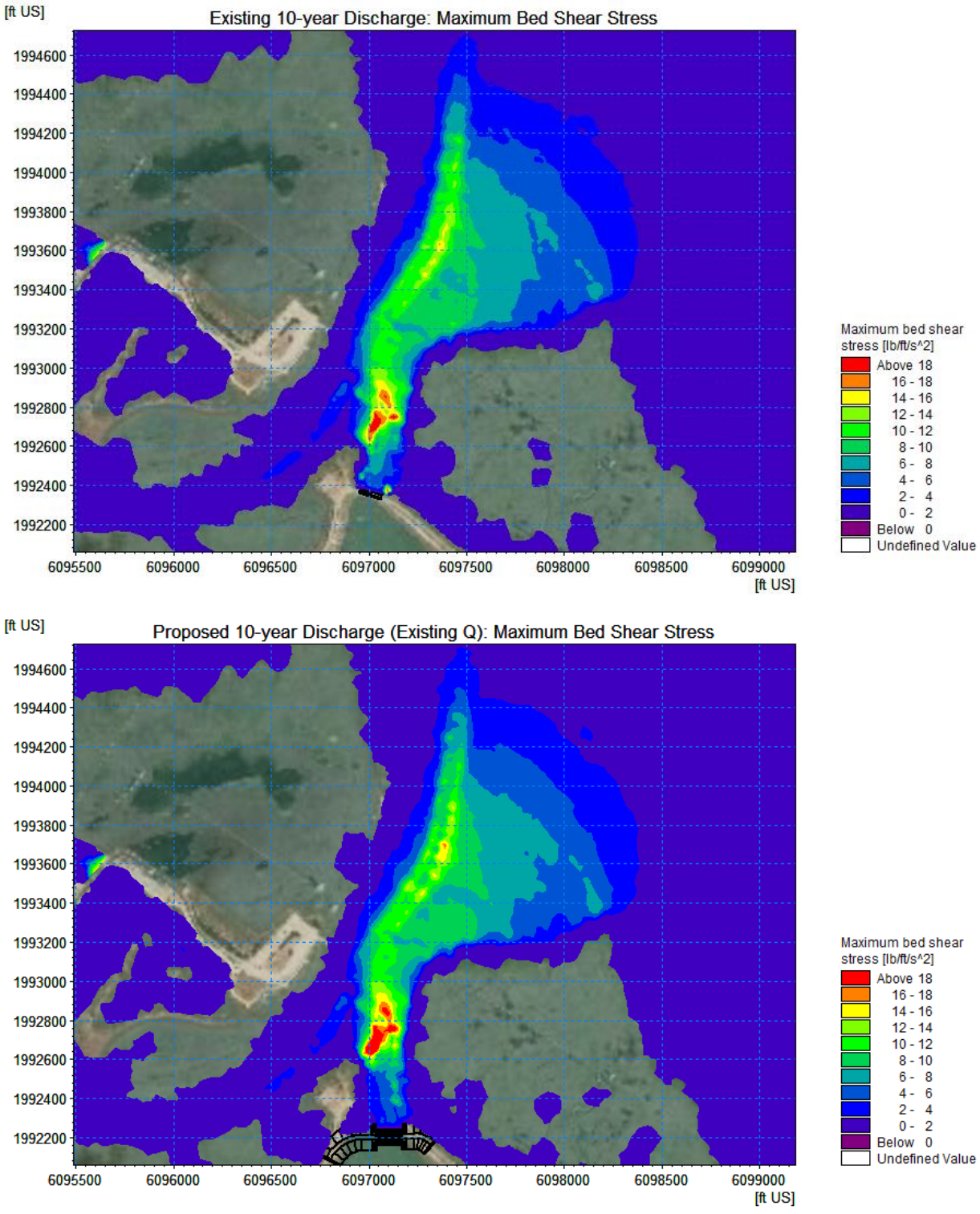

Figure A-4 Maximum bed shear stress for existing gate (top) and proposed gate using existing gate discharge (bottom) for 10-year discharge condition.

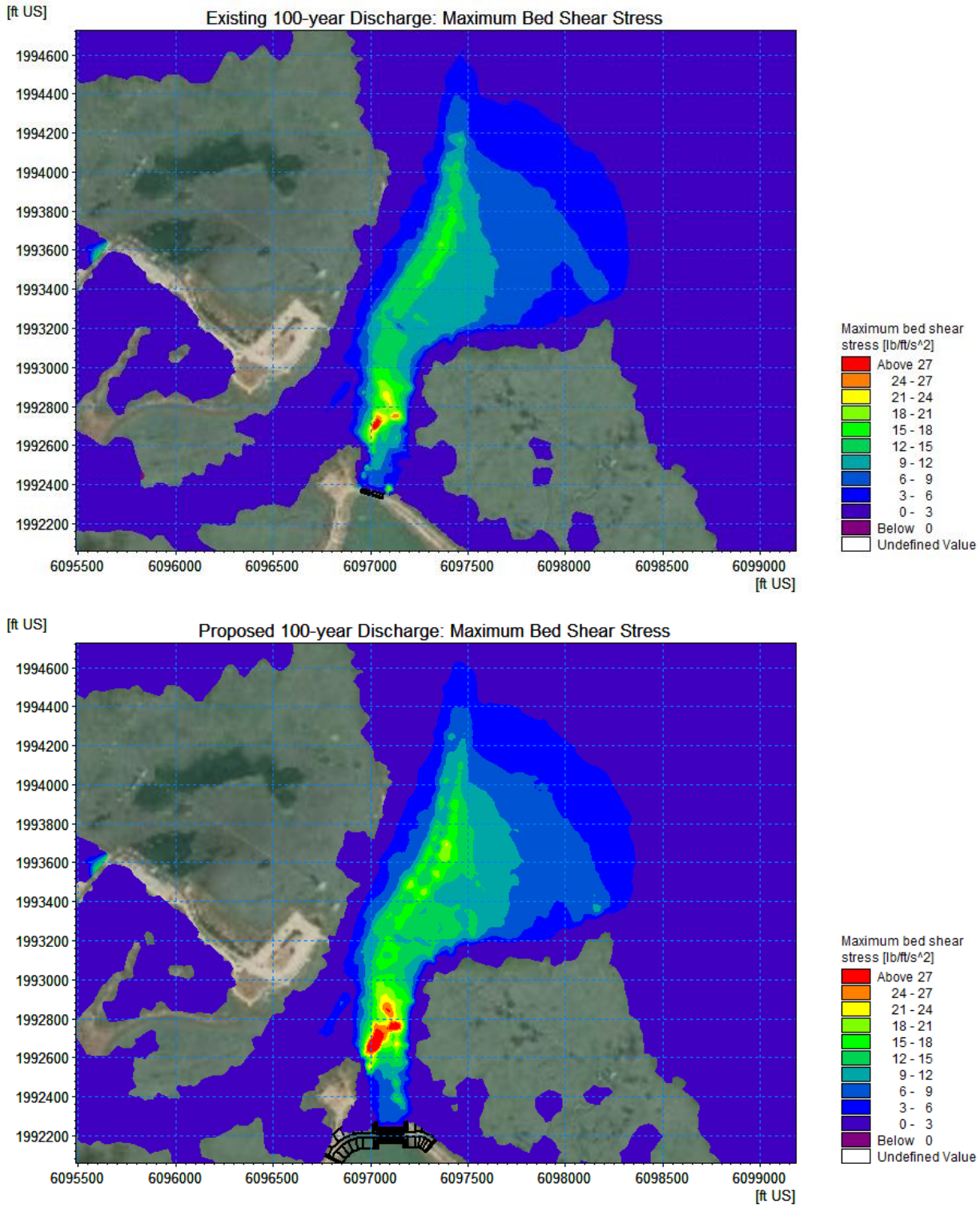

Figure A-5 Maximum bed shear stress for existing gate (top) and proposed gate (bottom) for 100-year discharge condition.

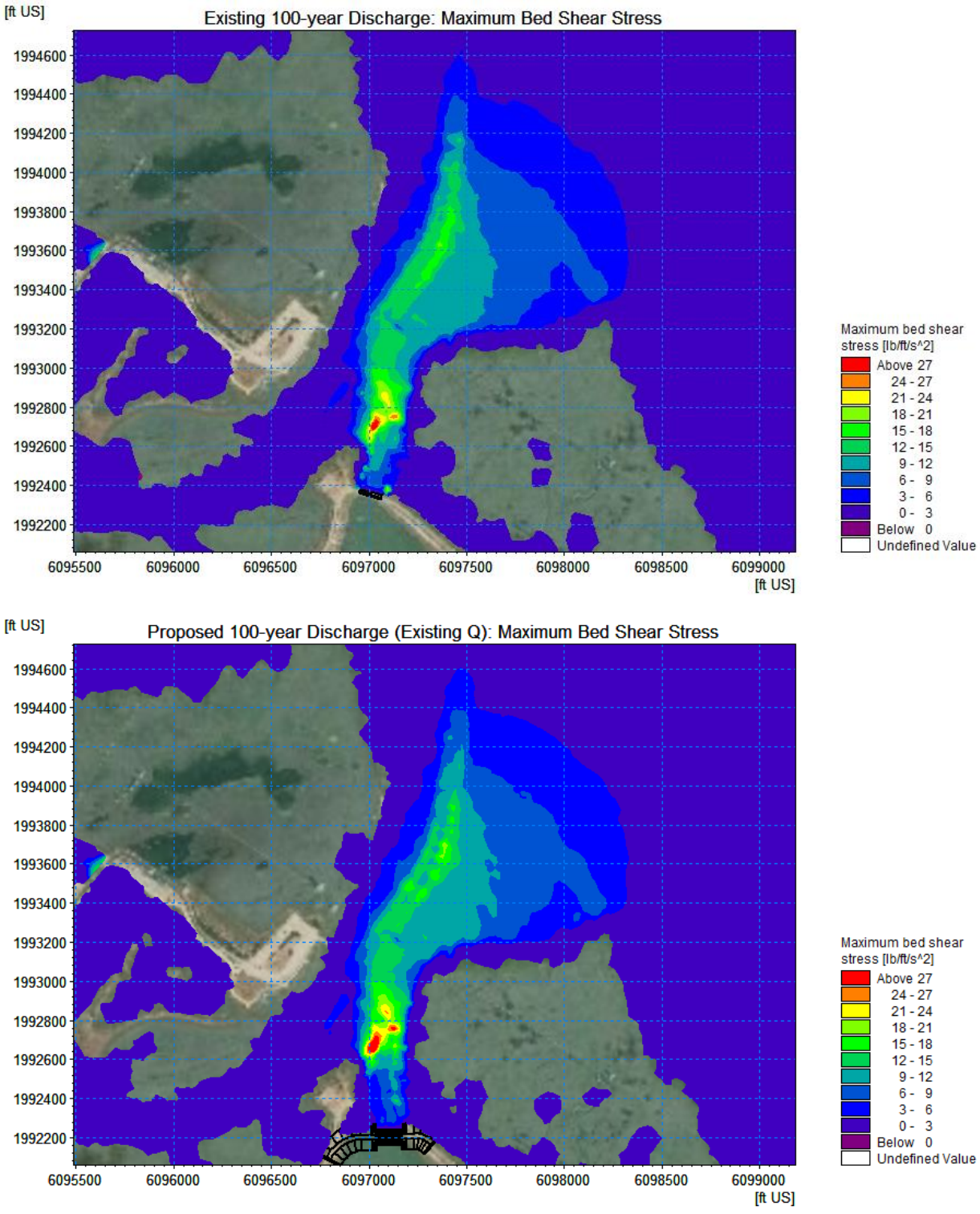

Figure A-6 Maximum bed shear stress for existing gate (top) and proposed gate using existing gate discharge (bottom) for 100-year discharge condition.

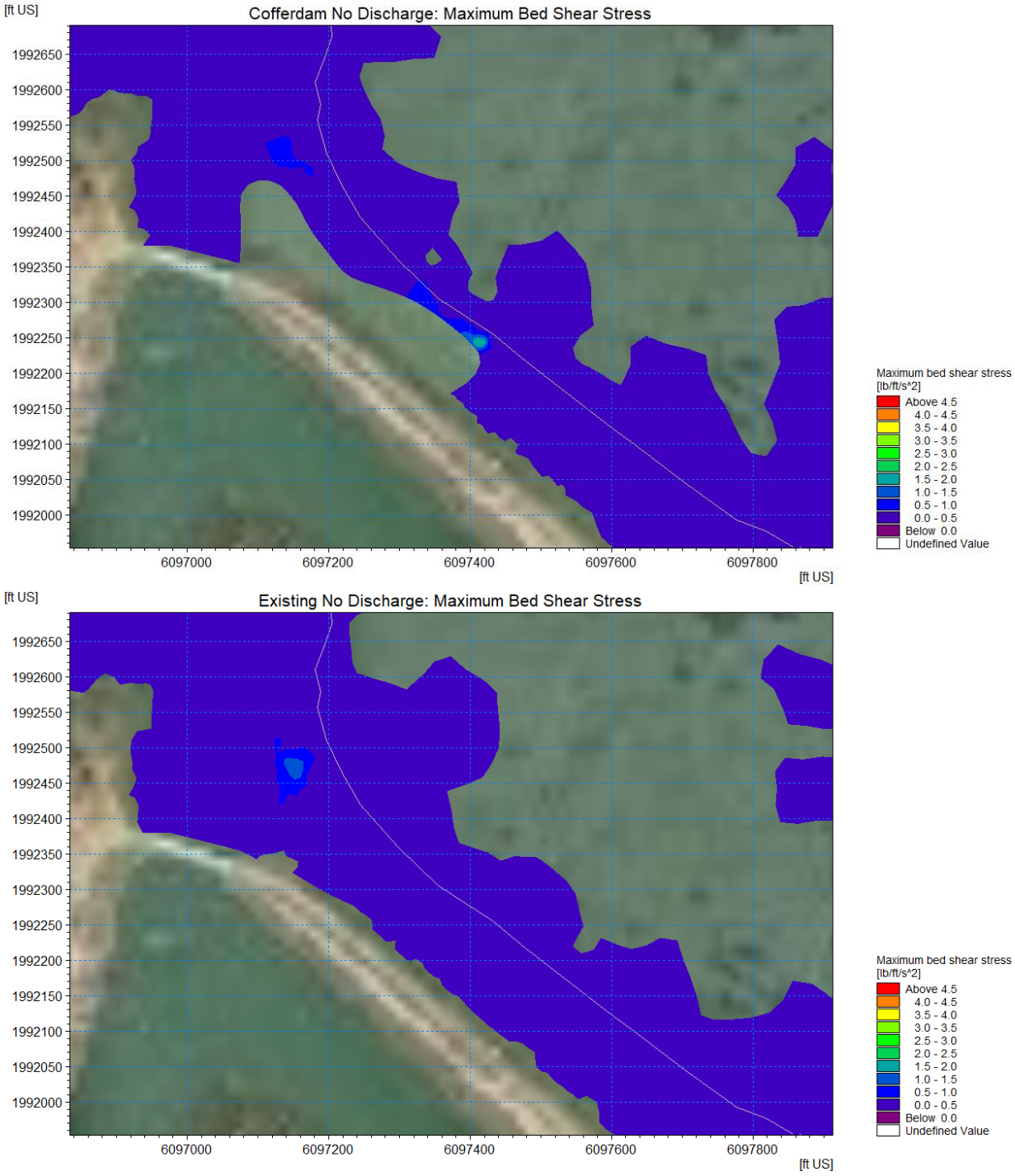

Figure A-7 Maximum bed shear stress for cofferdam (top) and existing (bottom) for zero discharge condition.

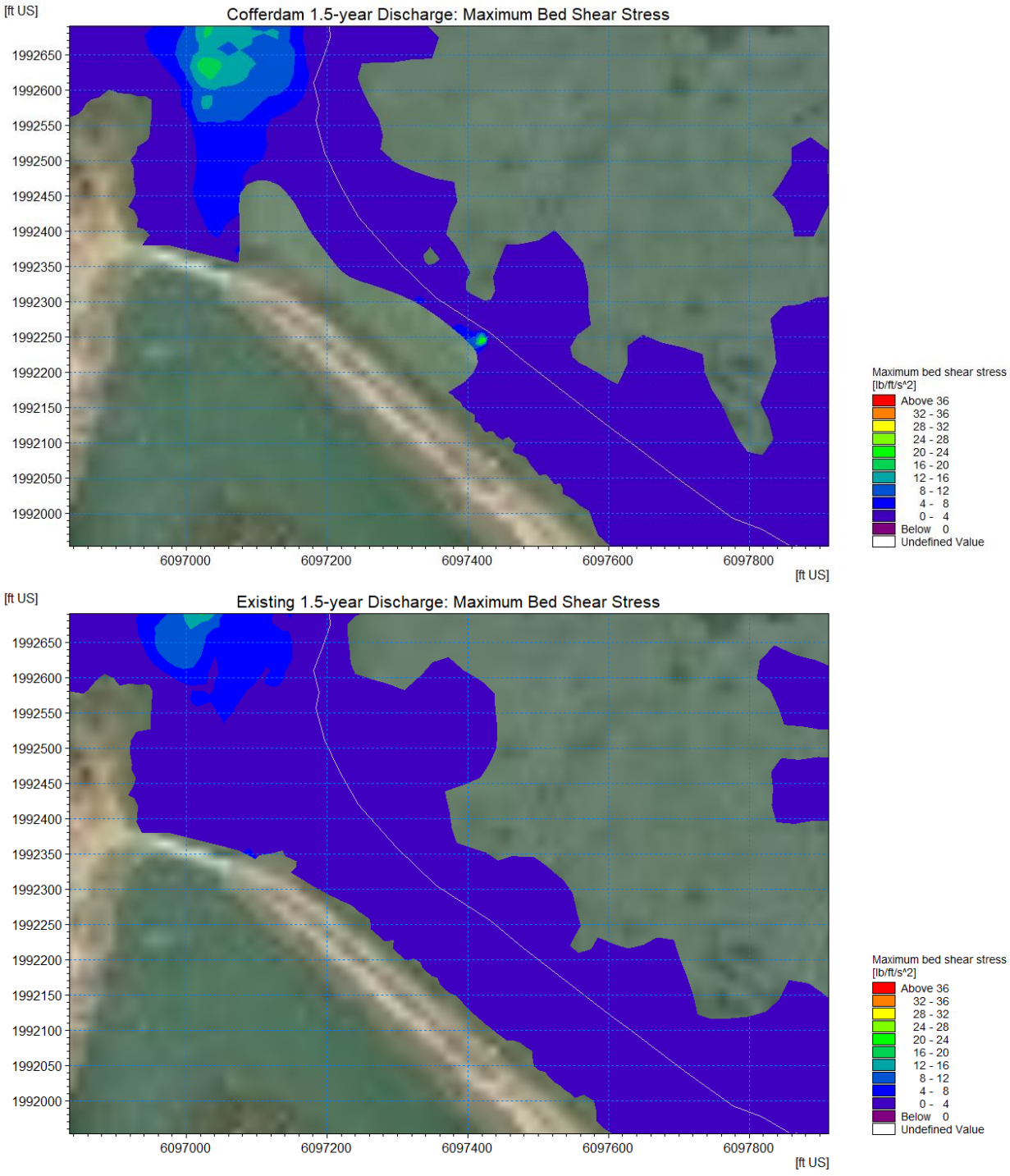

Figure A-8 Maximum bed shear stress for cofferdam (top) and existing (bottom) for 1.5-year discharge condition.

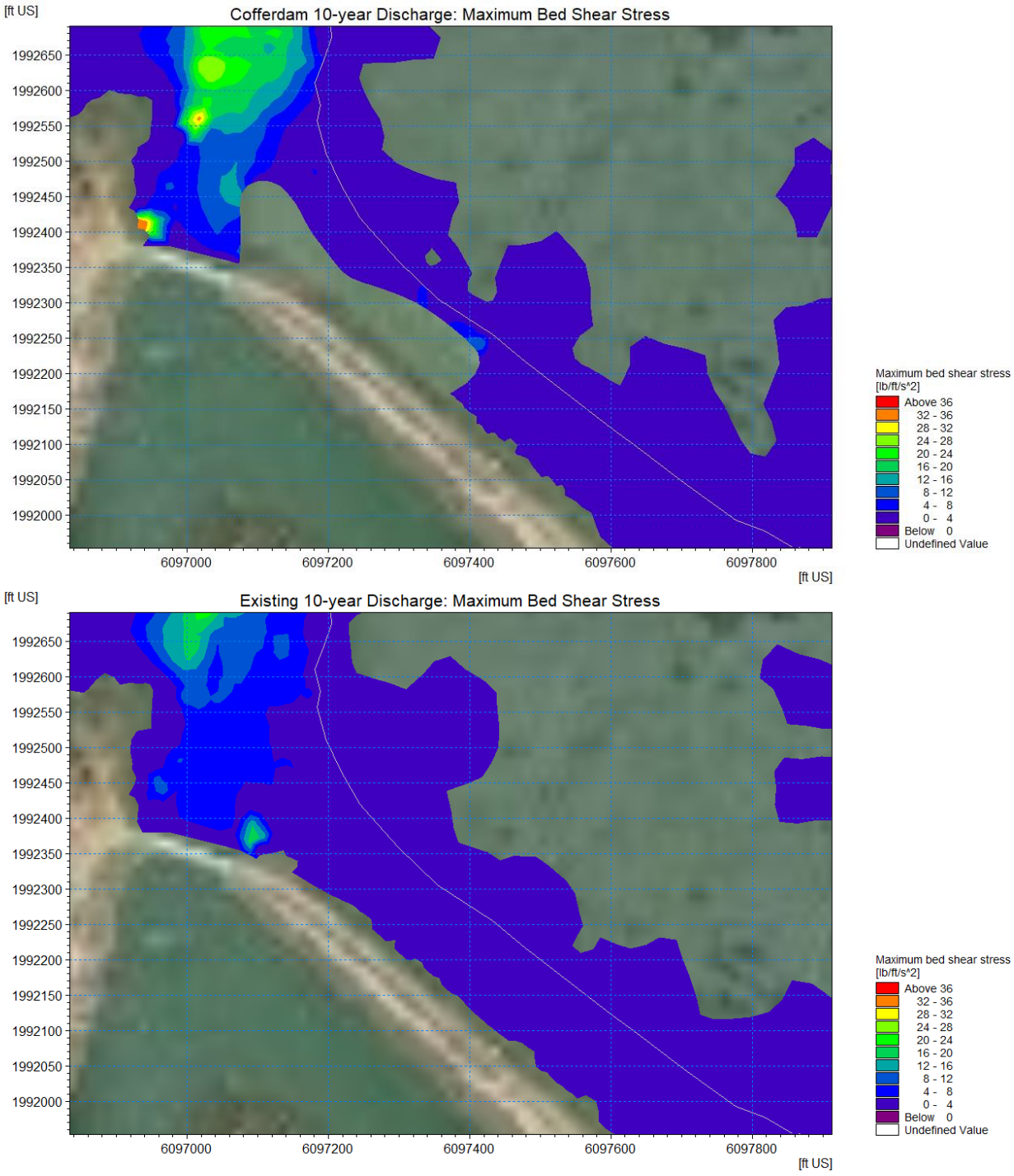

Figure A-9 Maximum bed shear stress for cofferdam (top) and existing (bottom) for 10-year discharge condition.

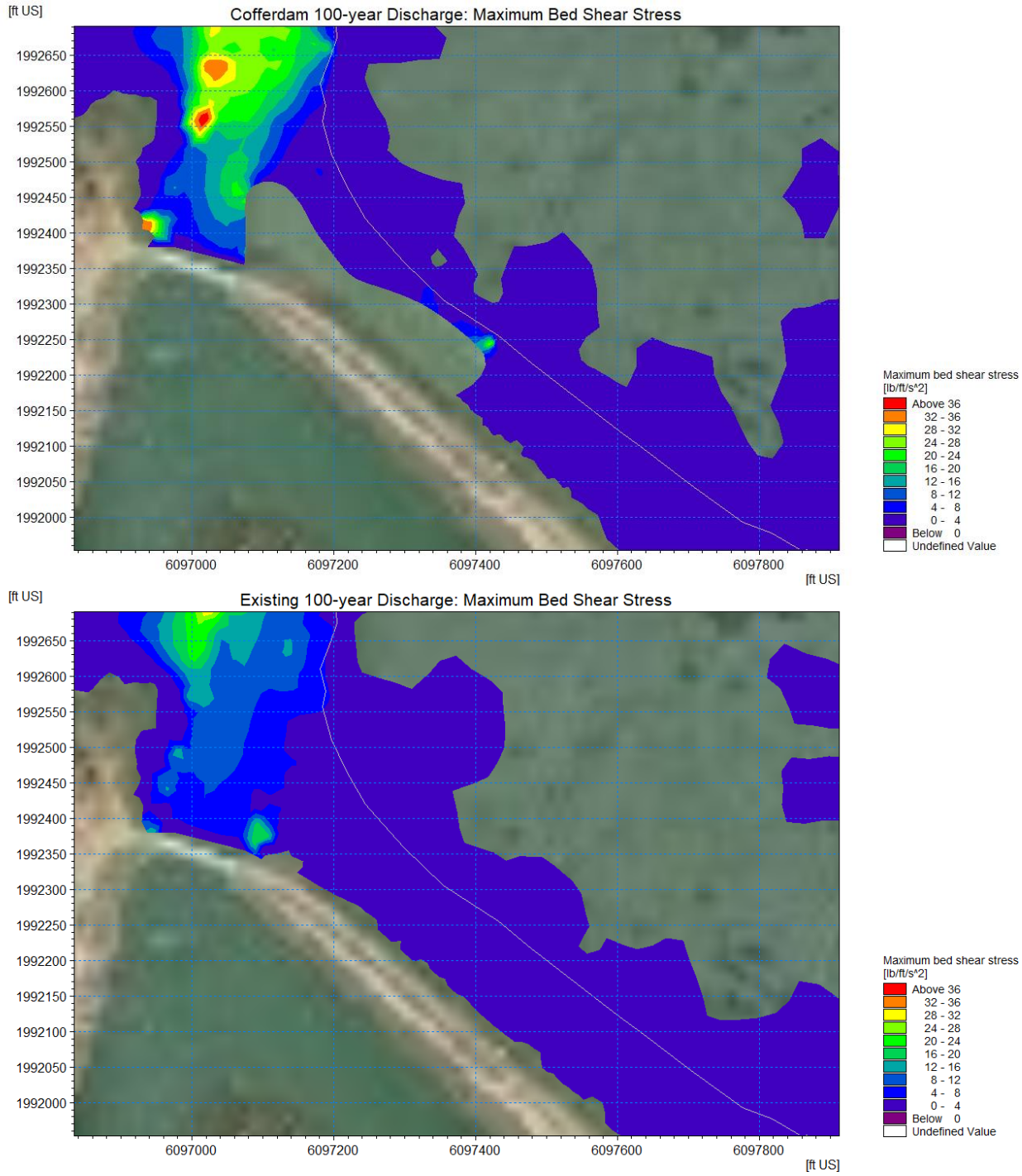

Figure A-10 Maximum bed shear stress for cofferdam (top) and existing (bottom) for 100-year discharge condition.

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Appendix F
Cultural Resources Investigation

Pacific Legacy Historic Preservation
Bay Area Division
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Berkeley, CA 94707
Phone: 510.524.3991
Fax: 510.524.4419
www.pacificlegacy.com

August 21, 2019

Alexander Hunt
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

Re: Cultural Resources Investigation for the Palo Alto Tide Gate Replacement Project (3039-01, Task 9) Santa Clara County, California

Dear Mr. Hunt:

This letter report presents the results of a cultural resources investigation conducted by Pacific Legacy, Inc. on behalf of the Santa Clara Valley Water District (Valley Water) for the Palo Alto Tide Gate Replacement Project (Project), which has been proposed within the Palo Alto Flood Basin in the City of Palo Alto, Santa Clara County, California (*see* Attachment A, Figures 1 and 2 and Attachment B). All tasks for the Project were performed under contract number 3039-01, Task 9 between Pacific Legacy and Valley Water. The investigation was conducted to support Project compliance with the National Environmental Policy Act (NEPA), Section 106 of the National Historic Preservation Act (NHPA), and the California Environmental Quality Act (CEQA). Its purpose was to identify historic properties and/or historical resources that may be adversely affected by ground disturbing activities associated with the Project.

Results Summary
On July 30, 2019, Pacific Legacy personnel completed an archival and records search through the California Historical Resources Information System (CHRIS) for the Project area and a surrounding 0.25-mile radius. No known cultural resources were revealed within the Project area, and only a small portion of the Project area was encompassed by a prior cultural resources assessment (S-046899) conducted in support of a US Army Corps of Engineers (USACE) feasibility study. That assessment did not include a pedestrian inventory survey within the Project area and focused on lands southeast of the Charleston Slough. Contact with the Native American Heritage Commission (NAHC) was initiated on July 30, 2019 to request a search of the Sacred Lands File for the Project area. The NAHC responded on August 8, 2019, stating that no Native American cultural resources had been listed in the Sacred Lands File within the Project area. The NAHC provided a list of six Native American tribal representatives who may have knowledge of or an interest in the Project vicinity. Those individuals were contacted via certified letter on August 8, 2019 (*see* Attachment C). Responses to these requests for contact are anticipated within 30 days of receipt and will be forwarded to Valley Water as they become available.

A pedestrian inventory survey of the Project area was completed on August 1, 2019 by Pacific Legacy Senior Archaeologist Lisa Holm, PhD. Ground surface visibility within the Project area was excellent (approximately 90%), limited only by pockets of Bayshore vegetation (*see* Attachment B). No prehistoric or historic period archaeological sites or isolated finds were

noted, though the Palo Alto Flood Basin Levee and Tide Gate were recorded within the Project area as a historic period built environment resource. Department of Parks and Recreation (DPR) Forms 523 documenting the resource are presented in Attachment D. These forms include a historical context for the resource as well as a National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR) evaluation of the levee and tide gate. Although the resource is over 50 years old, it does not meet eligibility criteria for listing in the NRHP and/or CRHR and does not comprise a historic property under Section 106 of the NHPA or a historical resource per CEQA.

Based on the results of the archival and records search, contact with the NAHC, the pedestrian inventory survey, and an assessment of the Palo Alto Flood Basin Levee and Tide Gate, we find that the proposed Project will not have an adverse effect on historic properties and/or historical resources. As the Project area possesses very low sensitivity for buried cultural resources, we do not recommend archaeological monitoring during Project construction.

Project Location and Setting

The Project area is in northern Santa Clara County in the City of Palo Alto along the San Francisco Bay shoreline to the east of Highway 101 and the Palo Alto Municipal Airport. Project access routes span from Embarcadero Road near Byxbee Park in the west to San Antonio Road at Terminal Boulevard in the southeast, though the Project is centered on an existing levee segment and a tide gate structure that marks the outlet of the Mayfield Slough and Matadero, Adobe, and Barron creeks. The Project area is in an unsectioned portion of Township 6 South, Range 2 West and in the unsectioned *Rancho Rincon de San Francisquito* land grant. It is depicted in Attachment A, Figure 1 on the 1997 Mountain View 7.5-minute USGS topographic map and on a true-color orthophoto in Attachment A, Figure 2.

Project Background and Description

The levee and tide gate structure that retain the Palo Alto Flood Basin were constructed in 1956-1957 by the Santa Clara County Flood Control and Water District (known today as the Santa Clara Valley Water District or Valley Water) with support from the City of Palo Alto to prevent flooding in the lower reaches of Matadero, Adobe, and Barron creeks. Currently, floodwaters stored in the Palo Alto Flood Basin are released to the San Francisco Bay through an existing 113-foot long tide gate structure with 16 cells. Valley Water completed emergency repairs to the structure in 2012 when it was discovered that water was flowing beneath it. Although these temporary repairs arrested significant underflow, Valley Water identified the need for permanent improvements to maintain flood protection and prevent flooding along the lower reaches of the three creeks that converge at the structure. Following attempted repairs in 2017, an assessment of the tide gate led Valley Water to conclude that it would need to be replaced. Key objectives of the Project include preventing failure of the existing tide gate structure; expanding the size of the tide gate so that it might function under conditions of future sea-level rise; maintaining or improving flood protection for Matadero, Adobe, and Barron creeks; and protecting sensitive habitat in the Palo Alto Flood Basin and immediate tide gate vicinity.

To fulfill these aims, the proposed Project would involve construction of a new up to 235-foot wide tide gate immediately southeast of the existing 113-foot-wide tide gate and the

construction of a new levee segment in place of the existing tide gate (*see* Attachment A, Figure 2). Dewatering would occur in two phases prior to construction of the new tide gate and levee. Steel sheet pile walls would be installed around the work area to exclude water from entering, and water would be pumped out of the enclosed area to provide a dry working area. Piles would be pressed into place with an excavator and then vibrated into place with a GIKEN system or installed with a barge. Construction would be phased to ensure continuous operation of either the existing or new tide gate at all times. The new tide gate would be similar to the existing tide gate and would consist of concrete bays housing iron flap gates. The new tide gate would increase the conveyance capacity between the Palo Alto Flood Basin and the Bay to accommodate future sea-level rise and would be compatible with other projects such as the SAFER Bay Project for East Palo Alto and Menlo Park (SFCJPA 2016), which is currently in planning.

The first phase of construction would involve excavating the existing levee where the new tide gate would be installed. After excavation of the levee to the depth of the existing levee base, a concrete pile system, slab, and cut-off wall would be installed to support the new tide gate. The second phase of construction would begin with the installation of a second sheet pile around the original tide gate to isolate the structure and facilitate dewatering. The original tide gate would be removed to allow construction of a levee in its place. The foundation of the new levee would be constructed by importing engineered fill material with dump trucks and then compacting that material. The levee embankment would be sloped using a 2:1 or 3:1 ratio, and the top width or crown of the levee would be approximately 18 feet. After the levee is constructed to the specified grade and the dewatering system is removed, the levee slope would be revegetated with tidal marsh and upland vegetation as appropriate. Due to the assumed presence of California Ridgway's rail (*Rallus obsoletus*), work would be restricted to September 1 through January 30 to avoid disturbance during the rail's breeding season. Construction is expected to require three to four work seasons beginning in 2020 and ending in 2023 or 2024.

Project Area of Potential Effects

The Area of Potential Effects (APE) for the Project includes existing unpaved access routes, two proposed staging areas, and the areas encompassing the new tide gate and levee (*see* Attachment A, Figure 2). The APE will be accessed from the west at Embarcadero Road and from the southeast via San Antonio Road. Unpaved portions of these access routes extend from the parking lot at Byxbee Park northwest along the top of the levee to the existing tide gate and from the tide gate southeast along the levee to San Antonio Road at Terminal Boulevard, distances of roughly 0.57 and 2.22 miles respectively. These routes correspond to a significant segment of the Adobe Creek Loop Trail. A detour route along the south side of the flood basin will be marked during construction to divert pedestrians and cyclists around the closed portion of the trail. The two staging areas also are located along the existing levee. One is a 0.14-acre staging area just west of the current tide gate and the other is a 0.39 acre staging area on a flat or turnout 0.4 miles southeast of the tide gate. The APE for the new tide gate and levee spans approximately 1.72 acres and is centered on and just southeast of the existing tide gate (*see* Attachment A, Figure 2).

The following sections provide a brief overview of the Project area's cultural history as well as a summary of the archival and records search results, contact with the NAHC and potential Native American tribal representatives, and the results of the pedestrian inventory survey of the Project area. These are followed by a brief assessment of the cultural resource sensitivity of the Project area as well as our findings and conclusions. An assessment of the Palo Alto Flood Basin Levee and Tide Gate is presented in Attachment D.

Prehistoric Background

Archaeological evidence indicates that Native Americans have lived in the San Francisco Bay Area for at least 10,000 years (Moratto 1984). Several chronological frameworks have been constructed to describe the development of Native populations in the region. Most recently, Milliken et al. (2007) have put forward a framework subdivided into a PaleoIndian Period (11,500 to 8,000 BC), Early Period (8,000 to 500 BC), Middle Period (500 BC to AD 1050), and Late Period (AD 1050 to 1550). They further characterized these periods by examining underlying *patterns,* or units of culture marked by distinct economic modes, technological adaptations, and ceremonial practices; *phases*, or spatially and temporally limited site components; *aspects*, or local variations of broader economic patterns; and *localities*, or geographic spaces that would have exhibited cultural homogeneity.

The earliest clear evidence of human occupation within the San Francisco Bay Area dates to the Early Period (8,000 to 500 BC), which was characterized by mobile hunter-gatherer populations and material assemblages that included handstones, millingslabs, and large wide-stemmed and leaf-shaped projectile points. The mortar and pestle, shell beads, and charmstones were first documented in later Early Period (3,500 to 500 BC) burials, indicating a shift towards increasing sedentism. During the Middle Period (500 BC to AD 1050), which has been subdivided into Lower Middle (500 BC to AD 430) and Upper Middle (AD 430 to 1050) periods, population mobility persisted, though there was an increasing reliance on more permanent habitation sites with satellite or temporary-use sites from which a diverse range of natural resources could be accessed. A number of stratified midden sites with dense, diverse cultural deposits dating to the Middle Period have been recorded throughout the San Francisco Bay region. Milliken et al. (2007:115) have argued that the later part of the Lower Middle Period, which was marked by an increasing number of milling tools, obsidian and chert concave-base projectile points, *Olivella* beads, and bone tools and ornaments, represented a cultural climax within the San Francisco Bay Area. This was followed by a period of cultural disruption beginning with the Upper Middle Period (ca AD 430), which witnessed a collapse in the *Olivella* bead trade network, widespread site abandonment, and shifts in burial practices.

The Late Period (AD 1050 to 1550), which is the best represented in the San Francisco Bay Area, was characterized by an increasing emphasis on sedentism, social stratification, and ceremonial practice. Populations were mostly aggregated in large, central village sites while "high-status burials and cremations" were marked by an array of "uncommon wealth items" such as *Haliotis* ornaments (Milliken et al. 2007:117). Arrow-sized projectile points appeared around AD 1250. An increase in the amount of tool manufacturing debris recorded throughout the region from that time has indicated that obsidian from the Napa Valley was increasingly imported as flakes or small performs and then used to produce projectiles points, bifaces, and other flake tools.

Casual tools made from chert or local toolstone also persisted, however, particularly in areas towards the South Bay.

Ethnohistoric Background

Native Americans living in the San Francisco Bay region were referred to by Spanish explorers of the 18th century as "Costaño" or "coast people." Costaño groups were recognized as speaking seven closely related languages that have become known as the Costanoan language group (Shipley 1978). These languages were spoken throughout a large area extending from the San Francisco Bay southward along the coast to Point Sur and inland to the Diablo Range and portions of the northern San Joaquin Valley (Milliken 1995). The term "Costanoan" is misleading, however because it amalgamates the 10,000 or more people who lived in the region into a single ethnolinguistic unit. In reality the term "Costanoan" subsumes as many as forty or fifty politically independent groups, some of which spoke mutually unintelligible but genetically related languages. Many present-day Native descendants prefer the term Ohlone, which is said to have derived from the name of a coastal village in San Mateo County (Levy 1978). Knowledge of Ohlone culture is largely based on information gathered from 18th century Spanish expeditions, mission documents, the work of ethnographers and linguists, and from Ohlone descendants. Primary ethnographic sources include Harrington (1933, 1942) and Kroeber (1925). Overviews are provided in Heizer (1974), Levy (1978), Margolin (1978), and Milliken (1983, 1991, 1995). Galvan (1968) and Williams (1890) offer Native accounts of Ohlone history, and an excellent example of contemporary ethnohistory can be found in Cambra et al. (1996).

The Ohlone were hunter-gatherers who occupied semi-permanent camps and villages from which they could take advantage of seasonal changes in resource availability. Dwellings at these habitation sites were dome-shaped with pole frameworks and thatched roofs and walls. Other Ohlone village structures included acorn granaries; male sweat houses, often located along stream banks; female menstrual houses; and dance or assembly houses, generally situated in the center of the village (Levy 1978). From these semi-permanent camps and villages, the Ohlone visited the mountains, valleys, and sloughs to collect resources. The local environment afforded abundant natural resources for food, ornamentation, tools, and economic exchange. The Ohlone subsisted on the seasonal gathering of acorns, grass seeds, kelp, and shellfish; hunting of terrestrial and marine mammals (deer, elk, rabbit, and sea lion); and fishing in freshwater streams and inshore marine habitats. Salt was collected from tidal marshes by scraping it off rocks or leaving sticks or twigs in briny pools on which the salt would crystalize and could be harvested (EDAW and USFWS 2009).

Archaeological and ethnographic evidence has indicated that trade and exchange of items such as *Olivella* shells, mussels, abalone shells, dried abalone, salt, and woven baskets for obsidian and piñon nuts took place with Native groups as distant as the eastern side of the Sierra Nevada Range. The establishment of missions and the introduction of European diseases by settlers resulted in a rapid and dramatic decline in the Ohlone population in the 18th and 19th centuries. Subsequent persecution and suppression of Ohlone cultural expressions by Spanish, Mexican, and American ruling governments also greatly impacted traditional lifeways.

Historic Period Background

Spanish and Mexican Periods

Captain Gaspar de Portolá and his party made initial contact with the Ohlone of the San Francisco Bay region in 1769 while seeking the Monterey Bay (Hoover et al. 1990). Further coastal and land expeditions followed as the Spanish extended their reach into Alta California by establishing a network of religious missions, military *presidios*, and secular *ranchos* between the present-day cities of San Diego and Sonoma. *El Presidio Real de San Francisco* (the Presidio of San Francisco) and *Mission San Francisco de Asís* (Mission Dolores) were founded in 1776 to the north of the Project area while *Mission Santa Clara de Asís* was established to the south in 1777.

Spanish control of Alta California ended with Mexico's independence in 1821. In 1834, the Mexican government secularized the missions, freeing the Native Americans that had been brought into the mission system. Returning to their former way of life was difficult, however, since land holdings were typically given to Mexican settlers and seldom reverted to Native ownership. A few Native Americans were granted lands, but records show that many of these individuals quickly lost ownership through land claim disputes and sales. Native Americans became increasingly marginalized as a result of their decreasing population numbers, the effects of mission life, and the erosion of traditional lifeways. The population of Alta California by 1846 has been estimated as 8,000 non-Natives and 10,000 Natives (Breschini and Haversat 1988). This represented a dramatic decline in the Native population from an estimated total of 133,500 persons in 1770.

In 1841, a portion of the current Project area was granted by Governor Juan Bautista Alvarado to José Peña, an artilleryman at the Presidio of San Francisco. In 1822, Peña had received permission from *Mission Santa Clara de Asís* to occupy a portion of its pasture lands. He built a wooden house on those lands in 1824 and his son, Narciso Antonia Peña, who later became a local justice of the peace, built a small adobe near the mission horse corral. In 1841, José Peña applied for and was granted the *Rancho Rincón de San Francisquito,* which spanned two leagues between the San Francisquito and San Antonio (Adobe) creeks and included the mission lands he had initially occupied (Beck and Haase 1980). In 1847, Peña sold all but a small portion of his lands to Secondino Robles and his brother Teodoro. Following José Peña's death in 1852, his widow Gertrudies Lorenzana inherited her husband's remaining portion of the *rancho*.

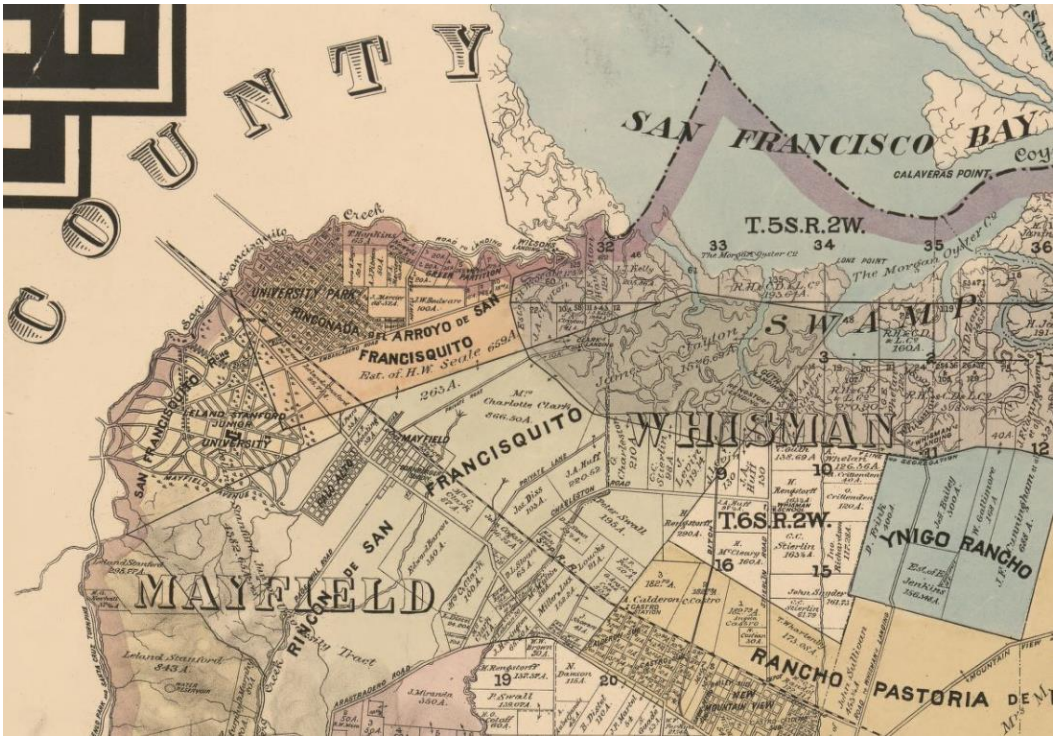
Secondino Robles was born in Santa Cruz and served as the majordomo at *Mission Santa Clara de Asís*. He and his brother Teodoro discovered cinnabar deposits south of what is now the City of San Jose in 1835. These deposits proved to be rich in quicksilver, which the brothers leveraged for a cash payment of $13,000 as well as an interest in the New Almaden Quicksilver Mine. In 1847, Secondino and Teodoro traded their interest in the mine for Peña's *rancho* and the buildings upon it.

American Period

In 1848, the Treaty of Guadalupe Hidalgo brought Alta California under the control of the US government. News of the Gold Rush in 1848 sparked a massive and rapid influx of American settlers into California. Due to this influx, legal determination of ownership of lands awarded by Spanish or Mexican authorities was often disputed in California. The US government passed the Land Act of 1851, which placed the burden of proof-of-ownership on land grantees. The few

Native Americans who had received grants lost their titles, as did many Hispanic landowners. By congressional action, grant claims were heard by a board of Land Commissioners and then appealed in Federal Courts. By 1885, nearly all of the claims had been decided.

As required by the Land Act, a claim for *Rancho Rincon de San Francisquito* was filed with the Public Land Commission in 1852 and the grant was patented to Secondino Robles and his brother Teodoro in 1868. By the mid-1850s, however, Secondino Robles had already begun to sell off portions of his property to pay his debts, reducing his holdings by half over the next 20 years (Hoover et al. 1990). In 1853, the area encompassing present day Barron Park, Matadero Creek, and the Stanford Business Park were sold to Elisha Crosby, who established the Mayfield Farm. This farm gave its name to the nearby community of Mayfield and to the Mayfield Slough. In 1859, Jeremiah Clarke of San Francisco bought a portion of the *rancho* from María Robels, who acquired the land following a divorce from Teodoro. Clarke was a prominent local landowner with holdings that extended to the Mayfield Slough. Peter Coutts bought 1,162 acres from Jeremiah Clarke and subsequently sold the land in 1882 to Leland Stanford. Secondino Robles died in 1890, and the adobe the family once occupied lay in disrepair by the end of the 19th century. It finally collapsed in the 1906 earthquake (Hoover et al. 1990:406).



Project Vicinity ca. 1890 (Herrmann Brothers1890).

City of Palo Alto

Palo Alto, which subsumes most of the former *Rancho Rincon de San Francisquito,* is in the northwest corner of Santa Clara County. It was established by Leland Stanford, the founder of Stanford University, and shares a border with East Palo Alto, Mountain View, Los Altos, and Menlo Park. The township of Mayfield formed in 1855 around a stagecoach stop near what is today the intersection of El Camino Real and California Avenue in southern Palo Alto. Peter

Coutts' property, noted above, was dubbed Ayrshire Farm and incorporated land in Mayfield. The southern portion of his property was near Matadero Creek. Leland Stanford, also noted above, began acquiring property in 1876 and purchased Coutts' Ayrshire Farm in 1882. Stanford and his wife established Stanford University in 1891. The community of "University Park," bounded by El Camino Real, San Francisquito Creek, Boyce, Channing, Melville, and Hopkins avenues, and Embarcadero Road, sprang up to support the university and was incorporated in 1894 as Palo Alto. Palo Alto quickly expanded, and eventually Mayfield was annexed as a part of the City in 1925.

The Salt Industry and Bayshore Restoration

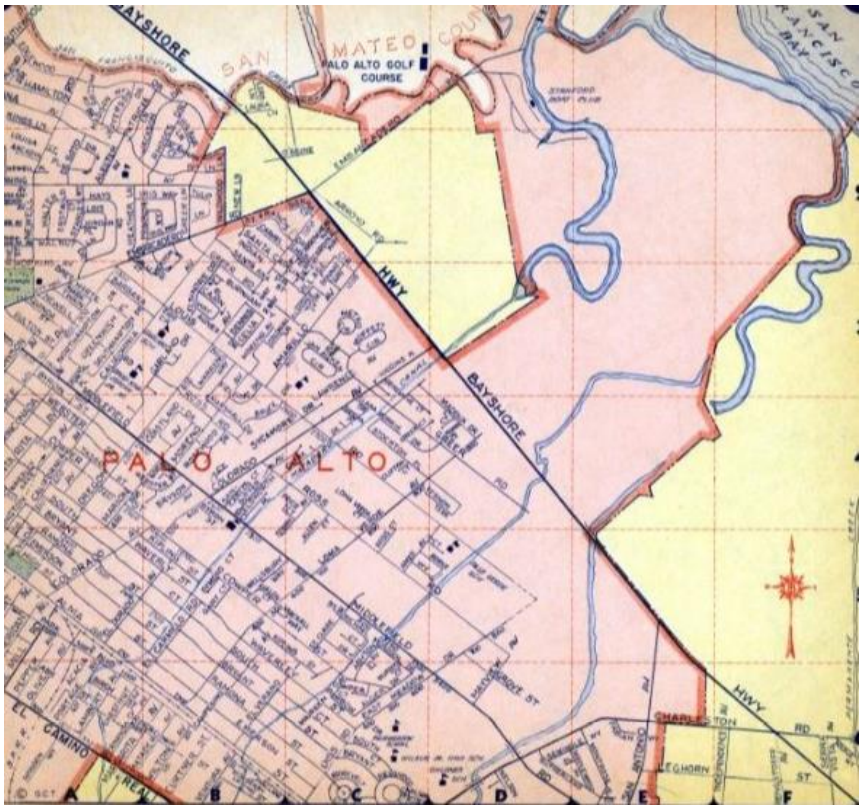
The Bayshore played an important role in the development of Palo Alto and the communities surrounding it. Historically, most of the Bayshore consisted of tidal salt marsh. Spanish missionaries used salt to cure meat and fish, which they sold to outgoing ships. By using shallow marshes along the Bayshore, the missionaries were able to procure enough salt that they eventually exported minor quantities to Europe. Early Spanish harvesting methods did not involve landscape modification and left no traces that are discernible today. The first levees constructed to create artificial salt ponds in the San Francisco Bay region were established in 1853 by John Johnson. He enclosed a 14-acre tract with levees from which he was able to harvest roughly 25 tons of salt, which was then shipped to San Francisco to support the needs of its burgeoning population (EDAW and USFWS 2009).

Solar salt extraction, the method used by Johnson and subsequent salt industry producers, is based on a simple process. Under this method, ponds are created using earthen dike divisions and water control gates along the open Bay or slough. Seawater is directed into the first series of ponds where the water begins to evaporate. When the water reaches a certain salinity level, the brine is moved to condensing ponds and then to crystallizing ponds, where the salt precipitates out of solution to form crystals. The end product, or layer of salt crystals, is then harvested (EDAW and USFWS 2009:4).

The solar salt industry required hundreds of acres of tidal marshlands, which were typically unattractive or untenable as farmland without significant reclamation efforts. To encourage use of these lands, the Green Act of 1869 removed all acreage limitations for swampland purchases, allowing individuals to acquire extensive tracts along the Bayshore. Following the Green Act, roughly 17,000 acres of marshlands in the East Bay and 10,000 acres in the South Bay were filled, diked, and channelized (EDAW and USFWS 2009:3). The rise of silver mining, which involved the use of salt in processing ore, and the rise in population of San Francisco, helped to fuel the demand for salt and the growth of the solar salt industry. By the 1890s, the Dumbarton Land & Improvement Company had acquired 19,000 acres in Santa Clara and Alameda counties encompassing approximately 17 miles of shoreline. Beginning ca. 1892, the C.E. Whitney Company began working on Dumbarton Land & Improvement Company-owned lands. In 1904, after C.E. Whitney died, the name was changed to Leslie Salt Refining Company, which was run by several of Whitney's sons. A.L. Whitney and two other major salt producers, Schilling and the Stauffer Chemical Company, joined in 1907 to form the Leslie Salt Company, which consolidated Leslie and Stauffer salt holdings. Further consolidation was driven by larger

companies seeking to buy out smaller, often family-run enterprises, and by 1924 only a handful of salt operators remained.

The Alviso area was owned by the Dumbarton Land & Improvement Company but beginning in 1919 was developed by Schilling under the Arden Salt Company. Schilling's operation expanded rapidly and in 1929 he acquired the Alviso Salt Company. The Alviso Salt Works relied on extensive evaporation ponds, levee systems, and water control devices. It was developed exclusively for brine production with no crystallizing ponds or processing plants. In 1936, Schilling's company merged with Leslie-California Salt as the reconstituted Leslie Salt Company. Although not recognizable as such today, the Palo Alto Flood Basin was a part of the Leslie Salt Company's holdings. In 1941, Palo Alto signed a purchase-option agreement with the Leslie Salt Company for the area that now encompasses the flood basin. That agreement was made final in 1950, bringing it under City ownership (City of Palo Alto 2008).



Project Vicinity ca. 1956 (Thomas Brothers1890).

The Leslie Salt Company continued to sell parcels of land along the Bayshore to be used for urban development in the late 1950s and early 1960s. Public pressure to preserve the natural character of the Bay influenced Leslie Salt to sell 20,000 acres to the US Fish and Wildlife Service in 1972 for the creation of the Don Edwards San Francisco Bay National Wildlife Refuge. Although the Leslie Salt Company retained the rights to continue producing salt from ponds within the refuge, the company exited the salt business in 1978, selling their interests to Cargill Incorporated (EDAW and USFWS 2009:5). Cargill continued production for the next two decades until 2003 when the company transferred about 14,000 acres to the US Fish and Wildlife

Service and nearly 1,000 acres to the State of California for ecological restoration. Much of the Alviso Salt Works has slowly been restored to include salt marsh habitat as part of the South Bay Salt Pond Restoration Project (CDFW 2019). Breaches in the levees are allowing tidal flows to remake many of the salt ponds into irregular shapes. Several ponds are being left intact as habitat for brine shrimp, and a few ponds are being modified for migratory birds with some levees maintained for pedestrian trails and public access.

Flood Control and the Palo Alto Flood Basin

By the 1920s and 1930s, Palo Alto's expanding population had created pressures to reclaim portions of the Bayshore for residential and municipal development. Around that time, possibly as a flood control measure, San Francisquito Creek was diverted from its original path into its current man-made channel, which flows northward into the Bay (City of Palo Alto 2008:247). It is unclear whether this rerouting affected flood risk in the area, though it did create a significant amount of reclaimed land. By 1960, the City owned roughly 1,880 acres of marshland, much of it diked, filled, or developed. The potential consequences of reclamation, however, were already being felt by the mid-1950s. In 1955, severe flooding was caused when a high tide prevented the outflow of heavy runoff from Matadero, Adobe, and Barron creeks into the San Francisco Bay, causing them to inundate areas upstream. Significant rainfall and debris blockage also caused San Francisquito Creek to back up during the "Christmas Flood" of 1955. Flood waters overtopped the levees on the Palo Alto side of the creek and burst a 20-foot gap in one levee. Many homes and businesses were flooded, resulting in over 1 million dollars in property damage (Palo Alto History.org 2012).

In the following year, attempts were made to reduce flood risks in Palo Alto. Levees along the new San Francisquito Creek channel were raised; levees built along the perimeter of the Bayshore were raised to protect the City from tidal flooding; and the Palo Alto Flood Basin was created by raising the levees around this low lying area and by cutting off tidal action from the sloughs that drained Matadero, Baron, and Adobe creeks (City of Palo Alto 2008:247-8). A one-way tidal gate was constructed in 1957 at the confluence of Adobe and Matadero creeks to isolate the basin from tidal inflow. The tide gate allowed water to pass out of the basin into the Bay but prevented tidal waters from flowing into the basin during high tides. Water levels in the Palo Alto Flood Control Basin were thus kept artificially low to allow for increased runoff from the three creeks during storm events.

The mid-1960s witnessed a rise in awareness and concern for Bayshore ecology and environmental quality. In 1965, Palo Alto dedicated its parks, including City-owned Bayshore lands. A Citizen's Advisory Committee also advocated for the creation of a marshland wildlife preserve during that same year (City of Palo Alto 2008:23). In 1967, the City of Palo Alto granted Valley Water an easement that gave the water district the right to take the lead in maintaining the Palo Alto Flood Basin and its associated flood protection structures, particularly the levee and tide gate (City of Palo Alto 1967). Plans for the area involving a County shoreline park were proposed and ultimately abandoned, as the City was committed to maintaining the Palo Alto Flood Basin in as natural a state as possible, providing both flood control and wildlife habitat as well as reasonable public access (City of Palo Alto 2008:131). In the early 1970s, the City began

work on the *Baylands Master Plan*, which outlined a plan for balancing ecological concerns with commercial and recreation use along the Bayshore (City of Palo Alto 2008).

A 1976 City report that discussed restoring the original marshland habitat of the flood basin noted that the basin had been cut off from tidal flows since 1957. Therefore, in 1977, the original tide gate was modified to allow for the two-way flow of water between the flood basin and the Bay. Further improvements beyond routine maintenance were made to the tide gate in 1993 and 2002, and repairs were made in 2012 and 2017. Today the Palo Alto Flood Basin is maintained to allow adequate space for flows from Matadero, Adobe, and Barron creeks; to facilitate vector management, which requires water levels to remain below a specified height; and to allow for habitat management, which requires a daily flush of tidal water to provide necessary nutrients and aquatic life (City of Palo Alto 2008:131).

Archival and Records Search

On July 30, 2019, Pacific Legacy personnel conducted an archival and records search (File No. 19-0202) at the Northwest Information Center (NWIC) of the CHRIS encompassing a 0.25-mile radius around the Project area. The search included a review of the following:

- *The Historic Properties Directory* (California Office of Historic Preservation 2015);
- *The California Inventory of Historic Resources* (State of California 1976);
- *California Historical Landmarks (*California Office of Historic Preservation 1996);
- *California Points of Historical Interest* listing May 1992 (State of California 1992); and
- The National Register of Historic Places (*Directory of Determinations of Eligibility*, California Office of Historic Preservation, Volumes I and II, 1990; Office of Historic Preservation Computer Listing 1990 and updates).

Pacific Legacy personnel also reviewed historic period maps, aerial photographs, and documents encompassing the Project vicinity as well as recent environmental studies and reports pertaining to the greater Bayshore area. These included the *Palo Alto Baylands Existing Conditions* report (AECOM 2017), *Climate Change and Sea Level Rise at the Baylands* (AECOM 2018), *Palo Alto Baylands Comprehensive Conservation Plan Draft* (AECOM 2019), the *South San Francisco Bay Shoreline Phase I Study Final Integrated Document* (USACE 2015), and the 4th edition of the *Baylands Master Plan* (City of Palo Alto 2018), among others. The sections below focus on the CHRIS archival and records search results while the other environmental studies have been used to inform the historic context and evaluation of the Palo Alto Flood Basin and Tide Gate presented in the DPR Forms 523 included as Attachment D.

Prior Cultural Resource Studies

The 2019 archival and records search revealed that nine prior cultural resource studies have been conducted within a 0.25-mile radius of the Project area and that one of those studies overlapped a portion of the Project APE (*see* Table 1). That study encompassed multiple reports, including a cultural resources assessment by Basin Research Associates (S-046899), a feasibility report prepared by MWH centered on the Alviso Salt Works (S-046899a), Phase I documents completed by the USACE (S-046899e and S-046899f), and correspondence with the Office of Historic Preservation (S-046899g). The 2009 report by Basin Research Associates (S-046899) was aimed at providing a planning level assessment of the condition and spatial extents of known

cultural resources that might be impacted by USACE efforts to initiate flood-damage reduction activities and restoration improvements along the southern San Francisco Bay shoreline. An archival and records search and field inventory were completed, resulting in the relocation or discovery of historic period flood control structures, recreation features, and former salt production areas. No pedestrian inventory surveys were conducted by Basin Research Associates within the current Project APE, as their efforts were focused to the east of the Charleston Slough. The other eight studies conducted outside of the Project APE but within a surrounding 0.25-mile radius were focused largely on infrastructural projects, particularly those associated with Highway 101 and State Route 85. All of these studies are detailed in Table 1.

Table 1. Prior Cultural Resource Studies Conducted within 0.25 Miles of the Project Area.

Study Designation	Author	Year	Report Title	Study Type	In Project APE?	Results in Project APE
S-033697a	Dean Martorana	2003	Palo Alto Regional Water Quality Control Plant Reuse Pipeline: Cultural Resources Inventory Report	Archaeological, Field study	No	Negative
S-034074	Eric Strother, Aimee Arrigoni, Drew Bailey, James Allan, and William Self	2007	Cultural Resource Assessment, Palo Alto Regional Water Quality Control Plant, UV Disinfection Project, Palo Alto, Santa Clara County, California	Archaeological, Field study	No	Negative
S-037075	Adrian Whitaker	2008	Historic Resources Compliance Report for the U.S. 101 Auxiliary Lanes (Route 85 to Embarcadero Road) Project, Santa Clara County, California 04-SCL-101 PM 52.17-48.97 EA 04-4A330	Architectural/historical, Management/planning	No	Negative
S-037075a	Brian F. Byrd, Michael Darcangelo, Jeffrey Rosenthal, and Jack Meyer	2008	Archaeological Survey Report for the US 101 Auxiliary Lanes (Route 85 to Embarcadero Road) Project, Santa Clara County, California, 04-SCL-101 PM 48.97/52.17 EA 04-4A3300	Archaeological, Field study	No	Negative
S-037075b	Adrian Whitaker	2008	Extended Phase I Testing for the U.S. 101 Auxiliary Lanes (Route 85 to Embarcadero Road) Project, Santa Clara County, California 04-SCL-101 PM 52.17-48.97 EA 04-4A330O	Archaeological, Excavation	No	Negative
S-041536	Michael Corbett and Denise Bradley	2001	Final Survey Report, Palo Alto Historical Survey Update, August 1997- August 2000	Architectural/historical, Evaluation, Field study	No	Negative

Study Designation	Author	Year	Report Title	Study Type	In Project APE?	Results in Project APE
S-043191	Kathleen Kubal and Jay Rehor	2013	Historic Property Survey Report, State Route 85 Express Lanes Project, Santa Clara County, California, EA 4A7900, EFIS 0400001163, US 101 PM 23.1-28.6, SR 85 PM 0.0-24.1, US 101 PM 47.9-52.0	Archaeological, Architectural/historical, Excavation, Field study	No	Negative
S-043191a	Kathleen Kubal	2013	Archaeological Survey Report, State Route 85 Express Lanes Project, Santa Clara County, California: EA 4A7900; EFIS 0400001163, US 101 PM 23.1-28.6, SR 85 PM 0.0-24.1, US 101 PM 47.9-52.0	Archaeological, Field study	No	Negative
S-043191b	Jay Rehor and Kathleen Kubal	2013	Extended Phase I Study, State Route 85 Express Lanes Project, Santa Clara County, California: Project No. 0400001163; EA 4A7900, US 101 PM 23.1-28.6, SR 85 PM 0.0-24.1, US 101 PM 47.9-52.0	Archaeological, Excavation, Field study	No	Negative
S-043191c	Kathleen Kubal	2013	Environmentally Sensitive Area Action Plan, State Route 85 Express Lanes Project, Santa Clara County, California: EA 4A7900; EFIS 0400001163, US 101 PM 23.1-28.6, SR 85 PM 0.0-24.1, US 101 PM 47.9-52.0	Archaeological, Management/planning	No	Negative
S-044044	Heidi Koenig	2014	Historic Property Survey Report Highway 101 Overcrossing Project Palo Alto, Santa Clara County, CA County Post Mile SCL 50.684	Archaeological, Architectural/historical, Field study	No	Negative
S-044044b	Heidi Koenig	2014	Archaeological Survey Report Highway 101 Overcrossing Project Palo Alto, Santa Clara County, CA County Post Mile SCL 50.684	Archaeological, Field study	No	Negative
S-046899	Basin Research Associates	2009	Cultural Resources Assessment, South San Francisco Bay Shoreline Interim Feasibility Study, Contract: W9-12P7-06-D-007	Archaeological, Architectural/historical, Field study	Yes	Negative
S-046899a	MWH	2010	South San Francisco Bay Shoreline Study, Alviso Ponds and Santa Clara County Area Interim Feasibility Study, Environmental Settings Report, Contract No. W912P7-06-D-006, Task Order No. 002	Archaeological, Field study	Yes	Negative

Study Designation	Author	Year	Report Title	Study Type	In Project APE?	Results in Project APE
S-046899e	USACE - San Francisco District	2014	Draft South San Francisco Bay Shoreline Phase I Study, Draft Integrated Document Cultural Resources Report Section Chapter 4.15	Archaeological, Other research	Yes	Negative
S-046899f	USACE - San Francisco District	2014	Draft South San Francisco Shoreline Phase I Study - Draft Integrated Document Aesthetics Chapter 4.12	Other research	Yes	Negative
S-046899g	Thomas R. Kendall	2015	COE_2014_1219_001; South San Francisco Bay Phase I Shoreline Study	OHP Correspondence	Yes	Negative
S-048737	Heidi Koenig,	2017	Historic Property Survey Report Highway 101 Overcrossing Project Palo Alto, Santa Clara County, CA County Post Mile SCL 50.684	Management/planning	No	Negative
S-048737a	Heidi Koenig	2017	Archaeological Survey Report Highway 101 Overcrossing Project Palo Alto, Santa Clara County, CA County Post Mile SCL 50.684	Archaeological, Field study	No	Negative
S-050545	Carolyn Losee	2016	Cultural Resources Investigation for Trileaf 626559/Crown Castle 815021 "Hwy 101/San Antonio Temp Relo", 1010 Corporation Way, Palo Alto, Santa Clara County, California 94303 (letter report)	Archaeological, Architectural/historical, Field study	No	Negative
S-050545a	Carolyn Losee	2016	New Tower ("NT") Submission Packet, FCC Form 620, Crown Castle 815021 "Palo Alto Temp. Tower", 1010 Corporation Way, Palo Alto, CA 94303	Archaeological, Management/planning	No	Negative

Note that studies listed in Table 1 are not listed under References.
Studies that are italicized or with designations with “a”, “b”, or “c”, etc. indicate associated reports that were part of a single larger study or project.

Known Cultural Resources

The archival and records search revealed that two known cultural resources have been previously recorded within a 0.25-mile radius of the Project area and that neither overlaps the Project APE (*see* Table 2). One of these resources is a possible flood control structure (P-43-002247) located near the north end of a levee road along the west edge of a former salt pond. The structure measures approximately 100 feet in length, 10 feet in width and is constructed from cut lumber. The decking is comprised of 8 foot long horizontal planking with a partially intact railing system along its eastern edge as it faces the former salt pond. The railing is constructed from 3-4 foot tall vertical lumber with horizontal 1-foot by 2-foot planks. Two 12-foot long protruding support walls extend into the former salt pond. These walls are constructed from vertically and horizontally placed cut lumber. The south end of the deck is

covered in wooden debris. A recently constructed wood deck is located immediately south of the resource. The structure was reported to be a 1940s-1950s intake gate structure. The original steel pipe (not seen during the inventory) was replaced with a corrugated metal pipe in the 1960s (Canzonieri 2008).

Table 2. Previously Recorded Cultural Resources within 0.25 Miles of the Project Area.

Resource Designation	Author	Year Recorded	Description	NRHP/CRHR Status	In Project APE?
P-43-002247 Flood Control Structure - West Edge on Pond A1 (Reach A)	Christopher Canzonieri	2008	A historic period (ca. 1940s-1950s) flood control or intake gate structure near the north end of a levee road that measures approximately 100 feet in length and 100 feet in width. It is constructed of cut lumber and consists of 8-foot long horizontal planking with a partially intact railing system along the east face.	Not Evaluated	No
P-43-002823 Alviso Salt Works Historic Landscape; Alviso or Schillling Arden Salt Company; Alviso Salt Works	Lou Ann Speulda-Drews, Nick Valentine, Ellen Joslin Johnck (US Fish & Wildlife Service)	2007	A historic period (ca. 1950s-1970s) district or landscape made up of large evaporation ponds defined by levees. Individual elements include pilings, remnant piers, small interior berms, and water control structures. Extends into Alameda County as P-01-011436; it forms a district with element P-43-003531, which is located in Santa Clara County.	Recommended eligible NRHP/CRHR	No
	Kathleen Ungvarsky (USACE)	2018			

Note that resources listed in Table 2 are not included under References.

The second resource recorded within a 0.25-mile radius of the current Project area is the Alviso Salt Works Historic Landscape (P-43-002823), which consists primarily of 25 large salt evaporation ponds defined by levees and the boundary of the US Fish and Wildlife Service, Don Edwards San Francisco Bay National Wildlife Refuge. The resource spans roughly 9,677 acres along the south Bayshore adjacent to the cities of Mountain View, San Jose, Fremont, and Milpitas (Speulda-Drews et al. 2007). The western boundary is marked by the Charleston Slough, the southern boundary by development, and the eastern boundary by Coyote Slough. Small scale elements include pilings, remnant piers, small interior berms, water control structures, and duck hunting blinds. The Alviso Salt Works was recorded most recently in 2018 to incorporate a salt pond near the San Jose-Santa Clara Regional Wastewater Treatment Facility near the southern end of the San Francisco Bay.

Although not on file with the NWIC, Historic Architectural Landscape Survey (HALS) documentation was completed for the Alviso Salt Works in 2005 by historians from EDAW and the US Fish and Wildlife Service. The HALS documentation described the resource as consisting of open, flat marshland within a protected bay with sunny, warm summers perfect for producing salt. Elements in the landscape include "sinuous levees, ponds of varying sizes, from large evaporation ponds to small crystallizing ponds, water control structures, water transportation pipes and siphons, and bright brine colors" (EDAW and USFWS 2009:1). The Alviso Salt Works Historic Landscape was determined eligible for listing in the NRHP and CRHR under Criterion A/1 at the local level "because it is associated with the twentieth century

period of industrialization when one operator created a vast network of evaporation ponds to produce the large amount of brine necessary to meet production demands" (Speulda-Drews et al. 2007). Both the historic period flood control structure (P-43-002247) and the Alviso Salt Works Historic Landscape (P-43-002823) were recorded to the east of the current Project area. They are depicted in Attachment A, Figure 3.

Native American Contact

On July 30, 2019, Pacific Legacy submitted a request to the NAHC for a search of the Sacred Lands File as it encompasses the Project area (*see* Attachment C). Gayle Totton, Associate Governmental Program Analyst with the NAHC, responded on August 8, 2018, stating that no Native American cultural resources had been reported within the Project area. She provided contact information for six Native American tribal representatives with potential knowledge of or interest in the Project vicinity. Those individuals included Mr. Valentin Lopez, Chairperson of the Amah Mutsun Tribal Band; Ms. Irenne Zwierlein, Chairperson of the Amah Mutsun Tribal Band of Mission San Juan Bautista; Ms. Ann Marie Sayers, Chairperson of the Indian Canyon Mutsun Band of Costanoan; Ms. Monica Arellano of the Muwekma Ohlone Indian Tribe of the San Francisco Bay Area; Ms. Katherine Erolinda Perez, Chairperson of the North Valley Yokuts Tribe; and Mr. Andrew Galvan of the Ohlone Indian Tribe. No responses to these requests for contact have been received to date but will be forwarded to Valley Water upon receipt.

Cultural Resources Pedestrian Inventory Survey

A pedestrian inventory survey of the Project area was conducted by Pacific Legacy Senior Archaeologist Lisa Holm on August 1, 2019. The purpose of the survey was to identify cultural resources that may be adversely affected by ground disturbing activities associated with the Project. All areas within the Project APE were carefully examined for cultural materials, and the Palo Alto Levee and Tide Gate were subject to thorough photo-documentation. Most of the Project APE is made up of the existing levee that confines the Palo Alto Flood Basin, which will be used to access the proposed tide gate replacement area. At the time of the survey, the levee measured an average of 100 feet in width above the waterline, though typically only a 75-foot corridor centered on the levee crown was accessible. The levee segment west of the tide gate is bordered by tidal marsh to the northwest and by Matadero Creek and the Mayfield Slough to the southeast. The levee segment east of the tide gate is bordered to the east by the broad expanse of the Charleston Slough, which flows northward into the Bay. Immediately west or southwest of the levee segment east of the tide gate is Adobe Creek, which reaches its confluence with Matadero Creek at the existing tide gate.

The Palo Alto Flood Basin itself is inaccessible to pedestrians from the Project APE. Much of the basin appeared to be at least partially inundated at the time of the survey, with areas of higher ground dominated by resting shorebirds and waterfowl. Areas along the levee adjacent to the water line were marked by dense fresh water or muted salt marsh vegetation, including common reed (*Phragmites australis*), arundo (*Arundo donax*), and tall wheatgrass (*Thinopyrum ponticum*) with other common plant species such as pickleweed, bulrush, and cattails (*Typha spp.*). Vegetation was generally much sparser ascending towards the center of the levee and virtually absent along the Adobe Creek Loop Trail, which has been graded and compacted to allow for pedestrians, cyclists, and maintenance vehicles.

The Adobe Creek Loop Trail extends the full length of the levee and measures approximately 15 feet in width on average. Informal pedestrian or social trails also have been carved out adjacent along the levee embankment, though few are deeply cut or well established. Exposed soils are characterized by light yellowish brown (10YR 7/4) sandy clay with light to moderate gravels. The two proposed staging areas are located along the top of the levee and just off the Adobe Creek Loop Trail. One is approximately 90 feet west of the existing tide gate and spans 0.14 acres, the other is roughly 1,985 feet to the southeast of the tide gate and subsumes a portion of a turnout spanning 0.39 acres. Both areas are graded and appeared to be regularly used by pedestrians, cyclists, and maintenance vehicles.

No prehistoric or historic period archaeological materials or features were observed during the pedestrian inventory survey. The Palo Alto Flood Basin Levee and Tide Gate was recorded within the Project APE as a historic period built environment resource. No other historic period structures or objects were noted. Attachment D provides DPR Forms 523 for the Palo Alto Flood Basin Levee and Tide Gate. These forms include a historical context for the resource as well as a NRHP and CRHR evaluation of the levee and tide gate. Although the resource is over 50 years old, it does not meet eligibility criteria for listing in the NRHP and/or CRHR and does not comprise a historic property under Section 106 of the NHPA or a historical resource per CEQA.

Project Area Cultural Resource Sensitivity

The Project APE is set within former and current marshland, thus it is considered to have very low sensitivity for archaeological or historic period archaeological resources. Although the Native inhabitants of the San Francisco Bayshore frequently accessed tidal marshlands to procure resources, including fish, waterfowl, and salt, frequently inundated areas were not preferred for habitation. Native mound sites representing extended periods of occupation have been recorded throughout the San Francisco Bay region, but none have been recorded within or adjacent to the Project area. Areas along the Bayshore that consist of artificial fill over San Francisco Bay mud have been noted in other parts of Palo Alto (Witter et al. 2006). Such landforms have the potential to contain deeply buried archaeological deposits associated with former occupation surfaces that have become submerged through time by rising sea levels and/or estuarine deposits. One notable prehistoric site (CA-SMA-273) in San Mateo County located several miles north of the Project area was detected at a depth of 3.5 meters (Meyer and Rosenthal 2007). The current Project area was never characterized by substantial historic period or modern fill, however, thus the potential to encounter buried cultural resources is extremely low. During much of the historic period, the Project area comprised marshland subject to periodic flooding. In general, therefore, the archaeological sensitivity of the Project area may be considered low.

Discussion of Results and Recommendations

The archival and records search revealed that one cultural resource study has been previously conducted within the Project area and that no cultural resources have been previously recorded. One of these resources was the Peninsula Yacht Club building, recorded by ESA in 2015. The NAHC failed to identify Native resources or areas of concern within the Project area. A pedestrian inventory survey of the Project area revealed no prehistoric or historic period archaeological materials. One historic period built environment resource, the Palo Alto Flood

Basin Levee and Tide Gate, was documented in the Project APE. A historical context for the resource as well as a NRHP/CRHR evaluation of the resource are presented in Attachment D. Although the resource is over 50 years old, it does not meet eligibility criteria for listing in the NRHP and/or CRHR and does not comprise a historic property under Section 106 of the NHPA or a historical resource per CEQA.

Based on the results of the archival and records search, contact with the NAHC, the pedestrian inventory survey, and an assessment of the Palo Alto Flood Basin Levee and Tide Gate, we find that the proposed Project will not have an adverse effect on historic properties and/or historical resources. As the Project area possesses very low sensitivity for buried cultural resources, we do not recommend archaeological monitoring during Project construction. In the unlikely event that prehistoric or historic period archaeological materials are encountered during Project construction, we recommend that Valley Water contact a qualified archaeologist to assess the find. Once the find has been identified, plans for the treatment, evaluation, and mitigation of impacts to the find will need to be developed if it is found to be NRHP and/or CRHR eligible. Potential prehistoric or historic period archaeological materials may consist of, but are not limited to the following:

- Historic period artifacts, such as leather, glass bottles and fragments, tin cans, nails, ceramic and pottery sherds, and other metal objects;
- Historic period features such as privies, wells, cellars, foundations or other structural remains (bricks, concrete, or other building materials);
- Flaked-stone artifacts and debitage, consisting of obsidian, basalt, and/or chert;
- Groundstone artifacts, such as mortars, pestles, and grinding slabs;
- Dark, almost black, soil with a "greasy" texture that may be associated with charcoal, ash, bone, shell, flaked stone, groundstone, and fire-affected rock; and,
- Human remains.

If human remains are encountered during construction, work in that area must cease and the Santa Clara County Coroner must be notified immediately. If the remains are determined to be Native American, the NAHC must be notified within 48 hours as required by Public Resources Code 5097. The NAHC will notify the designated Most Likely Descendant, who will in turn provide recommendations for the treatment of the remains within 24 hours. Should you have any questions regarding this report, I may be reached at 510.524.3991, ext. 2.

Sincerely,

Lisa Holm

Lisa Holm, Senior Archaeologist
Pacific Legacy, Inc.

Attachments:
Attachment A – Project Figures
Attachment B – Photographic Documentation
Attachment C – Native American Documentation
Attachment D – Palo Alto Flood Basin Levee and Tide Gate DPR Forms 523

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ATTACHMENT A: PROJECT FIGURES

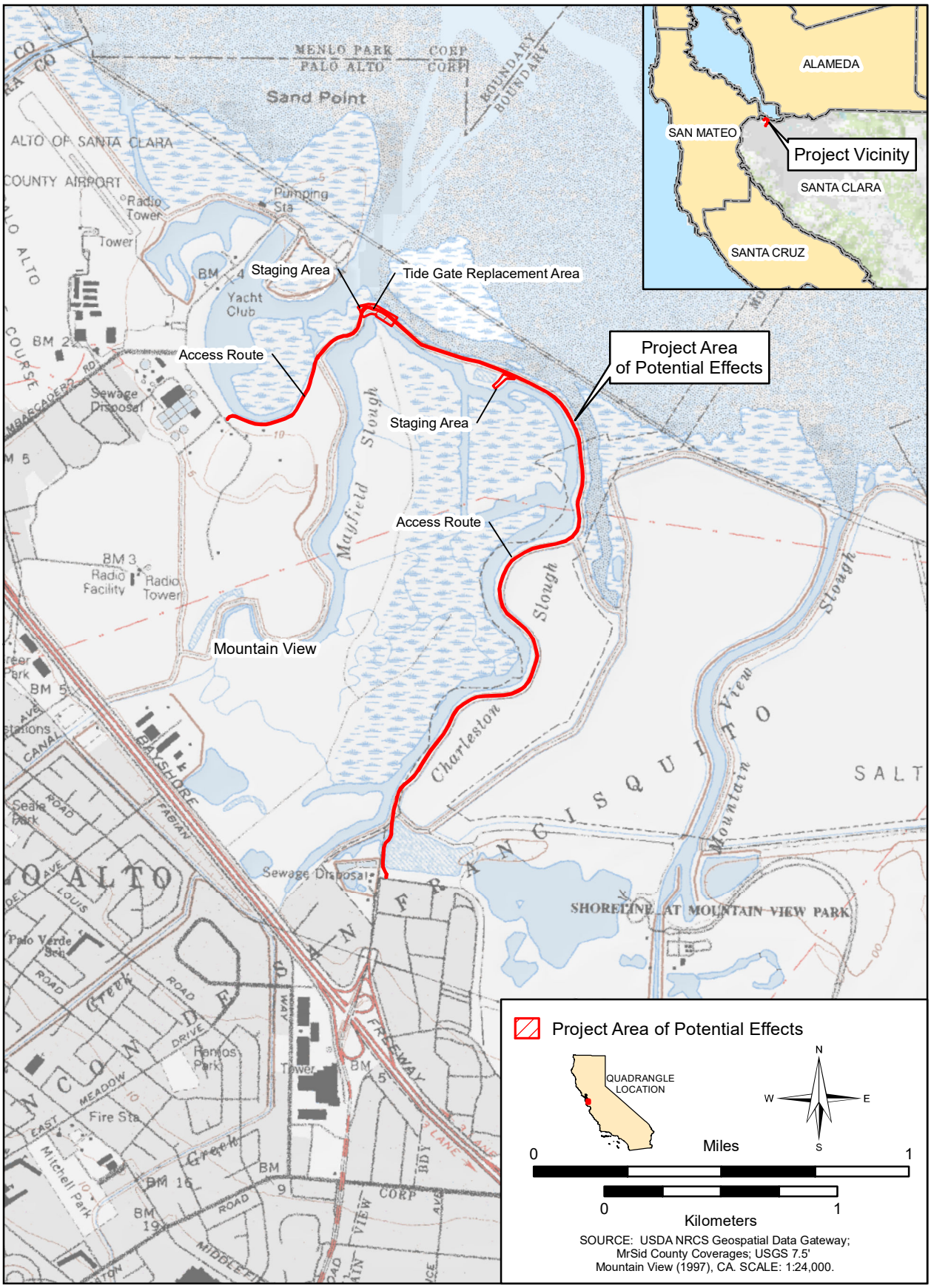

Figure 1. Valley Water Palo Alto Tide Gate Replacement Project Location and Vicinity Map.

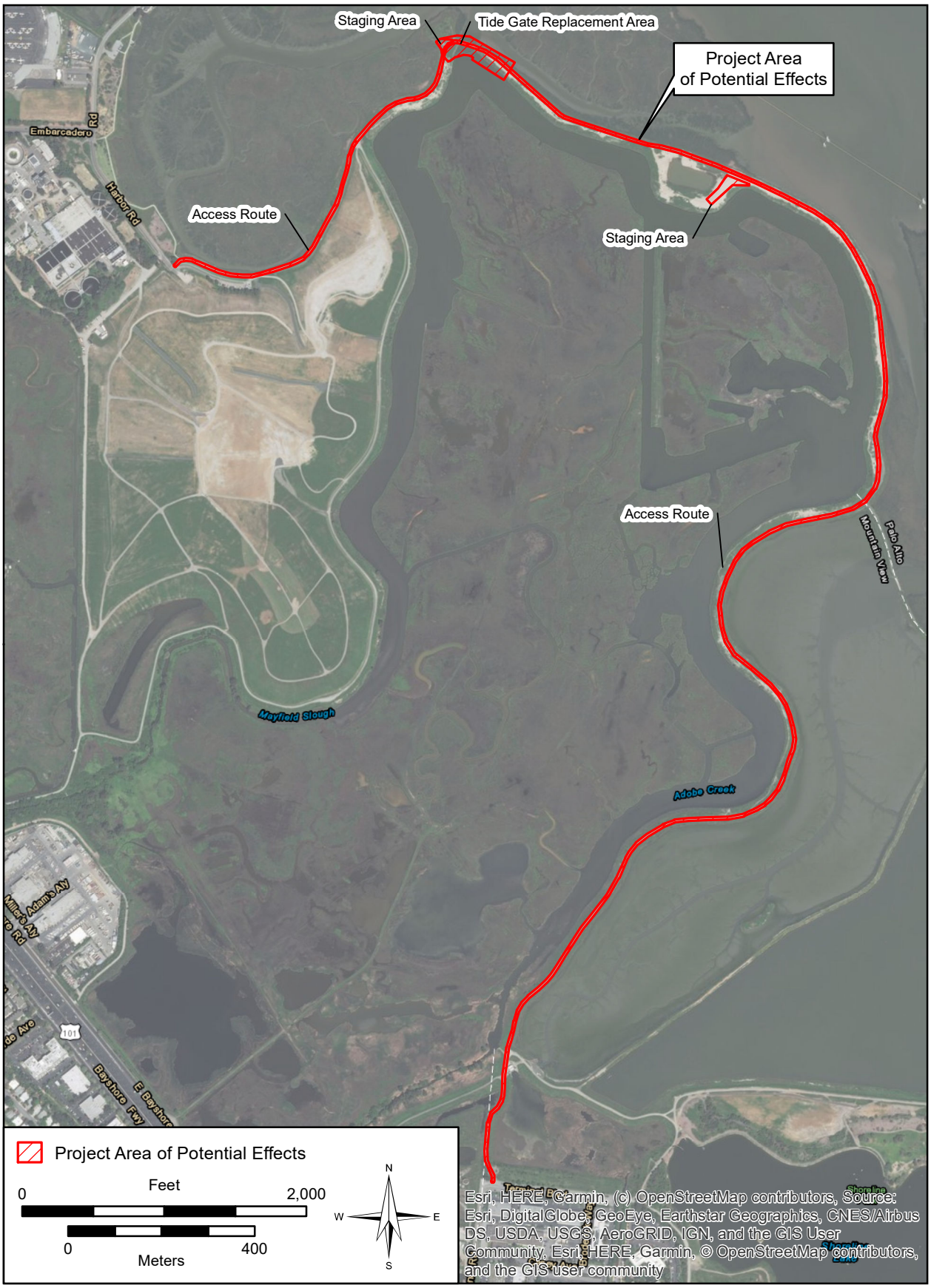

Figure 2. Valley Water Palo Alto Tide Gate Replacement Project Area of Potential Effects Map.

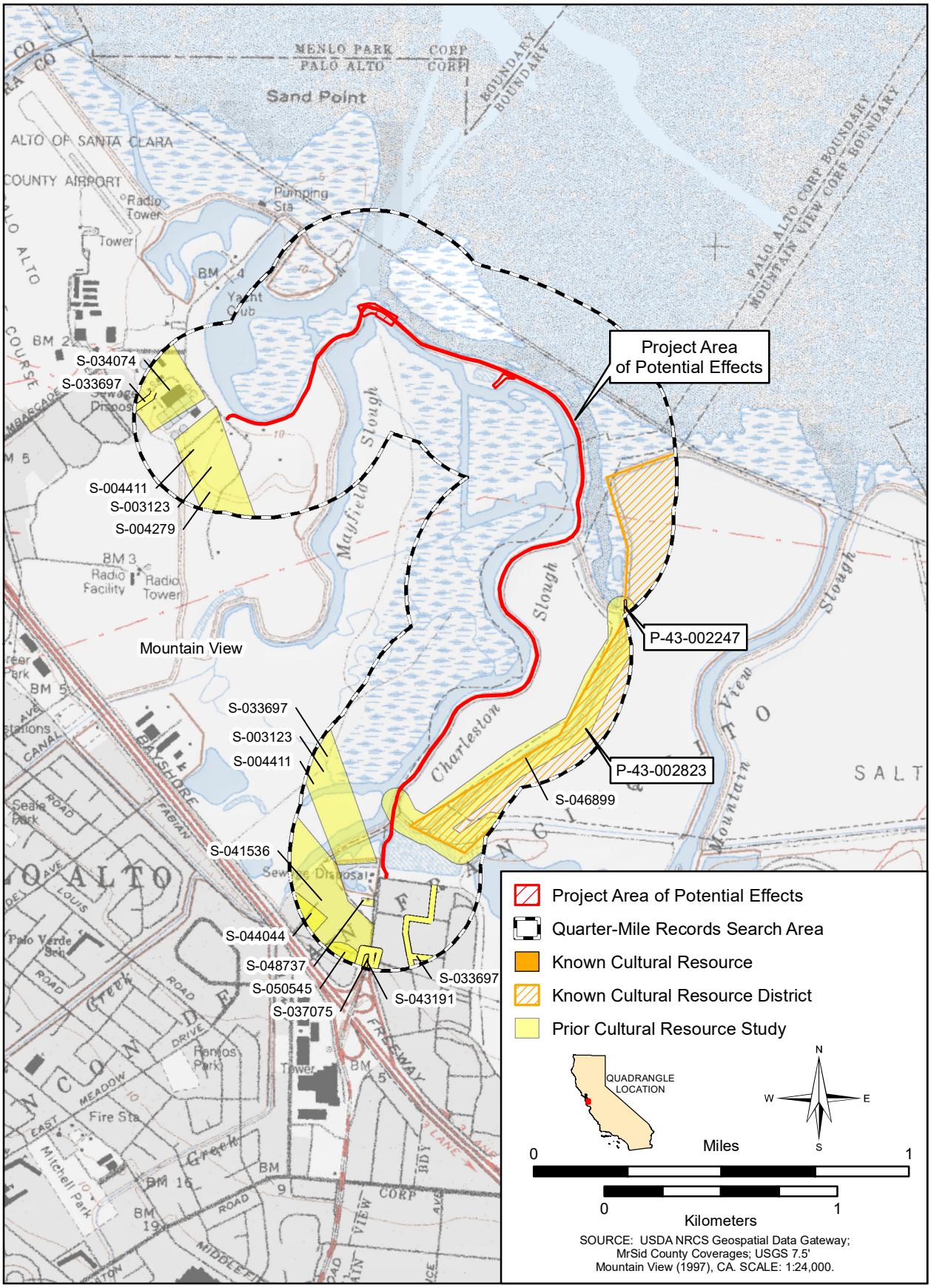

Figure 3. Valley Water Palo Alto Tide Gate Replacement Project Records Search Results Map.

ATTACHMENT B: PHOTOGRAPHIC DOCUMENTATION

Attachment B: Pacific Legacy Photographic Documentation

Client: Valley Water, Alexander Hunt Prepared by: L. Holm

Photograph No. 1
Direction: Northeast
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2480) View of the western edge of the Project APE with the Adobe Creek Loop Trail in the right foreground.

Photograph No. 2
Direction: North-northeast
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2490) View of the western portion of the Project APE on the levee crown with the tide gate in the background.

Attachment B: Pacific Legacy Photographic Documentation

Client: Valley Water, Alexander Hunt Prepared by: L. Holm

Photograph No. 3
Direction: North-northeast
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2494) View of the Palo Alto Levee and Tide Gate with a pedestrian on the Adobe Creek Loop Trail as it crosses the tide gate.

Photograph No. 4
Direction: Southeast
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2500) View of the top of the tide gate from the first Project staging area.

Attachment B: Pacific Legacy Photographic Documentation

Client: Valley Water, Alexander Hunt Prepared by: L. Holm

Photograph No. 5
Direction: West
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2503) Close-up view of the tide gate and metal piers as they retain the western segment of the levee.

Photograph No. 6
Direction: Northwest
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2505) View from the tide gate toward the western segment of the levee and first Project staging area.

Attachment B: Pacific Legacy Photographic Documentation

Client: Valley Water, Alexander Hunt Prepared by: L. Holm

Photograph No. 7
Direction: Northwest
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2511) View of the tide gate with its current 16-cell configuration looking towards the western levee segment.

Photograph No. 8
Direction: Southeast
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2521) View of the second Project staging area at the southern end of the levee turnaround.

Attachment B: Pacific Legacy Photographic Documentation

Client: Valley Water, Alexander Hunt Prepared by: L. Holm

Photograph No. 9
Direction: East
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2531) View from the eastern levee segment towards the Charleston Slough and a historic period structure in the middle foreground.

Photograph No. 10
Direction: South
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2543) A view of Adobe Creek and the Palo Alto Flood Basin with muted tidal marsh habitat and pelicans in the foreground.

Attachment B: Pacific Legacy Photographic Documentation

Client: Valley Water, Alexander Hunt Prepared by: L. Holm

Photograph No. 11
Direction: North
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2547) A view of the southeastern end of the levee alignment near where the Adobe Creek Loop Trail and Bay Trail meet.

Photograph No. 12
Direction: Southeast
Date: 08/01/18
Location: Palo Alto Tide Gate Replacement Project Area.
Photographer: Lisa Holm

Description:
(IMG-2572) View of the tide gate with its current 16-cell configuration looking towards the eastern levee segment where the new 32-cell tide gate will be constructed.

ATTACHMENT C: NATIVE AMERICAN CONTACT DOCUMENTATION

Sacred Lands File & Native American Contacts List Request

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95501
(916) 373-3710
(916) 373-5471 – Fax
nahc@nahc.ca.gov

Information Below is Required for a Sacred Lands File Search

Project: Valley Water Palo Alto Tide Gate Replacement Project (3039-01 Task 9)

County: Santa Clara

USGS Quadrangle

Name: Mountain View (1997)

Township: 6 South Range: 2 West Section(s): Unsectioned; Rincon de San Francisquito Civil Colonies Land Grant

Company/Firm/Agency:

Pacific Legacy

Contact Person: Lisa Holm

Street Address: 900 Modoc Street

City: Berkeley, California Zip: 94707

Phone: (510) 524-3991 Extension: 102

Fax:

Email: holm@pacificlegacy.com

Project Description:

On behalf of Valley Water, we are conducting a cultural resources investigation for the Palo Alto Tide Gate Replacement Project, located near the northern reach of the Mayfield Slough within the Palo Alto Flood Basin in the City of Palo in Santa Clara County. The Project will involve construction of a new 235-foot wide tide gate adjacent to an existing 113-foot wide deteriorating tide gate and construction of a new levee in place of the existing tide gate. The Project area will total approximately 2.8 acres and include the area of construction for the tide gate and levee as well as two staging areas. The Adobe Creek Loop Trail would be diverted from along the top of the levee for the duration of construction, and construction of the new tide gate would be phased to maintain operation of the either the existing tide gate or new gate at all times. Imported fill will be used for the new levee segment, and the levee slope will be revegetated.

We would like to request a search of the Sacred Lands File for the Project area (please see Figure 1, attached). We would also like to request a list of Native American Tribal representatives for Santa Clara County who may have an interest in or knowledge of the Project area. We will be contacting those parties for further consultation. Thank you in advance for your assistance.

☑ Project Location Map is attached

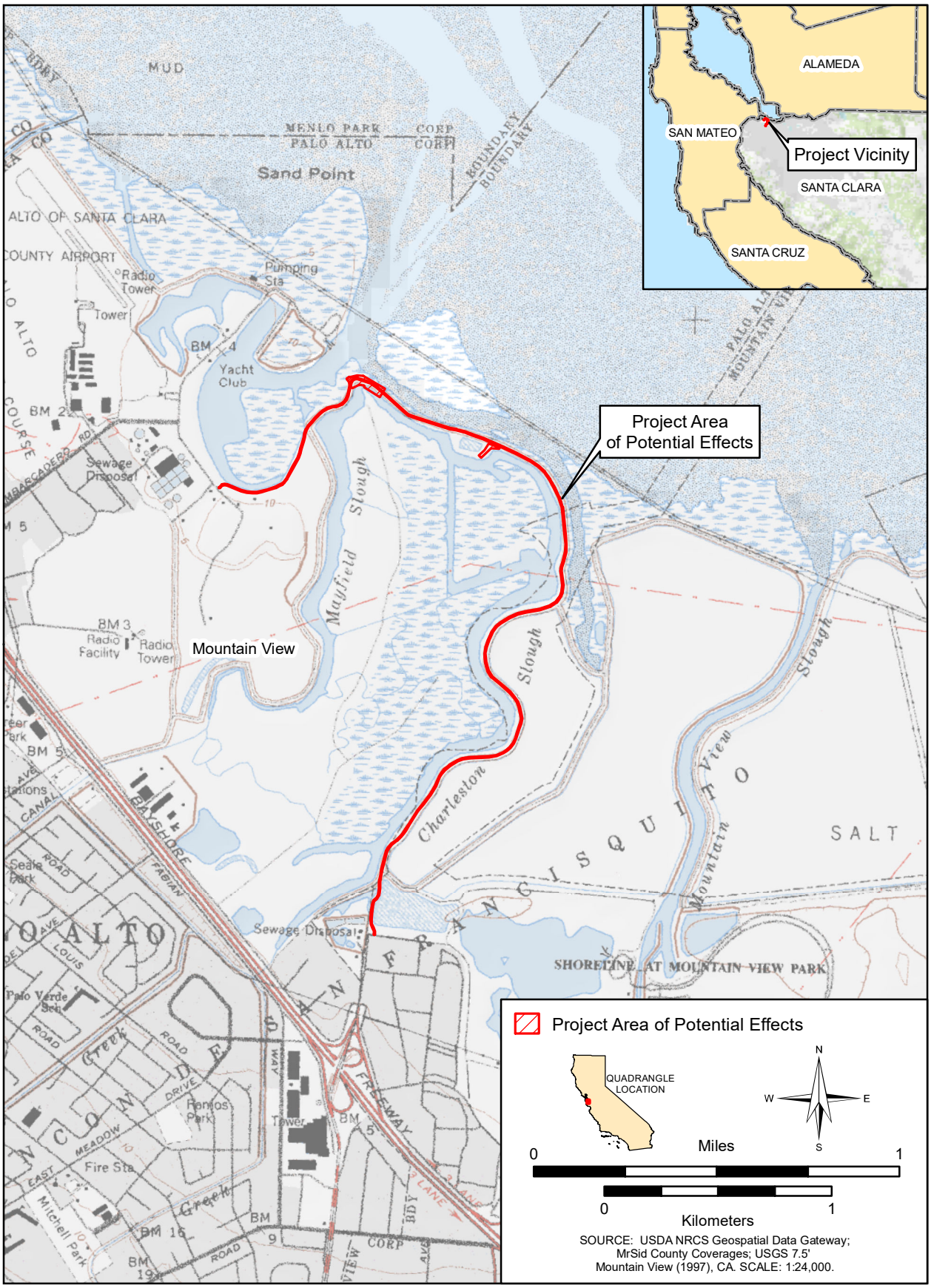

Figure 1. Valley Water Palo Alto Tide Gate Replacement Project (PL 3039-01 Task 9).

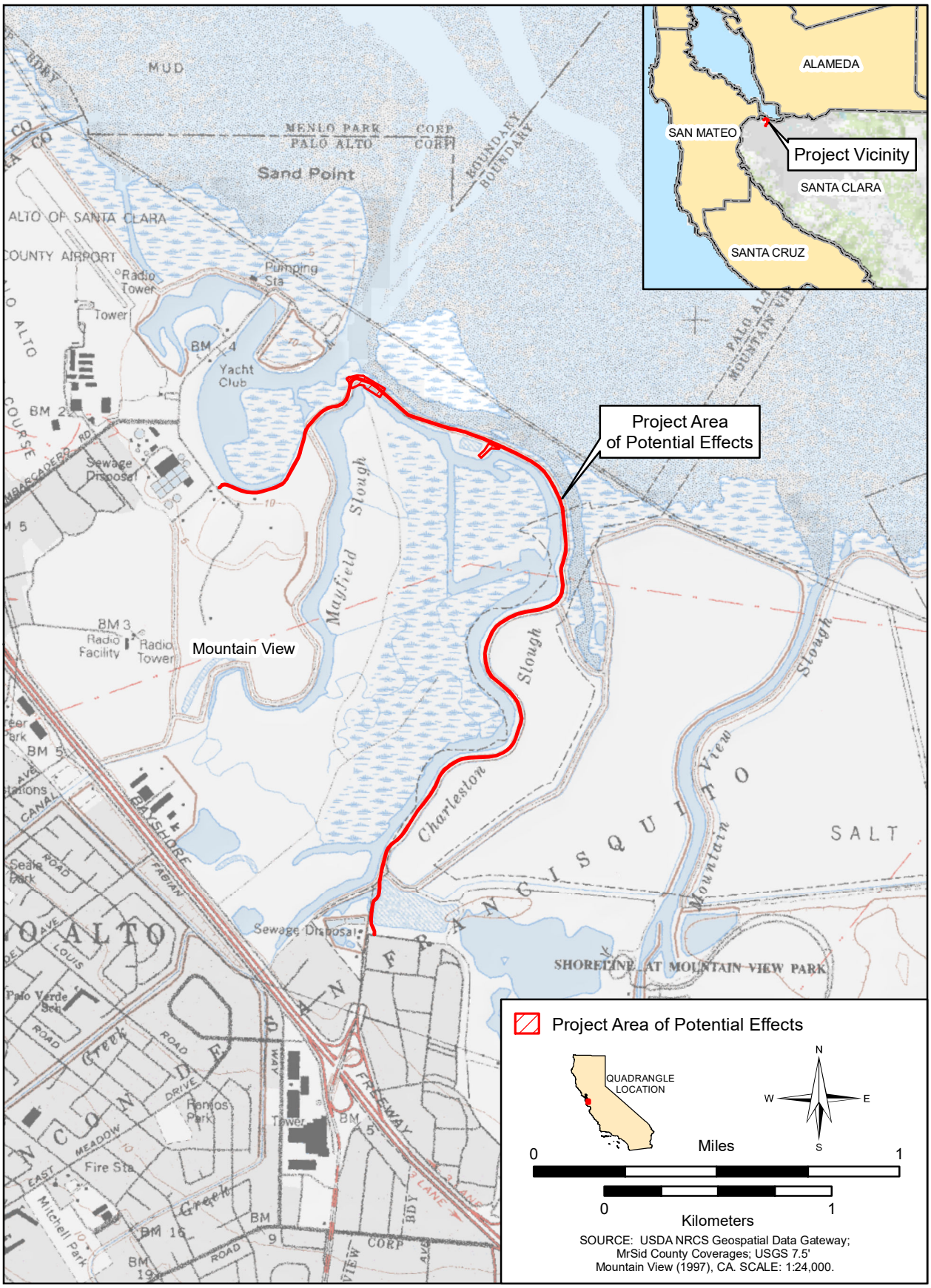

Figure 1. Valley Water Palo Alto Tide Gate Replacement Project (PL 3039-01 Task 9).

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov

August 5, 2019

Lisa Holm
Pacific Legacy

VIA Email to: holm@pacificlegacy.com

RE: **Valley Water Palo Alto Tide Gate Replacement (3039-01 Task 9) Project**, City of Palo Alto; Mountain View USGS Quadrangle, Santa Clara County, California.

Dear Ms. Holm:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative. The absence of specific site information in the SLF does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our lists contain current information. If you have any questions or need additional information, please contact me at my email address: gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton

Gayle Totton, B.S., M.A., Ph.D.
Associate Governmental Program Analyst

Attachment

Native American Heritage Commission
Native American Contact List
Santa Clara County
8/5/2019

Amah MutsunTribal Band
Valentin Lopez, Chairperson
P.O. Box 5272
Galt, CA, 95632
Phone: (916) 743 - 5833
vlopez@amahmutsun.org

Costanoan
Northern Valley
Yokut

Amah MutsunTribal Band of Mission San Juan Bautista
Irenne Zwierlein, Chairperson
789 Canada Road
Woodside, CA, 94062
Phone: (650) 851 - 7489
Fax: (650) 332-1526
amahmutsuntribal@gmail.com

Costanoan

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28
Hollister, CA, 95024
Phone: (831) 637 - 4238
ams@indiancanyon.org

Costanoan

Muwekma Ohlone Indian Tribe of the SF Bay Area
Monica Arellano,
20885 Redwood Road, Suite 232
Castro Valley, CA, 94546
Phone: (408) 205 - 9714
marellano@muwekma.org

Costanoan

North Valley Yokuts Tribe
Katherine Erolinda Perez, Chairperson
P.O. Box 717
Linden, CA, 95236
Phone: (209) 887 - 3415
canutes@verizon.net

Costanoan
Northern Valley
Yokut

The Ohlone Indian Tribe
Andrew Galvan,
P.O. Box 3388
Fremont, CA, 94539
Phone: (510) 882 - 0527
Fax: (510) 687-9393
chochenyo@AOL.com

Bay Miwok
Ohlone
Patwin
Plains Miwok

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Valley Water Palo Alto Tide Gate Replacement Project, Santa Clara County.

Pacific Legacy Historic Preservation
Bay Area Division
900 Modoc Street
Berkeley, CA 94707

Phone: 510.524.3991
Fax: 510.524.4419
www.pacificlegacy.com

August 8, 2019

Valentin Lopez, Chairperson
Amah Mutsun Tribal Band
PO Box 5272
Galt, CA 95632

Re: Valley Water Palo Alto Tide Gate Replacement Project (PL-3039-01, Task 9)

Dear Mr. Lopez:

We have been retained on behalf of Valley Water to conduct an archaeological investigation for the Valley Water Palo Alto Tide Gate Replacement Project. The Project will involve construction of a new 235-foot wide tide gate adjacent to an existing 113-foot wide deteriorating tide gate, and construction of a new levee in place of the existing tide gate. The Adobe Creek Loop Trail would be diverted from along the top of the levee for the duration of construction, and construction of the new tide gate would be phased to continuously maintain operation of either the existing or new gate. Imported fill will be used for the new levee segment, and the levee slope will be revegetated. The Project area will total approximately 2.8 acres and include the area of construction for the tide gate and levee as well as two staging areas. The Project is located near the northern reach of the Mayfield Slough within the Palo Alto Flood Basin, in the City of Palo Alto, Santa Clara County, on unsectioned land in the Rincon de San Francisquito Civil Colonies Land Grant. The attached map provides the project location on the Mountain View, CA 7.5' USGS Quadrangle.

The Sacred Lands Inventory on file with the Native American Heritage Commission (NAHC) has been reviewed. This review failed to indicate the presence of cultural resources in the immediate project area. The NAHC provided us with your name as a contact to identify any locations of concern to local Native American Groups within the project area. If appropriate, please provide us with any information you may have regarding locations of concern in the project area. This information will be used for project planning and will be kept confidential. If you do not feel it is appropriate to divulge the type of resource, it can be noted as "environmentally sensitive area".

You may respond by mail, email, phone, or visit our office in Berkeley to inspect our research files. We anticipate receiving your reply within 30 days. At present, there is no fixed date for start of work. If you have any questions, please contact me, at (510) 524-3991 ext. 109. Thank you for your kind attention to this matter.

Sincerely,

S. Streich

Shanna Streich
Staff Archaeologist
Pacific Legacy, Inc.
900 Modoc Street
Berkeley, CA 94707
510.524.3991 ext. 109
streich@pacificlegacy.com
Attachments: Figure 1. Project Vicinity Map

Pacific Legacy Historic Preservation
Bay Area Division
900 Modoc Street
Berkeley, CA 94707

Phone: 510.524.3991
Fax: 510.524.4419
www.pacificlegacy.com

August 8, 2019

Irenne Zwierlein, Chairperson
Amaha Mutsun Tribal Band of Mission San Juan Bautista
789 Canada Road
Woodside, CA 94062

Re: Valley Water Palo Alto Tide Gate Replacement Project (PL-3039-01, Task 9)

Dear Ms. Zwierlein:

We have been retained on behalf of Valley Water to conduct an archaeological investigation for the Valley Water Palo Alto Tide Gate Replacement Project. The Project will involve construction of a new 235-foot wide tide gate adjacent to an existing 113-foot wide deteriorating tide gate, and construction of a new levee in place of the existing tide gate. The Adobe Creek Loop Trail would be diverted from along the top of the levee for the duration of construction, and construction of the new tide gate would be phased to continuously maintain operation of either the existing or new gate. Imported fill will be used for the new levee segment, and the levee slope will be revegetated. The Project area will total approximately 2.8 acres and include the area of construction for the tide gate and levee as well as two staging areas. The Project is located near the northern reach of the Mayfield Slough within the Palo Alto Flood Basin, in the City of Palo Alto, Santa Clara County, on unsectioned land in the Rincon de San Francisquito Civil Colonies Land Grant. The attached map provides the project location on the Mountain View, CA 7.5' USGS Quadrangle.

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August 8, 2019

Ann Marie Sayers, Chairperson
Indian Canyon Mutsun Band of Costanoan
PO Box 28
Hollister, CA 95024

Re: Valley Water Palo Alto Tide Gate Replacement Project (PL-3039-01, Task 9)

Dear Ms. Sayers:

We have been retained on behalf of Valley Water to conduct an archaeological investigation for the Valley Water Palo Alto Tide Gate Replacement Project. The Project will involve construction of a new 235-foot wide tide gate adjacent to an existing 113-foot wide deteriorating tide gate, and construction of a new levee in place of the existing tide gate. The Adobe Creek Loop Trail would be diverted from along the top of the levee for the duration of construction, and construction of the new tide gate would be phased to continuously maintain operation of either the existing or new gate. Imported fill will be used for the new levee segment, and the levee slope will be revegetated. The Project area will total approximately 2.8 acres and include the area of construction for the tide gate and levee as well as two staging areas. The Project is located near the northern reach of the Mayfield Slough within the Palo Alto Flood Basin, in the City of Palo Alto, Santa Clara County, on unsectioned land in the Rincon de San Francisquito Civil Colonies Land Grant. The attached map provides the project location on the Mountain View, CA 7.5' USGS Quadrangle.

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August 8, 2019

Monica Arellano
Muwekma Ohlone Indian Tribe of the SF Bay Area
20885 Redwood Road, Suite 232
Castro Valley, CA 94546

Re: Valley Water Palo Alto Tide Gate Replacement Project (PL-3039-01, Task 9)

Dear Ms. Arellano:

We have been retained on behalf of Valley Water to conduct an archaeological investigation for the Valley Water Palo Alto Tide Gate Replacement Project. The Project will involve construction of a new 235-foot wide tide gate adjacent to an existing 113-foot wide deteriorating tide gate, and construction of a new levee in place of the existing tide gate. The Adobe Creek Loop Trail would be diverted from along the top of the levee for the duration of construction, and construction of the new tide gate would be phased to continuously maintain operation of either the existing or new gate. Imported fill will be used for the new levee segment, and the levee slope will be revegetated. The Project area will total approximately 2.8 acres and include the area of construction for the tide gate and levee as well as two staging areas. The Project is located near the northern reach of the Mayfield Slough within the Palo Alto Flood Basin, in the City of Palo Alto, Santa Clara County, on unsectioned land in the Rincon de San Francisquito Civil Colonies Land Grant. The attached map provides the project location on the Mountain View, CA 7.5' USGS Quadrangle.

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August 8, 2019

Katherine Erolinda Perez, Chairperson
North Valley Yokuts Tribe
PO Box 717
Linden, CA 95236

Re: Valley Water Palo Alto Tide Gate Replacement Project (PL-3039-01, Task 9)

Dear Ms. Perez:

We have been retained on behalf of Valley Water to conduct an archaeological investigation for the Valley Water Palo Alto Tide Gate Replacement Project. The Project will involve construction of a new 235-foot wide tide gate adjacent to an existing 113-foot wide deteriorating tide gate, and construction of a new levee in place of the existing tide gate. The Adobe Creek Loop Trail would be diverted from along the top of the levee for the duration of construction, and construction of the new tide gate would be phased to continuously maintain operation of either the existing or new gate. Imported fill will be used for the new levee segment, and the levee slope will be revegetated. The Project area will total approximately 2.8 acres and include the area of construction for the tide gate and levee as well as two staging areas. The Project is located near the northern reach of the Mayfield Slough within the Palo Alto Flood Basin, in the City of Palo Alto, Santa Clara County, on unsectioned land in the Rincon de San Francisquito Civil Colonies Land Grant. The attached map provides the project location on the Mountain View, CA 7.5' USGS Quadrangle.

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August 8, 2019

Andrew Galvan
The Ohlone Indian Tribe
PO Box 3388
Fremont, CA 94539

Re: Valley Water Palo Alto Tide Gate Replacement Project (PL-3039-01, Task 9)

Dear Mr. Galvan:

We have been retained on behalf of Valley Water to conduct an archaeological investigation for the Valley Water Palo Alto Tide Gate Replacement Project. The Project will involve construction of a new 235-foot wide tide gate adjacent to an existing 113-foot wide deteriorating tide gate, and construction of a new levee in place of the existing tide gate. The Adobe Creek Loop Trail would be diverted from along the top of the levee for the duration of construction, and construction of the new tide gate would be phased to continuously maintain operation of either the existing or new gate. Imported fill will be used for the new levee segment, and the levee slope will be revegetated. The Project area will total approximately 2.8 acres and include the area of construction for the tide gate and levee as well as two staging areas. The Project is located near the northern reach of the Mayfield Slough within the Palo Alto Flood Basin, in the City of Palo Alto, Santa Clara County, on unsectioned land in the Rincon de San Francisquito Civil Colonies Land Grant. The attached map provides the project location on the Mountain View, CA 7.5' USGS Quadrangle.

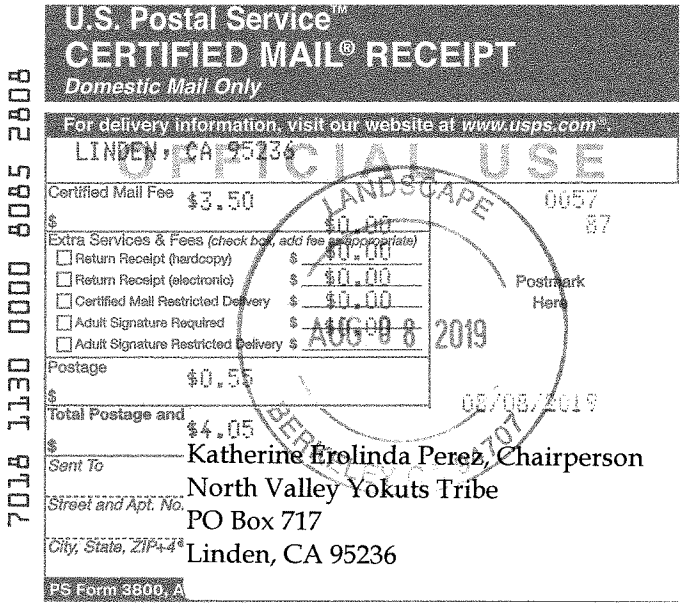
The Sacred Lands Inventory on file with the Native American Heritage Commission (NAHC) has been reviewed. This review failed to indicate the presence of cultural resources in the immediate project area. The NAHC provided us with your name as a contact to identify any locations of concern to local Native American Groups within the project area. If appropriate, please provide us with any information you may have regarding locations of concern in the project area. This information will be used for project planning and will be kept confidential. If you do not feel it is appropriate to divulge the type of resource, it can be noted as "environmentally sensitive area".

You may respond by mail, email, phone, or visit our office in Berkeley to inspect our research files. We anticipate receiving your reply within 30 days. At present, there is no fixed date for start of work. If you have any questions, please contact me, at (510) 524-3991 ext. 109. Thank you for your kind attention to this matter.

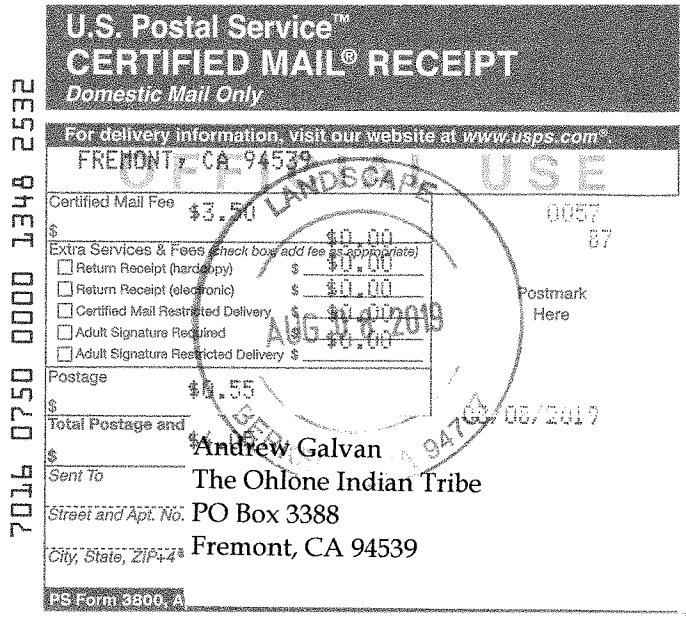
Sincerely,

S. Streich

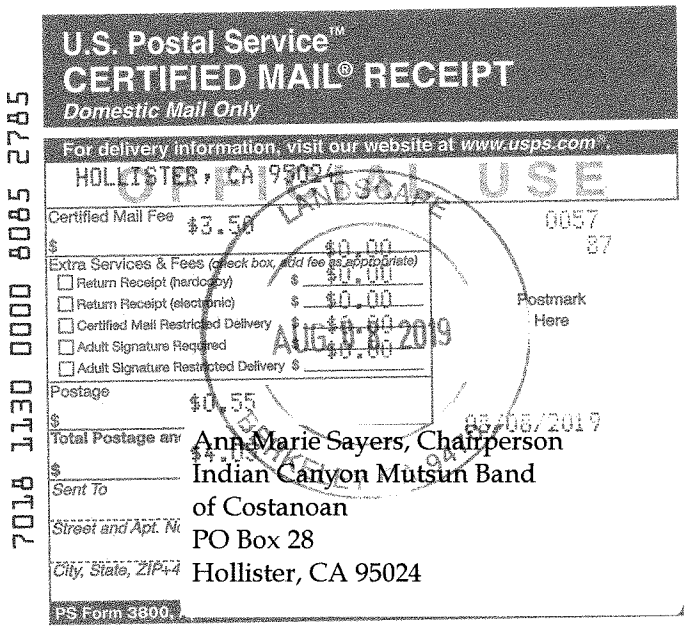
Shanna Streich
Staff Archaeologist
Pacific Legacy, Inc.
900 Modoc Street
Berkeley, CA 94707
510.524.3991 ext. 109
streich@pacificlegacy.com
Attachments: Figure 1. Project Vicinity Map



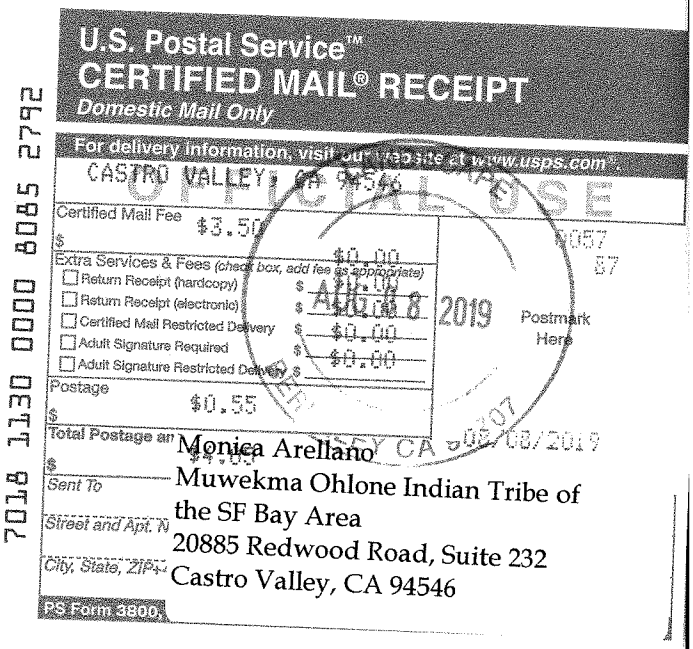
Katherine Erolinda Perez, Chairperson
North Valley Yokuts Tribe
PO Box 717
Linden, CA 95236



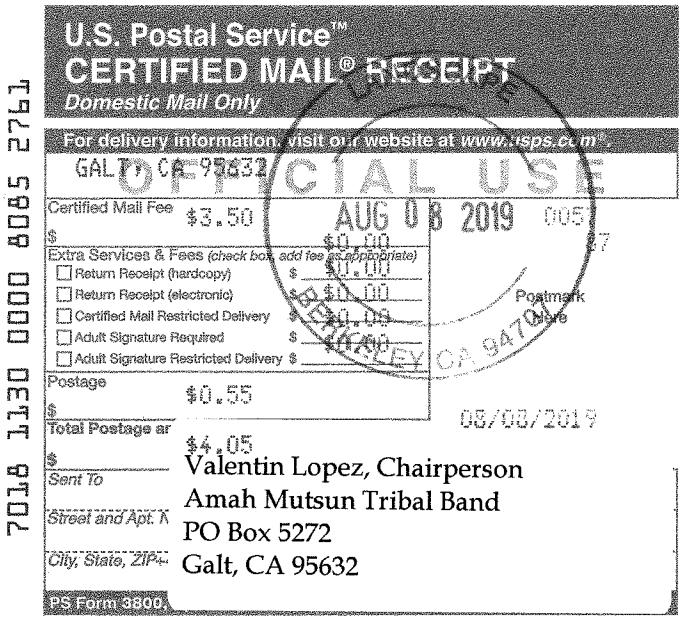
Andrew Galvan
The Ohlone Indian Tribe
PO Box 3388
Fremont, CA 94539



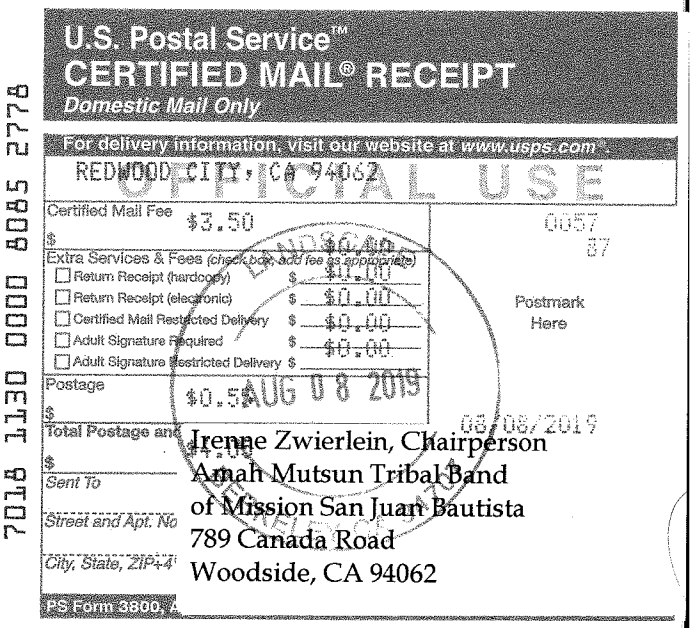
Ann Marie Sayers, Chairperson
Indian Canyon Mutsun Band
of Costanoan
PO Box 28
Hollister, CA 95024



Monica Arellano
Muwekma Ohlone Indian Tribe of
the SF Bay Area
20885 Redwood Road, Suite 232
Castro Valley, CA 94546



Valentin Lopez, Chairperson
Amah Mutsun Tribal Band
PO Box 5272
Galt, CA 95632



Irenne Zwierlein, Chairperson
Amah Mutsun Tribal Band
of Mission San Juan Bautista
789 Canada Road
Woodside, CA 94062

ATTACHMENT D: PALO ALTO FLOOD BASIN LEVEE AND TIDE GATE
DPR FORMS 523

Pacific Legacy Historic Preservation
Bay Area Division
900 Modoc Street
Berkeley, CA 94707
Phone: 510.524.3991
Fax: 510.524.4419
www.pacificlegacy.com

MEMO

August 21, 2019

Alexander Hunt
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

Re: Historic Period Built Environment Memo for the Palo Alto Tide Gate Replacement Project (3039-01, Task 9) Santa Clara County, California

Project Description
The Santa Clara Valley Water District (Valley Water) is proposing the Palo Alto Tide Gate Replacement Project in the City of Palo Alto in northern Santa Clara County along the San Francisco Bay shore. The levee and tide gate structure that retain the Palo Alto Flood Basin were constructed in 1956-1957 by the Santa Clara County Flood Control and Water District (now Valley Water) with support from the City of Palo Alto. Currently, floodwaters stored in the Palo Alto Flood Basin are released to the San Francisco Bay through an existing 113-foot long tide gate structure with 16 cells. In order to maintain flood protection and prevent flooding along the lower reaches of Matadero, Adobe, and Barron creeks, Valley Water identified the need to replace this structure with a new, larger capacity tide gate. Critical objectives of the Project include preventing failure of the existing tide gate structure; expanding the size of the tide gate so that it might function under conditions of future sea-level rise; maintaining or improving flood protection for Matadero, Adobe, and Barron creeks; and protecting sensitive habitat in the Palo Alto Flood Basin and immediate tide gate vicinity.

To achieve these objectives, the proposed Project would involve construction of a new up to 235-foot wide tide gate immediately southeast of the existing 113-foot-wide tide gate and the construction of a new levee segment in place of the existing tide gate. Dewatering would occur in two phases prior to construction. Steel sheet pile walls would be installed around the work area to exclude water from entering, and water would be pumped out of the enclosed area to provide a dry working area. The new tide gate would be similar to the existing tide gate and would consist of concrete bays housing iron flap gates. The new tide gate would increase the conveyance capacity between the Palo Alto Flood Basin and the Bay and would accommodate future sea-level rise.

The first phase of construction would involve excavating the existing levee where the new tide gate would be installed. A concrete pile system, slab, and cut-off wall would be installed to support the new tide gate. The original tide gate would be removed to allow construction of a levee in its place. The foundation of the new levee would be constructed by importing engineered fill material, which would then be compacted. The levee embankment would be sloped using a 2:1 or 3:1 ratio, and the top of the levee would be approximately 18 feet in width. After the levee is constructed to the specified grade and the dewatering system is removed, the

levee slope would be revegetated. Due to biological constraints, work would be restricted to September 1 through January 30 and would begin in 2020, ending in 2023 or 2024.

Summary of Findings

The only built environment resource in the Project Area of Potential Effects (APE) is the existing Palo Alto Flood Basin Levee and Tide Gate. This study concludes that the Palo Alto Flood Basin Levee and Tide Gate does not meet the criteria for listing in the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR) and is not a historic property under Section 106 of the National Historic Preservation Act (NHPA) or a historic resources for the purposes of California Environmental Quality Act (CEQA). This conclusion is in accordance with Section 106 of the NHPA (as amended) (54 USC 306108) and its implementing regulations (36 CFR Part 800) as well as Section 15064.5(a)(2)-(3) of the CEQA Guidelines using criteria outlined in Section 5024.1 of the California Public Resources Code. Please refer to the attached California Department of Parks and Recreation (DPR) 523 Form for a full NRHP/CRHR eligibility analysis, historic context, and description of the resource.

Fieldwork and Research Methodology

Pacific Legacy Senior Archaeologist Lisa Holm, PhD, conducted a cultural resources inventory survey of the Project on August 1, 2019. She photo-documented the Palo Alto Levee and Tide Gate and its appurtenant features and took notes on its design, characteristics, materials, condition, and apparent alterations. General observations were made on the immediate surroundings and setting of the resource. Pacific Legacy conducted research for this project to develop a history of the resource area and a historic context for the levee and tide gate. Materials collected through an archival and records search at the Northwest Information Center of the California Historical Resources Information System were examined, and additional sources in the form of key environmental studies, compliance documents, and historic period maps and aerial photographs were consulted via the internet and through Pacific Legacy's in-house library. Pacific Legacy Principal and Architectural Historian Scott Baxter, MA, provided key insights and oversaw the historic period built environment evaluation.

Preparer's Qualifications

This study was conducted under the general direction of Scott Baxter, MA, a Principal Investigator at Pacific Legacy with more than 20 years of experience conducting these types of studies. Mr. Baxter provided overall Project direction and guidance and reviewed and edited this technical memo and the attached DPR 523 Forms. Based on his level of experience and education, Mr. Baxter meets and exceeds the Secretary of the Interior's Professional Qualification Standards under History and Architectural History (as defined in 36 CFR Part 61). Ms. Holm authored the accompanying cultural resources assessment for the Project, conducted research, and carried out a pedestrian field inventory of the APE. She has over 26 years of experience in archaeology and 13 years of experience in California cultural resources management. She exceeds the Secretary of the Interior's Professional Qualification Standards in Archaeology (as defined in 36 CFR Part 61).

State of California - The Resources Agency	Primary #
DEPARTMENT OF PARKS AND RECREATION	HRI #
PRIMARY RECORD	Trinomial
	NRHP Status Code
Other Listings	
Review Code	Reviewer Date

 ***Resource Name or #:** Palo Alto Flood Basin Levee and Tide Gate

P1. Other Identifier:

***P2. Location:** ☑ **Not for Publication** ☐ **Unrestricted** ***a. County:** Santa Clara

and

***b. USGS 7.5' Quad:** Mountain View **Date:** 1997 **T** 5 South; **R** 2 West; Unsectioned**;** Mount Diablo Base & Meridian

c. Address: NA **City:** Palo Alto **Zip:** NA

d. UTM: 578904 mE, 4145310 mN (western end of levee); 579639 mE, 4143365 mN (eastern end of levee) NAD83 Z10

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate) **Elevation:** 10 feet amsl

From northbound Highway 101, take exit 402 for Embarcadero Road, merging right onto Embarcadero Road. Drive 0.7 miles and turn right (away from the Palo Alto Airport) to stay on Embarcadero Road. Drive 0.23 miles to arrive at the Byxbee Park parking lot. From the Byxbee Park parking lot, proceed north-northeast for 0.45 miles to arrive at the levee tide gate structure.

***P3a. Description:**

The resource comprises the Palo Alto Flood Basin Levee and Tide Gate, which was built in 1956-1957 in response to local flood events by the Santa Clara County Flood Control and Water District (now the Santa Clara Valley Water District or Valley Water) with support from the City of Palo Alto. At the time of the field visit, the freeboard or exposed levee embankment measured approximately 100 feet in width on average but varied from a minimum width of ~90 feet to a maximum width of ~395 feet where it incorporated a large turnaround for vehicle access. The crown of the levee consists of a 12-foot wide unpaved, graded access route that serves as part of the 5.5-mile long Adobe Creek Loop Trail. The levee itself is constructed from compacted bay mud at a 2:1 to 3:1 slope. The levee segment west of the tide gate borders the western edge of Matadero Creek and the Mayfield Slough. It measures roughly 1,172 ft. in length. The levee segment east of the tide gate divides Adobe Creek to the west and Charleston Slough to the east. It measures roughly 11,695 ft. in length. The levee segments and tide gate bound the Palo Alto Flood Basin, a 618-acre muted salt marsh that accumulates flows from Adobe, Matadero, and Baron creeks and includes the Mayfield Slough. The water level in the flood control basin is typically -2.2 to -2.0 feet below mean sea level. Tidal inflows and freshwater outflows in the Palo Alto Flood Basin are controlled by the existing tide gate, which regulates conditions and water levels in the basin. The tide gate is located at the end of Mayfield Slough and includes a two-way gate that allows bay water to enter the Palo Alto Flood Control Basin under managed conditions (AECOM 2017) (*see* Continuation Sheet, P3a).

***P3b. Resource Attributes:** HP39 (Other): Levee and tide gate structure

***P4. Resources Present:** ☐Building ☑Structure ☐Object ☐Site ☐District ☐Element of District ☐Other (Isolates)

P5b. Description of Photo: (August 1, 2019, IMG-2493) A view of the historic period levee and tidal gate looking north-northeast with the Adobe Creek Trail in the left foreground.

***P6. Date Constructed/Age and Sources:** ☑ Historic ☐ Prehistoric ☐ Both

***P7. Owner and Address:**
Santa Clara Valley Water District (Valley Water)
5750 Almaden Expressway
San Jose, CA 95118

***P8. Recorded by:**
Pacific Legacy, Inc.
900 Modoc Street
Berkeley, CA 94707

***P9. Date Recorded:**
August 1, 2019

***P10. Survey Type:**
Pedestrian survey

***P11. Report Citation:** Holm, Lisa (2019) Cultural Resources Investigation for the Palo Alto Tide Gate Replacement Project (3039-01, Task 9) Santa Clara County, California. On file at Valley Water, San Jose, CA.

***Attachments:** ☐NONE ☑Location Map ☐Sketch Map ☑Continuation Sheet ☑Building, Structure, and Object Record ☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record ☐Artifact Record ☐Photograph Record ☐Other (List):

BUILDING, STRUCTURE, AND OBJECT RECORD

***NRHP Status Code** 6Z

***Resource Name or #** (Assigned by recorder) Palo Alto Flood Basin Levee and Tide Gate

B1. Historic Name:
B2. Common Name:
B3. Original Use: Flood protection
B4. Present Use: Flood protection

***B5. Architectural Style:** Earthen levee

***B6. Construction History:** (Construction date, alterations, and date of alterations)

The Palo Alto Flood Basin Levee and Tide Gate were built in 1956-1957 by what was then the Santa Clara County Flood Control and Water District (now Santa Clara Valley Water District or Valley Water) with support from the City of Palo Alto. Spurred by flood events in 1955 that caused extensive damage in the City of Palo Alto, existing levees were raised in 1956. The installation of the tide gate the following year marked the creation of the Palo Alto Flood Basin as it exists today. In 1967, the City of Palo Alto granted Valley Water an easement to the Palo Alto Flood Basin, which gave Valley Water the right to oversee maintenance of the basin and its associated flood protection structures, particularly the levee and tide gate. Although the original 1957 tide gate is still in place, it has undergone multiple repairs and modifications in addition to routine maintenance. Most notably, the tide gate was modified in 1977 to allow for a two-way flow of water in and out of the flood basin. Before this modification, water could only flow out of the basin. Further improvements were made to the tide gate in 1993 and 2002 to maintain the marsh environment, and emergency repairs were made in 2012 when it was discovered water was flowing beneath the tide gate structure. Further repairs were undertaken in 2017.

***B7. Moved?** ☑No ☐Yes ☐Unknown **Date:** **Original Location:**

***B8. Related Features:** The levee and tide gate retain the Palo Alto Flood Basin, a 618-acre flood basin that collects flows from Adobe, Matadero, and Baron creeks and includes the Mayfield Slough. The water level in the flood basin is typically between -2.2 and -2.0 feet. The flood basin is a muted tidal wetland habitat. Historically, the flood basin was salt marsh, but the levee and tide gate have reduced saltwater flow into the basin. Today, the flood basin provides flood protection and habitat while allowing public access along the Adobe Creek Loop Trail.

B9a. Architect: n/a
b. Builder: Santa Clara County Flood Control and Water District

***B10. Significance Theme:** Flood control/flood protection **Area:** Santa Clara County
Period of Significance: n/a **Property Type:** Levee and tide gate **Applicable Criteria:** n/a
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

The Palo Alto Flood Basin Levee and Tide Gate, inclusive of its appurtenant features, does not meet the criteria for listing in the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR). It is not a historic property under Section 106 of the National Historic Preservation Act (NHPA), nor is it an historical resource for the purposes of the California Environmental Quality Act (CEQA). This structure has been evaluated in accordance with Section 106 of the NHPA of 1966 (as amended) (54 USC 306108) and its implementing regulations (36 CFR Part 800) and Section 15064.5(a)(2)-(3) of the CEQA Guidelines using criteria outlined in Section 5024.1 of the California Public Resources Code (*see* B10. on Continuation Sheet).

B11. Additional Resource Attributes: (List attributes and codes) None

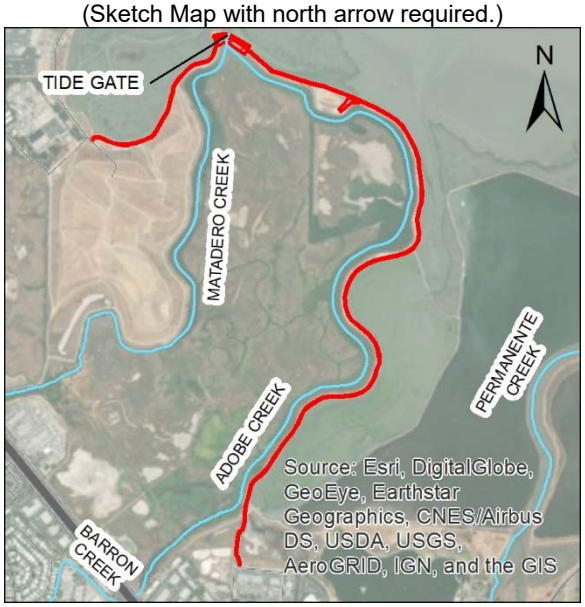
***B12. References:**
(*see* Continuation Sheet B12)

B13. Remarks: None

***B14. Evaluator:** Scott Baxter and Lisa Holm (Pacific Legacy, Inc.)

***Date of Evaluation:** August 15, 2019

(Sketch Map with north arrow required.)



(This space reserved for official comments.)

*Recorded by: Pacific Legacy, Inc. *Date: August 1, 2019 ☑ Continuation ☐ Update

***P3a. Description** (**continued)**
The Palo Alto Flood Control Basin, which is formed and protected and by the levee segments and tide gate, consists of muted salt marsh that has been cut off from full tidal influence but maintains wetland features. Vegetation communities in muted salt marsh are similar to those in salt marshes. Typically, however, fewer native plant species are present, and non-native plant species form a larger component. The Palo Alto Flood Control Basin is dominated by common reeds (*Phragmites australis*), arundo (*Arundo donax*), and tall wheatgrass (*Thinopyrum ponticum*) along with other plant species such as pickleweed, bulrush species, and cattails (*Typha* spp.). Muted salt marsh is found not only in the Palo Alto Flood Control Basin but also throughout the Mayfield Slough and in the nearby Emily Renzel Wetlands and at the site of the former Los Altos Treatment Plant. Tidal action and freshwater outflows in the Palo Alto Flood Control Basin are controlled by the existing tide gate, and the northern area of the basin closest to the tide gate experiences more saline conditions than the southern area. The southern portion of the basin is mostly dry, with marsh panne formations present throughout the area, indicating seasonal ponding (AECOM 2017). A large open area in the northeastern corner of the basin is relatively free of vegetation and supports roosting seabirds. The southern and eastern portions of the basin are dominated by invasive common reeds and creeping wildrye, with pickleweed, alkali heath, and non-native grasses and herbaceous species common throughout the basin (AECOM 2017:12).

The Palo Alto Flood Basin Levee and Tide Gate lie within a broader Bayshore landscape that is made up of levees, sloughs, salt ponds, tide gates, pumps, pipes, and culverts as well as reclaimed lands and restored habitat zones. Freshwater from Adobe, Barron, and Matadero creeks flows into the Palo Alto Flood Basin, and muted tidal flow connects the basin to the Bay through the tide gate. Fresh water from San Francisquito Creek to the north flows directly into the bay. Muted tidal flow connects the Emily Renzel Wetlands and the inner harbor through an underground pipe, and the saltwater then disperses throughout the wetlands to be discharged through a levee by pipe into Matadero Creek. Approximately 95 percent of the recycled wastewater from the Regional Water Quality Control Plant discharges to the bay through an underground pipe to a slough south of San Francisquito Creek. The remainder of the treated wastewater flows through underground pipe to the Emily Renzel Freshwater Pond where it is discharged into Matadero Creek. The Duck Pond, built in 1930 as a saltwater swimming pool and converted into a duck pond in 1947, also receives recycled freshwater from the Regional Water Quality Control Plant (AECOM 2017:16).

B10. Significance (continued):

Historic Context
Archaeological evidence indicates that Native Americans have lived in the San Francisco Bay Area for at least 10,000 years (Jones 1991; Moratto 1984). Native Americans living in the San Francisco Bay Area at the time of European contact were referred to by 18th century Spanish explorers as “Costaño” or “coast people,” and were recognized as speaking seven closely related languages that became known as the Costanoan language group (Shipley 1978). The term “Costanoan” is misleading, however, as it subsumes as many as forty or fifty politically independent groups, some of which spoke mutually unintelligible but genetically related languages. Many present-day Native descendants prefer the term Ohlone, a derivation of the name of a coastal village in San Mateo County (Levy 1978). The Ohlone were hunter-gatherers who occupied semi-permanent camps and villages from which they could take advantage of seasonal changes in resource availability. Dwellings at these habitation sites were dome-shaped with pole frameworks and thatched roofs and walls. Other Ohlone village structures included acorn granaries; male sweat houses, often located along stream banks; female houses; and dance or assembly houses, generally located in the center of the village (Levy 1978). From these semi-permanent camps and villages, the Ohlone visited the mountains, valleys, and sloughs to collect resources. They subsisted on the seasonal gathering of acorns, grass seeds, kelp, and shellfish; hunting of terrestrial and marine mammals; and fishing in freshwater streams and inshore marine habitats and tidal marshes. Archaeological and ethnographic evidence has indicated that trade and exchange of items such as *Olivella* shells, mussels, abalone shells, salt, dried abalone, and woven baskets with Native groups from the interior was a key part of their economy. The establishment of missions and the introduction of European diseases by settlers resulted in a dramatic decline in the Ohlone population in the 18th and 19th centuries.

Captain Gaspar de Portolá and his party made initial contact with the Ohlone of the San Francisco Bay region in 1769 while seeking the Monterey Bay (Hoover et al. 1990). Further coastal and land expeditions followed as the Spanish extended their reach into Alta California by establishing a network of religious missions, military *presidios*, and secular *ranchos* between the present-day cities of San Diego and Sonoma. *El Presidio Real de San Francisco* (the Presidio of San Francisco) and *Mission San Francisco de Asís* (Mission Dolores) were founded in 1776 to the north of the Project area while *Mission Santa Clara de Asís* was established to the south in 1777. Spanish control of Alta California ended with Mexico’s independence in 1821. In 1834, the Mexican government secularized the missions, freeing the Native Americans that had been brought into the mission system. Land holdings were typically given to Mexican settlers, however, and seldom reverted to Native ownership.

In 1841, a portion of the current Project area was granted by Governor Juan Bautista Alvarado to José Peña, an artilleryman at the Presidio of San Francisco. In 1822, Peña had received permission from *Mission Santa Clara de Asís* to occupy a portion of its pasture lands. He built a wooden house on those lands in 1824 and his son, Narciso Antonia Peña, who later became a local justice of the peace, built a small adobe near the mission horse corral. In 1841, José Peña applied for and was granted

the *Rancho Rincón de San Francisquito,* which spanned two leagues between the San Francisquito and San Antonio (Adobe) creeks and included the mission lands he had initially occupied. In 1847, Peña sold all but a small portion of his lands to Secondino Robles and his brother Teodoro. Following José Peña's death in 1852, his widow Gertrudies Lorenzana inherited her husband's remaining portion of the *rancho*.

Secondino Robles was born in Santa Cruz and served as the majordomo at *Mission Santa Clara de Asís*. He and his brother Teodoro discovered cinnabar deposits south of what is now the City of San Jose in 1835. These deposits proved to be rich in quicksilver, which the brothers leveraged for a cash payment of $13,000 as well as an interest in the New Almaden Quicksilver Mine. In 1847, Secondino and Teodoro traded their interest in the mine for Peña's *rancho* and the buildings upon it. In 1848, the Treaty of Guadalupe Hidalgo brought Alta California under the control of the US government. News of the Gold Rush that same year sparked a massive and rapid influx of American settlers into California. Due to this influx, legal determination of ownership of lands awarded by Spanish or Mexican authorities was often disputed in California. The US government passed the Land Act of 1851, which placed the burden of proof-of-ownership on land grantees. The few Native Americans who had received grants lost their titles, as did many Hispanic landowners. By congressional action, grant claims were heard by a board of Land Commissioners and then appealed in Federal Courts. By 1885, nearly all of the claims had been decided.

As required by the Land Act, a claim for *Rancho Rincon de San Francisquito* was filed with the Public Land Commission in 1852, and the grant was patented to Secondino Robles and his brother Teodoro in 1868. By the mid-1850s, however, Secondino Robles had already begun to sell off portions of his property to pay his debts, reducing his holdings by half over the next 20 years (Hoover et al. 1990). In 1853, the area encompassing present day Barron Park, Matadero Creek, and the Stanford Business Park were sold to Elisha Crosby, who established the Mayfield Farm. This farm gave its name to the nearby community of Mayfield and to the Mayfield Slough. In 1859, Jeremiah Clarke of San Francisco bought a portion of the *rancho* from María Robels, who acquired the land through her former husband Teodoro. Clarke was a prominent local landowner with holdings that extended to the Mayfield Slough. Peter Coutts subsequently bought 1,162 acres from Jeremiah Clarke and sold the land in 1882 to Leland Stanford. Secondino Robles died in 1890, and the adobe the family once inhabited lay unoccupied by the end of the 19th century until it finally collapsed in the 1906 earthquake (Hoover et al. 1990:406).

Palo Alto, which subsumes most of the former *Rancho Rincon de San Francisquito,* is in the northwest corner of Santa Clara County. It was established by Leland Stanford, the founder of Stanford University, and shares a border with East Palo Alto, Mountain View, Los Altos, and Menlo Park. The township of Mayfield formed in 1855 around a stagecoach stop near what is today the intersection of El Camino Real and California Avenue in southern Palo Alto. Peter Coutts' property, noted above, was dubbed Ayrshire Farm and incorporated land in Mayfield. The southern portion of his property was near Matadero Creek. Leland Stanford, also noted above, began acquiring property in 1876 and purchased Coutts' Ayrshire Farm in 1882. Stanford and his wide established Stanford University in 1891. The community of "University Park," bounded by El Camino Real, San Francisquito Creek, Boyce, Channing, Melville and Hopkins avenues, and Embarcadero Road, sprang up to support the university and was incorporated in 1894 as Palo Alto. Palo Alto quickly expanded, and eventually Mayfield was annexed as a part of the City in 1925.

The Bayshore played an important role in the development of Palo Alto and the communities surrounding it. Historically, most of the Bayshore consisted of tidal salt marsh. Spanish missionaries used salt to cure meat and fish, which they sold to outgoing ships. By using the shallow marsh along the bay front, the missionaries were able to recover amounts in surplus to their needs, eventually producing enough to export minor quantities to Europe. Early Spanish harvesting methods did not involve landscape modification and left no traces discernible today. The first levees constructed to create artificial salt ponds in the San Francisco Bay region were established in 1853 by John Johnson. He enclosed a 14-acre tract with levees from which he was able to harvest roughly 25 tons of salt, which was then shipped to San Francisco to support the needs of its burgeoning population (EDAW and USFWS 2009). Solar salt extraction, the method used by Johnson and subsequent salt industry producers, is based on a simple process. Under this method, ponds are created using earthen dike divisions and water control gates along the open bay or slough. Seawater is directed into the first series of ponds where the water begins to evaporate. When the water reaches a certain salinity level, the brine is moved to condensing ponds and to crystallizing ponds where the salt precipitates out of solution to form crystals. The end product, or layer of salt crystals, is then harvested (EDAW and USFWS 2009:4).

The solar salt industry required hundreds of acres of tidal marshlands, which were typically unattractive or untenable as farmland without significant reclamation efforts. To encourage use of these lands, the Green Act of 1869 removed all acreage limitations for swampland purchases, allowing individuals to acquire extensive tracts along the Bayshore. Following the Green Act, roughly 17,000 acres of marshlands in the East Bay and 10,000 acres in the South Bay were filled, diked, and channelized (EDAW and USFWS 2009:3). The rise of silver mining, which involved the use of salt in processing ore, and the rise in population of San Francisco, helped to fuel the demand for salt and the growth of the solar salt industry. By the 1890s, the Dumbarton Land & Improvement Company had acquired 19,000 acres in Santa Clara and Alameda counties encompassing approximately 17 miles of shoreline. Beginning ca. 1892, the C.E. Whitney Company began working on Dumbarton Land & Improvement Company-owned lands. In 1904, after C.E. Whitney died, the name was changed to Leslie

*Recorded by: Pacific Legacy, Inc. *Date: August 1, 2019 ☑ Continuation ☐ Update

Salt Refining Company, which was run by several of Whitney's sons. A.L. Whitney and two other major salt producers, Schilling and the Stauffer Chemical Company, joined in 1907 to form the Leslie Salt Company, which consolidated Leslie and Stauffer salt holdings. Further consolidation was driven by larger companies seeking to buy out smaller, often family-run enterprises, and by 1924 only a handful of salt operators remained.

The Alviso area was owned by the Dumbarton Land & Improvement Company but beginning in 1919 was developed by Schilling under the Arden Salt Company. Schilling's operation expanded rapidly, and in 1929 he acquired the Alviso Salt Company. The Alviso Salt Works relied on extensive evaporation ponds, levee systems, and water control devices. It was developed exclusively for brine production with no crystallizing ponds or processing plants. In 1936, Schilling's company merged with Leslie-California Salt to form the Leslie Salt Company. Although not recognizable as such today, the Palo Alto Flood Basin was a part of the Leslie Salt Company's holdings. In 1941, Palo Alto signed a purchase-option agreement with the Leslie Salt Company for the area that now encompasses the flood basin. That agreement was made final in 1950, bringing it under City ownership (City of Palo Alto 2008). The Leslie Salt Company continued to sell parcels of land along the Bayshore to be used for urban development in the late 1950s and early 1960s. Public pressure to preserve the natural character of the bay influenced Leslie Salt to sell 20,000 acres to the US Fish and Wildlife Service in 1972 for the creation of the Don Edwards San Francisco Bay National Wildlife Refuge. Although the Leslie Salt Company retained the rights to continue producing salt from ponds within the refuge, the company exited the salt business in 1978, selling their interests to Cargill Incorporated (EDAW and USFWS 2009:5). Cargill continued production for the next two decades until 2003 when the company transferred about 14,000 acres to the US Fish and Wildlife Service and nearly 1,000 acres to the State of California for ecological restoration. Much of the Alviso Salt Works has slowly been restored to include salt marsh habitat as part of the South Bay Salt Pond Restoration Project. Breaches in the levees are allowing tidal flows to remake many of the salt ponds into irregular shapes. Several ponds are being left intact as habitat for brine shrimp, and a few ponds are being modified for migratory birds with some levees maintained for pedestrian trails and public access.

History of the Palo Alto Flood Basin and Tide Gate

By the 1920s and 1930s, Palo Alto's expanding population had created pressure for the City to reclaim portions of the Bayshore for residential and municipal development. Around that time, possibly as a flood control measure, San Francisquito Creek was diverted from its original path into its current man-made channel, which flows northward into the bay (City of Palo Alto 2008:247). It is unclear whether this rerouting affected flood risk in the area, though it did create a significant amount of reclaimed land. By 1960, the City owned roughly 1,880 acres of marshland, much of it diked, filled, or developed. The potential consequences of reclamation, however, were already being felt by the mid-1950s. In 1955, severe flooding was caused when a high tide prevented the outflow of heavy runoff from Matadero, Adobe, and Barron creeks into the San Francisco Bay, causing them to inundate areas upstream. Significant rainfall and debris blockage also caused San Francisquito Creek to back up during the "Christmas Flood" of 1955. Flood waters overtopped the levees on the Palo Alto side of the creek and burst a 20-foot gap in one levee. Over 650 residences were flooded, resulting in significant property damage (Palo Alto History.org 2012). In the following year, attempts were made to reduce flood risks in Palo Alto. Levees along the new San Francisquito Creek channel were raised, levees built along the perimeter of the Bayshore were raised to protect the City from tidal flooding, and the Palo Alto Flood Basin was created by raising the levees around this low lying area and by cutting off tidal action from the sloughs that drained Matadero, Baron, and Adobe creeks (City of Palo Alto 2008:247-8). A one-way tidal gate was constructed in 1957 at the confluence of Adobe and Matadero creeks to isolate the basin from tidal inflow. The tide gate allowed water to pass out of the Palo Alto Flood Basin into the bay but prevented tidal waters from flowing into the basin during high tides. Water levels in the Palo Alto Flood Control Basin were thus kept artificially low to allow for increased runoff from the three creeks during storm events.

In 1967, the City of Palo Alto granted the Santa Clara County Flood Control and Water District (Valley Water) an easement that gave the water district the right to take the lead in maintaining the Palo Alto Flood Basin and its associated flood protection structures, particularly the levee and tide gate (City of Palo Alto 1967). Plans for the area involving a County shoreline park were proposed and ultimately abandoned, as the City was committed to maintaining the Palo Alto Flood Basin in as natural a state as possible, providing both flood control and wildlife habitat as well as reasonable public access (City of Palo Alto 2008:131). A 1976 City report that discussed restoring the original marshland habitat of the flood basin noted that the basin had been cut off from tidal flows since 1957. Therefore, in 1977, the original tide gate was modified to allow for the two-way flow of water between the flood basin and the bay. Further improvements beyond routine maintenance were made to the tide gate in 1993 and 2002. Today the Palo Alto Flood Basin is maintained to allow adequate space for flows from Matadero, Adobe, and Barron creeks; to facilitate vector management, which requires water levels to remain below a specified height; and to allow for habitat management, which requires a daily flush of tidal water to provide necessary nutrients and aquatic life (City of Palo Alto 2008:131).

Flood Control Structures in California

Flood control structures similar to the Palo Alto Flood Basin Levee and Tide Gate are common and relatively simple engineered structures that have been built in California since at least the 1850s and continue to be built today. Levees are typically low ridges or compacted earthen embankments built along the edges of streams or rivers to prevent flooding of

adjacent lands. These earthen embankments are most often built using a 2:1 or 3:1 slope and are designed to be sufficiently wide so that they will not collapse or be eroded through tidal activity or when rivers are running at unusually high levels. Many are faced with boulders, cobbles, or concrete, which provides further erosion protection. Grass or vegetation is often planted on the top of the levees' banks as a further anti-erosion measure. Artificial levees are typically needed to control the flow of streams and rivers within broad, flat floodplains but are also used to reclaim tidal wetlands and to protect flood-prone areas.

To control the flow of upland water into diked estuarine zones or river reaches and to prevent estuarine intrusion behind diked areas, flood boxes or tide boxes are used. Tide boxes can vary in complexity from single culverts running through a levee wall to more complex concrete structures that include two or more culverts, deflecting wing walls, and up and downstream pilings. Doors or lids are attached to the discharge ends of the culverts to control the flow of water. These doors are typically referred to as tide gates or flap gates. Tide gates close during incoming tides to prevent tidal waters from moving upland, and open during outgoing tides to allow upland waters to flow through the culvert(s) and into the estuary side of the dike (Charland 1998; Thomson and Associates 1999). Tide gates can be placed at the mouth of streams or small rivers where the estuary begins. In California, they are usually installed where tidal non-riverine channels that drain marshes, tributary streams, or field drainage ditches connect to sloughs. Like levees, tide gates are designed to regulate the flow of water and prevent flooding by allowing freshwater to flow into estuaries but preventing or regulating the upstream movement of estuarine waters.

Evaluation

Flood control structures such as levees and tide gates are common elements of the landscape in California, particularly in the San Francisco Bay region and in the Sacramento-San Joaquin Delta. They are among a class of infrastructural types, along with municipal water systems, electrical transmission lines, highways, etc., that provide critical support to the people and communities they serve. Their practical importance, however, does not necessarily render them historically significant under NRHP Criterion A or CRHR Criterion 1. Structures associated with a flood control system such as the Palo Alto Flood Basin Levee and Tide Gate are best evaluated for historical significance under this criterion based on their impact on the growth and development of the region, they served relative to similar, contemporaneous flood control systems within a wider geographic area. For example, a flood control system might be found significant under this criterion if it was the first example of its kind within an area or contributed to the area's development in a manner that exceeded that of other typical flood control systems. Under that threshold, the Palo Alto Flood Basin Levee and Tide Gate does not meet NRHP Criterion A or CRHR Criterion 1. The 1956-1957 levee and tide gate do not have important associations with historically significant events, trends, or patterns of development. The Palo Alto Flood Control Basin, which is regulated by the levee and tide gate, is not considered a part of the Alviso Salt Works Historic Landscape (P-43-002823), which was determined NRHP/CRHR-eligible under Criterion A/1 for its association with the initial period of salt production between 1920 and 1953 in the Alviso area of the southern San Francisco Bay (EDAW and USFWS 2009; Ungvarsky 2018). Although the Palo Alto Flood Basin Levee and Tide Gate serve an important flood control function and are key in maintaining the muted salt marsh habitat they circumscribe, they are utilitarian structures that do not have important associations with historically significant events, trends, or patterns of development.

The Palo Alto Flood Basin Levee and Tide Gate are not significant for an association with the lives of persons important to history (NRHP Criterion B or CRHR Criterion 2). Research did not reveal that any individual associated with this property has made demonstrably important contributions to history at the local, state, or national level.

Under NRHP Criterion C or CRHR Criterion 3, the Palo Alto Flood Basin Levee and Tide Gate, inclusive of its appurtenant elements, does not possess distinctive characteristics of a type, period, or method of construction, nor is it an important work of a master engineer. The Palo Alto Flood Basin Levee and Tide Gate consists of a compressed earthen levee with a 16-cell, two-way tide gate. Levees and tide gates are common flood control features found throughout California, with numerous examples in Santa Clara County. The Palo Alto Flood Basin Levee and Tide Gate are modest in size and scale relative to others in the region and are far from the earliest in California or Santa Clara County. Designing, engineering, and constructing the levee and tide gate did not require any engineering innovations or overcome any unusual engineering or construction obstacles, but followed standard engineering and design conventions. Overall, these features are typical in design, technology, method of construction, and materials for the period. Additionally, the levee and tide gate are not the important works of a master engineer. The Palo Alto Flood Basin Levee and Tide Gate do not possess distinctive characteristics of a type, period, or method of construction, nor are they works of a master engineer. The structures are designed to be utilitarian and do not possess high artistic values. The Palo Alto Flood Basin Levee and Tide Gate do not meet NRHP Criterion C or CRHR Criterion 3.

Under NRHP criterion D / CRHR Criterion 4, the Palo Alto Flood Basin Levee and Tide Gate are not a significant or likely source of important information about historic period construction materials or technologies that otherwise would not be available through documentary evidence. Repairs and modifications have somewhat diminished the structures' historic integrity of materials, workmanship, and design. Specifically, the tide gate was modified in 1977 to allow for the two-way flow of water into and out of the flood basin; formerly water could only pass out of the basin into the bay. Improvements also were made to the tide gate in 1993 and 2002, and emergency repairs were undertaken in 2012 when it was discovered that water

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was flowing beneath the structure. In summary, the Palo Alto Flood Basin and Tide Gate is recommended not eligible for listing in the NRHP and the CRHR under any criteria.

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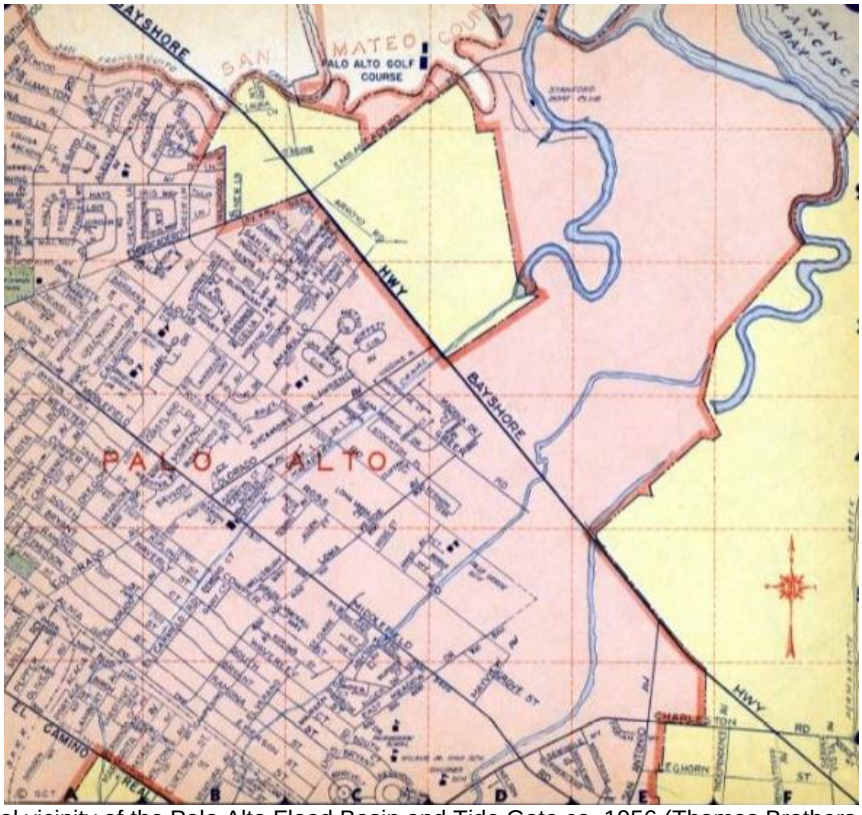
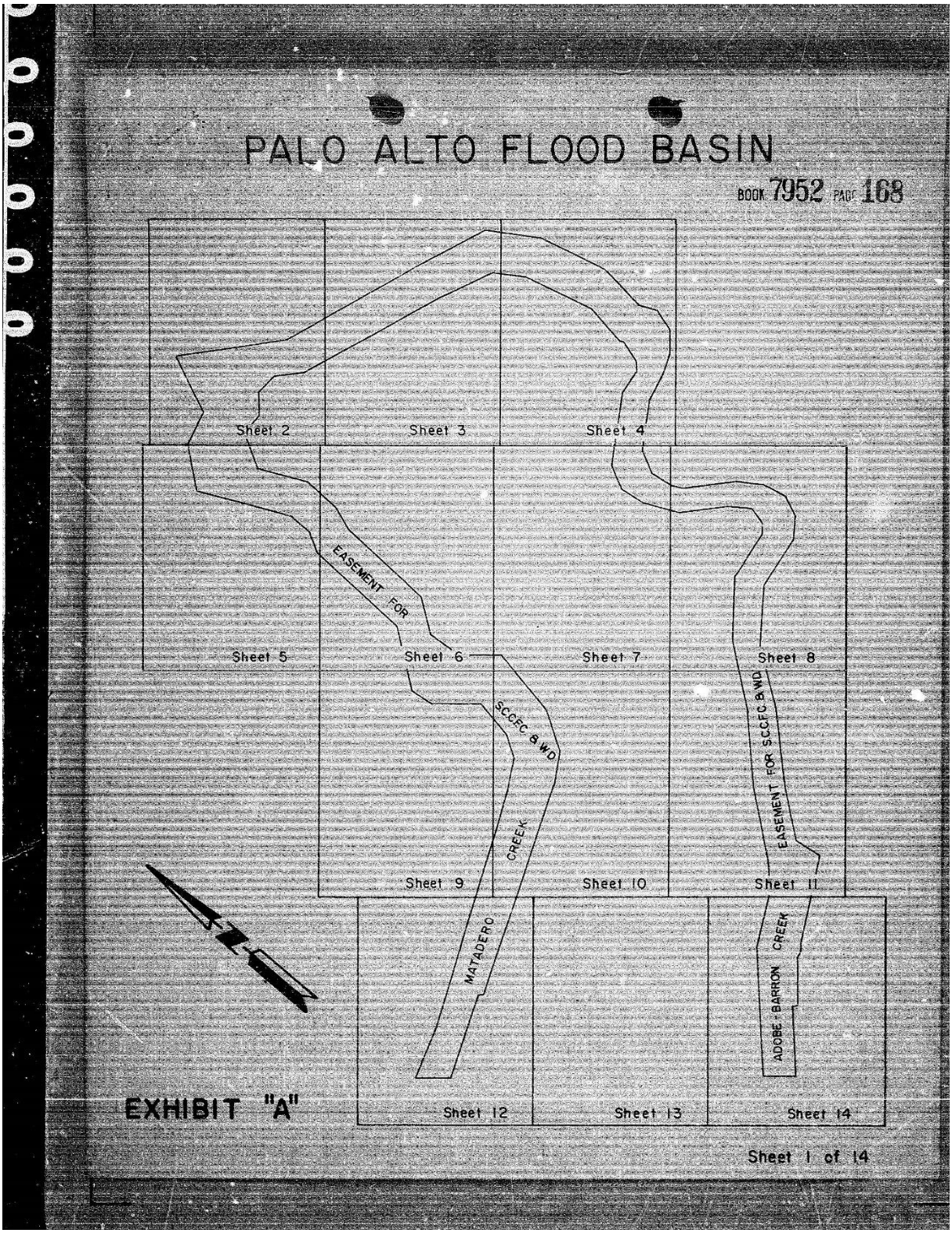
General vicinity of the Palo Alto Flood Basin and Tide Gate ca. 1890 (Herrmann Brothers 1890).



General vicinity of the Palo Alto Flood Basin and Tide Gate ca. 1956 (Thomas Brothers 1956).

*Recorded by: Pacific Legacy, Inc. *Date: August 1, 2019 ☑ Continuation ☐ Update



Map overview from the 1967 Palo Alto Flood Basin Easement and Agreement between the City of Palo Alto and Santa Clara County Flood Control and Water District (provided by Valley Water).

*Recorded by: Pacific Legacy, Inc. *Date: August 1, 2019 ☑ Continuation ☐ Update

(IMG-2492) A view of the historic period levee and tide gate looking north-northeast.

(IMG-2500) A view of the tide gate looking east with the San Francisco Bay to the left (north) and Palo Alto Flood Basin to the right (south).

*Recorded by: Pacific Legacy, Inc. *Date: August 1, 2019 ☑ Continuation ☐ Update

(IMG-2503) A close-up view (looking west) of the tide gate and the metal pilings that support the edge of the levee west of the gate.

(IMG-2506) A close-up view (looking west) of the bay side of the tide gate and the gate control.

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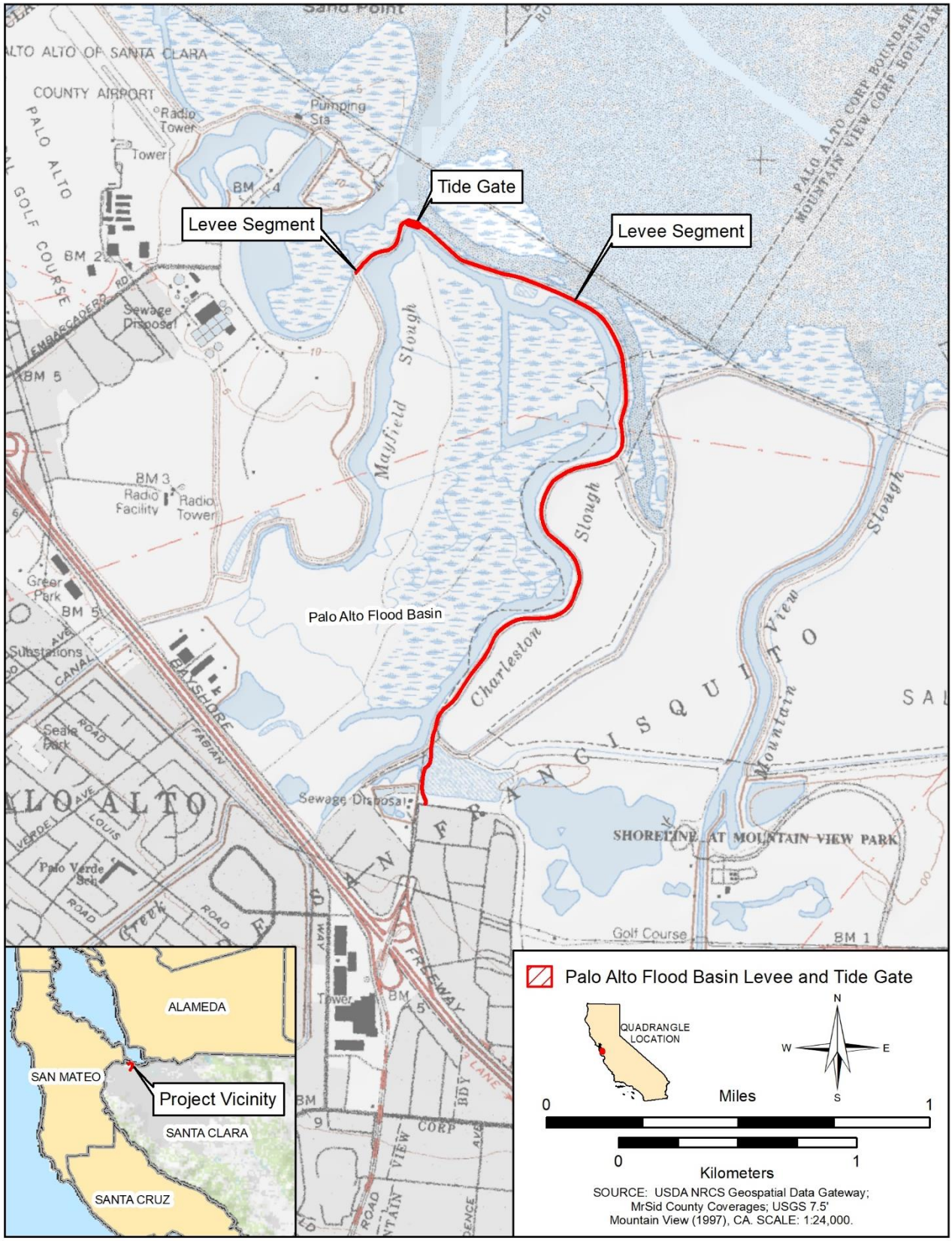
(IMG-25011 A view (looking west) of the tide gate and the Adobe Creek Loop Trail as it continues west.

(IMG-2555) A view (looking north) of a social trail along the levee just southeast of the tide gate with the top of the tide gate visible in the background and flood control basin to the left (west).

*Recorded by: Pacific Legacy, Inc. *Date: August 1, 2019 ☑ **Continuation** ☐ **Update**



Appendix G
Mitigation Monitoring and Reporting Program Summary Table

The following table summarizes the Mitigation Monitoring and Reporting Program (MMRP) which includes the Valley Water's best management practices (BMPs) and mitigation measures identified in the Mitigated Negative Declaration. For each measure, the table provides description of the measure, implementation timing, the entity responsible for implementing the measure, and the entity responsible for monitoring and oversight of the measure.

The MMRP will be adopted by the Valley Water Board of Directors for implementation by the Valley Water, as appropriate. Additionally, implementation of the MMRP will be reported and tracked consistent with CEQA Guidelines Section 15097 and permit reporting conditions.

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
AIR QUALITY					
Use Dust Control Measures	BMP AQ-1	The following Bay Area Air Quality Management District (BAAQMD) Dust Control Measures will be implemented: 1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day; 2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered; 3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited; 4. Water used to wash the various exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, etc.) will not be allowed to enter waterways; 5. All vehicle speeds on unpaved roads shall be limited to 15 mph; 6. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used; 7. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations), and this requirement shall be clearly communicated to construction workers (such as verbiage in contracts and clear signage at all access points). Idling shall also remain consistent with the City of Palo Alto Idling Ordinance (see Chapter 10.62 of the City Municipal Code), which requires idling not exceed 3 minutes on public property unless specific circumstances are met); 8. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications, and all equipment shall be checked by a certified visible emissions evaluator; 9. Correct tire inflation shall be maintained in accordance with manufacturer's specifications on wheeled equipment and vehicles to prevent excessive rolling resistance; and, 10. Post a publicly visible sign with a telephone number and contact person at the lead agency to address dust complaints; any complaints shall be responded to and take corrective action within 48 hours. In addition, a BAAQMD telephone number with any applicable regulations will be included.			
Avoid Stockpiling Odorous Materials	BMP AQ-2	Materials with decaying organic material, or other potentially odorous materials, will be handled in a manner that avoids impacting residential areas and other sensitive receptors, including: 1. Avoid stockpiling potentially odorous materials within 1,000 feet of residential areas or other odor sensitive land uses; and 2. Odorous stockpiles will be disposed of at an appropriate landfill.	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
Reduce Construction-related NOX Emissions	BMP-AQ-3	Nitrogen oxide (NOX) construction mitigation measures recommended by BAAQMD will be implemented, including the following: • Minimize idling time either by shutting equipment off when not in use or by reducing the time of idling to 5 minutes [required by 13 CCR Sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the entrances to the site. • Maintain all construction equipment in proper working condition in accordance with manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated. • Provide a plan for approval by Valley Water demonstrating that the construction contractors' heavy-duty off-road vehicles (50 horsepower or more) to be used in Project construction, including owned, leased, and subcontractor vehicles, will achieve a Project-wide fleet-average 20 percent NOX reduction and 45 percent particulate reduction compared to the most recent California Air Resources Board fleet average. Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available. • Ensure that emissions from Valley Water's construction contractors' off-road diesel-powered equipment used on the Project site do not exceed 40 percent opacity for more than three minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) will be repaired immediately. • A visual survey of all in-operation equipment will be made at least weekly.	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
Biological Resources					
Remove Temporary Fill	BMP BI-1	Temporary fill materials, such as for work pads or dewatering, will be removed upon finishing the work or as appropriate. The work area will be re-contoured to match pre-construction conditions to the extent possible.	Throughout construction	Valley Water or the construction contractor	Valley Water
Avoid Impacts to Nesting Migratory Birds	BMP BI-2	Nesting birds are protected by State and federal laws. Valley Water will protect nesting birds and their nests from abandonment, loss, damage, or destruction. Nesting bird surveys will be performed by a qualified biologist during the bird nesting season (January 15 to September 1) prior to any activity that could result in the abandonment, loss, damage, or destruction of birds, bird nests, or nesting migratory birds. If a lapse in Project-related work of 15 days or longer occurs, another survey would be conducted. Inactive bird nests may be removed with the exception of raptor nests. Birds, nests with eggs, or nests with hatchlings will be left undisturbed.	Throughout construction	Valley Water or the construction contractor	Valley Water
Avoid Impacts to Nesting Migratory Birds from Pending Construction	BMP BI-3	Nesting exclusion devices may be installed to prevent potential establishment or occurrence of nests in areas where construction activities would occur. All nesting exclusion devices will be maintained throughout the nesting season or until completion of work in an area makes the devices unnecessary. All exclusion devices will be removed and disposed of when work in the area is complete.	Throughout construction	Valley Water or the construction contractor	Valley Water
Choose Local Ecotypes of Native Plants and Appropriate Erosion-Control Seed Mixes	BMP BI-4	Whenever native species are prescribed for installation the following steps will be taken by a qualified biologist or vegetation specialist: 1. Evaluate whether the plant species currently grows wild in Santa Clara County; and, 2. If so, the qualified biologist or vegetation specialist will determine	Prior to and during revegetation activities	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		if any need to be local natives, i.e. grown from propagules collected in the same or adjacent watershed, and as close to the Project site as feasible. Also, consult a qualified biologist or vegetation specialist to determine which seeding option is ecologically appropriate and effective, specifically: 1. For areas that are disturbed, an erosion control seed mix may be used consistent with the Valley Water *Guidelines and Standards for Land Use Near Streams, Design Guide 5, 'Temporary Erosion Control Options.'* 2. In areas with remnant native plants, the qualified biologist or vegetation specialist may choose an abiotic application instead, such as an erosion control blanket or seedless hydro-mulch and tackifier to facilitate passive revegetation of local native species. If a gravel has been used to prevent soil compaction, this material may be left in place [if ecologically appropriate] instead of seeding. 3. Seed selection shall be ecologically appropriate as determined by a qualified biologist, per *Guidelines and Standards for Land Use Near Streams, Design Guide 2: Use of Local Native Species*.			
Avoid Animal Entry and Entrapment	BMP BI-5	All pipes, hoses, or similar structures less than 12 inches diameter will be closed or covered to prevent animal entry. All construction pipes, culverts, or similar structures, greater than 2-inches diameter, stored at a construction site overnight, will be inspected thoroughly for wildlife by a qualified biologist or properly trained construction personnel before the pipe is buried, capped, used, or moved. If inspection indicates presence of sensitive or State- or federally listed species inside stored materials or equipment, work on those	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		materials will cease until a qualified biologist determines the appropriate course of action. To prevent entrapment of animals, all excavations, steep-walled holes or trenches more than 6-inches deep will be secured against animal entry at the close of each day. Any of the following measures may be employed, depending on the size of the hole and method feasibility: 1. Hole to be securely covered (no gaps) with plywood, or similar materials, at the close of each working day, or any time the opening will be left unattended for more than one hour; or 2. In the absence of covers, the excavation will be provided with escape ramps constructed of earth or untreated wood, sloped no steeper than 2:1, and located no farther than 15 feet apart; or 3. In situations where escape ramps are infeasible, the hole or trench will be surrounded by filter fabric fencing or a similar barrier with the bottom edge buried to prevent entry.			
Minimize Predator-Attraction	BMP BI-6	Remove trash daily from the worksite to avoid attracting potential predators to the site.	Throughout construction	Valley Water or the construction contractor	Valley Water
Avoid Relocating Mitten Crabs	BMP BI-7	Sediment potentially containing Chinese Mitten Crabs will not be transported between San Francisco Bay Watersheds and Monterey Bay Watersheds, specifically: 1. Sediment removed from the San Francisco Bay watersheds will not be transported south of Coyote Creek Golf Drive in south San Jose, and the intersection of McKean and Casa Loma Roads; and, 2. Earth moving equipment used in the San Francisco Bay watershed will be cleaned before being moved to, and used in, the Pajaro Watershed.	Throughout construction and following construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
Minimize Spread of Invasive Plants	BMP BI-8	The spread of invasive nonnative plant species and plant pathogens will be avoided or minimized by implementing the following measures: 1. Construction equipment will arrive at the Project clean and free of soil, seed, and plant parts to reduce the likelihood of introducing new weed species. 2. Any imported fill material, soil amendments, gravel, etc., required for construction activities that will be placed within the upper 12 inches of the ground surface will be free of vegetation and plant material. 3. Certified weed-free imported erosion control materials (or rice straw in upland areas) will be used exclusively. 4. Implement all appropriate measures from the guidelines of the Working Group for Phytophthoras in Native Habitats (www.calphytos.org) to minimize the potential spread of Phytophthora plant pathogens to the maximum extent practicable.	Throughout construction	Valley Water or the construction contractor	Valley Water
Monitor Project Area for Erosion during Dewatering	BMP BI-9	During dewatering, Valley Water or its contractor will visually monitor areas outside and in the vicinity of the sheet pile cofferdams for evidence of erosion. Specific areas to be evaluated include along the marsh edge of Hooks Island, along the edges of the existing levees, and the island on the interior of the PAFB. While not anticipated, if evidence of erosion is observed to sensitive habitats (e.g., tidal salt marsh), Valley Water will consult with the appropriate environmental agencies regarding appropriate next steps.	During Dewatering	Valley Water or the construction contractor	Valley Water
Pre-Construction Surveys for Special-Status	MM-BIO-1	A qualified botanist will conduct preconstruction surveys for special-status plant species in the Project area during the appropriate species-specific identification periods and within one year of ground	Prior to the start of construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
Plants		disturbance in any given area (i.e., Phase 1 dewatering limits and Phase 2 dewatering limits). The survey(s) will be in accordance with the appropriate State and federal survey protocols for the special-status species (i.e., time of year for survey). If the survey(s) demonstrate absence of special-status plant species in the Project area, no further actions will be required. If the botanical surveys reveal the presence of special-status plants in the Project area, Valley Water or its contractor will retain a qualified botanist or restoration ecologist who will prepare a salvage, relocation, or propagation and monitoring plan prior to construction to address monitoring, salvage, relocation, and propagation of special-status plant species. Documentation will include provisions that address the techniques, location, and procedures required for the successful establishment of the plant populations. The plan will include provisions for performance that address survivability requirements, maintenance, monitoring, implementation, and the annual reporting requirements. All directly impacted stands of special-status plants will be documented by a qualified botanist. Documentation will include density and percent cover; key habitat characteristics, including soil type, associated species, hydrology, and topography; and photo documentation of preconstruction conditions			
Qualified Biologist and Biological Monitoring	MM-BIO-2	A qualified biologist will conduct a survey of appropriate habitat for special-status species within the work area, including all staging and access routes, immediately prior to initiation of construction activities. If individuals are observed within or near the work area, the biologist will remain onsite to monitor for unusual or stressed behavior as a result of Project activities and maintain an appropriate no-disturbance buffer. No work will occur within the buffer until a qualified biologist verifies that the individuals have left the area. If an appropriate buffer cannot be maintained, work shall be stopped immediately and the individual will be allowed to leave the area of	Prior to and throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		its own volition. If the individual does not leave the area, the qualified biologist will coordinate with USFWS and CDFW on how to proceed with work activities. A qualified biologist will be present during the installation of environmentally sensitive area (ESA) fencing and will determine on a daily basis which areas need to be monitored during construction activities to avoid harm to special-status species. If a special-status species is found within the ESA fencing during a Project activity that may result in take of a federally or State listed species, work will cease in that area until the individual has left the area of its own volition or been relocated out of the area by a qualified biologist. Relocation will follow all applicable USFWS or CDFW protocols, as appropriate. Work will not resume until the biological monitor has determined that the animal has safely left the work area. The qualified biologist shall have the authority to halt construction if determined necessary to avoid or minimize adverse impacts on special-status species at any point.			
Worker Environmental Awareness Training Program	MM-BIO-3	A Worker Environmental Awareness Training Program for construction personnel shall be prepared and provided by a qualified biologist retained by Valley Water or its contractor. All construction personnel shall receive the training prior to working on the Project site. The training program shall provide workers with information on their responsibilities with regard to the special-status species and sensitive habitats in the Project area; a physical description of each special-status species that has potential to occur; each species' habitat and legal protections; photographs to assist in identification of the species; as well as an overview of BMPs and applicable terms and conditions in the Project's permits.	Prior to and throughout construction	Valley Water or the construction contractor	Valley Water
Environmentally Sensitive Area Fencing	MM-BIO-4	ESA fencing shall be identified in the Project plans around sensitive habitats (i.e., wetlands and non-wetland waters, special-status species habitat) not identified to be impacted, as appropriate, in	Prior to and throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		coordination with a qualified biologist. The construction contractor, in coordination with the qualified biologists, shall install the fencing on the Project site prior to construction activities to ensure these areas are avoided. ESA fencing shall be constructed consistent with other fencing requirements (i.e., related to salt marsh harvest mouse). The fencing shall be brightly colored for ease of visibility and maintained in good conditions for the duration of construction activities. A designated individual will inspect and maintain the integrity of the ESA fencing during each working day to ensure there are no holes or rips and the base remains buried.			
Install Raptor Perching Deterrents	MM-BIO-5	Any temporary chain-link fencing on the Project site that could provide perching opportunities for avian predators of special-status species will be modified to include perch deterrents along the top of the fencing (i.e., repellent spikes). Perch deterrents will be maintained for the duration of the Project in a condition that deters predator access and raptor perching.	Throughout construction	Valley Water or the construction contractor	Valley Water
Conduct Preconstruction Surveys for Wintering Burrowing Owl	MM-BIO-6	To avoid impacts to burrowing owl, a pre-construction burrowing owl survey shall be conducted by a qualified biologist no more than seven days prior to the initiation of Project activities occurring within 150 meters of the Project area. If a wintering burrowing owl is detected onsite, an appropriate no-disturbance buffer (based on setback recommendations in the CDFW 2012 Staff Report on Burrowing Owl Mitigation) around the active burrow shall be implemented and maintained until work is finished or a qualified biologist confirms the burrow is no longer in use. If work within the no-disturbance buffer cannot be avoided, Valley Water shall coordinate with CDFW to determine the appropriate course of action to ensure wintering burrowing owls are not impacted	Prior to and throughout construction	Valley Water or the construction contractor	Valley Water
Salt Marsh Harvest Mouse and Salt Marsh	MM-BIO-7	Valley Water shall develop and implement avoidance and minimization measures specific to salt marsh harvest mice and salt marsh wandering shrew. Measures shall include, but not limited to,	Prior to and throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
Wandering Shrew Protection Measures		the following: • Prior to initiation of work within or adjacent to suitable habitat for salt marsh harvest mouse or salt marsh wandering shrew, a qualified biologist shall conduct a preconstruction survey for mice and shrews in areas where disturbance is planned. Surveys shall take place no more than 48 hours before the onset of work in habitats capable of supporting these species. • A qualified biologist shall survey for salt marsh harvest mice and salt marsh wandering shrew individuals or nests in all areas with suitable habitat prior to removal of vegetation and search for signs of harvest mice or other sensitive wildlife and plant species. Following inspection, personnel, under the supervision of the qualified biologist, should disturb (e.g., flush) vegetation to force movement of SMHM into adjacent marsh areas. Immediately following vegetation flushing, personnel, under the supervision of the qualified biologist should remove vegetation with non-mechanized hand tools so that vegetation is no taller than two inches. After vegetation removal, a fence suitable to exclude salt marsh harvest mice should be placed along the edge of the area removed of vegetation to further reduce the likelihood of salt marsh harvest mice returning to the area prior to construction. The fence should be made of a heavy plastic sheeting material that does not allow salt marsh harvest mice to pass through or climb, and the bottom should be buried to a depth of four inches so that the salt marsh harvest mice cannot crawl under the fence. Fence height should be at least two feet high but no higher than four feet. All supports for the exclusion fencing should be placed on the inside of the work area. Once the site is cleared of mice			

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		or shrews, the biologist will supervise the hand (i.e., non-mechanized) removal of any vegetation that could support salt marsh harvest mice and wandering shrews (i.e., salt marsh and immediately adjacent uplands) to avoid impacts to these species. Such monitoring will occur for the duration of all clearing work within suitable habitat. Vegetation clearing should begin at the existing tide gate structure and continue away from the structure to encourage any salt marsh harvest mice and wandering shrews in the area to move into suitable habitat outside of the Project area. Vegetation clearing should extend approximately 2 to 3 feet beyond the ESA fence outside the work area to discourage salt marsh harvest mice and wandering shrews from returning to the Project area. All brush resulting from vegetation clearing will immediately be moved offsite so as not to provide habitat for salt marsh harvest mice and wandering shrews in the Project area. • Prior to construction, ESA fencing shall be installed by hand along the limits of disturbance to prevent salt marsh harvest mice and wandering shrews from entering the active work area; to protect habitat within the marsh from earthmoving activities or accidental spills; and to exclude workers from the marsh outside of the impact area. A fencing plan shall be submitted to CDFW and USFWS for review and approval prior to installation. A qualified biologist shall be present onsite to monitor for salt marsh harvest mice and wandering shrews during ESA fence installation. • Work activities within 50 feet of saltmarsh harvest mouse habitat will not occur within two hours before or after extreme high tides (6.5 feet or above measured at the Golden Gate Bridge adjusted to the timing of local tides) or			

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		when the marsh plain is inundated, which could prevent individuals from reaching suitable cover, unless fencing has been installed around the work area. • If individuals are observed in the active work area, all activities in that area shall cease until the qualified biologist determines any individuals have safely left the area. USFWS and CDFW will be notified if work is stopped due to such an observation. Additional avoidance (e.g., allowing individuals to leave of their own volition), protection (e.g., implementation of no-work buffer zones), or relocation measures may be implemented in coordination with USFWS and CDFW, as appropriate. Work may continue away from the observed individual(s) if the qualified biologist determines work can occur without causing harm to the species			
Implement Fish Exclusion and Relocation	MM-BIO-8	A qualified fisheries biologist shall develop a Fish Exclusion or Relocation Plan to exclude and/or relocate fish from the Project area to avoid direct fish mortality from stranding during dewatering. The Fish Exclusion or Relocation Plan shall be reviewed and approved by NMFS and CDFW prior to implementation. The plan shall at a minimum identify methods for fish capture and/or exclusion, temporary holding methods, and appropriate release locations.	Prior to and during dewatering	Valley Water or the construction contractor	Valley Water
Compensate for Impacts to Jurisdictional Wetlands	MM-BIO-9	Valley Water shall ensure no net loss of wetlands from Project impacts through the purchase of mitigation bank credits from the San Francisco Bay Wetland Mitigation Bank located in Foster City. Valley Water will purchase wetland mitigation credits at a 2:1 mitigation to permanent impact ratio. Proof of credit purchase will be provided to the USACE, RWQCB, and CDFW prior to the start of construction.	Prior to the start of construction	Valley Water	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
Cultural Resources					
Accidental Discovery of Archaeological Artifacts, Tribal Cultural Resources, or Burial Remains	BMP CU-1	If historical or unique archaeological artifacts, or tribal cultural resources, are accidentally discovered during construction, work in affected areas will be restricted or stopped until proper protocols are met. Work at the location of the find will halt immediately within 100 feet of the find. A "no work" zone shall be established utilizing appropriate flagging to delineate the boundary of this zone. A Consulting Archaeologist will visit the discovery site as soon as practicable for identification and evaluation pursuant to PRC Section 21083.2 and CCR Section 15126.4. If the archaeologist determines that the artifact is not significant, construction may resume. If the archaeologist determines that the artifact is significant, the archaeologist will determine if the artifact can be avoided and, if so, will detail avoidance procedures. If the artifact cannot be avoided, the archaeologist will develop within 48 hours an Action Plan which will include provisions to minimize impacts and, if required, a Data Recovery Plan for recovery of artifacts in accordance with PRC Section 21083.2 and Section 15126.4 of the CEQA Guidelines. If a tribal cultural resource cannot be avoided, the Action Plan will include notification of the appropriate Native American tribe, and consultation with the tribe regarding acceptable recovery options. If burial finds are accidentally discovered during construction, work in affected areas will be restricted or stopped until proper protocols are met. Upon discovering any burial site as evidenced by human skeletal remains, the County Coroner will be immediately notified, and the field crew supervisor shall take immediate steps to secure and protect such remains from vandalism during periods when work crews are absent. No further excavation or disturbance within 100 feet of the site or any nearby area reasonably suspected to	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		overlie adjacent remains may be made except as authorized by the County Coroner, California Native American Heritage Commission, and/or the County Coordinator of Indian Affairs.			
Hazards and Hazardous Materials					
Prepare a Soil Management Plan	BMP HM-1	Prior to grading and excavation, Valley Water will retain a qualified professional to prepare a Soil Management Plan. The Soil Management Plan will address the concerns associated with releases of contaminated soil within and adjacent to the Project area. The Plan will include specifications for procedures to manage affected soil during construction and shall include engineering controls to minimize human exposure to potential contaminants. During construction activities, Valley Water or its contractor shall employ engineering controls and BMPs to minimize human exposure to potential contaminants and potential negative effects from an accidental release to groundwater and soils. Engineering controls and construction BMPs shall include, but not be limited to, the following: • Contractor employees working on-site shall be certified in OSHA's 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training program. • Contractor shall monitor the area around the construction site for fugitive vapor emissions with appropriate field screening instrumentation. • Contractor shall water/mist soil as it is being excavated and loaded onto trucks. • Contractor shall place any stockpiled soil in areas that are	Prior to and throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		shielded from prevailing winds. • Contractor shall cover the bottom of excavated areas with sheeting when work is not being performed.			
Restrict Vehicle and Equipment Cleaning to Appropriate Locations	BMP HM-2	Vehicles and equipment may be washed only at approved areas. No washing of vehicles or equipment will occur in the Project area.	Throughout construction	Valley Water or the construction contractor	Valley Water
Ensure Proper Vehicle and Equipment Fueling and Maintenance	BMP HM-3	No fueling or servicing will be done in a waterway or immediate flood plain, unless equipment stationed in these locations is not readily relocated (i.e., pumps, generators). 1. For stationary equipment that must be fueled or serviced on site, containment will be provided in such a manner that any accidental spill will not be able to come in direct contact with soil, surface water, or the storm drainage system. 2. All fueling or servicing done at the site will provide containment to the degree that any spill will be unable to enter any waterway or damage riparian vegetation. 3. All vehicles and equipment will be kept clean. Excessive build-up of oil and grease will be prevented. 4. All equipment used in the Bay or flood basin will be inspected for leaks each day prior to initiation of work. Maintenance, repairs, or other necessary actions will be taken to prevent or repair leaks, prior to use. 5. If emergency repairs are required in the field, only those repairs necessary to move equipment to a more secure	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		location will be done in a waterway or flood plain.			
Ensure Proper Hazardous Materials Management	BMP HM-4	Measures will be implemented to ensure that hazardous materials are properly handled, and the quality of water resources is protected by all reasonable means. 1. Prior to entering the work site, all field personnel will know how to respond when toxic materials are discovered. 2. Contact of chemicals with precipitation will be minimized by storing chemicals in watertight containers with appropriate secondary containment to prevent any spillage or leakage. 3. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials will not contact soil and not be allowed to enter surface waters or the storm drainage system. 4. All toxic materials, including waste disposal containers, will be covered when they are not in use, and located as far away as possible from a direct connection to the storm drainage system or surface water. 5. Quantities of toxic materials, such as equipment fuels and lubricants, will be stored with secondary containment that is capable of containing 110 percent of the primary container(s). 6. The discharge of any hazardous or non-hazardous waste as defined in Division 2, Subdivision 1, Chapter 2 of the California Code of Regulations will be conducted in accordance with applicable State and federal regulations.	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		7. In the event of any hazardous material emergencies or spills, personnel will call the Chemical Emergencies/Spills Hotline at 1-800-510-5151.			
Utilize Spill Prevention Measures	BMP HM-5	Prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water following these measures: 1. Field personnel will be appropriately trained in spill prevention, hazardous material control, and cleanup of accidental spills; 2. Equipment and materials for cleanup of spills will be available on site, and spills and leaks will be cleaned up immediately and disposed of according to applicable regulatory requirements; 3. Field personnel will ensure that hazardous materials are properly handled and natural resources are protected by all reasonable means; 4. Spill prevention kits will always be in close proximity when using hazardous materials (e.g., at crew trucks and other logical locations), and all field personnel will be advised of these locations; and, 5. The work site will be routinely inspected to verify that spill prevention and response measures are properly implemented and maintained.	Throughout construction	Valley Water or the construction contractor	Valley Water
Incorporate Fire Prevention Measures	BMP HM-6	1. All earthmoving and portable equipment with internal combustion engines will be equipped with spark arrestors. 2. During the high fire danger period (April 1–December 1), work crews will have appropriate fire suppression equipment	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		available at the work site. 3. An extinguisher shall be available at the project site at all times when welding or other repair activities that can generate sparks (such as metal grinding) is occurring. 4. Smoking shall be prohibited except in designated staging areas and at least 20 feet from any combustible chemicals or vegetation.			
Hydrology and Water Quality					
Limit Impact of Pump and Generator Operation and Maintenance	BMP WQ-1	Pumps and generators will be maintained and operated in a manner that minimizes impacts to water quality and aquatic species. 1. Pumps and generators will be maintained according to manufacturers' specifications to regulate flows to prevent dry-back or washout conditions. 2. Pumps will be operated and monitored to prevent low water conditions, which could pump muddy bottom water, or high-water conditions, which creates ponding. 3. Pump intakes will be screened to prevent uptake of fish and other vertebrates. Pumps will be screened according to NMFS criteria. 4. Sufficient back-up pumps and generators will be on site to replace defective or damaged pumps and generators.	During dewatering	Valley Water or the construction contractor	Valley Water
Limit Impacts from Staging and Stockpiling Materials	BMP WQ-2	1. To protect on site vegetation and water quality, staging areas should occur on access roads, surface streets, or other disturbed areas that are already compacted and only support ruderal vegetation. Similarly, all equipment and materials	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		(e.g., road rock and spoils) will be contained within the existing access roads or other pre-determined staging areas. 2. Building materials and other Project-related materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into water bodies. 3. No runoff from the staging areas may be allowed to enter water ways without being subjected to adequate filtration (e.g., vegetated buffer, swale, hay wattles or bales, silt screens). 4. The discharge of decant water to water ways from any on site temporary sediment stockpile or storage areas is prohibited. 5. During the wet season, no stockpiled soils will remain exposed, unless surrounded by properly installed and maintained silt fencing or other means of erosion control. During the dry season; exposed, dry stockpiles will be watered, enclosed, covered, or sprayed with non-toxic soil stabilizers.			
Limit Impact of Concrete Near Waterways	BMP WQ-3	Concrete that has not been cured is alkaline and can increase the pH of the water; fresh concrete will be isolated until it no longer poses a threat to water quality. Poured concrete will be excluded from the wetted channel for a period of four weeks after it is poured. During that time, the poured concrete will be kept moist, and runoff from the wet concrete will not be allowed to enter waterways. Commercial sealants (e.g., Deep	During tide gate structure construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		Seal, Elasto-Deck Reservoir Grade) may be applied to the poured concrete surface where difficulty in excluding water flow for a long period may occur. If a sealant is used, water will be excluded from the site until the sealant is dry. An area outside of the channel and floodplain will be designated to clean out concrete transit vehicles.			
Isolate Work in Tidal Areas with Use of Coffer Dam	BMP WQ-4	For work in tidal areas, it is preferable to isolate one side of the channel with a cofferdam and allow flows to continue on the other side of the creek. If downstream flows cannot be diverted around the project site, the creek waters will be transmitted around the site through cofferdam bypass pipes. By isolating the work area from tidal flows, water quality impacts are minimized. 1. Installation of coffer dams will begin at low tide. 2. Waters discharged through tidal coffer dam bypass pipes or from pumping will not exceed 10 percent in areas where natural turbidity is greater than 50 NTU over the background levels of the tidal waters into which they are discharged. Cofferdams and bypass pipes will be removed as soon as possible. Flows will be restored at a reduced velocity to minimize erosion, turbidity, or harm to habitat.	During dewatering	Valley Water or the construction contractor	Valley Water
Use Seeding for Erosion Control, Weed Suppression, and Site Improvement	BMP WQ-5	Disturbed areas shall be seeded with native seed as soon as is appropriate after activities are complete. An erosion control seed mix will be applied to exposed soils down to the ordinary high-water mark of the flood basin and the mean high higher tide line on the Bay side of the work area. The seed mix should consist of California native species suitable to the area.	During site restoration	Valley Water or the construction contractor	Valley Water
Maintain Clean Conditions at Work	BMP WQ-6	The work site, areas adjacent to the work site, and access roads will be maintained in an orderly condition, free and clear from debris	Throughout	Valley Water or the construction	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
Sites		and discarded materials on a daily basis. Personnel will not sweep, grade, or flush surplus materials, rubbish, debris, or dust into storm drains or waterways. Materials or equipment left on the site overnight will be stored as inconspicuously as possible and will be neatly arranged. Any materials and equipment left on the site overnight will be stored to avoid erosion, leaks, or other potential impacts to water quality Upon completion of work, all building materials, debris, unused materials, concrete forms, and other construction-related materials will be removed from the work site.	construction	contractor	
Manage Drilling Materials	BMP WQ-7	All materials or waters generated during drilling, CIDH pile construction, or levee ground improvements will be safely handled, properly managed, and disposed of according to all applicable federal, State, and local statutes regulating such. In no case will these materials and/or waters be allowed to enter, or potentially enter waterways. Such materials/waters must not be allowed to move off the property where the work is being completed.	During drilling activities	Valley Water or the construction contractor	Valley Water
Protect Groundwater from Contaminants via Drilling	BMP WQ-8	Any substances or materials that may degrade groundwater quality will not be allowed to enter any boring. Lubricants used on drill bits, drill pipe, or tremie pipe will not be comprised of oily or greasy substances or other materials that may degrade groundwater quality. Well openings or entrances will be sealed or secured in such a way as to prevent the introduction of contaminants.	During drilling activities	Valley Water or the construction contractor	Valley Water
Prevent Water Pollution	BMP WQ-9	Oily, greasy, or sediment laden substances or other material that originate from the Project and may degrade the quality of surface water or adversely affect aquatic life, fish, or wildlife will not be allowed to enter, or be placed where they may later enter, any waterway.	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		The Project will not increase the turbidity of any watercourse flowing past the construction site by taking all necessary precautions to limit the increase in turbidity as follows: 1. Where natural turbidity is between 0 and 50 Nephelometric Turbidity Units (NTU), increases will not exceed 5 percent; and 2. Where natural turbidity is greater than 50 NTU, increases will not exceed 10 percent. Water turbidity changes will be monitored. The discharge water measurements will be made at the point where the discharge water exits the water control system. Natural watercourse turbidity measurements will be made in the receiving water at least 100 feet from discharge site. Natural watercourse turbidity measurements will be made prior to initiation of Project discharges, preferably at least 2 days prior to commencement of work.			
Prevent Storm Water Pollution	BMP WQ-10	To prevent stormwater pollution, the applicable measures from the following list will be implemented: 1. Soils exposed due to Project activities will be seeded and stabilized using hydroseeding, straw placement, mulching, and/or erosion control fabric. These measures will be implemented such that the site is stabilized, and water quality protected prior to significant rainfall. Areas below the ordinary high-water mark of the flood basin and below the mean high tide line of the Bay are exempt from this BMP. 2. The preference for erosion control fabrics will be to consist of natural fibers; however, steeper slopes and areas that are highly erodible may require more structured erosion control methods. No non-porous fabric will be used as part of a permanent erosion control approach. Plastic sheeting may be	Throughout construction and during site restoration	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
		used to temporarily protect a slope from runoff, but only if there are no indications that special-status species would be impacted by the application. 3. Erosion control measures will be installed according to manufacturer's specifications. 4. To prevent stormwater pollution, the appropriate measures from, but not limited to, the following list will be implemented: • Silt Fences • Straw Bale Barriers • Brush or Rock Filters • Storm Drain Inlet Protection • Sediment Traps or Sediment Basins • Erosion Control Blankets and/or Mats • Soil Stabilization (i.e. tackified straw with seed, jute or geotextile blankets, etc.) • Straw mulch. 5. All temporary construction-related erosion control methods shall be removed at the completion of the Project (e.g. silt fences).			
Manage Sanitary and Septic Waste	BMP WQ-11	Temporary sanitary facilities will be located in compliance with California Division of Occupational Safety and Health (Cal/OSHA) regulation 8 California Code of Regulations 1526. All temporary sanitary facilities will be located where overflow or spillage will not enter a watercourse directly (overbank) or indirectly (through a storm drain).	Throughout construction	Valley Water or the construction contractor	Valley Water

MITIGATION MONITORING AND REPORTING PROGRAM					
Resource Areas	**BMP or Mitigation Measure**	**Description of Measures**	**Implementation Timing**	**Implementation Responsibility**	**Responsibility for Oversight**
Traffic and Transportation					
Incorporate Public Safety Measures	BMP TR-1	Fences, barriers, lights, flagging, guards, and signs will be installed as determined appropriate by the public agency having jurisdiction, to give adequate warning to the public of the construction and of any dangerous condition to be encountered as a result thereof.	Throughout construction	Valley Water or the construction contractor	Valley Water

Appendix H
Response to Comments

Additional Information and Response to Public Comments for the Mitigated Negative Declaration for the Palo Alto Flood Basin Tide Gate Structure Replacement Project

The Draft MND was circulated to local and state agencies, interested organizations, and the general public. The 30-day public review period, which conforms to California Environmental Quality Act (CEQA) Guidelines §15105(b), began on September 14, 2020 and ended on October 15, 2020. The following table includes the comment letters and emails Valley Water received, as well as the Valley Water's responses. All changes to the Draft MND are described in the responses below and referenced by the page number in which the revised text appears in the Final MND.

No.	Comment	Valley Water Response	MND Change (page in Final MND)
Comment Letter A – Received from San Francisco Bay Trail Project via Email on September 22, 2020			
A-1	*Communications Plan, Signage* We urge the development of a strong communications plan, with information posted online and signage onsite that lists dates of upcoming closures with images/maps that will help direct trail users to the detour/alternative route that runs through and over the back side of Byxbee Park and back to the baylands--north of the proposed construction site/closure. In addition to signage at each end of the project and at staging areas, we recommend written notices and way-finding communications that includes text with arrows, map, dates, and contact information about the detour through Byxbee Park, especially at junctions such as where the turn-off occurs from the frontage road into Byxbee Park, and vice versa. As with previous projects managed by the Water District, we have found that the dedicated websites and opportunity for the public to sign up for alerts serves as a very effective form of communication. Having dates of closures over the length of the project (such as the red, yellow, green chart/graphic), would be very helpful to commuters, educators and wildlife/bird groups who use the Bay Trail over the course of a year and who need to plan routes through or visits to the baylands ahead of time.	Valley Water agrees that clear communication and appropriate signage are critical to minimizing impacts associated with closure of the Bay Trail. As with many Valley Water projects, Valley Water plans to post schedules, maps, and other information pertaining to trail closure on the Project website (https://www.valleywater.org/pafbtidegates). The website allows the public to sign-up for updates related to the Project, including information relating to trail closure. Consistent with Best Management Practice (BMP) TR-1 (*Incorporate Public Safety Measures*), Valley Water will install fences, barriers, lights, flagging, guards, and/or signs at the Project site and along the trails, as determined appropriate in coordination with the City of Palo Alto. The signage will clearly explain to trail users the extent of trail closures, their duration, and the detour routes available. Detour routes will be clearly marked. Figure 4-9 indicates the location of trail detours and signage, with detour signage located at 11 locations in the Project vicinity. Furthermore, per Comment E-1 below from the City of Palo Alto, Valley Water will develop a Park Improvement Ordinance (PIO), which will consider impacts to the Bay Trail during construction.	n/a

	We appreciate plans to open sections of trail when possible during the lifetime of the project. Robust communication will avoid confusion since this project spans multiple years with section of the trail opening up, only to be closed again due to the seasonal nature of the work.	The PIO will be reviewed by the City's Parks and Recreation Commission before consideration by the City Council.	
A-2	*Access to Detour/Alternative Route* We encourage the detour/alternative route to remain as accessible to different groups as possible, and as open as possible, during the duration of this project.	Valley Water agrees that detour routes need to remain as accessible to different groups as possible, and as open as possible, for the duration of the Project. The detour routes identified in Figure 4-9 utilize the Adobe Creek Loop Trail, Bay Trail, and trails in Byxbee Park. The Adobe Creek Loop Trail and Bay Trail along these detour routes are paved and flat. The trails in Byxbee Park are paved but with steeper grades over the park hillside; however, these trails provide an optional detour route and the Adobe Creek Loop Trail and Bay Trail can be used by trail users who wish to avoid steeper grades. Valley Water will continue coordination with the appropriate entities to ensure these detour routes remain accessible throughout construction.	n/a
A-3	*City of Palo Alto Sailing Station* Thank you also for addressing earlier questions about possible impacts of this construction project on the nearby City of Palo Alto Sailing Station (part of the SF Bay Water Trail, adjacent to the Bay Trail) that is used as a launch and landing site for a variety of non-motorized crafts (kayaks, canoes, kiteboards, other), by City of Palo Alto summer camps, and by individuals and groups engaging in recreation, education and research. Effects previously inquired about (when other Options C and D were still being considered) included possible silting, sediment transport, change in water flow/depth(s), and possible closures due to construction activity. Option F seems to be a less impactful one in this regard.	Valley Water appreciates the importance of maintaining access to the San Francisco Bay Water Trail and agrees the proposed Project avoids impacts to this important recreational resource.	n/a
Comment Letter B – Received from Enid Pearson via Email on September 23, 2020			
B-1	Has anyone even thought of leaving the current tide gates in place while the new tide gates are being built? This would allow people to continue to use the trail, otherwise, we are denied access for almost 3 years. Build the new gates on either side of the current gates and when the new gates are done, demolish the old ones.	As explained in greater detail in the Project Description, the existing tide gate structure will remain in place while the new tide gate structure is built. Due to the multiple essential functions of the Palo Alto Flood Basin (PAFB) and the tide gate structure, the new structure would be constructed and put into service prior to removal of the existing tide gate structure in order to maintain operation of a tide gate structure throughout the duration of	n/a

		construction. As a result, a portion of the existing levee including the trail would be excavated (removed) during the first phase of work, but construction of the new levee and trail connecting to the new structure could not be completed until the final phases of work. The proposed Project minimizes the duration of trail closure to the shortest duration feasible.	
Comment Letter C – Received from County of Santa Clara Roads and Airport Department via Email on October 7, 2020			
C-1	Proposed project should identify and mitigate any impacts on Oregon/Page Mill Expressway and other County facilities if they are used during the construction stage.	The Project does not propose use of Oregon/Page Mill Expressway by construction vehicles. Construction vehicles would access the Project area from San Antonio Road and Embarcadero Road via US-101.	n/a
C-2	In addition, provide Construction Truck Route for County to review if County facilities are included.	No County facilities are proposed for use by construction vehicles. Construction vehicles would access the Project area from San Antonio Road and Embarcadero Road via US-101.	n/a
Comment Letter D – Received from County of Santa Clara Parks and Recreation Department via Email on October 13, 2020			
D-1	Figure 2-5 identifies the proposed trail closures and associated trail routes. The Bay Trail routes are correctly featured on the map. The Anza Trail routes, which share the Bay Trail routes in this area, should also be identified on Figure 2-5 and described under the Project Description.	Figure 2-5, the Project description, and other relevant portions of the MND have been updated to reflect the presence of the Anza Trail coincident with the Bay Trail.	2-5, 2-13, 3-1
D-2	In Land Use & Planning (page 4-101), the Local Regulatory Setting references the City of Palo Alto Comprehensive Plan and the Palo Alto Baylands Master Plan. This section should also reference the Countywide Trails Plan, which is part of the Santa Clara County General Plan and serves as a guide for trail development, use, and management throughout the County. The Countywide Trails Plan states that "the policies are also intended to provide a coordinated vision for linking the existing trail plans and implementation efforts of individual jurisdictions and agencies within the County."	A description of the Countywide Trails Master Plan has been added to the Regulatory Setting section under Land Use & Planning.	4-101, 4-103
D-3	In Recreation (page 4-117), two trail networks are featured: the Bay Trail and the San Francisco Bay Area Water Trail. Future documents and associated figures (such as Figures 4-8, 4-9, and 4-10) should also describe and cite the Anza Trail, which follows the same route as the Bay Trail in the Project area.	A description of the Anza Trail has been added to the Recreation section of the MND. Figures 4-8, 4-9, and 4-10 have also modified to include reference to the Anza Trail.	4-117 to 4-123

D-4	In Recreation (page 4-120), the Project "would include installation of educational signage on the Adobe Creek Loop Trail to provide visitors with information." This proposed educational signage is related to Bay Trail segments and the flora and fauna of the Palo Alto Baylands. Educational signage (and trail route signage) should also reference and honor the Anza Trail segments which share the Bay Trail route in the Project area.	Valley Water is coordinating signage with the City of Palo Alto Baylands staff. During prior outreach efforts, community members expressed interest in the signage focusing on the unique flora and fauna of the Baylands. Valley Water will explore and may also include reference to the Anza Trail in the educational signage.	4-120
Comment Letter E – Received from the City of Palo Alto via Email on October 15, 2020			
E-1	A Park Improvement Ordinance is required for any "substantial building, construction, reconstruction or development upon or with respect to any lands so dedicated." The proposed project is a substantial reconstruction project within the Baylands Nature Preserve; therefore, a Park Improvement Ordinance is required for the proposed project. The City understands that Valley Water is working in coordination with the City's Community Services Department with respect to this requirement.	Valley Water will coordinate with the City of Palo Alto in obtaining a Park Improvement Ordinance. This requirement has been added to the list of public agency approval requirements in the environmental checklist form at the beginning of Chapter 4.	4-1
E-2	Valley Water or its contractor will be required to obtain a Building Permit for the proposed electrical work associated with this project.	Valley Water will coordinate with the City of Palo Alto in obtaining a Building Permit. This requirement has been added to the list of public agency approval requirements in the environmental checklist form at the beginning of Chapter 4.	4-1
E-3	Valley Water or its contractor will be required to obtain an Excavation and Grading Permit from the City of Palo Alto's Public Works Division. This permit will require information such as earthwork volumes; truck routes; traffic control plans for vehicles, pedestrians, and bicyclists; and a logistics plan.	Valley Water will coordinate with the City of Palo Alto in obtaining an Excavation and Grading Permit. This requirement has been added to the list of public agency approval requirements in the environmental checklist form at the beginning of Chapter 4.	4-1
E-4	As mentioned on Page 4-91, the project is within the Traffic Pattern Zone of the Palo Alto Airport. The MND concludes that operation of the proposed project would not impact Palo Alto Airport's Influence Area. The project site is within the traffic pattern zone of the Airport, and any increase in wildlife activity could present a safety hazard to aircraft in flight. FAA AC 150/5200-33C Hazardous Wildlife Attractants on or near Airports should be considered when making land use decisions in the project area.	Valley Water understands that an increase in wildlife activity, namely birds, within the Traffic Pattern Zone for the Palo Alto Airport could result in a safety hazard for aircraft. The Project does not involve permanent land use changes that would result in attraction of additional wildlife to the Project area, as the Project would not result in a net change in the wildlife habitat area. During construction, BMP BI-6 (*Minimize Predator Attraction*) and Mitigation Measure BIO-5 (*Install Raptor Perching Deterrents*)	n/a

		would be implemented to minimize attraction of birds and other wildlife to the Project area. Nevertheless, Valley Water will consider Federal Aviation Administration Advisory Circular 150/5200-33C regarding Hazardous Wildlife Attractants on or near airports.	
E-5	Construction activities (e.g. the use of cranes) could impact aircraft; the FAA may require permits for certain construction activities to ensure that there would not be an impact on aircraft. The discussion should be amended to include reference to potentially needing permits to complete the work. The City of Palo Alto recommends that Valley Water coordinate with the Federal Aviation Administration (FAA) to determine whether an FAA Obstruction Evaluation Form 7460-1 needs to be filed for construction equipment at the project site.	Reference to Federal Aviation Administration (FAA) requirements for an Obstruction Evaluation/Airport Airspace Analysis (Form 7460-1) has been added to the MND. Valley Water will coordinate with the FAA regarding this approval, if required.	1-2, 1-3, 4-1
E-6	The Palo Alto Flood Basin Hydrology report, dated July 2016, indicates that a majority of Palo Alto's surface runoff drains towards the flood basin (see Figures 6 and 7). However, this is not accurate; the MND is based on an outdated storm drain system. Palo Alto has constructed several capital improvement projects since 2007 to divert runoff away from Matadero Creek (and ultimately the flood basin) and into San Francisquito Creek. The projects were based on recommendations from Schaaf and Wheeler. Provide a supplemental memo that identifies the San Francisquito Creek Pump Station and the storm drainpipe upgrades along Channing and Lincoln Avenue or otherwise provide clarifications in the MND that includes these improvements.	Because the CEQA MND does not reference the 2016 PAFB Hydrology Report, Valley Water believes this comment was made based on review of other documents available from the Project website (https://www.valleywater.org/pafbtidegates). However, Valley Water has confirmed that the mentioned storm drain improvements (diversions to San Francisquito Creek) are indeed included in the PAFB hydrologic model. These can be seen in the model schematic on Page 12 of the report. Therefore, modifications to the MND are not necessary.	n/a
E-7	Page 13 of the Palo Alto Flood Basin (PAFB) Hydrology Report states that the Matadero Creek Pump Station has the capacity to discharge 266 cfs. The Matadero Creek pump station was recently reconstructed and the new station has a capacity of 400 cfs. This should, accordingly, be updated in a supplemental memo or in the MND.	Because the CEQA MND does not reference the 2016 PAFB Hydrology Report, Valley Water believes this comment was made based on review of other documents available from the Project website (https://www.valleywater.org/pafbtidegates). However, flows from Matadero Creek, including via the pump station, are not the controlling factor for the tide gate design. Adobe Creek and the overall PAFB stage (water level) controls the design and the increase from the Matadero Creek Pump Station does not affect the Project design. Therefore, modifications to the MND are not necessary.	n/a

E-8	Page 2-29, Option E discusses construction of flood walls along the creeks to prevent the Palo Alto residents from flooding. This option indicates that the Matadero Creek Pump station would need to be upgraded due to greater pumping requirements. The City of Palo Alto believes that this statement may be based on inaccurate information with respect to the current Pump Station's capacity. If this is the case, please update accordingly. Also, this station discharges directly into Matadero Creek, therefore it's unclear what benefits upsizing the pumping requirements would provide.	Due to unregulated tidal action into the flood basin, Option E would raise the 100-year water surface elevation in Matadero Creek, thus increasing the hydraulic head operating conditions for the pump station. Valley Water does not presently know if the pump station can operate under these worsened conditions. Given the current uncertainty, the MND has been updated to state that the pump station "may" require upgrades, rather than it "would" require upgrades.	2-29
E-9	Page 3-1, 4-95, indicates that the tributary drainage area is 32 square miles. This should be verified based on comments above regarding the SFC pump station, Palo Alto CIP projects and Mountain View's stormwater pump station discharge.	Per the response to Comment E-6 above, Valley Water has confirmed that the storm drain improvements (diversions to San Francisquito Creek) are included in the PAFB hydrologic model. The text on page 3-1 and 4-95 in the CEQA MND states that the tributary drainage area is "approximately" 32 square miles, which Valley Water believes is accurate.	n/a
E-10	Pages 4-94 and 4-134 of the MND indicate that the PAFB receives water from Adobe, Matadero and Barron Creek. These paragraphs should be modified to also include flows from Mountain View's Coast Casey pump station. In previous discussion with Mountain View they have provided maps to show the outfall flows into Adobe Creek within the Basin. The use of the tide gate is not limited to only Palo Alto.	The referenced text on page 4-94 and 4-134 of the MND has been revised to mention the additional input from the City of Mountain View's Coast Casey Pump Station.	4-96, 4-135
E-11	On Page 4-119, Figures 4.8 and 4.9 show a trail within the flood basin. It's not clear whether this is an actual trail for the public's use. If it is not a trail it should be removed.	The referenced line, which is shown perpendicular to Bayshore Road, is not a trail open for public use and has been removed from Figures 4-8, 4-9, and 4-10.	4-120, 4-122, 4-123
E-12	The Maps show in Figures 4.9 – 4.10 Trail Closure and Detours are acceptable for the MND. However, actual Traffic Control Plans with notes and more details will need to be prepared and submitted to Palo Alto for review and approval as part of the Grading and Excavation project. Additional changes may be required in particular if there are other construction projects in the vicinity.	Valley Water will continue to coordinate with the City as the Project progresses and will prepare Traffic Control Plans for City of Palo Alto review and approval as part of the Grading and Excavation Permit.	n/a
E-13	See page 4-134. Provide a reference to the existing sensor within the tide basin and adjacent to the structure. It serves to monitor the existing water level elevations within the creek and compare with tide elevation or upcoming rain events. If the tide gate is relocated	The MND has been revised to state that new water level sensors would be installed and put into service for the new structure prior to decommissioning the existing structure and sensors. The existing water level sensor adjacent to the tide gate structure	4-135

	and sensor no longer able to read access the elevation of the flood basin the sensor will need to be replaced and relocated. This should be included within Discussion section A.	would be replaced prior to decommissioning the existing sensor and structure. A temporary above-ground electrical conduit would be used during construction to service the new sensors. The conduit would be relocated to the new west approach levee as it is constructed. While there may be some intermittent downtime for the power and communication lines while they are relocated, installation would be coordinated to not impact the ability for the sluice gate to be operated as needed.	
Comment Letter F – Received from the San Francisco Bay Regional Water Quality Control Board via Email on October 15, 2020			
F-1	*Compensatory Mitigation Plan is not Included in the MND* The Project site has diverse habitat supporting many federal and State listed species in addition to other aquatic and wildlife biota, including Bryant's savannah sparrow (Passerculus sandwichensis alaudinus), Black skimmer (Rynchops niger), California Ridgway's rail (Rallus obsoletus Obsoletus), Salt marsh harvest mouse (Reithrodontomys raviventris raviventris) Green sturgeon (Acipenser medirostris), California Central Coast steelhead (Oncorhynchus mykiss), Longfin smelt (Spirinchus thaleichthys), and many other species noted in the draft MND. The preferred alternative would result in loss of 0.09 acre of salt marsh, would directly impact about 2.7 acre of open waters in the Flood Basin and tidal Bay waters, and would limit access for recreational uses of the trails and waters during construction. The draft MND indicates the temporal and permanent losses of wetlands and other waters due to the Project's impacts would be less than significant based on implementing mitigation measure (MM) BIO-9, Compensate for Impacts to Jurisdictional Wetlands. However, MM-BIO-9 does not adequately characterize mitigation to deem the impacts as less than significant. MM-BIO-9 indicates Valley Water would develop an aquatic resource mitigation plan, or might purchase wetland mitigation credits from an agency-approved mitigation bank, such as the San Francisco Bay Wetland Mitigation Bank located in Foster City. Neither of these mitigation frameworks contain sufficient detail to demonstrate that the Project's impacts would be offset or compensated adequately, so the MND does not comply with CEQA. Moreover, we would be unable to issue water quality certification for the Project without a complete mitigation plan that includes compensation for the Project's unavoidable	The Biological Resources section of the MND indicates that the Project's impacts to jurisdictional wetlands are potentially significant but would be reduced to a less than significant level through implementation of MM-BIO-9 (*Compensate for Impacts to Jurisdictional Wetlands*). MM-BIO-9 has been modified to specify that Valley Water will purchase credits from the San Francisco Bay Wetland Mitigation Bank located in Foster City at a 2:1 mitigation to permanent impact ratio to mitigate for the minor (0.09-acre) permanent loss of jurisdictional wetlands. The service territory for this bank covers the Project area and the bank has sufficient credits available for sale to cover the impacts of this Project. As stated in the MND, Valley Water would purchase these credits prior to the start of construction and provide proof of credit purchase to the appropriate environmental resource agencies, including the San Francisco Bay Regional Water Quality Control Board (RWQCB). Use of a mitigation bank was determined appropriate in light of U.S. Army Corps of Engineers (USACE) and State Water Resources Control Board (SWRCB) mitigation guidance. In 2008, the USACE issued revised regulations governing compensatory mitigation (33 CFR Part 332, Compensatory Mitigation for Losses of Aquatic Resources) which established a preference for the use of mitigation banks when appropriate credits are available. The SWRCB's State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (Procedures), adopted in April 2019, states "the environmentally preferable compensatory mitigation may be provided through mitigation banks or in-lieu fee programs because they usually involve consolidating compensatory	4-65

	impacts. The MND must be revised with sufficient detail of the mitigation approach and the finding of less than significant should be changed to "significant" or "less than significant with mitigation." For the approach to develop and implement an aquatic resource mitigation plan, the plan must address the temporal impacts to wetlands and other waters for the duration of the five-year construction period, in addition to the permanent loss of about 0.09 acre of salt marsh habitat. The plan must include, at a minimum, the mitigation site location and the types and areal extents of the mitigation wetlands and/or other waters, mitigation methods, interim performance and final success criteria, a monitoring program, and implementation schedule. The mitigation plan would also need to include measures to prevent the introduction or spread of plant pathogens, including Phytophthora spp. For the approach to mitigate with credit from an approved mitigation bank, the MND must specify such details as the exact name of the approved bank, whether the Project is in the bank's service area, and whether the bank has the mitigation credit type available. If the bank is an appropriate means to mitigate for the Project's impacts, Valley Water would need to submit proof of the credit purchase prior to us issuing the water quality certification.	mitigation projects where ecologically appropriate, consolidating resources, providing financial planning and scientific expertise (which often is not practical for permittee-responsible compensatory mitigation projects), reducing temporal losses of functions, and reducing uncertainty over project success." Given the small area of permanent impact and the uncertainties with creating and/or restoring tidal wetlands, use of mitigation bank credits were determined to provide the most certain ecological benefits.	
F-2	*Sea Level Rise and Other Potential Climate Change Impacts* The draft MND indicates that the Project will be designed for the projected sea level rise of two feet over the next 25 to 30 years. Though not mentioned in the draft MND, other projects in the area, such as the South Bay Salt Pond Restoration Project, and the South Bay Shoreline Levee Project, are being designed for the sea level rise projections through about 2067. Although the draft MND states that Valley Water will coordinate the Project with those other projects to "maximize efficiencies of long-term Bay shoreline planning," the draft MND is not clear on whether sea level rise projections for the Project are consistent with those of the other projects. The MND should be revised with a basis of design report to provide information on the life span of the Project in the face of sea level rise projections, and with additional details for coordinating with the other projects in progress or being planned in the area that must also incorporate protection against future sea level rise. For the basis of design report, please also provide	Comment noted. The proposed top of deck elevation for the new tide gate structure has been coordinated to be consistent and compatible with the South San Francisco Bay Shoreline Phase II Feasibility Study. The design of the tide gate will maintain consistency and compatibility regarding coastal flood protection against sea level rise. The design limitation of two feet of sea level rise mentioned in the MND is specifically due to fluvial flood protection, which is the ability to drain the PAFB into the Bay and maintain the current starting water surface elevations for Matadero, Adobe, and Barron Creeks. The tide gate structure is a passive drainage system, meaning that water in the PAFB only drains when it is at a higher elevation than the water in the Bay. As such, the lowest water surface elevation that the tide gates can drain from the PAFB to is equal to low tide. This is directly affected by sea level rise and is true regardless of the number and size of tide gates. Beyond two feet of sea level rise the confidence level to drain the basin to adequately accommodate	n/a

	details to address the potential for climate change effects on storm intensity and frequency that could affect fluvial flows in the three creeks that drain to the Flood Basin. For purposes of CEQA, the design criteria for sea level rise projections and potential climate change effects on creek flows should be included in the MND to inform the selection of the preferred alternative. The Water Board will also require a basis of design report with the water quality certification application.	the 100-year storm event is reduced. Additional capacity for sea level rise beyond two feet, as well as any potential increases to the 100-year storm event due to climate change can be accommodated by the future addition of a pump station to assist in draining the PAFB. Valley Water will provide an alternatives analysis consistent with the Procedures and Section 404(b)(1) of the Clean Water Act with the application for water quality certification. After consideration of six alternatives in the draft alternatives analysis, only two alternatives met the screening criteria related to the Project purpose and feasibility: Alternative C (Replace Tide Gate Structure Adjacent to Existing Tide Gate on Levee) and Alternative F (Proposed Project). The Proposed Project was determined to be the least environmentally damaging practicable alternative (LEDPA) given it resulted in the fewest permanent impacts to waters of the United States/State and special-status species habitat by avoiding impacts on Hooks Island during Project operation. A Planning Study Report is currently available on the Project website at https://www.valleywater.org/pafbtidegates.	
F-3	*Dewatering Plan Impacts* The draft MND indicates that effects of dewatering would be less than significant because MM-BIO-8 implementation includes rescuing and relocating fish and other aquatic biota. We disagree with the finding of less than significant because the draft MND does not provide a complete dewatering plan, and because other aspects of dewatering are not addressed through BIO-8. A complete plan includes a schematic diagram of the dewatering pipes and pumps; specifications for pumps, pipelines, and fish screens consistent with National Marine Fisheries Service and California Department of Fish and Wildlife guidelines to prevent impacts to fish and other aquatic biota (in addition to the details already provided in the draft MND such as phased implementation schedule). If water needs to be contained for discharge later, Valley Water must monitor the discharge to ensure the water meets the Basin Plan receiving water criteria for temperature, dissolved oxygen, and dissolved sulfide, and we recommend	Comment noted. The dewatering process described in the MND included a two-phase dewatering approach whereby dewatering is accomplished through installation of steel sheet pile walls around the work area (completed at low tide), pumping of water out of the walled-off area and into a holding tank for sediment settlement, then discharged of water to either the Bay or flood basin. In addition, to prevent impacts to fish during dewatering, Valley Water would implement BMP WQ-1 which provides "pump intakes will be screened to prevent uptake of fish and other vertebrates. Pumps will be screened according to NMFS criteria." The MND provides sufficient level of detail for evaluating the impacts of dewatering and the analysis supports the less-than-significant impact conclusion under CEQA. However, based on experience with other Section 401 water quality certifications from the RWQCB for other projects, Valley Water expects that the RWQCB will require a detailed dewatering plan as a condition of the water quality certification to be submitted to the RWQCB for review and approval. The dewatering plan would include design	n/a

	Valley Water follow the dewatering and monitoring procedures in your Stream Maintenance Program, which the Water Board authorized with adoption of Order No. R2-2020-0017. In addition, while the dewatering systems are installed, Valley Water should monitor for potential adverse effects due to changes in hydraulics in the vicinity of the dewatering systems. (See also comment 6.b below on this topic). Accordingly, the MND should be revised with additional details for the dewatering plan to ensure entrainment of fish and other biota, and other water quality impacts, would be avoided or minimized.	plans and would specify the dewatering methods, schedule, and materials (e.g., pump and pipe sizing). The dewatering plan would also include procedures for monitoring water quality (i.e., temperature, dissolved oxygen, and dissolved sulfide) in receiving waters of dewatering discharge, consistent with the procedures in the Stream Maintenance Program (SMP; Attachment E to the SMP Manual). Discharged water would meet the receiving water criteria stipulated in the Project's permits. Regarding monitoring of potential effects to hydraulics in the vicinity of the dewatering systems, refer to comment F-6 below.	
F-4	*Compliance with the Stormwater Pollution Prevention Requirements* The draft MND correctly states in the Initial Study, Hydrology and Water Quality section, that Valley Water will need to seek coverage under and comply with the statewide NPDES General Permit for Discharges of Stormwater Associated with Construction Activity (Order No. DWQ-2009-0009, as amended by Order Nos. 2010-0014-DWQ and 2012-006-DWQ) (Construction Stormwater Permit) to construct the Project (p. 4-97). Through complying with the Construction General Permit, many impact and avoidance best management practices would be implemented, including (but not limited to): measures for daily good housekeeping; preventing vehicular fluid spills and leaks into wetlands or other waters; sedimentation and erosion from Project activities; management of soil stockpiles; and preparing for and preventing potential impacts of rainfall in the Project area. Please revise the MND, Table 1.1 to indicate that the Project will comply with the Construction General Permit. In addition, please note that the gravel and geotextile layer that will be used to resurface 2.3 acres of trails will need to be removed after each construction season. This should be addressed in the site plans and activities required under the Construction General Permit. If Valley Water intends to keep the gravel and geotextile in place for the duration of the Project, we would require additional information and modified designs, acceptable to the Water Board Executive Officer, for the Project to meet requirements under	Table 1-1 in the MND has been updated to reflect compliance with the Construction General Permit. Regarding the levee trail surface improvements, the purpose of these improvements is to smooth the surface and increase the load bearing capacity of the trail for construction vehicles and equipment. The trail surface improvements would constitute resurfacing the existing compacted gravel surface. The proposed gravel is similar to the gravel already installed on the existing levee trail surface and the geotextile fabric is a porous fabric. There would be no change in the area of impervious surfaces and the gravel and geofabric can remain in place permanently as part of the trail surface. Furthermore, the activity duration to perform both the installation and removal of this trail surface could potentially require close to the entire 5-month work season to complete, significantly reducing the ability to perform any other work activities and extending the duration of construction. Therefore, the trail improvements would be maintained throughout the duration of construction and remain in place following construction.	1-3

	Provision C.3 of the NPDES Stormwater Municipal Regional Permit (MRP), Order No. R2-2015-0049 (NPDES Permit No. CAS612008).		
F-5	*Beneficial Soil Beneficial Reuse Options* The draft MND indicates that excavated soil would be tested and reused in the South Bay Shoreline Project sites, provided the soil quality meets the South Bay Salt Pond reuse standards, and cites the 2018 Quality Assurance Project Plan dated 2018 (p. 2-10). Water Board and other agency staffs are reviewing soil reuse criteria and will likely revise the QAPP. Please coordinate with Water Board staff to ensure the most recent QAPP criteria would be followed for the duration of Project construction.	Valley Water will coordinate with RWQCB staff to ensure the most recent Quality Assurance Project Plan criteria are followed for excavated soils.	n/a
F-6	*Emergency Action Plan and Adaptive Management Monitoring and Actions* a. Emergency Action Plan. The draft MND states that "An Emergency Action Plan has been prepared in case the existing structure fails during the planning, design, or construction phase of the replacement Project." (p. 2-28) Please provide the Emergency Action Plan for us to evaluate how the plan would affect the Project activities and potential discharges of dredged, excavated, or fill materials, or pollutants to wetlands or other waters of the State. The Emergency Action Plan should include the key features that would be monitored during and after the Project is constructed and triggers to execute emergency actions, and what those emergency actions would be. b. Adaptive Management. Aspects of the Project would need to be subject to periodic monitoring and potential need for adaptive management measures to avoid emergency conditions. For example, the preferred alternative includes excavating a pilot channel measuring 200-feet long with a varying width of 132-feet wide at the outlet of the proposed tide gate structure and tapering to 60-feet wide at the end to facilitate outward flow from the new tide gate structure to the existing channel. (p. 2-30 4-97; and Appendix B, Biological Assessment, p. 16) The pilot channel would be designed to prevent erosion at Hook's Island shoreline. Therefore, we require Valley Water to develop and implement an adaptive management plan with details for monitoring sites,	a) The Emergency Action Plan (EAP), which is for the entire flood basin and not the tide gate structure specifically, is available on the Project website at https://www.valleywater.org/pafbtidegates. Section 2.5, *Emergency Remedial Actions*, of the EAP is intended to identify a suite of potential responses to delay, moderate, or prevent flooding from any situation that arises in the PAFB, including potential damage to the tide gate structure. Some emergency remedial actions (e.g., addressing levee erosion or repairs to the tide gate structure), if implemented, have the potential to result in discharge of dredged, excavated, or fill materials to waters of the United States/State. Valley Water would obtain the required authorizations, including emergency permits, for any remedial actions should they become necessary. Monitoring in the EAP is focused on the risk of flooding to the local communities (i.e., water level in the PAFB), and actions to address emergencies are unique to each situation and not detailed in the EAP. The EAP and the associated emergency responses are independent from this Project and would not affect how this Project would affect wetlands or waters of the United States/State. b) Regarding adaptive management, Valley Water does not propose to develop an adaptive management plan to account for potential impacts to Hooks Island or emergency conditions, as the likelihood of any impacts are negligible. Valley Water conducted hydrologic modeling for the operational condition of	2-27, 2-28, 4-67, 4-82, 4-83, 4-101, Appendix E

	procedures, and potential emergency prevention actions (such as shoreline stabilization measures consistent with Valley Water's SMP). In addition, the multiagency meeting of June 27, 2018, included a discussion for the environmental review to include a hydraulics analysis to inform the potential effects of the dewatering system, but this was not included in the draft MND. Please revise the MND with the pertinent information for monitoring and adaptive management of the Project to track the stability and integrity of Project elements and the potential for corrective actions.	Option C (Replace Tide Gate Structure Adjacent to Existing Tide Gate on Levee) due to the potential erosional impacts from that option, which is included in Appendix E to the MND (Potential Erosional Impacts Report). The potential for erosion for Option C was evaluated in detail given the operational condition of this option directed flows at Hooks Island, which could cause erosion on the edge of the island. Based on these findings, Valley Water modified the Project to the orient the tide gate structure such that flows are directed to the existing tidal channel. The pilot channel is intended to facilitate the initial flow to the existing tidal channel, but does not need to redirect flow given the structures orientation. The tide gate structure under the proposed Project is also approximately 100 feet further south of Hooks Island than under Option C, further reducing the likelihood of erosion during Project operation. In response to the RWQCB's comment regarding potential erosional impacts during dewatering, Valley Water conducted hydrodynamic modeling to update the Potential Erosional Impacts Report (Appendix E) to evaluate potential erosion on Hooks Island during construction. The results showed that any increases in flow velocities with potential to impact Hooks Island would be minor and brief. The greatest increase in flow velocities during the temporary dewatering condition would occur within the unvegetated portion of the channel. Any local scour to unvegetated substrate that occurs in this area is expected to naturally restore to pre-Project conditions shortly after removal of the dewatering system. Along the vegetated edge of Hooks Island, velocities only negligibly increase from the existing condition and the magnitude of these velocities remain low (less than 0.5 feet per second). It is also important to consider that the increased velocities were greatest during larger and infrequent storm events, so it is possible that even if some short term channel incision occurs, there may be enough time between storm events for the channel to return to its existing condition. In addition, if the channel does incise in the unvegetated channel, this would increase the cross-sectional area of the channel, further alleviating hydrologic pressures on Hooks Island. Therefore, the erosion impacts of the Project on Hooks Island would be less than significant and no mitigation would be	

		required. However, Valley Water heard the Regional Board's concerns and has included an avoidance and minimization measure, labeled as BMP BI-9, to the Project description to provide monitoring to confirm erosion is not occurring as a result of dewatering. BMP BI-9 requires that Valley Water visually monitor the Project area for erosion during dewatering, and in the highly unlikely event that erosion of Hooks Island occurs, Valley Water would consult with the environmental regulatory agencies including the RWQCB to determine the appropriate action to address the condition.	
F-7	Comments on Specific Best Management Practices (BMPs) The draft MND has a variety of BMPs at Table 2.4 to avoid and minimize impacts to wetlands and other waters of the State in the Project, some of which would be covered under the Construction General Permit. Please revise the MND to address the following issues: a. BMP BI-2, Avoid impacts to nesting migratory birds. This BMP would entail nesting bird surveys to be performed by a qualified biologist during the bird nesting season (January 15 to September 1) prior to any activity that could result in the abandonment, loss, damage, or destruction of birds, bird nests, or nesting migratory birds. If a lapse in Project-related work of 15 days or longer occurs, another survey would be conducted. This BMP may not be protective of migratory birds, and thus the WILD beneficial use, if the area surveyed exceeds the area where construction activities occur during a 15 day period. We recommend Valley Water consult with California Department of Fish and Wildlife and U.S. Fish and Wildlife Service, if such a consultation has not yet occurred, to verify whether an area should be resurveyed at least every 15 days even if there is no lag in work activities were to occur. b.BMP BI-8, Minimize Spread of Invasive Plants. Please clarify if this BMP would include measures to prevent the introduction or spread of Phytophthora spp. in addition to weeds mentioned in items 1 through 3 of this BMP. c.BMP WQ-4, Isolate Work in Tidal Areas with Use of Coffer Dam. This BMP includes a description of the dewatering plan in which the work area would be isolated and the ambient water would flow	a) As stated in the Project description, construction is scheduled from September 1 through January 31, which is largely outside of the bird nesting period (January 15 to September 1). Given construction would already be active when the migratory bird nesting season begins on January 15, birds would either avoid the area for nesting or be undisturbed by the on-going construction activities. However, as noted, Valley Water would still implement BMP BI-2 which requires nesting bird surveys not exceeding 15 days prior to construction. The California Department of Fish and Wildlife provided comments on the draft MND and did not raise concerns with this BMP. In addition, Valley Water will consult and coordinate with the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife during the permitting process regarding protection of nesting birds. Valley Water will remain in compliance with all permits and approvals, including conditions that relate to nesting birds and required surveys. b) BMP BI-8 has been updated to include that Valley Water will "implement all appropriate measures from the guidelines of the Working Group for Phytophthoras in Native Habitats (www.calphytos.org) to minimize the potential spread of Phytophthora plant pathogens to the maximum extent practicable." c) See response to Comment F-3 above. d) Comment noted. The Project is subject to the Construction General Permit and Valley Water would comply with the applicable requirements of this permit.	2-22, 2-25

	past the work area. See Comment 3, above pertaining to additional details needed for a complete dewatering plan. d.BMP WQ-10, Prevent Stormwater Pollution. In addition to the measures listed in this BMP, compliance with the Construction General Permit requirements will entail the measures noted in the BMP and many other pollution prevention measures. (See Comment 3 above.)		
F-8	In conclusion, the draft MND should be revised and recirculated to provide the opportunity for public review of the mitigation plan and the other changes necessary for a complete MND that meets CEQA requirements, before a final MND is adopted.	While the MND was revised to address and incorporate public comments as appropriate, CEQA Guidelines Section 15073.5(a) requires recirculation of an ND/MND only when the document must be substantially revised. A "substantial revision" means (1) a new avoidable significant effect is identified and mitigation measures or project revisions must be added to reduce that effect to insignificance; or (2) the lead agency determines that the proposed mitigation measures or project revisions will not reduce potential effects to less than significance and new measures or revisions must be required. Neither of the two specified conditions have occurred in this case. Rather, the revisions were made in the final MND in response to public comments on the Project's effects and the new information was added to clarify, amplify or make insignificant modifications to the draft MND (CEQA Guidelines Section 15073.5(c))	
Comment Letter G – Received from the California Department of Fish and Wildlife (Bay-Delta Region) via Email on October 20, 2020			
G-1	*Recommended Minimization Measure: California Black Rail and California Ridgway's Rail Surveys* Please be advised that impacts to California black rail (CBR) and California Ridgway's rail (CRR) must be fully avoided. In addition to the measures included in the MND that may minimize impacts, CDFW recommends that a survey be conducted on January 15 (or at least within two days of this date) if Project activities occur within 700 feet of CBR/CRR habitat during the rail breeding seasons which are from February 1 to September 1 for CBR and CRR. The listening stations should be established at 150-meter intervals along road, trails, and levees that will be affected by Project implementation. CBR and CRR vocalization recordings should be played at each station. If there is a lapse in work of more than 24	No work is scheduled to occur during rail breeding season to avoid impacts to nesting rails. The MND defines the rail breeding season as from February 1 to August 31, (rather than February 1 to September 1, as commented) which is consistent with recent Biological Opinion's issued by the USFWS. Given construction would be limited to the non-breeding season, surveys for rails are not proposed.	n/a

	hours, another pre-construction callback survey should be conducted. For CBR, each listening station should be occupied for one minute of passive listening, one minute of "grr" calls followed by 30 seconds of "ki-ki-krrr" calls, then followed by another 3.5 minutes of passive listening. For CRR, each listening station should be occupied for a period of 10 minutes, followed by one minute of playing CRR vocalization recordings, then followed by one additional minute of listening. Sunrise surveys should begin 60 minutes before sunrise and conclude 75 minutes after sunrise (or until presence is detected). Sunset surveys should begin 75 minutes before sunset and conclude 60 minutes after sunset (or until presence is detected). Surveys should not be conducted when tides are greater than 4.5 NGVD. A GPS receiver should be used to identify call location and distance. The call type, location, distance, and time should be recorded on a data sheet. If CBR/CRR are detected through surveys, then Project activities should not occur within 700 feet of an identified calling center. If the activity occurs where the Project site is across a major channel or slough from the Project site greater than 700 feet in distance, the activity may continue. If bird activity is surveyed or discovered within the buffer limits immediate consultation with CDFW is required. If a CRR or CBR is observed within the Project area at any time, work should be stopped immediately by a qualified biologist and the rail species should be allowed to leave the area on its own. If the rail species does not leave the area, then no work should commence until CDFW has made a determination on how to proceed with work activities. Daily monitoring surveys of Project sites should occur for CRR and CBR until the Project is complete. If an injured or dead CCR or CBR is discovered at the Project sites, consultation with CDFW is required immediately.		
G-2	*Recommended Mitigation Measure: Burrowing Owl Surveys* Although the MND provides some measures to minimize impacts, CDFW recommends that a qualified biologist conduct surveys following the California Department of Fish and Game (now	Information required by the 2012 Staff Report on Burrowing Owl (BUOW) Mitigation, Appendix C - Habitat Assessment and Reporting Details, was provided in the Biological Site Assessment (Appendix B of the MND). The Staff Report requires that following a habitat assessment, BUOW surveys be	4-53

	CDFW) 2012 Staff Report on Burrowing Owl Mitigation survey methodology (see https://wildlife.ca.gov/Conservation/Survey-Protocols#377281284-birds). Surveys should l encompass the Project area and a sufficient buffer zone to detect owls nearby that may be impacted. Time lapses between surveys or Project activities should trigger subsequent surveys including but not limited to a final survey within 24 hours prior to ground disturbance before construction equipment mobilizes to the Project area. The qualified biologist should have a minimum of two years of experience implementing the CDFW 2012 survey methodology resulting in detections. Detected burrowing owls should be avoided pursuant to the buffer zone prescribed in the CDFW 2012 Staff Report, unless otherwise approved in writing by CDFW, and any eviction plan should be subject to CDFW review. Please be advised that CDFW does not consider eviction of burrowing owls (i.e., passive removal of an owl from its burrow or other shelter) as a "take" avoidance, minimization, or mitigation measure; therefore, off-site habitat compensation should be included in the eviction plan.	conducted when BUOW habitat is encountered on or within 150 meters of a project site. Appendix B of the Staff Report defines BUOW habitat as "short or sparse vegetation, presence of burrows, burrow surrogates or presence of fossorial mammal dens, well-drained soils, and abundant and available prey." According to the Staff Report, "occupancy is confirmed at a site when at least one BUOW, or its sign at a burrow entrance, is observed within the last three years." The most recent records of nesting or wintering BUOW within 150 meters of the Project area were in 2005 and 2008, respectively. The Project area lacks ground squirrel burrows for nest sites, and upland vegetation along the levee roads is tall, ruderal grass which does not provide suitable nesting or foraging habitat for burrowing owls. Vegetation along the levee was overgrown at each site visit conducted by Valley Water biologists in 2018, 2019, and 2020, making the habitat unsuitable for burrowing owl nesting. Because suitable BUOW nesting or wintering habitat has not been present in recent years, and because the last observation of a BUOW within 150 meters of the Project site was of one wintering adult in 2008, Valley Water is maintaining MM-BIO-6 as described in the MND, with a qualified biologist conducting a pre-activity survey no more than seven days prior to the initiation of Project activities in each work season. If wintering BUOW are detected at that time, Valley Water will notify CDFW and coordinate with CDFW to determine the appropriate course of action to ensure any wintering burrowing owls are not impacted as a result of Project activities (no work is scheduled to occur during BUOW nesting season). However, the survey area in MM-BIO-6 has been changed from "within 250 feet of suitable habitat" to "within 150 meters of the Project site," consistent with the Staff Report. The recommended 250-foot no-disturbance buffer has also been changed to "an appropriate no-disturbance buffer (based on setback recommendations in the CDFW 2012 Staff Report on Burrowing Owl Mitigation)."	
G-3	*Salt Marsh Harvest Mouse and Salt Marsh Wandering Shrew* In the MND, MM-BIO-7 is described as developing an avoidance and mitigation measure that would include preconstruction surveys and installation of Environmentally Sensitive Area (ESA) fencing.	MM-BIO-7 has been updated to reflect that a fencing plan will be submitted to CDFW and USFWS for review and approval prior to installation. Valley Water concurs with the recommendations described in this comment, which have been incorporated into MM-BIO-7, with one exception: that a "designated individual"	4-55, 4-56

	CDFW recommends that a fencing plan be submitted for review and approval prior to initiation of construction activities. Additionally, no Project activities should occur within 50 feet of suitable tidal marsh habitat for salt marsh harvest mouse (Reithrodontomys raviventris; SMHM) within 2 hours before and after an extreme high tide event (6.5 feet or higher measured at the Golden Gate Bridge and adjusted to the timing of local tides) or when adjacent marsh is flooded unless SMHM-proof exclusion fencing has been installed around the work area. Prior to impacting saltmarsh habitat, an approved qualified biologist familiar with SMHM, should walk through and inspect suitable habitat prior to vegetation removal and search for signs of harvest mice or other sensitive wildlife and plant species. Following inspection, personnel, under the supervision of the qualified biologist, should disturb (e.g., flush) vegetation to force movement of SMHM into adjacent marsh areas. Immediately following vegetation flushing, personnel, under the supervision of the qualified biologist should remove vegetation with hand tools (e.g., weed-eater, hoe, rake, trowel, shovel, grazing) so that vegetation is no taller than two inches. After vegetation removal, a mouse proof barrier should be placed along the edge of the area removed of vegetation to further reduce the likelihood of SMHM returning to the area prior to construction. The fence should be made of a heavy plastic sheeting material that does not allow SMHM to pass through or climb, and the bottom should be buried to a depth of four inches so that the SMHM cannot crawl under the fence. Fence height should be at least 12 inches higher than the highest adjacent vegetation with a maximum height of four feet. All supports for the exclusion fencing should be placed on the inside of the work area and an approximately 2- to 3- foot wide de-vegetated buffer should be created along the habitat side of the exclusion fence. The qualified biologist or biological monitor should daily inspect the integrity of the exclusion fencing to ensure that there are no gaps, tears, or damage. Maintenance of the fencing should be conducted as needed.	inspect the integrity of the exclusion fencing daily rather than a biologist, as recommended. Inspection of the integrity of exclusion fencing does not require biological expertise. Language has been added to MM-BIO-7 stating that “fence height should be at least two feet high but no higher than four feet,” consistent with recent Biological Opinion’s issued by the USFWS.	
G-4	*Wetlands, MM-BIO-9* The MND states that Valley Water will “develop an aquatic resource mitigation plan, subject to approval by the USACE and	Per comment F-1 above, MM-BIO-9 has been updated to specify that mitigation would occur through the purchase of mitigation bank credits. MM-BIO-9 states that proof of credit purchase will	4-66

	RWQCB." CDFW recommends that this measure be updated to include CDFW's review and approval of the plan.	be provided to the USACE, RWQCB, and CDFW prior to the start of construction.	
G-5	*Table 4-7 Special-Status Animal Species* Please note that Tricolored blackbird (Agelaius tricolor) is listed in the MND as State Candidate (SCE) species but should be listed as State Threatened (ST) in Table 4-7.	The listing status of tricolored blackbird in Table 4-7 has been updated to State Threatened (ST).	4-43