Marin County Flood Control District
Santa Venetia
Flood Control Zone 7

Advisory Board Meeting

August 6, 2020

Slides for agenda item 6

Gallinas Levee Upgrade Project- Engineering and Funding Updates

https://www.marinwatersheds.org/resources/projects/gallinas-levee-upgrade-project

PROJECT MILESTONE	DATE
County Surveyors create plots of properties with or adjacent to the levee	2006 - 2008
Complete Levee Evaluation in Partnership with Army Corps of Engineers	2008 - 2014
Gallinas Watershed Program	2008 - 2017
Apply for $400k FEMA Grant to raise lowest portions of Timber-Reinforced Berm (about 10% of TRB)	2016
First grant application denied due to project benefit being too short-term and incomplete	2016
Apply for $3M FEMA grant for replacing full length of TRB	2017
FEMA consultant completes National Environmental Policy Act (NEPA) review for TRB project	2017 - 2020
Apply for $110k through State Coastal Conservancy Advancing Nature/Based Adaptation grant	April 2019
Aerial topographic survey of levee	June - July 2019
State Coastal Conservancy Advancing Nature/Based Adaptation denies grant	August 2019
California Environmental Quality Act (CEQA) Initial Study/Mitigated Negative Declaration	July - October 2019
Easement acquisition process and Q&A posted to website	September 2019
FEMA Awards $3M Hazard Mitigation Grant	February 2020
Draft Flood Barrier Study Technical Memo	June 2020
Draft Engineer's Report for Levee Project Benefit Assessment District	August 2020

PROJECT MILESTONE	DATE
Finalize Flood Barrier Study Technical Memorandum	August 2020
Finalize Benefit Assessment Engineer's Report	August 2020
Prepare Construction Plans and Specifications	August 2020 - April 2021
Town Hall / Z7 Advisory Board meeting to consider recommending sending a ballot for benefit assessment	September 15-17, 2020
District BOS to consider Resolution of Intention and Resolution Preliminarily Approving Engineer's Report. Set the date and time for Public Hearing.	October 20, 2020
Mail assessment ballots to property owners	By October 23, 2020
Environmental Permitting	November 2020 - February 2021
District BOS Conducts Public Hearing and opens ballots (tabulation); considers Resolution Adopting Engineer's Report, Confirming the Assessment, and Ordering the Work.	December 15, 2020
Easement Acquisition Process	December 2020 - May 2021
Advertise Construction Contract to Potential Bidders	May 2021 - June 2021
Reconstruct Timber-Reinforced Berm	June 2021 - November 2022
Grant Closeout Process	November 2022 - February 2023

Marin County Flood Control and Water Conservation District

Gallinas Levee Upgrade Project
Flood Barrier Study

FINAL DRAFT Technical Memorandum

June 2020

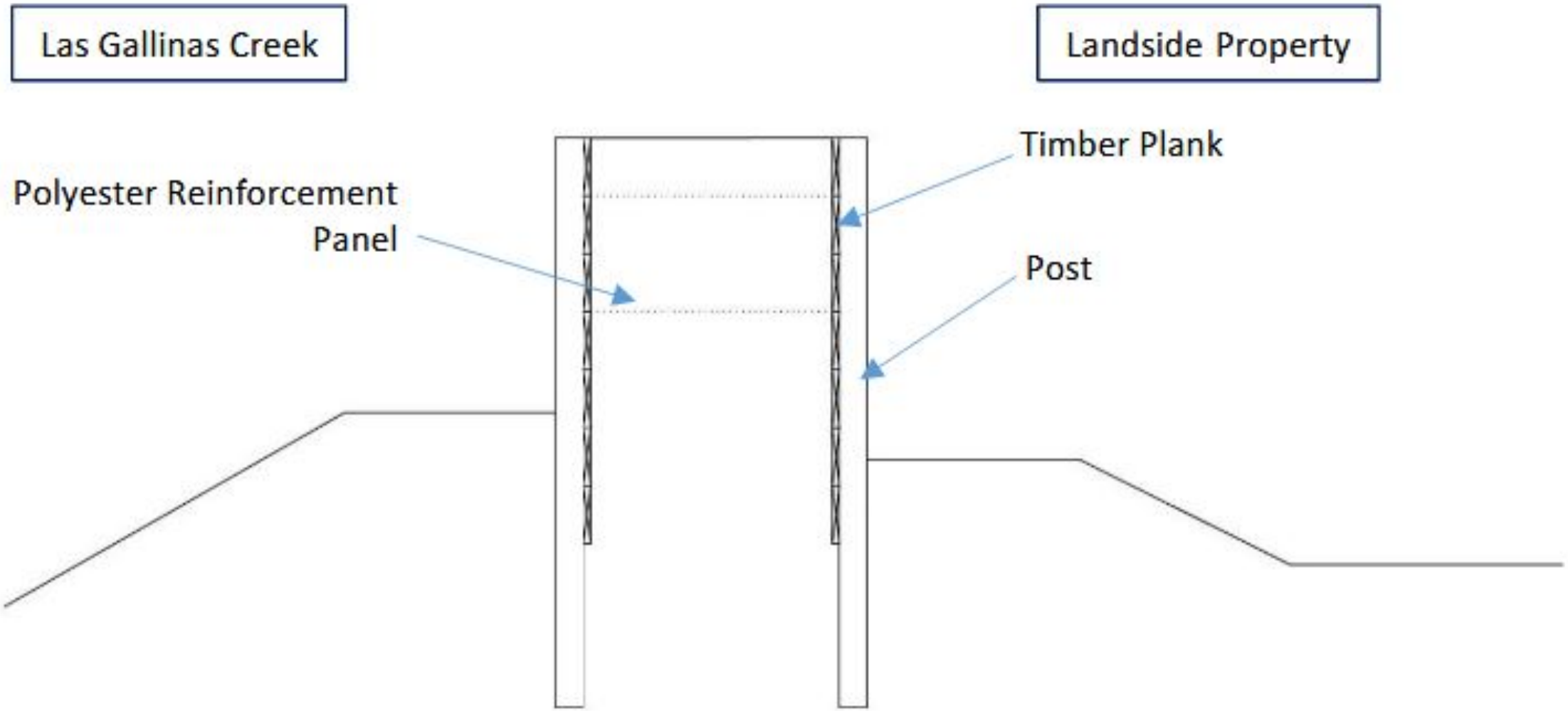

Figure 3-2: Timber Reinforced Berm Cross Section

Figure 3-3: Steel Tieback

Figure 3-4: Polyester Panels (Geogrid)

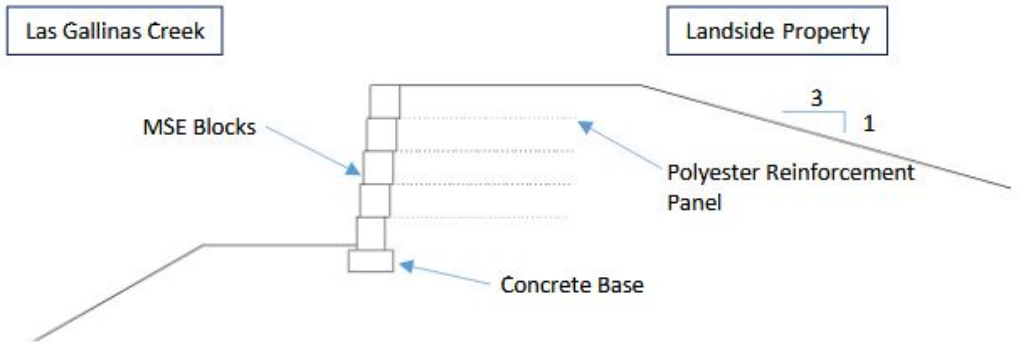

Figure 3-7: Mechanically Stabilized Earth Wall Cross Section

MSE walls can be found in all applications that require a retaining wall, including waterways. The blocks are placed on a small concrete foundation and embedded approximately 2 feet to mitigate soil erosion. The blocks and backfill are installed in layers with a final layer of topping block. See Figure 3-8 for a sample block, and Figure 3-9 for an example of an MSE block wall used as a creek liner.

Figure 3-8: Sample MSE Block

Figure 3-12: Sheet Pile Flood Wall

100-year Water Surface Elevation (NAVD88)		2050 Projected Sea Level Rise from OPC (published 2018)		Land Subsidence Estimates from 1990-2012 data by Kleinfelder (2018)	
USACE 2013	FEMA 2016	Low-end 66% Probability	1 in 200 Chance	Low	High
9.1	9.8	0.6	1.9	0.8	1

Table 2-1: Summary of Range of Elevation Design Criteria Factors

Selecting values from Table 2-1 results in a range of 10.45 to 12.7 feet NAVD88 as potential target design elevations that would meet the overall objective of providing 100-year flood protection over a 30-year design life. The alternatives analysis in this study is based on two different flood barrier elevation design criteria: 11 feet and 12.5 feet.

The 11-foot elevation alternative considers the following components:

- The USACE 100-year flood elevation (9.1 feet NAVD88)
- The median value of OPC 2018 66% probability for SLR (0.9 feet)
- The high end of the settlement projection range (1 foot)

The 12.5-foot elevation alternative considers the following components:

- The FEMA 100-year flood elevation (9.8 feet)
- The median between OPC 2018 5% probability and 0.5% probability SLR, which corresponds to the County of Marin's 2017 BayWAVE Vulnerability Analysis SLR estimate (1.7 feet)
- The high end of the settlement projection range (1 foot)

TABLE 1: Projected Sea-Level Rise (in feet) for San Francisco

Probabilistic projections for the height of sea-level rise shown below, along with the H++ scenario (depicted in blue in the far right column), as seen in the Rising Seas Report. The H++ projection is a single scenario and does not have an associated likelihood of occurrence as do the probabilistic projections. Probabilistic projections are with respect to a baseline of the year 2000, or more specifically the average relative sea level over 1991 - 2009. High emissions represents RCP 8.5; low emissions represents RCP 2.6. ***Recommended projections for use in low, medium-high and extreme risk aversion decisions are outlined in blue boxes below.***

		Probabilistic Projections (in feet) (based on Kopp et al. 2014)					H++ scenario (Sweet et al. 2017) *Single scenario
		MEDIAN	LIKELY RANGE		1-IN-20 CHANCE	1-IN-200 CHANCE	
		50% probability sea-level rise meets or exceeds...	66% probability sea-level rise is between...		5% probability sea-level rise meets or exceeds...	0.5% probability sea-level rise meets or exceeds...	
				Low Risk Aversion		Medium - High Risk Aversion	Extreme Risk Aversion
High emissions	2030	0.4	0.3 -	0.5	0.6	0.8	1.0
	2040	0.6	0.5 -	0.8	1.0	1.3	1.8
	2050	0.9	0.6 -	1.1	1.4	1.9	2.7
Low emissions	2060	1.0	0.6 -	1.3	1.6	2.4	
High emissions	2060	1.1	0.8 -	1.5	1.8	2.6	3.9
Low emissions	2070	1.1	0.8 -	1.5	1.9	3.1	
High emissions	2070	1.4	1.0 -	1.9	2.4	3.5	5.2
Low emissions	2080	1.3	0.9 -	1.8	2.3	3.9	
High emissions	2080	1.7	1.2 -	2.4	3.0	4.5	6.6
Low emissions	2090	1.4	1.0 -	2.1	2.8	4.7	
High emissions	2090	2.1	1.4 -	2.9	3.6	5.6	8.3
Low emissions	2100	1.6	1.0 -	2.4	3.2	5.7	
High emissions	2100	2.5	1.6 -	3.4	4.4	6.9	10.2
Low emissions	2110*	1.7	1.2 -	2.5	3.4	6.3	
High emissions	2110*	2.6	1.9 -	3.5	4.5	7.3	11.9
Low emissions	2120	1.9	1.2 -	2.8	3.9	7.4	
High emissions	2120	3	2.2 -	4.1	5.2	8.6	14.2
Low emissions	2130	2.1	1.3 -	3.1	4.4	8.5	
High emissions	2130	3.3	2.4 -	4.6	6.0	10.0	16.6
Low emissions	2140	2.2	1.3 -	3.4	4.9	9.7	
High emissions	2140	3.7	2.6 -	5.2	6.8	11.4	19.1
Low emissions	2150	2.4	1.3 -	3.8	5.5	11.0	
High emissions	2150	4.1	2.8 -	5.8	5.7	13.0	21.9

**Most of the available climate model experiments do not extend beyond 2100. The resulting reduction in model availability causes a small dip in projections between 2100 and 2110, as well as a shift in uncertainty estimates (see Kopp et al. 2014). Use of 2110 projections should be done with caution and with acknowledgement of increased uncertainty around these projections.*

Table 3-1: Summary of Cost Estimate

	Elevation 11 Feet	Elevation 12.5 Feet
Alternate	Cost (Total)	Cost (Total)
1A: TRB (Pressure Treated)	$2,000,000	$2,500,000
1B: TRB (Plastic Lumber)	$3,100,000	$3,800,000
2: MSE Blocks	$6,100,000	$8,900,000
3: Sheet Pile	$8,800,000	$9,900,000

Table 4-1: Summary of Alternatives and Goals

Alternative	Elevation	Budget	Service Life	Expandability
1A: TRB (Pressure Treated)	11 ft	X		X
	12.5 ft	X		X
1B: TRB (Plastic Lumber)	11 ft	X	X	X
	12.5 ft		X	X
2: MSE Blocks	11 ft		X	X
	12.5 ft		X	X
3: Sheet Pile	11 ft		X	
	12.5 ft		X	

MARIN COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DRAFT

Draft Engineer's Report For:

Gallinas Levee Project Assessment District

October 2020

Prepared by:

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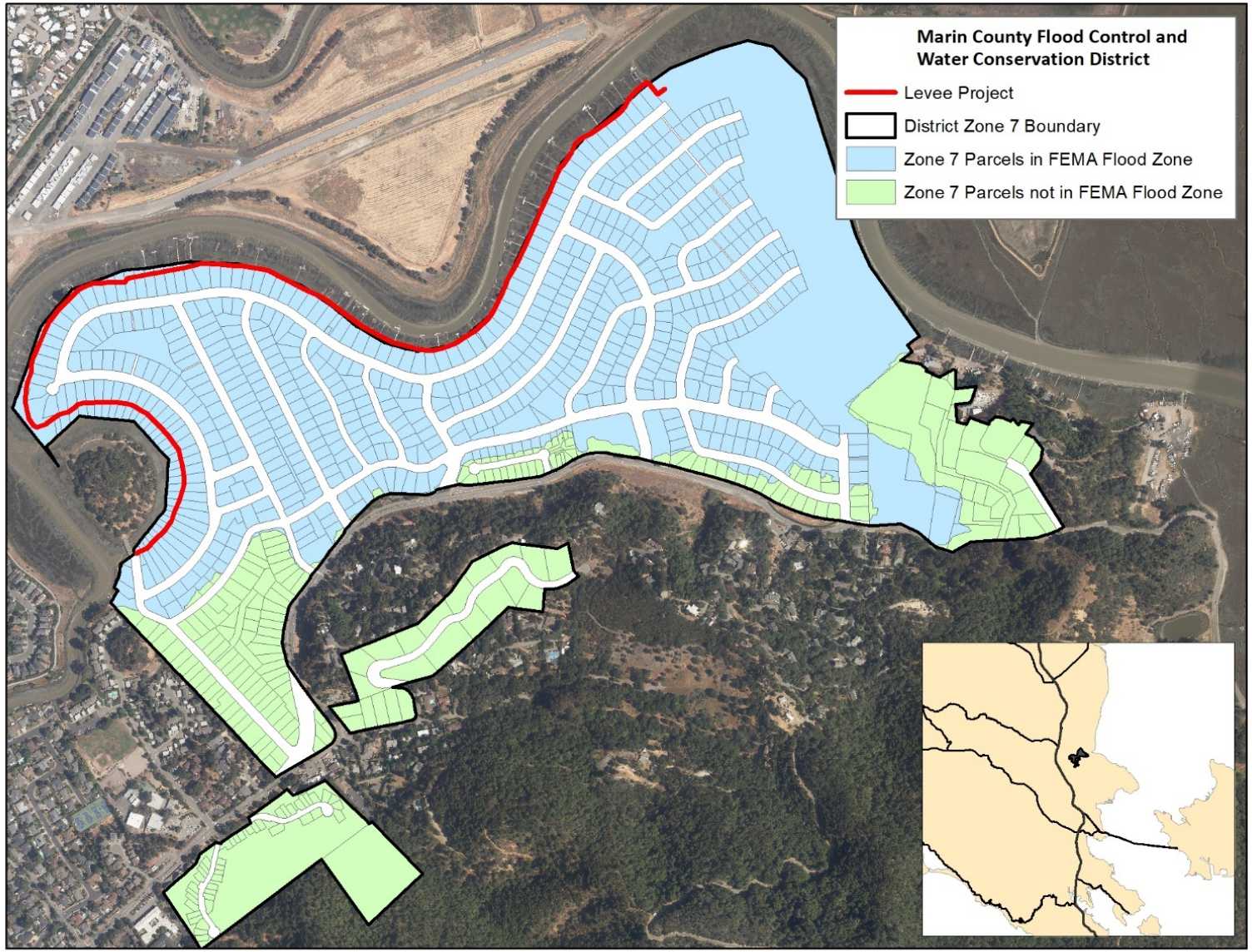

Figure 1 Flood Zone 7, the FEMA flood zone, and the levee project

Benefit Assessment vs. Special Tax

	Benefit Assessment	vs.	Special Tax
Project Description	Defined Improvements		Flexible Improvements
Special Benefit	Proportional to the special benefit the parcel receives (lower elevation parcels receive greater benefit)		Special tax does not require a finding of special benefit. Flexibility in the structure of the special tax.
Treatment of Parcels	No exemptions for non-taxable parcels or low-income seniors		Can exempt certain parcel land uses and low-income seniors
Approval Process	Majority Protest Proceeding (Property Owner)		Special Tax Election (Registered Voter)
Approval Threshold	No Majority Protest		2/3 Approval
Collection Method	Levied on the property tax bill. Opportunity for discounted payoff after district formation. Can payoff during term of the district.		Levied on the property tax bill. No discounted payoff after district formation. Can payoff during term of the district.

Assessment Engineering Factors

Mean elevation, parcel land use type, building size

All benefitting property assessed

General benefit: Peripheral Parcels (4.2%)

Benefit Point Assignment

Benefit Point Assignment

A	***Reduced Risk of Flooding: 1.0 Point***
B	***Reduced Risk of Flood Damage: 1.0 Point***
C	***Mean Elevation Factor: Varies***
D	***Building Factor: Varies***

Assessment Calculation

Parcel's Total Benefit Points x Assessment Rate per Benefit Point

($1,229 Estimated Assessment per Benefit Point)

($1,012 Estimated Construction Costs per Benefit Point)

Estimated Residential Property Assessments:

Mean Elevation Category	Estimated Maximum Assessment	Estimated Cash Collection Assessment	Estimated Annual Assessment
Less than 6 Feet	$2,458	$2,025	$462
6 to 7 Feet	1,966	1,620	373
7 to 8 Feet	1,475	1,215	280
8 to 9 Feet	983	810	187
9 to 10 Feet	737	607	140
10 to 11 Feet	492	405	93

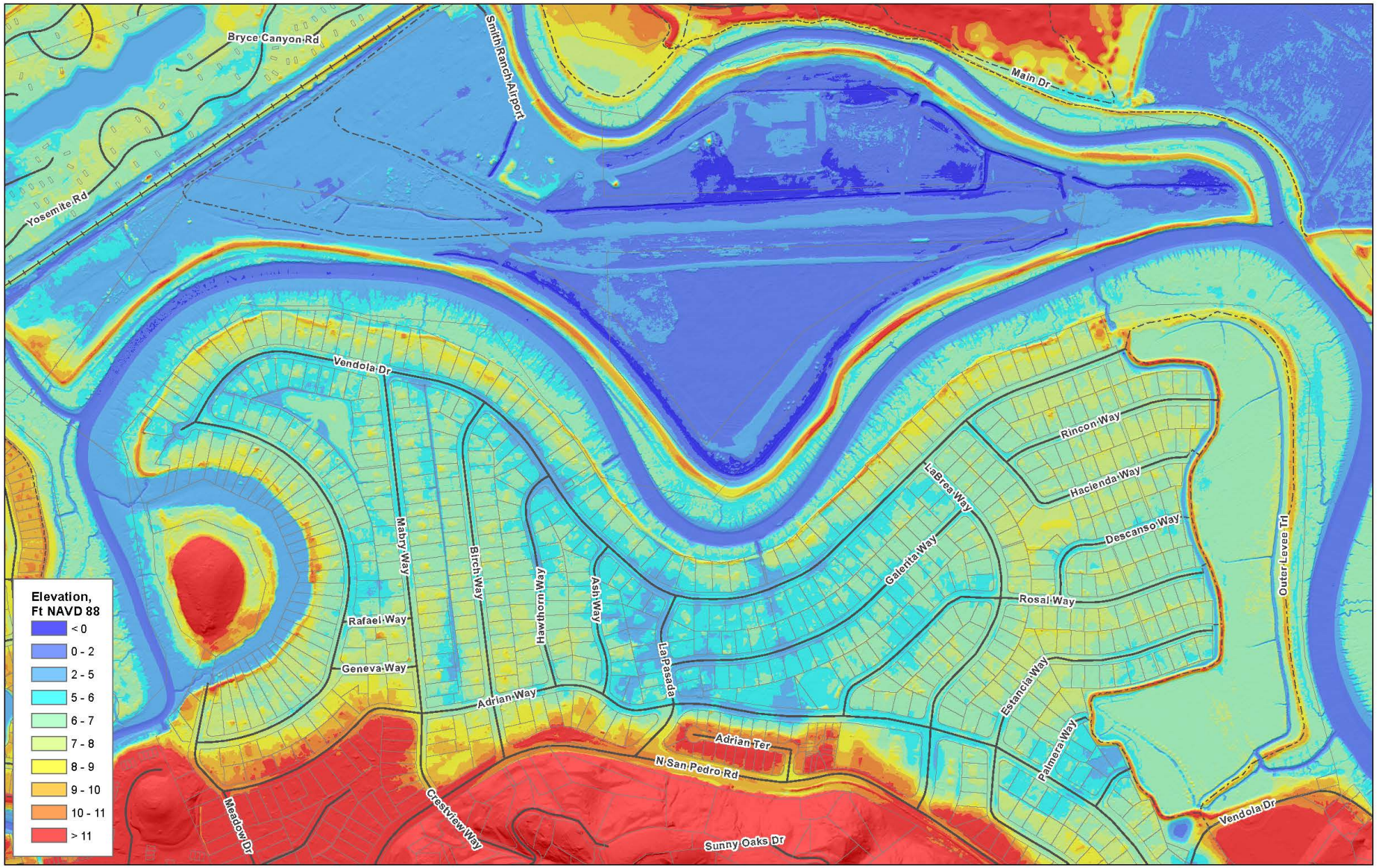

Figure 2 Bare earth elevations of the proposed Benefit Assessment District area

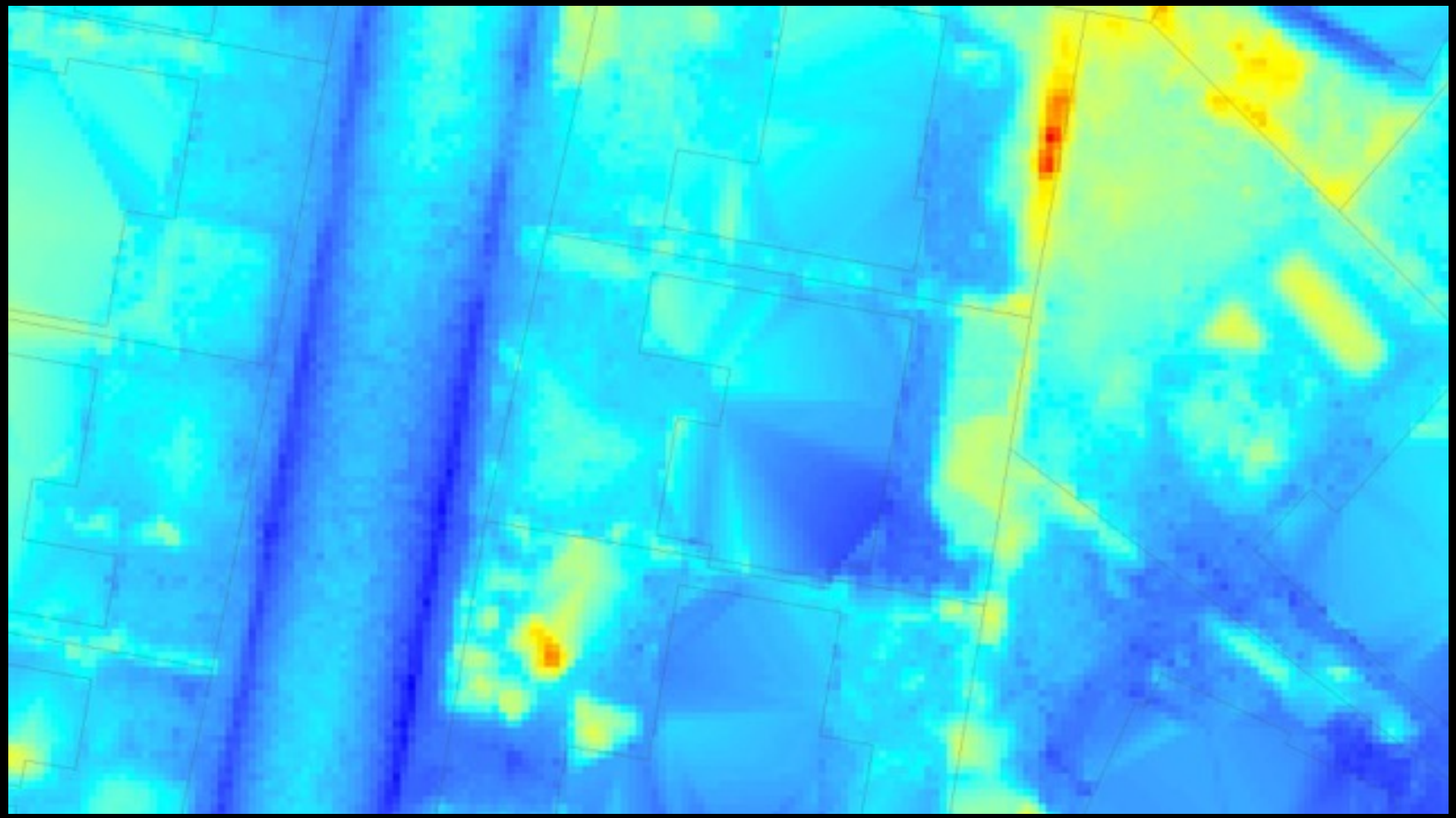

Figure 3 Draft cash collection assessments based on Figure 2 elevations

Table 1 provides a summary of the characteristics of the five estimate classes. The maturity level of project definition is the sole determining (i.e., primary) characteristic of class. In Table 1, the maturity is roughly indicated by a percentage of complete definition; however, it is the maturity of the defining deliverables that is the determinant, not the percent. The specific deliverables, and their maturity or status are provided in Table 3. The other characteristics are secondary and are generally correlated with the maturity level of project definition deliverables, as discussed in the generic RP [1]. The post sanction classes (Class 1 and 2) are only indirectly covered where new funding is indicated. Again, the characteristics are typical but may vary depending on the circumstances.

	Primary Characteristic	*Secondary Characteristic*		
ESTIMATE CLASS	**MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges at an 80% confidence interval
Class 5	0% to 2%	Concept screening	Capacity factored parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

Table 1 – Cost Estimate Classification Matrix for Process Industries