

The background image shows a coastal scene. In the foreground, there is a large, circular concrete structure, possibly a manhole or a well, surrounded by dark, mossy rocks. The structure is weathered and has some rust on its top surface. Behind it, a concrete wall or barrier extends into the water. The water is a mix of blue and green, with some white foam from waves. In the distance, a city skyline is visible under a clear blue sky with some light clouds. The overall scene suggests a coastal infrastructure project.

**Appendicies**  
**Storm Drain Master Plan**  
**Alameda, California**

August, 2008

**Schaaf & Wheeler**  
CONSULTING CIVIL ENGINEERS

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# APPENDIX C

The City of Alameda wished to know the expected flooding depth of the 25-year storm event, and the required projects to apply the same standard of allowable flooding to the City infrastructure for the 25-year storm. This Appendix presents the results of that analysis. Table 1-1 in Chapter 1 is repeated here to show the summary of the required projects to apply the improvement standard to both the 10- and 25-year storm events.

**Table 1-1: Summary of Master Plan Costs**

<b>Master Plan Improvements, Alameda Island</b>	<b>Eastside</b>	<b>North Central</b>	<b>Northside</b>	<b>South</b>	<b>Total</b>
Projects to Meet 10-Year Standard	\$8,470,000	\$9,686,000	\$24,261,000	\$11,999,000	\$54,416,000
Projects to Meet 25-Year Standard	\$11,940,000	\$10,796,000	\$37,311,000	\$13,149,000	\$73,196,000
<b>Master Plan Improvements, Bay Farm Island</b>	<b>East</b>	<b>North</b>	<b>Central</b>	<b>South</b>	<b>Total</b>
Projects to Meet 10-Year Standard	\$2,550,000	\$2,600,000	\$4,590,000	\$1,960,000	\$11,700,000
Projects to Meet 25-Year Standard	\$2,700,000	\$3,210,000	\$6,340,000	\$6,570,000	\$18,820,000

The total costs summary for the 25-year CIP projects along with the required lengths are shown for each priority level in Table A-1. Each subarea includes the recommended capacity improvements, including pump station capacity improvements. Also included in the table are recommended pump station upgrades such as self cleaning trash racks and on site backup power (as shown in Table 7-11). These costs include a 40% increase in construction cost estimates to include design, administration, and contingency costs.

**Table A-1 Summary of 25-Year CIP Costs**

<b>Alameda Island</b>						
	High		Medium		Low	
	Length	Cost	Length	Cost	Length	Cost
Northside	17,000	\$29,780,000	2,300	\$1,550,000	13,700	\$5,360,000
North Central	0	\$0	11,000	\$4,540,000	12,300	\$5,790,000
Eastside	10,000	\$9,570,000	6,000	\$2,320,000	0	\$0
South	3,600	\$2,060,000	15,900	\$6,740,000	8,300	\$3,560,000
Total Alameda Island	30,600	\$41,410,000	35,200	\$15,150,000	34,300	\$14,710,000
<b>Bay Farm Island</b>						
	High		Medium		Low	
	Length	Cost	Length	Cost	Length	Cost
North	0	\$600,000	2,900	\$1,650,000	1,200	\$960,000
South	0	\$0	7,100	\$3,410,000	3,800	\$3,160,000
East	0	\$0	5,700	\$2,450,000	600	\$250,000
Central	0	\$0	7,800	\$2,840,000	8,900	\$3,500,000
Total Bayfarm Island	0	\$600,000	23,500	\$10,350,000	14,500	\$7,870,000
<b>TOTAL:</b>	30,600	\$42,010,000	58,700	\$25,500,000	48,800	\$22,580,000

Not included in Table A-1 are the costs to extend storm drain lines on Alameda Island, as described in the text of the report. This accounts for the discrepancy between the total values between Tables 1-1 and A-1.

Pump stations may operate differently in a 25-year storm event due to changes in the flow delivered to the pump station and in the tide cycle. Table A-2 presents the model-generated results for pump station operation in a 25-Year storm event, and the additional required capacity to meet the 25-year improvement standards.

**Table A-2: Pumping Station Summary with 25-Year Storm Drain Improvements**

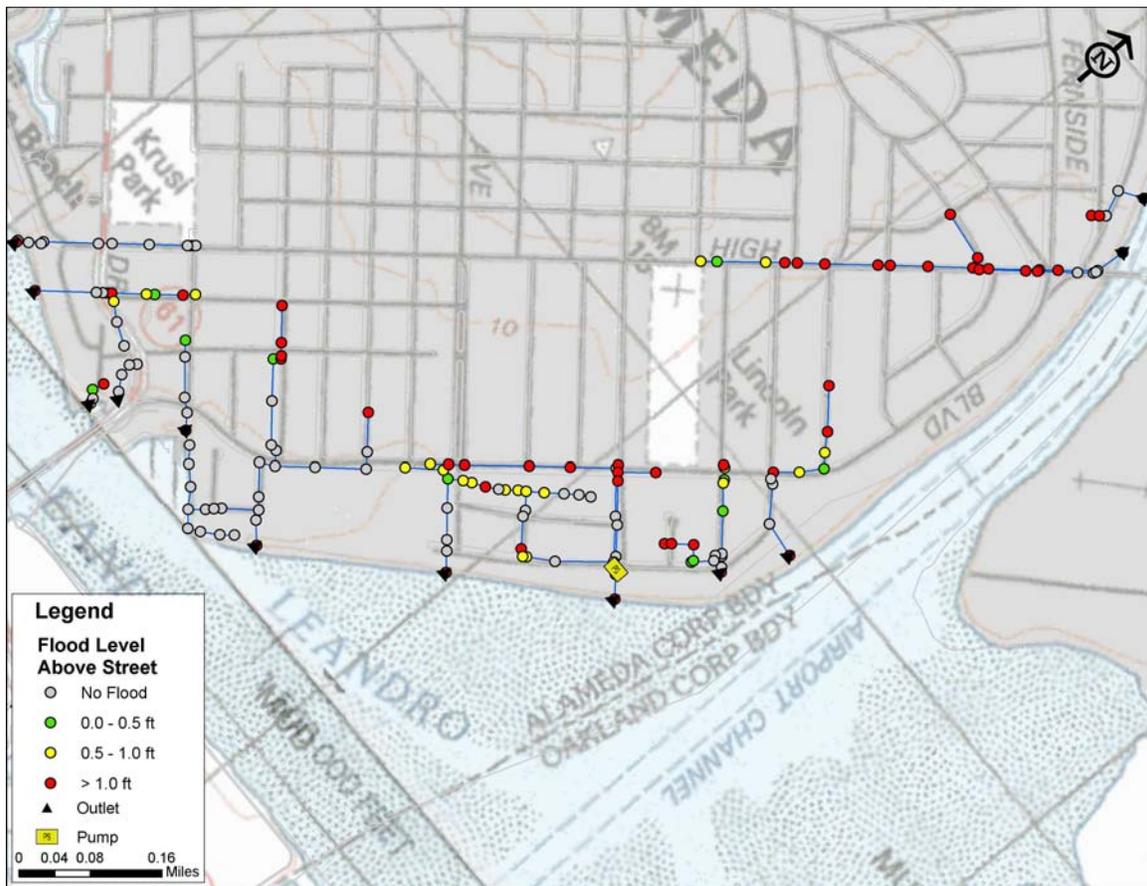
<b>Station Name</b>	<b>Location (Watershed)</b>	<b>Year Built or Updated</b>	<b>Design Capacity of Existing Station (GPM)</b>	<b>Actual Station Peak Discharge from Model (GPM)</b>	<b>Additional Req'd Station Discharge (GPM)</b>
Main Street	Alameda Northside	1998	13,500 GPM	11,900 GPM	0 GPM
Third Street	Alameda Northside	1993	1,650 GPM	2,000 GPM	2,000 GPM
Webster Street	Alameda Northside	1947	5,250 GPM	2,400 GPM	0 GPM
Northside (Marina Village)	Alameda Northside	1984	72,000 GPM	89,800 GPM	73,300 GPM
Arbor	Alameda Northside	1994	31,600 GPM	38,200 GPM	57,000 GPM
Central / Eastshore	Alameda Eastside	1967	8,600 GPM	9,100 GPM	13,500 GPM
Bayport	Alameda Northside	2004	42,600 GPM	44,000 GPM	0 GPM
Golf Course	Bay Farm East	1986	19,200 GPM*	GPM	GPM

\* Pump design capacity data based on bid documents

It should be noted that the 'Actual Station Peak Discharge' column is the peak outflow from the pump stations with the existing pipe network. In some locations, most notably at Marina Village & Webster Street Pump Stations, recommended pipe network improvements act to improve pump station operating capacity, even though additional capacity is not added via new pumps. For Eastshore, Arbor, Northside and 3<sup>rd</sup> Street Pump Stations, the additional capacity must be achieved via new pumps at the stations.

For each sub area, first the existing depths for the 25-year storm event are presented, followed by a table describing the improvements required to meet the standard set for by the City. The same methodology for determining improvements and assigning priority levels was used for the 25-year scenario as described within the report for the 10-year scenario. A figure showing these improvements with their priority level highlighted is next, followed finally by a large scale figure showing the recommended improvement pipe sizing, extent, and location.

**Figure A-1: Alameda Eastside Area Existing 25-Year Flooding Depths**



**Table A-3: Alameda Island, Eastside Area 25-Year CIP**

Improvement Name	Priority Level	Pipe Length	Connections	Outfalls	Construction Allowance	Total Allowance w/ Contingencies
Thompson	High	1344	11	1	\$404,000	\$566,000
Gibbons (new pipe)	High	4000	13	1	\$1,121,000	\$1,569,000
Liberty	High	509	8	1	\$172,000	\$241,000
Encinal	High	359	3	0	\$121,000	\$169,000
High	High	3776	26	1	\$1,380,000	\$1,932,000
Fernside	Moderate	2930	16	0	\$754,000	\$1,056,000
Washington	Moderate	1849	13	0	\$575,000	\$805,000
Post	Moderate	660	6	1	\$175,000	\$245,000
Calhoun	Moderate	534	5	1	\$154,000	\$216,000

**Figure A-2: Alameda Eastside Area Prioritized 25-Year Improvements**

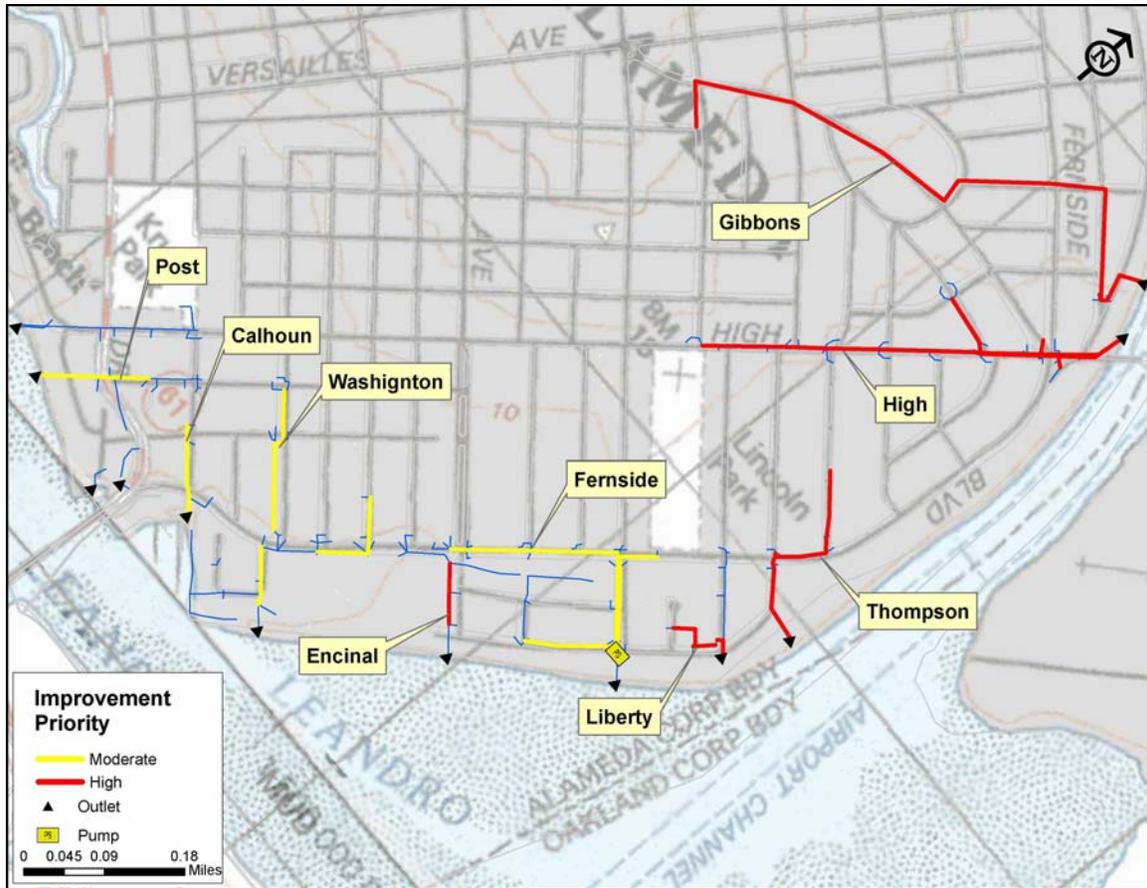
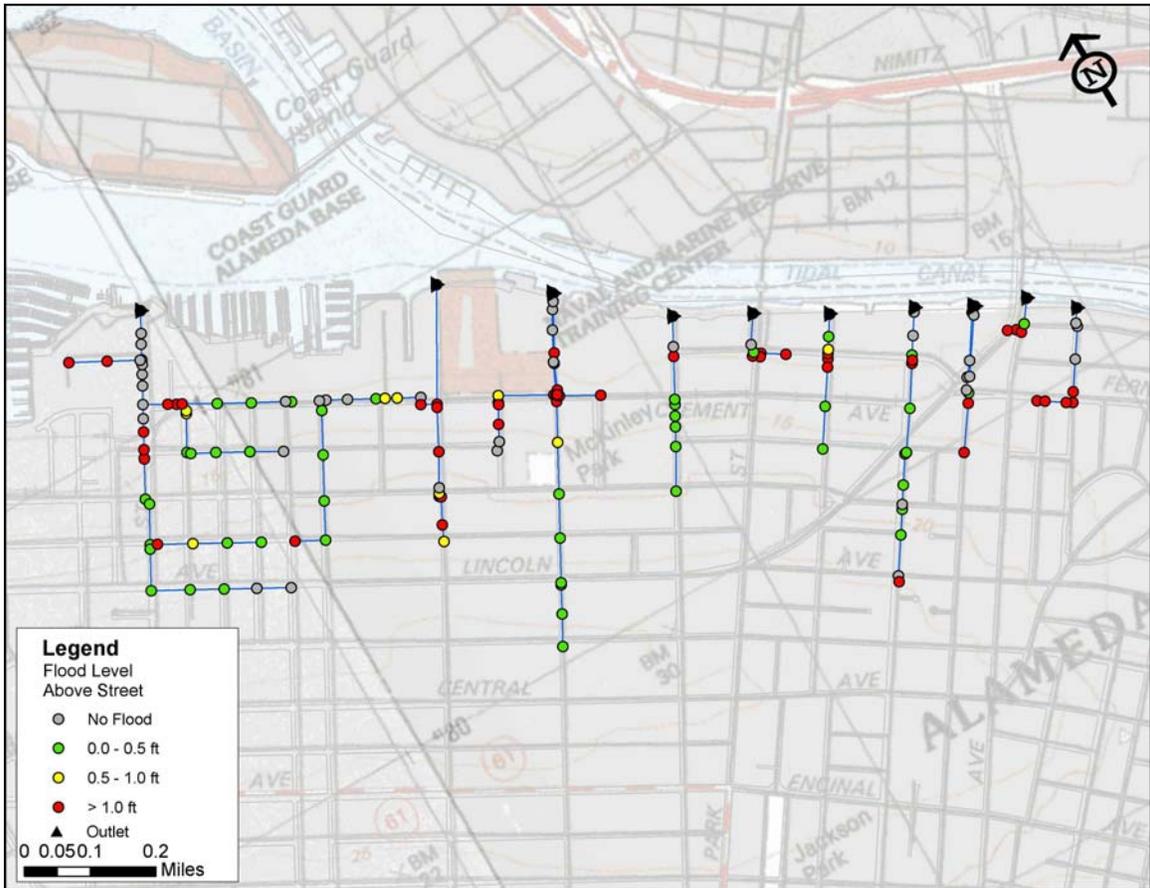


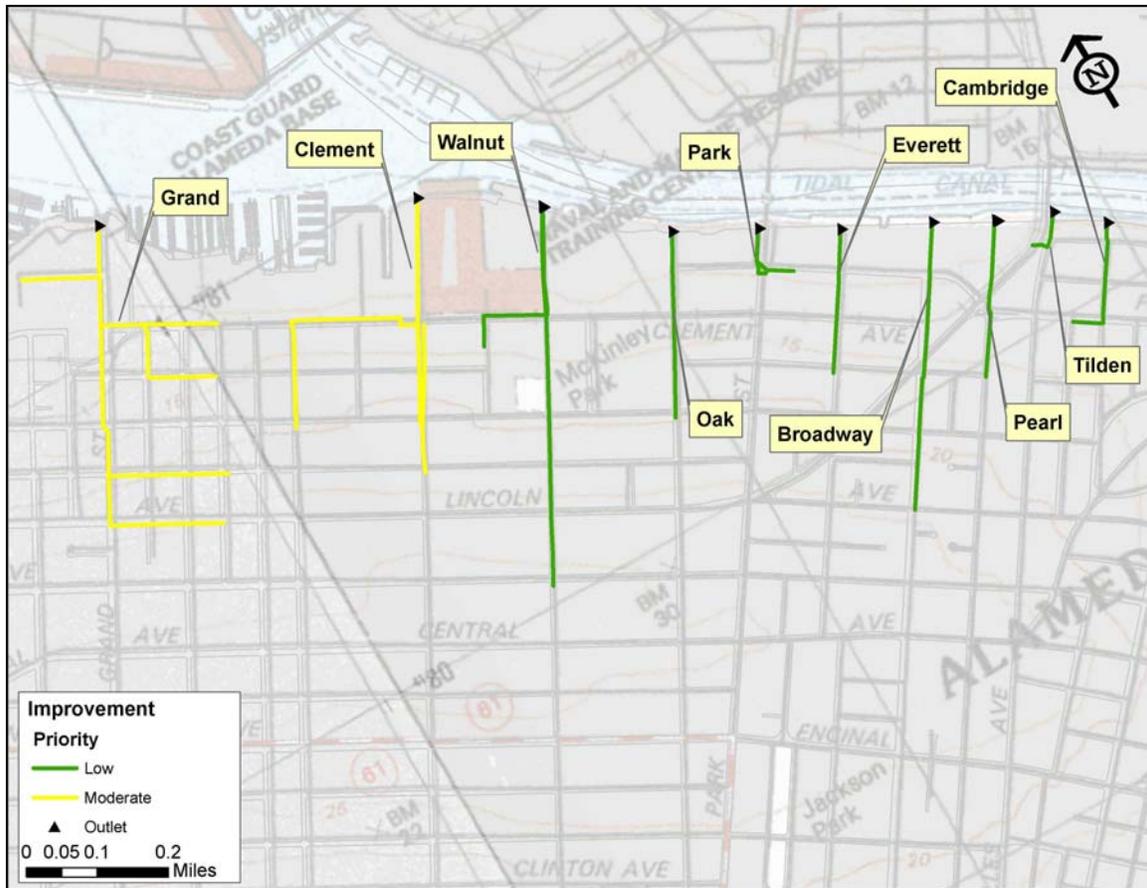
Figure A-3: Alameda North Central Area Existing 25-Year Flooding Depths



**Table A-4: Alameda Island, North Central Area 25-Year CIP**

Improvement Name	Priority Level	Pipe Length	Connections	Outfalls	Construction Allowance	Total Allowance w/ Contingencies
Grand	Moderate	6356	39	1	\$1,898,000	\$2,657,000
Clement	Moderate	4611	23	1	\$1,343,000	\$1,880,000
Walnut	Low	4357	24	1	\$1,382,000	\$1,935,000
Oak	Low	1399	9	1	\$469,000	\$657,000
Park	Low	740	8	1	\$261,000	\$365,000
Everett	Low	1086	8	1	\$390,000	\$546,000
Broadway	Low	2159	15	1	\$700,000	\$980,000
Pearl	Low	1189	8	1	\$375,000	\$525,000
Tilden	Low	395	5	1	\$136,000	\$190,000
Cambridge	Low	986	8	1	\$424,000	\$594,000

**Figure A-4: Alameda North Central Area Prioritized 25-Year Improvements**

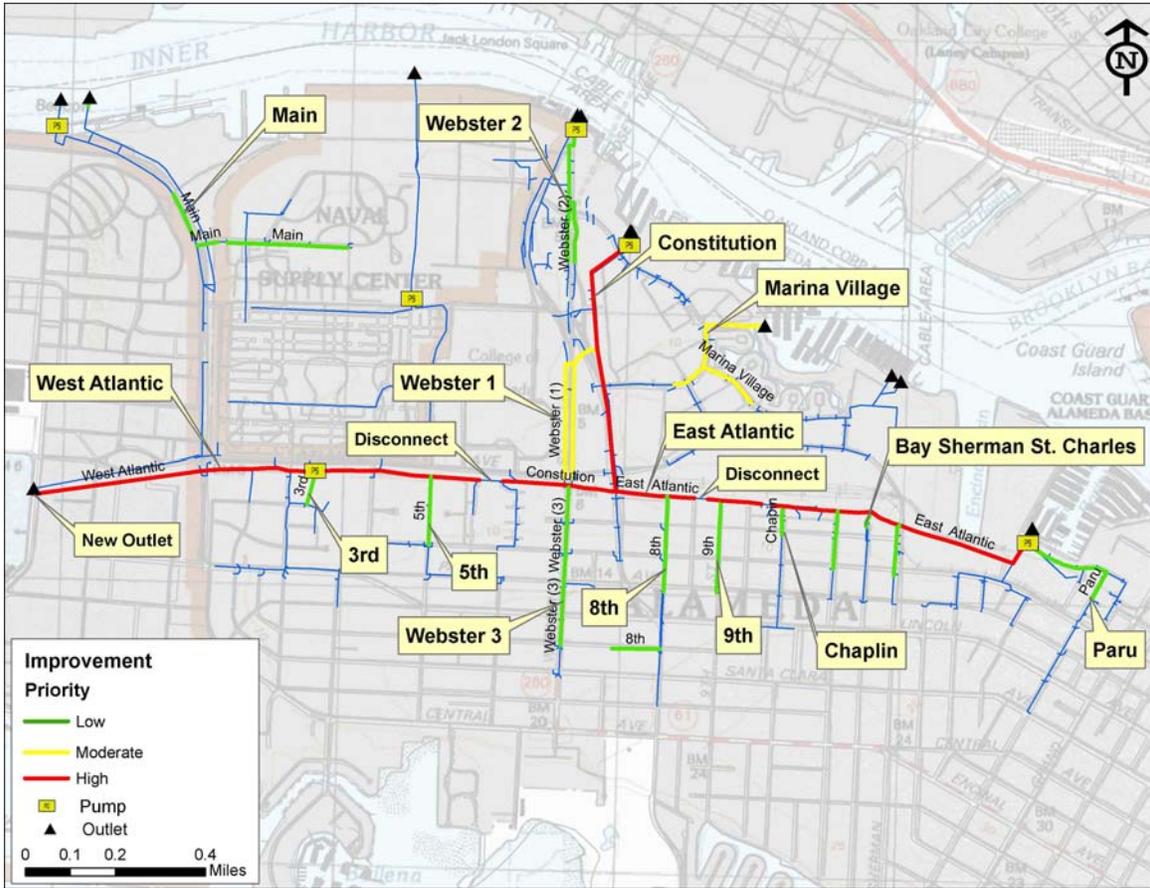




**Table A-5: Alameda Island, Northside Area 25-Year CIP**

<b>Improvement Name</b>	<b>Priority Level</b>	<b>Pipe Length</b>	<b>Connections</b>	<b>Outfalls</b>	<b>Construction Allowance</b>	<b>Total Allowance w/ Contingencies</b>
Constitution	High	3300	12	1	\$2,324,000	\$3,254,000
West Atlantic	High	3400	26	1	\$2,800,000	\$3,920,000
East Atlantic (1)	High	2900	22	0	\$1,454,000	\$2,036,000
East Atlantic (2)	High	3300	24	1	\$1,787,000	\$2,502,000
New Outfall	High	4100	8	1	\$2,281,500	\$3,194,000
Marina Village Parkway	Med	2300	12	1	\$749,000	\$1,049,000
Main St	Low	2300	11	0	\$549,000	\$769,000
Webster (2)	Low	2400	19	1	\$690,000	\$966,000
3rd Street	Low	400	2	0	\$81,000	\$113,000
Webster (3)	Low	1900	7	0	\$480,000	\$672,000
9th Street	Low	1100	5	0	\$337,000	\$472,000
Chapin	Low	300	4	0	\$109,000	\$153,000
Bay Sherman St. Charles	Low	1500	16	0	\$447,000	\$626,000
Paru	Low	1300	13	0	\$419,000	\$587,000
5th	Low	800	5	0	\$280,000	\$392,000
8th	Low	1700	6	0	\$440,000	\$616,000

Figure A-6: Alameda Northside Area Prioritized 25-Year Improvements



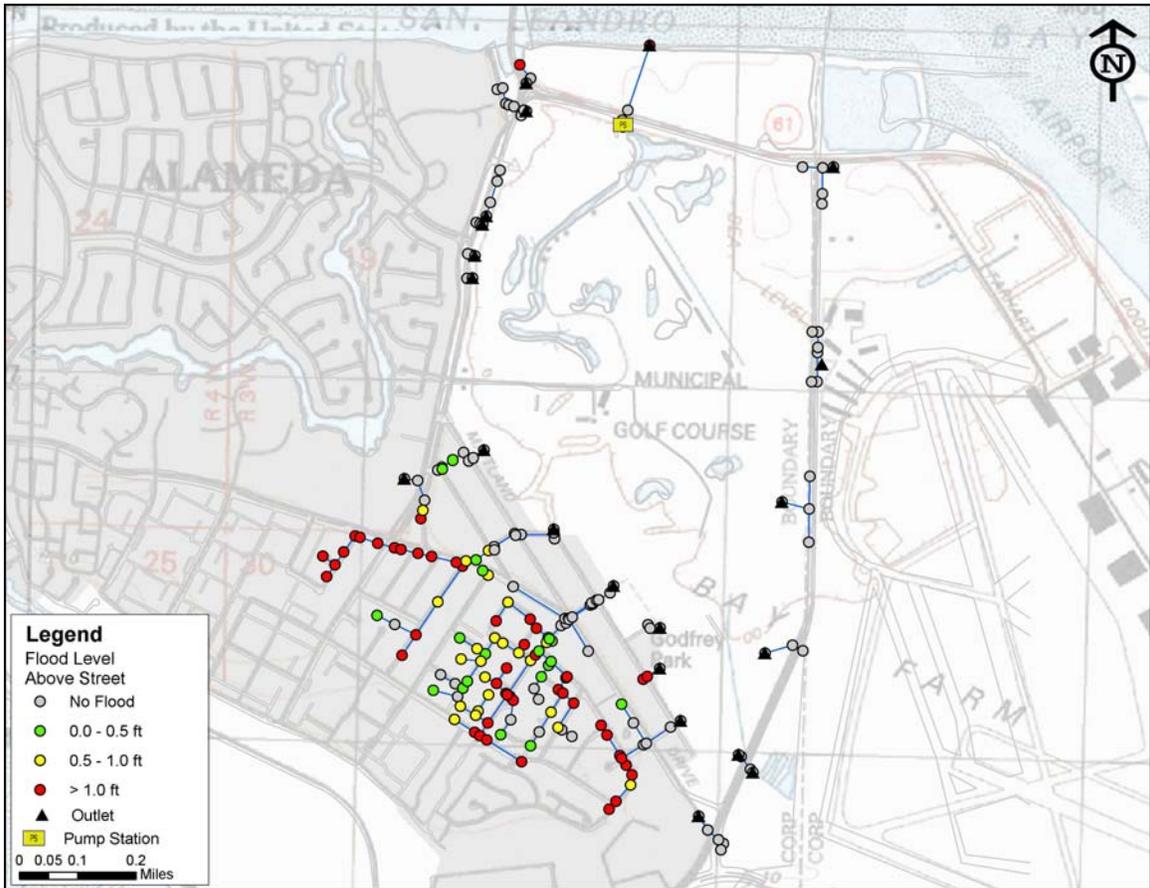


**Table A-6: Alameda Island, South Area 25-Year CIP**

<b>Improvement Name</b>	<b>Priority Level</b>	<b>Pipe Length</b>	<b>Connections</b>	<b>Outfalls</b>	<b>Construction Allowance</b>	<b>Total Allowance w/ Contingencies</b>
Fountain	High	2000	20	1	\$919,000	\$1,287,000
Mound	High	1600	10	1	\$553,000	\$774,000
Franciscan	Moderate	2700	16	0	\$732,000	\$1,025,000
Heather	Moderate	4100	23	1	\$1,196,000	\$1,674,000
Shell Gate	Moderate	2300	20	1	\$641,000	\$897,000
School	Moderate	800	5	1	\$282,000	\$395,000
Pearl	Moderate	700	6	0	\$294,000	\$412,000
12th	Moderate	2300	7	1	\$641,000	\$897,000
3rd	Moderate	800	7	1	\$251,000	\$351,000
Willow	Moderate	1700	10	0	\$602,000	\$843,000
S Shore Center W	Moderate	500	4	1	\$176,000	\$246,000
Regent	Low	500	7	1	\$212,000	\$297,000
Park	Low	1000	9	1	\$401,000	\$561,000
Page	Low	2100	17	1	\$564,000	\$790,000
Webster	Low	1200	9	1	\$337,000	\$472,000
Ballena	Low	800	8	1	\$260,000	\$364,000
Dayton (NEW)	Low	100	2	0	\$25,000	\$35,000
Union	Low	100	2	0	\$27,000	\$38,000
Balboa	Low	200	4	0	\$71,000	\$99,000
Laguna Vista	Low	46	2	0	\$24,000	\$34,000
Oak	Low	1200	8	1	\$318,000	\$445,000
Shoreline	Low	800	7	1	\$193,000	\$270,000
Otis	Low	300	4	0	\$114,000	\$160,000



Figure A-9: Bay Farm East Area Existing 25-Year Flooding Depths



**Table A-7: Bay Farm Island, East Area 25-Year CIP**

Improvement Name	Priority Level	Pipe Length	Connections	Outfalls	Construction Allowance	Total Allowance w/ Contingencies
Camelia	Moderate	3212	23	0	\$897,000	\$1,255,800
Melrose	Moderate	2479	23	0	\$854,000	\$1,195,600
Fitchburg	Low	632	5	0	\$178,000	\$249,200

**Figure A-10: Bay Farm East Area Prioritized 25-Year Improvements**

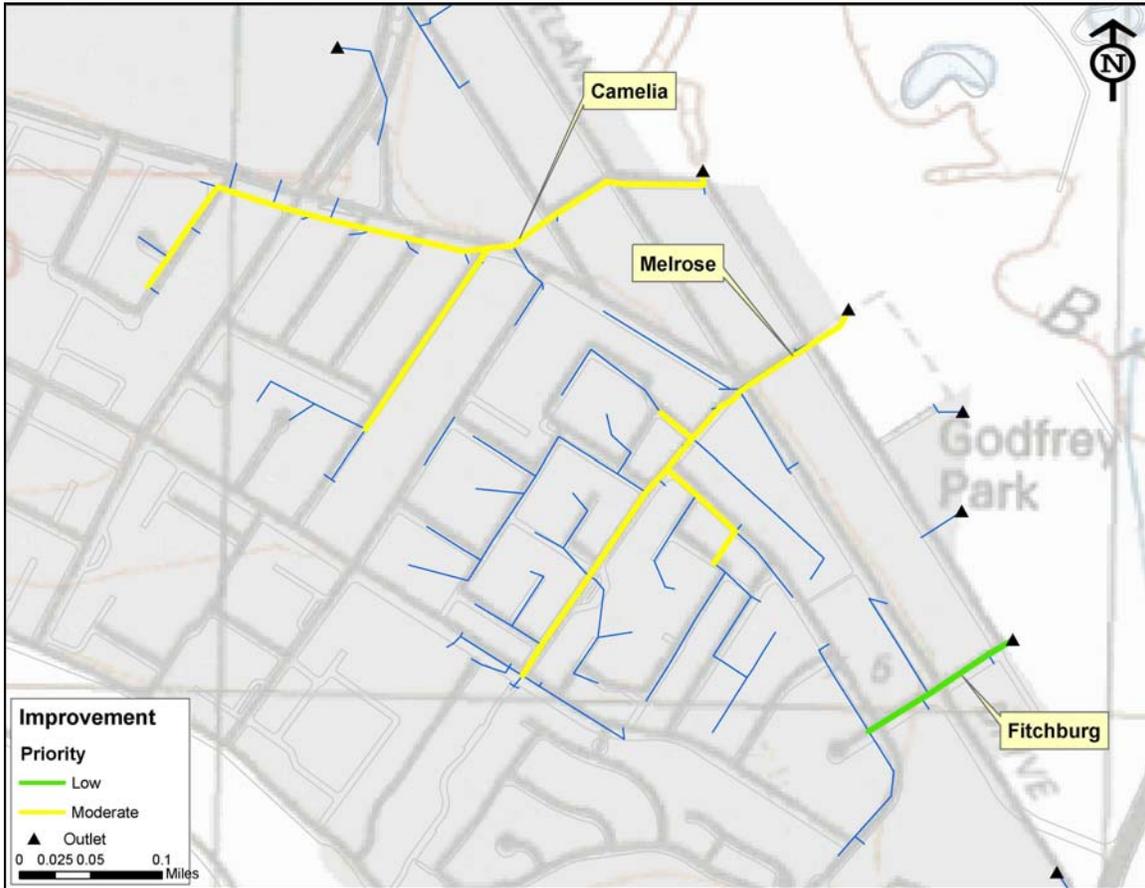
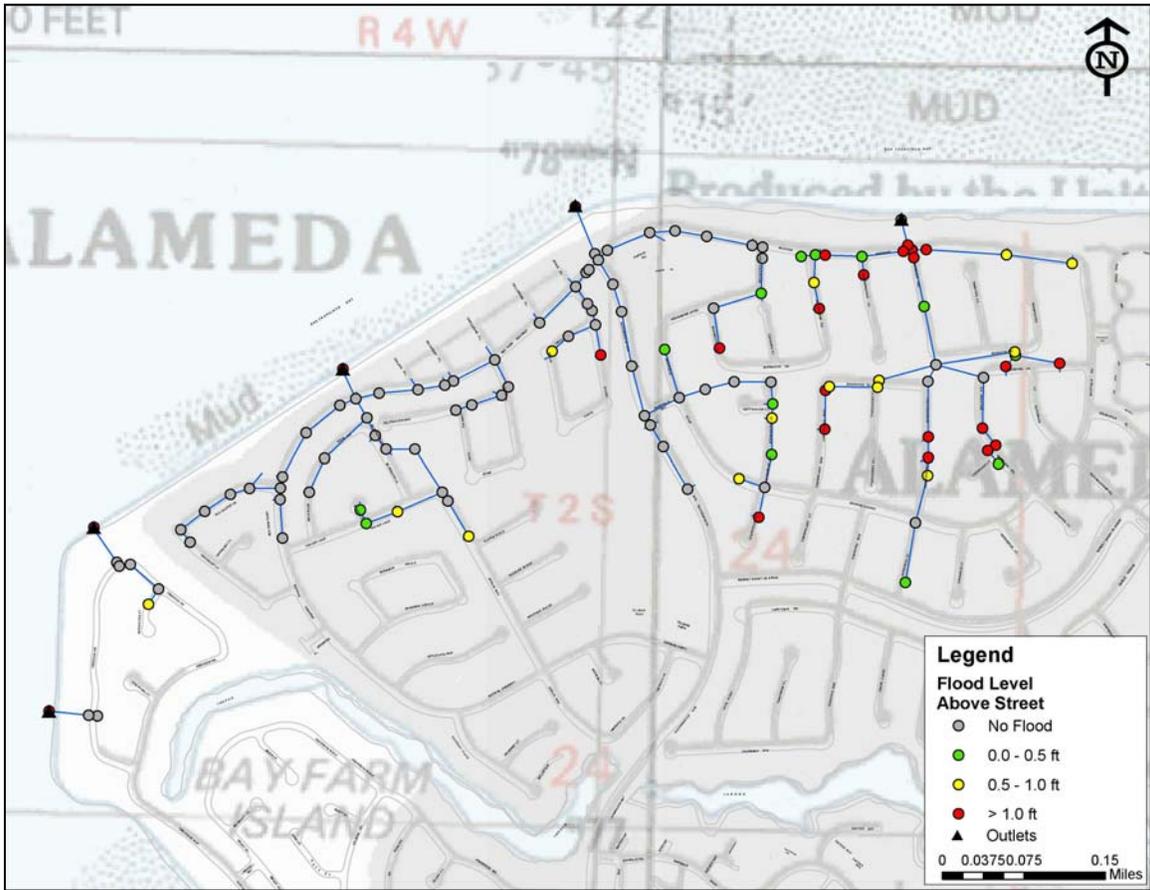


Figure A-11: Bay Farm North Area Existing 25-Year Flooding Depths



**Table A-8: Bay Farm Island, North Area 25-Year CIP**

Improvement Name	Priority Level	Pipe Length	Connections	Outfalls	Construction Allowance	Total Allowance w/ Contingencies
Stanbridge	Moderate	1000	5	0	\$265,000	\$371,000.0
Avington	Moderate	1851	8	1	\$487,000	\$681,800.0
Shamrock	Low	710	11	0	\$135,000	\$189,000.0
Justin	Low	319	5	0	\$80,000	\$112,000.0
Brunswick	Low	171	2	0	\$39,000	\$54,600.0

**Figure A-12: Bay Farm North Area Prioritized 25-Year Improvements**

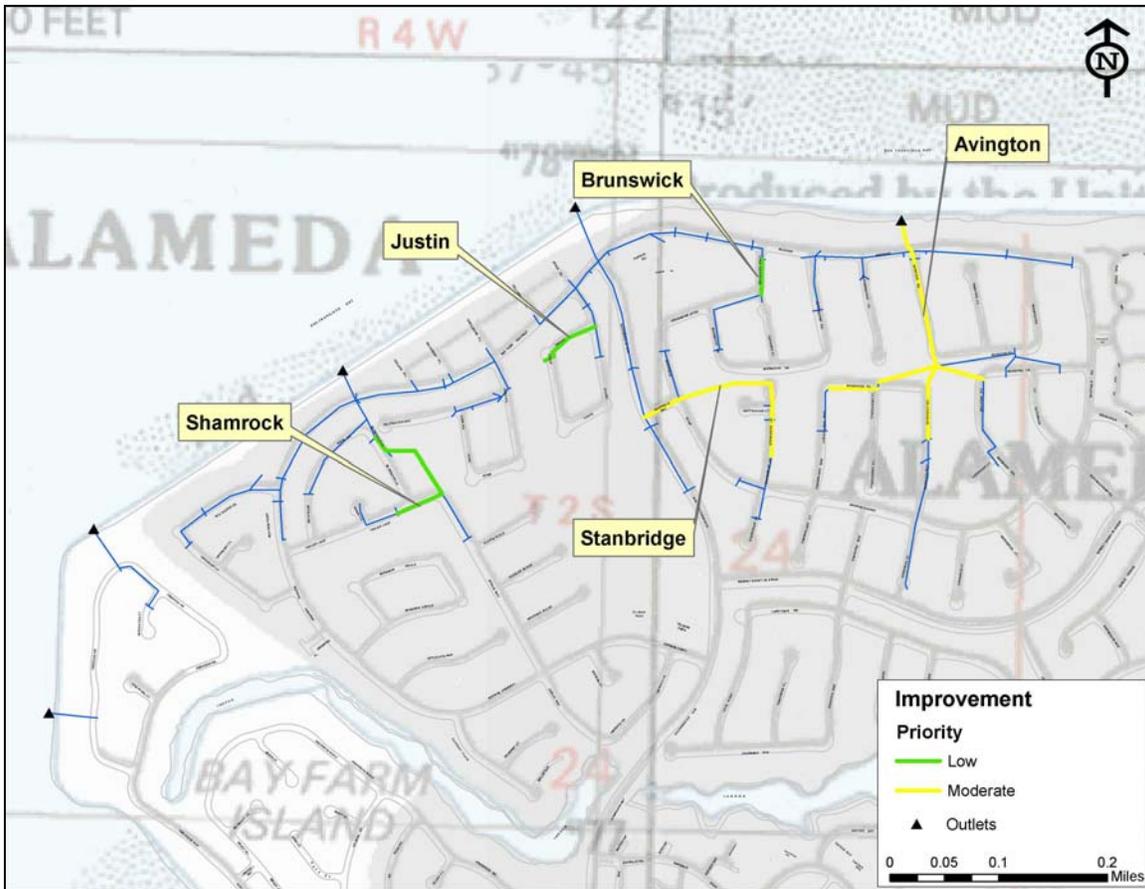
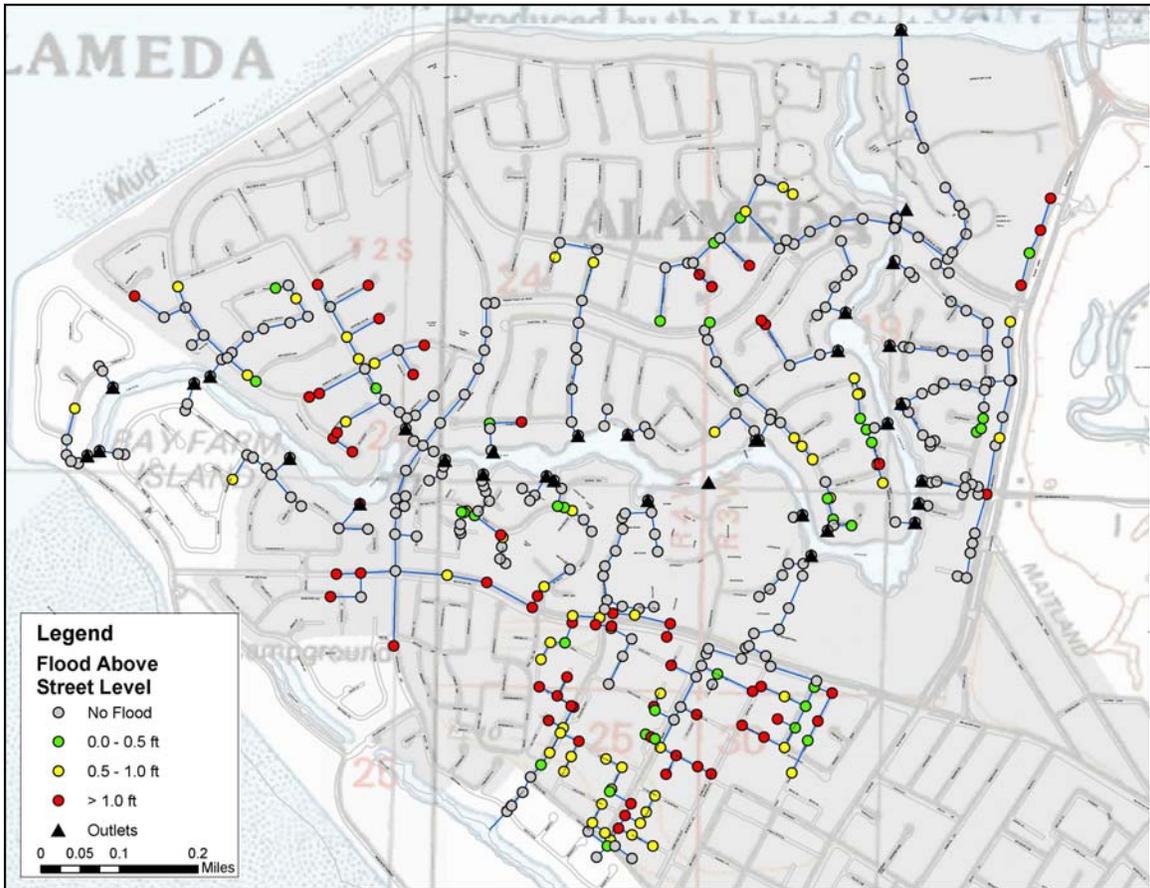


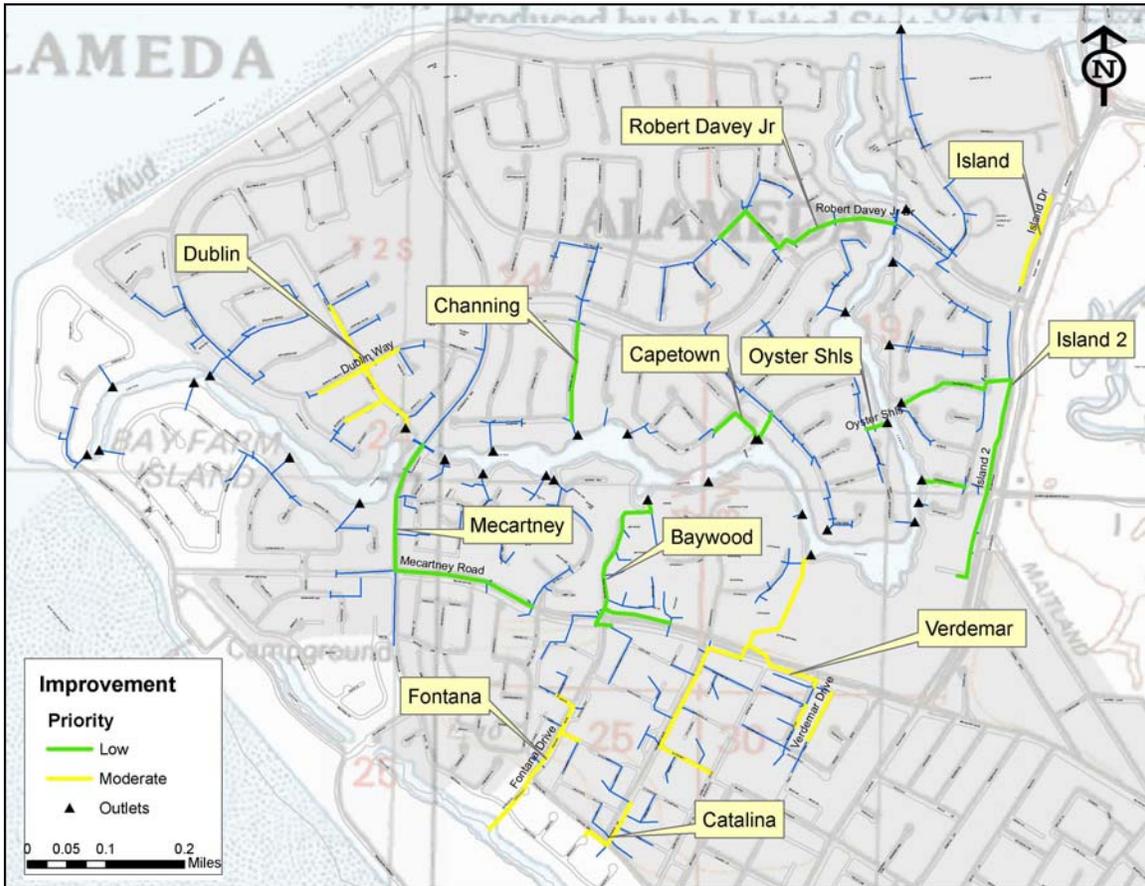
Figure A-13: Bay Farm Central Area Existing 25-Year Flooding Depths



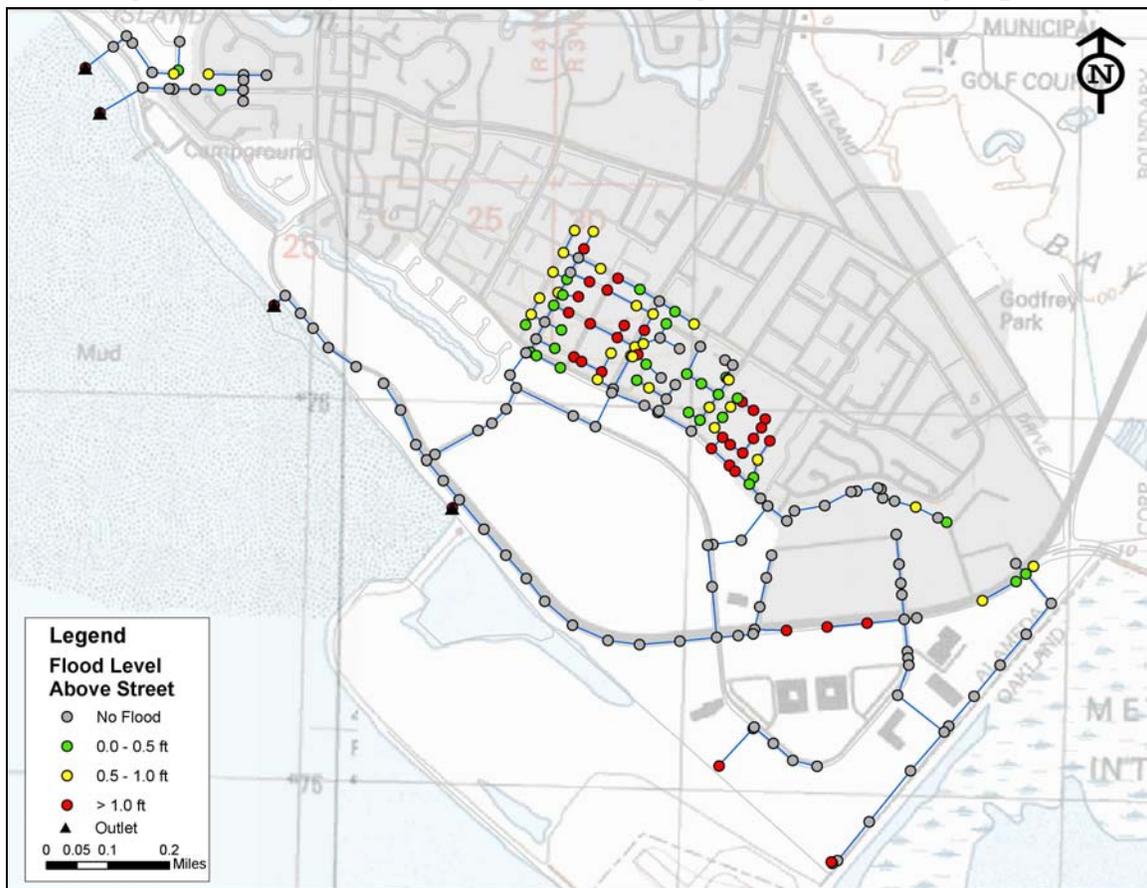
**Table A-9: Bay Farm Island, Central Area 25-Year CIP**

Improvement Name	Priority Level	Pipe Length	Connections	Outfalls	Construction Allowance	Total Allowance w/ Contingencies
Dublin Way	Moderate	1900	13	1	\$475,000	\$665,000
Island Dr	Moderate	692	5	0	\$159,000	\$222,600
Catalina Ave	Moderate	525	7	0	\$151,000	\$211,400
Fontana Drive	Moderate	1276	13	0	\$317,000	\$443,800
Verdemar Drive	Moderate	3367	26	1	\$930,000	\$1,302,000
Robert Davey Jr Dr	Low	1437	10	0	\$417,000	\$583,800
Capetown Court	Low	616	6	2	\$197,000	\$275,800
Baywood	Low	1633	16	1	\$530,000	\$742,000
Mecartney Road	Low	1855	9	0	\$497,000	\$695,800
Channing Way	Low	670	5	0	\$156,000	\$218,400
Oyster Shls	Low	446	6	1	\$150,000	\$210,000
Island 2	Low	2220	19	1	\$553,000	\$774,200

**Figure A-14: Bay Farm Central Area Prioritized 25-Year Improvements**



**Figure A-15: Bay Farm South Area Existing 25-Year Flooding Depths**



**Table A-10: Bay Farm Island, South Area 25-Year CIP**

<b>Improvement Name</b>	<b>Priority Level</b>	<b>Pipe Length</b>	<b>Connections</b>	<b>Outfalls</b>	<b>Construction Allowance</b>	<b>Total Allowance w/ Contingencies</b>
Harbor Bay	Moderate	1335	7	0	\$487,000	\$681,800
Catalina	Moderate	1482	12	0	\$448,000	\$627,200
Holly	Moderate	4333	24	0	\$1,500,000	\$2,100,000
Harbor Bay 2	Low	3440	13	0	\$1,733,000	\$2,426,200
Mecartney	Low	403	3	0	\$94,000	\$131,600

**Figure A-16: Bay Farm South Area Prioritized 25-Year Improvements**

