Update on the San Mateo County Reasonable Assurance Analysis

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Paradigm Environmental

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Note: Results are preliminary/draft and should not be quoted or cited.

SAN MATEO COUNTYWIDE
Water Pollution
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Reasonable Assurance Analysis (RAA)

HSPF/LSPC

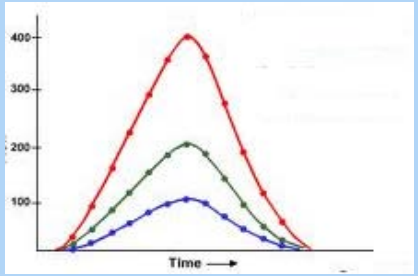
Data

- Rainfall
- HRUs/Land Use
- Impervious
- Elevation
- Slopes
- Evaporation
- Infiltration

Watershed Model

Results

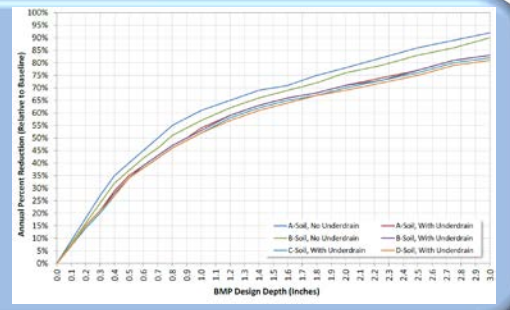
Hourly runoff and sediment/pollutant loads



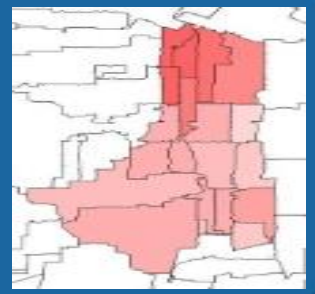
SUSTAIN

Stormwater Capture Model

GI Response



Stormwater Capture Model



Calculation of project capture volumes

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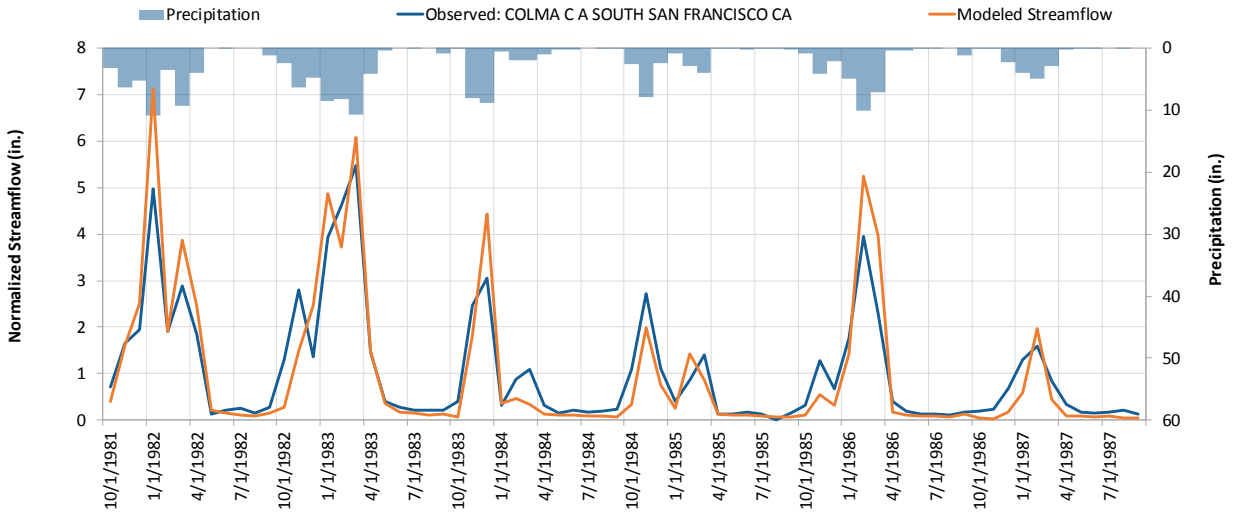
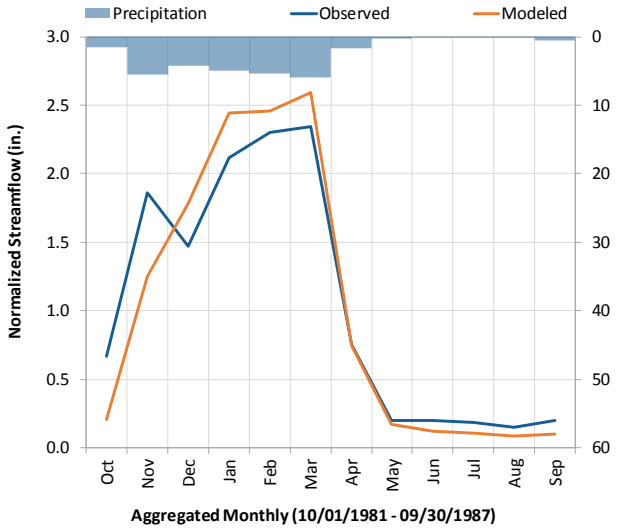
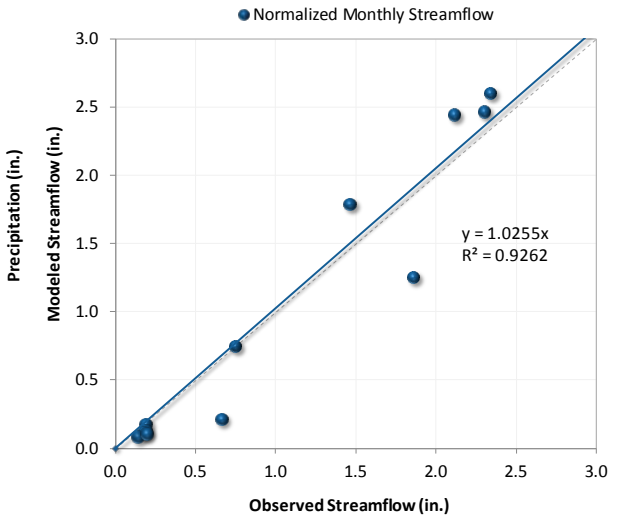
Status of Baseline LSPC Model

- Successfully calibrated:
  - Hydrology



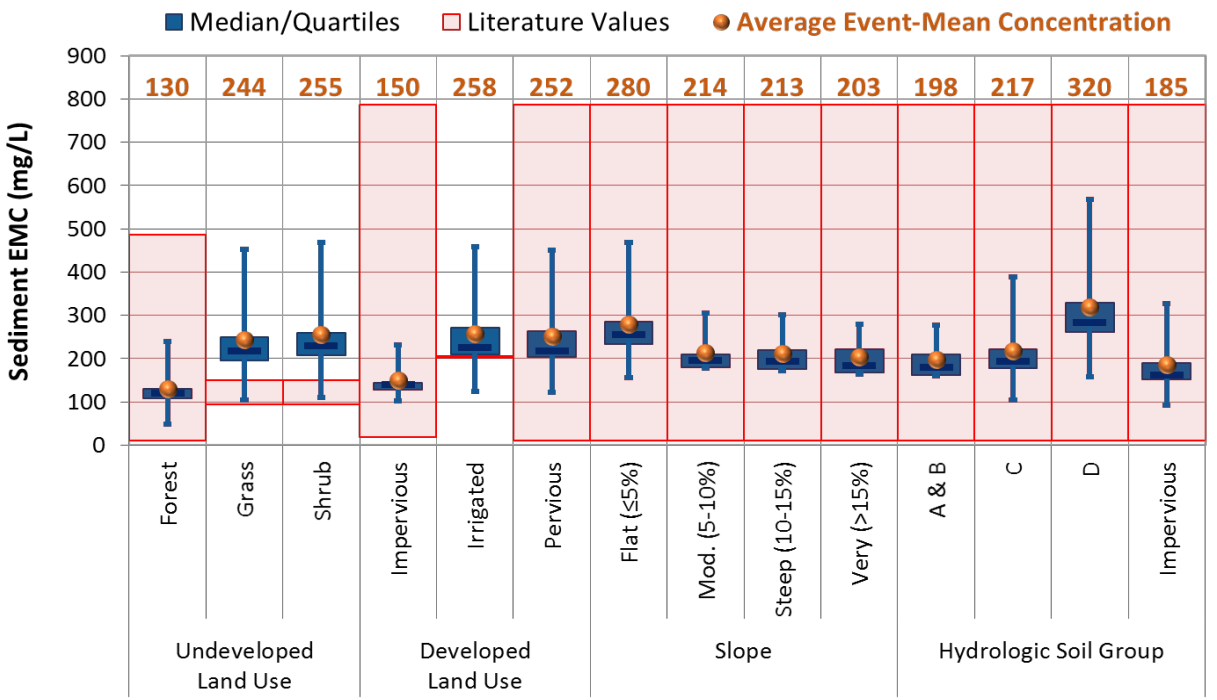
Calibration Metrics (10/01/1981 - 09/30/1987)	Relative Mean Error	Recommended Error Criteria			
		Very Good	Good	Fair	Poor
Total Annual Volume	-3.1%	≤ 5%	5 - 10%	10 - 15%	>15%
Highest 10% of Flows	-0.7%	≤ 10%	10 - 15%	15 - 25%	>25%
Lowest 50% of Flows	6.0%	≤ 10%	10 - 15%	15 - 25%	>25%
Annual Storm Volume	0.6%	≤ 10%	10 - 15%	15 - 25%	>25%

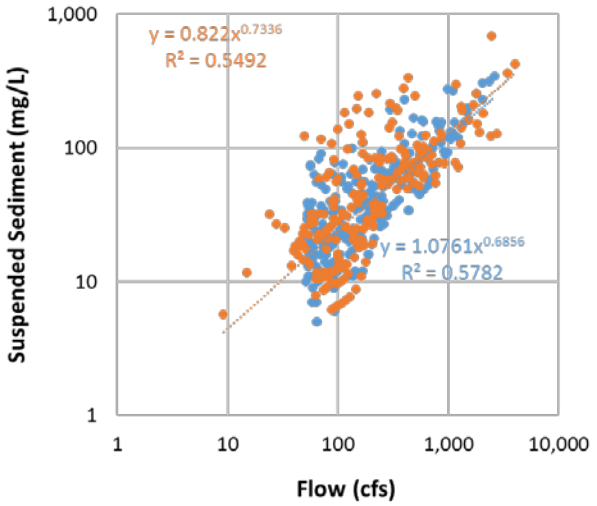


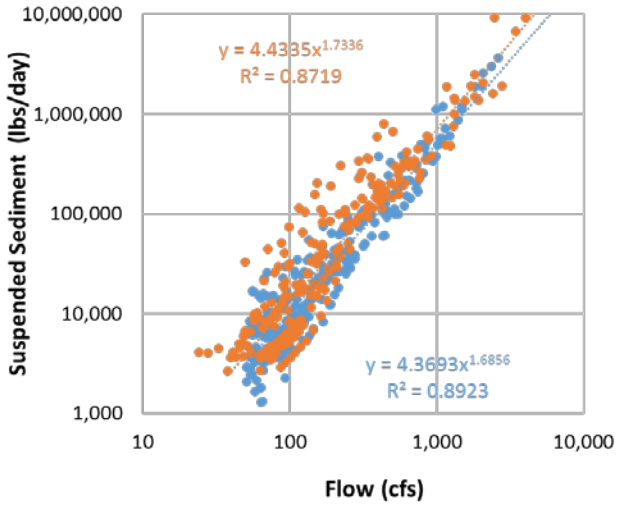


Status of Baseline LSPC Model

- Successfully calibrated:
  - Hydrology
  - Sediment loading

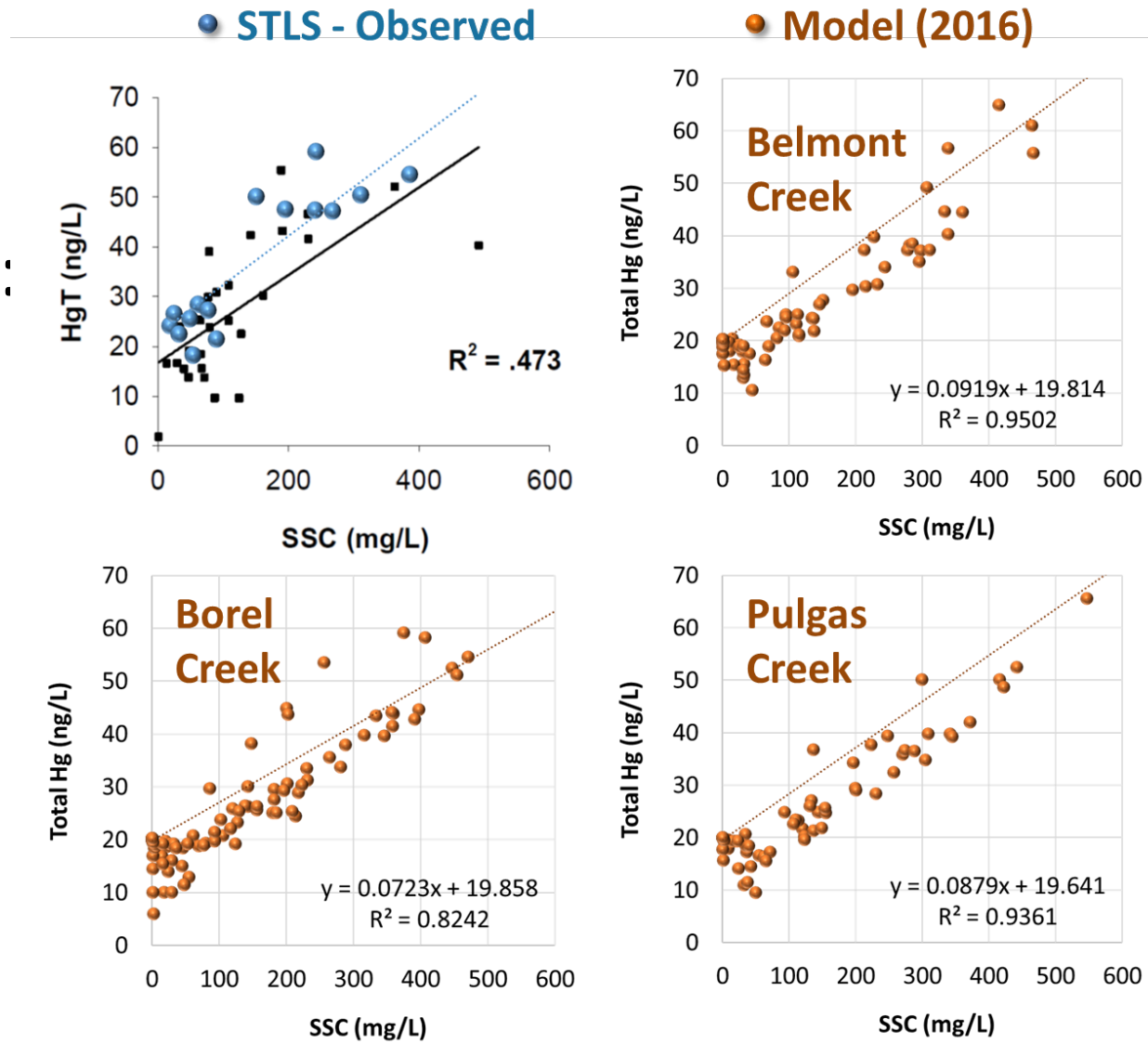






Status of Baseline LSPC Model

- Successfully calibrated:
  - Hydrology
  - Sediment loading
  - Mercury loading



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Regional Watershed Spreadsheet Model (RWSM)

SFEI-ABAG Category[1]	Area (acres)		Percent of Area		PCB[3] Runoff Conc. (ng/L)
	PulPumpN	PulPumpS	PulPumpN	PulPumpS	
0_Ag_Open	0.2	0.2	0.1%	0.1%	0.2
1_New_Industrial	11.8	2.8	8.7%	1.9%	0.2
2_New_Urban	--	0.1	--	0.1%	0.2
3_Old_Industrial	54.8	77.5	40.2%	53.7%	204
4_Old_Residential	8.9	0.02	6.5%	0.02%	4
5_Old_Urban	21.5	62.9	15.8%	43.6%	40
6_Source_Areas	39.1	0.7	28.7%	0.5%	204
Total	**136.3**	**144.2**	**100%**	**100%**	--
% Impervious (NLCD)[2]	--	--	**83.5%**	**87.0%**	--

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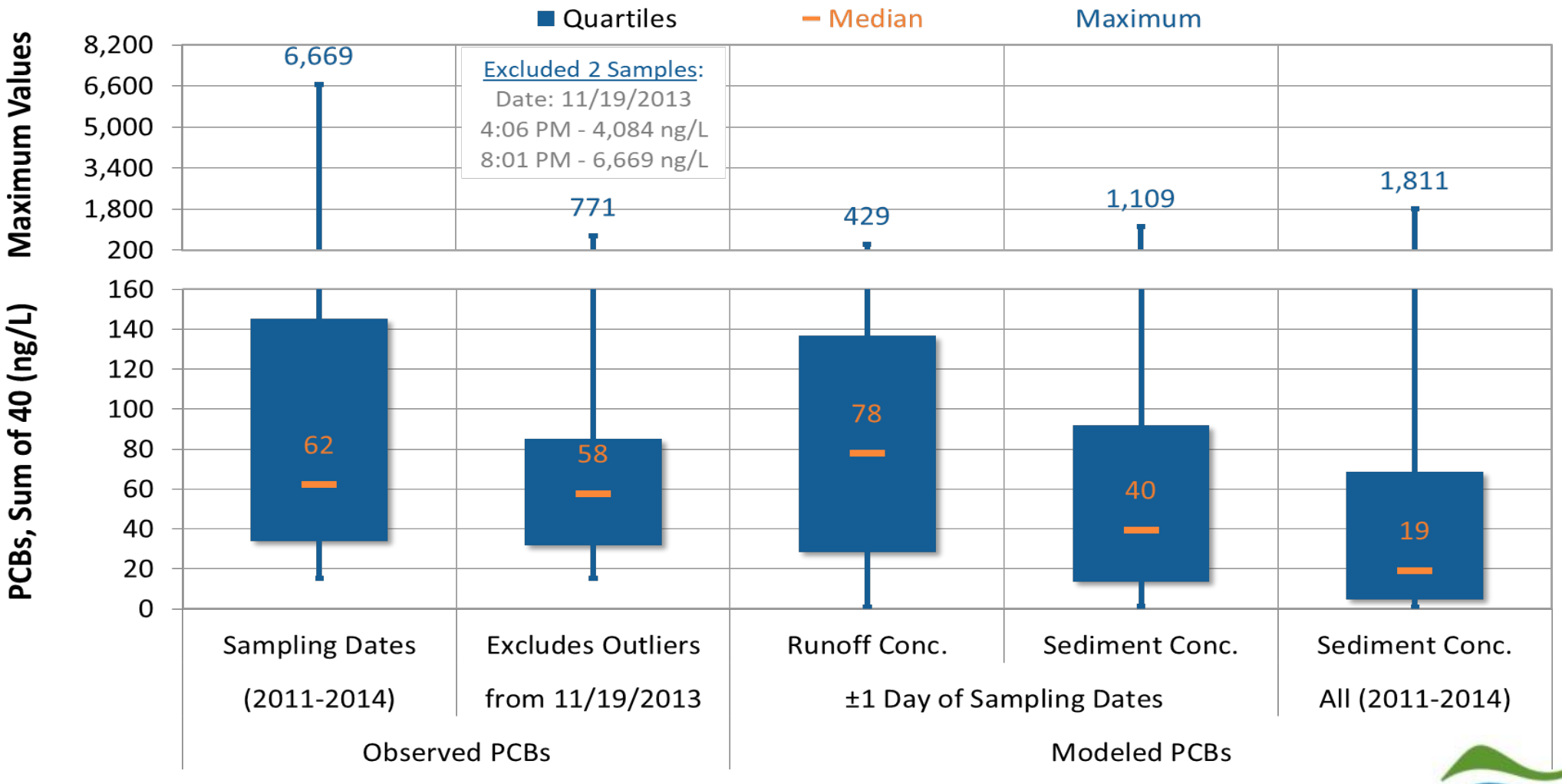
Validation: Modeled (based on RWSM) vs. Observed Data at Pulgas Creek



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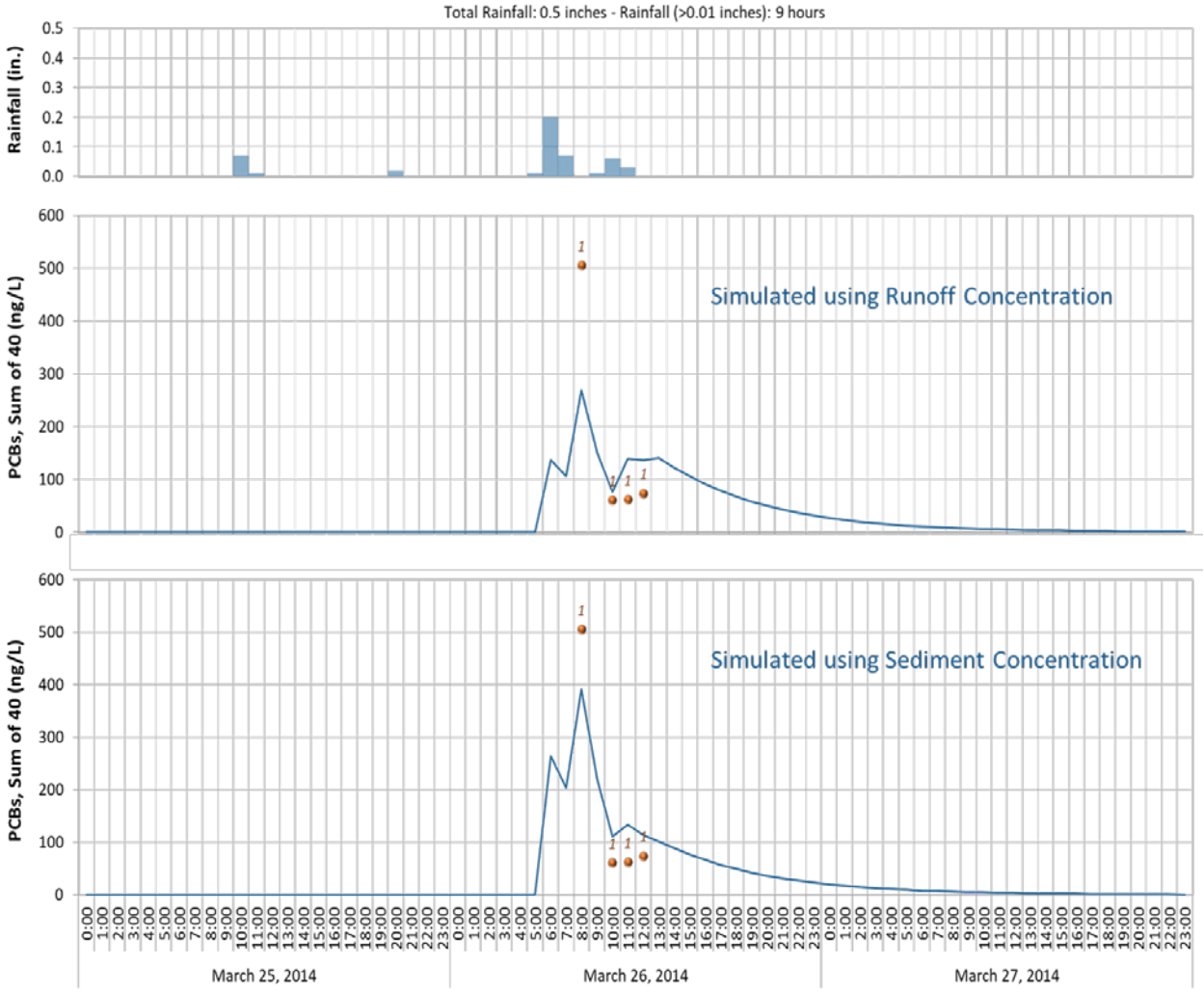
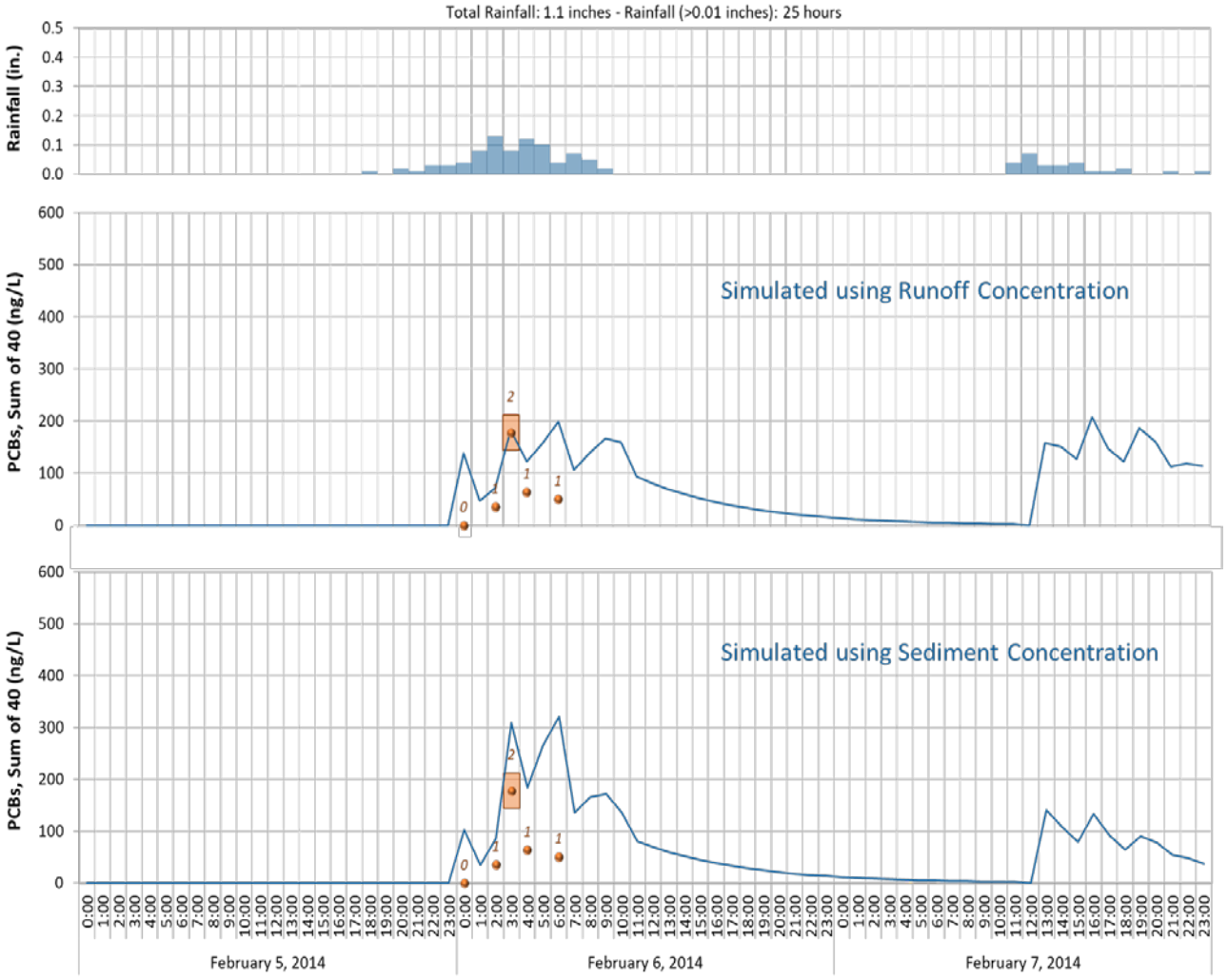
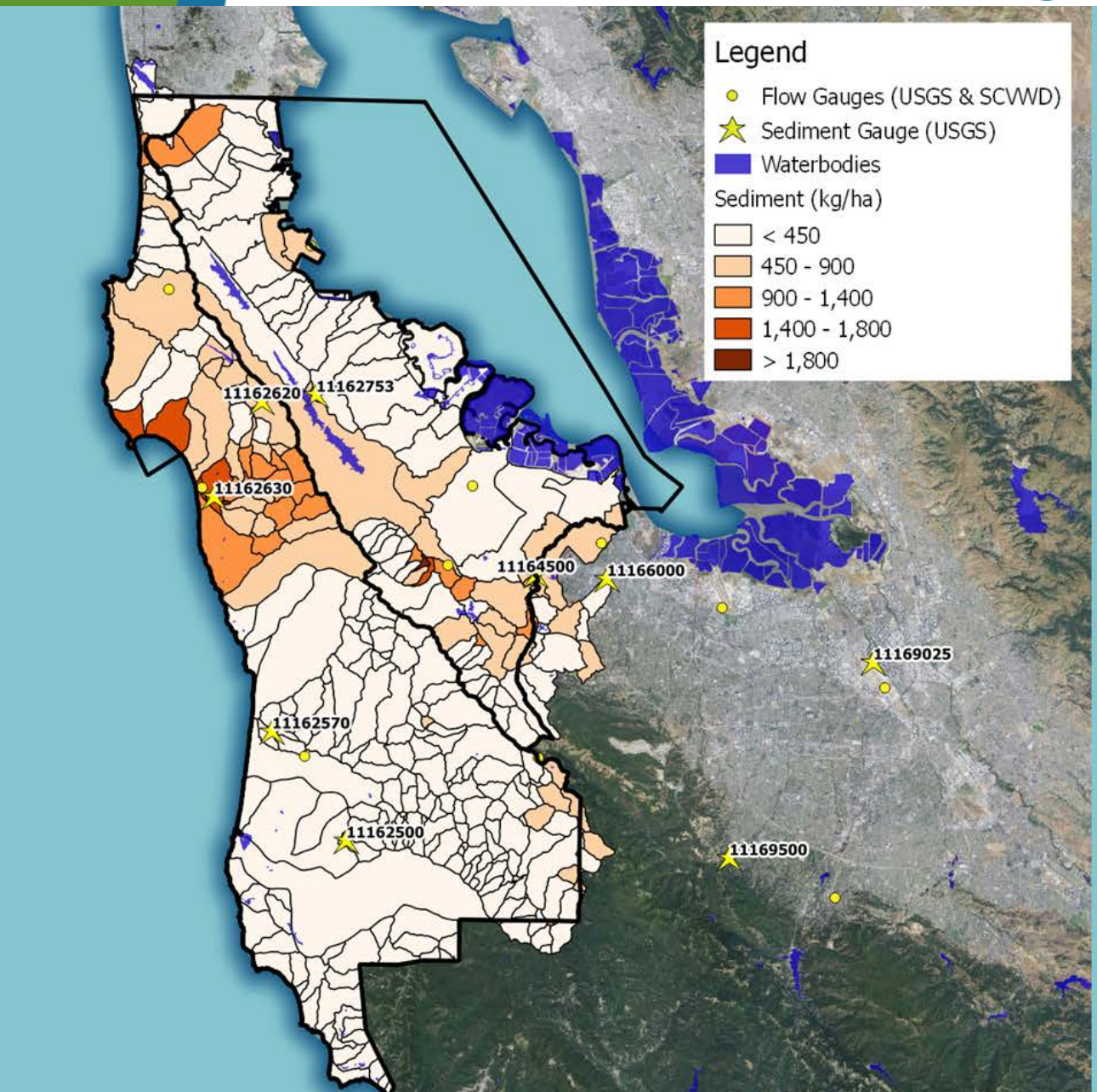
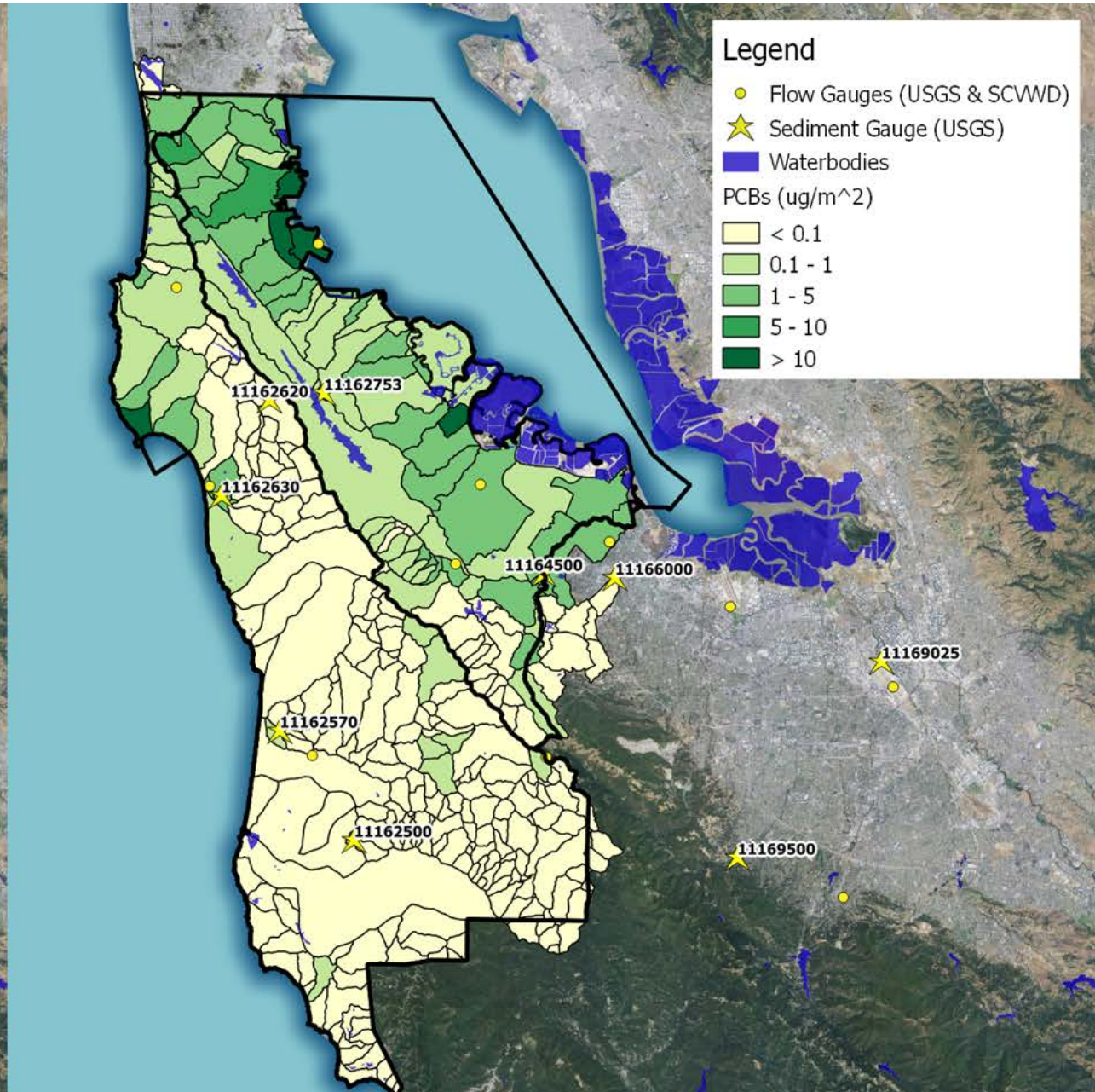




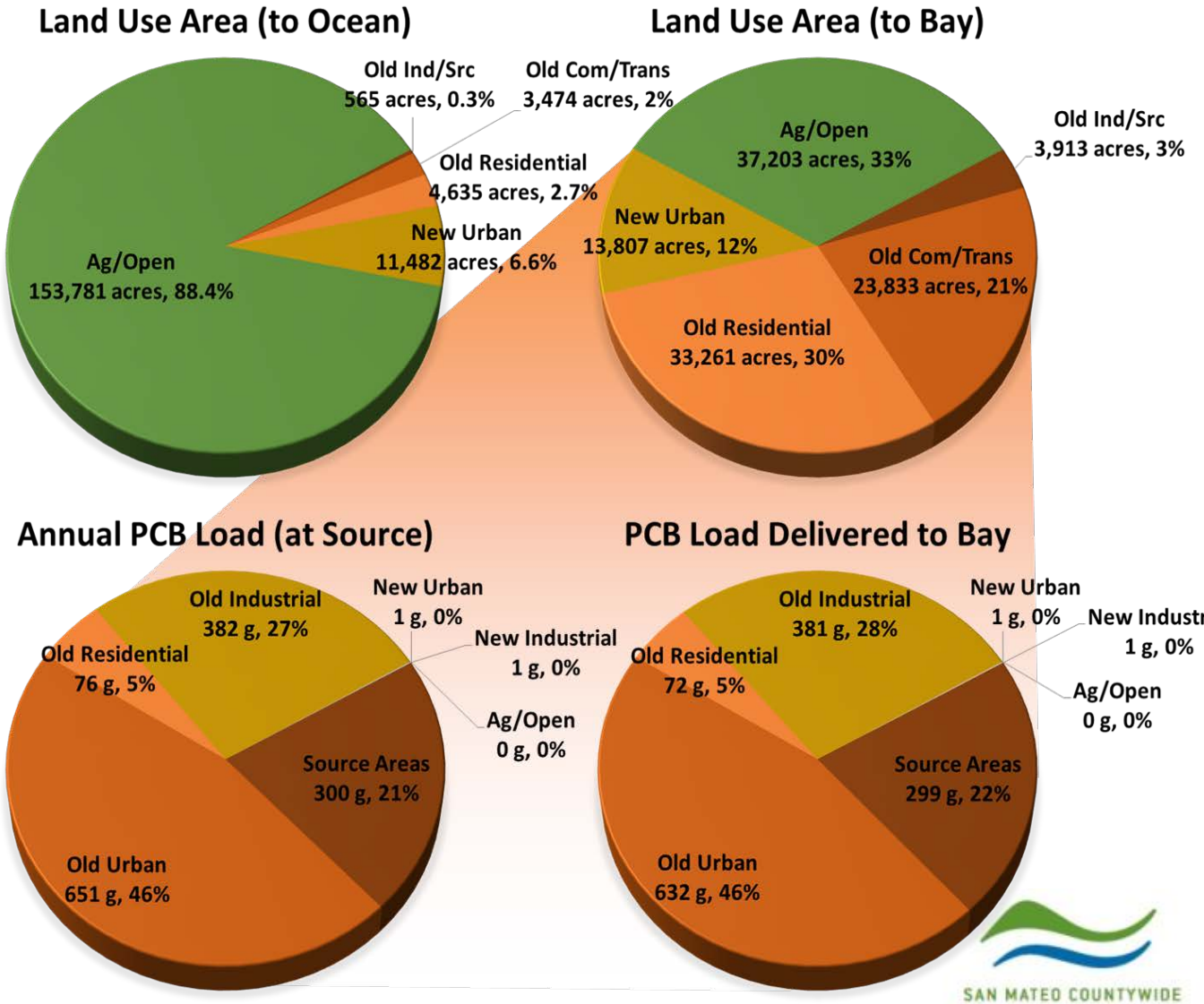
Loading Analysis





Loading Analysis

- Consideration of urban areas addressed by MRP
- To be further refined based on Phase II MS4 permits, Industrial General Permit, and Caltrans



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Load Reduction Goals

Note: Results are preliminary/draft and should not be quoted or cited.

1	2	3	4	5 = 3 x 4	6 = 2 - 5	7 = 6 / 2
Source	Existing PCB Load (kg/year)	Annual Sediment Load (t/year)	Target Sediment Concentration (µg/kg)	PCB Wasteload Allocation (kg/year)	PCB Load Reduction (kg/year)	Percent Reduction
Bay-wide WLA	20	2,000,000	1	2	18	90.0%
SMC portion of WLA	2	200,000	1	0.2	1.8	90.0%
SMC loads based on RAA	1.4	10,000	n/a	0.2	1	85.7%

Based on Modeled Sediment

Based on SFEI RWSM

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Load Reduction Goals

Note: Results are preliminary/draft and should not be quoted or cited.

1	2	3	4	5 = 3 x 4	6 = 2 - 5	7 = 6 / 2
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SMC loads based on RAA	1.4	10,000	n/a	0.2	1	85.7%
Load Reduction Achieved Through GI (20.8%)					0.208	17.8%

Based on Modeled Sediment

Based on SFEI RWSM

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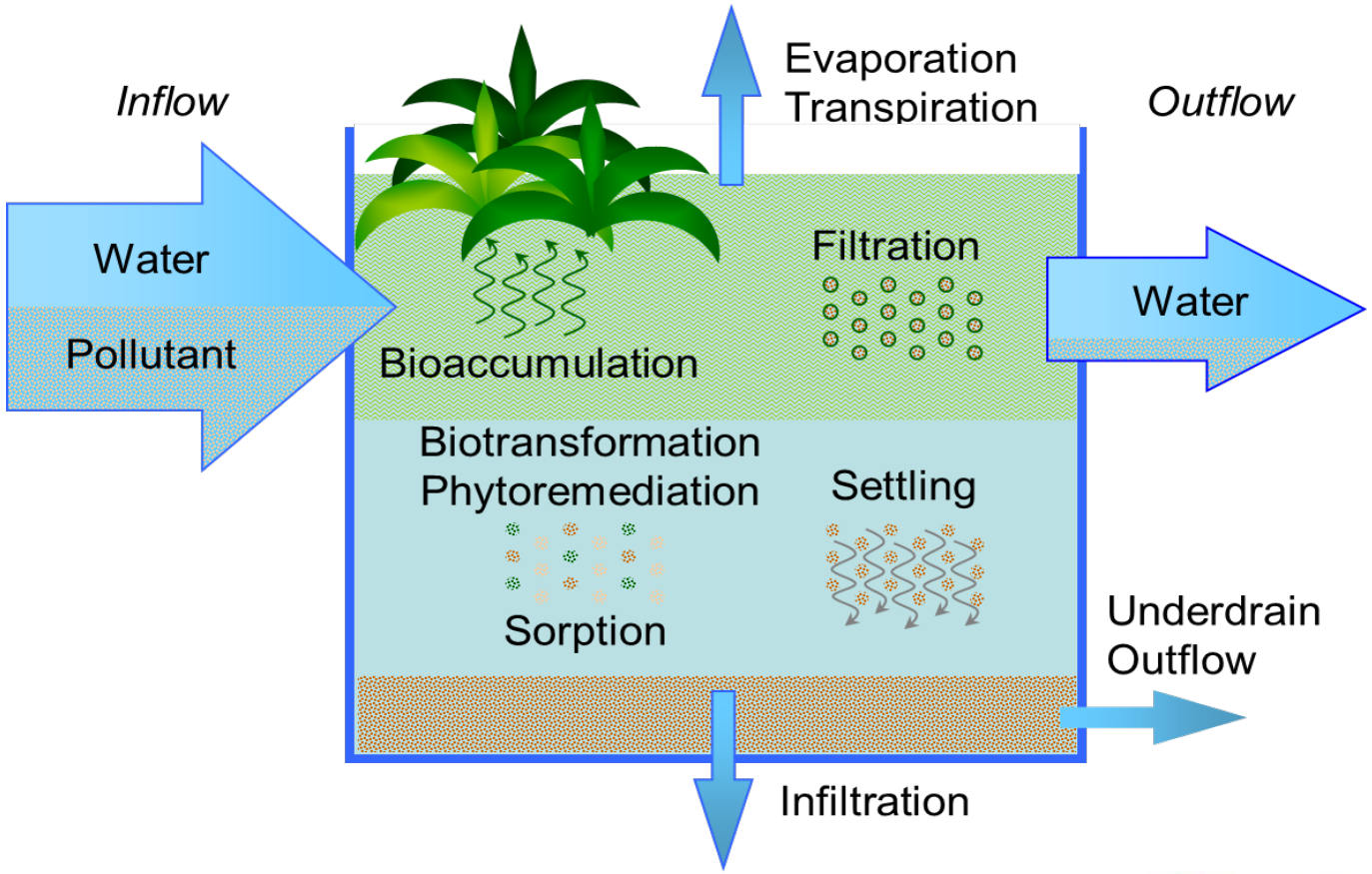
Green Infrastructure Modeling - SUSTAIN

- Process simulation
- Modeling assumptions documented and made available for review in memorandum



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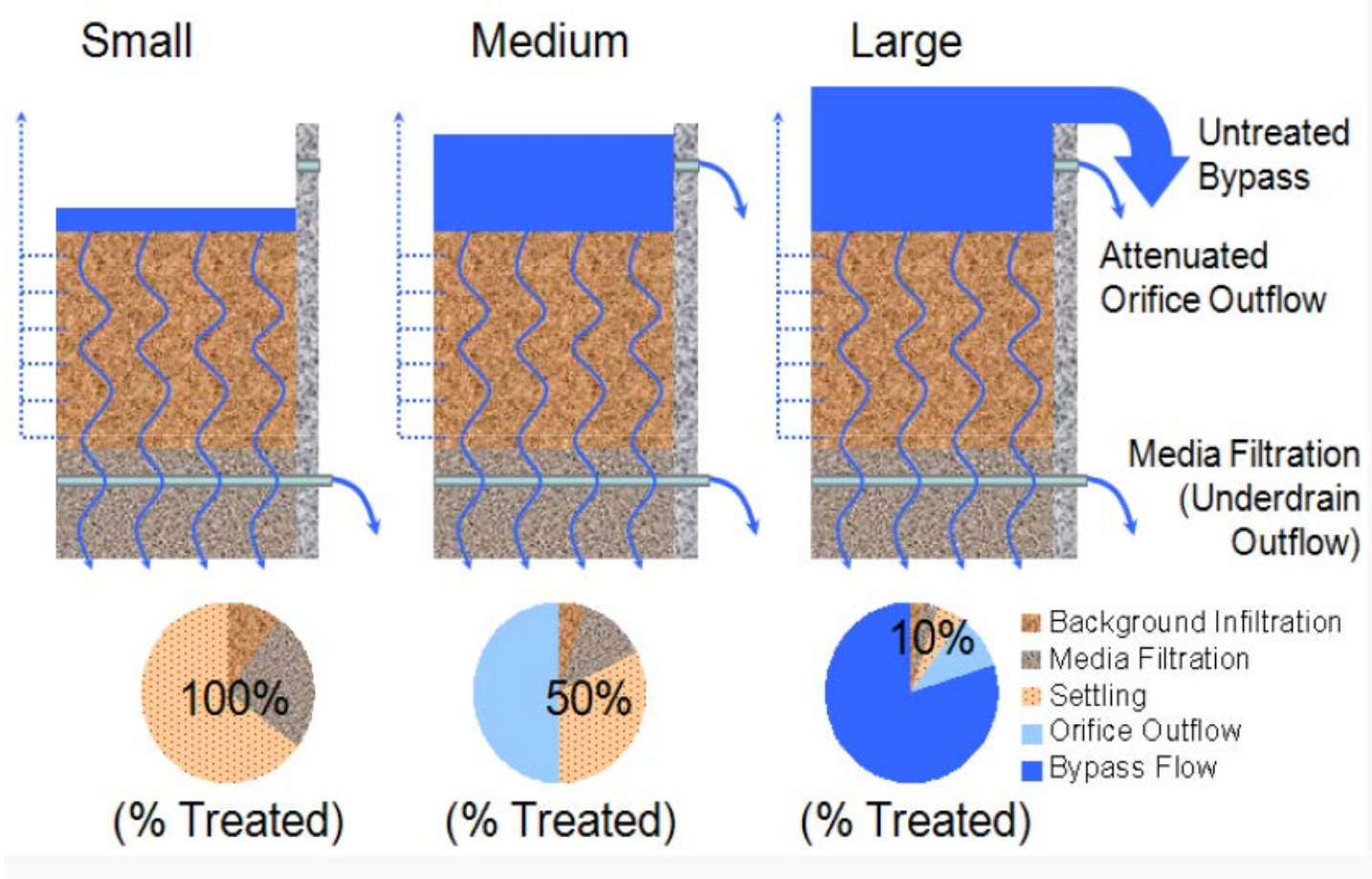
Green Infrastructure Modeling - SUSTAIN

- Simulates effectiveness of GI during varying storm sizes and conditions



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Water Pollution Prevention Program

LID for New/Redevelopment (C.3)

Single-Family (acres)	Multi-Family Residential (acres)	Employer* (acres)	Total (acres)
164.4	476.6	973.9	1,614.9

* Represents an aggregate of retail, service/office, manufacturing, warehousing, and industrial land uses

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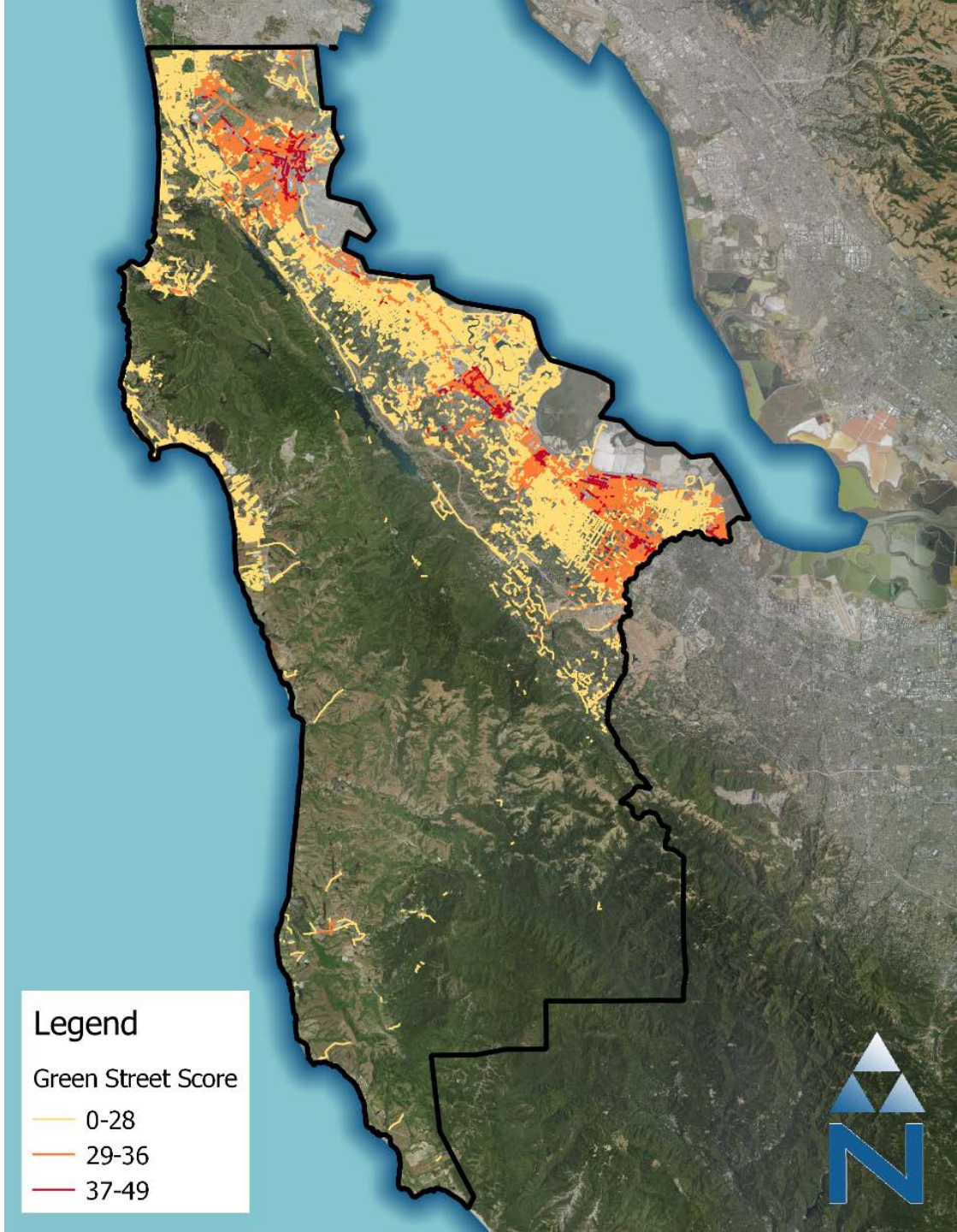
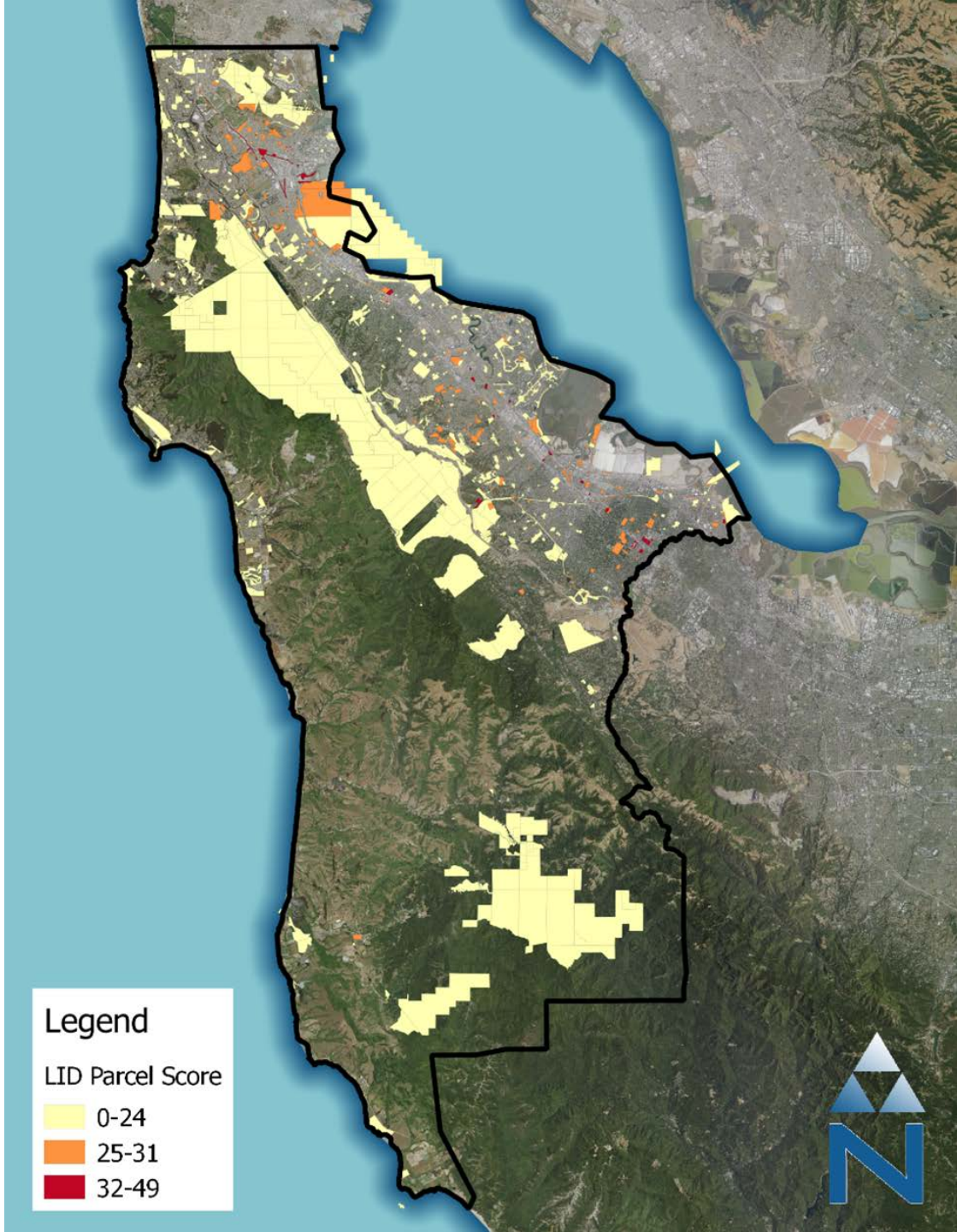
Green Street Opportunities

- Screened and prioritized for SRP
- Concepts developed for select high-priority projects



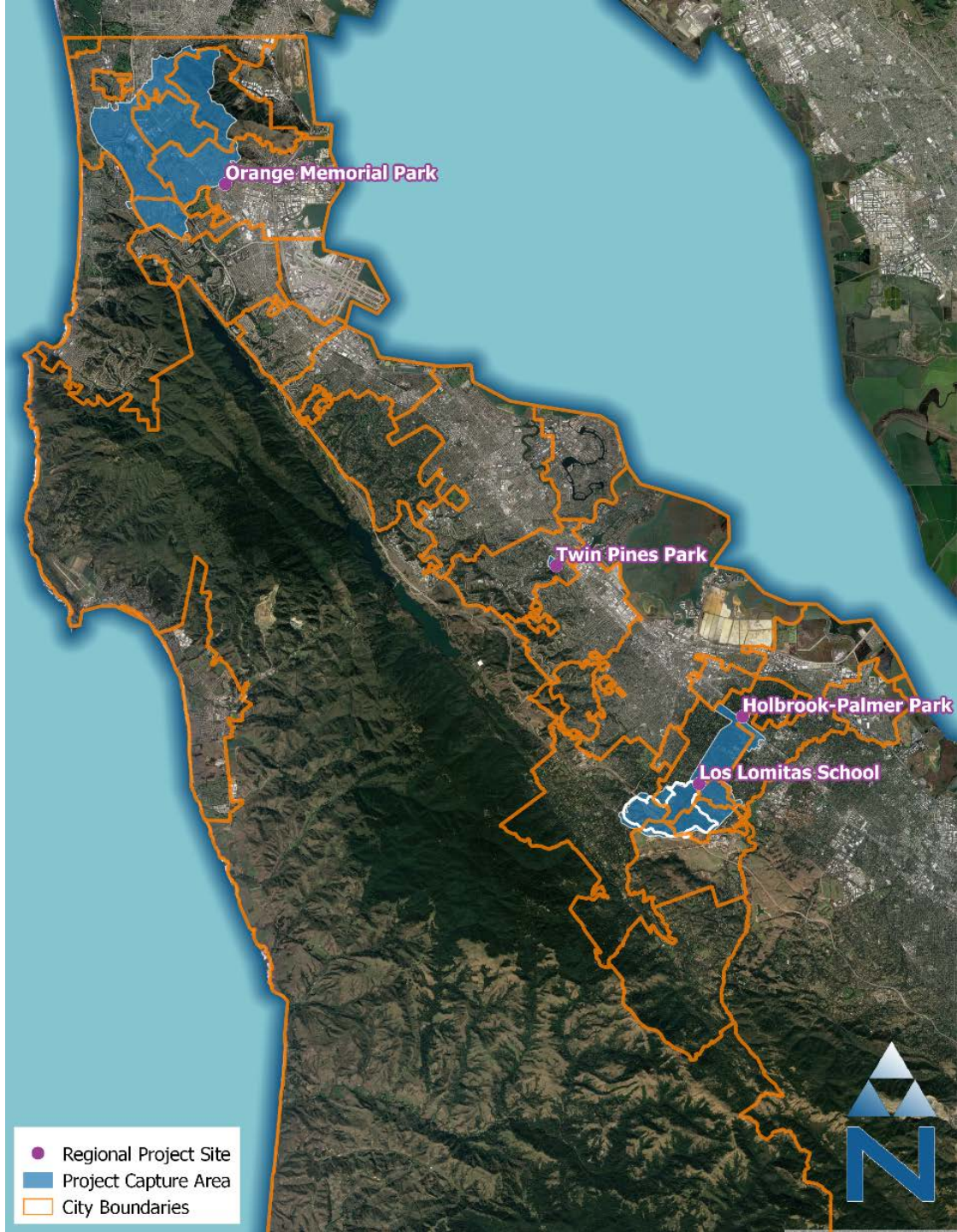
LID Retrofit Opportunities

- Screened and prioritized for SRP
- Concepts developed for select high-priority projects

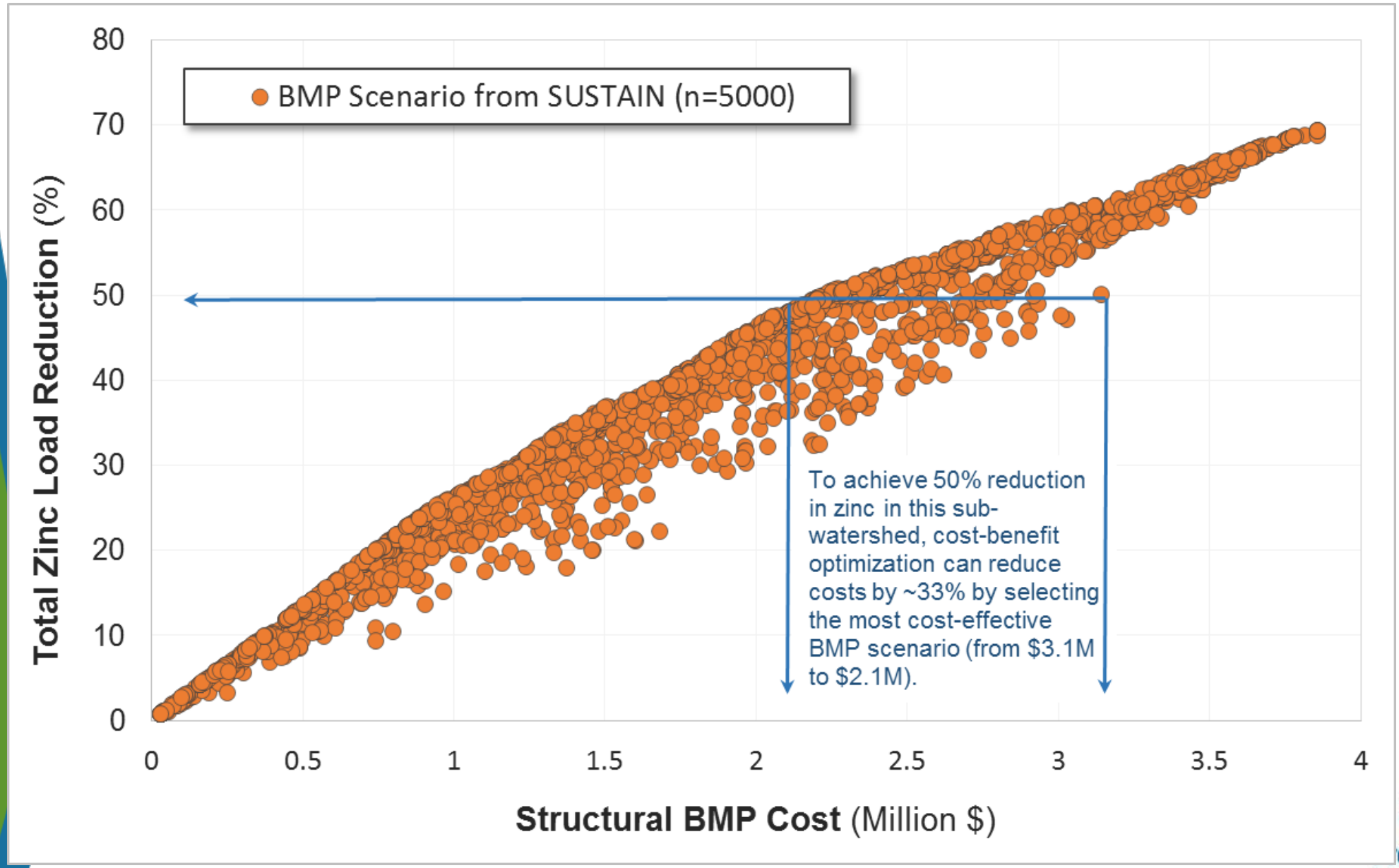


Regional Project Opportunities

- Concepts developed for SRP:
  - Orange Memorial Park
  - Twin Pines Park
  - Holbrook-Palmer Park
- Atherton prepared concept for Las Lomitas Elementary School and updated concept for Holbrook-Palmer Park



Cost-Effectiveness Curve (Optimization)



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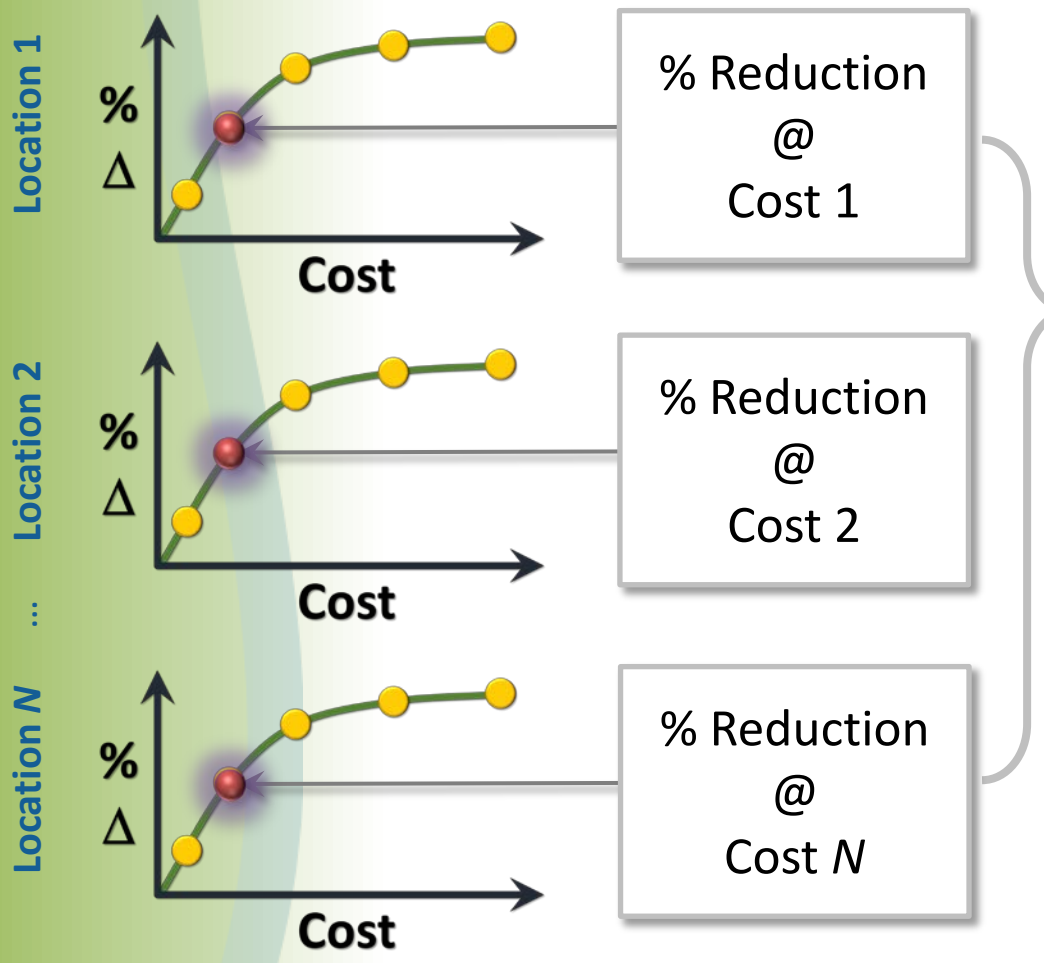
Proportional

*Each **location** is responsible for individually achieving the target load reduction*



Total Cost (Proportional)

$$\sum_{k=0}^{n} Cost_k$$

Targeted

*Optimization approach reduces total implementation cost by targeting specific source areas across **locational** boundaries*

$$>> \quad Total\ Cost_{Targeted}$$

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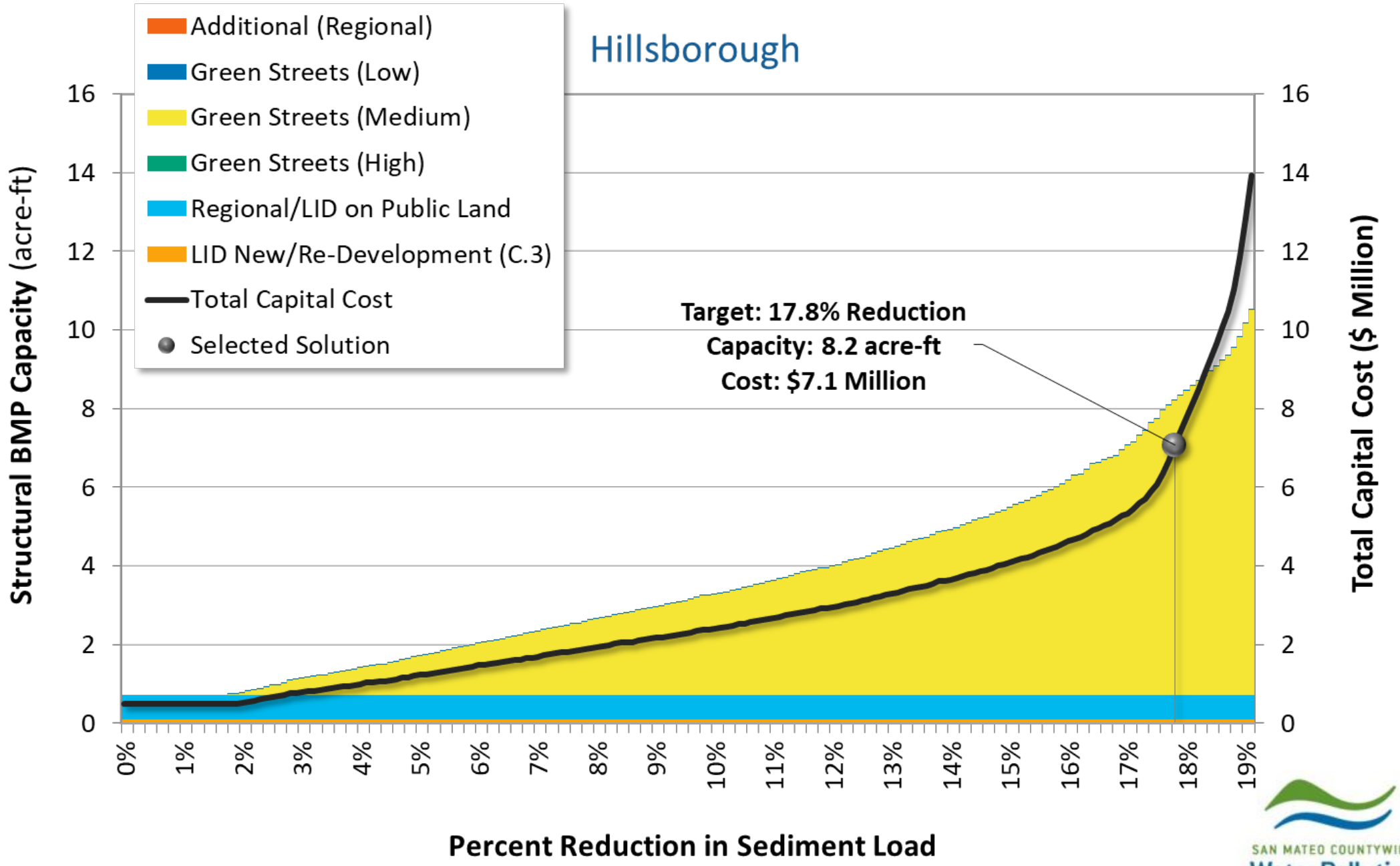

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Hillsborough GI Goals

Subwatershed	BMP Capacity (acre-feet)						
	LID New/Re-Development (C.3)	Regional/LID on Public Land	Green Streets (High)	Green Streets (Medium)	Green Streets (Low)	Additional (Regional)	Total
2312	0.01	--	--	0.20	--	0	**0.2**
2313	0.00	0.00	--	0.04	--	0	**0.0**
2315	0.04	0.16	--	2.45	--	0	**2.6**
2316	0.00	0.00	--	0.01	--	0	**0.0**
2318	0.03	0.44	--	2.74	--	0	**3.2**
2320	0.00	0.04	--	1.61	--	0	**1.7**
2321	0.00	0.00	--	0.46	0.02	0	**0.5**
2328	0.00	0.00	--	0.00	--	0	**0.0**
2329	0.00	0.00	--	0.03	--	0	**0.0**
Total	**0.1**	**0.6**	**0.0**	**7.6**	**0.0**	**0.0**	**8.3**

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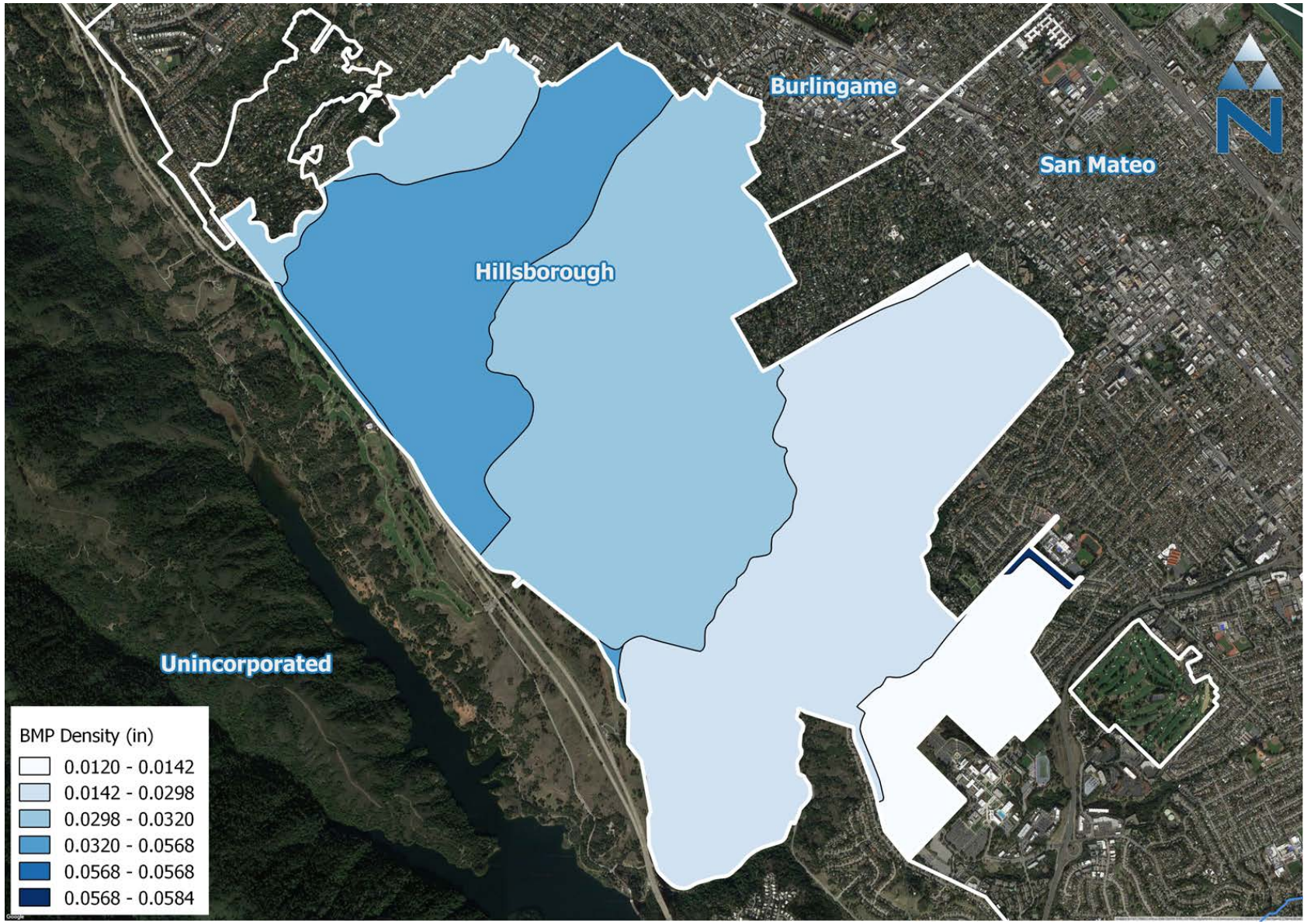
Water Pollution Prevention Program

Hillsborough GI Goals



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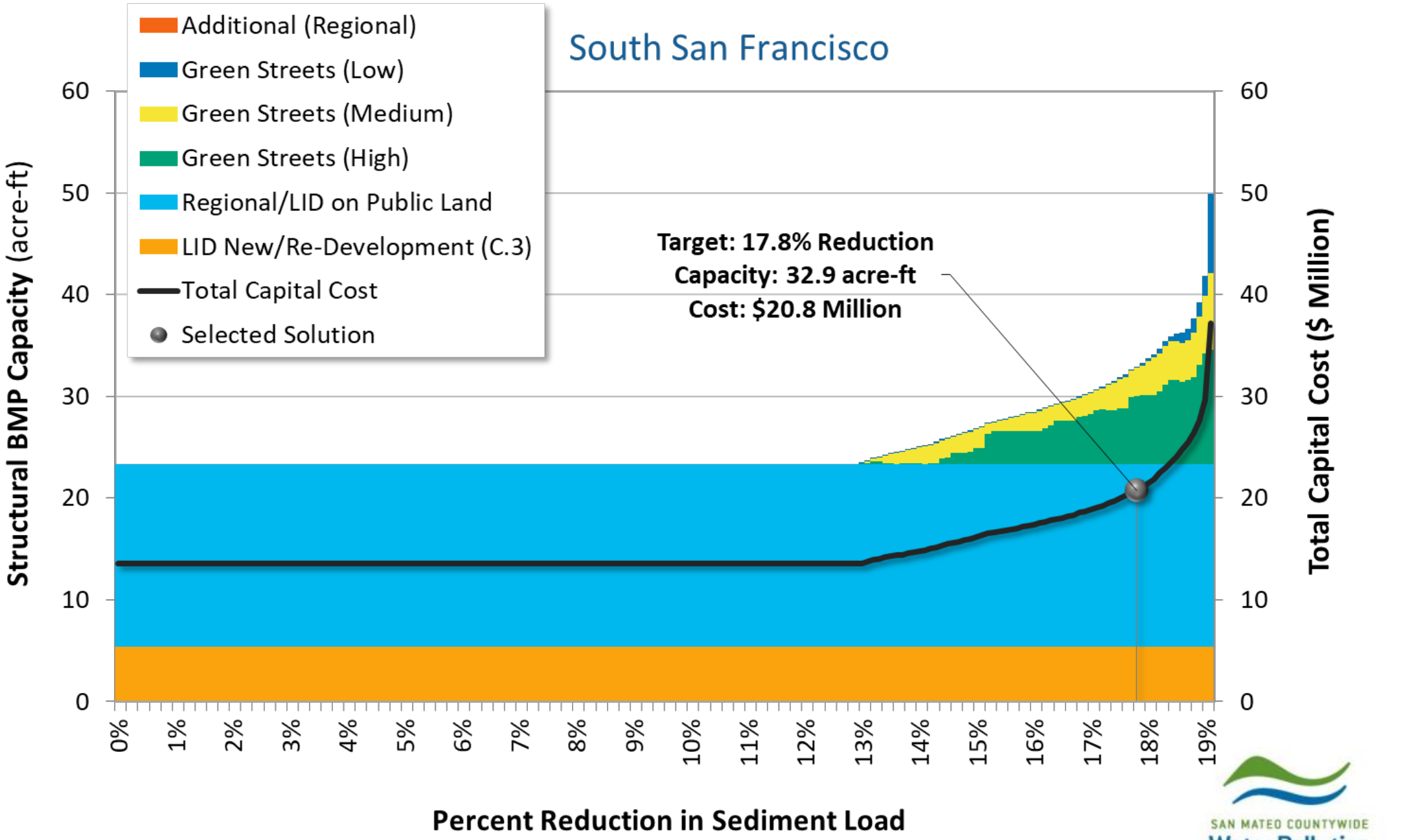

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South San Francisco GI Goals

Subwatershed	BMP Capacity (acre-feet)						
	LID New/Re-Development (C.3)	Regional/LID on Public Land	Green Streets (High)	Green Streets (Medium)	Green Streets (Low)	Additional (Regional)	Total
2325	0.05	0.51	0.07	0.01	0.04	0	**0.7**
2326	0.00	7.18	--	--	--	0	**7.2**
2401	2.60	4.38	4.45	0.00	--	0	**11.4**
2402	0.60	1.30	0.54	--	--	0	**2.4**
2403	0.74	1.78	1.04	0.69	--	0	**4.2**
2404	0.11	1.04	--	--	--	0	**1.1**
2405	0.28	0.56	0.63	--	--	0	**1.5**
2501	0.66	1.13	--	1.77	0.10	0	**3.7**
2502	0.32	0.09	--	0.33	--	0	**0.7**
2503	0.04	0.00	--	--	0.02	0	**0.1**
Total	**5.4**	**18.0**	**6.7**	**2.8**	**0.2**	**0.0**	**33.0**

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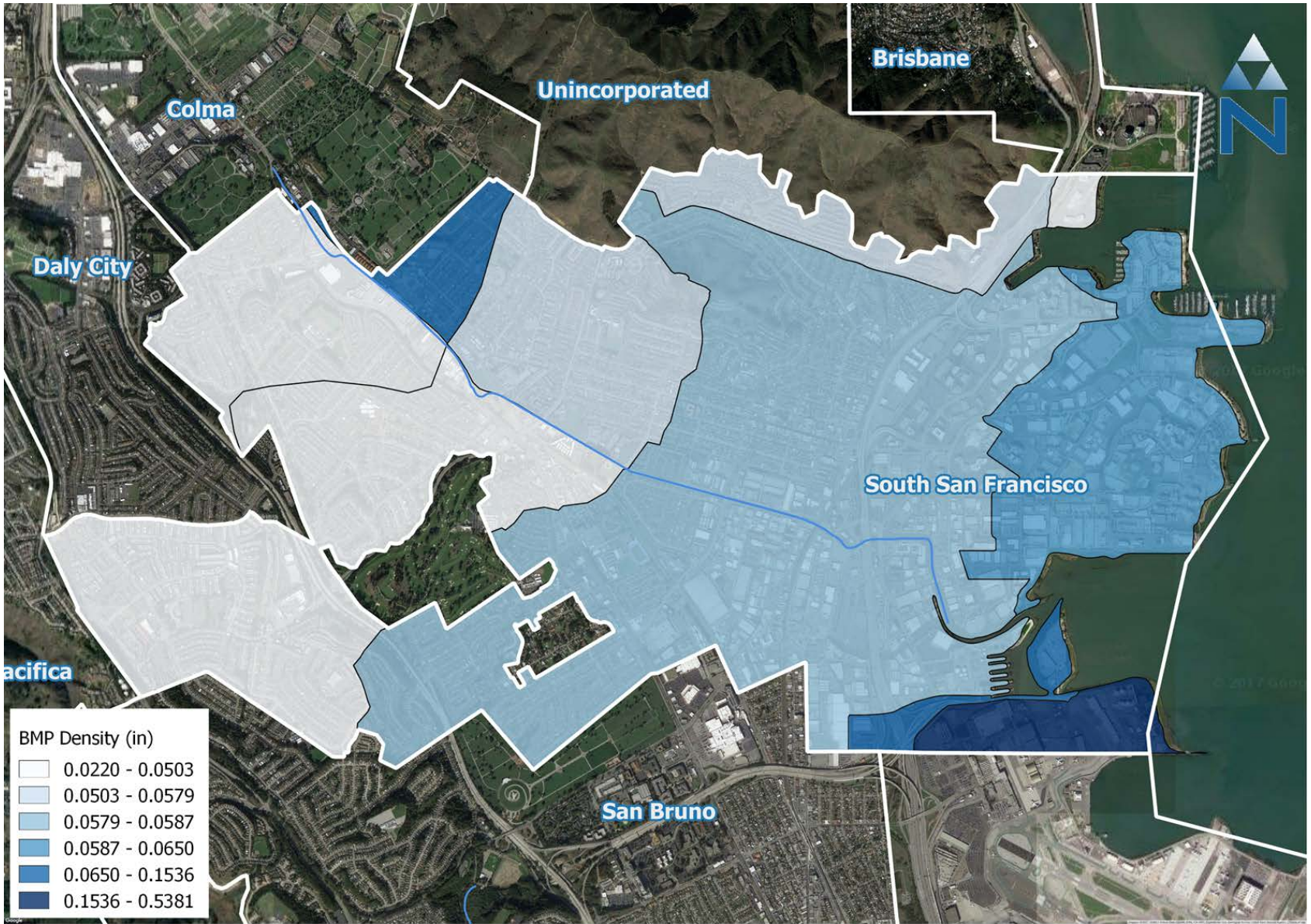
South San Francisco GI Goals



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Water Pollution
Prevention Program

SRP Regional Project Quantitative Scoring

Table 4-1. Parcel prioritization criteria for regional stormwater capture

	Points						Weight Factor
	0	1	2	3	4	5	
Parcel Land Use	--	--	Schools/Golf Courses	Public Buildings	Parking Lot	Park / Open Space	--
Impervious Area (%)	X < 40	40 ≤ X < 50	50 ≤ X < 60	60 ≤ X < 70	60 ≤ X < 80	80 ≤ X < 100	--
Parcel Size (acres)	0.25 ≤ X < 0.5	0.5 ≤ X < 1	1 ≤ X < 2	2 ≤ X < 3	3 ≤ X < 4	4 ≤ X	--
Hydrologic Soil Group	--	D	Unknown	C	B	A	--
Slope (%)	5 < X ≤ 10	4 < X ≤ 5	3 < X ≤ 4	2 < X ≤ 3	1 < X ≤ 2	0 < X ≤ 1	--
Proximity to Flood-prone Channels (miles)	Not in sub-basin	3 < X	--	1 < X ≤ 3	--	X ≤ 1	2
Contains PCB Risk Areas	None	--	--	Moderate	--	High	2
Currently planned by City or co-located with other City project	No					Yes	2
Drains to TMDL water	No					Yes	
Above groundwater basin	No		Yes				--
Augments water supply	No	Yes					--
Water quality source control	No	Yes					--
Reestablishes natural hydrology	No	Yes					--
Creates or enhances habitat	No	Yes					--
Community enhancement	No	Yes					--

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Water Pollution Prevention Program

SRP Green Street Quantitative Scoring

Table 4-1. Right-of-Way prioritization criteria for green streets

	Points						Weight Factor
	0	1	2	3	4	5	
Street Type	Highway	--	Arterial	Collector	Alley	Local	--
Imperviousness (%)	X < 40	40 ≤ X < 50	50 ≤ X < 60	60 ≤ X < 70	60 ≤ X < 80	80 ≤ X < 100	--
Hydrologic Soil Group	--	D	Unknown	C	B	A	--
Slope (%)	--	4 < X ≤ 5	3 < X ≤ 4	2 < X ≤ 3	1 < X ≤ 2	0 < X ≤ 1	--
Proximity to Flood-prone Channels (miles)	Not in sub-basin	3 < X	--	1 < X ≤ 3	--	X ≤ 1	2
Contains PCB Risk Areas	None	--	--	Moderate	--	High	2
Currently planned by City or co-located with other City project	No					Yes	2
"Safe Routes to School" program	No					Yes	2
Drains to TMDL water	No					Yes	--
Above groundwater basin	No		Yes				--
Augments water supply	No	Yes					--
Water quality source control	No	Yes					--
Reestablishes natural hydrology	No	Yes					--
Creates or enhances habitat	No	Yes					--
Community enhancement	No	Yes					--

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Water Pollution Prevention Program

SRP LID Quantitative Scoring

Table 4-1. Parcel prioritization criteria for LID

	Points						Weight Factor
	0	1	2	3	4	5	
Parcel Land Use	--	--	Schools/Golf Courses	Park / Open Space	Parking Lot	Public Buildings	--
Impervious Area (%)	X < 40	40 ≤ X < 50	50 ≤ X < 60	60 ≤ X < 70	70 ≤ X < 80	80 ≤ X < 100	--
Hydrologic Soil Group	--	D	Unknown	C	B	A	--
Slope (%)	5 < X ≤ 10	4 < X ≤ 5	3 < X ≤ 4	2 < X ≤ 3	1 < X ≤ 2	0 < X ≤ 1	--
Proximity to Flood-prone Channels (miles)	Not in sub-basin	3 < X	--	1 < X ≤ 3	--	X ≤ 1	2
Contains PCB Risk Areas	None	--	--	Moderate	--	High	2
Currently planned by City or co-located with other City project	No					Yes	2
Drains to TMDL water	No					Yes	--
Above groundwater basin	No		Yes				--
Augments water supply	No	Yes					--
Water quality source control	No	Yes					--
Reestablishes natural hydrology	No	Yes					--
Creates or enhances habitat	No	Yes					--
Community enhancement	No	Yes					--

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