

Green Infrastructure

Mandates, Plans, Project Identification, and Design

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American Public Works Association Northern California
November 6, 2019



Topics

- What is Green Infrastructure?
- Part 1: Green Infrastructure Planning
 - Mandate and Drivers
 - What's in the Green Infrastructure Plans
 - Implementation/Next Steps
- Part 2: Project Identification and Design
 - Basic Steps
 - Examples

What is Green Infrastructure?

- Low Impact Development drainage design
 - Bioretention, landscape dispersal, pervious pavement
- Retrofit
- In the right of way
- At the planning scale, may also include LID on development projects



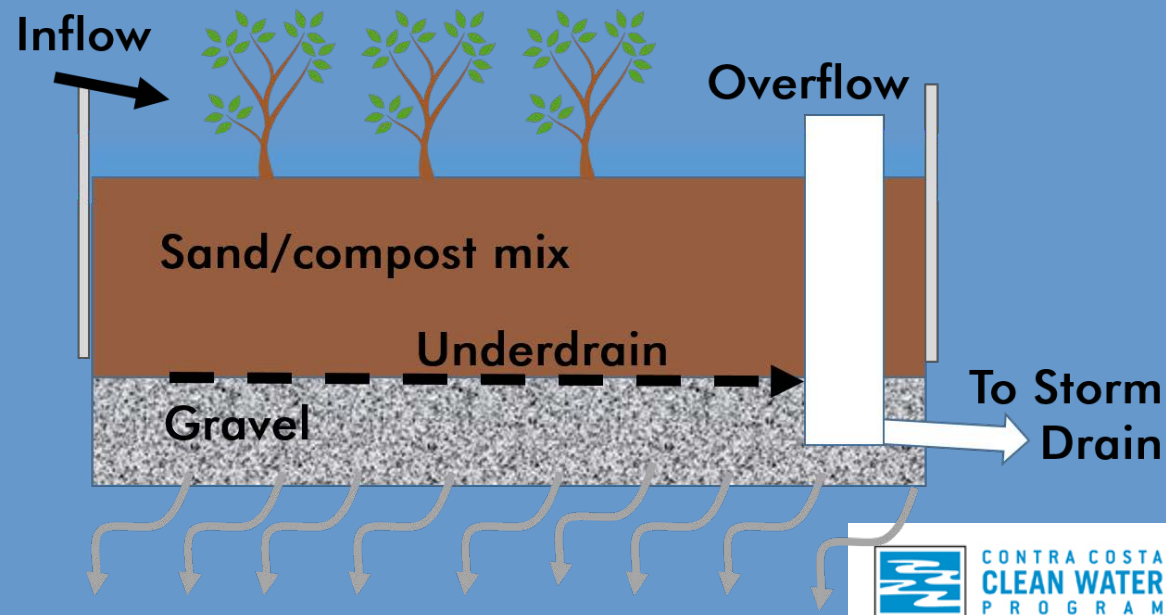
Objective: Grey to Green

- Impervious surfaces: roofs and pavement
- Catch basins and piped drainage
- “Collect and convey” design objective

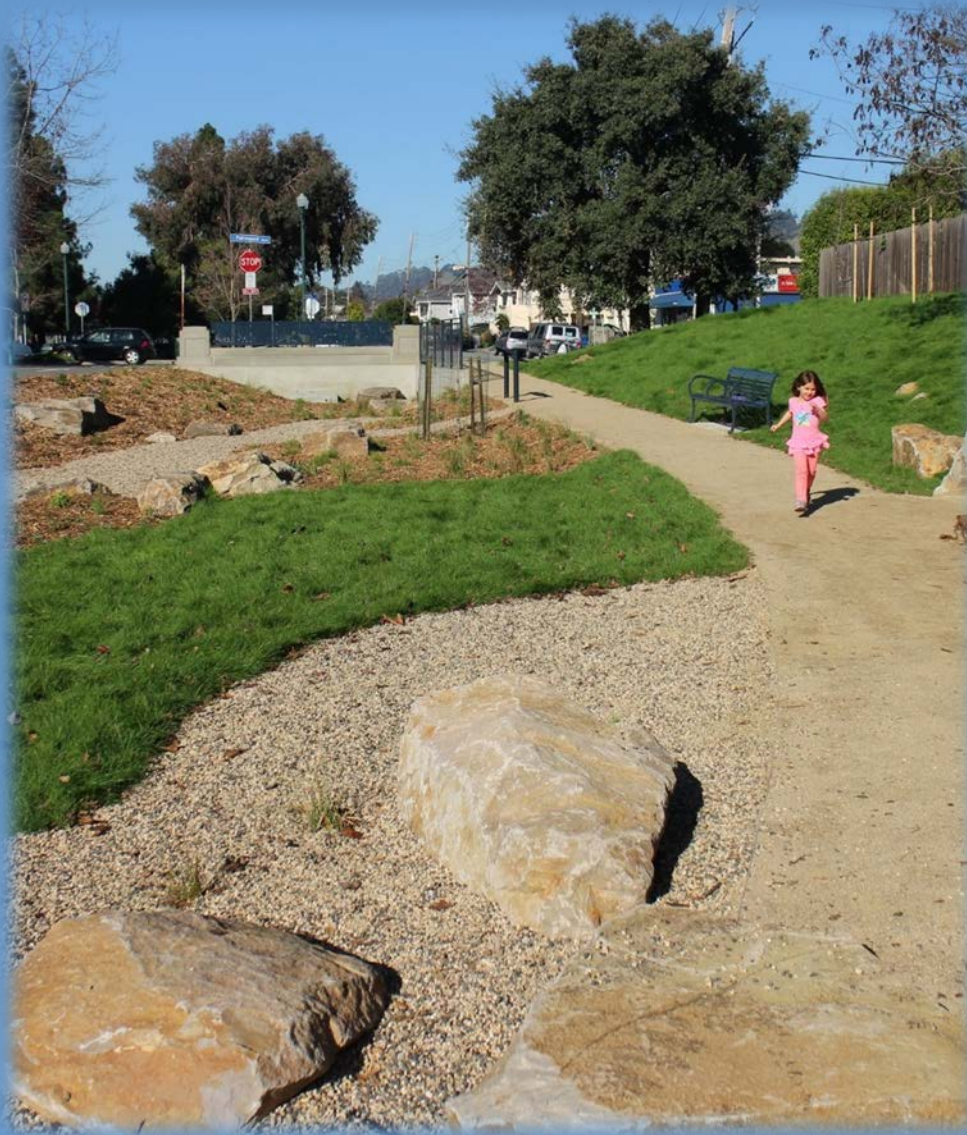


Method: Low Impact Development

- Minimize imperviousness
 - Minimize roofs and paving
 - Substitute pervious paving where possible
- Disperse runoff to landscaping
- Direct runoff to bioretention facilities



Multiple Use



Multiple Benefits

- Stop spills, dumping, and “urban slobber”
- Sustainable, low-maintenance treatment
- Synergies
 - Multi-modal transport, “complete streets”
 - Urban greening and air quality
 - Heat island mitigation
 - Active and passive recreation
 - Urban creek restoration and habitat creation

Part 1: Green Infrastructure Planning



Political & Regulatory Momentum

- Solution to combined sewer overflows
- Big-city scale commitments
 - Philadelphia, Washington, San Francisco
- Political momentum
 - Climate change
 - Public health
 - Triple bottom line
- Perceived solution to stormwater-related non-attainment



San Francisco Bay Area Mandate

- Progression of Stormwater NPDES
 - New Development Requirements (2001)
 - Green Streets Retrofits (2009)
 - Low Impact Development (2011)
- Municipal Regional Permit 2.0 (2015)
 - Municipal Green Infrastructure Plans
 - “No missed opportunities”
- Municipal Regional Permit 3.0 - ??

Green Infrastructure Plans

- Planning framework or workplan adopted by June 30, 2017
- Green Infrastructure Plan completed by September 30, 2019

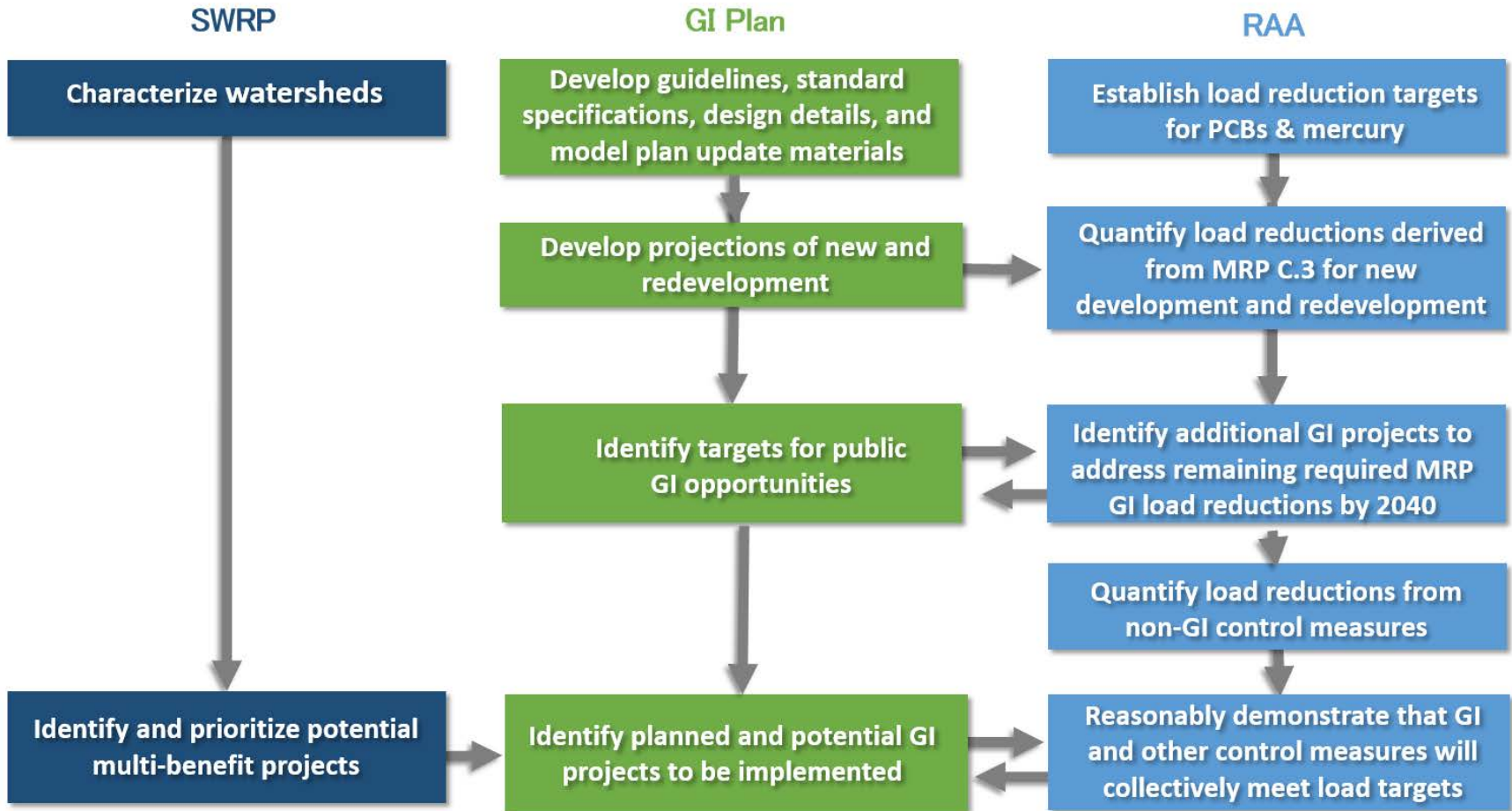
MRP 2.0 Mandated Plan Elements

- Projections/Targets for impervious surface converted to GI:
 - Development/Redevelopment
 - Public Infrastructure (retrofits)
- Associated reductions in PCBs & Mercury
- Target dates: 2020, 2030, and 2040
- Project lists and maps
- Tracking of completed projects

Ancillary GI Plan Elements

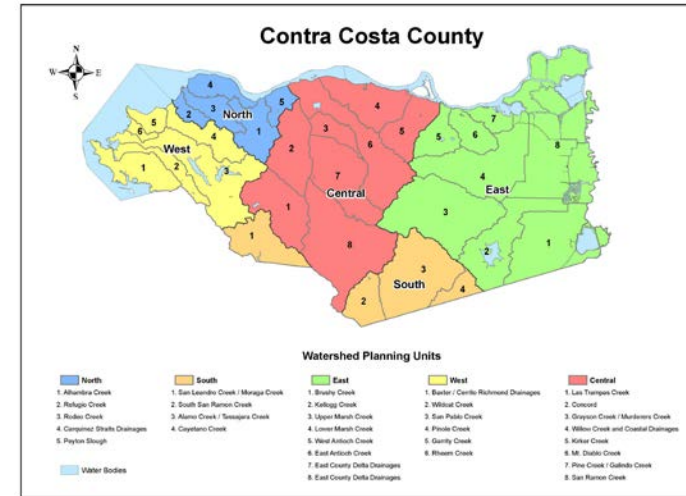
- Updates to Related Planning Documents
- Design Guidelines – Streetscapes
- Standard Specifications and Details
- Guidance for Sizing GI Facilities
- Funding Strategies
- Policies and Ordinances
- Outreach and Education

Relationship between SWRP, GI Plan, and RAA



Contra Costa Watersheds Stormwater Resource Plan

- Grant-funded plan to build stormwater capture projects/programs
- ***Projects must be in a SWRP to obtain future state bond funds***
- Projects provide at least two benefits:
 - Water Quality, Water Supply, Flood Management, Environmental, and Community
- Water Quality focus for CCW SWRP
 - Load Reductions for PCBs and Hg
 - **Municipal GI Plans**

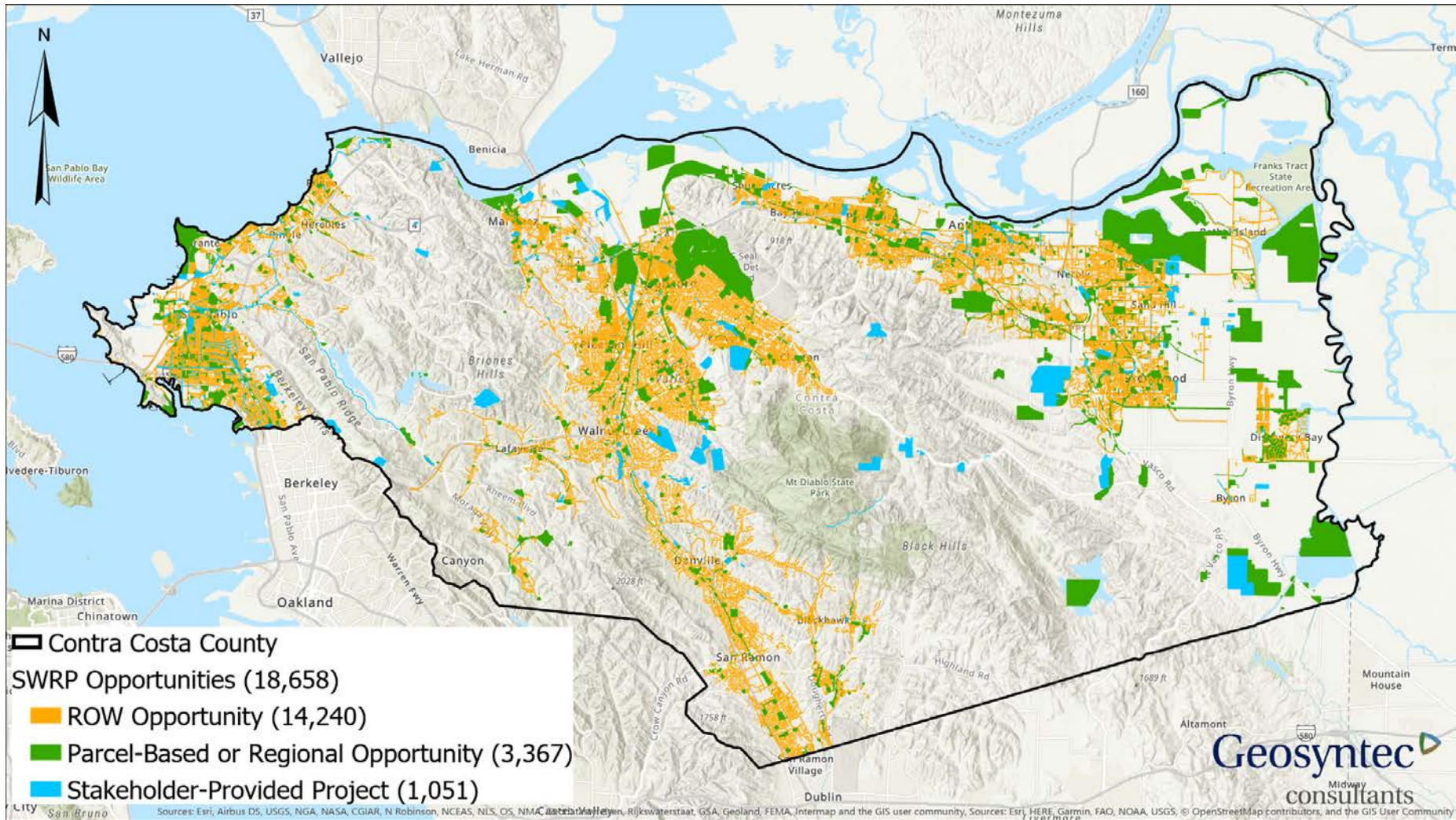


PERMEABLE PAVEMENT



BIORETENTION

SWRP Stormwater Capture Project Identification



Reasonable Assurance Analysis

- PCBs TMDL specifies 90% reduction of urban runoff load by 2030

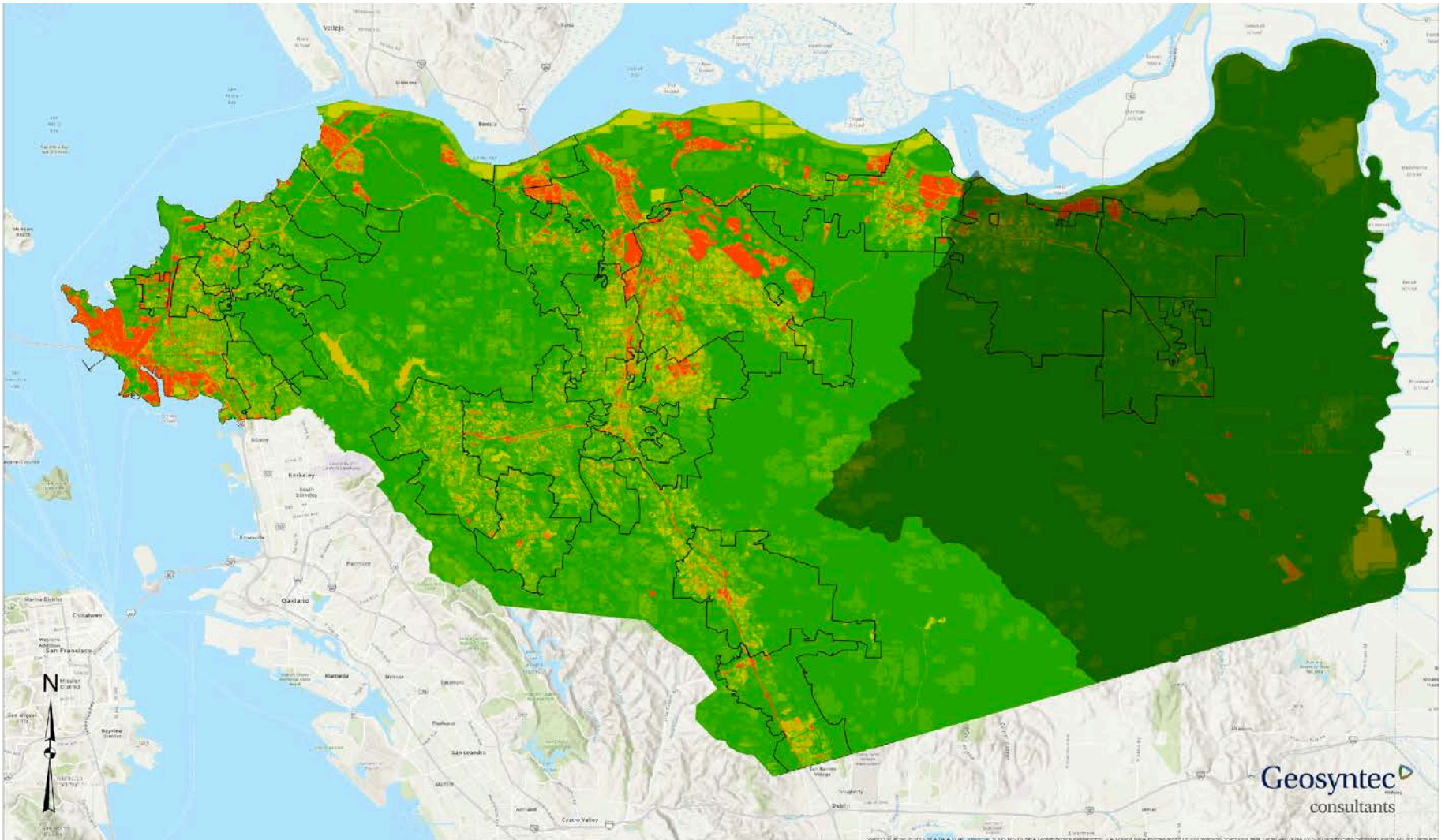
PCBs Baseline Load	PCBs Wasteload Allocation	PCBs Reduction By 2030
3,000 g/yr	300 g/yr	2,700 g/yr

- MRP 2.0 has PCBs interim goals and 2040 green infrastructure targets

2014 – 2020 Load Reduction Goal	2003 – 2040 GI Load Reduction
560 g/yr (23 g/yr from GI)	500 g/yr

- Green Infrastructure RAA: Demonstrate required PCBs load reductions will be achieved through GI by 2040
- PCBs Control Measure Implementation Plan & RAA: Demonstrate PCBs TMDL wasteload allocation will be achieved by 2030

RAA – Preliminary PCBs Loading Results



Permittee GI Plan Summary_20190807 - Excel

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Population Year: 2000

Contra Costa County Permittees Load Reduction Goals and Progress (Region 2)

County	Permittee	Population	% of MSP covered (2000)	County Baseline Methodology	County VLA [kg/yr]	Load Reduction Goal GI 2040 [kg/yr]	Loads Reduced via GI [kg/yr] 2003-2020 (from AGDL, public and private)	Loads Reduced via GI [kg/yr] 2003-2020 (from GI Plans, public and private)	Loads Reduced via GI [kg/yr] 2003-2020 (from Urbanism Projections, private)	Total PCBs load reduced via GI from 2003-2020 [kg/yr]	Load Reduction Achieved by 2020 via GI [kg/yr] from GI Plans, public and private)	Loads Reduced via GI [kg/yr] 2003-2030 (from Urbanism Projections, private)	Total PCBs load reduced via GI from 2003-2030 [kg/yr]	Load Reduction Achieved by 2040 via GI [kg/yr] from GI Plans, public and private)	Loads Reduced via GI [kg/yr] 2003-2040 (from Urbanism Projections, private)	Total PCBs load reduced via GI from 2003-2040 [kg/yr]	Load Reduction Target GI 2040, public [kg/yr]
Contra Costa	Cligton	16,24	1.9%	1567	0.3	0.003	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.002
Contra Costa	Concord	18,029	15.8%	1567	0.3	0.046	0.195	0.041	0.006	0.000	0.003	0.008	0.007	0.006	0.001	0.015	-0.004
Contra Costa	Unincorporated	89,956	23.8%	1567	0.3	0.063	0.238	0.062	0.001	0.000	0.000	0.001	0.000	0.001	0.004	0.019	0.043
Contra Costa	Danville	3,778	4.6%	1567	0.3	0.012	0.052	0.011	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.002	0.000
Contra Costa	El Cerrito	22,250	2.8%	1567	0.3	0.009	0.039	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.001	0.000	0.000
Contra Costa	Hercules	17,825	2.2%	1567	0.3	0.007	0.029	0.006	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.002	0.004
Contra Costa	Lafayette	24,684	3.1%	1567	0.3	0.009	0.040	0.008	0.000	0.000	0.001	0.001	0.002	0.001	0.002	0.005	0.000
Contra Costa	Marinez	23,079	3.7%	1567	0.3	0.001	0.040	0.000	0.000	0.000	0.001	0.002	0.000	0.002	0.000	0.004	0.006
Contra Costa	Moraga	10,186	1.3%	1567	0.3	0.004	0.017	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Contra Costa	Orinda	14,290	1.8%	1567	0.3	0.005	0.023	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Contra Costa	Piedra	16,772	2.4%	1567	0.3	0.006	0.028	0.006	0.001	0.000	0.001	0.002	0.001	0.002	0.001	0.003	0.003
Contra Costa	Pittsburg	44,794	5.7%	1567	0.3	0.017	0.074	0.015	0.002	0.000	0.009	0.011	0.011	0.012	0.015	0.019	-0.003
Contra Costa	Pleasant Hill	3,049	4.8%	1567	0.3	0.012	0.052	0.011	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Contra Costa	Riskindom	102,888	13.1%	1567	0.3	0.029	0.163	0.025	0.072	0.001	0.006	0.014	0.030	0.005	0.038	0.113	-0.077
Contra Costa	San Pablo	30,760	3.8%	1567	0.3	0.012	0.059	0.010	0.002	0.000	0.000	0.002	0.001	0.000	0.002	0.007	0.004
Contra Costa	San Ramon	36,229	4.5%	1567	0.3	0.014	0.066	0.014	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Contra Costa	Valued Creek	60,650	7.7%	1567	0.3	0.012	0.059	0.010	0.002	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000
Contra Costa	Total	784,246	100.0%														

CCCWP Permittee Attainment Tool_20181203 - Excel

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East County Permittees (Region 5)

County	Permittee	Population	% of Region Permittees Total Population
Contra Costa	Antioch	80,197	48.7%
Contra Costa	Brentwood	16,491	9.8%
Contra Costa	Oakley	17,762	10.8%
Contra Costa	Unincorporated PE	82,076	31.6%
Contra Costa	Total	184,595	100.0%

Goals GI Plan Summary

Goal 2040 (g) 1515

Retrofit Acres to Meet 1515

Select Jurisdiction: Walnut Creek

Notes: - This tab is intended to provide an overview of the Planned, Public, and ROW sites identified in the Contra Costa County SWRP for the selected Jurisdiction. - Cells to the right are a **subset** of the SWRP Database tab. **Do not attempt to sort or filter the view of the database on this tab.** - To sort the table into a different order, simply sort the SWRP Database on the desired field (suggested sorting fields are in **light blue** on the SWRP Database tab). - To refine the list of projects shown to the right it will be necessary to copy the cells as 'values' and paste them in a new tab, or new Excel workbook. - **Dark Green** cells are part of the **Countywide Attainment Scenario** for year 2040.

Number	SWRP ID	Project Type	Jurisdiction	Planning Unit	Project Rank	Project In Attainment Scenario	Project Area (acres)	Impervious Area Treated (acres)	% Impervious	Base (gr)
1	Parcel_126613	Regional Opportunity	Walnut Creek	Central	1	FALSE	1.51	0.36	63.4	
2	Parcel_126008	Regional Opportunity	Walnut Creek	Central	1	FALSE	1.06	0.67	62.3	
3	Parcel_127126	Regional Opportunity	Walnut Creek	Central	1	FALSE	1.62	0.94	57.7	
4	Parcel_126516	Parcel-Based Opportunity	Walnut Creek	Central	1	FALSE	0.19	0.11	56.7	
5	RDW_13263	ROW Opportunity	Walnut Creek	Central	1	FALSE	1.97	0.57	29.1	
6	Parcel_125406	Regional Opportunity	Walnut Creek	Central	1	FALSE	0.61	0.14	23.4	
7	RDW_12633	ROW Opportunity	Walnut Creek	Central	3	FALSE	6.10	3.07	50.3	
8	RDW_1301	ROW Opportunity	Walnut Creek	Central	2	FALSE	2.21	1.86	84.2	
9	planned_453	Planned Unlined Bioretention	Walnut Creek	Central	2	FALSE	5.66	4.51	73.7	
10	Parcel_113464	Regional Opportunity	Walnut Creek	Central	1	FALSE	1.93	1.41	70.9	
11	Parcel_111176	Parcel-Based Opportunity	Walnut Creek	Central	1	FALSE	0.28	0.19	66.4	
12	RDW_1225	ROW Opportunity	Walnut Creek	Central	2	FALSE	4.31	2.94	68.3	
13	Parcel_45368	Parcel-Based Opportunity	Walnut Creek	Central	2	FALSE	0.42	0.33	77.5	
14	Parcel_120162	Parcel-Based Opportunity	Walnut Creek	Central	1	FALSE	4.71	3.32	70.3	
15	planned_213	Planned Unlined Bioretention	Walnut Creek	Central	2	FALSE	10.89	8.14	74.8	
16	RDW_16579	ROW Opportunity	Walnut Creek	Central	3	FALSE	0.98	0.70	71.5	
17	RDW_13181	ROW Opportunity	Walnut Creek	Central	1	FALSE	9.00	5.60	62.3	
18	RDW_11157	ROW Opportunity	Walnut Creek	Central	3	FALSE	7.63	5.35	70.1	
19	planned_454	Planned Unlined Bioretention	Walnut Creek	Central	2	FALSE	0.77	0.51	66.6	
20	RDW_14660	ROW Opportunity	Walnut Creek	Central	3	FALSE	3.50	2.36	67.6	
21	Parcel_43020	Regional Opportunity	Walnut Creek	Central	3	FALSE	1.77	1.13	63.7	
22	Parcel_136845	Regional Opportunity	Walnut Creek	Central	1	FALSE	1.46	0.72	49.3	
23	Parcel_119115	Parcel-Based Opportunity	Walnut Creek	Central	1	FALSE	3.63	1.44	39.8	
24	RDW_17453	ROW Opportunity	Walnut Creek	Central	3	FALSE	7.46	3.74	50.2	
25	Parcel_129611	Regional Opportunity	Walnut Creek	Central	2	FALSE	2.32	0.89	38.6	
26	Parcel_126534	Regional Opportunity	Walnut Creek	Central	2	FALSE	2.40	0.93	38.5	
27	RDW_19382	ROW Opportunity	Walnut Creek	Central	3	FALSE	4.19	2.14	51.2	
28	Parcel_43988	Parcel-Based Opportunity	Walnut Creek	Central	1	FALSE	7.62	2.48	32.5	
29	Parcel_130467	Parcel-Based Opportunity	Walnut Creek	Central	1	FALSE	10.42	3.82	36.7	
30	Parcel_123467	Regional Opportunity	Walnut Creek	Central	2	FALSE	2.68	0.66	24.8	
31	RDW_13192	ROW Opportunity	Walnut Creek	Central	3	FALSE	8.45	4.4	49.0	
32	RDW_17155	ROW Opportunity	Walnut Creek	Central	1	FALSE	9.88	4.67	47.2	
33	Parcel_128258	Regional Opportunity	Walnut Creek	Central	1	FALSE	2.60	0.77	29.7	
34	RDW_21497	ROW Opportunity	Walnut Creek	Central	2	FALSE	5.73	2.48	43.4	
35	Parcel_125222	Parcel-Based Opportunity	Walnut Creek	Central	1	FALSE	9.37	2.15	23.0	
36	RDW_19447	ROW Opportunity	Walnut Creek	Central	1	FALSE	0.83	0.39	47.4	
37	planned_43	Planned Flood Control Basin	Walnut Creek	Central	1	FALSE	20.37	7.80	38.3	

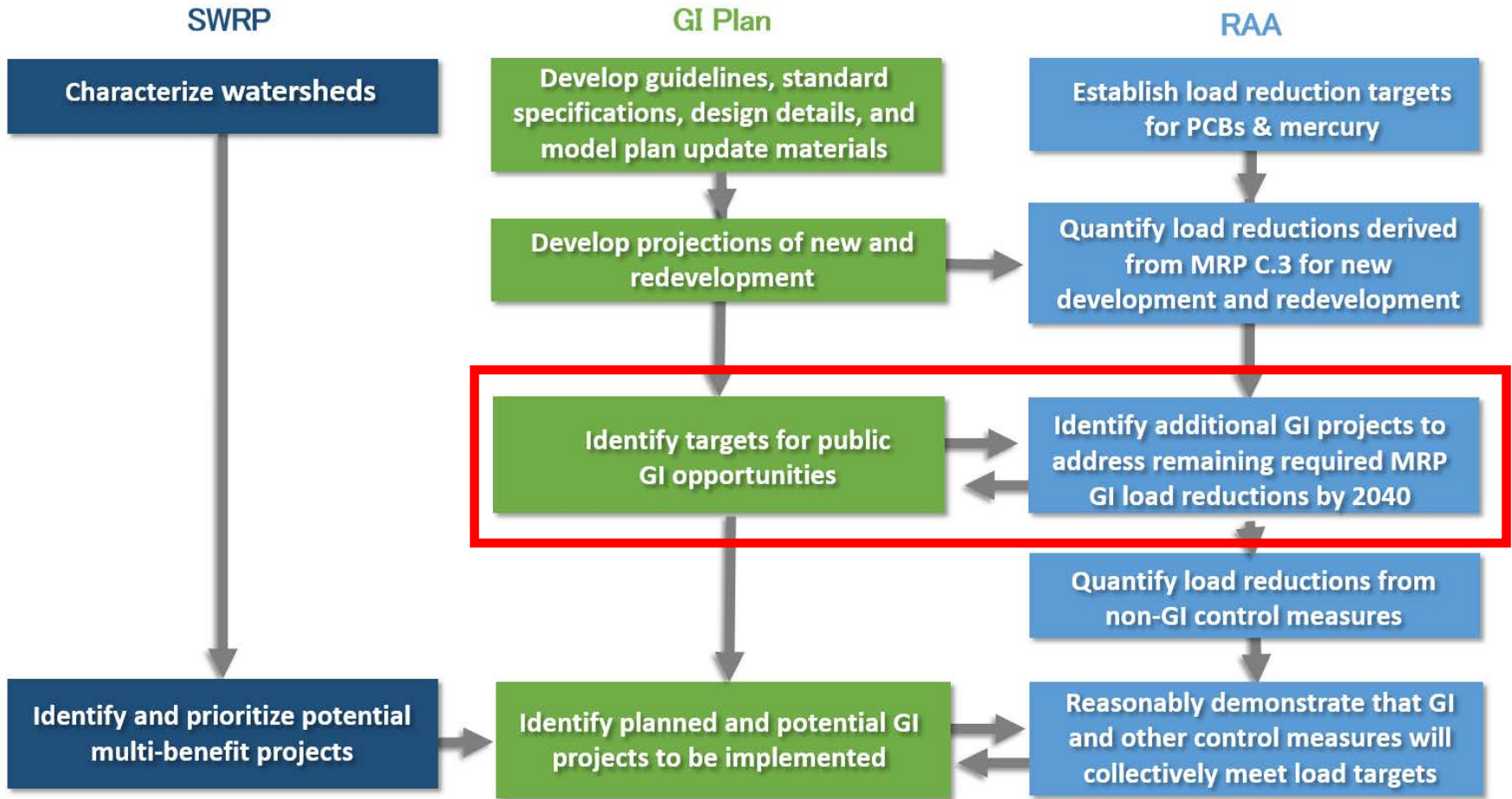
Cumulative PCBs Load Reduced (grams) per Acre Treated

Cumulative PCBs Load Reduced (grams) per Project Treated

READ ME Goals Permittee Overview SWRP Database Impervious Area Baseline PCBs Allocation Population domains

Preliminary results, do not cite

Relationship between SWRP, GI Plan, and RAA

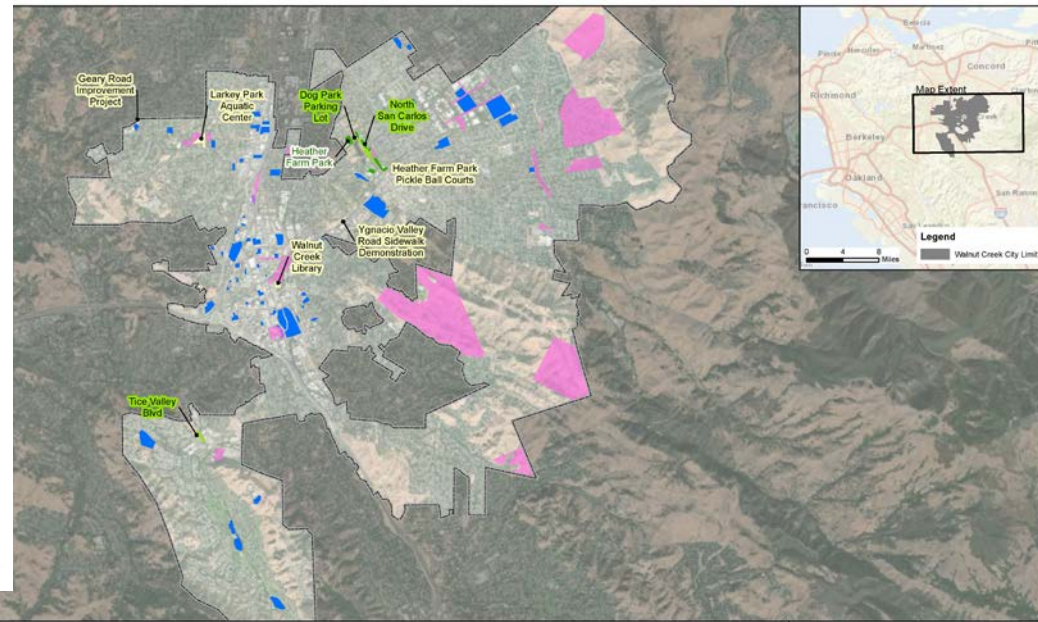
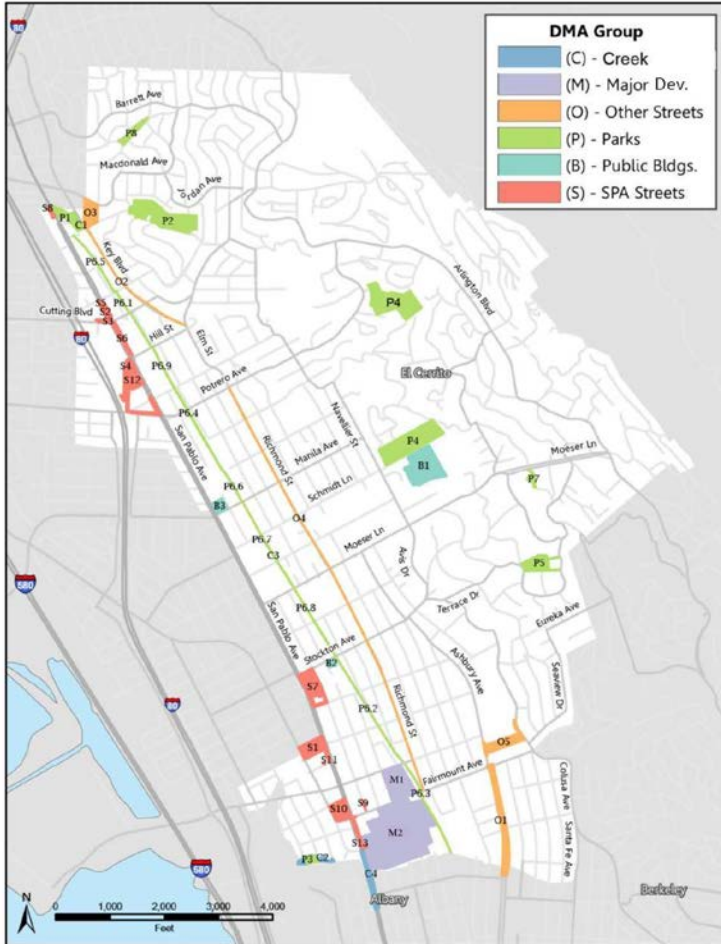


Countywide Attainment Strategy

- Public GI opportunities with the highest PCBs load reduction potential are concentrated in a few Contra Costa Permittee jurisdictional areas.
- More than half of Permittees have no significant opportunities to reduce PCBs loads through GI.
- Permittees must balance **required PCBs load reduction via GI** versus **other GI benefits**. Many have chosen to **focus on multi-benefit projects for GI Plans**.
 - *PCBs load reductions via GI must be attained at County scale.*
- Ongoing discussions with Water Board regarding PCBs load reduction via GI requirements in MRP 3.

Permittee GI Plans

Figure 5: El Cerrito Planned Green Infrastructure Projects by Type



FINAL DRAFT

55

SEPTEMBER 2019

<https://www.ccleanwater.org/green-infrastructure-plans>



Walnut Creek GI Plan
Public and Private GI
Implemented Projects and Project Opportunities
Walnut Creek, CA

Geosyntec consultants

Figure B-1

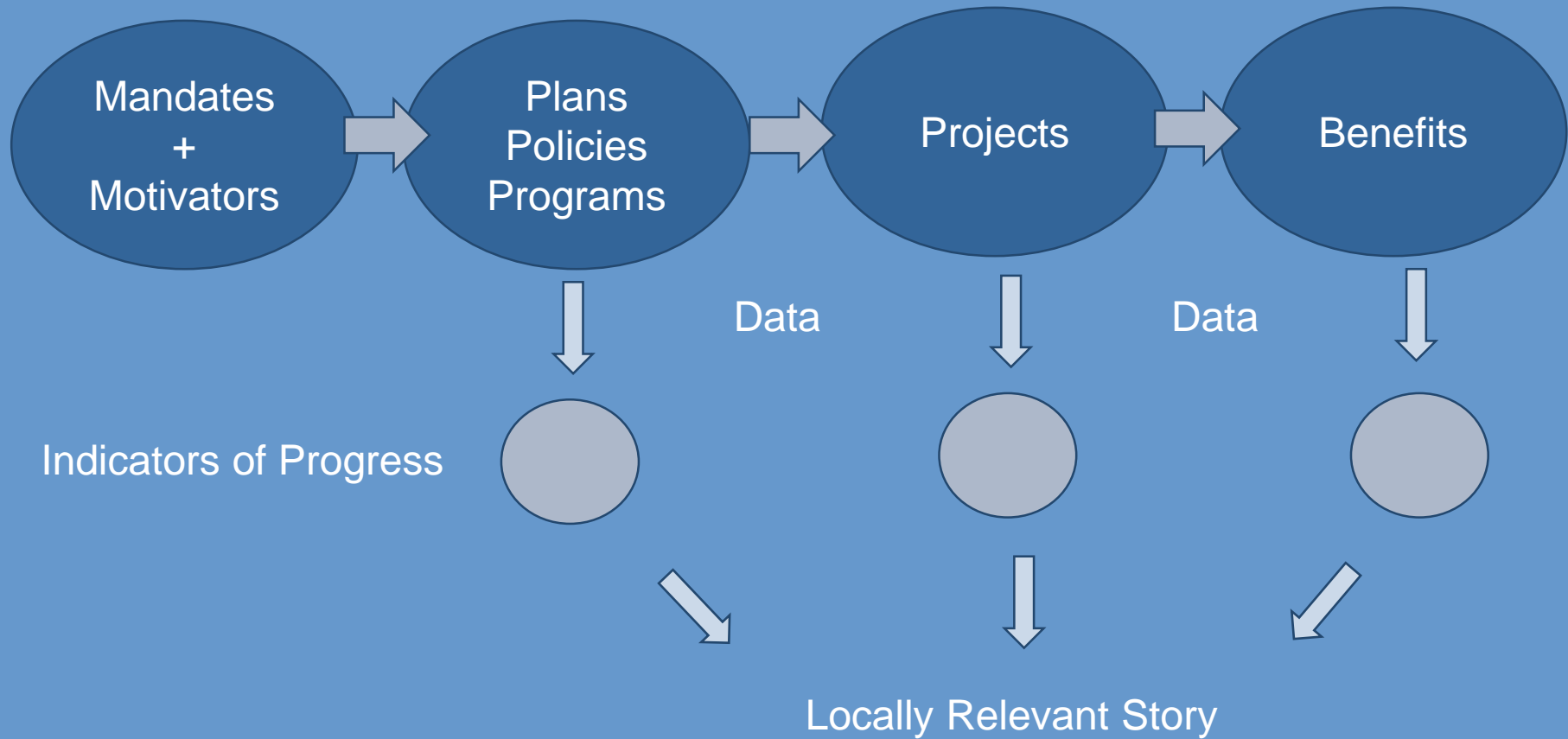
WW2599 May 2019

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MRP 3.0: What are we aiming for?

- Opportunistic objective:
 - “Do what you can where you can.”
- Long-term change objective:
 - “Change the way we build infrastructure.”
- Targets
 - TMDLs and Pollutant Load Reductions
 - “Greened Acres”

Drivers and Indicators

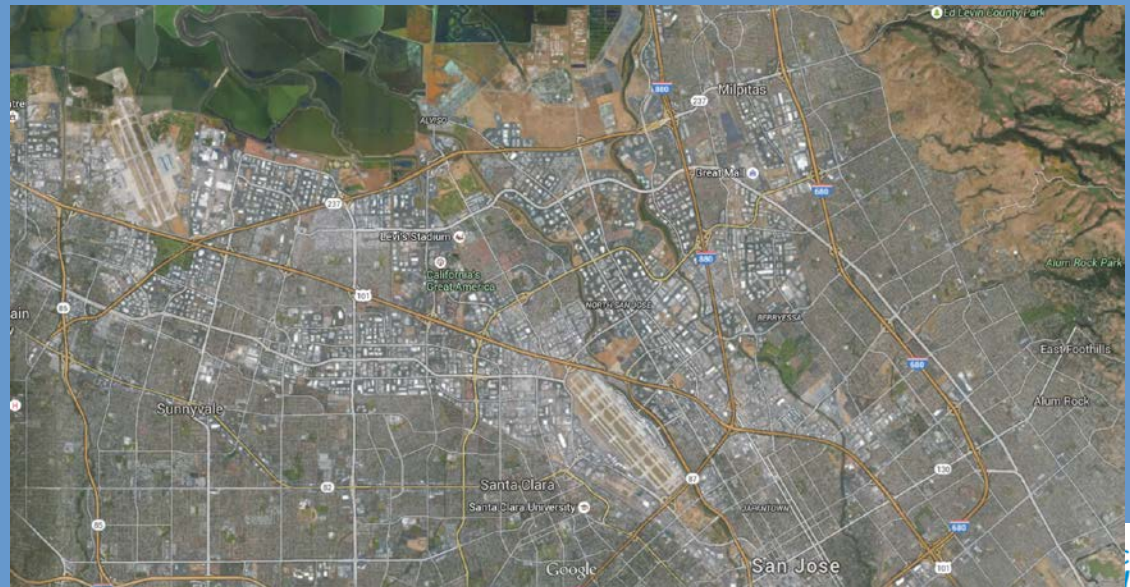


Part II: Project Identification and Design

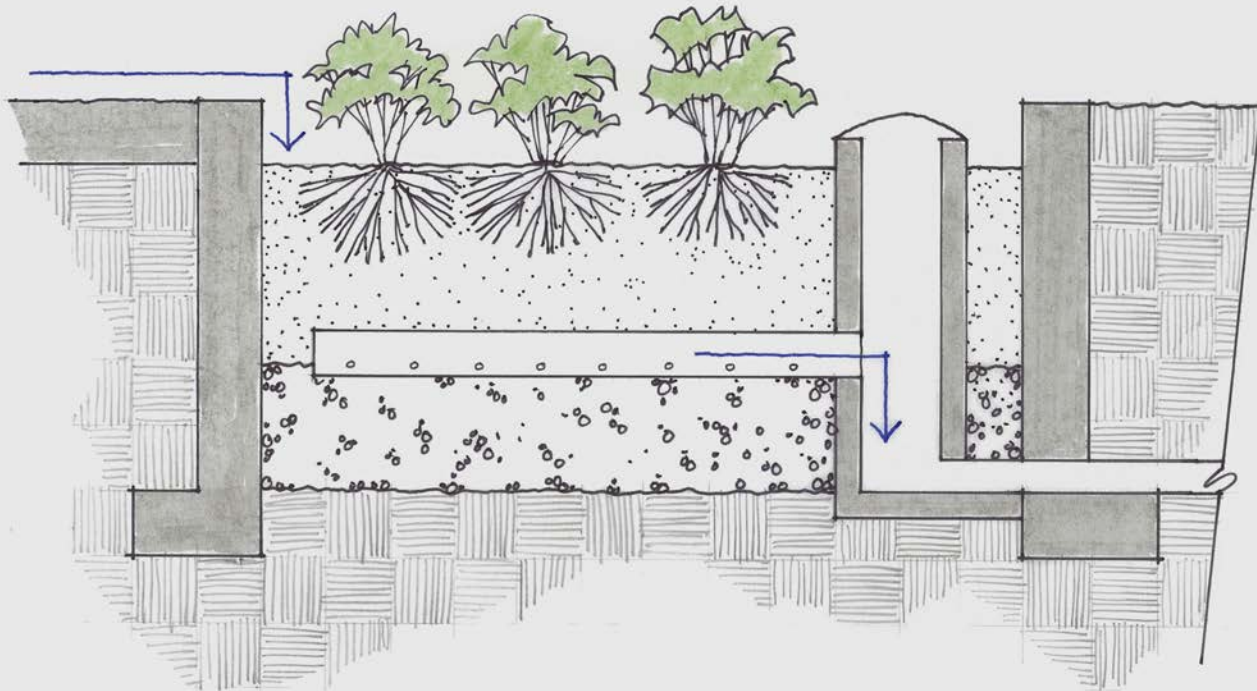


Project Identification Context

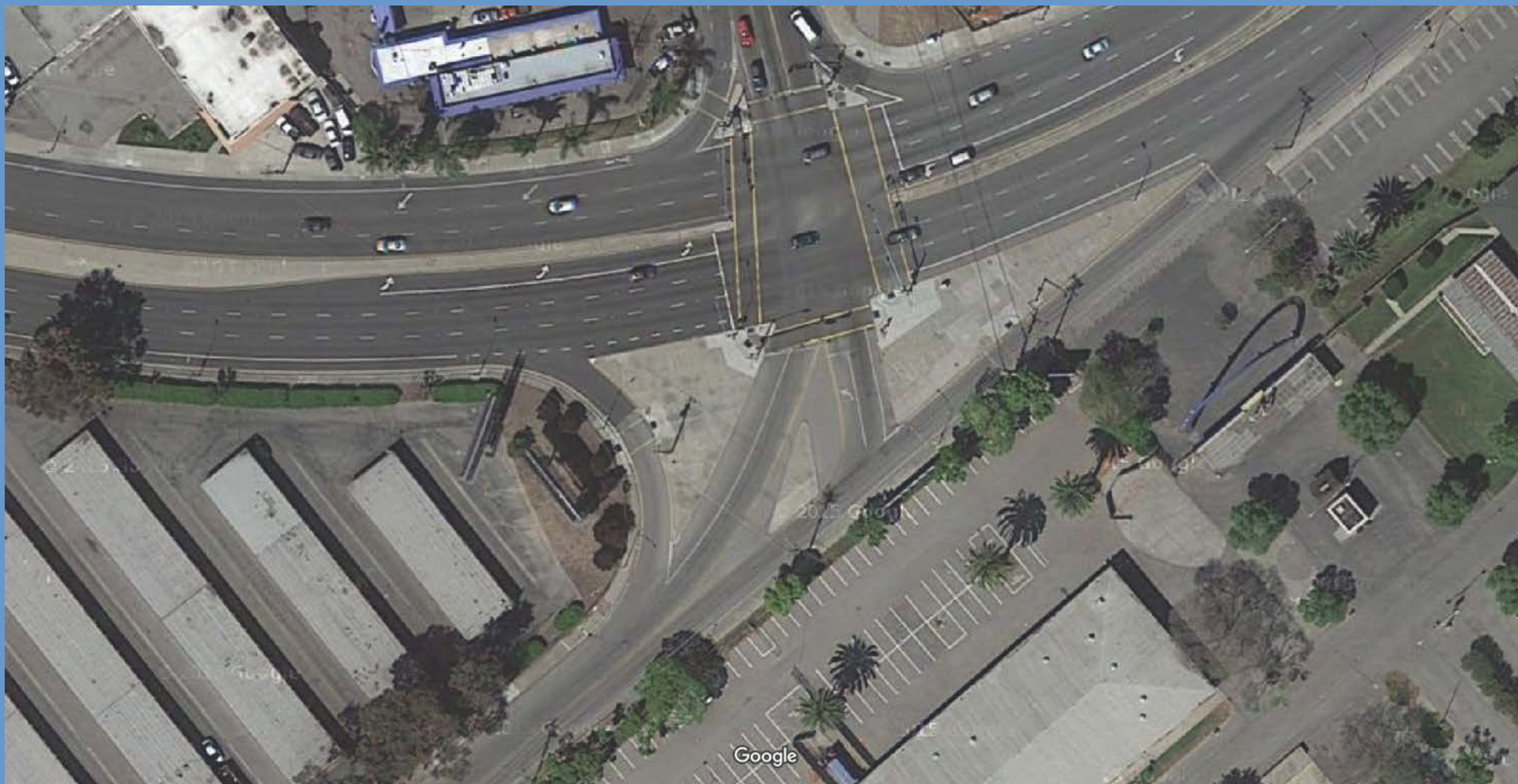
1. Area-wide planning
2. Opportunities associated with a transportation or drainage project



Bioretention: Where to put it?



Limitations of Desktop Analysis



Project ID and Concept Basics

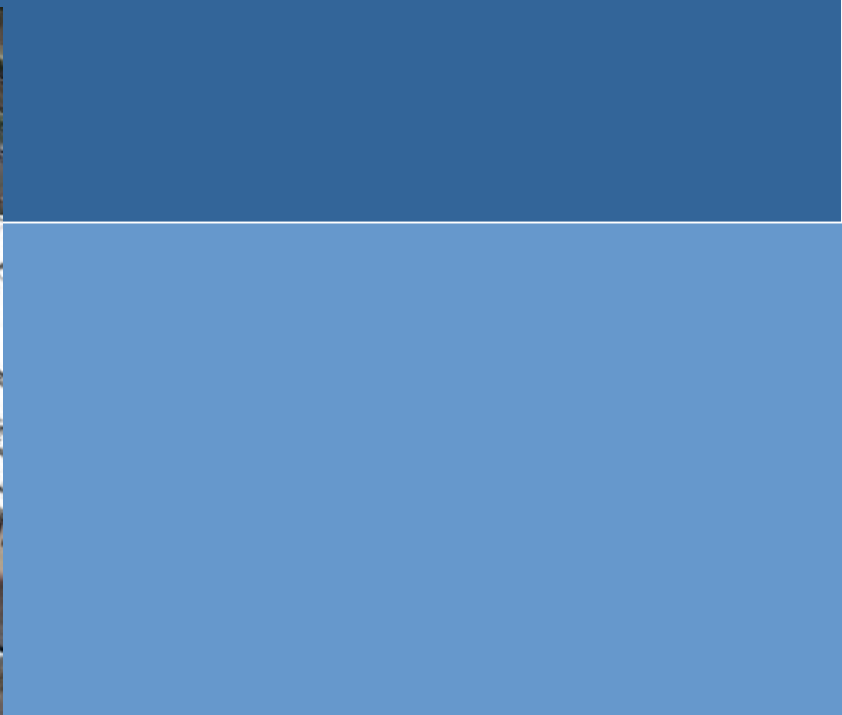
1. Find the low points
 - Look for catch basins
2. Look for flat unused area around the low points and evaluate
3. Evaluate tributary area
4. Evaluate tributary-to-treatment area ratio



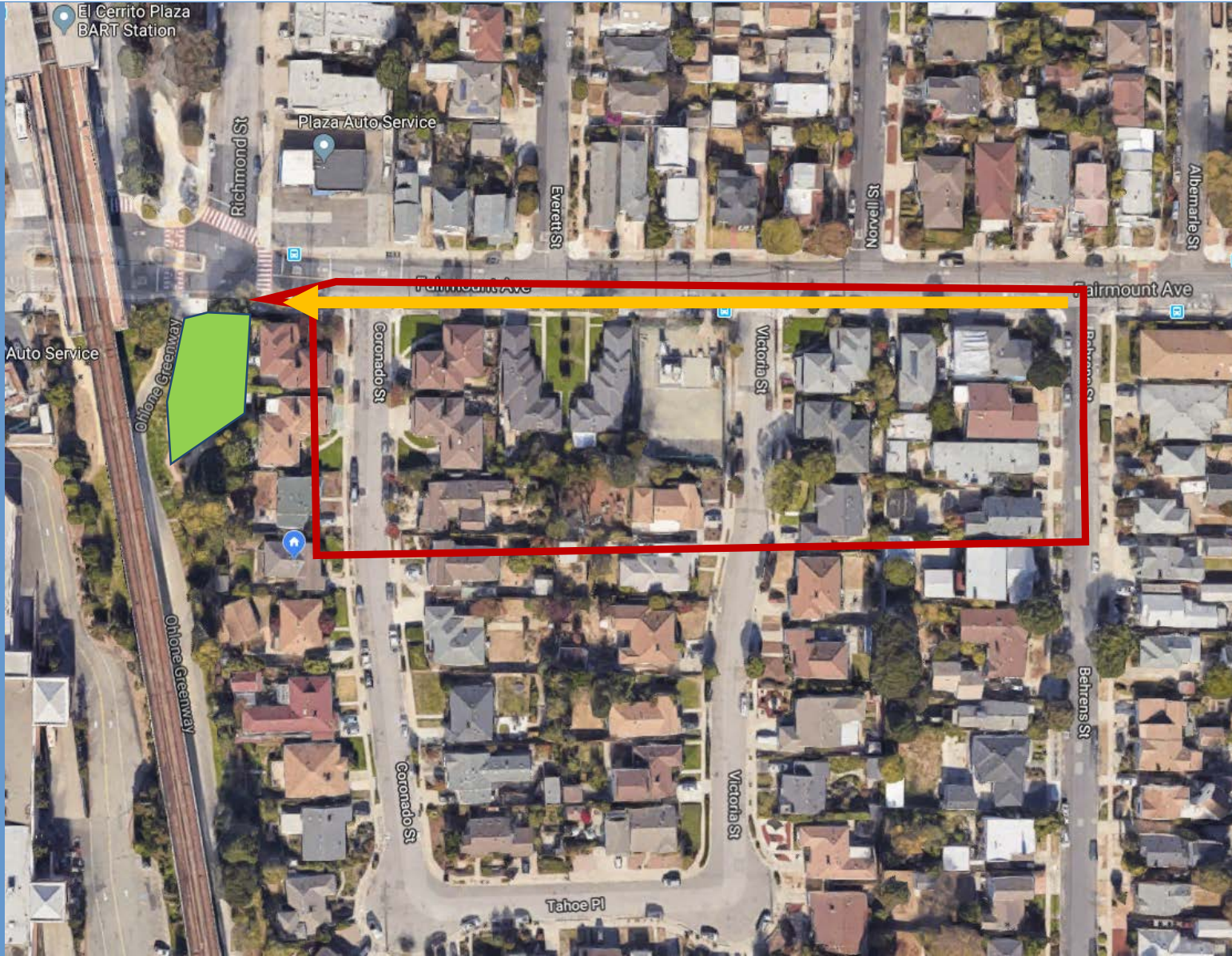
Examples

- Road Diet/Complete Streets
- Fortuitous unused ROW
- Development project frontage





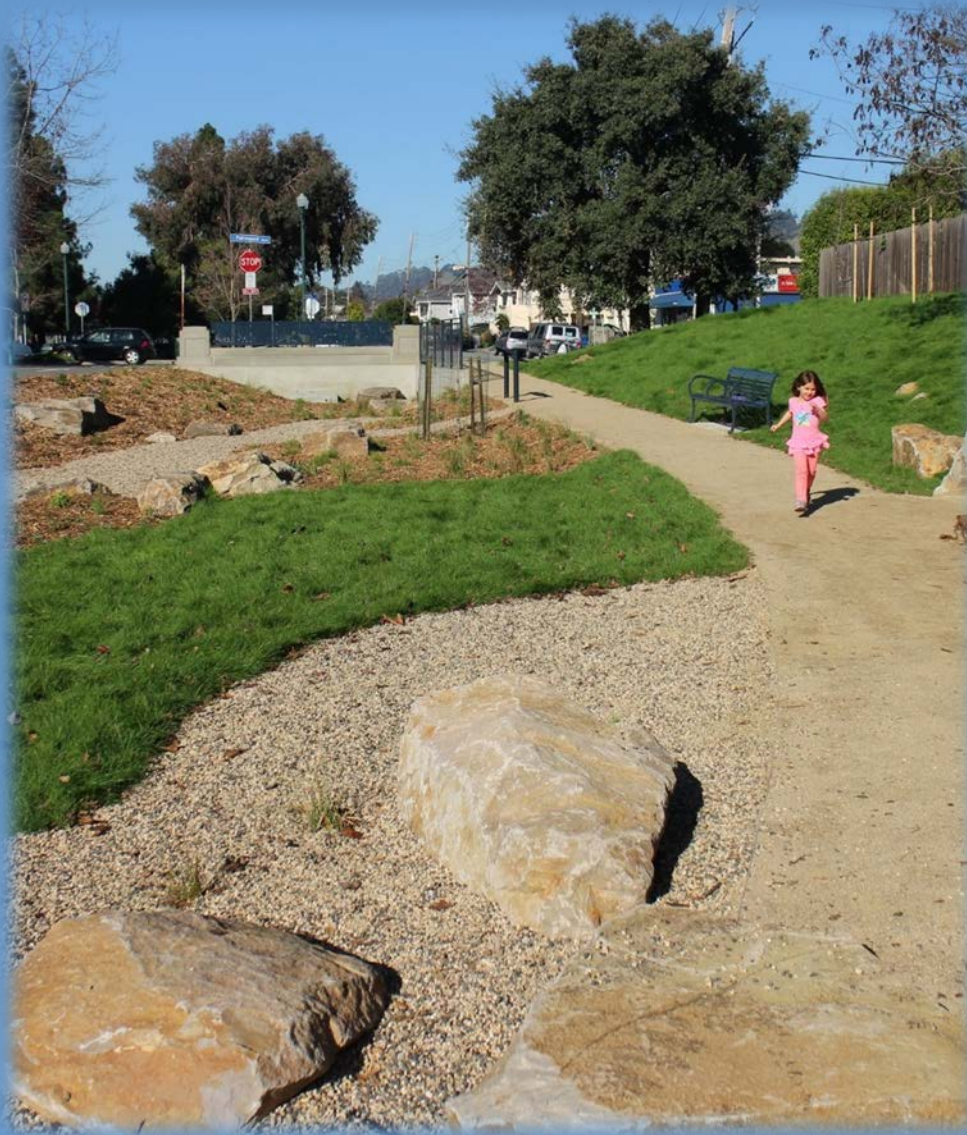
Drainage area



Inlet and overflow



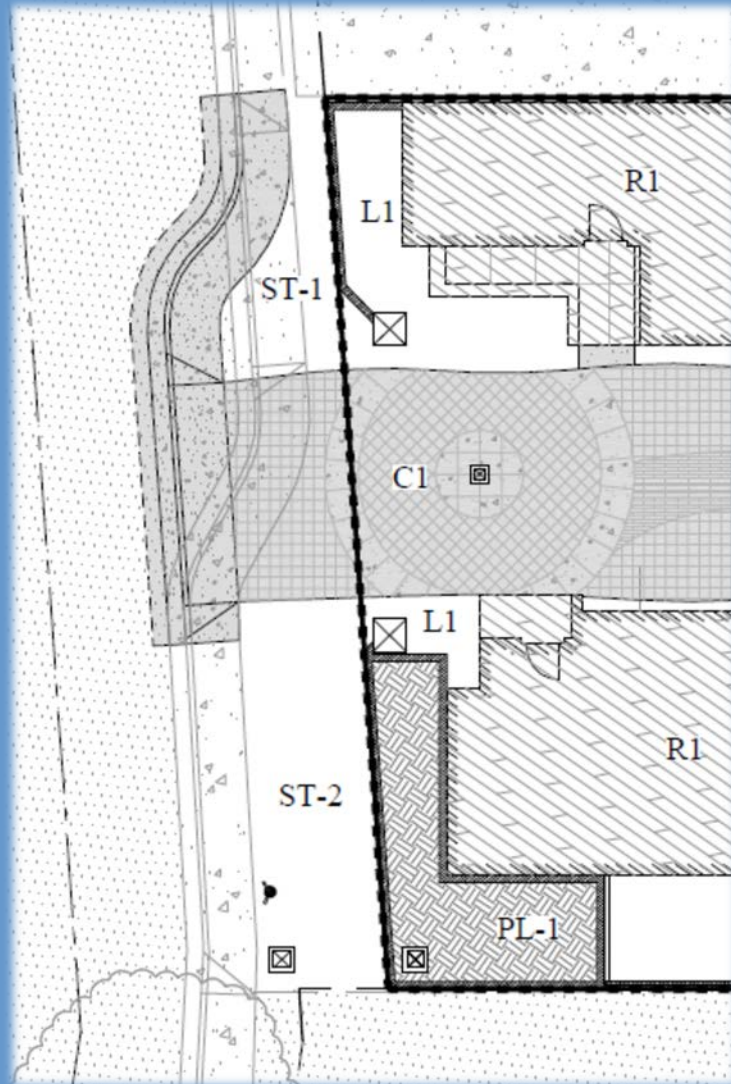
Multiple Use



Frontage Improvements



Green Infrastructure in Frontage



Discussion