Advancing Multi-Scale Green Stormwater Infrastructure in San Mateo County

Midcoast Community Council Meeting - April 26, 2023









- 01. SMCWPPP Background
- 02. Multi-scale GSI approach in San Mateo County
- 03. Case study projects across scales
- 04. Funding Need
- 05. Q&A



Countywide Stormwater Program Overview

Support member agencies in meeting Municipal Regional Permit regulatory requirements

Funded by:

- Property Tax Fees: \$1.5 million
- Portion of \$10 Vehicle Registration Fee: \$1M

One full-time staff (currently) & consultants

Primary areas of support:

- Local program implementation
- Do compliance directly for member agencies
- Participate in regional efforts



SAN MATEO COUNTYWIDE Water Pollution Prevention Program

Clean Water. Healthy Community.



Countywide Stormwater Program Structure



Watershed Assessment and Monitoring

Public Works Municipal Maintenance

Parks Maintenance and Integrated Pest Management



MRP 3.0 Priorities

- More regulated project categories
- Polychlorinated biphenyls in Old Industrial areas
- Trash and Low Impact Development Water Quality Monitoring
- Discharges associated with unsheltered populations
- Discharges associated with fire-fighting
- Asset management
- Cost reporting



SAN MATEO COUNTYWIDE Water Pollution Prevention Program

Clean Water. Healthy Community.







Climate Change

- Modeled countywide changes in precipitation using 10 Climate Change Models from CalAdapt at an 8.5 RCP and downscaled to county grid
- 24% increase in storm depth for a future 10-year storm on bayside



There are **major deficiencies** in the existing City storm drain systems. Common drainage system concerns are undersized At the Marsh Road box culvert, the existing capacity of the storm drain lines, bubble-up storm drain systems, and areas Atherton Channel is limited to less than estimated 10-year There are **major deficience** there are **major deficience** systems. Common drainage system concern systems, Common drainage system drain systems, and area storm drain lines, bubble-up storm drain, there is concern with storm drain lines, bubble-up storm drain, there is concern with storm drain systems. In addition, there is concern with without storm drain systems. In addition, there is concern with there is concern with storm drain lines, bubble-up storm drain systems. In addition, there is concern with there is concern with storm event flows. Providing 100-year flood protection for the downstream Atherton Channel constraint is due to the aviation inits. (Atherton) Atherton Channel is **not currently feasible** due to the existing inadequate flow capacity of Belmont Creek. (Belmont) downstream Atherton Channel constraints beyond the Town limits. (Atherton) Replacement of the inadequately sized pipeline from

Undersized storm drain systems drain systems as concentrated a San Benito Road through the rights-of-way between Replacement of the rights-or-way set and along Maripos considered a **high priority deficiency** due to the depth properties down to Mariposa Street and along Maripos and duration of flooding. The pipes that convertes the depth and duration of flooding. (Brisbane) Undersized storm drain systems drain systems drain systems drain systems as concentrat and could enter private properties as concentrat as the intersection of Main Street should also be duration of flooding. The pipes that serve the duration of flooding. The pipes that serve the duration of flooding. The pipes that duration duration of flooding. The pipes that duration duration of flooding. The pipes that duration considered a high priority deficiency due to the depth and duration of flooding. The pipes that serve this area may flow. (Hillsborough)

properties. The regional problems generally affect many property owners and usually occur only when there is a significant storm event. These problems occur as a result of deficiencies in the existing storm drain collection system.

Stormwater Management Scales

Parcel-Scale

Green Streets



Regional Projects







Implementation Cost (\$)





Parcel-scale GSI

Focus on site-level capture and treatment

Program elements:

- Rain Barrel and Rain Garden Rebate Program
- Local policies advancing on-site controls
- Pilot projects with cities and schools







Buildings & Sites Green Infrastructure



















Rain barrels with a 50-99 gallon capacity: Up to \$100 rebate per rain barrel

Rain barrels with a 100-199 gallon capacity: Up to \$150 rebate per rain barrel

Rain barrels/cisterns with a 200+ gallon capacity: Up to \$200 rebate per rain barrel

RAIN GARDENS BENEFIT YOUR PROPERTY AND THE ENVIRONMENT!

A rain garden is a shallow landscaped depression that captures, cleans, and absorbs rain water from a roof, driveway or street. This practice mimics natural hydrology by infiltrating and evapotranspiring stormwater runoff as it collects and moves through a rain garden.

By positioning a rain garden at least 10 feet from your property and directing rain water runoff into the rain garden you redirect moisture away from your building's foundation. Rain gardens are a great way to reduce localized flooding, standing water issues, and stormwater runnoff leaving your property. Planted with deep-rooted native plants, rain gardens help filter out pollutants in runoff and provide food and shelter for pollinators, butterflies, and birds.

LAWN BE GONE! REBATE PROGRAM Now with NEW Rain Garden Rebate Option





S300 NEW RAIN GARDEN REBATE

IN ADDITION TO THE LAWN BE GONE! REBATE Effective July 1, 2020 through June 30, 2021

For the fastest rebate, apply online at BayAreaConservation.org

Street-scale GSI

Focus on block-level capture and treatment

Program elements:

- Demonstration projects
- Sustainable Streets Master Plan
- Safe Routes to School and Green Streets Pilot Program
- Local policies requiring development to treat ROW
- Tree sponges







Sustainable Streets

Active Transportation + Green Infrastructure





Project Typologies



1: Bulb Outs and **Curb Extensions**



2: Connectivity Improvements



3: Streetscape Projects

4: Frontage Improvements















Regional-scale GSI

Focus on watershed-level capture and treatment

Program elements:

- Stormwater Resource Plan
- Project Concepts
- Coordination with OneShoreline District and Caltrans
- State/Federal Grants
- Regional Collaborative Program
 Development







Site Description:

This project concept consists of two offline subsurface infiltration chambers at Orange Memorial Park. The park is a prime location to site a regional stormwater capture project and captures stormwater from large portion of the upper Colma Creek watershed and multiple city and county jurisdictions. The potential capture area of the project is roughly 6,300 acres that drains portions of the cities of South San Francisco, Colma, and Daly City and Unincorporated San Mateo County. A stormwater capture project at this location would aid these jurisdictions in meeting stormwater permit compliance and alleviate flooding in the lower reaches of Colma Creek. The project would also contribute to reductions of high-priority pollutants discharged to San Francisco Bay (including TMDLs that require reductions of mercury and PCB loads), augment water supply by recharging the Westside groundwater basin, and provide community enhancement through integration with the recreational facilities of the park. With the incorporation of a hydrodynamic separator for pretreatment of diverted water from the creek, the project also provides the reduction of trash transported through the creek to the San Francisco Bay. The Orange Memorial Park Master Plan (2007) was referenced in this design to ensure that the concept is consistent with the goals of future development for the park.

Although not specifically included within this project concept, the project also provides the opportunity for future integration of Low Impact Development (LID) within parking lots of the park to provide further community enhancement and opportunities for public education of LID and other project components.

Drainage Characteris	tics
Capture Area (acres)	6,3
Impervious Area (%)	38
Dominant Land Use	Re
Inviadiations	So
Jurisdictions	Un

Concept for a Multi-jurisdictional Regional Stormwater Capture Project Site: Orange Memorial Park (City of South San Francisco)

300

sidential outh San Francisco, Colma, Daly City, nincorporated San Mateo County



Dans Noter Hearthy Cam man Revolution (Line



Example concrete infiltration chamber

Site Description:

wo subsurface infiltration chambers will be considered on parcels owned by the City of South San Francisco to the west of Orange Memorial Park. Both parcels were acquired by the City of South San Francisco in 1996 and, while vacant, are included in plans for future park expansion. The first chamber (Project 1) will be located in the vacant parcel to the south of the Colma Creek channel. The second chamber (Project 2) will be located in portions of the vacant parcel to the north of the channel and the current park parcel. The Project 2 site represents the location of the future little league baseball fields according to the Master Plan. Runoff would be diverted directly from Colma Creek and details of the diversion structures will be determined during the design phase through coordination with the San Mateo County Flood Control District. A pretreatment unit (e.g. hydrodynamic separator) will be implemented to provide trash and sediment capture. Two projects are proposed to maximize the amount of available space used for the design and to provide an option for the City of South San Francisco to implement the design in two separate phases. This would allow the City to move forward with each phase separately as funding is acquired. The Master Plan also accounts for the possible purchase of the CalWater parcels along Chestnut Avenue for future park expansion, which could be used to expand Project 2 if that land becomes available. The proposed design (both chambers) would allow for the treatment of 26% of the 85th percentile, 24-hour runoff volume (36.4 of 142.4 ac-ft) for the Colma Creek watershed. As these volumes are completely removed via storage and infiltration, this provides an equivalent 26% reduction of pollutant loads for the storm event.

DISCLAIMER: All elements of this conceptual design are planning-level, based on desktop analysis. All assumptions and parameters must be re-evaluated during the detailed design process. Costs estimates are based on available data. Actual costs will vary.

Design Criteria Precipitation, 85th percentile, 24-Colma Creek Runoff Volume, 85t Colma Creek Peak Discharge, 85t Infiltration Rate (in/hr) **Project Characteristics**

Stormwater Capture Process Footprint (acres) Design Height (ft) Depth of Excavation (ft) Pumping Requirements Design Volume (ac-ft) 24-hr Infiltration Volume (ac-ft) **Total Treatment Volume (ac-ft)** Percent Treated ²

1 - sum of the Design Volume and 24-hr Infiltration Volume 2 - percentage the 85th percentile 24-hr storm Runoff Volume that is treated

Concept for a Multi-jurisdictional Regional Stormwater Capture Project Site: Orange Memorial Park (City of South San Francisco)

-hr storm (in)	0.83	
^h percentile, 24-hr storm (ac-ft)	142.4	
^h percentile, 24-hr storm (cfs)	309	
	0.5	

	Project 1	Project 2
	Subsurface Infiltr	ation Chamber
	0.5	2.3
	12	12
	15	15
	Dependent on Ge	eotechnical Investigation
	6	27.6
	0.5	2.3
1	6.5	29.9
	5%	21%









2007. The figure below depicts the phased implementation

QUANTITY	UNIT	UNIT COST	TOTAL
55,660	CY	\$50.00	\$2,783,000
Project 1 can be ut	tilized by l	both projects)	N/A
1	LS	\$150,000.00	\$150,000
1	LS	\$150,000.00	\$150,000
1	LS	\$1,750,000.00	\$1,750,000
150	LF	\$200.00	\$30,000
44,528	CY	\$300.00	\$13,358,000

Drivers/ Objectives Business Case Framework

Funding/Financing Options

Regional Collaborative

Credit Trading Marketplace Feasibility Regional Project Prioritization & Concepts





BUSINESS CASE FINDINGS FOR REGIONAL COLLABORATIVE SCENARIO

- Average cost savings of approximately 60% to 75%
- Additional opportunities for projects to provide
- Estimated cost savings of 75% to 95+% to achieve equivalent PCBs load reduction through GSI
- Estimated cost savings of approximately 70% to 75% to provide equivalent acres greened along with reduced
- Roughly equivalent to jurisdiction-by-jurisdiction scenario based on available data and analysis
- Opportunities for water supply to offset project costs
- Estimated cost savings of 60% to 70% for equivalent climate change impact offset
- Qualitative analysis, equivalent or better to jurisdiction-by-jurisdiction based on assessment
- Qualitative analysis, equivalent or better to urisdiction-by-jurisdiction based on assessment
- Qualitative analysis, equivalent or better to jurisdiction-by-jurisdiction based on assessment





RDX_RANK	VOLRDX_RANK	PCBRDX_RANK	GRNAC_RANK	VOLMAN_RA
40	1	1	2	4
40	28	2	20	34
19	22	3	23	42
40	8	4	29	18
40	2	5	1	3
40	3	6	3	5
40	9	7	5	7
40	6	8	17	11
40	4	9	7	9
40	12	10	4	6
40	11	11	26	19
13	27	12	30	31
40	7	13	10	10
40	35	14	35	33
40	14	15	15	12
30	32	16	49	37
29	31	17	46	32
40	10	18	13	14
40	13	19	21	22
4	46	20	42	29
31	43	21	52	41
40	16	22	27	24
40	30	23	6	8
40	24	24	8	13
40	20	25	12	17
40	15	26	11	16
40	18	27	9	23

REGIONAL COLLABORATIVE

Geosyntec developed a Countywide Regional Collaborative framework with input from the project Technical Advisory Committee, which highlights the project's findings:





HALF MOON BAY SEWER AUTHORITY MID-COASTSIDE REGIONAL PROJECT CONCEPT REPORT



Figure 2-1. Project drainage area



Half Moon Bay Regional Stormwater Capture Project Summary:

- on coastside
- Watershed
- Major drivers:

 - and storage dependent)

HALF MOON BAY SEWER AUTHORITY MID-COASTSIDE **REGIONAL PROJECT CONCEPT REPORT**

• Large Multi-benefit Stormwater Capture Project

• Drains 17,800 acres of the Pilarcitos Creek

 Proposed diversion from Pilarcitos Crk Channel to dry/wet detention wetland basin on HMB property adjacent to SAM WWTP

Water quality (Total Suspended Solids)

• Peakflow reduction during large storms (cfs

• "Greened Acre" requirements



Figure 3-1. Half Moon Bay BMP Layout



Figure 3-2. Half Moon Bay BMP Preliminary Concept Profile

Capture Project

- Primary benefits:
 - 20-37% of average annual runoff captured/treated (2 cfs-8cfs range)
 - 5-11% average annual TSS reduced
 - Equivalent of 1,000-1,850 ac-ft/year managed
- Potential additional benefits:
 - Trash load reduction
 - Integration with WWTP wet weather storage/recycled water
 - Irrigation/street trees/street sweeping water

```
Half Moon Bay Regional Stormwater
```

Model for Collaboration and Cost-sharing

GSI Retrofit Requirements

- Each Permittee "shall implement, or cause to be implemented" green stormwater infrastructure (GSI) based on population.
- Table H-1 in the MRP shows the "greened acres" requirement by city and countywide.

	2019 US Census	MRP 3 GSI Retrofit		County
	Bureau Population	Assignment	% of	Total
Permittee	Estimate	(acres)	Total	(acres)
Atherton	7,137	0.43	1.0%	
Belmont	26,941	1.62	3.7%	
Brisbane	4,671	0.28	0.6%	
Burlingame	30,889	1.85	4.3%	
Colma	1,489	0.20	0.5%	
Daly City	106,280	5.00	11.5%	
East Palo Alto	29,314	1.76	4.1%	
Foster City	33,901	2.03	4.7%	
Half Moon Bay	12,932	0.78	1.8%	
Hillsborough	11,387	0.68	1.6%	
Menlo Park	34,698	2.08	4.8%	43.30
Millbrae	22,394	1.34	3.1%	
Pacifica	38,546	2.31	5.3%	
Portola Valley	4,568	0.27	0.6%	
Redwood City	85,925	5.00	11.5%	
San Bruno	42,807	2.57	5.9%	
San Carlos	30,185	1.81	4.2%	
San Mateo	104,430	5.00	11.5%	
San Mateo County	64,832	3.89	9.0%	
South San Francisco	67,789	4.07	9.4%	
Woodside	5,458	0.33	0.8%	

Table H-1 from the Tentative Order



Stormwater Funding



Infrastructure Costs

	Storm Drain	High Priority	Med Priority	Low Priority
	Master Plan Cost (total)	Projects	Projects	Projects
Atherton	\$45	\$18	\$24	\$3
Belmont	\$57	\$13	\$13	\$31
Brisbane	\$20	\$15	\$3	\$2
East Palo Alto	\$39	\$31	\$5	\$3
Hillsborough	\$58	\$26	\$14	\$18
Menlo Park	\$39	\$23	\$16	
Millbrae	\$42	\$3	\$30	\$9
Pacifica	\$11	\$9	\$2	
San Bruno	\$26	\$19		\$7
San Carlos	\$56	\$43	\$13	
San Mateo	\$57	\$33	\$16	\$8
South San Francisco	\$54	\$23	\$27	\$4
Total	\$504	\$256	\$163	\$85
Note All costs in \$ m	villions for jurisdictions wit	h storm drain	master nlans a	wailable to C

millions, for jurisdictions with storm drain master plans available to C/CAG INOU Data are preliminary, not to be cited



Infrastructure Costs

	Storm Drain	High Priority	Med Priority	Low Priority	Dedicated Annual
	Master Plan Cost (total)	Projects	Projects	Projects	Revenue
Atherton	\$45	\$18	\$24	\$3	\$0.000
Belmont	\$57	\$13	\$13	\$31	\$0.300
Brisbane	\$20	\$15	\$3	\$2	\$0.055
East Palo Alto	\$39	\$31	\$5	\$3	\$0.125
Hillsborough	\$58	\$26	\$14	\$18	\$0.030
Menlo Park	\$39	\$23	\$16		\$0.335
Millbrae	\$42	\$3	\$30	\$9	\$0.240
Pacifica	\$11	\$9	\$2		\$0.178
San Bruno	\$26	\$19		\$7	\$0.575
San Carlos	\$56	\$43	\$13		\$0.435
San Mateo	\$57	\$33	\$16	\$8	\$0.000
South San Francisco	\$54	\$23	\$27	\$4	\$0.425
Total	\$504	\$256	\$163	\$85	\$3

Note: All costs in \$ millions, for jurisdictions with storm drain master plans available to C/CAG Data are preliminary, not to be cited



Water Quality Costs

Agency	Estimated Future Annual Costs
C/CAG	\$2,752,320
Atherton	\$298,267
Belmont	\$1,739,544
Brisbane	\$1,415,466
Burlingame	\$2,231,982
Colma	\$537,880
Daly City	\$2,265,544
East Palo Alto	\$1,597,787
Foster City	\$1,449,464
Half Moon Bay	\$282,257
Hillsborough	\$266,425
Menlo Park	\$3,021,189
Millbrae	\$1,568,084
Pacifica	\$879,653
Portola Valley	\$182,137
Redwood City	\$3,902,863
San Bruno	\$1,994,691
San Carlos	\$3,817,215
San Mateo	\$4,137,166
SSF	\$6,514,467
Woodside	\$320,576
SM County	\$31,501,565
TOTALS	\$46,041,837

Note: data from C/CAG's 2014 funding needs analysis, likely not representative of current regulatory requirements



Water Quality Costs

Agency	Estimated Future Annual Costs	Estimated Annual Dedicated Revenue	
C/CAG	\$2,752,320	\$	2,220,000
Atherton	\$298,267	\$	80,000
Belmont	\$1,739,544	\$	427,726
Brisbane	\$1,415,466	\$	148,442
Burlingame	\$2,231,982	\$	329,841
Colma	\$537,880	\$	37,500
Daly City	\$2,265,544	\$	837,507
East Palo Alto	\$1,597,787	\$	218,967
Foster City	\$1,449,464	\$	75,000
Half Moon Bay	\$282,257	\$	37,500
Hillsborough	\$266,425	\$	117,436
Menlo Park	\$3,021,189	\$	401,649
Millbrae	\$1,568,084	\$	330,932
Pacifica	\$879,653	\$	322,515
Portola Valley	\$182,137	\$	75,000
Redwood City	\$3,902,863	\$	338,278
San Bruno	\$1,994,691	\$	593,279
San Carlos	\$3,817,215	\$	550,676
San Mateo	\$4,137,166	\$	612,922
SSF	\$6,514,467	\$	629,858
Woodside	\$320,576	\$	75,000
SM County	\$31, 501,565	\$	612,166
TOTALS 🤇	\$46,041,837	\$	9,072,194

Note: data from C/CAG's 2014 funding needs analysis, likely not representative of current regulatory requirements



Existing Stormwater Fees (Annual for Single Family)

- C/CAG: \$7.40
- Atherton: **\$0**
- Belmont:
- Brisbane:
- Burlingame:
- Colma: **\$0**
- Daly City:
- East Palo Alto:
- Foster City: **\$0**

- Half Moon Bay: **\$0**
- Hillsborough:
- Menlo Park:
- Millbrae:
- Pacifica:
- Portola Valley: \$0
- Redwood City: \$0
- San Bruno:
 - -Current: \$
 - –Proposed: \$



- San Carlos: \$
- San Mateo: \$0
- So. San Francisco: \$
- Woodside: **\$0**
- San Mateo County: \$0

Existing Stormwater Fees (Annual for Single Family)

- C/CAG: \$7.40
- Atherton: **\$0**
- Belmont: \$30
- Brisbane: \$9.48
- Burlingame \$150
- Colma: **\$0**
- Daly City: \$9.80
- East Palo Alto: \$20
- Foster City: **\$0**

- Half Moon Bay: \$0
- Hillsborough: \$7.34
- Menlo Park: \$16-26
- Millbrae: \$25.66
- Pacifica: \$14
- Portola Valley: \$0
- Redwood City: \$0
- San Bruno:
 - -Current: \$46
 - -Proposed/failed: \$154



- San Carlos: \$20
- San Mateo: \$0
- So. San Francisco: \$8.72
- Woodside: **\$0**
- San Mateo County: \$0

Example Funding Approaches

- Property-Related Fee
 - -Property-owner balloting: Simple majority
 - –General electorate: 2/3 majority
 - -SB 231: no balloting, likely legal challenge
- Parcel Tax
 - –General Electorate: 2/3 majority
- Enhanced Infrastructure Financing District -Commit future portion of property tax increment -No voter approval required, unless issuing bonds



Scales of Implementation

- Countywide (e.g., current C/CAG fee) -C/CAG
 - -Flood & Sea Level Rise Resiliency District
 - -LA County Measure W (parcel tax, \$285M/yr)
- Sub-Countywide
 - –Jurisdictions opt in or out of countywide, or join together for group effort (ex. Flood control zones)
- Jurisdictional
 - -Each agency pursues individually (San Bruno, Burlingame, San Mateo)





Resources

www.Flowstobay.org

- <u>Stormwater Resource Plan</u> /srp
- Sustainable Streets Master Plan /ssmp
- <u>Regional Collaborative Program</u> / regional-collaborative
- Green Infrastructure Design Guide / gidg •
- C.3 Regulate Projects Guide /c-3-regulated-projects



Any Questions?

Reid Bogert, Senior Stormwater Program Specialist, rbogert@smcgov.org





