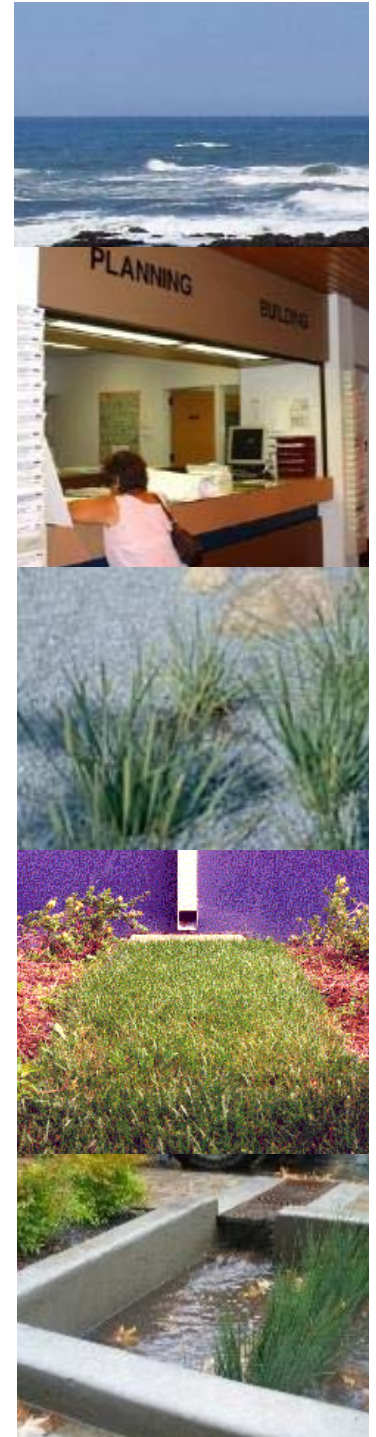


Overview of Green Infrastructure Requirements

Jill Bicknell, P.E., EOA, Inc.
San Mateo Countywide Pollution Prevention
Program

June 21, 2017



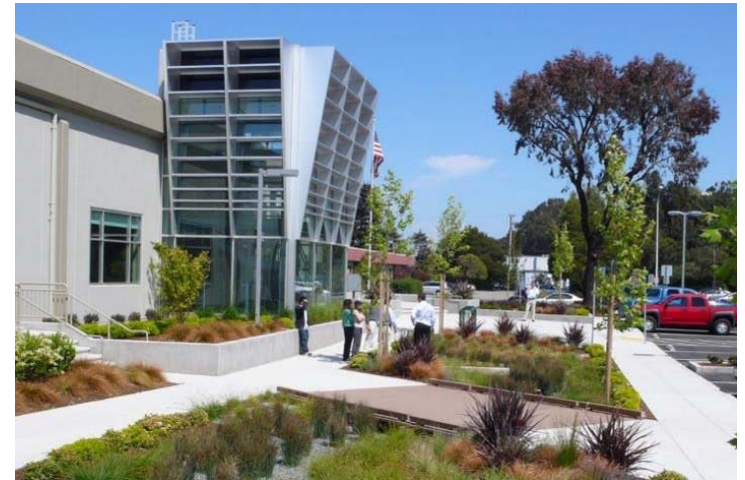


Outline of Presentation

- What is Green Infrastructure (GI)?
- MRP Requirements for GI
- Using GI to Reduce Pollutants of Concern (POCs)
- How is GI Design Different?
- GI Information Resources

What is Green Infrastructure? (or Green Stormwater Infrastructure)

- LID drainage design using vegetation, soils, and natural processes, integrated into urban streetscapes, parking lots and other public and private developments to manage stormwater
- Unlike traditional “gray” infrastructure, green infrastructure reduces and treats stormwater at its source, while providing multiple environmental, social, and economic benefits



Green Infrastructure (GI)

- Over the long term, municipalities will need to retrofit existing public streets, roofs, and parking lots to divert runoff to:
 - Vegetated areas
 - Pervious pavements
 - Biotreatment and infiltration facilities
- These efforts will supplement current requirements for LID on regulated projects



GI Project Types

Green Infrastructure (LID Measures)

C.3 Regulated Projects:

- Private
- Public

Non-Regulated Public Retrofit Projects:

- Green Streets
- Parcel-based LID
- Regional Projects

Green Infrastructure Benefits

- GI projects can provide:
 - Flow reduction
 - Pollutant reduction
 - Urban greening
 - Traffic calming
 - Improved bike and pedestrian safety
 - Climate benefits
 - Increased property values
- Promoting multiple benefits can help get public support and funding

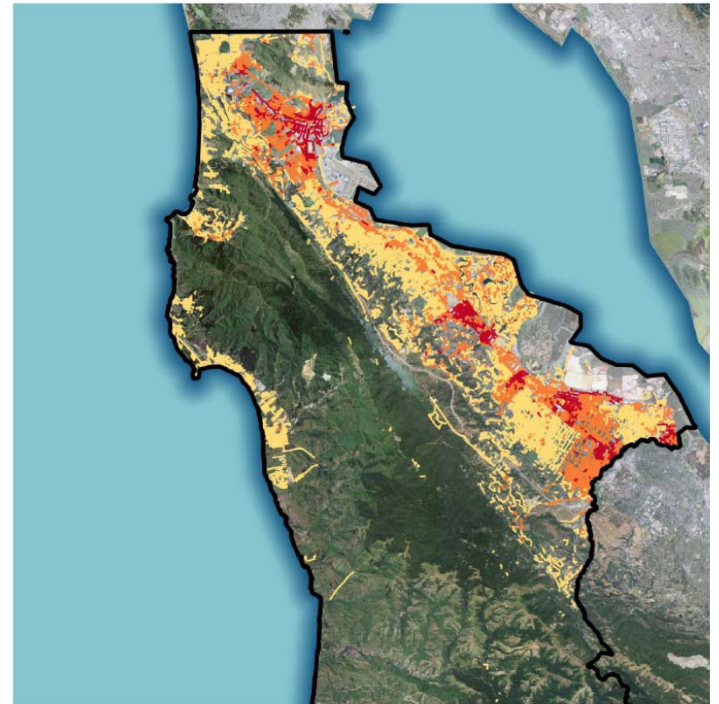


GI Requirements (C.3.j)

- Develop a long term GI Plan to shift from “gray” to “green” and achieve pollutant load reductions
 - Develop a Work Plan to prepare the GI Plan
- Conduct education and outreach to elected officials, department staff, development community and general public
- Conduct “early implementation”
 - Construct planned and funded projects
 - Review public project lists and assess opportunity for incorporating GI elements

GI Plan: Required Elements

- Mechanism to prioritize and map areas for potential and planned projects over specified timeframes (2020, 2030, 2040)
 - Prioritization criteria
 - Treatment opportunities
 - Maps and project lists to incorporate into CIPs



Prioritization of Opportunities for Green Streets – Countywide (Stormwater Resource Plan for San Mateo County, 2017)

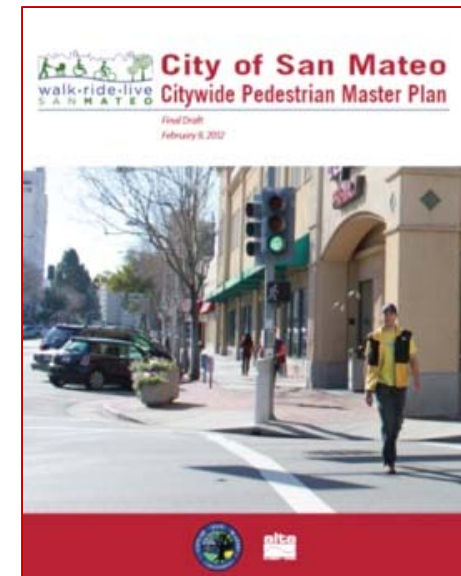
GI Plan: Required Elements

- Targets for amount of impervious surface retrofitted by 2020, 2030 and 2040
- Process for tracking/mapping completed projects
- Guidelines for streetscape and project design
- Standard specifications and design details

Countywide GI Guidance Manuals

GI Plan: Required Elements

- Planning document updates to incorporate GI requirements and work plan for future updates
- Work plan to complete prioritized projects
- Evaluation of funding options
- Adopted policies, ordinances, and other implementing mechanisms

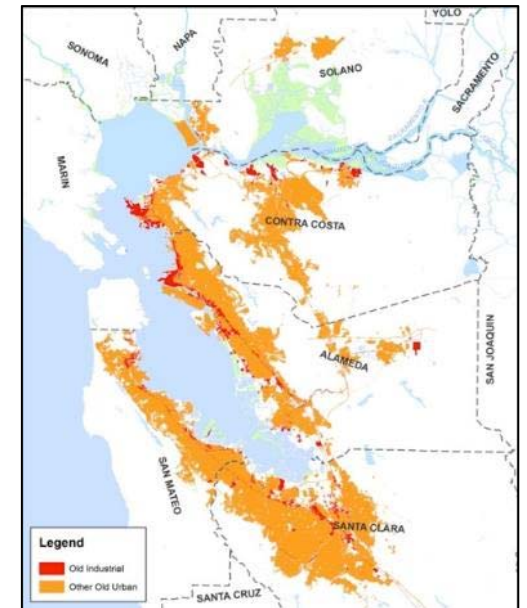


Key C.3.j Deadlines

Deliverable	Due Date
List of Current/Potential GI Projects	9/30/16; annually
Summary of GI Education and Outreach	9/30/16; annually
Approved GI “Framework” (Work Plan)	6/30/17
Completed GI Plan	9/30/19

GI & POC Requirements

- Link between GI implementation and required pollutant controls
 - Control measures for certain pollutants (PCBs and mercury) include green infrastructure
 - Quantities of PCBs and mercury discharged to the Bay must be reduced to specified levels by 2020 and 2040
 - GI Plans must provide reasonable assurance that specified PCB and mercury load reductions will be met (via public and private projects)



Land Areas with
Higher PCB Yields

Load Reduction Requirements for GI Implementation By June 30, 2020

County Permittees	Load Reduction (g/yr)	
	PCBs	Mercury
Alameda	37	15
Contra Costa	23	9
San Mateo	15	6
Santa Clara	37	16
Solano*	8	2
Total	120	48

* Fairfield, Suisun City and Vallejo only

Estimating Load Reductions from GI in San Mateo County

Land Use-Based PCB Yield (mg/acre/year)				
Old Industrial	Old Urban	New Urban	Open Space	Other
50	17.5	2	2.5	2

- Interim Accounting Methodology – based on load reduction due to land use conversion
- Projects in old industrial/old urban areas achieve the most reductions per acre treated
- Regional projects may be most cost-effective due to larger areas

How is GI Design Different?

Traditional LID Site Design	GI Design Approach
<ul style="list-style-type: none">• Conserve/protect natural areas• Cluster buildings• Minimize disturbance to natural drainages• Strategically locate treatment areas	<ul style="list-style-type: none">• Work within confines of existing design• Combine with other street or parking lot improvements• Integrate with a redesign for another purpose

How is GI Design Different?

Traditional LID Site Design	GI Design Approach
<ul style="list-style-type: none">• Minimize impervious area	<ul style="list-style-type: none">• Convert impervious area to pervious area/vegetation
<ul style="list-style-type: none">• Use impervious area efficiently	<ul style="list-style-type: none">• Convert inefficient use to more efficient use<ul style="list-style-type: none">• Balance parking with landscaping• Add tree canopy

Example: Striped Red Zone (Redwood City)

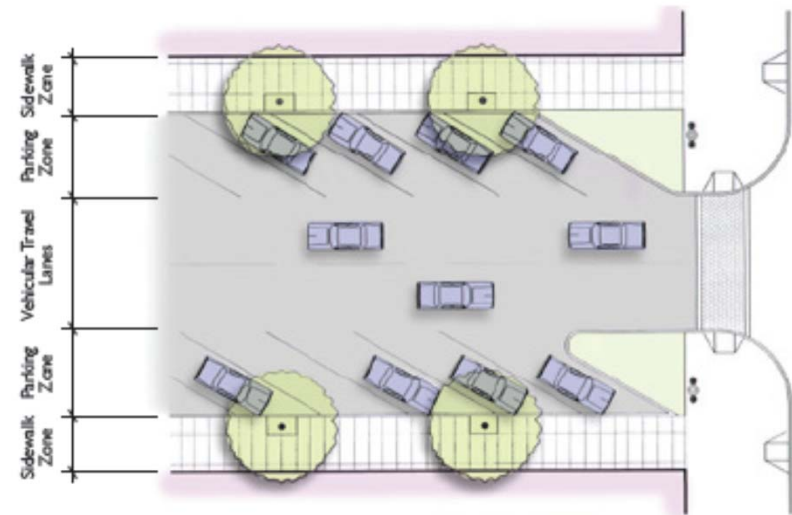


Possible location for a stormwater curb extension?

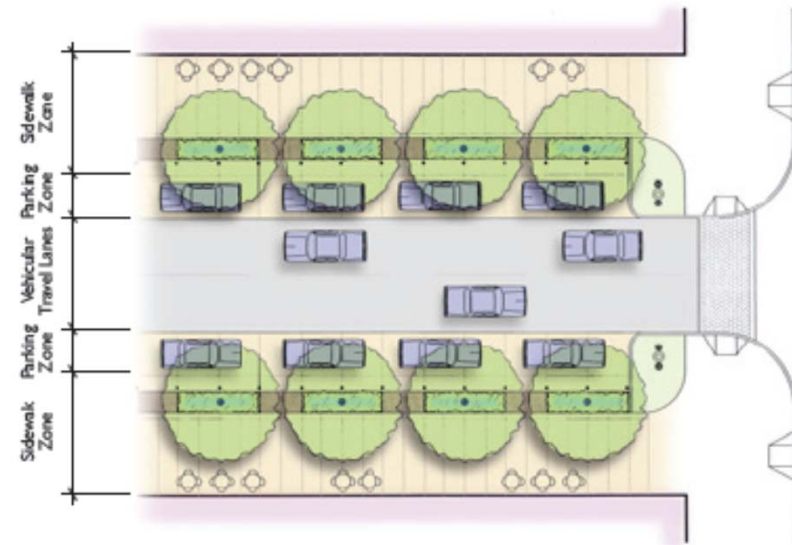
More Efficient Parking

A shift from angled parking to parallel parking frees up space for biotreatment and tree filters between the parking and sidewalk zones.

Source: San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook, 2009



Angled Parking Scenario



Parallel Parking Scenario

How is GI Design Different?

Traditional LID Site Design	GI Design Approach
<ul style="list-style-type: none">• Design landscaping as a self-retaining area for runoff from new impervious area	<ul style="list-style-type: none">• Redirect existing impervious area to existing landscaping• Convert existing landscaping into a stormwater treatment area

Example: Park Area (Before) (Berkeley)



Example: Park Area (After)



New bioretention area to treat roadway runoff

GI Opportunities

- Improvements for active transportation
 - Complete Streets projects
 - Safe Routes to School
 - Downtown area revitalization
- Better use of inefficiently used spaces
- Extend the curb wherever possible
 - Especially red ones!

GI Opportunities



Safe Routes to School Improvements – San Mateo

GI Opportunities



Curb Extension at a Corner – Southgate, Palo Alto



Design Challenges: Siting

- Sufficient space in public right-of-way
- Infiltration capacity of native soils
- Proximity to storm drain system
- Working with existing grades
- Presence of other utilities
- Potential loss of parking
- Availability of water supply

Design Challenges: Sizing

- May not be able to meet C.3.d sizing for retrofit projects
- Alternative Sizing Approach
 - MRP allows non-regulated projects to use a different sizing approach if constraints prevent meeting C.3.d sizing
 - BASMAA conducting regional project to determine approach, using hydrologic model
 - Smallest sizing factor to meet C.3.d sizing?
 - What portion of C.3.d volume is treated for smaller sizing factors?
 - What “credit” given toward pollutant removal?

Design Challenges: Integration

- Roadway projects need to accommodate:
 - Pedestrian/ADA access, safety
 - Cyclist access, safety
 - Transit stop requirements
 - Traffic flow, loads, turning radius
 - Driveway access and parking
 - Public safety (e.g., fire truck movement)

Design Challenges: Maintenance

- Safe access by crews
 - Work in high traffic areas
- Ease of maintenance
 - Type and frequency of activity
 - Confined space entry?
 - Type of equipment needed
- Costs (consider life cycle costs)
- Integrated benefits

For More Information:

- SMCWPPP Green Streets Webpage:
(including San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook)
<http://flowstobay.org/greenstreets>
- San Mateo County Stormwater Resource Plan:
<http://ccag.ca.gov/srp/>
- City of San Mateo Sustainable Streets Plan:
<http://sustainablestreetssanmateo.com/>
- EPA Green Infrastructure Resources:
<https://www.epa.gov/green-infrastructure>
- SMCWPPP GI Guidance Manuals
(coming soon!)

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