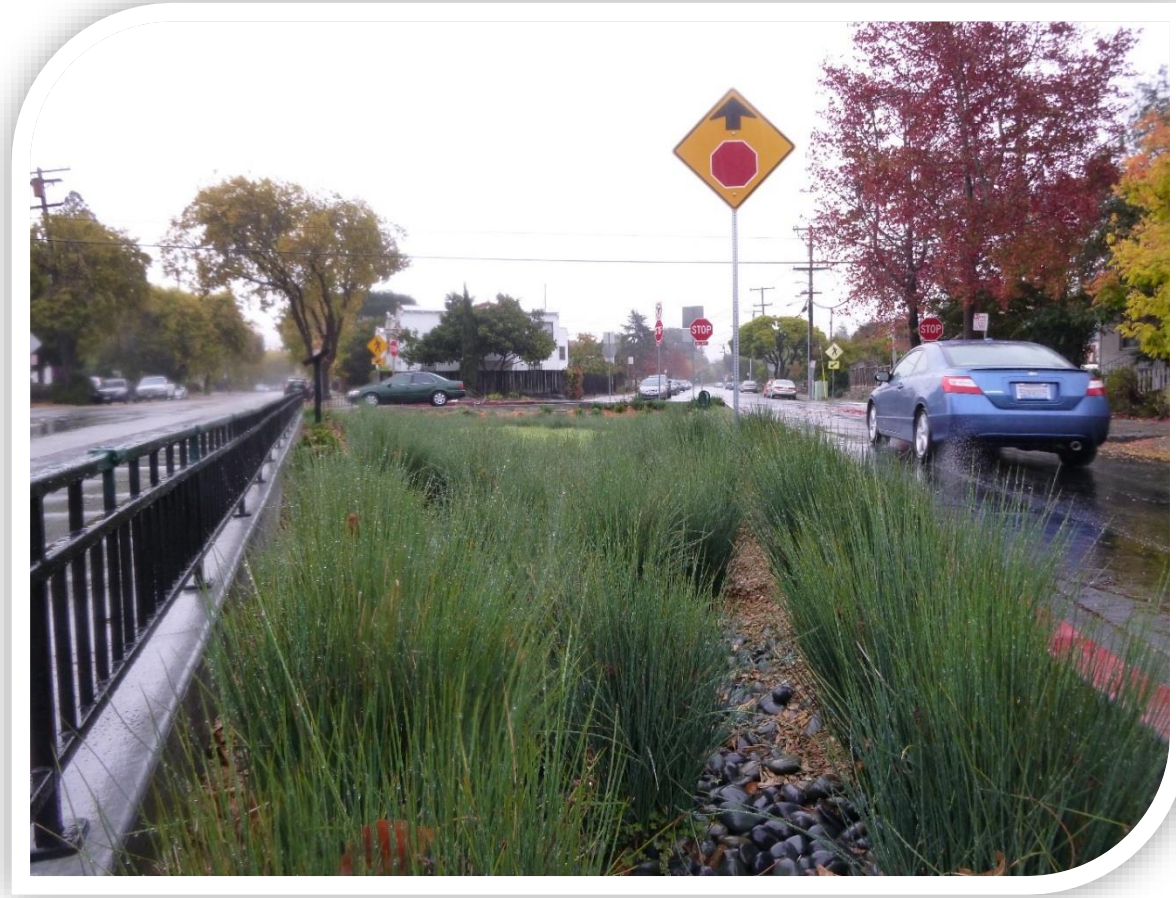


# City of Berkeley Green Infrastructure Plan 2019

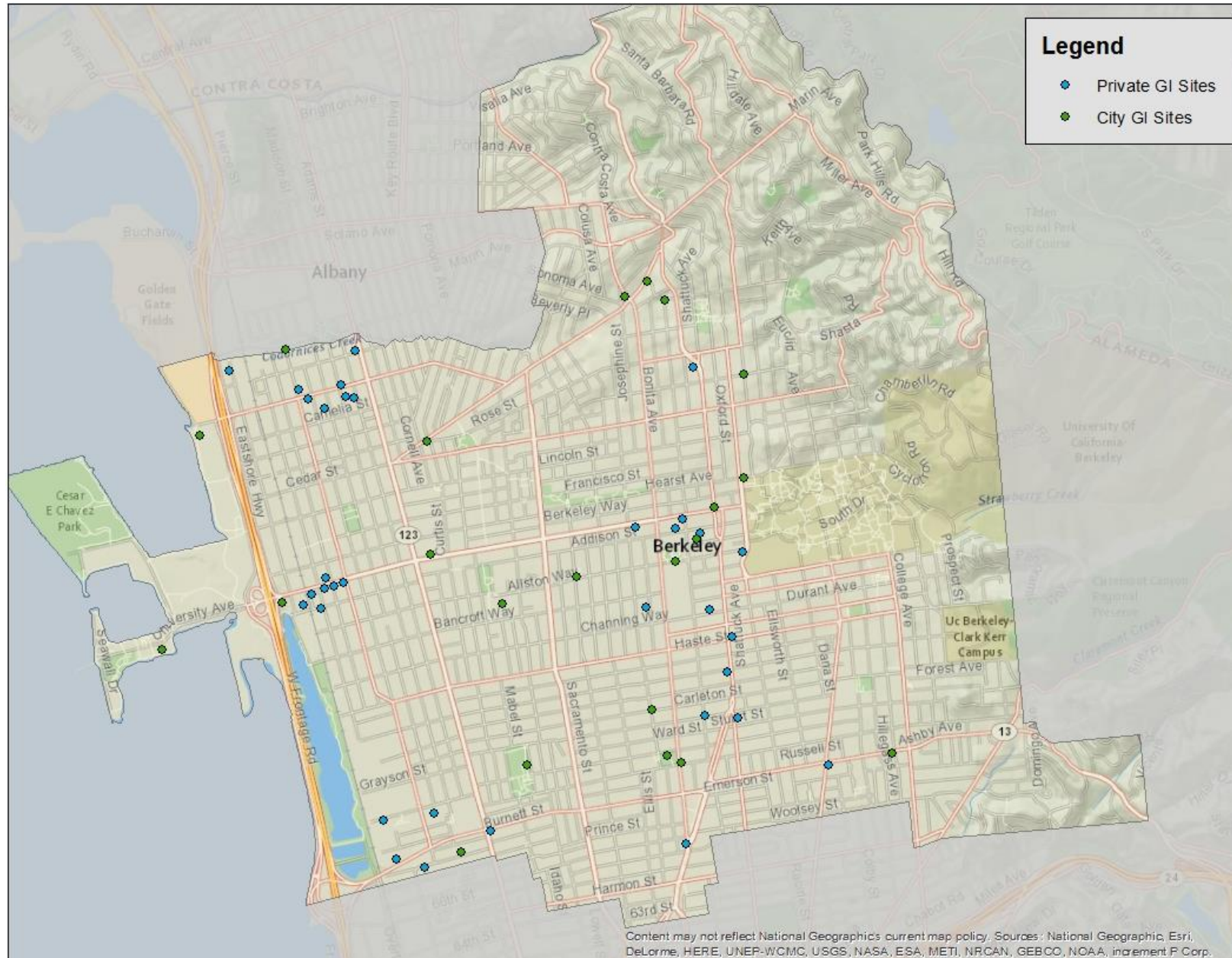


June 18, 2019

# Background

- Green Infrastructure defined as:  
*“a sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and/or uses bioretention and other low impact development practices to improve the water quality of stormwater runoff.”*
- In Berkeley, existing Green Infrastructure facilities include permeable pavement, bioswales, rain gardens, flow-through planters, green roofs, and cisterns.
- Since the early 2000s, over 50 Green Infrastructure facilities have been installed in Berkeley as part of City “Green Streets” projects and public and private development projects.

# Existing Green Infrastructure Sites in Berkeley



# Permeable Pavement



# Bioswales



# Bioswales (cont.)



# Complete Streets



# Flow-Through Planters





# Green Roofs



# Green Infrastructure Plan Regulatory Requirements

- The City is required to complete a Green Infrastructure Plan (GI Plan) by September 30, 2019 under the Municipal Regional Stormwater NPDES Permit (MRP)
- Required elements of the GI Plan include:
  - Development of a tool to prioritize areas for potential GI projects and a tool to track completed GI projects;
  - Targets for the amount impervious surface to be retrofitted (by private and public projects) in Berkeley by 2020, 2030, and 2040;
  - Updating of City planning documents to include GI requirements;
  - A workplan for completion of Early Implementation GI projects; and
  - An evaluation of funding options for GI projects.

# Impervious Surface Retrofit Targets

- As required by the MRP, targets are consistent with timeframes for assessing PCBs and Mercury load reductions
- Private Development targets are based on the UrbanSim Model provided by the San Francisco Bay Area Metropolitan Transportation Commission
- Private Development projections are relatively low for Berkeley compared to other cities in the region

# Approach for Prioritizing and Mapping Projects

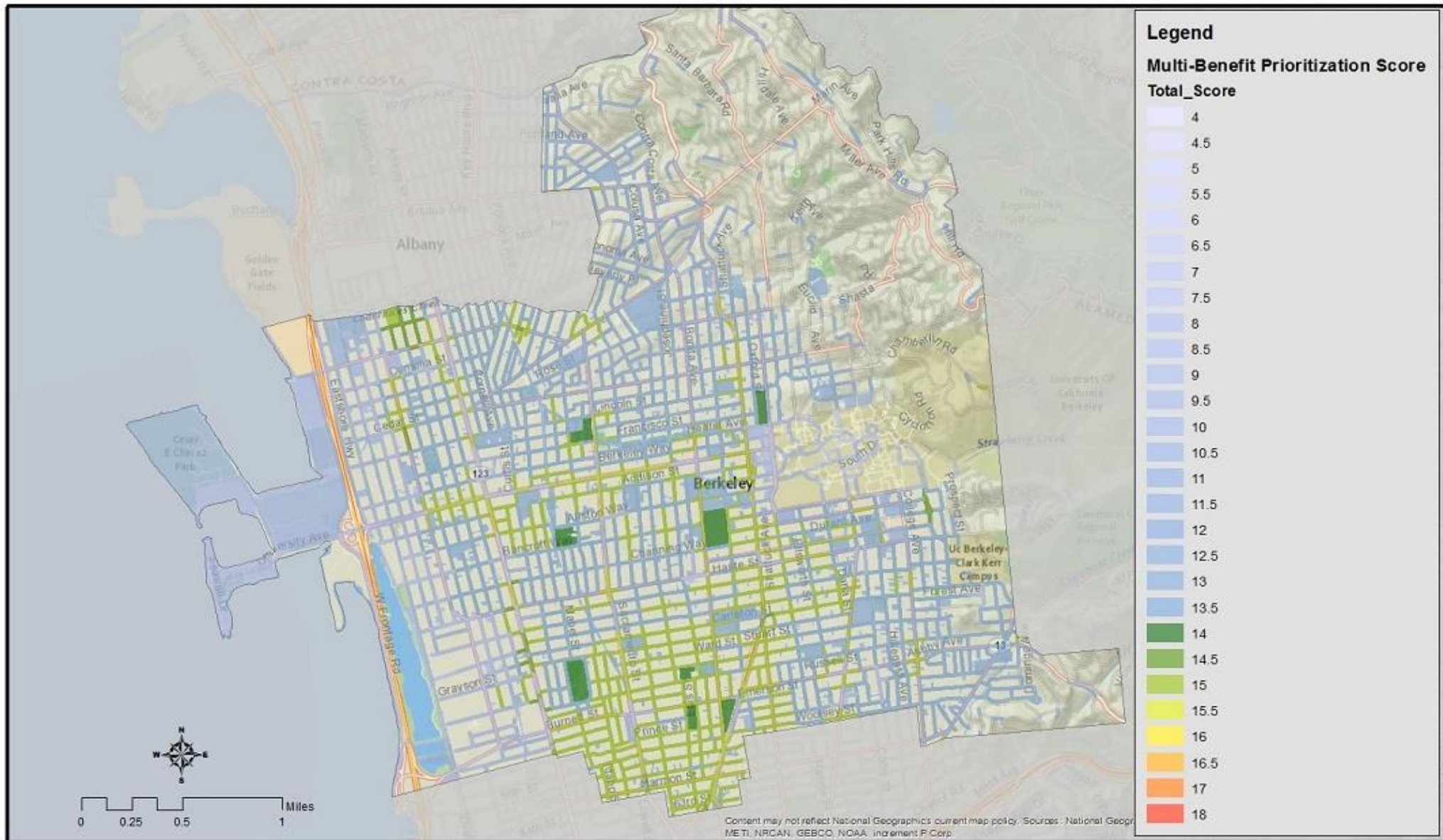
The GI Mechanism consists of the following components:

- The Alameda Countywide Multi-Benefit Metrics Prioritization Protocol (**Multi-Benefit Prioritization Tool**);
- The City of Berkeley Land-Use-Based Micro-Watershed Pollutant Load Estimation Tool (**Micro-Watershed Tool**); and

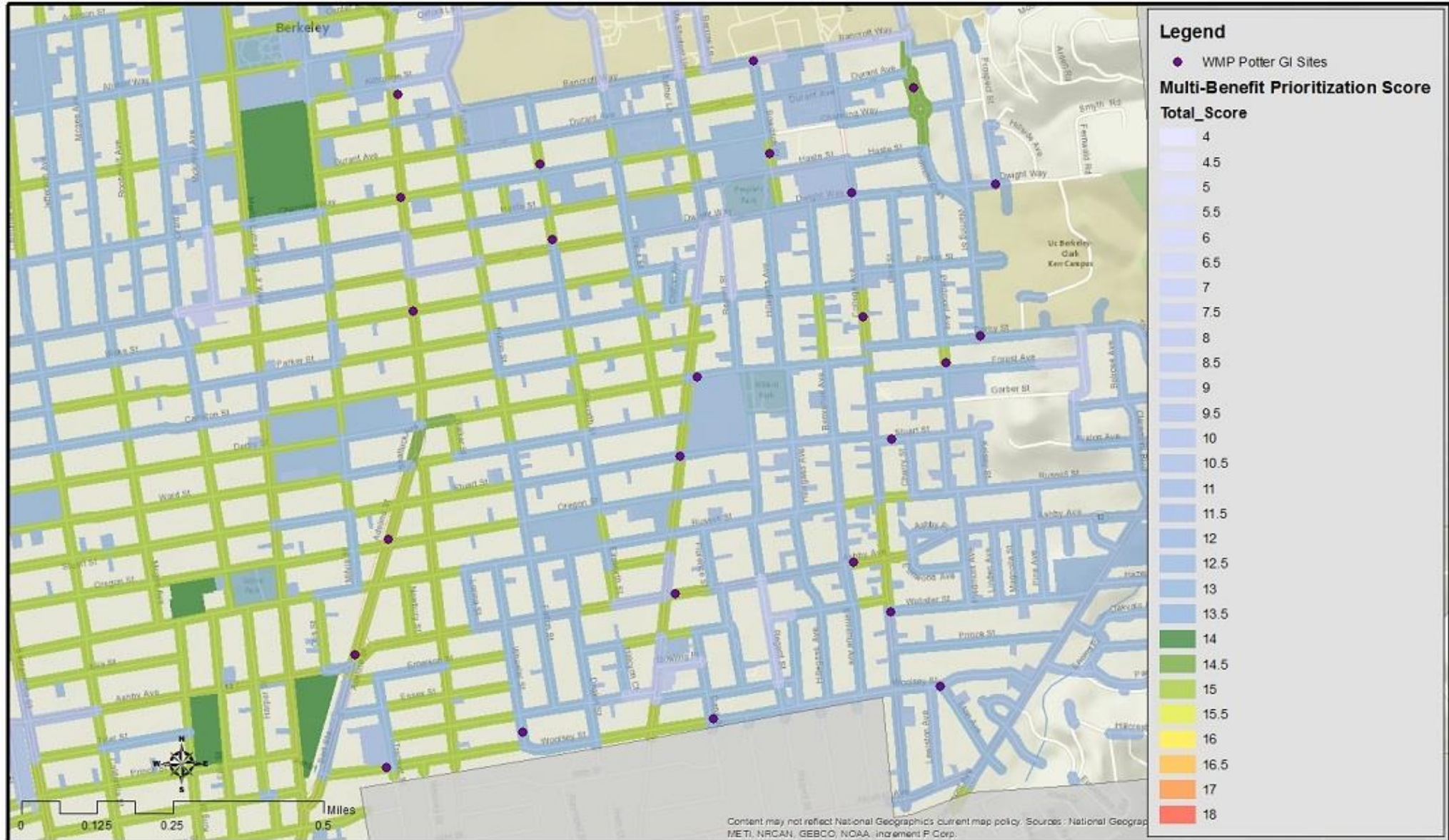
# Alameda Countywide Multi-Benefit Metrics Prioritization Protocol (Multi-Benefit Prioritization Tool)

- A quantitative metrics-based evaluation was performed for each publicly owned parcel and each block of public Right-of-Way in Berkeley using an automated GIS process.
- Scoring Metrics included:
  - Location Slope
  - Infiltration Feasibility
  - Pollutant Load Reduction Potential
  - Water Supply Augmentation Potential
  - Flood Control Co-Benefit
  - Re-Establishment of Natural Drainage Systems
  - Restoration of Habitat or Open Space
  - Public Use/Community Involvement Benefits
  - Trash Capture Co-Benefit

# Multi-Benefit Prioritization Tool



# Potter Watershed WMP GI Projects Evaluated Using the Multi-Benefit Prioritization Tool



# Woolsey and Tremont Bioswale and Cistern

(Planned Project)



- Plans to construct a bioswale on Woolsey to treat surface runoff and an underground cistern to detain peak flows from adjacent storm drain main.
- Bioswale to treat runoff from a 1.7-acre watershed, cistern to detain peak flows from a 286-acre watershed.
- Watershed Management Plan Proposed Project.
- Multi-Benefit Prioritization Score = 15.



# Piedmont Avenue Traffic Circle and Medians

(Potential Joint Project between UC Berkeley and City of Berkeley)

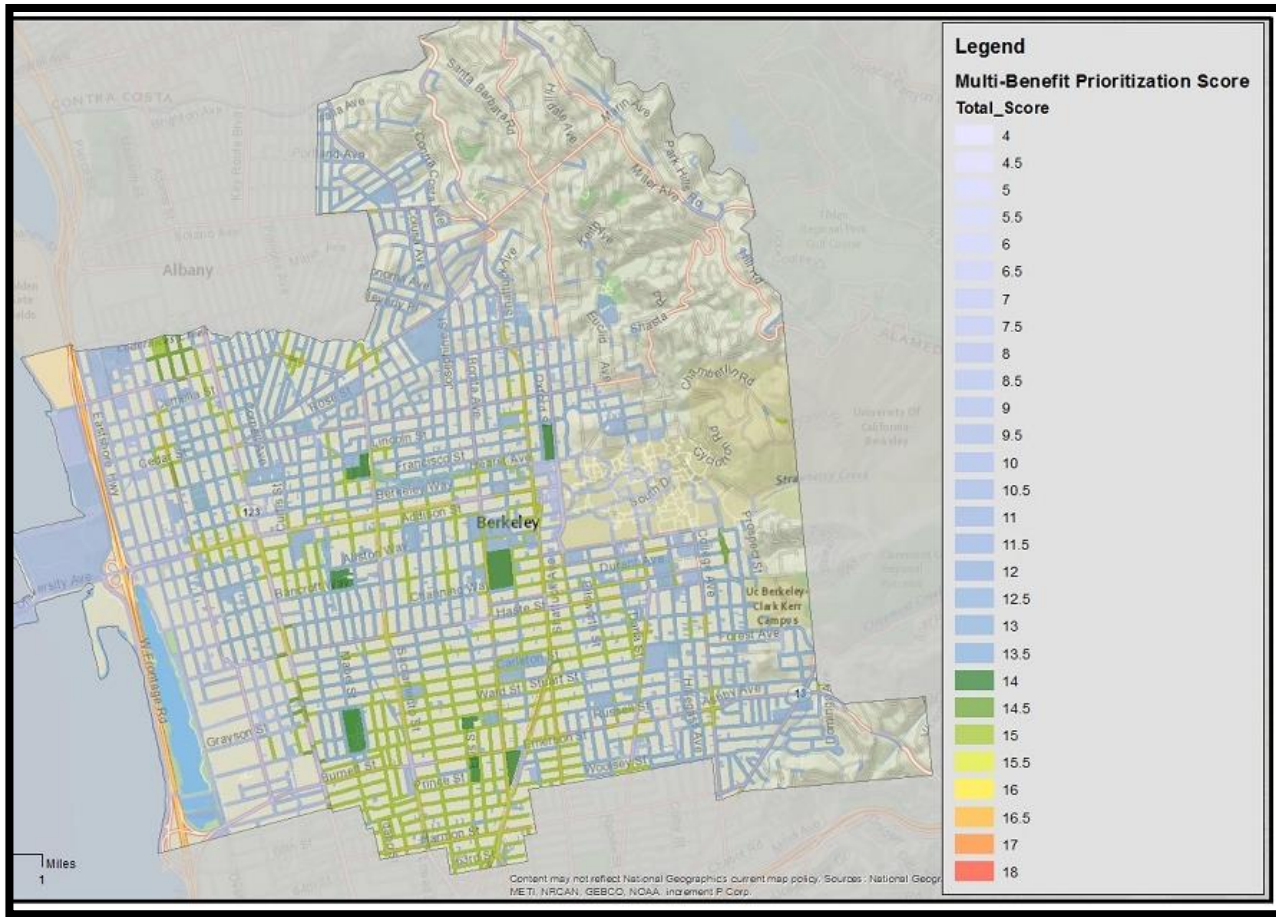


- Opportunity to install a biotreatment facility and cistern in large traffic circle or medians on Piedmont between Durant and Haste.
- Watershed Management Plan Proposed Project.
- Multi-Benefit Prioritization Score = 14.5.
- The Historical Designation of this Olmstead designed street could present challenges.

# Piedmont Avenue Traffic Circle and Medians (cont.)



# Limitations of the Multi-Benefit Prioritization Tool



- Biased towards areas where infiltration is feasible.
- Does not know that actual area that drains to each ROW section or public parcel, assumes pre-defined buffers.

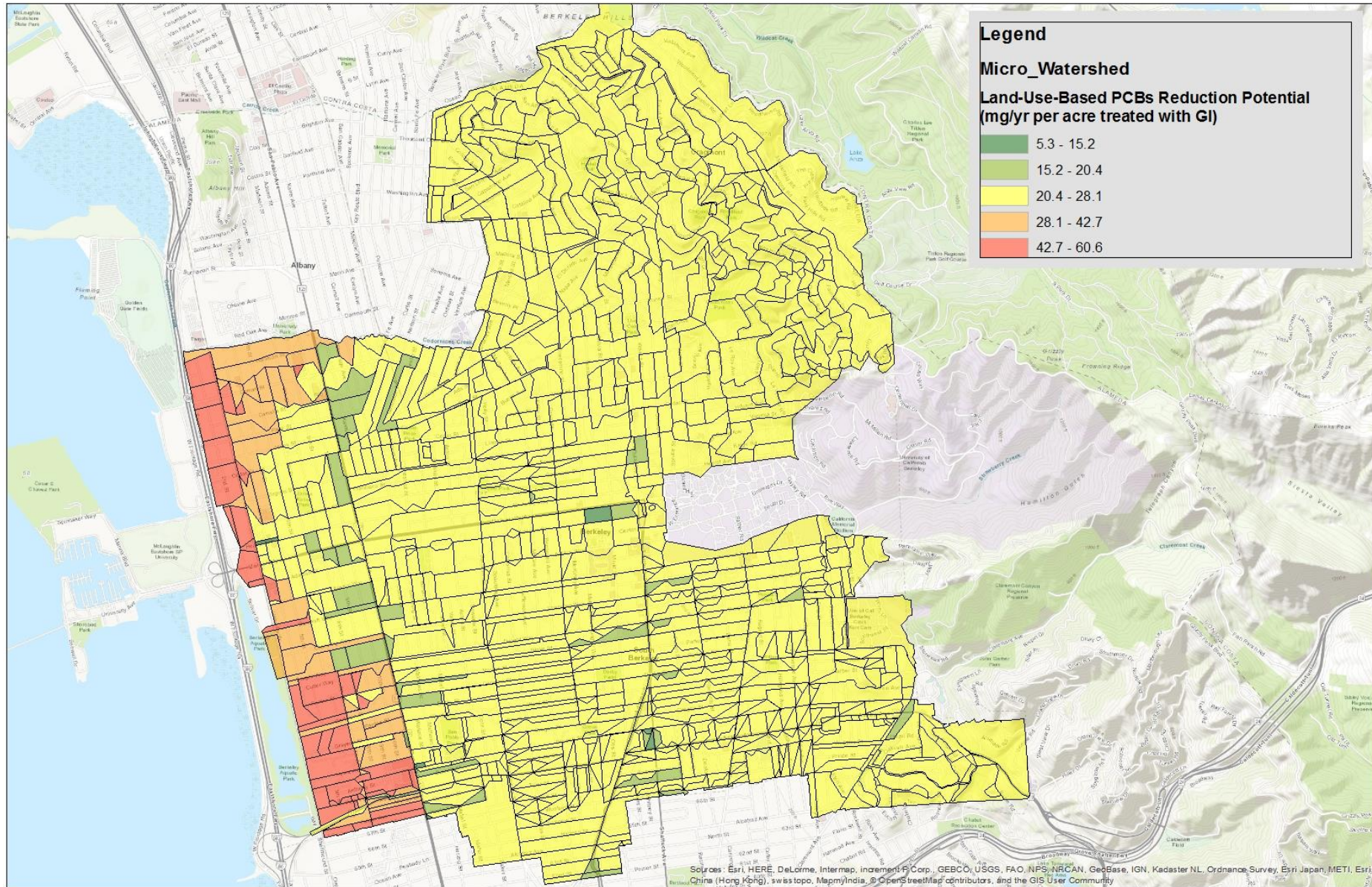
City of Berkeley Land-Use-Based Micro-Watershed Pollutant Load  
Estimation Tool  
(Micro-Watershed Tool)

- As part of the green infrastructure planning process, the City's surface drainage maps were digitized in GIS
- GIS polygons were created for the drainage area to each storm drain inlet in the City (Micro-Watersheds)
- The Micro-Watersheds were overlain with the Historical Land Use Layer and the amount of each category of land-use within each Micro-Watershed was calculated
- Using formulas from the BASMAA Interim Accounting Methodology for TMDL Loads Reduced, a PCB Reduction Potential value was calculated for each Micro-Watershed





# Micro-Watershed Tool (cont.)



# Micro-Watershed Tool (cont.)





# Page Between Fourth and Railroad (Gilman Watershed)

## Potential Project



# Jones Between Fourth and Railroad (Gilman Watershed)

## Potential Project



# Channing at Railroad ROW (Potter Watershed)

Potential Project



# Other West Berkeley Potential GI Sites



Potential GI Locations Near Railroad ROW on Heinz (above), Dwight (top right), and Grayson (bottom right).

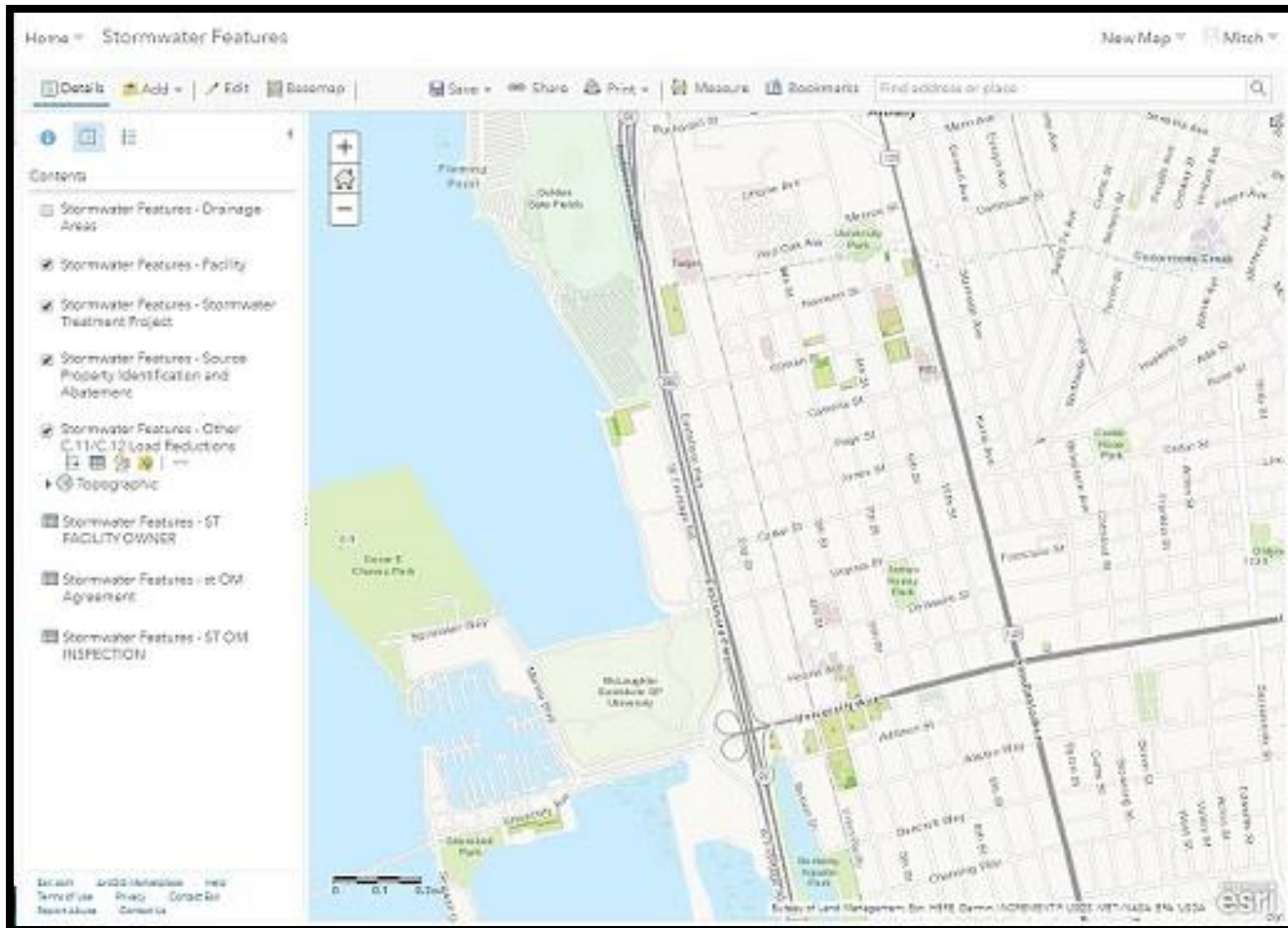
Comparison of High-Priority Potential Green Infrastructure Projects

City of Berkeley 2019 Green Infrastructure Plan

Location	Watershed	Max Feature Size (acres)	Max Drainage (acres)	MBPT Score	PCB Reduction Potential for Microshed* (mg/year per acre treated)	3% Treatment Area (acres)	Description
<i>West Berkeley</i>							
Heinz and Railroad (3rd st)	Potter	0.04	6.5	9	48.4	1.3	Opportunity for bioretention feature at dead-end of Heinz (at 3rd) with existing inlet that drains to Potter Outfall
Grayson and Railroad (3rd st)	Potter	0.1	5.5	9	52.4	3.3	Opportunity for bioretention feature along either side of Grayson, between 7th and 3rd
Dwight and Railroad (3rd st)	Potter	0.09	1.6	9	36.3	3.0	Opportunity for bioretention features in parking lane/planter strip along either side of Dwight, between 4th and 3rd
Channing and Railroad (3rd st)	Potter	0.03	15.8	9	32.7	1.0	Opportunity for bioretention feature at dead-end of Channing (at 3rd) with existing inlets that drain to Potter Outfall
<i>Gilman Watershed</i>							
Jones between 4th and Railroad (3rd st)	Gilman	0.08	15.4	9	31.8	2.7	Opportunity to install two connected bioretention features along the south side of Jones between 4th St and the Railroad ROW
Page between 4th and Railroad (3rd)	Gilman	0.09	9.6	9	34.3	3.0	Opportunity to install a bioretention feature at the dead-end of Page St at the Railroad ROW
<i>Codornices Projects</i>							
10th St at Codornices Creek	Codornices	0.03	2.9	13	40.9	1.0	Opportunity to install bioretention features on the east and west sides of 10th St at Codornices Creek, similar to the existing rain gardens on 6th St at Codornices Creek
9th St at Codornices Creek	Codornices	0.03	3	14.5	40.9	1.0	A portion of the concrete island at end of 9th St could be converted to a bioretention feature treating runoff from 9th st before it flows into Codornices Creek. Challenges include coordination with and financial participation from upstream and downstream private property owners, and any creek restoration requirements
<i>Piedmont Ave/UC Joint Project</i>							
Piedmont Traffic Circle	Potter	0.12	5.8	14.5	21.2	4.0	Large grassy traffic circle could be converted to a bioretention feature to treat runoff from Piedmont Ave and Channing Way
Median between Durant and Channing	Potter	0.16	1.5	14.5	21.2	5.3	Large grassy median could be converted to a bioretention feature to treat runoff from Piedmont Ave
<i>Parks Projects</i>							
San Pablo Park (Ward St)	Potter	0.1	8.9	14	21.2	3.3	Grassy area in NW corner of park or strip of grass along northern side of park could be converted to a swale to treat runoff from Ward St

\* = Calculated using the BASMAA Interim Accounting Methodology for TMDL Loads Reduced

# The Alameda County/Contra Costa Project Tracking and Load Reduction Accounting Tool ArcGIS Online web application (AGOL Tool)



- The Alameda Countywide and Contra Costa Clean Water Programs cooperatively developed a regional ArcGIS Online Green Infrastructure tracking tool
- The City of Berkeley has incorporated the AGOL Tool into our GI reporting procedures
- The AGOL Tool will be viewable by the public by October 2019

## DRAFT Impervious Surface Retrofit Targets through 2040

### City of Berkeley 2019 Green Infrastructure Plan

Future Year	Project Category	Total Area Treated by GI (acres)	Estimated Impervious Surface Retrofitted (acres)
<b>2020</b>	Private Development*	21	21
	Public Development	9	9
	City Green Streets and Regional GI Projects	15	11
	<b><u>Total Targets:</u></b>	<b>45</b>	<b>41</b>
<b>2030</b>	Private Development*	38	38
	Public Development	16	16
	City Green Streets and Regional GI Projects	25	19
	<b><u>Total Targets:</u></b>	<b>79</b>	<b>73</b>
<b>2040</b>	Private Development*	59	59
	Public Development	25	25
	City Green Streets and Regional GI Projects	35	26
	<b><u>Total Targets:</u></b>	<b>119</b>	<b>110</b>

\*: Based on UrbanSim development projections provided by the San Francisco Bay Area Metropolitan Transportation Commission

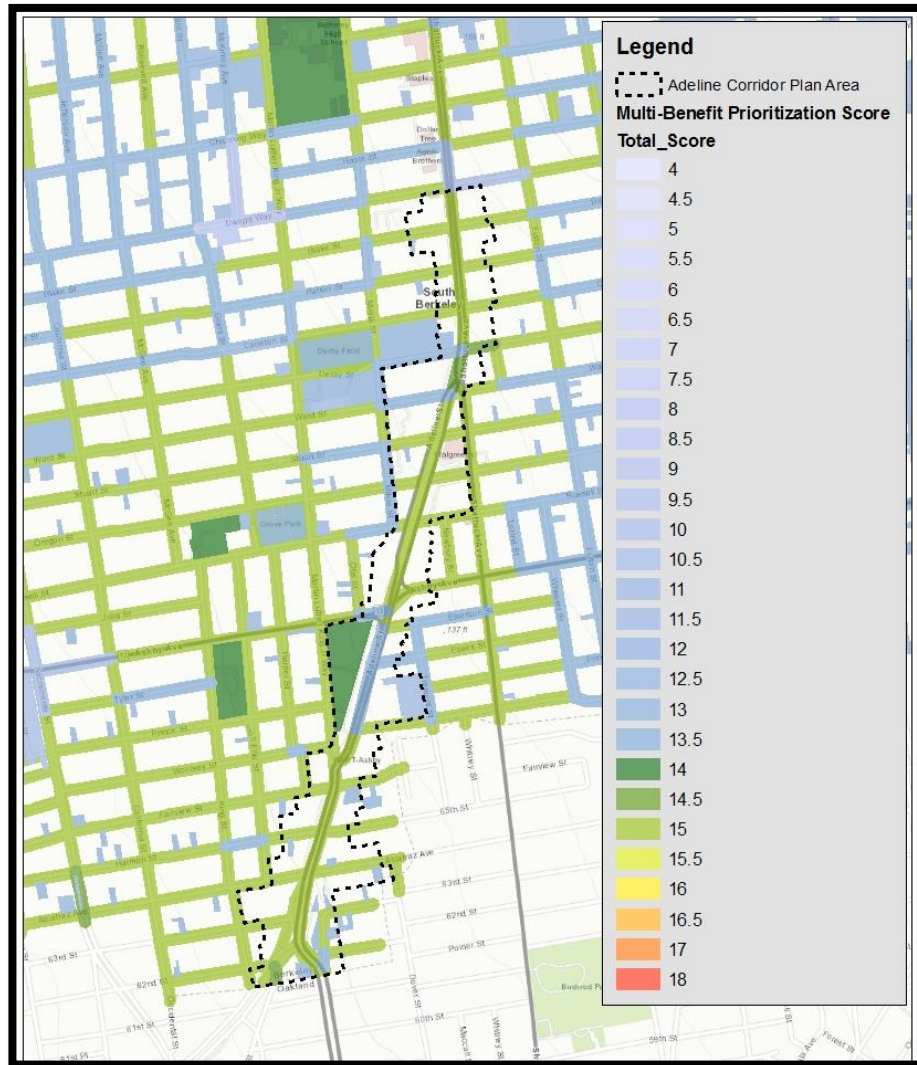
# Updating Planning Documents and Programs

## Partial List of City of Berkeley Planning Documents and Programs that Include Green Infrastructure Elements:

- City of Berkeley General Plan
- Downtown Berkeley Design Guidelines
- Downtown Streets and Open Space Improvement Plan
- Downtown Area Plan
- Berkeley Strategic Transportation Plan (BeST Plan)
- Watershed Management Plan
- Adeline Corridor Plan (in progress)
- Pedestrian Master Plan (update in progress)
- Southside Complete Streets (in progress)



# Adeline Corridor Plan



- High-Priority area for GI according to the Multi-Benefit Prioritization metrics
- Plan to include potential locations and types of GI that could be installed as part of proposed roadway reconfigurations
- Plan directs designers to use the GI Plan tools during the design process



# Questions?

- Additional questions or comments can be directed to [dakagi@cityofberkeley.info](mailto:dakagi@cityofberkeley.info)
- Thank you!

