

Baxter Creek Bioswale

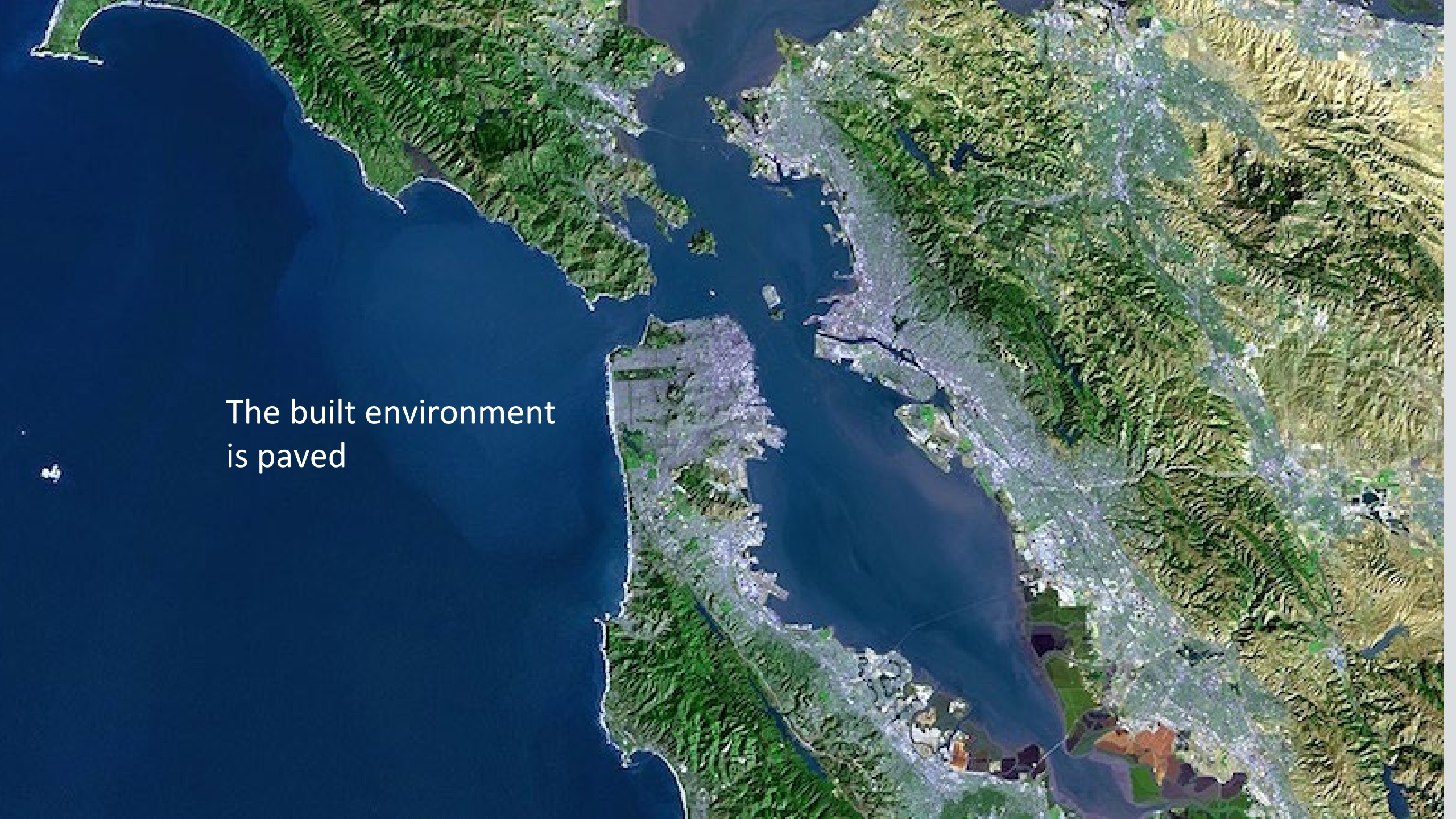
A Case Study in
Green Stormwater
Infrastructure



Overview

Project Background
Planting Plan and TWP Revamp
Soil and Irrigation
Water Quality
Questions

Bioswale Tour – 10:50 a.m.

A satellite map showing a coastal region. A large body of water, likely a bay or harbor, is the central feature. The surrounding land is densely forested, appearing in shades of green and brown. Several small islands and peninsulas are visible. A small, light-colored, rectangular area is highlighted on one of the peninsulas, possibly indicating a specific point of interest or a built environment. The text "The built environment is paved" is overlaid on the water area.

The built environment
is paved

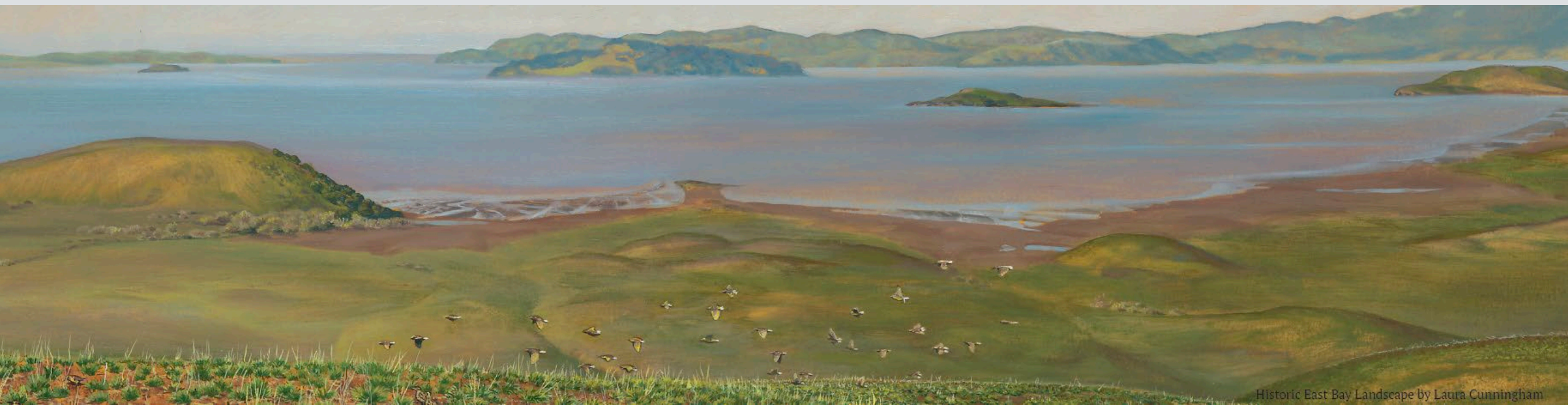


Green Stormwater Infrastructure
(GSI) helps our cities behave more like
sponges



Dayl

Baxter Creek Daylighting



Baxter Creek watershed is small, draining less than 2 square miles

Pre 1800 - Ohlone tribe (Huchiun clan) lived along the creek for thousands of years

Early 1800s – cattle and sheep grazing during Mission and Rancho periods

Late 1800s – creek was dammed, pumped, diverted for agricultural and industrial uses

Early/Mid 1900s – intermittent stream, channelized, straightened and buried in pipes

2000 – **Baxter Creek Restoration and Daylighting in Booker T Anderson Jr Park**
(Friends of Baxter Creek, Urban Creeks Council)

2018 – **Baxter Creek Bioswale** was constructed by The Watershed Project & CoR

Baxter Creek Bioswale

The Watershed Project + City of Richmond
(funding from CA Coastal Conservancy)

2 GSI areas in the Booker T Anderson parking lot
Landscape Design by Restoration Design Group

Broke ground July 2018

Construction and Planting Complete October 2018

ASPHALT PARKING AISLE
IS REMOVED AND REPLACED
WITH BIOSWALE

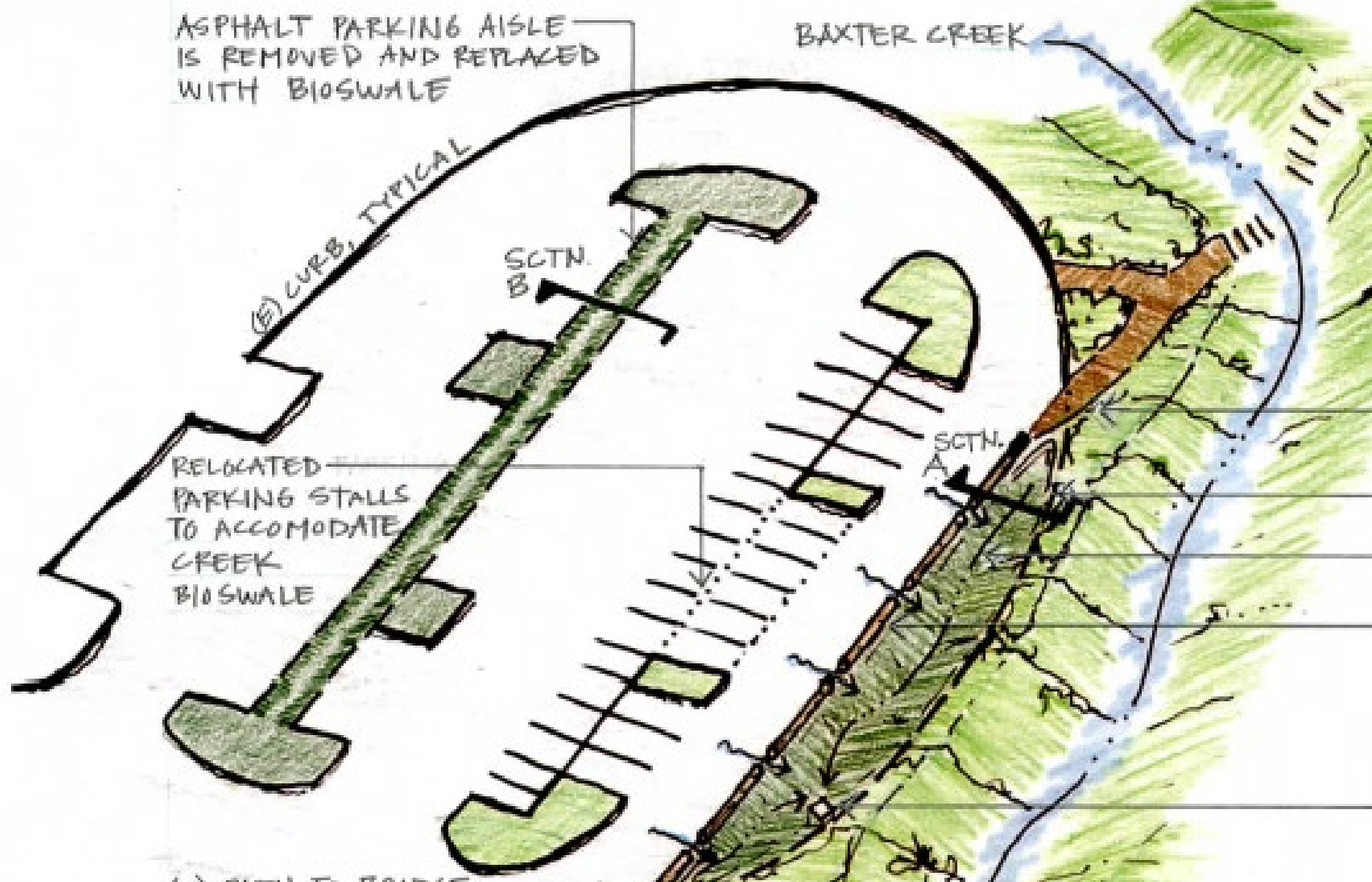
BAXTER CREEK

⑤ CURB, TYPICAL

SECTN.
B

SECTN.
A

RELOCATED
PARKING STALLS
TO ACCOMMODATE
CREEK
BIOSWALE



BIOSWALE

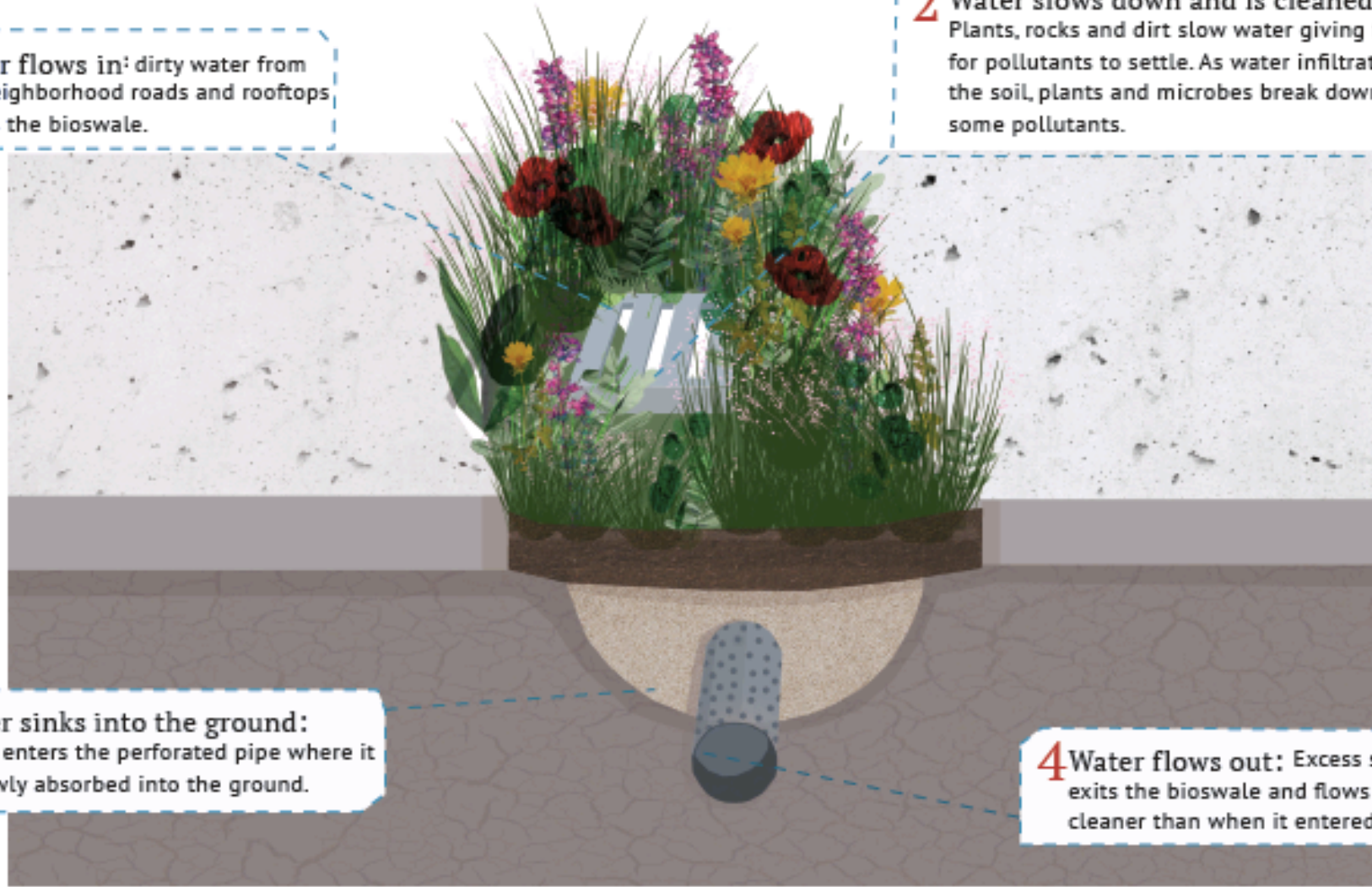
With community input and volunteer assistance The Watershed Project is creating bioswales along around Richmond. The bioswale captures stormwater and slows it down, keeping the water from flooding homes, the Greenway path, and nearby streets, where it creates potholes. The bioswale helps clean the water before it enters the San Francisco Bays as well and the native plants also create habitats for birds and butterflies.

1 Water flows in: dirty water from the neighborhood roads and rooftops enters the bioswale.

2 Water slows down and is cleaned: Plants, rocks and dirt slow water giving time for pollutants to settle. As water infiltrates the soil, plants and microbes break down some pollutants.

3 Water sinks into the ground: water enters the perforated pipe where it is slowly absorbed into the ground.

4 Water flows out: Excess stormwater exits the bioswale and flows into the Bay cleaner than when it entered.







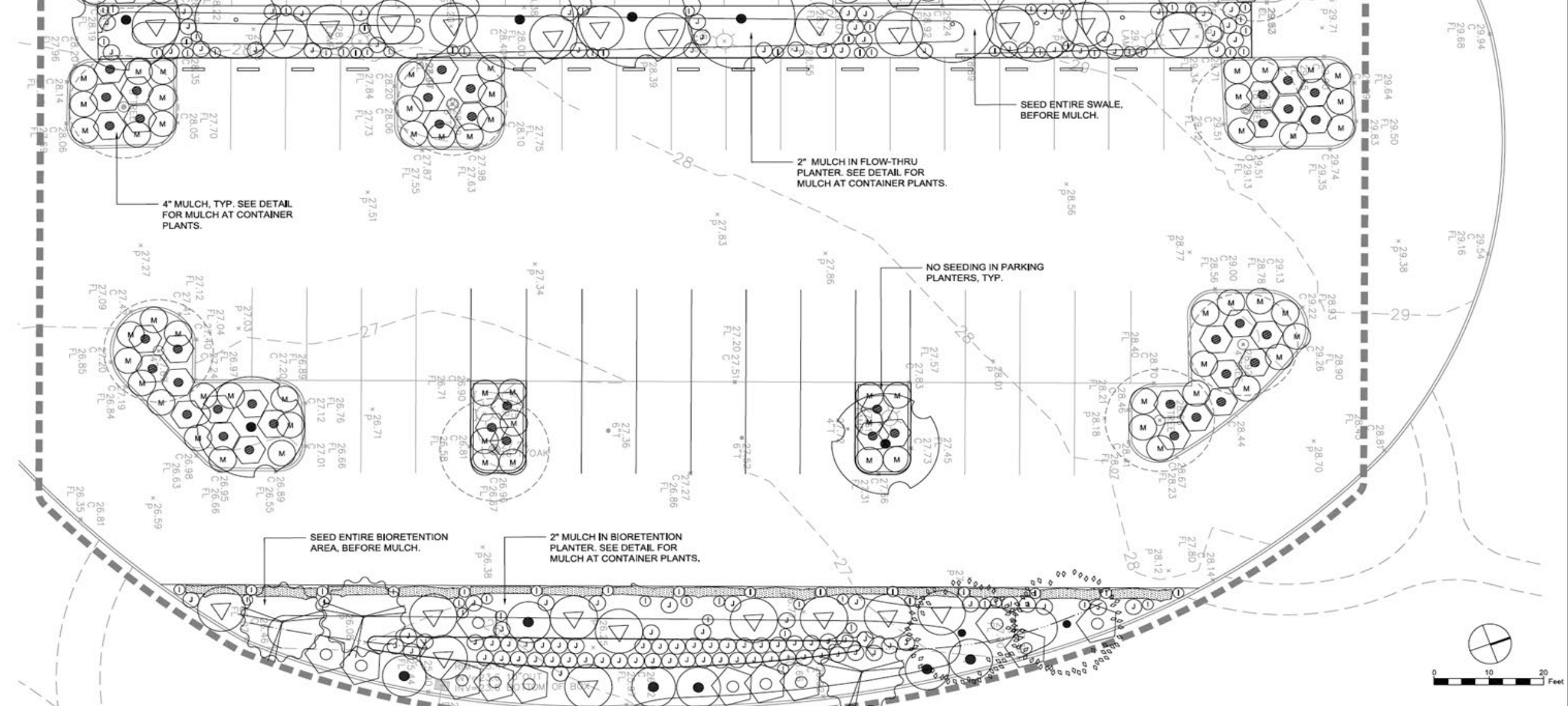


Permits

- **Encroachment Permit**
- **Adopt-a-Spot**



Planting Plan



PLANT SCHEDULE

TREES (15 GALLON)		
COMMON NAME	BOTANICAL NAME	QTY.
 BIG LEAF MAPLE	ACER MACROPHYLLUM	2
 BOX ELDER	ACER NEGUNDO	3

COMMON NAME	BOTANICAL NAME	QTY.
 OREGON ASH	FRAXINUS LATIFOLIA	6
 WESTERN REDBUD	CERCIS OCCIDENTALIS	5

SHRUBS			
COMMON NAME	BOTANICAL NAME	QTY.	SIZE
 COFFEEBERRY	FRANGULA CALIFORNICA	6	5 GAL.
 COYOTE BRUSH	BACCHARIS PILULARIS "PIGEON POINT"	23	1 GAL.
 FLOWERING CURRENT	RIBES SANGUINEUM	12	1 GAL.
 CEANOTHUS	CEANOTHUS HEARSTIUM	52	5 GAL.

NATIVE GRASSES + FORBES (1 GALLON)		
COMMON NAME	BOTANICAL NAME	QTY.
 DEERGRASS	MUHLENBERGIA RIGENS	80
 COMMON RUSH	JUNCUS PATENS	110
 DOUGLAS IRIS	IRIS DOUGLASIANA	75
SEEDING		
COMMON NAME	BOTANICAL NAME	QTY.

Plant List – Main Bioswale

Trees:

- 3 Box Elder
- 2 Big Leaf Maple

Shrubs:

- 6 Coffeeberry
- 10 Coyote Brush
- 12 Pink-Flowering Currant

Riparian:

- 60 Gray Juncus
- 20 Douglas Iris



Plant List ... Attrition Rate (4 years)

Trees

- 3 Box Elder
- 2 Big Leaf Maple

Shrubs:

- 6 Coffeeberry.....1 Left
- 10 Coyote Brush.....3 Left
- 12 Pink-Flowering Currant....8 Left

Other:

- 60 Gray Juncus.....40 Left
- 20 Douglas Iris.....8 Left



Maintenance Challenges

- **City maintenance staff were able to line-trim, but did not have capacity to hand-weed**
- **TWP did not have staff capacity to support maintenance for several years**
- **Guesswork watering schedule – how much is enough?**

Results:

- Green and weedy in the winter
- Mowed and "empty" by late summer
- No significant bloom season – only early spring
- A common site for litter









The Same Site Today:

- Never mowed to the ground
- Flowers and visual interest in all seasons
- Littering has decreased
- Birds, insects, butterflies and **people** are common visitors











2023 - New Staff / Renewed Funding



Bioswale Rehab

- Build on what was there
- Weed control
- Expand the plant palette and fill the space
- Sustainable maintenance strategy



What Was Still There?

Shady end of bioswale:

- Shrubs were successful here
- Red fescue

Juncus:

- Remaining plants were a good size

Trees:

- Healthy but small



Work Strategy

- "Pulses" of work using volunteers: planting, mulching
- Regular workdays with staff and interns: hand weeding, pruning



Weed Control

- Line-trimming **before** seed set
- Selective hand-weeding
- **Sheet mulching**
 - Cardboard layer
 - 4-6 inches woody mulch



Plant Palette

- Native
- Flowering/Seed producing
- Fast-spreading
- Disturbance-tolerant



Water-Tolerant & Long-Flowering



Pacific Aster



Gumplant



Marsh Baccharis

Drought-Tolerant Flowers



Yarrow



Mugwort



CA Poppy

Shade Tolerant Flowers/Grass



Douglas Iris



Alumroot



CA Fescue

Maintenance Strategy Spring / Summer

- Hoe weed seedlings
- Hand-pull mature weeds before seeds drop



Maintenance Strategy Fall

- Deadhead...or don't?
- Add mulch
- Last chance for **biennial** weeds
- Plan any fill-in plantings



Maintenance Strategy: Late Winter

- Prune most **flowering** plants to ground level:
 - Asters
 - Gumplant
 - Marsh Baccharis
 - Mugwort
 - Yarrow



Rushes: Juncus

- **Do not hard prune**, this may kill the plant
- **Do not “shape”** by cutting it shorter.

Thin in the fall/winter season by:

- Cutting **some** of the stems to the base
- **Dethatch** with gloved hands or a stiff rake
- If needed/desired, dig up and divide



Juncus should look like this:



Not
Like
This!



Biotreatment Soil Media (BSM)

Requirements for BSM:

- 5" water infiltration per hour
- 60-70% Sand, 30-40% compost

Challenges of BSM:

- Trees tend to remain stunted
- Nutrient flushing, esp. N and P
- Sand can flush metals, esp. **Copper**
- **This soil *struggles* to retain water**

Building Soil Structure in BSM

- Healthy soil infiltrates water AND retains moisture
- Use and **reapply** woody mulch – we recommend arborist mulch
- **Utilize summer irrigation** (beyond establishment phase)

Irrigation

- Sprinklers – good site coverage, simple
- Drip – lower water use, but difficult in sandy soil



Water Quality Monitoring: Basic Procedure

- Note time rain begins
- Collect water samples at all curb cut inlets and combine in bucket
- Note time of bioswale saturation
- Collect water samples from overflow pipes in drain
- Send to lab for testing





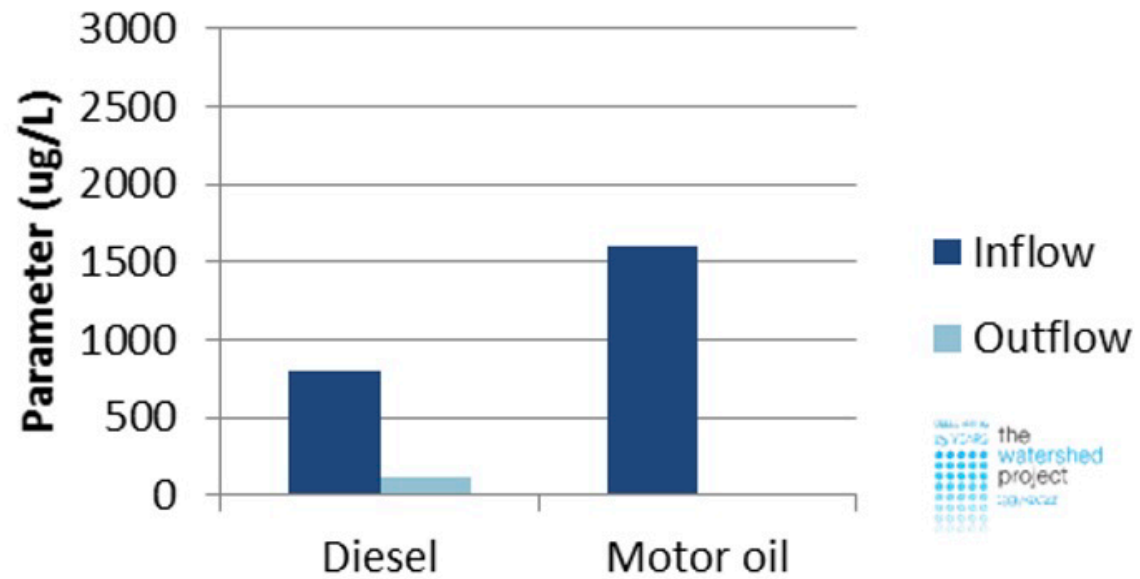


BIOSWALE SATURATION

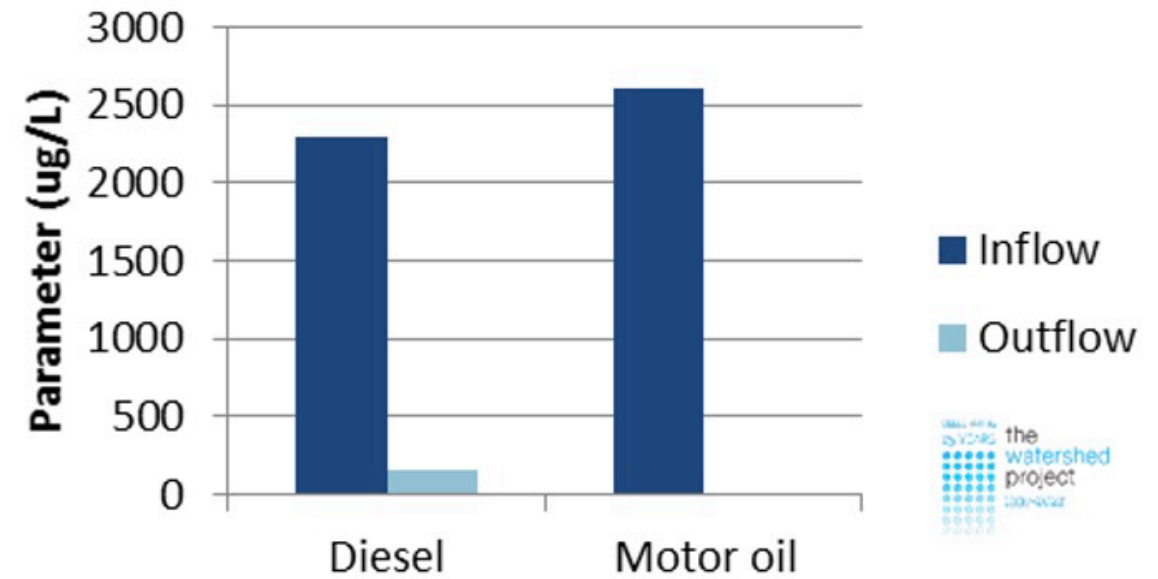




Diesel and Motor Oil at BTA 02/08/2019

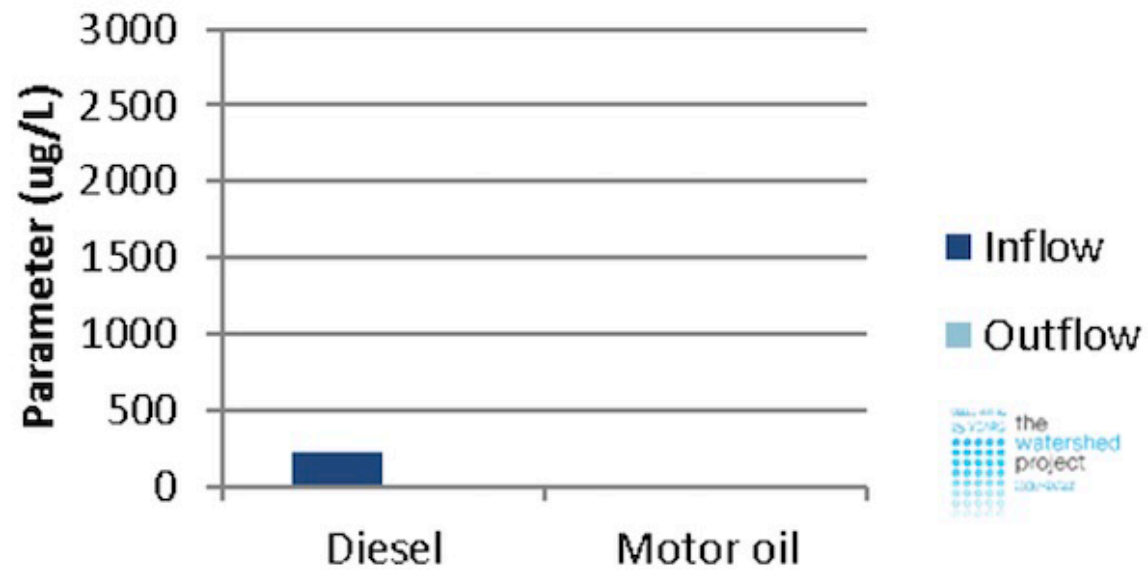


Diesel and Motor Oil at BTA 11/26/2019

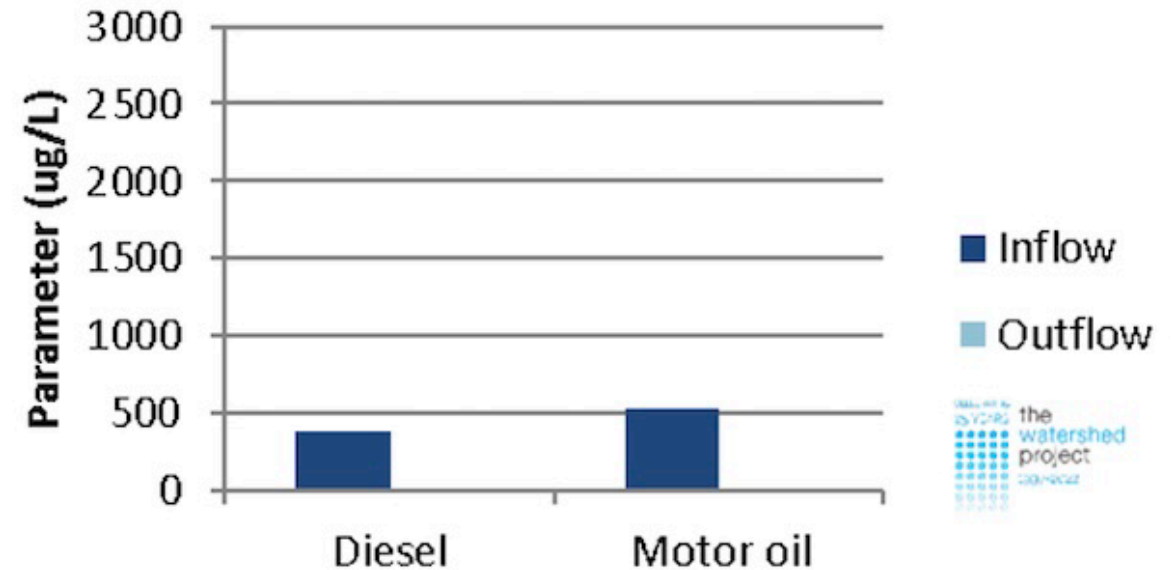


Bioswale cleans Diesel and Motor Oil from Booker T Anderson parking lot 🚗

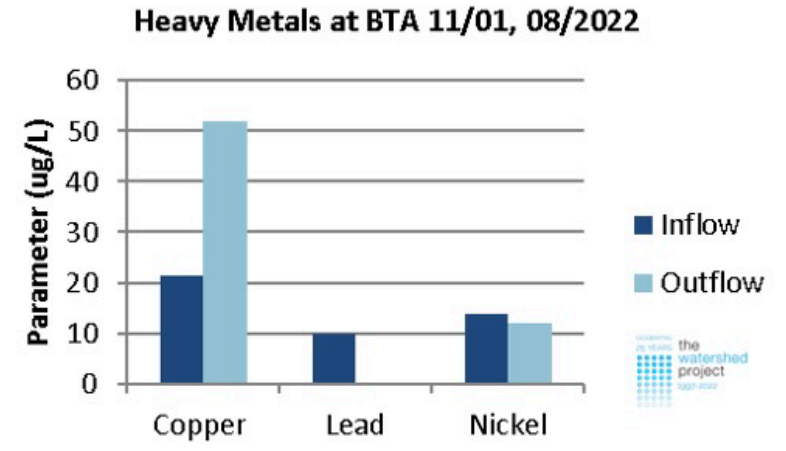
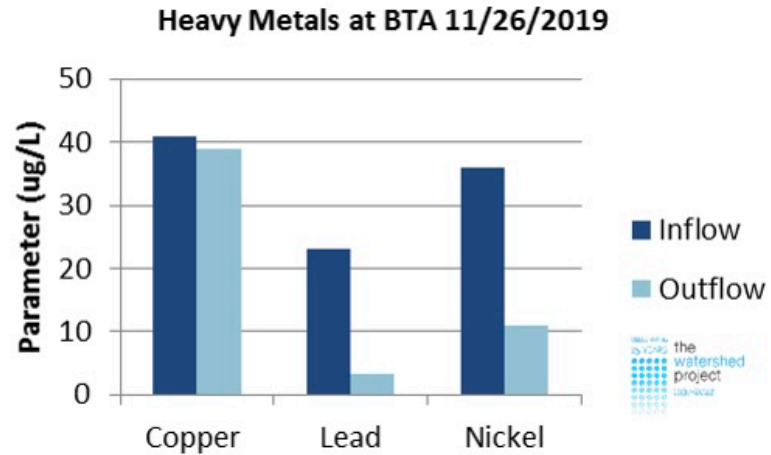
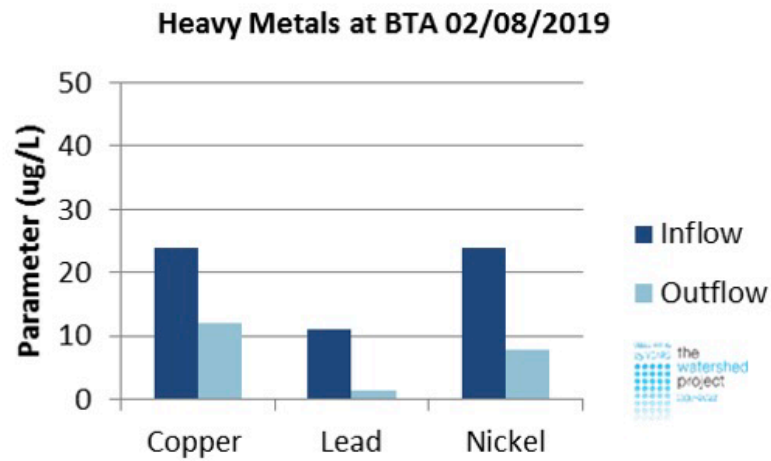
Diesel and Motor Oil at BTA 12/20/2023



Diesel and Motor Oil at BTA 01/31/2024



Bioswale testing when Booker T Anderson Community Center was closed



Heavy Metals

WHY HAVE COPPER LEVELS BEEN INCREASING?? 🤔

We have some ideas...

Main Takeaways:

- Bioswales help create "sponge" cities that **invite water IN**
- Bioswales protect creeks!
- Mulch will make maintenance easier and build better soil
- You can use **flowering** plants in bioswales! Let natives fill gaps
- Hand-weeding will make maintenance easier over time
- Summer irrigation helps bioswales look their best



Bioswale Tour!



Thank you

Kat Sawyer kat@thewatershedproject.org

Greening Urban Watersheds Senior Manager

<https://thewatershedproject.org>