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Credit Valley Conservation inspired by nature

bentway staging grounds

March 2025

Prepared for TRCA – source to stream

the bentway

our partners

WATERFRONT BIA

TORONTO

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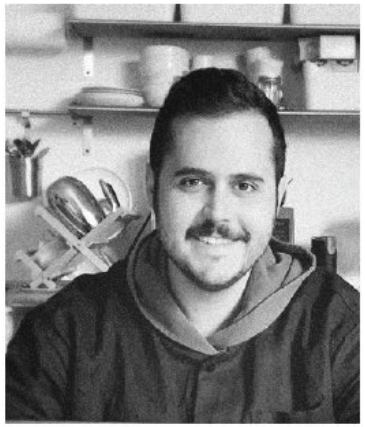
our team

TEI CARPENTER -
Agency—Agency



JAKE ROSENWALD -
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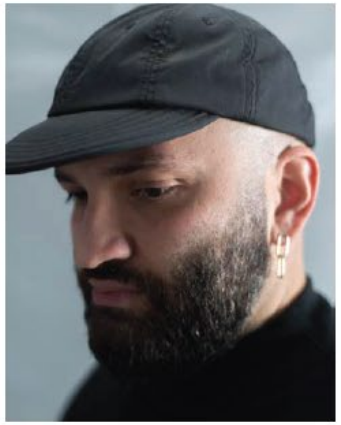
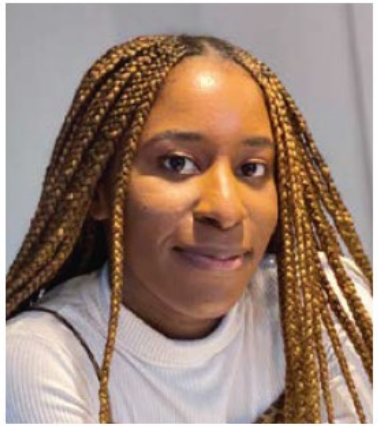


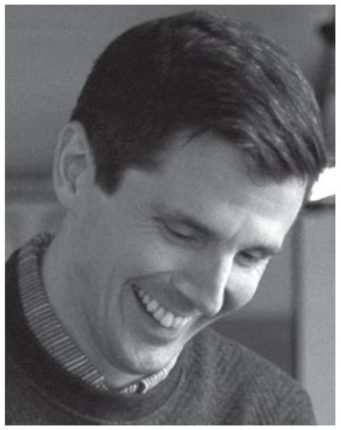
REZA NIK -
SHEEEP

CONNOR STEVENS -
SHEEEP



SOMTO UYANNA -
BURO HAPPOLD

ALICE SHAY -
BURO HAPPOLD



NEIL DONNELLY
Neil Donnelly Studio

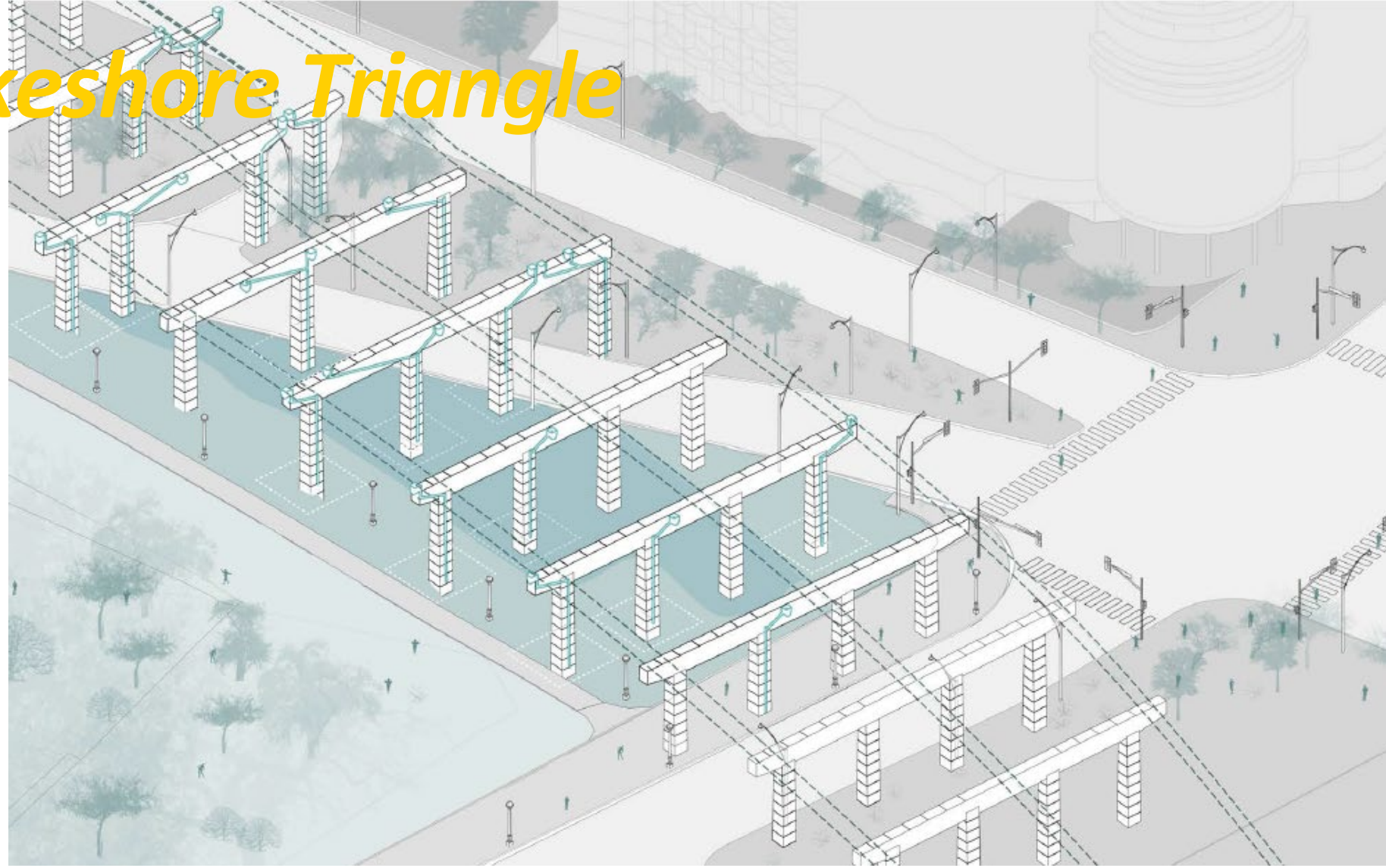
ISAAC CROSBY
BROTHER NATURE

an ongoing activation!

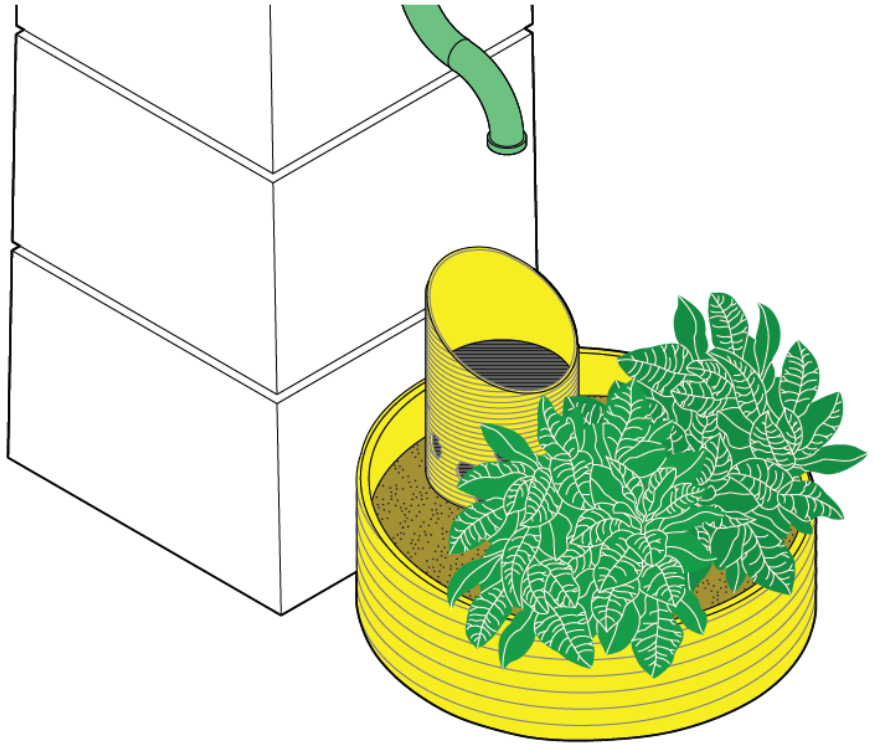
Stage 1	Stage 2	Stage 3	Stage 4
Interim Activation	**Gardiner Rehab work**	**Construction of new space**	**Opening of new space**
2023-2025	2025-2028	2028-2029	2030
Launched Sept 2023			

Leckie Lakeshore Triangle

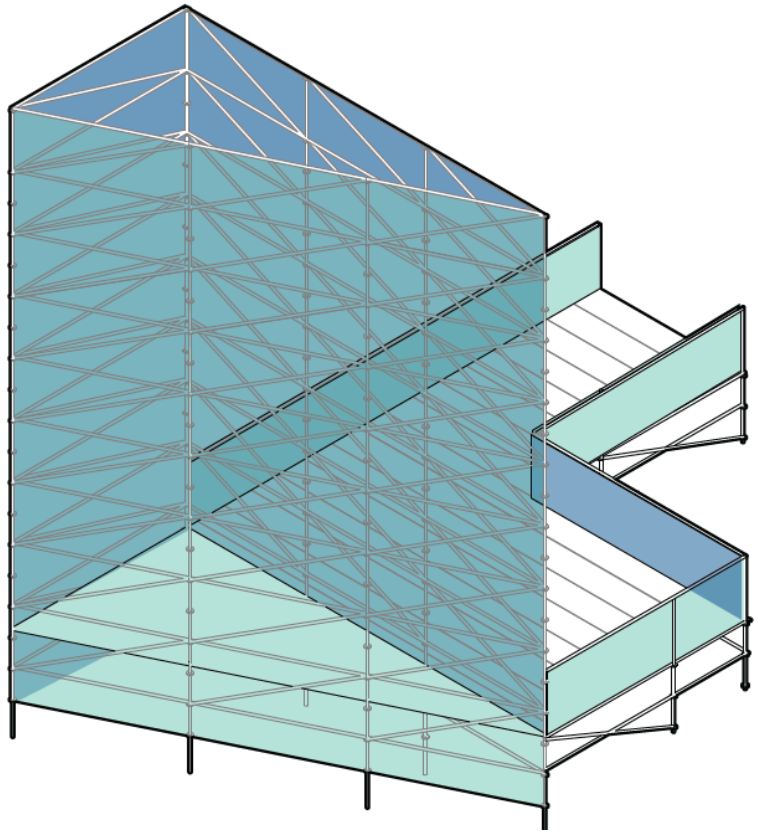
Aiming for a strategy that can be replicated and scaled along the Gardiner corridor, this project was seen as an opportunity to explore the concept of the understory, manage stormwater, and reintroduce indigenous species that have historically been present in the area.



Existing condition



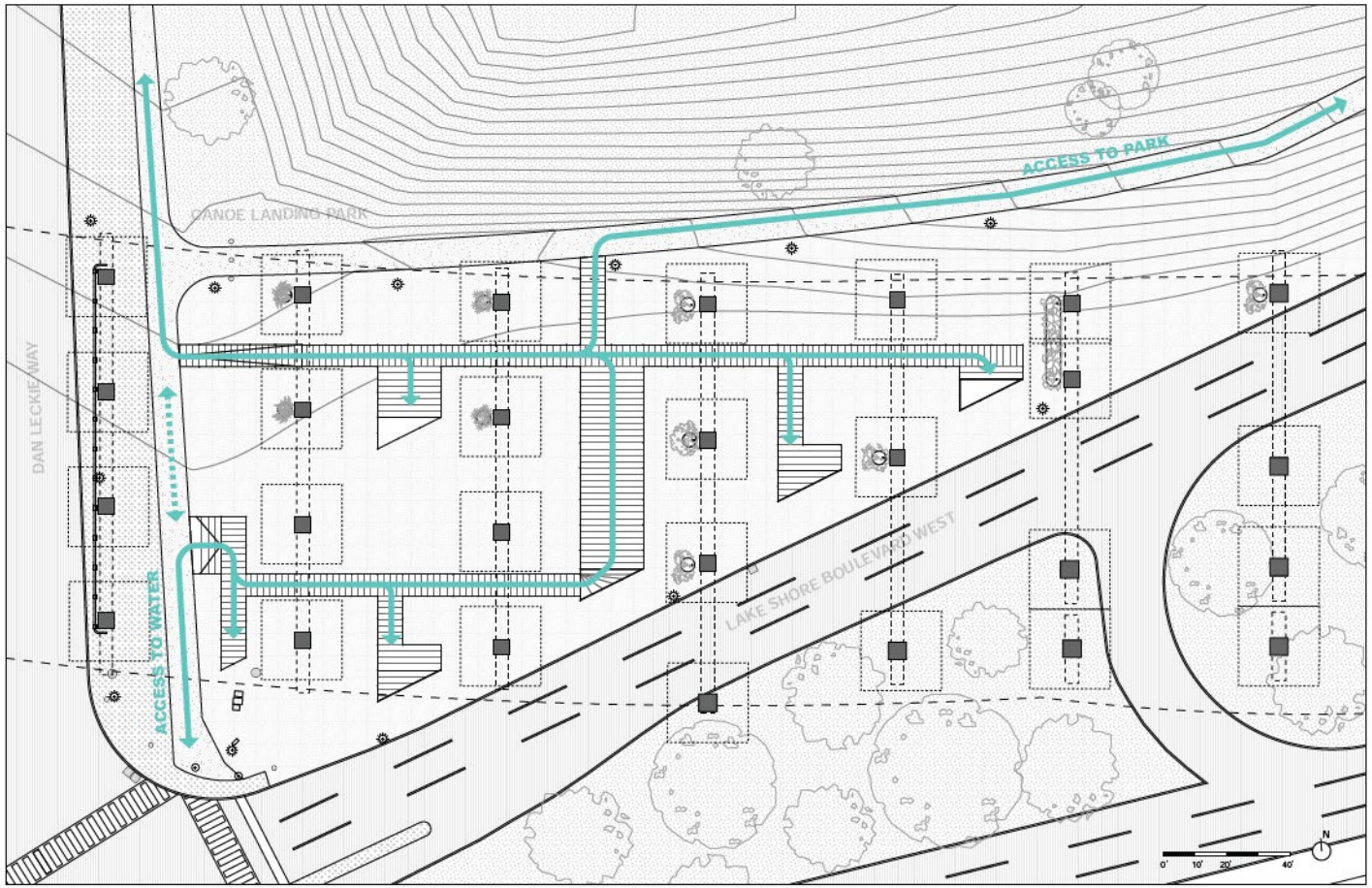
Planting



Paths


Staging Grounds

Transforming shade into sanctuary – Bentway Staging Grounds mimics Ontario's forest canopy





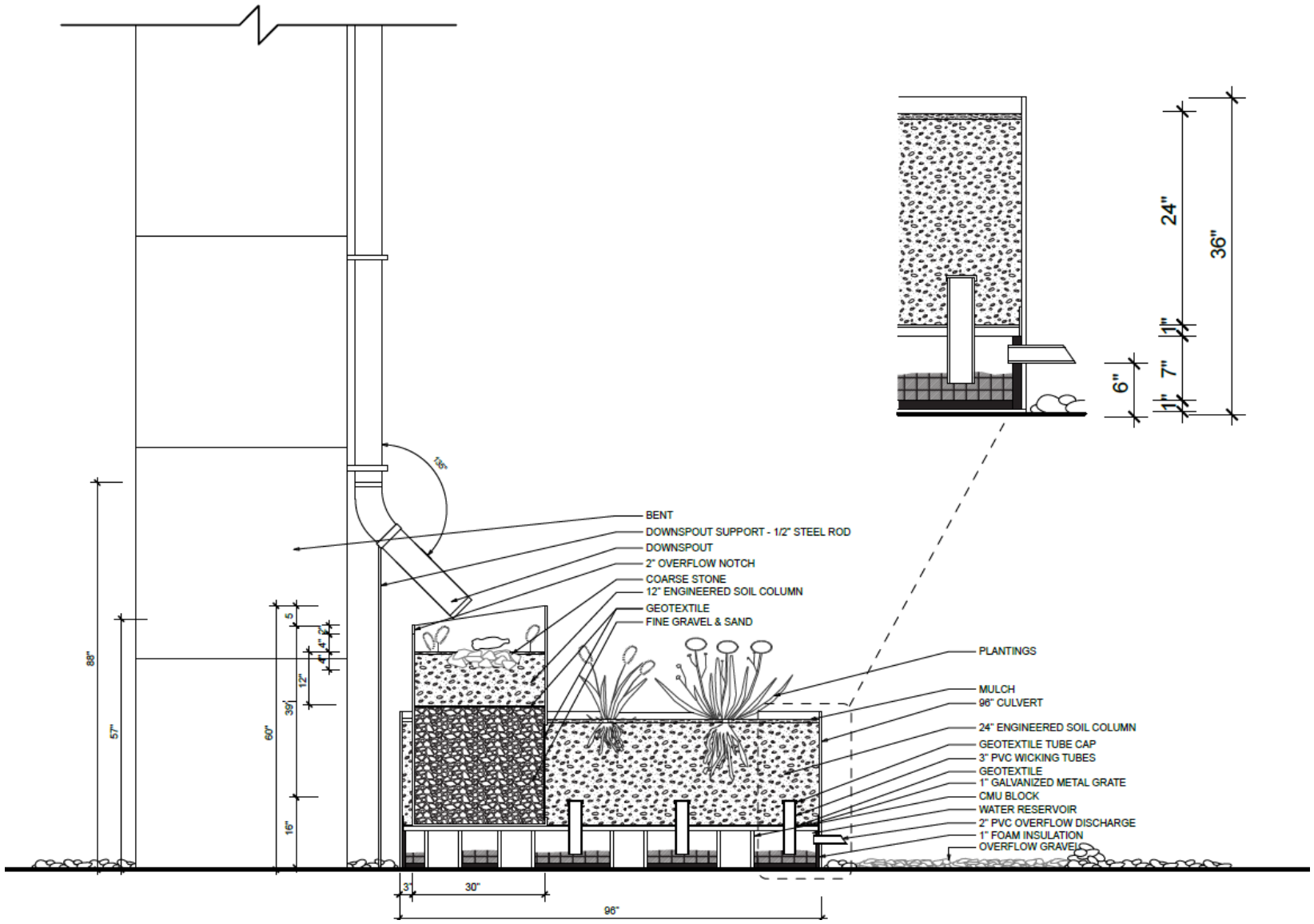


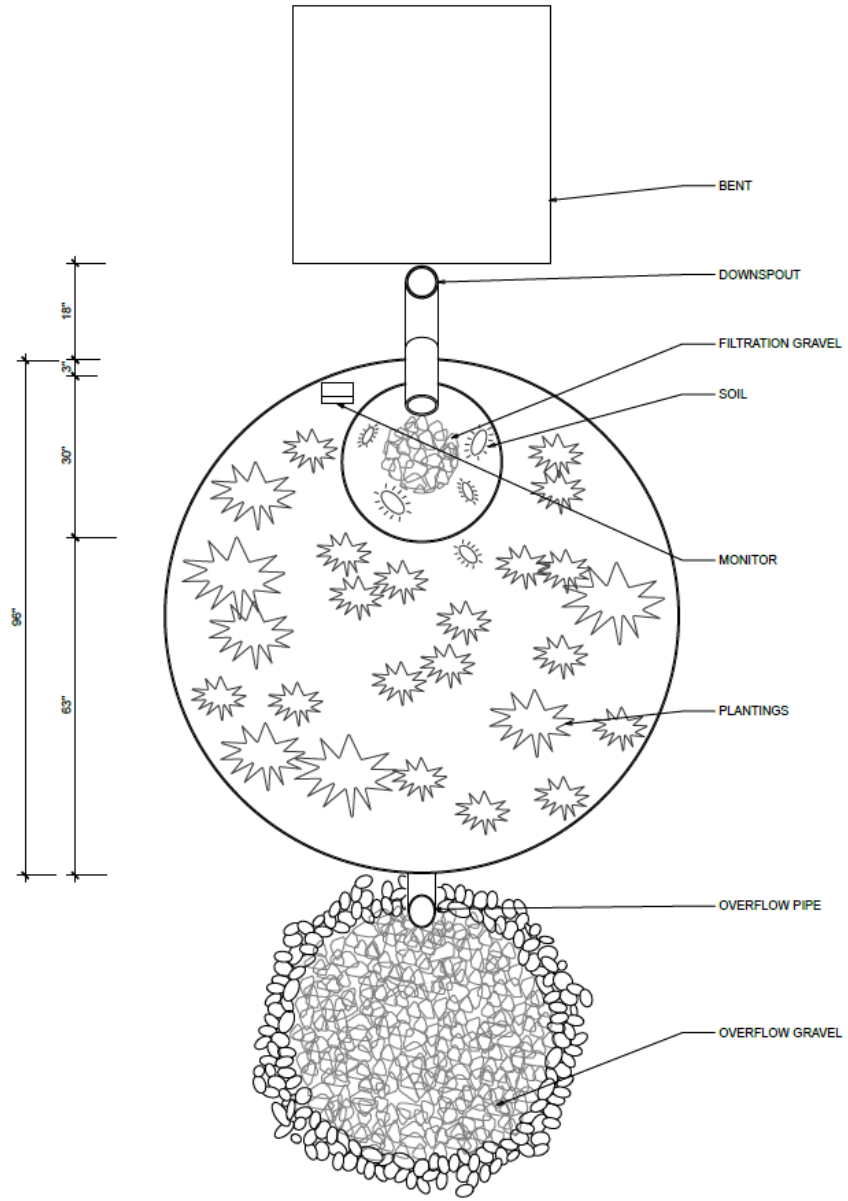


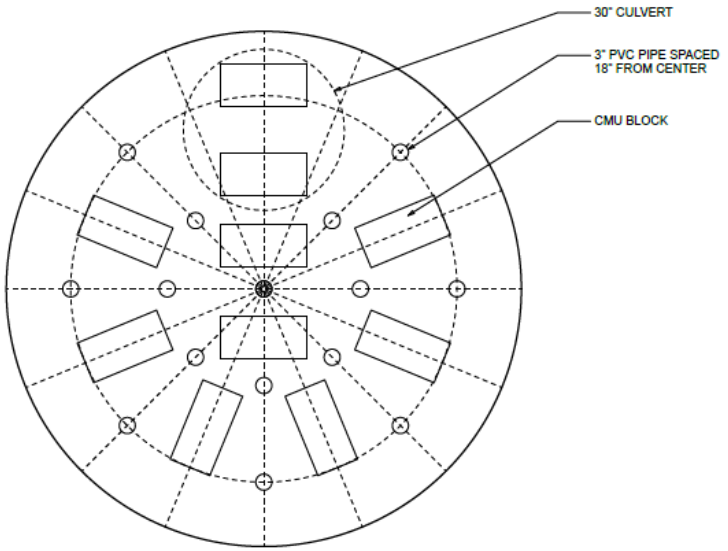




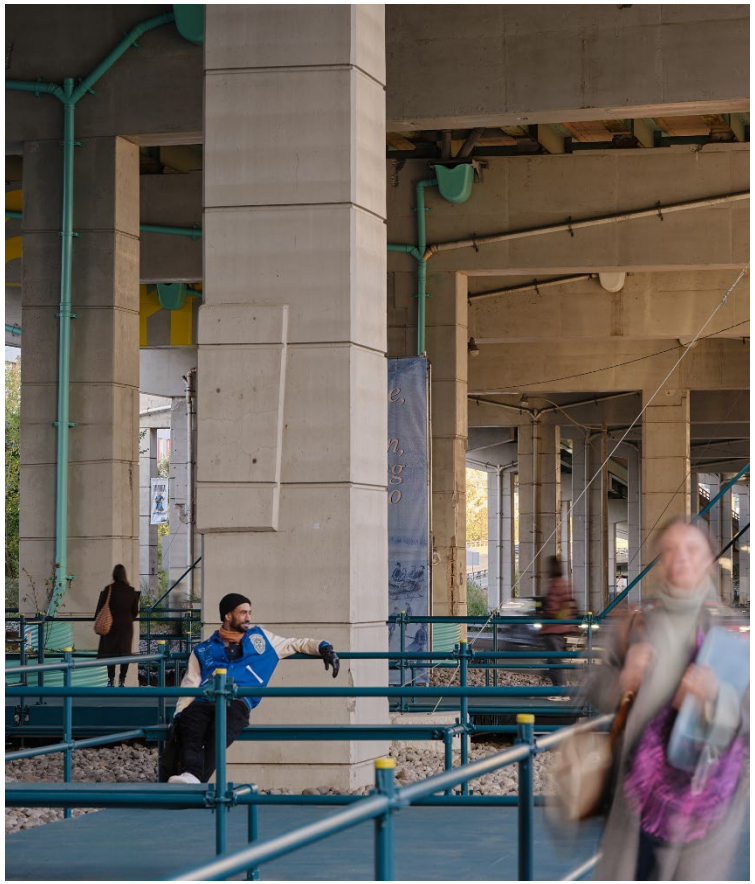

native, perennial, woodland understory plants like Ontario columbine, berry bladder fern, and flat-topped white aster populate these experimental gardens demonstrating ***nature and infrastructure*** that reinforce each other


BENT
DOWNSPOUT SUPPORT - 1/2" STEEL ROD
DOWNSPOUT
2" OVERFLOW NOTCH
COARSE STONE
12" ENGINEERED SOIL COLUMN
GEOTEXTILE
FINE GRAVEL & SAND
PLANTINGS
MULCH
96" CULVERT
24" ENGINEERED SOIL COLUMN
GEOTEXTILE TUBE CAP
3" PVC WICKING TUBES
GEOTEXTILE
1" GALVANIZED METAL GRATE
CMU BLOCK
WATER RESERVOIR
2" PVC OVERFLOW DISCHARGE
1" FOAM INSULATION
OVERFLOW GRAVEL
24"
36"
6"
1"
7"
1"
88"
57"
60"
39"
16"
5
4"
4"
12"
3"
30"
96"


BENT
DOWNSPOUT
FILTRATION GRAVEL
SOIL
MONITOR
PLANTINGS
OVERFLOW PIPE
OVERFLOW GRAVEL
18"
3"
30"
63"
96"


30" CULVERT
3" PVC PIPE SPACED
18" FROM CENTER
CMU BLOCK


113
114
115
116




116
115
114

...third season

Season 1

Season 2

- Nodding Onion
- Wild Strawberry
- Golden Rod
- Milkweed
- Wild yam
- Agastache
- Native Sunflower
- Wild Ginger
- Staghorn sumac
- Iris lactea
- Berry bladder fern
- Sedge
- May Apple
- Blood Root
- Ground Nut
- Columbine
- Squirrel corn
- Vetch
- Prairie smoke
- Little bluestem

An ongoing collab!

thank you!

Josh Harskamp
Design Manager
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Toronto ON M5V 0R6

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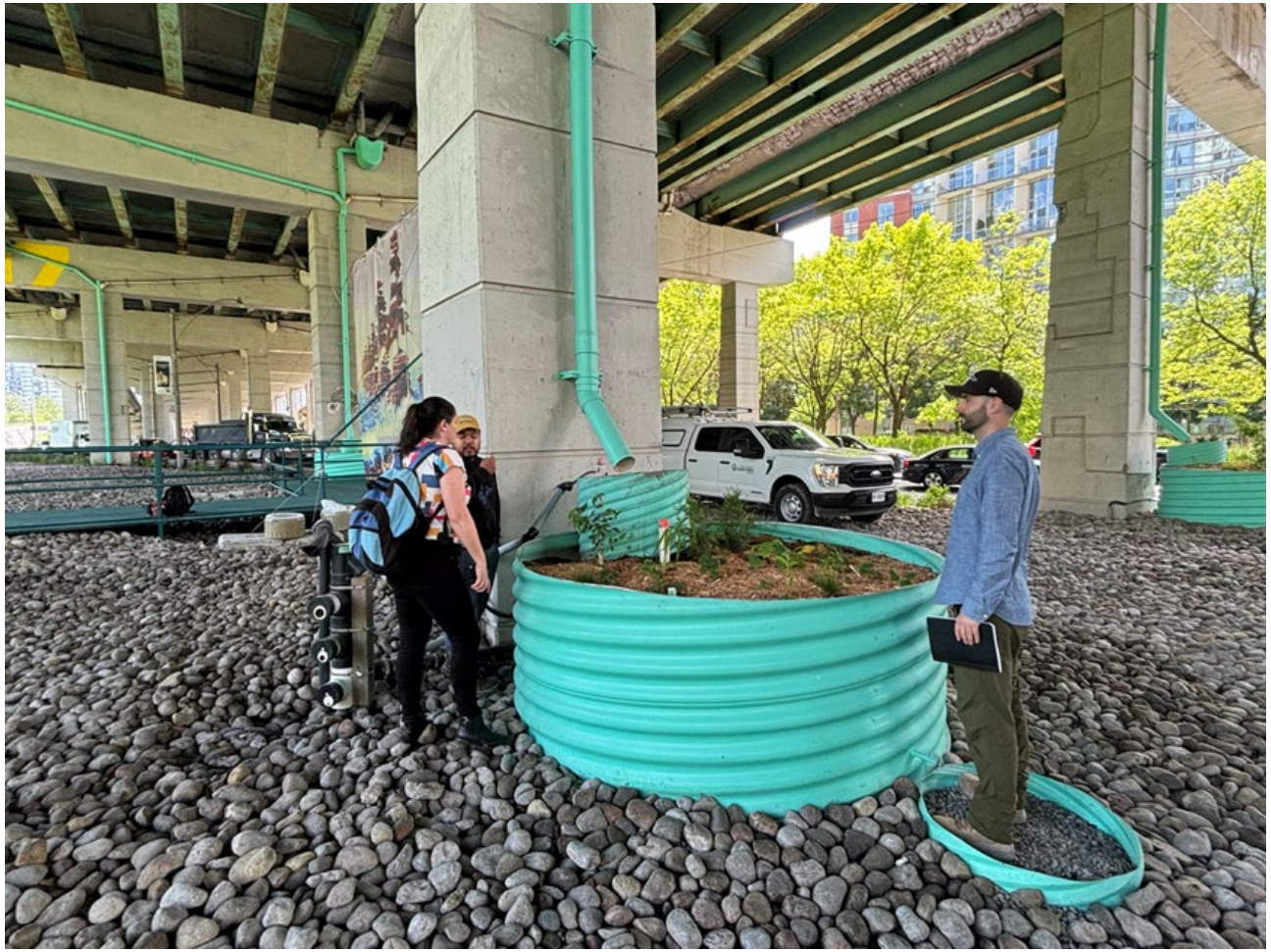
+1 416 304 0222

The Bentway Staging Grounds Monitoring

Presented by: Alexus Maglalang and Josh Harskamp

Bentway Staging Grounds Planters



Each pillar at the Staging Grounds consists of a planter designed with two chambers to capture and treat stormwater runoff conveyed through downspouts fed by catchbasins on the Gardiner Expressway

Inlet Chamber

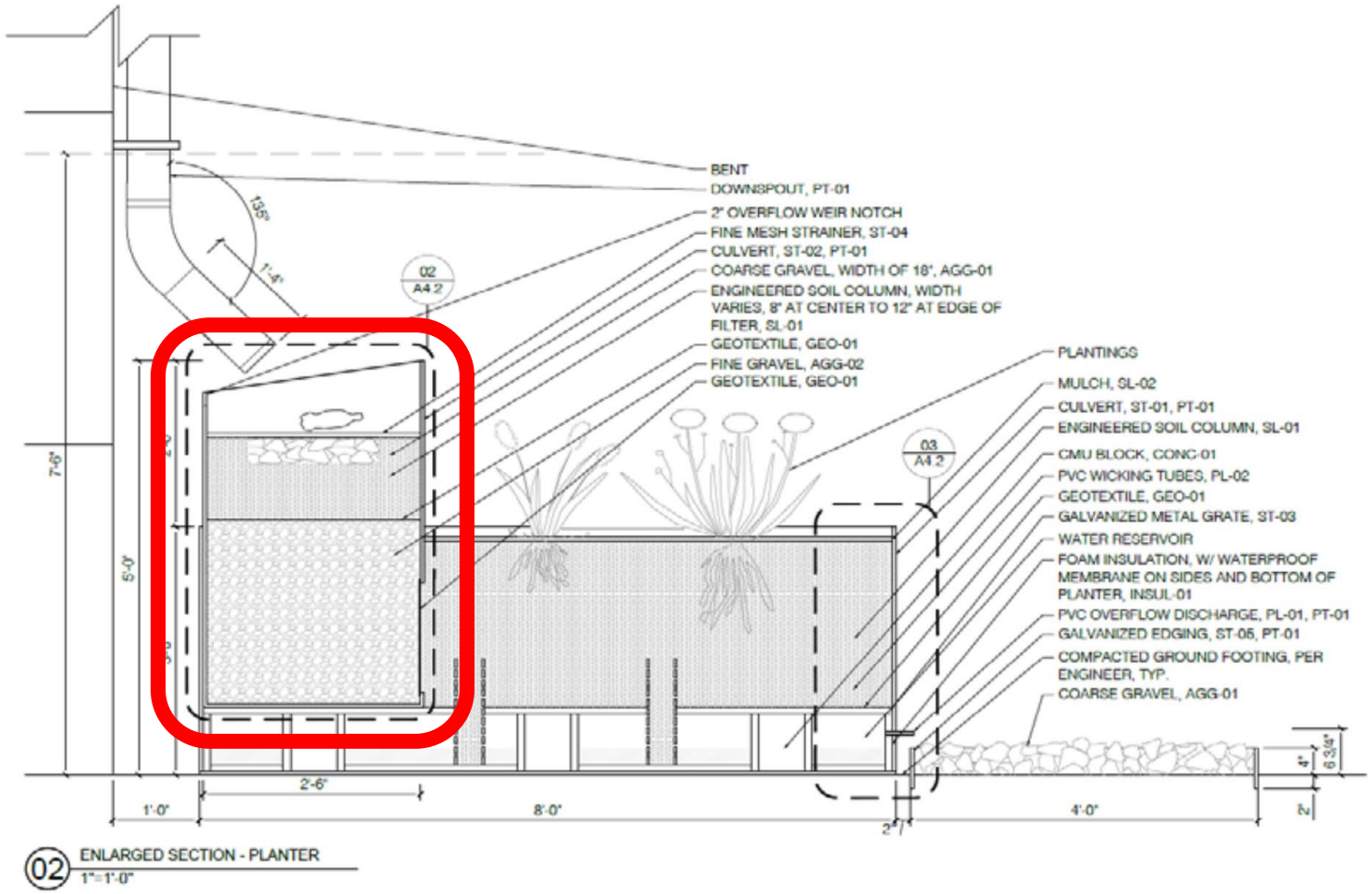


Figure 1: Profile view of Planter

Planter

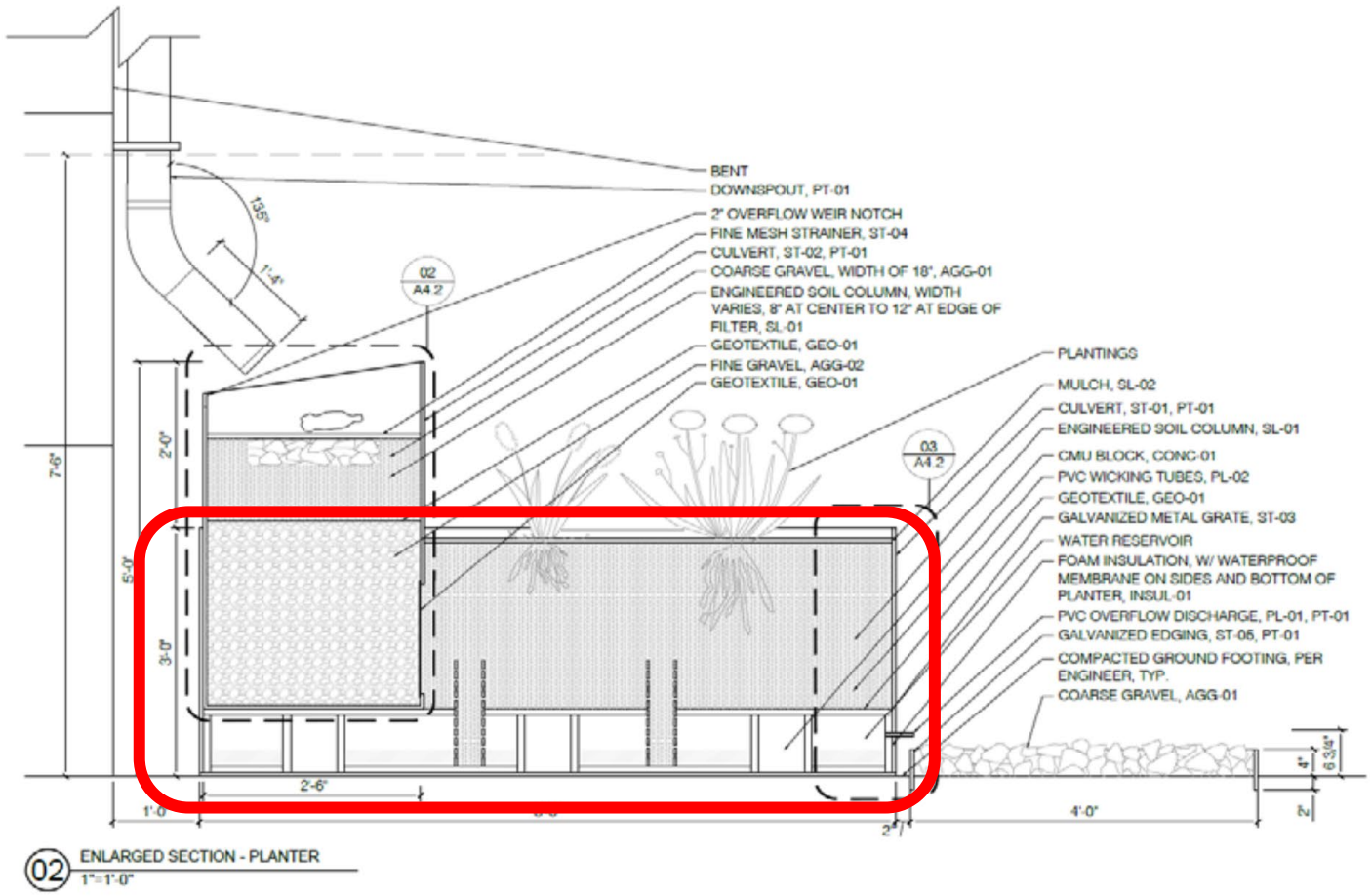


Figure 1: Profile view of Planter

- The planter receives moisture through a horizontal geotextile wrapped opening, on the side of the first chamber
- The planter also receives moisture by capillary action through wicking cones, from a water reservoir found below

Planter Reservoir

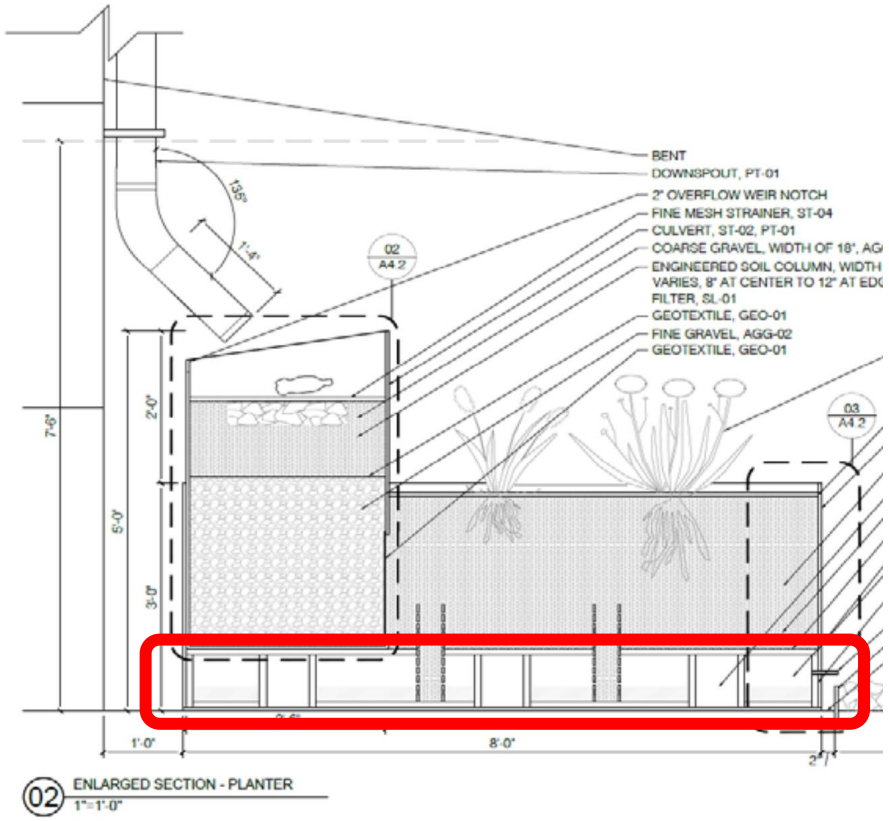


Figure 1: Profile view of Planter

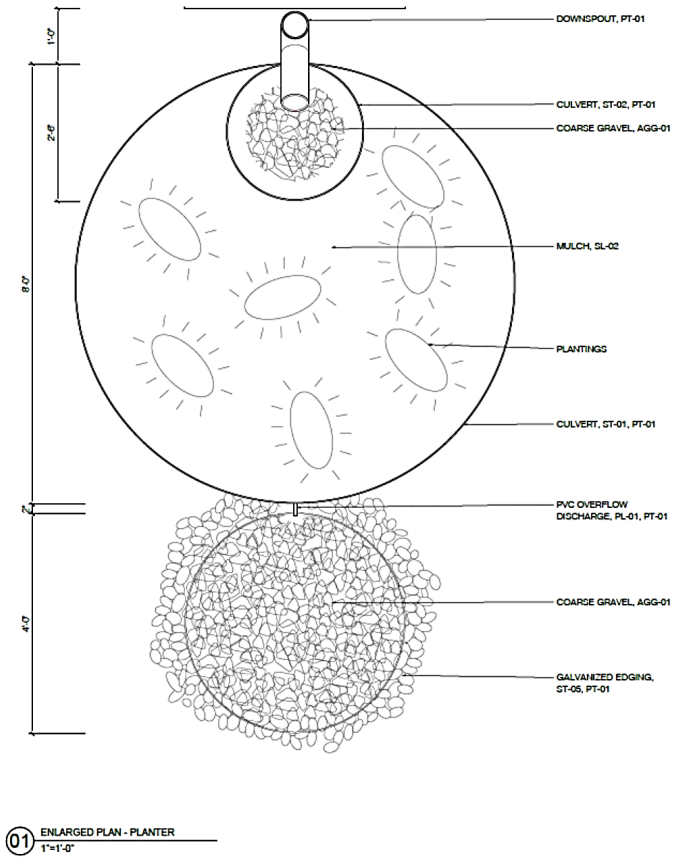


Figure 2: Plan view of Planter

- The planter reservoir features a PVC overflow discharge pipe which flows into a bed of coarse gravel
- The staging grounds surrounding the planters is covered by river rock allowing outflows to spread and infiltrate into the soil

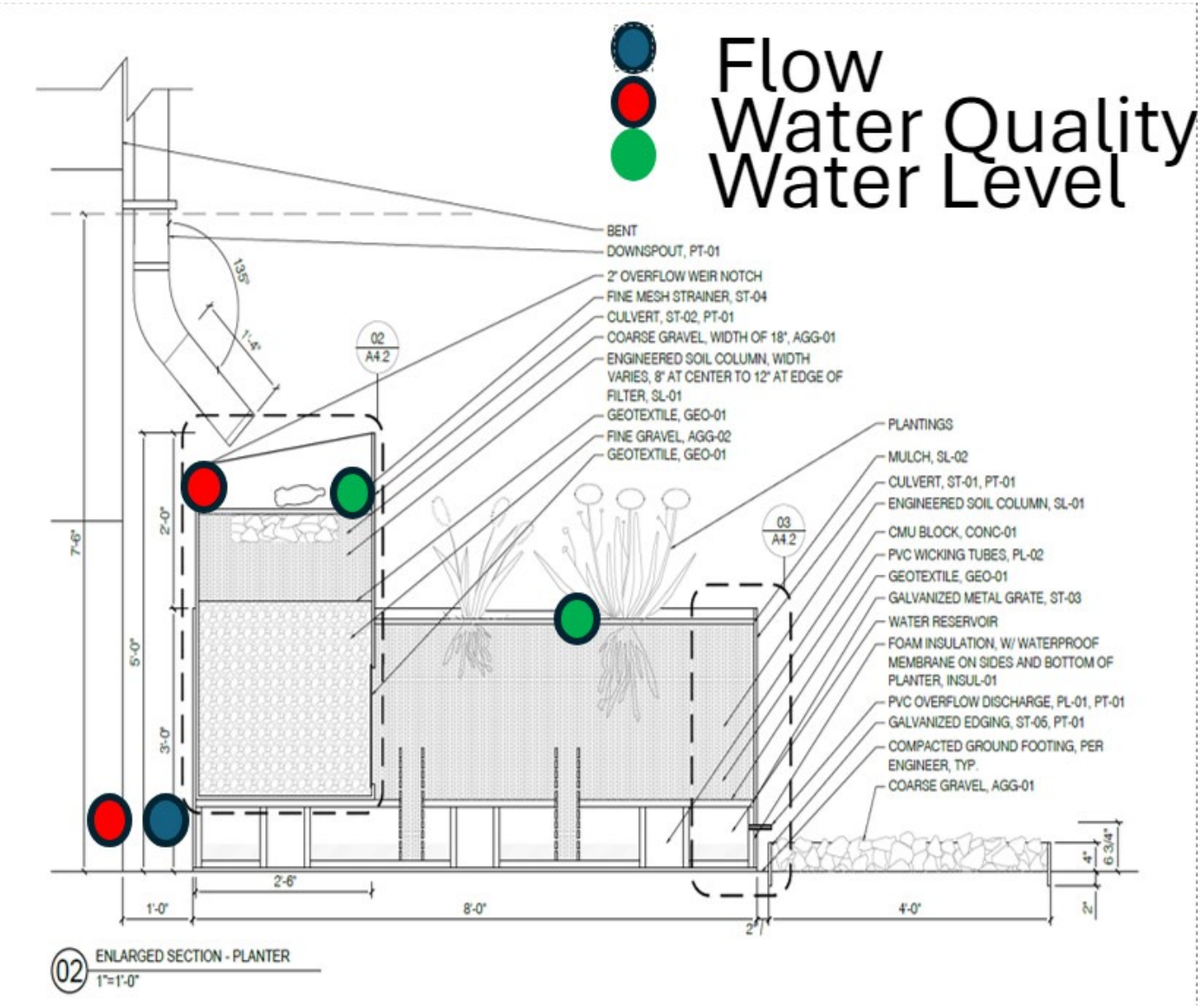
Key Monitoring Objectives

1. Evaluate the effectiveness of the planters in treating and reducing runoff volumes, while providing sufficient moisture to planting beds

2. Assess the level of maintenance required to keep the system operational

3. Provide insights into design improvements to promote enhanced system function from a treatment and maintenance perspective.

Monitoring Approach



The stormwater function and performance of the overall system was monitored through a series of co-ordinated precipitation, water level, soil moisture, water quantity, and water quality

Monitoring Approach – Water Quantity

- Precipitation data was collected from a local TRCA gauge
- Monitoring Wells
  - Ponding level at the Inlet Chamber
  - Planter has a monitoring well to measure water level in the full depth of storage

Monitoring Approach – Water Quantity

- Inlet volume was determined using rainfall and drainage area
- Outlet volume and flow rates were measured using a stilling well with a calibrated orifice standpipe, connected at the 2” drain pipe (outlet) at the back of the planter
- The lowest orifice was levelled to be at the same height of the 1” outlet spout at the front of the planter

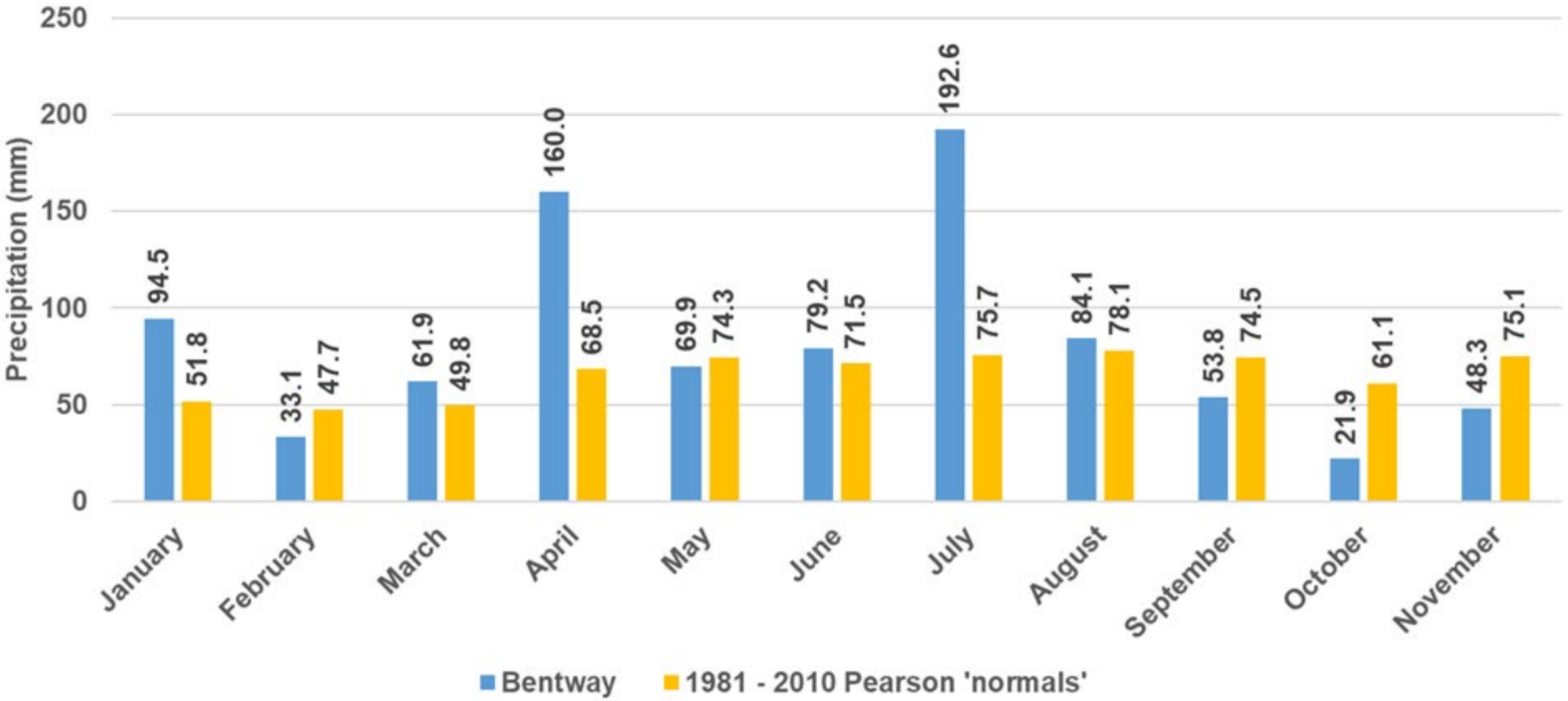
Monitoring Approach – Water Quality

Water quality samples were collected at the inlet and outlet of the south planter by ISCO automated water samplers contained in locked enclosures, triggered during rain events by water level changes

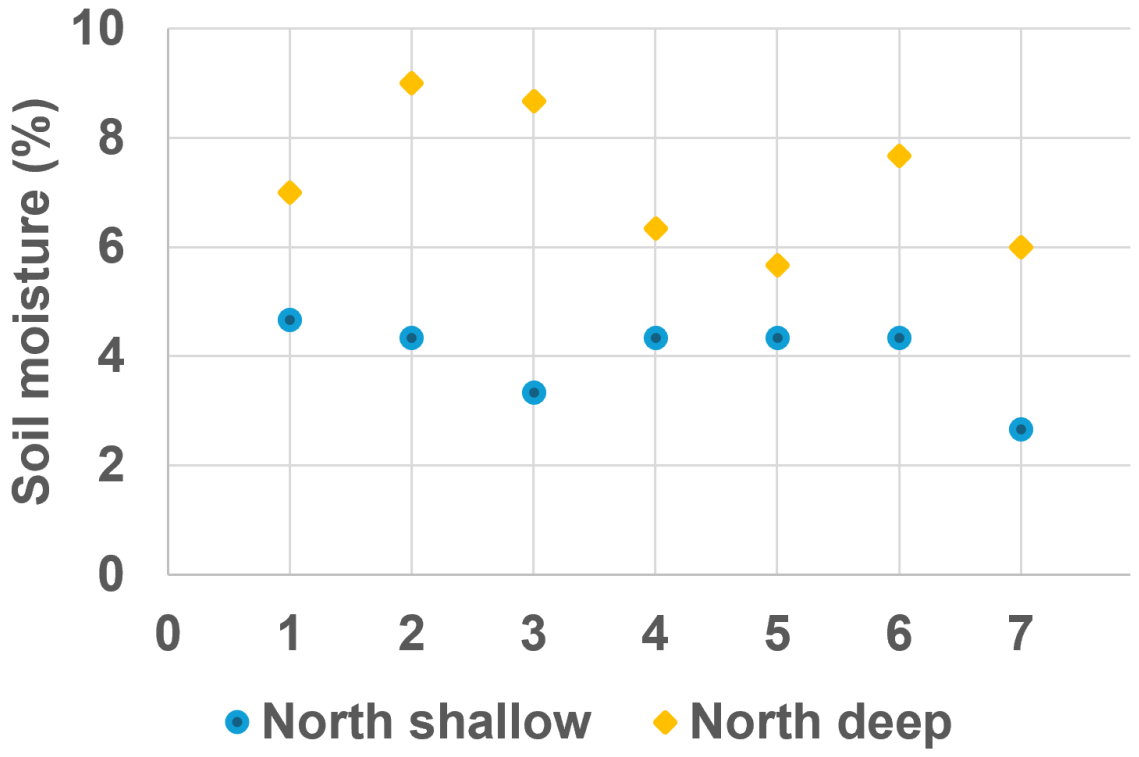
Monitoring Approach – Soil Moisture

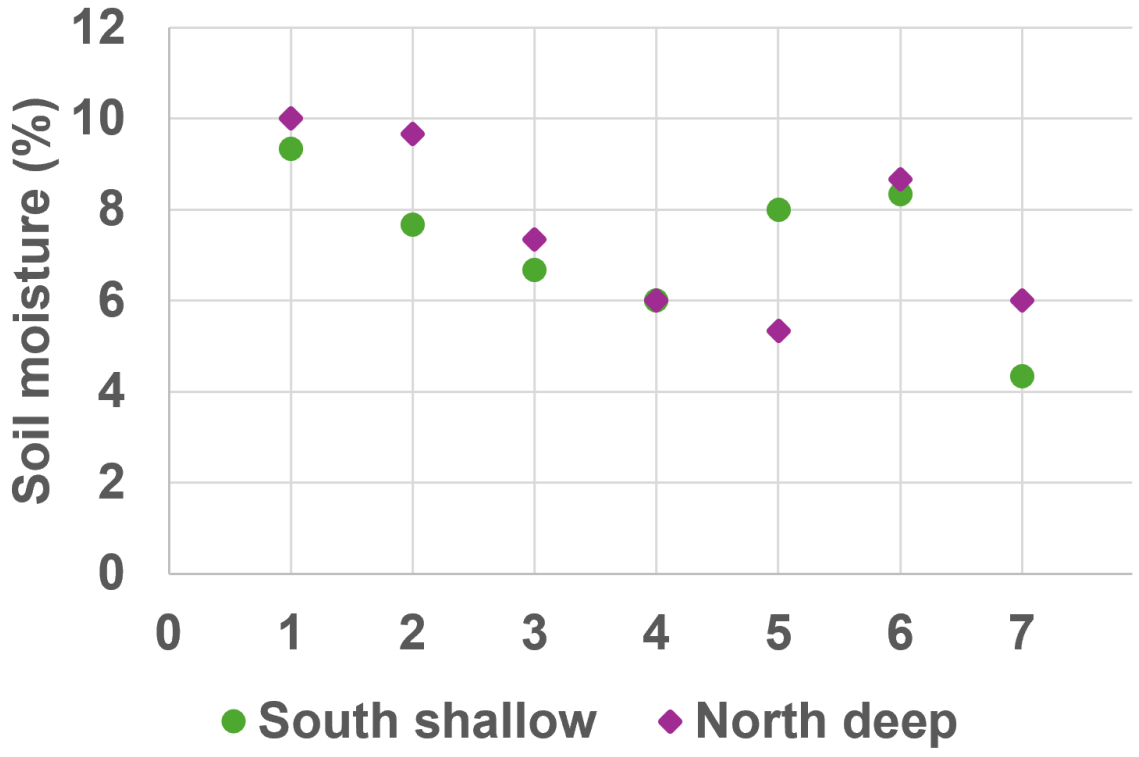
- Soil moisture was monitored at the main planter and a second adjacent planter using a soil moisture probe
- Measurements were taken in a linear pattern from the inlet to the outer edge of the planter
- Taken at depths of 30cm and 60cm to assess the vertical distribution of moisture provided by the reservoir through the wicking cones

Results – Rainfall

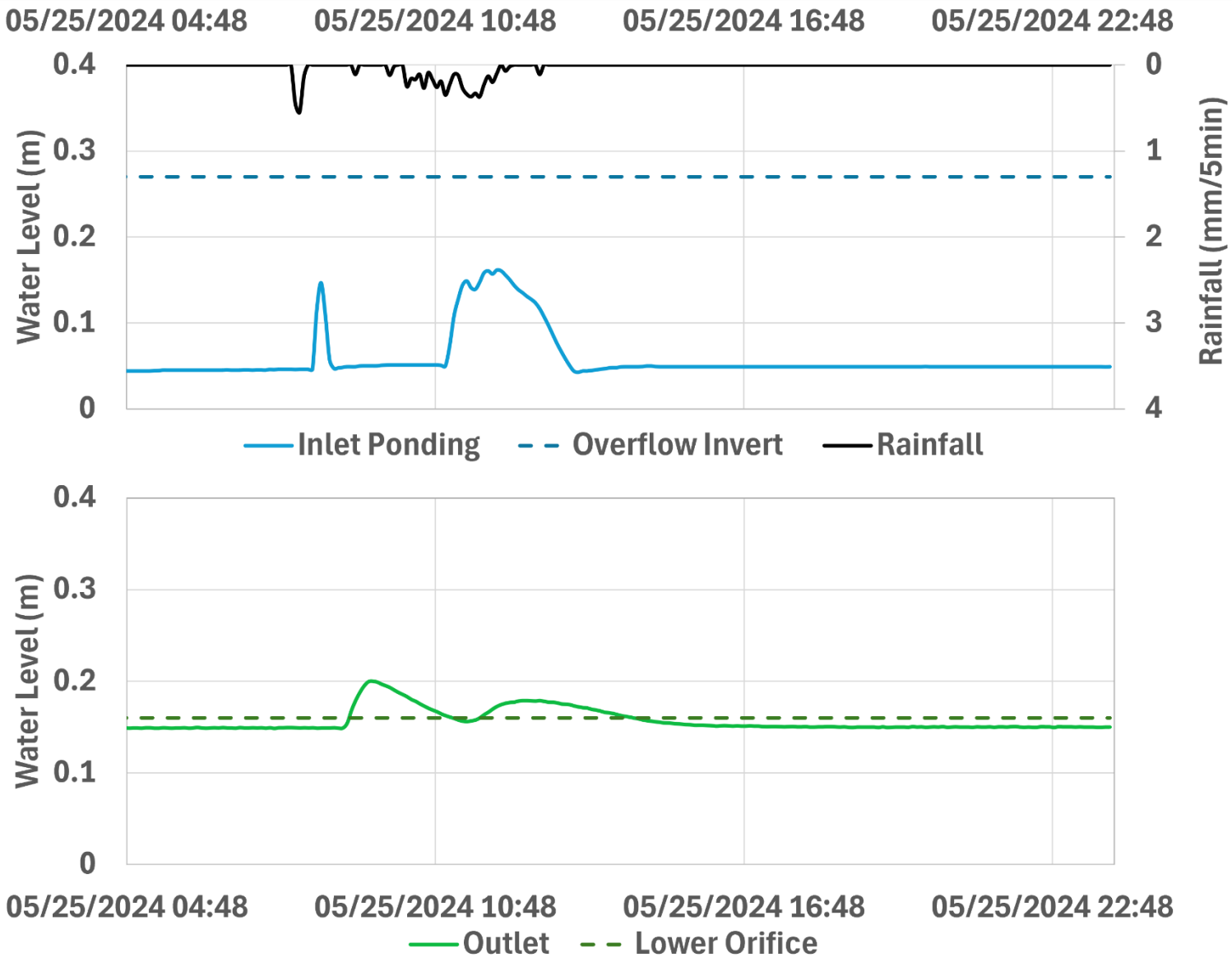


Results – Soil Moisture (North and South Planters)





Results – Event Analysis May 25, 2024



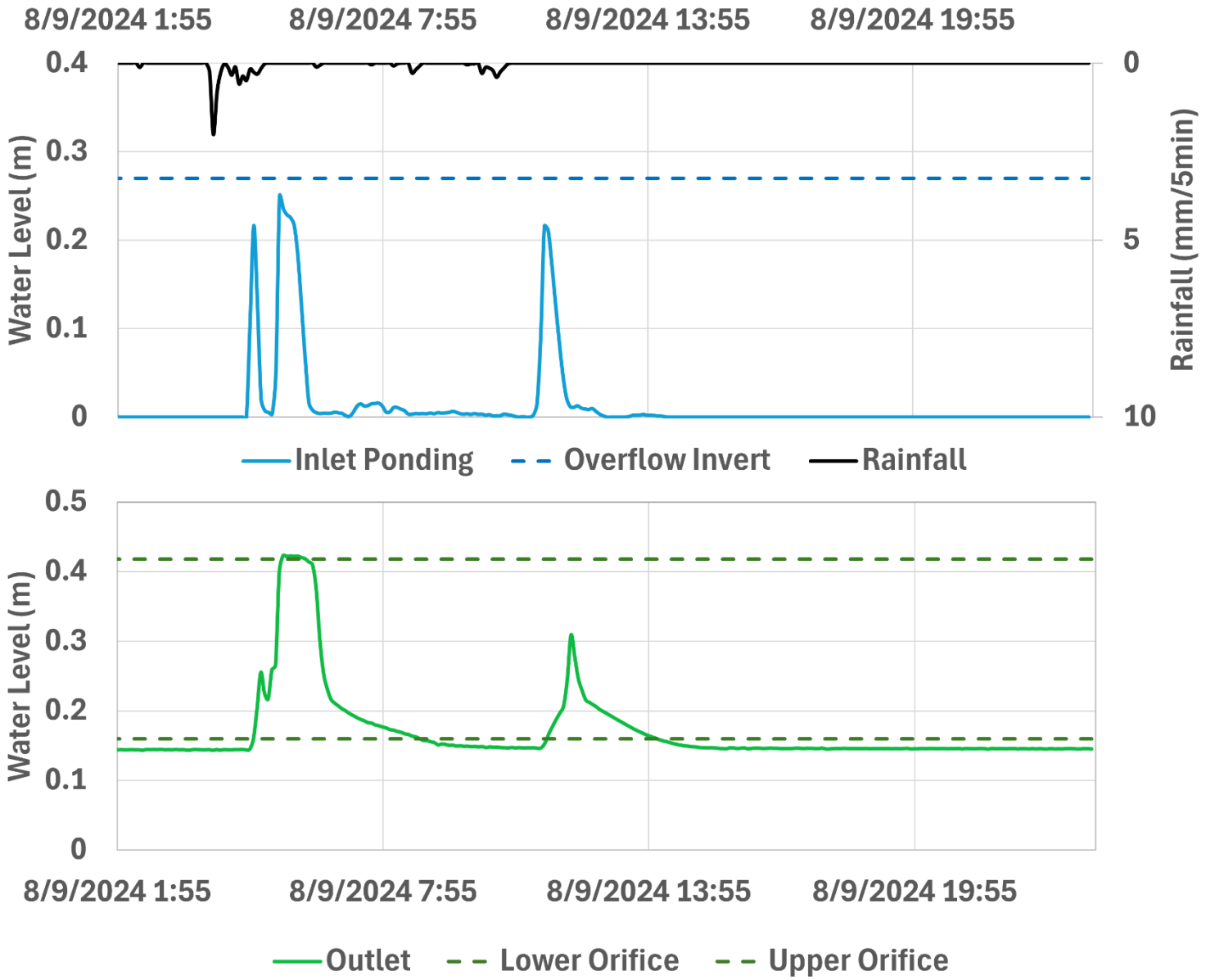
Total Rainfall: 6.41 mm

Inlet Volume: 1.54 m^3

Outlet Volume: 0.47 m^3

Volume Reduction: 69%

Results – Event Analysis August 9, 2024



Total Rainfall: 8.99 mm

Inlet Volume: 2.16 m^3

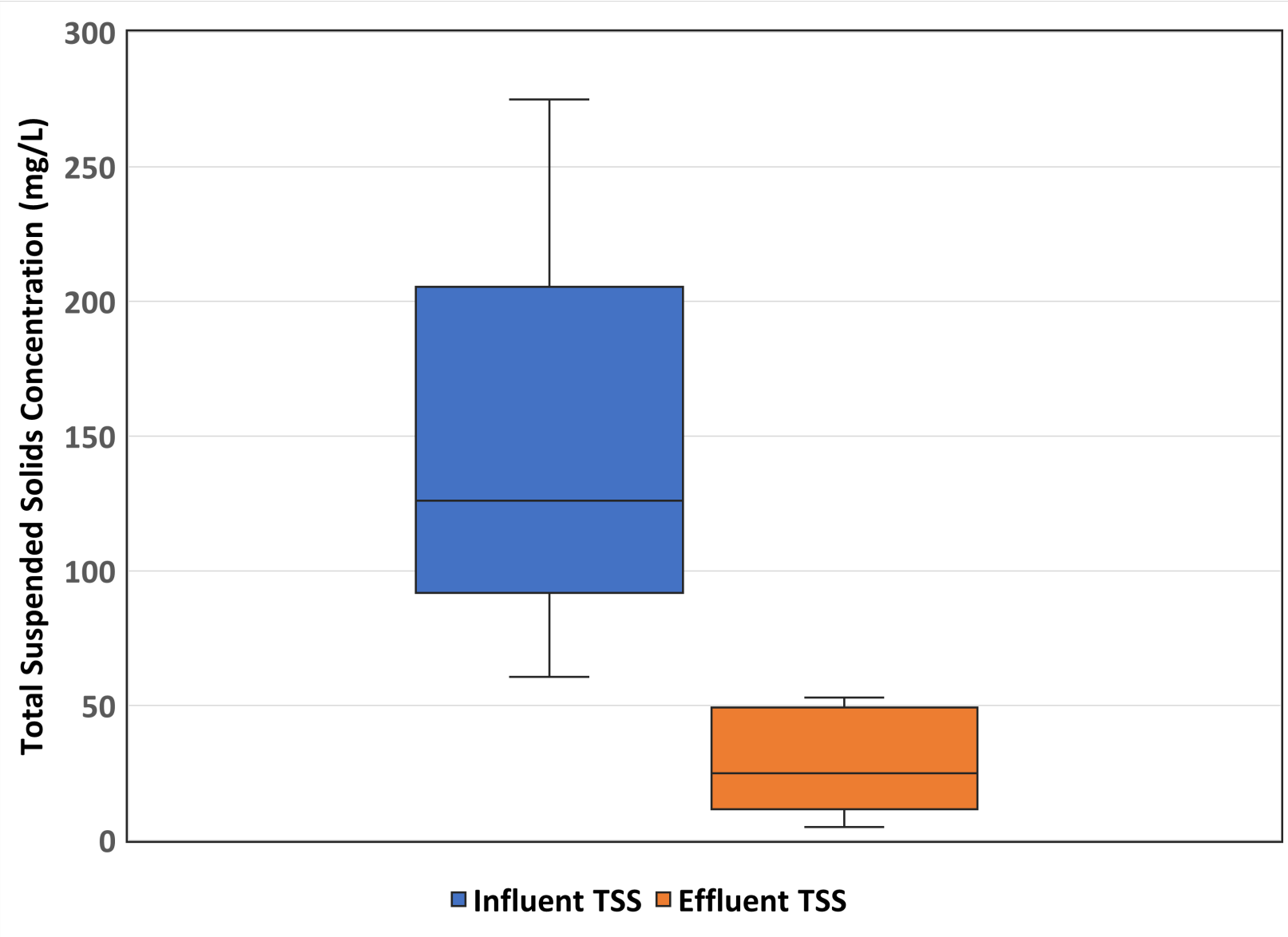
Outlet Volume: 1.28 m^3

Volume Reduction: 40.7%

Results – Water Quality

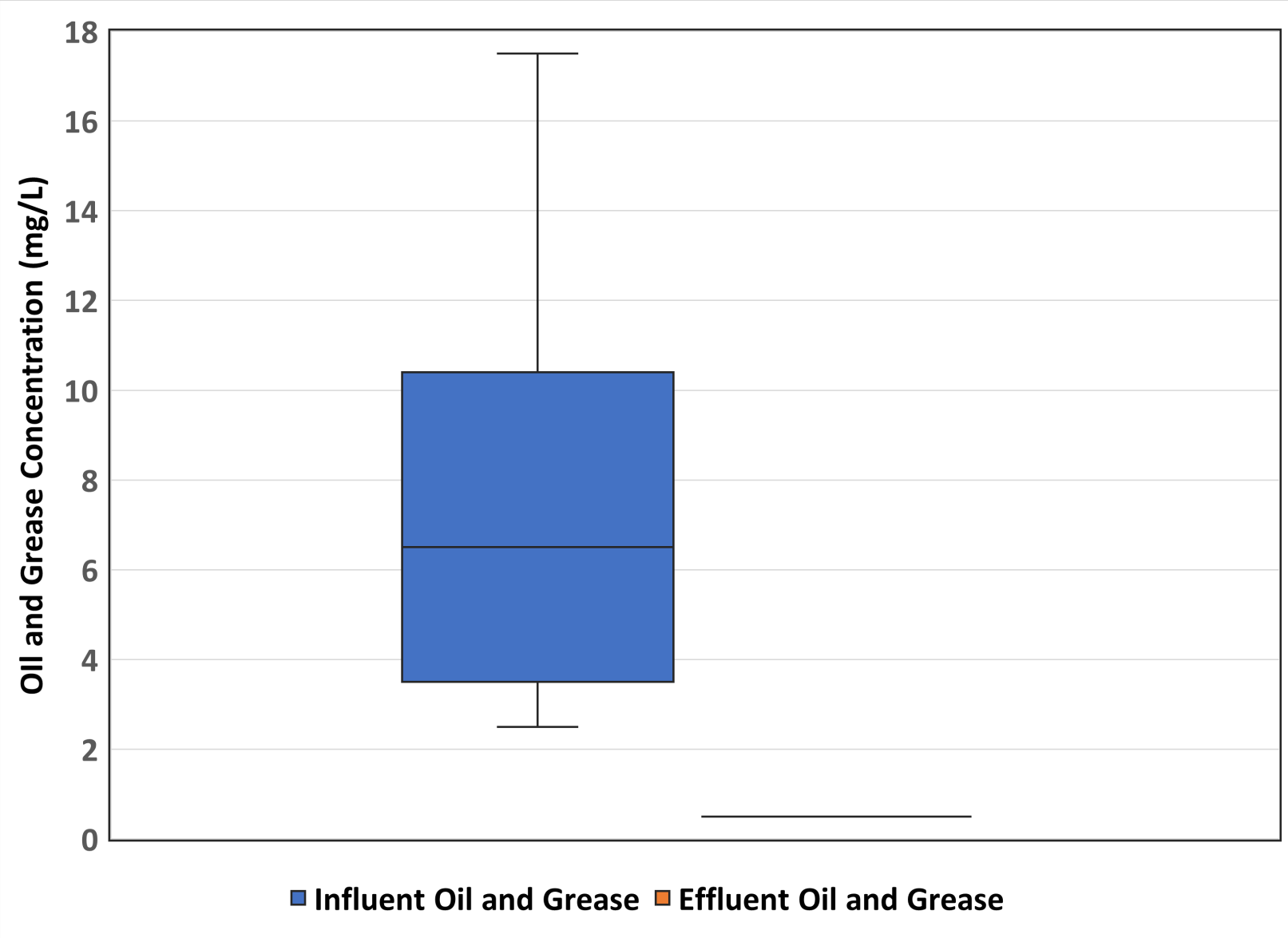
- Monitored at the Main Planter - inlet chamber and outlet orifice
- Total of 10 paired samples from precipitation events between January 2024 to November 2024
- Water quality results compared to established water quality guidelines
- Preliminary findings for Total Suspended Solids (TSS), Oil & Grease and Chloride

Water Quality – Total Suspended Solids



TSS: 79% Reduction

Water Quality – Oil and Grease

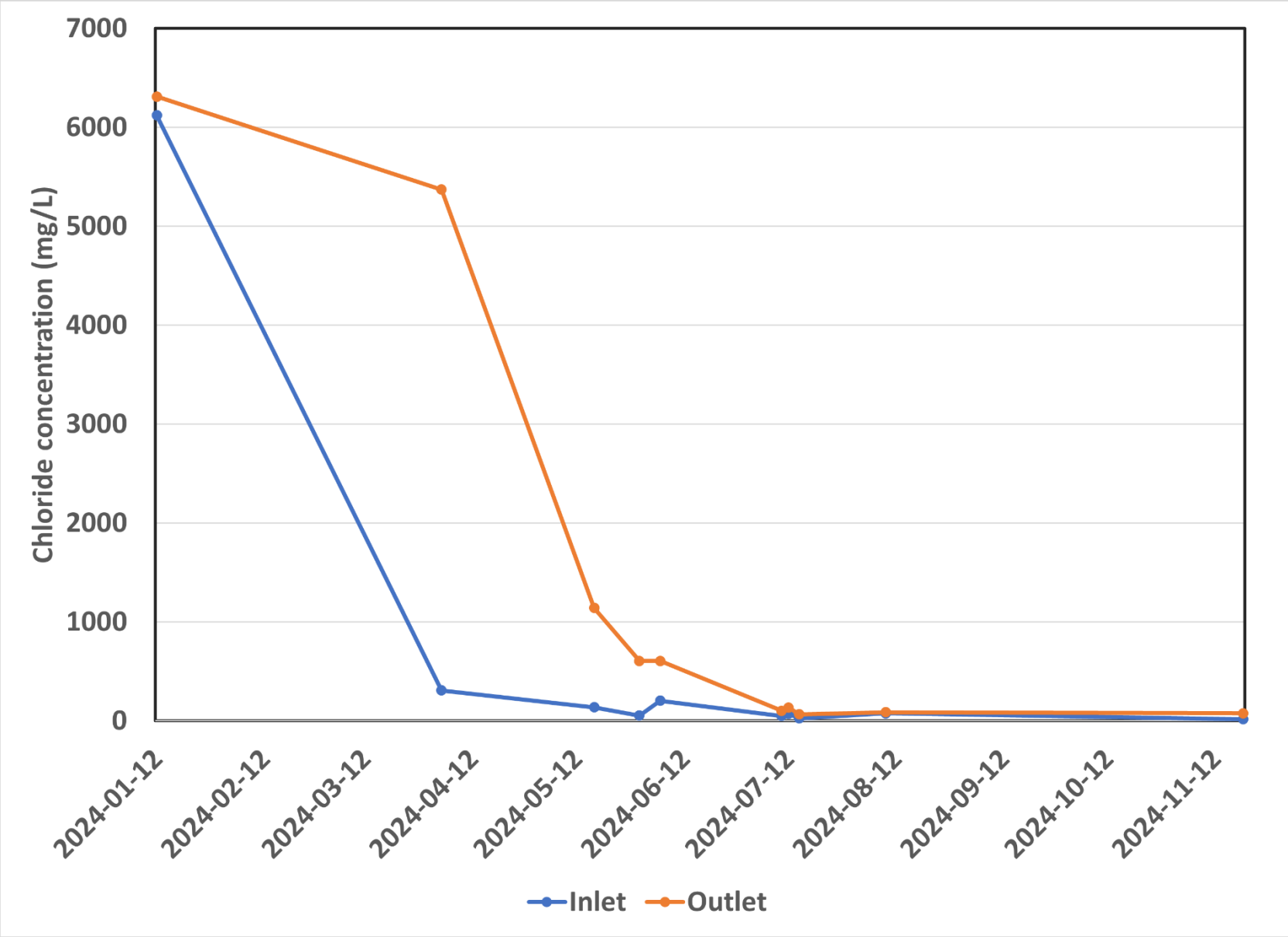


Oil and grease: 81% Reduction

Two samples at the outlet with concentration > 1mg/L

(1.6mg/L and 2.8mg/L)

Water Quality – Chloride



- **Higher in winter months due to salt application**
- **Higher concentration at the outlet**
- **Chloride accumulating and being retained within the planter media**
- **Lower concentrations after June 2024, with more rain events and no salt application**

Maintenance & Field Observations

- Overflows at the inlet chamber, volume not being retained within the planter system and causing erosion on the top layer of the planter
- Due to combination of chamber sizing, low rate of flow of filter cloth, clogging from sediment
- May 2024, geotextile filter changed to higher flow rate, some river rocks were removed
- Bentway continued to maintain the inlet chambers at the Staging Grounds

Key Takeaways & Future Growth

- Future designs or retrofits
- Easier maintenance
- Sizing of chamber and planters
- Incorporating the planters in a treatment train approach for future work

Thank You!
We'd Like to Hear from you! Questions?

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Alexus Maglalang
Environmental Technician
alexus.maglalang@trca.ca

Special thanks to The Bentway Conservancy, and members of the STEP Water Team for helping put this presentation together!

the bentway

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