Atlanta's Environmental Impact Bond for Green Infrastructure

Southeast Stormwater Association – Chattanooga, TN
October 2019

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ENVIRONMENTAL IMPACT BONDS

Quantified Ventures

Neighborly

CITY OF ATLANTA DEPARTMENT OF watershed management

Intermediary/Advisor
coordinates deal, aligns and coordinates stakeholders

Investors
provide up-front capital through bond investment

Evaluator
verifies that project outcomes are achieved

Public Entity
(e.g., Municipality or Utility)
repays investors based on achievement of outcomes

green infrastructure or other resilience project deployment

Public Entity or Partner
(e.g., Municipality or Utility)
constructs projects to help meet stormwater management or other resilience targets
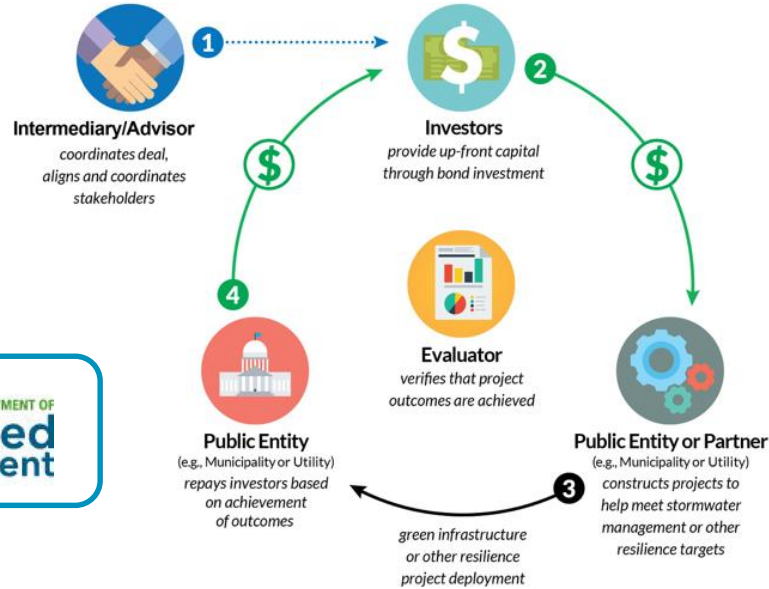
What is an EIB?

- Assign an economic value to project benefits
- Price these benefits into the Performance or a financial structure
- Evaluate actual project outcomes post construction

3

ENVIRONMENTAL IMPACT BONDS

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Why use and EIB?

- Manage risks of innovative approaches by sharing risk with investors willing to take on some risk in exchange for positive outcomes

- Leverages environmental and economic data to support investment in resilient infrastructure

Environmental Impact Bond (EIB)

Mayor Keisha Lance Bottoms announced in March 2018 that the City of Atlanta is the first municipality in the country to be awarded grant funding to issue publicly-offered Environmental Impact Bonds (EIBs) for **green infrastructure projects in Proctor Creek watershed**. This announcement was made during the 17th annual Parks and Greenspace Conference at the Atlanta Botanical Gardens.

Benefits of Green Infrastructure

Environmental
- Water Quality
- Air Quality
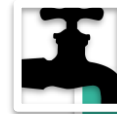- Wildlife Habitat
- Floodplain Restoration

Social
- Equity & workforce
- Flood reduction
- Public Health
- Education
- Access to green space

Economic
- Job Creation
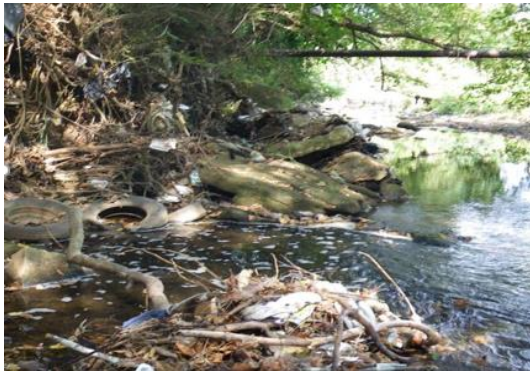- Increased Property Values
- Avoided flood damages

Infrastructure
- Flood storage
- Sediment Removal
- Protect downstream sewer infrastructure
- Capacity Relief

Primary Drivers: Flood Mitigation and Water Quality

Significant direct and indirect costs avoided

Proctor Creek is listed as impaired by the Georgia EPD

Outcome Metric

How did we link EIB interest payments to project performance?

Used **volume** of stormwater captured or detained by green infrastructure, as measured by hydrologic surveys, as the metric for determining payments to the bondholders.

Why volume?

- A simple metric that can be applied to and aggregated across all projects (types and geography).

- Reflects both flood reduction and water quality improvement, the two major drivers.

- Easy for investors to understand and related to their environmental interests

- Allows consistent prediction and measurement of results

Probability Analysis: Aggregation of Influencing Variables into a Single Overall Storage Volume

- 3 Factors:
  - Bid Price
  - Unforeseen Utilities
  - Errors/Field Performance
- Aggregate curve for all 6 projects
- Selected the most likely construction scenario.
- Two Methods were used:
  - Analytical solution
  - Monte Carlo Simulation
- The mean value of the aggregate probability curve was 6,318,301 gallons.
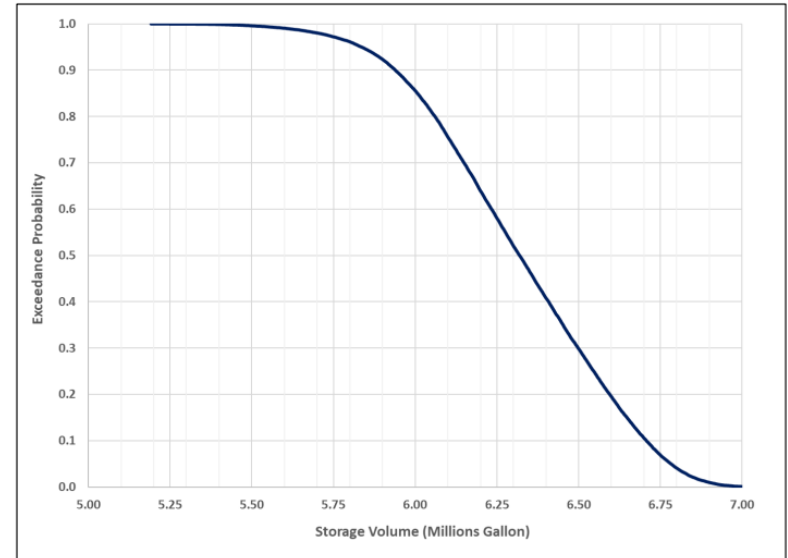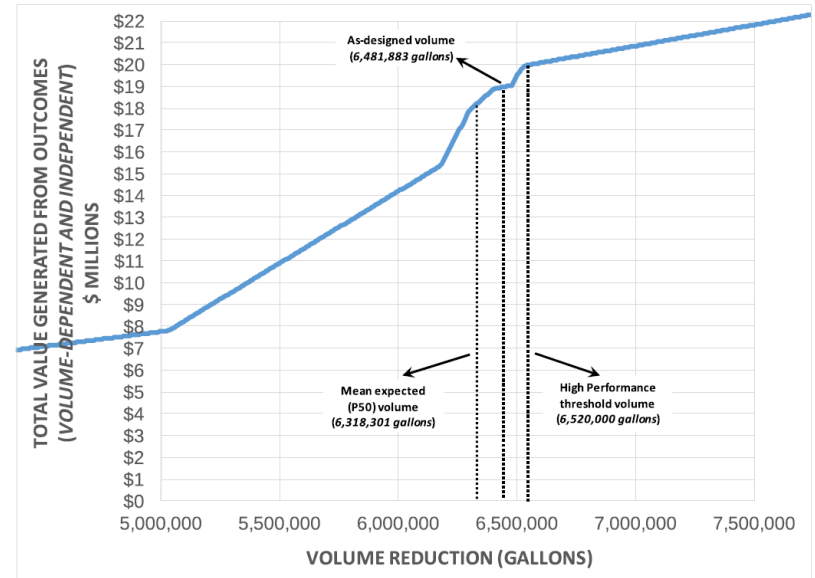

Figure 3. Probability Curve based on the Monte Carlo Simulation Method

Economic Model: Quantifying Multiple Benefits of the Projects to the City
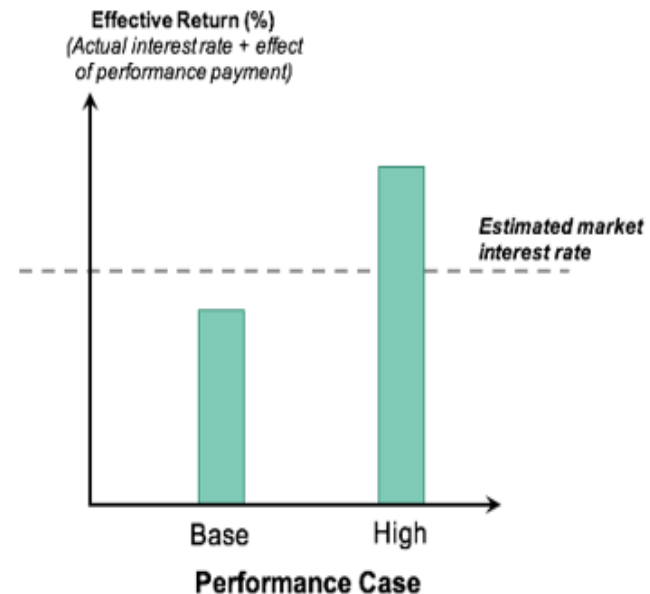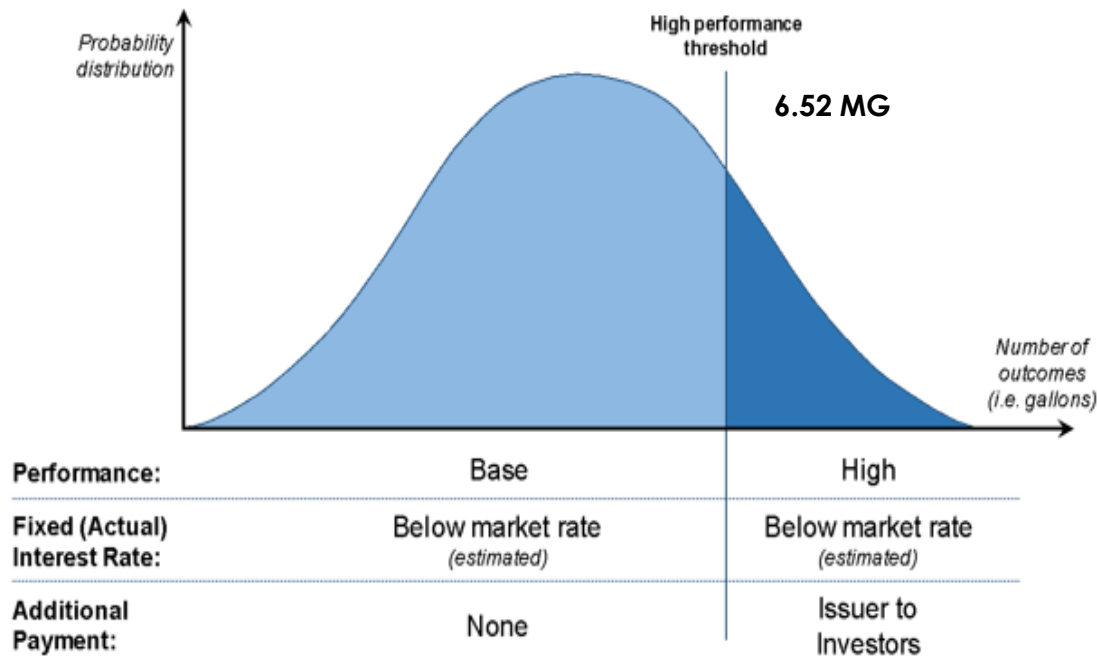
- Economic value depended on volume of stormwater captured in the Green Infrastructure
- Evaluated benefit based on:
  - Water Quality
  - Flood Reduction Benefit
  - Other benefits were not quantified in the model
- Expected benefit to the City exceeded $18,000,000 in environmental and social outcomes.
- If Performance Threshold is exceeded, an additional economic value of $1,800,000 accrues to the City, which is greater than the $1,000,000 performance payment.

Calculating Performance Payment

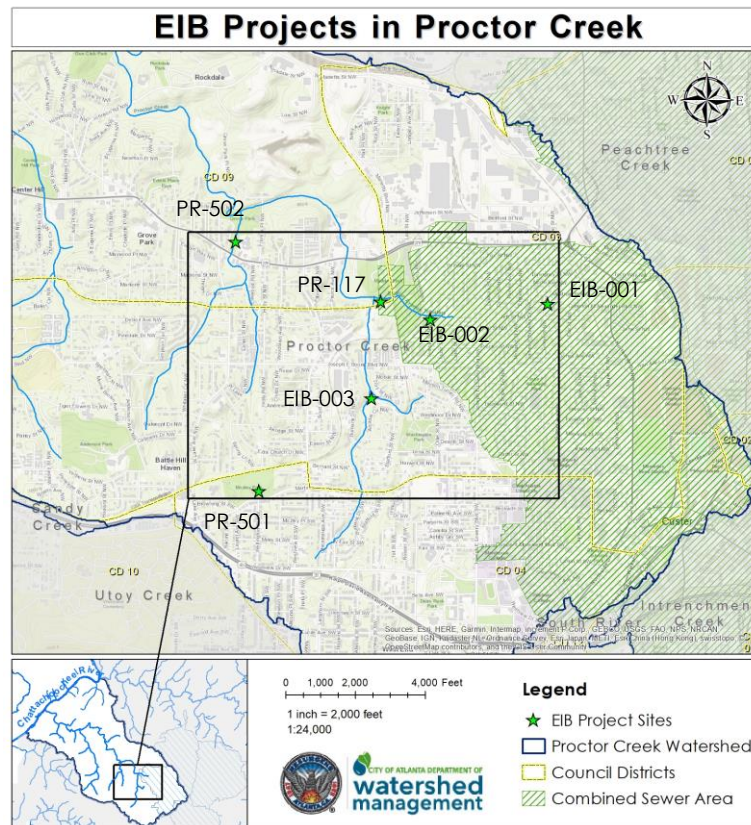## TWO-TIERED PERFORMANCE STRUCTURE

Performance:	Base	High
Fixed (Actual) Interest Rate:	Below market rate (estimated)	Below market rate (estimated)
Additional Payment:	None	Issuer to Investors

Atlanta's EIB

- Rockefeller Foundation Grant

- $14 M to finance Green Infrastructure in Proctor Creek

  – Up to six projects

  – Combined and separate sewer areas

  – A mix of ecosystem restoration and stormwater BMPs to improve the health and resilience of Westside communities

- Performance Metrics (stormwater volume)

- Multiple environmental & social benefits

- Focus on local job creation – workforce development is a secondary metric

EIB Projects in Proctor Creek

Legend
- ★ EIB Project Sites
- ▭ Proctor Creek Watershed
- ▭ Council Districts
- ▨ Combined Sewer Area

Lessons Learned

- Volume is a viable metric for comparing outcomes across different types of green infrastructure

- Ensure consistency in measurement methods for validation

- Timing of bond issuance early in the design process led to uncertainty in the probability calculation

- Relatively high transaction costs based on new funding model

- EIB are marketable offerings in the public sector. The bonds have been sold to investors. Project design is underway.
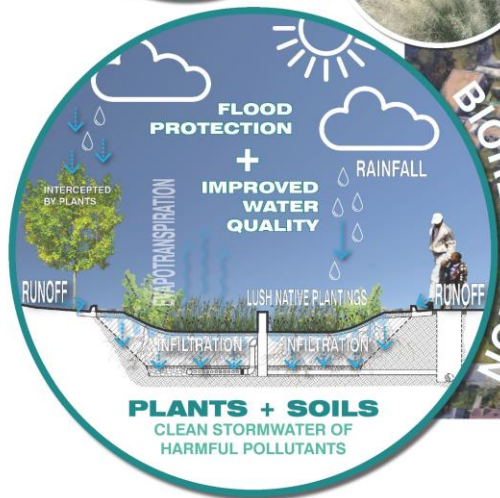
GROVE PARK
GREEN INFRASTRUCTURE IMPROVEMENTS

SUMMARY: This project implements low-maintentance, green stormwater infrastructure throughout Grove Park. A combination of bioretention gardens, enhanced swales, and re-vegetated areas will capture, treat, and infiltrate stormwater runoff to improve water quality, address erosion, and provide added flood protection. An aesthetically pleasing plant palette of ornamental grasses accents the park landscape, enhancing the existing community resource. Additional benefits include improved downstream aquatic and terrestrial habitat and opportunities for the community to learn about green infrastructure practices.

PLANTING PALETTE

FLOOD PROTECTION + IMPROVED WATER QUALITY

RAINFALL

INTERCEPTED BY PLANTS

EVAPOTRANSPIRATION

RUNOFF

LUSH NATIVE PLANTINGS

RUNOFF

INFILTRATION   INFILTRATION

BIORETENTION

PLANTS + SOILS
CLEAN STORMWATER OF HARMFUL POLLUTANTS

HORTENSE PLACE NW

ENHANCED BUFFER AREA

IMPROVED WATER QUALITY

BIORETENTION

BIOSWALE

BIORETENTION

FLOOD STORAGE

2M GAL

ADDED FLOOD STORAGE

BIORETENTION

PERMEABLE PAVERS

COMMUNITY ASSET

FRANCIS PLACE NW

MOZLEY PARK
GREEN INFRASTRUCTURE IMPROVEMENTS

BIORETENTION BASIN

SUMMARY: This project implements low-maintentance, green stormwater infrastructure throughout Mozley Park. A combination of bioretention gardens, enhanced swales, and re-vegetated areas will capture, treat, and infiltrate stormwater runoff to improve water quality, address erosion, and provide added flood protection. An aesthetically pleasing plant palette accents the park landscape, enhancing the existing community resource. Additional benefits include improved downstream aquatic and terrestrial habitat and opportunities for the community to learn about green infrastructure practices.

3M GAL ADDED FLOOD STORAGE

BIORETENTION

BIORETENTION

BIOSWALE

BIORETENTION

RE-VEGETATED AREA

RE-VEGETATED AREA

MLK JR. DRIVE SW

PLANTINGS

PLANTING PALETTE
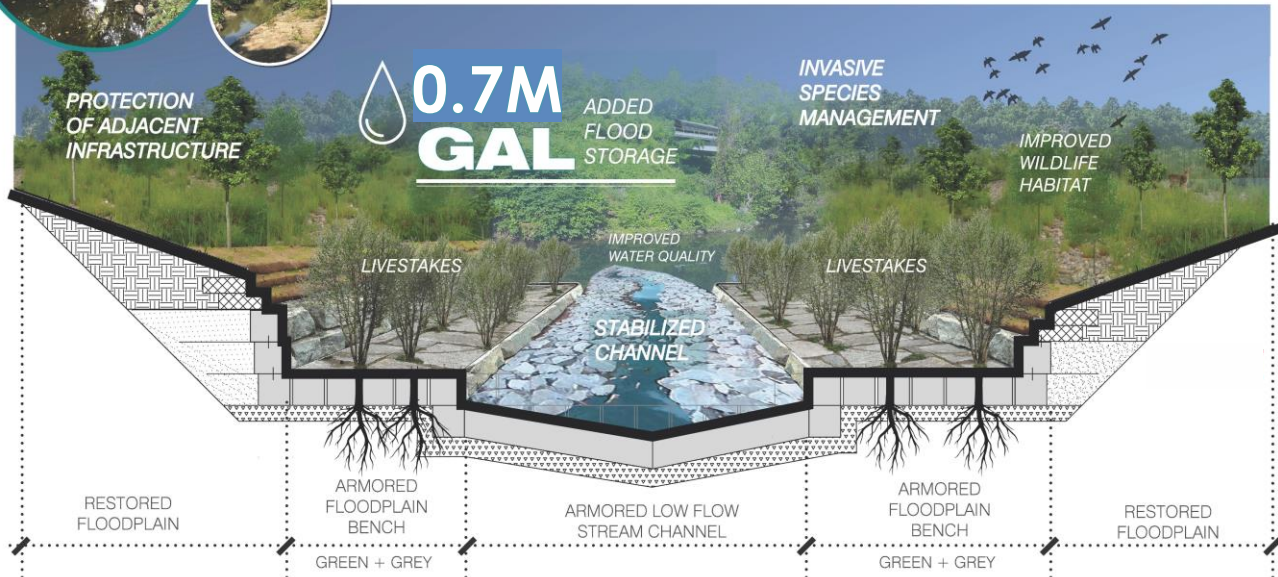
MOSQUITO HOLE TRIBUTARY

GREEN + GREY STORMWATER INFRASTRUCTURE

SUMMARY: This project combines green and grey infrastructure techniques along with natural channel design to reduce the potential for standing, stagnant water in the Proctor Creek tributary draining the North Avenue CSO facility. It also protects the sanitary sewer infrastructure near the confluence of Mosquito Hole Tributary and Proctor Creek. The design stabilizes the embankment around the upstream culvert and protects the existing North Avenue NW roadway embankment from erosion and scour. The new channel profile provides access to a restored floodplain during higher flows and enhances aquatic and riparian habitat at lower flows. Invasive plant species are also managed as part of the plan.
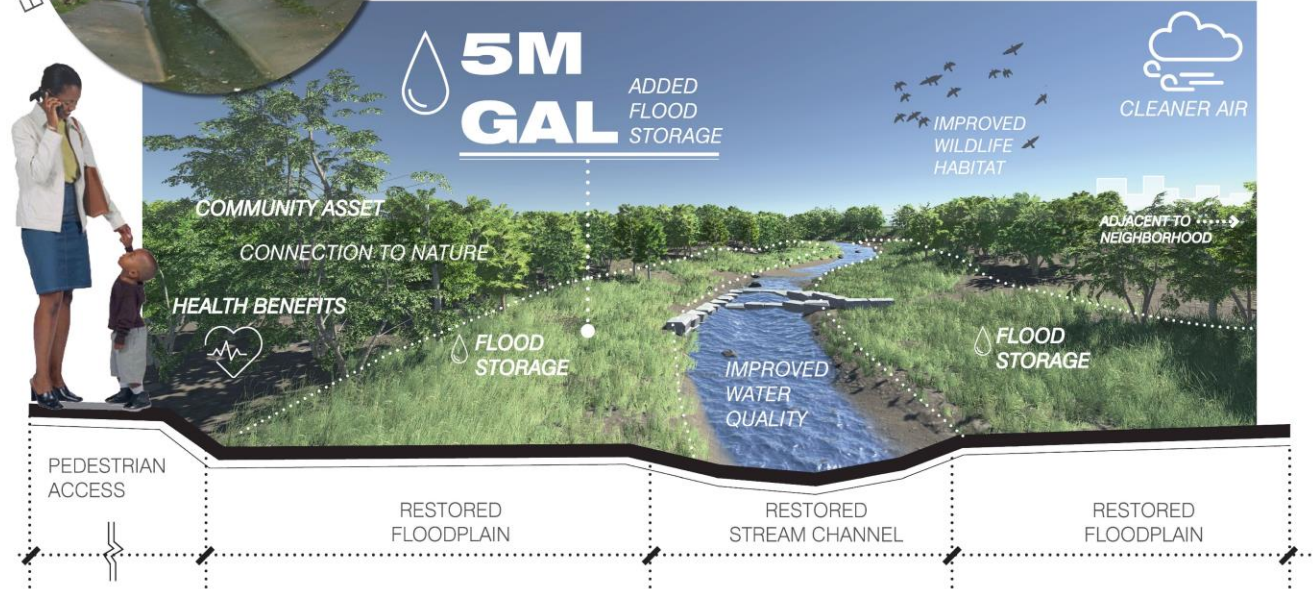
EXISTING CONDITIONS

0.7M GAL

PROTECTION OF ADJACENT INFRASTRUCTURE

ADDED FLOOD STORAGE

INVASIVE SPECIES MANAGEMENT

IMPROVED WILDLIFE HABITAT

LIVESTAKES

IMPROVED WATER QUALITY

STABILIZED CHANNEL

LIVESTAKES

RESTORED FLOODPLAIN

ARMORED FLOODPLAIN BENCH

ARMORED LOW FLOW STREAM CHANNEL

ARMORED FLOODPLAIN BENCH

RESTORED FLOODPLAIN

GREEN + GREY

GREEN + GREY

ENGLISH AVE NEIGHBORHOOD
GREEN INFRASTRUCTURE STREET IMPROVEMENTS

4.5M GAL ADDED FLOOD STORAGE

SUMMARY: This project implements green stormwater infrastructure along key streets in the English Ave community. Stormwater planters in combination with underground storage manage stormwater quantity, mitigating localized flooding. Plants and soils in the planters remove harmful pollutants from entering our waterways. The planters add aesthetic value to the improved streetscape with lush native grasses, shrubs, and flowers for the residents to enjoy.

IMPROVED AESTHETICS

PARKING

STORMWATER RUNOFF

STORMWATER PLANTER

UNDERGROUND STORAGE

COMMUNITY ASSET

UNDERGROUND STORAGE

INFILTRATION

FLOOD MANAGEMENT

INFILTRATION

IMPROVED WATER QUALITY

STORMWATER PLANTER

VISUALIZATION ONLY, NOT TO SCALE

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Questions?

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