STORMWATER MANAGEMENT:

LeFrak City, Queens

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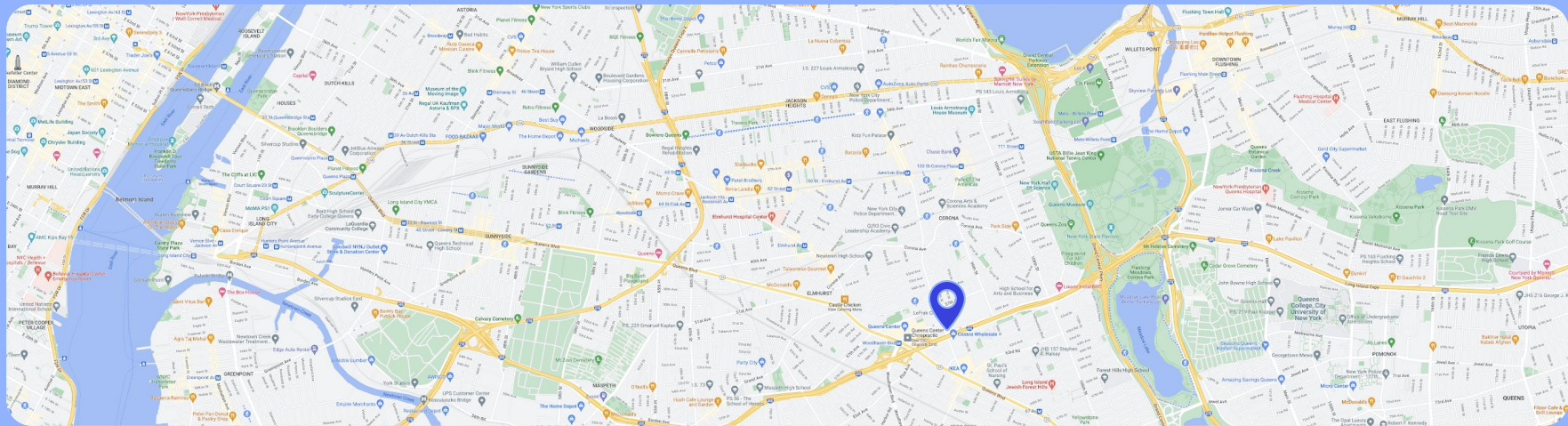- Roof Surface Solutions

Introduction

LeFrak City, Queens

The purpose of this presentation is to assess the current stormwater management system at LeFrak City and to identify improvements that will relieve buildings in the surrounding area from current flood risk.

LeFrak City is a 4,605-apartment complex built for no-fee affordable housing in the southernmost region of Corona and the easternmost part of Elmhurst in Queens, NY.

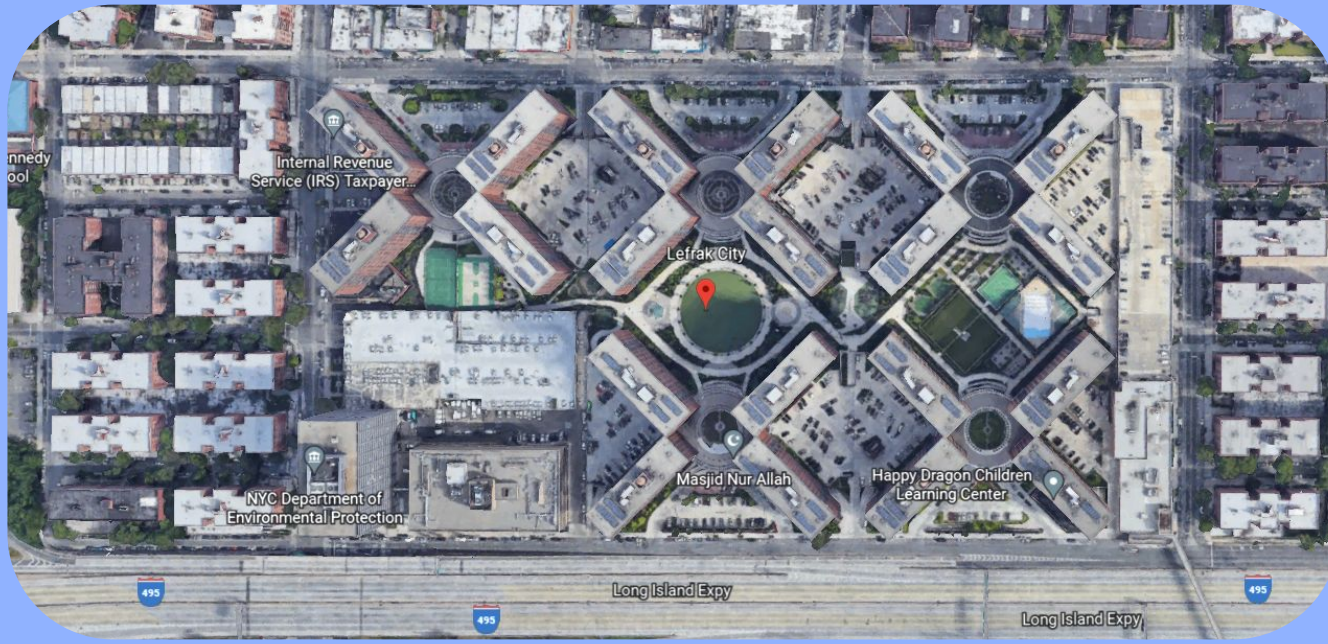## Demographics

LeFrak & Rego Park Population:
66,740

Racial Demographics:

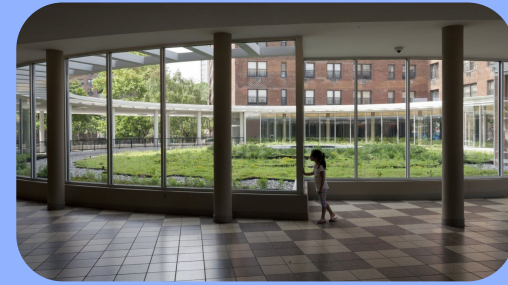|	
Asian - 32.9%	Bi/Multiracial - 3.4%
White - 30.5%	Native American - 3.2%
Latino - 21.3%	Other - 2.3%
Black 6.4%	

Affordability

Cost of living: 21% higher than the NYC average

More than 64% of apartments are rented.

External central circular courtyard

Internal courtyard, inaccessible

LeFrak City

Developed in the 1960's and renovated in the 2010s. As visible in the aerial view, LeFrak City has limited green spaces within it. The central circle is a manicured lawn, with the surrounding open space consisting of mostly surface parking. They have also invested in a miniscule amount of renewable energy, in this case - the roof solar photovoltaic panels.

Surrounding Area

Green Space in Surrounding Area

Types of Housing Stock

Surrounding Area

Surrounding Area

Apartments in the area around Lefrak City have experienced extreme basement flooding, and are lacking in green infrastructure. There is an enormous potential to solve the crisis it experiences. There are only 2 new rain gardens, outside the DEP building in the whole neighborhood.

Assessment

Flood Risk & Stormwater Retention

Hurricane Ida, 2021

The Storm

- Category 4 Hurricane
- September 1, NYC's first-ever flash flood emergency

LeFrak City

- Because of the storm, only 2 of the 60 elevators serving 14,000 people were not functioning for over 24 hours *(NBC)*

Attempted Resilience

- 2018 - Green Infrastructure Improvements through smaller internal courtyards, but they were not enough during the extreme storm event

Historic Wetlands

The location of LeFrak City experiences deep and contiguous flooding during extreme rain events, as was made apparent by historic rain event Hurricane Ida.

Overlaying city datasets in ArcGIS, it appears that this neighborhood was developed over a historic wetland, explaining why it is prone to extensive flooding. LeFrak City was built on top of Horse Brook.

Legend:
- Above Ground & Affected
- At or Below Ground & Affected
- Not Likely Affected
- Subway Lines
- Proposed Triboro Line
- Proposed Triboro Stations
- Water Treatment Plants

Stormwater Outfall Type
- CSO
- MS4
- DIRECT
- Interceptor / Force Main
- CSO Drainage Areas
- Subsewersheds
- Study Area
- Nuisance Flooding (4" - 12")
- Deep Flooding (12" or more)
- Future High Tides (year 2080)

CSO Outfall: BB 006

Green Infrastructure can help manage stormwater runoff through adequate absorption and pollutant infiltration

Catch Basins

An increased number of catch basins can help alleviate street flooding from increased rainwater

Sewers & Water-mains

Repaving roads, new sidewalks, pedestrian ramps will improve quality of life
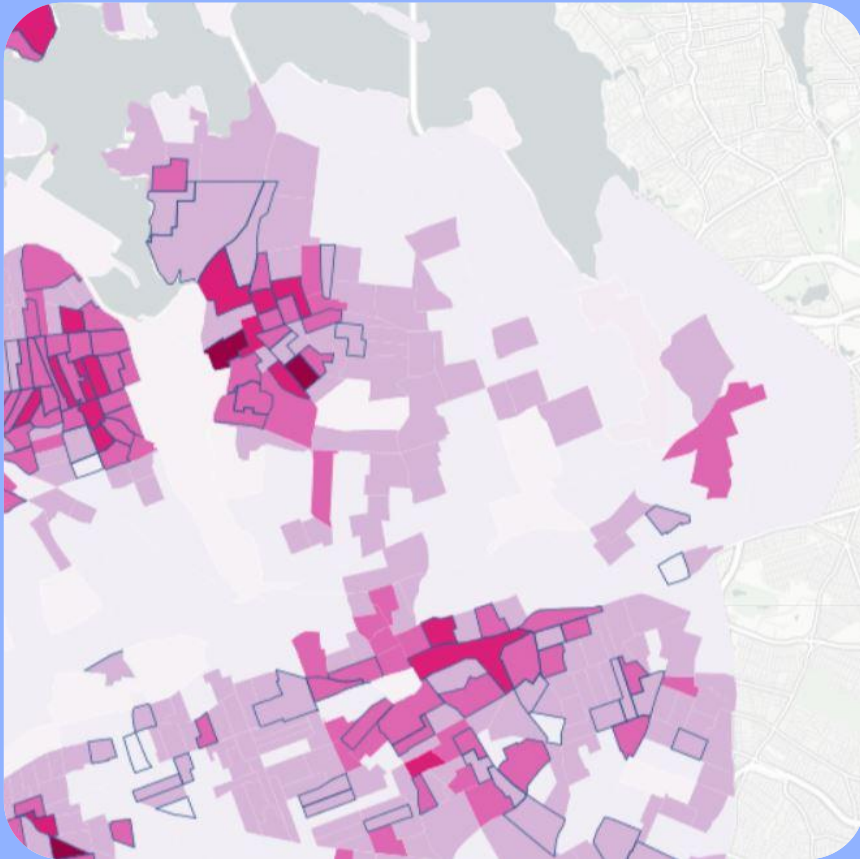
Social Vulnerability

The LeFrak neighborhood currently indicates a lower social vulnerability but is surrounded by neighborhoods who rate higher. Buildings around LeFrak have basements and are subject to higher levels of flooding as well.

Interventions proposed for LeFrak City stand to impact surrounding neighborhoods through flood alleviation and efficient stormwater capture.

SOCIAL VULNERABILITY (EQUAL WEIGHT)

0 - LOW   1 - HIGH
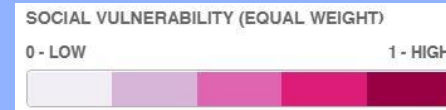
Current Stormwater Stats & Calculations

Inference

Number of Buildings: **20**
Number of apartments: **4,605**
Number of residents: **14,000**
Average Annual Rainfall: **3.85 ft**

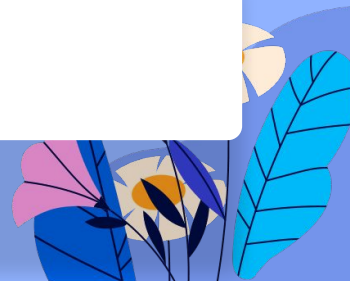**Calculations Table**

Property Lot Surface Area	Precipitation	Total Stormwater runoff
1,108,989 sq ft	**0.024 ft/hr**	**200,468 gallons**

Volume of rainwater that can be captured from terrace:

8 million gallons

Proposals

for Green Infrastructure

Ground Surface Solutions

Surrounding areas of LeFrak City,
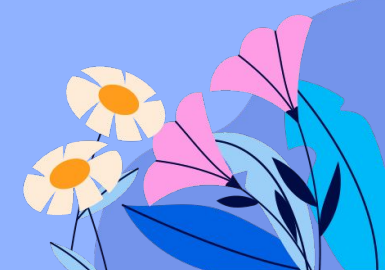Internal Parking Lots, Community
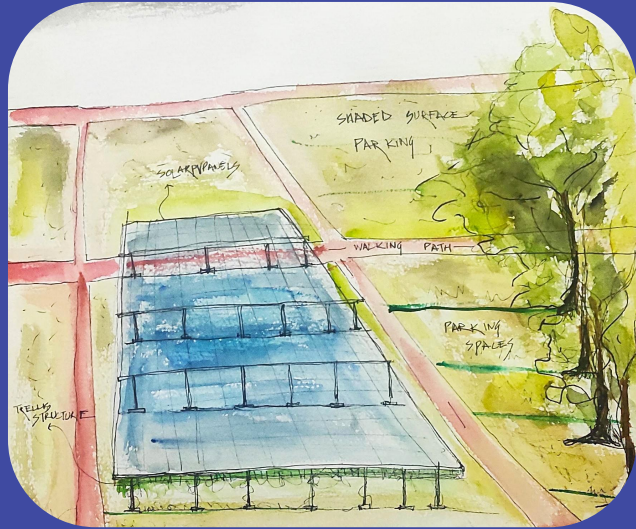Spaces and Central Lawn

Rooftop Solutions

Green Roof
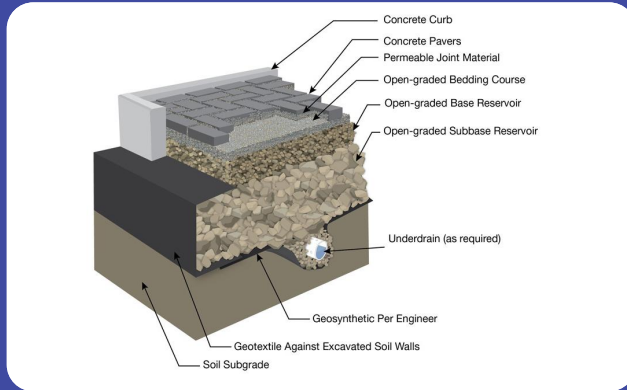Blue Roof

Stormwater Capture Opportunities

7,601,029 gal

1,588,110 gal

BioSwales | Permeable Surfaces | Green + Blue Roof | Retention

10,688,946 gal

78,469.76 gal

Total

19,956554.76 gal

Ground Surface Solutions

Permeable Surfaces

We would suggest redesigning the parking lots to incorporate permeable pavement and shaded areas underneath solar PV panels.

Impact Calculations

Surface area
476.33 sq ft

Calculations Table

Inference

Water Captured by bed

1.8 million gallons

Water Captured by Void

0

Infiltration Volume

9 million gallons

Stormwater Capacity

10,688,946 gallons

Bioswales

SIDEWALK

X

Y

DRAIN
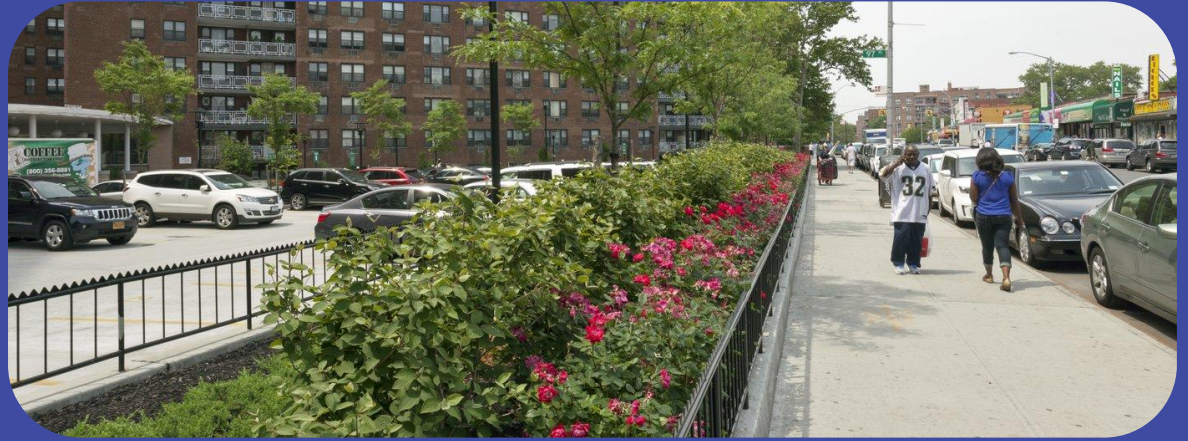
Impact Calculations

Surface area
317,556 sq ft

Number of Bioswales
8945

(10' x 3'-6" - 35.5 sq. ft)

Calculations Table

Water Captured by bed

1 million gallons

Water Captured by Void

600,000 gallons

Infiltration Volume

6 million gallons

Stormwater Capacity

7 million gallons

Central Green Courtyard

Depth of excavation: **3 feet**

MAP KEY

Central Green Courtyard
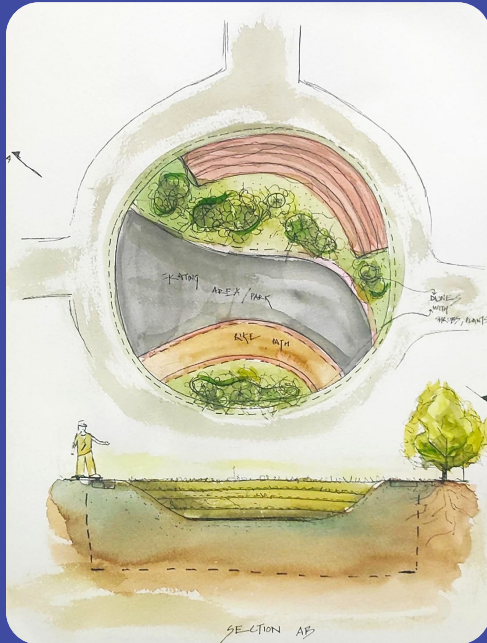
Depth of excavation: **3 feet**

MAP KEY

Central Green Courtyard

Redesigning the Skate Park, Community Garden, and
Retention Pool for the neighborhood by giving it depth, and
using the excavated soil for multi dimensional terrain for all.
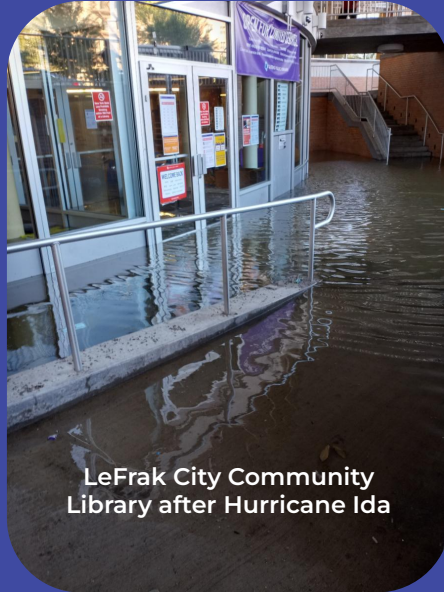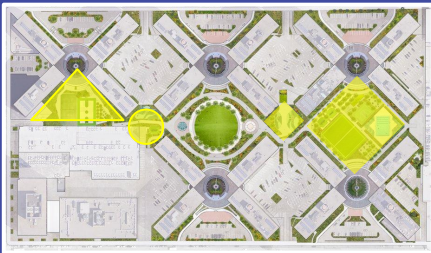

MAP KEY

Surrounding Lawns and Community Spaces

Accessible Community Spaces

By converting parking lots to greener spaces, there will be an increase of open spaces for the public to enjoy.

LeFrak City Community Library after Hurricane Ida

Rooftop Solutions

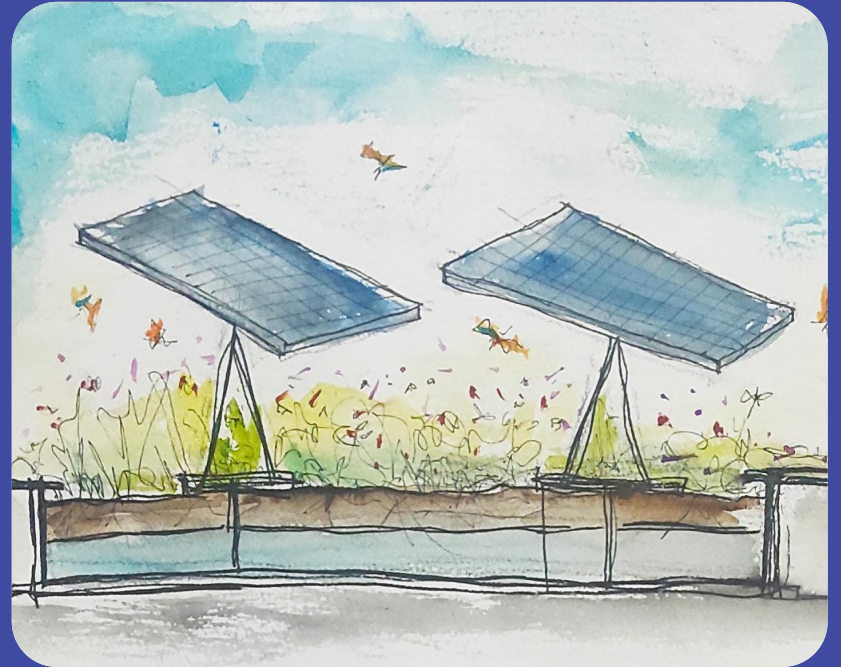# Roof Interventions

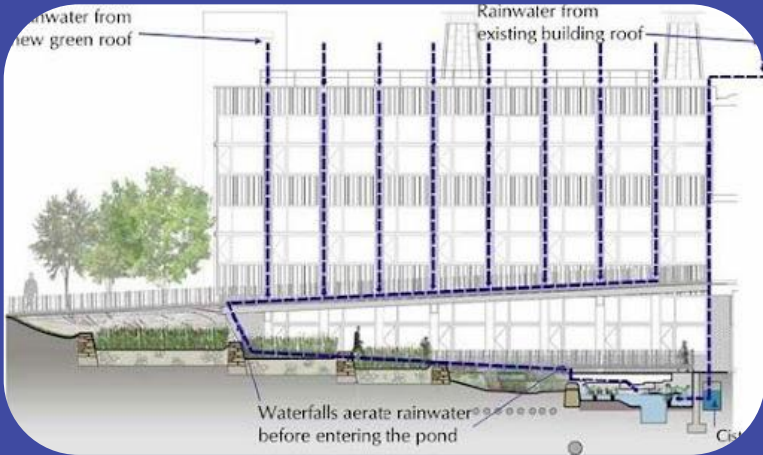Solar PV Panels
Green Roofs
Blue Roofs Rainwater harvesting
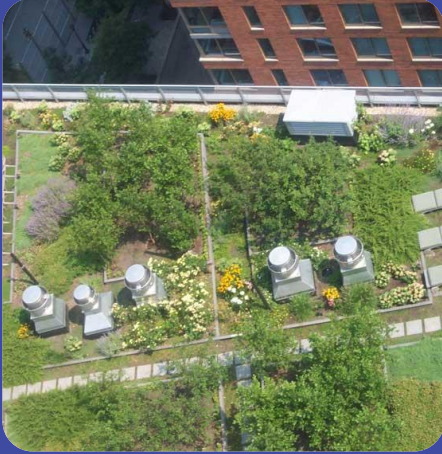

Current Rooftops

Proposed

Green + Blue Roof

Rainwater harvesting system

Green+Blue Roof

Greening

Impact Calculations

Surface area
317,556 sq ft

Potential Rainwater Volume
captured from the roof:
31631.67
Total water demand percentage
that can be met by rainfall
collected from the entire site
11%
% of water demand that can be
met by potential roof rainwater
5%
Volume of rainwater that can be
recharged (m3)
78469.76

Calculations Table

Extensive

Soil Depth

0.5 ft

Water captured
by soil

53,079 gal

Stormwater
capacity

397,027 gal

Intensive

Soil Depth

1.5 ft

Water captured
by soil

159,236 gal

Stormwater
capacity

1,191,082 gal

+ 98.9%

200,468 gallons → 19,956,554.76 gallons

+ 19,677,616 gallons

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Thank You!