Upper Intrenchment Creek

DWM has implemented a nationally recognized Southeast Atlanta Green Infrastructure Initiative, treating over **10 million gallons a year**.

This program has made positive impact in the watershed and the following recommendations are meant to build off this work.

Objectives:

1. Contextualize basin geography and infrastructure.
2. Contextualize community impacts and sensitivity to flooding.
3. Define relations of physical characteristics to community sensitivity.
4. Define the scale of volume in the overall study basin

Questions

1. Present opportunities for volume management in Public Realm
2. Present opportunity for volume management in Public/Private parcels
3. Present opportunities for an integrated approach within the Summerhill development
4. Summarize the aggregate impact of projects presented with DWM relief currently in place
5. Additional study and project opportunities

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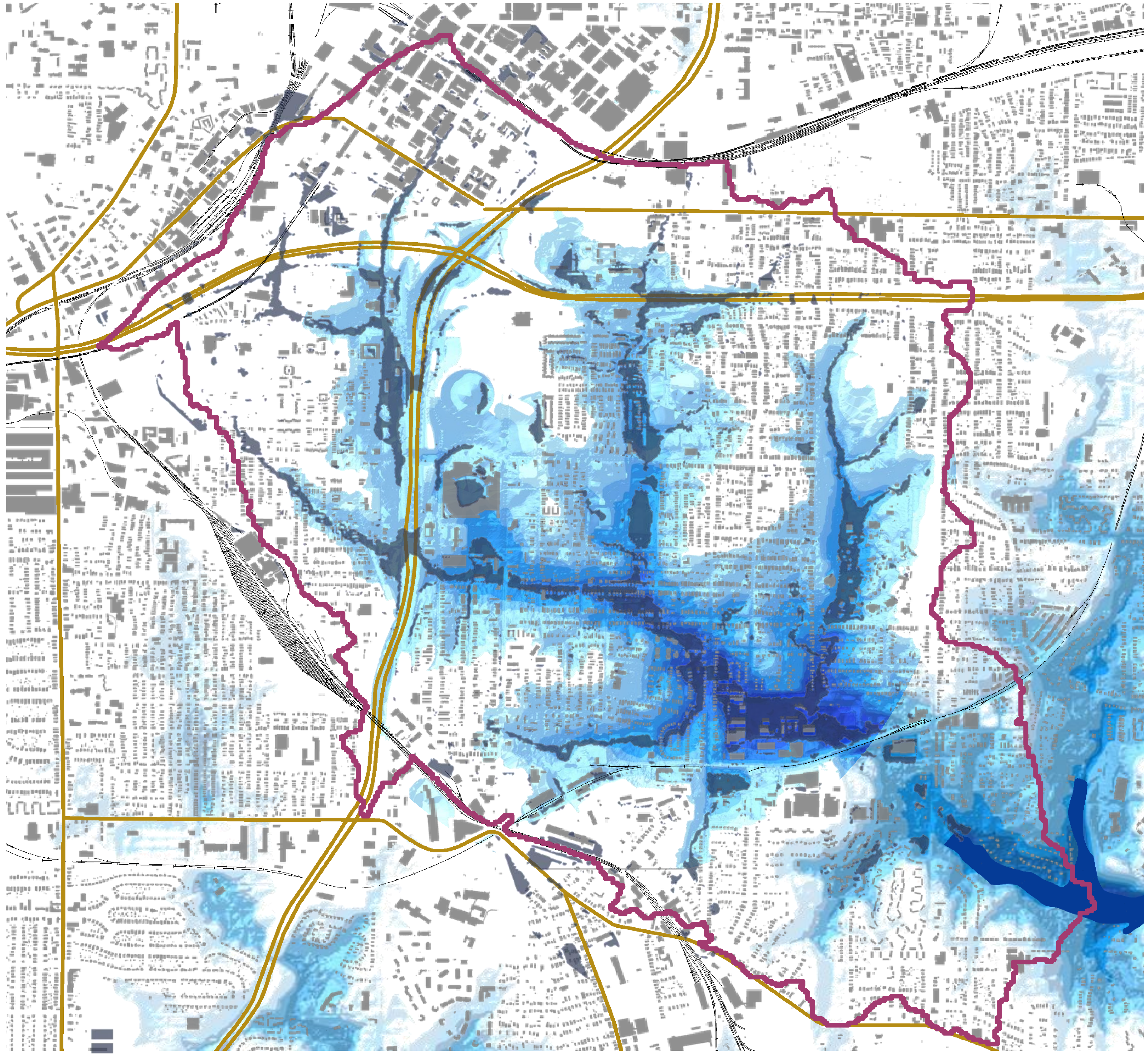
Legend

Combined Sewer Lines

Upper Intrenchment Creek

Where Rivers are born

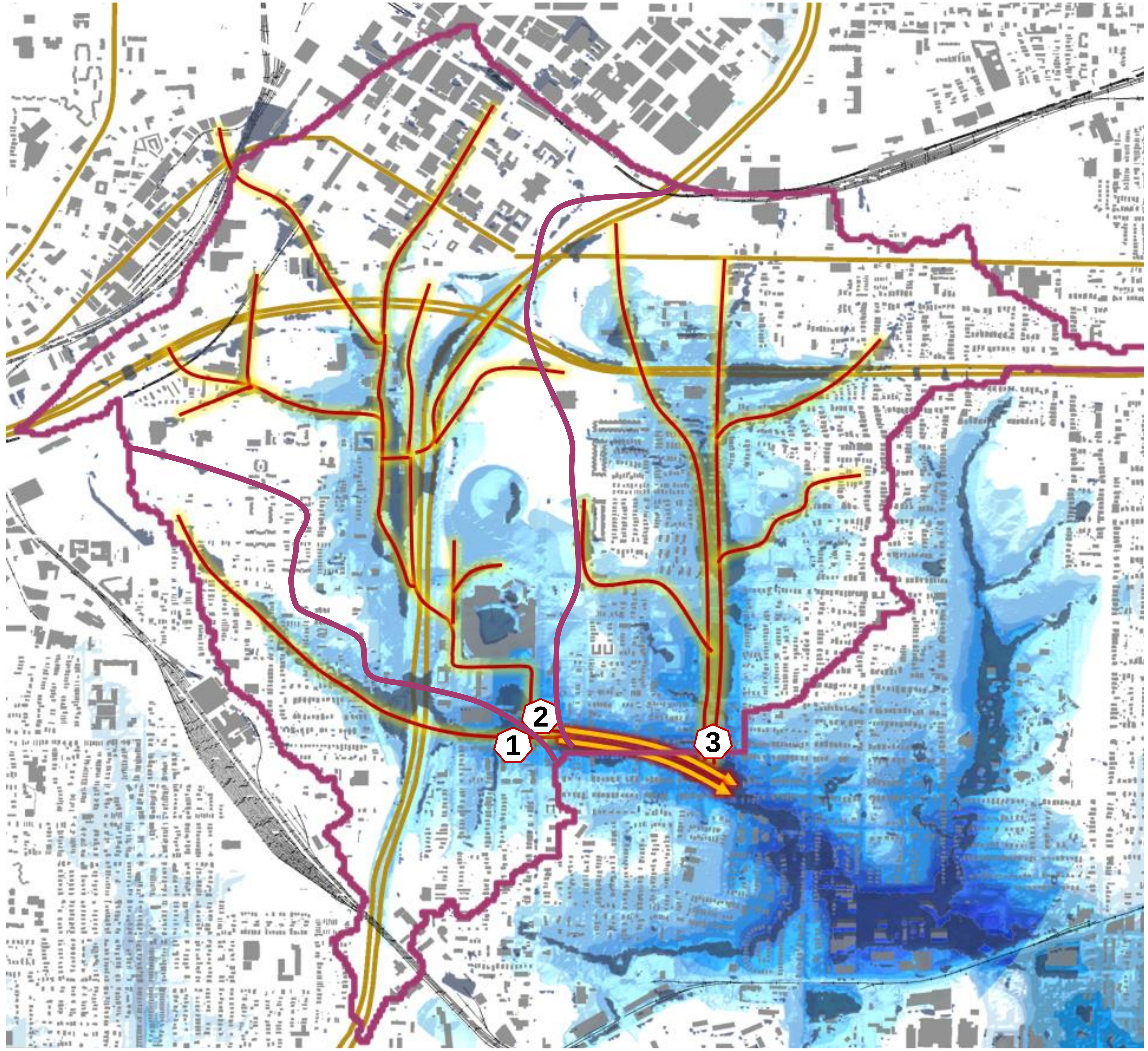
- Roughly 2,600 acres of Southeast Atlanta passes through Upper Intrenchment Creek and the Beltline before eventually entering into the combined sewer system
    - ≈ 1.8 billion gallons per year
    - ≈ 35 million gallon in 1” Event
- Intrenchment Creek is defined by sharp steep elevation changes in the upper basin and flatter lowlands.
- These characteristics promote high velocity erosive flows in the upper basin that slow down and accumulate into flooding before reaching the Beltline



Upper Intrenchment Creek

Where Rivers are born

- Dense development and highway infrastructure in the upper basin overwhelm capacity in drainage infrastructure
- This prevents the localized flooding in the lowlands from entering the system, compounding the destructive effects of accumulated runoff.
- Three major basins connect to dual trunks directing drainage southeasterly towards Boulevard Regulator and Custer Ave CSO.
    1. Crew Street – 42” x 84”(24.5 ft^2)
    2. Lloyd St – 120” x 120” (100 ft^2)
    3. Connally – 96” x 108” (72 ft^2)



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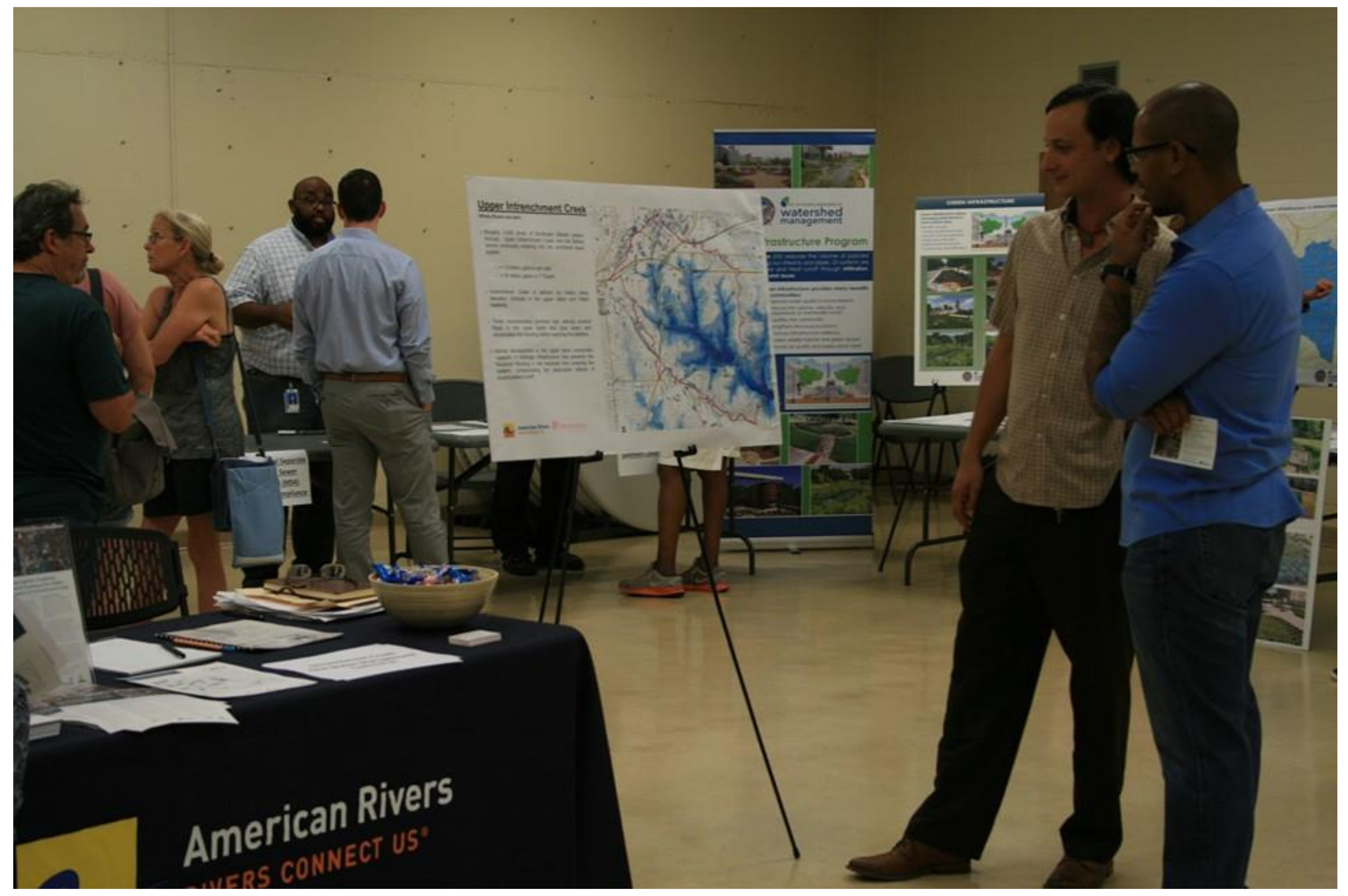
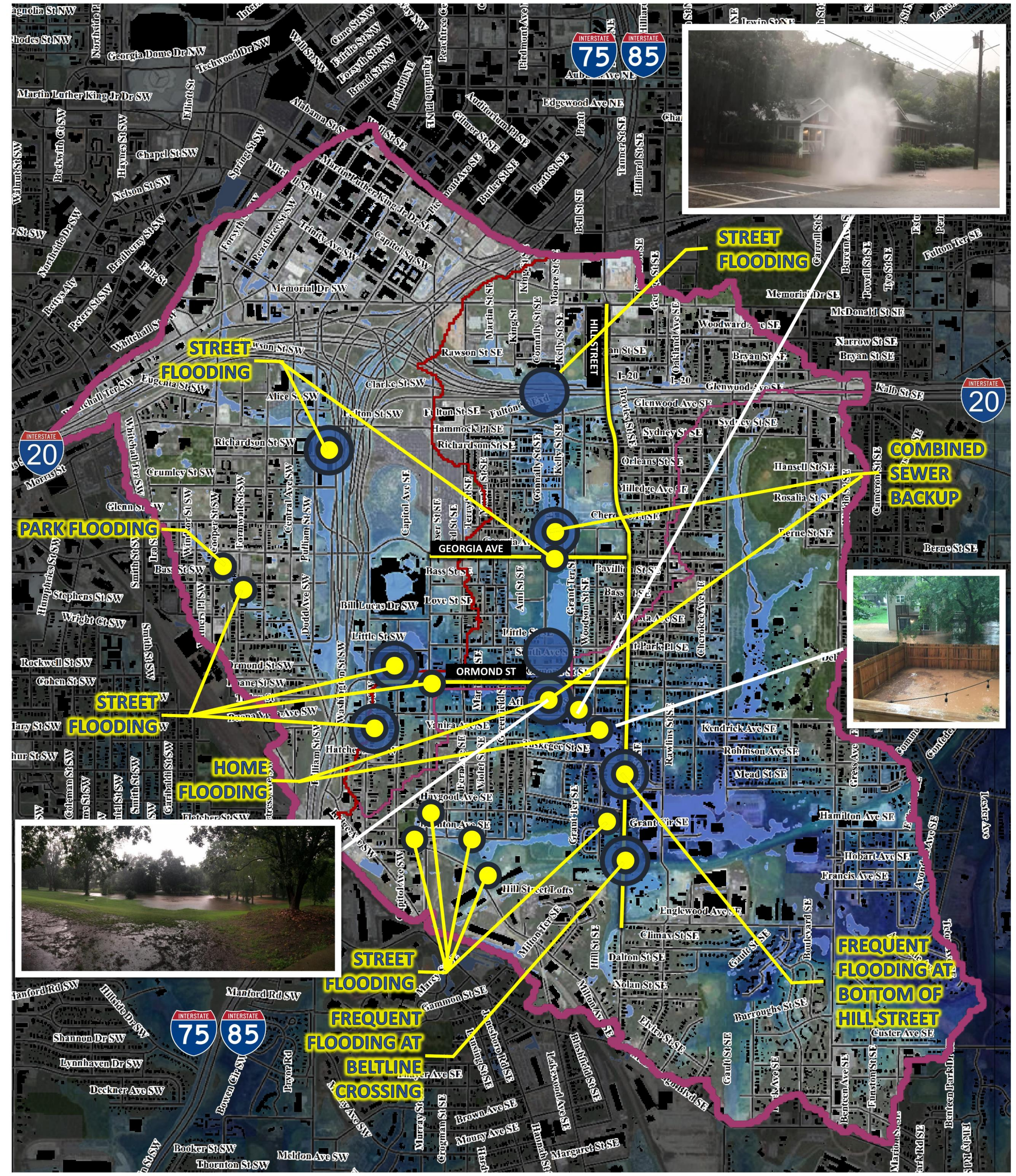
Upper Intrenchment Creek

Known Problem Areas – Community Input



Known Problem Areas

MAJOR STORM   MINOR STORM



WHERE ARE YOUR PROBLEMS?

Where Does Flooding Occur?
When Does Flooding Occur (DATE/TIME)?
How Often Does Flooding Occur?
How Long Does Flooding Last?

SEND US YOUR PICTURES

info@intrenchment.com
intrenchment.com

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* Problem areas identified represent issues that still exist post-Department of Watershed interventions

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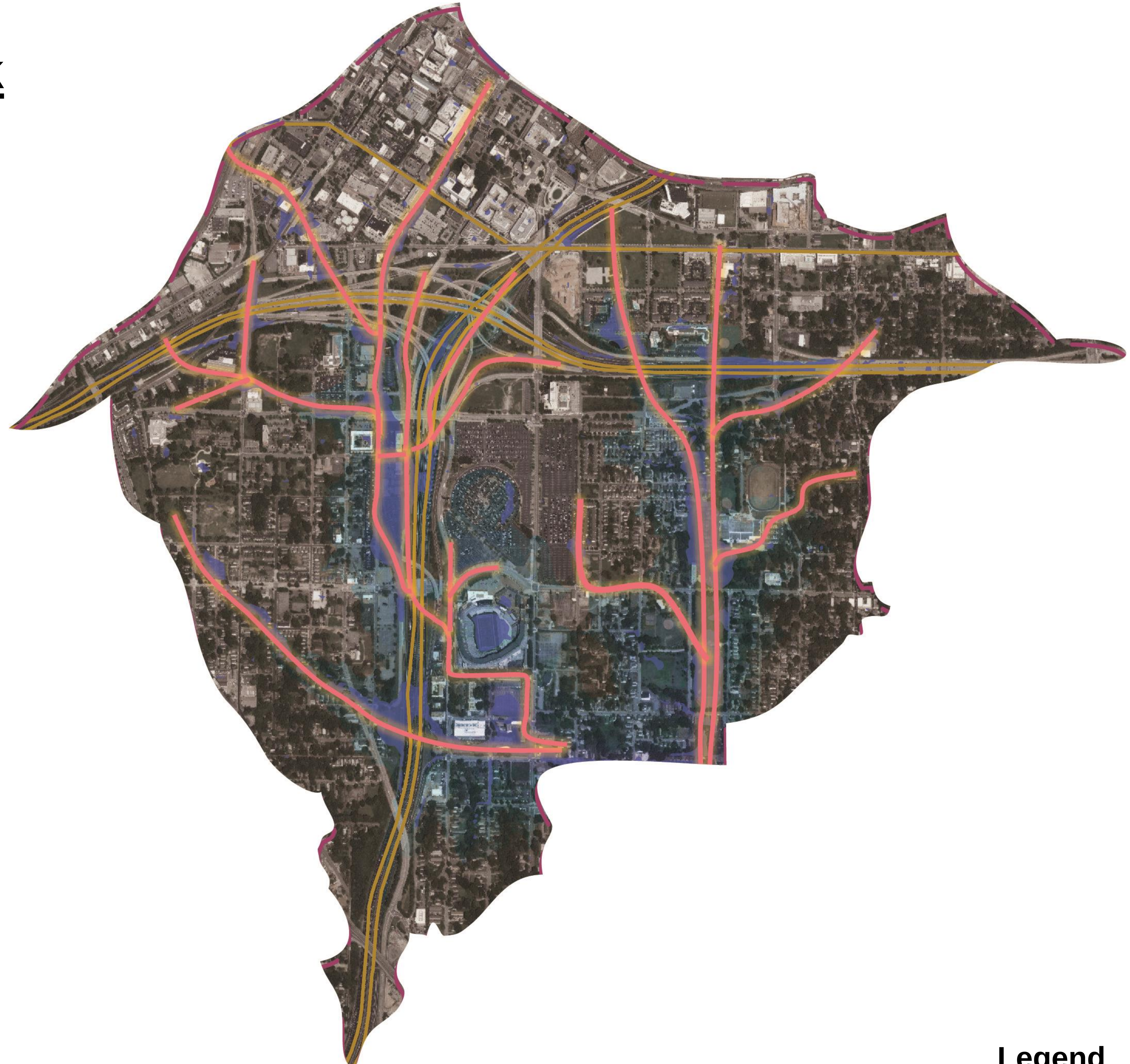
Upper Intrenchment Creek



General Basin Characteristics

- Impervious Upper Basins
- Steep upper portions of basins ≈ 7%
- Shallow pipe/channel slope ≈ 1%

Flood Volumes

- 100 Year - 138 Million Gallons
- 25 Year - 85 Million Gallons

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Legend

Combined Sewer Lines

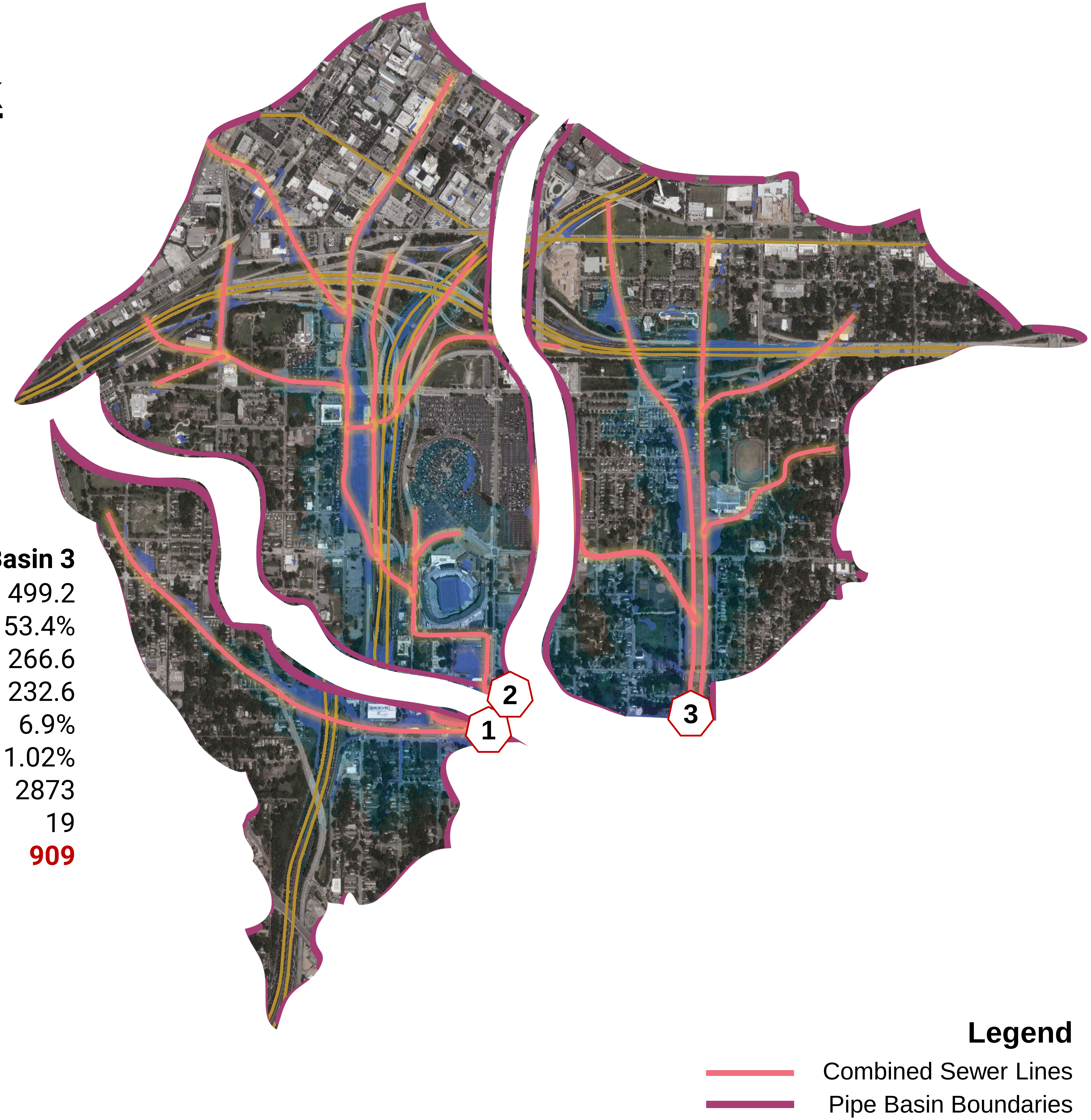
Upper Intrenchment Creek

Junction Basins

General Basin Characteristics

- Impervious Upper Basins
- Steep upper portions of basins ≈ 7%
- Shallow pipe/channel slope ≈ 1%
- Shallow final outfall elevation = 909

	Basin 1	Basin 2	Basin 3
Acreage	198.4	588.8	499.2
Impervious	54.6%	**77.4%**	53.4%
Impervious Acreage	108.3	455.7	266.6
Pervious Acreage	90.1	133.1	232.6
Basin Slope	7.6%	7.6%	6.9%
Channel Slope	**1.85%**	1.04%	1.02%
Channel Length	2109	3322	2873
Time of Concentration	14	20	19
Minimum basin elevation	922	923	**909**



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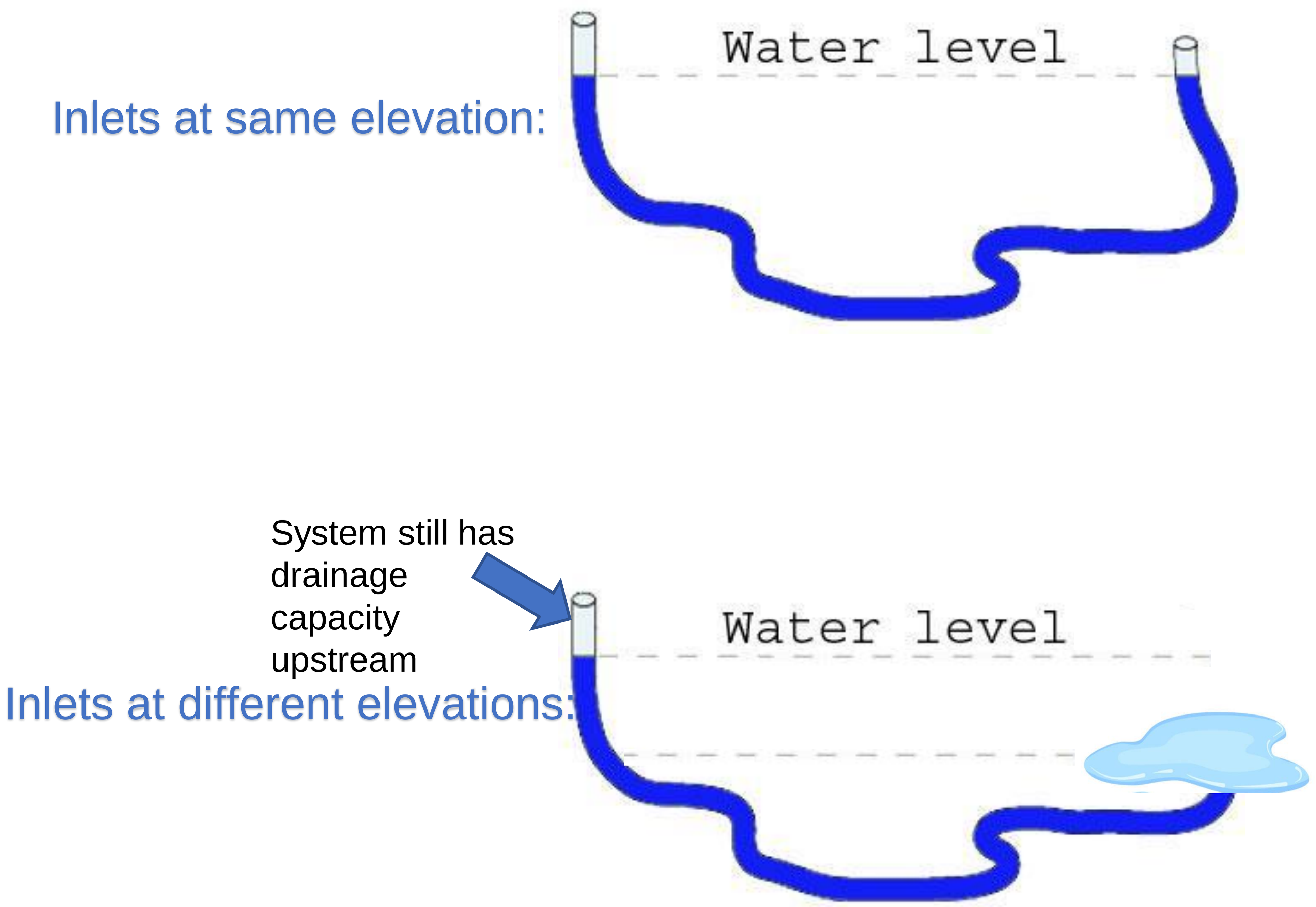
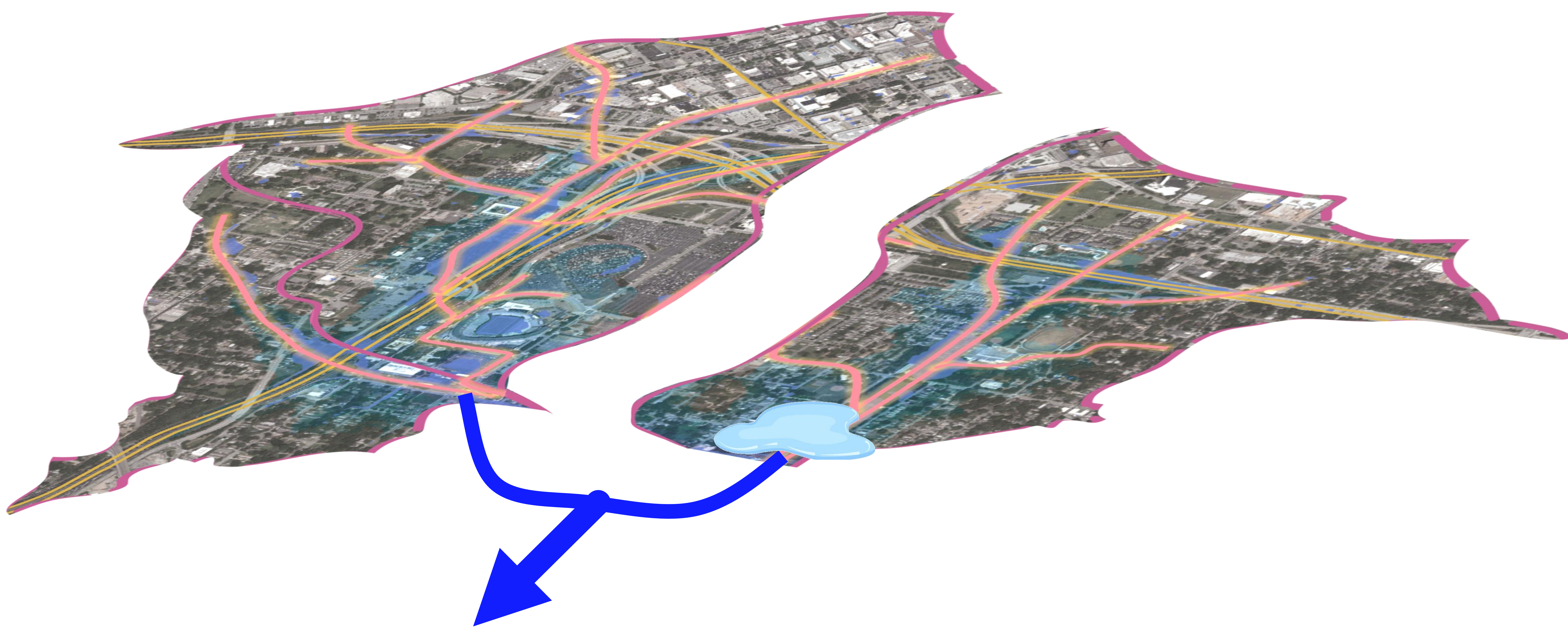
Upper Intrenchment Creek

Junction Basins

Flooding Characteristics

- Basin 1 & 2 have a high elevation relative to Basin 3
- Impervious area in higher elevations of Basins 1 & 2 drain quickly and fill the pipe capacity; decreasing Basin 3's ability to drain
- Until the upper basins fully drain; the lower basin flooding volumes surcharge, accumulate at inlets, and must wait to drain
- This compound effect of velocity, volumes, and elevations causes the flooding





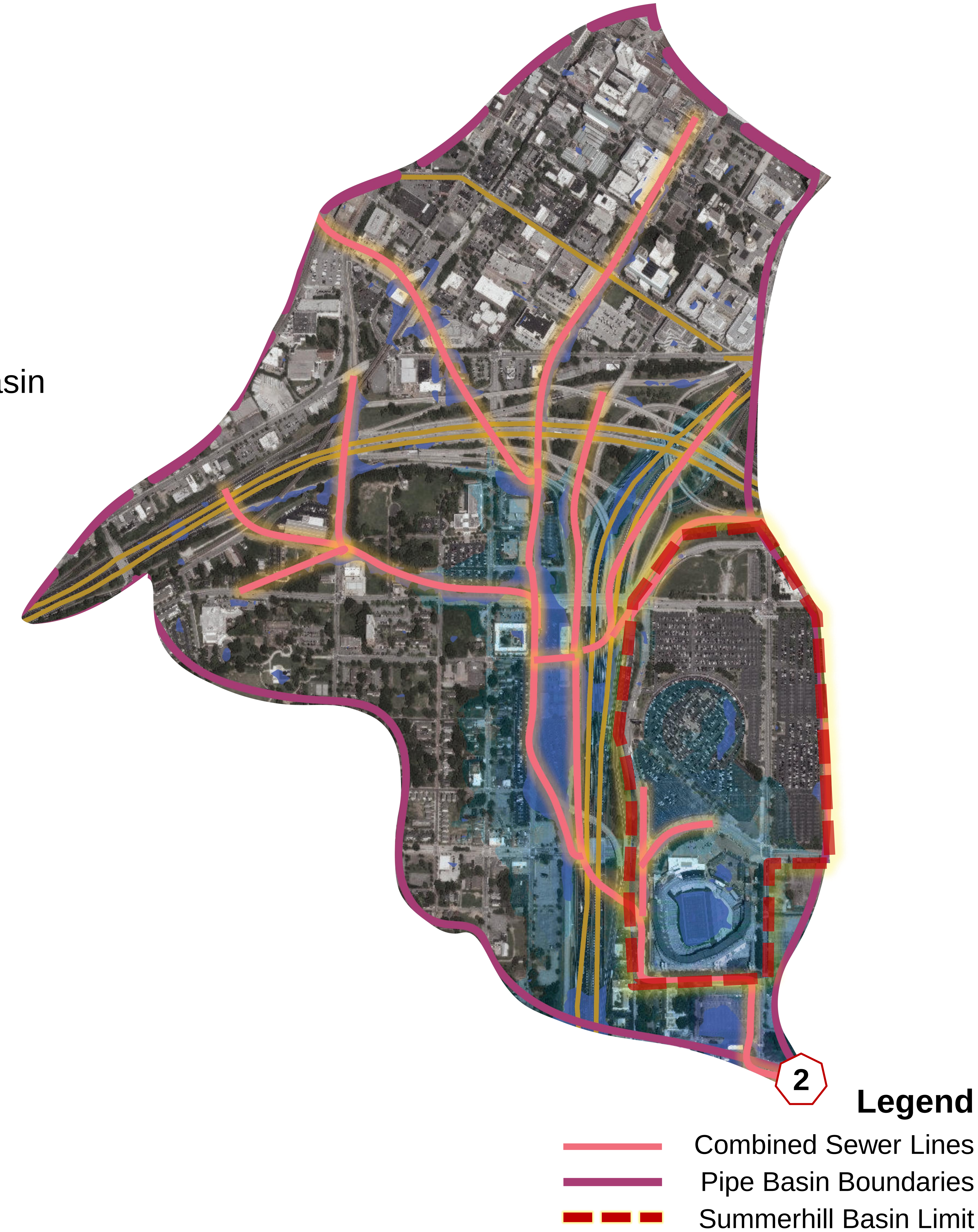
Upper Intrenchment Creek

Downtown Basin

General Basin Characteristics

- High elevation relative to junction elevation
- Large proportion of impervious area compared to overall basin
- Minimal greenspace and impervious disconnects

	Basin 2	Summerhill
Acreage	588.8	96
Impervious	**77.4%**	**84.5%**
Impervious Acreage	455.7	81.1
Pervious Acreage	133.1	14.9
Basin Slope	7.6%	7.2%
Channel Slope	1.04%	1.43%
Channel Length	3322	929
Time of Concentration	20	13
Minimum basin elevation	923	932
Pipe Outfall Elevation	**909**	**909**



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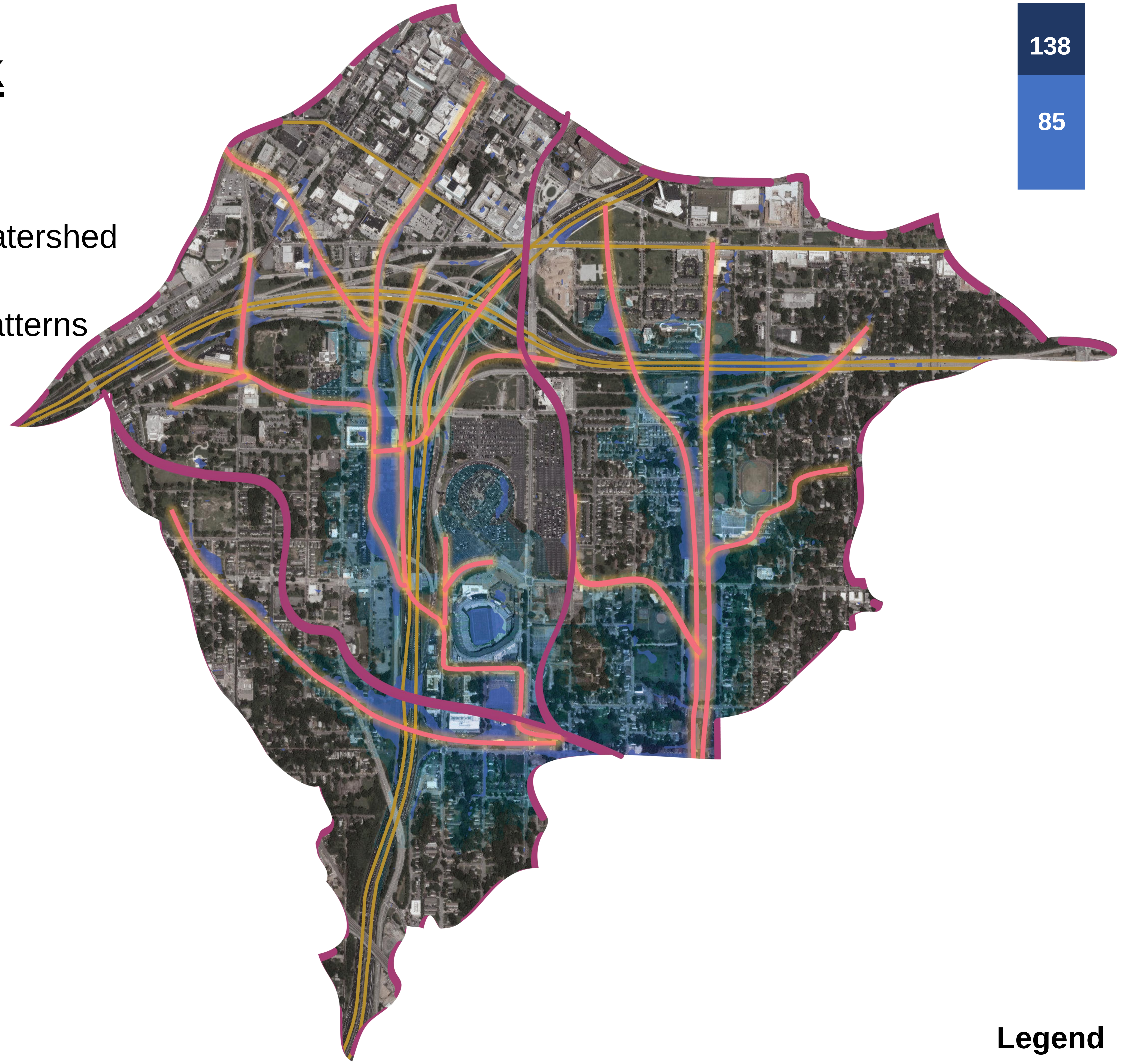
Upper Intrenchment Creek

Recommended Approach

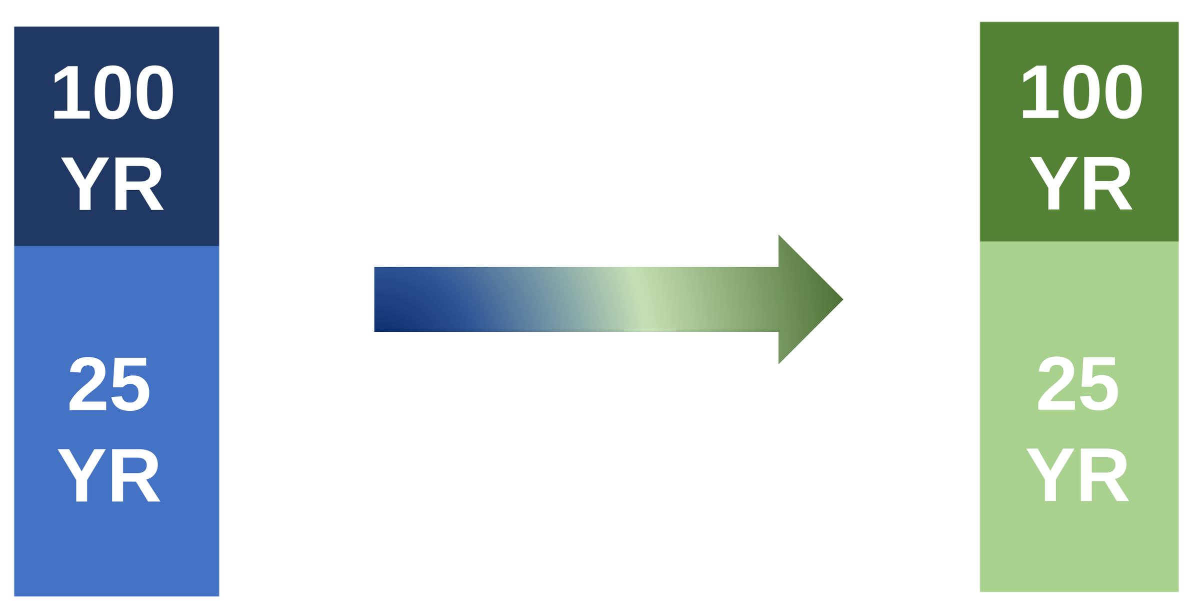
- Reuse, Infiltrate, Slow, & Store upper watershed
- Optimize basin junctions and elevations
- Restore lower basin ecology and flow patterns

Flood Volumes

- 100 Year - 138 Million Gallons
- 25 Year - 85 Million Gallons



Goal: To holistically manage volumes



Existing Volumes **Managed Volumes**

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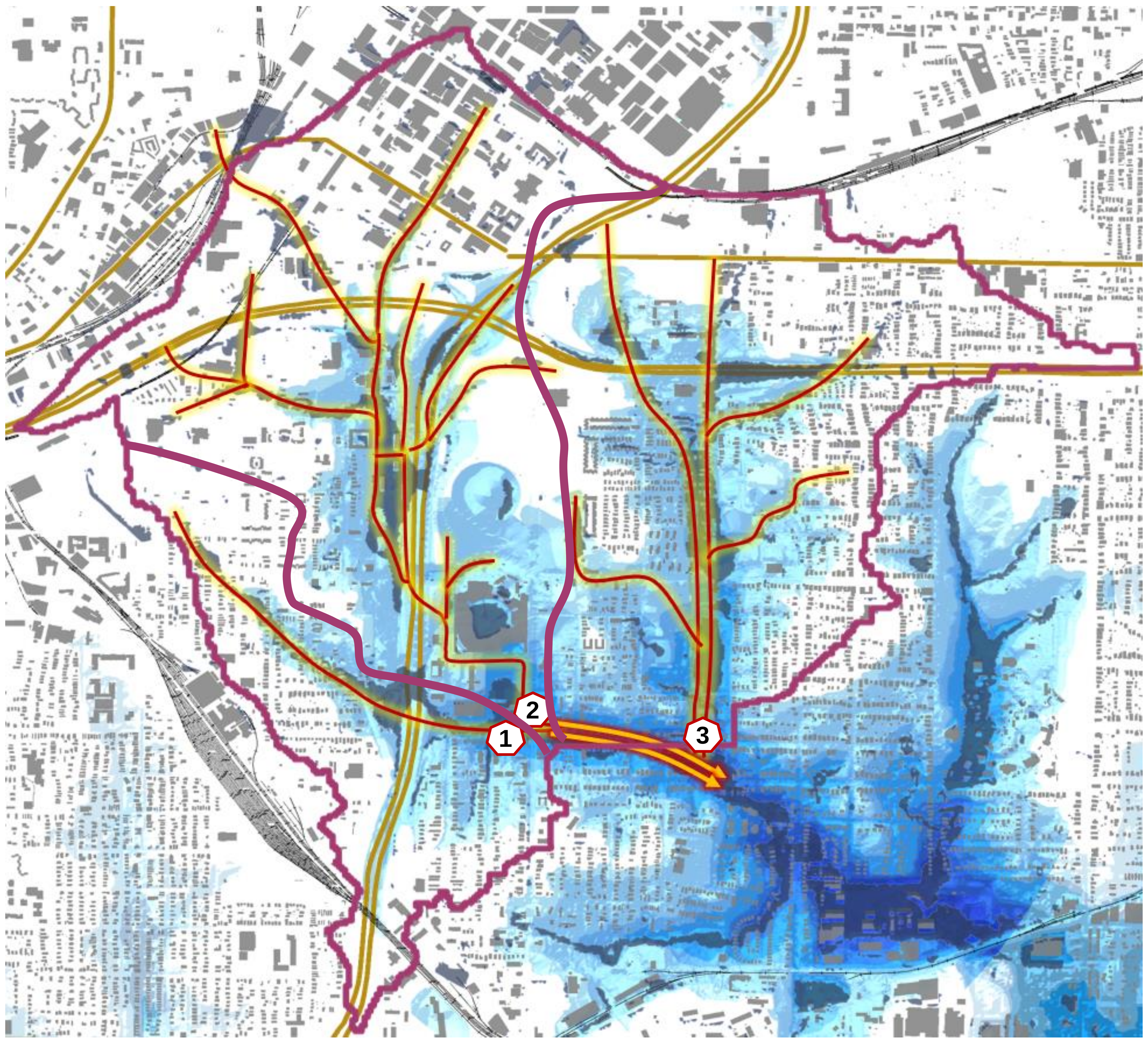
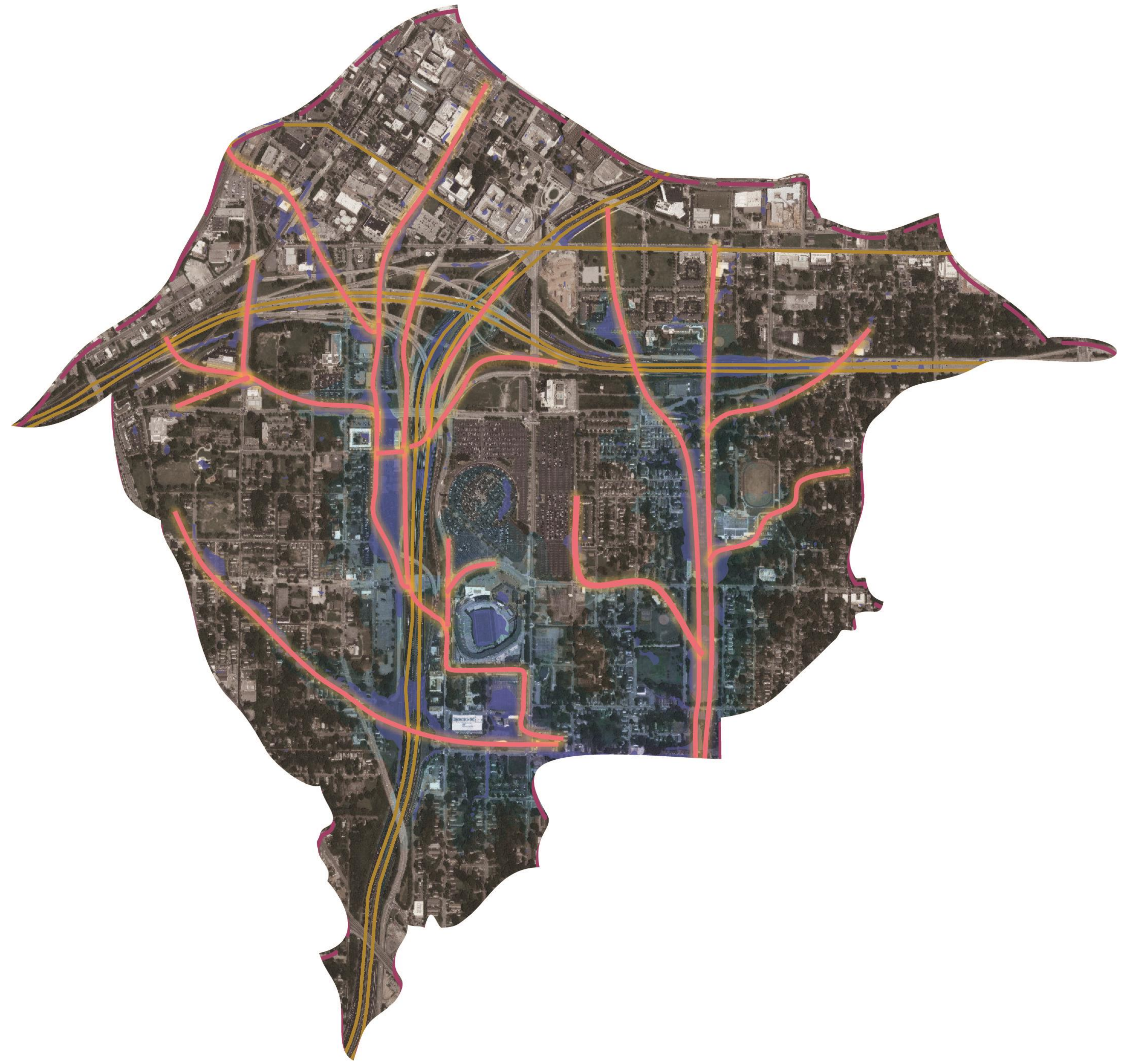
Legend

Combined Sewer Lines
Pipe Basin Boundaries

Questions?





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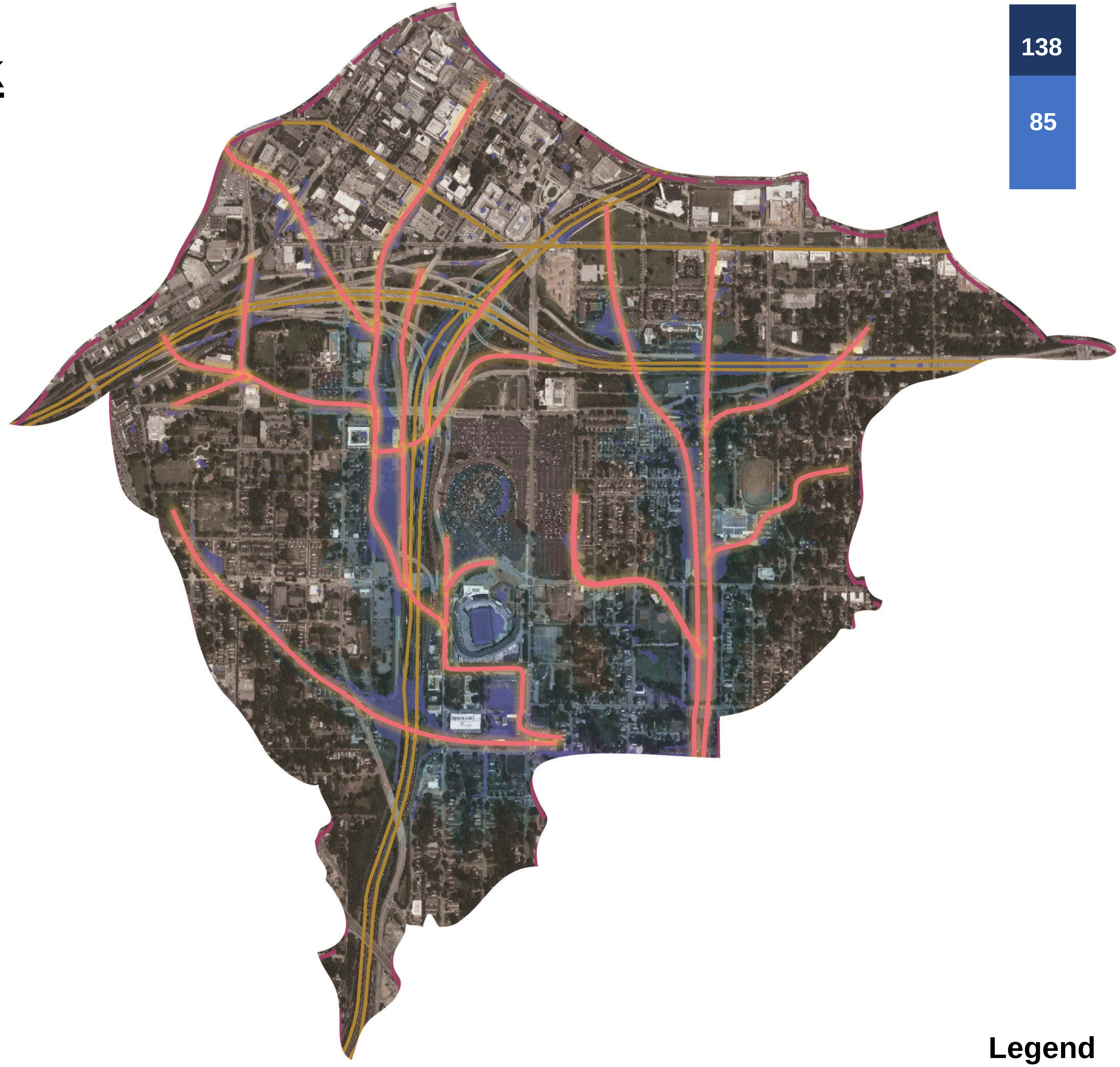
Upper Intrenchment Creek



General Basin Characteristics
- Impervious Upper Basins
- Steep upper portions of basins ≈ 7%
- Shallow pipe/channel slope ≈ 1%

Flood Volumes
- 100 Year - 138 Million Gallons
- 25 Year - 85 Million Gallons

Legend

Combined Sewer Lines

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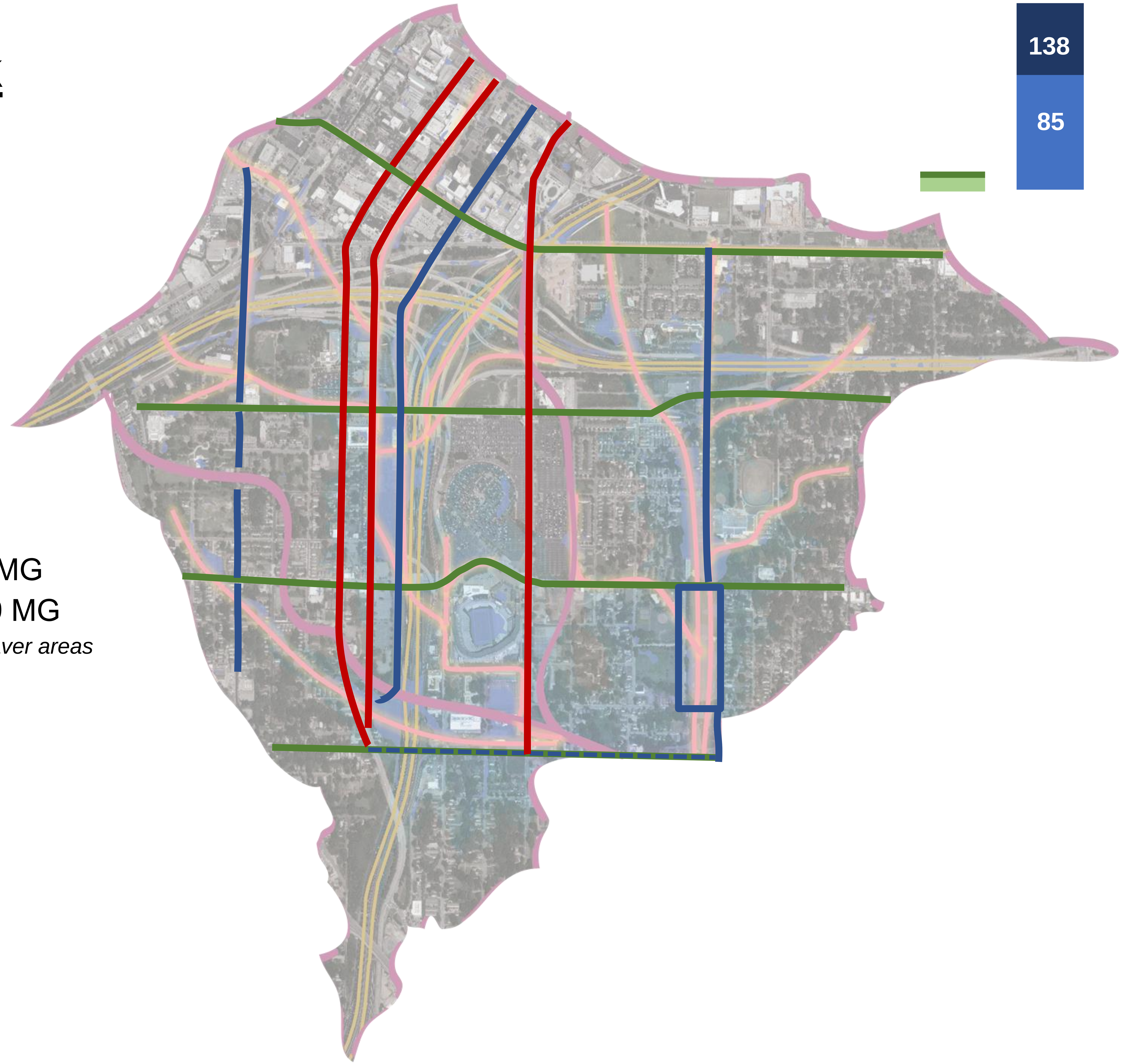
Upper Intrenchment Creek

Road Network - Dual Purpose Connectivity

Road Drainage Typologies

- Channel Roads – Conveyance
- Spanning Roads - Sponges
- Arterial Roads – Connectivity



Runoff Flood Impact

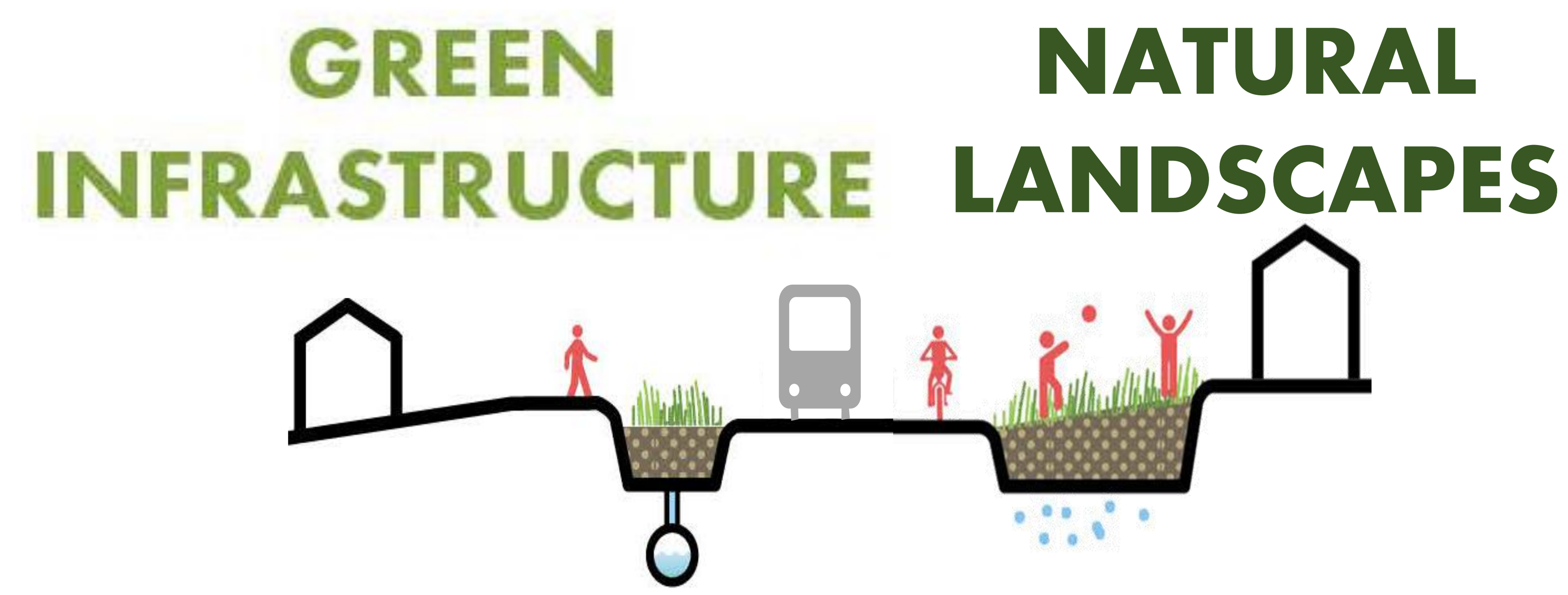
- Impervious Area* ≈ 108 Acres
- Contribution in 25 year (4hr) Event ≈ 10.2 MG
- Contribution in 100 year (6hr) Event ≈ 14.9 MG

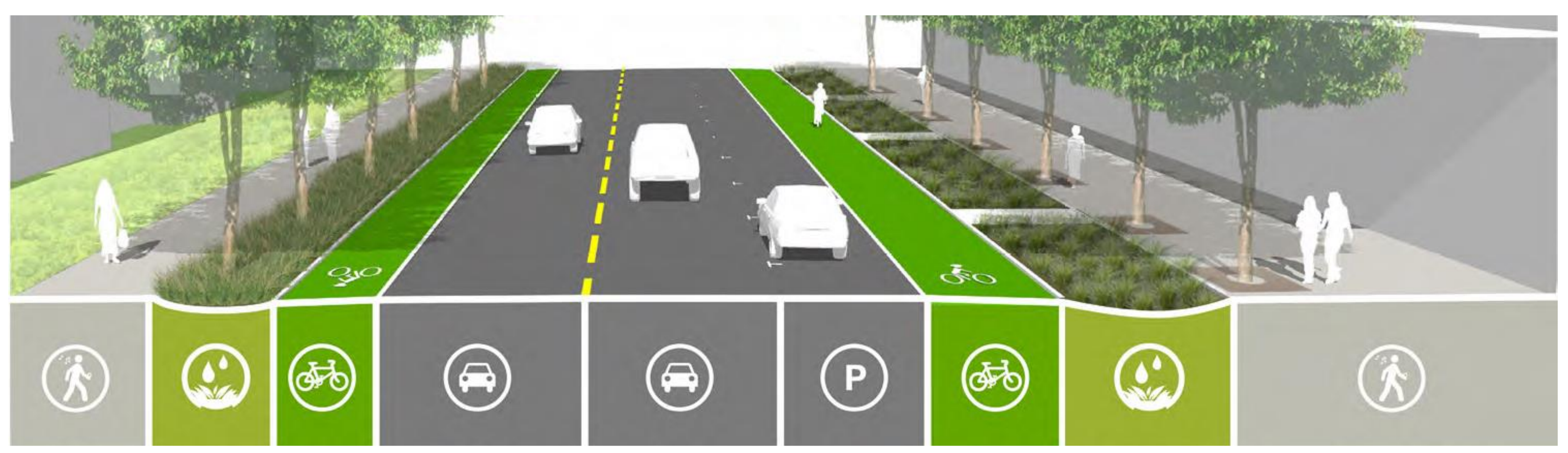
** Excludes existing paver areas*

Upper Intrenchment Creek

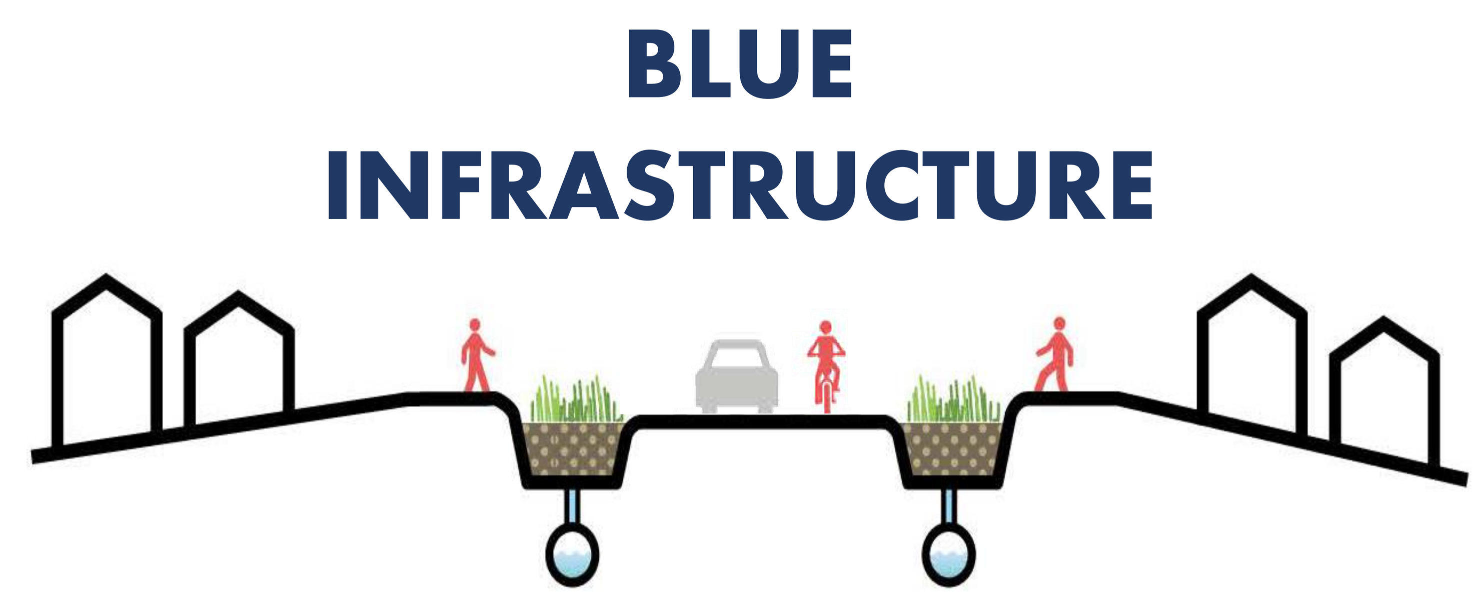
Road Network - Dual Purpose Connectivity

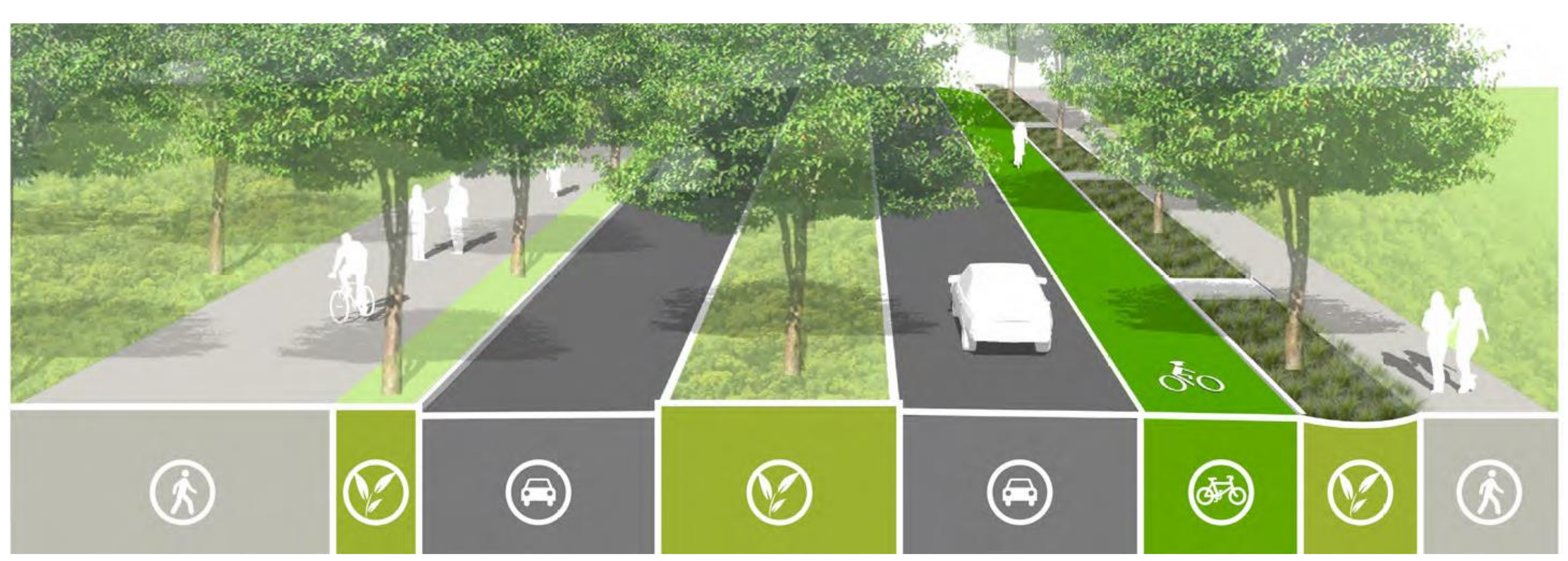
GREEN STREETS



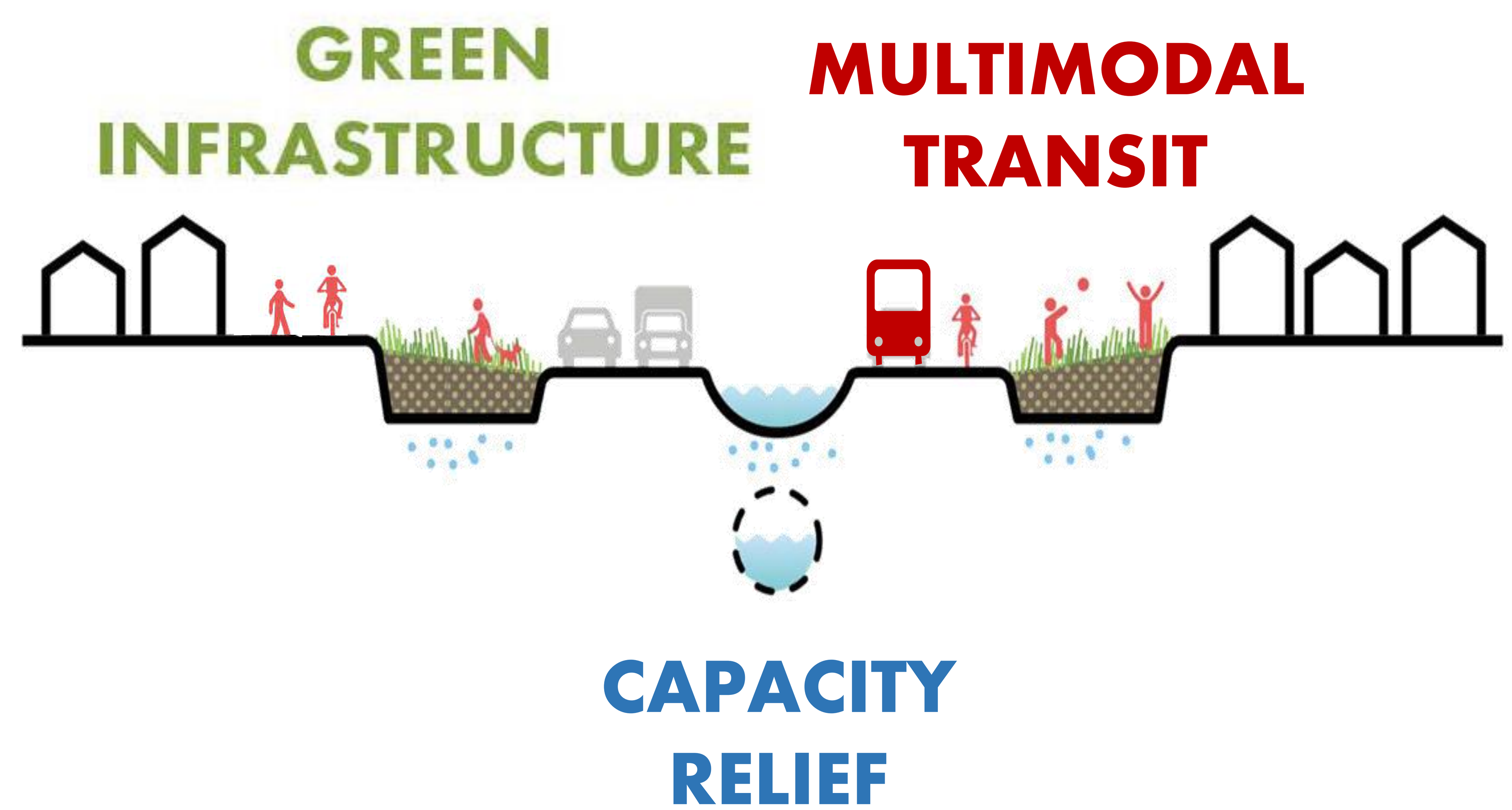


BLUE STREETS





ARTERIES



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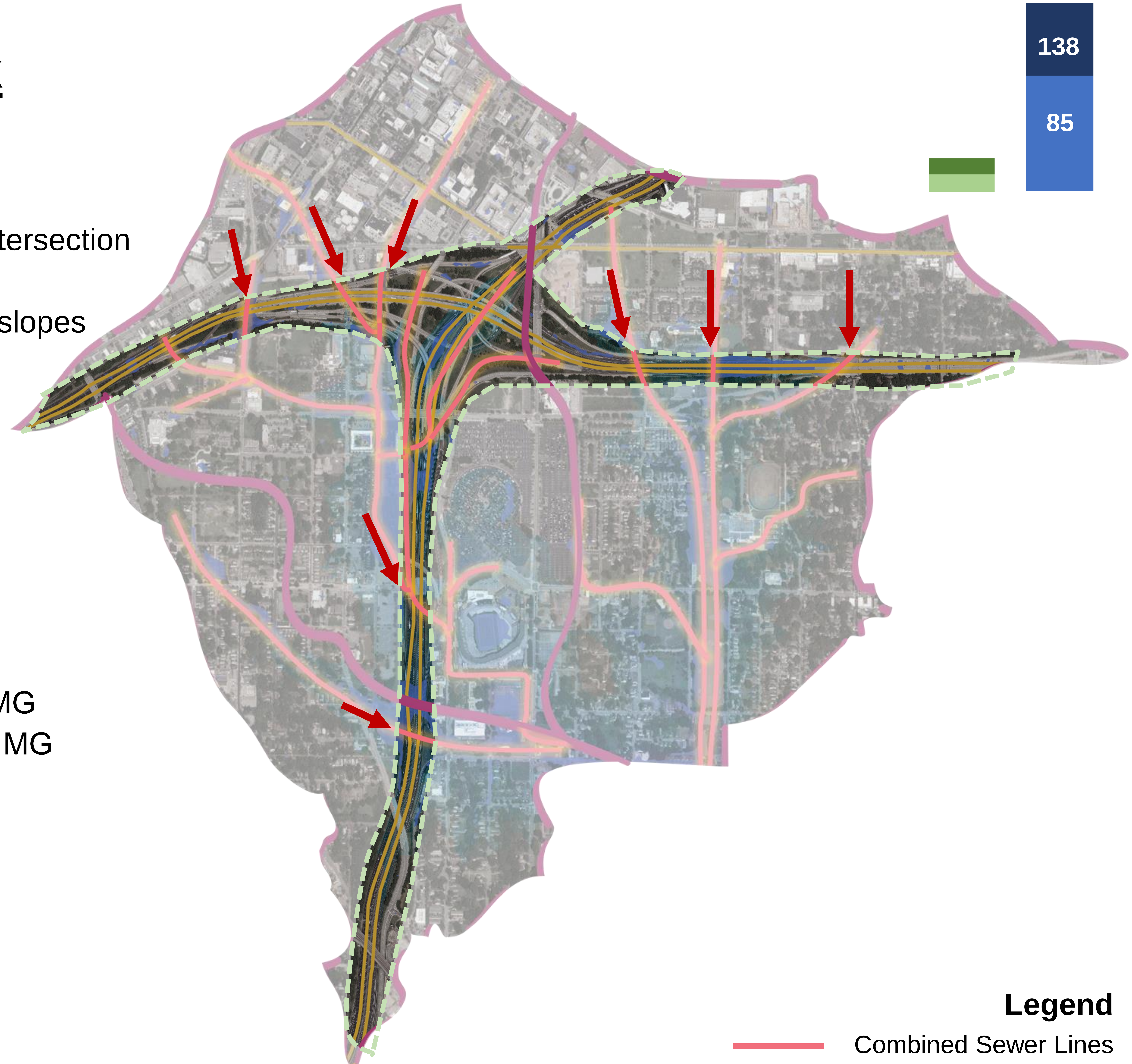
Upper Intrenchment Creek

Highway Basins

Highway Drainage Characteristics

- Construction required pipe realignment at intersection
- Hydraulic “dams” to upper basin
- Exacerbates crossing shallow pipe/channel slopes



Runoff Flood Impact

- Area ≈ 130 Acres
- Contribution in 25 year (4hr) Event ≈ 12.8 MG
- Contribution in 100 year (6hr) Event ≈ 24.6 MG

Legend

Combined Sewer Lines
Pipe Basin Boundaries
Highway “Dam” Impact

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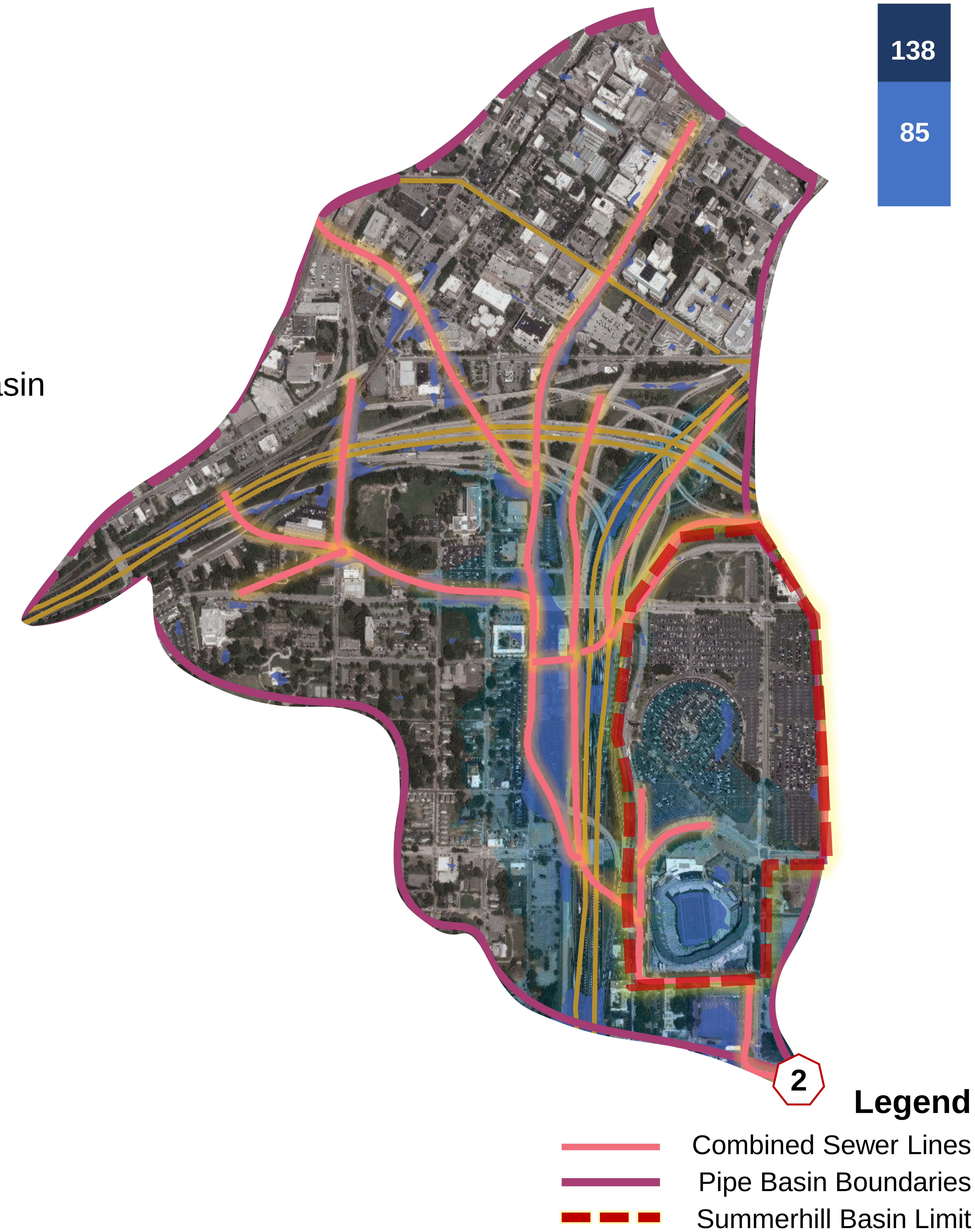
Upper Intrenchment Creek

Downtown Basin

General Basin Characteristics

- High elevation relative to junction elevation
- Large proportion of impervious area compared to overall basin
- Minimal greenspace and impervious disconnects



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Upper Intrenchment Creek

Central Ave Flooding Area

Central Avenue Basin Characteristics

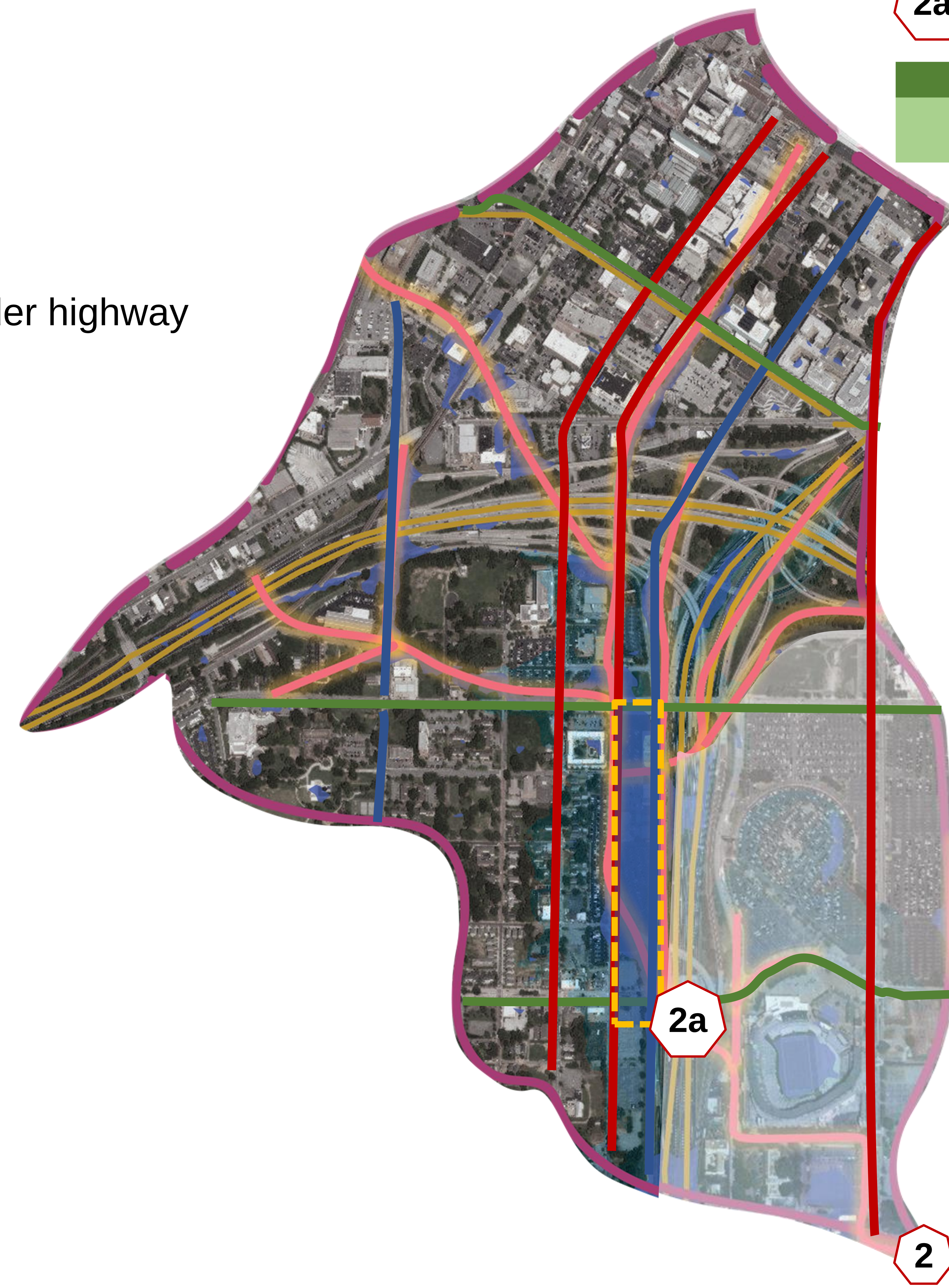
- High elevation relative to junction elevation
- All Downtown flows and flooding pass through sites and under highway
- Minimal existing buildings, currently surface parking

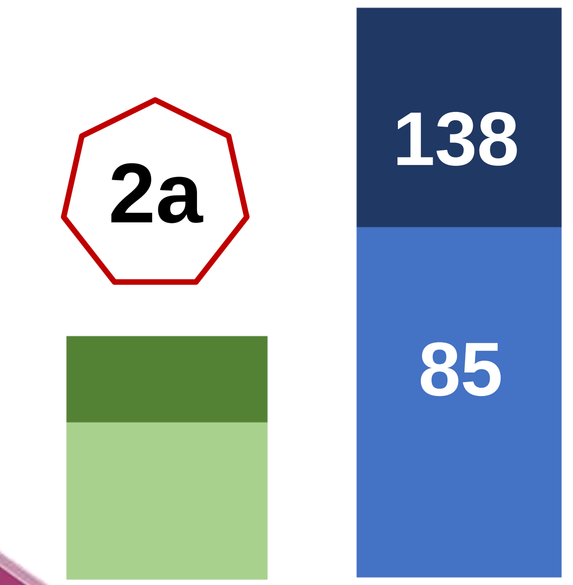
Basin Characteristics	Basin 2a	Basin 2
Acreage	492.8	588.8
Impervious	**76.7%**	**77.4%**
Impervious Acreage	378.0	455.7

Runoff Flood Impact		
25 year (4hr) Event (MG)	38	45
100 year (6hr) Event (MG)	59	70

Legend

- Combined Sewer Lines
- Pipe Basin Boundaries
- Central Ave Flooding Area
- Channel Roads – Conveyance
- Spanning Roads – Sponge
- Arterial Roads – Connectivity





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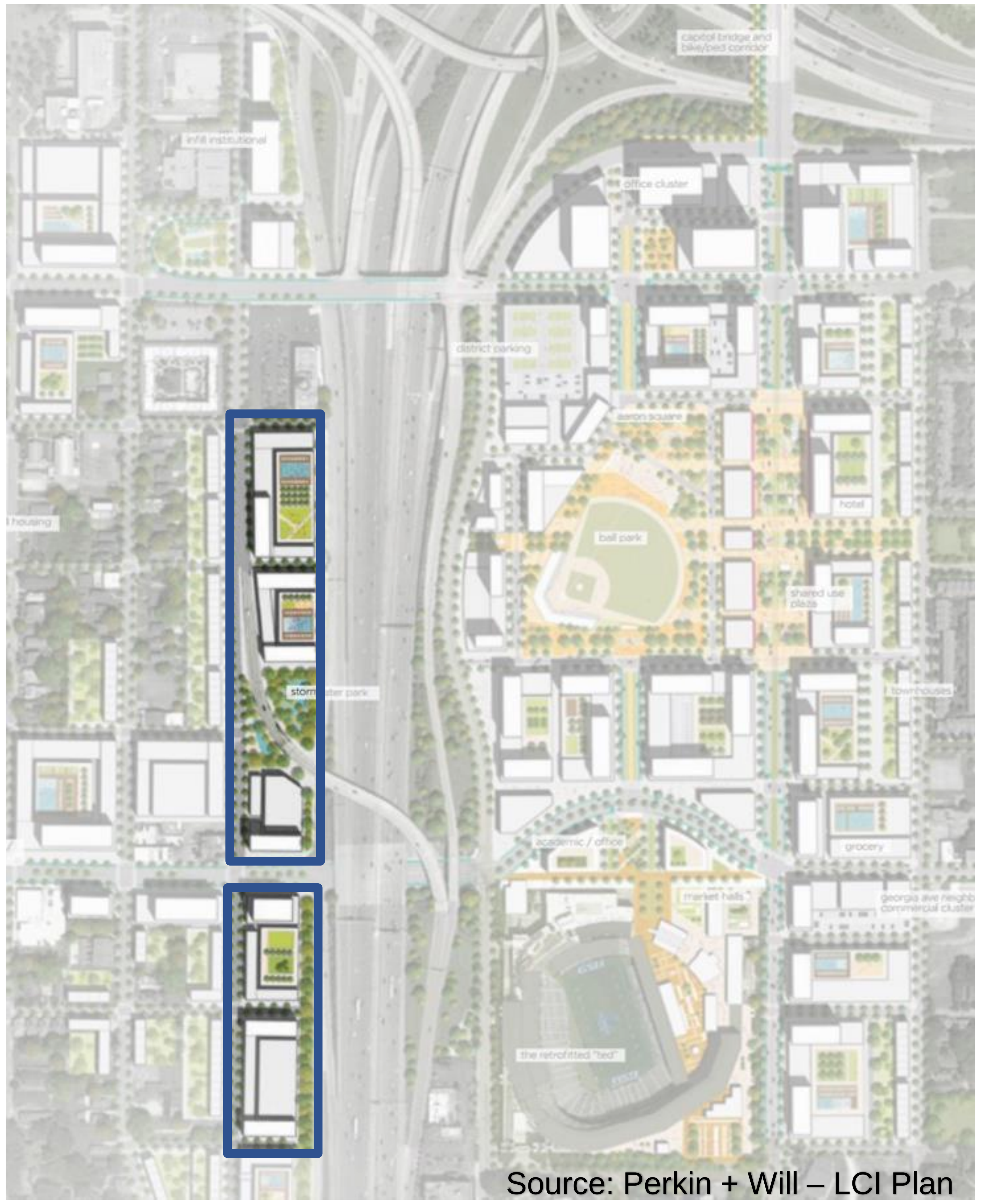
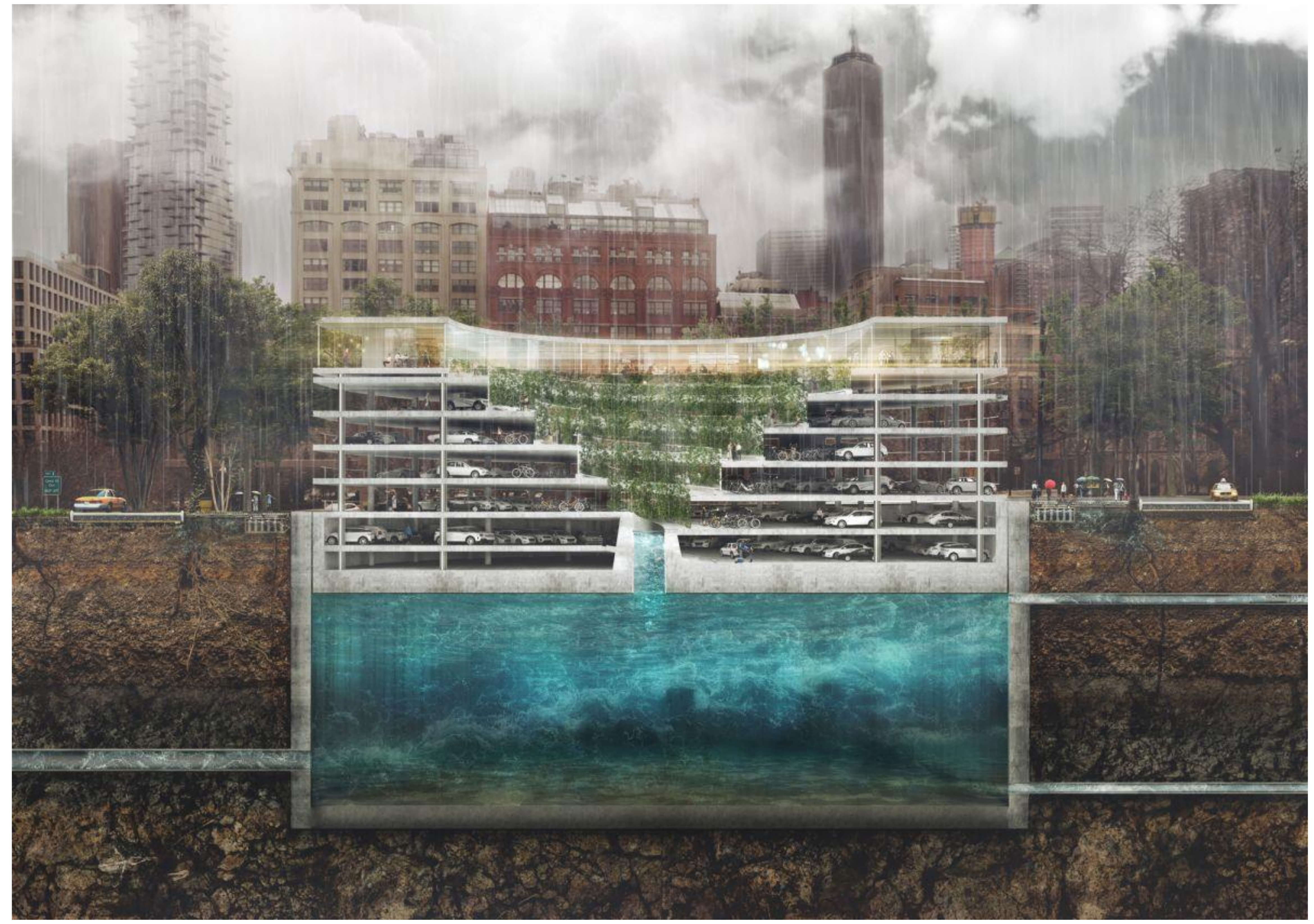
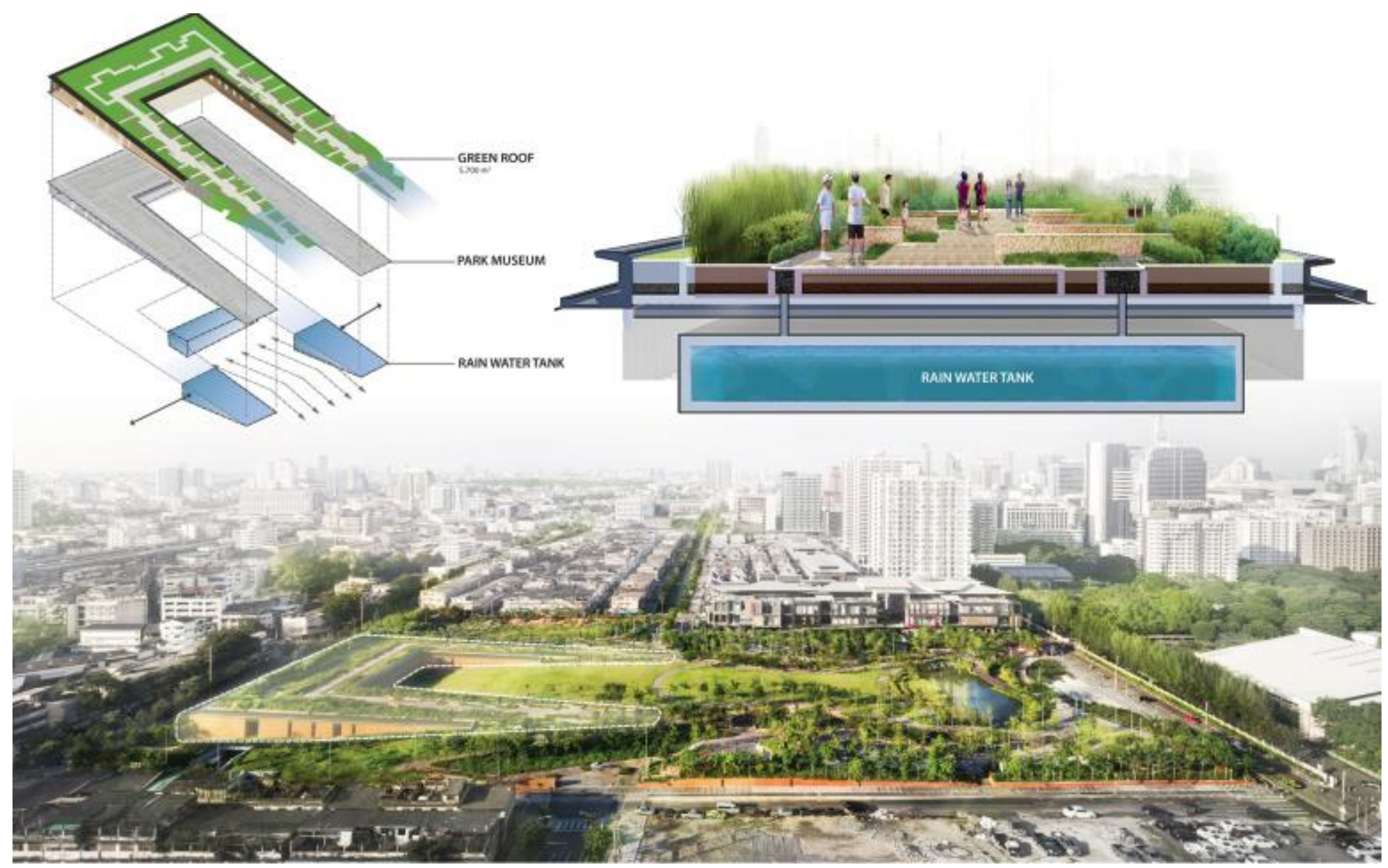
Upper Intrenchment Creek

Central Ave Flooding Area



Source: Perkin + Will – LCI Plan





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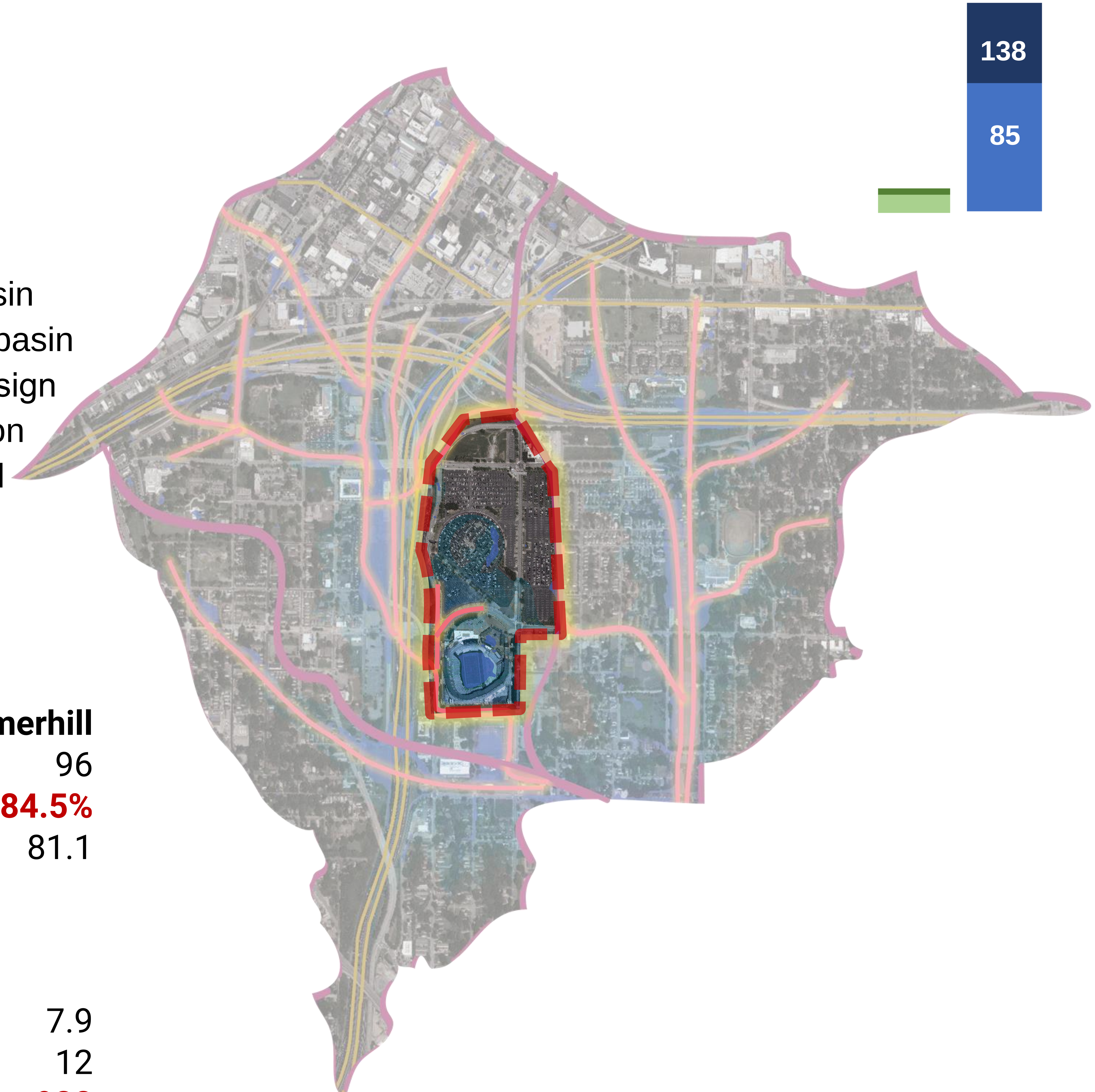
Upper Intrenchment Creek

Summerhill Basin Contribution

Summerhill Basin Characteristics

- The largest connected impervious area in the entire basin
- The largest proposed development by land area in the basin
- Centrally located “hub” that can catalyze connective design
- Pipe Outfall Elevation much lower than Ground Elevation
  - Backup will occur in the lower basin when pipe is full



Basin Characteristics	Upper Intrenchment Creek	Summerhill
Acreage	1286.4	96
Impervious	**64.6%**	**84.5%**
Impervious Acreage	830.6	81.1
Runoff Flood Impact		
25 year (4hr) Event (MG)	85	7.9
100 year (6hr) Event (MG)	138	12
Minimum basin elevation	**909**	**932**
Pipe Outfall Elevation	≈ 885	**909**

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Upper Intrenchment Creek

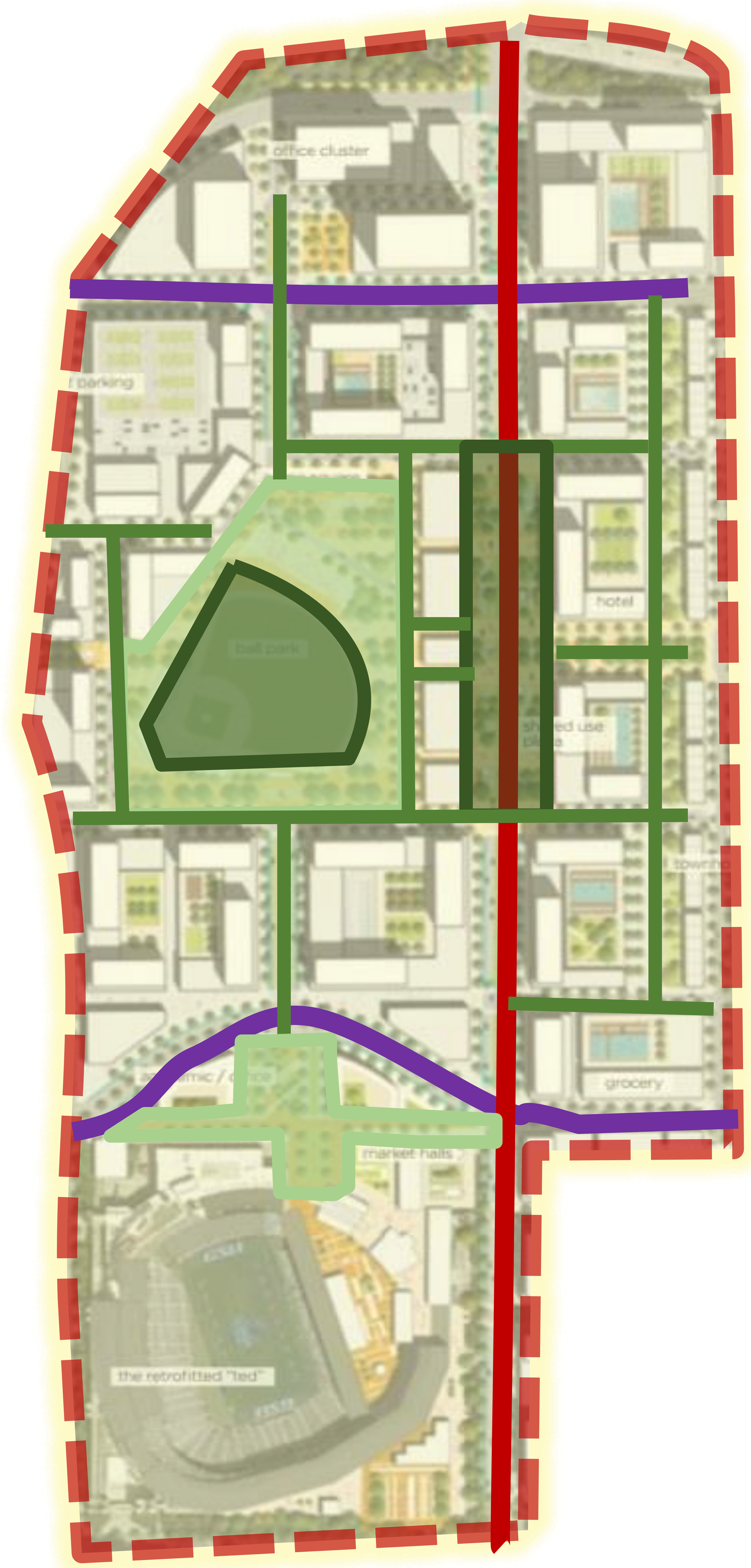
Summerhill Basin

Opportunities

1. **Promote development wide infiltration.**
   - Direct impervious areas to permeable nodes
   - Minimize slopes and velocities to promote retention time
   - Evaluate areas of unsuitable soils and protect soils that can infiltrate
   - If site-based infiltration is not feasible explore regional and reuse option

2. **Organize corridors with performative landscape sections**
   - Pavers, Narrow infiltration strips & conveyance
   - Bio-swales, vegetated swales, connective GI
   - Storage and infiltration nodes
   - Optimize road corridors to integrate green infrastructure and development overflow connections

3. **Optimize outfall to maximize upstream infiltration/storage before conveyance to combined sewer system**



Source: Perkin + Will – LCI Plan

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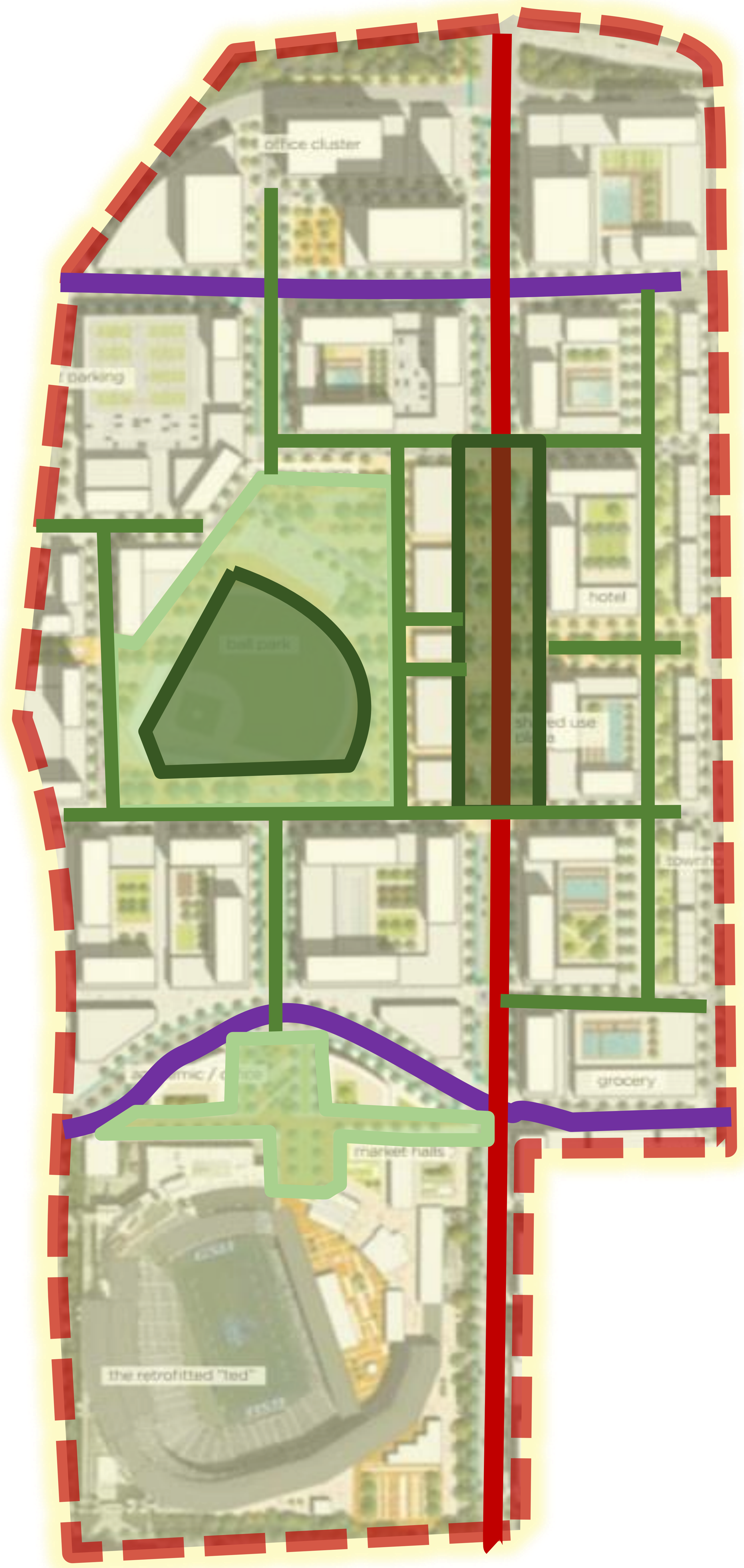
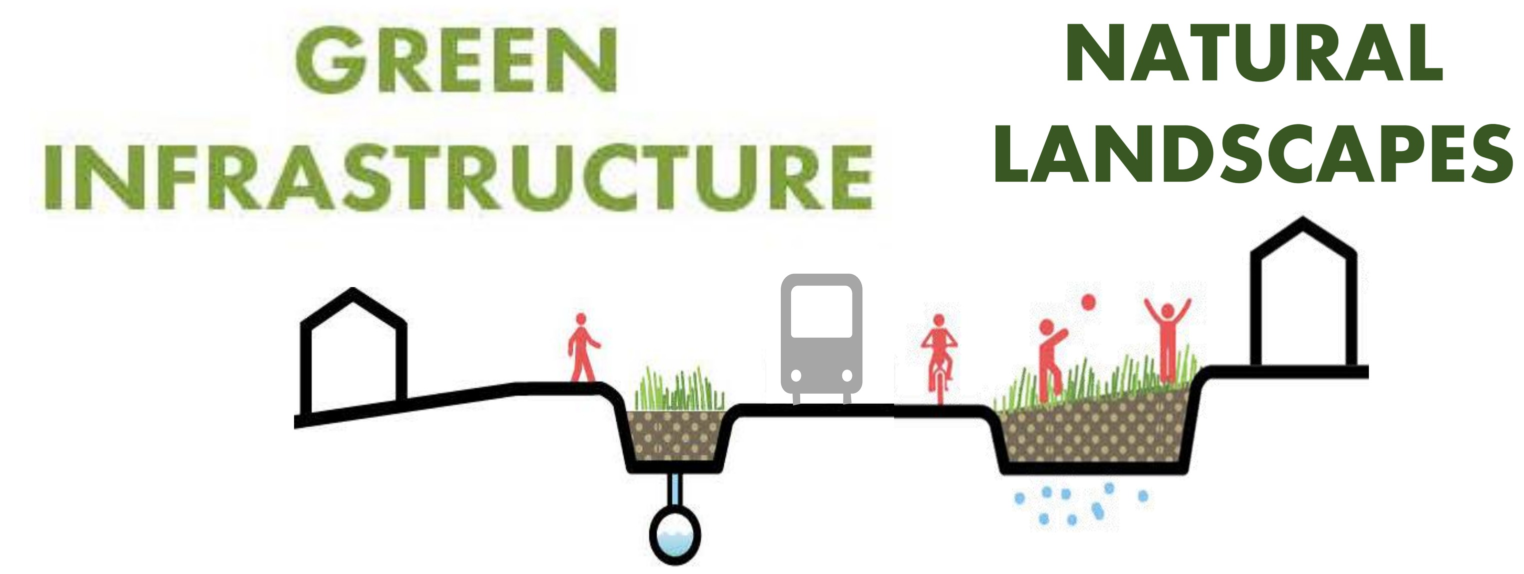
Summerhill Redevelopment

Performative Circulation Opportunities

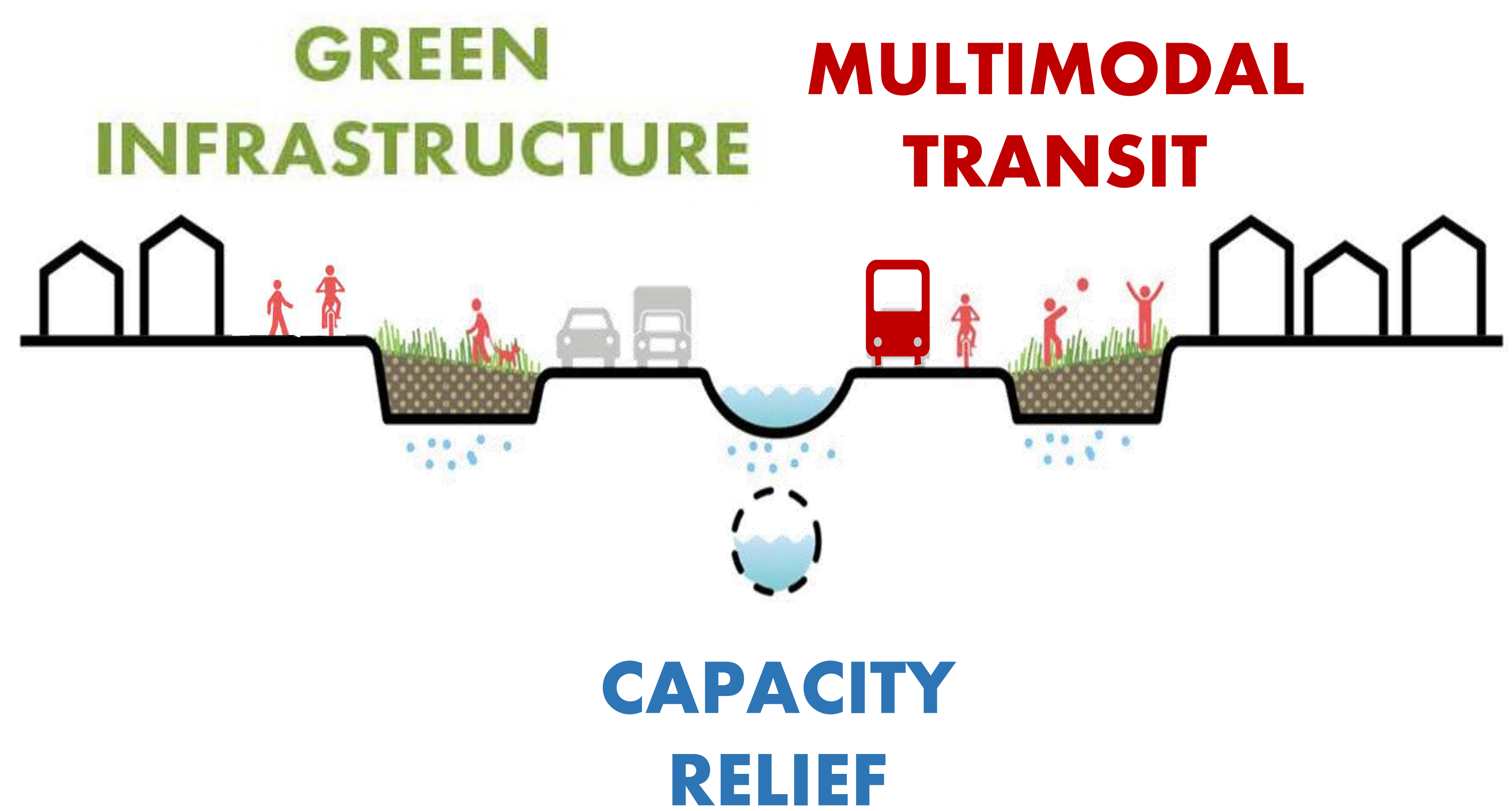


PATHWAYS



STREETS

ARTERIES



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Summerhill Redevelopment

GSU Stormwater Opportunities

GSU Stormwater Master Plan

- Reducing detention costs for complying with CoA stormwater management requirements
- Allows future development to occur without new stormwater systems construction costs
- Increased developable land area
- Immediate impacts to downstream communities not tied to future development to occurring first
- Reducing runoff pollution and combined sewer overflows to downstream waterways

Basin Characteristics	**Baseball Field**	**Stadium Plaza**
Acreage	7.75	2.57
Existing Impervious	**100%**	**95%**
Impervious Acreage	7.75	2.57
Runoff Contribution		
1” event (MG)	0.20	0.06
Average per year (MG)	10	3.3
25 year (4hr) Event (MG)	0.73	0.24
100 year (6hr) Event (MG)	1.1	0.35

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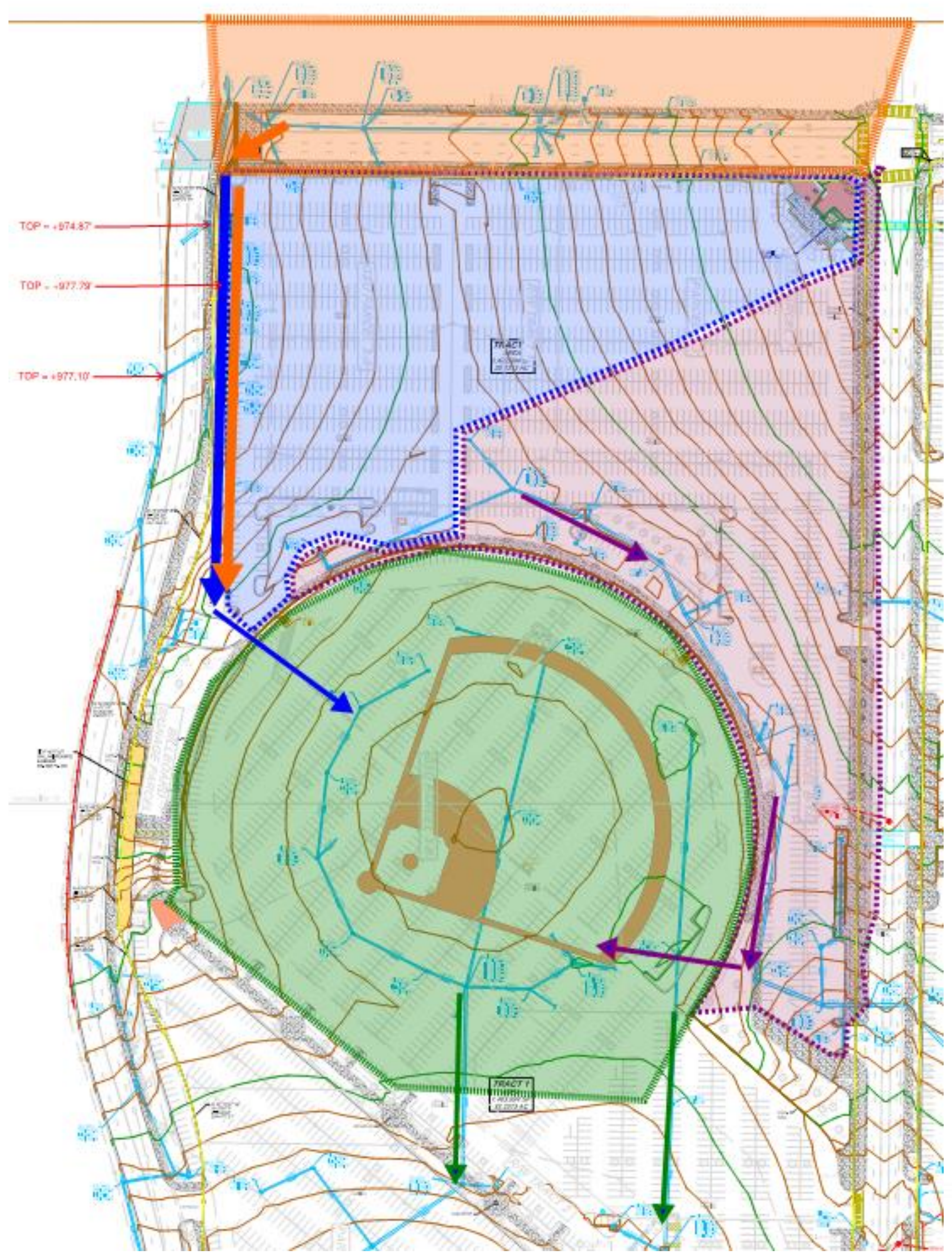
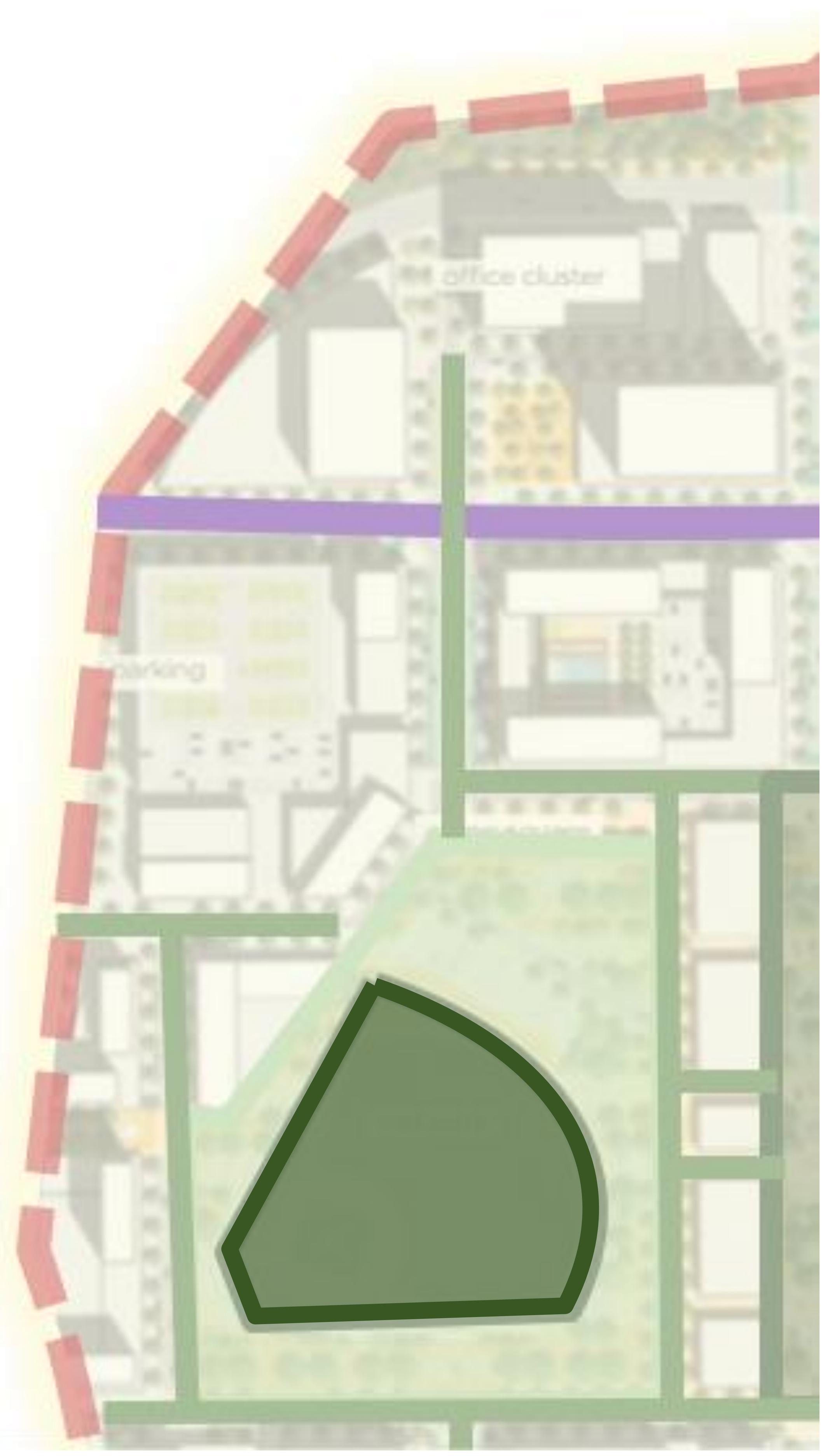
Summerhill Redevelopment

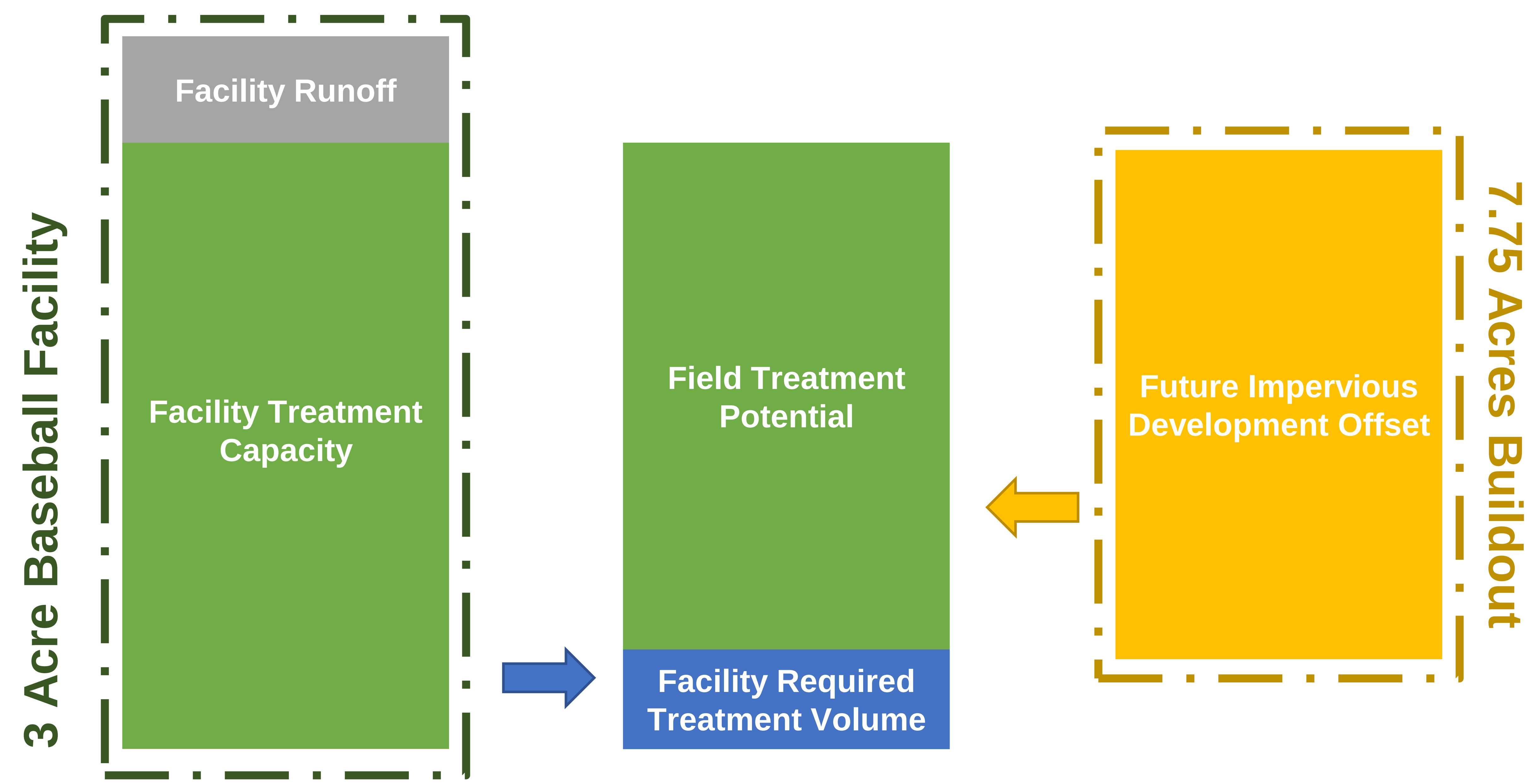
GSU Stormwater Opportunities





By redirecting stormwater from the surrounding district to the baseball field the benefits widen to include:

- Larger landscape footprints & ecological influence
- Centralized treatment system & maintenance
- Resilience to future interruptions to water supplies and drought
- Reducing water costs



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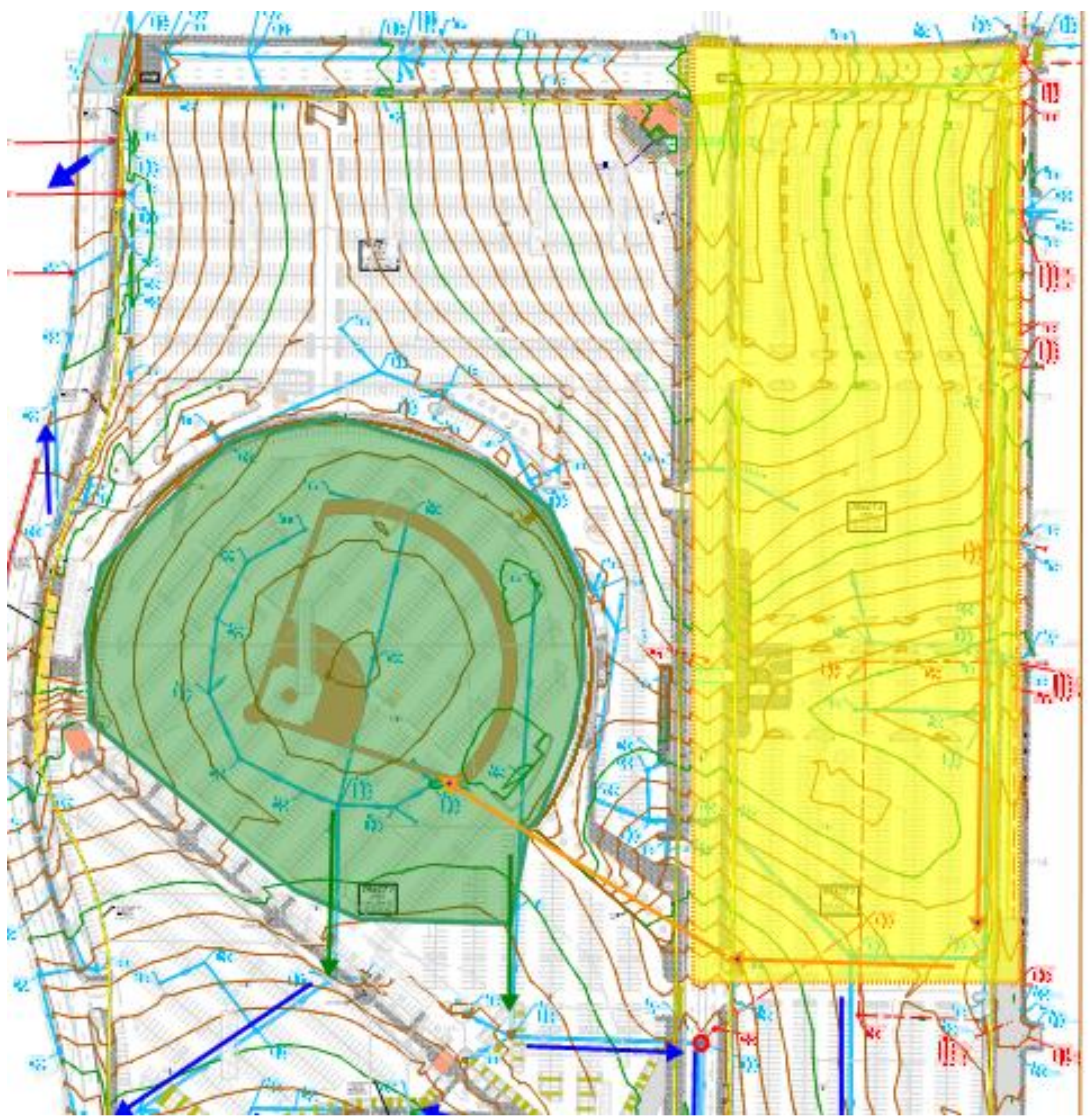
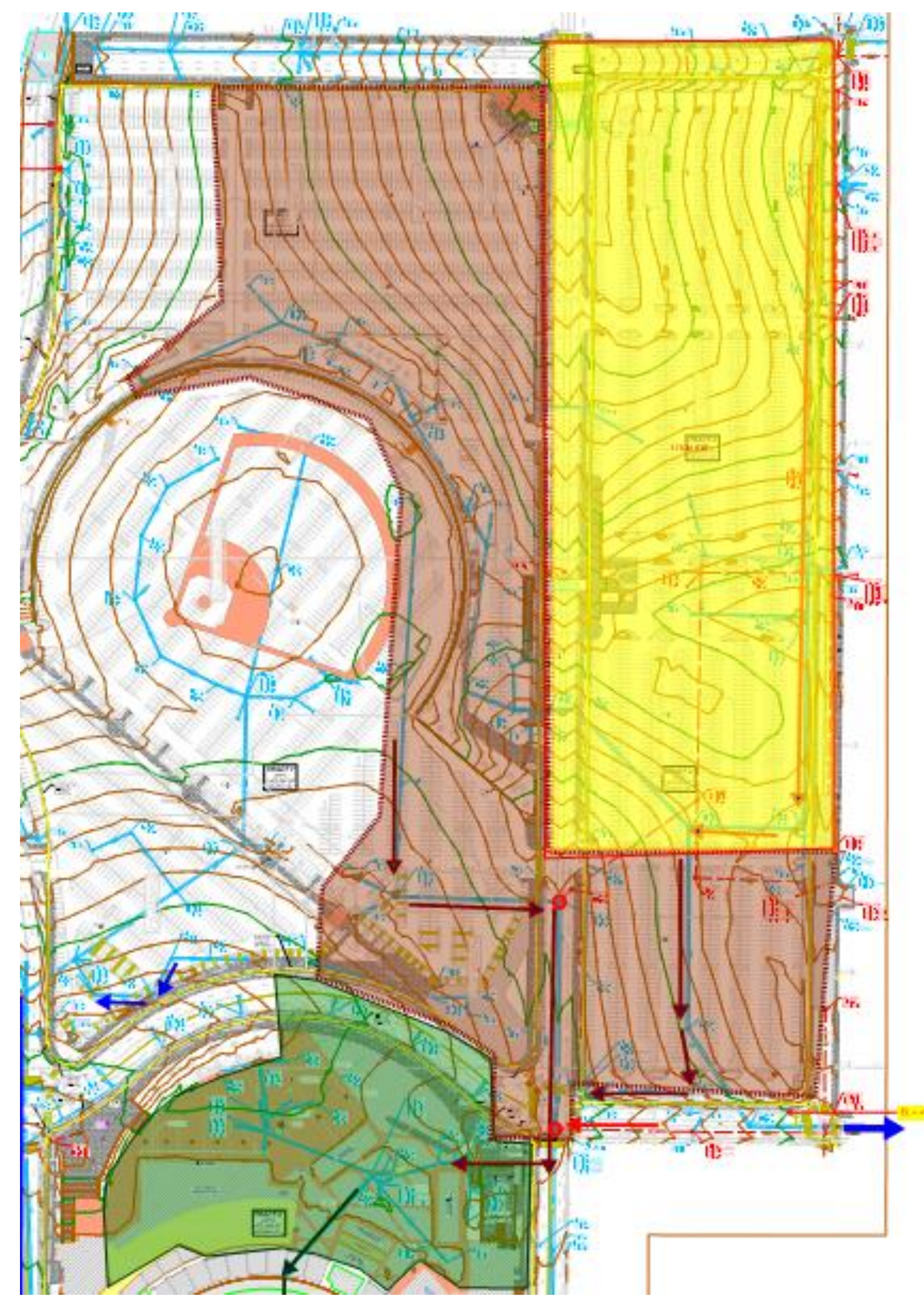
Summerhill Redevelopment

GSU & Carter Stormwater Partnership Opportunities

Direct Northeast Quadrant to Baseball Field
- 4.03 Acres of Impervious Surface
- Total Baseball Field Storage Impacts
  - 11.78 Acres
  - 25 year = 1.11 Million Gallons
  - 100 year = 1.67 Million Gallons



Redirect Existing Storm Line to Panther Stadium Plaza
- 9.07 Acres of Impervious Surface
- Total Plaza Storage Impacts
  - 10.58 Acres
  - 25 year = 1.00 Million Gallons
  - 100 year = 1.50 Million Gallons



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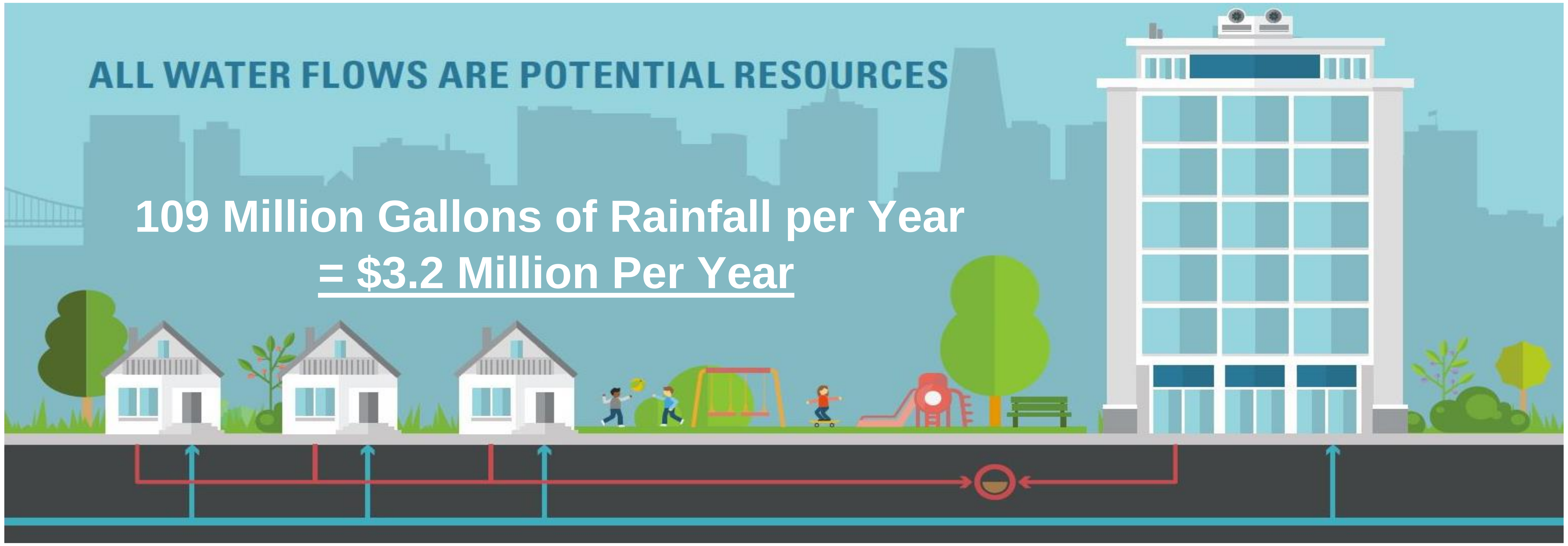
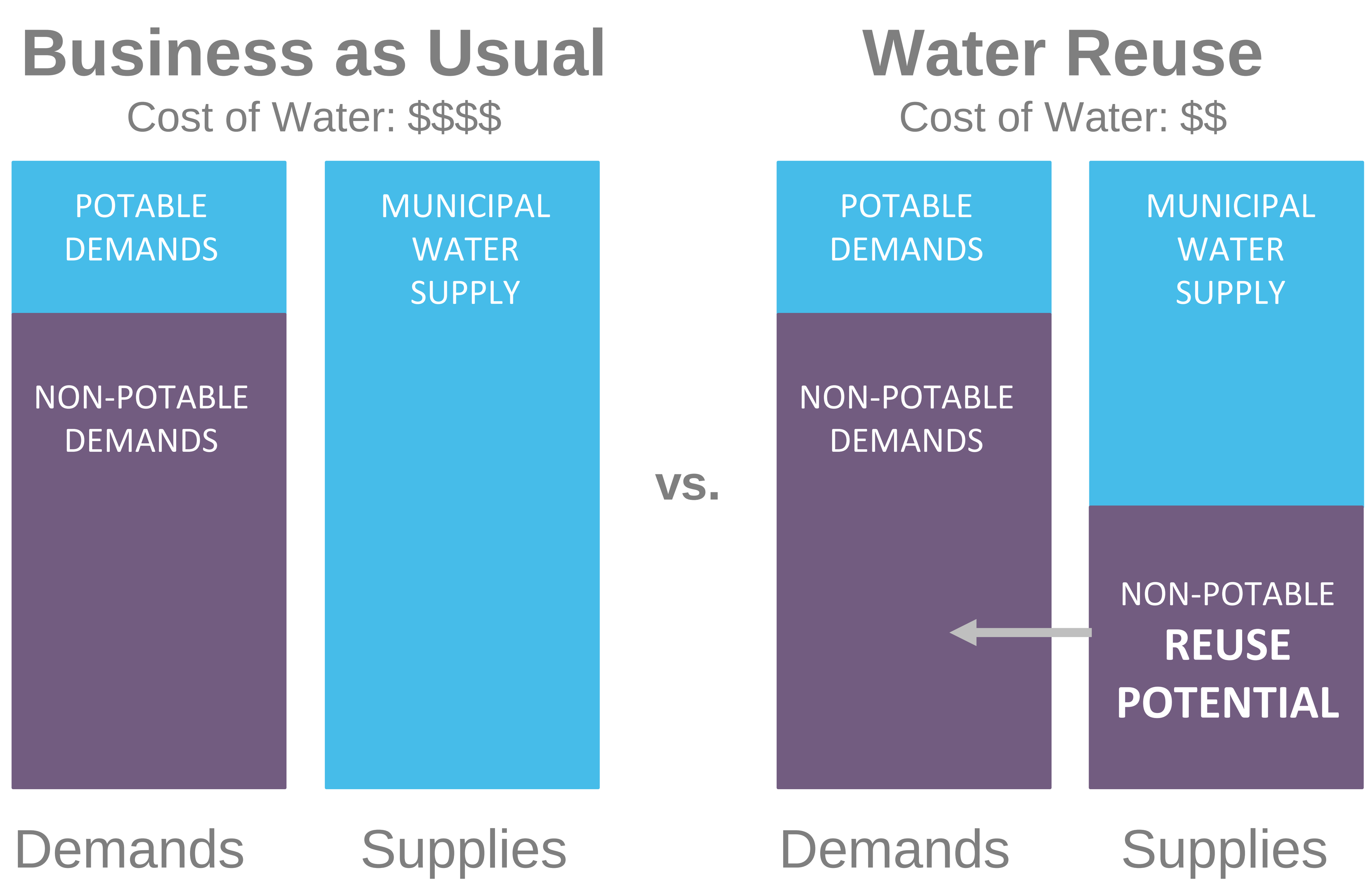
Summerhill Redevelopment

Summerhill Stormwater Opportunities





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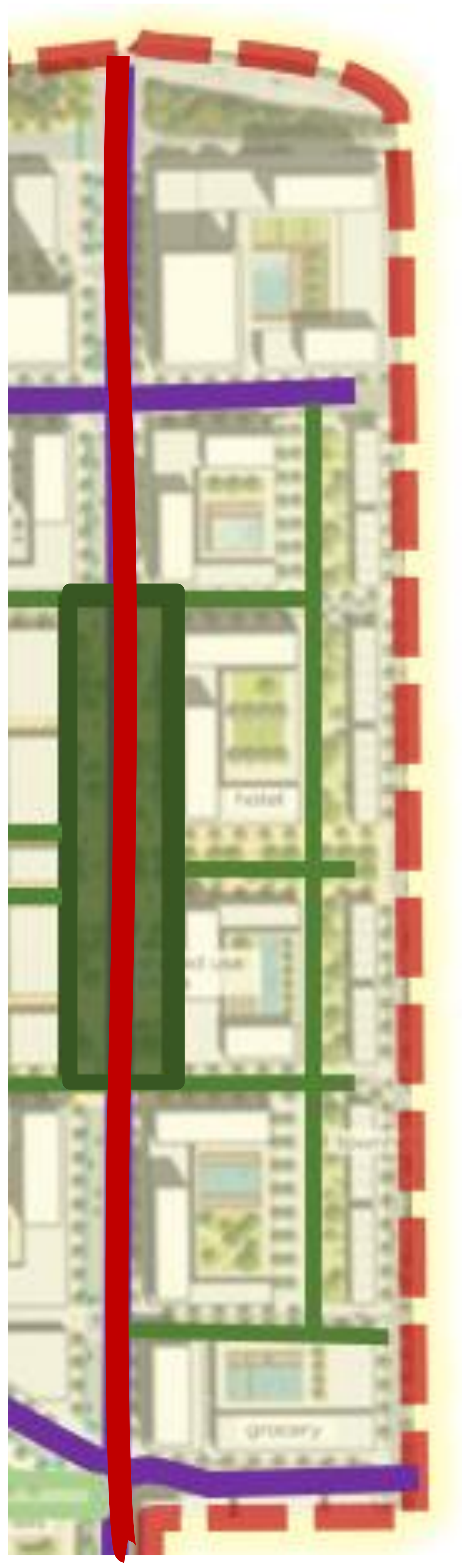
Summerhill Redevelopment

Connective Network to Multimodal Plaza Node



Roadway Characteristics

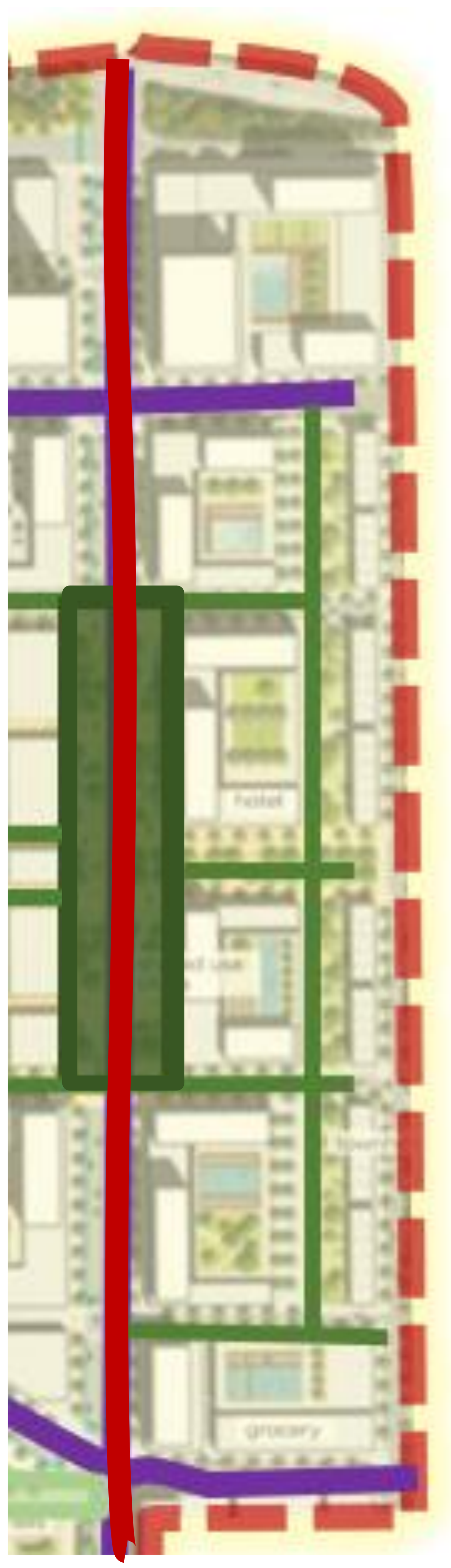
- New roadways are proposed to connect future blocks and lots
- Walkways and local streets connect the development internally
- Regional streets and arteries cross though the development connecting the surrounding neighborhoods
- Bus Rapid Transit and a multimodal hub is proposed to connect the development to Downtown and the Capital

Roadway Runoff Contribution

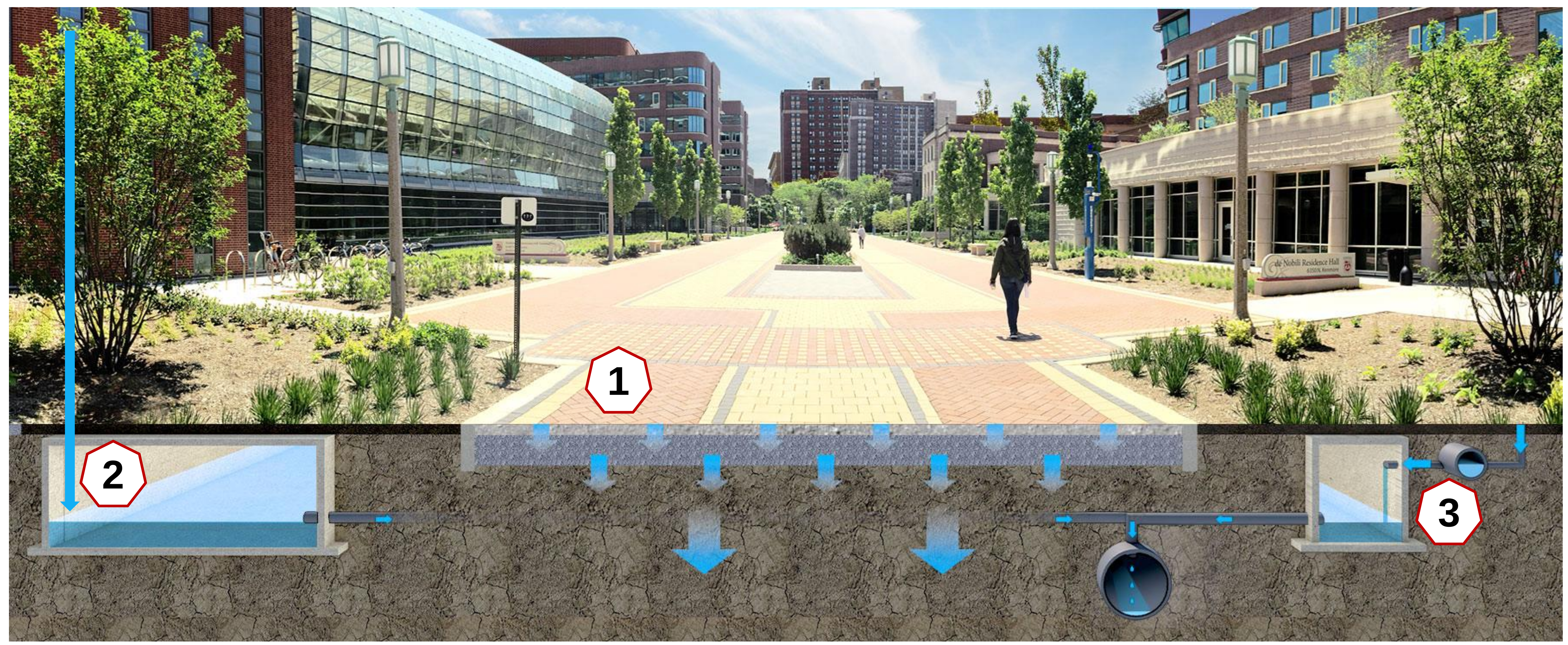
- Impervious Area ≈ 7.38 Acres
- Contribution in 25 year (4hr) Event ≈ 700,000 Gallons
- Contribution in 100 year (6hr) Event ≈ 1.0 MG

Summerhill Redevelopment

Connective Network to Multimodal Plaza Node



By aligning sustainable stormwater designs with new roadway/plaza footprints; a connective system of green infrastructure can leverage the impacts of individual blocks and connect the community through infrastructure and ecology.



1. PERMEABLE PAVERS: Allow rainwater to percolate directly into the soil to reduce runoff
2. CISTERNS: The roof of adjacent buildings can be directed to cisterns for regional reuse and irrigation
3. STORAGE VAULT: Rainwater from basins can be collected and detained before entering the city's sewer system.

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Source: Loyola University Chicago

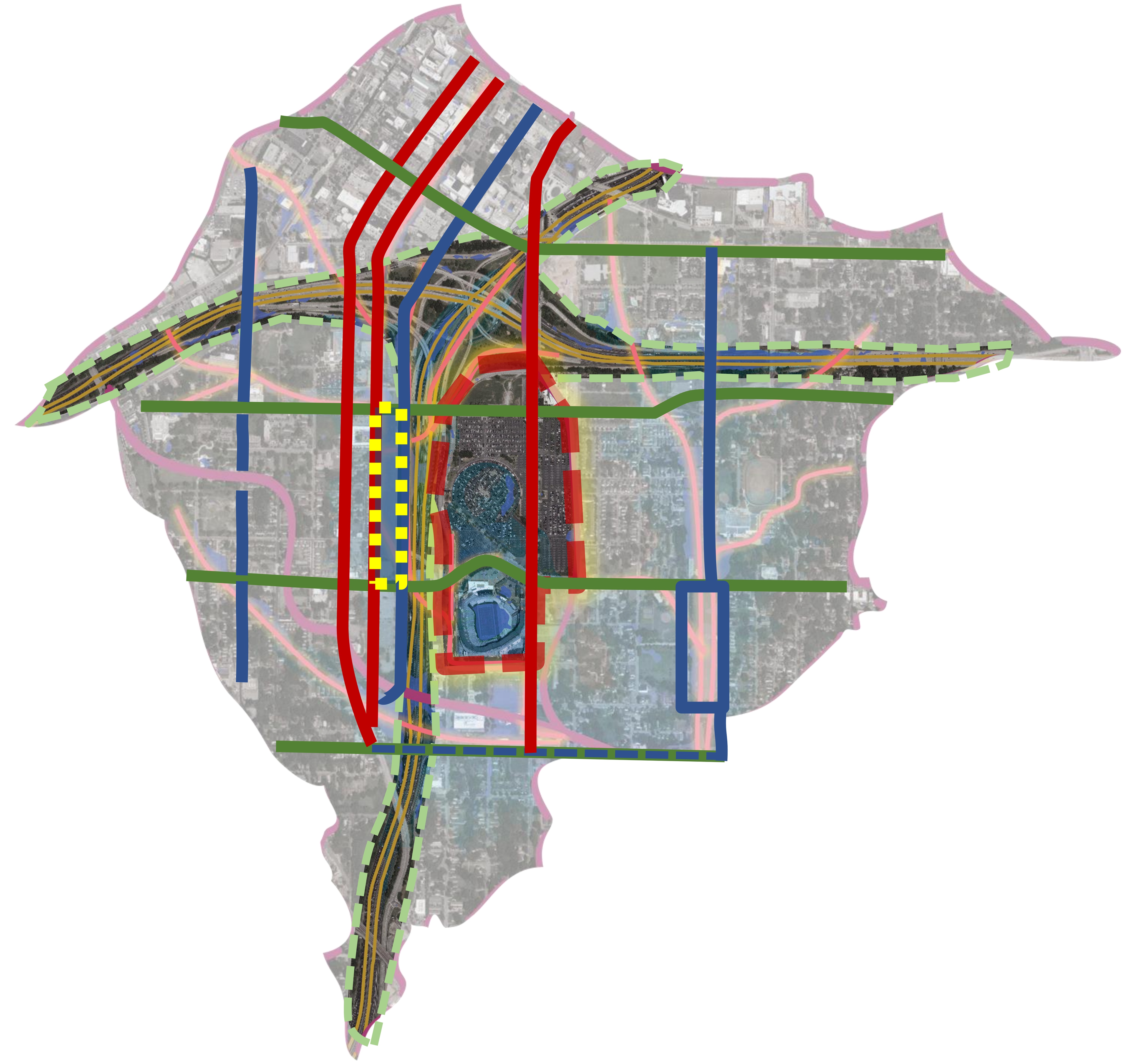
Upper Intrenchment Creek

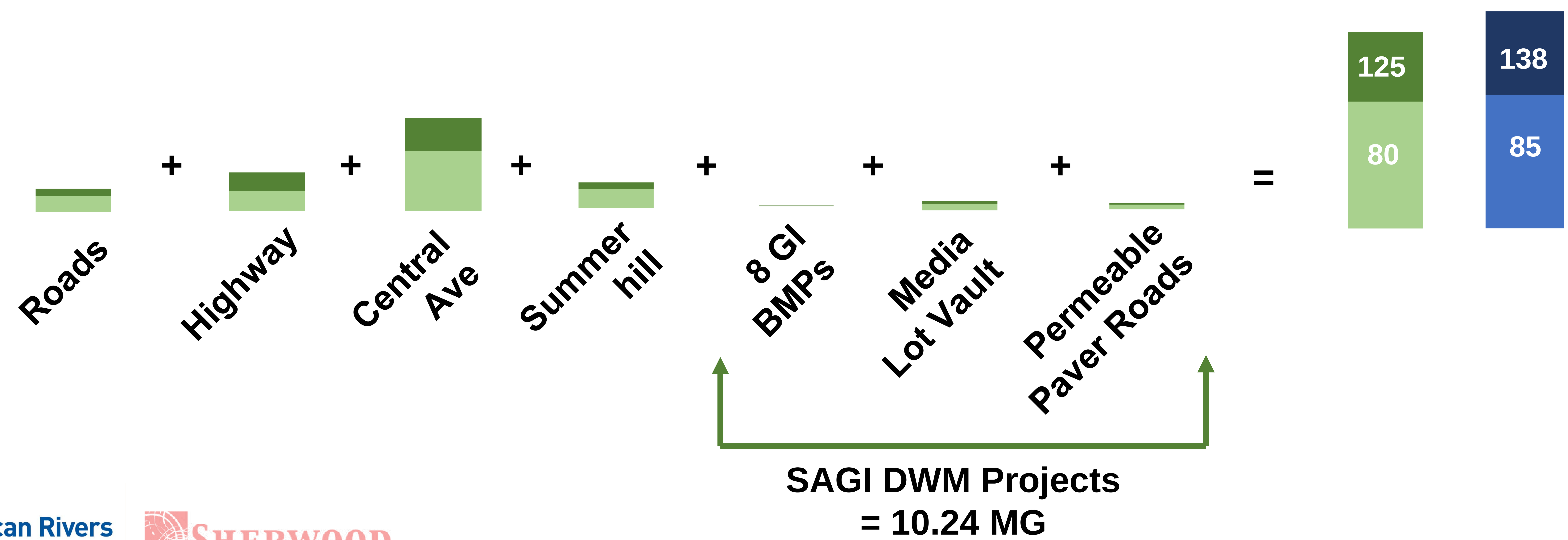
An Integrated Approach

By integrating the redevelopment of Summerhill, Central Avenue, the roadways that connect the basin, and completed CoA SAGI Projects:

1. Phase 1: 8 GI BMPs - 0.34 MG
2. Phase 2: Media Lot Vault - 5.9 MG
3. Phase 2: 4 mi Permeable Paver Roads + 32 Stormwater Planters - 4.0 MG

over **90% of all runoff** in the basin can be managed to mitigate downstream flooding, combined sewer overflows, and ecological degradation.





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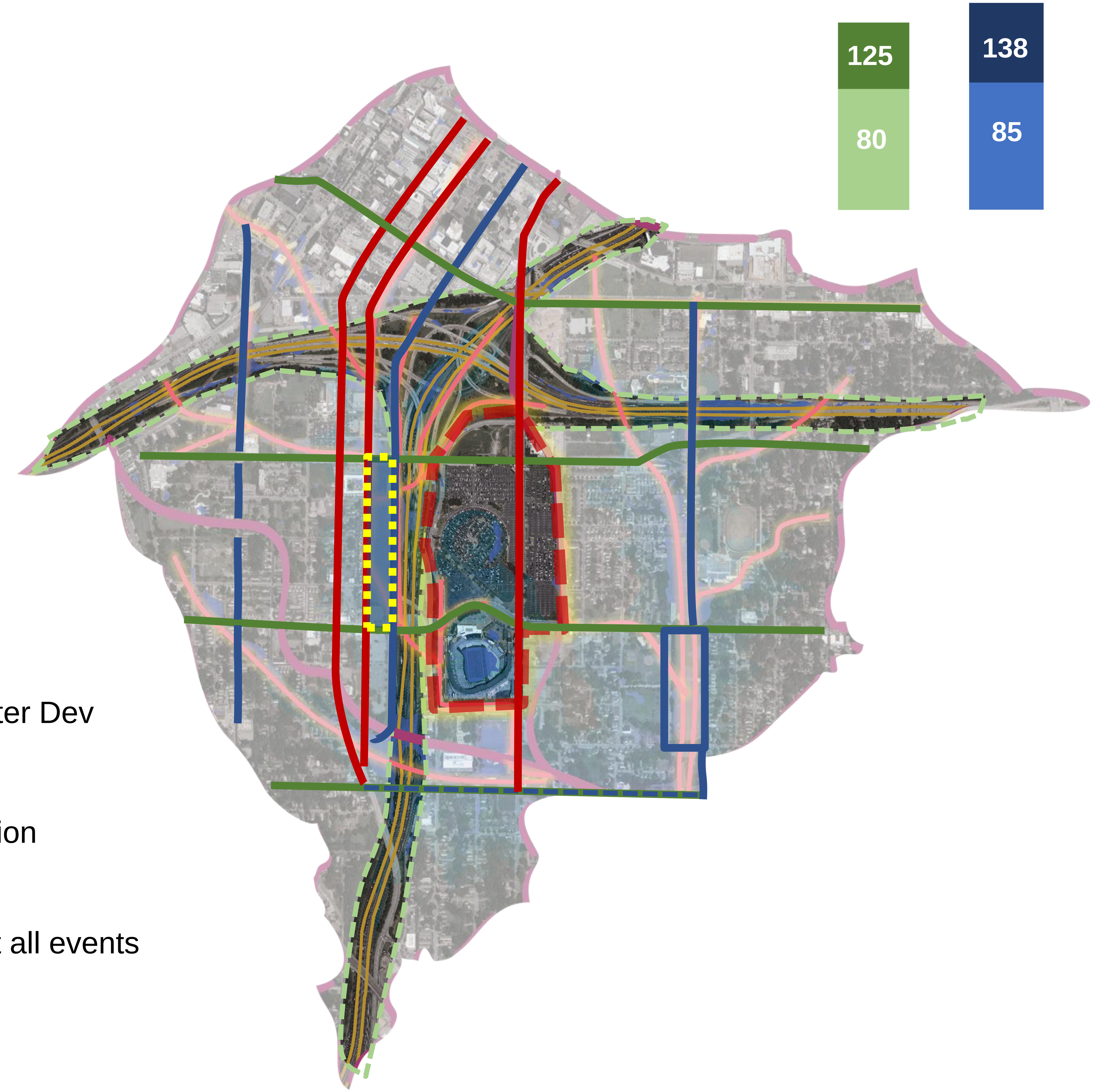
Upper Intrenchment Creek

An Integrated Approach

Recommended Projects

1. Carter:
   - Parcel By Parcel GI
   - Robust implementation of the COA ordinance
   - Road GI Integration
   - Connect to GSU regional stormwater capture
   - Reuse water from GSU regional stormwater capture
   - Active Outfall Controls – Dynamic Valve
2. GSU
   - Baseball Field Central Hub
   - Traditional GI
   - Plaza Permeable Paver Area – Central Hub
   - Road GI Integration
   - Stormwater Master Plan – Incorporate Flows from Carter Dev
   - Active Outfall Controls – Dynamic Valve
3. DWM / Atl-DOT / DPW / MARTA
   - Road/Transit Redevelopment and Stormwater Integration
   - Central Avenue Stormwater/Development Conditions
   - Bus Rapid Transit Plaza
   - Dynamic Valve Retrofit for Media Lot Storage – Impact all events
   - Creative Financing and Environmental Impact Bonds
   - Mapping and Modeling Assistance
   - Data Sharing
4. GDOT
   - Continued Implementation of GI Retrofits
   - Coordinate with CoA on pipe elevations at highway crossings



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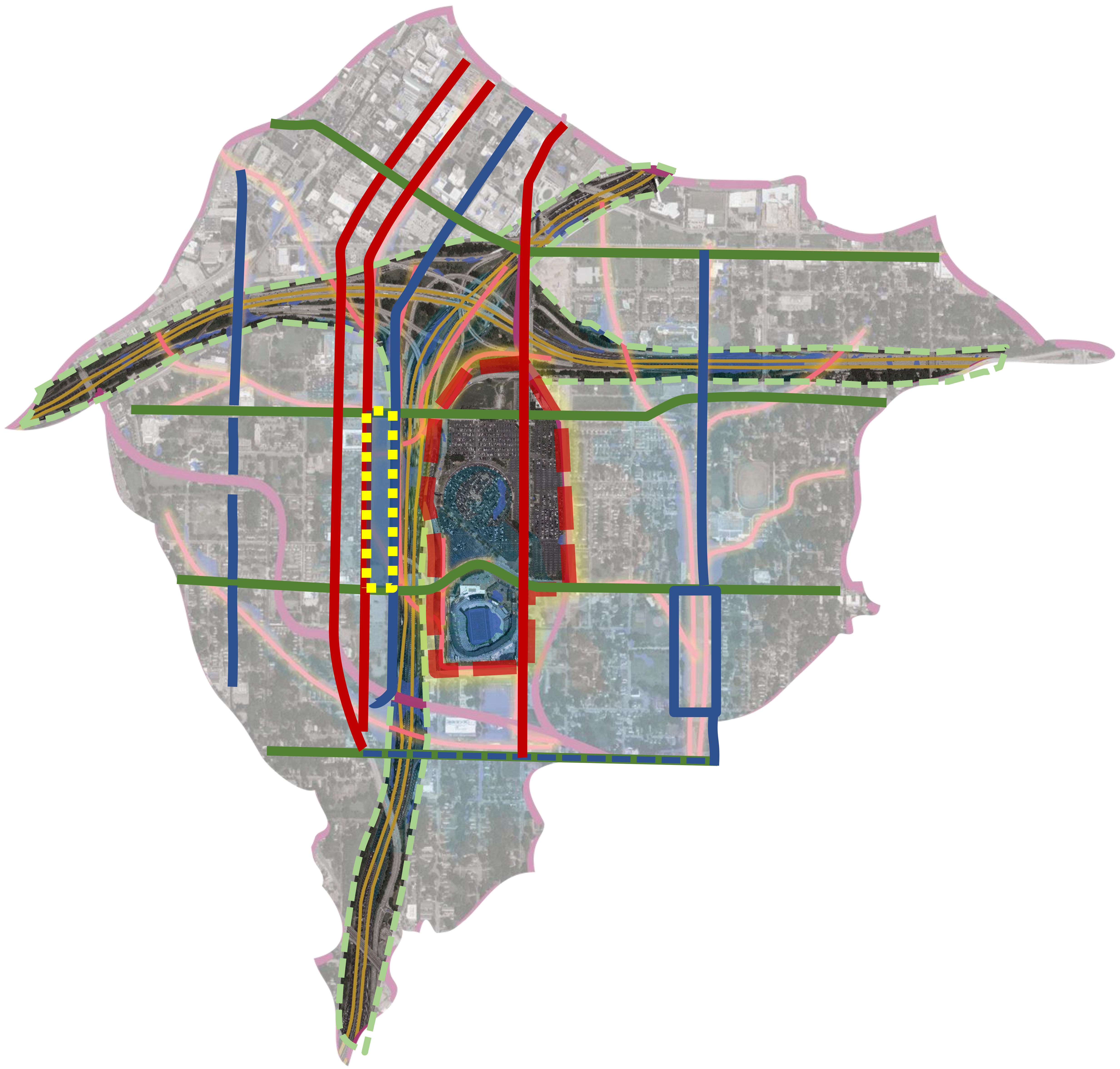
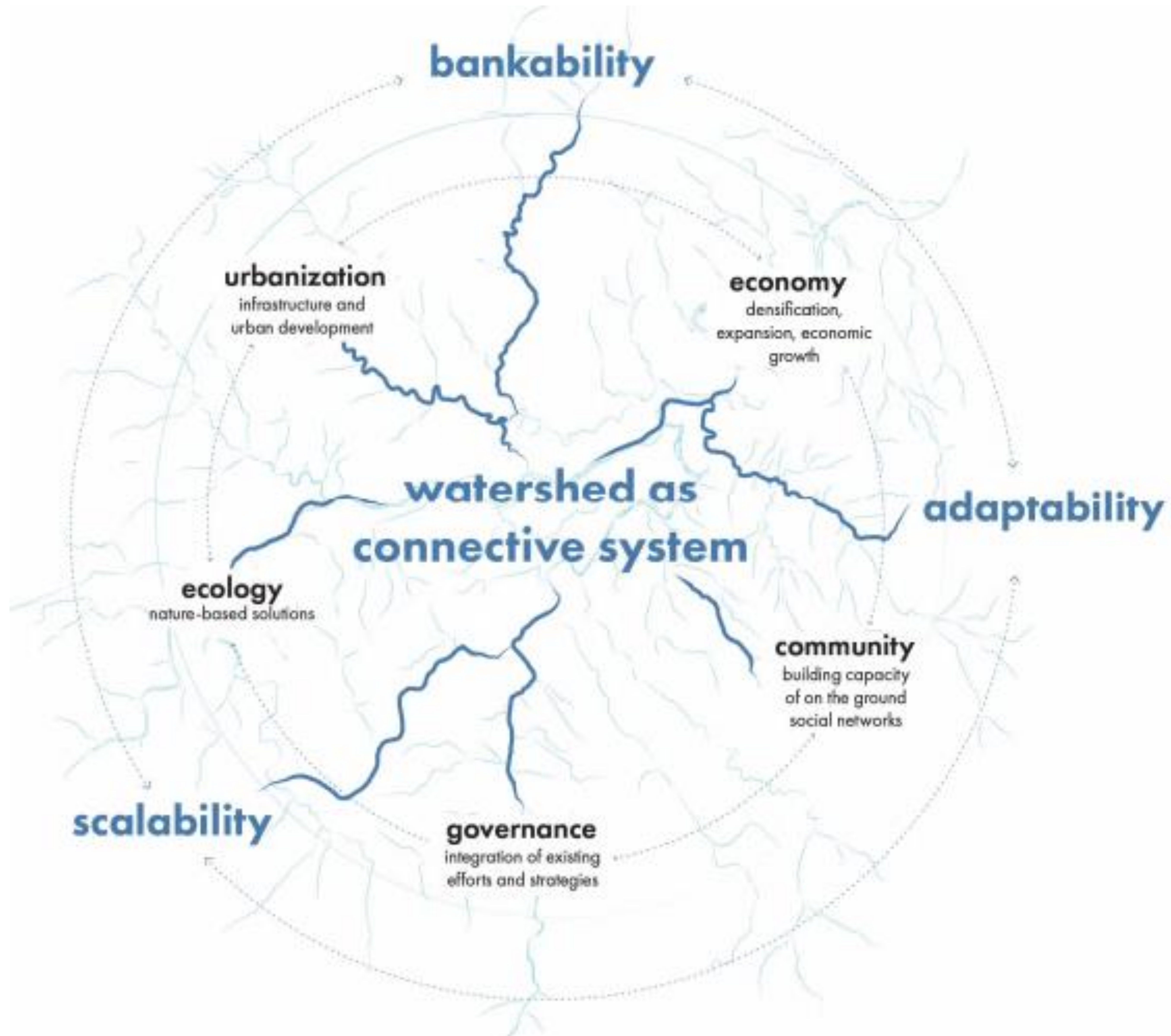
Upper Intrenchment Creek

Transforming Flooding Impacts into Community Benefits





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Source: ONE Architecture

Upper Intrenchment Creek

Transforming Flooding Impacts into Community Benefits

Existing Community Impacts

IMPACT ON VULNERABLE COMMUNITIES

Uplands
- Erosive Flows

Lowlands
- Localized Flooding
- Combined Sewer Surcharge
- Property Damage
- Reduced Pipe Capacity

NATURE

Uplands
- Steep Slope
- High Velocity

Lowlands
- Flat Topography
- Basin Junctions

INDUSTRY

Uplands
- Impervious Area
- Combined Sewer Flows

Lowlands
- Accumulated Runoff
- Pipe Elevations
- Inlet Capacity

Proposed Community Benefits

SOCIAL ECOSYSTEM

Uplands
- Headwater Stewardship
- Community Education
- Green Jobs

Lowlands
- Flood Plain Maintenance
- Monitoring and Communication

NATURAL ECOSYSTEM

Uplands
- Green Infrastructure
- Restored Tree Canopy
- Reduced Urban Heat Island

Lowlands
- Stream Restoration
- Wetland Habitats

INDUSTRIAL ECOSYSTEM

Uplands
- Water Reuse
- Blue Infrastructure
- Urban Agriculture

Lowlands
- Sewer Separation
- Flood Storage

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