Innovative Approach to Select and Implement Green Infrastructure Practices within Public ROW Areas

Nirali Desai, Arcadis

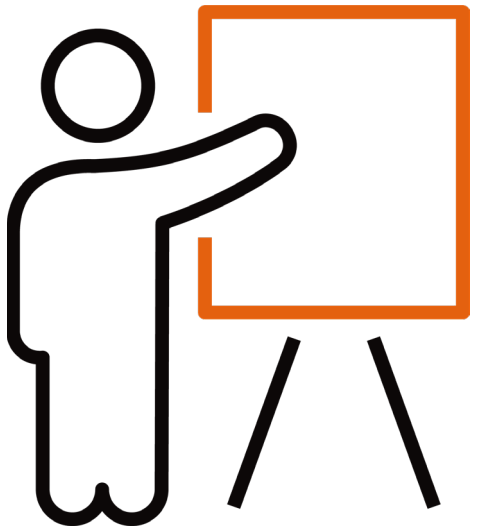
Michael Moscariello, Arcadis

Agenda

1. Introduction
2. Planning and Site Selection Process
3. Innovative approaches to the design of Green Infrastructure
4. Conclusion and Discussion

© Arcadis 2022

Introduction

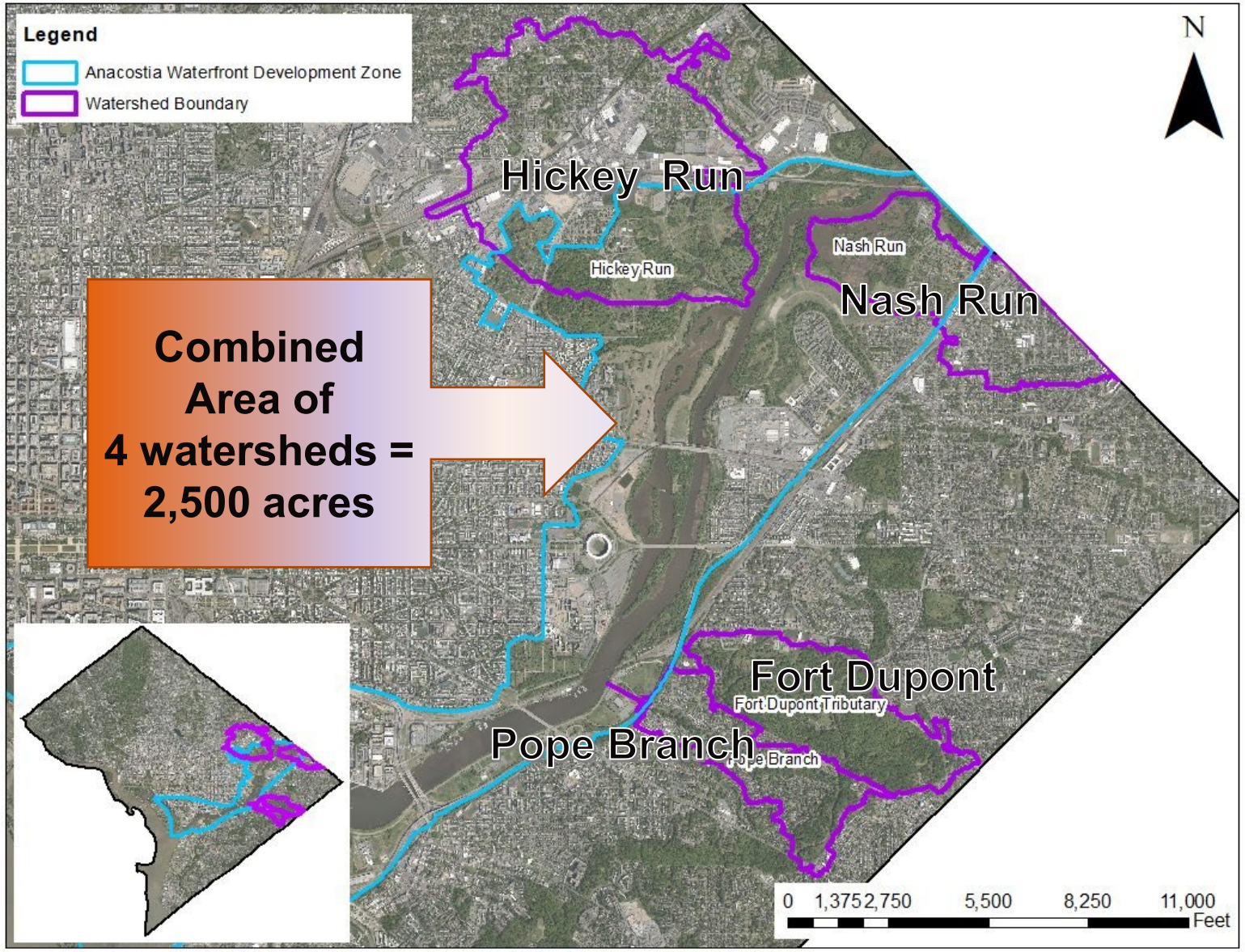


A case study of GI planning and design within four sub-watersheds in District of Columbia's Anacostia Watershed

- **Purpose** – Retrofit areas within public right of way (ROW) of District Department of Transportation (DDOT)
- **Goal of the project** – identify and select sites for GI practices to capture and treat runoff from 10 acres of impervious area within the ROW of the four project watersheds
- **Challenges**
  - Selecting sites in large watershed areas
  - Manage stormwater in separate stormwater areas
  - Design in urban residential areas

© Arcadis 2022

Four Sub-Watersheds



Planning and Site Selection Process

Site Selection Process – Utilized a GIS-based automated screening tool that incorporates available infrastructure and utility data to provide a high-level evaluation of favorable potential GI BMP locations.

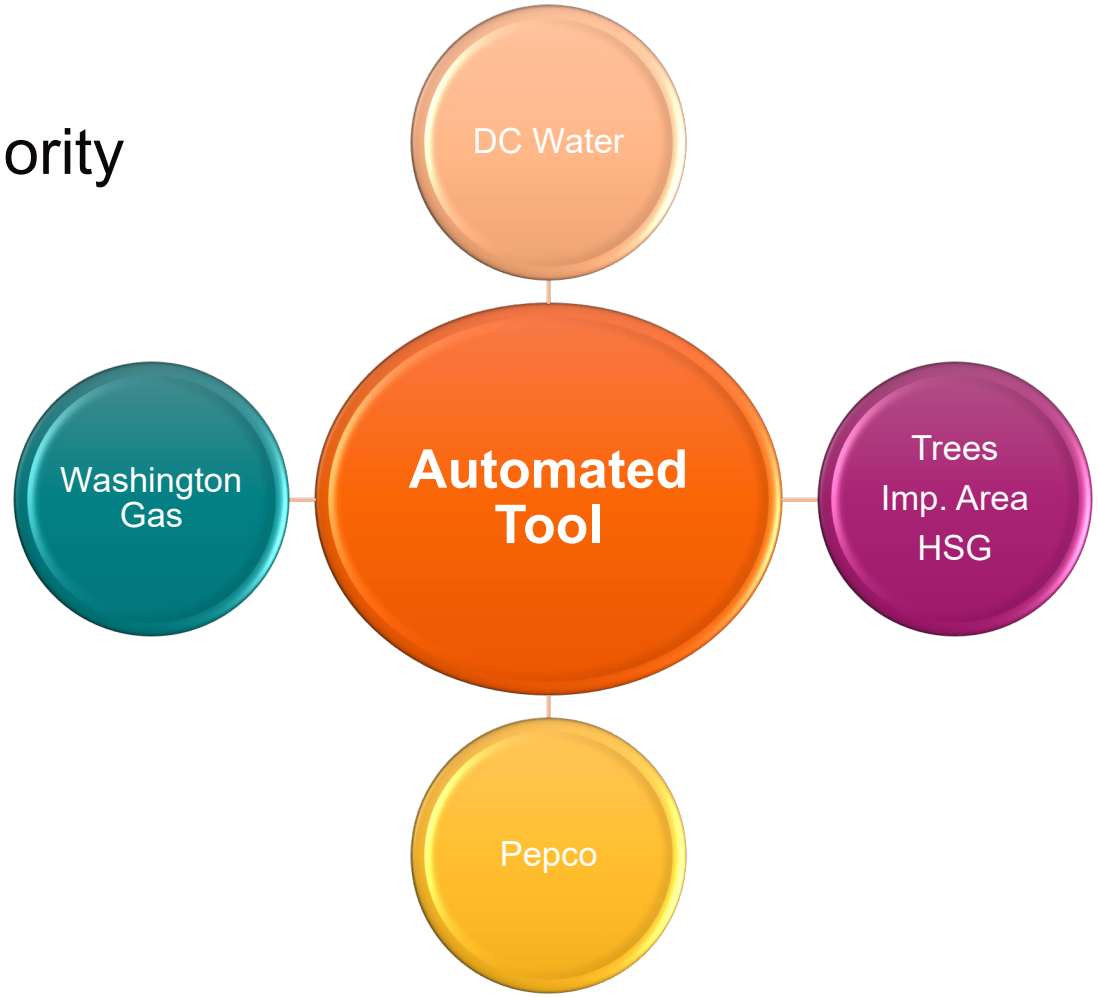
Four-step process

© Arcadis 2022

Four-step process

Step 1: Acquire Infrastructure and Utility Data

- District of Columbia Water and Sewer Authority
- Washington Gas
- Pepco
- Open Data DC and Miscellaneous
  - Trees
  - Impervious surfaces
  - Hydrologic Soil Data



© Arcadis 2022

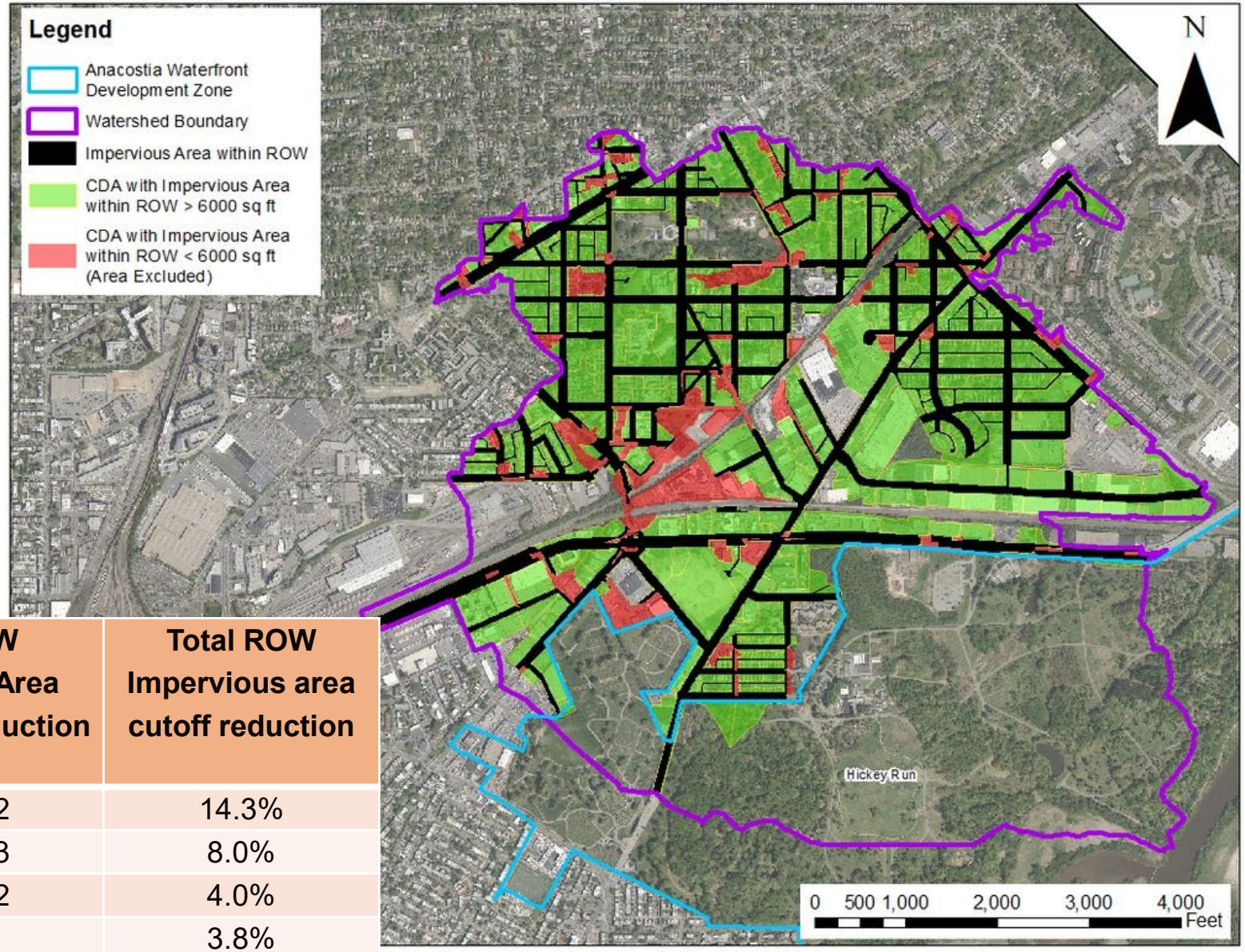
Step 2: Impervious Area Availability

1. Determine Contributing Drainage Area for each catch basin
2. Impervious area within the ROW
3. Apply minimum impervious area cut-off

© Arcadis 2022

Step 2: Contd.

Impervious Area within the ROW with 6,000 SF cutoff Reduction



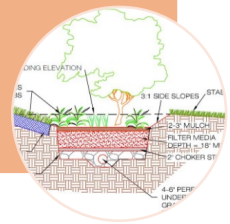
Watershed Name	Total ROW Impervious Area (ft^2)	Total ROW Impervious Area with cutoff reduction (ft^2)	Total ROW Impervious area cutoff reduction
Hickey Run	6,449,700	5,523,732	14.3%
Nash Run	2,889,000	2,659,313	8.0%
Pope Branch	1,949,600	1,162,162	4.0%
Fort Dupont	862,200	536,037	3.8%

© Arcadis 2022

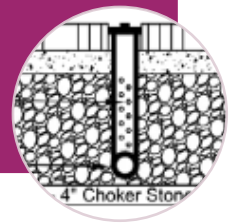
Step 3: Site Availability

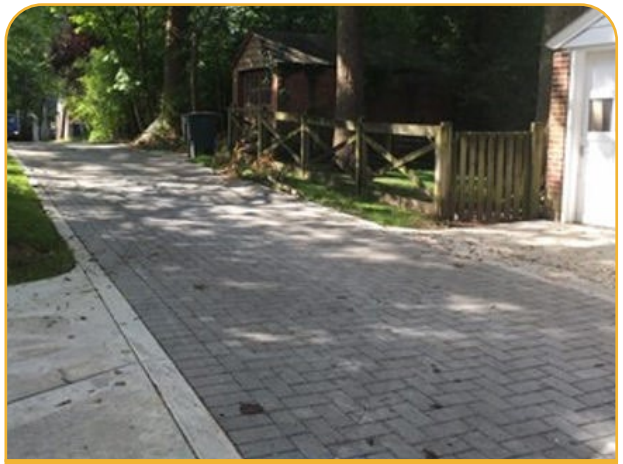
- Type of GI Practices selected for this project:

Bioretention Bump-outs

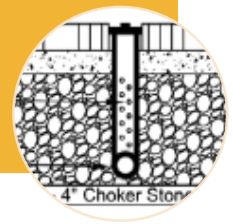


Parking Lane Permeable Pavement





Permeable Pavement Alley (Green Alley)



© Arcadis 2022

Step 3: Site Availability (Contd.)

- Refined the site selection by using evaluation criteria that incorporate the standard minimum design widths based on DDOT Design and Engineering Manual and DOEE Stormwater Management guidelines.

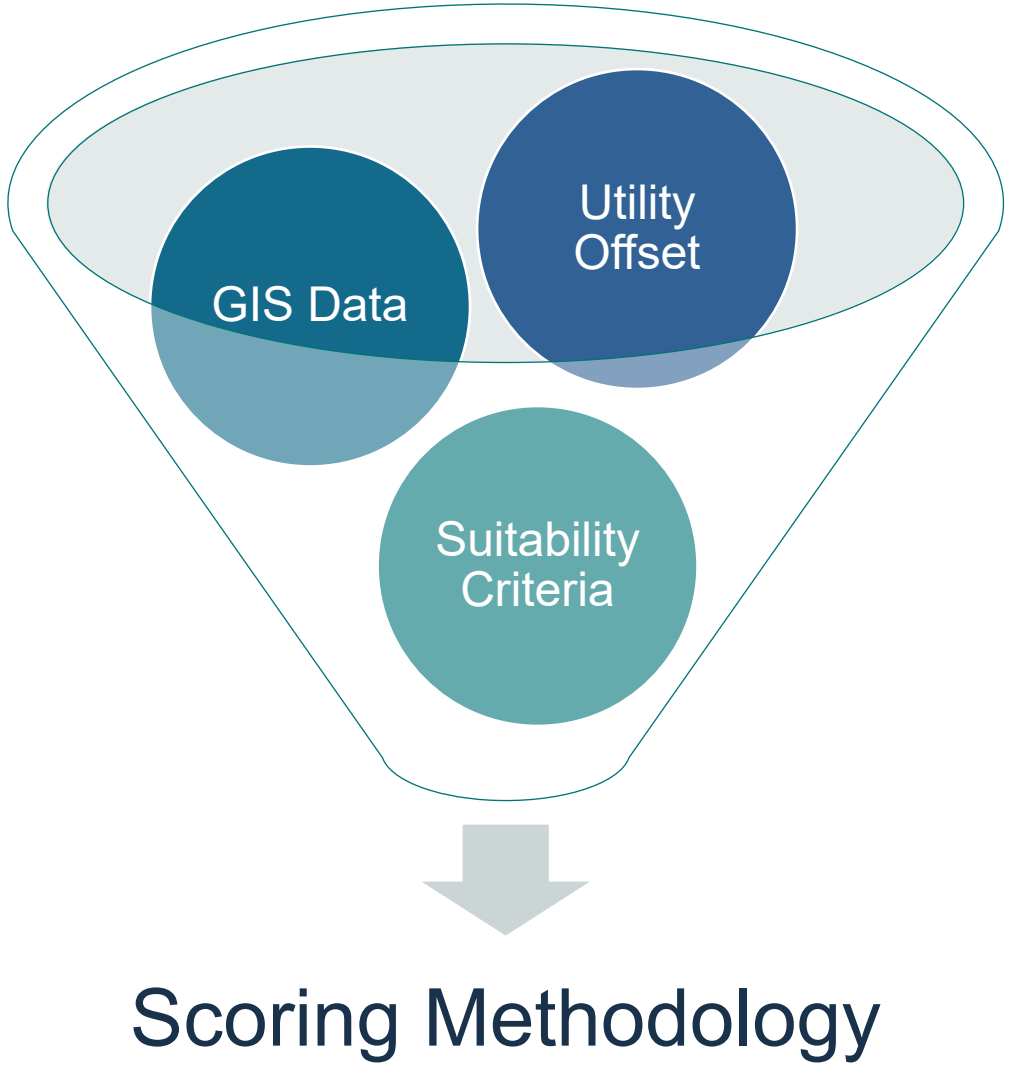
Site Availability Evaluation Criteria

GI BMP	Evaluation Criteria
Bioretention Bump-outs	Minimum sidewalk/grass strip width including parking lane: 10 feet
Green Alleys	Minimum alleys width: 8 feet
Permeable Pavement	Minimum parking lane width: 8 feet

© Arcadis 2022

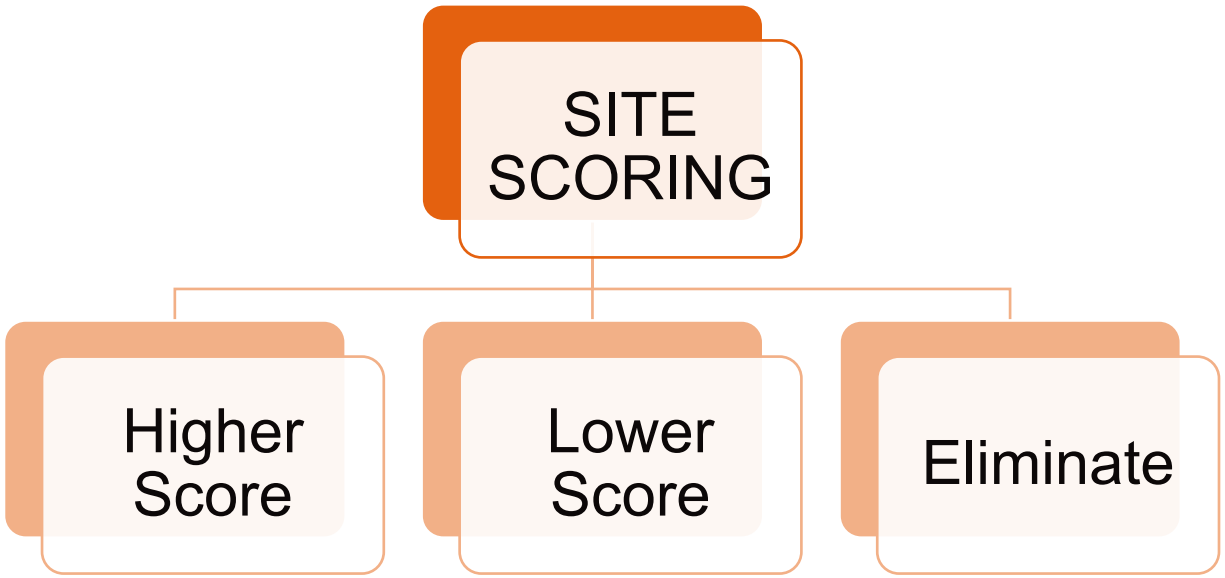
Step 4: Site Suitability

- Utilized the collected GIS data.
- Utilized minimum offsets and cutoff values based on utility company, DDOT, and DOEE requirements.
- Prepared a minimum site suitability criteria to generate a scoring methodology for GI BMPs.



© Arcadis 2022

Step 4: Site Suitability (Contd.)



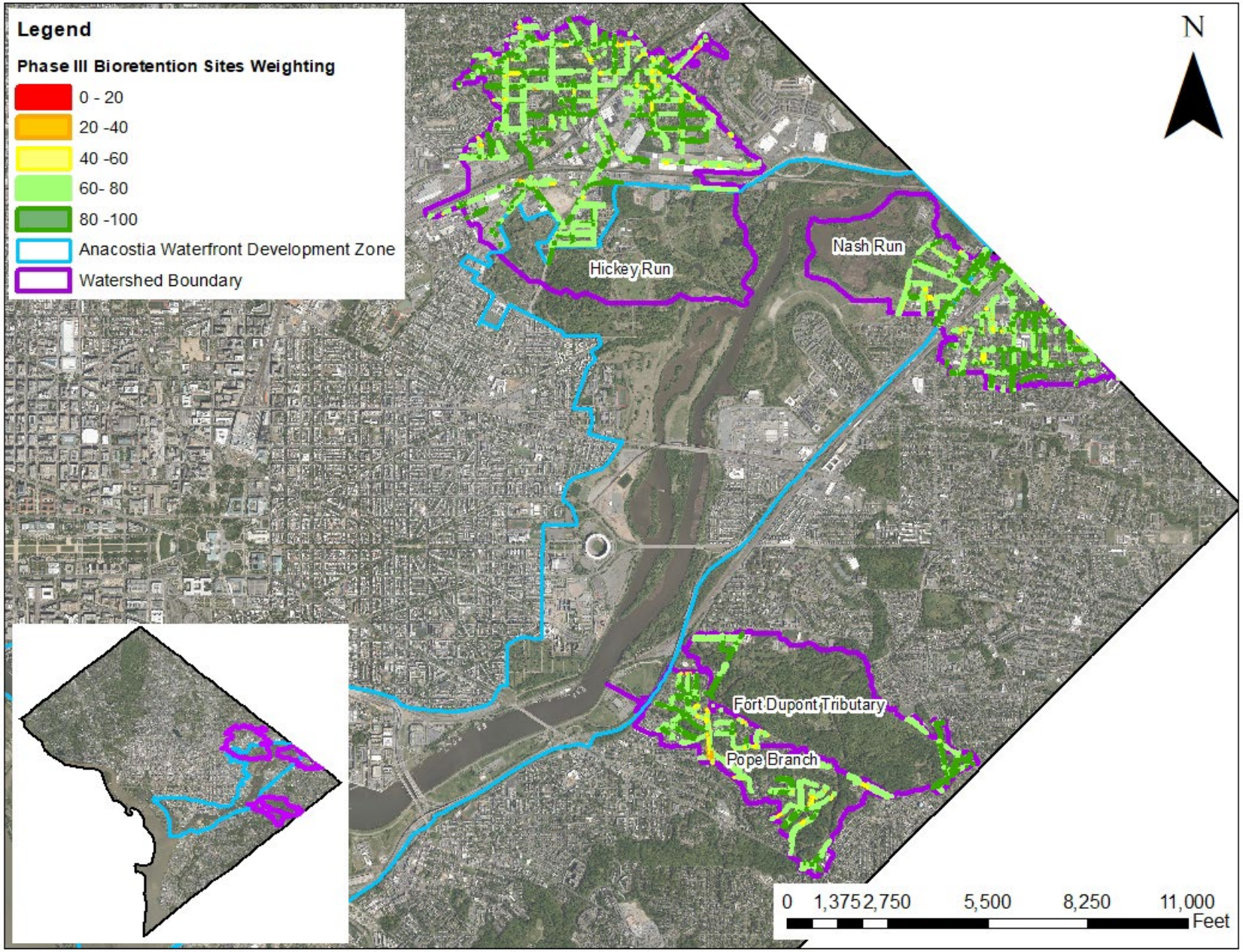
© Arcadis 2022

Site Scoring for Bioretention Practices

Top 20% (80 to 100)

Bioretention

- # of sites – 157
- Imp. Area – 48 acres

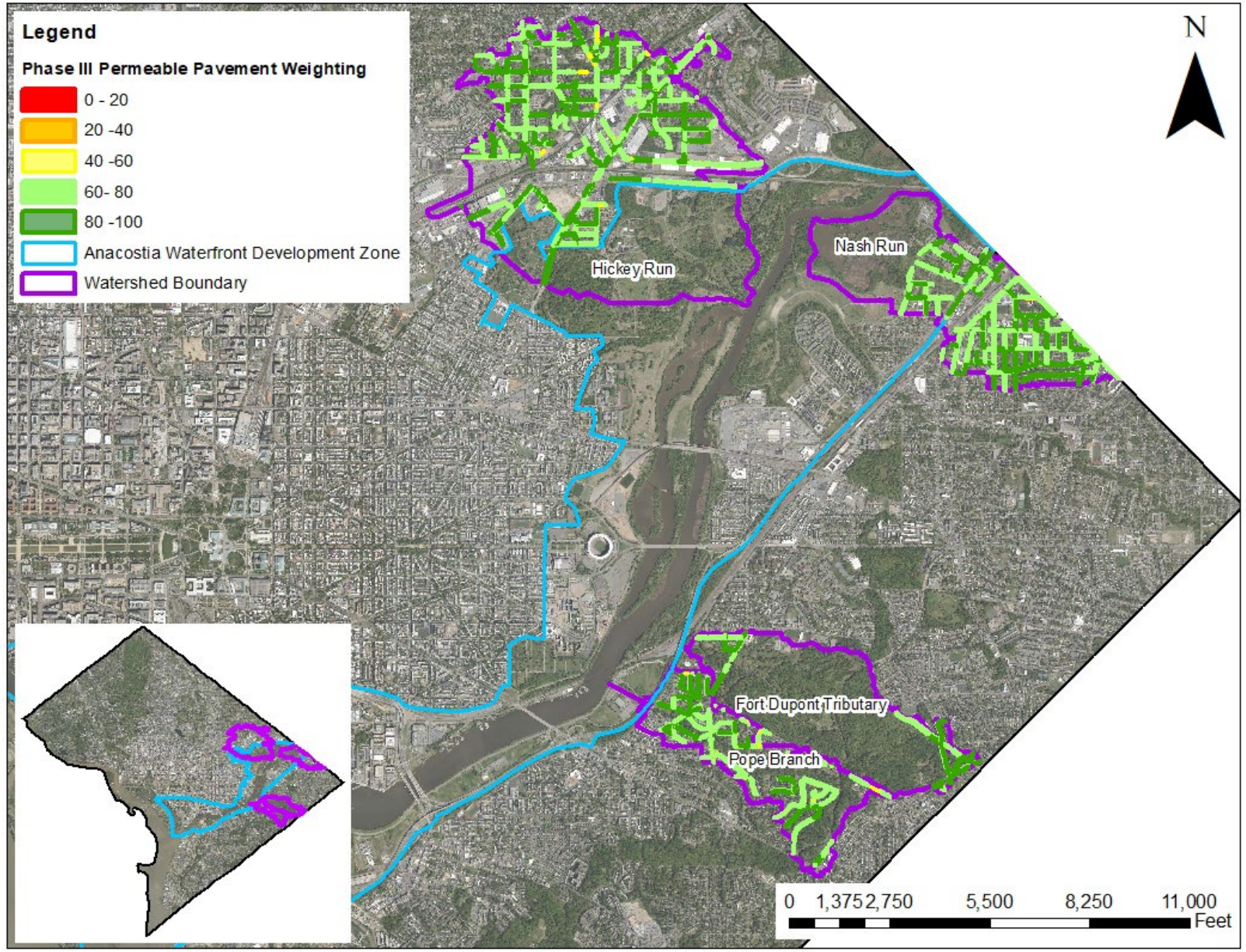


© Arcadis 2022

Site Scoring for Parking Lane Permeable Pavements

Top 20% (80 to 100)

Parking Lane Permeable Pavement
• # of sites – 61 • Imp. Area – 25 acres

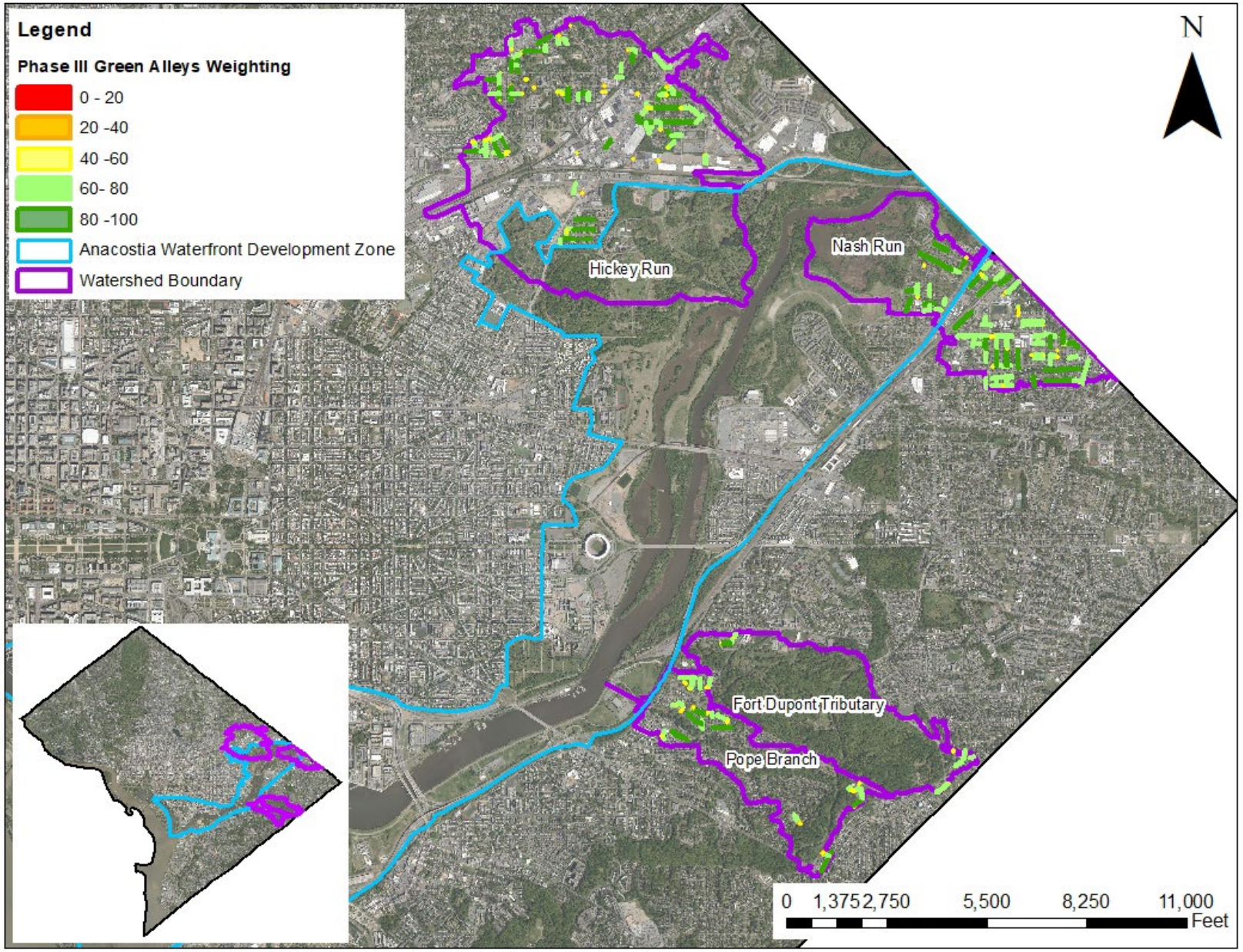


© Arcadis 2022

Site Scoring for Green Alleys

Top 20% (80 to 100)

Green Alley
• # of sites – 53 • Imp. Area – 7 acres



© Arcadis 2022

Site Scoring Results Summary (Top 5%)

The final site recommendations were developed by selecting sites scoring within the top 5 percentile (with score between 95 and 100).

Bioretention	Permeable Pavement	Green Alley	**Total**
• # of sites: 52 • Imp. Area: 21 acres	• # of sites: 23 • Imp. Area: 13 acres	• # of sites: 24 • Imp. Area: 4 acres	• **# of sites: 99** • **Imp. Area: 38 acres**

© Arcadis 2022

Finalize Site Selection Process

- Field Reconnaissance
- Outreach and Community Engagement
  - Flyers, Post cards
  - Website (www.foursubwatersheds.com)
  - Advisory Neighborhood Commissions (ANC) meetings
- Surveying
- Geotechnical Testing/Soil Investigation

© Arcadis 2022

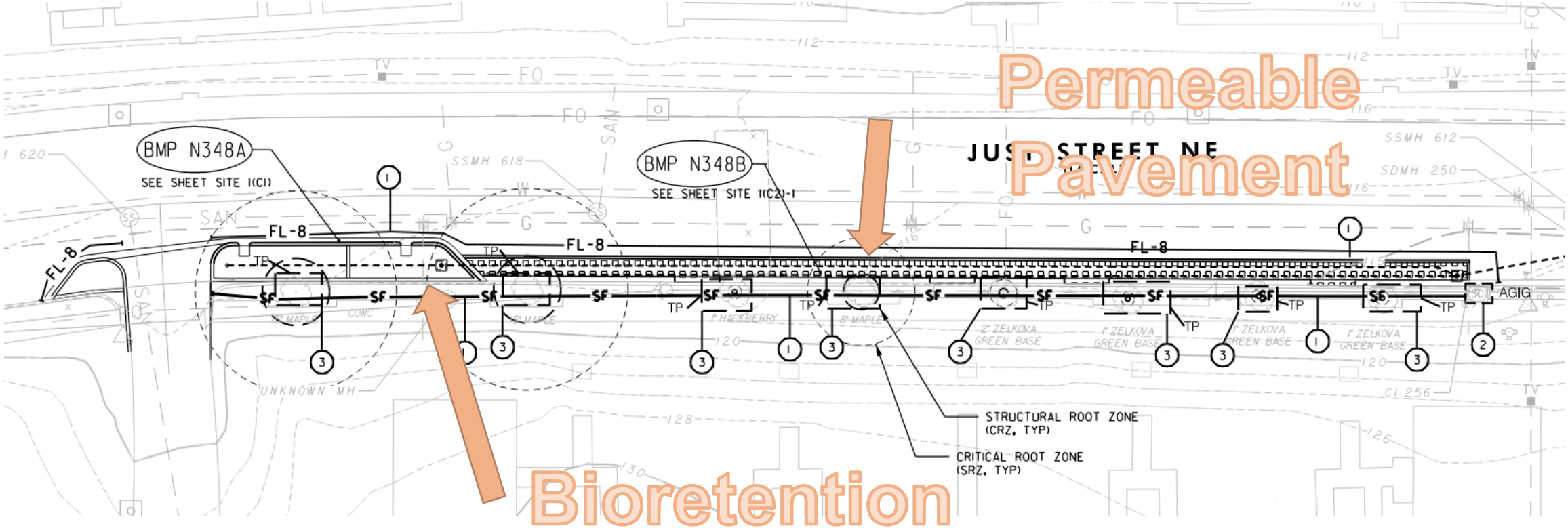
Innovative Design Approach

Enhanced GI Design

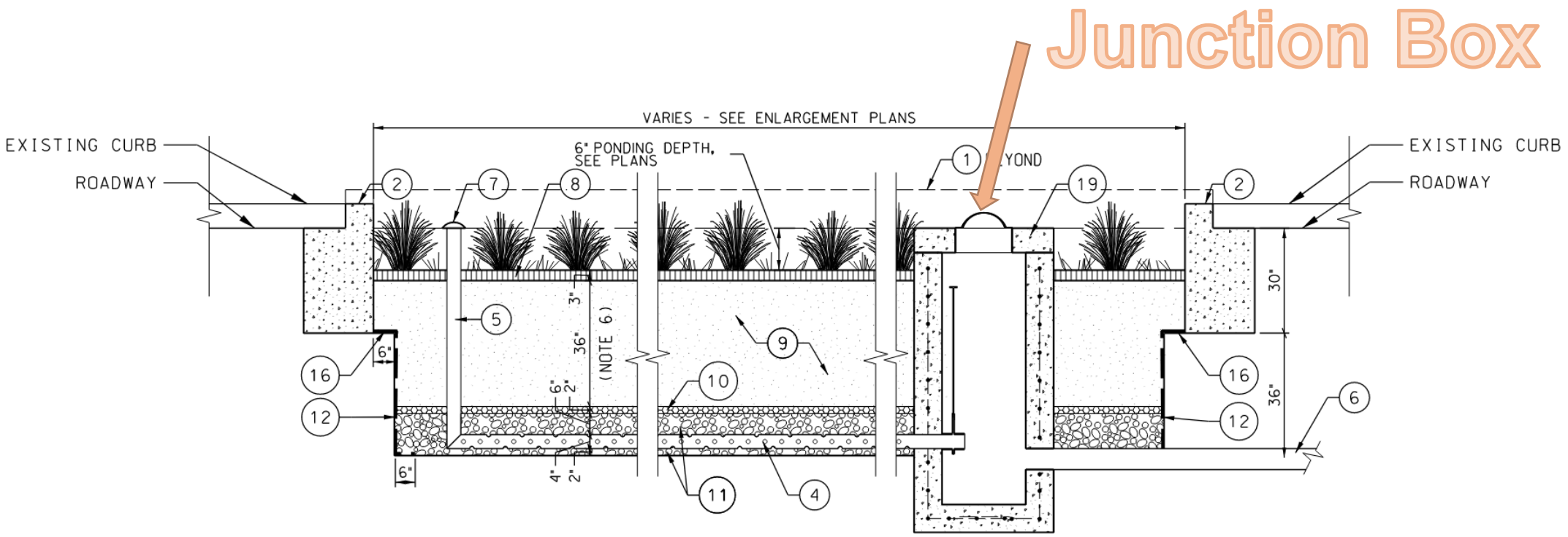
- Design of GI BMPs
  - Treatment Train approach
  - Junction Box for maintenance
  - Shallow check dams in bioretention
- Impervious Area Removal
  - Tree Bump-outs

© Arcadis 2022

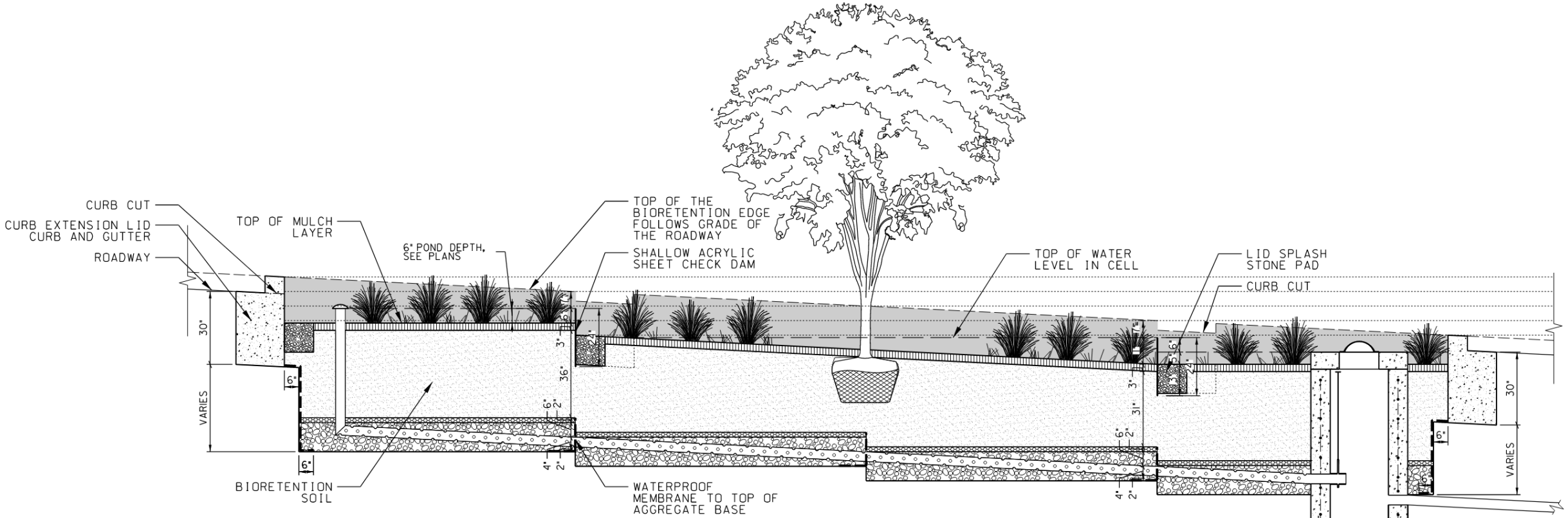
Treatment Train Approach



Junction Box



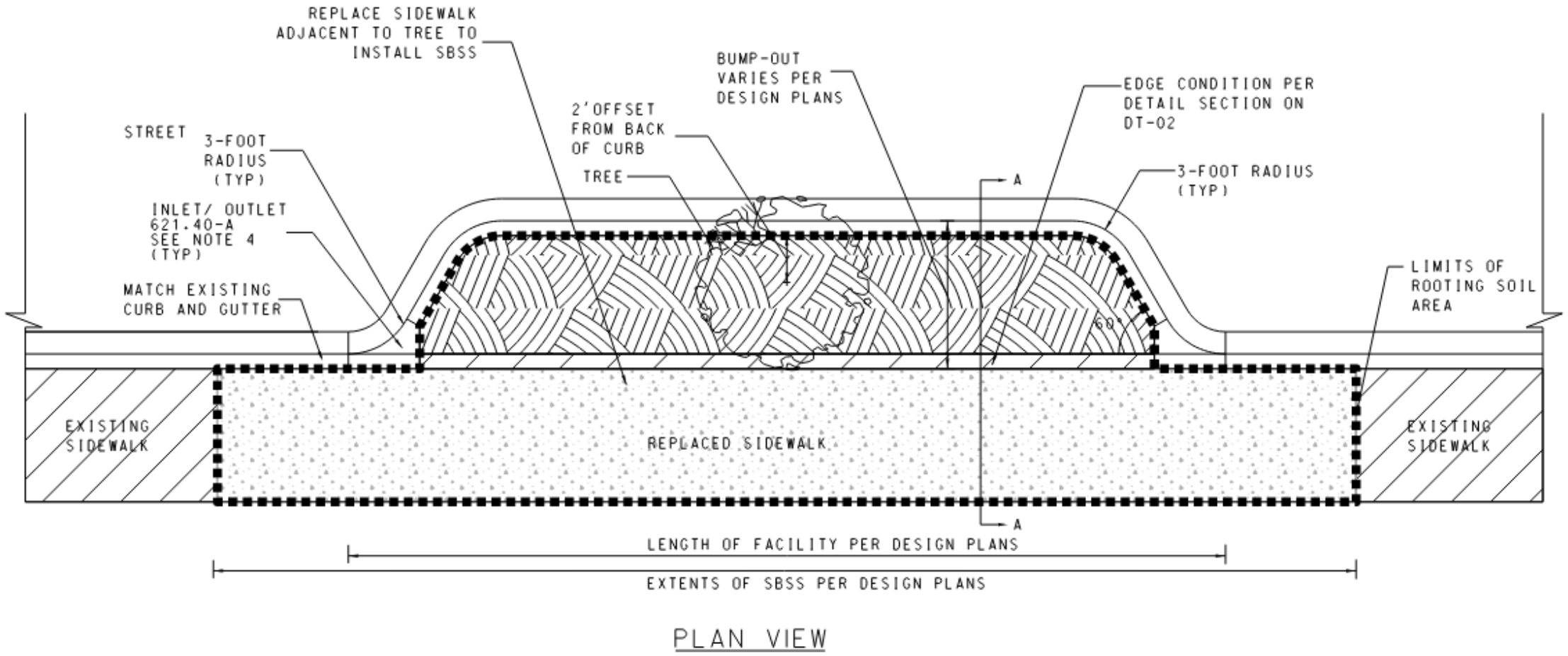
Shallow Check Dams



TYPICAL ACRYLIC SHEET CHECK DAM
ELEVATION WITH TREE PLANTING

G - 1

Impervious Area Removal



PLAN VIEW

© Arcadis 2022

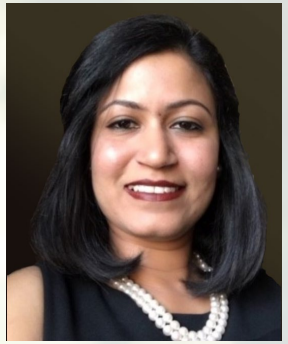
Conclusion and Discussion

- Large Project Area – GIS selection tool helped identify and rank optimal locations for GI practices
- Field reconnaissance and public outreach helped further narrow down to final project locations
- GIS-based Site Selection tool is customizable to work with many project specific factors and priorities
- Identifying ideal locations for GI allows for opportunities to innovate

© Arcadis 2022

Questions And Answers

Contact Us



Nirali Desai, PE

Senior Engineer

Nirali.Desai@arcadis.com

Michael Moscariello, PE, LEED AP, PMP

National GI Practice Leader

Michael.Moscariello@arcadis.com

Arcadis. Improving quality of life.

© Arcadis 2022