Anacostia River Watershed Restoration Plan

Pope Branch Subwatershed
Provisional Restoration Project Inventory

August 2009

I. Background

Located in southeast Washington, DC, Pope Branch is a first order tributary to the Anacostia River, approximately 1.6 miles in length. The entire stream lies within the Washington, DC city boundary, originating downstream of Fort Davis Drive SE and flowing in a northwesterly direction towards the Anacostia River. A portion of the stream, approximately 1,700 feet, is piped from the CSX railroad to an outfall at its confluence with the Anacostia River (COG, 2003). The Pope Branch subwatershed encompasses an approximately 248.5-acre area and is roughly bounded by Alabama Avenue SE to the east, Pennsylvania Avenue SE to the south, and Massachusetts Avenue SE to the north.

The Pope Branch subwatershed is heavily urbanized. As a result, stormwater runoff from moderate storm events cause flashy and intense stream channel flows. The hydrologic alterations caused by urbanization and development have deteriorated the water quality of Pope Branch and degraded its natural habitat. In addition, watershed analyses have revealed that erosion of its stream banks during storm events is the primary cause of sedimentation within the Pope Branch subwatershed.

There are several other current threats to both water quality and the health of the riparian buffer in the Pope Branch watershed. These include nonpoint source water pollution from stormwater runoff, a failing sewer line that traverses segments of Pope Branch, and lack of riparian cover along portions of the stream. As a result of this, Pope Branch does not support swimmable or secondary contact recreation uses. The potential for sewage line leaks into Pope Branch has produced a human health risk as well. In addition to the degraded water quality, the lower part of Pope Branch is piped, serving as a barrier to fish passage upstream and preventing potential recreational and aesthetic enjoyment of the riparian habitat.

Recognizing both the severity and extent of environmental and ecological problems affecting the Anacostia River watershed and the need to better coordinate restoration efforts and resources, the three jurisdictions and the Metropolitan Washington Council of Governments entered into a Federal cost-sharing agreement with the U.S. Army Corps of Engineers to prepare a 10-year watershed restoration plan. The Anacostia River Watershed Restoration Plan will identify opportunities and approaches for restoring and protecting the 14 major subwatersheds and the tidal river reach within the Anacostia River basin.

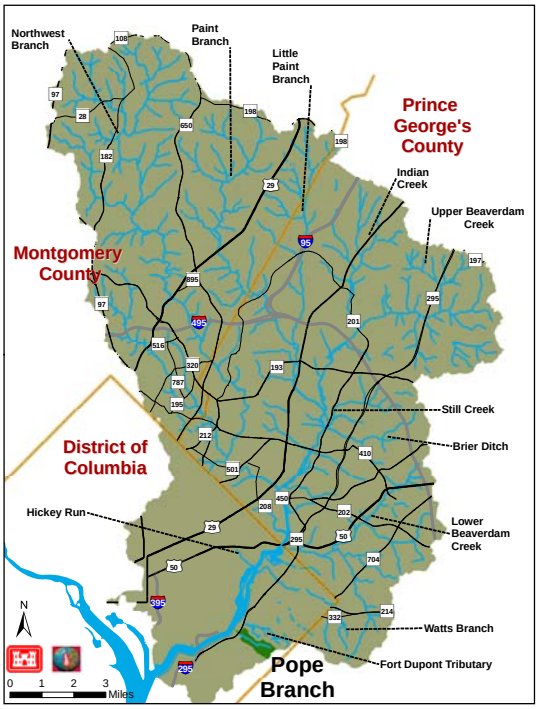

Figure 1- Pope Branch Subwatershed

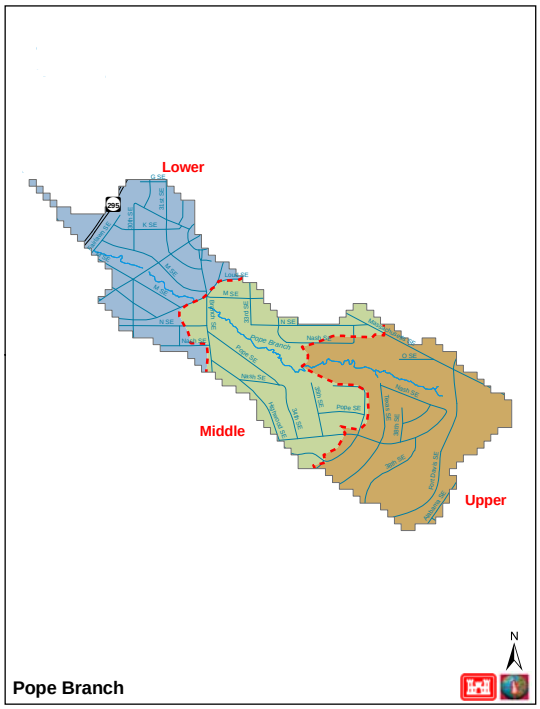

Figure 2- Pope Branch Subwatershed Unit

II. Restoration Inventory

The following sections include stormwater retrofit, stream restoration, wetland restoration, fish blockage removal, riparian restoration, invasive plant management, and wildlife habitat improvement projects, land acquisition and other-related projects and actions for further evaluation by others. As previously noted, the restoration projects presented herein are conceptual or planning level only. It is recognized that more detailed drainage and site analyses are required, and that facility size and costs shown represent approximations.

To facilitate reader understanding of the Pope Branch Subwatershed: Provisional Restoration Project Inventory, information has been organized into the following four sections:

- Section A - Impervious Features Summary
- Section B - Existing Stormwater Management Facilities Summary
- Section C - Candidate Restoration Project Summary
- Section D - Pope Branch Candidate Restoration Projects

A. Impervious Features Summary

Figure 3 - Summary: Pope Branch Impervious Features

Table 1. Pope Branch: Summary - Impervious Surfaces

Category	Acres	Miles
1. Roads	**44.9**	8.5
a. State/Fed	0.0	0.1
b. Local	44.9	8.4
2. Parking Lots	**0.6**	
a. Public/Institutional	0.0	
b. Private	0.6	
3.Roofs	**25.8**	
a. Public/Institutional	0.0	
b .Private	2.1	
c. Single Family	23.7	
3. Other	16.4	
a. Sidewalks *	4.1	
b. Single Family Driveways ^	12.3	
Total	**87.7**	
Avg. % Imperviousness	33.5%	
# of Single Family Homes	882	
Total Drainage area	**262**	
^ Driveways assumptions	Average Driveway=0.014 Acres	
*** Sidewalks assumptions**	Width equal to four feet, with a sidewalk running the length of one side of the road.	
Note: Drainage area and tributary area calculated using the USGS 30-meter digital elevation model (DEM)		

B. Existing Stormwater Management Facilities Summary

Figure 4 - Summary: Pope Branch Existing Stormwater Management BMP Sites

Table 2. Pope Branch: Summary – Pope Branch Existing Stormwater Management BMPs

Type		No. of Facilities	Percent of Total BMP's	D.A. Controlled (ac.)
1.	Dry Pond			
2.	ED Dry Pond			
3.	Wet Pond			
4.	ED Wet Pond			
5.	Wetland (non-ED and ED)			
6.	Infiltration (Trench or Basin)			
7.	Oil Grit Separator			
8.	Water Quality Inlet (e.g. Stormreceptor, Bay Saver, etc)			
9.	Bioretention /Rain Garden	2	100.0%	0.4
10.	'Green Street'*			
11.	Bioswale			
12.	Grass Swale w/ Check Dams			
13.	Porous Pavement			
14.	Sand Filter			
15.	Underground Pipe Storage			
16.	Cistern			
17.	Green Roof			
18.	Other			
	Total	**2**	**100.0%**	**0.4**

* May include a mix of LID techniques including, but not limited to: bioretention, rain garden, bioswale, soil amendment, etc.

C. Candidate Restoration Project Summary

Table 3. Summary: Restoration Candidate Projects

	Candidate Project Type	Number of Projects	Estimated Cost ($)	Impervious Acreage Controlled (ac)	Length (feet)	Acreage (ac)
1	Stormwater Retrofit	13	3,992,000	58.6	-	128.9
2	Stream Restoration	3	2,570,000	-	8,800	-
3	Wetland Creation/Restoration	1	50,000	-	-	1
4	Fish Blockage Removal/Modification	3	820,000	-	4350	-
5	Riparian Reforestation, Meadow Creation, Street Tree and Invasive Management	2	28,500	-	-	5.7
6	Trash Reduction	2	5,800	-	528	-
7	Toxic Remediation	-	-	-	-	-
8	Parkland Acquisition	2	201,000			2.0
	Total	**26**	**7,667,300**	**58.6**	**13,678**	**138**

Table 4. Pope Branch Subwatershed: Provisional Restoration Project Inventory 'Unit Costs'*

No.	Practice	Approx. Unit Cost ($)
Stormwater Retrofit		
1	Existing Stormwater Management Pond/Wetland Retrofitting	~ $1,000-3,000/acre of drainage
2	New Stormwater Management Pond/Wetland Construction	~$3,000-5,000/acre of drainage
3	LID-Bioretention (w/Underdrain System)	~ $100,000/ impervious acre
4	LID-Curbside/Street Planter	~ $100,000/ impervious acre
5	LID-Tree Box Filter	~ $54,450 - $65,340/impervious acre
6	LID-Green Roof	~ $42/square foot
7	LID-Single Family Home Rain Garden	~ $5,000 per individual garden
8	LID-Single Family Home Rain Barrel	~ $200/barrel (Typically, two per house)
9	Sand Filter	~ $20,000 to $25,000 per impervious acre**
10	Underground Pipe Storage	~ $15,000 per impervious acre***
11	Permeable Pavement	~ $4.00 per square foot
12	LID Bioswale	~ $100,000/impervious acre
13	Storm Filter	~ $80,000/acre
Stream Restoration/Fish Passage/Wetland Creation		
14	Stream Restoration	~ $300/LF
15	Concrete Stream Channel Removal	~ $1,000/LF
16	Stream 'Day Lighting'	~ $2,000/LF
17	Regenerative Stormwater Conveyance System	~ $370/ft
18	Fish Passage/Riffle Grade Control Structure	~ $150,000 per one foot barrier height
19	Wetland Creation	~50,000/Acre
Riparian Reforestation/Meadow Creation/ Invasive Plant Management		
20	Riparian Reforestation	~ $9,000/acre
21	Wildflower Meadow Creation	~ $5,000/acre
22	Invasive Plant Management	~ $5,000/acre
Trash Reduction/Water Quality		
23	Manual Trash Pickup	~ $300/100 LF
24	Fresh Creek Trash Netting System	~ $1,000/acre of drainage
25	Signage	~ $1600
26	End–of-Pipe Trash Catching System	~ $4,000/ acre of drainage
27	Street Sweeping****	~ $50/curb mile/year
28	Storm Drain Trash Grate	~ $500/inlet
Land Acquisition		
29	Land Acquisition	~ $100,000/acre

includes (where appropriate) design and construction/installation costs

** escalated to 2009 dollars from "*Schueler, T.R. 1994. Developments in Sand Filter Technology to Improve Stormwater Runoff Quality, Watershed Protection Techniques 1(2):47-54"*

*** *USEPA 20001 Storm Water Technology Fact Sheet On-Site Underground Retention/Detention EPA 832-F-01-005*

**** EPA-certified as water quality BMP

D. Pope Branch Candidate Restoration Projects

Figure 5 – Upper Pope Branch Candidate Stormwater Retrofit Sites

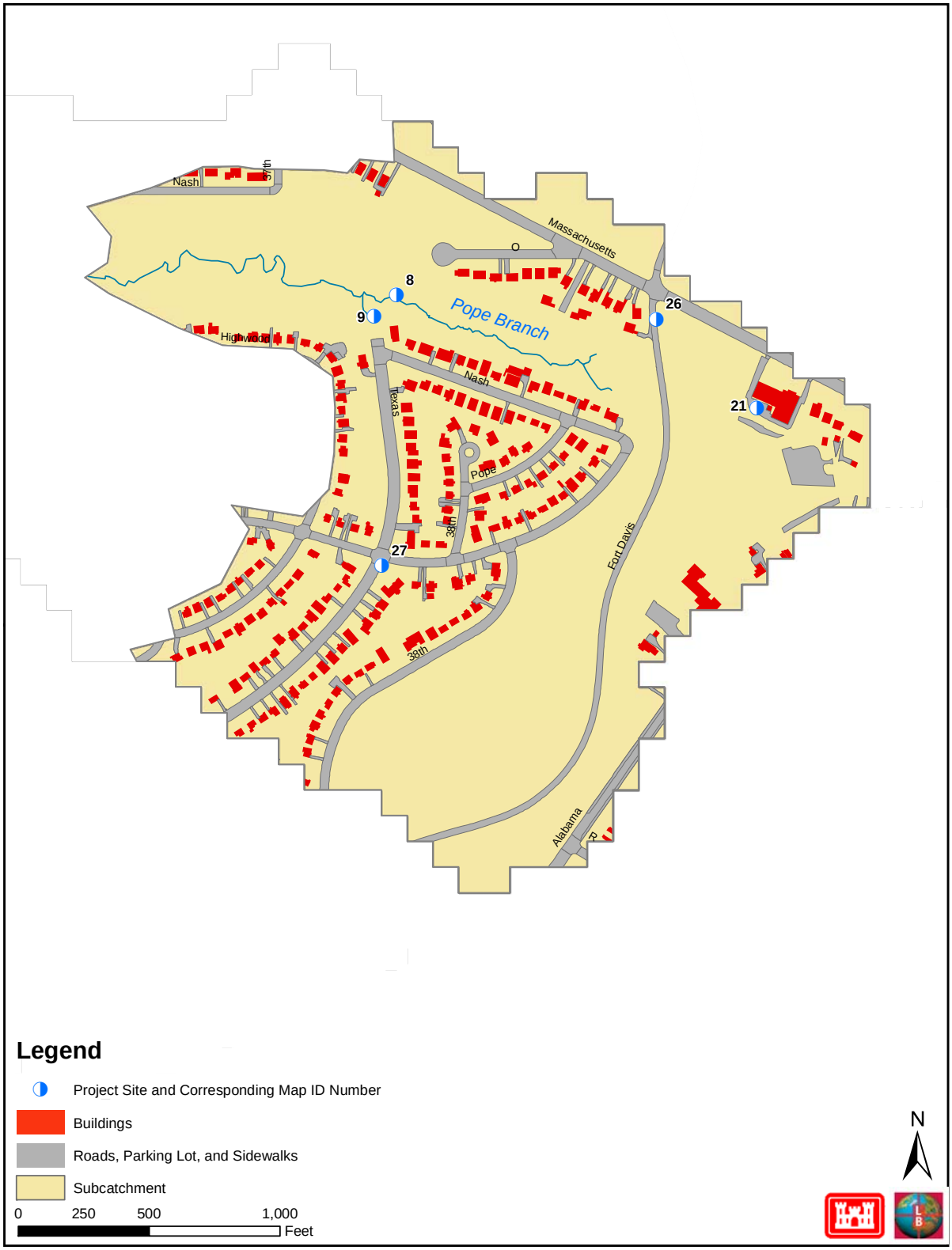

Figure 6 – Upper Pope Branch Candidate Stormwater Retrofit Drainage Areas

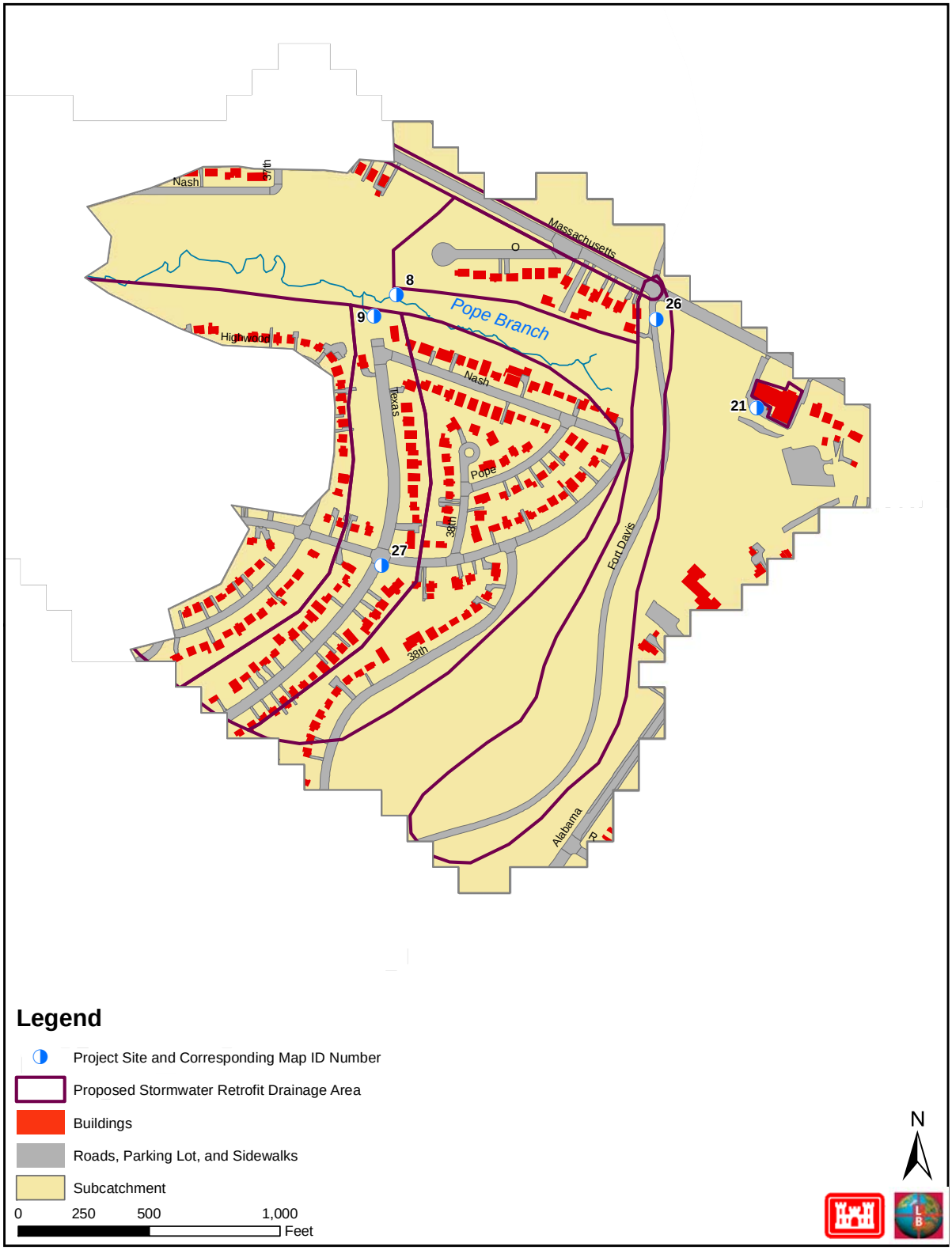

Figure 7 – Upper Pope Branch Candidate Stormwater Retrofit and Existing Stormwater Retrofit Drainage Areas

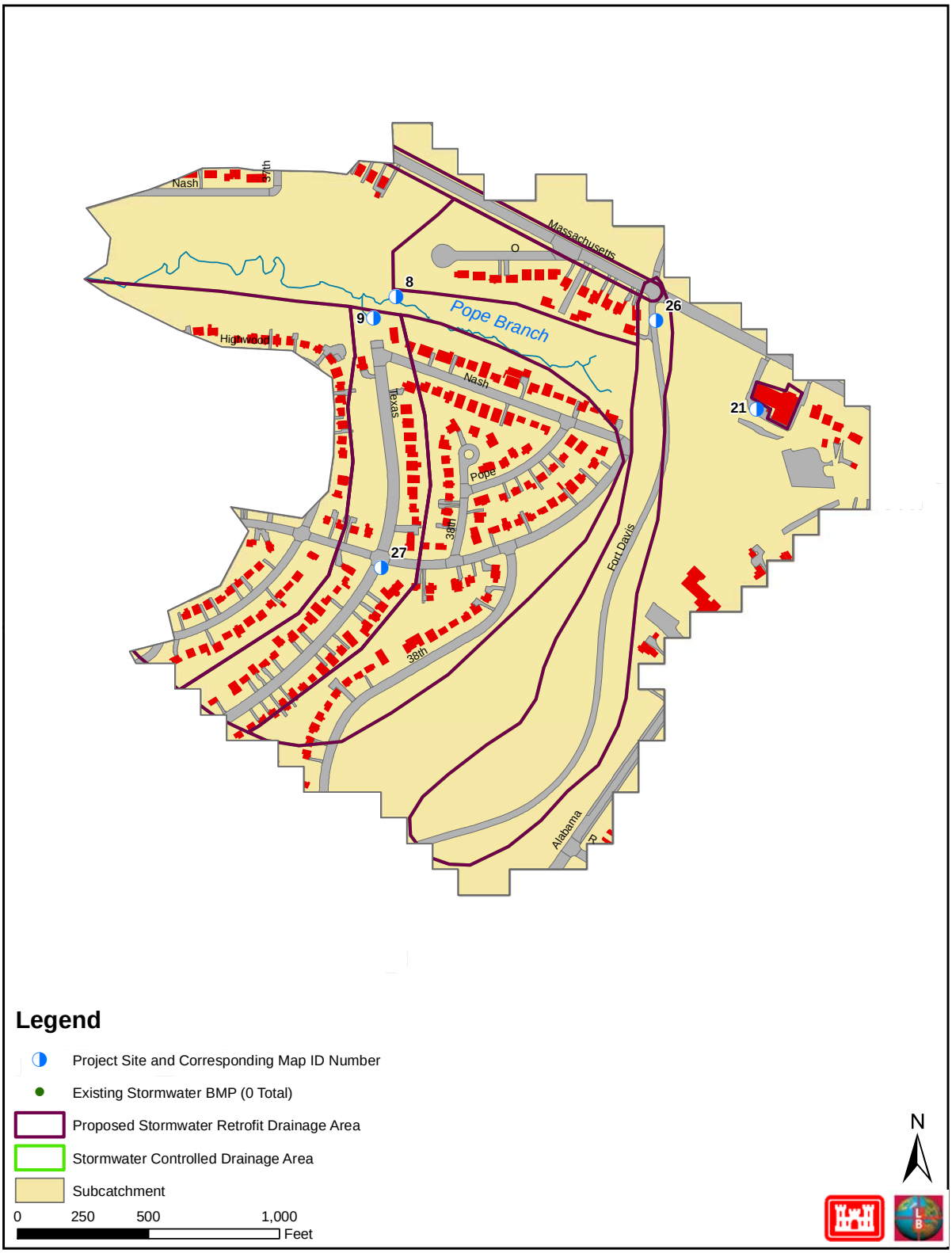

Table 5. Upper Pope Branch – Stormwater Retrofit Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx D.A. (acres)	Approx. Impervious		General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
								%	(acres)				
PO-U-01-S-1	27	DC	Texas Avenue SE between Pope Branch and S Street SE, Washington, DC	18 B 6	1b	Public	11.5	80	9.2	LID Bioretention, LID Tree Box Filters	736,000		
PO-U-01-S-2	26	DC	Fort Davis Drive SE between Massachusetts Avenue SE and Pennsylvania Avenue SE, Washington, DC	18 C 6	1b	Public	12.8	80	10.2	LID Bioretention	1,020,000		
PO-U-01-S-3	8	DC	Outfall SS#1076 draining O Street SE off of Massachusetts Avenue SE, Washington, DC	18 B 6	1b	Mixed	5.7	60	3.4	Regenerative Stormwater Conveyance, LID Bioretention, LID Tree Box Filters	241,000		
PO-U-01-S-4	9	DC	Neighborhood draining to outfall SS#1075, located along Carpenter Street SE between Highwood Drive SE and Nash Place SE, Washington, DC	18 B 6	1b	Mixed	19.9	25	5.0	Regenerative Stormwater Conveyance, LID Bioretention, LID Tree Box Filters, Rainscape	268,000		
PO-U-01-S-5	21	DC	DuPont Park Seventh Day Adventist Church and DuPont Park School, 3985 Massachusetts Avenue SE, Washington, DC	18 C 6	1c	Private	0.4	60	0.2	LID Bioswale, LID Rain Garden	40,000		

DC = District of Columbia

[1] 1a= Water quantity, 1b= Water quantity and quality, 1c= Water quality

Figure 8a – Candidate Stormwater Retrofit Project		
Site Location:	Texas Avenue SE between Pope Branch and S Street SE, Washington, DC	
Project No.:	PO-U-01-S-1	
ADC Map Book Location:	18 B 6	Map ID: 27
Approximate Associated Drainage Area (acres):	11.5	
Approximate Imperviousness:	80%	9.2 acres
Description of Existing Conditions:	Texas Avenue SE is a two-lane residential street with parking on either side. South of Carpenter Street SE there is a sidewalk and grassy berm. North of Carpenter Street SE there is no public sidewalk. The stormwater runoff from the street drains to the north through multiple curb inlet drains.	
Project Description:	**LID Bioretention, LID Tree Box Filters** – Construct a bioretention system at the dead end near Nash Street SE. Install tree box filters at the curb inlet drains.	

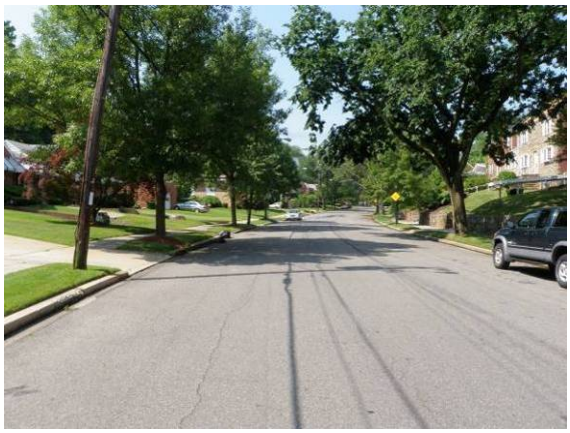

Figure 8b – Candidate Stormwater Retrofit Project		
Site Location:	Fort Davis Drive SE between Massachusetts Avenue SE and Pennsylvania Avenue SE, Washington, DC	
Project No.:	PO-U-01-S-2	
ADC Map Book Location:	18 C 6	Map ID: 26
Approximate Associated Drainage Area (acres):	12.8	
Approximate Imperviousness:	80%	10.2 acres
Description of Existing Conditions:	The road is surrounded by forested area. Stromwater runoff drains north and south to curb inlet drains at the intersections. Some areas have constructed ditches, while others only have a grassy berm.	
Project Description:	**LID Bioretention** – Construct bioretention systems on either side of the road in the grassy areas.	

Figure 8c – Candidate Stormwater Retrofit Project		
Site Location:	Outfall SS#1076 draining O Street SE off of Massachusetts Avenue SE, Washington, DC	
Project No.:	PO-U-01-S-3	
ADC Map Book Location:	18 B 6	Map ID: 8
Approximate Associated Drainage Area (acres):	5.7	
Approximate Imperviousness:	60%	3.4 acres
Description of Existing Conditions:	This site consists of a two-foot-diameter concrete culvert at the base of a slope that drains a small residential neighborhood. There is severe scouring downstream of the outfall. Stormwater runoff reaches the outfall by means of curb inlet drains. A moderate amount of sediment was observed at the inlet drains, and a small amount of trash was observed at the outfall.	
Project Description:	**Regenerative Stormwater Conveyance, LID Bioretention, LID Tree Box Filters -** Install a regenerative stormwater conveyance downstream from the outfall. Remove a portion of the pavement at the cul-de-sac and construct a bioretention system. Install tree box filters at the curb inlet drains.	

Figure 8d – Candidate Stormwater Retrofit Project		
Site Location:	Neighborhood draining to outfall SS#1075, located along Carpenter Street SE between Highwood Drive SE and Nash Place SE, Washington, DC	
Project No.:	PO-U-01-S-4	
ADC Map Book Location:	18 B 6	Map ID: 9
Approximate Associated Drainage Area (acres):	19.9	
Approximate Imperviousness:	25%	5.0 acres
Description of Existing Conditions:	This site consists of a residential neighborhood and streets. Stormwater runoff drains to curb inlet drains and then to a three-foot-diameter concrete culvert into Pope Branch. The outfall provides the furthest upstream intermittent flow for Pope Branch. The outflow contained much sediment and soap scum. There is a large plunge pool and severe scouring at the outfall.	
Project Description:	**Regenerative Stormwater Conveyance, LID Bioretention, LID Tree Box Filters, Rainscape -** Install a regenerative stormwater conveyance system at the outfall to prevent channel scouring. Remove a portion of the pavement at the dead end of Texas Street SE and construct a bioretention system. Install tree box filters at the curb inlet drains. Install rain gardens and rain barrels at the downspouts in the neighborhood.	

Figure 8e – Candidate Stormwater Retrofit Project		
Site Location:	DuPont Park Seventh Day Adventist Church and DuPont Park School, 3985 Massachusetts Avenue SE, Washington, DC	
Project No.:	PO-U-01-S-5	
ADC Map Book Location:	18 C 6	Map ID: 21
Approximate Associated Drainage Area (acres):	0.4	
Approximate Imperviousness:	60%	0.2 acres
Description of Existing Conditions:	This site includes a two-story private school and church with a small parking area to the south. The downspouts are connected to the stormwater system. Stormwater runoff drains to Massachusetts Avenue SE by a concrete ditch located on the west side of the property.	
Project Description:	**LID Bioswale, LID Rain Garden -** Disconnect the downspouts from the stormwater system and install rain gardens at the downspouts. Replace the concrete ditch on the west side of the property with a bioswale.	

Figure 9 – Upper Pope Branch Candidate Stream Restoration Sites

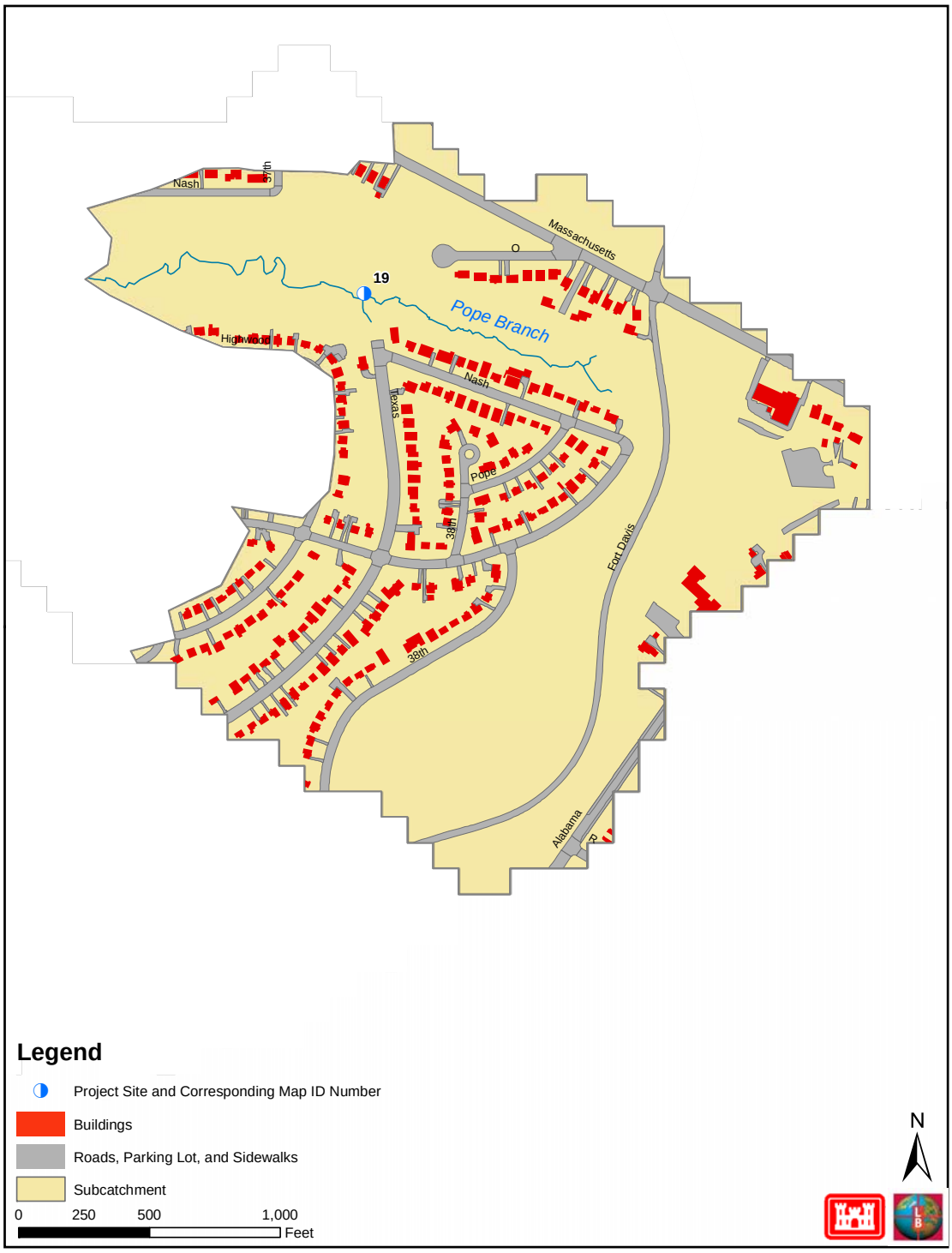

Table 6. Upper Pope Branch – Candidate Stream Restoration Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx Length (feet)	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-U-02-SR-1	19	DC	Sewer line perpendicular to stream, downstream of O Street SE, Washington, DC	18 D 6	1a, 1b	Public	300	Stream Channel Morphology Restoration	90,000		

DC = District of Columbia

[1] 1a= Channel Morphology, 1b= In-Stream Habitat/Bank Stabilization, 1c= Fish Blockage, 1d= Vernal Pool Creation Enhancement

Figure 10a – Candidate Stream Restoration Project		
Site Location:	Sewer line perpendicular to stream, downstream of O Street SE, Washington, DC	
Project No.:	PO-U-02-SR-1	
ADC Map Book Location:	18 D 6	Map ID: 19
Approximate Length (feet):	300	
Description of Existing Conditions:	This site consists of a perched, one-foot sewer pipe on concrete pillars located in an area of heavy stream erosion. The utility line lacks armor.	
Project Description:	**Stream Channel Morphology Restoration** - Armor the utility line as a part of the stream restoration.	

Figure 11 – Upper Pope Branch Candidate Fish Blockage Removal Sites

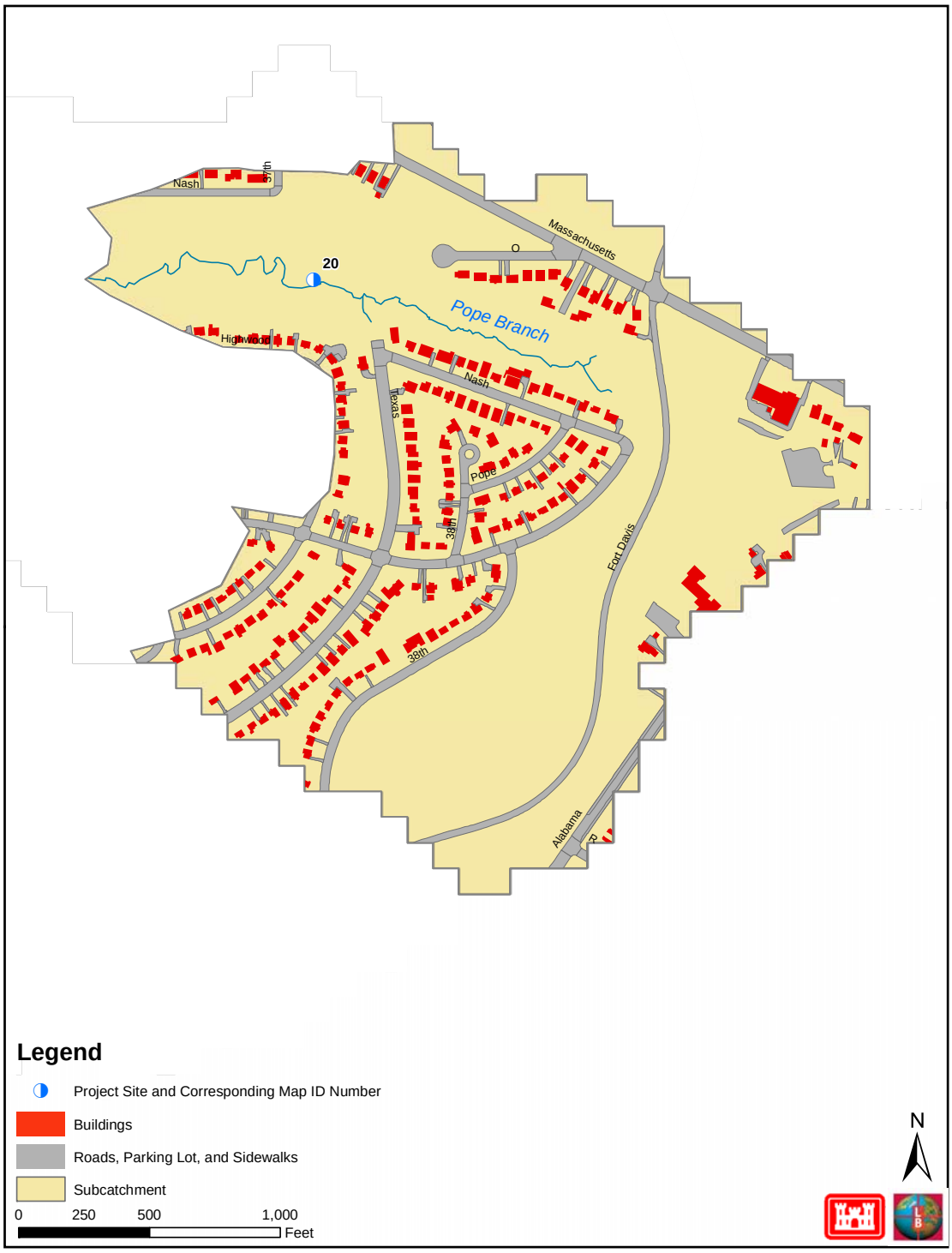

Table 7. Upper Pope Branch – Candidate Fish Blockage Removal Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Ownership	Approx Length (feet)	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-U-04-F-1	20	DC	Pope Branch mainstem, south of Nash Place SE, Washington, DC	18 D 6	Public	800	Fish Blockage Removal	300,000		

DC = District of Columbia

Figure 12a – Candidate Fish Blockage Removal Project		
Site Location:	Pope Branch mainstem, south of Nash Place SE, Washington, DC	
Project No.:	PO-U-04-F-1	
ADC Map Book Location:	18 D 6	Map ID: 20
Approximate Upstream Length Open (feet):	800	
Description of Existing Conditions:	There is an armored concrete sewer line presenting a complete fish blockage. The blockage is not directly perpendicular to the stream, and spans approximately 30 feet. It is two feet thick and two feet tall.	
Project Description:	**Fish Blockage Removal** - Install a series of riffle and pool complexes to facilitate fish passage.	

Figure 13 – Upper Pope Branch Candidate Trash Reduction Sites

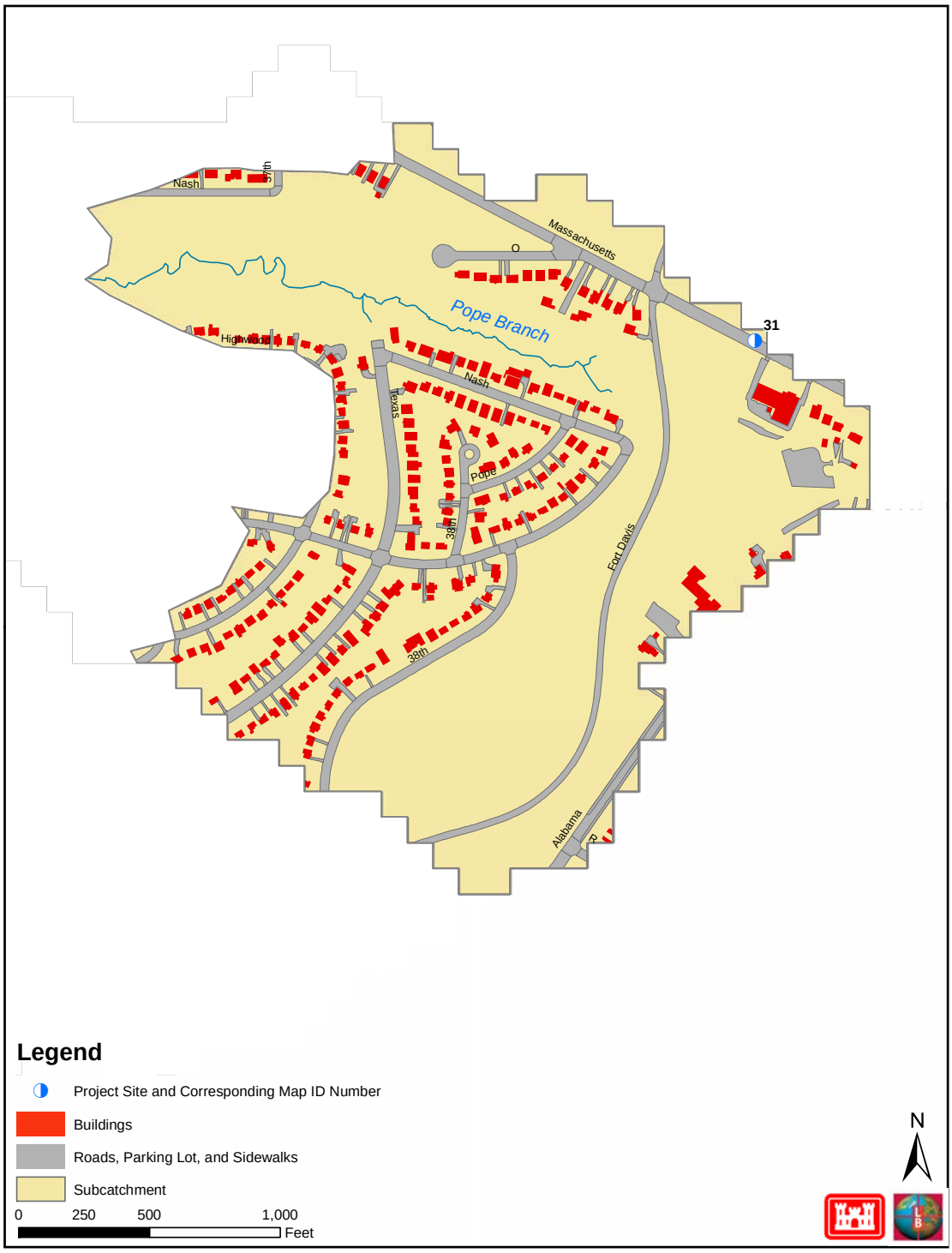

Table 8. Upper Pope Branch – Candidate Trash Reduction Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx Length (mile)	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-U-06-T-1	31	DC	Massachusetts Avenue SE from Alabama Avenue SE to O Street NE, Washington, DC	18 B 6	1a, 1b	Public	0.4	Street Sweeping, Trash Removal, Trash Grate	6,000		

DC = District of Columbia

[1] 1a = Street Sweeping, 1b = Manual/Mechanical Removal, 1c= Structural, 1d=Outreach/Education

Figure 14a – Candidate Trash Reduction Project		
Site Location:	Massachusetts Avenue SE from Alabama Avenue SE to O Street NE, Washington, DC	
Project No.:	PO-U-01-T-1	
ADC Map Book Location:	18 B 6	Map ID: 31
Approximate Length (miles):	0.40	
Description of Existing Conditions:	This two-lane street has parking on either side and is surrounded by residences and forested land. Massachusetts Avenue SE drains to an outfall at the end of O Street SE. Stormwater runoff reaches the outfall by means of curb inlet drains. A moderate amount of sediment was observed at the inlet drains, and a small amount of trash was observed at the outfall.	
Project Description:	**Street Sweeping, Trash Removal, Trash Grates -** Conduct street sweeping monthly to decrease the amount of sediment entering the inlet drains. Install trash grates at the curb inlet drains and conduct trash cleanup at the outfall.	

Figure 15 – Upper Pope Branch Candidate Land Acquisition Sites

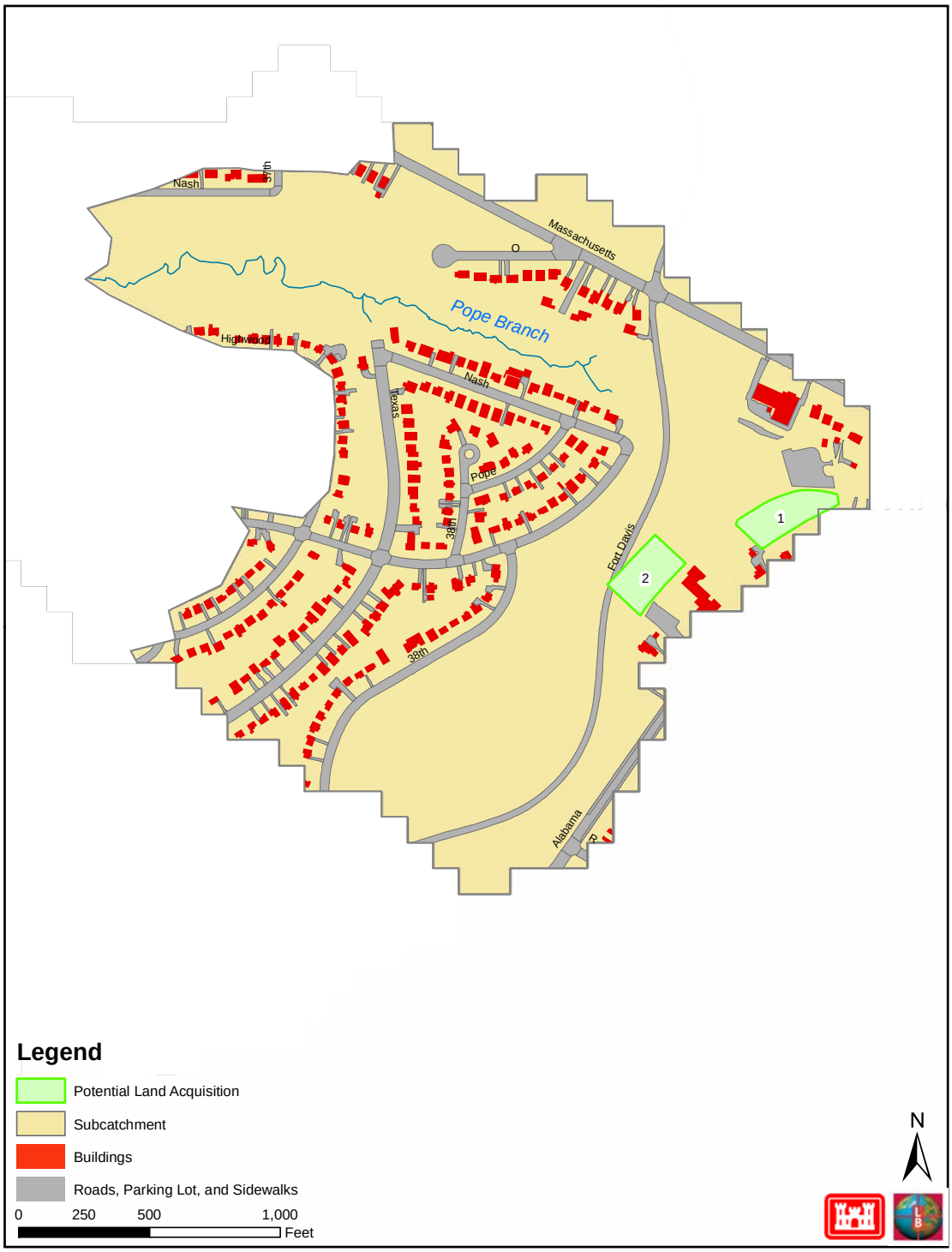

Table 9. Upper Pope Branch – Candidate Land Acquisition Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Owner	Ownership	Approx. Acreage	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking[1]
PO-U-08-L-1	1	PG	Alabama Avenue and 40th Street SE, Washington, DC	18 C 6	Irving B. Yochelson	Private	1.02	Land Acquisition	102,000		Medium
PO-U-08-L-2	2	PG	Alabama Avenue and 40th Street SE, Washington, DC	18 C 6	United States of America	Public	0.99	Land Acquisition	99,000		Low

[1] Potential land acquisition projects were identified by the following criteria: adjacency to streams/stream channel erosion, forested riparian corridors, NWI wetlands, private parcels forming a gap between a contiguous riparian corridors, forest, NWI wetland or parkland, adjacency to existing forest or mature forest, adjacency to or within a FEMA 1-percent-annual-chance floodplain, size of private parcel.

Figure 16 – Middle Pope Branch Candidate Stormwater Retrofit Sites

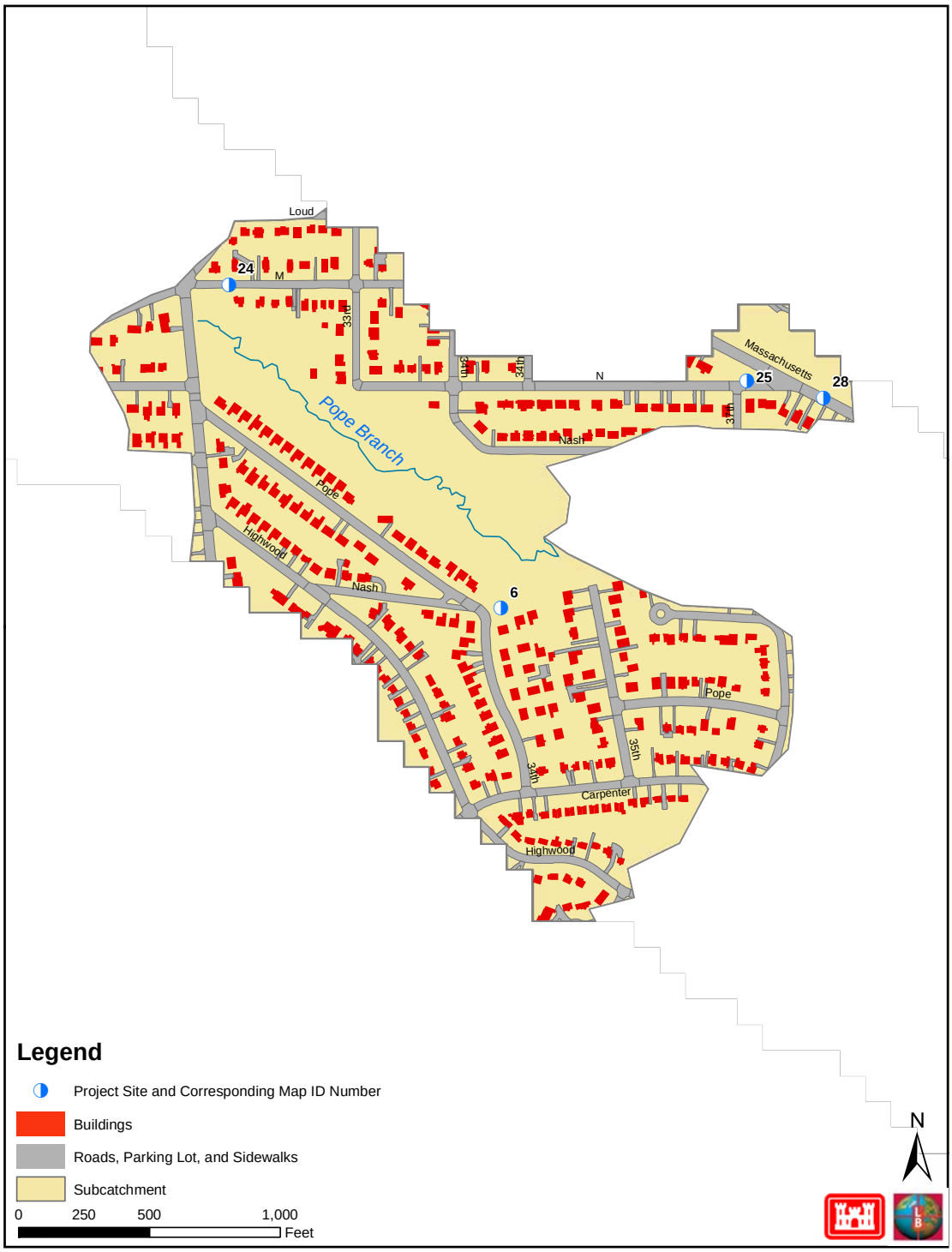

Figure 17 – Middle Pope Branch Candidate Stormwater Retrofit Drainage Areas

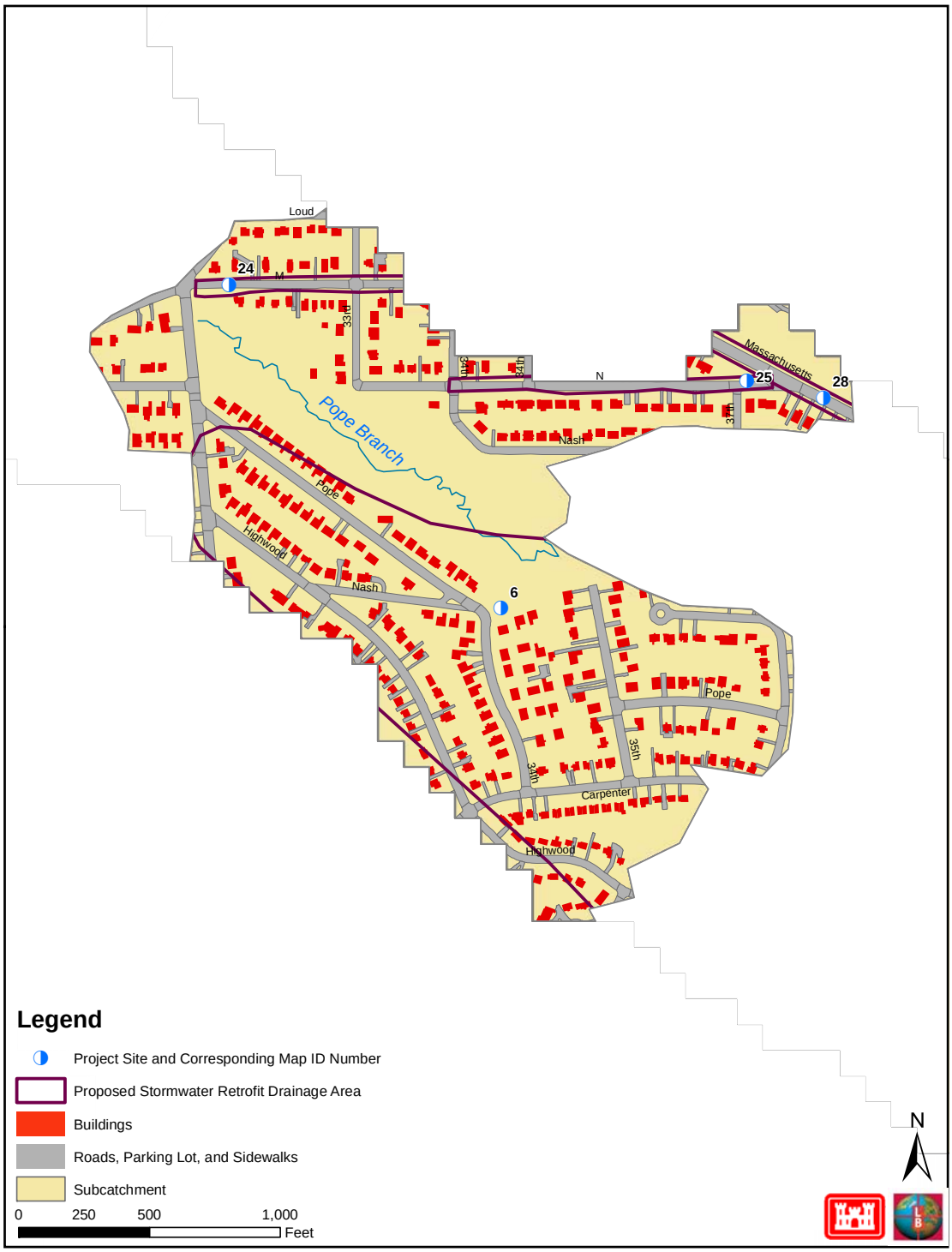

Figure 18 – Middle Pope Branch Candidate Stormwater Retrofit and Existing Stormwater Retrofit Drainage Areas

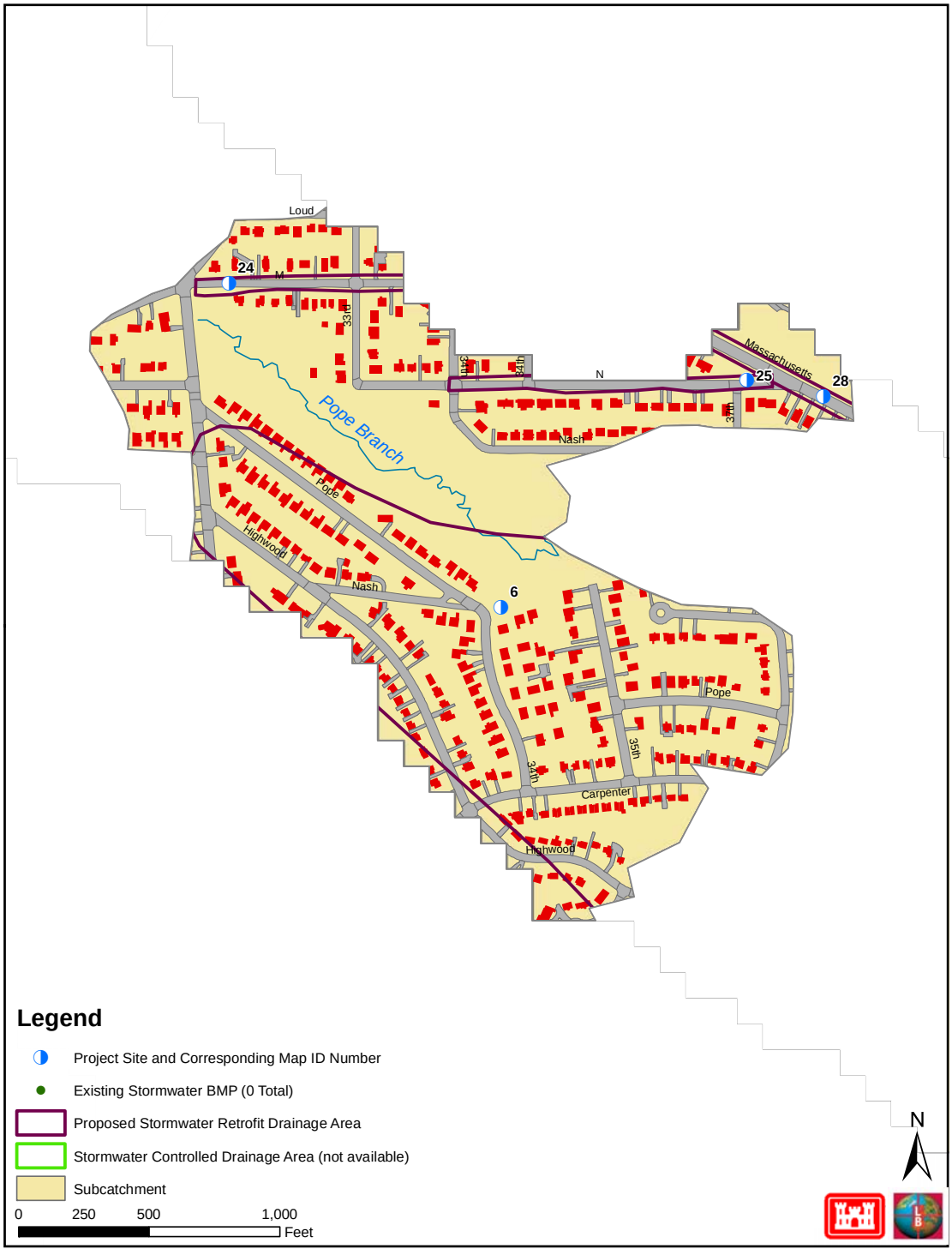

Table 10. Middle Pope Branch - Candidate Stormwater Retrofit Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx D.A. (acres)	Approx. Impervious		General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
								%	(acres)				
PO-M-01-S-1	24	DC	M Street SE between 34th Street SE and 33rd Place SE, Washington, DC	18 A 5	1c	Public	1.3	80	1.0	LID Tree Box Filters	100,000		
PO-M-01-S-2	25	DC	N Street SE between Massachusetts Avenue SE and 33rd Place SE, Washington, DC	18 B 5	1c	Public	1.6	70	1.1	LID Tree Box Filters	66,000		
PO-M-01-S-3	28	DC	Massachusetts Avenue SE between Randle Circle SE and Alabama Avenue SE, Washington, DC	18 A 5	1c	Public	6.5	98	6.4	Infiltration Trenches, LID Bioswale	384,000		
PO-M-01-S-4	6	DC	Residential neighborhood composed of 34th Street SE north of Carpenter Street SE to three residences into Pope Street SE, and Nash Place SE, Washington, DC	18 A 6	1b	Mixed	55.7	25	13.9	Regenerative Stormwater Conveyance, LID Bioretention, Rainscape	470,000		

DC = District of Columbia

[1] 1a= Water quantity, 1b= Water quantity and quality, 1c= Water quality

Figure 19a – Candidate Stormwater Retrofit Project		
Site Location:	M Street SE between 34th Street SE and 33rd Place SE, Washington, DC	
Project No.:	PO-M-01-S-1	
ADC Map Book Location:	18 A 5	Map ID: 24
Approximate Associated Drainage Area (acres):	1.3	
Approximate Imperviousness:	80%	1.0 acres
Description of Existing Conditions:	This site includes a moderately sloped residential street. Stromwater runoff drains west by means of numerous curb inlet drains. There is only a small amount of space between the asphalt and sidewalk.	
Project Description:	**LID Tree Box Filters** - Install tree box filters at the curb inlet drains.	

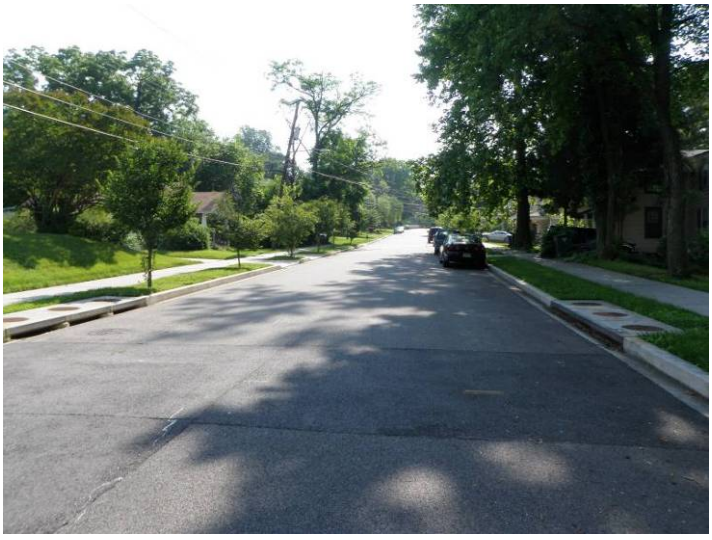

Figure 19b – Candidate Stormwater Retrofit Project		
Site Location:	N Street SE between Massachusetts Avenue SE and 33rd Place SE, Washington, DC	
Project No.:	PO-M-01-S-2	
ADC Map Book Location:	18 B 5	Map ID: 25
Approximate Associated Drainage Area (acres):	1.6	
Approximate Imperviousness:	70%	1.1 acres
Description of Existing Conditions:	N Street SE is a two-lane residential street with parking on either side and multiple curb inlet drains. The portion east of 34th Place SE is relatively flat; however, the portion west of 34th Place SE is fairly steep. The street drains to the east.	
Project Description:	**LID Tree Box Filters** - Install tree box filters at curb inlet drains.	

Figure 19c – Candidate Stormwater Retrofit Project		
Site Location:	Massachusetts Avenue SE between Randle Circle SE and Alabama Avenue SE, Washington, DC	
Project No.:	PO-M-01-S-3	
ADC Map Book Location:	18 A 5	Map ID: 28
Approximate Associated Drainage Area (acres):	6.5	
Approximate Imperviousness:	98%	6.4 acres
Description of Existing Conditions:	Massachusetts Avenue SE, between Randle Circle SE and Alabama Avenue SE, is a two-lane road with a bike lane and a parking lane on the south side surrounded by residences and forested areas. The road is moderately sloped and stormwater runoff drains to numerous curb inlet drains. Drainage is generally towards the west.	
Project Description:	**Infiltration Trenches, LID Bioswale** - Replace the storm sewer line on the north side with infiltration trenches and bioswale.	

Figure 19d – Candidate Stormwater Retrofit Project		
Site Location:	Residential neighborhood composed of 34th Street SE north of Carpenter Street SE to three residences into Pope Street SE, and Nash Place SE, Washington, DC	
Project No.:	PO-M-01-S-4	
ADC Map Book Location:	18 A 6	Map ID: 6
Approximate Associated Drainage Area (acres):	55.7	
Approximate Imperviousness:	25%	13.9 acres
Description of Existing Conditions:	The neighborhood is composed of one- and two-story residences. Stormwater runoff drains to curb inlet drains to outfall SS#1073.	
Project Description:	**Regenerative Stormwater Conveyance, LID Bioretention, Rainscape** - Install a regenerative stormwater conveyance at the outfall. Construct bioretention systems in the small community park above the outfall and install rain gardens and rain barrels at downspout locations in the neighborhood.	

Figure 20 – Middle Pope Branch Candidate Stream Restoration Sites

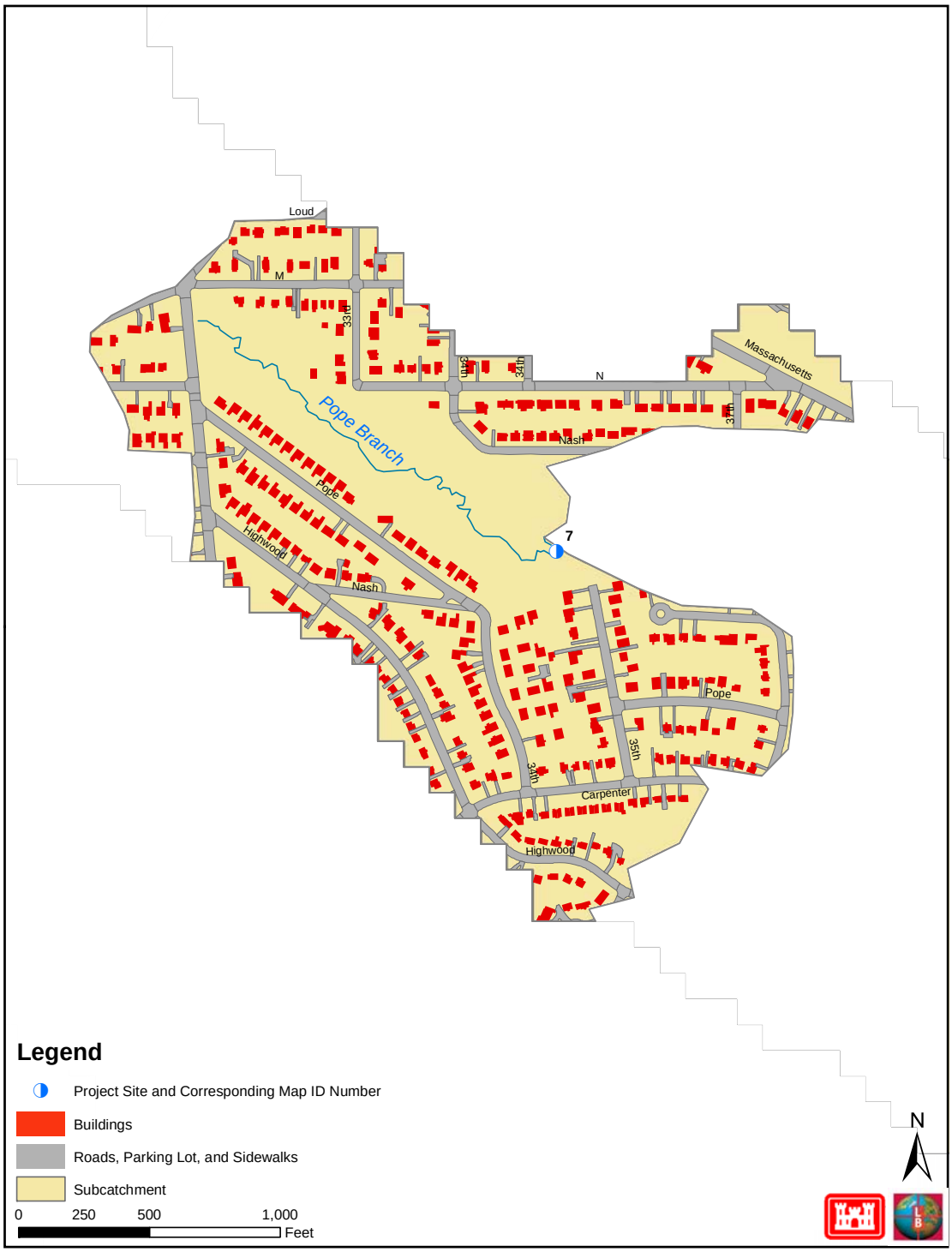

Table 11. Middle Pope Branch - Candidate Stream Restoration Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx Length (feet)	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-M-02-SR-1	7	DC	Pope Branch between the headwaters and Fairlawn Avenue SE, Washington, DC	18 A 6	1a, 1b	Public	6,900	Stream Channel Morphology Restoration, In-stream Habitat Enhancement	2,000,000		

Figure 21a – Candidate Stream Restoration Project		
Site Location:	Pope Branch between the headwaters and Fairlawn Avenue SE, Washington, DC	
Project No.:	PO-M-02-SR-1	
ADC Map Book Location:	18 A 6	Map ID: 7
Approximate Length (feet):	6,900	
Description of Existing Conditions:	Pope Branch has been confined to a narrow floodplain throughout its open reach. The majority of the stream is incised, and lacks sinuosity and connection to its floodplain.	
Project Description:	**Stream Channel Morphology Restoration, In-stream Habitat Enhancement –** Regrade banks and install appropriate bank stabilization measures (i.e. brush layering, live stakes) and toe protection. Install log vanes and riffle-pool sequences to protect banks and improve habitat**.**	

Figure 22 – Middle Pope Branch Candidate Fish Blockage Removal Sites

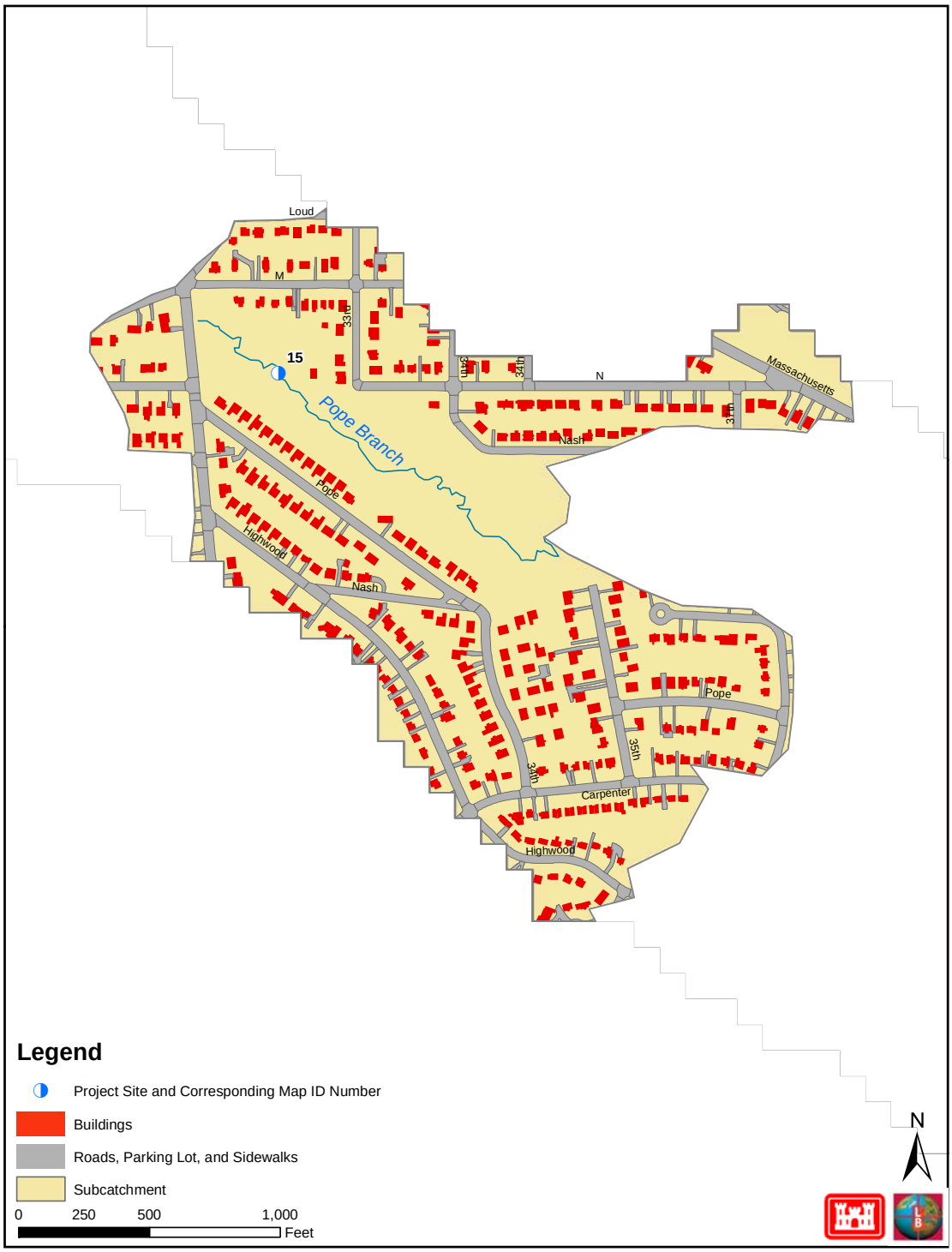

Table 12. Middle Pope Branch - Candidate Fish Blockage Removal Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Ownership	Approx Length (feet)	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-M-04-F-1	15	DC	Sewer line crossing Pope Branch near 3208 Pope Street SE, Washington, DC	18 A 5	Public	2,700	Fish Blockage Removal	300,000		

DC = District of Columbia

Figure 23a – Candidate Fish Blockage Removal Project		
Site Location:	Sewer line crossing Pope Branch near 3208 Pope Street SE, Washington, DC	
Project No.:	PO-M-04-F-1	
ADC Map Book Location:	18 A 5	Map ID: 15
Approximate Upstream Length Open (feet):	2,700	
Description of Existing Conditions:	This site consists of an armored sewer line crossing Pope Branch that forms a complete fish blockage approximately one-and-a-half feet high, eight feet wide and two feet thick.	
Project Description:	**Fish Blockage Removal -** Install a series of riffle and pool complexes to facilitate fish passage.	

Figure 24 - Middle Pope Branch Candidate Riparian Restoration Sites

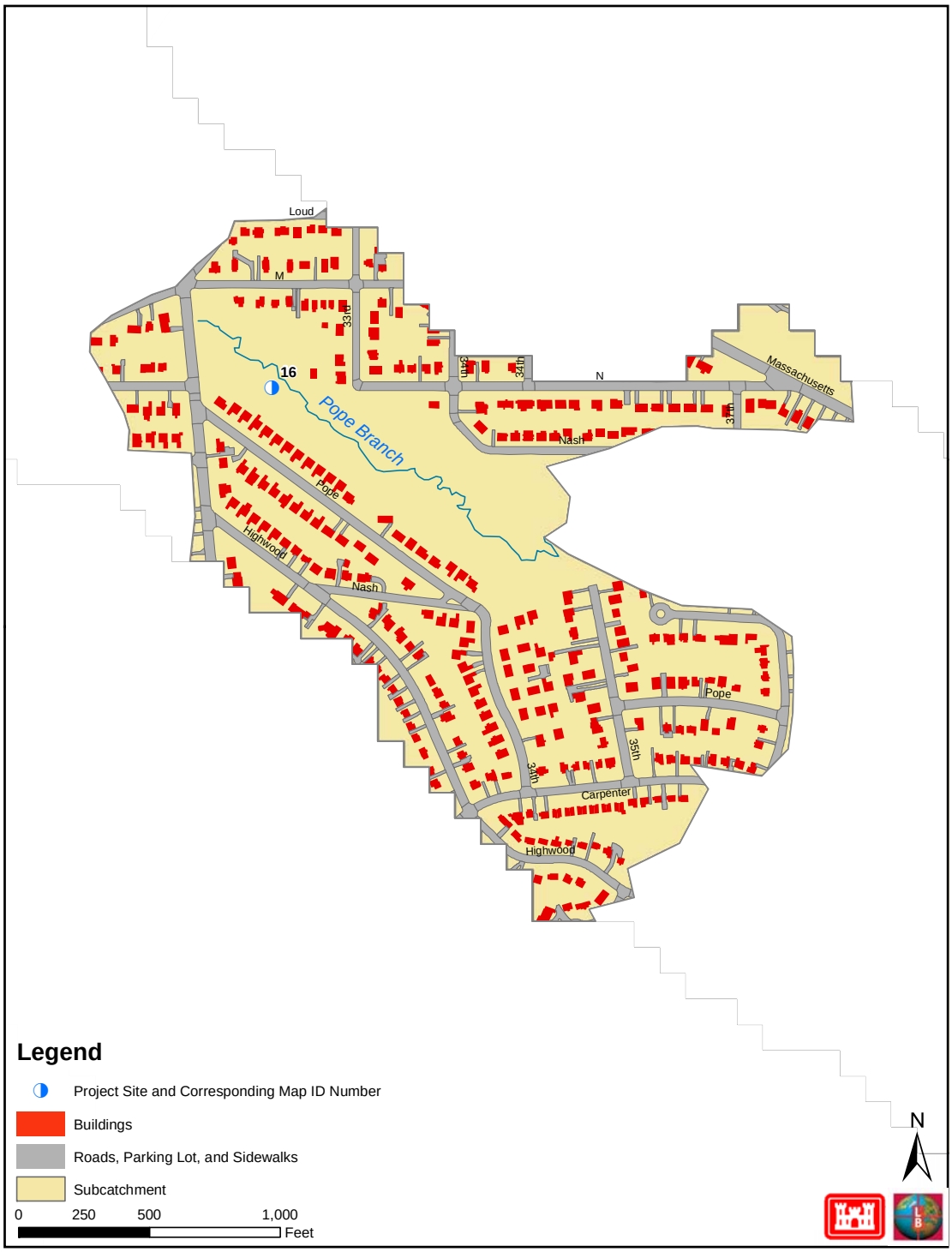

Table 13. Middle Pope Branch - Candidate Riparian Restoration Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx Acreage	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-M-05-R-1	16	DC	Riparian area of Pope Branch between Branch Avenue SE and 34th Street SE, Washington, DC	18 A 5	1d	Public	4.8	Invasive Species Removal	24,000		

DC = District of Columbia

[1] 1a= Upland Reforestation, 1b= Riparian Reforestation, 1c= Meadow Creation, 1d= Invasive Plant Management

Figure 25a – Candidate Riparian Restoration Project		
Site Location:	Riparian area of Pope Branch between Branch Avenue SE and 34th Street SE, Washington, DC	
Project No.:	PO-M-05-R-1	
ADC Map Book Location:	18 A 5	Map ID: 16
Approximate Acreage (acres):	4.8	
Description of Existing Conditions:	The understory of the riparian area is a monoculture of English ivy (*Hedera helix*), an invasive plant species. The ivy is killing many of the native trees in the riparian area.	
Project Description:	**Invasive Species Removal** - Remove the invasive plant species and revegetate using endemic species.	

Figure 26 - Middle Pope Branch Candidate Trash Reduction Sites

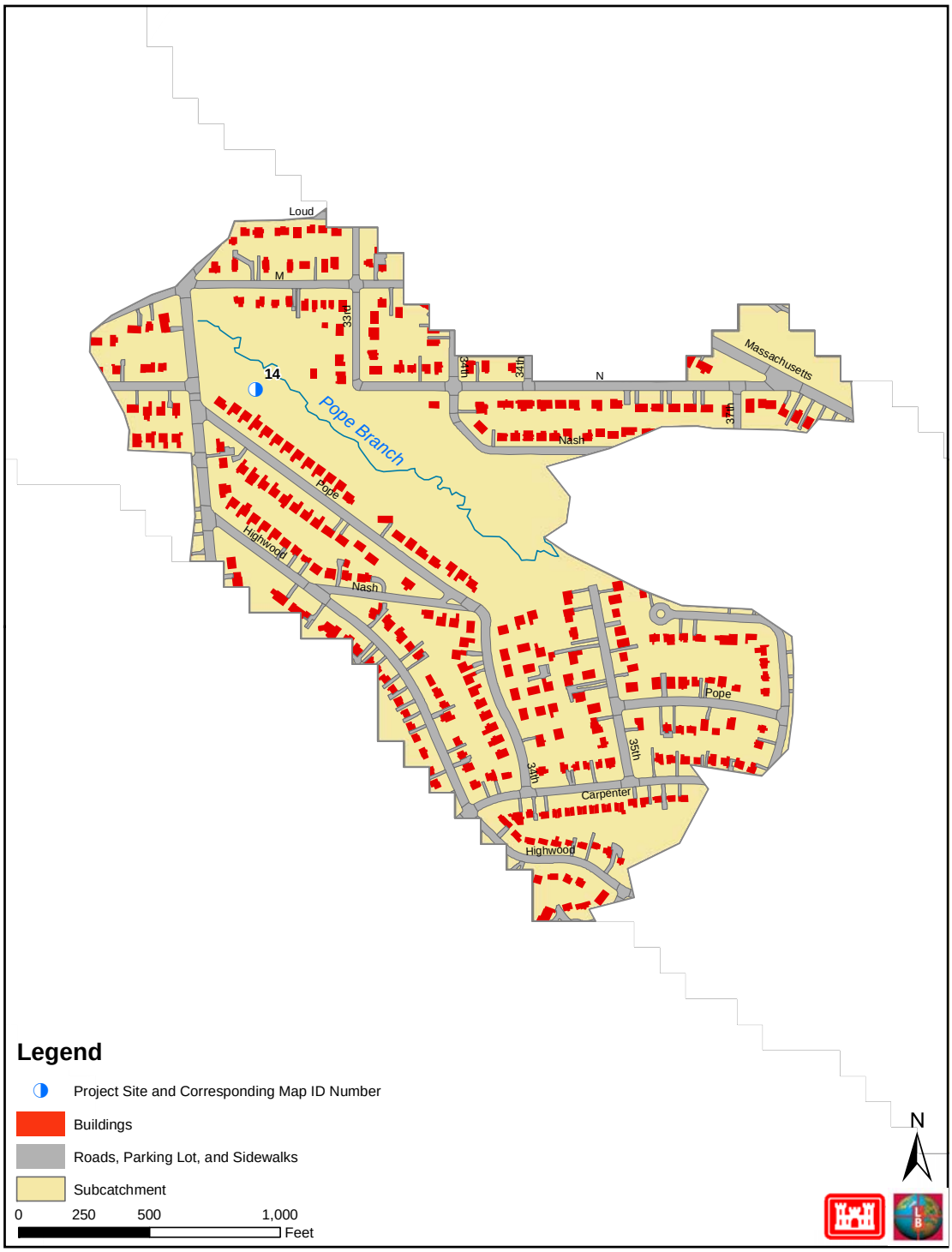

Table 14. Middle Pope Branch - Candidate Trash Reduction Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx Length (mile)	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-M-06-T-1	14	DC	South bank of Pope Branch, between 3208 Pope Street SE and the Branch Avenue SE culvert, Washington, DC	18 A 5	1d	Public	0.05	Trash Removal, Community Cleanup	800		

DC = District of Columbia

[1] 1a = Street Sweeping, 1b = Manual/Mechanical Removal, 1c= Structural, 1d=Outreach/Education

Figure 27a – Candidate Trash Reduction Project		
Site Location:	South bank of Pope Branch, between 3208 Pope Street SE and the Branch Avenue SE culvert, Washington, DC	
Project No.:	PO-M-06-T-1	
ADC Map Book Location:	18 A 5	Map ID: 14
Approximate Length (miles):	0.05	
Description of Existing Conditions:	Trash has been thrown over the bank, primarily consisting of appliances.	
Project Description:	**Trash Removal, Community Cleanup** - Remove trash and debris and perform community outreach.	

Figure 28 – Lower Pope Branch Candidate Stormwater Retrofit Sites

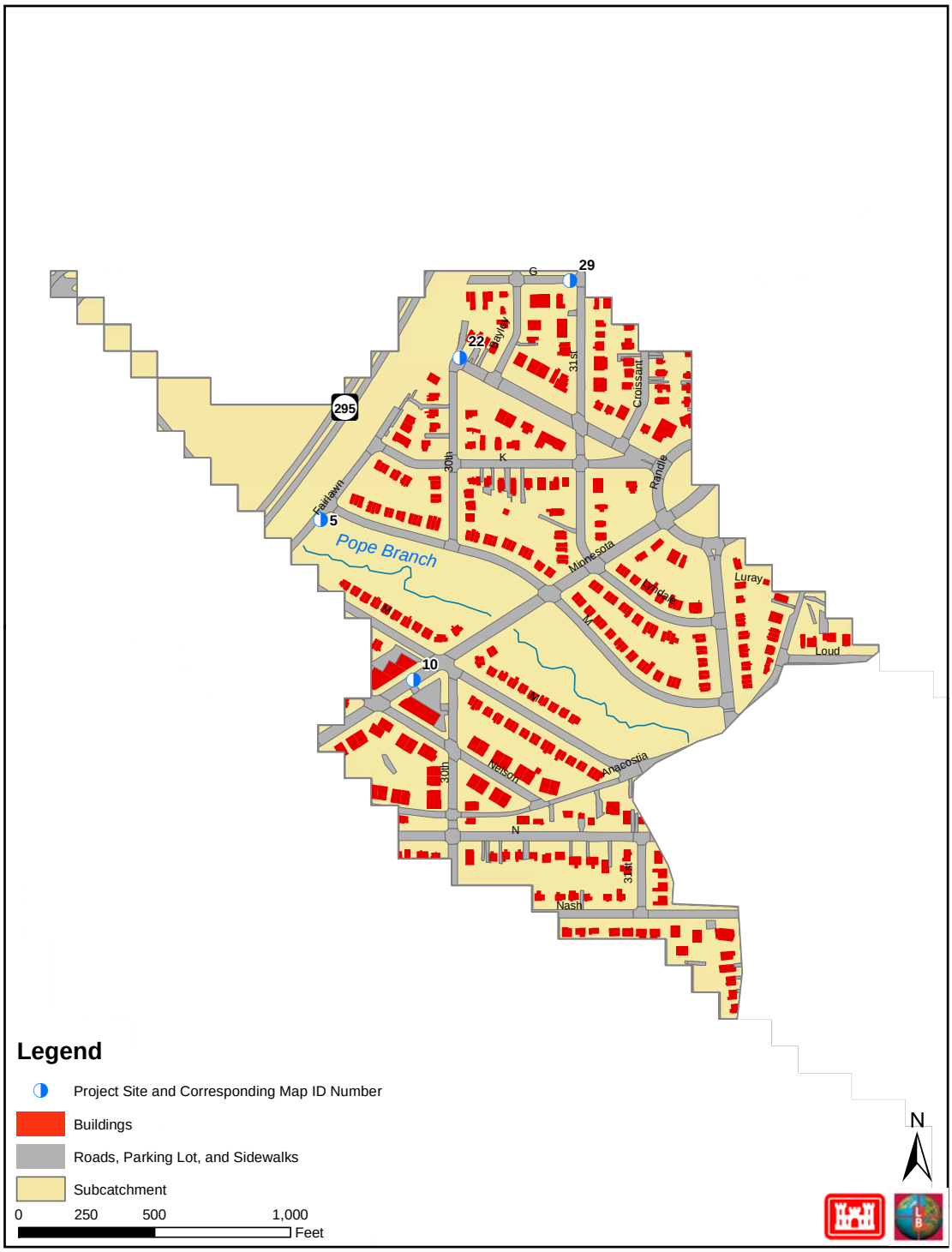

Figure 29 - Lower Pope Branch Candidate Stormwater Retrofit Drainage Areas

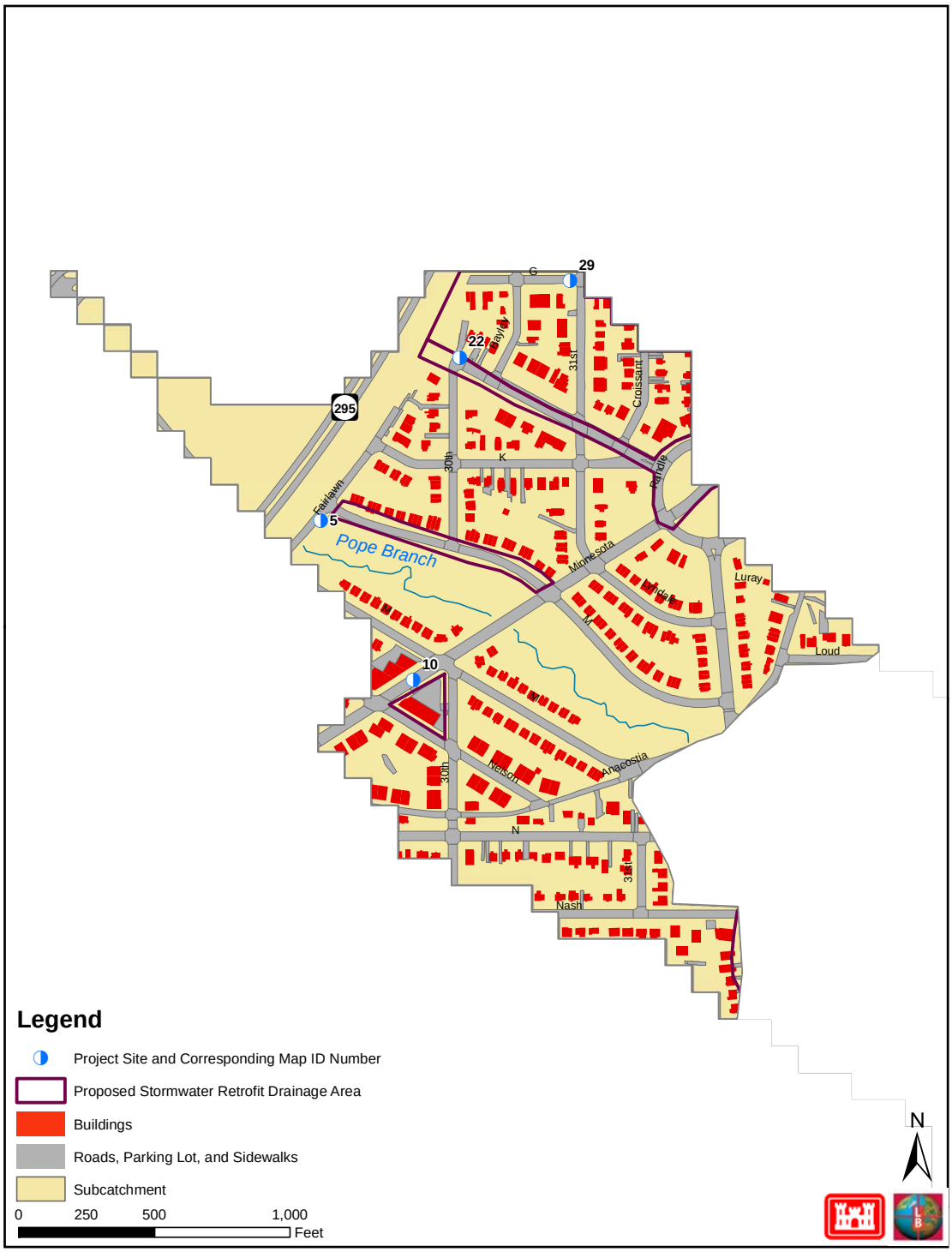

Figure 30 - Lower Pope Branch Candidate Stormwater Retrofit and Existing Stormwater Retrofit Drainage Areas

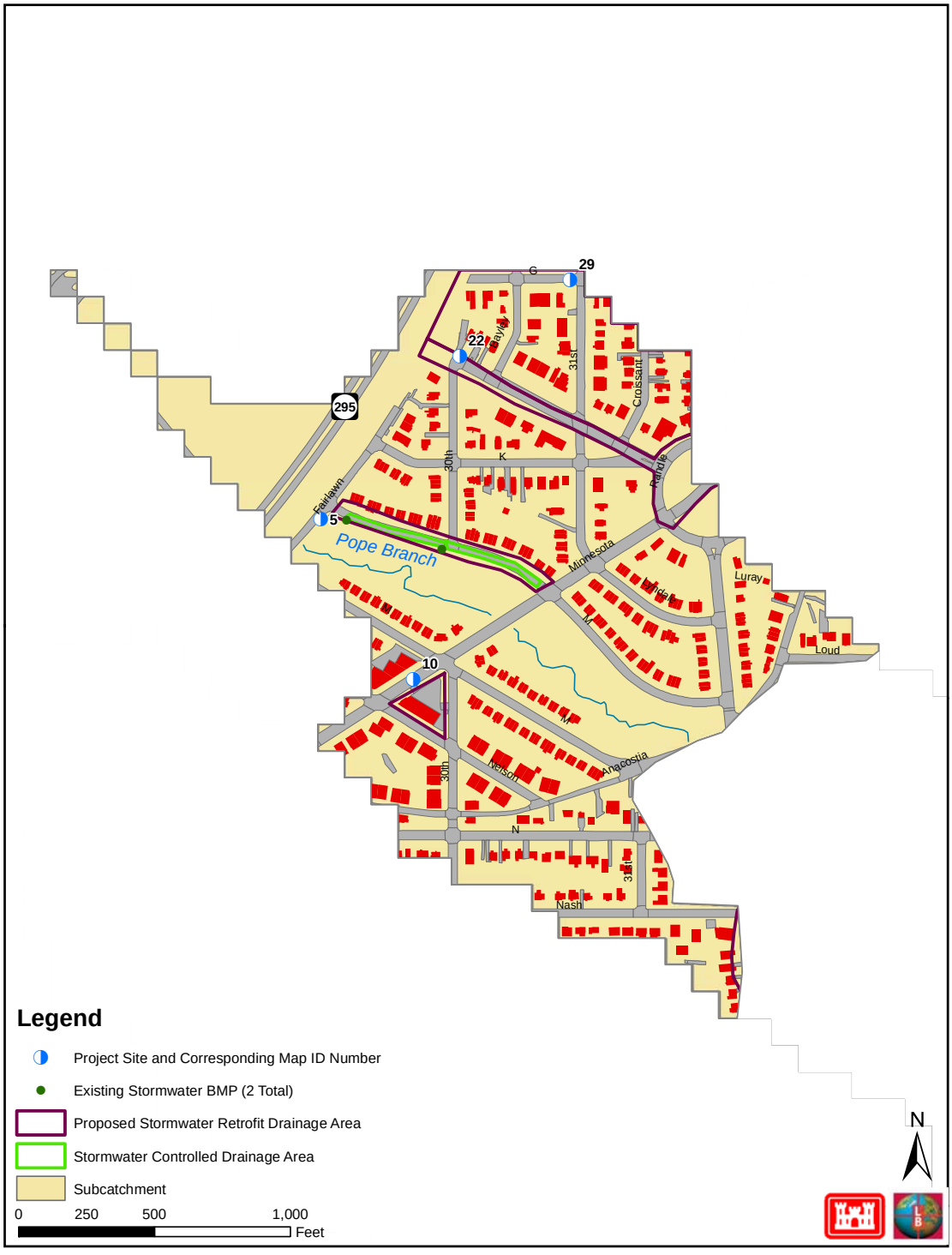

Table 15. Lower Pope Branch - Candidate Stormwater Retrofit Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx D.A. (acres)	Approx. Impervious		General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
								%	(acres)				
PO-L-01-SW-1	22	DC	Massachusetts Avenue SE and 30th Street SE, Washington, DC	17 K 4	1b	Public	2.7	80	2.2	LID Bioretention	220,000		
PO-L-01-SW-2	29	DC	G Street SE, 31st Street SE and 32nd Street SE, Washington, DC	17 K 4	1c	Public	8.9	50	4.5	Rainscape	297,000		
PO-L-01-SW-3	10	DC	Earl's Discount Auto Parts, 2901 Minnesota Avenue SE, Washington, DC	17 K 5	1b	Public	0.6	85	0.5	LID Bioretention	50,000		
PO-L-01-SW-4	5	DC	Fairlawn Avenue SE between M Street SE and G Street SE, Washington, DC	17 K 5	1b	Public	1.3	80	1.0	LID Bioretention	100,000		

DC = District of Columbia

[1] 1a= Water quantity, 1b= Water quantity and quality, 1c= Water quality

Figure 31a – Candidate Stormwater Retrofit Project		
Site Location:	Massachusetts Avenue SE and 30th Street SE, Washington, DC	
Project No.:	PO-L-01-SW-1	
ADC Map Book Location:	17 K 4	Map ID: 22
Approximate Associated Drainage Area (acres):	2.7	
Approximate Imperviousness:	80%	2.2 acres
Description of Existing Conditions:	Massachusetts Avenue SE is two lanes wide with additional parking lanes, sidewalks, and grassy medians on both sides. There are no concrete curbs; the grassy area directly connects to the asphalt. Stormwater runoff from Massachusetts Avenue SE drains west into the dead end, where there is a grassy area between the dead end and the railroad.	
Project Description:	**LID Bioretention** - Construct bioretention systems between the road and the sidewalk in the grassy area and at the dead end.	

Figure 31b – Candidate Stormwater Retrofit Project		
Site Location:	G Street SE, 31st Street SE and 32nd Street SE, Washington, DC	
Project No.:	PO-L-01-SW-2	
ADC Map Book Location:	17 K 4	Map ID: 29
Approximate Associated Drainage Area (acres):	8.9	
Approximate Imperviousness:	50%	4.5 acres
Description of Existing Conditions:	The residential neighborhood consists of houses and two-story apartments. The lots are small and the houses have small lawns.	
Project Description:	**Rainscape** - Install rain gardens and rain barrels at downspouts.	

Figure 31c – Candidate Stormwater Retrofit Project		
Site Location:	Earl's Discount Auto Parts, 2901 Minnesota Avenue SE, Washington, DC	
Project No.:	PO-L-01-SW-3	
ADC Map Book Location:	17 K 5	Map ID: 10
Approximate Associated Drainage Area (acres):	0.6	
Approximate Imperviousness:	85%	0.5 acres
Description of Existing Conditions:	The parcel consists of a one-story commercial structure with a parking lot to the north. Downspouts are connected to the stormwater system. Stormwater runoff drains to Minnesota Avenue SE.	
Project Description:	**LID Bioretention** – Construct a bioretention system in the grassy area between the parking lot and the Minnesota Avenue SE / 30th Street SE intersection**.** Disconnect downspouts from the stormwater system.	

Figure 31d – Candidate Stormwater Retrofit Project		
Site Location:	Fairlawn Avenue SE between M Street SE and G Street SE, Washington, DC	
Project No.:	PO-L-01-SW-4	
ADC Map Book Location:	17 K 5	Map ID: 5
Approximate Associated Drainage Area (acres):	1.3	
Approximate Imperviousness:	80%	1.0 acres
Description of Existing Conditions:	Fairlawn Avenue SE is a two-lane suburban street. Stormwater runoff drains to Pope Branch by means of curb inlet drains. A railway track and utility line parallel the road to the west.	
Project Description:	**LID Bioretention** – Construct a bioretention system in the grassy area between the roadway and railway.	

Figure 32 – Lower Pope Branch Candidate Stream Restoration Sites

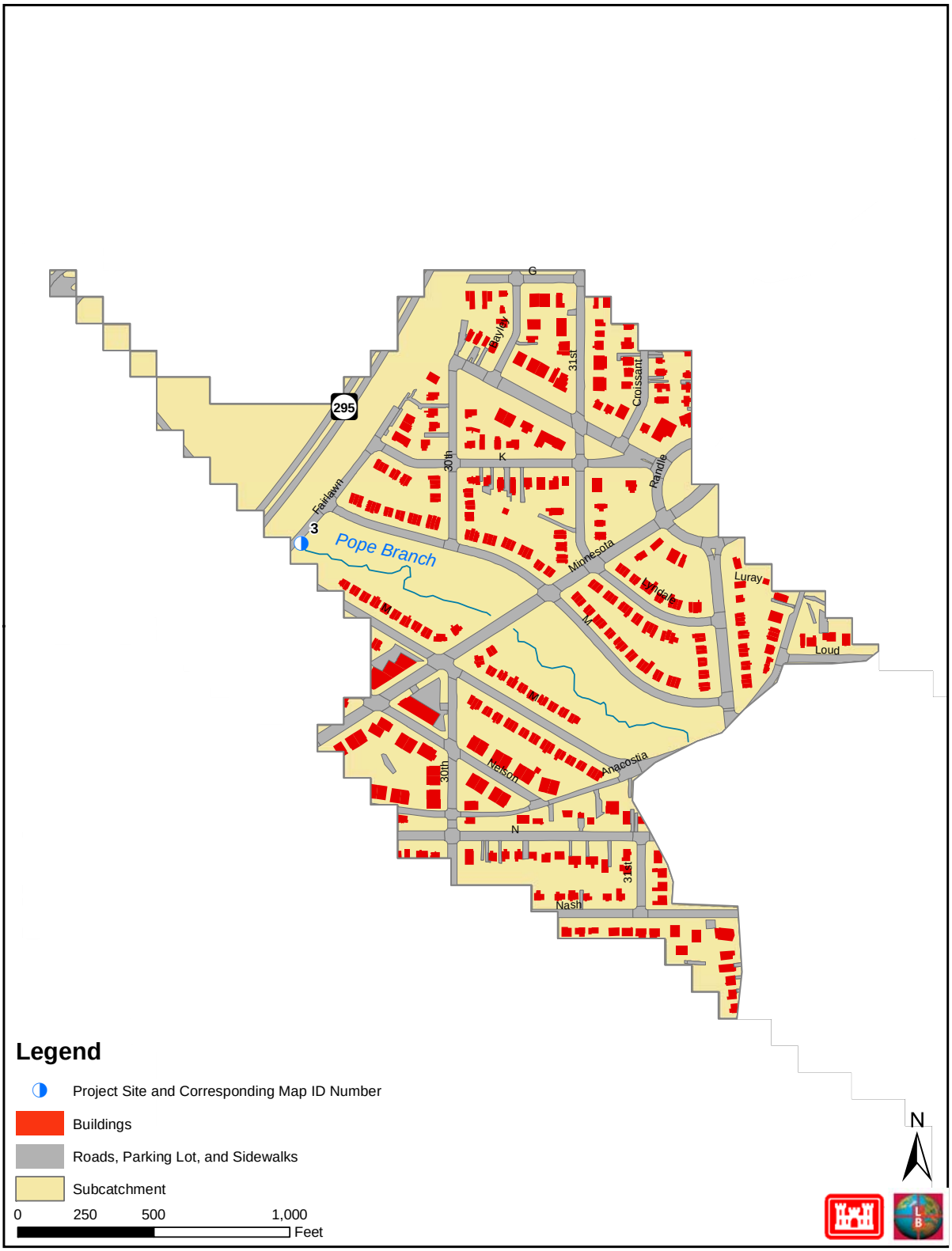

Table 16. Lower Pope Branch – Candidate Stream Restoration Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx Length (feet)	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-L-02-SR-1	3	DC	Pope Branch between Fairlawn Avenue SE and the Anacostia River, Washington, DC	17 K 5	1b	Mixed	1,600	Stream Daylighting	480,000		

DC = District of Columbia

[1] 1a= Channel Morphology, 1b= In-Stream Habitat/Bank Stabilization, 1c= Fish Blockage, 1d= Vernal Pool Creation Enhancement

Figure 33a – Candidate Stream Restoration Project		
Site Location:	Pope Branch between Fairlawn Avenue SE and the Anacostia River, Washington, DC	
Project No.:	PO-L-02-SR-1	
ADC Map Book Location:	17 K 5	Map ID: 3
Approximate Length (feet):	1,600	
Description of Existing Conditions:	Pope Branch is piped from the Fairlawn Avenue SE culvert to the Anacostia River.	
Project Description:	**Stream Daylighting** - Daylight the stream and establish a natural stream channel.	

Figure 34 – Lower Pope Branch Candidate Wetland Restoration Sites

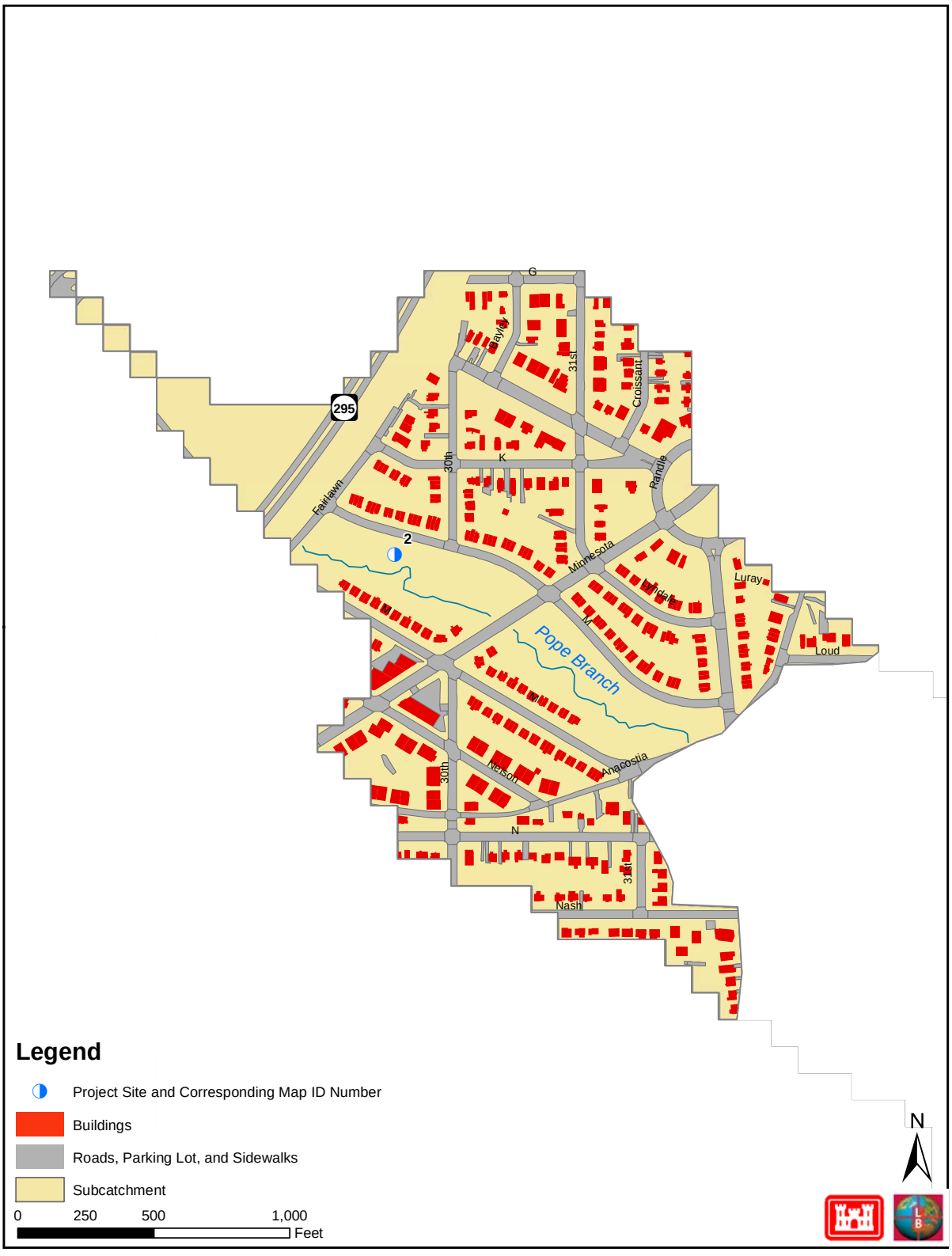

Table 17. Lower Pope Branch – Candidate Wetland Restoration Projects

Project ID	Map ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx Acreage	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-L-03-W-1	2	DC	Pope Branch floodplain, just east of Fairlawn Avenue SE, Washington, DC	17 K 5	1e, 1f	Public	1.0	Wetland Restoration, Invasive Species Removal	50,000		

DC = District of Columbia

[1] 1a= Channel Morphology, 1b= In-Stream Habitat/Bank Stabilization, 1c= Fish Blockage, 1d= Vernal pool Creation Enhancement, 1e= Wetland Creation/Restoration, 1f = Invasive Species Control

Figure 35a – Candidate Wetland Restoration Project		
Site Location:	Pope Branch floodplain, just east of Fairlawn Avenue SE, Washington, DC	
Project No.:	PO-L-03-W-1	
ADC Map Book Location:	17 K 5	Map ID: 2
Approximate Acreage (acres):	1.0	
Description of Existing Conditions:	Pope Branch is connected to the floodplain in this region. The south bank is forested and has water marks indicative of flooding. The north bank has a small riparian area and maintained lawn. The lawn area was saturated to the surface at the time of the survey.	
Project Description:	**Wetland Restoration, Invasive Species Removal** - Excavate portions of the north floodplain to expand the wetland area. Remove the invasive English ivy (*Hedera helix*) dominating the forest understory.	

Figure 36 – Lower Pope Branch Candidate Fish Blockage Removal Sites

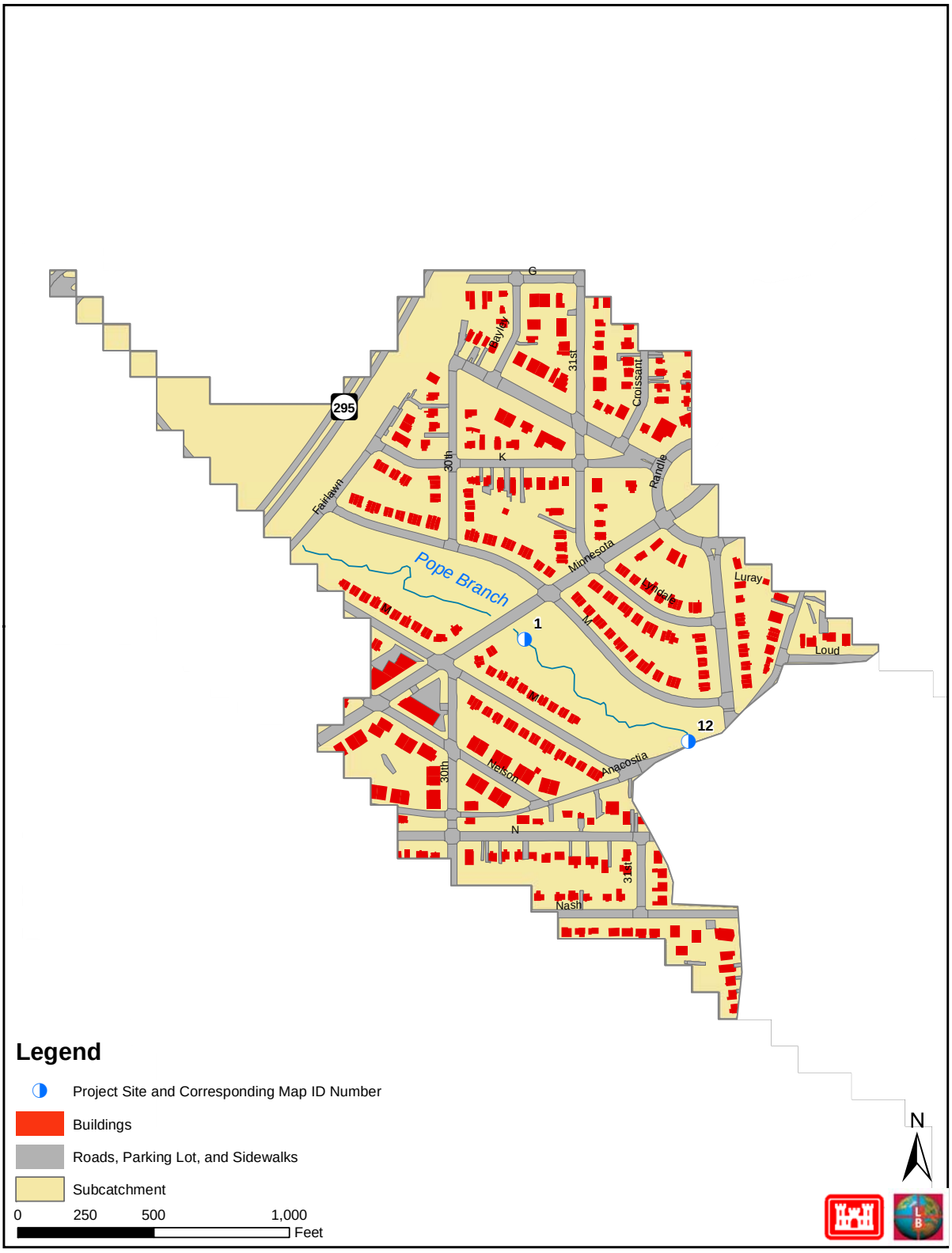

Table 18. Lower Pope Branch – Candidate Fish Blockage Removal Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Ownership	Approx Length (feet)	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-L-04-F-1	12	DC	Culvert at the intersection of Branch Avenue SE and Anacostia Road SE, Washington, DC	18 A 5	Public	400	Fish Blockage Removal	150,000		
PO-L-04-F-2	1	DC	Culvert at Minnesota Avenue SE, Washington, DC	17 K 5	Public	850	Soft Bottom Channel Creation, Fish Blockage Removal	220,000		

DC = District of Columbia

Figure 37a – Candidate Fish Blockage Removal Project		
Site Location:	Culvert at the intersection of Branch Avenue SE and Anacostia Road SE, Washington, DC	
Project No.:	PO-L-04-F-1	
ADC Map Book Location:	18 A 5	Map ID: 12
Approximate Upstream Length Open (feet):	400	
Description of Existing Conditions:	The concrete culvert conveying Pope Branch underneath Branch Avenue SE and Anacostia Road SE has collapsed. Both the culvert and the rubble present a complete fish blockage approximately 220 feet long.	
Project Description:	**Fish Blockage Removal** - Replace the culvert with a design that allows fish passage.	

Figure 37b – Candidate Fish Blockage Removal Project		
Site Location:	Culvert at Minnesota Avenue SE, Washington, DC	
Project No.:	PO-L-04-F-2	
ADC Map Book Location:	17 K 5	Map ID: 1
Approximate Upstream Length Open (feet):	850	
Description of Existing Conditions:	The culvert consists of a seven-foot-tall arched tunnel with a concrete bed. The upstream end has a small flow restrictor, and the downstream end has a 1.5-foot drop to a large plunge pool.	
Project Description:	**Soft Bottom Channel Creation, Fish Blockage Removal -** Replace the existing culvert with a soft-bottom design. Install a series of riffle and pool complexes to facilitate fish passage.	

Figure 38 – Lower Pope Branch Candidate Riparian Restoration Sites

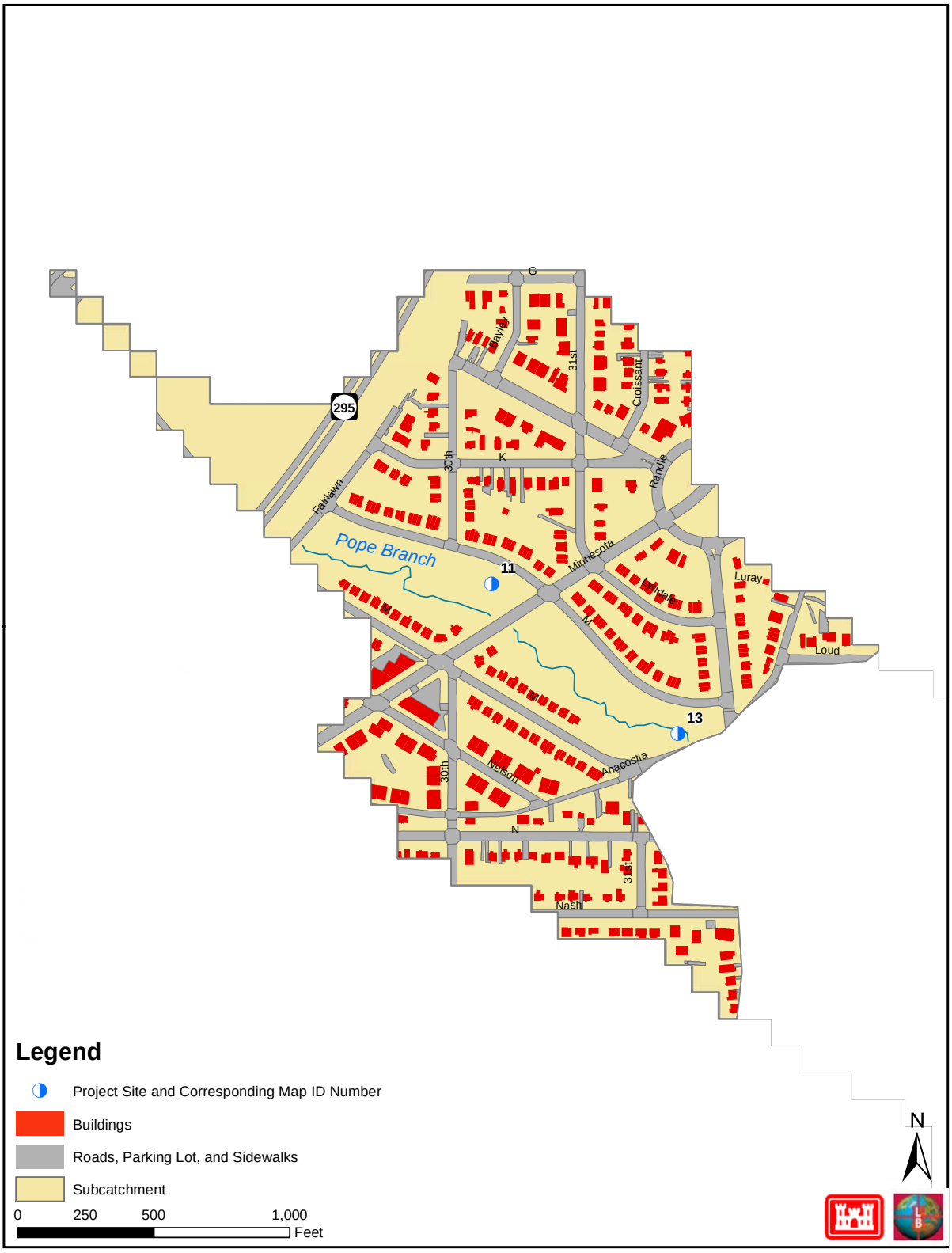

Table 19. Lower Pope Branch – Candidate Riparian Restoration Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx Acreage	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-L-05-R-1	13	DC	Riparian area of Pope Branch between Branch Avenue SE and Minnesota Avenue SE, Washington, DC	18 A 5	1d	Public	4.3	Invasive Species Removal	22,000		
PO-L-05-R-2	11	DC	Grassy field between M Place SE and Pope Branch, west of Minnesota Avenue SE and east of Fairlawn Avenue SE, Washington, DC	17 K 5	1b	Public	0.9	Riparian Reforestation	4,500		

DC = District of Columbia

[1] 1a= Upland Reforestation, 1b= Riparian Reforestation, 1c= Meadow Creation, 1d= Invasive Plant Management

Figure 39a – Candidate Riparian Restoration Project		
Site Location:	Riparian area of Pope Branch between Branch Avenue SE and Minnesota Avenue SE, Washington, DC	
Project No.:	PO-L-05-R-1	
ADC Map Book Location:	18 A 5	Map ID: 13
Approximate Acreage (acres):	4.3	
Description of Existing Conditions:	The understory of the riparian area is dominated by the invasive plant species English ivy (*Hedera helix*), Japanese honeysuckle (*Lonicera japonica*), multifloral rose (*Rosa multiflora*), bush honeysuckle (*Lonicera maackii*), and tree of heaven (*Ailianthus altissma*).	
Project Description:	**Invasive Species Removal** - Remove the invasive plant species and revegetate using endemic species.	

Figure 39b – Candidate Riparian Restoration Project		
Site Location:	Grassy field between M Place SE and Pope Branch, west of Minnesota Avenue SE and east of Fairlawn Avenue SE, Washington, DC	
Project No.:	PO-L-05-R-2	
ADC Map Book Location:	17 K 5	Map ID: 11
Approximate Acreage (acres):	0.9	
Description of Existing Conditions:	This site consists of a maintained grassy area between the street and the riparian area of Pope Branch. There are some existing tree plantings adjacent to the street.	
Project Description:	**Riparian Reforestation** - Reforest the grassy area using endemic trees and shrubs.	

Figure 40 – Lower Pope Branch Candidate Trash Reduction Sites

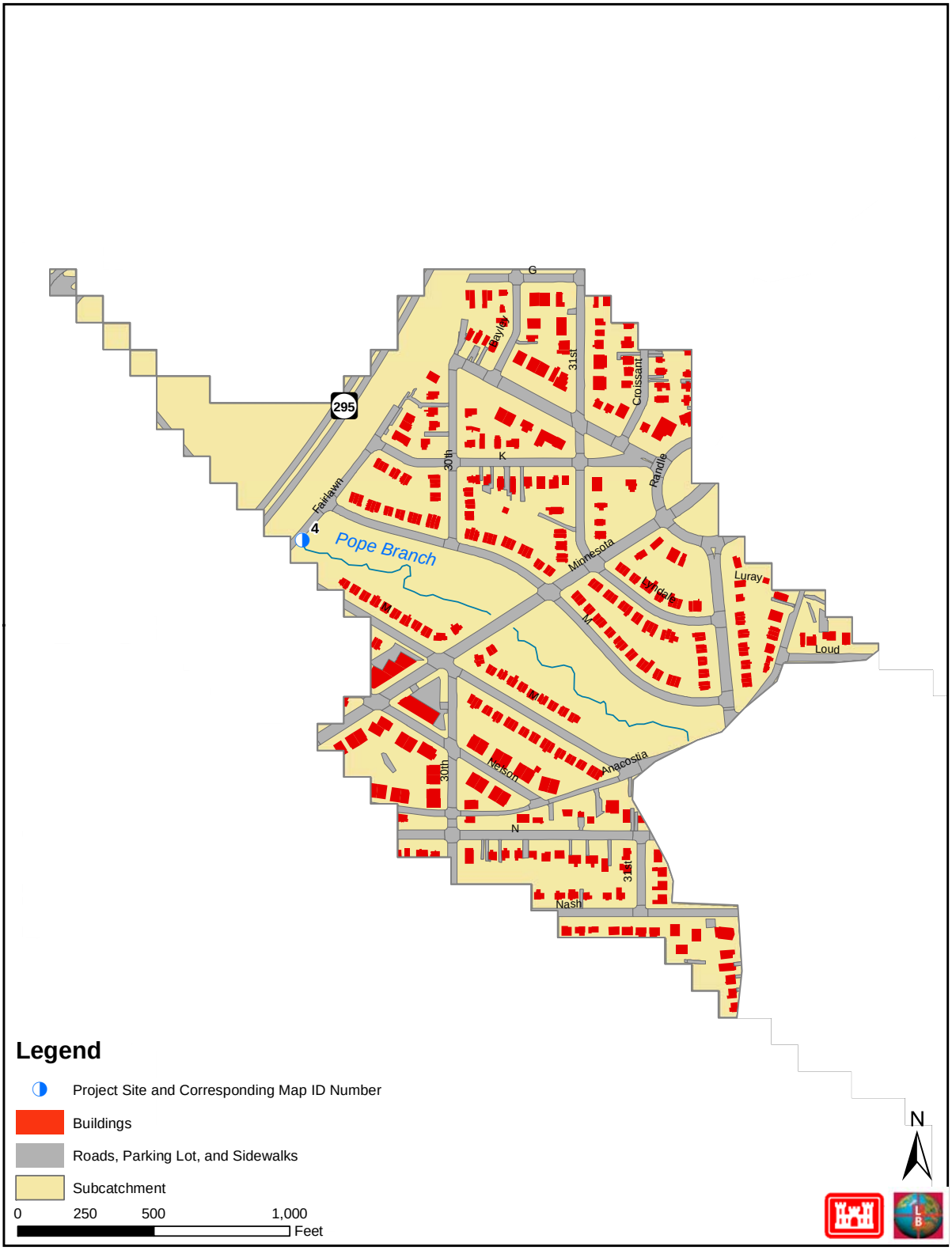

Table 20. Lower Pope Branch – Candidate Trash Reduction Projects

Project ID	MAP ID	Jurisdiction	Site Location Name	ADC Map Book Location	Project Type[1]	Ownership	Approx Length (mile)	General Description of Proposed Actions	Estimated Cost ($)	Project Score (pts)	Project Ranking
PO-L-06-T-1	4	DC	Immediately upstream of the Fairlawn Avenue SE culvert, Washington, DC	17 K 5	1b, 1c	Public	0.05	Trash Removal, Trash Net	5,000		

DC = District of Columbia

[1] 1a = Street Sweeping, 1b = Manual/Mechanical Removal, 1c= Structural, 1d=Outreach/Education

Figure 41a – Candidate Trash Reduction Project		
Site Location:	Immediately upstream of the Fairlawn Avenue SE culvert, Washington, DC	
Project No.:	PO-L-06-T-1	
ADC Map Book Location:	17 K 5	Map ID: 4
Approximate Length (miles):	0.05	
Description of Existing Conditions:	A large amount of woody debris and trash has accumulated at the culvert.	
Project Description:	**Trash Removal, Trash Net** - Remove the accumulated trash and woody debris. Install a trash net at the culvert.