Appendix B: Technical Documents

i. Subwatershed Strategies

Technical Memo 3.2 describes how initial strategies were developed for Nichol Run and Pond Branch watersheds. The memo discusses the characterization of subwatershed improvement, stream restoration, and regional pond alternative strategies. The memo also describes how based on these strategies priority subwatersheds were identified and potential candidate restoration projects were selected.

ii. Prioritization

Technical Memo 3.4/3.5 describes how potential candidate projects were evaluated and the final list of projects incorporated in the watershed management plan was selected. The memo describes how candidate projects were investigated in the field to evaluate the scope, feasibility, and benefits of each candidate project. The memo also discusses the procedure by which candidate structural projects were evaluated and ranked.

iii. Modeling description

Technical Memo 3.6 describes the selection of projects to be further evaluated with hydrologic and hydraulic models. The memo discusses this assessment of potential impacts and discusses if objectives were met by implementing the modeled projects. The memo summarizes the setup, calibration and results of the hydrologic and hydraulic modeling performed. Results from the final STEPL pollution model were also summarized in this memo.

This page intentionally left blank.

F. X. Browne, Inc.
Memorandum

To: Fairfax County
From: F. X. Browne, Inc.
Date: July 16, 2009
RE: Task 3.2 Initial Subwatershed Strategies for Nichol Run and Pond Branch Watersheds

Task 3.2 provides that initial strategies will be developed for Nichol Run and Pond Branch watersheds. The initial subwatershed strategies consist of two main components, identifying priority subwatersheds and identifying candidate restoration projects.

Priority Subwatershed Identification

Priority subwatersheds/candidate restoration areas were identified based on the results of Final Subwatershed Ranking, priority restoration elements from SPA, problem areas identified during subwatershed characterization and field reconnaissance, and input from the WAG team.

F.X. Browne, Inc. used the following data sources and indicators to identify priority subwatersheds/candidate restoration areas.

Table 1 Candidate Restoration Area Selection Criteria

Data Source/ Indicator	Selection Process
Subwatershed Ranking	Lowest 40% of overall objective composite scores
SPA	Best professional judgment, numerous impairments for habitat, CEM (type 2 or 3), stream crossings, erosion, bank stability/headcuts, or insufficient riparian buffer
Flooding	All subwatersheds with non-zero scores for SW Ranking flooding indicators.
Field Reconnaissance	Best professional judgment, problem areas identified during field reconnaissance
Public Comments	Subwatersheds with problem areas identified by WAG members or during the Introduction and Initial Scoping Forum

There are also many areas within Nichol Run and Pond Branch watersheds that would benefit from preservation strategies rather than solely restorative strategies. Preservation strategies target the less impacted and more pristine subwatersheds including key areas such as headwaters to prevent future degradation of the subwatershed and downstream areas.

F. X. Browne, Inc. is using the following data sources and indicators to identify priority subwatersheds for preservation strategies.

Table 2 Candidate Preservation Area Selection Criteria

Data Source/ Indicator	Selection Process
Subwatershed Ranking	Highest 20% of overall objective composite scores to identify less impacted subwatersheds
STEPL	Greatest increase in modeled pollutant loadings to identify subwatersheds (top 20%) at greatest risk for future impairments
Total Impervious Area	Total impervious area of less than 10% to identify pristine subwatersheds & Greatest increase in impervious area to identify subwatersheds (top 20%) at greatest risk for future impairments

Identifying Impairments & Preservation Qualities

Once priority subwatersheds were identified, F. X. Browne, Inc. reviewed the following data in order to identify impairments for each subwatershed.

Table 3 Impairment Data Reviewed for Each Priority Subwatershed

Data Format	Data/Indicator	Impairment/Preservation Quality Type
Table	Overall composite score	All
Table	Objective composite scores	All
Table	Flooding Indicators	Flooding & Water Quantity
Table	STEPL pollutant loads	Pollutant Loading & Water Quality
Table	STEPL streambank erosion loads	Habitat & Stream Condition
Table	% Imperviousness	All
Table	% Forest Cover	All
GIS	SPA CEM, Erosion, Headcuts	Habitat & Stream Condition
GIS	SPA Crossings, Ditch, Pipe	Habitat & Stream Condition
GIS	SPA Deficient Buffer, Habitat	Habitat & Stream Condition
GIS	SPS Fish IBI Score (Fish Community)	Habitat & Stream Condition
GIS	SPS IBI Score (Benthic Community)	Habitat & Stream Condition
GIS	E. coli	Pollutant Loading & Water Quality
GIS	303d Impaired Streams	Pollutant Loading & Water Quality
GIS	Subarea stormwater management controls	All

Reviewing the data directly removes the problems associated with relying on surrogate data used during SW Ranking. This is most notable with E. coli and SPS data that have limited data points.

Developing Strategies

General subwatershed characteristics and impairments were recorded for each priority subwatershed. Sources of subwatershed impairments were identified where evident and improvement goals/strategies were developed for each priority subwatershed. Improvement goals/strategies may include both structural and non-structural practices. The following table includes a summary of project types that may be included for the various improvement goals/ strategies.

Table 4 Summary of Subwatershed Strategies & Project Types

Strategies:	Project Types (with Type ID #):
Subwatershed Improvements	Stormwater Pond Retrofits New Stormwater Ponds Low Impact Development Retrofits Culvert Retrofits, including Road Crossing Improvements Outfall Improvements Area-wide Drainage Improvements
Stream Restoration	Streambank Stabilization Natural Channel Restoration
Non-Structural Measures & Preservation Strategies	Buffer restoration Rain barrel programs Dumpsite/Obstruction removal Community outreach/Public education Conservation acquisition/easements Street sweeping Storm drain stenciling

Subwatershed Improvement Strategies are intended to reduce stormwater impacts and may include retrofits to existing stormwater ponds, new stormwater ponds, culvert retrofits, drainage improvements, low impact development projects or a combination of the aforementioned project types.

Low impact development (LID) projects are Best Management Practices (BMPs) designed to provide water quality and quantity benefits for stormwater management on the site where stormwater is generated. LID projects, categorized under Subwatershed Improvement Strategies, represent a variety of project types and a single project may consist of a suite of smaller projects. Possible LID projects include:

- Sand and Sand/Peat Filters
- Rain Gardens/Bioretention
- Infiltration Basins/Trenches
- Vegetated Rooftops
- Porous/Permeable Paving
- Underground or Rooftop Storage

Stream Restoration Strategies are targeted at improving habitat, promoting stable stream geomorphology, and reducing in-stream pollutants due to erosion. Subwatershed Improvement Strategies are critical to the success of Stream Restoration Strategies by improving drainage and reducing peak flows. A major component of Stream Restoration Strategies is identifying and addressing the source of the impairments.

Non-Structural Measures and Preservation Strategies are crucial to successful watershed management. Although it may be difficult to directly measure their benefits, Non-Structural Measures and Preservation Strategies can provide significant benefits to both the quality and quantity of stormwater runoff, improve habitat and stream quality, and help mitigate the potential impacts of future development. Because county-wide policy recommendations were adequately developed during the first round of Watershed Management Plans (WMPs), the Non-Structural Measures and Preservation Strategies developed for the Sugarland Run and Horsepen Creek WMP will focus on projects other than policy-related recommendations.

Priority Subwatersheds

Based on the data/indicators available as of the completion of this technical memorandum, the following subwatersheds have been identified as priorities for restorative or preservation strategies. Table 6 also indicates which selection criteria were used elevate the subwatershed to priority status.

Table 6 Priority Subwatersheds and Selection Criteria

	Preservation				Restoration					
Subwatershed ID	SW Ranking	Total Imperv. Area	% Increase Total Impervious	% Increase STEPL TSS	SW Ranking	SPA Data	Flooding	Public Comment/ Involvement	Field Recon/ Drainage Complaint	Field Recon/ ProRata
NI-HB-0001		X			X	X	X			X
NI-HB-0002		X								X
NI-JB-0001	X	X	X	X						
NI-JB-0002		X								
NI-JB-0003		X		X	X		X			
NI-JB-0004		X					X			
NI-JB-0005	X	X					X			
NI-JB-0006	X	X								
NI-NI-0001		X								
NI-NI-0002		X	X	X			X			
NI-NI-0003	X	X								
NI-NI-0004		X	X	X			X			
NI-NI-0005		X					X			
NI-NI-0006		X								
NI-NI-0007		X		X			X	X		
NI-NI-0008		X			X	X	X		X	X
NI-NI-0009	X	X								
NI-NI-0010		X				X	X			X
NI-NI-0011	X	X	X			X				

	Preservation				Restoration					
Subwatershed ID	SW Ranking	Total Imperv. Area	% Increase Total Impervious	% Increase STEPL TSS	SW Ranking	SPA Data	Flooding	Public Comment/ Involvement	Field Recon/ Drainage Complaint	Field Recon/ ProRata
NI-NI-0012	X	X	X						X	
NI-NI-0013		X								
NI-NI-0014		X								
NI-NI-0015		X			X	X		X	X	
NI-NI-0016							X		X	
NI-PO-0001		X								
NI-PO-0002	X	X								
NI-PO-0003	X	X								
NI-PO-0004	X	X	X	X						
NI-PO-0005	X	X								
PN-CL-0001		X	X	X	X	X	X	X		
PN-CL-0002		X	X							
PN-CL-0003		X			X					
PN-CL-0004		X			X			X		
PN-CL-0005		X	X		X					
PN-CL-0006		X			X		X			
PN-CL-0007		X			X					
PN-CL-0008		X			X			X		
PN-CL-0009		X	X		X			X		X
PN-MR-0001		X			X		X			
PN-MR-0002		X			X					
PN-MR-0003		X			X	X	X			
PN-MR-0004		X			X					
PN-MR-0005		X			X		X			
PN-MR-0006		X		X	X	X		X	X	

	Preservation				Restoration					
Subwatershed ID	**SW Ranking**	**Total Imperv. Area**	**% Increase Total Impervious**	**% Increase STEPL TSS**	**SW Ranking**	**SPA Data**	**Flooding**	**Public Comment/ Involvement**	**Field Recon/ Drainage Complaint**	**Field Recon/ ProRata**
PN-MR-0007		X	X	X	X		X			
PN-MR-0008		X		X	X				X	
PN-PN-0001		X					X	X		
PN-PN-0002		X								
PN-PN-0003		X		X						
PN-PN-0004		X		X		X	X	X		X
PN-PO-0001		X			X					
PN-PO-0002		X								
PN-PO-0003		X								
PN-PO-0004		X								
PN-PO-0005		X			X	X			X	
PN-PO-0006		X			X					X
PN-PO-0007		X			X					
PN-PO-0008	X	X								
PN-PO-0009		X								
PN-PO-0010		X								
PN-PO-0011		X						X		
PN-PO-0012		X	X					X		

This page intentionally left blank

Identifying Projects

A universe of potential projects was identified for the watersheds focusing on the Improvement Goals/Strategies and Preservation Strategies developed for each subwatershed. Temporary Project Identification Numbers and preliminary Project Type Codes were assigned to each project. All structural candidate projects were investigated in the field in order to determine viability and WAG members were allowed three weeks to review and provide comments on the initial universe of potential projects. The initial universe of candidate projects is provided in Appendix A. Preliminary Project Type Codes, used in the Candidate Projects table, are provided in Table 7

Table 7 Preliminary Project Type Codes

Code:	Project Type:
1	New Stormwater Ponds and Stormwater Pond Retrofits
2	Natural Channel Restoration
3	Streambank Stabilization
4	Road Crossing Improvements
7	Culvert Retrofits
8	Drainage Improvements
9	Low Impact Development Retrofits
No ID	Non-Structural & Preservation

Final Project Type Codes were developed by the County after the completion of the Candidate Projects table and will be used in final project numbering and in the Watershed Management Plan. These Project Type Codes are provided in Table 8, below.

Table 8 Final Project Type Codes

Code:	Project Type:
1	New Stormwater Ponds and Stormwater Pond Retrofits
2	Stream Restoration
3	Area-wide Drainage Improvements
4	Culvert Retrofits
5	New Best Management Practices/Low Impact Development Retrofits
6	Flood Protection/Mitigation
7	Outfall Improvements
No ID	Non-Structural & Preservation

This page intentionally left blank

Appendix A

Candidate Projects Table
Index Map
Candidate Projects Map #1
Candidate Projects Map #2
Candidate Projects Map #3
Candidate Projects Map #4

This page intentionally left blank

Candidate Projects Report

Subwatershed ***NI-HB-0001*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol-Upper*

Description	Primarily Estate Residential, forested lots, no StormNet facililities, some quality/ quantity designation	***Impairments***	Primarily erosion issues downstream of NI-HB-0002 confluence (source), poor water quality, flooding at Beach Mill Road
Restoration Selection Criteria	SW Ranking, SPA Data, Flooding, Field Recon/Pro Rata	***Preservation Qualities***	High percent forested land
Preservation Selection Criteria	Imp	***Improvement Goals***	Streambank stabilization/restoration - source is located in NI-HB-0002, remove obstructions, preserve privately owned riparian buffers, reduce flooding impacts.
Percent Impervious	6.87%		
Percent Forest	76.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
M10	Natural Channel Restoration	2	Repair erosion between Utterbach Store Road and confluence with Nichol Run	Private property, ESR	10808 BEACH MILL RD
M11	Natural Channel Restoration	2	Restore ditch to natural stream channel with riparian vegetation	Private property, ESR	10808 BEACH MILL RD
M12	Preservation		Conservation easement to preserve riparian forest upstream of Utterbach Store Road	Private property, ESR	521 LOST ACRE LA

Subwatershed ***NI-HB-0002*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol-Upper*

Description	Headwaters subwatershed, Mixed Estate & Low Density Residential, cleared lots, headwaters dry pond, DS wet pond, entire subbasin has SW controls	***Impairments***	Deficient buffer, little forest, possibly insufficient SW controls
Restoration Selection Criteria	Field Recon/Pro Rata	***Preservation Qualities***	
Preservation Selection Criteria	Imp	***Improvement Goals***	Reduce peak flow, riparian buffer restoration
Percent Impervious	9.48%		
Percent Forest	18.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
M13	Road Crossing Improvements	4	Replace culvert at Beach Mill Road, ProRata project Map No: NI411		10879 PATOWMACK DR
M14	Stormwater Pond Retrofit	1	Raise outlet to provide additional volume, or drain and convert to constructed wetlands or enhanced extended detention basin (preferred)	Private property, ESR	10879 PATOWMACK DR
M15	Stormwater Pond Retrofit	1	Retrofit in-line dry pond to provide additional quality/quantity controls, wetland/micro-pool above weir?	Private property, ESR & LDR	499 SAINT IVES RD
M16	New Stormwater Pond	1	New constructed wetland or enhanced extended detention basin between outfalls and stream channel	Private property, between ESR and LDR	10909 BELGRAVIA CT

Subwatershed ***NI-JB-0001*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol- Jefferson*

Description Half mostly wooded OS, half mostly wooded ESR, 1 head cut (Impact score 10)

Impairments

Restoration Selection Criteria

Preservation Qualities Low % Imp, Overall composite score good (low stormwater runoff, low flooding hazards, good drinking water quality, and good storage).

Preservation Selection Criteria SW Ranking, Imp, % Increase Imp, % Increase TSS

Improvement Goals Preserve OS and riparian buffers with conservation easement, repair stream erosion impacts

Percent Impervious 0.58%

Percent Forest 79.00%

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
24	Natural Channel Restoration	2	Repair stream erosion head cut (impact score 10) ID#NIJB001.H001	Within OS	215 SENECA RD
25	Preservation		Preserve OS and riparian buffers with conservation easement		215 SENECA RD

Subwatershed ***NJ-JB-0002*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol- Jefferson*

Description	Mostly ESR, some wooded OS, a little LDR, 2 farm ponds	***Impairments***	Poor habitat health, poor total Phosphorus, poor septic
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp, low flooding hazards, good storage
Preservation Selection Criteria	Imp	***Improvement Goals***	Preserve OS and riparian buffers with conservation easement, improve habitat health and water quality
Percent Impervious	4.02%		
Percent Forest	51.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***
26	Non-Structural Projects		Riparian buffer restoration	Private Property, ESR, farm fields	201 DONMORE DR
27	Culvert Retrofits	7	Improve culvert/dam with water quality micropools or bioretention	Private property, ESR	207 DONMORE DR
28	Stormwater Pond Retrofits	1	Improve existing farm pond with water quality bioretention/storage	Private property, ESR	214 DONMORE DR
29	Stormwater Pond Retrofits	1	Improve existing farm pond with water quality bioretention/storage	Private property, ESR	227 DONMORE DR

Subwatershed ***NI-JB-0003*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol- Jefferson*

Description	Mix of wooded OS, ESR, LDR and one INT, 4 farm ponds, some proposed detention only, quality/quantity (wet), and 1 quality only treatments.	***Impairments***	Overall composite score poor (flooding hazards, poor habitat health), poor total phosphorus, poor septic
Restoration Selection Criteria	SW Ranking, Flooding	***Preservation Qualities***	Low % Imp, good storage
Preservation Selection Criteria	Imp, % Increase TSS	***Improvement Goals***	Preserve OS and riparian buffers with conservation easements, improve flooding hazards, improve habitat health, improve water quality.
Percent Impervious	4.98%		
Percent Forest	81.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
30	Stormwater Pond Retrofits	1	Improve existing farm ponds with water quality bioretention/storage, remove concrete channels (if applicable).	Private property, between ESR and LDR	413 SENECA RD
31	New Stormwater Ponds	1	New pond for storage and water quality	Private property, ESR	401 SENECA RD
32	Drainage Improvements	8	Replace concrete channel with naturalized channel	Between OS and ESR	11212 W MONTPELIER RD
33	Stormwater Pond Retrofits	1	Improve existing farm pond with storage/bioretention, outlet structure	Between OS and ESR	440 MONTPELIER RD
34	Stormwater Pond Retrofits	1	Improve existing farm pond with storage/bioretention, add outlet structure	Private property, ESR	444 MONTPELIER RD
35	New Stormwater Ponds	1	New pond for storage and water quality	Within OS	11218 RICHLAND GROVE DR
36	Preservation		Preserve OS and riparian buffers with conservation easements	Mostly ESR	11209 RICHLAND GROVE DR
37	Drainage Improvements	8	Replace paved ditches on both sides of the street with naturalized channels	Between R/W and LDR	11431 WOOLINGTON RD

Subwatershed ***NJ-JB-0004*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol- Jefferson*

Description	Primarily LDR, some ESR, mostly forested lots, one dry pond providing some detention-only SW control, most of development required to have quantity/quality controls but none evident	***Impairments***	Overall composite score poor (high SW outfalls, poor water quality, high channelized streams), Flooding and erosion impacts at stream crossing on Beach Mill Road,
Restoration Selection Criteria	Flooding	***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	Improve water quality, restore natural stream channels, reduce SW runoff and repair impacts to stream crossing at Beach Mill Road.
Percent Impervious	8.41%		
Percent Forest	67.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
38	New Stormwater Ponds	1	New Dry Pond or wetland to help control flow before continuing downstream		11295 BEACH MILL RD
39	New Stormwater Ponds	1	New dry pond or wetland to help control flow and dissipate energy		11295 BEACH MILL RD
40	Drainage Improvements	8	Remove concrete channels and replace with grass swales		500 SENECA KNOLL CT
41	New Stormwater Ponds	1	New dry pond or wetland to help control water quality and peak flow		11361 SENECA KNOLL DR
42	Stormwater Pond Retrofits	1	Improve existing pond with storage, vegetation and outlet structure		11368 SENECA KNOLL DR
43	Drainage Improvements	8	Remove concrete channels in area and replace with vegetated swales		11384 SENECA KNOLL DR
44	Drainage Improvements	8	Remove concrete channels in area and replace with vegetated swales		11212 ELMVIEW PL
46	New Stormwater Ponds	1	New dry pond or wetland to help control water quality and peak flow		501 OLD SAYBROOK WY
47	Culvert Retrofit	7	Retrofit culvert with outlet structure and wetland or micropool		11295 BEACH MILL RD

Subwatershed ***NI-JB-0005*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol- Jefferson*

Description	Mostly ESR, some LDR and a few OS, two farm ponds.	***Impairments***	Flooding hazards, poor septic
Restoration Selection Criteria	Flooding	***Preservation Qualities***	Low % Imp, Overall composite score good (low stormwater runoff, good habitat diversity, good stream water and drinking water quality, good storage)
Preservation Selection Criteria	SW Ranking, Imp	***Improvement Goals***	Preserve OS and riparian buffers with conservation easement, control flooding hazards.
Percent Impervious	4.87%		
Percent Forest	72.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
45	Drainage Improvements	8	Remove concrete channels in area and replace with vegetated swales		11371 SENECA KNOLL DR
48	Stormwater Pond Retrofit	1	Improve existing pond with storage, vegetation and outlet structure		11371 SENECA KNOLL DR
49	Stormwater Pond Retrofits	1	Improve existing pond with storage, vegetation and outlet structure		625 SENECA RD
50	Stormwater Pond Retrofits	1	Improve existing pond with storage, vegetation and outlet structure		11314 COROBON LA
51	Stormwater Pond Retrofits	1	Improve existing pond with storage, vegetation and outlet structure		11314 COROBON LA
52	New Stormwater Ponds	1	New dry pond or wetland to help control water quality and peak flow		11124 COROBON LA
53	New Stormwater Ponds	1	New dry pond or wetland to help control water quality and peak flow		11123 COROBON LA

Subwatershed ***NI-JB-0006*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol- Jefferson*

Description Half ESR, half LDR, some OS, a few proposed for quality treatment only, 2 farm ponds, one inefficient buffer, one concrete obstruction along Jefferson Branch, one erosion (impact score 7) along Jefferson Branch

Impairments Poor stormwater outfalls, poor septic

Restoration Selection Criteria

Preservation Qualities Low % Imp, Overall composite score good (low stormwater runoff, low flooding hazards, good habitat diversity, good stream water quality, good storage capacity).

Preservation Selection Criteria SW Ranking, Imp

Improvement Goals Preserve OS and riparian buffers with conservation easements, improve stormwater outfalls.

Percent Impervious 6.25%

Percent Forest 78.00%

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
54	Streambank Stabilization	3	Repair streambank erosion (impact score 7).	private property, ESR	11300 SENECA VIEW WY
55	Culvert Retrofits	7	Improve culverts (one under Seneca View Road, two under driveways)	Private property, ESR	11335 SENECA VIEW WY
56	Stormwater Pond Retrofits	1	Improve existing farm pond with storage, outlet structure, or bioretention.	Private property, ESR	11395 SENECA VIEW WY
57	Drainage Improvements	8	Improve outfall, replace pipe/concrete channel with naturalized channel.	Private property, LDR	702 CROWN MEADOW DR
58	Drainage Improvements	8	Improve culvert/outfall.	Private property, LDR	11112 RICHLAND VALLEY DR
59	Drainage Improvements	8	Improve culvert/outfall	Private property, LDR	11132 RICH MEADOW DR
60	Drainage Improvements	8	Remove or improve concrete obstruction (ID#NIJB006.T001)(Impact score 10)	Private property, LDR	11143 RICH MEADOW DR
61	Non-Structural Projects		Improve riparian buffer from lawn to meadow or woodland	Private property, ESR and LDR	11143 RICH MEADOW DR
62	Drainage Improvements	8	Improve culvert/outfall	Private property, LDR	11155 RICH MEADOW DR
63	Preservation		Preserve OS and riparian buffers with conservation easements	OS, ESR and LDR	11151 RICH MEADOW DR

Subwatershed ***NI-NI-0001*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Lower*

Description	Partially wooded OS, ESR and LDR, no SWM facilities (except storm sewer)	***Impairments***	Poor septic
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp, Overall composite score good (low flooding hazards, good habitat health, good storage capacity)
Preservation Selection Criteria	Imp	***Improvement Goals***	Preserve OS with conservation easements.
Percent Impervious	3.46%		
Percent Forest	69.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
12	New Stormwater Ponds	1	New pond or wetland, drainage area approx 1.5 acres	private property, LDR, if temp id 13 is not viable	10112 HIGH HILL CT
13	Drainage Improvements	8	Replace pipes or concrete channel with naturalized channel	private property, LDR, if temp id 12 is not viable	10112 HIGH HILL CT
14	New Stormwater Ponds	1	New pond or wetland, drainage area approx 6 acres	private property, LDR, if temp id 15 is not viable	10104 HIGH HILL CT
15	Drainage Improvements	8	Replace pipes or concrete channel with naturalized channel	private property, LDR, if temp id 14 is not viable	106 FALCON RIDGE RD
16	Preservation		Preserve open space and riparian buffers with conservation easements		103 INTERPROMONTORY RD

Subwatershed ***NJ-NJ-0002*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Lower*

Description	Half wooded OS, half ESR, one INT property, 3 wet ponds, 1 farm pond, 1 paved ditch	***Impairments***	Flooding hazards
Restoration Selection Criteria	Flooding	***Preservation Qualities***	Low % Imp, Overall composite score fair (low stormwater runoff, good habitat health and diversity, good stream and drinking water quality, good storage capacity).
Preservation Selection Criteria	Imp, % Increase Imp, % Increase TSS	***Improvement Goals***	Decrease flooding hazards, preserve open space and riparian buffers with conservation easements.
Percent Impervious	2.14%		
Percent Forest	86.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
17	Stormwater Pond Retrofits	1	Improve existing WP0200 by increasing storage or adding bioretention	Private property, ESR	5 JEFFERSON RUN RD
18	Stormwater Pond Retrofits	1	Improve existing farm pond with more storage or bioretention	Private property, ESR	107 JEFFERSON RUN RD
19	Drainage Improvements	8	Replace paved ditch with vegetated swale	Within OS	111 COMMONAGE DR
20	Stormwater Pond Retrofits	1	Improve existing wet pond with more storage, outlet structure or bioretention	Within OS	230 SPRINGVALE RD
21	Preservation		Preserve OS and riparian buffers with conservation easement		235 SPRINGVALE RD

Subwatershed ***NI-NI-0003*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Lower*

Description	Mostly wooded OS, ESR & LDR, some with proposed quality/quantity (wet) standards, 2 farm ponds	***Impairments***	Poor septic
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp, Overall composite score good (low stormwater runoff, low flooding hazards, good habitat diversity, and good stream water quality).
Preservation Selection Criteria	SW Ranking, Imp	***Improvement Goals***	Preserve OS and riparian buffers with conservation easement.
Percent Impervious	2.97%		
Percent Forest	63.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
22	Stormwater Pond Retrofits	1	Improve existing farm pond with more storage, outlet structure or bioretention	Private property, ESR	317 SPRINGVALE RD
23	Preservation		Preserve OS and riparian buffers with conservation easement		128 COMMONAGE DR

Subwatershed ***NI-NI-0004*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Lower*

Description	Primarily ESR, some LDR & OS, mostly forested lots, 2 non-SWM ponds, no apparent SW controls although quality/quantity control was required for newer homes	***Impairments***	Flooding at Beach Mill Rd, stream channel actively downcutting & widening
Restoration Selection Criteria	Flooding	***Preservation Qualities***	Low % Imp, good habitat diversity & stream water quality, at risk from future development
Preservation Selection Criteria	Imp, % Increase Imp, % Increase TSS	***Improvement Goals***	Preserve OS & riparian buffers to protect habitat and water quality, reduce SW runoff within subwatershed and upstream, and repair stream erosion.
Percent Impervious	4.16%		
Percent Forest	82.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
M1	New Stormwater Pond	1	New pond or wetland to control flow from outfalls before it reaches stream channel, drainage area approx 10 acres	private property, LDR	10856 PATOWMACK DR
M2	New Stormwater Pond	1	New pond or wetland to control flow from outfalls before it enters pipe, drainage area greater than 10 acres	private property, LDR	10840 PATOWMACK DR
M3	New Stormwater Pond	1	New pond or wetland to control flow from outfalls before it reaches stream channel, drainage area greater than 10 acres	private property, ESR	10835 PATOWMACK DR
M4	Natural Channel Restoration	2	Replace concrete channel with natural stream channel	Private property, LDR	10844 PATOWMACK DR
M5	Natural Channel Restoration	2	Replace concrete channel with natural stream channel	Private property, ESR	10835 PATOWMACK DR
M6	Stormwater Pond Retrofit	1	Retrofit existing farm pond to SWM wet pond, additional volume available & water quality possible	Private property, ESR	10611 ALLENWOOD LA
M7	Low Impact Development Retrofits	9	Rain gardens for homes on Allenwood Lane, homes required to have quality/quantity controls, but none apparent	Private properties, ESR & LDR	10608 ALLENWOOD LA
M8	Stormwater Pond Retrofit	1	Possible retrofit to existing pond (probably a farm pond)	Private property, ESR, along pipeline	10906 THIMBLEBERRY LA
M9	Road Crossing Improvements	4	Raise road at Beach Mill Road		390 NICHOLS RUN CT

Subwatershed ***NI-NI-0005*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	Primarily ESR with some LDR, forested lots, 3 non-SWM ponds, no SWM controls	***Impairments***	Flooding at Sycamore Springs Lane, main stem actively downcutting and widening, poor water quality and habitat health
Restoration Selection Criteria	Flooding	***Preservation Qualities***	Low % Imp.
Preservation Selection Criteria	Imp	***Improvement Goals***	Reduce SW flows, improve water quality & habitat, address flooding
Percent Impervious	5.14%		
Percent Forest	66.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
M17	Stormwater Pond Retrofit	1	Retrofit in-line non-SWM ponds to SWM pond (constructed wetland/enhanced extended detention basin, wet pond with lower water elevation for additional storage)	Private property, ESR	10607 BEACH MILL RD
M18	Stormwater Pond Retrofit	1	Retrofit in-line non-SWM pond to SWM pond (constructed wetland/enhanced extended detention basin, wet pond with lower water elevation for additional storage)	Private property? OS	10550 BEACH MILL RD
M19	Stormwater Pond Retrofit	1	Raise outlet to provide additional volume, drainage area approx 20 acres	Private property, ESR	10409 CHELSEA MANORS CT
M20	Low Impact Development Retrofits	9	New infiltration basin with vegetated swales along boundary between field and woods, drainage area approx 6 acres	Private property, ESR	511 UTTERBACK STORE RD
M21	Preservation		Conservation easement to preserve riparian forest along major stream corridors	Private property, ESR	10712 CREAMCUP LA

Subwatershed ***NI-NI-0006*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description Primarily ESR with some LDR, mostly forested lots, 1 large & 3 small non-SWM ponds, some quality/quantity desgination, but no apparent SWM controls

Impairments Poor water quality, lacking SWM controls

Restoration Selection Criteria

Preservation Qualities Low % Imp., good habitat diversity

Preservation Selection Criteria Imp

Improvement Goals Improve water quality, preserve forested riparian buffers

Percent Impervious 6.16%

Percent Forest 81.00%

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
81	Stormwater Pond Retrofit	1	Retrofit existing farm pond to wet pond with additional storage and water quality, or drain and convert to constructed wetlands or enhanced extended detention basin	Private property, ESR	440 SPRINGVALE RD
82	Low Impact Development Retrofits	9	New rain gardens for properties 441, 443, 445 & 447 Springvale Rd.	Private properties, ESR & LDR	445 SPRINGVALE RD
83	New Stormwater Pond	1	New constructed wetland at tributary confluence to treat uncontrolled SW from Parker House Rd.		10428 PARKERHOUSE DR
84	Preservation		Conservation easement to preserve riparian forest along major stream corridors	Private properties, ESR & LDR	436 SPRINGVALE RD

Subwatershed ***NI-NI-0007*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	Primarily ESR with some LDR, mostly forested lots (cleared lots in headwater areas), 1 dry pond, 1 non-SWM pond, most ESR has no SWM controls	***Impairments***	Flooding at Fawn Dr and unnamed road, pubic comment - stream dammed up with rocks at 'Trail' 17' (unnamed road?)
Restoration Selection Criteria	Flooding, Public Comment	***Preservation Qualities***	Low % Imp. at risk from future development
Preservation Selection Criteria	Imp, % Increase TSS	***Improvement Goals***	Reduce flooding impacts, investigate and repair stream impacts and obstructions, preserved forested riparian buffers
Percent Impervious	5.56%		
Percent Forest	70.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
85	Stormwater Pond Retrofit	1	Retrofit existing farm pond to wet pond with additional storage and water quality, or drain and convert to constructed wetlands or enhanced extended detention basin	Private property, ESR	621 UTTERBACK STORE RD
86	Road Crossing Improvements	4	Raise road bed @ unnamed road, increase culvert size/capacity, investigate alternative crossing improvements		611 UTTERBACK STORE RD
87	Stream Restoration	2	Investigate public comment regarding stream obstruction, may be located at SPA point NINI003.T003 or at farm pond downstream of unnamed road		621 UTTERBACK STORE RD
88	Road Crossing Improvements	4	Raise road bed @ Fawn Dr, increase culvert size/capacity, investigate alternative crossing improvements		10716 FAWN DR
89	New Stormwater Pond	1	New enhanced extended detention pond or constructed wetland, drainage area approx. 12 acres	Private property, ESR & OS	10612 MILKWEED DR
90	Low Impact Development Retrofits	9	New vegetated swale in existing drainage route along Utterbach Store Road		533 UTTERBACK STORE RD

Subwatershed ***NI-NI-0008*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	Primarily ESR, mostly forested lots (cleared lots upstream), 1 non-SWM pond, some quality/quantity designation, but no apparent SWM controls	***Impairments***	Flooding complaints near the intersection of Springvale Rd and Down Patrick Ln, erosion impacts downstream of crossing @ unnamed road, crossing impacts @ Springvale Rd & unnamed road
Restoration Selection Criteria	SW Ranking, SPA Data, Flooding, Field Recon/Drainage Complaint, Field Recon/Pro Rata	***Preservation Qualities***	Low % Imp.
Preservation Selection Criteria	Imp	***Improvement Goals***	Reduce SW flows, reduce stream impacts from erosion and crossings
Percent Impervious	5.43%		
Percent Forest	68.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
91	Natural Channel Restoration	2	Repair erosion downstream of unnamed road		522 SPRINGVALE RD
92	Stormwater Pond Retrofit	1	Retrofit existing farm pond to wet pond with additional storage and water quality, or drain and convert to constructed wetlands or enhanced extended detention basin		10610 WISE OWL WY
93	Low Impact Development Retrofits	9	New bioretention or vegetated swale in natural swale between treeline and road, drainage area approx. 14 acres	Private properties, ESR & LDR	539 SPRINGVALE RD
94	Culvert Retrofit	7	Culvert retrofit with micropool upstream of crossing @ Springvale Road	Will compliment or replace road crossing improvement at this location	529 SPRINGVALE RD
95	Road Crossing Improvements	4	Raise road bed @ Springvale Road, increase culvert size/capacity	Possible alternative or compliment to culvert retrofit at this location	529 SPRINGVALE RD

Subwatershed ***NJ-NJ-0009*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	Primarily ESR, cleared lots, 1 WP, 5 non-SWM ponds,	***Impairments***	High SW outfalls, poor riparian buffer
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp., fair overall objective composite score
Preservation Selection Criteria	SW Ranking, Imp	***Improvement Goals***	Reduce SW flows to reduce downstream impacts, improve SW outfalls & restore riparian buffers
Percent Impervious	6.01%		
Percent Forest	39.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
100	Low Impact Development Retrofits	9	New bioretention/vegetated swale, drainage area approx 6 acres	Private property, ESR	10440 NEW ASCOT DR
96	Stormwater Pond Retrofit	1	Retrofit any of 3 existing farm ponds (in series) to SWM wet ponds to provide additional volume & water quality if possible. If not used recreationally, consider enhanced extended detention	Private properties, ESR	10420 DOWN PATRICK LA
97	Stormwater Pond Retrofit	1	Retrofit any of 2 existing farm ponds (in series) to SWM wet ponds to provide additional volume & water quality if possible. If not used recreationally, consider enhanced extended detention	Private properties, ESR	10430 NEW ASCOT DR
98	Low Impact Development Retrofits	9	New bioretention/rain garden, drainage area approx 2 acres	Private property, ESR	617 SPRINGVALE RD
99	Low Impact Development Retrofits	9	New bioretention/rain garden, drainage area approx. 1.5 acres	Private property, ESR	619 SPRINGVALE RD

Subwatershed ***NI-NI-0010*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	ESR, LDR, some OS, some proposed for Quality/Quantity (wet) treatment, 1 farm pond, 1 eroded culvert (NINI016.C002) along Utterback Store Rd., 5 obstructions along stream (Impact scores 6, 6, 7, 8, 10), one raise road and install culvert.	***Impairments***	flooding hazards, poor septic
Restoration Selection Criteria	SPA Data, Flooding, Field Recon/Pro Rata	***Preservation Qualities***	Low % Imp, habitat diversity good, stream water and drinking water quality good.
Preservation Selection Criteria	Imp	***Improvement Goals***	Preserve OS and riparian buffers with conservation easements, improve flooding hazards.
Percent Impervious	5.94%		
Percent Forest	40.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
64	Natural Channel Restoration	2	Improve stream, multiple obstructions	Private property, ESR	10865 WOLFE HILL LA
65	Road Crossing Improvements	4	Raise bed of road and install culvert	R/W adjacent to ESR	630 UTTERBACK STORE RD
66	Stormwater Pond Retrofits	1	Improve existing farm pond with storage, outlet structure or bioretention.	Private property, ESR, adjacent to OS	10920 BECKMAN WY
67	New Stormwater Ponds	1	New pond for flood control, drainage area approx 16 acres	Private property, ESR	10856 WOLFE HILL LA
68	New Stormwater Ponds	1	New pond for flood control, drainage area approx 30 acres	Private property, ESR	10866 WOLFE HILL LA
69	New Stormwater Ponds	1	New pond for flood control, drainage area approx 24 acres	Private property, ESR	615 RUNNING BROOK DR
70	Preservation		Preserve OS and riparian buffers with conservation easements	OS, ESR, LDR	10910 BECKMAN WY
71	New Stormwater Ponds	1	New pond to control development runoff, drainage area approx 9 acres	Private property, LDR	11101 RICHLAND VALLEY DR
72	New Stormwater Ponds	1	New pond for flood control, capture development runoff, drainage area approx 22 acres	Private property, ESR	11100 RICH MEADOW DR

Subwatershed ***NI-NI-0011*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	ESR, some OS, some LDR, some propsoed quality/quantity (wet) treatment, some minor erosion (impact scores 6 & 7)	***Impairments***	poor habitat health, poor septic
Restoration Selection Criteria	SPA Data	***Preservation Qualities***	Low % Imp, Overall composite score good (low stormwater runoff, flow flooding hazards, good habitat diversity, good stream water and drinking water quality)
Preservation Selection Criteria	SW Ranking, Imp, % Increase Imp	***Improvement Goals***	Preserve OS and riparian buffers with conservation easements, improve habitat health.
Percent Impervious	3.58%		
Percent Forest	36.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
73	Streambank Stabilization	3	Some erosion along stream (Impact scores 6&7)	private property, ESR and OS	704 UTTERBACK STORE RD
74	New Stormwater Ponds	1	New pond for flood control, drainage area approx 30 acres	Within OS	701 RUNNING BROOK DR
75	New Stormwater Ponds	1	New pond for flood control, drainage area approx 30 acres	Within OS	718 RUNNING BROOK DR

Subwatershed ***NI-NI-0012*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	ESR, LDR, and some OS, some proposed quality/quantity (wet) treatment, 1 BMP pond, 1 farm pond, 1 dry pond.	***Impairments***	Poor stormwater outfalls, poor septic
Restoration Selection Criteria	Field Recon/Drainage Complaint	***Preservation Qualities***	Low % Imp, Overall composite score good (low flooding hazards, good habitat diversity, good stream water quality, good storage).
Preservation Selection Criteria	SW Ranking, Imp, % Increase Imp	***Improvement Goals***	Preserve OS and riparian corridors with conservation easements, improve stormwater outfalls
Percent Impervious	4.92%		
Percent Forest	63.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
76	Stormwater Pond Retrofits	1	Improve existing BMP/wet pond with storage, outlet structures, or bioretention	Within OS	817 BLACKS HILL RD
77	Stormwater Pond Retrofits	1	Improve existing dry pond with storage, outlet structure, or bioretention	Private property, LDR	11110 FARM RD
78	Drainage Improvements	8	Improve culvert/outfall	Private property, LDR	11110 FARM RD
79	Stormwater Pond Retrofits	1	Improve existing farm pond with storage, outlet structure or bioretention	Within OS	11300 KELLIE JEAN CT
80	New Stormwater Ponds	1	New pond for flood control, drainage area approx 12 acres	Private property, LDR	11301 KELLIE JEAN CT

Subwatershed ***NI-NI-0013*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	ESR, some LDR, some OS, soem proposed quality/quantity (wet) treatment, 7 farm ponds	***Impairments***	Poor total phosphorus, poor septic
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp, low flooding hazards, good habitat diversity
Preservation Selection Criteria	Imp	***Improvement Goals***	Preserve OS and riparian buffers with conservation easements, improve water quality
Percent Impervious	5.11%		
Percent Forest	72.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
M21	Stormwater Pond Retrofits	1	Potential to retrofit existing ponds to add capacity and water quality treatment		10888 WOODLEAF LA
M22	Drainage Improvements	8	Verify concrete channel and replace with naturalized swale		10712 CREAMCUP LA
M23	New Stormwater Ponds	1	New stormwater facility to provide quantity treatment if topography allows		10713 MILKWEED DR
M24	Stormwater Pond Retrofits	1	Potential to add capacity or water quality treatment to existing pond		10915 CROSSVIEW DR
M25	Drainage Improvement	8	Verify concrete channel and remove and naturalize swale		10915 CROSSVIEW DR
M26	Drainage Improvements	8	Remove concrete channel and naturalize swale		11000 GREEN BRANCH CT
M27	Culvert Retrofits	7	Construct control structure for potential micro-pool or wetland		11000 GREEN BRANCH CT
M28	Stormwater Pond Retrofits	1	Potential to add capacity or water quality treatment to existing ponds		10821 NICHOLSRIDGE RD
M29	Stormwater Pond Retrofits	1	Potential to add capacity or water quality treatment to existing ponds		10809 NICHOLSRIDGE RD
M44	Preservation		Preserve open space and riparian buffer with conservation easements		10818 NICHOLSRIDGE RD

Subwatershed ***NI-NI-0014*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	ESR, some LDR, little OS, some proposed quality/quantity (wet) treatment, one dry pond (1412DP)	***Impairments***	poor habitat health, poor total phosphorus, poor septic
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp, low flooding hazards, good habitat diversity, good storage
Preservation Selection Criteria	Imp	***Improvement Goals***	Preserve OS and riparian buffers with conservation easements, imiprove habitat health and water quality.
Percent Impervious	5.71%		
Percent Forest	62.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***
M30	Low Impact Development Retrofits	9			10493 PATRICIAN WOODS CT
M31	Stormwater Pond Retrofits	1	Potential to add capacity or water quality treatment to existing ponds; remove concrete channels		10507 PATRICIAN WOODS CT
M32	Drainage Improvements	8	Remove concrete channel and replace with naturalized swale		10508 PATRICIAN WOODS CT
M43	Preservation		Preserve open space and riparian buffer with conservation easements		638 SPRINGVALE RD

Subwatershed ***NI-NI-0015*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	Mix of ESR, LDR, little OS, some proposed quality/quantity (wet) treatment, 2 dry ponds (0857DP, 0797DP), 1 farm pond, 2 stream erosion (NINI007.E001, NINI008.E001) with an impact score of 7 and insufficient riparian buffers (lawn)	***Impairments***	overall composite score poor (poor habitat health, poor stream and drinking water quality, poor storage), poor upland sediment, poor water quality (N,P), poor septic
Restoration Selection Criteria	SW Ranking, SPA Data, Public Comment, Field Recon/Drainage Complaint	***Preservation Qualities***	Low % Imp, low flooding hazards, good habitat diversity
Preservation Selection Criteria	Imp	***Improvement Goals***	Preserve OS and riparian buffers with conservation easement, improve water quality, habitat and storage
Percent Impervious	8.70%		
Percent Forest	50.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
M33	Stormwater Pond Retrofit	1	Potential to add capacity or water quality treatment to existing ponds; nearby NP comment		718 SPRINGVALE RD
M34	Stormwater Pond Retrofits	1	Potential to add capacity or water quality treatment to existing ponds; remove concrete swales		10720 FALLS POINTE DR
M35	Drainage Improvements	8	Remove rock trench and naturalize swale		10720 FALLS POINTE DR
M36	Natural Channel Restoration	2	Erosion in channel downstream of dry pond; potential for wetland if topography suitable		732 SPRINGVALE RD
M37	Stormwater Pond Retrofits	1	Potential to add capacity or water quality treatment to existing ponds; remove concrete channels		800 GRACE MEADOW CT
M38	Drainage Improvements	8	Remove concrete channel and naturalize swale		801 GRACE MEADOW CT
M39	Drainage Improvements	8	Remove concrete channel and naturalize swale		804 GRACE MEADOW CT
M40	Drainage Improvements	8	Remove concrete channel and naturalize swale		10604 DOGWOOD FARM LA
M41	Low Impact Development Retrofits	9	Potential rain garden or micro-pool		10711 FALLS POINTE DR
M42	Preservation		Preserve open space and riparian buffer with conservation easements		730 SPRINGVALE RD

Subwatershed ***NI-NI-0016*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run- Upper*

Description	Mix LDR, ESR, little OS, 6 small MDR properties, lots of proposed quality/quantity (wet) treatment, some proposed detention only treatment, 1 wet pond (0683DP), 1 dry pond (3302DP), 1 erosion (impact score 6)	***Impairments***	% Imp, flooding hazards, poor composite score (urban area, poor water quality (N,P), poor septic, channelilzed/piped streams)
Restoration Selection Criteria	Flooding, Field Recon/Drainage Complaint	***Preservation Qualities***	good habitat diversity, good storage
Preservation Selection Criteria		***Improvement Goals***	Preserve OS and riparian buffers with conservation easements, improve water quality, stream conditions
Percent Impervious	10.23%		
Percent Forest	52.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***
M45	Stormwater Pond Retrofits	1	Potential to increase capacity or water quality in existing pond		10901 WOODLAND FALLS DR
M46	Stormwater Pond Retrofits	1	Potential to increase capacity or water quality in existing pond		11101 FARM RD
M47	Stormwater Pond Retrofits	1	Potential to increase capacity or water quality in existing BMP		801 LAKE WINDERMERE CT
M48	Drainage Improvements	8	Remove concrete channels along roadway and naturalize channels		807 LAKE WINDERMERE CT
M49	Drainage Improvements	8	Remove concrete channels along roadway and naturalize channels		928 WELHAM GREEN RD
M50	Stormwater Pond Retrofits	1	Potential to increase capacity or water quality in existing pond		10900 GEORGETOWN PI
M51	Preservation		Preserve open space and riparian buffer with conservation easements		928 WELHAM GREEN RD

Subwatershed ***NI-PO-0001*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run - Potomac River*

Description Mixed land use (LDR, ESR, & OS), mostly forested, no SWM facilities (only storm sewer).

Impairments Poor nutrients, poor septic.

Restoration Selection Criteria

Preservation Qualities Low % Imp, Overall composite score fair (flooding good, storage capacity good), composite score good.

Preservation Selection Criteria Imp

Improvement Goals Improve water quality and septic, preserve open space.

Percent Impervious 6.92%

Percent Forest 68.00%

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
1	New Stormwater Pond	1	New pond or wetland, drainage area approx. 6 acres	between OS and LDR property, if temp id 2 is not viable	59 WINDY HOLLOW CT
10	Drainage Improvements	8	Replace pipes or concrete channel with naturalized channel	private property, LDR, if temp id 9 is not viable	9904 BLACKMORE VALE WY
11	Preservation		Preserve open space and riparian buffer with conservation easement		51 WINDY HOLLOW CT
2	Drainage Improvement	8	Replace pipes or concrete channel with naturalized channel	between OS and LDR property, if temp id 1 is not viable	59 WINDY HOLLOW CT
3	New Stormwater Ponds	1	New basin or wetland. Drainage area approx 1/2 acre	private property, between LDR and ESR, if temp id 4 is not viable	10020 WINDY HOLLOW RD
4	Drainage Improvements	8	Replace pipe or concrete channel with naturalized channel	private property, between LDR and ESR, if temp id 3 is not viable	10020 WINDY HOLLOW RD
5	New Stormwater Ponds	1	New pond or wetland, drainage area approx 1/2 acre	private property, ESR, if temp id 6 is not viable	51 WARWICK STONE WY
6	Drainage Improvement	8	Replace pipe or concrete channel with naturalized channel	private property, ESR, if temp id 5 is not viable	51 WARWICK STONE WY
7	New Stormwater Ponds	1	New pond or wetland, drainage area approx 2 acres	private property, LDR, if temp id 8 is not viable	9916 WINDY HOLLOW RD
8	Drainage Improvement	8	Replace pipe with naturalized channel	private property, LDR, if temp id 7 is not viable	9916 WINDY HOLLOW RD
9	New Stormwater Pond	1	New pond or wetland, drainage area approx 6 acres	private property, LDR, if temp id 10 is not viable	55 WARWICK STONE WY

Subwatershed ***NI-PO-0002*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run - Potomac River*

Description	Mostly wooded OS, small ESR property, no SWM facilities	***Impairments***	
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp, stormwater runoff low, low flooding hazard, high habitat health, good stream water quality, good drinking water quality, good storage.
Preservation Selection Criteria	SW Ranking, Imp	***Improvement Goals***	Implement countywide preservation strategies
Percent Impervious	0.43%		
Percent Forest	84.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*

Subwatershed ***NI-PO-0003*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run - Potomac River*

Description	Mostly wooded OS with some ESR, some farm fields, no SWM facilities	***Impairments***	
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp, overall composite score good (low stormwater runoff, low flooding hazards, good drinking water quality and good storage capacity), good composite score
Preservation Selection Criteria	SW Ranking, Imp	***Improvement Goals***	Implement countywide preservation strategies
Percent Impervious	0.46%		
Percent Forest	71.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*

Subwatershed ***NI-PO-0004*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run - Potomac River*

Description	Mostly wooded OS, with some ESR, one farm field, no SWM facilities	***Impairments***	
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp, overall composite score good (low stormwater runoff, low flooding hazards, good habitat, good stream water quality, good drinking water quality, good storage).
Preservation Selection Criteria	SW Ranking, Imp, % Increase Imp, % Increase TSS	***Improvement Goals***	Implement countywide preservation strategies
Percent Impervious	0.39%		
Percent Forest	91.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***

Subwatershed ***NI-PO-0005*** ***Watershed:*** *Nichol Run* ***Management Area:*** *Nichol Run - Potomac River*

Description	Wooded OS	***Impairments***	
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp, Overall composite score good (low stormwater runoff, low flooding hazards, good stream water quality, good drinking water quality, good storage)
Preservation Selection Criteria	SW Ranking, Imp	***Improvement Goals***	Implement countywide preservation strategies
Percent Impervious	0.00%		
Percent Forest	98.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*

Subwatershed ***PN-CL-0001*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Clark*

Description	Primarily ESR & OS, most OS w/in Riverbend Park, 1 non-stormwater (ornamental) pond	***Impairments***	fair habitat, high TP loads, high septic use, flooding, multiple low to moderate crossing impacts, moderate erosion, severe 4' headcut noted in SPA
Restoration Selection Criteria	SW Ranking, SPA Data, Flooding, Public Comment	***Preservation Qualities***	Low % IMP, high % forested at risk for increased IMP & TSS
Preservation Selection Criteria	Imp, % Increase Imp, % Increase TSS	***Improvement Goals***	Stabilize and restore headcut and erosion impacts, reduce & mitigate erosive flows and flooding issues, improve water quality
Percent Impervious	3.43%		
Percent Forest	81.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
57	Natural Channel Restoration	2	Repair headcut at SPA point PNCB001.H001		211 CARRWOOD RD
58	Streambank Stabilization	3	Stabilize and restore erosion impacts @ SPA point PNCB001.E001 and clear obstructions upstream at SPA point PNCB001.T001		9118 POTOMAC RIDGE RD
59	Streambank Stabilization	3	Stabilize and reinforce eroded and scoured streambanks downstream of Potomac Forest Dr.		3 CLARKS BRANCH RD
60	Culvert Retrofits	7	Retrofit culvert @ Potomac Ridge Rd w/ control structure & create micro-pool/wet pond/wetland.	if not feasible, implement project 61, may also be implemented with project 61	4 CLARKS BRANCH RD
61	Road Crossing Improvements	4	Raise road bed @ Potomac Ridge Rd , increase culvert size/capacity	may replace or complement project 60	5 CLARKS BRANCH RD
62	Culvert Retrofits	7	Retrofit culvert @ Carrwood Rd w/ control structure & create micro-pool/wet pond/wetland.	if not feasible, implement project 63, may also be implemented with project 63	208 CARRWOOD RD
63	Road Crossing Improvements	4	Raise road bed @ Carrwood Rd, increase culvert size/capacity	may replace or complement project 62	208 CARRWOOD RD
64	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		119 CLARKS RUN RD
65	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		9106 POTOMAC RIDGE RD

66	Non-Structural Projects	Targeted Rain Barrel Program @ Brandes Estates	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9410 PISCATAWAY LA
67	Non-Structural Projects	Targeted Rain Barrel Program @ Potomac Ridge Estates & Clark's Branch Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9118 POTOMAC RIDGE RD
68	Non-Structural Projects	Remove two concrete pipes in stream channel, stabilize stream bed and banks		119 CLARKS RUN RD

Subwatershed ***PN-CL-0002*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Clark*

Description	ESR w/ some OS & LDR, ESR lots being developed, forested lots, no SW treatment	***Impairments***	fair habitat, high septic use
Restoration Selection Criteria		***Preservation Qualities***	Low %IMP, high % forested, at risk for increased IMP
Preservation Selection Criteria	IMP, % Increase Imp	***Improvement Goals***	Implement Countywide Preservation Strategies, capture SW runoff
Percent Impervious	3.53%		
Percent Forest	87.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
69	Culvert Retrofits	7	Retrofit culvert @ Potomac Forest Dr w/ control structure & create micro-pool/wet pond/wetland.		9111 POTOMAC FOREST DR
70	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		9009 POTOMAC FOREST DR
71	Non-Structural Projects		Targeted Rain Barrel Program @ Black Riffles Estates	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9210 BLACK RIFFLES CT
72	Non-Structural Projects		Targeted Rain Barrel Program @ Potomac Forest Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9008 POTOMAC FOREST DR
73	New Stormwater Ponds	1	New SW pond to capture outfall fr Eaton Park Rd. drainage area approx. 3 acres		9086 EATON PARK RD

Subwatershed ***PN-CL-0003*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Clark*

Description	Headwaters subwatershed, Mixed ESR & LDR w/ some OS, mostly forested lots, some neighborhoods w/ cleared lots, 2 DP, 4 non-stormwater ponds	***Impairments***	high nutrient loads, high septic use, high channelized/piped streams, poor habitat health
Restoration Selection Criteria	SW Ranking	***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	preserve forested OS, improve water quality & habitat, reduce channelized/piped streams, capture SW runoff
Percent Impervious	7.76%		
Percent Forest	74.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
74	Low Impact Development Retrofits	9	LID: new bioretention/rain garden to capture outfall fr River Bend Rd	coordinate w/ property owner	9317 MORISON LA
75	Low Impact Development Retrofits	9	LID retrofit Dry Pond 0677DPto naturalized infiltration pond	if soils support infiltration, otherwise try project 76	9306 MORISON LA
76	Stormwater Pond Retrofit	1	Retrofit Dry Pond 0677DP to naturalized extended detention dry pond	if project 75 can not be implemented	9306 MORISON LA
77	Drainage Improvements	8	Remove concrete channels & replace w/ grass swales	implement together with project 89	260 GOLDEN WOODS CT
78	Low Impact Development Retrofits	9	LID retrofit Dry Pond 0649DPto naturalized infiltration pond	if soils support infiltration, otherwise try project 79	250 GOLDEN WOODS CT
79	Stormwater Pond Retrofit	1	Retrofit Dry Pond 0649DP to naturalized extended detention dry pond	if project 78 can not be implemented	260 GOLDEN WOODS CT
80	Natural Channel Restoration	2	Repair headcut @ field recon point PN-CL-0003-Q01and repair/restore downstream channel	may not be needed if project 81 is feasible	9303 FITZ FOLLY DR
81	New Stormwater Ponds	1	New SW pond to capture flow from Fitz Folly Dr. drainage area approx.6.8 acres	implement in area of headcut in project 81 & repair d/s channel	9303 FITZ FOLLY DR
82	Drainage Improvements	8	Remove concrete channels & replace w/ grass swales along Oak Falls Ct		9494 OAK FALLS CT
83	Low Impact Development Retrofits	9	Vegetated swale or rain garden/bioretention w/ swale combo to capture outfall fr Morrison La		9300 MORISON LA
84	Low Impact Development Retrofits	9	Vegetated swale/rain garden combo to capture drainage fr Oak Falls Ct	coordinate with property owners	9490 OAK FALLS CT

85	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland	if no base flow, retrofit to naturalized extended detention pond	203 RIVER BEND RD
86	Culvert Retrofits	7	Retrofit culvert @ private drive off Golden Woods Ct w/ control structure & create micro-pool/wet pond/wetland.	coordinate with property owners	262 GOLDEN WOODS CT
87	New Stormwater Ponds	1	New SW pond to capture drainage Jeffrey Rd & Jeffrey La, drainage area approx. 13 acres		258 JEFFERY LA
88	New Stormwater Ponds	1	New SW pond to capture drainage fr Eaton Ct & Eaton Park Rd. drainage area approx. 15.3 acres		9106 EATON PARK RD
89	Low Impact Development Retrofits	9	Daylight pipe, install bioretention & veg. swale to dry pond.	implement together with project 77	250 GOLDEN WOODS CT
90	Non-Structural Projects		Targeted Rain Barrel Program @ Eaton Park, Golden Woods & Crampton Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	260 GOLDEN WOODS CT
91	Non-Structural Projects		Targeted Rain Barrel Program @ Fitz Folly Farms	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	207 RIVER BEND RD
92	Non-Structural Projects		Targeted Rain Barrel Program @ The Morriston Estate	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9313 MORISON LA

Subwatershed ***PN-CL-0004*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Clark*

Description	Headwaters subwatershed, mixed ESR & LDR, LDR lots cleared, most ESR lots forested, 1 non-stormwater pond	***Impairments***	high nutrient loads, high septic use, high channelized/piped streams, high SW runoff, poor habitat health & diversity, poor water quality
Restoration Selection Criteria	SW Ranking, Public Comment	***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	preserve forested OS, improve water quality & habitat, reduce channelized/piped streams, capture SW runoff
Percent Impervious	8.01%		
Percent Forest	67.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
100	New Stormwater Ponds	1	New SW pond to capture outfall fr Chesapeake Dr, drainage area 3 acres		330 CHESAPEAKE DR
101	New Stormwater Ponds	1	New SW pond to capture outfall fr Chesapeake Dr & Darlene La, drainage area approx. 4.5 acres		320 CHESAPEAKE DR
102	Culvert Retrofits	7	Retrofit culvert @ private drive off Neuse Wy w/ control structure & create micro-pool/wet pond/wetland.		9503 NEUSE WY
103	New Stormwater Ponds	1	New SW pond to capture outfall fr Chesapeake Dr, drainage area 4.2 acres		316 CHESAPEAKE DR
104	Stormwater Pond Retrofit	1	Retrofit Farm pond to wet pond or wetland		210 CARRWOOD RD
105	Road Crossing Improvements	4	Driveway culvert off Beach Mill Rd may be undersized, raise road bed & increase size or elevation, stabilize and restore eroded areas u/s & d/s of culvert		9499 BEACH MILL RD
106	Culvert Retrofits	7	Retrofit culvert @ Beach Mill Rd, w/ control structure & create micro-pool/wet pond/wetland		9513 BEACH MILL RD
107	Preservation		Preserve riparian zone w/ conservation easement		214 CARRWOOD RD
108	Non-Structural Projects		Targeted Rain Barrel Program @ Fitz Folly Farms & Carrwood Estates	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9499 BEACH MILL RD
109	Non-				

			tructural Projects Targeted Rain Barrel Program @ Riverside Manors & Riverside Meadows	include education & outreach re: individual on-lot SW treatment options - rain	9410 PAMLICO LA

93	New Stormwater Ponds	1	New SW pond to capture outfall fr Pamlico La, drainage area approx. 3.3 acres	coordinate w/ property owner	339 CHESAPEAKE DR
94	Low Impact Development Retrofits	9	Daylight pipe, install veg. swale to dry pond.		9412 PAMLICO LA
95	Drainage Improvements	8	Remove concrete channels & replace w/ grass swales along Chesapeake Dr		342 CHESAPEAKE DR
96	Drainage Improvements	8	Remove concrete channels along Neuse Wy & replace w/ vegetated swales & bioretention/rain garden		334 CHESAPEAKE DR
97	New Stormwater Ponds	1	New SW pond to capture outfalls fr Chesapeake Dr & Neuse Wy, drainage area approx. 4.44 acres		9511 NEUSE WY
98	Low Impact Development Retrofits	9	New bioretention/rain garden to capture drainage fr paved ditches along Chesapeake Dr		340 CHESAPEAKE DR
99	Low Impact Development Retrofits	9	Daylight pipe, install vegetated swale to potential rain garden/bioretention		9504 PAMLICO LA

Subwatershed ***PN-CL-0005*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Clark*

Description	Headwaters subwatershed, primarily ESR w/ some LDR & OS, mostly forested lots, no SW treatment	***Impairments***	high septic use, high SW runoff, poor habitat health & diversity (2005 Fish IBI)
Restoration Selection Criteria	SW Ranking	***Preservation Qualities***	Low % IMP, at risk for increased IMP
Preservation Selection Criteria	Imp, % Increase Imp	***Improvement Goals***	capture & reduce SW runoff, improve habitat health
Percent Impervious	4.36%		
Percent Forest	73.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
110	Preservation		Preserve riparian zone w/ conservation easement and restore riparian buffer.		9722 BEACH MILL RD
111	Low Impact Development Retrofits	9	LID: new bioretention/rain garden to capture drainage before culvert under Rivers Edge Dr		210 RIVERS EDGE DR
112	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		9720 BEACH MILL RD
113	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		9558 BELL DR
114	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		9555 BELL DR
115	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		201 DEEPWOODS DR
116	Non-Structural Projects		Targeted Rain Barrel Program @ Carrwood Estates & Herrick Estates	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	201 RIVERS EDGE DR
117	Non-Structural Projects		Targeted Rain Barrel Program @ Beach Mill Farms	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	161 YARNICK RD

Subwatershed ***PN-CL-0006*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Clark*

Description	Mixed ESR & LDR w/ some OS and parts of Riverbend Golf Course, mostly cleared lots, 2 DP	***Impairments***	high SW runoff, flooding, poor habitat, poor water quality, high TP loads, high septic use, high fecal, high channelized/piped streams
Restoration Selection Criteria	SW Ranking, Flooding	***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	capture & reduce SW runoff, improve habitat health & water quality, mitigate flooding issues and reduce channelized/piped streams
Percent Impervious	6.99%		
Percent Forest	56.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
118	Low Impact Development Retrofits	9	LID: new bioretention/rain garden to capture drainage before culvert under Lindsay Blake La		9801 LINDSAY BLAKE LA
119	Low Impact Development Retrofits	9	Improve existing grass swale w/ vegetation & check dams for addt'l storage		9724 LINDSAY BLAKE LA
120	Low Impact Development Retrofits	9	Daylight pipe, install bioretention & veg. swale to dry pond.		9716 LINDSAY BLAKE LA
121	Low Impact Development Retrofits	9	LID retrofit Dry Pond 0892DP to naturalized infiltration pond	if soils support infiltration, otherwise try project 122	354 CLUB VIEW DR
122	Stormwater Pond Retrofit	1	Retrofit Dry Pond 0892DP to naturalized extended detention dry pond	if project 121 can not be implemented	354 CLUB VIEW DR
123	Low Impact Development Retrofits	9	LID retrofit Dry Pond 0086DP to naturalized infiltration pond	if soils support infiltration, otherwise try project 124	344 CLUB VIEW DR
124	Stormwater Pond Retrofit	1	Retrofit Dry Pond 0086DP to naturalized extended detention dry pond	if project 123 can not be implemented	344 CLUB VIEW DR
125	Drainage Improvements	8	Improve SW outfall, daylight pipe & create veg. swale if possible		354 CLUB VIEW DR
126	New Stormwater Ponds	1	New SW pond to capture outfall fr Darlene La, drainage area approx. 8.55 acres		9700 DARLENE LA
127	Drainage Improvements	8	Improve SW outfall, daylight pipe & create veg. swale if possible		332 CLUB VIEW DR
128	Culvert Retrofits	7	Retrofit culvert @ Beach Mill Rd, w/ control structure & create micro-pool/wet pond/wetland	may be unnecessary if flows are reduced by upstream projects	9715 BEACH MILL RD

129	Road Crossing Improvements	4	Raise road bed @ Beach Mill Rd, increase culvert size/capacity	may be unnecessary if flows are reduced by upstream projects	9715 BEACH MILL RD
130	Low Impact Development Retrofits	9	Daylight pipe, install bioretention & veg. swale to dry pond.		354 CLUB VIEW DR
131	New Stormwater Ponds	1	New SW pond in OS lot to capture outfalls fr Katie Leigh Ct & Club View Dr, drainage area approx.	may need to excavate & regrade to provide necessary storage	365 CLUB VIEW DR
132	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		329 CLUB VIEW DR
133	Preservation		Preserve forested OS in riparian buffer through conservation easement	may already in easement as part of OS reqs for Eagon Hills Subdv.	320 CLUB VIEW DR
134	Non-Structural Projects		Targeted Rain Barrel Program @ Club View Ridge Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9805 BEACH MILL RD
135	Non-Structural Projects		Targeted Rain Barrel Program @ Eagon Hills Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	328 CLUB VIEW DR
136	Non-Structural Projects		Targeted Rain Barrel Program @ Dogwood Hills & Riverbend Estates	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9800 LINDSAY BLAKE LA

Subwatershed ***PN-CL-0007*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Clark*

Description	Primarily Riverbend Golf Course, some ESR, LDR & a few OS lots, cleared lots, 2 non-stormwater ponds, 1 WP, 2 UG, multiple areas w/ quality only designations	***Impairments***	Deficient buffer, high SW outfalls, high septic use, high SW runoff, poor habitat health & diversity
Restoration Selection Criteria	SW Ranking	***Preservation Qualities***	Low % IMP, high drinking water quality, low flood hazard
Preservation Selection Criteria	Imp	***Improvement Goals***	reduce SW runoff, reduce no. SW outfalls, improve habitat health and riparian buffers
Percent Impervious	4.59%		
Percent Forest	18.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
137	Stormwater Pond Retrofit	1	Retrofit ornamental pond in Riverbend Golf Course to wet pond or wetland	drain pond & add outlet structure for addt'l storage, coordinate w/ Riverbend Golf Course	419 WALKER RD
138	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland		439 WALKER RD
139	Low Impact Development Retrofits	9	Daylight pipe, install veg. swale, direct drainage to wet pond		371 WALKER RD
140	New Stormwater Ponds	1	New SW pond to capture drainage fr Forest Lake Dr & Walker Rd, drainage are approx. 6 acres		414 WALKER RD
141	Stormwater Pond Retrofit	1	Retrofit wet pond in Riverbend Golf Course, add outlet structure, provide addt'l wetland plantings	coordinate w/ Riverbend Golf Course	9711 BEACH MILL RD
142	Non-Structural Projects		Riparian buffer restoration along stream in Riverbend Golf Course	coordinate w/ Riverbend Golf Course	371 WALKER RD
143	Low Impact Development Retrofits	9	LID: new LID treatments around maintenance building-infiltration trench, vegetated filter strips, sand filter, & WQ inlet		371 WALKER RD
144	New Stormwater Ponds	1	New SW pond to capture outfall fr Arnon Meadow Rd, drainage are approx. 16 acres		501 ARNON MEADOW RD

Subwatershed ***PN-CL-0008*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Clark*

Description	Headwaters subwatershed, primarily ESR w/ some LDR & OS, motlsy cleared lots, 2 non-stormwater ponds, some areas w/ quality only designation	***Impairments***	high septic use, high TP loads, high SW runoff, WAG member noted road crossing flooding, poor habitat health & diversity, poor water quality
Restoration Selection Criteria	SW Ranking, Public Comment	***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	capture & reduce SW runoff, improve habitat & water quality, mitigate flooding issues
Percent Impervious	5.42%		
Percent Forest	77.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
145	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland		10190 MILSTEAD RD
146	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond/micro-pool/wetland in conjunction w/ culvert retrofit @ Walker Rd to capture & treat runoff fr Squires Tr & Walker Rd	will need to expand pond for addt'l storage & capacity	502 WALKER RD
147	Road Crossing Improvements	1	Raise road bed @ Walker Rd, increase culvert size/capacity, repair crossing impacts u/s & d/s		502 WALKER RD
148	Culvert Retrofits	7	Retrofit culvert @ Walker Rd, w/ control structure & create micro-pool/wet pond/wetland		447 WALKER RD
149	Road Crossing Improvements	1	Raise road bed @ Walker Rd, increase culvert size/capacity, repair crossing impacts u/s & d/s		443 WALKER RD
150	Non-Structural Projects		Targeted Rain Barrel Program @ Squires Haven & Robert T. Shea Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	501 RACCOON TR
151	Non-Structural Projects		Targeted Rain Barrel Program @ Akhtamar's Haven	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	10230 AKHTAMAR DR
152	Non-Structural Projects		Targeted Rain Barrel Program @ Walker Hill Estates & Arnon Meadow Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	616 WALKER HILL LA

153	New Stormwater Ponds	New SW pond to capture drainage fr Walker Rd & Walker Hill La, drainage area approx. 17.5 acres	coordinate with property owners	509 WALKER RD
154	New Stormwater Ponds	New SW pond to capture drainage fr Walker Rd & Arnon Meadow Rd, drainage area approx. 6 acres	coordinate with property owners	453 WALKER RD

Subwatershed ***PN-CL-0009*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Clark*

Description	Headwaters subwatershed, primarily ESR w/ some LDR w/ cleared lots & OS lots, 2 non-stormwater ponds	***Impairments***	high septic use, high TP loads, high SW runoff, WAG member noted road crossing flooding, poor habitat health & diversity, poor water quality
Restoration Selection Criteria	SW Ranking, Public Comment, Field Recon/Pro Rata	***Preservation Qualities***	Low % IMP, at risk for increased IMP
Preservation Selection Criteria	Imp, % Increase Imp	***Improvement Goals***	capture & reduce SW runoff, improve habitat & water quality, mitigate flooding issues
Percent Impervious	5.56%		
Percent Forest	65.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
155	Road Crossing Improvements	4	ProRata project Map No. PN411, raise road bed @ Walker Rd and increase culvert size, stabilize streambanks downstream		432 WALKER RD
156	Stormwater Pond Retrofit	1	Retrofit farm pond u/s of Walker Lake to wet pond or wetland, add outlet structure & wetland plantings	drain pond for addt'l storage if possible	432 WALKER RD
157	Low Impact Development Retrofits	9	Daylight pipe, install veg. swale, direct drainage to farm/wet pond		440 WALKER RD
158	Low Impact Development Retrofits	9	Daylight pipe, install veg. swale, direct drainage to farm/wet pond		444 WALKER RD
159	New Stormwater Ponds	1	New SW pond to capture drainage fr west of Forest Brook La & south of Deerfoot Dr, drainage area approx. 7.6 acres		10120 FOREST BROOK LA
160	Preservation		Preserve open space area w/ conservation easement or land acquisition		10120 FOREST BROOK LA
161	New Stormwater Ponds	1	New SW pond to capture drainage fr Haven La & Squires Tr, drainage area approx. 7.6 acres		501 HAVEN LA
162	New Stormwater Ponds	1	New SW pond to capture drainage fr		

			ven La, drainage area approx. 6.2 acres		508 HAVEN LA
163	Culvert Retrofits	7	Retrofit culvert @ Forest Brook La, w/ control structure & create micro-pool/wet pond/wetland		10116 FOREST BROOK LA
164	Non-Structural Projects		Targeted Rain Barrel Program @ Robert T. Shea Subdivision, Casa Continental, & Forest Lakes Estates	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	10219 FOREST LAKE DR
165	Non-Structural Projects		Targeted Rain Barrel Program @ Down Patrick Farms, Finger Lakes Estates, & Squire's Haven	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	10423 DOWN PATRICK LA

Subwatershed ***PN-MR-0001*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Mine Run*

Description	Primarily OS w/in Great Falls Park, some ESR & LDR w/ forested lots, 2 non-stormwater ponds	***Impairments***	flooding hazards, poor habitat diversity, high septic use, 2006 303d Fecal Imapirment
Restoration Selection Criteria	SW Ranking, Flooding	***Preservation Qualities***	Low % IMP, high % forested, good drinking water quality, good storage capacity
Preservation Selection Criteria	Imp	***Improvement Goals***	Preserve forested OS, improve habitat & mitigate flooding issues
Percent Impervious	2.55%		
Percent Forest	91.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
166	Streambank Stabilization	3	Stabilize and restore erosion impacts @ SPA point PNMR5-1-E1	may be implemented w/ project 167, may be unnecessary if upstream flows are reduced.	513 RIVER BEND RD
167	Road Crossing Improvements	4	Raise road bed @ Old Dominion Dr, increase culvert size/capacity, repair crossing impacts u/s & d/s	may be implemented w/ project 166, may be unnecessary if upstream flows are reduced	513 RIVER BEND RD
168	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland	drain pond for addt'l storage if possible	9101 MINE RUN DR
169	Preservation		Preserve forested OS in riparian buffer through conservation easement		9101 MINE RUN DR
170	Non-Structural Projects		Targeted Rain Barrel Program @ Jackson Hills Development	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9106 MINE RUN DR

Subwatershed ***PN-MR-0002*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Mine Run*

Description	Headwaters subwatershed, mixed ESR & LDR w/ some OS, forested lots, no SW treatment	***Impairments***	poor habitat health, high SW outfalls, high nutrient loads, high septic use, moderate crossing impact, 2006 303d Fecal impairment
Restoration Selection Criteria	SW Ranking	***Preservation Qualities***	Low % IMP, low flood hazard, good storage capacity
Preservation Selection Criteria	Imp	***Improvement Goals***	Provide water quality treatment, improve habitat
Percent Impervious	8.31%		
Percent Forest	78.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
171	Culvert Retrofits	7	Retrofit culvert @ Deer Park Rd, w/ control structure & create micro-pool/wet pond/wetland		9111 DEER PARK RD
172	Road Crossing Improvements	4	Raise road bed @ Deer Park Rd (SPA crossing point PNMR003.C001), increase culvert size/capacity		9101 DEER PARK RD
173	Low Impact Development Retrofits	9	LID: new bioretention/rain garden to capture drainage before culvert under Maria Av		9117 MARIA AV
174	Drainage Improvements	8	Daylight pipe, install rain garden/bioretention & veg. swale along Maria Av combo		9116 MARIA AV
175	New Stormwater Ponds	1	New SW pond to capture drainage north of Maria Av, drainage area approx 8.5 acres		9126 MARIA AV
176	New Stormwater Ponds	1	New SW pond in OS lot on Weant Dr, drainage area approx 4.4 acres		9117 WEANT DR
177	New Stormwater Ponds	1	New SW pond in OS lot on Weant Dr across fr Waring Dr, drainage area approx 2.4 acres		9119 WEANT DR
178	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		9113 JEFFERY RD
179	New Stormwater Ponds	1	New SW pond in OS lot off of Waring Dr, drainage area approx. 5.64 acres	if project 178 is implemented	9122 WEANT DR
180	Non-Structural Projects		Targeted Rain Barrel Program @ Weant Subdivision & Washington Great Falls Survey	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9131 WEANT DR

181	Non-Structural Projects	Targeted Rain Barrel Program @ Great Falls Estates Sec. 2, Maria Avenue & Deer Park Subdivisions	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9123 MARIA AV

Subwatershed ***PN-MR-0003*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Mine Run*

Description	Mostly ESR w/ some OS, mostly forested lots w/ some cleared lots, 1 non-stormwater pond	***Impairments***	Flooding, poor stream & drinking water quality, poor storage capacity, high SW outfalls, high upland sediment load, high TP loads, high septic use, moderate erosion & obstruction impacts
Restoration Selection Criteria	SW Ranking, SPA Data, Flooding	***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	Mitigate flooding issues, improve water quality, reduce nutrient & sediment loads, stabilize & restore erosion impacts
Percent Impervious	4.23%		
Percent Forest	74.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
182	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland		500 RIVER BEND RD
183	Streambank Stabilization	1	Stabilize and restore erosion impacts @ SPA points PNMR5-2-E3 to E6.		528 RIVER BEND RD
184	Road Crossing Improvements	4	Raise road bed @ River Bend Rd, increase culvert size/capacity, repair crossing impacts u/s & d/s		9120 MINE RUN DR
185	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		464 RIVER BEND RD
186	Preservation		Preserve open space area w/ conservation easement or land acquisition		9348 CORNWELL FARM DR
187	New Stormwater Ponds	1	New SW pond to capture drainage fr Mine Ridge Rd, drainage area approx 10 acres		651 MINE RIDGE RD
188	Non-Structural Projects		Remove obstructions @ SPA points PNMR5-2-O8 to O10		651 MINE RIDGE RD
189	New Stormwater Ponds	1	New SW pond to capture drainage fr River Bend Rd, drainage area approx 10 acres		509 RIVER BEND RD
190	Non-Structural Projects		Remove obstructions @ SPA points PNMR5-2-O5		464 RIVER BEND RD
191	Non-Structural Projects		Targeted Rain Barrel Program @ Jackson Hills Development	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9126 MINE RUN DR

192	Non-Structural Projects		Targeted Rain Barrel Program @ Cornwell Farm Development	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9300 CORNWELL FARM DR
193	Streambank Stabilization	1	Stabilize and restore erosion impacts @ SPA points PNMR5-2-E8 & E9.		466 RIVER BEND RD

Subwatershed ***PN-MR-0004*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Mine Run*

Description	Headwaters subwaterhsed, primarily ESR w/ some LDR & OS, mostly cleared lots, 1 DP, 6 non-stormwater ponds	***Impairments***	overall composite score low, high TP loads, high septic use, obstruction impacts
Restoration Selection Criteria	SW Ranking	***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	Remove obstructions, reduce nutrient loads, preserve forested OS
Percent Impervious	5.54%		
Percent Forest	59.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
194	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland		550 RIVER BEND RD
195	Stormwater Pond Retrofit	1	Retrofit non-stormwater pond to wet pond or wetland		600 RIVER BEND RD
196	Stormwater Pond Retrofit	1	Retrofit non-stormwater pond to wet pond or wetland		9308 GEORGETOWN PI
197	Stormwater Pond Retrofit	1	Retrofit non-stormwater pond to wet pond or wetland		9341 CORNWELL FARM DR
198	Stormwater Pond Retrofit	1	Retrofit non-stormwater pond to wet pond or wetland		9351 CORNWELL FARM DR
199	Stormwater Pond Retrofit	1	Retrofit non-stormwater pond to wet pond or wetland		9411 CORNWELL FARM DR
200	Non-Structural Projects		Remove obstructions @ SPA points PNMR004-T002		9341 CORNWELL FARM DR
201	Low Impact Development Retrofits	9	LID retrofit Dry Pond 1443DP to naturalized infiltration pond		801 OLDE GEORGETOWN CT
202	Stormwater Pond Retrofit	1	Retrofit Dry Pond 1443DP to naturalized extended detention dry pond		801 OLDE GEORGETOWN CT
203	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		9401 CORNWELL FARM DR
204	New Stormwater Ponds	1	New SW pond in field off River Bend Rd, drainage area approx 8.7 acres		528 RIVER BEND RD
205	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		9331 CORNWELL FARM DR

206	New Stormwater Ponds	1	New SW pond in wooded area off River Bend Rd, drainage area approx 13 acres		634 RIVER BEND RD
207	New Stormwater Ponds	1	New SW pond in field off Georgetown PI, drainage area approx 7.2 acres		9408 GEORGETOWN PI
208	Non-Structural Projects		Targeted Rain Barrel Program @ Jackson Hills & Cornwell Farm Developments	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9321 CORNWELL FARM DR

Subwatershed ***PN-MR-0005*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Mine Run*

Description	Headwaters subwatershed, primarily ESR w/ some LDR, mostly cleared lots, forested lots on many ESR areas, 1 WP, 3 non-stormwater ponds	***Impairments***	high SW runoff, flooding, poor habitat health & stream water quality, overall composite score low, high SW outfalls, high nutrient loads, high septic use, high channelized/piped streams
Restoration Selection Criteria	SW Ranking, Flooding	***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	Mitigate flooding issues, reduce nutrient loads, improve water quality, reduce channelized/piped stream, preserve forested OS
Percent Impervious	7.88%		
Percent Forest	71.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
209	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland		462 RIVER BEND RD
210	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland	drain pond for addt'l storage if possible	456 RIVER BEND RD
211	Low Impact Development Retrofits	9	Daylight pipe, install vegetated swale to potential rain garden/bioretention north of Arnon Chapel Rd.		9416 ARNON CHAPEL RD
212	New Stormwater Ponds	1	New SW pond to capture drainage north of Weant Dr, drainage area approx 3 acres	coordinate w/ property owner	341 RIVER BEND RD
213	Preservation		Preserve open space area w/ conservation easement or land acquisition		9229 WEANT DR
214	New Stormwater Ponds	1	New SW pond in OS lot off Weant Rd, drainage area approx 2 acres	if project 213 can be implemented	9229 WEANT DR
215	New Stormwater Ponds	1	Existing natural pond can be expanded to capture outfalls fr McNalane Ct, drainage area approx 4.81 acres	stormwater pipes can be daylighted and veg swales can be used to convey SW to new pond	9300 MONALAINE CT
216	New Stormwater Ponds	1	New SW pond in OS lot off River Bend Rd & Lagovista Ct, drainage area approx 2.95 acres		419 RIVER BEND RD
217	Low Impact Development Retrofits	9	Daylight pipe, install vegetated swale to potential rain garden/bioretention off Lagovista Ct		414 RIVER BEND RD
218	Drainage Improvements	8	Daylight pipe, improve drainage channel & outfalls to stream		9305 MONALAINE CT

219	Preservation	Preserve riparian zone w/ conservation easement and restore riparian buffer.	coordinate with property owners	444 RIVER BEND RD
220	Preservation	Preserve forested OS in riparian buffer through conservation easement or land acquisition		502 RIVER BEND RD
221	Non-Structural Projects	Targeted Rain Barrel Program @ Riverside Manor & Riverside Meadows Developments	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9314 ARNON CHAPEL RD
222	Non-Structural Projects	Targeted Rain Barrel Program @ Bound Brook, Potomac Meadows & Timberlake Run Developments	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9404 LAGOVISTA CT
223	Non-Structural Projects	Targeted Rain Barrel Program @ Laylin Family Trust	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	488 RIVER BEND RD

Subwatershed ***PN-MR-0006*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Mine Run*

Description	Headwaters subwatershed, primarily ESR w/ some LDR & OS, cleared lots in over half of watershed, 1 DP, 1 WP, 1 non-stormwater pond	***Impairments***	high SW runoff, poor habitat health & stream water quality, overall composite score low, high TP loads, high septic use, high channelized/piped streams, moderate to severe headcuts, obstruction and erosion impacts
Restoration Selection Criteria	SW Ranking, SPA Data, Public Comment, Field Recon/Drainage Complaint	***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp, % Increase TSS	***Improvement Goals***	capture & reduce SW runoff, improve habitat & water quality, reduce channelized/piped streams, stabilize & restore erosion problems
Percent Impervious	5.62%		
Percent Forest	59.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
224	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		470 RIVER BEND RD
225	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		486B RIVER BEND RD
226	Preservation		Preserve open space area w/ conservation easement or land acquisition		484 RIVER BEND RD
227	Preservation		Preserve open space area w/ conservation easement or land acquisition		442 RIVER BEND RD
228	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		480 RIVER BEND RD
229	Preservation		Preserve open space area w/ conservation easement or land acquisition		576 INNSBRUCK AV
230	Preservation		Preserve open space area w/ conservation easement or land acquisition		9444 RABBIT HILL RD
231	Low Impact Development Retrofits	9	LID retrofit Dry Pond 0182DP to naturalized infiltration pond	if soils support infiltration, otherwise try project 232	501 ARNON RIDGE CT
232	Stormwater Pond Retrofit	1	Retrofit Dry Pond 0182DP to naturalized extended detention dry pond	if project 231 can not be implemented	507 ARNON RIDGE CT
233	Natural Channel Restoration	2	Remove obstructions at SPA points PNUT4-1-O1 to O6, stabilize & repair erosion impact at PNUT4-1-E1 & headcut at PNUT4-1-H1		9697 ARNON CHAPEL RD

234	Preservation		Preserve open space area w/ conservation easement or land acquisition		9714 ARNON CHAPEL RD
235	Culvert Retrofits	7	Retrofit culvert @ Arnon Chapel Rd, w/ control structure & create micro-pool/wet pond/wetland		9700 ARNON CHAPEL RD
236	Drainage Improvements	8	Daylight pipe, install veg. swale, direct drainage to new SW facility at project 238	if project 238 not implement, daylight pipe and install swale to intermittent stream off Watts Rd.	9508 WATTS RD
237	Drainage Improvements	8	Daylight pipe & install veg swales to convey runoff off Watts Rd		9505 WATTS RD
238	Low Impact Development Retrofits	9	New bioretention/rain garden to capture drainage fr pipe outfalls along Watts Rd		9508 WATTS RD
239	Drainage Improvements	8	Daylight pipe & install veg swales to convey runoff off Chesapeake Dr		412 CHESAPEAKE DR
240	Low Impact Development Retrofits	9	New bioretention/rain garden to capture drainage before culvert beneath Arnon Chapel Rd		9502 ARNON CHAPEL RD
241	Preservation		Preserve open space area w/ conservation easement or land acquisition		9812 ARNON CHAPEL RD
242	Low Impact Development Retrofits	9	New veg swale to capture drainage off Arnon Chapel Rd & Arnon Ridge Ct, direct to dry pond		501 ARNON RIDGE CT
243	Low Impact Development Retrofits	9	New bioretention/rain garden to capture drainage before culvert beneath Arnon Chapel Rd		9800 ARNON CHAPEL RD
244	Drainage Improvements	8	Daylight pipe & install veg swales to convey runoff off Arnon Chapel Rd		498 ARNON RIDGE CT
245	New Stormwater Ponds	1	New SW pond in forested area off private drive fr Innsbruck Ave, drainage are approx. 7.03 acres	daylight pipes & install veg swale to direct drainage to new facility	544 INNSBRUCK AV
246	Non-Structural Projects		Targeted Rain Barrel Program @ Bound Brook & Riverside Manor Developments	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	420 CHESAPEAKE DR
247	Non-Structural Projects		Targeted Rain Barrel Program @ Laylin Family Trust	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	507 ARNON RIDGE CT
248	Non-Structural Projects		Targeted Rain Barrel Program @ Arnon Ridge & Arnon Lake Developments	include education & outreach re: individual on-lot SW treatment options – rain gardens, porous paving etc.	480 RIVER BEND RD

Subwatershed ***PN-MR-0007*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Mine Run*

Description	Primarily ESR w/ some OS & LDR, motsly cleared lots, 2 WP, 2 non-stormwater ponds	***Impairments***	high SW runoff, flooding hazards, poor habitat health & stream water quality, overall composite score low, high SW outfalls, high TP loads, high septic use, severe obstruction impact
Restoration Selection Criteria	SW Ranking, Flooding	***Preservation Qualities***	Low % IMP, at risk for increased IMP & TSS
Preservation Selection Criteria	Imp, % Increase Imp, % Increase TSS	***Improvement Goals***	clear obstruction, stabilize & repair impacts, capture & reduce SW runoff, improve habitat & water quality, mitigate flooding hazards
Percent Impervious	5.66%		
Percent Forest	38.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
249	Streambank Stabilization	3	Remove major obstruction at SPA point PNMR5-2-O11, stabilize & repair impacts		470 RIVER BEND RD
250	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland		650 AD HOC RD
251	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		684 ROSSMORE CT
252	Preservation		Preserve riparian zone w/ conservation easement or land acquisition and restore riparian buffer.		472 RIVER BEND RD
253	Preservation		Preserve riparian zone w/ conservation easement or land acquisition and restore riparian buffer.		680 ROSSMORE CT
254	Preservation		Preserve open space area w/ conservation easement or land acquisition		9636 GEORGETOWN PI
255	Preservation		Preserve open space area w/ conservation easement or land acquisition		9624 GEORGETOWN PI
256	Preservation		Preserve open space area w/ conservation easement or land acquisition		693 ROSSMORE CT
257	Preservation		Preserve riparian zone w/ conservation easement or land acquisition and restore riparian buffer.		9421 CORNWELL FARM DR
258	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland		9500 GEORGETOWN PI
259	Preservation		Preserve riparian zone w/ conservation easement or land acquisition and restore riparian buffer.		672 AD HOC RD

260	New Stormwater Ponds	1	New SW pond in OS Lot off Ad Hoc Rd, drainage area approx 5 acres		672 AD HOC RD
261	New Stormwater Ponds	1	New SW pond in forested area off Innsbruck Ave, drainage area approx 10.3 acres		520 INNSBRUCK AV
262	Drainage Improvements	8	Daylight pipe & install veg swales to convey runoff off Rossmore Ct	install bioretention/rain garden if possible	694 ROSSMORE CT
263	New Stormwater Ponds	1	New SW pond in OS lot, drainage area approx. 9.15 acres		684 ROSSMORE CT
264	New Stormwater Ponds	1	New SW pond in OS lot off Riber Bend Rd, drainage area approx. 7.57 acres		680 ROSSMORE CT
265	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		472 RIVER BEND RD
266	Non-Structural Projects		Targeted Rain Barrel Program @ Cornwell Farm & Chamborley Developments	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	692 ROSSMORE CT

Subwatershed ***PN-MR-0008*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Mine Run*

Description	Headwaters subwatershed, mixed ESR & LDR w/ some INT, LIC, HIC & IND, mostly cleared lots, 1 TR, 5 WP, 1 non-stormwater pond	***Impairments***	poor SW runoff conveyance, moderate erosion impacts, high SW runoff, poor habitat health, overall composite score low, deficient stream buffers, high SW outfalls, high TP loads, high septic use
Restoration Selection Criteria	SW Ranking, Field Recon/Drainage Complaint	***Preservation Qualities***	Low % IMP, at risk for increased TSS
Preservation Selection Criteria	Imp, % Increase TSS	***Improvement Goals***	retrofit SW runoff conveyance systems, improve SW controls, stabilize & repair erosion impacts, improve habitat & water quality, preserve forested OS & restore riparain buffers.
Percent Impervious	8.43%		
Percent Forest	30.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
267	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		9809 ARNON CHAPEL RD
268	Preservation		Preserve open space area w/ conservation easement or land acquisition		9805 ARNON CHAPEL RD
269	Preservation		Preserve open space area w/ conservation easement or land acquisition		584 INNSBRUCK AV
270	Preservation		Preserve open space area w/ conservation easement or land acquisition		649 DEERFIELD FARM CT
271	Preservation		Preserve open space area w/ conservation easement or land acquisition		10004 ARNON CHAPEL RD
272	Preservation		Preserve open space area w/ conservation easement or land acquisition		628 WALKER RD
273	Preservation		Preserve open space area w/ conservation easement or land acquisition		634 WALKER RD
274	Preservation		Preserve open space area w/ conservation easement or land acquisition		700 WALKER RD
275	Preservation		Preserve open space area w/ conservation easement or land acquisition		603 DEERFIELD POND CT
276	Preservation		Preserve open space area w/ conservation easement or land acquisition		725 WALKER RD
277	Preservation		Preserve riparian zone w/ conservation easement and restore riparian buffer.		588 INNSBRUCK AV

278	Low Impact Development Retrofits	9	LID: New LID treatments around parking lot and along driveway - infiltration trenches, bioretention, filter strips, swales.	Implement together with Project 303	701 WALKER RD
279	Low Impact Development Retrofits	9	New bioretention/rain garden to capture outfalls fr building		701 WALKER RD
280	Low Impact Development Retrofits	9	LID: new LID treatments around parking lot and along driveway - infiltration trench, bioretention, vegetated filter strips, sand filter, & WQ inlet		718 WALKER RD
281	Low Impact Development Retrofits	9	LID: new LID treatments around parking lot and along driveway - infiltration trench, bioretention, vegetated filter strips, sand filter, & WQ inlet		717 WALKER RD
282	Low Impact Development Retrofits	9	LID: new LID treatments around parking lot and along driveway - infiltration trench, bioretention, vegetated filter strips, sand filter, & WQ inlet		719 WALKER RD
283	Low Impact Development Retrofits	9	LID: new LID treatments around parking lot and along driveway - infiltration trench, bioretention, vegetated filter strips, sand filter, & WQ inlet		721 WALKER RD
284	Low Impact Development Retrofits	9	LID: new LID treatments around parking lot and along driveway - infiltration trench, bioretention, vegetated filter strips, sand filter, & WQ inlet		731G WALKER RD
285	Drainage Improvements	8	Daylight pipe & install veg swales to convey runoff off Walker Rd		632 WALKER RD
286	Drainage Improvements	8	Retrofit SW conveyance system in this neighborhood, daylight pipes & install veg swales to wet pond if possible		9915 DEERFIELD POND DR
287	Low Impact Development Retrofits	9	New bioretention/rain garden to capture drainage fr pipe outfalls off Deerfield Pond Dr	coordinate w/ property owner, if project 288 is better location, daylight pipe & install veg swale instead	9907 DEERFIELD POND DR
288	Low Impact Development Retrofits	9	Improve existing grass swale w/ vegetation & check dams for addt'l storage & water quality benefits		9905 DEERFIELD POND DR
289	Stormwater Pond Retrofit	1	Retrofit wet pond for additional storage to capture runoff from Deerfield Pond Development	retrofit conveyance systems to ponds as well, see if pond can be drained, liner removed for addtl storage capacity	9901 DEERFIELD POND DR
290	Drainage Improvements	8	Improve SW outfall, daylight pipe & create veg. swale if possible		9901 DEERFIELD POND DR

291	Culvert Retrofits	7	Retrofit culvert @ Deerfield Pond Ct, w/ control structure & create micro-pool/wet pond/wetland	may need to berm side of new pond structure to protect homeowner's property	606 DEERFIELD POND CT
292	Preservation		Preserve riparian zone w/ conservation easement and restore riparian buffer.	flood protection measures including cross vanes, j-hooks to push water away fr homeowner's property may be needed	607 DEERFIELD POND CT
293	Low Impact Development Retrofits	9	New bioretention/rain garden or wetland in wooded area	coordinate w/ property owner	600 DEERFIELD POND CT
294	Low Impact Development Retrofits	9	New bioretention/rain garden or wetland in wooded area	coordinate w/ property owner	600 DEERFIELD POND CT
295	New Stormwater Ponds	1	New SW pond in wooded area of lot off Deerfield Pond Ct. drainage area approx 5.5 acres		605 DEERFIELD POND CT
296	Preservation		Preserve riparian zone w/ conservation easement and restore riparian buffer.	flood protection measures including cross vanes, j-hooks to push water away fr homeowner's property may be needed	696 BUCKS LA
297	New Stormwater Ponds	1	New SW pond in open area of lot off Deerfield Farm Ct. drainage area approx 14 acres		604 DEERFIELD POND CT
298	Low Impact Development Retrofits	9	New bioretention/rain garden to capture drainage before culvert beneath Deerfield Pond Dr	coordinate w/ property owner	606 DEERFIELD POND CT
299	New Stormwater Ponds	1	New SW pond in wooded area adjacent to athletic fields of school off Walker Rd, drainage area approx 12 acres		610 DEERFIELD POND CT
300	Culvert Retrofits	7	Retrofit culvert @ outlet to Walker Rd w/ control structure & create micro-pool/wet pond/wetland		723 WALKER RD
301	New Stormwater Ponds	1	New SW pond in OS lot off Bucks La, drainage area approx. 7.5 acres		9830 GEORGETOWN PI
302	Non-Structural Projects		Targeted Rain Barrel Program @ Deerfield Farm & Deerfield Pond Developments	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9904 DEERFIELD POND DR
303	Non-Structural Projects		Targeted Rain Barrel Program @ John W. Hanes Gunnel Run Farm, John W. Hanes Jr Gunnel Run Farm & Marmota Farm Subdivisions	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	619 INNSBRUCK AV

304	Non-Structural Projects	Targeted Rain Barrel Program @ Forestville Heights Development	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	713 WALKER RD

Subwatershed ***PN-PN-0001*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch*

Description	Mixed ESR & LDR w/ some OS, forested lots, no SWM facilities, some quality only designation	***Impairments***	poor water quality, high septic use, flooding, erosion problems noted by public comment, insufficient SW controls.
Restoration Selection Criteria	Flooding, Public Comment	***Preservation Qualities***	Low % Imp, good habitat diversity & storage capacity
Preservation Selection Criteria	Imp	***Improvement Goals***	Reduce peak flow, improve water quality, and preserve OS
Percent Impervious	6.29%		
Percent Forest	66.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
1	New Stormwater Ponds	1	New SW pond to capture northern outfall fr Deepwoods Hollow Subdv. drainage area approx. 3 acres		9889 WINDY HOLLOW RD
2	New Stormwater Ponds	1	New SW pond to capture Southern outfall fr Deepwoods Hollow Subdv. drainage area approx 5 acres		9893 WINDY HOLLOW RD
3	Road Crossing Improvements	4	Replace road bed and repair and restore culvert	WAG member noted that bridge has been washed out	176 RIVER PARK DR
4	New Stormwater Ponds	1	New SW pond to capture outfall fr northern part of Riverbend Knolls Subdv. drainage area approx. 6.6 acres		176 RIVER PARK DR
43	Natural Channel Restoration	2	Stabilize and restore eroded and undercut banks, install cross vanes and j-hooks to divert erosive flows away from banks		166 RIVER PARK DR
44	Road Crossing Improvements	4	Fill in exposed culvert pipe and restore road bed		182 RIVER PARK DR
45	Drainage Improvements	8	Improve SW outfall structure, fill in exposed pipe and improve outfall structure w/ riprap/plunge pool to dissipate more SW runoff flows	may be unnecessary if Project 4 can be implemented	176 RIVER PARK DR
5	Preservation		Preserve open space area w/ conservation easement		101 RIVER PARK LA
6	Non-Structural Projects		Targeted Rain Barrel Program @ Deepwoods Hollow Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	172 RIVER PARK DR

7	Non-Structural Projects		Targeted Rain Barrel Program @ Riverbend Knolls Subdivision.	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9889 WINDY HOLLOW RD
8	Drainage Improvements	8	Remove concrete channel & replace w/ grass swale		180 RIVER PARK DR

Subwatershed ***PN-PN-0002*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch*

Description	Headwaters subbasin, primarily ESR & LDR, no SWM facilities, some quality only designation	***Impairments***	Moderate erosion problems, insufficient SW controls
Restoration Selection Criteria		***Preservation Qualities***	Low % Imp, low flooding hazard, good storage
Preservation Selection Criteria	Imp	***Improvement Goals***	Preserve forested OS & improve SW controls
Percent Impervious	6.26%		
Percent Forest	58.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
10	Low Impact Development Retrofits	9	New vegetated swale or rain garden to capture outfall adjacent to River Park Dr		182 RIVER PARK DR
11	New Stormwater Ponds	1	New SW pond to capture 3 outfalls fr River Park La. drainage area approx. 11 acres		148 RIVER PARK LA
12	Non-Structural Projects		Targeted Rain Barrel Program @ Riverbend Knolls & Riverbend Farms Subdivisions	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	203 RIVER PARK DR
9	New Stormwater Ponds	1	New SW pond to capture 2 outfalls fr River Park Dr. drainage area approx. 10 acres	will need to coordinate w/ property owners	210 RIVER PARK DR

Subwatershed ***PN-PN-0003*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch*

Description	Primarily ESR w/ some LDR, 2 non-SW (farm) ponds, some quality only designation	***Impairments***	poor habitat, high channelized streams, high nutrient source loading, source indicator score low, high fecal
Restoration Selection Criteria		***Preservation Qualities***	Low % IMP, at risk for increased TSS, low flooding hazard
Preservation Selection Criteria	Imp, % Increase TSS	***Improvement Goals***	Improve water quality, restore natural stream channels, preserve forested open space.
Percent Impervious	7.01%		
Percent Forest	51.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
13	Drainage Improvements	8	Remove concrete channel & replace w/ grass swale		222 FALCON RIDGE RD
14	Drainage Improvements	8	Remove concrete channel & replace w/ grass swale		205 FALCON RIDGE RD
15	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		10100 HAREWOOD CT
16	New Stormwater Ponds	1	New SW pond to capture outfall fr Falcon Ridge Subdv off High Hills Pl. drainage area approx. 4.24 acres		9901 WINDY HOLLOW RD
17	Stormwater Pond Retrofit	1	Retrofit Farm pond to wet pond or wetland		221 BLISS LA
18	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		224 FALCON RIDGE RD
19	Non-Structural Projects		Targeted Rain Barrel Program @ Falcon Ridge Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	9994 BLACKBERRY LA
20	Non-Structural Projects		Targeted Rain Barrel Program @ Merryelle Acres Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	10101 HAREWOOD CT

Subwatershed ***PN-PN-0004*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch*

Description	Headwaters subwatershed, primarily Estate Residential with some LDR, 1 wet pond, 3 non SW (farm) ponds	***Impairments***	Crossing impacts along Beach Mill Rd & below wet pond; poor habitat & encroachment below wet pond
Restoration Selection Criteria	SPA Data, Flooding, Public Comment, Field Recon/Pro Rata	***Preservation Qualities***	Low % IMP, at risk for increased TSS
Preservation Selection Criteria	Imp, % Increase TSS	***Improvement Goals***	Reduce peak flow, culvert improvements, improve habitat below wet pond (Walker Lake?)
Percent Impervious	6.11%		
Percent Forest	53.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
21	Stormwater Pond Retrofit	1	Retrofit Farm pond to wet pond or wetland		10112 WALKER LAKE DR
22	Stormwater Pond Retrofit	1	Retrofit Farm pond to wet pond or wetland		10301 BEACH MILL RD
23	Stormwater Pond Retrofit	1	Retrofit Farm pond to wet pond or wetland		439A SPRINGVALE RD
24	Drainage Improvements	8	Remove concrete channels & replace w/ grass swale		10116 WALKER LAKE DR
25	Road Crossing Improvements	4	ProRata project, raise road bed @ Beech Mill Rd & increase culvert size at Field Recon site PN-PN-0004-C01.		10300 BEACH MILL RD
26	Road Crossing Improvements	4	ProRata project, raise road bed @ Beech Mill Rd & increase culvert size at Field Recon site PN-PN-0004-C02. Stabilize streambanks upstream and downstream of road	coordinate with property owners	10209 BEACH MILL RD
27	Preservation		Preserve riparian zone w/ conservation easement and restore riparian buffer.		10209 BEACH MILL RD
28	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		10223 BEACH MILL RD
29	Preservation		Preserve forested OS in riparian buffer through conservation easement or land acquisition		10300 BEACH MILL RD
30	Preservation		Preserve open space area w/ conservation easement or land acquisition		10106 WALKER WOODS DR

Subwatershed ***PN-PO-0001*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Forested OS area adjacent to Potomac River, no SW treatment	***Impairments***	
Restoration Selection Criteria	SW Ranking	***Preservation Qualities***	Low % IMP, high % forested
Preservation Selection Criteria	Imp	***Improvement Goals***	Implement Countywide Preservation Strategies
Percent Impervious	1.71%		
Percent Forest	63.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***

Subwatershed ***PN-PO-0002*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Forested OS area adjacent to Potomac River, no SW treatment	***Impairments***	
Restoration Selection Criteria		***Preservation Qualities***	Low % IMP, high % forested
Preservation Selection Criteria	Imp	***Improvement Goals***	Implement Countywide Preservation Strategies
Percent Impervious	0.00%		
Percent Forest	95.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***

Subwatershed ***PN-PO-0003*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Mostly forested area in Great Falls Park w/ small area of LDR, no SW treatment	***Impairments***	
Restoration Selection Criteria		***Preservation Qualities***	Low % IMP, high % forested
Preservation Selection Criteria	Imp	***Improvement Goals***	Implement Countywide Preservation Strategies
Percent Impervious	1.65%		
Percent Forest	95.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***

Subwatershed ***PN-PO-0004*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Forested area in Great Falls Park adjacent to Potomac River, no SW treatment	***Impairments***	
Restoration Selection Criteria		***Preservation Qualities***	
Preservation Selection Criteria	Imp	***Improvement Goals***	
Percent Impervious	0.12%		
Percent Forest	91.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***

Subwatershed ***PN-PO-0005*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Primarily ESR, OS in Great Falls Park & some LDR, 3 Non-stormwater ornamental ponds	***Impairments***	overall composite score low, high TP, poor habitat diversity, failing culverts & drainage complaints
Restoration Selection Criteria	SW Ranking, SPA Data, Field Recon/Drainage Complaint	***Preservation Qualities***	Low % IMP, high % forested
Preservation Selection Criteria	Imp	***Improvement Goals***	Improve water quality, preserve forested riparian buffers, improve culverts and mitigate drainage & flooding issues
Percent Impervious	4.58%		
Percent Forest	83.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
31	Road Crossing Improvements	4	ProRata project Map No. PN431, raise road bed @ River Bend Rd and increase culvert size, stabilize streambanks downstream		651 RIVER BEND RD
32	Preservation		Preserve open space area w/ conservation easement or land acquisition		9025 JACKSON LA
33	Natural Channel Restoration	2	Remove dam and ornamental pond downstream of River Bend Rd and restore natural stream channel	pond may be contributing to flooding & drainage issues at River Bend Rd.	651 RIVER BEND RD

Subwatershed ***PN-PO-0006*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Mostly ESR & LDR w/ cleared lots, some OS areas slated for ESR dev., 2 DP, 1 large Non-stormwater (farm) pond	***Impairments***	overall composite score low, high SW runoff, poor habitat health, poor stream buffers, high septic use & TP loads
Restoration Selection Criteria	SW Ranking, Field Recon/Pro Rata	***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	Capture SW runoff & improve water quality, preserve forested OS
Percent Impervious	5.42%		
Percent Forest	48.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
34	Low Impact Development Retrofits	9	LID retrofit Dry Pond DP0245 to naturalized infiltration pond	if soils support infiltration, otherwise try project 35	740 STRAWFIELD LA
35	Stormwater Pond Retrofit	1	Retrofit Dry Pond DP0245 to naturalized extended detention dry pond	if project 34 can not be implemented	740 STRAWFIELD LA
36	Low Impact Development Retrofits	9	LID retrofit Dry Pond 1197DP to naturalized infiltration pond	if soils support infiltration, otherwise try project 37	731 STRAWFIELD LA
37	Stormwater Pond Retrofit	1	Retrofit Dry Pond 1197DP to naturalized extended detention dry pond	if project 36 can not be implemented	731 STRAWFIELD LA
38	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland	see if pond could be drained and outlet structure installed	700 RIVER BEND RD
39	Low Impact Development Retrofits	9	LID: New LID treatments around parking lot and along driveway - infiltration trenches, bioretention, filter strips, swales.	Implement this project together with project 40	9222 GEORGETOWN PI
40	Non-Structural Projects		Non-structural: provide informational signs at LID treatments and create educational program for students, parents and community	Implement this project together with project 39	9222 GEORGETOWN PI
41	Preservation		Preserve forested OS in riparian buffer through conservation easement		700 STRAWFIELD LA
42	Non-Structural Projects		Targeted Rain Barrel Program @ Riverbend Subdivision	include education & outreach re: individual on-lot SW treatment options - rain gardens, porous paving etc.	711 STRAWFIELD LA

Subwatershed ***PN-PO-0007*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Mostly OS in Great Falls Park, some ESR & LDR, no SWM facilities, no SW treatment	***Impairments***	overall composite score low high SW runoff, poor stream buffers
Restoration Selection Criteria	SW Ranking	***Preservation Qualities***	low flood hazard, good drinking water quality, low % IMP, high % forested
Preservation Selection Criteria	Imp	***Improvement Goals***	Implement Countywide Preservation Strategies, capture SW runoff, improve riparian buffers
Percent Impervious	7.48%		
Percent Forest	65.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
46	New Stormwater Ponds	1	New SW pond to capture runoff from parking lots and buildings, drainage area approx. 4 acres	Coordinate w/ National Park Service	531 FALLS RD
47	Low Impact Development Retrofits	9	LID: New LID treatments around parking lot and along driveway - infiltration trenches, bioretention, filter strips, swales.	provide informational signage for education & outreach, coordinate w/ National Park Service	531 FALLS RD
48	New Stormwater Ponds	1	New SW pond to capture runoff from upstream area, drainage area approx. 5 acres	Coordinate w/ National Park Service	9001 JACKSON LA
49	New Stormwater Ponds		New SW pond to capture runoff from parking lots and buildings, drainage area approx. 4.4 acres	Coordinate w/ National Park Service	9187 OLD DOMINION DR
50	Low Impact Development Retrofits	9	LID: New LID treatments around parking lot and along driveway - infiltration trenches, bioretention, filter strips, swales.	provide informational signage for education & outreach, coordinate w/ National Park Service	9187 OLD DOMINION DR
51	Non-Structural Projects		Restore riparian buffer along trail/road	Coordinate w/ National Park Service	531 FALLS RD

Subwatershed ***PN-PO-0008*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Forested OS area in Great Falls Park and Riverbend Park	***Impairments***	
Restoration Selection Criteria		***Preservation Qualities***	Low % IMP, high % forested, low flood hazard, good habitat health, good drinking water quality
Preservation Selection Criteria	SW Ranking, Imp	***Improvement Goals***	Implement Countywide Preservation Strategies
Percent Impervious	4.15%		
Percent Forest	92.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***

Subwatershed ***PN-PO-0009*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Forested OS area in Riverbend Park	***Impairments***	
Restoration Selection Criteria		***Preservation Qualities***	Low % IMP, high % forested
Preservation Selection Criteria	Imp	***Improvement Goals***	Implement Countywide Preservation Strategies
Percent Impervious	1.89%		
Percent Forest	89.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***

Subwatershed ***PN-PO-0010*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Mostly OS w/in Riverbend Park, some ESR & LDR, no SW treatment	***Impairments***	
Restoration Selection Criteria		***Preservation Qualities***	Low % IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	Implement Countywide Preservation Strategies
Percent Impervious	4.15%		
Percent Forest	76.00%		

Temporary Project ID	***Strategy***	***Project Type***	***Description of Project***	***Comments***	***Nearest Address***

Subwatershed ***PN-PO-0011*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Mostly OS w/in Riverbend Park w/ some ESR, 2 Non-stormwater (farm) ponds	***Impairments***	Public comment noted algae in non-SW pond w/in Riverbend Park
Restoration Selection Criteria	Public Comment	***Preservation Qualities***	Low % IMP, high % forested, at risk for increased IMP
Preservation Selection Criteria	Imp	***Improvement Goals***	Implement Countywide Preservation Strategies
Percent Impervious	1.47%		
Percent Forest	94.00%		

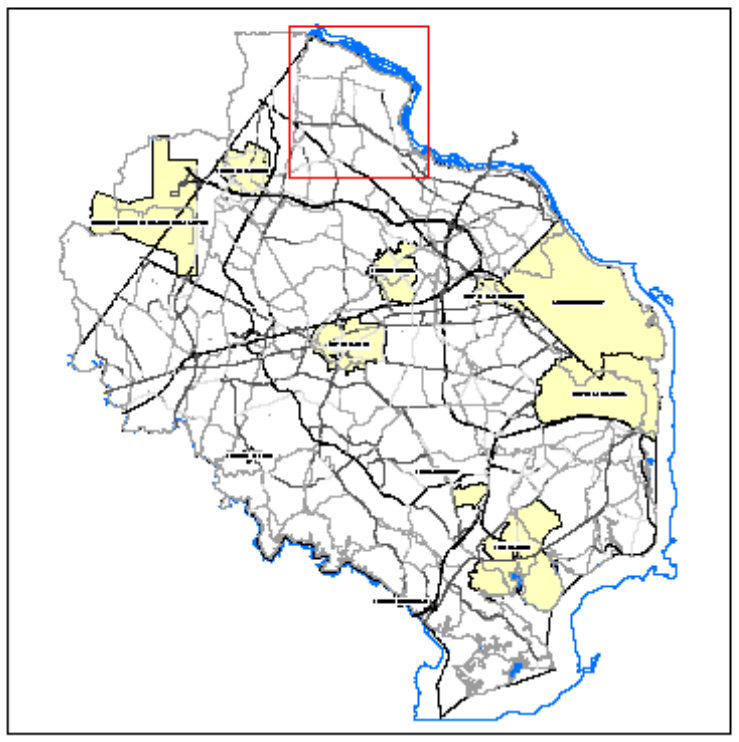
Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
52	Stormwater Pond Retrofit	1	Retrofit farm pond to wet pond or wetland	see if pond could be drained and outlet structure installed	8917 POTOMAC FOREST DR
53	Preservation		Preserve open space area w/ conservation easement or land acquisition		95 RIVER BIRCH DR

Subwatershed ***PN-PO-0012*** ***Watershed:*** *Pond Branch* ***Management Area:*** *Pond Branch- Potomac*

Description	Mostly OS w/ some ESR, ESR areas piped but no SW treatment	***Impairments***	Public comment noted channelized streams
Restoration Selection Criteria	Public Comment	***Preservation Qualities***	Low % IMP, high % forested, at risk for increased IMP
Preservation Selection Criteria	Imp, % Increase Imp	***Improvement Goals***	Implement Countywide Preservation Strategies
Percent Impervious	1.71%		
Percent Forest	91.00%		

Temporary Project ID	*Strategy*	*Project Type*	*Description of Project*	*Comments*	*Nearest Address*
54	Natural Channel Restoration	2	Remove walls & concrete channel, restore natural stream channel	coordinate w/ property owner	131 YARNICK RD
55	Preservation		Preserve open space area w/ conservation easement or land acquisition		137 YARNICK RD
56	New Stormwater Ponds	1	New SW pond to capture 2 outfalls fr Yarnick Rd. drainage area approx. 5 acres	if project 55 is implemented	127 RIVER PARK LA

This page intentionally left blank



Map 1

Map 2

Map 3

Map 4

N

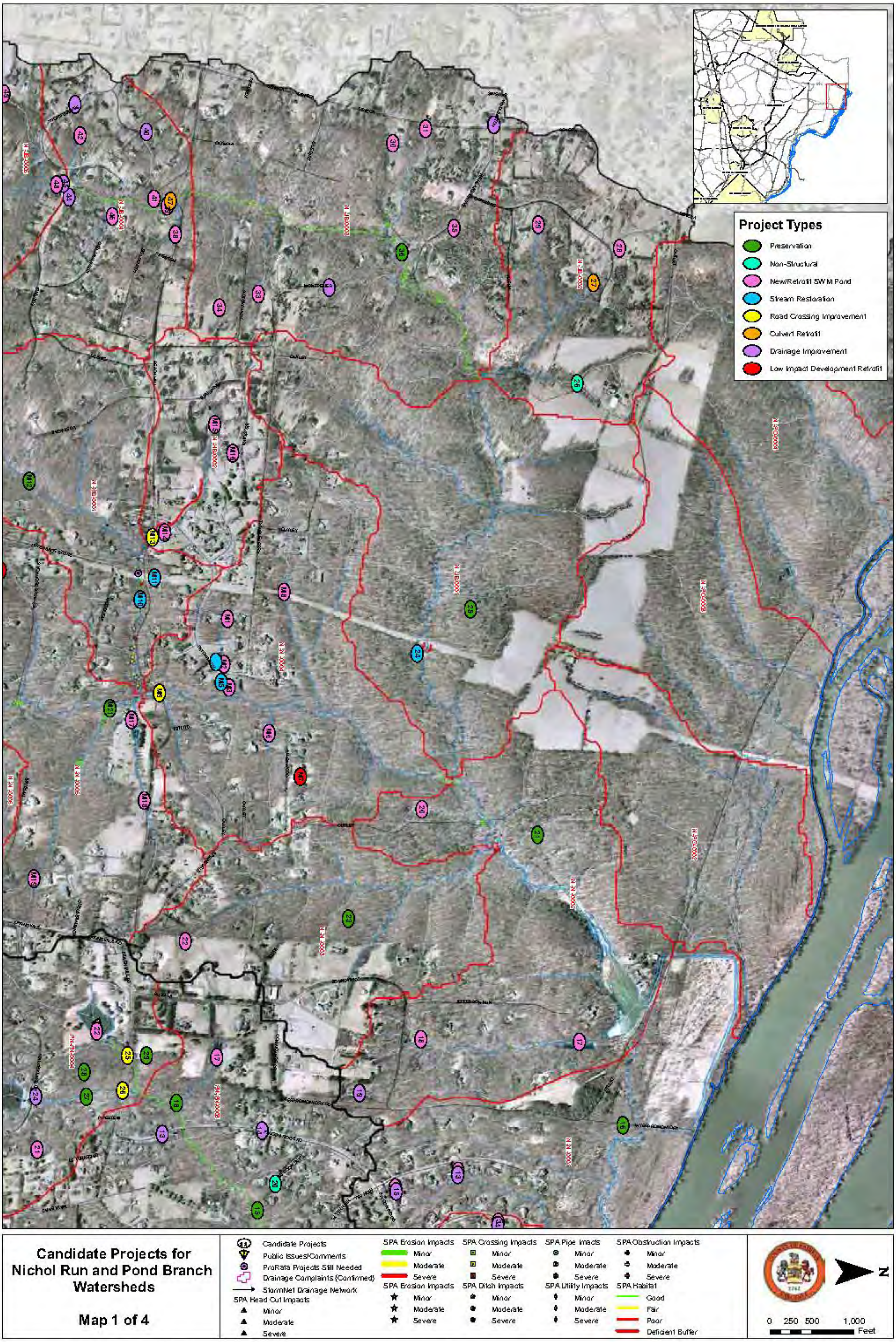
0 0.2 0.4 0.6 Miles

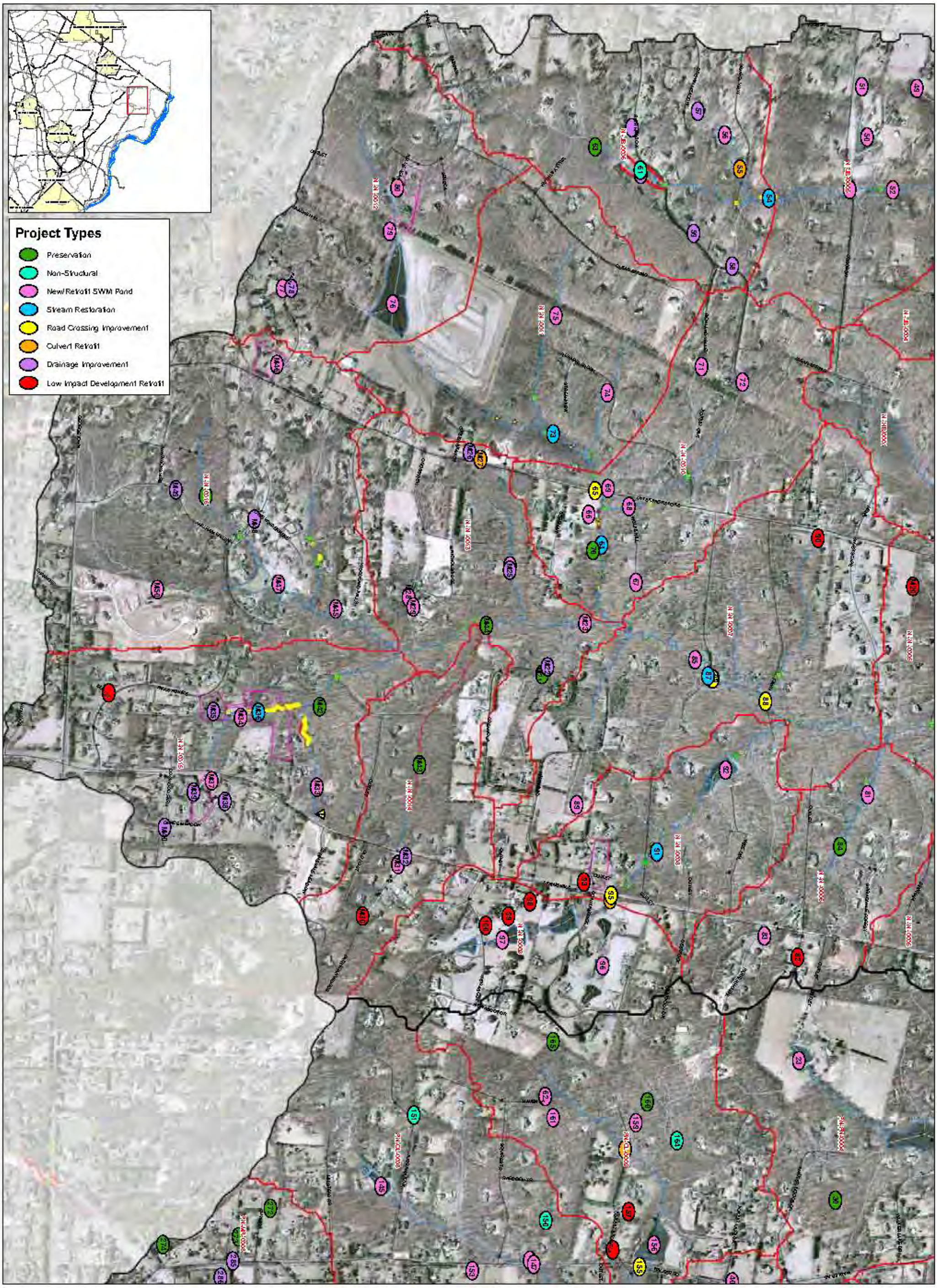
Legend

- Perennial Streams
- Roads
- Subwatersheds
- Watersheds
- County Bndry

Index Map for Candidate Projects Maps

Nichol Run and Pond Branch Watersheds


Project Types
Preservation
Non-Structural
New/Retrofit SWM Pond
Stream Restoration
Road Crossing Improvement
Culvert Retrofit
Drainage Improvement
Low Impact Development Retrofit
Candidate Projects for Nichol Run and Pond Branch Watersheds
Map 1 of 4
Candidate Projects
Public Issues/Comments
ProRata Projects Still Needed
Drainage Complaints (Confirmed)
StormNet Drainage Network
SPA Head Cut Impacts
SPA Erosion Impacts
SPA Crossing Impacts
SPA Ditch Impacts
SPA Pipe Impacts
SPA Utility Impacts
SPA Obstruction Impacts
SPA Habitat
Minor
Moderate
Severe
Good
Fair
Poor
Deficient Buffer
0 250 500 1,000
Feet
N



Candidate Projects for Nichol Run and Pond Branch Watersheds

Map 2 of 4

Candidate Projects
Public Issues/Comments
ProRata Projects Still Needed
Drainage Complaints (Confirmed)
StormNet Drainage Network

SPA Head Cut Impacts
Minor
Moderate
Severe

SPA Erosion Impacts
Minor
Moderate
Severe

SPA Crossing Impacts
Minor
Moderate
Severe

SPA Pipe Impacts
Minor
Moderate
Severe

SPA Obstruction Impacts
Minor
Moderate
Severe

SPA Erosion Impacts
Minor
Moderate
Severe

SPA Ditch Impacts
Minor
Moderate
Severe

SPA Utility Impacts
Minor
Moderate
Severe

SPA Habitat
Good
Fair
Poor
Deficient Buffer

N

0 250 500 1,000 Feet

Project Types

- Preservation
- Non-Structural
- New/Retrofit SWM Pond
- Stream Restoration
- Road Crossing Improvement
- Culvert Retrofit
- Drainage Improvement
- Low Impact Development Retrofit

Candidate Projects for Nichol Run and Pond Branch Watersheds

Map 3 of 4

- Candidate Projects
- Public Issues/Comments
- ProRata Projects Still Needed
- Drainage Complaints (Confirmed)
- StormNet Drainage Network

SPA Head Cut Impacts
- Minor
- Moderate
- Severe

SPA Erosion Impacts
- Minor
- Moderate
- Severe

SPA Crossing Impacts
- Minor
- Moderate
- Severe

SPA Pipe Impacts
- Minor
- Moderate
- Severe

SPA Obstruction Impacts
- Minor
- Moderate
- Severe

SPA Erosion Impacts
- Minor
- Moderate
- Severe

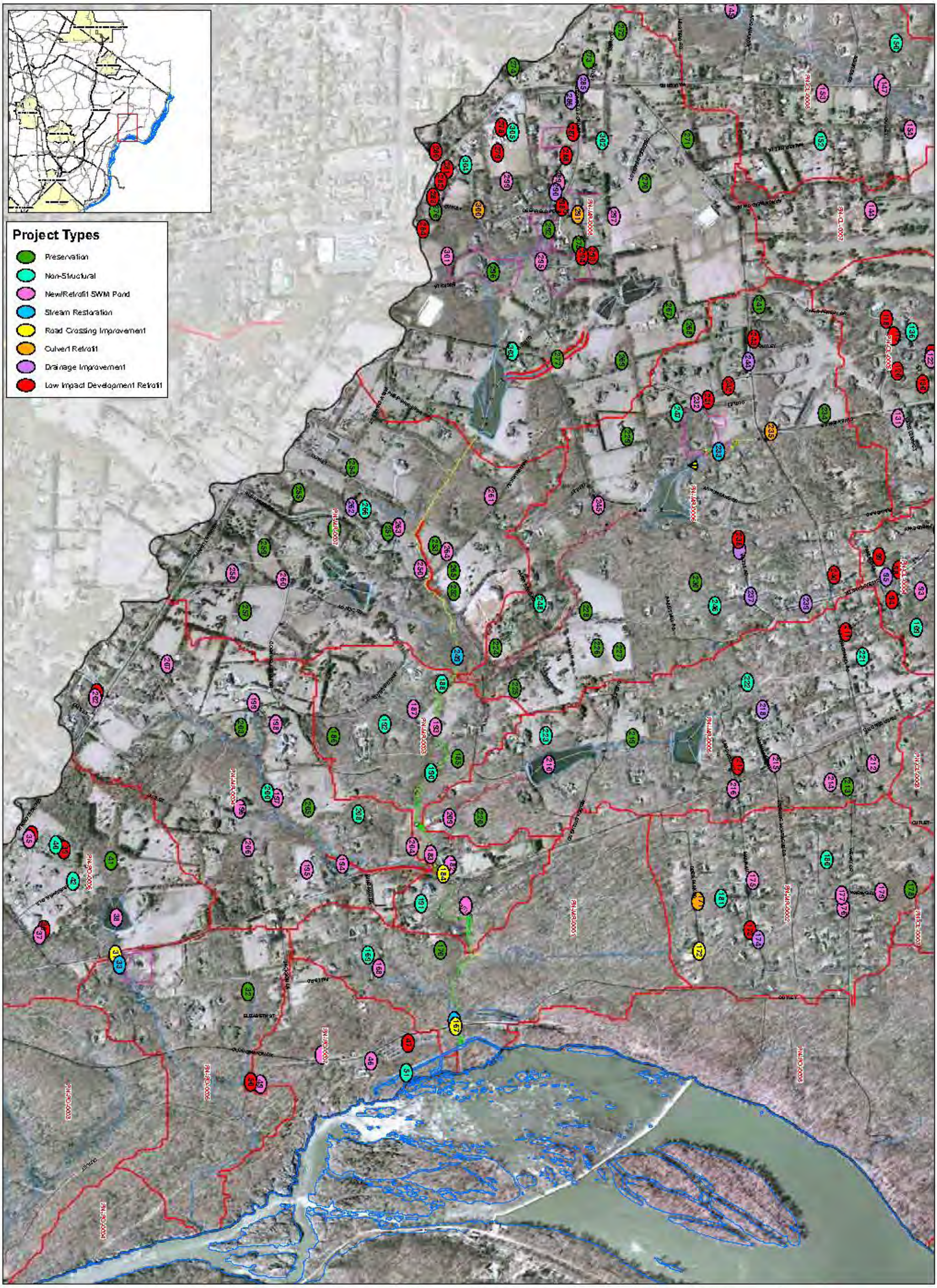
SPA Ditch Impacts
- Minor
- Moderate
- Severe

SPA Utility Impacts
- Minor
- Moderate
- Severe

SPA Habitat
- Good
- Fair
- Poor
- Deficient Buffer

N

0 250 500 1,000 Feet



Candidate Projects for Nichol Run and Pond Branch Watersheds

Map 4 of 4

Candidate Projects
Public Issues/Comments
ProRata Projects Still Needed
Drainage Complaints (Confirmed)
StormNet Drainage Network

SPA Head Cut Impacts: Minor, Moderate, Severe

SPA Erosion Impacts: Minor, Moderate, Severe

SPA Crossing Impacts: Minor, Moderate, Severe

SPA Pipe Impacts: Minor, Moderate, Severe

SPA Obstruction Impacts: Minor, Moderate, Severe

SPA Erosion Impacts: Minor, Moderate, Severe

SPA Ditch Impacts: Minor, Moderate, Severe

SPA Utility Impacts: Minor, Moderate, Severe

SPA Habitat: Good, Fair, Poor, Deficient Buffer

N

0 250 500 1,000 Feet

F. X. Browne, Inc.
Memorandum

To: Fairfax County
From: F. X. Browne, Inc.
Date: April 12, 2010
Revised: December 21, 2010
RE: Tasks 3.3, 3.4 and 3.5 Evaluation and Ranking of Candidate Structural and Non-Structural Projects for Nichol Run and Pond Branch Watersheds

Task 3.3 requires that potential candidate sites be investigated in the field to evaluate the potential scope, feasibility, and benefits of each candidate project. Tasks 3.4 and 3.5 require candidate structural projects be evaluated and ranked following the guidelines described in Section 5.1-E of the WMP Standards version 3.2 and that non-structural candidate projects be evaluated and ranked using best professional judgment based on their overall benefit and feasibility in meeting watershed goals and objectives.

Task 3.3 Investigation of Candidate Projects

Watershed advisory group (WAG) members reviewed proposed candidate projects and discussed overall project selection methods and the location and scope of individual proposed projects at a WAG meeting on June 30th, 2009. Comments from the WAG meeting were summarized and considered during field reconnaissance efforts.

Field visits to candidate sites were conducted for all potential candidate structural projects in the Nichol Run and Pond Branch watersheds from June 29th through July 3rd. A field evaluation form, provided by the County, was completed for each candidate project site. Additional notes were taken on aerial photographs of candidate sites and photos were taken at each site. Data recorded on field forms were digitized into a County-provided database.

Field reconnaissance efforts helped to provide a basis for the initial reduction of candidate projects. Various constraints for new stormwater management facilities identified during field reconnaissance efforts that limited project feasibility included space, slope, utilities, a change in the development status, and existing, mature vegetation; all potential project constraints were recorded on field forms and digitized into the County-provided database. Some proposed projects were deemed low priority due to favorable existing conditions including properly functioning and appropriately sized outlet structures, naturalized basin bottoms and swales, adequate energy dissipation, and a general lack of visible impacts from high velocity and high volume stormwater flows.

Best professional judgment was used to reduce the initial list of candidate structural projects to 70 projects in Nichol Run and Pond Branch watersheds. Factors considered during the initial

feasibility analysis included constraints identified during field reconnaissance, the size and scale of the projects, the location and distribution of projects within a subwatershed, existing stormwater treatment in the subwatershed, project drainage area, and specific WAG member comments. Candidate projects deemed viable were those which had few, if any, site constraints, would provide significant additional stormwater treatment to a subwatershed, and were considered to be of significant size and scope.

Upon completion of the field reconnaissance efforts and initial feasibility analysis, candidate project sites that were deemed viable were digitized into GIS polygon shapefile format (*N_projects.shp; P_projects.shp*).

Project Cost Estimates

Costs were estimated for each project using unit costs provided by the County. The County considers a project to be of considerable size and scope if it is a minimum of $80,000. Smaller projects of similar scope and close proximity were grouped together during the initial reduction of candidate projects under Task 3.3. Individual sub-projects in a suite of grouped subprojects may be estimated to cost less than the County-minimum of $80,000; however, the total project group is greater than the threshold for project qualification.

Task 3.4 Evaluation and Ranking Candidate Structural Projects

Viable structural projects were given a six or seven digit project number according to the following numbering convention: XX9YZZ; where XX is the 2-digit watershed code, Y is the project type code, and ZZ is a 2-digit numbering code starting with 00 at the lowest point in the watershed. An additional seventh letter is used for any project with multiple subprojects.

Project type codes have been defined by the County in order to maintain consistency throughout the watershed management plans. Project type codes used in the Nichol Run and Pond Branch watersheds include:

1 – New Stormwater Ponds and Stormwater Pond Retrofits
2 – Stream Restoration and Streambank Stabilization
3 – Area-wide Drainage Improvements
4 – Road Crossing Improvements and Culvert Retrofits
5 – New Low Impact Development/Best Management Practices and LID/BMP Retrofits
9 – Non-Structural Projects

Viable structural projects were prioritized and ranked according to the guidance set forth in Section 5.1E of the Watershed Management Plan Standards 3.2. Structural projects were scored from 1 to 5 points, with 5 representing the highest priority and 1 representing the lowest priority.

The project scores were based on the following five factors:

1. Effect on Watershed Impact Indicators
2. Effect on Source Indicators
3. Location within Priority Subwatersheds
4. Sequencing
5. Implementability

Evaluation of structural projects based on each of these factors is discussed in further detail below. Prioritization tables for each factor are located in Appendices A, B, C, D, and E.

GIS Processing

Prior to prioritization and ranking outlined in Section 5.1E, a sequence of GIS processing was required in preparation for water quality modeling with STEPL. The projects were divided into five 'runs' for GIS processing and water quality modeling purposes. Each run contained no more than one project per subwatershed; projects with multiple subprojects and regional pond alternative scenarios were processed together in order to model the benefits of the entire group of projects.

Drainage areas to each project with water quality and/or water quantity benefits were delineated in GIS and a revised subarea treatment layer was calculated for each 'run' to show proposed stormwater management for the future with projects modeling scenario. During the GIS processing, output tables were created for each 'run' that contain the land use and soils data for the proposed stormwater management areas for use in water quality and water quantity modeling.

Water Quality Modeling with STEPL

The land use and soils output tables were loaded into the STEPL spreadsheets in order to show the water quality benefits for each proposed candidate project. Previous land use information was cleared from the spreadsheets prior to loading the revised tables in order to ensure an accurate data transfer.

In some cases, the new project drainage areas caused a change in the majority soil type of the subareas within the subwatershed. Because of the changes in majority soil types, the total pollutant loadings before stormwater management facility reductions were applied varied from the future without projects condition to the future with projects condition by as much as 15 percent in either direction. This discrepancy in future pollutant loading resulted in a misrepresentation of the project benefits. In order to minimize the impact from this modeling flaw, the total pollutant loadings without BMP reductions (the total pollutant loading before stormwater management facility reductions were applied) for the future without projects and future with projects were averaged, the future with projects BMP reductions were applied, and an adjusted future with projects pollutant loading was calculated.

Effect on Subwatershed Ranking Indicators

Select subwatershed ranking indicators were evaluated for various candidate project types to facilitate candidate project ranking. Total nitrogen, total phosphorus, and total suspended solids were calculated for the future with projects scenario using STEPL as indicated above. Other indicators could not be calculated for the future with projects condition and were evaluated based on existing condition and/or future without projects condition.

Generally, each indicator without future with projects data was evaluated in two ways. First, the existing and/or future without projects subwatershed ranking data was reviewed to establish the overall need and potential benefit for a project in that particular subwatershed. A project was assumed to have a greater potential benefit if it was located in a subwatershed that was in poor condition compared to a subwatershed that was in better condition Also, if the subwatershed

shows a worsening condition from the existing subwatershed ranking scenario to the future without project subwatershed ranking scenario, the subwatershed is in greater need of a proposed project. The second way each project was evaluated was based on the likely impact of the project on each subwatershed ranking indicator using our best professional judgment. This was dependent on the scale of the project and specific project details.

Project scores for each indicator were within a range from one to five, with five being the most beneficial and one providing the least benefit. Each project started with a score of 3 and was adjusted up or down based on the existing and future without projects subwatershed ranking data and our best professional judgment as indicated above and depicted on Tables 1, 2, and 3.

Table 1 Project Scoring Methodology – Indicators with Existing Condition Only (1)

Project Score Adjustment	**Subwatershed Ranking (SW) Indicators:** Benthic Communities, Fish Communities, Aquatic Habitat, Channel Morphology, RPA Riparian Habitat, Headwater Riparian Habitat, Wetland Habitat
Start with "3", then add or subtract:	
+1	Existing SW Ranking Score 2 or 4
0	Existing SW Ranking Score 6
-1	Existing SW Ranking Score 8 or 10
+1	Great Benefit
0	Some Potential Benefit
-1	Minimal/No Benefit

Table 2 Project Scoring Methodology – Indicators with Existing Condition Only (2)

Project Score Adjustment	**Subwatershed Ranking (SW) Indicators:** Instream Sediment, Channelized/Piped Streams, Stormwater Outfalls, Streambank Buffer Deficiency
Start with "3", then add or subtract:	
+1	Existing SW Ranking Score 2.5
0	Existing SW Ranking Score 5
-1	Existing SW Ranking Score 7.5
-2	Existing SW Ranking Score 10
+1	Great Benefit
0	Some Potential Benefit
-1	Minimal/No Benefit

Table 3 Project Scoring Methodology – Indicators with Future w/out Projects Data

Project Score Adjustment	**Subwatershed Ranking (SW) Indicators:** Hydrology, Number of Road Hazards, Magnitude of Road Hazards, Residential and Non-Residential Building Hazards, Total Impervious Area, Directly Connected Impervious Area
Start with "3", then add or subtract:	
+1	Worsening Condition from Existing to Future without Projects Scenario
+1	Future without Projects SW Ranking Score 2.5
0	Future without Projects SW Ranking Score 5
-1	Future without Projects SW Ranking Score 7.5
-2	Future without Projects SW Ranking Score 10
+1	Great Benefit
0	Some Potential Benefit
-1	Minimal/No Benefit

For the indicators with future without projects data, listed in Table 3, consideration of the expected change from existing condition to future without projects condition was included in the project score determination. Projects in subwatersheds that anticipate a worsening condition due to anticipated development were given an additional point to reflect the greater need of projects in the subwatershed. The hydrology indicator for a subwatershed was considered to have a worsening condition if the modeled flow per acre increased by six percent or greater. No changes were noted in the residential or non-residential building hazards indicators. The number and magnitude of road hazards was considered to have a worsening condition if the modeled flood scenarios indicated any change in the number or magnitude of road hazards. The total impervious area and directly connected impervious area indicators for a subwatershed were considered to have a worsening condition if the anticipated percentage of impervious area increased by one percent.

The best professional judgment factor was applied according to Tables 1, 2, and 3 on a project by project basis depending on the anticipated benefit of the project. Some generalizations could be made based on the project type and specific project features. For the Instream Sediment indicator, a streambank stabilization project is anticipated to have a greater benefit than a stormwater pond retrofit so the streambank stabilization projects generally receive a +1 BPJ score, while a stormwater pond retrofit may receive a 0 or -1. The stormwater pond retrofit BPJ score is based on project specific factors such incorporation of outfall improvements or energy dissipation which will likely provide a greater benefit in terms of instream sediment than pond retrofits without these features.

For the indicators listed in Tables 2 and 3 above, it is possible to arrive at a project score of 0 or 6, which are outside of the required 1-5 range. These occurrences were very infrequent, but when encountered the project scores were capped at 1 and 5.

The hydrology indicator was first calculated using the same method as other indicators with only existing condition and future condition without projects data. Starting with a base score of 3, values were added or subtracted based on the future without projects score as shown in Table 3 above. Best professional judgment was then applied on a project by project basis depending on the anticipated benefit of the project. An additional factor was also applied to the hydrology

indicator for those subwatersheds that exhibited worsening conditions. Subwatersheds were considered to have a worsening condition if the modeled flow per acre increased by six percent or greater.

Initial hydrology indicator values were incorporated with the other indicators to generate a preliminary prioritization ranking of proposed projects. The list of projects generated from the preliminary prioritization was used to determine which projects would be modeled in SWMM and HEC-RAS as discussed in Technical Memo 3.6. SWMM models of proposed projects allowed for the hydrology indicator to be scored based on the project's impact on the future with projects scenario for those projects which were modeled in SWMM. Quartiles were calculated based on the range of percent change in the Nichol Run and Pond Branch values from the future without projects scenario to the future with projects scenario. Table 4 below depicts the quartiles used for the projects where the hydrology indicator was updated. Tertiles were used in lieu of the recommended quintiles in order to allow an additional point of adjustment based on best professional judgment without exceeding the maximum five point score. Projects not modeled in SWMM maintain their initial hydrology indicator scores, as described above.

Table 4 Hydrology Indicator Quartiles

Percentile	% Change: Future w/out Project to Future with Project	Project Score
0%	-88.7% to -37.8%	4
50%	-37.8% to -10.5%	3
100%	-10.5% or greater	2

Several other indicators for which the future with projects scenario could be calculated were scored based on the project's impact on the future with projects scenario. These indicators include Total Nitrogen, Total Phosphorus, and Total Suspended Solids. Preliminary quartiles were calculated based on the range of percent change in the Sugarland Run values from the future without projects scenario to the future with projects scenario. Final quartiles (or quintiles) will be calculated by the County based on the range of percent change in all of the county watersheds and revised scores may be applied.

Indicators for which the future with projects scenario could be calculated were scored based on the project's impact on the future with projects scenario. These indicators include Total Nitrogen, Total Phosphorus, and Total Suspended Solids. Preliminary quartiles were calculated based on the range of percent change in the Nichol Run and Pond Branch values from the future without projects scenario to the future with projects scenario. Final quartiles (or quintiles) may be calculated by the County based on the range of percent change in all of the county watersheds and revised scores may be applied. Tables 5, 6, and 7, depict the preliminary quartiles used for each of the referenced indicators. Quartiles were used in lieu of the recommended quintiles in order to allow an additional point of adjustment based on best professional judgment without exceeding the maximum five point score.

Table 5 Total Nitrogen (TN) Quartiles

Percentile	% Change: Future w/out Project to Future with Project	Preliminary Project Score
0%	-26% to -4.1%	4
33%	-4% to -2.1%	3
67%	-2% to -0.1%	2
100%	0% or greater	1

Table 6 Total Phosphorus (TP) Quartiles

Percentile	% Change: Future w/out Project to Future with Project	Preliminary Project Score
0%	-41% to -5.1%	4
33%	-5% to -2.1%	3
67%	-2% to -0.1%	2
100%	0% or greater	1

Table 7 Total Suspended Solids (TSS) Quartiles

Percentile	% Change: Future w/out Project to Future with Project	Preliminary Project Score
0%	-64% to -10.1%	4
33%	-10% to -4.1%	3
67%	-4% to -0.1%	2
100%	0% or greater	1

In some cases, the existing and future condition without projects water quality scores (STEPL model) were modeled inaccurately. The treatment by some ponds was not included in the model because the pond was either not included in the County's stormwater network and not identified until candidate project field reconnaissance, or the drainage area to the pond did not contain any parcels included in the County's controlled parcels GIS layer. The treatment of some other areas was overestimated in the model either because the parcels were included in the County's controlled parcels GIS layer, but not located within the drainage area of an existing stormwater management facility, or because candidate project field reconnaissance indicated that an existing pond provided less treatment than was originally modeled. Best professional judgment was used to adjust the project scores for total nitrogen, total phosphorus, and total suspended solids based on whether the project benefit was accurately modeled or if the project benefits were over or under estimated due to inaccuracies in the future without projects condition STEPL model. Appendix F includes the STEPL output tables including pollutant loading for future without projects condition and future with projects condition, the percent reduction of pollutant loading, preliminary project score and best professional judgment score adjustment.

Projects which were not modeled in STEPL such as stream restoration projects and road crossing improvements were given a project score for total nitrogen, total phosphorus, and total suspended solids using best professional judgment based on the project's likely ability to affect each indicator.

Since every indicator is not likely to be impacted by some project types, a matrix was developed to show which project types are likely to affect which subwatershed ranking indicators. This

way, the indicators evaluated for each project were targeted to those which the project was most likely to affect. This matrix is depicted in Tables 8 and 9, below.

While most projects conform to the matrix depicted in Tables 8 and 9, some projects consist of multi-faceted components that consist of a variety of project types, such as a stormwater pond retrofit that includes improvements to the pond's outfall and repairing streambank erosion below the outfall. For these situations, additional indicators may have been evaluated in order to more accurately represent the scale and variety of project benefits.

Table 8 Impact Indicator Scores Evaluated by Project Type

Individual Impact Indicator Scores	**Stream Restoration** (Type Code 2)	**Outfall Improvement** (Type Code 7)	**Culvert Retrofit** (Type Code 4)	**Flood Protection/ Mitigation** (Type 6)	**New/Retrofit BMP/LID** (Type Code 5)	**New Stormwater Pond** (Type Code 1)	**Stormwater Pond Retrofit** (Type Code 1)	**Area-wide Drainage Improvement** (Type 3)
Benthic Communities	X	X						X
Fish Communities	X	X						X
Aquatic Habitat	X	X	X					X
Channel Morphology (CEM)	X			X				X
Instream Sediment	X	X				X	X	X
Hydrology	X	X	X	X	X	X	X	X
Number of Road Hazards			X	X				
Magnitude of Road Hazards			X	X				
Residential Building Hazards			X	X				
Non-Residential Building Hazards			X	X				
Flood Complaints								
RPA Riparian Habitat	X							X
Headwater Riparian Habitat	X							X
Wetland Habitat	X				X	X	X	X
Terrestrial Forested Habitat								
E. coli								
TSS Concentration (STEPL)	X	X	X		X	X	X	X
TN Concentration (STEPL)		X	X		X	X	X	X
TP Concentration (STEPL)	X	X	X		X	X	X	X
X – Effects on these indicators were scored and evaluated								

Table 9 Source Indicator Scores Evaluated by Project Type

Individual Impact Indicator Scores	**Stream Restoration** (Type Code 2)	**Outfall Improvement** (Type Code 7)	**Culvert Retrofit** (Type Code 4)	**Flood Protection/ Mitigation** (Type 6)	**New/Retrofit BMP/LID** (Type Code 5)	**New Stormwater Pond** (Type Code 1)	**Stormwater Pond Retrofit** (Type Code 1)	**Area-wide Drainage Improvement** (Type 3)
Channelized/Piped Streams	X	X	X	X		X		X
Directly Connected Impervious Area (DCIA)				X	X	X	X	X
Total Impervious Area				X	X			X
Stormwater Outfalls	X	X		X	X	X	X	X
Sanitary Sewer Crossings								
Streambank Buffer Deficiency	X							X
TSS Concentration (STEPL)	X	X	X		X	X	X	X
TN Concentration (STEPL)	X	X	X		X	X	X	X
TP Concentration (STEPL)	X	X	X		X	X	X	X
X – Effects on these indicators were scored and evaluated								

The RPA Riparian Habitat and Headwater Riparian Habitat indicators will only be impacted by a project if the project is located within the RPA area or headwater area, respectively. Therefore, a project was only evaluated for whichever riparian area it was located within, but not for both headwater and RPA riparian habitat indicators.

Flood complaints were not considered for any project type due to the inconsistency of this data. Terrestrial forested habitat and sanitary sewer crossings are unlikely to be significantly affected by any of the structural projects; therefore, these indicators were not considered in project ranking. The scarcity of E. coli data and the difficulty in determining likely project benefits eliminated this indicator from consideration in project ranking.

Preliminary project scores based on subwatershed ranking indicator scores were calculating by taking an average of all of the individual indicator scores which were evaluated for each project. Appendix A contains a summary of the preliminary project scores based on subwatershed ranking impact indicator scores. A summary of preliminary project scores based on subwatershed ranking source indicator scores are located in Appendix B.

Location within Priority Subwatersheds

Results of the existing condition SW Ranking, updated in August 2009 (directory: Task2deliverables_Nichol-Pond/SW Ranking/Existing_080709/) were used to evaluate the "location within priority subwatersheds" project prioritization factor. Generally, candidate projects located within poor quality subwatersheds have the potential to provide a greater overall impact than a project located within a high quality subwatershed. In order to quantify this difference, preliminary quintiles were calculated based on existing condition watershed impact composite score for Nichol Run and Pond Branch subwatersheds. Final quintiles may be calculated by the County based on the range of existing condition watershed impact composite scores in all of the county watersheds and revised scores may be applied. Table 10 depicts the preliminary quintiles used for Nichol Run and Pond Branch watershed. A complete list of project scores based on these priority subwatershed scores is located in Appendix C.

Table 10 Watershed Impact Composite Score Quintiles

Percentile	Watershed Impact Composite Scores	Preliminary Project Score
80%	6.59 to 10	1
60%	6.51 to 6.58	2
40%	6.40 to 6.50	3
20%	6.17 to 6.39	4
0%	5.90 to 6.16	5

Figures 1 and 2 overlay the 0-25 year proposed candidate projects on the existing condition SW Ranking results.

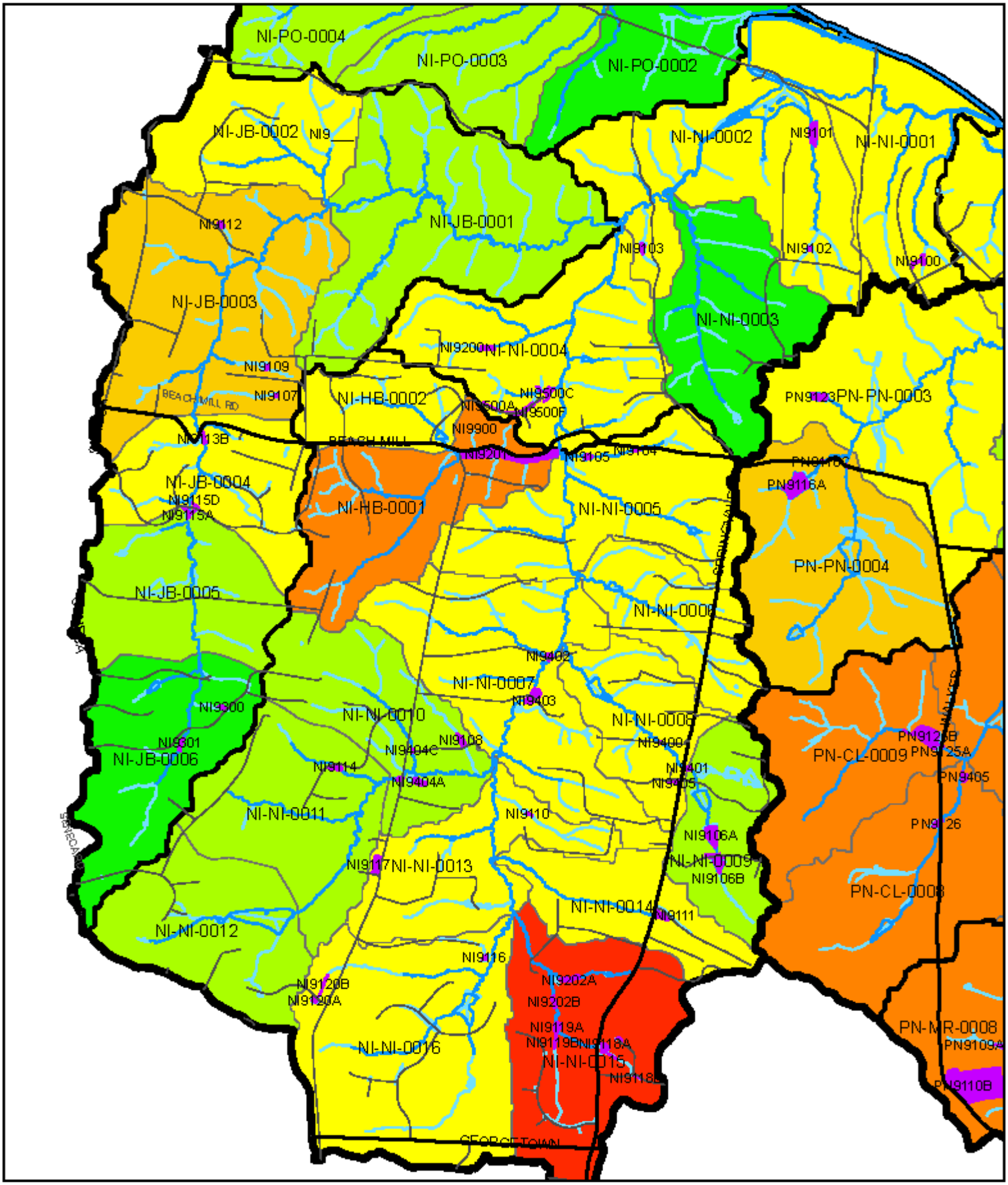


FIGURE 1

Nichol Run
0-25 Year Projects

This page intentionally left blank.

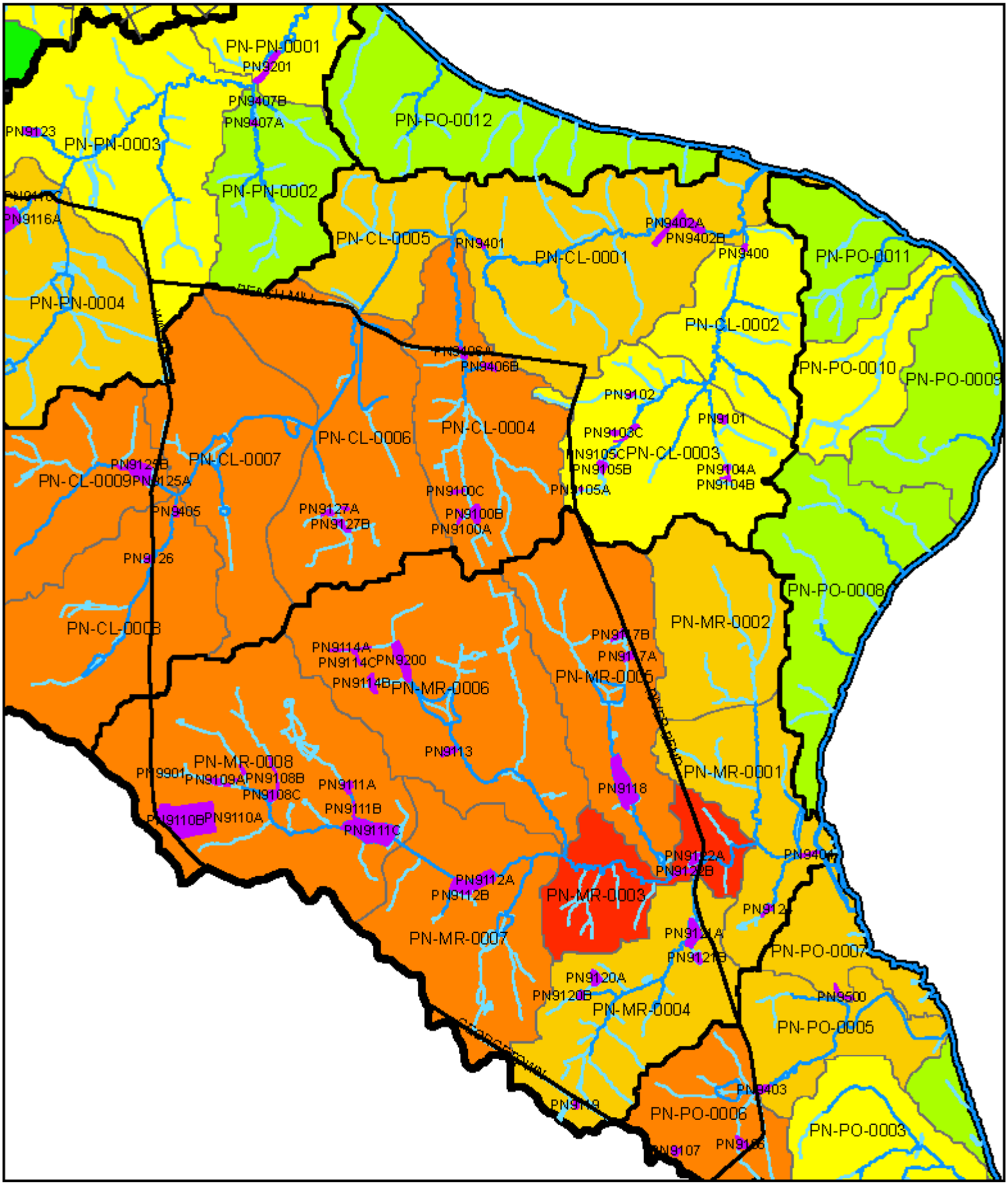


FIGURE 2

Pond Branch
0-25 Year Projects

This page intentionally left blank.

Sequencing

Projects upstream relative to other projects should be completed prior to projects located downstream because upstream projects will provide protection for future downstream projects and also mitigate sources and stressors that cause cumulative impacts downstream. Therefore, projects in headwater areas should be considered the highest priority and receive a higher project score.

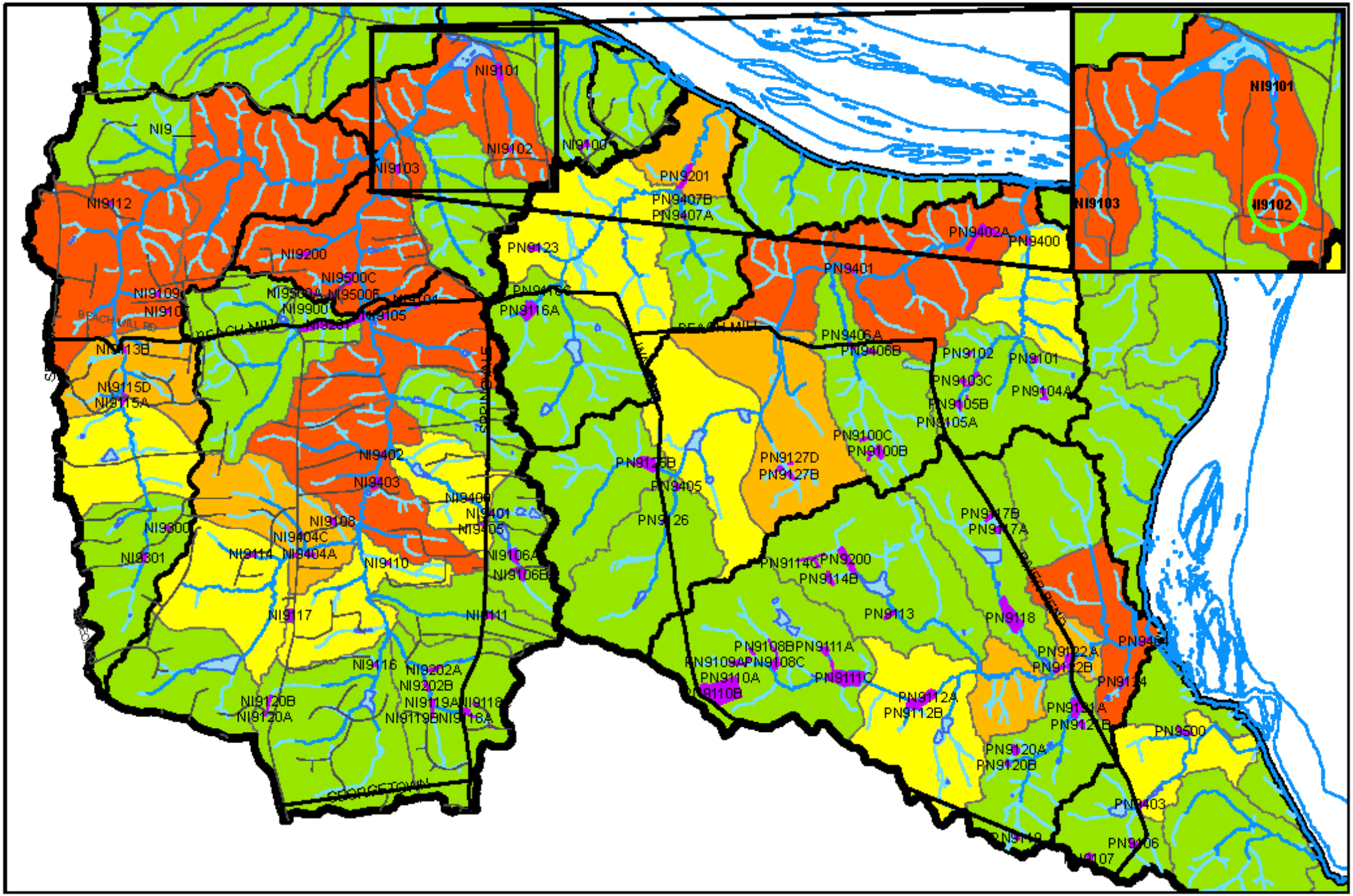
Subwatersheds were numbered according to relative stream order, see Figure 3. Headwater subwatersheds were given an order of one with higher numbered subwatersheds downstream. Once the subwatersheds were ordered, quintiles were calculated to determine project scores for each subwatershed. The subwatershed sequencing quintiles are depicted in Table 11, below.

Table 11 Subwatershed Sequencing Tertiles

Percentile	Subwatershed Order	Preliminary Project Score
80%	4 to 7	1
60%	2 to 3	3
0% - 40%	1	5

A subwatershed may have headwater streams even if it receives flow from an upstream subwatershed. Candidate project NI9102 in Figure 3 Inset is an example of this; the project is located in NI-NI-0002 which was given a sequencing order of 7, however, NI9102 is located in a headwaters area so it should be scored accordingly. Project scores for projects located in these headwater areas, such as candidate project NI9102, were adjusted manually on a case by case basis. A complete listing of subwatershed order and project scores is provided in Appendix D.

This page intentionally left blank.



N

Perennial Streams
Intermittent Streams
Major Roads
0-25 Year Projects
Watersheds

Sequence Order
1
2
3
4 - 7

0 0.25 Miles

FIGURE 3

Sequencing Order 0-25 Year Projects

This page intentionally left blank.

Implementability

Less complex projects and projects without land acquisition requirements will be easier to implement and are given higher scores accordingly. Those projects which are located on County property or retrofits of County-maintained stormwater facilities were scored higher than projects on private parcels and those with multiple landowners. Implementability was determined in three steps:

1) Analysis of property owner – projects were assigned points based on property ownership. County-owned parcels were assigned a point value of 1; Homeowners Associations, 2; Churches and Commercial parcels, 3; and private parcels, 4. The total point value for each project area was summed so that a greater number of owners resulted in a greater point value and indicated a greater difficulty of implementation. This point value was divided by 2 if the project involved an existing County-maintained facility regardless of land owner, since existing County-maintained facilities have existing maintenance agreements in place. Table 12 shows some examples of this step in the Implementability analysis.

Table 12 Analysis of Property Ownership for Implementability

Property Owner(s)	Point Value	Existing County Facility?	Adjusted Point Value
1 County Parcel	1	Yes	0.5
1 County Parcel	1	No	1
1 HOA Parcel	2	Yes	1
1 Commercial or Church Parcel	3	Yes	1.5
1 HOA Parcel	2	No	2
1 Private Parcel	4	Yes	2
1 Commercial or Church Parcel	3	No	3
1 Commercial or Church Parcel	6	Yes	3
1 Private Parcel	4	No	4
3 Private Parcels	12	Yes	6
3 Private Parcels	12	No	12

2) Quintiles were established to produce a score based on parcel ownership. Quintiles for Implementability are depicted in Table 13. The quintiles were established so that County-maintained facilities on County-owned land were scored highest with the greatest ease of implementability, and private parcels without County-maintained facilities were scored lowest.

Table 13 Implementability Score Quintiles

Percentile	Adjusted Point Values Based on Ownership	Preliminary Project Score
0%	1-3	5
20%	4-6	4
40%	7	3
60%	8-15	2
80%	16 or greater	1

3) Final adjustments were made using best professional judgment based on the overall complexity and implementability of the project. In some cases, County-maintained facilities are located on parcels with multiple owner records in the ownership database provided by the County, this resulted in inflated initial point values that were not adequately reduced by the County-maintained facility division factor. Several BPJ adjustments were made to adjust this anomaly.

Implementability scores for each project are located in Appendix E.

Initial Ranking Composite Score
An initial ranking composite score was calculated for each project based on the weighted average of the five project scores described above.

1) Effect on Subwatershed Ranking Watershed Impact Indicators (30%)
2) Effect on Subwatershed Ranking Watershed Source Indicators (30%)
3) Location within Priority Subwatersheds (10%)
4) Sequencing (20%)
5) Implementability (10%)

The initial ranking composite score, or prioritization score is used to determine the overall rank of each project. Projects are ranked from one to 70 for Nichol Run and Pond Branch according to the prioritization score. The least beneficial projects may drop from the 0-25 year implementation plan and the top 35 projects will be promoted to the 10-year implementation plan.

A summary of the five project scores and the initial ranking composite score for each candidate project is provided in Table 14.

Following the fourth and fifth Watershed Advisory Group (WAG) meetings, comments from WAG members weree compiled and the initial ranking composite scores were adjusted based on the comments received. Project ranks were updated based on the revised composite scores and initial 10-year and 25-year implementation plans were organized using the revised project ranks.

Details for each project in the 10-year implementation plan were compiled onto a project fact sheet. The project fact sheets contain geographical information, a description of the project, potential benefits, project design considerations, a map of the project area and an estimated project cost.

Table 14 Summary of Individual Project Scores and Initial Ranking Composite Score

Subwatershed	Project No.	Watershed Impact Indicators	Watershed Source Indicators	Location within Priority Subwatersheds	Sequencing	Implementability	Ranking Composite Score	Project Rank
NI-NI-0001	NI9100	2.83	2.00	1.00	5.00	2.00	2.75	60
NI-NI-0002	NI9101	3.83	2.83	2.00	3.00	5.00	3.30	35
NI-NI-0002	NI9102	3.17	2.33	2.00	5.00	4.00	3.25	39
NI-NI-0002	NI9103	2.67	1.83	2.00	5.00	5.00	3.05	49
NI-NI-0005	NI9104	3.50	2.33	5.00	1.00	4.00	2.85	56
NI-NI-0005	NI9105	3.50	2.33	5.00	1.00	4.00	2.85	56
NI-NI-0009	NI9106	3.67	3.50	1.00	5.00	1.00	3.35	34
NI-JB-0003	NI9107	2.33	1.67	4.00	5.00	4.00	3.00	51

Subwatershed	Project No.	Watershed Impact Indicators	Watershed Source Indicators	Location within Priority Subwatersheds	Sequencing	Implementability	Ranking Composite Score	Project Rank
NI-NI-0010	NI9108	4.00	3.00	1.00	3.00	4.00	3.20	40
NI-JB-0003	NI9109	2.67	1.67	4.00	5.00	3.00	3.00	51
NI-NI-0013	NI9110	3.50	2.50	1.00	4.00	4.00	3.10	46
NI-NI-0014	NI9111	3.50	2.83	2.00	5.00	4.00	3.50	22
NI-JB-0003	NI9112	3.00	1.67	4.00	5.00	4.00	3.20	40
NI-JB-0004	NI9113	4.00	4.00	5.00	3.00	2.00	3.70	14
NI-JB-0005	NI9115	3.17	2.67	1.00	3.00	2.00	2.65	61
NI-NI-0016	NI9116	2.33	2.50	2.00	5.00	4.00	3.05	48
NI-NI-0013	NI9117	2.83	2.17	1.00	5.00	3.00	2.90	54
NI-NI-0015	NI9118	3.17	3.17	5.00	5.00	1.00	3.60	17
NI-NI-0015	NI9119	4.00	3.50	5.00	5.00	4.00	4.25	1
NI-NI-0016	NI9120	2.67	2.83	2.00	5.00	3.00	3.15	45
NI-NI-0004	NI9200	3.25	2.33	4.00	3.00	3.00	2.98	53
NI-HB-0001	NI9201	3.42	3.17	5.00	4.00	1.00	3.38	31
NI-NI-0015	NI9202	3.83	3.83	5.00	5.00	3.00	4.20	3
NI-JB-0006	NI9300	2.58	2.50	1.00	5.00	2.00	2.83	58
NI-JB-0006	NI9301	2.58	2.13	1.00	5.00	3.00	2.81	59
NI-NI-0008	NI9400	2.11	1.25	5.00	3.00	3.00	2.41	67
NI-NI-0009	NI9401	3.11	3.50	1.00	5.00	4.00	3.48	25
NI-NI-0007	NI9402	3.22	3.25	2.00	1.00	3.00	2.64	62
NI-NI-0007	NI9403	2.44	2.25	2.00	1.00	5.00	2.31	68
NI-NI-0010	NI9404	2.67	2.00	1.00	3.00	2.00	2.30	69
NI-NI-0008	NI9405	2.11	1.50	5.00	3.00	4.00	2.58	63
NI-NI-0004	NI9500	3.17	2.86	4.00	1.00	1.00	2.51	65
PN-CL-0004	PN9100	3.67	3.33	3.00	5.00	1.00	3.50	24
PN-CL-0003	PN9101	3.83	3.33	3.00	5.00	3.00	3.75	11
PN-CL-0003	PN9102	3.17	2.50	3.00	5.00	3.00	3.30	37
PN-CL-0003	PN9103	3.67	3.17	3.00	5.00	2.00	3.55	18
PN-CL-0003	PN9104	3.50	3.33	3.00	5.00	4.00	3.75	12
PN-CL-0003	PN9105	3.33	3.33	3.00	5.00	2.00	3.50	22
PN-PO-0006	PN9106	3.17	2.00	1.00	5.00	5.00	3.15	43
PN-PO-0006	PN9107	3.00	2.17	1.00	5.00	5.00	3.15	43
PN-MR-0008	PN9108	4.00	4.00	3.00	5.00	3.00	4.00	5
PN-MR-0008	PN9109	4.17	4.00	3.00	5.00	1.00	3.85	9
PN-MR-0008	PN9110	3.17	3.00	3.00	5.00	5.00	3.65	16

Subwatershed	Project No.	Watershed Impact Indicators	Watershed Source Indicators	Location within Priority Subwatersheds	Sequencing	Implementability	Ranking Composite Score	Project Rank
PN-MR-0008	PN9111	4.33	3.83	3.00	5.00	1.00	3.90	7
PN-MR-0007	PN9112	4.50	3.17	4.00	3.00	4.00	3.70	15
PN-MR-0006	PN9113	4.17	3.83	1.00	5.00	4.00	3.90	7
PN-MR-0006	PN9114	3.33	3.00	1.00	5.00	4.00	3.40	28
PN-PN-0004	PN9116	4.00	3.33	2.00	5.00	4.00	3.80	10
PN-MR-0005	PN9117	4.00	4.00	3.00	5.00	2.00	3.90	6
PN-MR-0005	PN9118	4.00	3.83	3.00	5.00	1.00	3.75	12
PN-MR-0004	PN9119	3.50	2.17	2.00	5.00	5.00	3.40	28
PN-MR-0004	PN9120	3.83	2.33	2.00	5.00	3.00	3.35	32
PN-MR-0004	PN9121	4.33	2.67	2.00	4.00	1.00	3.20	40
PN-MR-0003	PN9122	4.50	3.33	5.00	5.00	4.00	4.25	1
PN-PN-0003	PN9123	3.17	3.00	3.00	5.00	4.00	3.55	18
PN-MR-0001	PN9124	3.83	2.33	3.00	5.00	2.00	3.35	32
PN-CL-0009	PN9125	4.33	3.00	1.00	4.00	2.00	3.30	37
PN-CL-0008	PN9126	4.33	3.33	1.00	4.00	2.00	3.40	27
PN-CL-0006	PN9127	4.00	3.50	5.00	5.00	4.00	4.15	4
PN-MR-0006	PN9200	3.83	3.33	1.00	5.00	2.00	3.45	26
PN-PN-0001	PN9201	3.33	2.83	5.00	3.00	1.00	3.30	35
PN-CL-0002	PN9400	3.11	3.50	4.00	3.00	3.00	3.53	21
PN-CL-0001	PN9401	3.11	2.75	5.00	1.00	4.00	2.86	55
PN-CL-0001	PN9402	3.56	3.50	5.00	1.00	2.00	3.02	50
PN-PO-0005	PN9403	2.44	3.00	1.00	3.00	2.00	2.53	64
PN-MR-0001	PN9404	2.33	1.50	3.00	1.00	5.00	2.15	70
PN-CL-0008	PN9405	3.11	3.50	1.00	4.00	2.00	3.08	47
PN-CL-0004	PN9406	3.00	4.00	3.00	4.00	2.00	3.40	30
PN-PN-0002	PN9407	2.00	1.50	3.00	4.00	3.00	2.45	66
PN-CL-0004	PN9408	3.00	4.00	3.00	4.00	1.00	3.55	20
NI-NI-0001	NI9100	2.83	2.00	1.00	5.00	2.00	2.75	60

Task 3.5 Evaluation and Ranking Candidate Non-Structural Projects

Viable non-structural projects were given a six or seven digit project number according to the following numbering convention: XX9YZZ; where XX is the 2-digit watershed code, Y is the project type code, and ZZ is a 2-digit numbering code starting with 00 at the lowest point in the watershed. The project type code was not defined for non-structural projects; therefore, a code of '9' was used for non-structural projects. An additional seventh letter is used for any project with multiple subprojects, such as buffer restoration in several disconnected locations.

Non-structural projects are likely to be implemented through existing Fairfax County program, such as the buffer program and policy/outreach mandates. Table 15 contains a description of each of the viable non-structural projects for Nichol Run and Pond Branch watersheds.

Table 15 Non-Structural Projects

Subwatershed	Project No.	Project Description
NI-JB-0002	NI9900	Riparian buffer restoration
NI-NI-0002	NI9901	Preserve OS and riparian buffers with conservation easement
NI-HB-0001	NI9902A	Stop mowing gas easement, plant wildflower meadow since location is highly visible
NI-NI-0015	NI9902B	Preserve open space and riparian buffer with conservation easements
NI-NI-0016	NI9902C	Preserve open space and riparian buffer with conservation easements
PN-PN-0004	PN9900	Preserve open space area w/ conservation easement and restore riparian buffer where needed
PN-PN-0001	PN9901A	Targeted Rain Barrel Program @ Deepwoods Hollow Subdivision
PN-PN-0002	PN9901B	Targeted Rain Barrel Program @ Riverbend Knolls & Riverbend Farms Subdivisions
PN-PN-0003	PN9901C	Targeted Rain Barrel Program @ Merryelle Acres Subdivision and along Beach Mill Road
PN-PN-0003	PN9901D	Targeted Rain Barrel Program @ Falcon Ridge Subdivision
PN-CL-0005	PN9902A	Preserve open space area w/ conservation easement and restore riparian buffer where needed
PN-CL-0001	PN9902B	Preserve forested OS in riparian buffer through conservation easement
PN-CL-0002	PN9902C	Preserve forested OS in riparian buffer through conservation easement
PN-CL-0009	PN9902D	Preserve open space area w/ conservation easement
PN-CL-0005	PN9903A	Targeted Rain Barrel Program @ Beach Mill Farms & Club View Ridge Subdivision
PN-CL-0006	PN9903B	Targeted Rain Barrel Program @ Eagon Hills Subdivision, Dogwood Hills & Riverbend Estates and along Club View Drive
PN-CL-0008	PN9903C	Targeted Rain Barrel Program @ Walker Hill Estates, & Arnon Meadow Subdivision
PN-MR-0006	PN9904A	Preserve open space area w/ conservation easement and restore riparian buffer

Subwatershed	Project No.	Project Description
PN-MR-0007	PN9904B	Preserve and restore forested OS in riparian buffer (RPA) through conservation easement
PN-MR-0004	PN9904C	Preserve open space area w/ conservation easement and restore riparian buffer within riparian buffer
PN-MR-0008	PN9904D	Riparian Buffer Restoration
PN-MR-0005	PN9904E	Riparian Buffer Restoration
PN-MR-0008	PN9904F	Restore riparian buffer along stream banks on property
PN-MR-0006	PN9904G	Preserve forested OS in riparian buffer through conservation easement
PN-MR-0003	PN9904H	Riparian Buffer restoration
PN-MR-0008	PN9904I	vegetate banks & stabilize erosion, disconnect roof leaders
PN-MR-0001/3/4	PN9905A	Targeted Rain Barrel Program @ Jackson Hills Development & Cornwell Farm Development
PN-MR-0002	PN9905B	Targeted Rain Barrel Program @ Weant Subdivision, Washington Great Falls Survey, Great Falls Estates Sec. 2, Maria Avenue & Deer Park Subdivisions
PN-MR-0005	PN9905C	Targeted Rain Barrel Program @ Riverside Meadows
PN-MR-0006	PN9905D	Targeted Rain Barrel Program @ Laylin Family Trust, Arnon Ridge
PN-MR-0007	PN9905E	Targeted Rain Barrel Program @ Cornwell Farm & Chamborley Developments
PN-MR-0008	PN9905F	Targeted Rain Barrel Program and Homeowner's education (Re: landscaping/headwater riparian buffers) @ John W. Hanes Jr. Gunnell Run Farm, Deerfield Pond, & Deerfield Farm Subdivisions
PN-MR-0003	PN9906A	Remove obstructions @ SPA points PNMR5-2-O8 to O10
PN-MR-0003	PN9906B	Remove obstructions @ SPA points PNMR5-2-O5
PN-MR-0004	PN9906C	Remove obstructions @ SPA points PNMR004-T002

This page intentionally left blank.

Appendix A

Project Scores
Based on Subwatershed Ranking
Impact Indicator Scores

This page intentionally left blank.

IMPACT INDICATOR SCORES

Project Number	Project Type	Sub-watershed	Benthic	Fish Comm	Aquatic Habitat	Channel Morph	Instream Sediment	Hydrology	No Road Hazard	Magnitude Rd Hazard	Res. Bldg Haz	Non-Res Bldg Haz	Flood Complaints	Prot. RPA Riparian	Prot. Headwater Riparian	Prot. Wetl.	Prot. Nat Habitat	TSS	TN	TP	Ecoli	Sum	Score
NI9100	1	NI-NI-0001	-	-	-	-	3	2	-	-	-	-	-	-	-	4	-	2	3	3	-	17	2.83
NI9101	1	NI-NI-0002	-	-	-	-	3	3	-	-	-	-	-	-	-	5	-	4	4	4	-	23	3.83
NI9102	1	NI-NI-0002	-	-	-	-	2	3	-	-	-	-	-	-	-	5	-	3	3	3	-	19	3.17
NI9103	1	NI-NI-0002	-	-	-	-	2	3	-	-	-	-	-	-	-	4	-	2	2	3	-	16	2.67
NI9104	1	NI-NI-0005	-	-	-	-	4	3	-	-	-	-	-	-	-	5	-	3	3	3	-	21	3.50
NI9105	1	NI-NI-0005	-	-	-	-	4	3	-	-	-	-	-	-	-	5	-	3	3	3	-	21	3.50
NI9106	1	NI-NI-0009	-	-	-	-	1	4	-	-	-	-	-	-	-	5	-	4	4	4	-	22	3.67
NI9107	1	NI-JB-0003	-	-	-	-	1	3	-	-	-	-	-	-	-	4	-	2	2	2	-	14	2.33
NI9108	1	NI-NI-0010	-	-	-	-	4	5	-	-	-	-	-	-	-	5	-	3	3	4	-	24	4.00
NI9109	1	NI-JB-0003	-	-	-	-	2	4	-	-	-	-	-	-	-	4	-	2	2	2	-	16	2.67
NI9110	1	NI-NI-0013	-	-	-	-	3	4	-	-	-	-	-	-	-	5	-	3	3	3	-	21	3.50
NI9111	1	NI-NI-0014	-	-	-	-	1	5	-	-	-	-	-	-	-	5	-	4	3	3	-	21	3.50
NI9112	1	NI-JB-0003	-	-	-	-	3	5	-	-	-	-	-	-	-	4	-	2	2	2	-	18	3.00
NI9113	1	NI-JB-0004	-	-	-	-	3	5	-	-	-	-	-	-	-	5	-	4	4	3	-	24	4.00
NI9115	1	NI-JB-0005	-	-	-	-	2	3	-	-	-	-	-	-	-	5	-	3	3	3	-	19	3.17
NI9116	1	NI-NI-0016	-	-	-	-	1	5	-	-	-	-	-	-	-	5	-	1	1	1	-	14	2.33
NI9117	1	NI-NI-0013	-	-	-	-	2	4	-	-	-	-	-	-	-	5	-	2	2	2	-	17	2.83
NI9118	1	NI-NI-0015	-	-	-	-	2	5	-	-	-	-	-	-	-	5	-	2	2	3	-	19	3.17
NI9119	1	NI-NI-0015	-	-	-	-	4	5	-	-	-	-	-	-	-	5	-	2	4	4	-	24	4.00
NI9120	1	NI-NI-0016	-	-	-	-	1	4	-	-	-	-	-	-	-	5	-	2	2	2	-	16	2.67
NI9200	2	NI-NI-0004	3	3	3	2	4	3	-	-	-	-	-	3	3	5	-	4	3	3	-	39	3.25
NI9201	2	NI-HB-0001	3	3	3	2	4	3	-	-	-	-	-	3	2	4	-	4	5	5	-	41	3.42
NI9202	2	NI-NI-0015	3	3	5	2	4	3	-	-	-	-	-	3	4	5	-	4	5	5	-	46	3.83
NI9300	3	NI-JB-0006	2	3	3	1	2	3	-	-	-	-	-	2	3	5	-	3	2	2	-	31	2.58
NI9301	3	NI-JB-0006	3	3	3	2	3	3	-	-	-	-	-	3	2	5	-	2	1	1	-	31	2.58
NI9400	4	NI-NI-0008	-	-	3	-	-	3	5	3	1	1	-	-	-	-	-	1	1	1	-	19	2.11
NI9401	4	NI-NI-0009	-	-	5	-	-	5	2	2	1	1	-	-	-	-	-	4	4	4	-	28	3.11
NI9402	4	NI-NI-0007	-	-	3	-	-	4	3	5	1	1	-	-	-	-	-	4	4	4	-	29	3.22
NI9403	4	NI-NI-0007	-	-	3	-	-	2	3	5	1	1	-	-	-	-	-	3	2	2	-	22	2.44
NI9404	4	NI-NI-0010	-	-	3	-	-	5	4	4	1	1	-	-	-	-	-	2	2	2	-	24	2.67
NI9405	4	NI-NI-0008	-	-	2	-	-	3	5	3	1	1	-	-	-	-	-	2	1	1	-	19	2.11
NI9500	5	NI-NI-0004	-	-	-	-	2	3	-	-	-	-	-	-	-	5	-	3	3	3	-	19	3.17
PN9100	1	PN-CL-0004	-	-	-	-	3	5	-	-	-	-	-	-	-	5	-	3	3	3	-	22	3.67
PN9101	1	PN-CL-0003	-	-	-	-	4	5	-	-	-	-	-	-	-	5	-	3	3	3	-	23	3.83
PN9102	1	PN-CL-0003	-	-	-	-	3	4	-	-	-	-	-	-	-	5	-	2	2	3	-	19	3.17
PN9103	1	PN-CL-0003	-	-	-	-	4	4	-	-	-	-	-	-	-	5	-	3	3	3	-	22	3.67
PN9104	1	PN-CL-0003	-	-	-	-	2	5	-	-	-	-	-	-	-	5	-	3	3	3	-	21	3.50
PN9105	1	PN-CL-0003	-	-	-	-	2	4	-	-	-	-	-	-	-	5	-	3	3	3	-	20	3.33
PN9106	1	PN-PO-0006	-	-	-	-	3	5	-	-	-	-	-	-	-	5	-	2	2	2	-	19	3.17
PN9107	1	PN-PO-0006	-	-	-	-	2	5	-	-	-	-	-	-	-	5	-	2	2	2	-	18	3.00
PN9108	1	PN-MR-0008	-	-	-	-	2	5	-	-	-	-	-	-	-	5	-	4	4	4	-	24	4.00
PN9109	1	PN-MR-0008	-	-	-	-	3	5	-	-	-	-	-	-	-	5	-	4	4	4	-	25	4.17

IMPACT INDICATOR SCORES

Project Number	Project Type	Sub-watershed	Benthic	Fish Comm	Aquatic Habitat	Channel Morph	Instream Sediment	Hydrology	No Road Hazard	Magnitude Rd Hazard	Res. Bldg Haz	Non-Res Bldg Haz	Flood Complaints	Prot. RPA Riparian	Prot. Headwater Riparian	Prot. Wetl.	Prot. Nat Habitat	TSS	TN	TP	Ecoli	Sum	Score
PN9110	1	PN-MR-0008	-	-	-	-	2	5	-	-	-	-	-	-	-	5	-	2	2	3	-	19	3.17
PN9111	1	PN-MR-0008	-	-	-	-	4	5	-	-	-	-	-	-	-	5	-	4	4	4	-	26	4.33
PN9112	1	PN-MR-0007	-	-	-	-	5	5	-	-	-	-	-	-	-	5	-	4	4	4	-	27	4.50
PN9113	1	PN-MR-0006	-	-	-	-	3	5	-	-	-	-	-	-	-	5	-	4	4	4	-	25	4.17
PN9114	1	PN-MR-0006	-	-	-	-	3	5	-	-	-	-	-	-	-	5	-	2	2	3	-	20	3.33
PN9116	1	PN-PN-0004	-	-	-	-	4	5	-	-	-	-	-	-	-	5	-	3	3	4	-	24	4.00
PN9117	1	PN-MR-0005	-	-	-	-	3	5	-	-	-	-	-	-	-	5	-	4	3	4	-	24	4.00
PN9118	1	PN-MR-0005	-	-	-	-	4	4	-	-	-	-	-	-	-	4	-	4	4	4	-	24	4.00
PN9119	1	PN-MR-0004	-	-	-	-	2	5	-	-	-	-	-	-	-	5	-	3	3	3	-	21	3.50
PN9120	1	PN-MR-0004	-	-	-	-	3	5	-	-	-	-	-	-	-	5	-	3	3	4	-	23	3.83
PN9121	1	PN-MR-0004	-	-	-	-	4	5	-	-	-	-	-	-	-	5	-	4	4	4	-	26	4.33
PN9122	1	PN-MR-0003	-	-	-	-	4	3	-	-	-	-	-	-	-	5	-	5	5	5	-	27	4.50
PN9123	1	PN-PN-0003	-	-	-	-	2	3	-	-	-	-	-	-	-	5	-	3	3	3	-	19	3.17
PN9124	1	PN-MR-0001	-	-	-	-	3	4	-	-	-	-	-	-	-	5	-	3	4	4	-	23	3.83
PN9125	1	PN-CL-0009	-	-	-	-	5	4	-	-	-	-	-	-	-	5	-	4	4	4	-	26	4.33
PN9126	1	PN-CL-0008	-	-	-	-	4	5	-	-	-	-	-	-	-	5	-	4	4	4	-	26	4.33
PN9127	1	PN-CL-0006	-	-	-	-	4	5	-	-	-	-	-	-	-	5	-	3	3	4	-	24	4.00
PN9200	2	PN-MR-0006	4	5	5	2	5	4	-	-	-	-	-	3	3	4	-	5	3	3	-	46	3.83
PN9201	2	PN-PN-0001	-	-	-	2	3	3	-	-	-	-	-	3	2	5	-	4	4	4	-	30	3.33
PN9400	4	PN-CL-0002	-	-	4	-	-	4	3	3	1	1	-	-	-	-	-	4	4	4	-	28	3.11
PN9401	4	PN-CL-0001	-	-	4	-	-	4	4	5	1	1	-	-	-	-	-	3	3	3	-	28	3.11
PN9402	4	PN-CL-0001	-	-	4	-	-	5	4	5	1	1	-	-	-	-	-	4	4	4	-	32	3.56
PN9403	4	PN-PO-0005	-	-	5	-	-	3	1	1	1	1	-	-	-	-	-	4	3	3	-	22	2.44
PN9404	4	PN-MR-0001	-	-	3	-	-	3	4	5	1	1	-	-	-	-	-	2	1	1	-	21	2.33
PN9405	4	PN-CL-0008	-	-	5	-	-	5	2	2	1	1	-	-	-	-	-	4	4	4	-	28	3.11
PN9406	4	PN-CL-0004	-	-	4	-	-	5	2	2	1	1	-	-	-	-	-	4	4	4	-	27	3.00
PN9407	4	PN-PN-0002	-	-	3	-	-	5	2	2	1	1	-	-	-	-	-	2	1	1	-	18	2.00
PN9408	4	PN-CL-0004	-	-	4	-	-	5	2	2	1	1	-	-	-	-	-	4	4	4	-	27	3.00

Appendix B

Project Scores
Based on Subwatershed Ranking
Source Indicator Scores

This page intentionally left blank.

SOURCE INDICATOR SCORES

Project Number	Project Type	Subwatershed	Total Imp	DCIA	Stream Bank Deficient	SW Outfalls	VPDES	Total Urban Area (%)	TSS	TN	TP	Septic	Channelized Pipes/Streams	Sum	Score
NI9100	1	NI-NI-0001	-	1	-	2	-	-	2	3	3	-	1	12	2.00
NI9101	1	NI-NI-0002	-	2	-	2	-	-	4	4	4	-	1	17	2.83
NI9102	1	NI-NI-0002	-	2	-	2	-	-	3	3	3	-	1	14	2.33
NI9103	1	NI-NI-0002	-	2	-	1	-	-	2	2	3	-	1	11	1.83
NI9104	1	NI-NI-0005	-	2	-	2	-	-	3	3	3	-	1	14	2.33
NI9105	1	NI-NI-0005	-	2	-	2	-	-	3	3	3	-	1	14	2.33
NI9106	1	NI-NI-0009	-	1	-	5	-	-	4	4	4	-	3	21	3.50
NI9107	1	NI-JB-0003	-	1	-	2	-	-	2	2	2	-	1	10	1.67
NI9108	1	NI-NI-0010	-	3	-	3	-	-	3	3	4	-	2	18	3.00
NI9109	1	NI-JB-0003	-	1	-	2	-	-	2	2	2	-	1	10	1.67
NI9110	1	NI-NI-0013	-	2	-	2	-	-	3	3	3	-	2	15	2.50
NI9111	1	NI-NI-0014	-	2	-	3	-	-	4	3	3	-	2	17	2.83
NI9112	1	NI-JB-0003	-	1	-	2	-	-	2	2	2	-	1	10	1.67
NI9113	1	NI-JB-0004	-	4	-	5	-	-	4	4	3	-	4	24	4.00
NI9115	1	NI-JB-0005	-	2	-	2	-	-	3	3	3	-	3	16	2.67
NI9116	1	NI-NI-0016	-	4	-	4	-	-	1	1	1	-	4	15	2.50
NI9117	1	NI-NI-0013	-	3	-	2	-	-	2	2	2	-	2	13	2.17
NI9118	1	NI-NI-0015	-	4	-	3	-	-	2	2	3	-	5	19	3.17
NI9119	1	NI-NI-0015	-	3	-	3	-	-	2	4	4	-	5	21	3.50
NI9120	1	NI-NI-0016	-	3	-	4	-	-	2	2	2	-	4	17	2.83
NI9200	2	NI-NI-0004	-	-	1	1	-	-	4	3	3	-	2	14	2.33
NI9201	2	NI-HB-0001	-	-	2	2	-	-	4	5	5	-	1	19	3.17
NI9202	2	NI-NI-0015	-	-	2	3	-	-	4	5	5	-	4	23	3.83
NI9300	3	NI-JB-0006	2	2	1	5	-	-	3	2	2	-	3	20	2.50
NI9301	3	NI-JB-0006	2	2	2	5	-	-	2	1	1	-	2	17	2.13
NI9400	4	NI-NI-0008	-	-	-	-	-	-	1	1	1	-	2	5	1.25
NI9401	4	NI-NI-0009	-	-	-	-	-	-	4	4	4	-	2	14	3.50
NI9402	4	NI-NI-0007	-	-	-	-	-	-	4	4	4	-	1	13	3.25
NI9403	4	NI-NI-0007	-	-	-	-	-	-	3	2	2	-	2	9	2.25
NI9404	4	NI-NI-0010	-	-	-	-	-	-	2	2	2	-	2	8	2.00
NI9405	4	NI-NI-0008	-	-	-	-	-	-	2	1	1	-	2	6	1.50
NI9500	5	NI-NI-0004	3	3	-	2	-	-	3	3	3	-	3	20	2.86
PN9100	1	PN-CL-0004	-	4	-	3	-	-	3	3	3	-	4	20	3.33
PN9101	1	PN-CL-0003	-	4	-	3	-	-	3	3	3	-	4	20	3.33
PN9102	1	PN-CL-0003	-	3	-	2	-	-	2	2	3	-	3	15	2.50
PN9103	1	PN-CL-0003	-	4	-	3	-	-	3	3	3	-	3	19	3.17
PN9104	1	PN-CL-0003	-	4	-	3	-	-	3	3	3	-	4	20	3.33
PN9105	1	PN-CL-0003	-	4	-	3	-	-	3	3	3	-	4	20	3.33
PN9106	1	PN-PO-0006	-	1	-	4	-	-	2	2	2	-	1	12	2.00
PN9107	1	PN-PO-0006	-	2	-	4	-	-	2	2	2	-	1	13	2.17
PN9108	1	PN-MR-0008	-	4	-	5	-	-	4	4	4	-	3	24	4.00
PN9109	1	PN-MR-0008	-	4	-	5	-	-	4	4	4	-	3	24	4.00

SOURCE INDICATOR SCORES

Project Number	Project Type	Subwatershed	Total Imp	DCIA	Stream Bank Deficient	SW Outfalls	VPDES	Total Urban Area (%)	TSS	TN	TP	Septic	Channelized Pipes/Streams	Sum	Score
PN9110	1	PN-MR-0008	-	4	-	5	-	-	2	2	3	-	2	18	3.00
PN9111	1	PN-MR-0008	-	4	-	5	-	-	4	4	4	-	2	23	3.83
PN9112	1	PN-MR-0007	-	2	-	4	-	-	4	4	4	-	1	19	3.17
PN9113	1	PN-MR-0006	-	3	-	4	-	-	4	4	4	-	4	23	3.83
PN9114	1	PN-MR-0006	-	3	-	3	-	-	2	2	3	-	5	18	3.00
PN9116	1	PN-PN-0004	-	2	-	4	-	-	3	3	4	-	4	20	3.33
PN9117	1	PN-MR-0005	-	4	-	5	-	-	4	3	4	-	4	24	4.00
PN9118	1	PN-MR-0005	-	3	-	5	-	-	4	4	4	-	3	23	3.83
PN9119	1	PN-MR-0004	-	1	-	2	-	-	3	3	3	-	1	13	2.17
PN9120	1	PN-MR-0004	-	1	-	2	-	-	3	3	4	-	1	14	2.33
PN9121	1	PN-MR-0004	-	1	-	2	-	-	4	4	4	-	1	16	2.67
PN9122	1	PN-MR-0003	-	1	-	3	-	-	5	5	5	-	1	20	3.33
PN9123	1	PN-PN-0003	-	3	-	3	-	-	3	3	3	-	3	18	3.00
PN9124	1	PN-MR-0001	-	1	-	1	-	-	3	4	4	-	1	14	2.33
PN9125	1	PN-CL-0009	-	2	-	2	-	-	4	4	4	-	2	18	3.00
PN9126	1	PN-CL-0008	-	2	-	4	-	-	4	4	4	-	2	20	3.33
PN9127	1	PN-CL-0006	-	4	-	3	-	-	3	3	4	-	4	21	3.50
PN9200	2	PN-MR-0006	-	-	1	4	-	-	5	3	3	-	4	20	3.33
PN9201	2	PN-PN-0001	-	-	1	2	-	-	4	4	4	-	2	17	2.83
PN9400	4	PN-CL-0002	-	-	-	-	-	-	4	4	4	-	2	14	3.50
PN9401	4	PN-CL-0001	-	-	-	-	-	-	3	3	3	-	2	11	2.75
PN9402	4	PN-CL-0001	-	-	-	-	-	-	4	4	4	-	2	14	3.50
PN9403	4	PN-PO-0005	-	-	-	-	-	-	4	3	3	-	2	12	3.00
PN9404	4	PN-MR-0001	-	-	-	-	-	-	2	1	1	-	2	6	1.50
PN9405	4	PN-CL-0008	-	-	-	-	-	-	4	4	4	-	2	14	3.50
PN9406	4	PN-CL-0004	-	-	-	-	-	-	4	4	4	-	4	16	4.00
PN9407	4	PN-PN-0002	-	-	-	-	-	-	2	1	1	-	2	6	1.50
PN9408	4	PN-CL-0004	-	-	-	-	-	-	4	4	4	-	4	16	4.00

Appendix C

Project Scores
Based on Location within Priority Subwatersheds

This page intentionally left blank.

Priority Subwatersheds		Future w/o Project Score	Preliminary Project Score	FXB Adjustment (+1, 0, -1)	County Adjustment (+/-)	Applied Score
Project Number	Subwatershed					
NI9100	NI-NI-0001	7.07	1			1
NI9101	NI-NI-0002	6.51	2			2
NI9102	NI-NI-0002	6.51	2			2
NI9103	NI-NI-0002	6.51	2			2
NI9104	NI-NI-0005	5.95	5			5
NI9105	NI-NI-0005	5.95	5			5
NI9106	NI-NI-0009	6.70	1			1
NI9107	NI-JB-0003	6.14	4			4
NI9108	NI-NI-0010	7.08	1			1
NI9109	NI-JB-0003	6.14	4			4
NI9110	NI-NI-0013	6.59	1			1
NI9111	NI-NI-0014	6.51	2			2
NI9112	NI-JB-0003	6.14	4			4
NI9113	NI-JB-0004	5.90	5			5
NI9115	NI-JB-0005	6.60	1			1
NI9116	NI-NI-0016	6.48	2			2
NI9117	NI-NI-0013	6.59	1			1
NI9118	NI-NI-0015	4.28	5			5
NI9119	NI-NI-0015	4.28	5			5
NI9120	NI-NI-0016	6.48	2			2
NI9200	NI-NI-0004	6.17	4			4
NI9201	NI-HB-0001	4.63	5			5
NI9202	NI-NI-0015	4.28	5			5
NI9300	NI-JB-0006	6.86	1			1
NI9301	NI-JB-0006	6.86	1			1
NI9400	NI-NI-0008	6.09	5			5
NI9401	NI-NI-0009	6.70	1			1
NI9402	NI-NI-0007	6.54	2			2
NI9403	NI-NI-0007	6.54	2			2
NI9404	NI-NI-0010	7.08	1			1
NI9405	NI-NI-0008	6.09	5			5
NI9500	NI-NI-0004	6.17	4			4
PN9100	PN-CL-0004	6.40	3			3
PN9101	PN-CL-0003	6.40	3			3
PN9102	PN-CL-0003	6.40	3			3
PN9103	PN-CL-0003	6.40	3			3
PN9104	PN-CL-0003	6.40	3			3
PN9105	PN-CL-0003	6.40	3			3
PN9106	PN-PO-0006	6.59	1			1
PN9107	PN-PO-0006	6.59	1			1

Priority Subwatersheds		Future w/o Project Score	Preliminary Project Score	FXB Adjustment (+1, 0, -1)	County Adjustment (+/-)	Applied Score
Project Number	Subwatershed					
PN9108	PN-MR-0008	6.43	3			3
PN9109	PN-MR-0008	6.43	3			3
PN9110	PN-MR-0008	6.43	3			3
PN9111	PN-MR-0008	6.43	3			3
PN9112	PN-MR-0007	6.18	4			4
PN9113	PN-MR-0006	6.59	1			1
PN9114	PN-MR-0006	6.59	1			1
PN9116	PN-PN-0004	6.51	2			2
PN9117	PN-MR-0005	6.40	3			3
PN9118	PN-MR-0005	6.40	3			3
PN9119	PN-MR-0004	6.48	2			2
PN9120	PN-MR-0004	6.48	2			2
PN9121	PN-MR-0004	6.48	2			2
PN9122	PN-MR-0003	4.87	5			5
PN9123	PN-PN-0003	6.40	3			3
PN9124	PN-MR-0001	6.43	3			3
PN9125	PN-CL-0009	6.59	1			1
PN9126	PN-CL-0008	6.67	1			1
PN9127	PN-CL-0006	5.90	5			5
PN9200	PN-MR-0006	6.59	1			1
PN9201	PN-PN-0001	3.77	5			5
PN9400	PN-CL-0002	6.30	4			4
PN9401	PN-CL-0001	6.05	5			5
PN9402	PN-CL-0001	6.05	5			5
PN9403	PN-PO-0005	7.47	1			1
PN9404	PN-MR-0001	6.43	3			3
PN9405	PN-CL-0008	6.67	1			1
PN9406	PN-CL-0004	6.40	3			3
PN9407	PN-PN-0002	6.40	3			3
PN9408	PN-CL-0004	6.40	3			3

Appendix D

Project Scores
Based on Sequencing

This page intentionally left blank.

Sequencing		Sequence Number	Preliminary Project Score	FXB Adjustment	County Adjustment (+/-)	Applied Score
Project Number	Subwatershed					
NI9100	NI-NI-0001	1	5			5
NI9101	NI-NI-0002	7	1	2		3
NI9102	NI-NI-0002	7	1	4		5
NI9103	NI-NI-0002	7	1	4		5
NI9104	NI-NI-0005	5	1			1
NI9105	NI-NI-0005	5	1			1
NI9106	NI-NI-0009	1	5			5
NI9107	NI-JB-0003	4	1	4		5
NI9108	NI-NI-0010	3	3			3
NI9109	NI-JB-0003	4	1	4		5
NI9110	NI-NI-0013	2	3	1		4
NI9111	NI-NI-0014	1	5			5
NI9112	NI-JB-0003	4	1	4		5
NI9113	NI-JB-0004	3	3			3
NI9115	NI-JB-0005	2	3			3
NI9116	NI-NI-0016	1	5			5
NI9117	NI-NI-0013	2	3	2		5
NI9118	NI-NI-0015	1	5			5
NI9119	NI-NI-0015	1	5			5
NI9120	NI-NI-0016	1	5			5
NI9200	NI-NI-0004	6	1	2		3
NI9201	NI-HB-0001	1	5	-1		4
NI9202	NI-NI-0015	1	5			5
NI9300	NI-JB-0006	1	5			5
NI9301	NI-JB-0006	1	5			5
NI9400	NI-NI-0008	2	3			3
NI9401	NI-NI-0009	1	5			5
NI9402	NI-NI-0007	4	1			1
NI9403	NI-NI-0007	4	1			1
NI9404	NI-NI-0010	3	3			3
NI9405	NI-NI-0008	2	3			3
NI9500	NI-NI-0004	6	1			1
PN9100	PN-CL-0004	1	5			5
PN9101	PN-CL-0003	1	5			5
PN9102	PN-CL-0003	1	5			5
PN9103	PN-CL-0003	1	5			5
PN9104	PN-CL-0003	1	5			5
PN9105	PN-CL-0003	1	5			5
PN9106	PN-PO-0006	1	5			5
PN9107	PN-PO-0006	1	5			5

Sequencing		Sequence Number	Preliminary Project Score	FXB Adjustment	County Adjustment (+/-)	Applied Score
Project Number	Subwatershed					
PN9108	PN-MR-0008	1	5			5
PN9109	PN-MR-0008	1	5			5
PN9110	PN-MR-0008	1	5			5
PN9111	PN-MR-0008	1	5			5
PN9112	PN-MR-0007	2	3			3
PN9113	PN-MR-0006	1	5			5
PN9114	PN-MR-0006	1	5			5
PN9116	PN-PN-0004	1	5			5
PN9117	PN-MR-0005	1	5			5
PN9118	PN-MR-0005	1	5			5
PN9119	PN-MR-0004	1	5			5
PN9120	PN-MR-0004	1	5			5
PN9121	PN-MR-0004	1	5	-1		4
PN9122	PN-MR-0003	3	3	2		5
PN9123	PN-PN-0003	2	3	2		5
PN9124	PN-MR-0001	4	1	4		5
PN9125	PN-CL-0009	1	5	-1		4
PN9126	PN-CL-0008	1	5	-1		4
PN9127	PN-CL-0006	3	3	2		5
PN9200	PN-MR-0006	1	5			5
PN9201	PN-PN-0001	3	3			3
PN9400	PN-CL-0002	2	3			3
PN9401	PN-CL-0001	5	1			1
PN9402	PN-CL-0001	5	1			1
PN9403	PN-PO-0005	2	3			3
PN9404	PN-MR-0001	4	1			1
PN9405	PN-CL-0008	1	5	-1		4
PN9406	PN-CL-0004	1	5	-1		4
PN9407	PN-PN-0002	1	5	-1		4
PN9408	PN-CL-0004	1	5	-1		4

Appendix E

Project Scores
Based on Implementability

This page intentionally left blank.

Implementability		Initial Score based on Ownership	Is there an Existing DPs / WPs? (Yes = +1)	Adjusted Score for County Maintained WP or DP (Init Score / 2)	Preliminary Project Score	FXB Adjustment	County Adjustment	Applied Score
Project Number	Subwatershed							
NI9100	NI-NI-0001	10	0	10.0	2			2
NI9101	NI-NI-0002	4	1	2.0	5			5
NI9102	NI-NI-0002	4	0	4.0	4			4
NI9103	NI-NI-0002	3	0	3.0	5			5
NI9104	NI-NI-0005	4	0	4.0	4			4
NI9105	NI-NI-0005	4	0	4.0	4			4
NI9106	NI-NI-0009	28	0	28.0	1			1
NI9107	NI-JB-0003	4	0	4.0	4			4
NI9108	NI-NI-0010	5	0	5.0	4			4
NI9109	NI-JB-0003	8	0	8.0	3			3
NI9110	NI-NI-0013	4	0	4.0	4			4
NI9111	NI-NI-0014	4	0	4.0	4			4
NI9112	NI-JB-0003	4	0	4.0	4			4
NI9113	NI-JB-0004	14	0	14.0	2			2
NI9115	NI-JB-0005	14	0	14.0	2			2
NI9116	NI-NI-0016	4	0	4.0	4			4
NI9117	NI-NI-0013	8	0	8.0	3			3
NI9118	NI-NI-0015	30	0	30.0	1			1
NI9119	NI-NI-0015	6	0	6.0	4			4
NI9120	NI-NI-0016	8	0	8.0	3			3
NI9200	NI-NI-0004	8	0	8.0	3			3
NI9201	NI-HB-0001	34	0	34.0	1			1
NI9202	NI-NI-0015	8	0	8.0	3			3
NI9300	NI-JB-0006	10	0	10.0	2			2
NI9301	NI-JB-0006	8	0	8.0	3			3
NI9400	NI-NI-0008	8	0	8.0	3			3
NI9401	NI-NI-0009	6	0	6.0	4			4
NI9402	NI-NI-0007	8	0	8.0	3			3
NI9403	NI-NI-0007	12	1	6.0	4	5		5
NI9404	NI-NI-0010	21	0	21.0	1	2		2
NI9405	NI-NI-0008	10	0	10.0	2	4		4
NI9500	NI-NI-0004	34	0	34.0	1			1
PN9100	PN-CL-0004	17	0	17.0	1			1
PN9101	PN-CL-0003	8	0	8.0	3			3
PN9102	PN-CL-0003	8	0	8.0	3			3
PN9103	PN-CL-0003	16	0	16.0	1	2		2
PN9104	PN-CL-0003	8	1	4.0	4			4
PN9105	PN-CL-0003	12	0	12.0	2			2
PN9106	PN-PO-0006	2	1	1.0	5			5

Implementability		Initial Score based on Ownership	Is there an Existing DPs / WPs? (Yes = +1)	Adjusted Score for County Maintained WP or DP (Init Score / 2)	Preliminary Project Score	FXB Adjustment	County Adjustment	Applied Score
Project Number	Subwatershed							
PN9107	PN-PO-0006	3	1	1.5	5			5
PN9108	PN-MR-0008	8	0	8.0	3			3
PN9109	PN-MR-0008	24	0	24.0	1			1
PN9110	PN-MR-0008	7	0	7.0	4	5		5
PN9111	PN-MR-0008	30	0	30.0	1			1
PN9112	PN-MR-0007	4	0	4.0	4			4
PN9113	PN-MR-0006	4	0	4.0	4			4
PN9114	PN-MR-0006	14	1	7.0	4			4
PN9116	PN-PN-0004	5	0	5.0	4			4
PN9117	PN-MR-0005	10	0	10.0	2			2
PN9118	PN-MR-0005	24	0	24.0	1			1
PN9119	PN-MR-0004	4	1	2.0	5			5
PN9120	PN-MR-0004	8	0	8.0	3			3
PN9121	PN-MR-0004	16	0	16.0	1			1
PN9122	PN-MR-0003	6	0	6.0	4			4
PN9123	PN-PN-0003	4	0	4.0	4			4
PN9124	PN-MR-0001	12	0	12.0	2			2
PN9125	PN-CL-0009	16	0	16.0	1	2		2
PN9126	PN-CL-0008	10	0	10.0	2			2
PN9127	PN-CL-0006	14	1	7.0	4			4
PN9200	PN-MR-0006	16	0	16.0	1	2		2
PN9201	PN-PN-0001	28	0	28.0	1			1
PN9400	PN-CL-0002	8	0	8.0	3			3
PN9401	PN-CL-0001	4	0	4.0	4			4
PN9402	PN-CL-0001	18	0	18.0	1	2		2
PN9403	PN-PO-0005	10	0	10.0	2			2
PN9404	PN-MR-0001	1	0	1.0	5			5
PN9405	PN-CL-0008	12	0	12.0	2			2
PN9406	PN-CL-0004	9	0	9.0	2			2
PN9407	PN-PN-0002	8	0	8.0	3			3
PN9408	PN-CL-0004	19	0	19.0	1			1

Appendix F

STEPL

This page intentionally left blank.

Total Suspended Solids (TSS)		Existing	Future w/o Project	Future w/Project	% Change Future w/o to Future w/project	Adjusted Existing Score	FXB Adjustment (+1, 0, -1)	Indicator Score
Project No.	**Subwatershed**	**Metric**	**Metric**	**Metric**				
NI9100	NI-NI-0001	0.05	0.05	0.05	-4.22%	2	0	2
NI9101	NI-NI-0002	0.03	0.03	0.02	-21.10%	4	0	4
NI9102	NI-NI-0002	0.03	0.03	0.03	-7.22%	3	0	3
NI9103	NI-NI-0002	0.03	0.03	0.03	-3.06%	2	0	2
NI9104	NI-NI-0005	0.05	0.05	0.05	-10.08%	3	0	3
NI9105	NI-NI-0005	0.05	0.05	0.05	-1.45%	2	1	3
NI9106	NI-NI-0009	0.03	0.03	0.02	-34.36%	4	0	4
NI9107	NI-JB-0003	0.04	0.04	0.04	-0.92%	2	0	2
NI9108	NI-NI-0010	0.02	0.02	0.02	-3.25%	2	1	3
NI9109	NI-JB-0003	0.04	0.04	0.04	-1.71%	2	0	2
NI9110	NI-NI-0013	0.04	0.04	0.04	-8.93%	3	0	3
NI9111	NI-NI-0014	0.05	0.05	0.04	-11.27%	4	0	4
NI9112	NI-JB-0003	0.04	0.04	0.04	-2.68%	2	0	2
NI9113	NI-JB-0004	0.07	0.07	0.06	-5.99%	3	1	4
NI9115	NI-JB-0005	0.01	0.01	0.00	-63.80%	4	-1	3
NI9116	NI-NI-0016	0.07	0.07	0.07	0.01%	1	0	1
NI9117	NI-NI-0013	0.04	0.04	0.04	-0.09%	2	0	2
NI9118	NI-NI-0015	0.26	0.26	0.26	-1.32%	2	0	2
NI9119	NI-NI-0015	0.26	0.26	0.25	-4.30%	2	0	2
NI9120	NI-NI-0016	0.07	0.07	0.07	-0.96%	2	0	2
NI9200	NI-NI-0004	0.03	0.04	NA	-	-	4	4
NI9201	NI-HB-0001	0.25	0.25	0.04	-83.11%	4	0	4
NI9202	NI-NI-0015	0.26	0.26	0.07	-72.86%	4	0	4
NI9300	NI-JB-0006	0.05	0.05	NA	-	-	3	3
NI9301	NI-JB-0006	0.05	0.05	NA	-	-	2	2
NI9400	NI-NI-0008	0.07	0.07	NA	-	-	1	1
NI9401	NI-NI-0009	0.03	0.03	0.02	-20.33%	4	0	4
NI9402	NI-NI-0007	0.04	0.04	0.02	-40.34%	4	0	4
NI9403	NI-NI-0007	0.04	0.04	NA	-	-	3	3
NI9404	NI-NI-0010	0.02	0.02	0.02	-1.88%	2	0	2
NI9405	NI-NI-0008	0.07	0.07	NA	-	-	2	2
NI9500	NI-NI-0004	0.03	0.04	0.03	-2.22%	2	1	3
PN9100	PN-CL-0004	0.06	0.06	0.06	-5.45%	3	0	3
PN9101	PN-CL-0003	0.06	0.06	0.06	-5.23%	3	0	3
PN9102	PN-CL-0003	0.06	0.06	0.06	-3.05%	2	0	2
PN9103	PN-CL-0003	0.06	0.06	0.06	-1.21%	2	1	3
PN9104	PN-CL-0003	0.06	0.06	0.06	-7.83%	3	0	3

Total Suspended Solids (TSS)		Existing	Future w/o Project	Future w/Project	% Change Future w/o to Future w/project	Adjusted Existing Score	FXB Adjustment (+1, 0, -1)	Indicator Score
Project No.	**Subwatershed**	**Metric**	**Metric**	**Metric**				
PN9105	PN-CL-0003	0.06	0.06	0.06	-6.66%	3	0	3
PN9106	PN-PO-0006	0.06	0.06	0.05	-8.13%	3	-1	2
PN9107	PN-PO-0006	0.06	0.06	0.05	-7.44%	3	-1	2
PN9108	PN-MR-0008	0.05	0.05	0.04	-8.01%	3	1	4
PN9109	PN-MR-0008	0.05	0.05	0.04	-6.49%	3	1	4
PN9110	PN-MR-0008	0.05	0.05	0.04	-3.46%	2	0	2
PN9111	PN-MR-0008	0.05	0.05	0.04	-8.01%	3	1	4
PN9112	PN-MR-0007	0.04	0.04	0.03	-26.27%	4	0	4
PN9113	PN-MR-0006	0.06	0.06	0.05	-5.71%	3	1	4
PN9114	PN-MR-0006	0.06	0.06	0.05	-3.31%	2	0	2
PN9116	PN-PN-0004	0.05	0.05	0.04	-10.56%	3	0	3
PN9117	PN-MR-0005	0.06	0.06	0.05	-4.30%	3	1	4
PN9118	PN-MR-0005	0.06	0.06	0.05	-7.09%	3	1	4
PN9119	PN-MR-0004	0.05	0.05	0.05	-1.14%	2	1	3
PN9120	PN-MR-0004	0.05	0.05	0.05	-10.68%	3	0	3
PN9121	PN-MR-0004	0.05	0.05	0.03	-36.03%	4	0	4
PN9122	PN-MR-0003	0.15	0.15	0.04	-73.96%	4	1	5
PN9123	PN-PN-0003	0.05	0.05	0.05	-5.92%	3	0	3
PN9124	PN-MR-0001	0.04	0.04	0.03	-10.32%	3	0	3
PN9125	PN-CL-0009	0.04	0.04	0.02	-57.67%	4	0	4
PN9126	PN-CL-0008	0.04	0.04	0.02	-49.59%	4	0	4
PN9127	PN-CL-0006	0.06	0.06	0.05	-9.92%	3	0	3
PN9200	PN-MR-0006	0.06	0.06	0.05	-17.07%	4	2	6
PN9201	PN-PN-0001	0.53	0.53	0.06	-89.55%	4	0	4
PN9400	PN-CL-0002	0.04	0.04	0.01	-63.20%	4	0	4
PN9401	PN-CL-0001	0.04	0.04	0.04	-2.23%	2	1	3
PN9402	PN-CL-0001	0.04	0.04	0.02	-48.49%	4	0	4
PN9403	PN-PO-0005	0.05	0.05	NA	-	-	4	4
PN9404	PN-MR-0001	0.04	0.04	NA	-	-	2	2
PN9405	PN-CL-0008	0.04	0.04	0.03	-13.71%	4	0	4
PN9406	PN-CL-0004	0.06	0.06	0.04	-30.00%	4	0	4
PN9407	PN-PN-0002	0.05	0.05	NA	-	-	2	2
PN9408	PN-CL-0004	0.06	0.06	0.04	-30.00%	4	0	4

Total Nitrogen (TN)		Existing	Future w/o Project	Future w/Project	% Change Future w/o to Future w/project	Adjusted Existing Score	FXB Adjustment (+1, 0, -1)	Indicator Score
Project No.	**Subwatershed**	**Metric**	**Metric**	**Metric**				
NI9100	NI-NI-0001	1.72	1.77	1.71	-3%	3	0	3
NI9101	NI-NI-0002	1.02	1.61	1.47	-9%	4	0	4
NI9102	NI-NI-0002	1.02	1.61	1.56	-3%	3	0	3
NI9103	NI-NI-0002	1.02	1.61	1.59	-1%	2	0	2
NI9104	NI-NI-0005	2.76	2.85	2.74	-4%	3	0	3
NI9105	NI-NI-0005	2.76	2.85	2.84	0%	2	1	3
NI9106	NI-NI-0009	1.78	1.80	1.57	-13%	4	0	4
NI9107	NI-JB-0003	2.35	2.47	2.46	0%	2	0	2
NI9108	NI-NI-0010	1.23	1.27	1.25	-2%	2	1	3
NI9109	NI-JB-0003	2.35	2.47	2.45	-1%	2	0	2
NI9110	NI-NI-0013	2.21	2.29	2.23	-3%	3	0	3
NI9111	NI-NI-0014	2.61	2.66	2.54	-5%	3	0	3
NI9112	NI-JB-0003	2.35	2.47	2.44	-1%	2	0	2
NI9113	NI-JB-0004	3.59	3.64	3.54	-3%	3	1	4
NI9115	NI-JB-0005	1.27	1.29	0.96	-26%	4	-1	3
NI9116	NI-NI-0016	3.42	3.47	3.47	0%	1	0	1
NI9117	NI-NI-0013	2.21	2.29	2.29	0%	2	0	2
NI9118	NI-NI-0015	3.78	3.90	3.82	-2%	2	0	2
NI9119	NI-NI-0015	3.78	3.90	3.64	-7%	4	0	4
NI9120	NI-NI-0016	3.42	3.47	3.46	0%	2	0	2
NI9200	NI-NI-0004	1.73	2.02	NA	-	-	3	3
NI9201	NI-HB-0001	2.79	2.86	2.53	-11%	4	2	6
NI9202	NI-NI-0015	3.78	3.90	3.59	-8%	4	3	7
NI9300	NI-JB-0006	1.72	1.79	NA	-	-	2	2
NI9301	NI-JB-0006	1.72	1.79	NA	-	-	1	1
NI9400	NI-NI-0008	2.39	2.50	NA	-	-	1	1
NI9401	NI-NI-0009	1.78	1.80	1.67	-7%	4	0	4
NI9402	NI-NI-0007	2.20	2.34	1.97	-16%	4	0	4
NI9403	NI-NI-0007	2.20	2.34	NA	-	-	2	2
NI9404	NI-NI-0010	1.23	1.27	1.25	-1%	2	0	2
NI9405	NI-NI-0008	2.39	2.50	NA	-	-	1	1
NI9500	NI-NI-0004	1.73	2.02	1.98	-2%	2	1	3
PN9100	PN-CL-0004	3.02	3.08	2.99	-3%	3	0	3
PN9101	PN-CL-0003	3.08	3.19	3.11	-3%	3	0	3
PN9102	PN-CL-0003	3.08	3.19	3.14	-1%	2	0	2
PN9103	PN-CL-0003	3.08	3.19	3.17	-1%	2	1	3
PN9104	PN-CL-0003	3.08	3.19	3.07	-4%	3	0	3

Total Nitrogen (TN)		Existing	Future w/o Project	Future w/Project	% Change Future w/o to Future w/project	Adjusted Existing Score	FXB Adjustment (+1, 0, -1)	Indicator Score
Project No.	**Subwatershed**	**Metric**	**Metric**	**Metric**				
PN9105	PN-CL-0003	3.08	3.19	3.09	-3%	3	0	3
PN9106	PN-PO-0006	2.45	2.63	2.57	-3%	3	-1	2
PN9107	PN-PO-0006	2.45	2.63	2.55	-3%	3	-1	2
PN9108	PN-MR-0008	2.46	2.56	2.45	-4%	3	1	4
PN9109	PN-MR-0008	2.46	2.56	2.49	-3%	3	1	4
PN9110	PN-MR-0008	2.46	2.56	2.52	-1%	2	0	2
PN9111	PN-MR-0008	2.46	2.56	2.45	-4%	3	1	4
PN9112	PN-MR-0007	2.08	2.37	2.10	-11%	4	0	4
PN9113	PN-MR-0006	2.49	2.61	2.53	-3%	3	1	4
PN9114	PN-MR-0006	2.49	2.61	2.56	-2%	2	0	2
PN9116	PN-PN-0004	2.51	2.66	2.54	-4%	3	0	3
PN9117	PN-MR-0005	2.96	3.01	2.95	-2%	2	1	3
PN9118	PN-MR-0005	2.96	3.01	2.91	-3%	3	1	4
PN9119	PN-MR-0004	2.60	2.73	2.72	-1%	2	1	3
PN9120	PN-MR-0004	2.60	2.73	2.60	-5%	3	0	3
PN9121	PN-MR-0004	2.60	2.73	2.29	-16%	4	0	4
PN9122	PN-MR-0003	2.13	2.28	2.08	-9%	4	1	5
PN9123	PN-PN-0003	2.70	2.84	2.76	-3%	3	0	3
PN9124	PN-MR-0001	0.98	0.98	0.89	-10%	4	0	4
PN9125	PN-CL-0009	2.19	2.32	1.77	-24%	4	0	4
PN9126	PN-CL-0008	2.14	2.24	1.79	-20%	4	0	4
PN9127	PN-CL-0006	2.65	2.72	2.60	-4%	3	0	3
PN9200	PN-MR-0006	2.49	2.61	2.59	-1%	2	1	3
PN9201	PN-PN-0001	3.31	3.39	2.63	-22%	4	0	4
PN9400	PN-CL-0002	1.73	2.13	1.60	-25%	4	0	4
PN9401	PN-CL-0001	1.83	2.03	2.00	-1%	2	1	3
PN9402	PN-CL-0001	1.83	2.03	1.62	-20%	4	0	4
PN9403	PN-PO-0005	1.78	1.80	NA	-	-	3	3
PN9404	PN-MR-0001	0.98	0.98	NA	-	-	1	1
PN9405	PN-CL-0008	2.14	2.24	2.11	-6%	4	0	4
PN9406	PN-CL-0004	3.02	3.08	2.65	-14%	4	0	4
PN9407	PN-PN-0002	2.62	2.76	NA	-	-	1	1
PN9408	PN-CL-0004	3.02	3.08	2.65	-14%	4	0	4

Total Phosphorus (TP)		Existing	Future w/o Project	Future w/Project	% Change Future w/o to Future w/project	Adjusted Existing Score	FXB Adjustment (+1, 0, -1)	Indicator Score
Project No.	**Subwatershed**	**Metric**	**Metric**	**Metric**				
NI9100	NI-NI-0001	0.28	0.28	0.27	-4%	3	0	3
NI9101	NI-NI-0002	0.16	0.24	0.21	-14%	4	0	4
NI9102	NI-NI-0002	0.16	0.24	0.23	-5%	3	0	3
NI9103	NI-NI-0002	0.16	0.24	0.23	-2%	3	0	3
NI9104	NI-NI-0005	0.41	0.42	0.40	-4%	3	0	3
NI9105	NI-NI-0005	0.41	0.42	0.42	-1%	2	1	3
NI9106	NI-NI-0009	0.26	0.26	0.20	-21%	4	0	4
NI9107	NI-JB-0003	0.35	0.37	0.36	-1%	2	0	2
NI9108	NI-NI-0010	0.18	0.19	0.18	-2%	3	1	4
NI9109	NI-JB-0003	0.35	0.37	0.36	-1%	2	0	2
NI9110	NI-NI-0013	0.33	0.34	0.32	-5%	3	0	3
NI9111	NI-NI-0014	0.39	0.39	0.37	-5%	3	0	3
NI9112	NI-JB-0003	0.35	0.37	0.36	-1%	2	0	2
NI9113	NI-JB-0004	0.53	0.53	0.53	-1%	2	1	3
NI9115	NI-JB-0005	0.17	0.18	0.12	-34%	4	-1	3
NI9116	NI-NI-0016	0.52	0.52	0.52	0%	1	0	1
NI9117	NI-NI-0013	0.33	0.34	0.34	0%	2	0	2
NI9118	NI-NI-0015	0.66	0.67	0.66	-2%	3	0	3
NI9119	NI-NI-0015	0.66	0.67	0.62	-7%	4	0	4
NI9120	NI-NI-0016	0.52	0.52	0.52	-1%	2	0	2
NI9200	NI-NI-0004	0.26	0.29	NA	0%	-	3	3
NI9201	NI-HB-0001	0.48	0.49	0.36	-26%	4	2	6
NI9202	NI-NI-0015	0.66	0.67	0.55	-18%	4	3	7
NI9300	NI-JB-0006	0.26	0.27	NA	0%	-	2	2
NI9301	NI-JB-0006	0.26	0.27	NA	0%	-	1	1
NI9400	NI-NI-0008	0.37	0.38	NA	0%	-	1	1
NI9401	NI-NI-0009	0.26	0.26	0.23	-12%	4	0	4
NI9402	NI-NI-0007	0.32	0.34	0.25	-26%	4	0	4
NI9403	NI-NI-0007	0.32	0.34	NA	0%	-	2	2
NI9404	NI-NI-0010	0.18	0.19	0.19	-1%	2	0	2
NI9405	NI-NI-0008	0.37	0.38	NA	0%	-	1	1
NI9500	NI-NI-0004	0.26	0.29	0.29	-2%	2	1	3
PN9100	PN-CL-0004	0.46	0.47	0.46	-3%	3	0	3
PN9101	PN-CL-0003	0.47	0.49	0.47	-3%	3	0	3
PN9102	PN-CL-0003	0.47	0.49	0.48	-2%	3	0	3
PN9103	PN-CL-0003	0.47	0.49	0.48	-1%	2	1	3
PN9104	PN-CL-0003	0.47	0.49	0.47	-5%	3	0	3

Total Phosphorus (TP)		Existing	Future w/o Project	Future w/Project	% Change Future w/o to Future w/project	Adjusted Existing Score	FXB Adjustment (+1, 0, -1)	Indicator Score
Project No.	**Subwatershed**	**Metric**	**Metric**	**Metric**				
PN9105	PN-CL-0003	0.47	0.49	0.47	-4%	3	0	3
PN9106	PN-PO-0006	0.39	0.41	0.40	-3%	3	-1	2
PN9107	PN-PO-0006	0.39	0.41	0.39	-5%	3	-1	2
PN9108	PN-MR-0008	0.36	0.38	0.36	-6%	3	1	4
PN9109	PN-MR-0008	0.36	0.38	0.36	-4%	3	1	4
PN9110	PN-MR-0008	0.36	0.38	0.37	-2%	3	0	3
PN9111	PN-MR-0008	0.36	0.38	0.36	-6%	3	1	4
PN9112	PN-MR-0007	0.32	0.35	0.29	-17%	4	0	4
PN9113	PN-MR-0006	0.38	0.39	0.37	-5%	3	1	4
PN9114	PN-MR-0006	0.38	0.39	0.38	-2%	3	0	3
PN9116	PN-PN-0004	0.37	0.39	0.36	-7%	4	0	4
PN9117	PN-MR-0005	0.45	0.45	0.44	-2%	3	1	4
PN9118	PN-MR-0005	0.45	0.45	0.43	-5%	3	1	4
PN9119	PN-MR-0004	0.40	0.42	0.42	-1%	2	1	3
PN9120	PN-MR-0004	0.40	0.42	0.39	-8%	4	0	4
PN9121	PN-MR-0004	0.40	0.42	0.31	-26%	4	0	4
PN9122	PN-MR-0003	0.37	0.38	0.31	-19%	4	1	5
PN9123	PN-PN-0003	0.41	0.43	0.41	-4%	3	0	3
PN9124	PN-MR-0001	0.17	0.17	0.14	-13%	4	0	4
PN9125	PN-CL-0009	0.33	0.35	0.21	-39%	4	0	4
PN9126	PN-CL-0008	0.32	0.33	0.22	-33%	4	0	4
PN9127	PN-CL-0006	0.43	0.44	0.41	-6%	4	0	4
PN9200	PN-MR-0006	0.38	0.39	0.39	-2%	2	1	3
PN9201	PN-PN-0001	0.69	0.70	0.40	-42%	4	0	4
PN9400	PN-CL-0002	0.26	0.31	0.19	-41%	4	0	4
PN9401	PN-CL-0001	0.28	0.31	0.30	-2%	2	1	3
PN9402	PN-CL-0001	0.28	0.31	0.21	-33%	4	0	4
PN9403	PN-PO-0005	0.28	0.28	NA	0%	-	3	3
PN9404	PN-MR-0001	0.17	0.17	NA	0%	-	1	1
PN9405	PN-CL-0008	0.32	0.33	0.30	-9%	4	0	4
PN9406	PN-CL-0004	0.46	0.47	0.37	-22%	4	0	4
PN9407	PN-PN-0002	0.40	0.42	NA	0%	-	1	1
PN9408	PN-CL-0004	0.46	0.47	0.37	-22%	4	0	4

F. X. Browne, Inc.
Memorandum

To: Fairfax County
From: F. X. Browne, Inc.
Date: August 23, 2010
Revised: December 21, 2010
RE: Task 3.6 Model Analysis and Evaluation of Alternative Scenarios for Nichol Run and Pond Branch Watersheds

1.1 Introduction

Task 3.6 requires that proposed 10-yr implementation projects be further analyzed using SWMM and HEC-RAS to evaluate hydrologic and hydraulic (H&H) benefits. The H&H analyses allows for an assessment of potential impacts as well as evaluation of the objectives met by implementing the projects.

The following represents occasions where modeled output is essential:

- Water quality retrofits that have strong potential to create or exacerbate upstream or downstream flooding conditions
- Projects where the objective is to reduce/mitigate erosive downstream velocities
- Projects where the objective is to reduce/mitigate downstream flooding

In these cases, modeled SWMM and HEC-RAS analysis have been performed to quantify whether adverse impacts were avoided or that objectives were met. This memo summarizes the setup, calibration and results of the hydrologic and hydraulic modeling performed in Task 3.6. A costs and benefits analysis was performed as part of Task 3.6 and is summarized below as well. Results from the final STEPL pollution model from Task 3.4 are also summarized in this memo.

1.2 Design Storms

Storm events are classified by the amount of rainfall, in inches, that occurs over the duration of a storm. The amount of rainfall depends on how frequently the storm will statistically occur and how long the storm lasts. In general, smaller storms occur more frequently than larger storms of equal duration. Hence, a 2-year, 24hr storm (having a 50 percent chance of happening in a given year) has less rainfall than a 10-year, 24hr storm (having a 10 percent chance of happening in a given year).

Modeling is a way to mathematically predict and spatially represent what will occur with a given rainfall event. Hydrologic and hydraulic models were used to achieve this goal and are briefly described below:

- *Hydrologic models* take into account several factors including the particular rainfall event of interest, the physical nature of the land area where the rainfall occurs, and how quickly the resulting stormwater runoff drains this given land area. Hydrologic models can describe both the quantity of stormwater runoff and resulting pollution, such as nutrients (nitrogen and phosphorus) and sediment that are transported by the runoff.

- *Hydraulic models* represent the effect the stormwater runoff from a particular rainfall event has on both man-made and natural systems. These models can predict both the ability man-made culverts/channels have in conveying stormwater runoff and the spatial extent of potential flooding.

Table 1 provides modeling rationale for the three storm events that were modeled for this project.

Table 1
Modeling Rationale

Storm Event	Modeling Rationale
2-year, 24hr	Represents the amount of runoff that defines the shape of the receiving streams.
10-year, 24hr	Used to determine which road culverts will have adequate capacity to convey this storm without overtopping the road.
100-year, 24hr	Used to define the limits of flood inundation zones

1.3 Selection of Projects

As shown in Table 2, twenty-nine (29) projects from the ten year implementation plan were selected for SWMM and/or HEC-RAS modeling, and two (2) additional stream restoration and culvert retrofit projects were selected for changes to be modeled only in HEC-RAS through the subtask 3.6 modeling effort. Subprojects within a project group such as in the case of regional pond alternatives were analyzed individually but were assessed together per the guidance document entitled, Clarification of language from March 2009 WMP Standards Version 3.2 (Subtasks 3.4 & 3.6).

1.2.1 Justification for selection of projects

Projects were selected based on the criteria established at the Technical Team Meeting #6 and in accordance with the guidance document entitled, Clarification of language from March 2009 WMP Standards Version 3.2 (Subtasks 3.4 & 3.6). Based on these criteria, projects that were capable of providing meaningful increased quantity control, decreased downstream flow velocities or reduced flooding were selected for additional modeling in subtask 3.6.

All culvert retrofits that proposed increased conveyance capacities and/or the addition of micropool systems or additional storage capacity were included to be modeled within HEC-RAS. Stream restoration projects that significantly changed the morphology of the stream channel or proposed changes that would have significant impact to downstream flow velocities were also included in the list of projects to be modeled within HEC-RAS.

1.2.2 Justification for projects not modeled in SWMM

The TM-3 Guidance Update dated February 13, 2008, specifies that double-counting of treatment types is not considered due to wide variation in how treatment would be assigned in nested areas, due to limited availability of information and the number of assumptions that would need to be made.

To be consistent with this guidance, the modeling effort in subtask 3.6 did not include modeling subarea type C facilities in the SWMM model. Projects of this type include rain gardens, green roofs, infiltration trenches, water quality filters, infiltration basins and constructed wetlands. Projects of this class were generally smaller scale improvements to the local area, such as rain gardens, water quality filters, and infiltration trenches. Inherent in their limited scope, these low impact projects have high water quality benefits, but provide no meaningful quantity control and have little to no impact on reducing flooding conditions. Large scale projects that fall into this subtype such as infiltration basins, green roofs and constructed wetlands also were not selected for modeling. Constructed wetlands, green roofs and infiltration basins present modeling difficulties with limited availability of information which would lead to inaccurate assumptions without further detailed study. The current set up of SWMM models does not have mechanisms or capabilities to incorporate these large-scale type C projects without being inconsistent with previous guidance documentation. Although large in scale, these projects would not provide significantly higher water quantity control as standard design practice would have these projects control only the 2-year recurrence interval runoff volumes. In terms of water quantity, type C facilities, particularly those that incorporate bioretention or infiltration, generally reduce runoff volumes and will therefore not increase flooding downstream.

1.2.3 Justification for projects not modeled in HEC-RAS

The HEC-RAS model for Nichol Run and Pond Branch contains only the main stem and major tributaries of the two watersheds. Culvert retrofits, in-line ponds, and stream restoration projects that are not located on a modeled channel cannot be incorporated into the model and were excluded from the selected projects list.

Culvert retrofit projects that did not expand the conveyance capability of the channel or increased storage capacity through a micropool or designed outlet structure were also excluded from the selected projects list. In these cases, modeling the culvert retrofit would not result in a change to the velocities within the stream channel.

Likewise, stream restoration projects that did not propose alterations to the channel cross sections or significant changes to the morphology and planform of the stream were also excluded from the modeling effort. These minor stream restoration projects, such as stream bank

stabilization, do not significantly change the conveyance capability of the stream channel nor do they generally have a significant impact on channel velocities.

Table 2 below shows the final list of projects modeled in the hydrologic and hydraulic models.

Table 2
List of Modeled Projects

Subwatershed	Project ID	Modeled in			SWMM RUN
		STEPL	SWMM	HEC-RAS	
NI-HB-0001	NI9201	x			
NI-JB-0004	NI9113A	x	x	x	1
NI-NI-0002	NI9101	x	x		1
NI-NI-0009	NI9106A	x	x		1
NI-NI-0009	NI9106B	x	x		1
NI-NI-0009	NI9106C	x			
NI-NI-0009	NI9106D	x			
NI-NI-0009	NI9401	x	x		2
NI-NI-0014	NI9111	x	x		1
NI-NI-0015	NI9118A	x	x		1
NI-NI-0015	NI9119A	x	x		2
NI-NI-0015	NI9119B	x			
NI-NI-0015	NI9202A	x			
NI-NI-0015	NI9202B	x			
PN-CL-0002	PN9400	x	x		1
PN-CL-0003	PN9101	x			
PN-CL-0003	PN9102	x			
PN-CL-0003	PN9103A	x			
PN-CL-0003	PN9103B	x			
PN-CL-0003	PN9103C	x	x		1
PN-CL-0003	PN9104A	x	x		2
PN-CL-0003	PN9105B	x	x		3
PN-CL-0003	PN9105C	x			
PN-CL-0004	PN9100B	x	x		1
PN-CL-0004	PN9100C	x			
PN-CL-0006	PN9127A	x	x		1
PN-CL-0006	PN9127B	x	x		1
PN-CL-0006	PN9127C	x			
PN-CL-0006	PN9127D	x			
PN-CL-0008	PN9126	x	x		1
PN-CL-0009	PN9125B	x	x		1
PN-MR-0001	PN9124	x	x		1
PN-MR-0003	PN9122A	x	x		1

Table 2 List of Modeled Projects					
Subwatershed	Project ID	Modeled in			SWMM RUN
		STEPL	SWMM	HEC-RAS	
PN-MR-0003	PN9122B	x			
PN-MR-0004	PN9119	x	x		1
PN-MR-0004	PN9120A	x	x		2
PN-MR-0004	PN9120B	x	x		2
PN-MR-0004	PN9121A	x	x		3
PN-MR-0005	PN9117A	x	x		1
PN-MR-0005	PN9117B	x	x		1
PN-MR-0005	PN9118	x	x		2
PN-MR-0006	PN9113	x			
PN-MR-0006	PN9114B	x	x		1
PN-MR-0006	PN9200	x			
PN-MR-0007	PN9112	x	x	x	1
PN-MR-0008	PN9108C	x	x		1
PN-MR-0008	PN9109A	x	x		2
PN-MR-0008	PN9110A	x			
PN-MR-0008	PN9110B	x			
PN-MR-0008	PN9111B	x			
PN-MR-0008	PN9111C	x	x		3
PN-MR-0008	PN9111D	x			
PN-PN-0001	PN9201	x		x	
PN-PN-0003	PN9123	x	x		1
PN-PN-0004	PN9116A	x	x		1

2.1 Setup and Calibration of Stormwater Models

As discussed in the previous section, modeling is a way to mathematically predict and spatially represent what will occur during a given rainfall event. Hydrologic and hydraulic models are the two types of models that are used to achieve this.

Hydrologic and hydraulic models were created for three distinct scenarios as listed below:

- Existing conditions
- Future conditions without projects
- Future conditions with projects

For *Existing Conditions,* the models simulated the condition of the watersheds at the time the models were created by incorporating information on land use, soils, existing stormwater management and best management practice facilities, previous stream and watershed assessments, and actual field reconnaissance and site visits. The *Future Conditions without*

Projects scenario simulated future conditions based on countywide future land use and development, derived from the county's comprehensive plan and build-out predictions. As the name implies, the *Future Conditions without Projects* models do not contain any of the watershed restoration strategies or projects identified in this plan. The *Future Conditions with Projects* scenario simulates the implementation of the projects discussed in the previous sections. The *Future Conditions with Projects* scenario uses the *Future Conditions without Projects* models as a base on which proposed restoration strategies are added and evaluated.

Comparison of modeling results from these three scenarios yielded pollutant loading and stormwater runoff reductions discussed below.

2.2 GIS Processing

A sequence of Geographical Information System (GIS) processing was required in preparation for pollution modeling with STEPL and hydrologic modeling with SWMM. The *Future Conditions with Projects* scenario was evaluated in two ways. First, each project was evaluated individually, in order to assess the benefits of each individual project. In order to isolate project benefits, the projects were divided into multiple 'runs' for modeling purposes. Each run contained no more than one project per subwatershed; projects with multiple subprojects and regional pond alternative scenarios were processed together in order to model the benefits of the entire group of projects. A final 'run' was also processed for each model in order to evaluate the benefits of the implementation plans as a whole.

For each run, drainage areas to each modeled project were delineated in GIS. Processing was conducted in GIS to break each subwatershed into subareas based on the existing and/or proposed stormwater controls. There are five distinct subareas, each representing a type of stormwater facility:

- Peak-shaving only (subarea A)
- Peak-shaving and water quality, wet pond (subarea B1)
- Peak-shaving and water quality, dry pond (subarea B2)
- Peak-shaving only (subarea C)
- No stormwater treatment (subarea D)

Subareas were delineated from subwatersheds to adequately characterize all of the stormwater treatment that was occurring in the subwatershed. In some cases, the *Existing Conditions* and *Future Conditions without Projects* subareas were calculated incorrectly. The treatment by some ponds was not included in the appropriate subarea because the pond was not included in the County's stormwater network and not identified until candidate project field reconnaissance, or the drainage area to the pond did not contain any parcels included in the County's controlled parcels GIS layer. The treatment of some other areas was overestimated either because the parcels were included in the County's controlled parcels GIS layer, but not located within the drainage area of an existing stormwater management facility, or because candidate project field reconnaissance indicated that an existing pond provided less treatment than was originally modeled. These inaccuracies inherent in the GIS processing methodology are minimal at the watershed scale; however, they are problematic at an individual project scale. Best professional

judgment was used to determine whether individual project benefits were over or under estimated in pollution modeling. Some projects were excluded from hydrologic modeling due to these inconsistencies.

During the GIS processing, output tables were created for each 'run' that contain the land use and soils data for the proposed stormwater management areas for use in water quality and water quantity modeling.

2.3 Pollution Model

The Spreadsheet Tool for the Estimation of Pollutant Load (STEPL) model developed for the U. S. EPA was used to quantify the nutrient and sediment loads generated by stormwater runoff. The STEPL model calculates nutrient and sediment loads using simple algorithms based on the runoff volume and the pollutant concentrations in the runoff water as influenced by factors such as the land use distribution and management practices. The annual sediment load is calculated based on the Universal soil Loss Equation (USLE) and the sediment delivery ratio. Sediment and pollutant load reductions that result from the implementation of existing and/or proposed stormwater management facilities or best management practices (BMPs) are computed using known pollutant removal efficiencies.

2.2.1 Pollutant Model Setup

A STEPL model was developed for each of three conditions as described above. The model for each scenario was generally set up in the same manner. Local data such as state name, county name, precipitation information, universal soil loss equation (USLE) parameters and nutrient concentration in runoff were entered into the model.

Land use and soils tables were developed and imported into the STEPL model based on the distribution of each land use type or soil hydrologic group within each subarea. Pollutant loads and load reductions were automatically calculated for total nitrogen, total phosphorus, and sediment.

Because pollutant loads and load reductions were calculated at a subwatershed scale, each proposed project was modeled individually in order to show the water quality benefits for each specific project, and as a group to show the water quality benefits of watershed management plan as a whole.

Regional ponds were not modeled using the subarea classifications like smaller stormwater facilities because these facilities often drain larger areas that may include several subareas with additional stormwater controls. Therefore, regional facilities that were proposed for retrofit or construction were modeled by revising the regional pond pollutant removal efficiencies.

2.2.2 Streambank Erosion

Only locations where SPA data was available were used to calculate streambank erosion. All SPA erosion data (previous SPA assessments and the SPA conducted by F. X. Browne, Inc as

part of subtask 2.3) that had an impact score of 5 or greater were included in the calculations. Bank length and height were obtained from the SPA layers and reflect actual measurements performed in the field during the SPA analysis. For the areas where this data was not measured, the height was estimated based on the severity ranking and nearby field investigations.

Per the guidance document "Guidance for Representing Streambank Erosion and Regional Pond Efficiencies," dated 2/5/2009, the empirical equation provided in the document was used to characterize the streambank erosion.

The following equation and parameters were used to calculate streambank erosion:

Annual Sediment Load from Streambank, ton = L*H*RR*DW* NCF

Where:

L = Streambank Length, ft
H = Streambank Height, ft
RR = Lateral Recession Rate, ft/year
DW = Soil Dry Weight, ton/ft^3, based on the soil texture
NCF = Nutrient correction faction, based on the soil texture (optional)

Load Reduction = Load * BMP Efficiency

Nutrient Load, lbs = Sediment Load * NC/100
Where NC = Nutrient concentration %

The locations where streambank erosion was calculated were compared with the Soils_complete_w_HSG shapefile that had been clipped to our watershed boundaries. With this, the soil textural class was obtained and used to identify the soil dry weight based on the table provided in the guidance document "Guidance for Representing Streambank Erosion and Regional Pond Efficiencies," dated 2/5/2009 as replicated in Table 3 below.

Table 3: Dry Density and Nutrient Correction Factors for Various Soil Textures

Soil Textural Class	Dry Density ($tons/ft^3$)	Nutrient Correction Factor
Clay	0.035	1.15
Clay loam	0.0375	1.15
Fine Sandy loam	0.05	0.85
Loams, sandy clay loams	0.045	0.85
Organic	0.011	1.5
Sands, Loamy sands	0.055	0.85
Sandy clay	0.045	0.85
Sandy loam	0.0525	0.85
Silt Loam	0.0425	1
Silty clay loam, silty clay	0.04	1

As shown in Table 4 below, default values for lateral recession rates were determined based on the qualitative assessment of lateral erosion as assessed through the SPA habitat assessments. Lateral recession rates were obtained from the 'Gully&Streambank Erosion' tab in the STEPL template and posted on the WMP forum on February 6, 2009.

Table 4: Lateral Recession Rates based on SPA Impact Scores

Impact Score	Lateral Recession	Rate (ft/yr)
5	Moderate	0.13
6	Moderate	0.13
7	Severe	0.4
8	Severe	0.4
9	Severe	0.4
10	Very Severe	0.5

A Microsoft Excel spreadsheet was used to calculate stream loadings in lieu of creating a separate STEPL model. The calculated loads were aggregated to the subwatershed level and incorporated with the land-based loadings generated in the previously loaded STEPL models to determine total loadings used in the project prioritization task as discussed in the Task 3.4/3.5 technical memo.

2.3 Hydrologic Model

The SWMM model was developed by the U. S. EPA and was used to model rainfall runoff relationships in the Nichol Run and Pond Branch watersheds. Peak rate of runoff and total runoff volume values were generated from the SWMM models and describe the magnitude of stormwater runoff that results from each of the design storms.

2.3.1 Hydrologic Model Setup

SWMM models were generally created in the same manner for all three scenarios. Delineated subwatersheds were imported into the model and subareas were added depending on the type of stormwater facility/restoration strategy. Subwatershed and subarea parameters were input into the model from existing data, updated with field reconnaissance data and calibrated against real world flow and runoff information.

Subareas were delineated from subwatersheds to adequately characterize all of the stormwater treatment that was occurring in the subwatershed. Subareas were representative of all stormwater facilities or restoration strategies of a single type within a subwatershed. Therefore, the area draining to the facilities of each type were summed up and modeled as a single subarea (i.e. sum of all areas draining to C type facilities are represented by a single C type subarea within the model).

Regional ponds listed in the 1989 County Regional Stormwater Management Plan have both the stage-area relationship and the orifice elevation and size available. These regional ponds were represented within the model separately from the subarea delineation described above. The stage-area table from the report was specified for the storage unit, and the sizes and crest heights were specified for the orifices.

SWMM models for the *Existing Conditions* and the *Future Conditions without Projects* scenarios were prepared by the County's Technical Consultant, the Water Resources Group of Tetra-Tech, Inc., updated with field reconnaissance data and calibrated using discharge relationships developed in D. G. Anderson's 1970 Water Supply Paper and/or flood frequency methods detailed in U.S.G.S. Fact Sheet 023-01.

The SWMM models for the *Future Conditions with Projects* scenario were developed using the *Future Conditions without Projects* as the base models into which the proposed 10-year structural projects would be added. The SWMM Updating Tool developed by Tetra-Tech, Inc. and the methodology outlined in the "Tutorial for using the SWMM Updating Tool" provided by Tetra-Tech, Inc. were used to build these SWMM models. Subareas delineated in the GIS processing described above were manually entered into the SWMM models and subarea parameters such as subarea width and storage unit surface areas were calculated and adjusted in the models. Orifice sizes for the various stormwater facilities were calculated per the "Tutorial for Orifice Sizing" provided by Tetra-Tech, Inc. For subareas with no change in area, the previously calibrated infiltration values and routing parameters from the base model (*Future Conditions without Projects*) were copied into the *Future Conditions with Projects* models and finalized.

2.4 Hydraulic Model

The Hydrologic Engineering Centers River Analysis System (HEC-RAS) hydraulic model was initially developed by the U.S. Army Corps of Engineers (USACE) in the early 1990s as a tool to manage the rivers and harbors in their jurisdiction. HEC-RAS has found wide acceptance as the standard for simulating the hydraulics of water flow through natural and/or manmade channels and rivers. HEC-RAS is commonly used for modeling water flowing through a system of open channels with the objective of computing water surface elevations.

2.4.1 Hydraulic Model Setup

The geographic input data for the HEC-RAS model was extracted using HEC-GeoRAS. HEC-GeoRAS is a tool that processes the geospatial data within the County's Geographic Information System, specifically as it pertains to physical features such as stream geometry and flow path so that these features can be represented in the model. The HEC-RAS models were limited to the major tributaries and the main stem of Nichol Run and Pond Branch and do not include intermittent streams in headwater areas. Low flows and undefined channels prevent the models from providing beneficial output in these areas. However, the flow contributions from these areas were considered in downstream areas within the model.

Using available County or Virginia Department of Transportation (VDOT) engineering data, bridge and culvert crossings were coded into the model to simulate the effect these facilities have on the water surface elevations or profile. Where data were not available, field reconnaissance was performed to obtain the crossing elevation data. This crossing data was determined relative to a point where the elevation could be estimated accurately from the County's topographic data. Manning's 'n' values, which represent surface roughness, were assigned to the channel and overbank portions of the studied streams based on field visits and aerial photographs.

Proposed in-line ponds such as stormwater wet ponds or micro-pools associated with culvert retrofits were modeled in HEC-RAS by adjusting stream cross-sections for proposed grading changes in the stream channel. Additionally, outlet control structures were modeled as in-stream structures based on the orifice sizing calculations used for the SWMM hydrologic models. Stream restoration projects were modeled in HEC-RAS by adjusting the stream cross-sections to reflect the proposed grading and planform changes.

The hydrologic flow input data and the locations where the flows change were extracted from SWMM. The 2-yr, 10-yr and 100-yr storm flow outputs were determined at several locations in order to provide a detailed flow profile for input into the HEC-RAS hydraulic model.

As stated previously, the 2-year storm discharge is regarded as the channel-forming or dominant discharge that transports the majority of a stream's sediment load and therefore actively forms and maintains the channel. A comparison of stream dynamics and channel geometry for the 2-year discharge provides insight regarding the relative stability of the system and helps to identify areas in need of restoration.

The 10-year storm discharge was included to analyze the level of service of bridge and culvert stream crossings. Occurring less frequently than the 2-year storm, the flood stage associated with this storm can result in more significant safety hazards to residents. All stream crossings (bridges and culverts) were analyzed against this storm to see if they performed at safe levels.

The 100-year storm discharge is used by the Federal Emergency Management Agency (FEMA) to delineate floodplain inundation zones in order to establish a Flood Insurance Rate Map (FIRM) for a given area. The 100-yr HEC-RAS models were built in compliance with FEMA standards and were included to map the limits of these floodplain inundation zones. This mapping provided a means to assess which properties are at risk to flooding by the 100-yr storm event.

3.1 Analysis of Stormwater Modeling Results

Results of the modeling efforts were compiled and analyzed to determine the magnitude and extent of flooding and flow changes caused by implementation of the modeled projects. Pollutant load reductions were evaluated for all projects in the watershed management plan.

3.2 STEPL Model Results

STEPL model results for the overall 10-year implementation plan are presented in Table 5. Overall, the 10-year implementation plan will reduce total nitrogen, phosphorus and suspended solids by 1,113 pounds per year, 290 pounds per year and 167 tons per year, respectively.

Table 5
STEPL Model Results for 10-year Implementation Plan

	Modeling Scenario	Total Nitrogen (lb/yr)	Total Phosphorus (lb/yr)	Total Suspended Solids (ton/yr)
Nichol Run Watershed, Jefferson Branch WMA	Future Condition without Projects	2,363.62	347.98	43.61
	Future Condition with Projects	2,337.68	341.83	42.50
	Reduction	-25.94	-6.15	-1.11
Nichol Run Watershed, Nichol-Lower WMA	Future Condition without Projects	1,507.80	225.67	28.96
	Future Condition with Projects	1,473.97	217.32	27.47
	Reduction	-33.82	-8.34	-1.49
Nichol Run Watershed, Potomac WMA	Future Condition without Projects	831.36	135.37	25.71
	Future Condition with Projects	831.36	135.37	25.71
	Reduction	0.00	0.00	0.00
Nichol Run Watershed, Nichol-Upper WMA	Future Condition without Projects	6,138.16	942.20	195.29
	Future Condition with Projects	5,885.02	867.73	113.74
	Reduction	-253.14	-74.48	-81.55
Nichol Run Watershed, Total	Future Condition without Projects	***10,840.94***	***1,651.22***	***293.56***
	Future Condition with Projects	***10,528.04***	***1,562.25***	***209.42***
	Reduction	***-312.91***	***-88.97***	***-84.14***
Pond Branch Watershed, Clark Run WMA	Future Condition without Projects	4,131.97	639.61	79.48
	Future Condition with Projects	3,855.32	576.88	67.72
	Reduction	-276.65	-62.74	-11.75
Pond Branch Watershed, Pond Branch WMA	Future Condition without Projects	2,105.70	334.82	84.17
	Future Condition with Projects	1,993.10	296.71	36.56
	Reduction	-112.60	-38.11	-47.61
Pond Branch Watershed, Mine Run WMA	Future Condition without Projects	4,076.84	619.38	93.91
	Future Condition with Projects	3,665.90	518.77	70.29
	Reduction	-410.94	-100.61	-23.62
Pond Branch Watershed, Potomac WMA	Future Condition without Projects	1,648.24	274.89	55.12
	Future Condition with Projects	1,648.24	274.89	55.12
	Reduction	0.00	0.00	0.00
Pond Branch Watershed, Total	Future Condition without Projects	***11,962.74***	***1,868.71***	***312.67***
	Future Condition with Projects	***11,162.25***	***1,667.20***	***229.68***
	Reduction	***-800.50***	***-201.52***	***-83.00***

3.3 SWMM Model Results

Tables 6 and 7 below presents the 2-Year and 10-Year peak rate of runoff flows from the SWMM model runs for Nichol Run and Pond Branch. The tables below show the effects of the modeled projects individually and bundled in cases of subprojects or regional pond alternatives.

Table 6 SWMM Model Results for Nichol Run							
Subbasin	Project ID	2-YR Total Flow (cfs)			10-YR Total Flow (cfs)		
		Future without Projects	Future with Projects	Difference	Future without Projects	Future with Projects	Difference
NI-JB-0004	NI9113A	180.85	145.19	-20%	365.58	318.03	-13%
	Overall		145.19	-20%		318.03	-13%
NI-NI-0002	NI9101	1073.75	960.92	-11%	2326.22	2142.69	-8%
	Overall		949.28	-12%		2121.07	-9%
NI-NI-0009	NI9106A & NI9106B	49.84	17.21	-65%	99.04	38.89	-61%
	NI9401		13.84	-72%		55.01	-44%
	Overall		10.05	-80%		40.12	-59%
NI-NI-0014	NI9111	37.67	19.96	-47%	74.81	43.45	-42%
	Overall		20.42	-46%		44.56	-40%
NI-NI-0015	NI9118A	72.37	55.05	-24%	142.55	109.84	-23%
	NI9119A		46.88	-35%		93.73	-34%
	Overall		45.59	-37%		91.85	-36%

In the Nichol Run watershed, NI9401, a culvert retrofit project that consisted of a proposed micro-pool upstream of the culvert, showed the greatest reduction in flows with a 72% reduction in flows from the 2-year and a 44% reduction in flows from the 10-year storm events. Project NI9101, which proposes retrofitting an existing farm pond into a stormwater wet pond, had the weakest reductions with an 11% and 8% reduction in flows from the 2-year and 10-year storm events, respectively.

Table 7 SWMM Model Results for Pond Branch							
Subbasin	Project ID	2-YR Total Flow (cfs)			10-YR Total Flow (cfs)		
		Future without Projects	Future with Projects	Difference	Future without Projects	Future with Projects	Difference
PN-CL-0002	PN9400	173.40	70.17	-60%	370.31	170.05	-54%
	Overall		64.01	-63%		156.63	-58%
PN-CL-0003	PN9103C	135.36	81.06	-40%	273.07	172.54	-37%
	PN9104A		76.96	-43%		163.23	-40%
	PN9105B		80.29	-41%		171.27	-37%
	Overall		74.51	-45%		158.11	-42%
PN-CL-0004	PN9100B	105.41	87.88	-17%	209.30	169.98	-19%
	Overall		87.87	-17%		169.97	-19%
PN-CL-0006	PN9127A & PN9127B	274.10	122.48	-55%	565.63	310.65	-45%
	Overall		124.11	-55%		310.53	-45%

Table 7 SWMM Model Results for Pond Branch							
Subbasin	**Project ID**	**2-YR Total Flow (cfs)**			**10-YR Total Flow (cfs)**		
		Future without Projects	**Future with Projects**	**Difference**	**Future without Projects**	**Future with Projects**	**Difference**
PN-CL-0008	PN9126	92.01	79.49	-14%	188.06	158.18	-16%
	Overall		79.49	-14%		158.18	-16%
PN-CL-0009	PN9125B	86.01	9.72	-89%	174.68	45.21	-74%
	Overall		9.72	-89%		45.21	-74%
PN-MR-0001	PN9124	566.88	292.77	-48%	1209.47	710.19	-41%
	Overall		217.44	-62%		512.07	-58%
PN-MR-0003	PN9122A	434.71	217.57	-50%	935.23	527.62	-44%
	Overall		137.47	-68%		360.81	-61%
PN-MR-0004	PN9119	83.39	55.34	-34%	167.30	112.45	-33%
	PN9120A & PN9120B		51.52	-38%		104.39	-38%
	PN9121A		19.36	-77%		49.10	-71%
	Overall		17.93	-78%		43.56	-74%
PN-MR-0005	PN9117A & PN9117B	87.82	58.35	-34%	174.13	115.60	-34%
	PN9118		23.44	-73%		45.27	-74%
	Overall		23.46	-73%		45.31	-74%
PN-MR-0006	PN9114B	96.55	85.48	-11%	192.34	165.92	-14%
	Overall		85.48	-11%		165.92	-14%
PN-MR-0007	PN9112	230.40	114.03	-51%	491.97	249.55	-49%
	Overall		47.40	-79%		133.82	-73%
PN-MR-0008	PN9108C	177.62	114.67	-35%	350.23	223.09	-36%
	PN9109A		102.77	-42%		199.57	-43%
	PN9111C		28.71	-84%		70.12	-80%
	Overall		26.54	-85%		70.26	-80%
PN-PN-0003	PN9123	171.50	92.11	-46%	391.21	191.29	-51%
	Overall		91.06	-47%		191.29	-51%
PN-PN-0004	PN9116A	102.33	54.76	-46%	205.93	111.82	-46%
	Overall		54.76	-46%		111.82	-46%

The SWMM model results show that projects PN9125B and PN9111C yielded the greatest reduction in flows of projects in the Pond Branch watershed that were modeled. Both projects are retrofits of farm ponds into stormwater wet ponds in areas where no stormwater treatment currently exists. The SWMM model indicates that implementation of project PN9125B would result in an 89% and 74% reduction in flows from the 2-year and 10-year storm events,

respectively. Similarly, implementation of project PN9111C would generate an 84% and 80% reduction in flows from the 2-year and 10-year storm events, respectively. The hydrologic models show that project PN9114B would have the lowest reductions of all projects modeled with 29% reductions in flows from the 2-year or 10-year storm events. The results shown in Tables 6 and 7 above indicate a significant impact to stormwater flows through implementation of the water quantity controls proposed in the 10-year implementation plan.

3.4 HEC-RAS Model Results

Peak flow values from the SWMM models were used as inputs for HEC-RAS models. In general, *Future Conditions without Projects* models showed increased water surface elevations compared to *Existing Conditions* models, although the extent of flooding was generally the same. Peak flow values for *Future Conditions with Projects* models were generally lower and resulted in water surface elevations that were lower. In some cases where projects were targeted to alleviate flooding or to prevent roadway overtopping, water surface elevations were significantly lower and the goal of preventing damage to property from flooding was achieved. Figure 1 below depicts the magnitude of the difference in water surface elevations between the *Future Conditions with Projects* and *Future Conditions without Projects* scenarios in some sections.

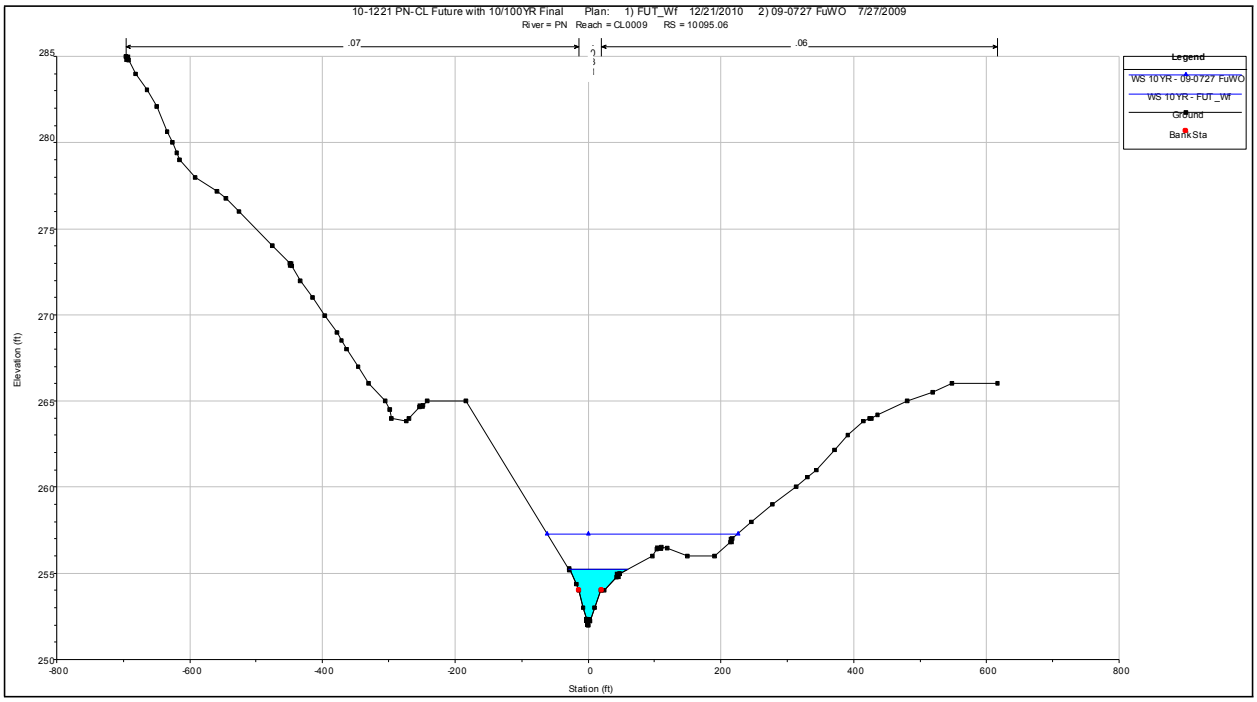


Figure 1: Plot of HEC-RAS cross-section located on Clarks Branch of the Pond Branch watershed showing reduction in flow from *Future Conditions without Projects* to *Future Conditions with Projects* scenario for the 10-year storm event.

4.0 Cost Benefits Analysis

An integral element to evaluating the benefits of restoration strategies and projects is associated costs. Cost estimates were calculated for all structural projects. Detailed cost estimates were

determined for structural projects in the 0-10 year implementation phase. The total costs of implementing projects in this phase were calculated to be approximately $2 million and $7 million for the Nichol Run and Pond Branch watersheds, respectively. Associated costs for structural projects in the 11-25 year phase were roughly approximated based on the overall costs associated with similar projects in the 10 year implementation plan and estimated to total about $4 million. Cost estimates were not calculated for non-structural projects, because non-structural projects do not require traditional construction measures to be implemented and may be programmatic in nature.

In addition to the calculation of cost estimates for projects listed in the implementation plan, a cost benefit analysis was also performed. The project cost distribution for all projects listed in the 10-year implementation plan was evaluated. The evaluation of the project cost distribution allowed for a determination of outliers within the lists of projects. A chart detailing the project cost distribution is attached in Appendix B. These outliers could be projects that were significantly more or less expensive than other projects in the lists. These projects were further scrutinized and evaluated to determine if they should remain in the 10-year list. Outliers determined to be kept in the list were evaluated separately from the other projects in the 10-year list. A cost to benefit ratio was calculated based on the subwatershed ranking composite score and the projects' associated costs.

Using the cost to benefit ratio, all structural projects in the 10-year implementation plan were reordered based on this analysis. Best professional judgment will be used to determine the appropriateness of the ranking adjustments for each 10-year project. A table detailing the results of the cost benefits analysis is attached in Appendix B. The composite scores from the prioritization process were adjusted to reflect the cost benefits analysis. Quintiles were established based on the difference in project rank from the prioritization process and the cost benefits analysis. Score adjustments to the composite scores were scaled based on the magnitude of the change as shown in Table 8 below to reflect the impact of the cost benefits analysis. Projects were reordered based on these adjusted scores and reviewed using best professional judgment to determine the final list of 10-year implementation projects.

Table 8
Quintiles for Cost Benefit Analysis Adjustments

Percentile	Change in Rank (Cost Benefits Analysis Score – Composite Score)	Score Adjustment
0%	-21.00	0.10
20%	-11.80	0.05
40%	-6.60	0.00
60%	-0.40	-0.05
80%	9.40	-0.10

5.0 Conclusions & Ranking Modifications

Based on the results presented in this memo, the overall impact of implementing the projects identified in the 10-year priority list is generally beneficial to reducing pollutant loads and

stormwater runoff flows. These results were used to adjust the overall ranking of structural projects for the final watershed management plan. Projects showing significant reductions were weighted favorably whereas projects showing increased flows or potential for downstream flooding were further evaluated to determine viability in the 10-year priority list.

This page intentionally left blank

Appendix A: Determination of SWMM Input Parameters

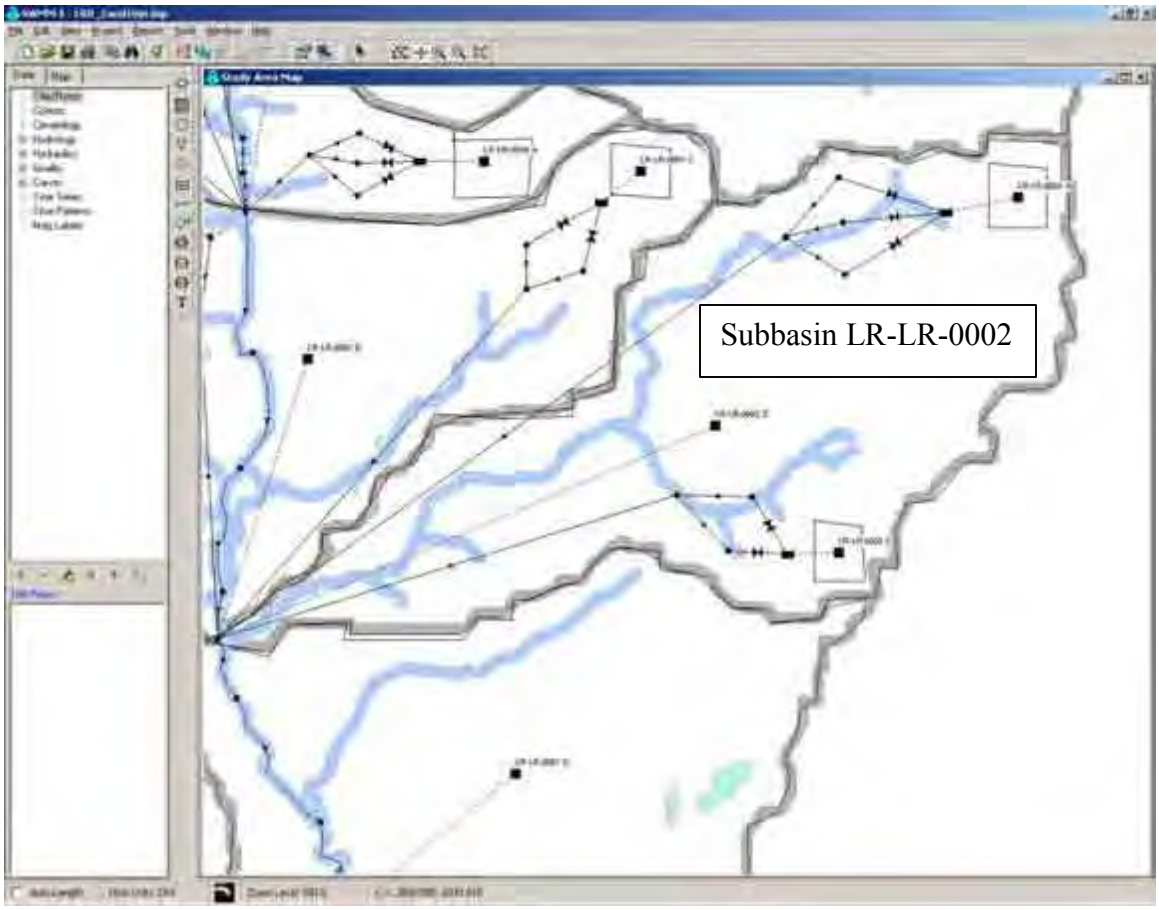
This page intentionally left blank

Determination of SWMM input parameters

This short write-up explains how input parameters for the County SWMM models are developed. The LRR-SWMM model is used as an example in the following discussions.

1. General model setup

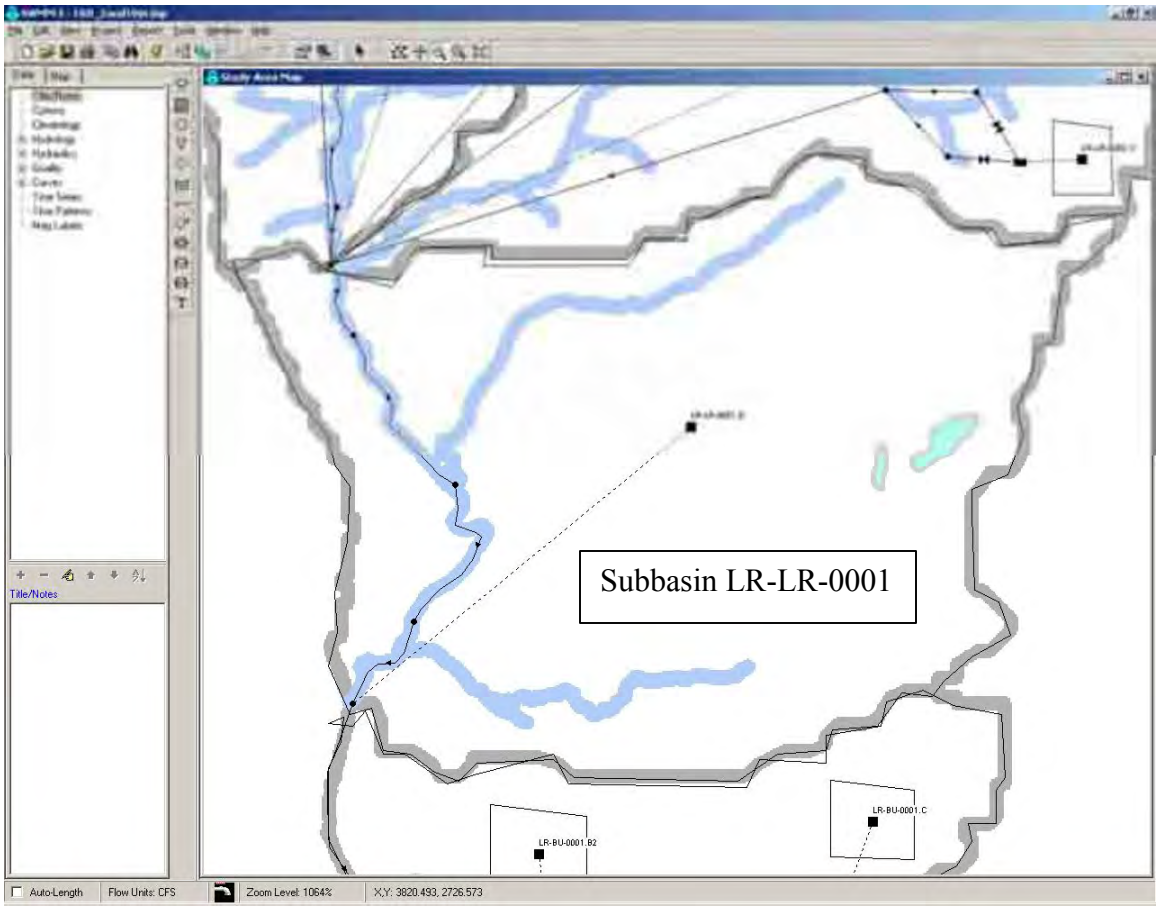
When setting up SWMM, the subbasins and subareas are delineated. Since most subbasins always have subarea D (no-treatment) and may have one or more other subareas (i.e., A, B1, B2, and C), by default the delineation along the subbasin boundary is named as subarea "D." Other subareas, if any, are delineated as rectangular boxes within subarea "D." This delineation scheme only illustrates the subarea composition within a subbasin, and does not reflect the real location of subareas or influence the routing of surface runoff. The input parameters for each subarea is entered separately (discussed in Section 2) and flow is routed to downstream components, independent of the size or location of the delineation.



The screenshot above shows the delineation for several Little Rocky Run subbasins/subareas. As shown, in subbasin LR-LR-0002, there are three subareas of A, C, and D. By default the delineation along the subbasin boundary is named as subarea D, and subareas A and C are delineated as rectangles within. Surface runoff from each

subarea is either routed to the subbasin outlet or the downstream stormwater facility (discussed in Section 3).

A subbasin may also contain only one subarea, as shown below for subbasin LR-LR-0001. The only subarea here, Subarea D, is delineated along the subbasin boundary and routed to subbasin outlet. Natural stream channel (discussed in Section 4) carries upstream runoff to downstream through the subbasin.



2. Input parameters for subarea

As shown in the SWMM input parameter window above for subarea LR-LR-0002.D, input parameters for a subarea include area, width, slope, percentage of impervious, Manning's *n* for both pervious and impervious surfaces, depression storage for both impervious and pervious surfaces, percentage of impervious surfaces with zero depression storage, subarea internal routing method and percentage, and the Horton infiltration parameters. The generation of each input parameter is discussed below.

Area – In a given subbasin, the aggregated area for one particular subarea type (i.e. sum all C subareas within LR-LR-0002) is the value to input for that subarea in SWMM.

Width – The width of a subbasin, as specified in SWMM User's manual, is calculated by dividing the subbasin area by the longest flow path. The longest flow path is

automatically generated using ArcHydro. In subbasins consisting of more than one subareas, TM3 specifies that the width of the subbasin is divided among the subareas in proportion to the area percentage of each subarea in the subbasin. For example, the LR-LR-0002 subbasin has a total area of 145.66 acres and a longest flow path of 6792.02 ft. Thus, the width for the subbasin is 934.18 ft. Since the area of subarea D is 125.35 acre, or 86%, the width for subarea D is 934.18*86%=803.91 ft.

Slope – Slope for a subbasin is calculated as "rise over run," in which the "run" represents the longest flow path, and the "rise" is the elevation difference between the starting and ending points of the longest flow path. As is specified in TM3, slope is calculated for subbasins only, and all the subareas within a subbasin use the same slope.

Percentage of imperviousness – The percentage of imperviousness of a subarea is calculated as dividing the total planimetric impervious area (i.e. building, roadway, parking lot, and sidewalk) by the total area of the subarea.

Manning's *n* – The Manning's *n* for both impervious and pervious surfaces are calculated based on land use information following TM3 specifications (pp. 4-29). The area of each type of land use within a subarea is first tabulated and the percentage calculated. By referring to the Manning's *n* for each type of land use in TM3, an area-weighted Manning's *n* is calculated for the whole subarea.

Depression storage – The depression storage for pervious and impervious surfaces follows the TM3 recommendations, in which the depression storage for pervious surface is 0.2 in and impervious 0.1 in.

Percentage of impervious surface with zero depression storage – A default value of 25% suggested by TM3 is used in the initial model setup.

Internal routing method and percentage – This is a SWMM5 capability of allowing for internal routing of flow among pervious and impervious surfaces (SWMM has three categories of surfaces: DCIA, NDCIA, and pervious), which makes it possible to reflect runoff from NDCIA surfaces (by routing NDCIA runoff to neighboring pervious surfaces). When specifying the internal routing method, flow is routed to pervious surfaces, and the percentage routed is calculated as the NDCIA area divided by the total impervious area (DCIA+NDCIA).

Horton infiltration parameters (WLMIN, WLMAX, and DECAY) – The Horton infiltration parameters are generated based on the soils information within each subarea, following TM3 specifications (pp. 4-13). The area of each hydraulic soils group within a subarea is first tabulated, and area-weighted WLMAX, WLMIN, and DECAY are then calculated for the soils in the subarea.

3. Input parameters for stormwater facilities

There are four types of stormwater facilities: peak-shaving only (subarea A); peak-shaving and water quality, wet pond (subarea B1); peak-shaving and water quality, dry pond (subarea B2); and peak-shaving only (subarea C).

3.1 *Peak-shaving facilities*

The peak-shaving facilities serve the purpose of maintaining the pre-development peak flow for both 2-year and 10-year design storms. In the model representation, a storage unit with three orifices is used to represent the facility. Facing downstream, the three orifices are the 2-year orifice, 10-year orifice, and overflow orifice from left to right. The elevation of the orifices also increase as they change from 2-year to overflow. For example, the 2-year orifice is always located at the bottom of the storage unit (Crest Height=0). Dummy channels carries flow from the three orifices to a downstream converging point, before discharging the combined outflow to subbasin outlet.

The storage unit is initialized to have a surface area of 1/8 acre with uniform depth, and the maximum depth is set to be 20 ft. The surface area of the storage unit might change during the sizing process. The sizing process follows the procedures in Virginia Stormwater Management Handbook.

At the end of sizing process, the 2-year orifice has a maximum outflow rate that equals the pre-development subarea (Impervious percentage=0) peak runoff rate during the 2-year design storm. No flow occurs in the 10-year and overflow orifices during the 2-year event. During a 10-year design event, the combined flow from the 10-year and 2-year orifices equal the pre-development subarea peak flow rate, and no flow occurs in the overflow orifice. The overflow orifice is located at the maximum water depth in the storage unit during a 10-year storm, and the overflow orifice diameter is uniformly set to be 5 ft.

3.2 *Peak-shaving and water quality facilities, wet pond*

The wet pond facilities provide water quality benefits through the permanent pool of water. Except for the permanent pool, all other features are the same as the peak-shaving facilities.

Following the Virginia Stormwater Management Handbook guidelines, the volume of the permanent pool of water is four times the water quality volume. The water quality volume is defined as the first inch of runoff from the impervious surfaces of a subarea. After calculating the volume of permanent pool, the initial depth of water in the SWMM storage unit is calculated by dividing the volume with the storage unit surface area. The initial depth of water in the storage unit is the elevation for the 2-year outflow orifice. The sizing procedures followed for 2-year, 10-year, and overflow orifices are the same as those in the peak-shaving facilities case.

3.3 *Water quality only facilities*

The sizing for water quality only facilities observes the County regulations on water quality facilities, in which an imperviousness-based water quality volume has to be detained and released in 48 hours. The relationship between subarea imperviousness and the volume required for storage is specified in Plate No. 2-6 of the County Public Facilities Manual.

For water quality only facilities, one storage unit and two orifices (water quality orifice and overflow orifice) are used for the representation. Initial settings for the storage unit (surface area and maximum depth) are the same as in the peak-shaving only facilities. Similar to peak-shaving only facilities and wet pond type facilities, the two orifices are water quality orifice and overflow orifice from left to right when facing downstream.

Sizing of water quality orifice follows the Virginia Stormwater Management Handbook procedures. The final water quality orifice sizing ensures that the release time for the storage volume is 48 hours. The overflow orifice is uniformly set to be 5 ft in diameter.

3.4 *Peak-shaving and water quality facilities, dry pond*

The peak-shaving and water quality facilities functions like a combination of the peak-shaving only facility and the water quality only facility. In SWMM, the representation is one storage unit with four outflow orifices: water quality orifice, 2-year outflow orifice, 10-year outflow orifice, and overflow orifice. When facing downstream, the four orifices are arranged as water quality orifice, 2-year orifice, 10-year orifice, and overflow orifice from left to right.

During the sizing process, the water quality orifice is first sized following the same steps as those in the water quality only facilities. Then the 2-year, 10-year, and overflow orifices are sized as for the peak-shaving only facilities. The only difference here is that during a 2-year event, the peak rate of the combined flow from the water quality and 2-year orifices matches the pre-development subarea peak runoff rate. And in a 10-year design event, the combined flow from the water quality orifice, 2-year orifice, and 10-year orifice matches the pre-development subarea peak runoff rate. The overflow orifice diameter is uniformly set to 5 ft.

4. Input parameters for natural channels

Cross-sections are cut along the main channel stem following TM3 guidelines (pp. 6-5). The ArcGIS 3D Analyst is used to derive the cross-section channel profile based on the County TIN data. The cross-section data are then exported in Excel files, which are then loaded into SWMM.

All the natural channel cross-sections have the “irregular” shape, which has the cross-section from the TIN data. The channel lengths are measured from the County FHD layer. A SWMM5 default Manning’s *n* of 0.01 is used for all channels.

5. Input parameters for regional ponds

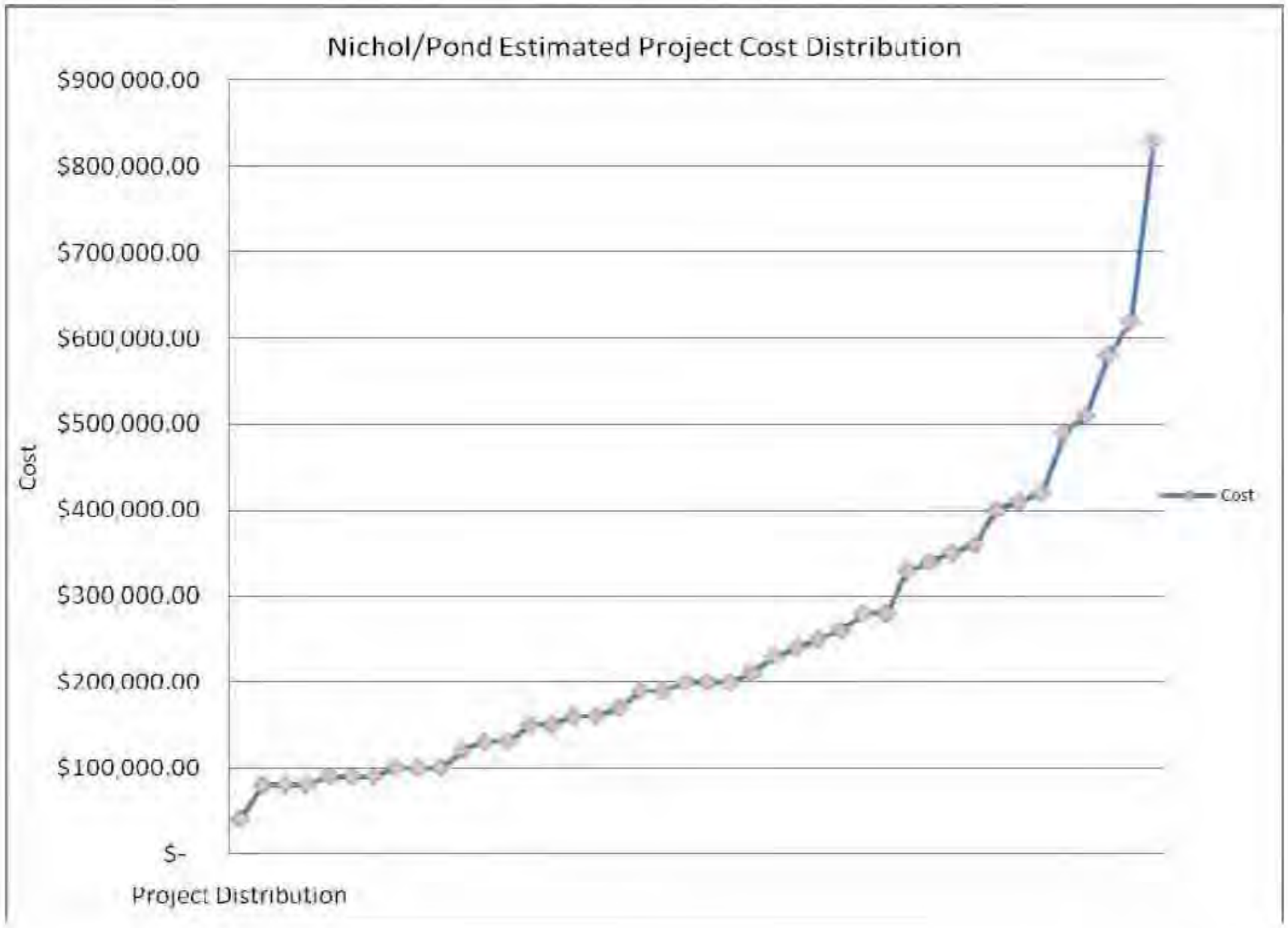
Regional ponds listed in the 1989 County Regional Stormwater Management Plan have both the stage-area relationship and the orifice elevation and size available. These regional ponds are represented within the model using one storage unit and two or three orifices depending on the design. The stage-area table from the report is specified for the storage unit, and the sizes and crest heights are specified for the orifices.

As for regional ponds that are not listed in the 1989 County Regional Stormwater Management Plan, some have as-built information available (i.e., Keene Mill Village regional pond in Pohick Creek) and some does not have any information (i.e. Lake Accotink in Accotink Creek, Burke Lake in Pohick). As for the ones that have the as-built information, the data are in the forms of elevation-outflow tables or curves for 2-year or 10-year design events (instead of stage-area for storage unit, and crest height and size for 2-year and 10-year orifices). That means that a separate representation needs to be created for both 2-year and 10-year design storms for these regional ponds (a total number of 10). Currently these ten regional ponds are not represented.

All regional ponds in the County are marked with text notation in the model, and the regional ponds that need addition information are noted in the "Description" of the pond.

Appendix B: Cost Benefit Analysis Results

This page intentionally left blank


Nichol/Pond Estimated Project Cost Distribution
$900,000.00
$800,000.00
$700,000.00
$600,000.00
$500,000.00
$400,000.00
$300,000.00
$200,000.00
$100,000.00
$-
Cost
Project Distribution
Cost

Project Number	Estimated Costs	Composite Score	Comp. Score Rank	CBA Score	CBA Scaled Score	CBA Rank	Change in Rank (CBA - Comp)	CBA Score Adjustment	CBA Adjusted Prioritization Score	Final Rank
NI9113	$ 40,000.00	3.70	14	3.31	1.12	2	-12	0.10	3.80	7
PN9101	$ 80,000.00	3.75	11	3.42	1.10	3	-8	0.05	3.80	10
NI9102	$ 80,000.00	3.25	39	3.42	0.95	19	-20	0.10	3.35	37
PN9124	$ 80,000.00	3.35	32	3.42	0.98	11	-21	0.10	3.45	25
NI9101	$ 90,000.00	3.30	35	3.45	0.96	16	-19	0.10	3.40	29
PN9123	$ 90,000.00	3.55	18	3.45	1.03	7	-11	0.05	3.60	18
PN9110	$ 90,000.00	3.65	16	3.45	1.06	4	-12	0.10	3.75	13
NI9201	$ 100,000.00	3.38	31	3.48	0.97	13	-18	0.10	3.48	24
PN9113	$ 100,000.00	3.90	7	3.48	1.12	1	-6	0.00	3.90	5
PN9119	$ 100,000.00	3.40	28	3.48	0.98	12	-16	0.10	3.50	21
PN9400	$ 120,000.00	3.53	21	3.53	1.00	9	-12	0.10	3.63	17
PN9102	$ 130,000.00	3.30	37	3.56	0.93	23	-14	0.10	3.40	31
PN9118	$ 130,000.00	3.75	12	3.56	1.05	5	-7	0.05	3.80	12
PN9120	$ 150,000.00	3.35	32	3.61	0.93	24	-8	0.05	3.40	29
NI9112	$ 150,000.00	3.20	40	3.61	0.89	29	-11	0.05	3.25	40
NI9401	$ 160,000.00	3.48	25	3.64	0.96	17	-8	0.05	3.53	20
PN9201	$ 160,000.00	3.30	35	3.64	0.91	28	-7	0.05	3.35	34
PN9100	$ 170,000.00	3.50	24	3.67	0.95	18	-6	0.00	3.50	23
NI9108	$ 190,000.00	3.20	40	3.73	0.86	32	-8	0.05	3.25	40
PN9114	$ 190,000.00	3.40	28	3.73	0.91	27	-1	0.00	3.40	31
PN9104	$ 200,000.00	3.75	12	3.75	1.00	10	-2	0.00	3.75	14
PN9105	$ 200,000.00	3.50	22	3.75	0.93	21	-1	0.00	3.50	21
PN9121	$ 200,000.00	3.20	40	3.75	0.85	34	-6	0.00	3.20	42
NI9111	$ 210,000.00	3.50	22	3.78	0.93	25	3	-0.05	3.45	26
NI9118	$ 230,000.00	3.60	17	3.84	0.94	20	3	-0.05	3.55	19
PN9112	$ 240,000.00	3.70	15	3.86	0.96	15	0	-0.05	3.65	16
PN9126	$ 250,000.00	3.40	27	3.89	0.87	31	4	-0.05	3.35	33
NI9106	$ 260,000.00	3.35	34	3.92	0.85	33	-1	0.00	3.35	34
PN9109	$ 280,000.00	3.85	9	3.97	0.97	14	5	-0.05	3.80	7
PN9125	$ 280,000.00	3.30	37	3.97	0.83	35	-2	0.00	3.30	39

Project Number	Estimated Costs	Composite Score	Comp. Score Rank	CBA Score	CBA Scaled Score	CBA Rank	Change in Rank (CBA - Comp)	CBA Score Adjustment	CBA Adjusted Prioritization Score	Final Rank
NI9119	$ 330,000.00	4.25	1	4.11	1.03	6	5	-0.05	4.20	1
PN9127	$ 340,000.00	4.15	4	4.14	1.00	8	4	-0.05	4.10	3
PN9200	$ 350,000.00	3.45	26	4.17	0.83	36	10	-0.10	3.35	34
PN9117	$ 360,000.00	3.90	6	4.19	0.93	22	16	-0.10	3.80	7
PN9116	$ 400,000.00	3.80	10	4.31	0.88	30	20	-0.10	3.70	15
PN9108	$ 410,000.00	4.00	5	4.33	0.92	26	21	-0.10	3.90	5
PN9406	$ 420,000.00	3.40	30	4.36	0.78	37	7	-0.05	3.35	37
PN9122	$ 490,000.00	4.25	1	5.66	0.75	38	37	-0.10	4.15	2
PN9408	$ 510,000.00	3.55	20	5.85	0.61	40	20	-0.10	3.45	28
NI9202	$ 580,000.00	4.20	3	6.51	0.65	39	36	-0.10	4.10	4
PN9103	$ 620,000.00	3.55	18	6.89	0.52	41	23	-0.10	3.45	27
PN9111	$ 830,000.00	3.90	7	8.86	0.44	42	35	-0.10	3.80	10