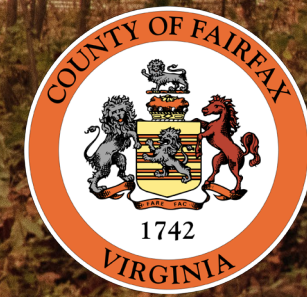




Lake Accotink Dredging

Alternatives Analysis

July 29 and August 5, 2021



Alternatives Analysis Report

1. Introduction
2. Summary of Existing Data
3. Evaluation Criteria
4. Development and Screening of Methods
5. Environmental and Cultural Resource Evaluation
6. Development and Screening of Alternatives
7. Analysis of Retained Alternatives



Fairfax County, Virginia

Alternatives Analysis Report

Lake Accotink Dredging Project

Project # SD-000041-001

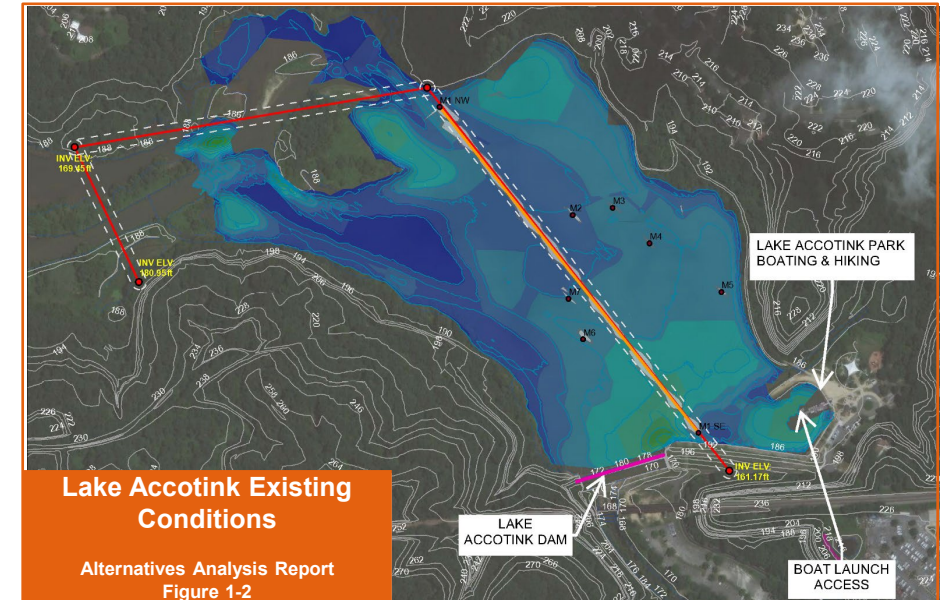
July 12, 2021

Full Report Available on Project Website: <https://www.fairfaxcounty.gov/publicworks/lake-accotink-dredging>

Introduction

Objective and Scope

- Project to include dredging, sediment transport, and disposal by truck
- Increase lake depth and overall volume of the lake
- Facilitate retention of the aesthetic and recreational value of the lake
- Provide a dredging maintenance plan that allows the lake to remain a valuable asset to the community



Lake Accotink Information	
Watershed Area	19,600 acres
Lake Area	55 acres
Average Sedimentation Rate	23,000 cubic yards per year
Previous Dredging Events	1960s, 1985, 2008
Nearby Land Use	Parks, Residential, Light Industrial
Surrounding Habitat	Forests, marshes, and ephemeral wetlands

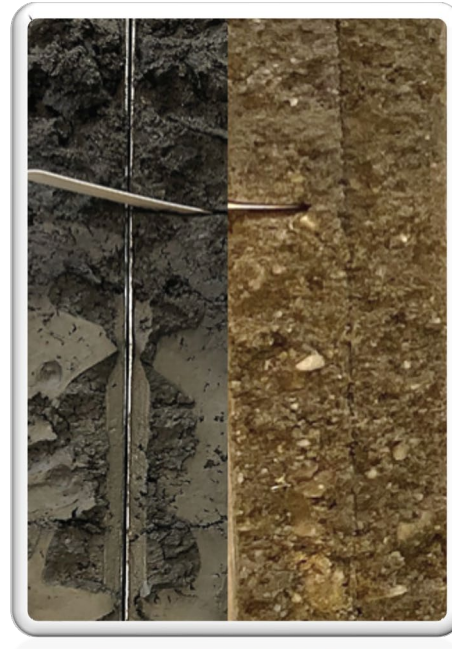
All values are approximate

Summary of Existing Data

Hydrographic Survey



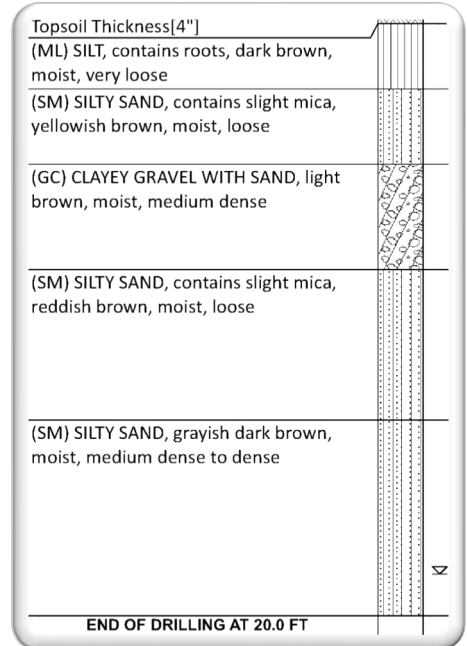
Sediment Testing



Dewatering Tests



Soil Testing



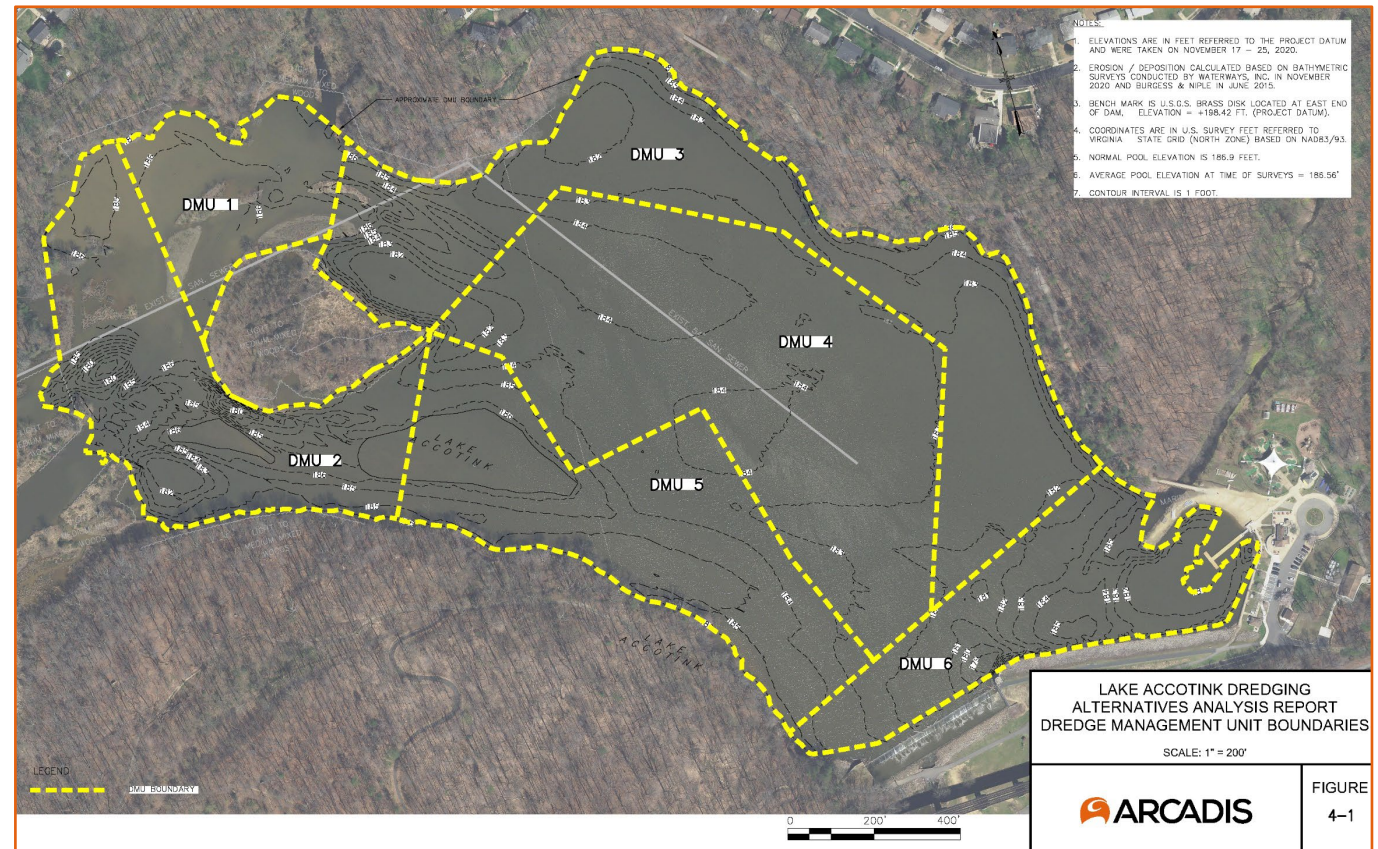
Evaluation Criteria

Category	Criteria
Park Management	Long-Term Park Vision
Community	Recreational Use Restrictions During Construction Community Considerations During Construction
Environment	Environmental Considerations Floodplain Impacts Sustainability
Construction and Dredging Program Operation	Available Area and Accessibility Site Preparation Requirements Flexibility/Compatibility with Various Equipment Efficient Water Return Constructability Long-Term Operation and Maintenance Schedule Costs

Sub-Criteria Developed for Each of the Components Evaluated

Assumptions

- Target Final Water Depth – 8 feet
- Dredge Volume – 450,000 to 500,000 cubic yards
- Construction Schedule – 3 years
- Dredging Schedule – 2 years
- Average Dredging Rate – 950 cubic yards per day



Development and Screening of Methods

Dredging

Dredging Methods



Mechanical

8 cubic yard bucket
16 cubic yard bucket



Hydraulic

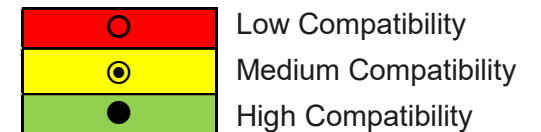
8-inch dredge
14-inch dredge



Amphibious (Hybrid)

Dredging Method Evaluation Table

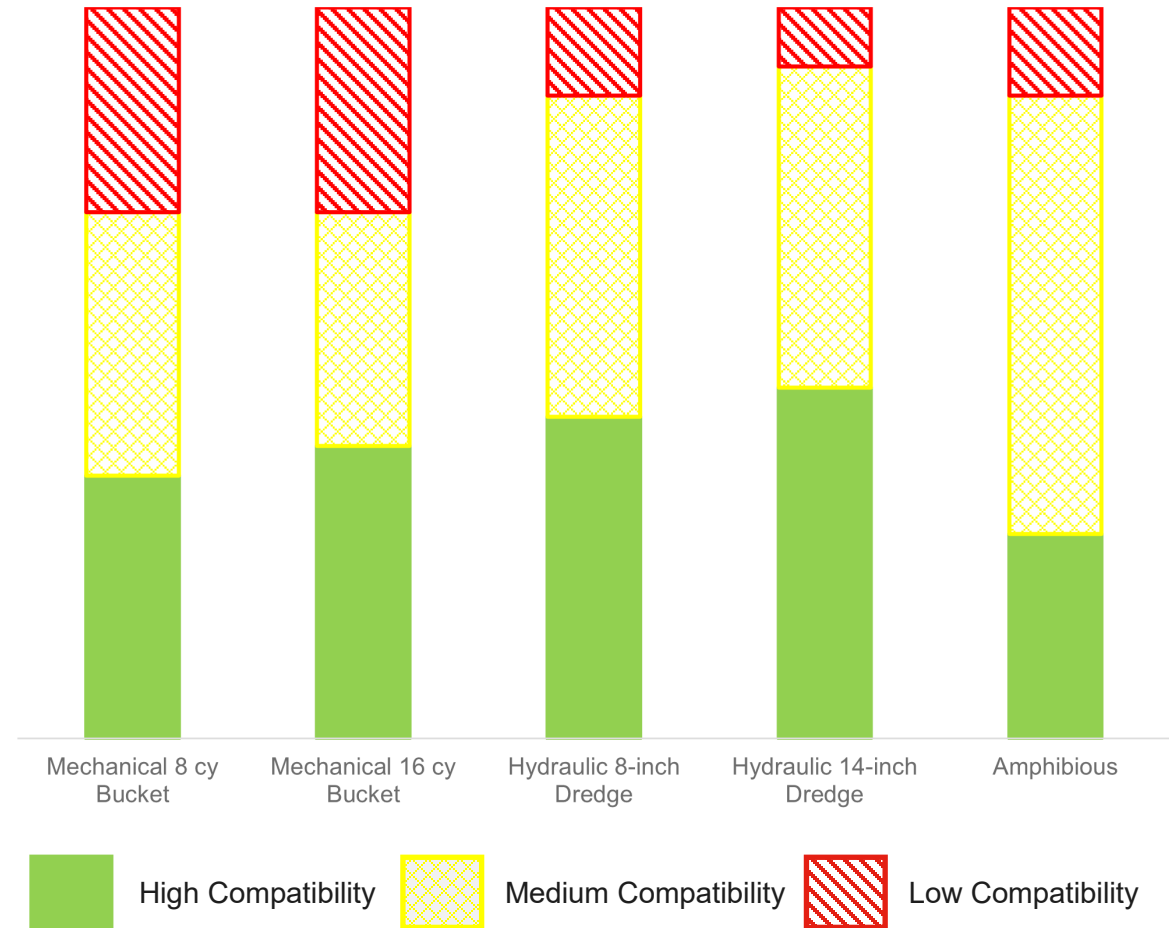
Criteria	Sub-Criteria	Mechanical 8-cubic-yard bucket	Mechanical 16-cubic-yard bucket	Hydraulic 8-inch dredge	Hydraulic 14-inch dredge	Amphibious
Lost Use Days	Minimizes days lost	⊙	⊙	⊙	⊙	⊙
Reduced Use	Minimizes reduced use of lake	⊙	⊙	●	●	⊙
Existing Infrastructure Impacts	Minimizes impacts to existing infrastructure	⊙	⊙	⊙	⊙	⊙
Lake Use	Minimizes impacts to lake use due to dredging activities (including aesthetic considerations)	⊙	⊙	●	●	⊙
Facilities Availability	Avoids closures of park facilities (e.g., marina, parking)	⊙	⊙	⊙	⊙	⊙
Minimizes Noise	Comparison of relative proximity of potential receptors	○	○	●	●	⊙
Minimizes Odors/Dust	Comparison of relative proximity of potential receptors	○	○	●	●	⊙
Impacts to Aquatic Wildlife	Minimizes impacts to aquatic wildlife	●	●	●	●	●
Wetland Impacts	Minimizes impacts to wetlands	●	●	●	●	●
Impacts to Terrestrial Wildlife	Minimizes impacts to terrestrial wildlife	●	●	●	●	●
Minimize Floodplain Impacts	--	○	○	⊙	⊙	⊙
Minimizes Sediment Resuspension	--	○	○	●	●	⊙
Greenhouse Emissions	Minimizes greenhouse gas emissions	○	○	⊙	⊙	○
Preserving wetlands	Minimizes impacts to wetlands	●	●	●	●	●
Minimizes Clearing/Grading	--	○	○	⊙	⊙	⊙
Requires Updated Infrastructure	Minimizes required updates to existing infrastructure	⊙	⊙	⊙	⊙	⊙
Sediment Processing Considerations	Adaptability to pipeline transport	⊙	⊙	●	●	●
Maneuverability Around Dock/Dam	--	●	●	⊙	⊙	●
Dredge Equipment Accuracy	--	●	●	●	●	●
Debris Compatibility	Separate debris removal step required	●	●	○	○	⊙
Debris Compatibility	Convertible for debris removal	●	●	○	○	⊙
Availability	--	●	●	⊙	⊙	○
Seasonal Restrictions	Seasonal impacts on dredge use	⊙	⊙	⊙	⊙	⊙
Production	Average sustained production rate	⊙	●	○	●	○
Relative Costs	--	○	○	⊙	⊙	⊙



Dredging Method Evaluation

Key Takeaways

- All options are feasible
- Main challenges (red ratings)
 - Hydraulic – debris handling
 - Amphibious – production rate
 - Mechanical – community and floodplain impacts



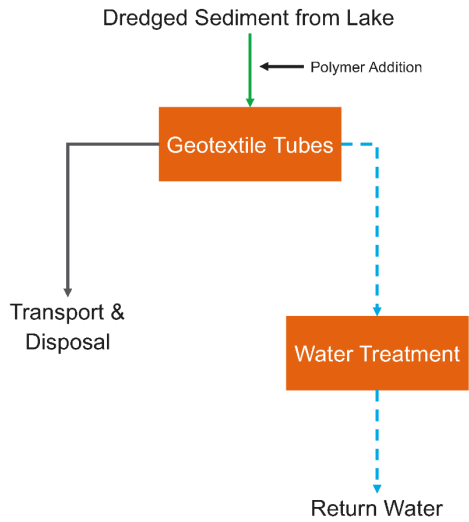
Detailed Evaluation in Exhibit 1 of Alternatives Analysis Report

Dewatering

Dewatering Methods

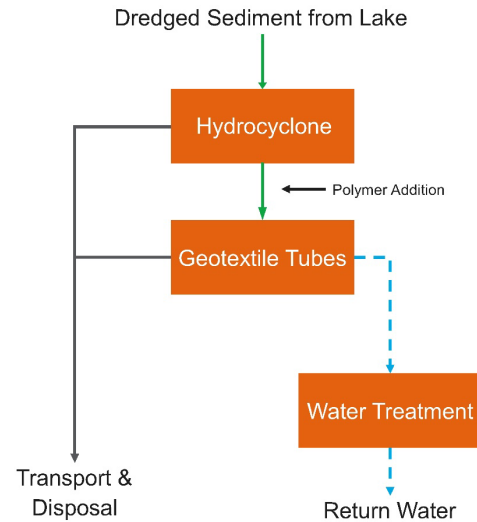


PASSIVE (GEOTEXTILE TUBE)



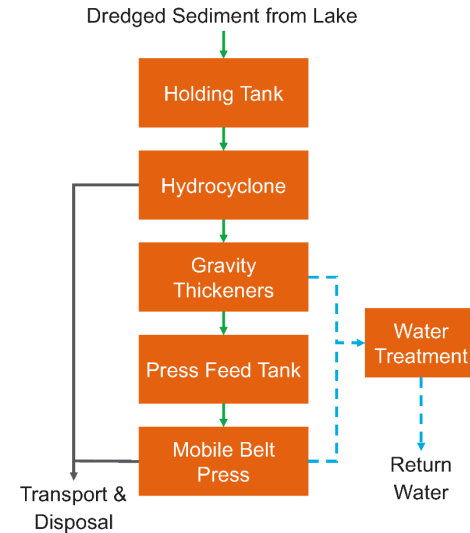
3.5 – 4.9 acres

PASSIVE WITH DESANDING



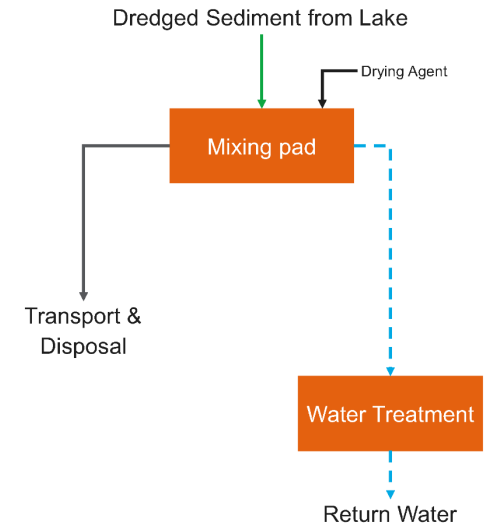
5.2 – 7.4 acres

MECHANICAL



3.2 – 5.8 acres

DRYING AGENT

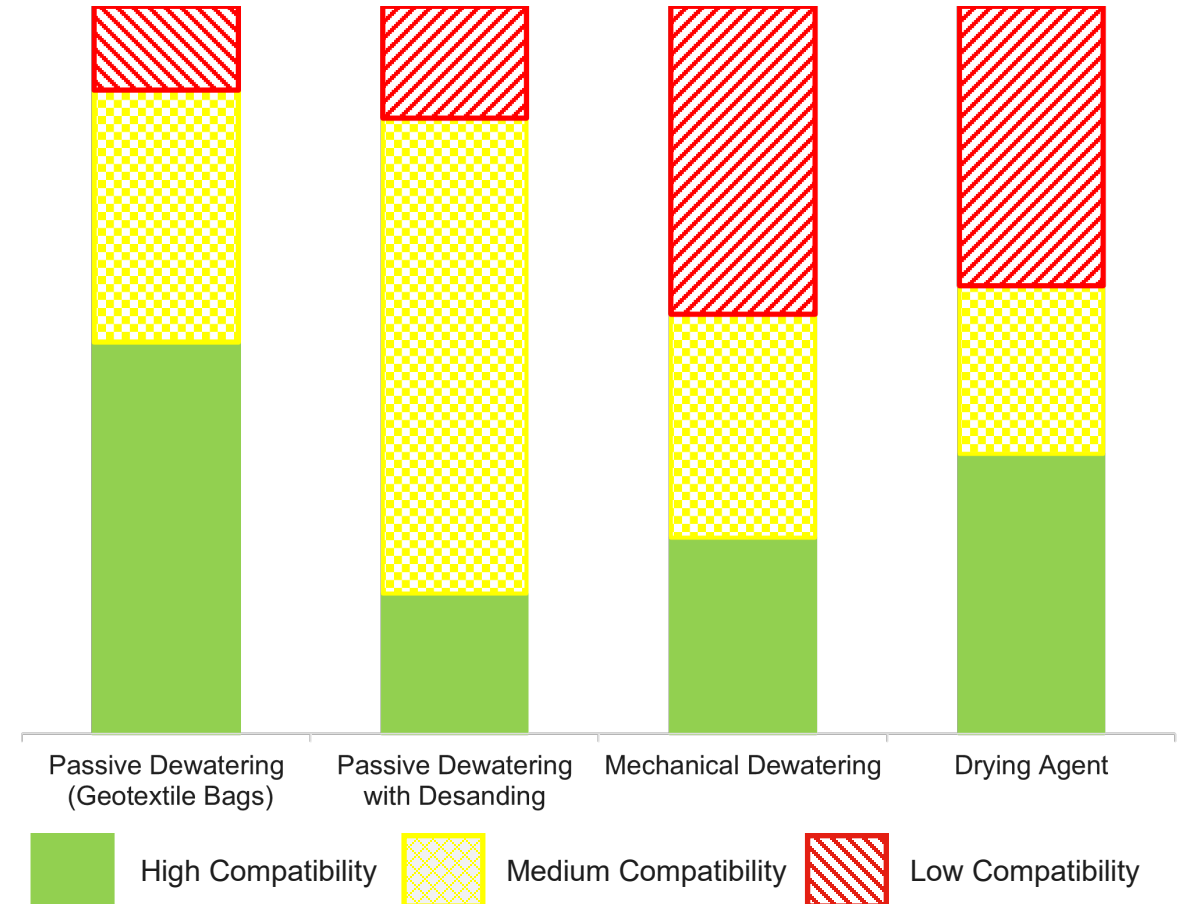


Island Options Only

Dewatering Method Evaluations

Key Takeaways

- Passive is simple and relatively low-cost but needs large, flat area
- Mechanical can accommodate higher throughput and creates drier material but is higher cost
- Identify location to provide most flexibility for contractor's approach



Detailed Evaluation in Exhibit 2 of Alternatives Analysis Report

Disposal Location

Disposal Locations

Island Expansion



Bank Restoration



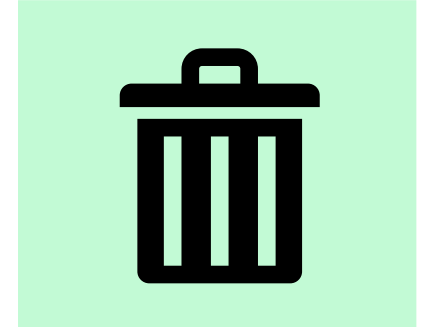
County Use



Offsite Reuse



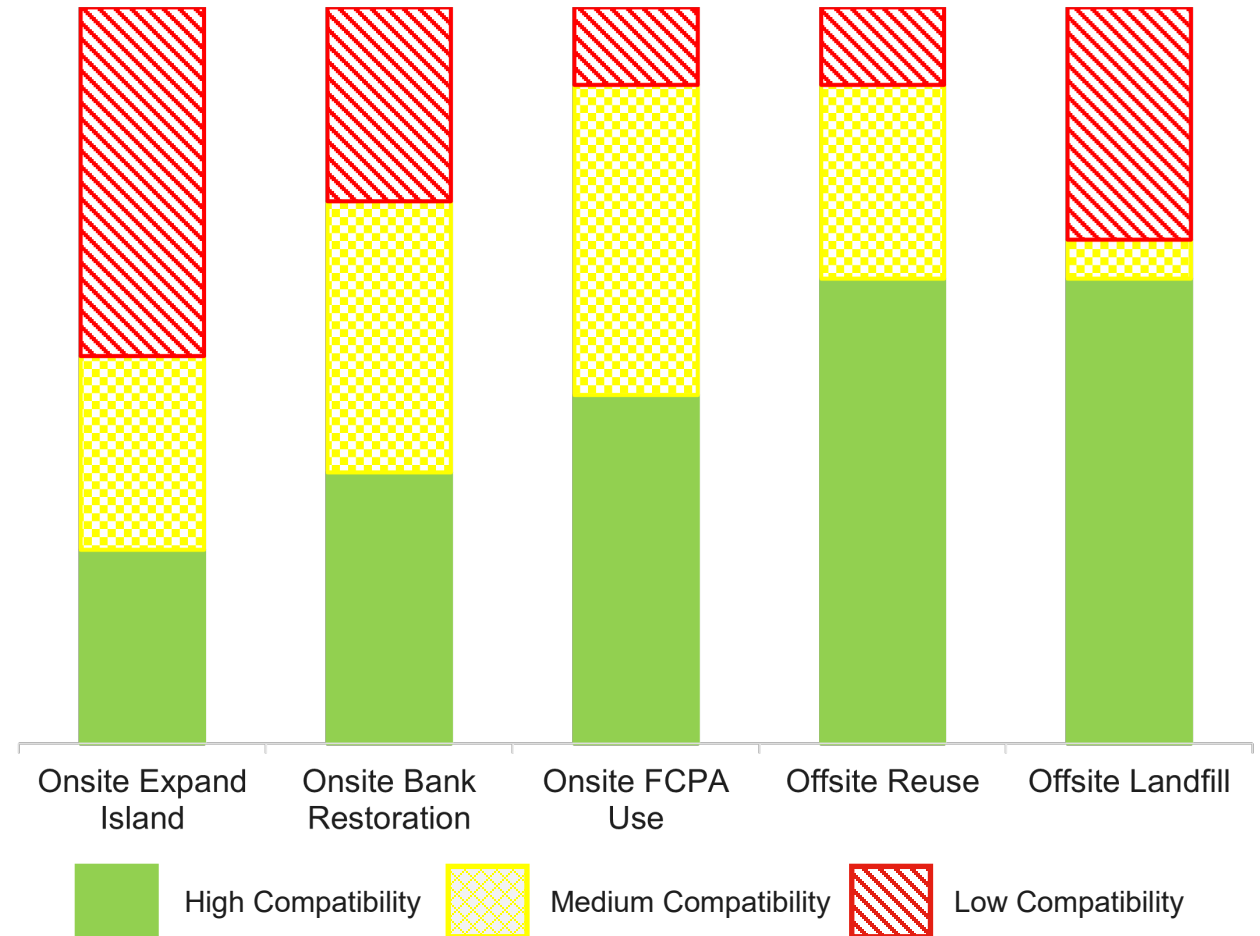
Offsite Landfill



Disposal Location Evaluation

Key Takeaways

- All disposal locations can be paired with any of the dredging and dewatering options
- Offsite landfill and offsite reuse have no public impacts but have higher costs
- Onsite reuse has lower costs but has public impacts



Detailed Evaluation in Exhibit 3 of Alternatives Analysis Report

Environmental and Cultural Resource Evaluation

Potential Wetland and Vegetative Impacts

- Provided impacts likely a "Worst Case Scenario"
- No distinction between "temporary" vs "permanent" wetland impacts
- Permit will require avoidance and minimization, reducing noted impacts
- Largest dewatering site "impacts" are associated with use of the island or settling basin
- Largest pipeline "impacts" are for alignments in stream valleys
- Largest tree "impacts" in stream valleys, maintenance area, settling basin

Details in Table 5-1 and Appendix C of Alternative Analysis Report

Potential Cultural Resource Impacts

- Based on Virginia Department of Historic Resources (VDHR) database review of previously recorded cultural resources within or adjacent to potential alignments and dewatering sites
- Seven sites were identified, consisting of prehistoric lithic scatter, civil war era features, and/or portions of the Orange & Alexandria rail bed
- No sites have been evaluated for listing in the National Register of Historic Places (NRHP)
- Sites could also meet Fairfax County criteria for local significance

Details in Appendix D of Alternative Analysis Report

Development and Screening of Alternatives

Alternative Components

Dewatering Locations

North of Braddock Road

1. Howrey Field
2. Wakefield Park Maintenance Facility
3. Wakefield Ball Fields
4. Dominion Energy (Dominion) Right-of-Way (ROW)

Lake Accotink Park

5. Lake Accotink Upper Settling Basin
6. Lake Accotink Island – Current Footprint
7. Lake Accotink Island – Expanded Footprint

Concrete Plant

8. Concrete Plant

**Detailed Evaluation in Exhibit 4 of
Alternatives Analysis Report**

Pipeline Alignments

North of Braddock Road

1. Cross-County Trail
2. Queensberry Avenue
3. Flag Run / Port Royal Road
4. Flag Run / Interstate 495

Lake Accotink Park

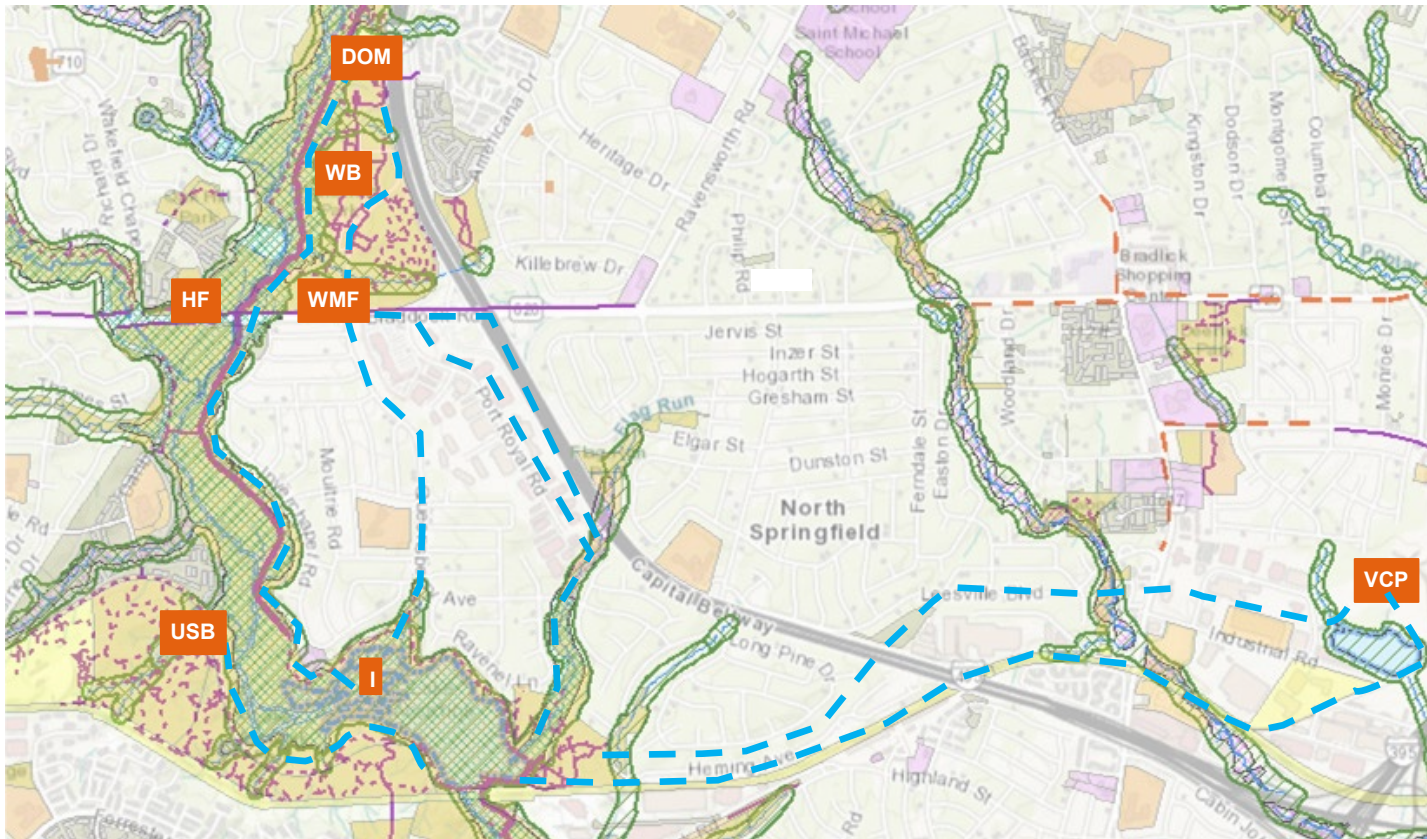
5. Lake Accotink Trail

Concrete Plant

6. Amtrak ROW
7. Residential Route

**Detailed Evaluation in Exhibit 5 of
Alternatives Analysis Report**

List of Potential Alternatives

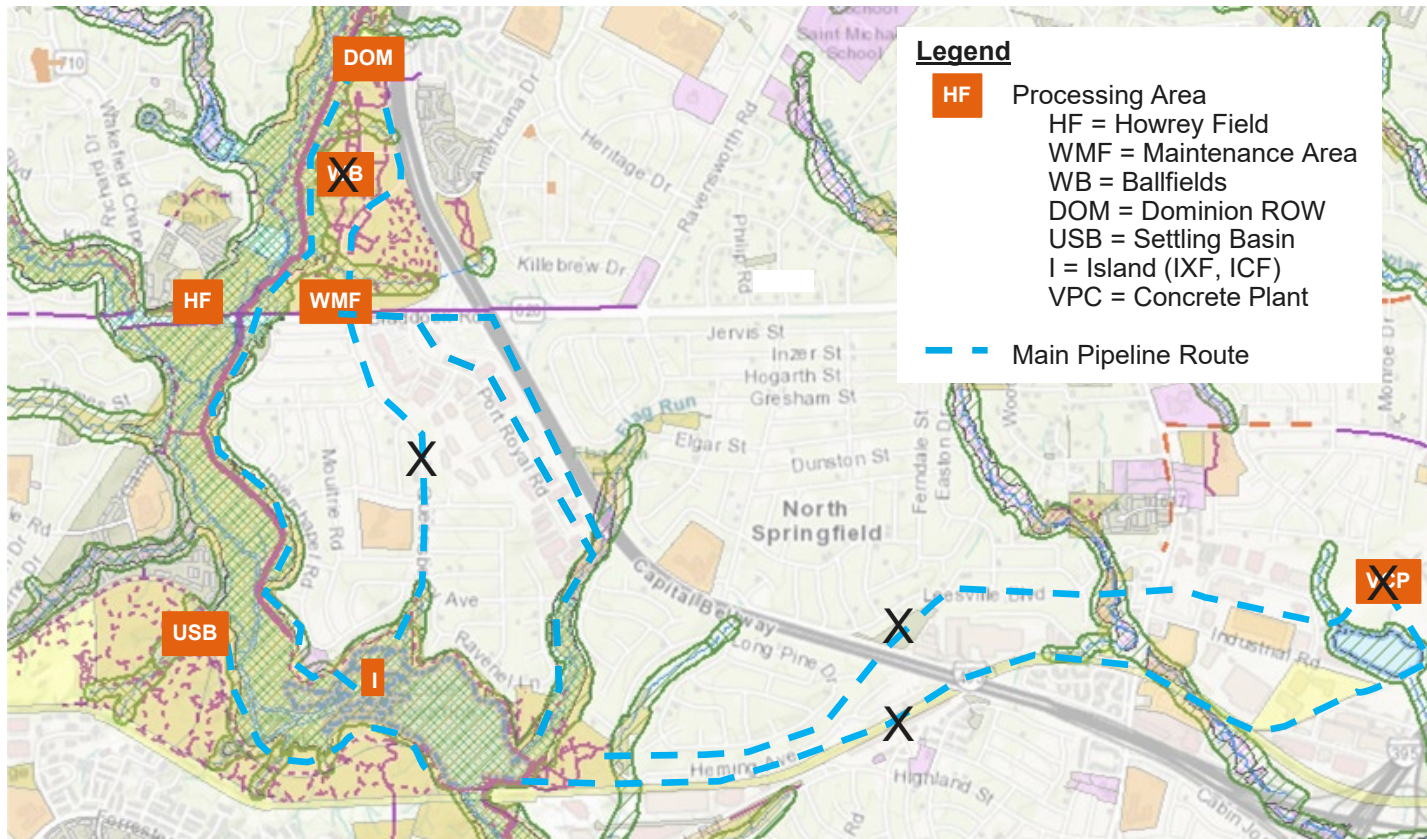


Legend

- Processing Area
- HF = Howrey Field
- WMF = Maintenance Area
- WB = Ballfields
- DOM = Dominion ROW
- USB = Settling Basin
- I = Island (IXF, ICF)
- VCP = Concrete Plant
- Main Pipeline Route

#	ID	Description
1	HF1	Howrey Field via Cross-County trail
2	HF2	Howrey Field via Queensberry Ave
3	HF3	Howrey Field via Flag Run/Port Royal Road
4	HF4	Howrey Field via Flag Run/I-495
5	WMF1	Wakefield Park Maintenance Facility via Cross-County Trail
6	WMF2	Wakefield Park Maintenance Facility via Queensberry Ave
7	WMF3	Wakefield Park Maintenance Facility via Flag Run/Port Royal Road
8	WMF4	Wakefield Park Maintenance Facility via Flag Run/I-495
9	WB1	Wakefield Ball Fields via Cross-County Trail
10	WB2	Wakefield Ball Fields via Queensberry Ave
11	WB3	Wakefield Ball Fields via Flag Run/Port Royal Road
12	WB4	Wakefield Ball Fields via Flag Run/I-495
13	DOM1	Dominion Right-of-Way (ROW) via Cross-County Trail
14	DOM2	Dominion ROW via Queensberry Ave
15	DOM3	Dominion ROW via Flag Run/Port Royal Road
16	DOM4	Dominion ROW via Flag Run/I-495
17	USB	Lake Accotink Upper Settling Basin
18	ICF	Lake Accotink Island - Current Footprint
19	IXF	Lake Accotink Island - Expanded Footprint
20	VCP1	Concrete Plant via Residential
21	VCP2	Concrete Plant via Amtrak ROW

Removed & Retained Alternatives in Report



#	ID	Description
1	HF1	Howrey Field via Cross-County trail
2	HF2	Howrey Field via Queensberry Ave ⁻¹
3	HF3	Howrey Field via Flag Run/Port Royal Road
4	HF4	Howrey Field via Flag Run/I-495
5	WMF1	Wakefield Park Maintenance Facility via Cross-County Trail
6	WMF2	Wakefield Park Maintenance Facility via Queensberry Ave ⁻¹
7	WMF3	Wakefield Park Maintenance Facility via Flag Run/Port Royal Road
8	WMF4	Wakefield Park Maintenance Facility via Flag Run/I-495
9	WB1	Wakefield Ball Fields via Cross-County Trail ⁻²
10	WB2	Wakefield Ball Fields via Queensberry Ave ^{-1, 2}
11	WB3	Wakefield Ball Fields via Flag Run/Port Royal Road ⁻²
12	WB4	Wakefield Ball Fields via Flag Run/I-495 ⁻²
13	DOM1	Dominion Right-of-Way (ROW) via Cross-County Trail
14	DOM2	Dominion ROW via Queensberry Ave ⁻¹
15	DOM3	Dominion ROW via Flag Run/Port Royal Road
16	DOM4	Dominion ROW via Flag Run/I-495
17	USB	Lake Accotink Upper Settling Basin
18	ICF	Lake Accotink Island - Current Footprint
19	IXF	Lake Accotink Island - Expanded Footprint
20	VCP1	Concrete Plant via Residential ⁻³
24	VCP2	Concrete Plant via Amtrak ROW ⁻³

Rationale for alternatives removed from consideration:

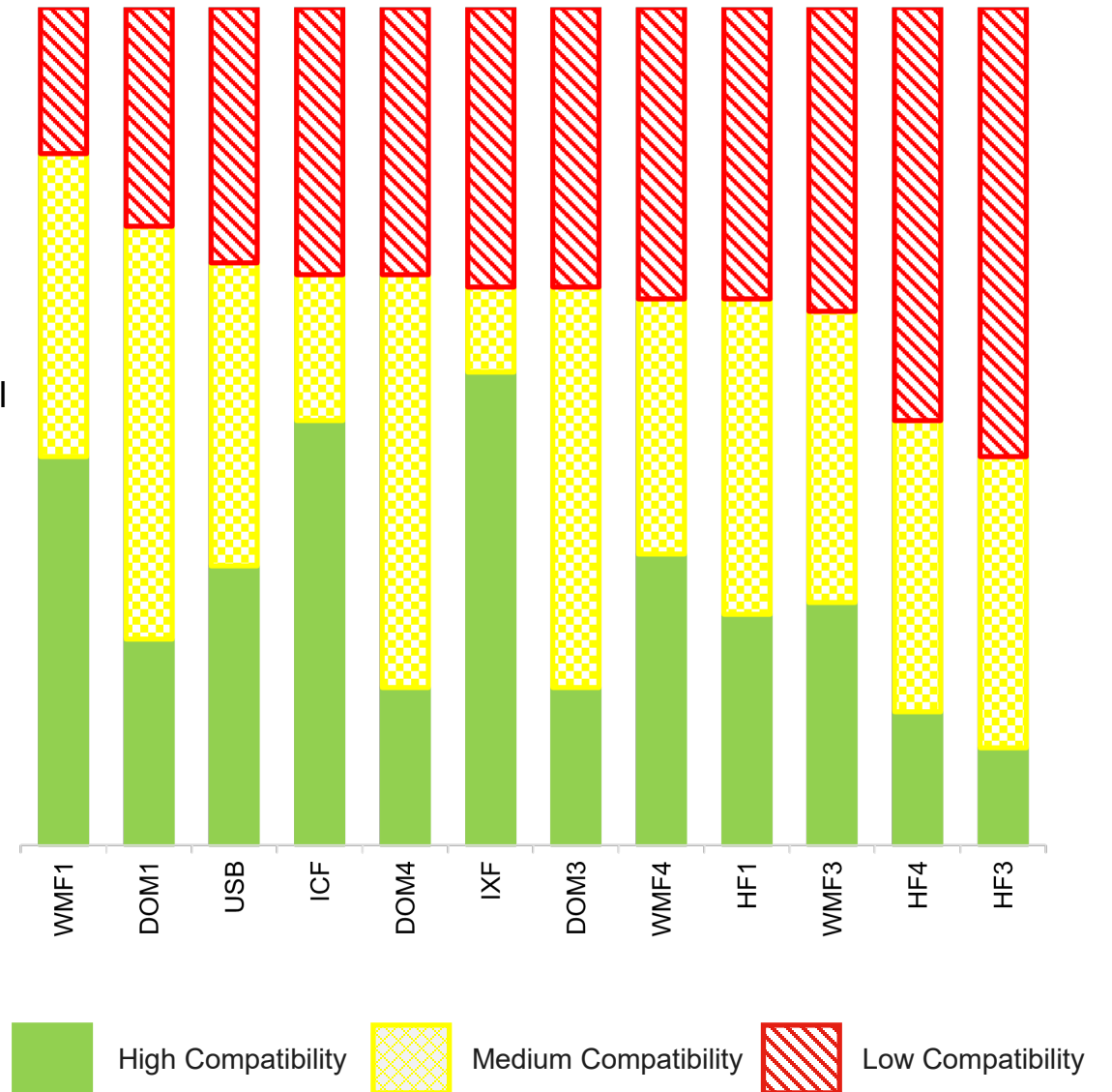
1. Queensberry Ave removed from consideration due to impacts to community and cost
2. Wakefield Ball Fields removed from consideration due to legal impacts and inability to replace facility that meets Title IX obligations
3. Concrete Plant removed from consideration as property owner is unable to accommodate dewatering operations

Analysis of Retained Alternatives

Retained Alternatives Evaluation

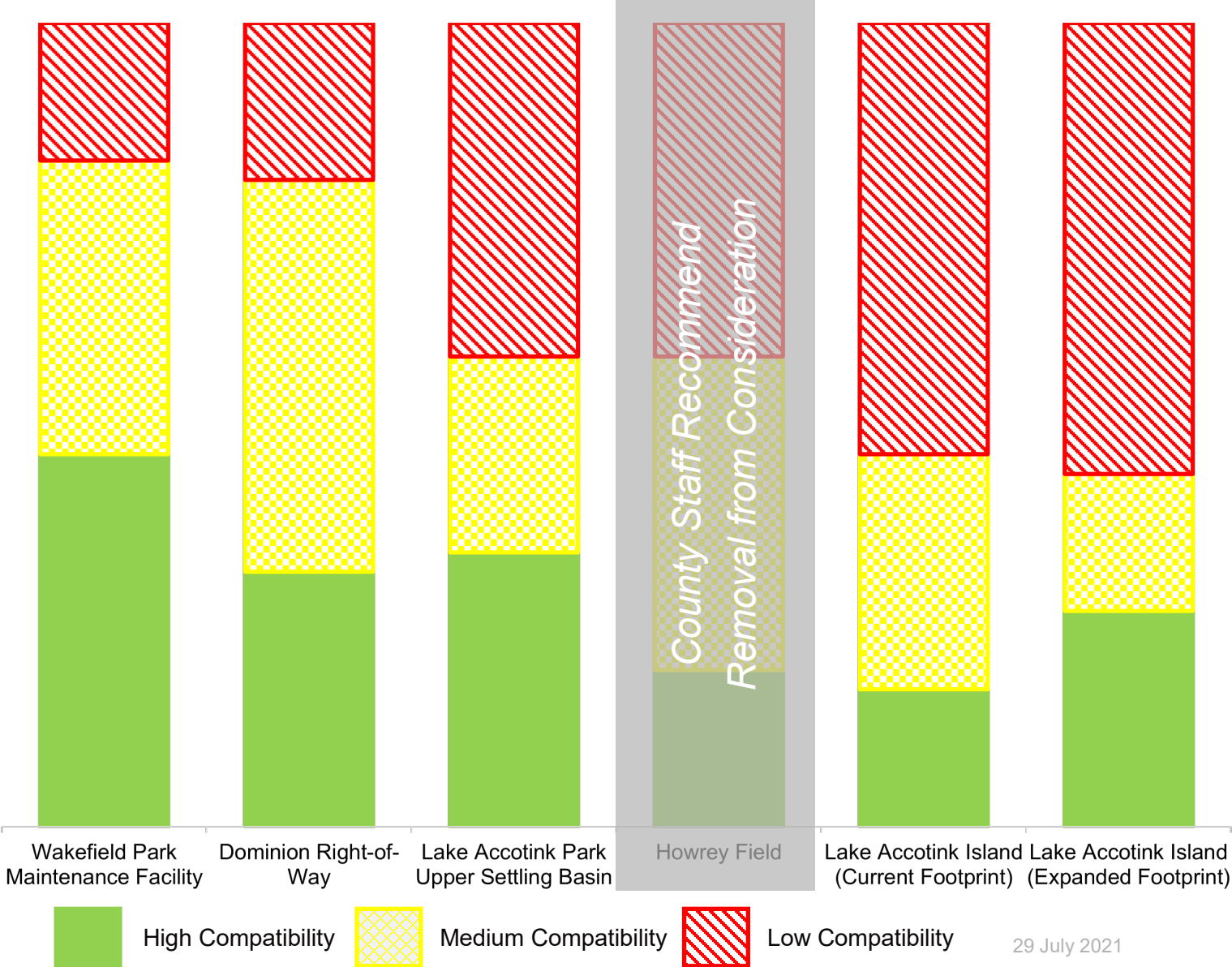
<u>ID</u>	<u>Alt #</u>	<u>Description</u>
HF1	1	Howrey Field via Cross-County trail
HF3	3	Howrey Field via Flag Run/Port Royal Road
HF4	4	Howrey Field via Flag Run/I-495
WMF1	5	Wakefield Park Maintenance Facility via Cross-County Trail
WMF3	7	Wakefield Park Maintenance Facility via Flag Run/Port Royal Road
WMF4	8	Wakefield Park Maintenance Facility via Flag Run/I-495
DOM1	13	Dominion Right-of-Way (ROW) via Cross-County Trail
DOM3	15	Dominion ROW via Flag Run/Port Royal Road
DOM4	16	Dominion ROW via Flag Run/I-495
USB	17	Lake Accotink Upper Settling Basin
ICF	18	Lake Accotink Island - Current Footprint
IXF	19	Lake Accotink Island - Expanded Footprint

Struck Text = County Staff Recommend Removal from Consideration



Dewatering Location Evaluation

See Exhibit 4 of Alternatives Analysis for Detailed Evaluation



Wakefield Park Maintenance Facility

Areas

Type	Acreages
Maximum Limits of Disturbance	7.7
Wetlands	0
Floodplain	2.6
Resource Protection Area	4.0

Method Compatibility*

Production (cy/day) Slurry Solids	950 7%	950 15%	1250 7%	1250 15%
Passive	Yes	Yes	No	No
Passive w/ Desanding	No	No	No	No
Mechanical	Maybe	Yes	No	Maybe
Drying Agent	No	No	No	No

*Based on current assumptions

Rating Summary

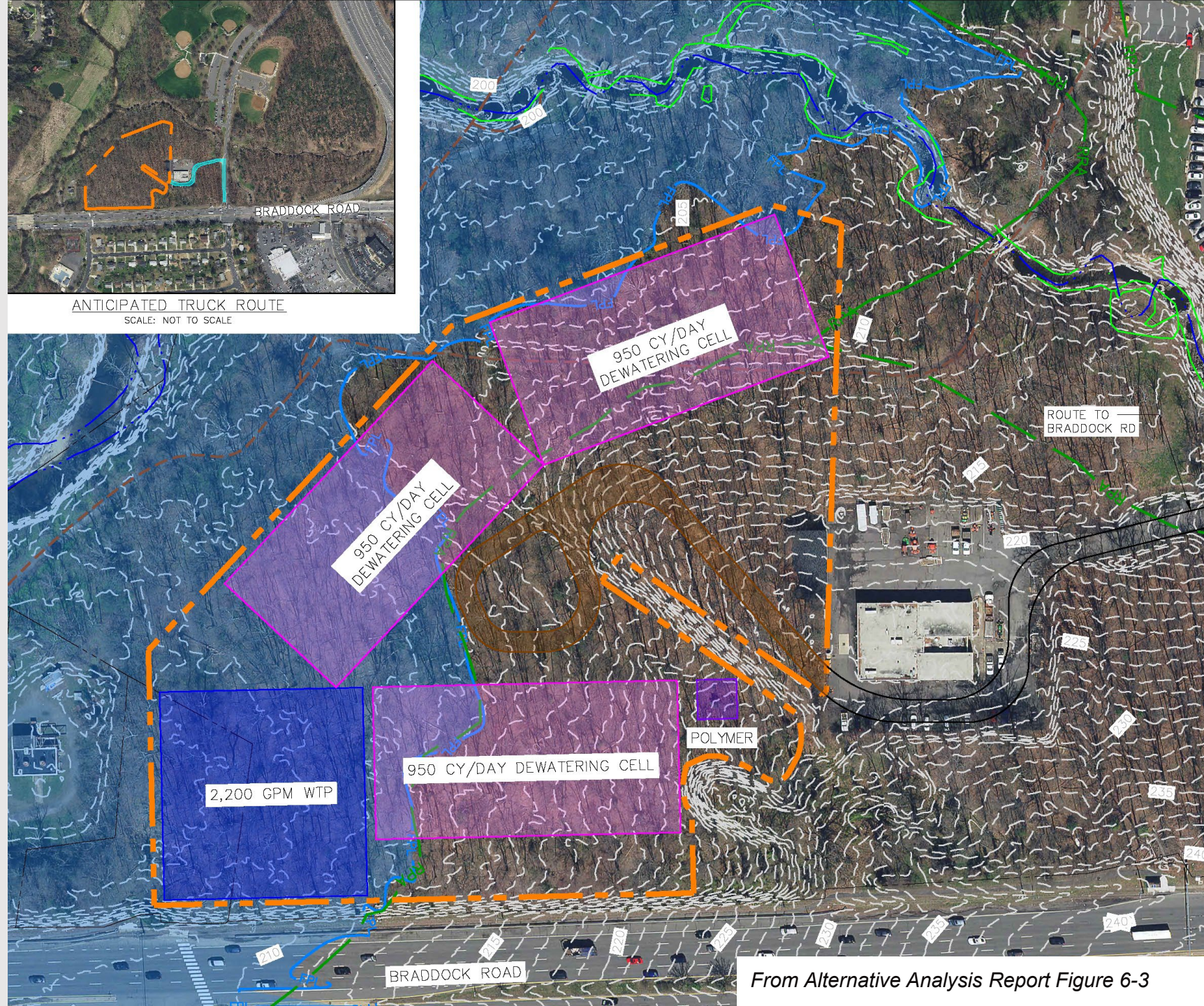
LOW = Extent of Clearing, Floodplain



HIGH = Limits Park & Community Impacts; Long-Term Use; Restoration & Remobilization; County-Owned



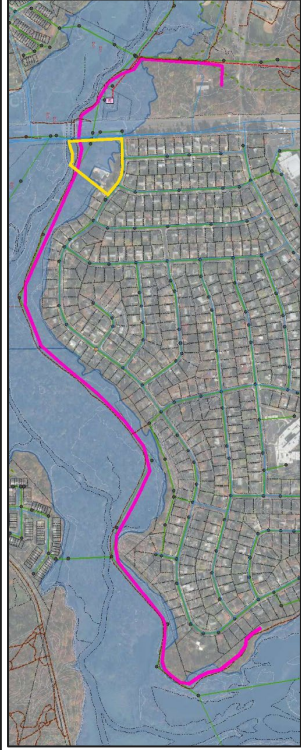
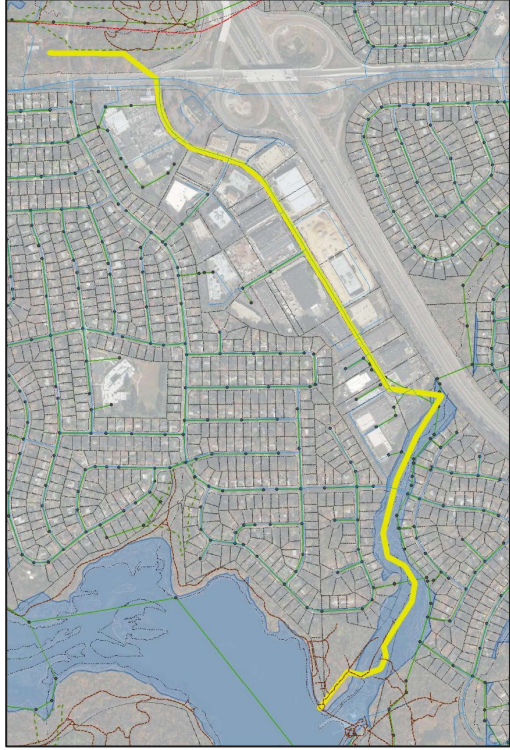
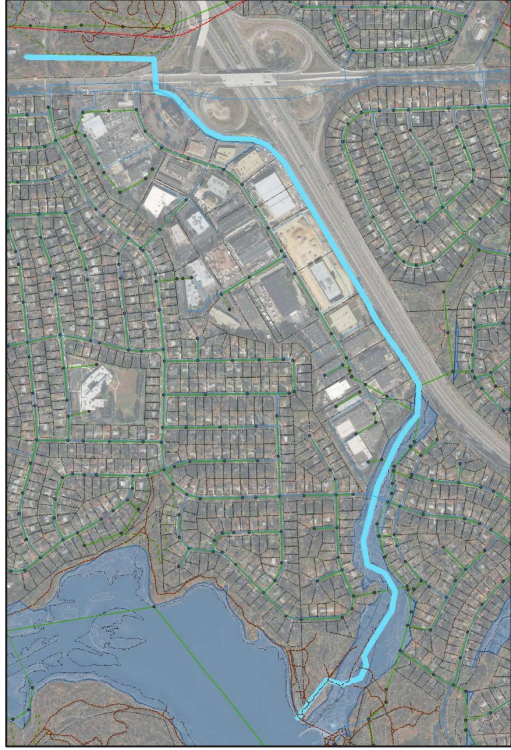
ANTICIPATED TRUCK ROUTE
SCALE: NOT TO SCALE

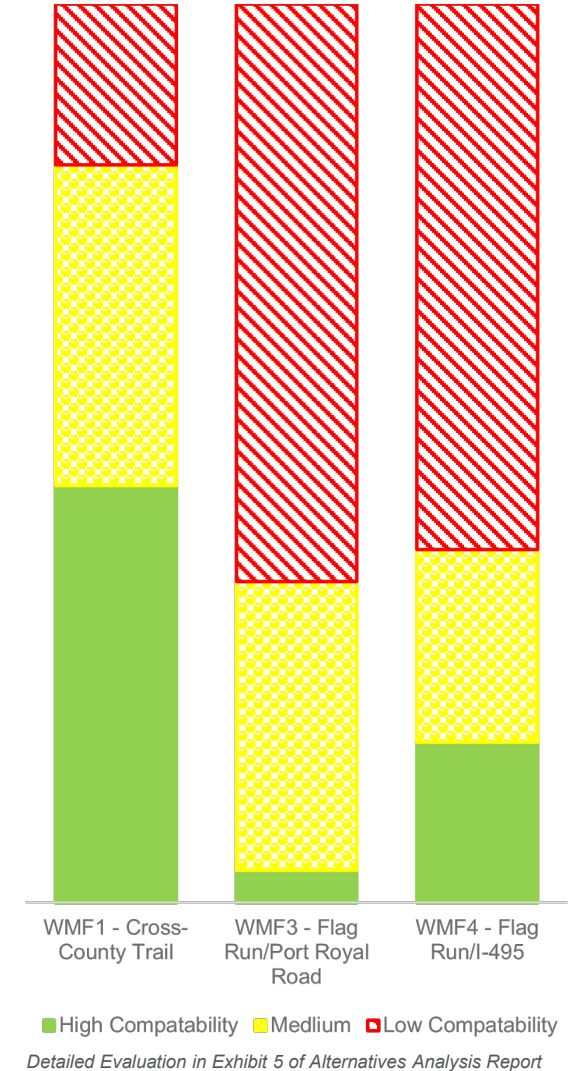


Unknown

- Extent of Braddock Rd Improvements

Wakefield Park Maintenance Facility Slurry Transport Alignments

	WMF1 - Cross-County Trail	WMF3 - Flag Run/Port Royal Road	WMF4 - Flag Run/I-495
Alignment			
Length, mi.	1.3	1.9	1.9
Pipe Diameter, inches	12 to 14	16 to 18	16 to 18
Difference in Elevation ¹ , ft.	17	110	110
No. of Utility Crossings ² , ea.	17	55	19
No. of Water Features/ Trail Crossings	7	29	27



Notes:
 1. Difference in elevation between highest and lowest point along the alignment.
 2. Sewer, Stormwater, Electrical & Water.

Dominion ROW

Areas

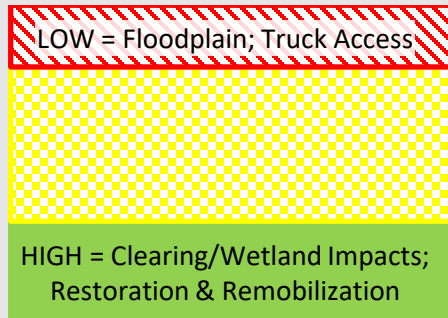
Type	Acres
Maximum Limits of Disturbance	10
Wetlands	0.2
Floodplain	6.2
Resource Protection Area	9.7

Method Compatibility*

Production (cy/day) Slurry Solids	950 7%	950 15%	1250 7%	1250 15%
Passive	Maybe	Maybe	No	No
Passive w/ Desanding	No	No	No	No
Mechanical	Maybe	Maybe	No	Maybe
Drying Agent	No	No	No	No

*Based on current assumptions

Rating Summary

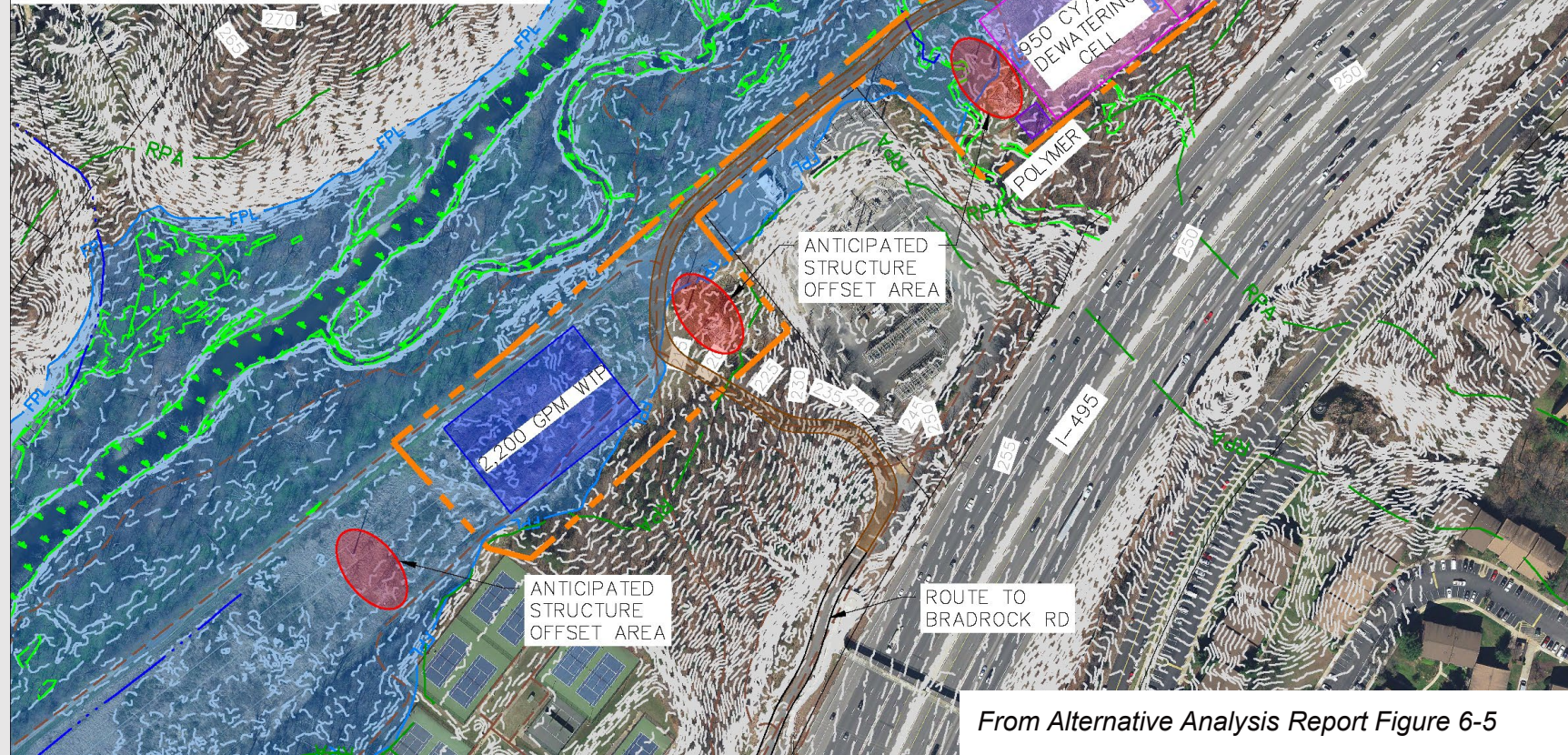


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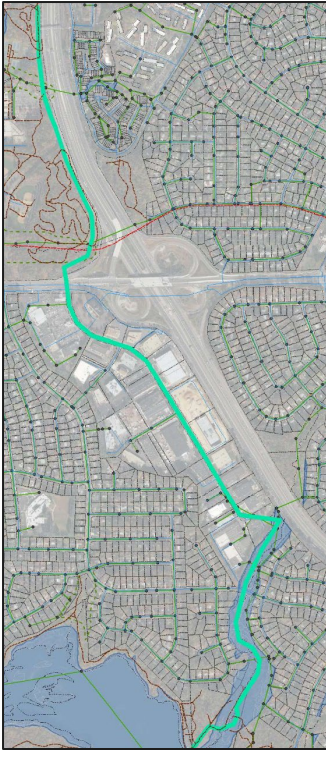

- Dominion requirements / use restrictions



ANTICIPATED TRUCK ROUTE
SCALE: NOT TO SCALE



Dominion ROW Slurry Transport Alignments

	DOM1 - Cross-County Trail	DOM3 - Flag Run/Port Royal Road	DOM4 - Flag Run/I-495
Alignment			
Length, mi.	2.1	2.5	2.2
Pipe Diameter, inches	16 to 18	16 to 18	16 to 18
Difference in Elevation ¹ , ft.	25	110	105
No. of Utility Crossings ² , ea.	26	66	23
No. of Water Feature/Trail Crossings	18	41	35

Note:

1. Difference in elevation between highest and lowest point along the alignment.
2. Sewer, Stormwater, Electrical & Water.



Upper Settling Basin

Areas

Type	Acres
Maximum Limits of Disturbance	6.7
Wetlands	4.1
Floodplain	0
Resource Protection Area	6.7

Method Compatibility*

Production (cy/day) Slurry Solids	950 7%	950 15%	1250 7%	1250 15%
Passive	Maybe	Maybe	No	No
Passive w/ Desanding	No	No	No	No
Mechanical	Maybe	Maybe	No	Maybe
Drying Agent	No	No	No	No

*Based on current assumptions

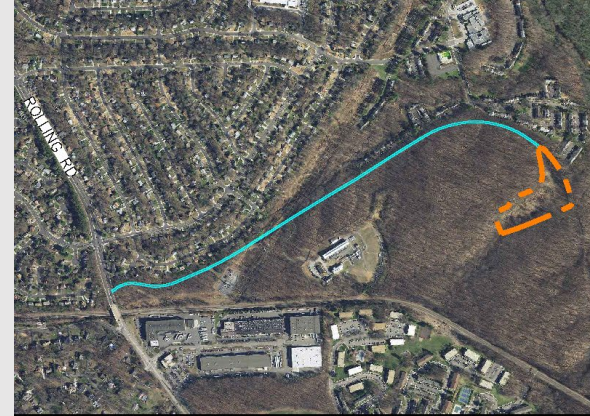
Rating Summary

LOW = Trail & Wetland Impacts,
Grading; Soil Condition, Community
Impacts, Site Preparation;
Accessibility

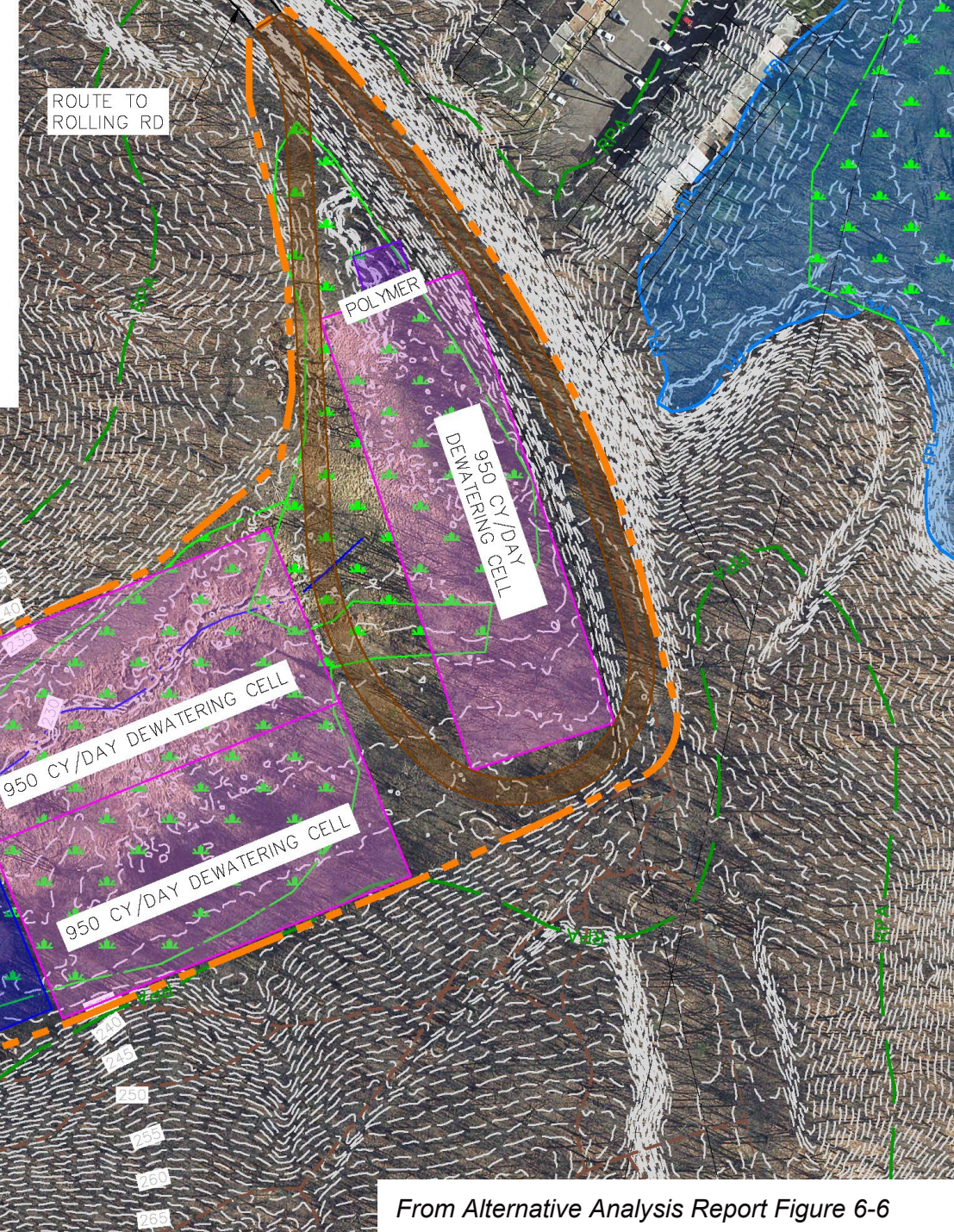
HIGH = Improve Infrastructure;
Outside Floodplain; Water Return;
Restoration & Remobilization

Unknown

- Surface/Subsurface Conditions
- Embankment Stability



ANTICIPATED TRUCK ROUTE
SCALE: NOT TO SCALE



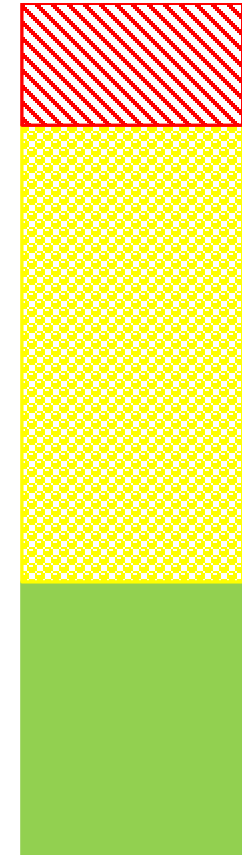
From Alternative Analysis Report Figure 6-6

Upper Settling Basin Slurry Transport Alignment

Upper Settling Basin – Trail Alignment	
Alignment	
Length, mi.	0.7
Pipe Diameter, inches	14 to 16
Difference in Elevation ¹ , ft.	70
No. of Utility Crossings ² , ea.	9
No. of Water Feature/Trail Crossings	15

Notes:

1. Difference in elevation between highest and lowest point along the alignment.
2. Sewer, Stormwater, Electrical & Water.



■ High Compatibility ■ Medium ■ Low Compatibility

Detailed Evaluation in Exhibit 5 of Alternatives Analysis Report

Howrey Field

County Staff Recommend Removal from Consideration

Areas

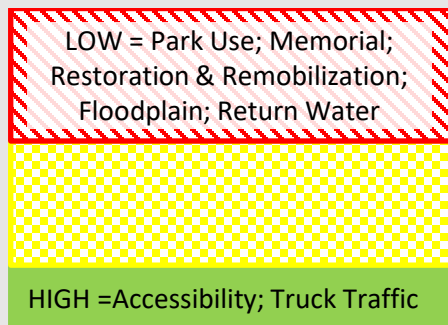
Type	Acreeages
Maximum Limits of Disturbance	7.5
Wetlands	0
Floodplain	4.5
Resource Protection Area	3.7

Method Compatibility*

Production (cy/day) Slurry Solids	950 7%	950 15%	1250 7%	1250 15%
Passive	Maybe	Maybe	No	No
Passive w/ Desanding	No	No	No	No
Mechanical	Maybe	Maybe	No	Maybe
Drying Agent	No	No	No	No

*Based on current assumptions

Rating Summary

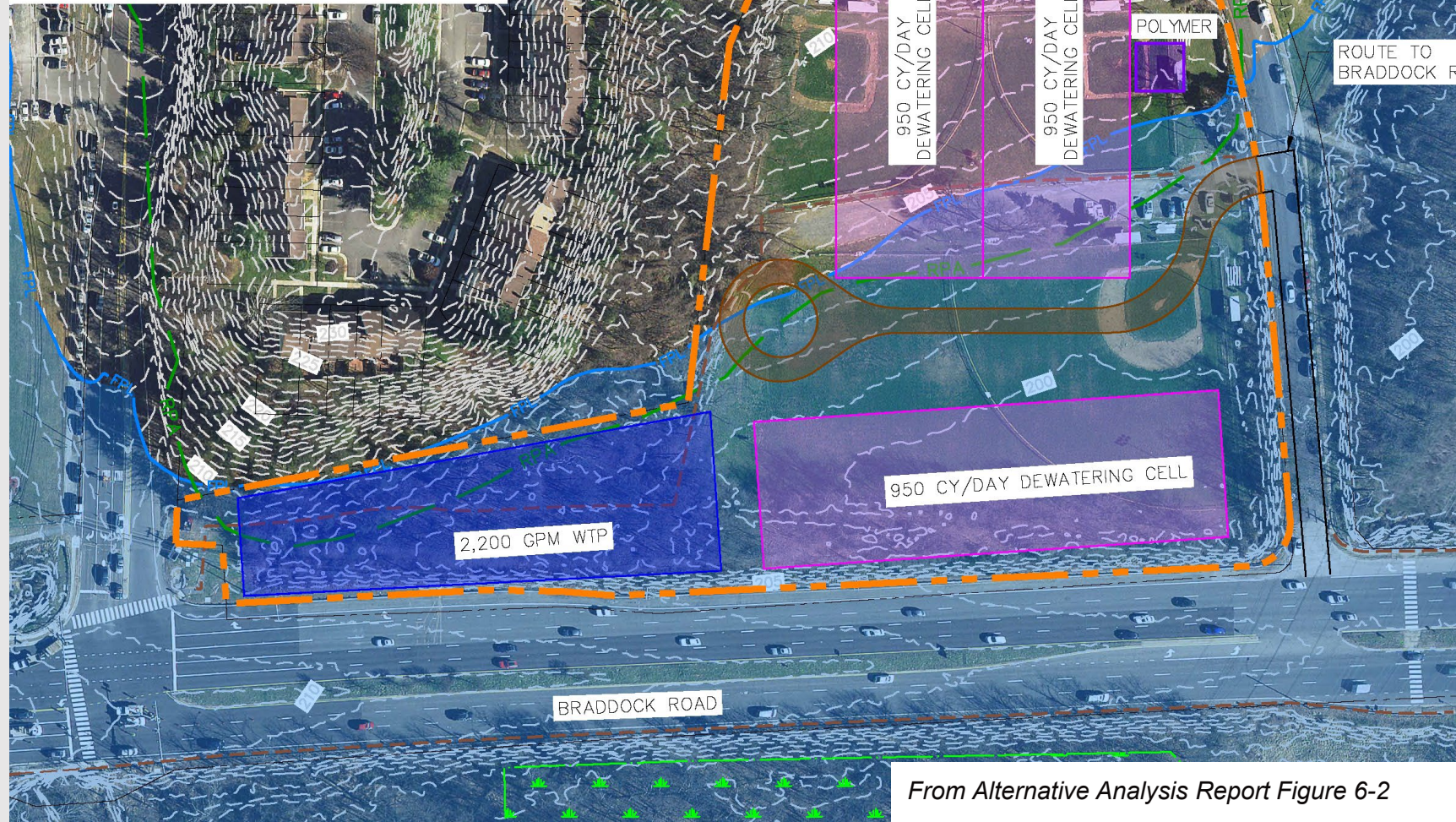


Unknown

- Extent of Braddock Rd Improvements

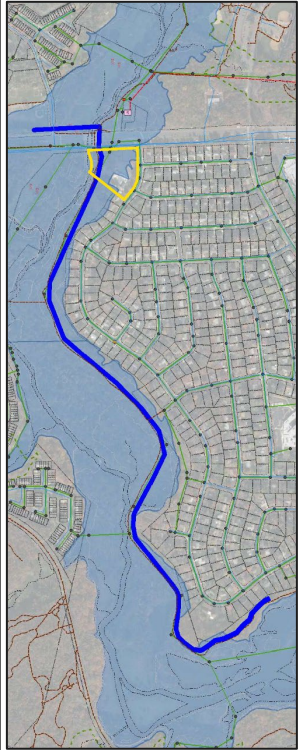
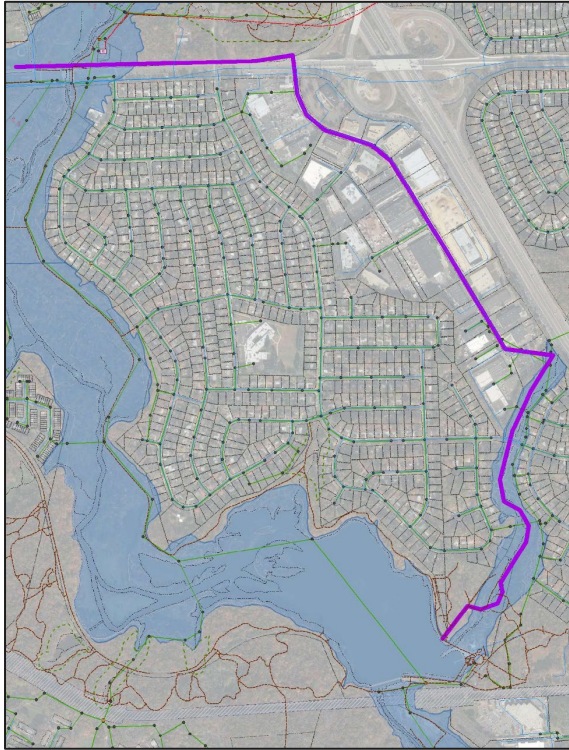
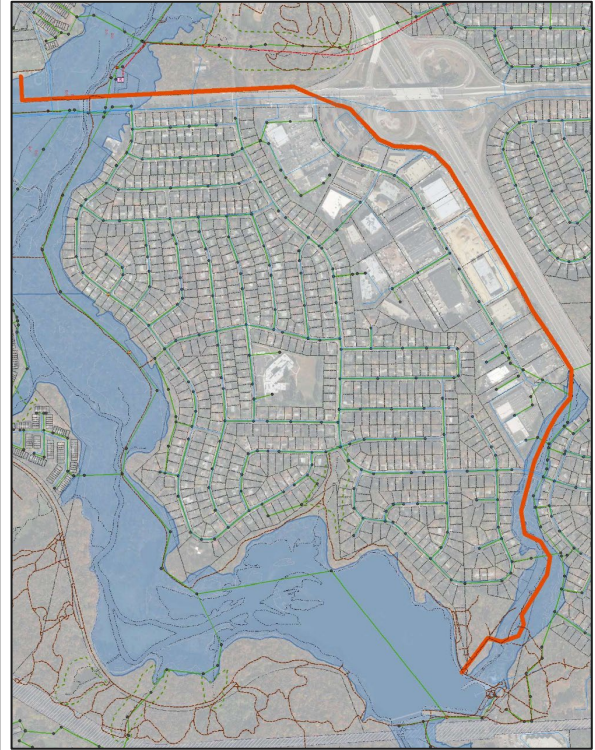


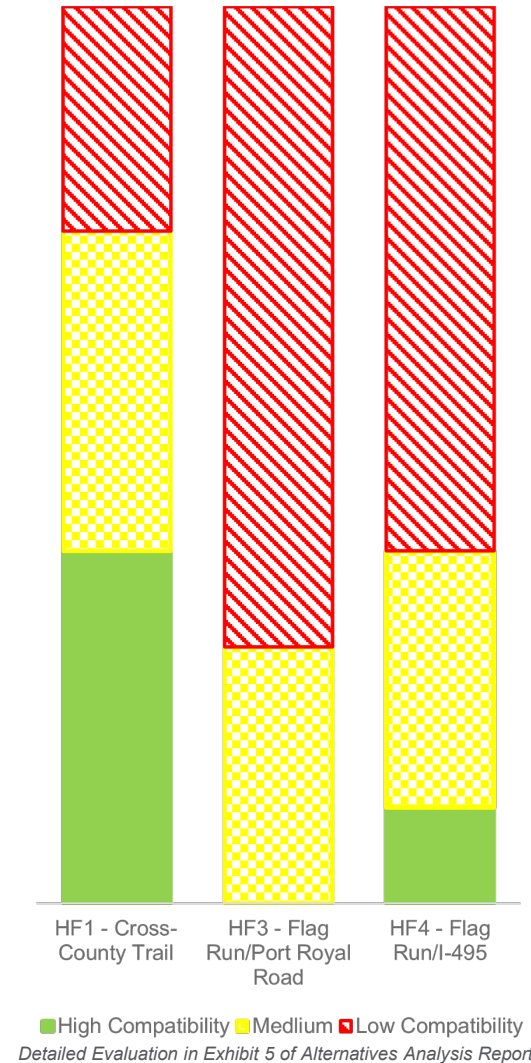
ANTICIPATED TRUCK ROUTE
SCALE: NOT TO SCALE



From Alternative Analysis Report Figure 6-2

Howrey Field Slurry Transport Alignments - County Staff Recommend Removal from Consideration

Type	HF1 - Cross-County Trail	HF3 - Flag Run/Port Royal Road	HF4 - Flag Run/I-495
Alignment			
Length, mi.	1.3	2.2	2.2
Pipe Diameter, inches	12 to 14	16 to 18	16 to 18
Difference in Elevation ¹ , ft.	15	105	110
No. of Utility Crossings ² , ea.	27	59	37
No. of Water Feature/Trail Crossings	8	32	29



Note:

1. Difference in elevation between highest and lowest point along the alignment.
2. Sewer, Stormwater, Electrical & Water.

Lake Accotink Island (Current Footprint)

Areas

Type	Acres
Maximum Limits of Disturbance	3.3
Wetlands	3.0
Floodplain	3.3
Resource Protection Area	3.3

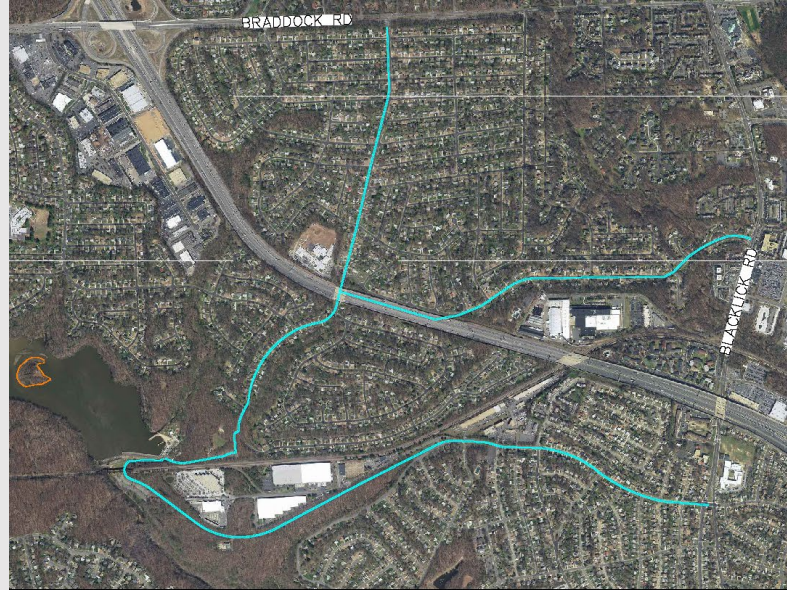
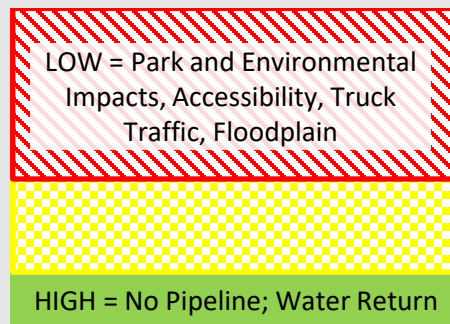
Method Compatibility*

Production (cy/day) Slurry Solids	950 7%	950 15%	1250 7%	1250 15%
Passive	No	No	No	No
Passive w/ Desanding	No	No	No	No
Mechanical	No	No	No	No
Drying Agent	Yes‡	Yes‡	Yes‡	Yes‡

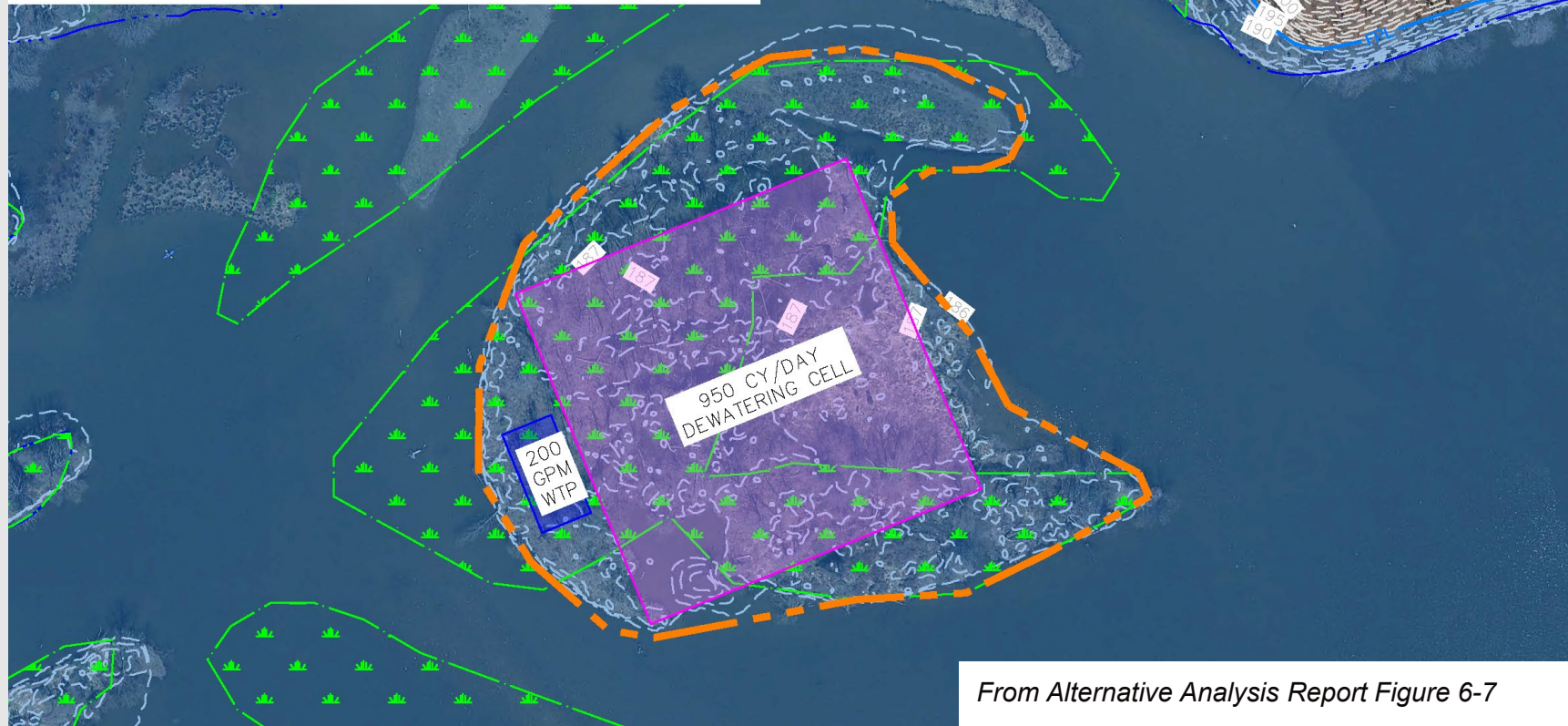
*Based on current assumptions

‡ If barge transport available

Rating Summary



ANTICIPATED TRUCK ROUTE
SCALE: NOT TO SCALE



Unknown

- Surface/subsurface conditions of island

Lake Accotink Island (Expanded Footprint)

Areas

Type	Acreages
Maximum Limits of Disturbance	10
Wetlands	4.4
Floodplain	9.6
Resource Protection Area	10

Method Compatibility*

Production (cy/day)	950	950	1250	1250
Slurry Solids	7%	15%	7%	15%
Passive	Yes	Yes	Yes	Yes
Passive w/ Desanding	Maybe	Maybe	Maybe	Maybe
Mechanical	No	No	No	No
Drying Agent	Yes‡	Yes‡	Yes‡	Yes‡

*Based on current assumptions

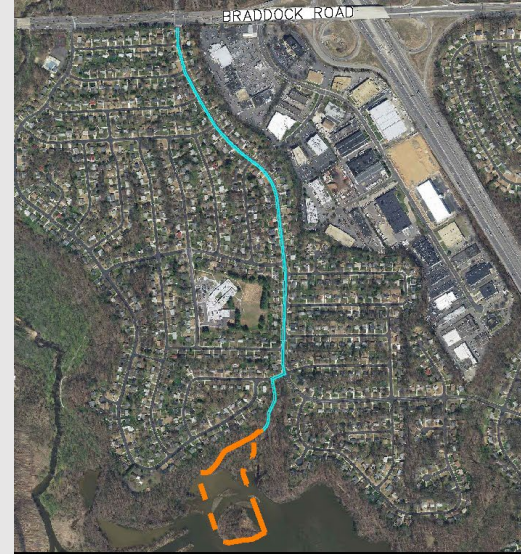
‡ If barge transport available

Rating Summary

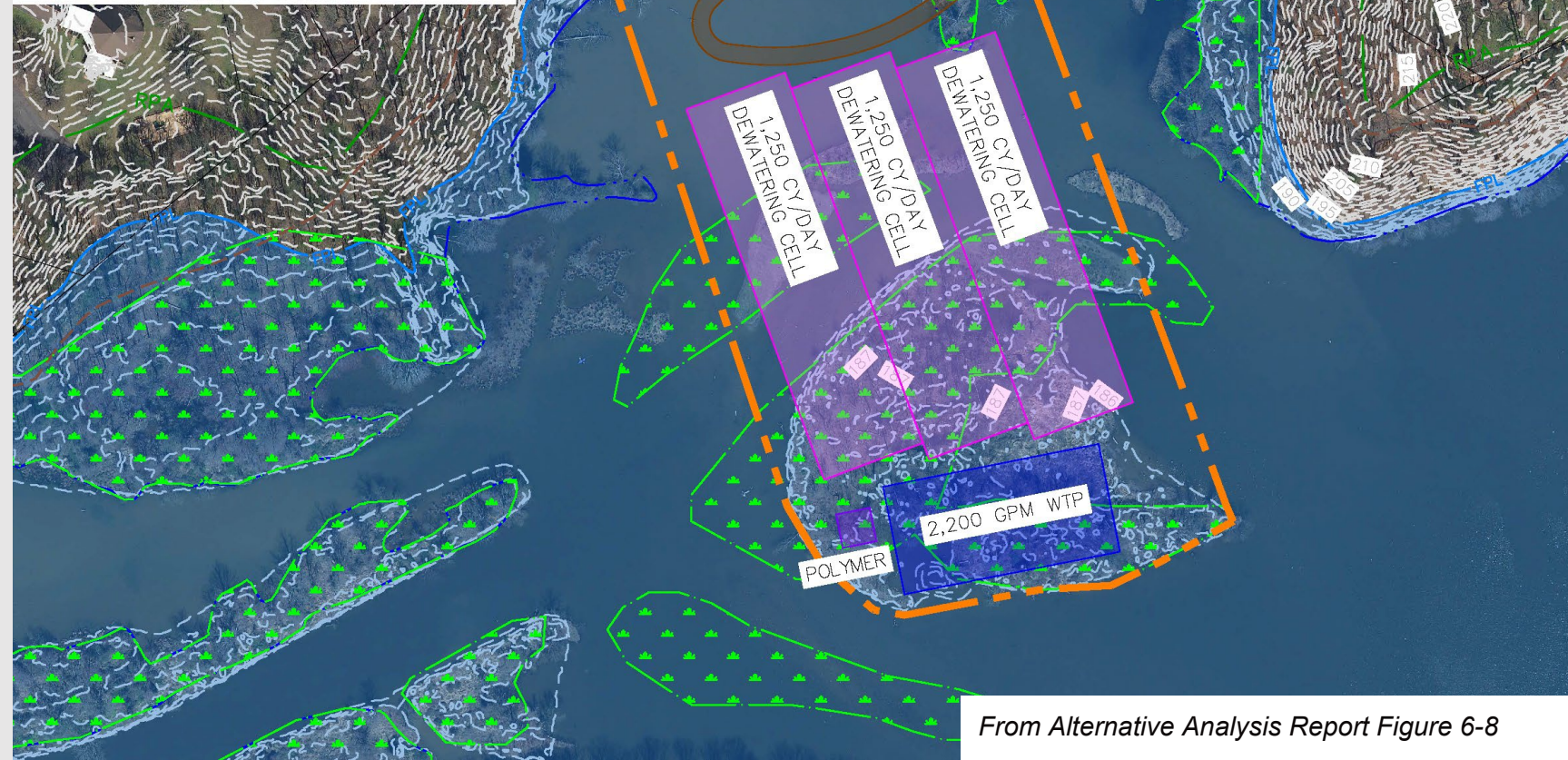
LOW = Park and Environmental Impacts, Site Preparation, Accessibility, Truck Traffic, Floodplain, Cost
HIGH = No Pipeline, Water Return, Method Compatibility

Unknown

- Surface/subsurface condition of island and land bridge area



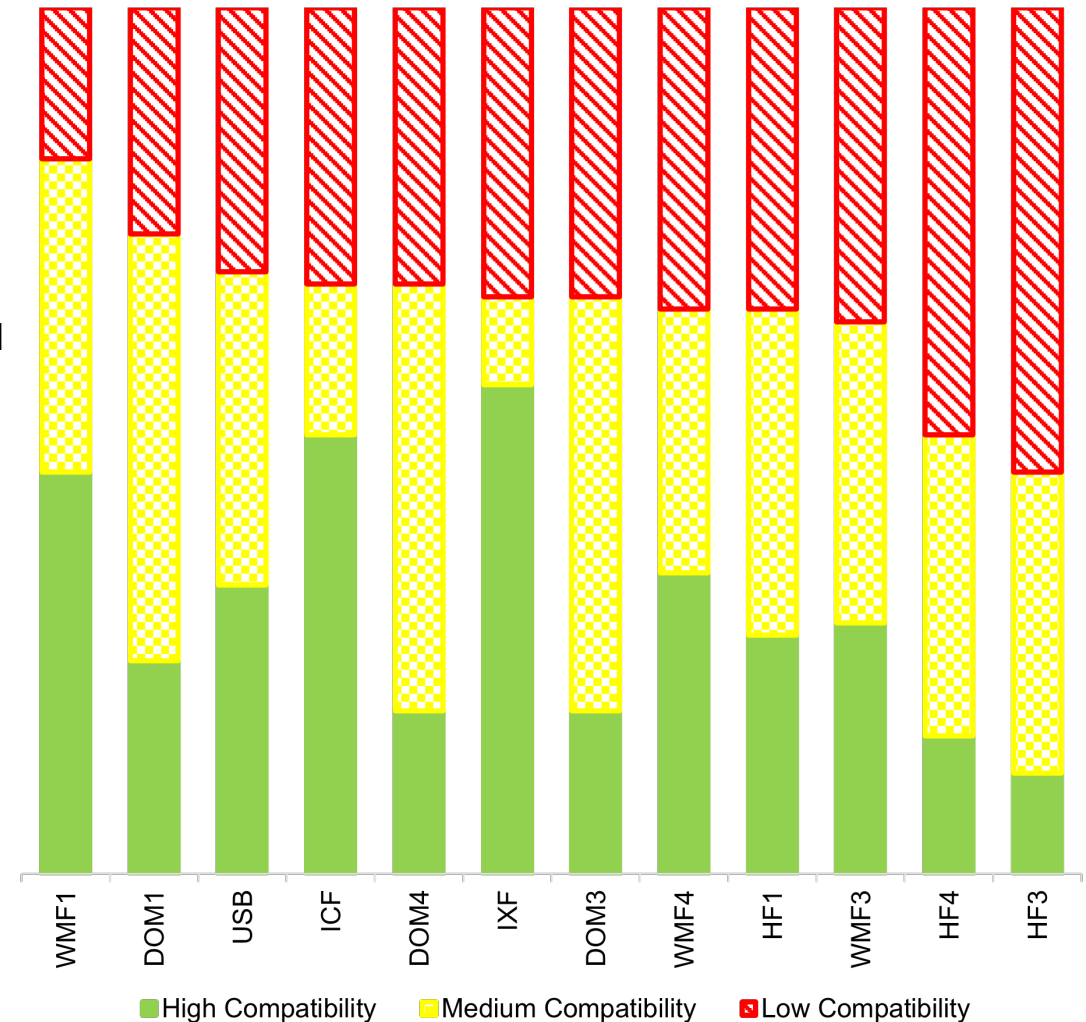
ANTICIPATED TRUCK ROUTE
SCALE: NOT TO SCALE



From Alternative Analysis Report Figure 6-8

Retained Alternatives Evaluation

<u>ID</u>	<u>Alt #</u>	<u>Description</u>
HF1	1	Howrey Field via Cross-County trail
HF3	3	Howrey Field via Flag Run/Port Royal Road
HF4	4	Howrey Field via Flag Run/I-495
WMF1	5	Wakefield Park Maintenance Facility via Cross-County Trail
WMF3	7	Wakefield Park Maintenance Facility via Flag Run/Port Royal Road
WMF4	8	Wakefield Park Maintenance Facility via Flag Run/I-495
DOM1	13	Dominion Right-of-Way (ROW) via Cross-County Trail
DOM3	15	Dominion ROW via Flag Run/Port Royal Road
DOM4	16	Dominion ROW via Flag Run/I-495
USB	17	Lake Accotink Upper Settling Basin
ICF	18	Lake Accotink Island - Current Footprint
IXF	19	Lake Accotink Island - Expanded Footprint



Struck Text = County Staff Recommend Removal from Consideration

Thank You For Your Time!