Dredging Examples

Item Type: Information

Charles Smith, Branch Chief, Department of Public Works & Environmental Services

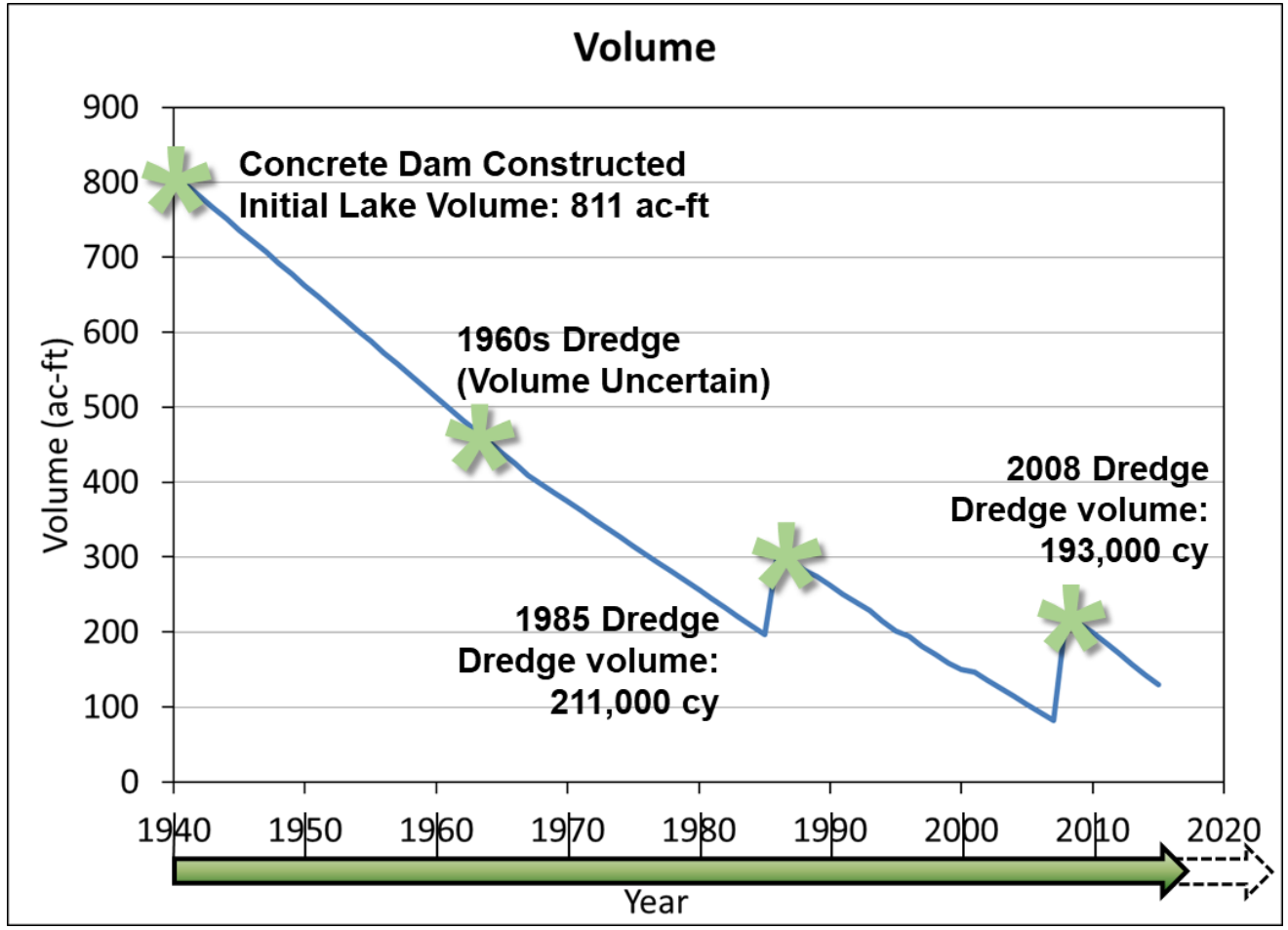
July 10, 2023

Accotink Creek Watershed

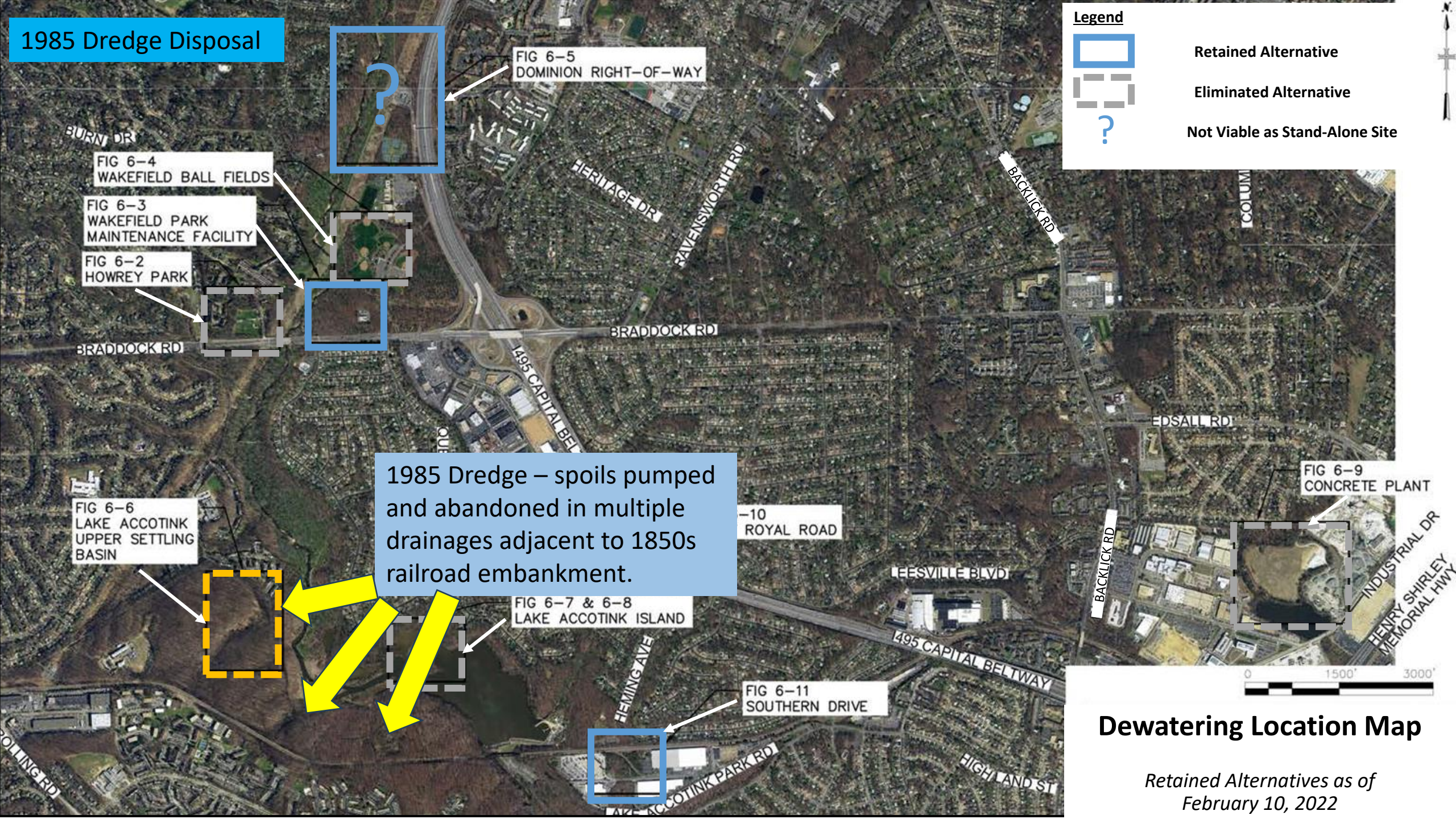
- 51 square miles (32,640 acres) in total size
- 30 square miles (~19,000 acres) to Lake Accotink
- Averages 27% impervious surfaces
- Much of the watershed built-out before stormwater controls were required
- 111 miles of stream
- 68 stream miles upstream of Lake Accotink

https://www.fairfaxcounty.gov/publicworks/stormwater/accotink-creek-watershed

Lake Accotink Management History

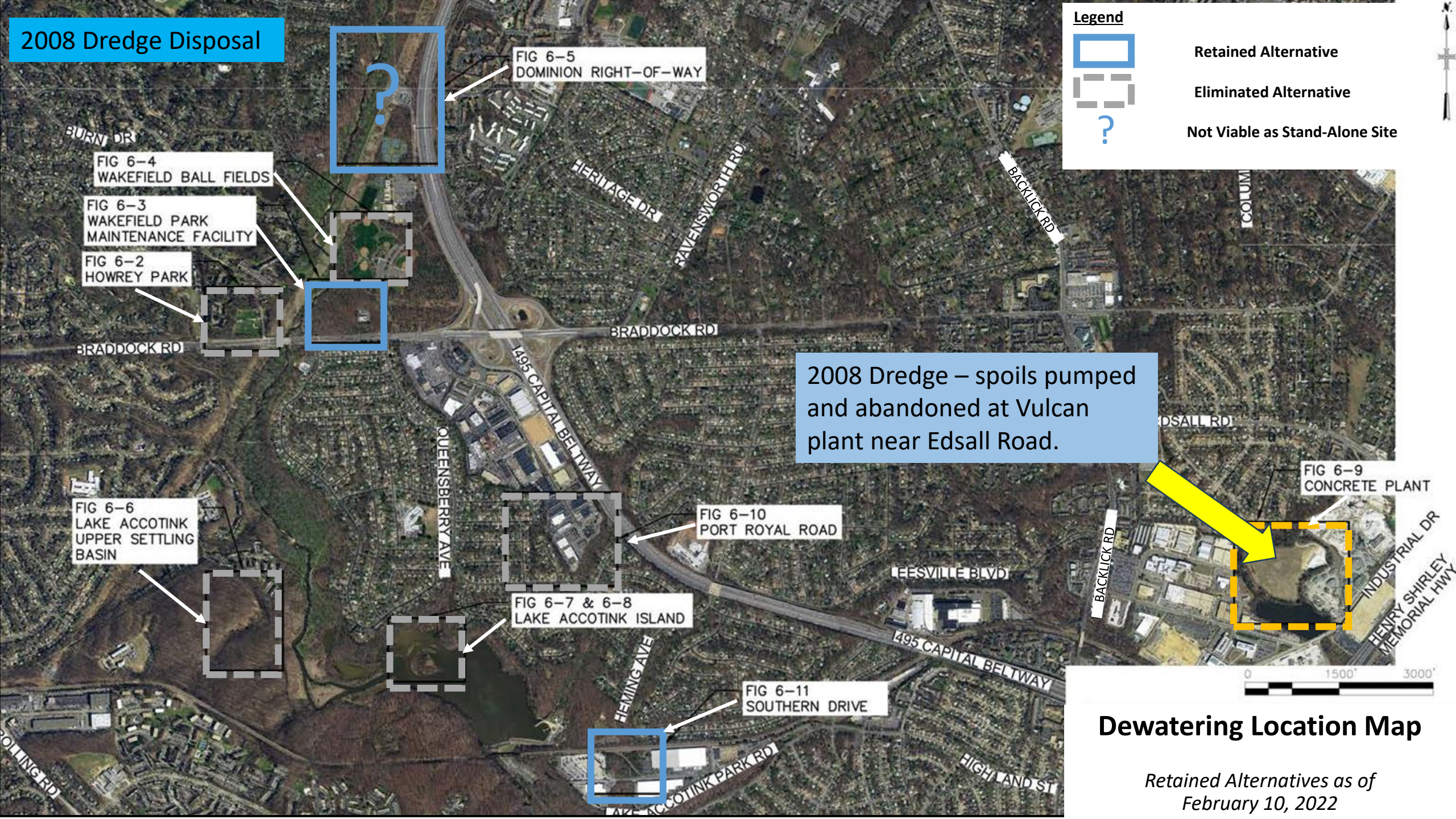


Lake Accotink dredging operations June 21, 2006 – Photo by Fairfax County DPWES



Dewatering Location Map

Retained Alternatives as of February 10, 2022



Dewatering Location Map

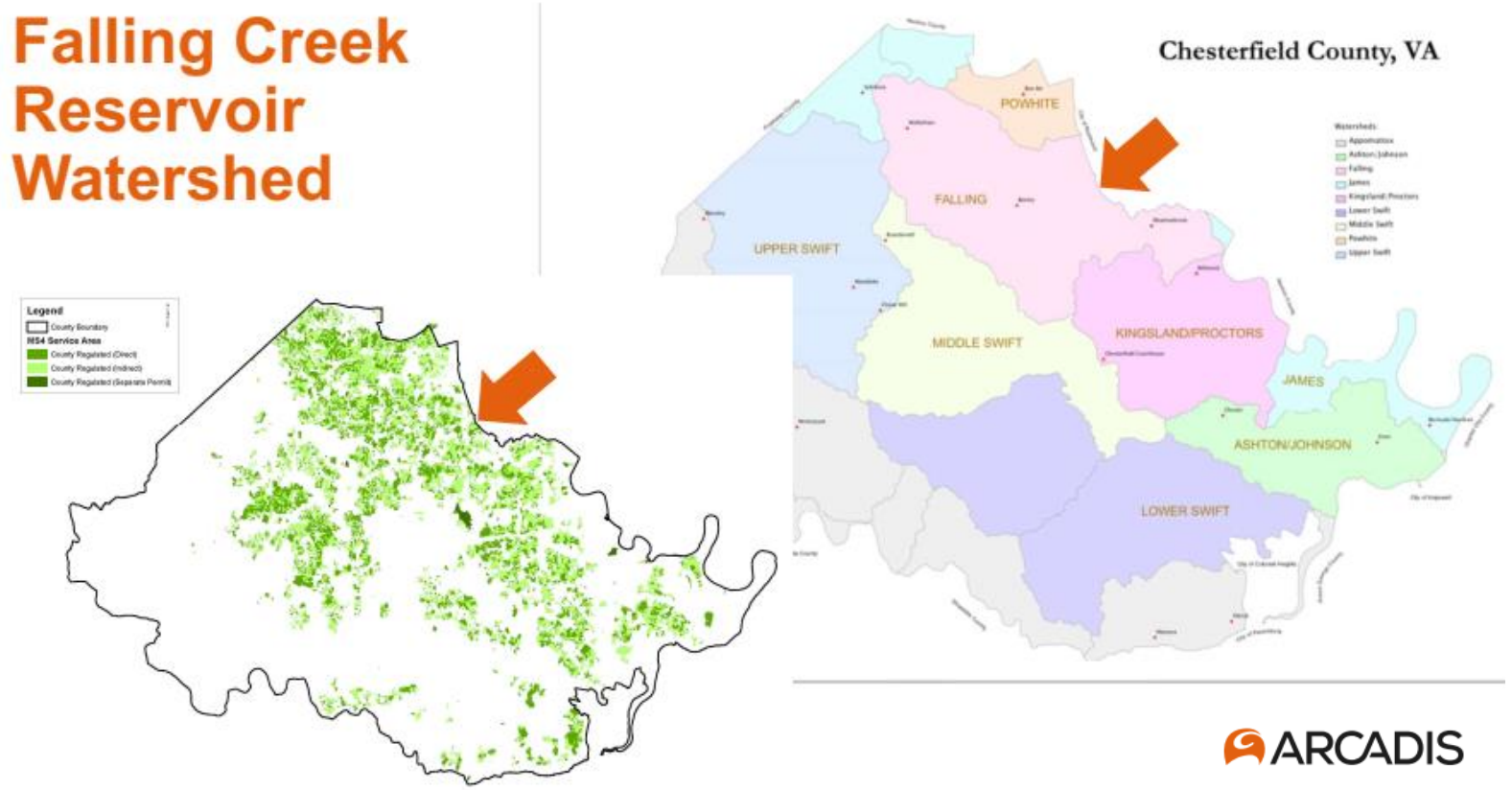
Retained Alternatives as of February 10, 2022

Lake Accotink Dredging Quantities and Costs*				
Dredge	Year Dredged	Quantity in Cubic Yards	Cost Estimate	Cost Per Cubic Yard
Lake Accotink Base Dredge	Future	500,000	$95,000,000	$190
Lake Accotink Maintenenance Dredge 1	Future	150,000	$46,500,000	$310
Lake Accotink Maintenenance Dredge 2	Future	150,000	$59,400,000	$396
Lake Accotink Maintenenance Dredge 3	Future	150,000	$96,800,000	$645
Lake Accotink Maintenenance Dredge 4	Future	150,000	$123,500,000	$823
Prior Lake Dredgings			Actual Cost of Prior Dredge Projects	
Lake Accotink	2008	193,000	$9,975,000	$52
Lake Barton	2010	32,500	$2,115,000	$65
Huntsman Lake	2014	43,000	$3,500,000	$81
Woodglen Lake	2015	40,000	$3,150,000	$79
Royal Lake	2017	80,000	$6,300,000	$79
Lake Barton	2022	19,100	$1,996,000	$105

*Note: Lake Accotink costs based on updated estimates January 2023

Falling Creek Reservoir – Chesterfield Co, VA

- Former drinking water reservoir
- Constructed in 1951
- Watershed size: 34,000 acres
- Residential – Suburban Development (25% impervious)
- Lake surface area: 360 acres



Falling Creek Reservoir – Chesterfield Co, VA

- Reservoir not previously dredged
- Assumed 7,500 cubic yards of accumulation per year
- 119,000 cubic yards of sediment removal with base dredge
- Costs per cubic yard as of 2023 similar to that anticipated for Lake Accotink
- Anticipated maintenance dredging every 3-5 years of ~40,000 cubic yards
- Completed project will enable Chesterfield County to meet MS4 permit requirements

Site Access

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ARCADIS

June 29, 2023

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Slurrying and Pumping

Trucking

Belt/Auger Conveyor

Lake Linganore Reservoir – Frederick Co, MD

- Primary drinking water reservoir for the City of Frederick
- Constructed in 1968 – not previously dredged
- Lake privately owned by Lake Linganore Association (LLA)
- Recreational facility for 8,500 residents in LLA, and about 500 nonresidents who own lots.
- Annual dues for range from $500 to $2,000 for residents, and about $300 for nonresidents
- Land use mixed – Suburban & rural
- Drainage area: 47,212 acres
- Lake surface area: 209 acres

Lake Linganore Reservoir – Frederick Co, MD

- Dredging joint venture between City of Frederick, Frederick County and Lake Linganore Association (LLA)
- Dredged 150,000 cubic yards
- Total cost: $21 million (~$140/cubic yard)
  - $3 million grant due to reservoir status
  - $18 million
    - 50% City of Frederick
    - 25% Frederick County
    - 25% LLA
- Short pipeline, processed spoils on existing cleared public land, short trucking and free disposal at Frederick County landfill

Frederick County Executive Jan H. Gardner facebook

Detention Facilities – Surface Area Sizing to Drainage Area

Lake Name	Facility ID	Year Built	Purpose	Normal Lake Area Acres	Drainage Area to Lake Acres	Ratio Lake Surface Area (=1) to Drainage Area	Percentage Lake Surface Area is of Drainage Area
Lake Mercer (Dam Site #1)	9991WP	1985	Flood Control	43.2	3962	91.71	1.09%
HUNTSMAN LAKE (DAM SITE #8)	9998WP	1970	Flood Control	28.6	1489	52.06	1.92%
Lake Royal (Dam Site #4)	9994WP	1972	Flood Control	37.5	2432	64.85	1.54%
Woodglen Lake (Dam Site #3)	9993WP	1976	Flood Control	15.2	738	48.55	2.06%
Lake Barton (Dam Site #2)	9992WP	1977	Flood Control	9.3	538	57.85	1.73%
Lake Braddock (Dam Site #7)	9997WP	1969	Flood Control	18.07	428	23.69	4.22%
Lake Accotink Dam	FM0501	1943	Reservoir	55	19600	356.36	0.28%
Falling Creek, Chesterfield Co, VA		1951	Reservoir	360	34000	94.44	1.06%
Lake Linganore, Frederick Co, MD		1968	Reservoir	209	47212	225.89	0.44%

Notes:

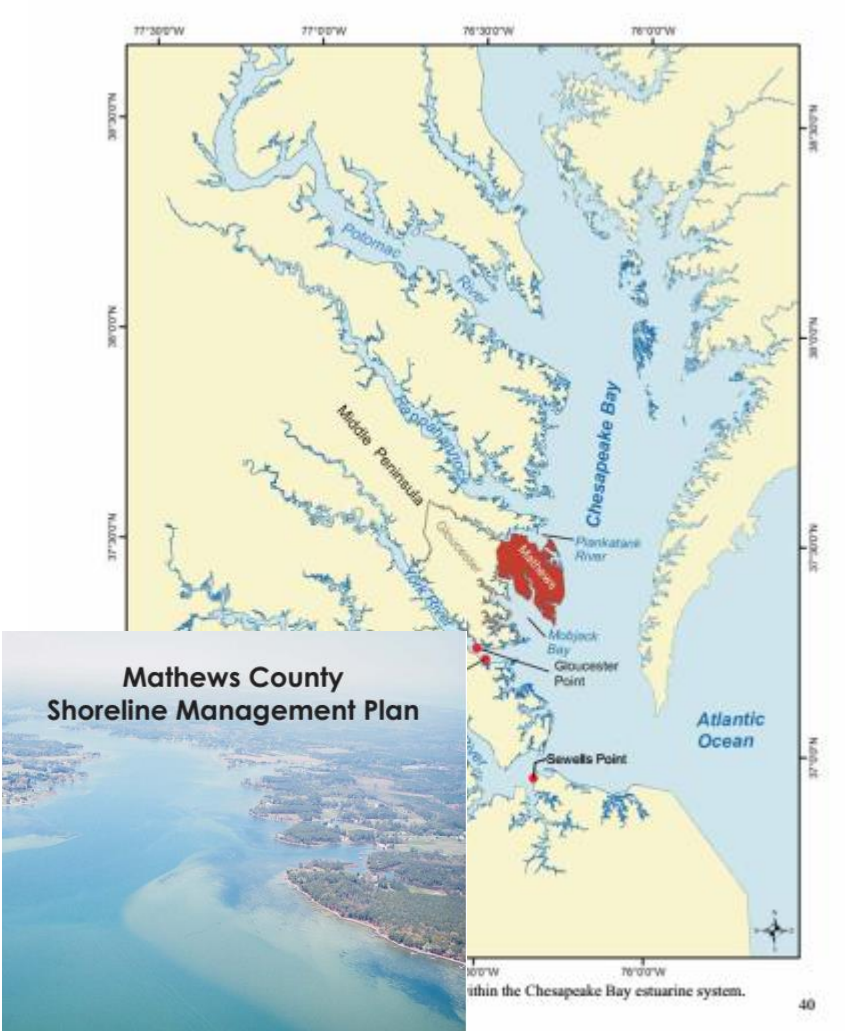
Ratio of Pond Surface Area to Drainage Area should not be greater than 1:100

A Wet Pond Surface Area should generally be 1-3% of the Drainage Area

Reference: VA DCR STORMWATER DESIGN SPECIFICATION NO. 14 - Wet Ponds

Note: Lake water surface area to drainage area comparisons are limited. Drainage area land use, lake storage volume and understanding of sediment load are critical to adequately assessing efficiency and sustainability of facilities.

Hole in the Wall Navigable Waterway Dredging – Mathews Co, VA



ithin the Chesapeake Bay estuarine system.

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- Necessary to allow safe navigation of commercial fishing, recreational and US Coast Guard vessels.
- Dredge quantity: 40,000 cubic yards
- Total cost estimate: $4 million (~$100/cubic yard)
- Sediment removed on barge, transported short distance, and disposed as “beneficial reuse.”
- Sediment will be used to protect shorelines from erosion.

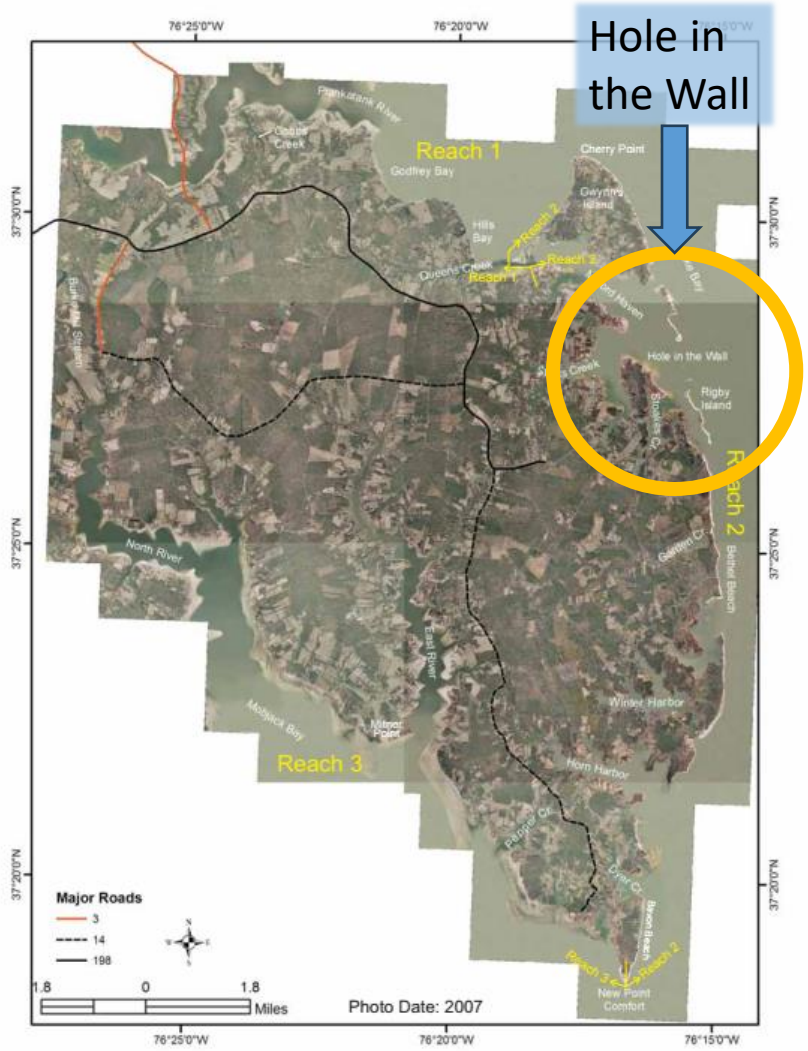

Figure 2-2. Image of Mathews County, Virginia with locations and Reaches designated.

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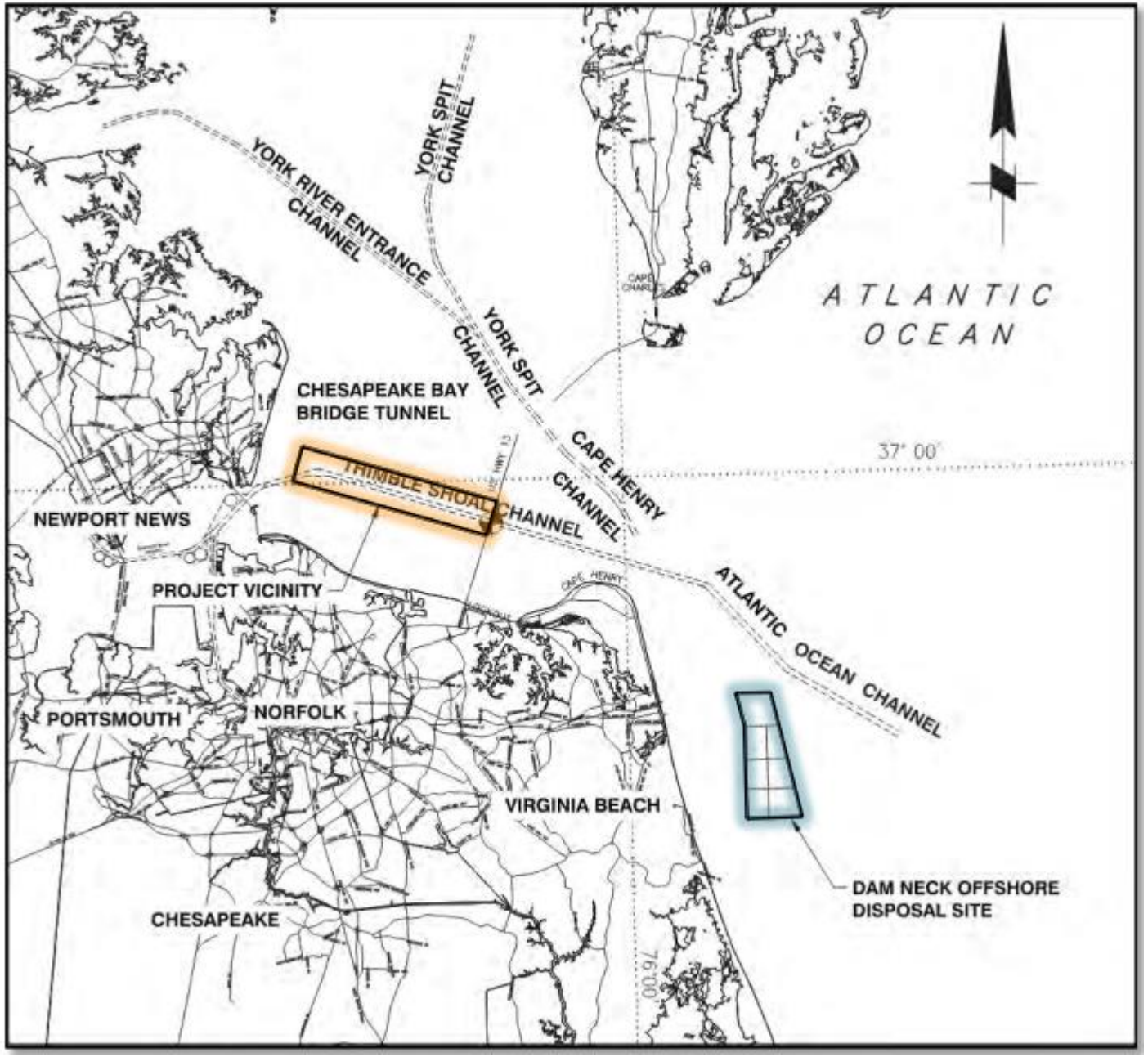
Norfolk Harbor Navigation Improvements – Thimble Shoal Channel West of Chesapeake Bay Bridge-Tunnel

- Necessary to allow safe navigation of commercial, military and recreational vessels
- Dredge quantity: 5,233,000 cubic yards
- Total cost estimate: $272 million (~$51/cubic yard)
- Sediment removed on barge, transported short distance, and disposed at designated site.



Summary

- Fairfax County maintenance dredging of the Pohick Creek (PL566) lakes is:
  - Rising in cost despite lower project complexity and quantities,
  - Due to increasing construction, trucking and disposal costs.
- The two analogous regional examples:
  - Falling Creek (Chesterfield County, VA):
    - Has lower quantities, similar complexity and watershed conditions, and
    - Is realizing costs directly in line with current estimates for Lake Accotink.
  - Lake Linganore (Frederick County, MD):
    - Had costs of $140/cubic yard despite a shorter pipeline, already cleared public site for processing, short trucking distance and free disposal at the county landfill.
- Most large-scale dredging is in navigable waters with significant drivers for commerce and community resilience and much lower complexity due to the ability to dredge, ship and dispose sediment nearby at low cost.