# Lake Accotink Sustainability



Presentation and Workshop May 16<sup>th</sup>, 2016

# Chelcome. Thank you for coming!

# Tonight's Agenda

- Welcome and Introductions
- Project Background
- Presentation on Sustainability Options
- Workshop Groups
- Report Out
- Next Steps

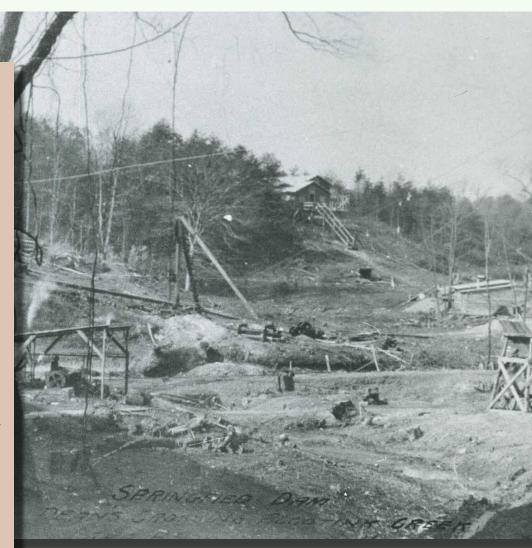


- 1 of the Park Authority's3 lakefront parks
- ❖ 493-acre park
- ❖ 55-acre lake
- Over 250,000 visitors a year (doesn't account for all those who enter the park on foot or bike)

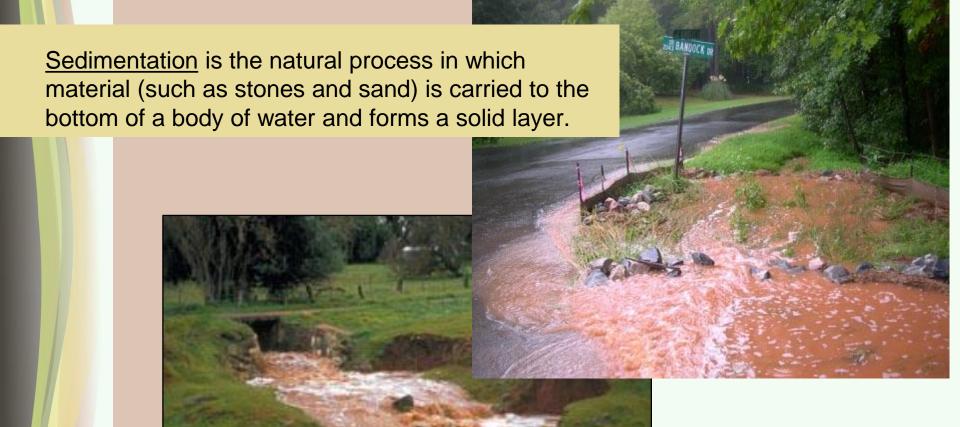
The Park Authority acquired the property in 1967 through the Federal Lands to Parks Program

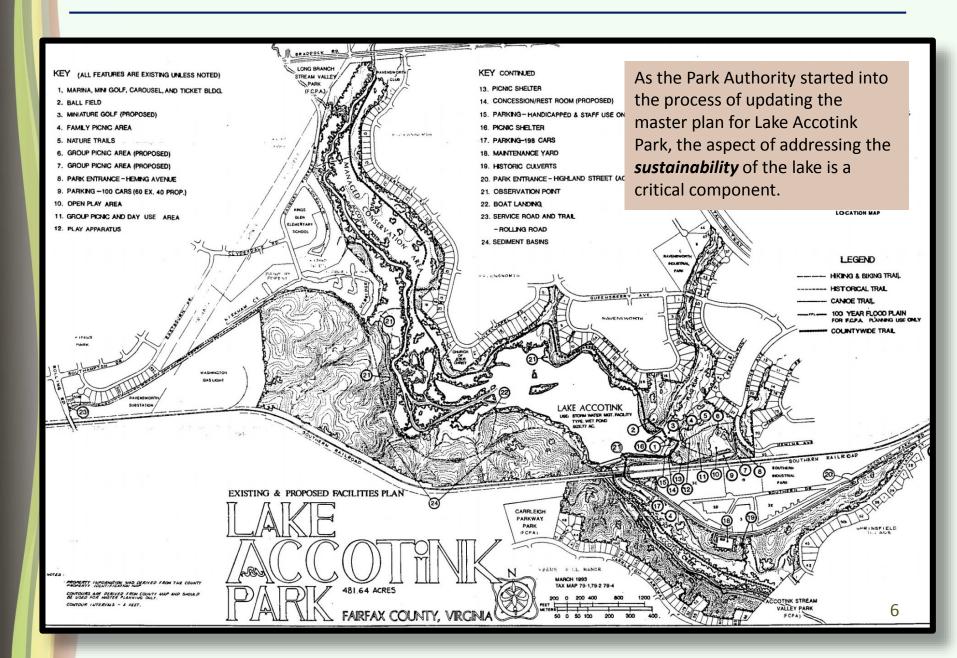


- Original "Springfield Dam" built in 1918 (removed 1922)
- Current concrete spillway and dam constructed in 1940 to provide a source of drinking water for Camp A. A. Humphries (now Fort Belvoir)
- Since the creation of Lake
   Accotink, sedimentation has
   always been an issue



## What is sedimentation?





# What does "sustainable" mean?

"able to be maintained at a certain rate or level"

"able to use without using up"

**ENVIRONMENTAL** 

**BEARABLE** 

**VIABLE** 

**SUSTAINABLE** 

SOCIAL

**FINANCIAL** 

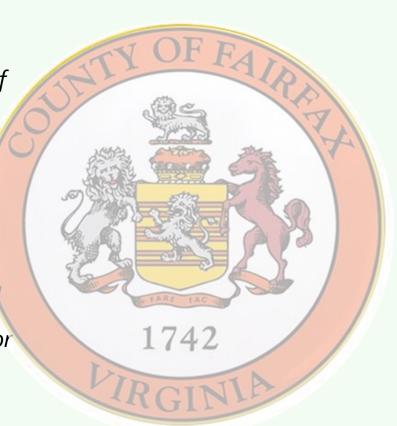
**EQUITABLE** 

In terms of Lake Accotink, our most "sustainable" solution will be found at the intersection of a broad range of environmental, social, and financial goals.

#### September 2014

Board of Supervisors voted to:

Approve one-time funding in the amount of \$179,000 to support a master site analysis and area-use recommendation study for Lake Accotink Park. This study is necessary planning work that will assist in the development and enhancement of this vital County facility. Staff will continue to look for additional funding sources to support this planning effort and required design elements, including grant funding.



As Lake Accotink Park is a significant countywide resource, the Board of Supervisors voted to assist the Park Authority by approving the allocation of funds to help study the lake and impacts of sedimentation.



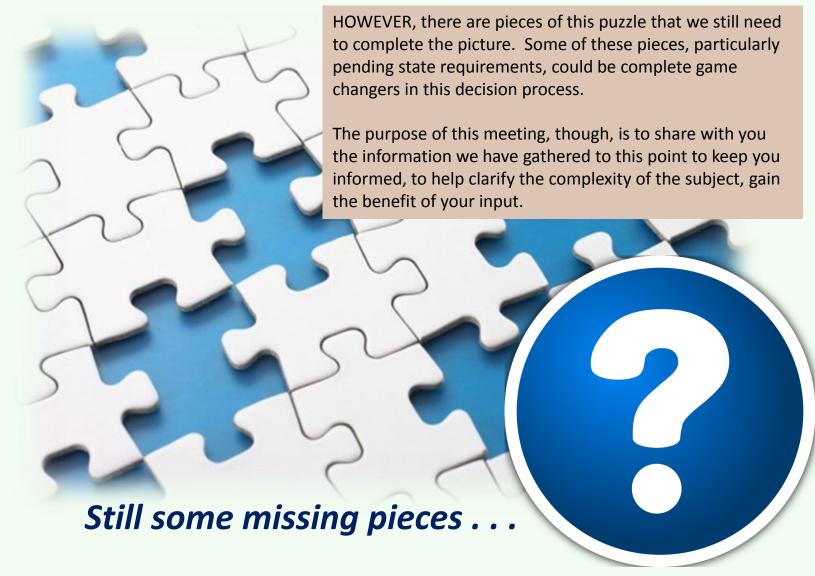
To evaluate the current rate at which sediment enters and is trapped within the lake

#### **AND**

To investigate a range of alternatives for the management of Lake Accotink.

Over the past year, the Park Authority has utilized this funding to contract the services of Burgess & Niple Engineering and Wetland Studies and Solutions. A critical piece of this process was to examine the impact of sediment within the lake and develop a range of options how we might better address this long-standing problem.

Community input will be one of many factors that will lead to an ultimate decision about the management of Lake Accotink.



# Plan for the evening

- Presentation by WSSI on lake sustainability issues and alternatives
- Break into working groups for discussion
- **❖** Report out from each group
- Discuss next steps

# and a few ground rules

- Please, no questions during the presentation
- Seek out the opinions of all group members
- **\***Extend courtesy to all during the evening

# Lake Accotink Sustainability Plan Summary of Potential Alternatives



Presented by:

Frank R. Graziano, P.E.

fgraziano@wetlandstudies.com

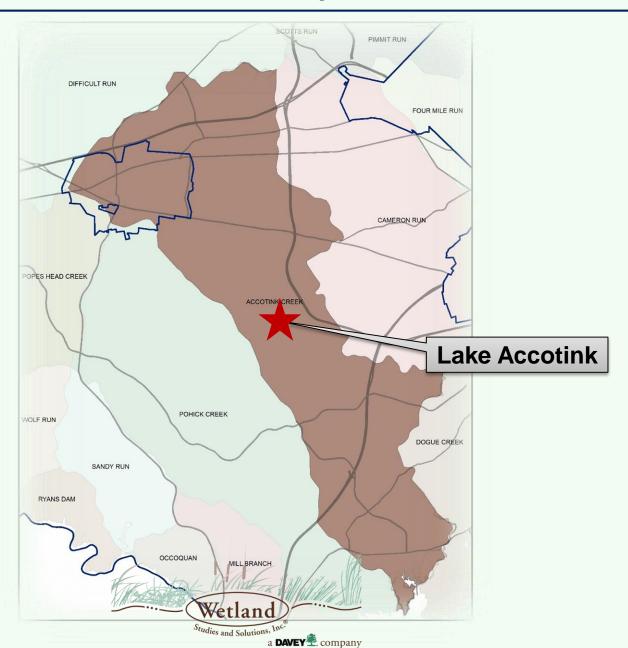
Dillon M. Conner, PLA

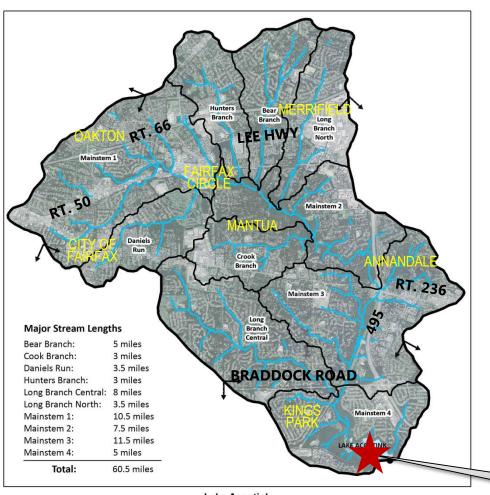
dconner@wetlandstudies.com

May 16, 2016









Lake Accotink Drainage Area 31 mi<sup>2</sup>

**Stream Length** 60.5 miles

*Impervious Cover* 30%

**Lake Accotink** 

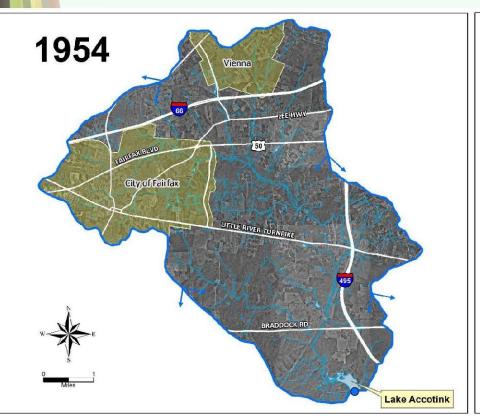
Lake Accotink Watershed, Subwatersheds, & Major Streams WSSI #22647.01 Original Scale: 1" = 1 mile

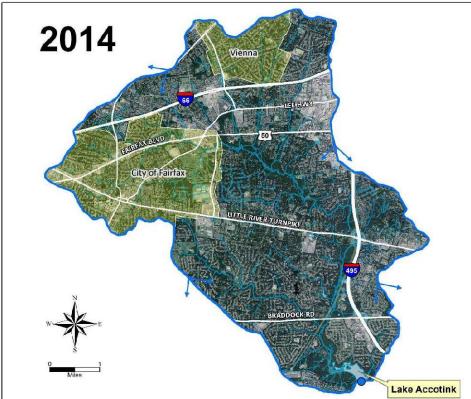
Aerial Source: NAIP. Summer 2014.

Wetland Studies and Solutions, Inc.

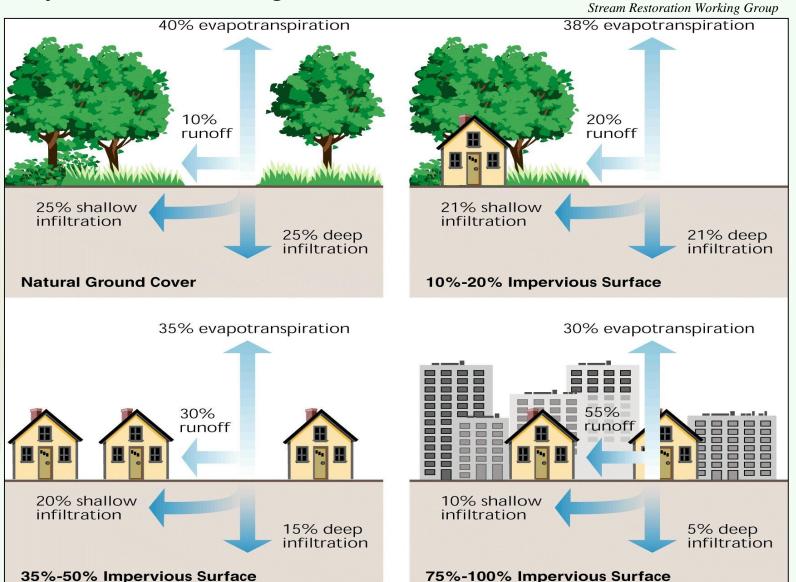
a **DAVEY** company







#### Why are streams eroding??

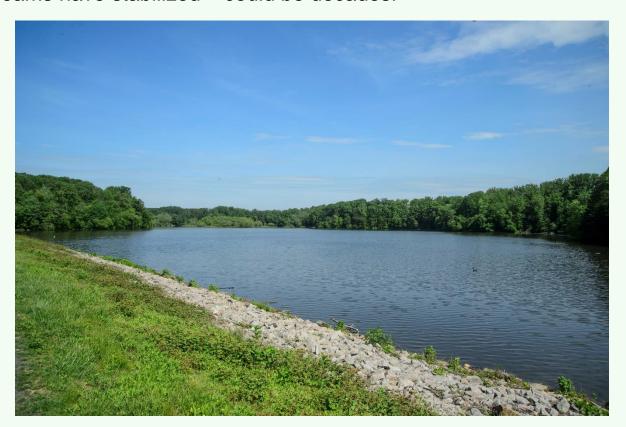


*Source: The Federal Interagency* 



#### Continuing problem of sedimentation and associated loss of lake function:

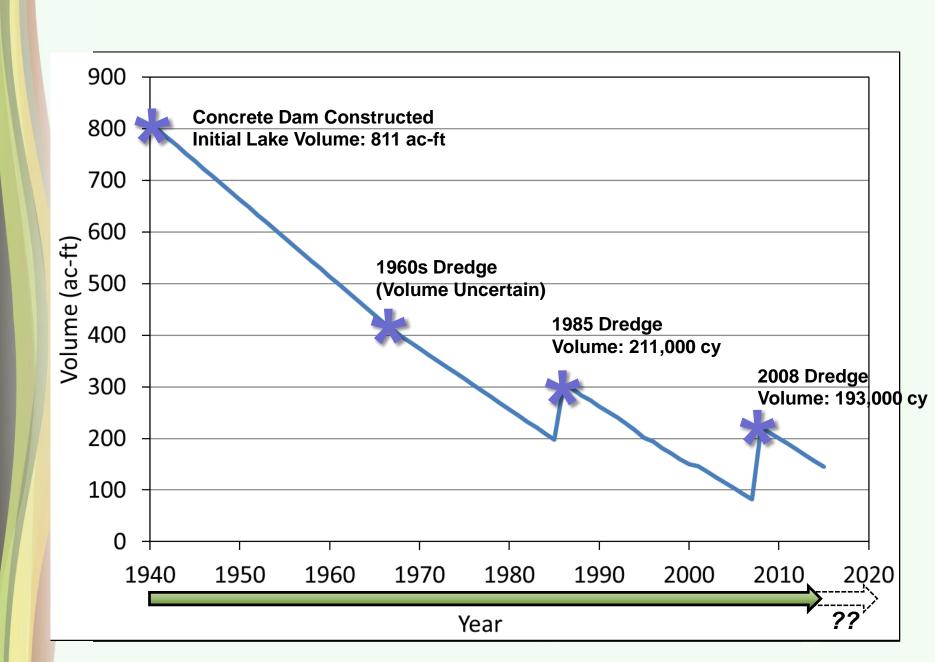
- Since 2011, **90,895** cy have been deposited, mostly in the upper region.
- Sedimentation rate = 22,750 cy/yr.
- Based on the source (primarily streambank erosion), this will continue until the streams have stabilized – could be decades!



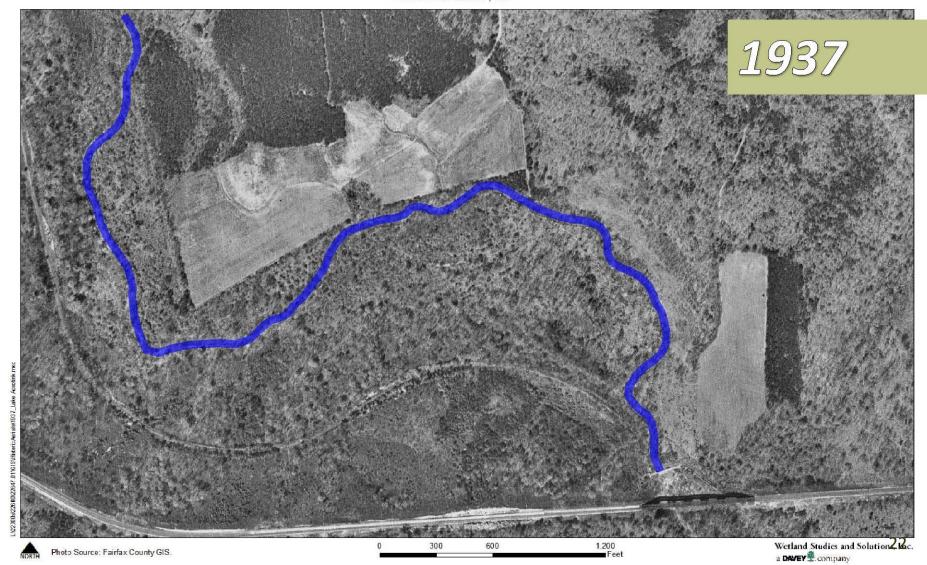
### **Previous Dredging Studies**

- Diagnostic and Feasibility Study for the Restoration of Lake Accotink (NUSAC Incorporated, 1982)
- F.X. Browne Sedimentation Studies 1983-1988 (Associated with 1985 Dredge Event)
- Lake Accotink Sediment Management Program Study (HDR Engineering, Inc., January 2002)

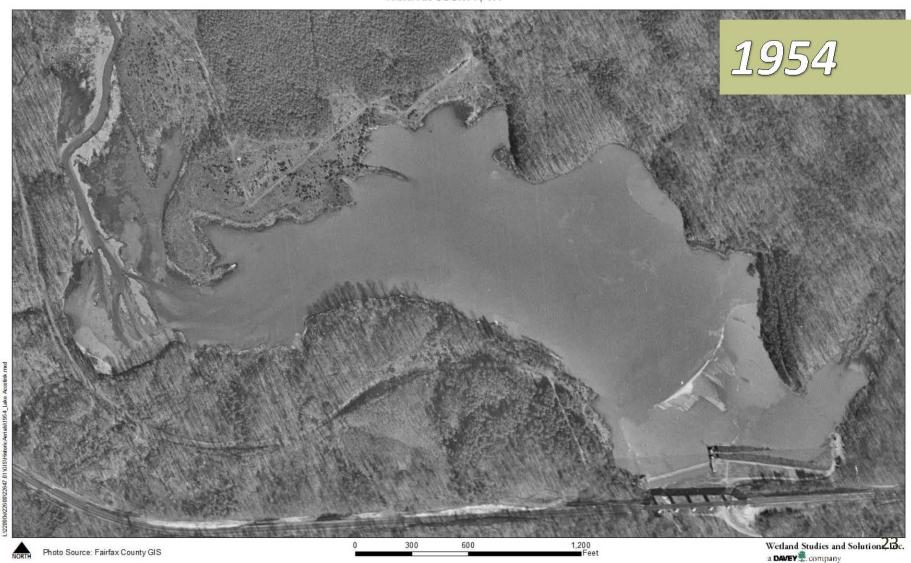




#### **Lake Accotink**



# Lake Accotink FAIRFAX COUNTY, VA



#### **Lake Accotink**



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#### Lake Accotink



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#### **Lake Accotink**



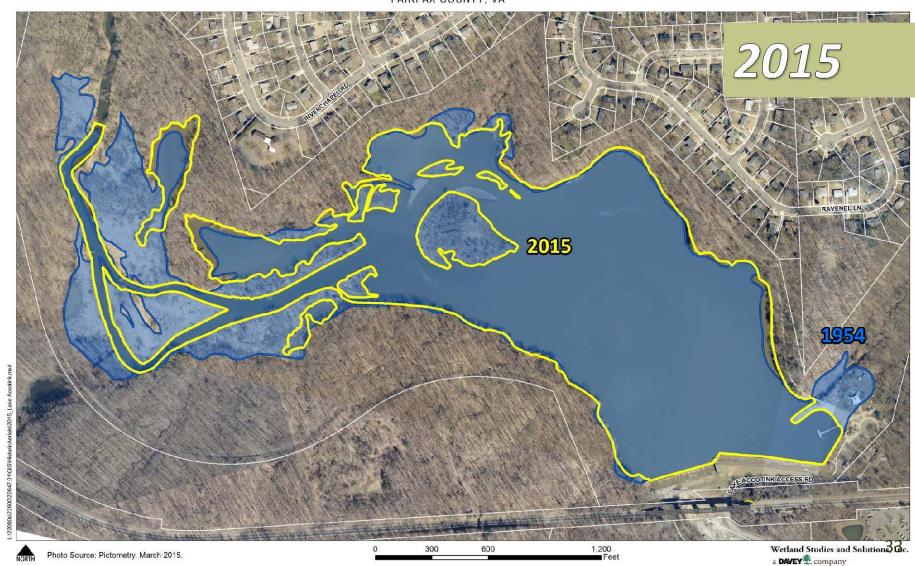
#### **Lake Accotink**



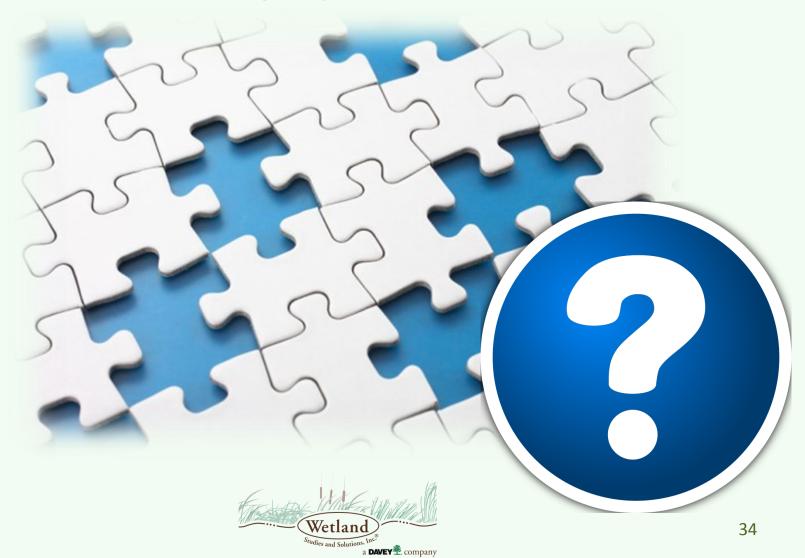
#### **Lake Accotink**



# Lake Accotink FAIRFAX COUNTY, VA



# A Range of Possibilities



# Lake Accotink Sustainability Study Continued Dredging

#### **Location**

 Within main body of the lake, primarily in the upper end.

#### <u>Goal</u>

 To restore average depth to 5-8 ft for recreational boating. Remove approximately 350,000 cy.

#### **Dredging Lifecycle**

• Approx. 15 - 20 year cycle.







# Lake Accotink Sustainability Study Continued Dredging

## **Considerations**

# ALTERNATIVE

#### **Full-Lake Dredge**

#### Initial Full Dredge of Lake:

✓ Required, ±350,000 cy

#### **Dredging Lifecycle:**

± every 15 years

#### Offsite Disposal of Sediment:

✓ Required
 (Note - Additional cost and likely impacts from trucking activities)

#### **Management Approach**

#### Maintenance Dredge Interval:

X No maintenance dredging is done with this alternative

#### Offsite Disposal of Sediment:

X Not applicable as maintenance dredging is not performed

#### **Recreation**

#### Recreational Use of the Lake:

✓ Maintained

# Interruption of Recreational Use During Dredging Operations:

 Interruption of lake usage for ±2 years every dredge cycle

#### **Environmental**

# Sediment Capture Relative to Current Level:

✓ Maintained

**Sediment Forebay** 

#### **Location**

 Either up-stream of lake or in-lake locations

#### **Configuration**

- Surface Area 13.3 ac
- Depth 8 ft
- Volume 94 ac-ft
- Sized for 15% of "Tv"

#### **Maintenance Dredging**

- Trap efficiency can be increased with larger volume.
- Requires "temporary" on-site disposal area to be viable.





# Lake Accotink Sustainability Study Sediment Forebay

#### **Considerations**

# B

**ALTERNATIVE** 

#### **Full-Lake Dredge**

#### Initial Full Dredge of Lake:

√ Required, ±500,000 cy

#### **Dredging Lifecycle:**

± every 30-40 years

#### Offsite Disposal of Sediment:

✓ Required
 (Note - Additional cost and likely impacts from trucking activities)

#### **Management Approach**

#### Maintenance Dredge Interval:

✓ Annual/Biennial dredge of forebay

#### Offsite Disposal of Sediment:

Required
 (Note - Additional cost and likely impacts from trucking activities)

#### <u>Recreation</u>

#### Recreational Use of the Lake:

✓ Maintained

## Interruption of Recreational Use During Dredging Operations:

- Interruption of lake usage for ±2 years every major dredge cycle
- X No interruption during annual/biennial maintenance dredge of up-stream forebay
- Interruption of lake usage for several months annually/biennially with in-lake forebay maintenance

#### **Environmental**

## Sediment Capture Relative to Current Level:

✓ Enhanced (isolated to facilitate removal)

# Lake Accotink Sustainability Study In-line "Beaver Dams"

a **DAVEY** company

#### **Location**

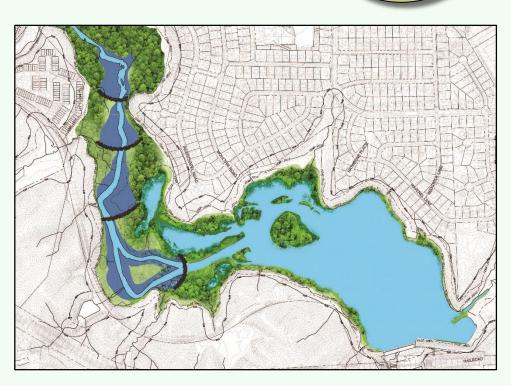
 Upstream of lake and within Accotink Creek.

#### **Configuration**

- Sheet pile "walls" within the channel to encourage sediment deposition. Rough capacity estimate of up to12,000 cy per structure over time (variable).
- Will convert existing forested wetland areas to "beaver swamps" over time.

#### **Maintenance Dredging**

- Some increased duration to the first full-lake dredging after installation, no impact thereafter.
- "Beaver ponds" not accessible.
   for maintenance.



In-line "Beaver Dams"

#### **Considerations**



#### **Full-Lake Dredge**

#### Initial Full Dredge of Lake:

✓ Required, ±350,000 cy

#### **Dredging Lifecycle:**

± every 15 years with one time extension of ± 3 years

#### Offsite Disposal of Sediment:

✓ Required
 (Note - Additional cost and likely impacts from trucking activities)

#### **Management Approach**

#### Maintenance Dredge Interval:

X Maintenance dredging of "beaver dams" impractical - one time use.

#### Offsite Disposal of Sediment:

X Not applicable as maintenance dredging is impractical

#### **Recreation**

#### Recreational Use of the Lake:

✓ Maintained

## Interruption of Recreational Use During Dredging Operations:

 Interruption of lake usage for ±2 years every major dredge cycle

#### **Environmental**

## Sediment Capture Relative to Current Level:

✓ Enhanced (limited lifetime only)

- Alternatives A, B, and C will all require an initial full dredge of the lake as the first phase of the project.
- Alternative B will require annual/biennial maintenance dredging and the ability to process dredge material on-site.
- Alternative C is a one-time option.

It is anticipated that ultimate disposal of dredge material will require trucking to off-site location for any of the dredge options.



# Lake Accotink Sustainability Study Sediment Disposal

#### Where to put it???

- Preliminary analysis of potential locations.
- Will require further study to align with chosen lake alternative.
- Removal of sediment will entail impacts to surrounding communities.





# Lake Accotink Sustainability Study Single Channel with Reclaimed Land

(Elimination of Existing Dam)

#### **Location**

 Stream along northern shore, reclaimed remaining footprint (reforest, wetlands, open

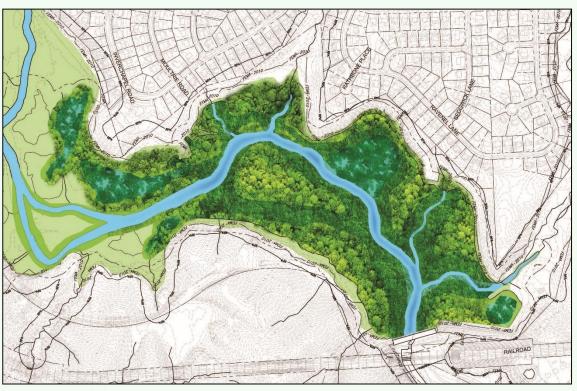
space).

#### **Configuration**

 Stream Creation Length – 3,300 lf.

#### **Maintenance Dredging**

Not necessary.





# Lake Accotink Sustainability Study Single Channel with Reclaimed Land

# ALTERNATIVE

# **Considerations**

#### **Establishment**

Establishment efforts focus on proper sizing and alignment of stream channel and the succession of a healthy wetland habitat.

#### Initial Full Dredge of Lake:

X No initial dredge required

#### Offsite Disposal of Sediment:

X None required as there is no dredging

#### **Management Approach**

Management efforts focus on stream channel stability and the succession of a healthy wetland habitat.

#### Maintenance Dredge Interval:

X No maintenance dredge required

#### Offsite Disposal of Sediment:

X None required as there is no maintenance dredging

#### **Recreation**

#### Recreational Use of the Lake:

X Removed

#### **Environmental**

## Sediment Capture Relative to Current Level:

X Effectively eliminates any sediment capture.

(Requires further evaluation of pending state regulations and downstream impacts.)

# Lake Accotink Sustainability Study Single Channel with Smaller Lake (Modification of Existing Dam)

#### **Location**

 Stream along southern shore, smaller "off-line" lake/wetlands along northern shore.

#### **Configuration**

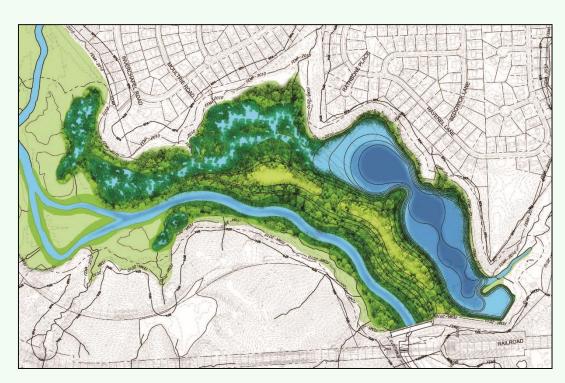
Lake Surface Area – 18.5 ac

Depth – 8 ft

Stream Length - 2,500 lf
 (90 ft wide (bankfull), 6 ft deep, transports sediment)

#### **Maintenance Dredging**

Not necessary



# Lake Accotink Sustainability Study Single Channel with Smaller Lake

#### ALTERNATIVE

# E

#### **Considerations**

#### **Establishment**

Establishment efforts focus on proper sizing and alignment of stream channel and the succession of a healthy vegetative habitat.

#### Initial Full Dredge of Lake:

X No initial dredge required

#### Offsite Disposal of Sediment:

X None required as there is no dredging

#### **Recreation**

#### Recreational Use of the Lake:

Retained but reduced

## Interruption of Recreational Use During Dredging Operations:

 Yes, if necessary (off-line areas of open water would only require very infrequent maintenance)

#### **Management Approach**

Management efforts focus on stream channel stability and the succession of a healthy vegetative habitat.

#### Maintenance Dredge Interval:

X No maintenance dredge required

#### Offsite Disposal of Sediment:

X None required as there is no maintenance dredging

#### **Environmental**

## Sediment Capture Relative to Current Level:

X Effectively eliminates any sediment capture.

(Requires further evaluation of pending state regulations and downstream impacts.)

## Lake Accotink Sustainability Study Comparison of Alternatives

ALTERNATIVES		FULL LAKE DREDGE				MANAGEMENT APPROACH				RECREATION		ENVIRONMENTAL		
ALTERNATIVE	DESCRIPTION OF ALTERNATIVE	INITIAL FULL DREDGE OF LAKE REQUIRED	DREDGING LIFECYCLE	ESTIMATED SEDIMENT REMOVAL	ESTIMATED IMPACT TO ADJACENT NEIGHBORHOODS FROM TRANSPORT OF DREDGE MATERIAL	ANNUAL/BIENNIAL MAINTENANCE REQUIRED	MAINTENANCE CYCLE	ESTIMATED SEDIMENT REMOVAL	ESTIMATED IMPACT TO ADJACENT NEIGHBORHOODS FROM TRANSPORT OF DREDGE MATERIAL	RETAINS RECREATIONAL USE OF LAKE	INTERRUPTION OF LAKE USE DURING LIFECYCLE OR MAINTENANCE DREDGING	SEDIMENT CAPTURE RELATIVE TO CURRENT LEVEL	ADDRESSES NEW STATE SEDIMENT STANDARDS	IMPACTS TO WILDLIFE
DREDGING ALTERNATIVES														
А	CONTINUE WITH CURRENT DREDGING METHOD	YES	<b>±15</b> YEARS BETWEEN FULL DREDGE	<b>±350,000</b> CY	±35,000 TRUCK LOADS OVER SEVERAL YEARS	NO				YES	YES	CONSISTENT	?	?
В	INSTALL FOREBAY (EITHER IN-LAKE OR UP-STREAM)	YES	<b>±30-40</b> YEARS BETWEEN FULL DREDGE	<b>±500,000</b> CY	±50,000 TRUCK LOADS OVER SEVERAL YEARS	YES	ANNUAL/ BIENNIAL MAINTENA NCE	<b>±15,000</b> CY	±1,500 TRUCK LOADS OVER SEVERAL MONTHS	YES	NO UP-STREAM FOREBAY YES IN-LAKE FOREBAY	ENHANCED (ISOLATES FOR REMOVAL)	?	?
С	INSTALL "BEAVER DAM" STRUCTURES	YES	±15 YEARS BETWEEN FULL DREDGE WITH 1 TIME EXTENSION OF ±3 YRS.	<b>±350,000</b> CY	±35,000 TRUCK LOADS OVER SEVERAL YEARS	N/A				YES	YES	ENHANCED FOR A LIMITED PERIOD OF TIME	?	?
STREAM CHANNEL ALTERNATIVES														
D	SINGLE CHANNEL WITH RECLAIMED LAND (ELIMINATION OF EXISTING DAM)	N/A	ESTABLISHMENT EFFORTS FOCUS ON SIZING AND ALIGNMENT OF STREAM CHANNEL AND THE SUCCESSION OF A HEALTHY WETLAND HABITAT.				MAINTENANCE EFFORTS WOULD FOCUS ON STREAM STABILITY AND THE SUCCESSION OF A HEALTHY WETLAND HABITAT.			NO	N/A	EFFECTIVELY ELIMINATES SEDIMENT CAPTURE	?	?
Ε	SINGLE CHANNEL WITH SMALLER LAKE (MODIFICATION OF EXISTING DAM)	N/A	ESTABLISHMENT EFFORTS FOCUS ON SIZING AND ALIGNMENT OF STREAM CHANNEL AND THE SUCCESSION OF A HEALTHY VEGETATIVE HABITAT.				MAINTENANCE EFFORTS WOULD FOCUS ON STREAM STABILITY AND THE SUCCESSION OF A HEALTHY VEGETATIVE HABITAT.			YES	N/A	EFFECTIVELY ELIMINATES SEDIMENT CAPTURE	<b>?</b> 47	?

#### **Summary**

- 1) Discussed current watershed issues and concerns and the impacts to Lake Accotink
- 2) Overview of efforts to date
- 3) Several alternatives presented as to how Lake Accotink could be managed:
  - A. Continue with current operation (major dredge every 15-20 years).
  - B. Construct a sediment forebay either up-stream of the lake or within the lake.
  - C. Construction of smaller "beaver dam" type structures upstream of the lake in line with the stream.
  - D. Alteration of the dam to return the lake to a single thread channel (land is reclaimed reforested, wetland creation, or open space).
  - E. Alteration of the dam to return the lake to a single thread channel, with smaller "off-line" ponds.

# 4) Each option is quite different, but some common challenges/considerations:

- Dredge-related forebay alternatives require temporary on-site disposal to be financially viable.
- Ultimate disposal of material will require trucking off-site.
- Many alternatives involve wetland impacts.
- Dam removal alternatives may have regulatory implications and require additional study to assess downstream impacts such as flooding and ultimate deposition of accumulated sediments.

#### 5) Stakeholder input is essential!!



#### **Workshop Session**

#### **Instructions**

- Dot on your name tag will direct you to your working group
- 2. You will have 45 minutes to discuss two open-ended questions
- Select a team member to record your working group's input
- Select a team member to provide a briefly report out on the group's discussions

## **Supplies**

- List of questions
- Copies of the Alternatives
- Comparison chart of Alternatives
- Some "fast facts" about Lake Accotink Park
- Aerial photograph
- Various writing/drawing materials

#### **Group Facilitators**

- Julie Tahan
   Manager, Lake Accotink Park
- Ed RichardsonManager, Area 4 Maintenance
- Chris GoldbeckerLakefront Park Manager
- Sandy Stallman
   Manager, Park Planning Branch
- Gayle Hooper Landscape Architect, Park Planning Branch
- Andi DorlesterSenior Planner, Park Planning Branch
- Liz Cronauer Trails Manager, Park Planning Branch
- 8. Danielle Wynne Senior Ecologist, Stormwater Planកិម្បា

#### **Workshop Session**

#### **Subject Matter Experts**

#### **Natural Resources**

 Kristen Sinclair, Senior Ecologist, Resource Management Division

#### **Cultural Resources**

 John Rutherford, Resource Management Division

#### **Stormwater Planning/Watershed**

Charles Smith, Stormwater Planning

#### **Sustainability Alternatives**

Frank Graziano, WSSI



#### **Next Steps**

#### Lake Sustainability Study

- The presentation from tonight and a meeting summary will be posted on the project web page
- Public input on the alternatives presented will accepted through June 30, 2016.
- DEQ to publish updated TMDL standards by end of 2016
- Analysis of the new standards and what they mean to this project.
- Additional opportunities for public involvement



Final Lake Accotink
 Sustainability Study

#### **Master Plan Revision**

- Continue to interact with the community to better understand their use of and vision for Lake Accotink Park to inform the master plan
  - Cardboard Boat Regatta
  - Summer Concert Series
  - Community Groups
- Additional opportunities for public involvement



Draft Lake Accotink Park Master Plan
 Revision for public review and comment

# Thank you!

for sharing your time and input

