

Stafford Drive Stream Restoration: A Tree Save Analysis

Tuesday, August 22nd, 2023



Kimley»»Horn



Meeting Outline

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 5. Stafford Drive Rendering
5. Next Steps
6. Open Discussion



Representative Bank Erosion

1. Project Team Introductions



SATOSHI ETO
CPM, Public Works
Program Manager

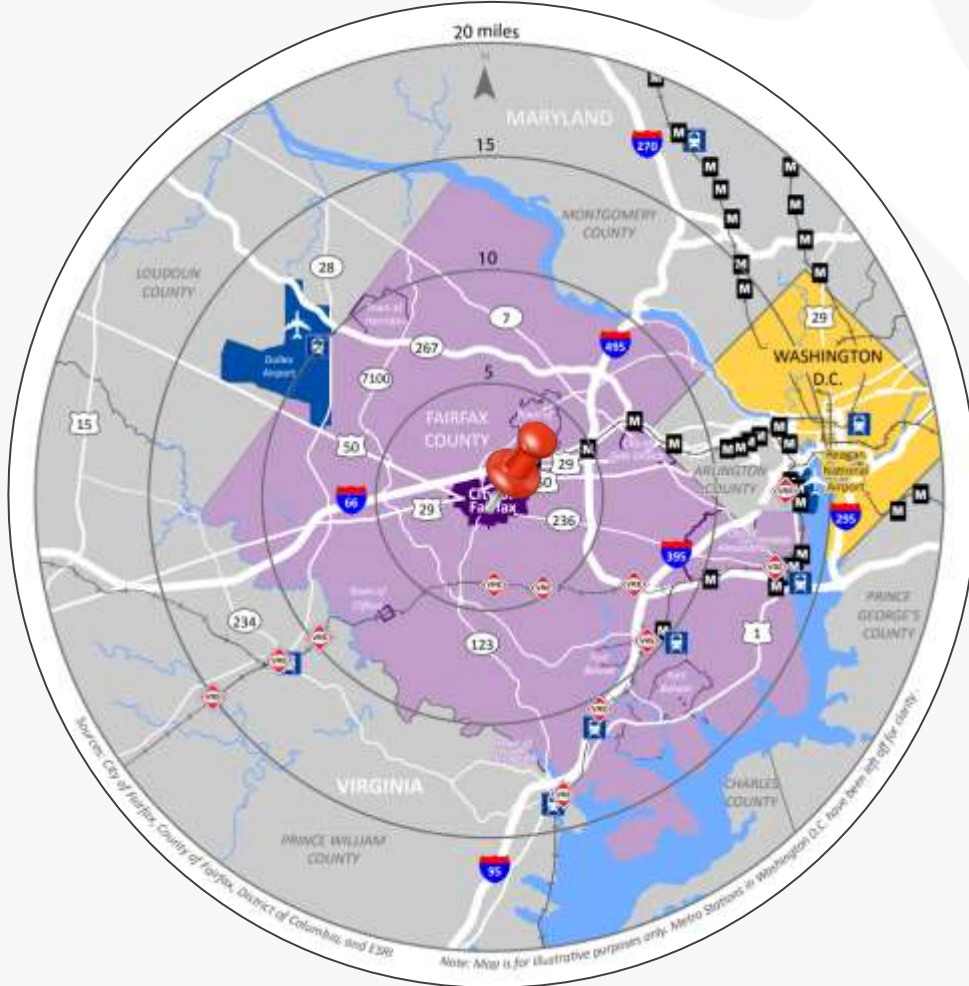


JUAN CAMPOS
P.E., Project Manager



2. Project Background

2.1 City of Fairfax Background & Project Motivation



City of Fairfax Regional Map

- Urbanization has historically impacted stream ecosystems throughout the City of Fairfax.
- As part of the requirements of the City's **MS-4 Permit**, they are required to meet POC reduction goals outlined for:
 - **Chesapeake Bay TMDL** - Nitrogen, Phosphorus, Total Suspended Solids
 - **Accotink Creek Local TMDL** - Benthic (Sediment)
- The City of Fairfax and Kimley-Horn have collaborated to implement creative, cost-effective solutions to achieve compliance for their **TMDL goals**.
- The **Stafford Drive Stream Restoration** project was identified as a feasible opportunity to help reach compliance and is now working toward the **100% design phase**.

2. Project Background

2.2 Stafford Drive Stream Restoration Project Overview

- Proposed **restoration reach length** = ~2,300 LF
- Estimated **limits of disturbance** (LOD) = 7.90 acres
- The project limits are primarily within two City-owned parcels
- **Infrastructure** within project limits:
 - 8' diameter double-barrel culvert under Fair Woods Parkway
 - 9' x 8' double-box culvert under Stafford Drive
 - Five piped inflows
- Estimated **POC credit reduction**:
 - 78,492.86 lb./year of Total Suspended Solids (TSS)
 - 323.66 lb./year of Nitrogen
 - 181.04 lb./year of Phosphorus



2. Project Background

2.3 Stafford Drive Stream Restoration Project Timeline



Legend

- Design
- Studies & Grants
- Outreach

2. Project Background

2.4 Design Constraints & Complications



- The stream corridor is bound by **steep hills** to the south and **condominiums** to the north.
- Stream channel is disconnected from the existing stream valley.
- Existing culvert is undersized, creating a tailwater condition.
- 896 total trees of DBH 5" and higher in the project area.
- Project is in proximity of the George Snyder Trail project, which also requires tree removal.
- Controversial stream restoration projects within nearby jurisdictions.

2 Project Background

2.5 Tree Removal Concerns

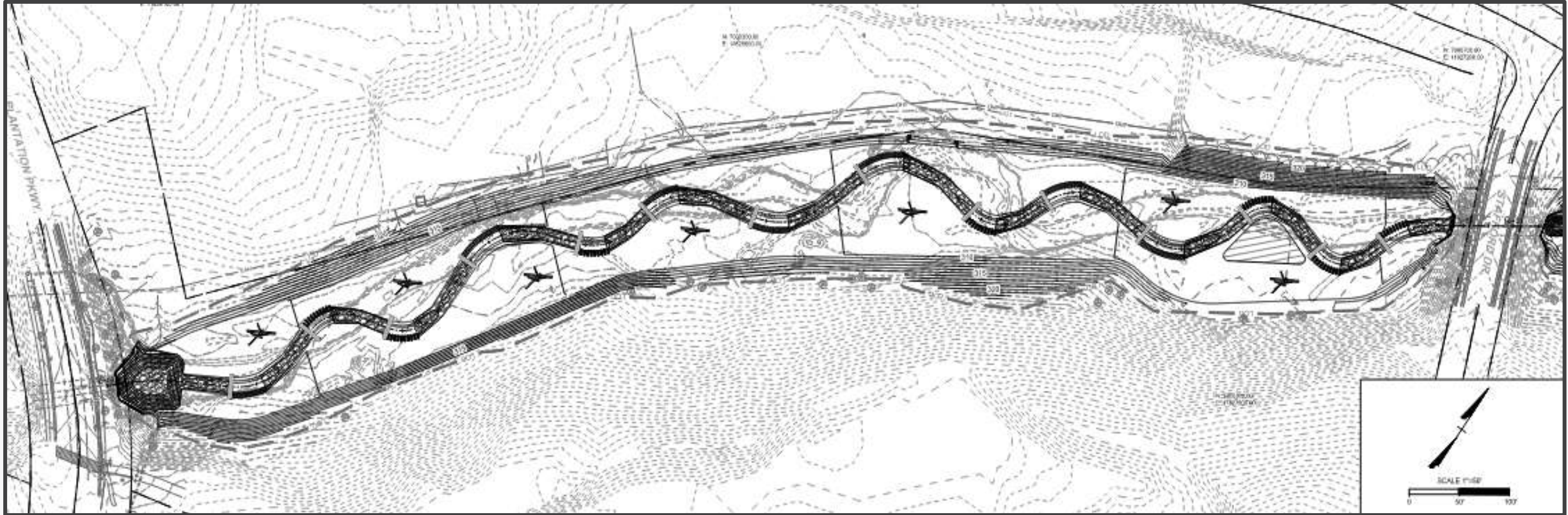


Stafford Drive Stream Restoration Tree Inventory

- Tree removal concerns arose during 30% design.
- Two design alternatives were developed and presented to project stakeholders:
 - Parks and Recreation Advisory Board (PRAB) – October 14, 2021
 - Environmental Sustainability Committee (ESC) – November 17, 2021

3 Project Alternative Analysis

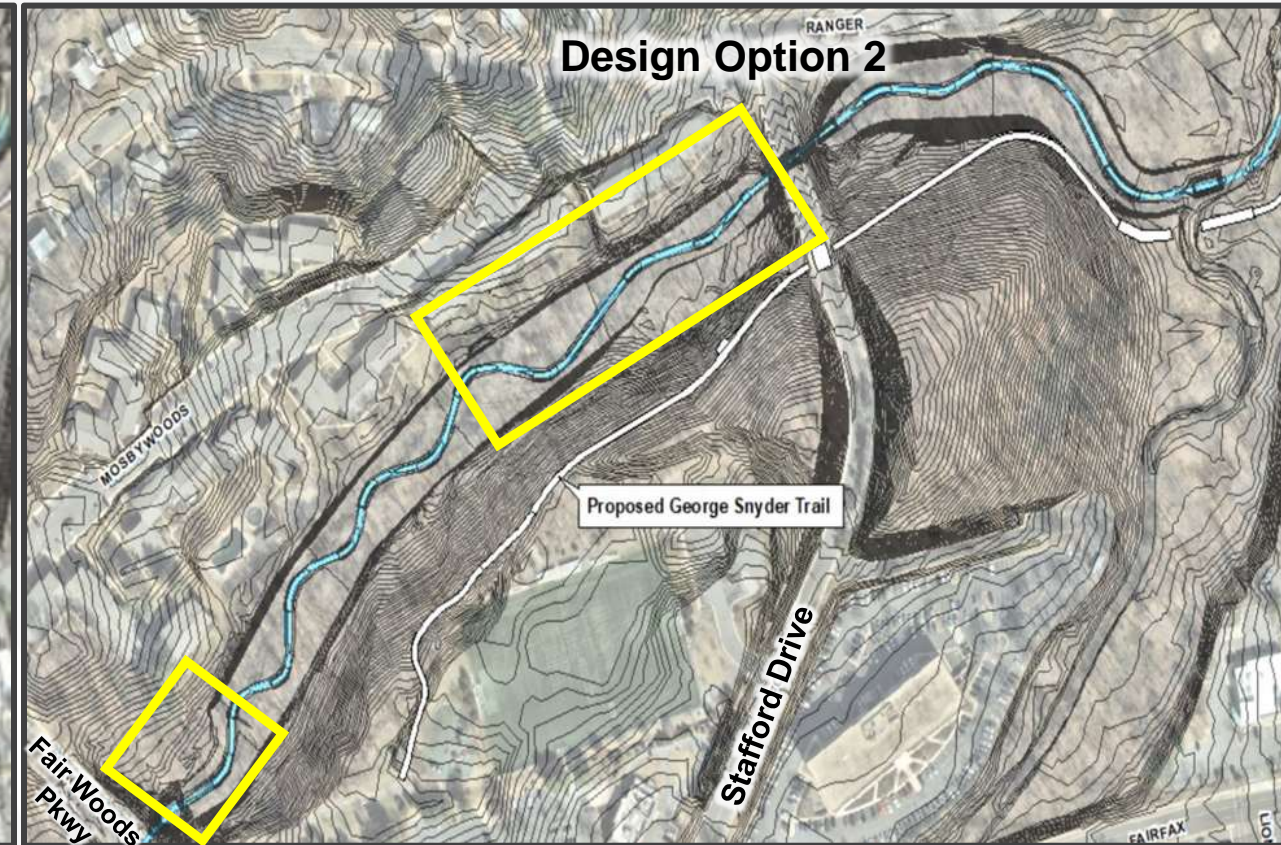
3.1 Original Design



- Designed with Natural Channel Design (NCD) principles.
- Best engineering practices utilized for development of stream dimensioning, pattern, and profile.
- Most hydraulically efficient design option.

3 Project Alternative Analysis

3.2 Design Alternatives Overview



Changes from Original Design

- All areas at 3:1 grade **changed to 2:1**, where feasible
- Installation of **imbricated walls** along floodplain fringe and at areas adjacent to Mosby Woods community.
- **Minor tree save** along the Stafford Drive and Mosby woods viewshed
- **Optimal** Hydraulic Design

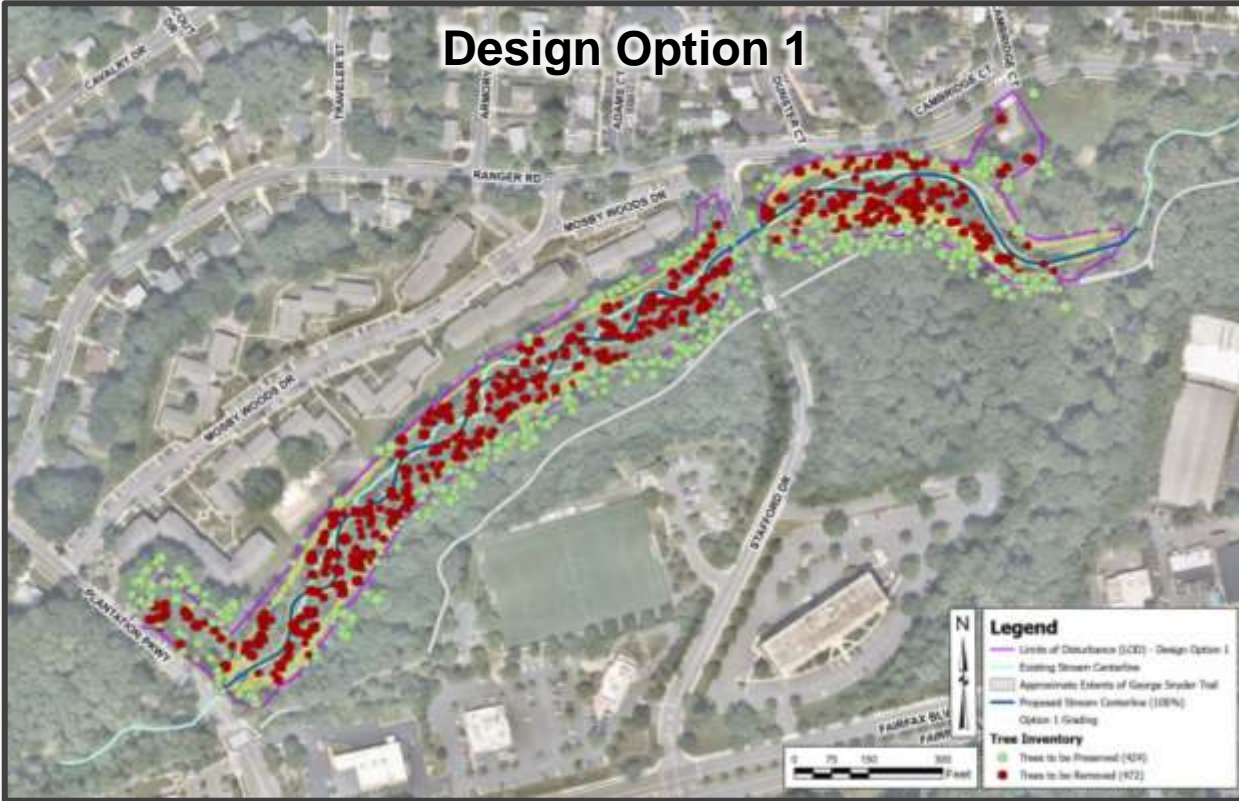
Changes from Original Design

- All areas at 3:1 grade **changed to 2:1**, where feasible
- Installation of **imbricated** walls along floodplain fringe and at areas adjacent to Mosby Woods community, where feasible.
- **Modification of grading extents** near Plantation Parkway
- **Decrease of channel sinuosity and floodplain area** near Stafford Drive
- **Substantial tree save** along the Stafford Drive and Mosby woods viewshed

3. Project Alternative Analysis

3.3 Design Alternative vs. Trees Saved

649 trees were to be removed with the original stream restoration design.



Design Option 1 – 472 Total Trees to be Removed

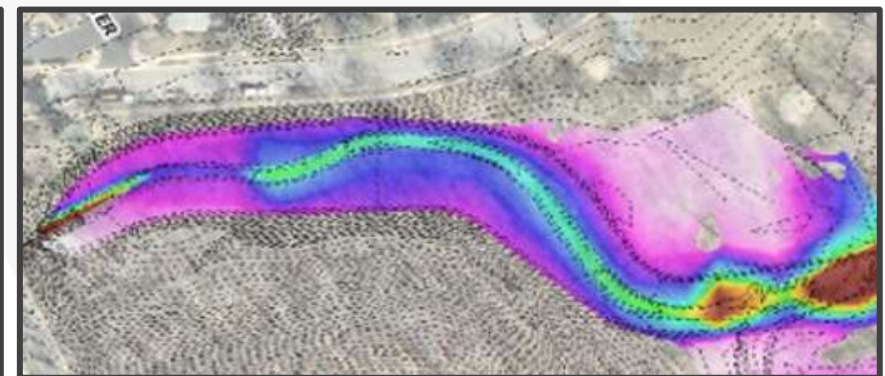
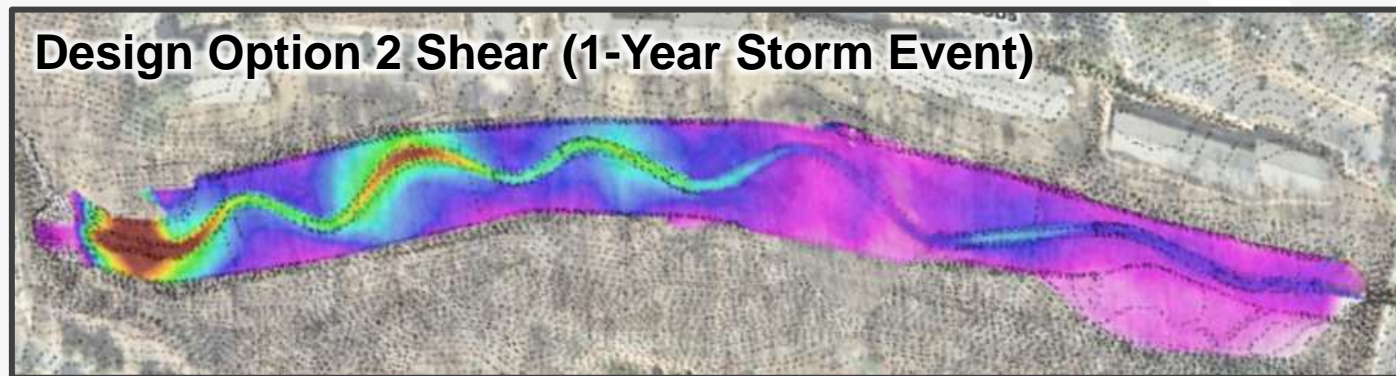
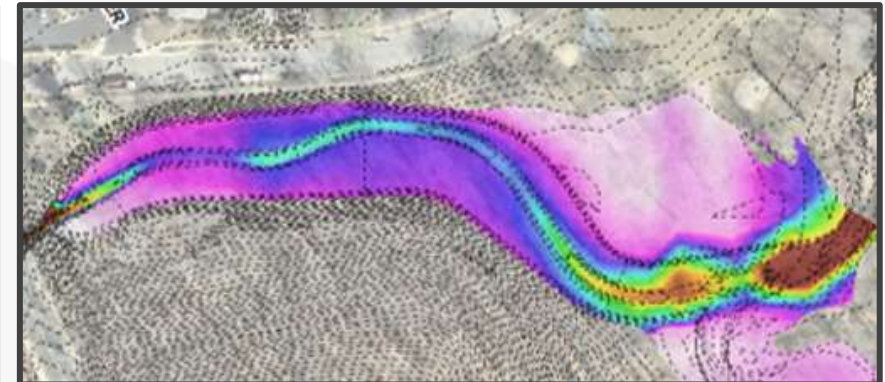
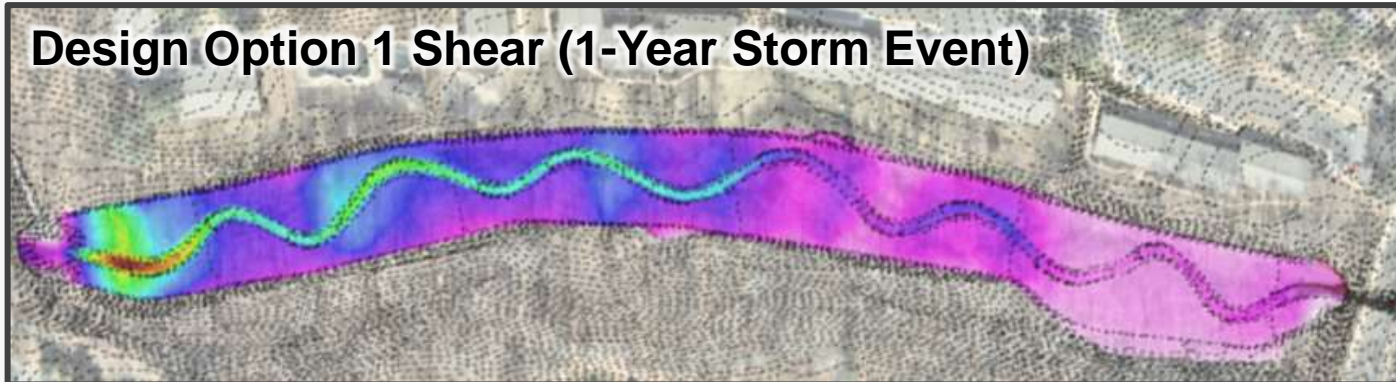
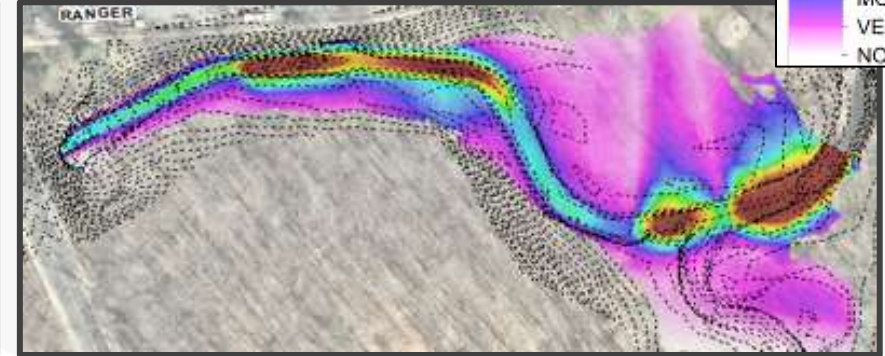
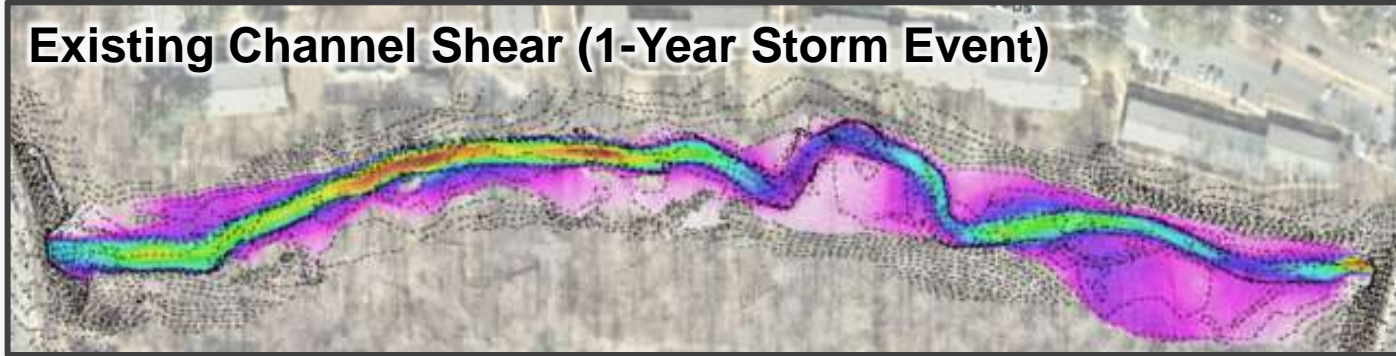
- 5"- 10" Trees to be Removed - 168
- 11"- 16" Trees to be Removed - 122
- 17"- 23" Trees to be Removed - 114
- 24"- 30" Trees to be Removed - 54
- 31"+ Trees to be Removed - 14

Design Option 2 – Tree Removal – 439 Total Trees to be Removed

- 5"- 10" Trees to be Removed - 161
- 11"- 16" Trees to be Removed - 111
- 17"- 23" Trees to be Removed - 102
- 24"- 30" Trees to be Removed - 48
- 31"+ Trees to be Removed - 17

3. Project Alternative Analysis

3.4 HEC-RAS Bank Shear Analysis Comparison



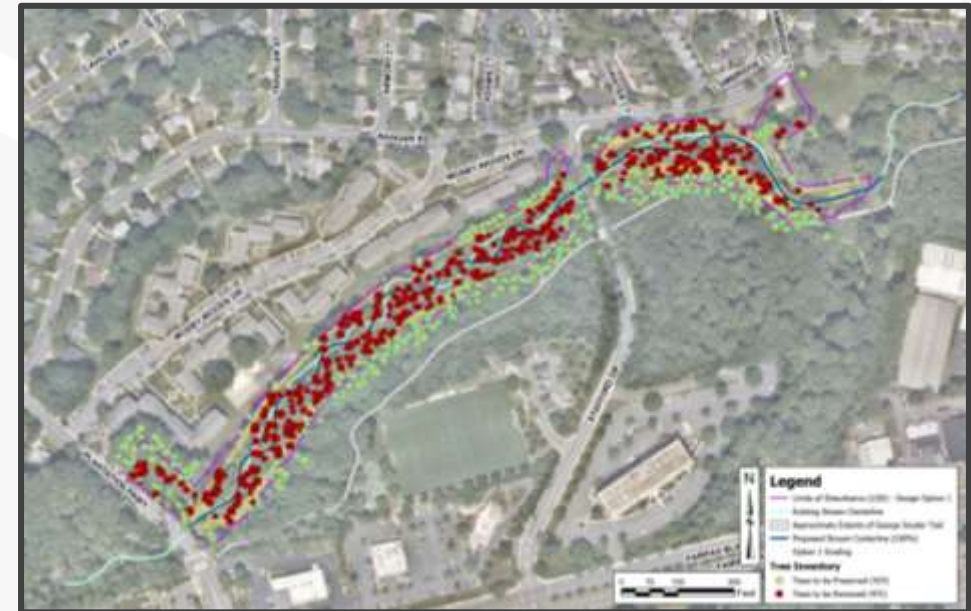
3. Project Alternative Analysis

3.5 Presentation to Park & Recreation Advisory Board (PRAB)

- The **Parks & Recreation Advisory Board (PRAB)** is a 14-member committee that advises City Council on matters related to City parks, facilities, programs, and special events.
- PRAB is advisory in nature but is considered a **key stakeholder** because City Council utilizes their recommendation as a **gauge on public opinion**.
- During the presentation, Kimley-Horn explained:
 - Stream restoration guidelines
 - Site constraints – primarily the inability to raise the floodplain
 - The two design alternatives that were developed
 - The impact of each design alternative on tree removal
 - The impact of each design on channel shear stress
 - The costs associated with each design alternative
- Staff requested guidance from PRAB on the alternatives ahead of final design.
- PRAB members **voted and endorsed design option 1**.



Design Option 1 Bank Shear Analysis

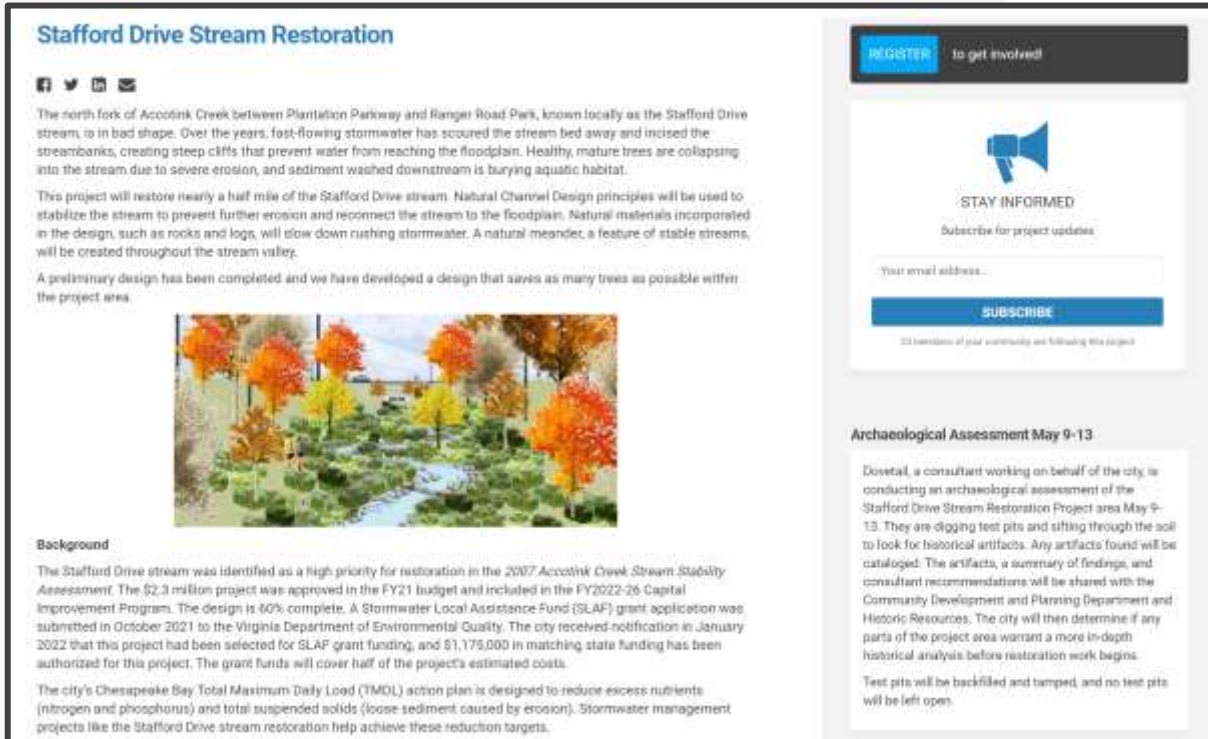


Design Option 1 Tree Removal Plan

4. Public Outreach

4.1 Engage Fairfax: Project Website

- A **City website** was created to share project information and involve the public.
- Key website features:
 - General project information
 - Project updates and timeline
 - Relevant project documents
 - Public comment section



Stafford Drive Stream Restoration

The north fork of Accotink Creek between Plantation Parkway and Ranger Road Park, known locally as the Stafford Drive stream, is in bad shape. Over the years, fast-flowing stormwater has scoured the stream bed away and incised the streambanks, creating steep cliffs that prevent water from reaching the floodplain. Healthy, mature trees are collapsing into the stream due to severe erosion, and sediment washed downstream is burying aquatic habitat.

This project will restore nearly a half mile of the Stafford Drive stream. Natural Channel Design principles will be used to stabilize the stream to prevent further erosion and reconnect the stream to the floodplain. Natural materials incorporated in the design, such as rocks and logs, will slow down rushing stormwater. A natural meander, a feature of stable streams, will be created throughout the stream valley.

A preliminary design has been completed and we have developed a design that saves as many trees as possible within the project area.

REGISTER to get involved!

STAY INFORMED
Subscribe for project updates

Your email address...

SUBSCRIBE

23 members of your community are following this project

Archaeological Assessment May 9-13

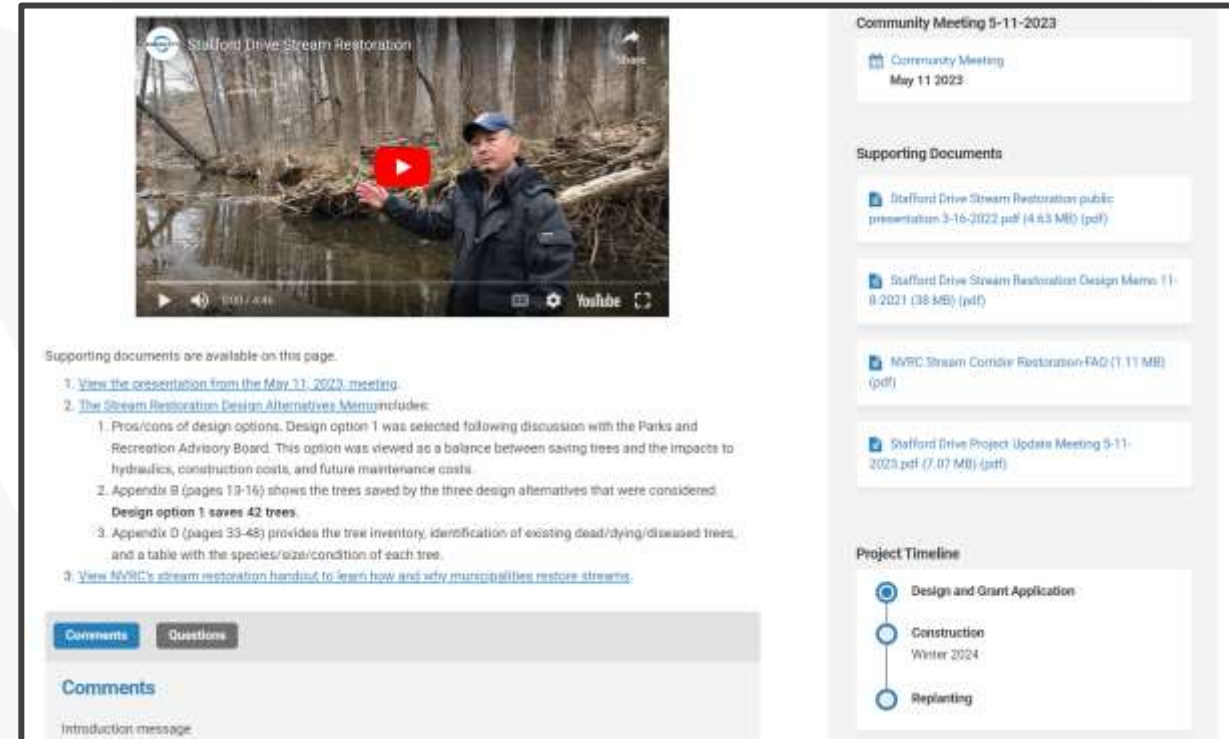
Dovetail, a consultant working on behalf of the city, is conducting an archaeological assessment of the Stafford Drive Stream Restoration Project area May 9-13. They are digging test pits and sifting through the soil to look for historical artifacts. Any artifacts found will be catalogued. The artifacts, a summary of findings, and consultant recommendations will be shared with the Community Development and Planning Department and Historic Resources. The city will then determine if any parts of the project area warrant a more in-depth historical analysis before restoration work begins.

Test pits will be backfilled and tamped, and no test pits will be left open.

Background

The Stafford Drive stream was identified as a high priority for restoration in the 2007 Accotink Creek Stream Stability Assessment. The \$2.3 million project was approved in the FY21 budget and included in the FY2022-26 Capital Improvement Program. The design is 60% complete. A Stormwater Local Assistance Fund (SLAF) grant application was submitted in October 2021 to the Virginia Department of Environmental Quality. The city received notification in January 2022 that this project had been selected for SLAF grant funding, and \$1,175,000 in matching state funding has been authorized for this project. The grant funds will cover half of the project's estimated costs.

The city's Chesapeake Bay Total Maximum Daily Load (TMDL) action plan is designed to reduce excess nutrients (nitrogen and phosphorus) and total suspended solids (loose sediment caused by erosion). Stormwater management projects like the Stafford Drive stream restoration help achieve these reduction targets.



Stafford Drive Stream Restoration

Community Meeting 5-11-2023

Community Meeting
May 11 2023

Supporting Documents

- Stafford Drive Stream Restoration public presentation 3-16-2022.pdf (4.63 MB) (pdf)
- Stafford Drive Stream Restoration Design Memo 11-8-2021 (38 MB) (pdf)
- NVRC Stream Corridor Restoration-FAQ (1.11 MB) (pdf)
- Stafford Drive Project Update Meeting 5-11-2023.pdf (7.07 MB) (pdf)

Project Timeline

- Design and Grant Application
- Construction
Winter 2024
- Replanting

Supporting documents are available on this page.

1. [View the presentation from the May 11, 2023 meeting.](#)
2. [The Stream Restoration Design Alternatives Memo](#) includes:
 1. Pros/cons of design options. Design option 1 was selected following discussion with the Parks and Recreation Advisory Board. This option was viewed as a balance between saving trees and the impacts to hydraulics, construction costs, and future maintenance costs.
 2. Appendix B (pages 13-16) shows the trees saved by the three design alternatives that were considered. **Design option 1 saves 42 trees.**
 3. Appendix D (pages 33-48) provides the tree inventory, identification of existing dead/dying/diseased trees, and a table with the species/size/condition of each tree.
3. [View NVRC's stream restoration handbook to learn how and why municipalities restore streams.](#)

Comments **Questions**

Comments

Introduction message

4. Public Outreach

4.2 Public Project Presentations

March 16, 2022, Presentation:

- Announced the project to the public
- Explained the PRAB process
- Requested feedback from the public

May 11, 2023, Presentation:

- Provided a project progress update
- Collaborated and presented with a wildlife biologist to respond to **wildlife impact questions**
- Provided graphics to better explain the project to citizens
- Local environmental groups connected with homeowner associations in the project area and **raised two primary concerns** using social media:
 - Tree removal
 - Stream restoration practices



How concerns were addressed:

- A **Stream Restoration FAQ website** was created to respond to these concerns. Other localities in the Northern Virginia region have developed similar sites.
- An **article** based off the FAQ has been developed and will be **distributed through CityScene**, a monthly community newsletter



4. Public Outreach

4.3 Stream Restoration Examples

One of the most frequently asked stream restoration questions we receive during public outreach is:

“What will the stream look like post-construction?”

Pre-Construction:



Key Features

Eroded banks, falling trees, high velocity flow through channel

Immediately After Construction:



Key Features

Newly graded earth (stabilized with biodegradable matting), naturally deposited native rock, seeding to re-establish vegetation and bank cover

After Vegetation Has Re-Established:



Key Features

Well-established vegetation (tree plantings and live stakes), properly defined channel, biodiverse ecosystem

4. Public Outreach

4.4 Retaining Wall Visualization

Existing Conditions



The proposed retaining wall is approximately 250 feet long, 4 feet high, and will save 18 trees of DBH 6" and higher.

Note: Vegetation has been removed from the rendering to make proposed stream restoration features visible.

Proposed Conditions



4. Public Outreach

4.5 Stafford Drive Rendering

A rendering of the Stafford Drive Stream Restoration corridor was developed to showcase the anticipated post-construction conditions.



**Stafford Drive Stream
Restoration: Typical Section**

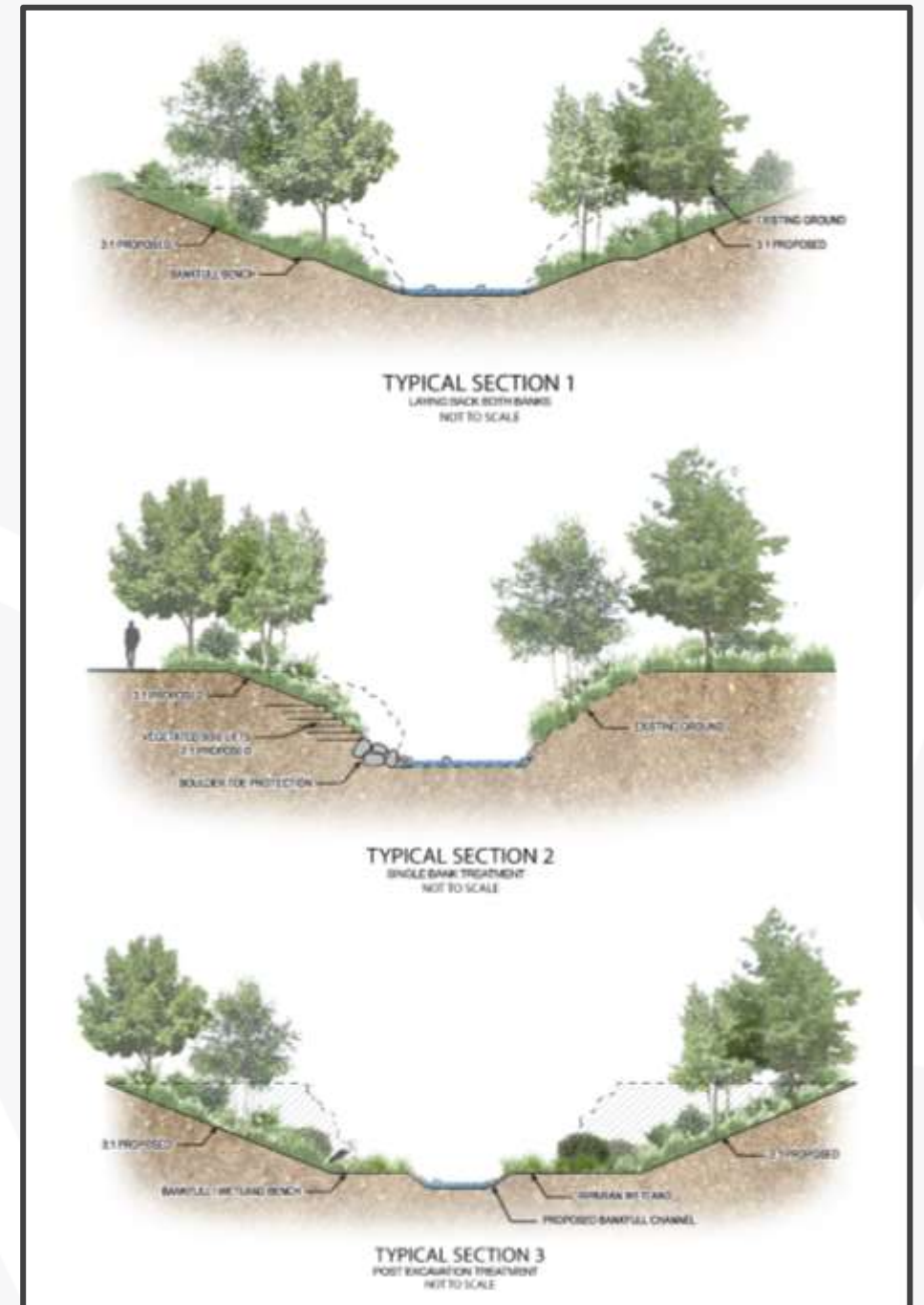


**Stafford Drive Culvert
Crossing and Proposed
Retaining Wall**

Note: Vegetation has been removed from the rendering to make proposed stream restoration features visible.

5. Next Steps

- Finalize 100% design plans based off City review comments.
- Develop landscaping plan through collaboration with the City's Urban Forester.
- Awaiting issuance of final permits required for construction.
- Conduct a work session with City Council to provide a project update and respond to any questions.
- Prepare bid submittal package & select contractor.
- Begin construction! Construction is anticipated to begin early Winter 2024.



6. Open Discussion



Kimley»»Horn