Stream Restoration Projects Update

April 27, 2021

City Council Legislative Work Session

Overview

1. Background | Approach | City Projects and Themes

2. Alternatives Discussion

3. Potential Options

Background | Approach | City Projects | Main Themes

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Why do Stream Restorations?

- Identified our urban streams that need stewardship
- Address public infrastructure issues
- Science-based approach
- Protect and improve local waterways
- Do all this **WHILE** addressing Chesapeake Bay mandates
- Consistent with City goals and approved plans

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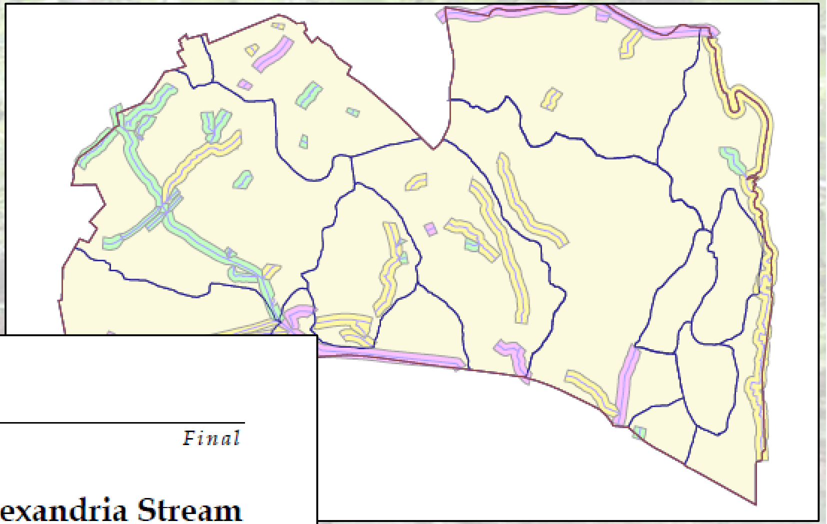
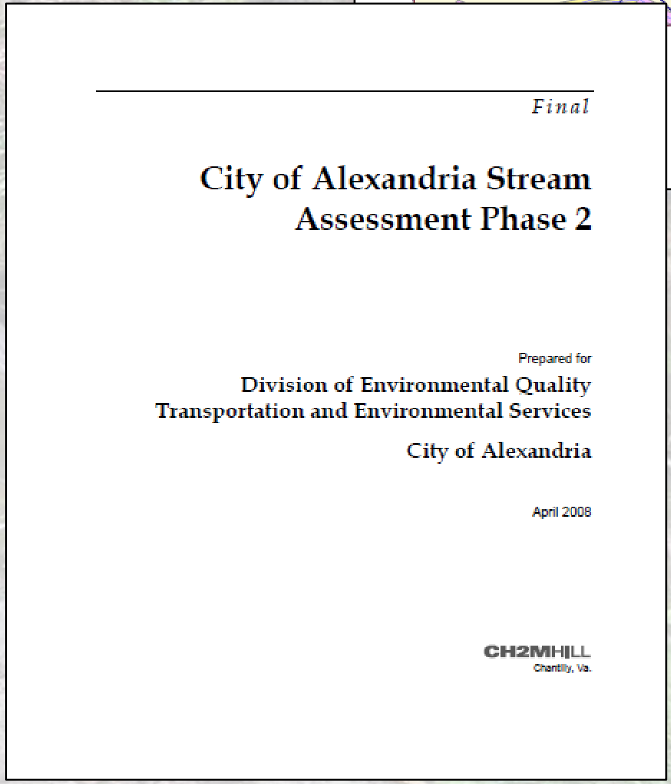
Earlier Stream Assessments to Guide Watershed Management Strategies

- Phase II Stream Assessment (Completed 2008) – Baseline for overall conditions
  - Bank Stability
  - Habitat Conditions
  - Erosion: scouring and downcutting
  - Buffer density
  - Infrastructure Assessment
- Future work needed to develop management options





Final

City of Alexandria Stream Assessment Phase 2

Prepared for

Division of Environmental Quality
Transportation and Environmental Services

City of Alexandria

April 2008

CH2MHILL
Chantilly, Va.

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Phase III Stream Assessment (2019): Prioritized Streams for Restoration Efforts

- Prioritized streams identified earlier
- Identified and quantified erosion rates and infrastructure issues
- Start to develop management strategies
- Co-benefits: fix earlier identified issues for long-term stream health
  - Address local water quality & Bay TMDL
  - Create Bank stability
  - Reduce ongoing erosion
  - Restore buffer
  - Protection of public infrastructure

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Chesapeake Bay Total Maximum Daily Load (TMDL)

- Nitrogen, phosphorus, sediment ‘clean up mandates’
- Conservative approach; regulatory changes
- “All the Above” toolbox approach
  - Pond Retrofits
  - BMPs in Right-of-Way / City property
  - Public Private Partnerships
  - Stream Restoration
  - Tree Planting
  - CSO Reduction Credits (Bi-Lateral Trading)

Pollutant	100% Total Reductions (lbs./yr.)	To Date Achieved (lbs./yr.)	Still Need (lbs./yr.)
Nitrogen	7,597	5,223	2,374
Phosphorus	1,005	717	288
Sediment	861,937	581,058	280,879

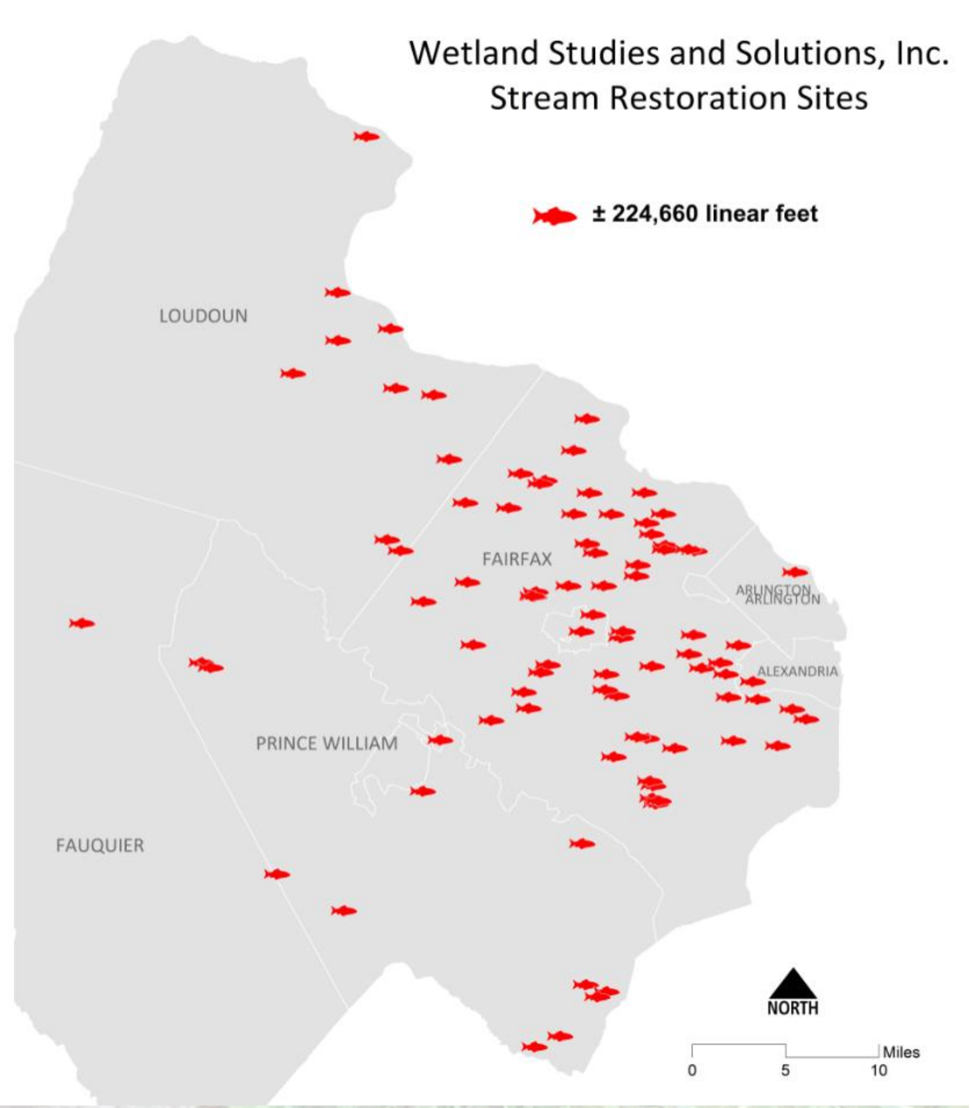
Examples from other jurisdictions

The Way it Was Done

Natural Channel Restoration: Widely Studied, Scientifically Accepted & Broadly Applied

- VA alone: 111 stream restoration projects awarded a total $61M
  - Virginia Department of Environmental Quality (VDEQ) Stormwater Local Assistance Fund (SLAF) grants since FY2014
- EPA estimates > 441 Bay stream miles restored by 2025

- District of Columbia
- Anne Arundel County
- Montgomery County
- VDOT
- MDHSA
- Howard County
- Prince William County
- City of Rockville
- James City County
- Roanoke County
- City of Hampton
- Albermarle County
- Town of Christiansburg
- City of Roanoke
- Town of Dumfries
- Henrico County
- City of Charlottesville
- City of Harrisonburg
- City of Hopewell
- List goes on…



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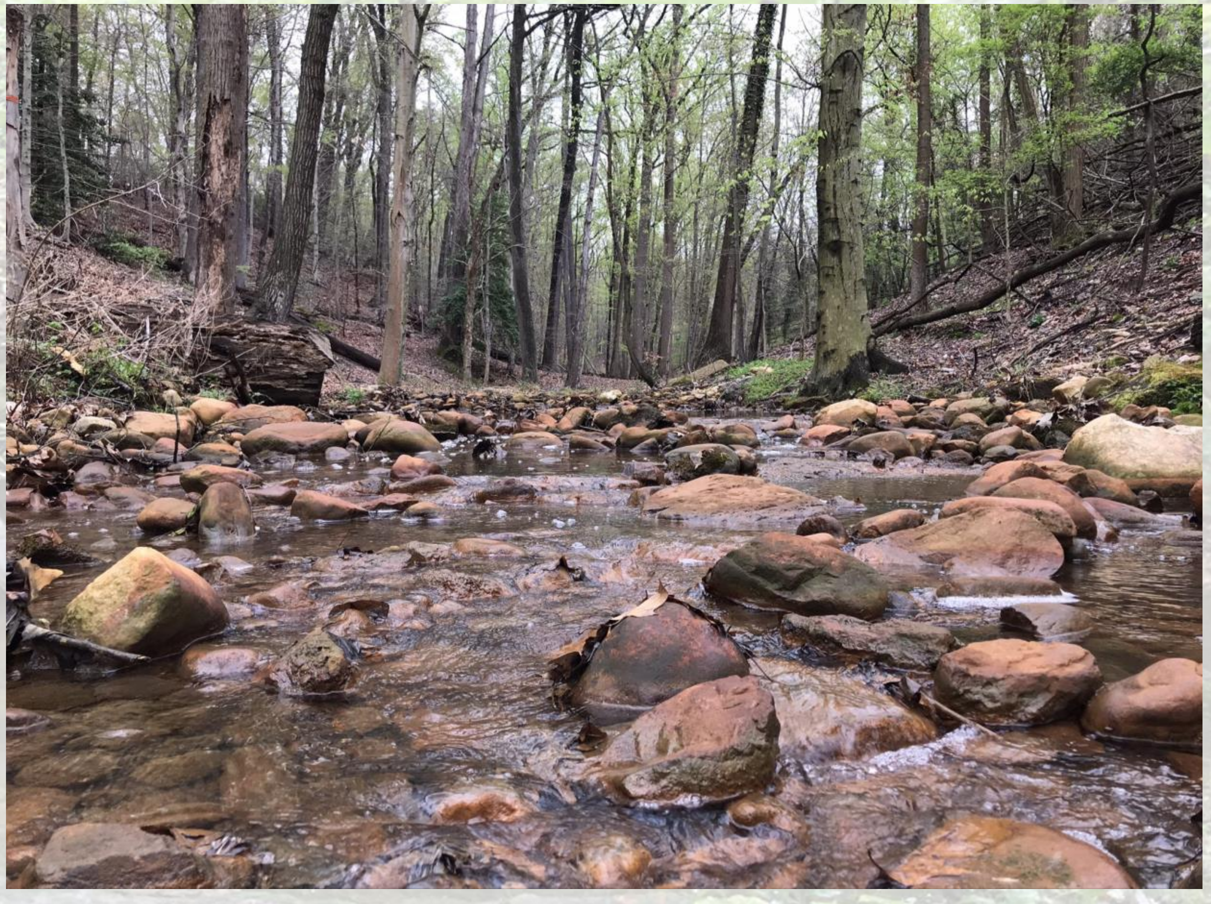
Snakeden Branch - Reston (Fairfax County)

Courtesy of Wetland Studies and Solutions

Pope Branch – District of Columbia



Courtesy of District Department of Energy and Environment

Planned City Stream Restoration Efforts

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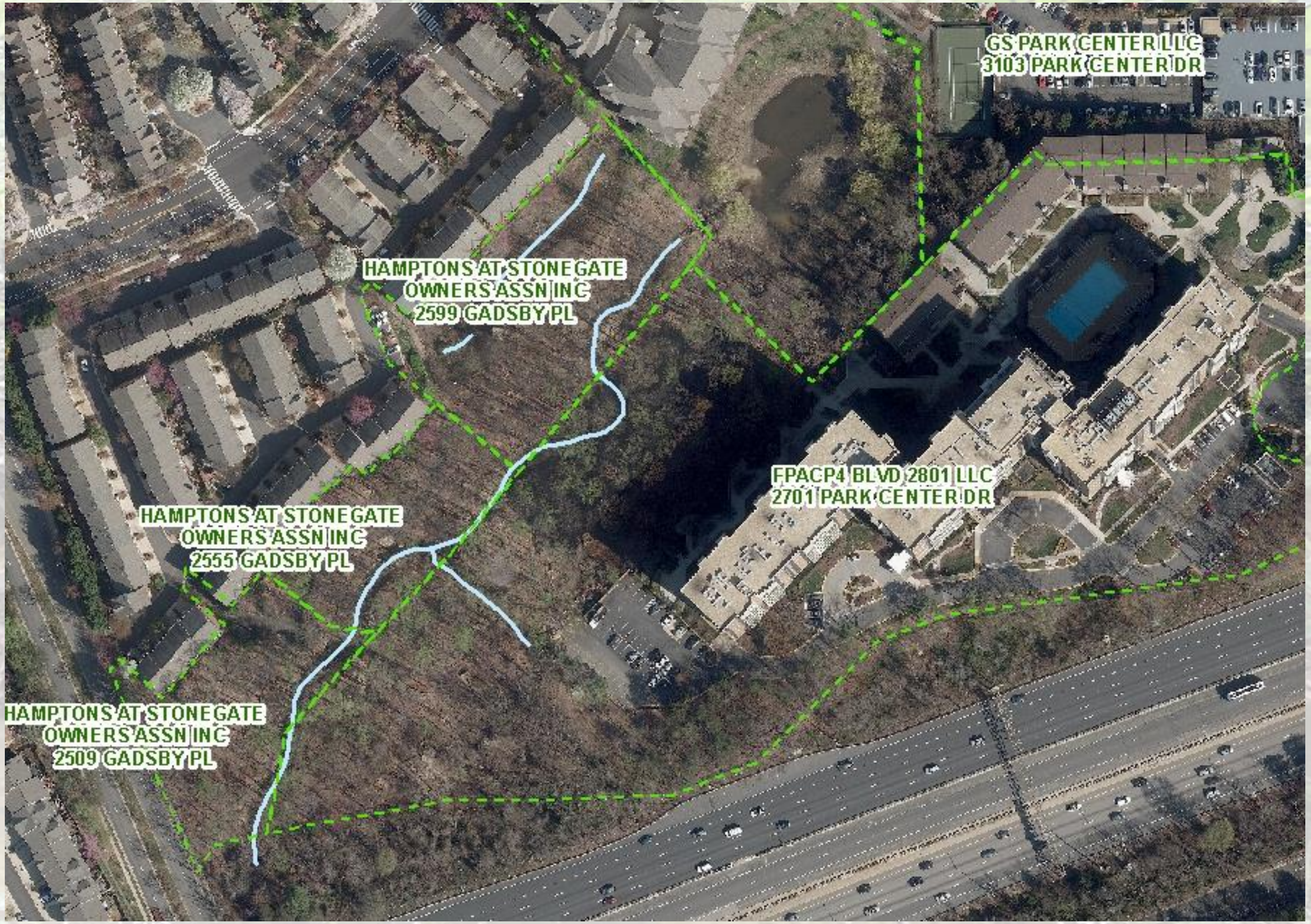
Lucky Run Stream Restoration

- Braddock Rd to Park Center Pond (City maintenance)
- ~950 linear feet
- $1.3M with $700,000 SLAF grant (FY2017)
- Proposed Construction: Winter 2021 to 2022



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Lucky Run Project Goals

- Erosion: stabilize and stop accelerated erosion and reduce export of sediment and nutrients
- Protect Infrastructure: stabilize sanitary sewer and path
- Reduce sediment entering pond and perform Pond maintenance
- Habitat creation
- Buffer restoration
- Reduce pollutants (nitrogen, phosphorus, and sediment)

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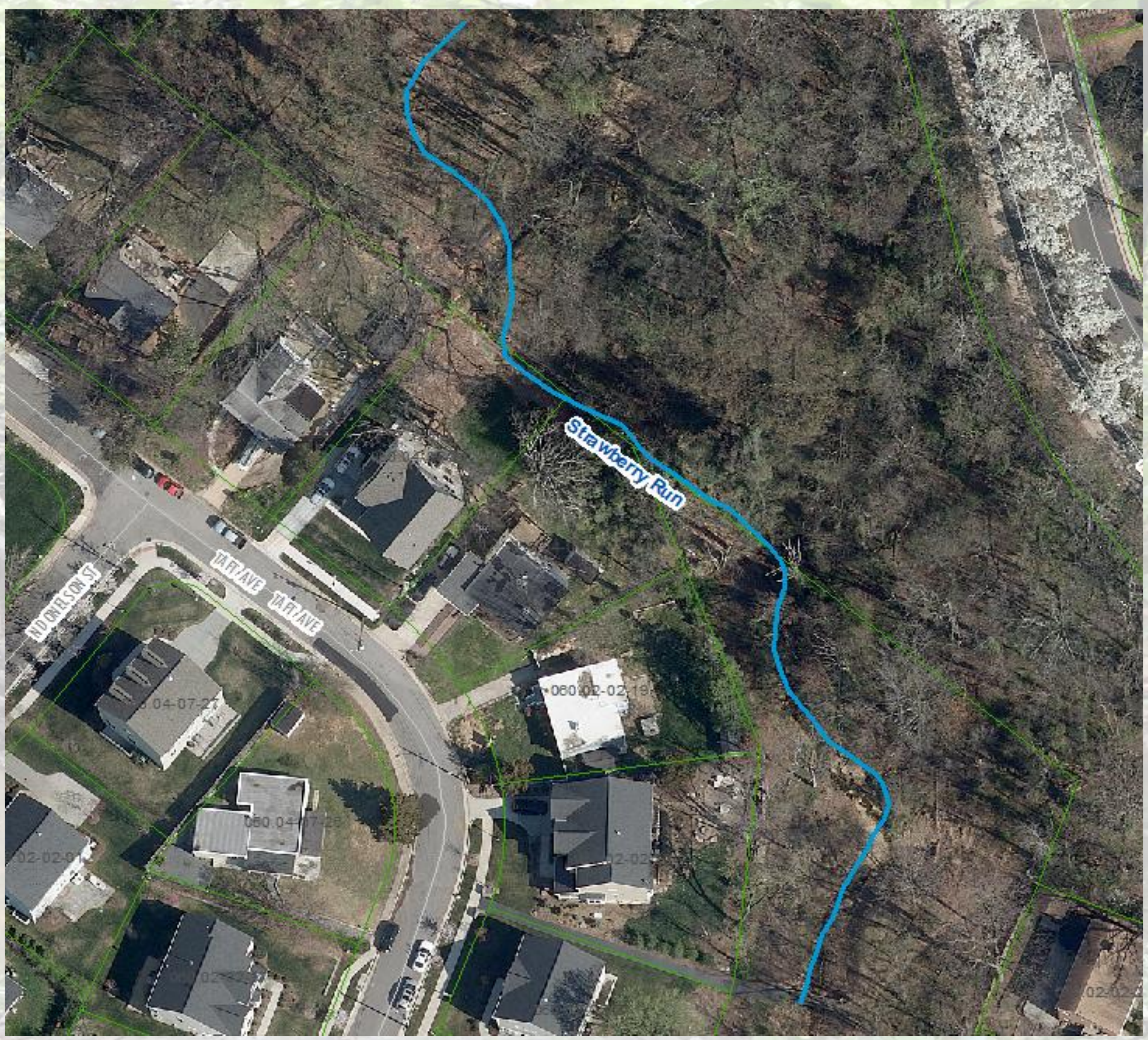
Strawberry Run Stream Restoration

- Ft. Williams Pkwy at Dearborn to Pedestrian bridge from Taft Avenue
- About 900 feet in length
- $800,000 SLAF Grant (FY2019)
- Proposed Construction: Summer 2022 to 2023



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Source: Wood Environmental

Strawberry Run Project Goals and Benefits

- Erosion: stabilize stream banks and restore healthy stream characteristics
- Infrastructure: protect and stabilize storm sewers, private property, safety
- Habitat creation
- Buffer restoration
- Reduce pollution: nitrogen, phosphorous, and sediment

March 16, 2018
Source: Wood Environmental

January 20, 2021
Source: Wood Environmental

Downstream Prior Restoration

- Developer funded management strategy
- Taft Avenue subdivision; nexus for the restoration
- Earlier natural channel design
- Full natural channel design principles and practices not applied
- Designed to 2-yr storm and not the 100-yr like the upstream
- Large storms, 14-18 months have impacted downstream portion

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Main Themes – Strawberry Run*

Theme	Response
Process Concerns	• Outreach; onsite, associations, public, but earlier outreach would have been better • Plans have progressively become more specific over time
BANCS Assessment checklists not provided	• Assessment "checklist" not a formal submission; assessment is the entire Phase III Stream Assessment, as provided
Prior downstream restoration has failed and so will the proposed; provide plans	• Target of opportunity - developer funded management strategy • Early natural channel design effort constructed by adjacent developer • Points of failure in the downstream restoration • In hindsight, the upstream portion should have been completed first • Previous "restoration" plans and the current plans on the website

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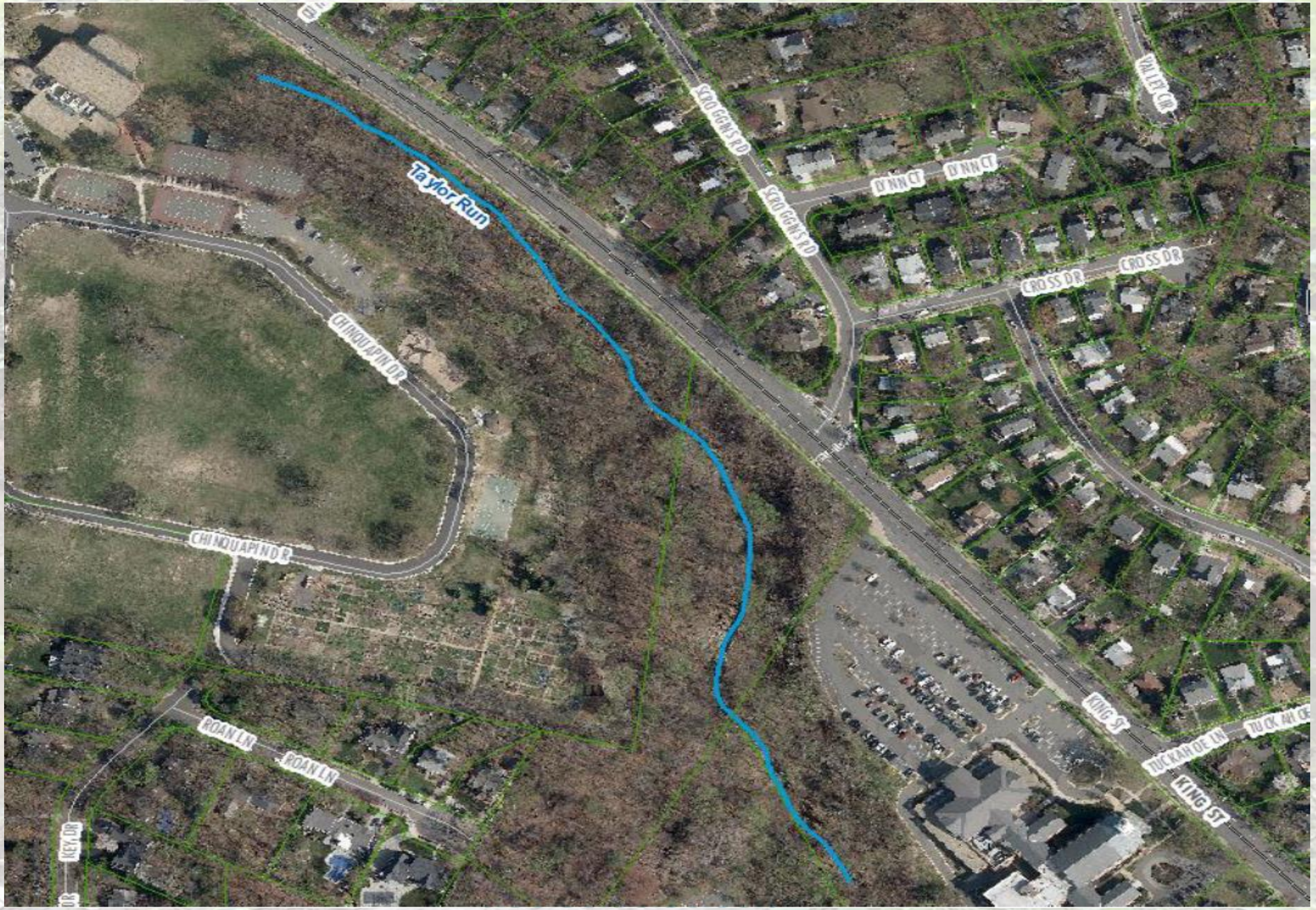
**See attached Companion*

Taylor Run Stream Restoration

- Chinquapin Rec Center Outfall to Church culvert
- About 1,900 feet in length
- $4.5M with $2.255M SLAF Grant (FY2019)
- Proposed Construction: Summer 2022 to 2023



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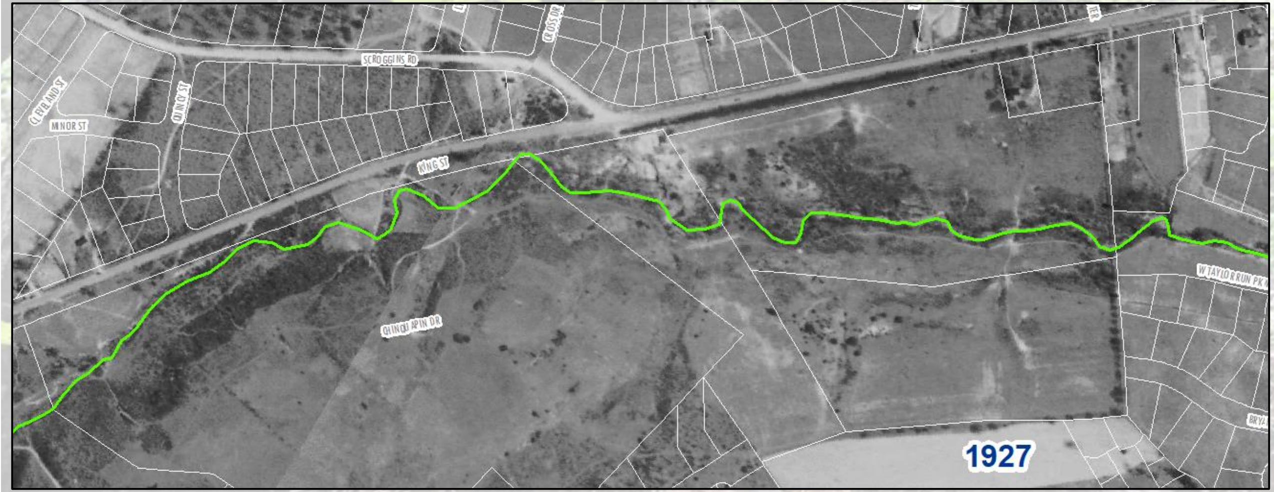
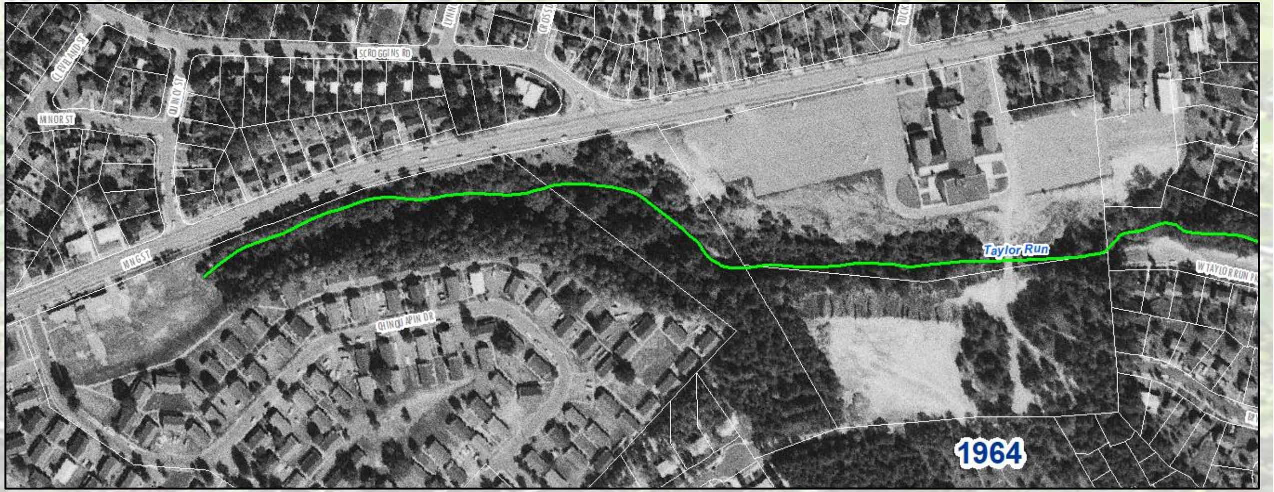
Changes to Taylor Run Over Time





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Taylor Run Existing Conditions: Infrastructure, Erosion, Buffer

Taylor Run Existing Conditions: Erosion, Infrastructure, and Buffers

Taylor Run Project Goals and Benefits

- Erosion: limit ongoing erosion, widening, and downcutting
- Protect Infrastructure: stabilize the sanitary sewer
- Buffer: prevent loss of trees due to eroding banks, and create a dense riparian buffer with native vegetation
- Safety: fix trail erosion and install railing
- Reduce pollutants (nitrogen, phosphorus, and sediment) generated from accelerated stream bank and bed erosion

Existing Conditions

Rendering: Proposed Conditions

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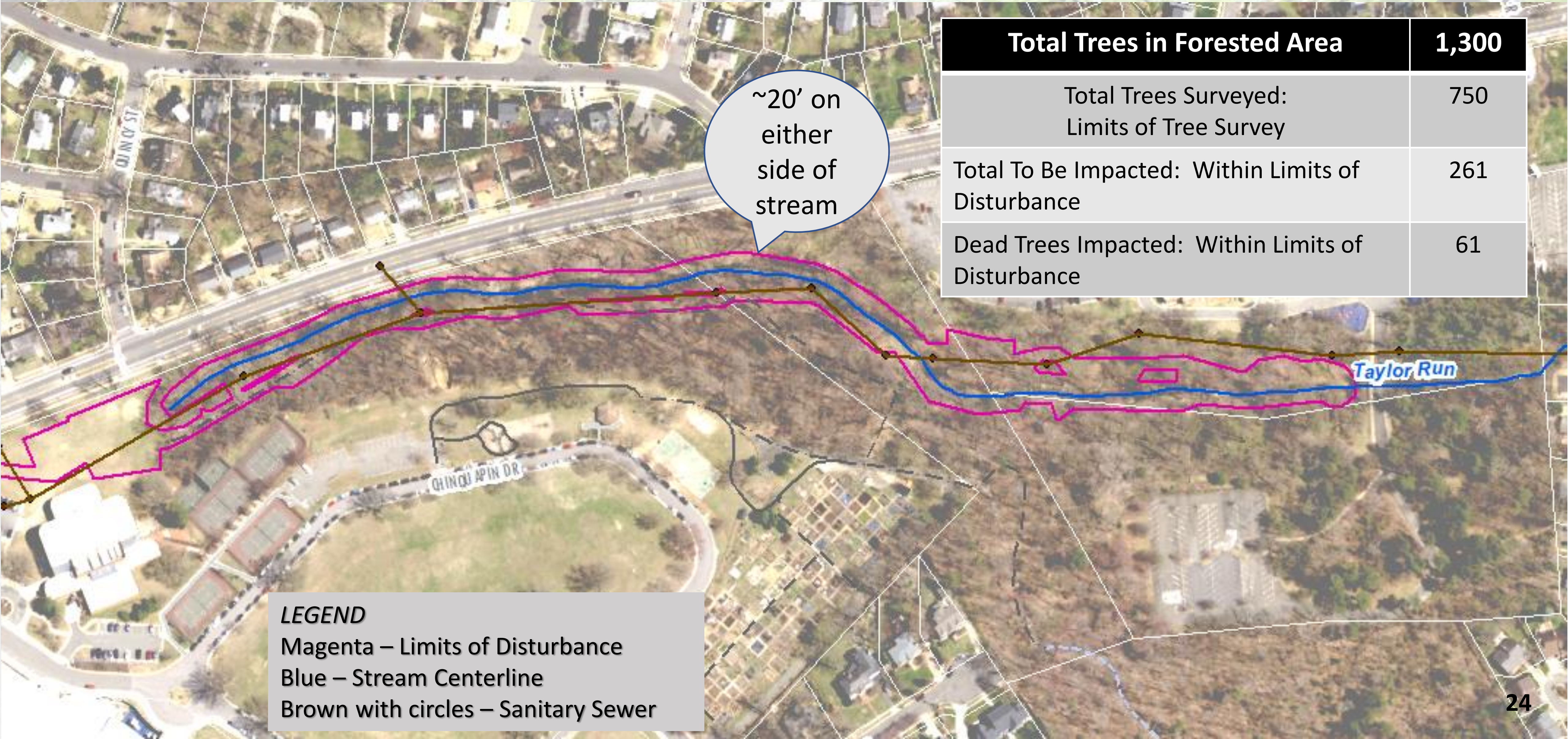
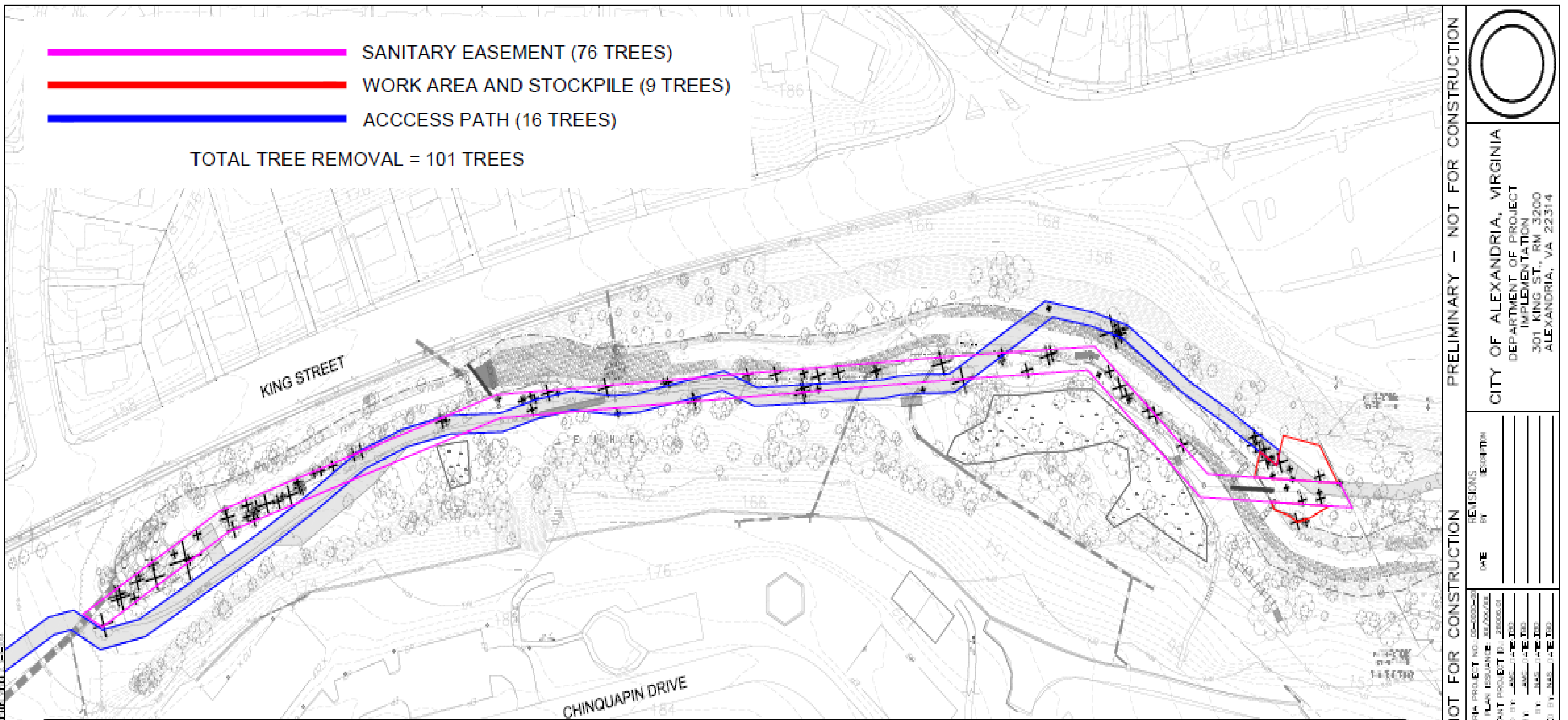
Forested Area and Limits of Disturbance

Total Trees in Forested Area	1,300
Total Trees Surveyed: Limits of Tree Survey	750
Total To Be Impacted: Within Limits of Disturbance	261
Dead Trees Impacted: Within Limits of Disturbance	61



LEGEND
Magenta – Limits of Disturbance
Blue – Stream Centerline
Brown with circles – Sanitary Sewer



Preliminary Estimated Tree Impacts for Sanitary Sewer Work Alone

Main Themes – Taylor Run*

Theme	Response
Don't Bulldoze this Natural Forested Park	• Forest will not be bulldozed • The forest and the stream has been impacted over time • Chinquapin and Forest Park areas about 31.6 acres with under 2 acres disturbed within city property
Acidic Seepage Wetland (Swamp) will be destroyed	• Wetland is outside of the project area; moved access farther away • Raising the bed will bring it close to the historical elevation
Alternative upland BMPs or Tree Planting alternatives	• No viable alternatives presented that address the project goals • Channelized, eroding stream is the pollution source
Not designed for big storms	• Design ensures the stream can withstand large storm events; the 100-yr for stability

**See attached Companion*

Recent Community-Proposed Alternatives Discussion

1. Build Lucky Run & Plant $2 million of Trees Instead of Doing Taylor/Strawberry

- $2M → 3,636 trees → 16.6 lbs./yr. Total Phosphorus*
- Urban Tree Canopy Expansion Expert Panel (December 2016)
  - Modeled approach based on simulated land use changes (turf to forest)
  - Planting area of at least ¼ acre and minimum 50 ft width (871' x 50' min.)
  - Recent VDEQ Action Plan Guidance includes this BMP (February 2021)
- **Significant challenge** finding dedicated space for planting density & credit number is aggressive
- If tree planting is feasible, City would still be short on nitrogen. Options:
  - Purchase credits: $640,000
  - BMPs: $3M to $7M total (includes tree credit)
- Does not address the goals of the stream restoration projects / co-benefits
  - Sewer line protection work would still need to be done

*Assumes $550 per tree

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2. Build Lucky Run & Rely on Upstream Improvements Instead of Taylor/Strawberry

- Retrofits of BMPs in the Right-of-Way and public property
- ~45 new BMPs
  - $4M to $10M total: Increase SWU fee (?) or re-program funds
- Purchase credits: $840,000
- Siting and feasibility risks. Resource (staff) intensive.

- Does not address the goals of the stream restoration projects / co-benefits
  - Sewer line protection work would still need to be done

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3. Build Lucky Run & Rely on CSO Credits Instead of Taylor/Strawberry

- Identified **early** as City strategy in Chesapeake Bay TMDL Action Plan
  - Plan took conservative ("everything but the kitchen sink" approach) and includes buffer to overachieve mandated goals
- City and AlexRenew agree: **CSO credits will contribute to the City's goal**
- Credits will be calculated **annually and may fluctuate**
- Credits for **total nitrogen may need to be purchased at ~$1 million or achieved through BMPs for $3 to $10 million**
- Does not address the goals of the stream restoration projects / co-benefits
  - Sewer line protection work would still need to be done

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4. Use Fields' Design in Taylor Run (Large Woody Debris Instead of Restoration)

- City considered wood-based design initially but discarded due to its **limited longevity** and protection for stream
- City design (natural channel) **more fully addresses** system-wide instability & solution more permanent
- Better integrates and **protects the existing sanitary line**
- Similar effect on floodplain hydrology
- Significant number of **tree impacts**: ~150 trees
- Bay credit generation as co-benefit? Still unknown... but significant uncertainty

Potential Options* and Fiscal Impact

A) PROCEED WITH CURRENT PLAN

B) PROCEED USING UPDATED CREDITING PROTOCOL

C) PAUSE TO EVALUATE FURTHER

D) STOP USING STREAM RESTORATION

**Options A through C assume Lucky Run proceeds as planned*

Option A
PROCEED WITH CURRENT PLAN*

Advantage	Disadvantage	*Fiscal Impact*
Complete final design	No further input on design	• No additional fiscal impact beyond appropriated funds
Receive allowable credits	Concerns about pollution credits remain	
Reduce risk to SLAF grant		
Advances MS4 permit compliance		
No increase to project cost		

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**Assumes Lucky Run proceeds*

Option B
PROCEED USING UPDATED CREDITING PROTOCOL*

Advantage	Disadvantage	*Fiscal Impact*
Address concern on pollutant crediting	Risk change (increase or decrease) of credits	• Sampling and analysis • Potential credit decrease means additional BMPs (also potential to stay same or increase)
Designs can proceed (pending final check-in with Council)	Additional work and cost	

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**Assumes Lucky Run proceeds*

Option C
Pause to Evaluate Further Using Updated Protocol*

Advantage	Disadvantage	*Fiscal Impact*
Increase understanding	Potential loss of SLAF grant	• Loss of $2.225M SLAF (Taylor) and $0.800M (Strawberry) • Sampling and analysis • Potential credit decrease means additional BMPs (potential to stay same) • Additional design (unknown) • Project cost inflation
Use of new crediting protocol	Potential change in credit calculation approach	
	Redesign due to continued change in stream conditions	
	Increase project cost & need for focused staff (flooding priority)	
	Increase interim risk of impact to sanitary sewer	
	Increase SWU Fee?	

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**Assumes Lucky Run proceeds*

Option D
Stop Using Stream Restoration?

Advantage	Disadvantage	*Fiscal Impact*
Reduce concern with projects	Loss of all current SLAF grants	• Loss of $2.225M SLAF (Taylor), $0.800M (Strawberry) and $0.669M (Lucky) • ~$500,000 sewer stabilization • Purchase credits: $2.5M • BMPs: $11M to $28M
	Increase SWU Fee?	
	Potential future SLAF ineligibility?	
	Sanitary sewer stabilization using 'grey' techniques	
	Future increased focus on water quality in CIP?	

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Thank you! Questions?

CONCLUSION

- Impacts to city's streams identified ~15 years ago & still need stewardship today
- Natural channel design is widely-used, scientifically supported approach that provides comprehensive protection and restoration
- Options exist to meet Bay credit goals, some risk on credit calculations when reliance on CSO credits becomes primary strategy
- Stream restoration in City toolbox & Environmental Action Plan because the projects are needed, and co-benefits are significant
- **Stream restoration with SLAF grants remains the most cost-effective strategy to meet overarching City goals**