Attachment 1

Stream Restoration Projects Update

April 27, 2021

City Council Legislative Work Session

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CLEAN WATERWAYS

Overview

1. Background | Approach | City Projects and Themes

2. Alternatives Discussion

3. Potential Options

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Background | Approach | City Projects | Main Themes

3

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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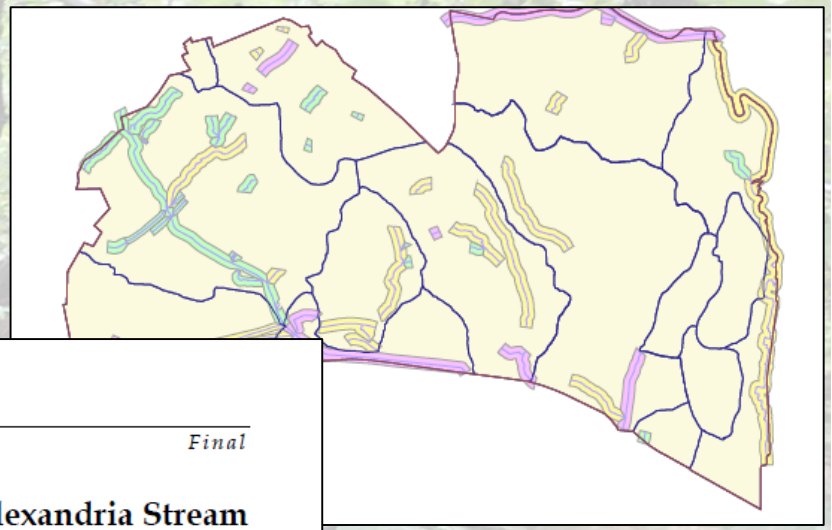
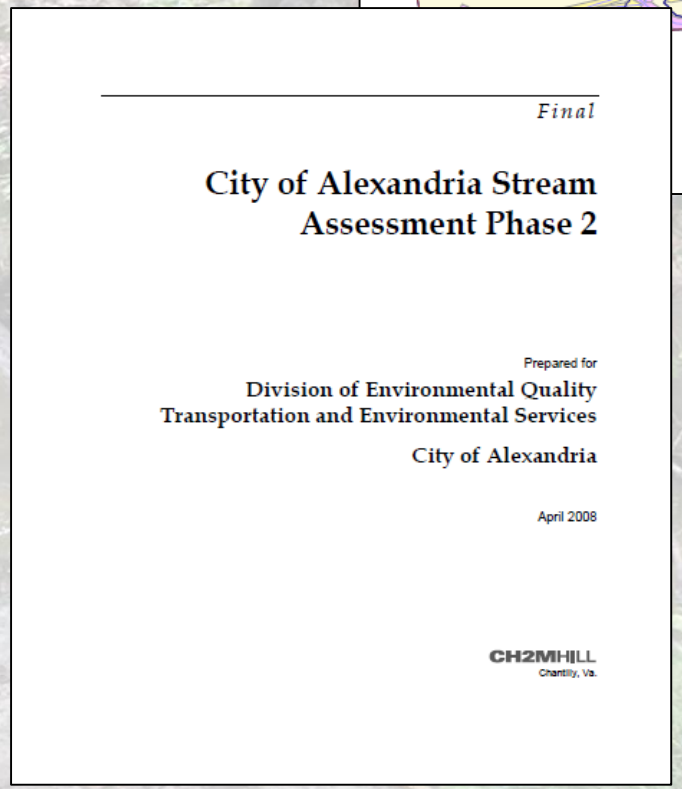
Earlier Stream Assessments to Guide Watershed Management Strategies

- 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





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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

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

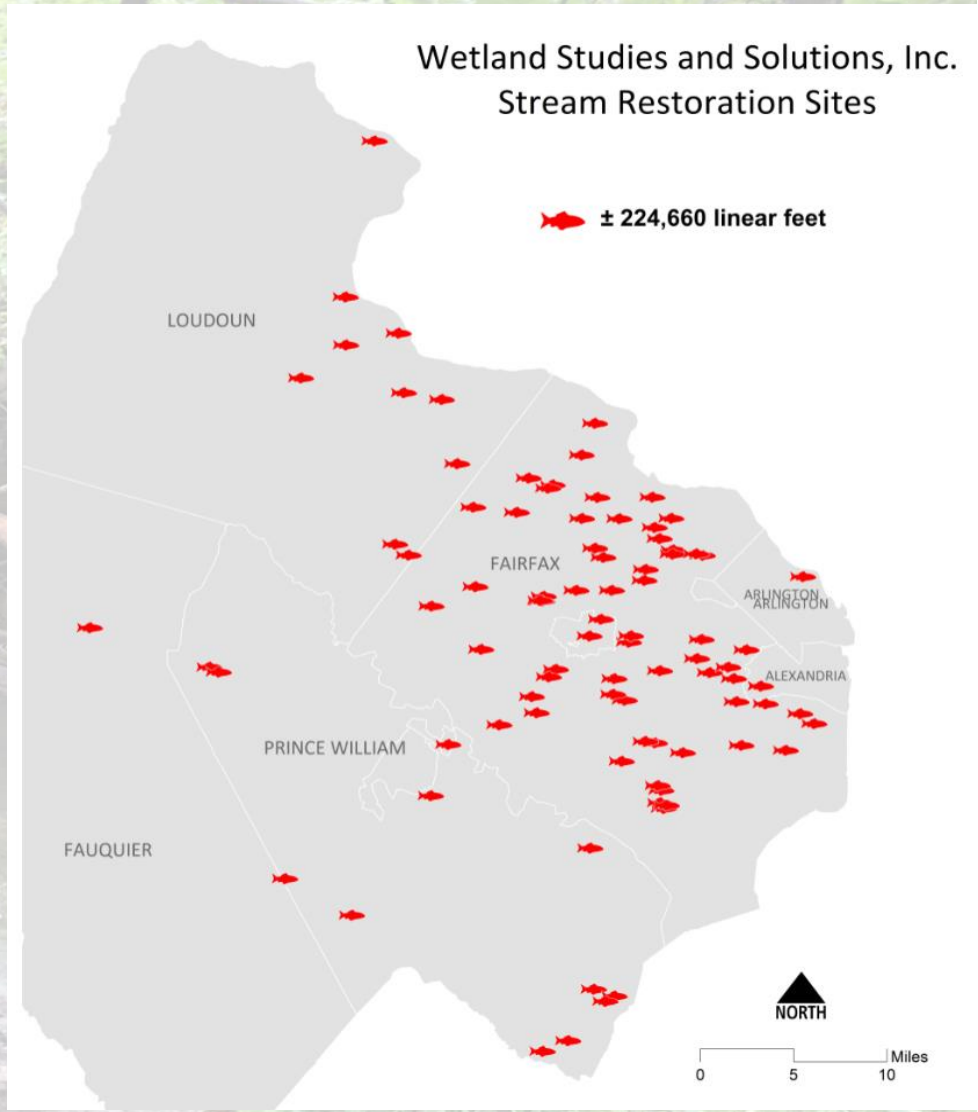
Examples from other jurisdictions

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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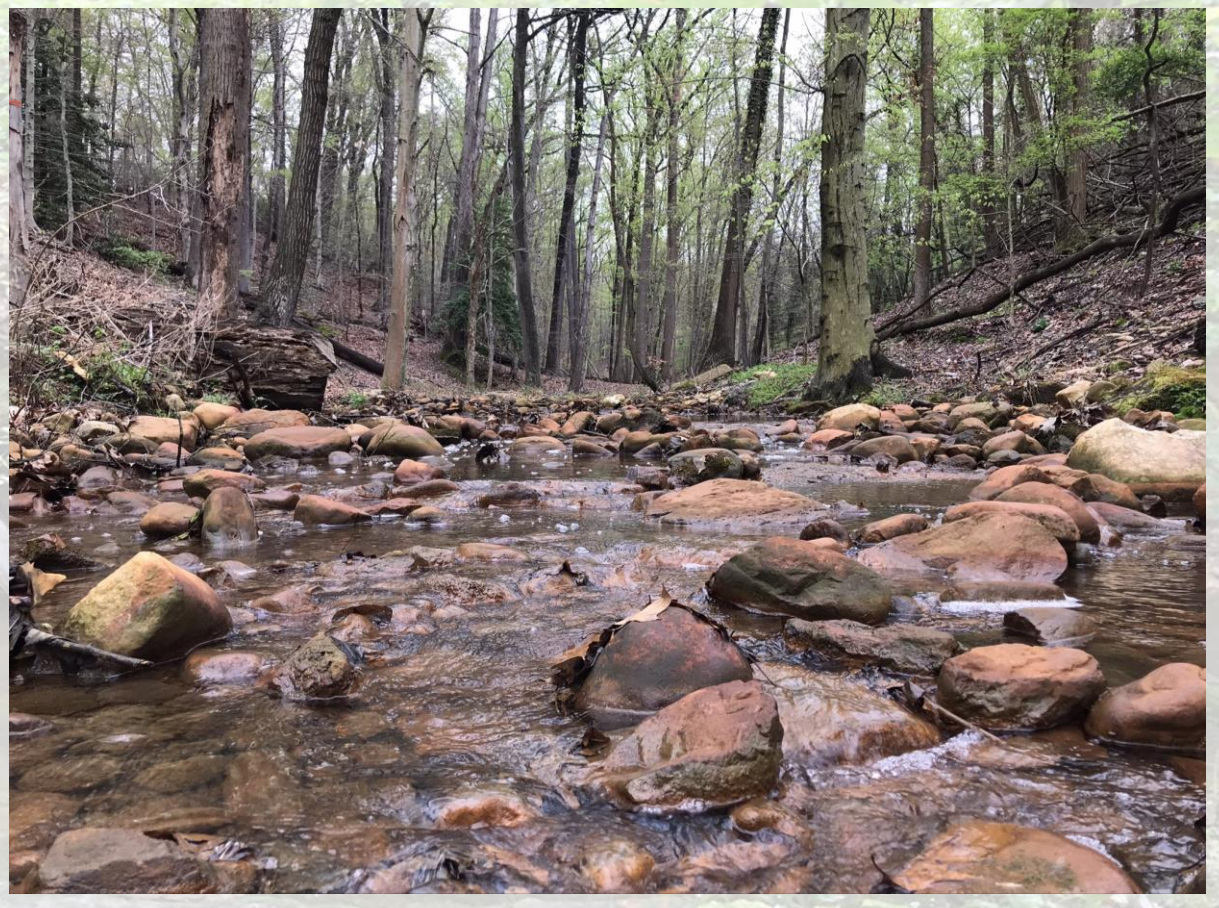
Snakeden Branch - Reston (Fairfax County)

Courtesy of Wetland Studies and Solutions

Pope Branch – District of Columbia

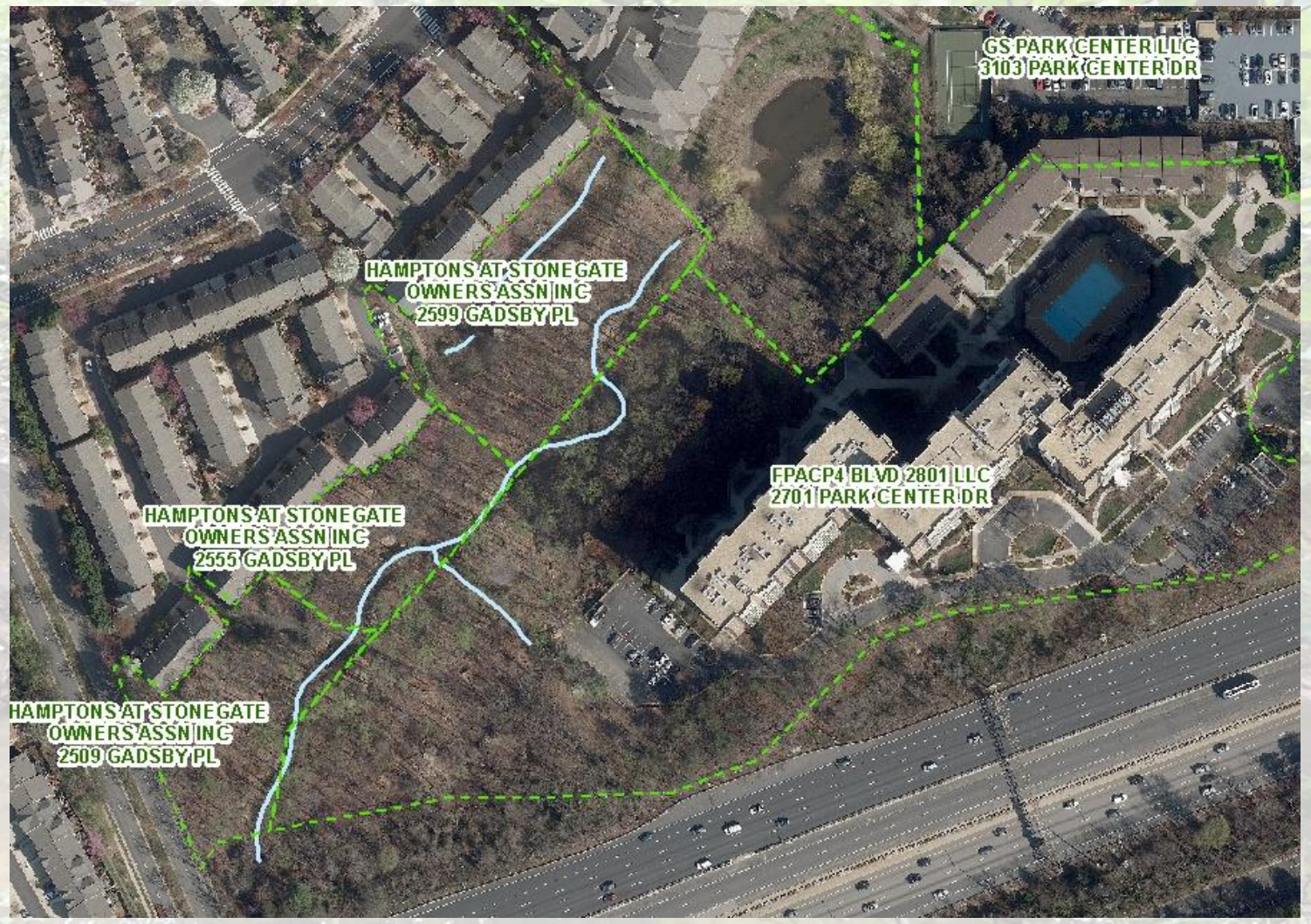


Courtesy of District Department of Energy and Environment

Planned City Stream Restoration Efforts

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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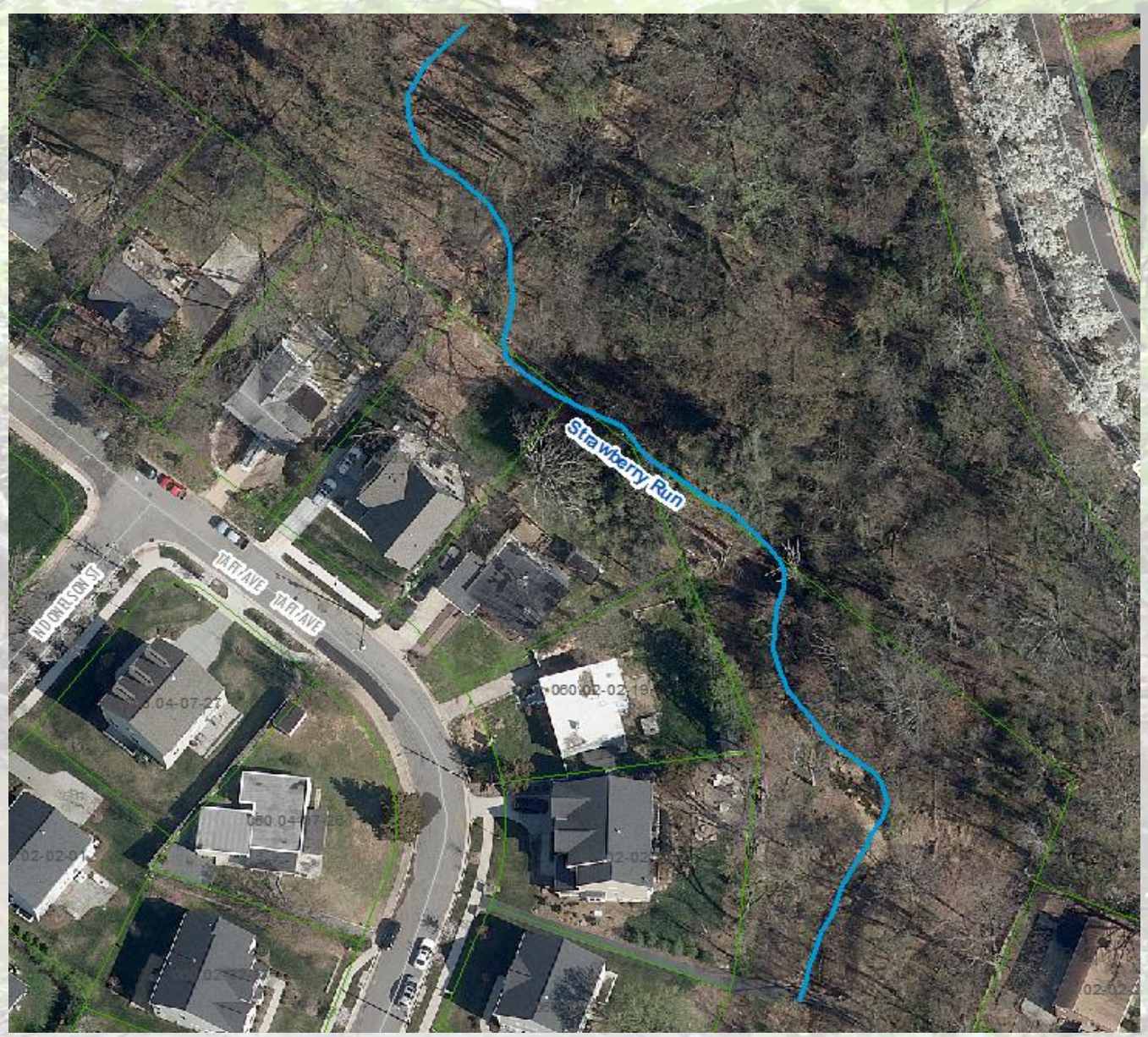
Strawberry Run Stream Restoration

- 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

*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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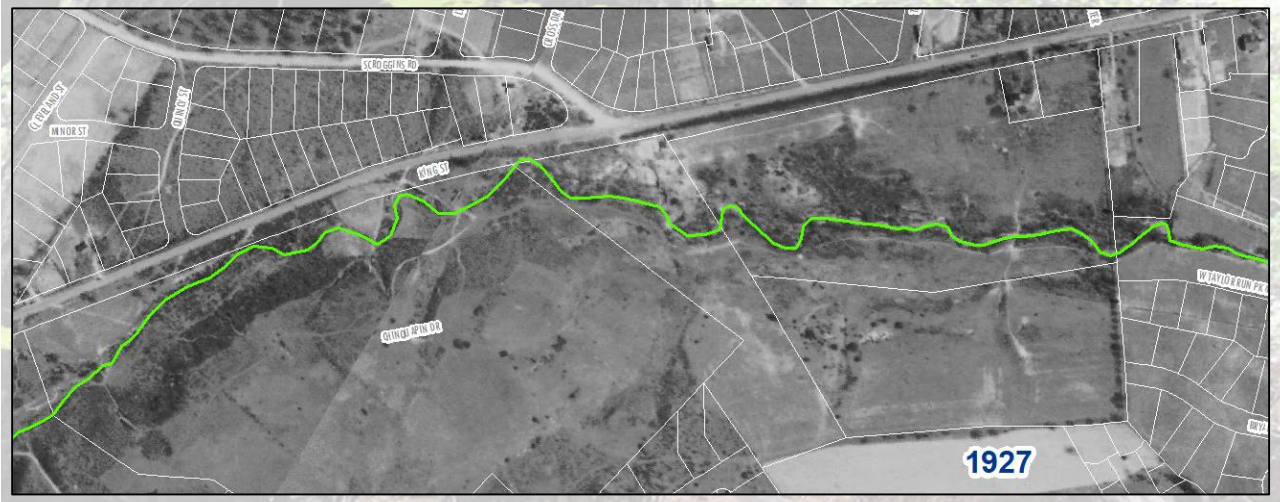
Changes to Taylor Run Over Time



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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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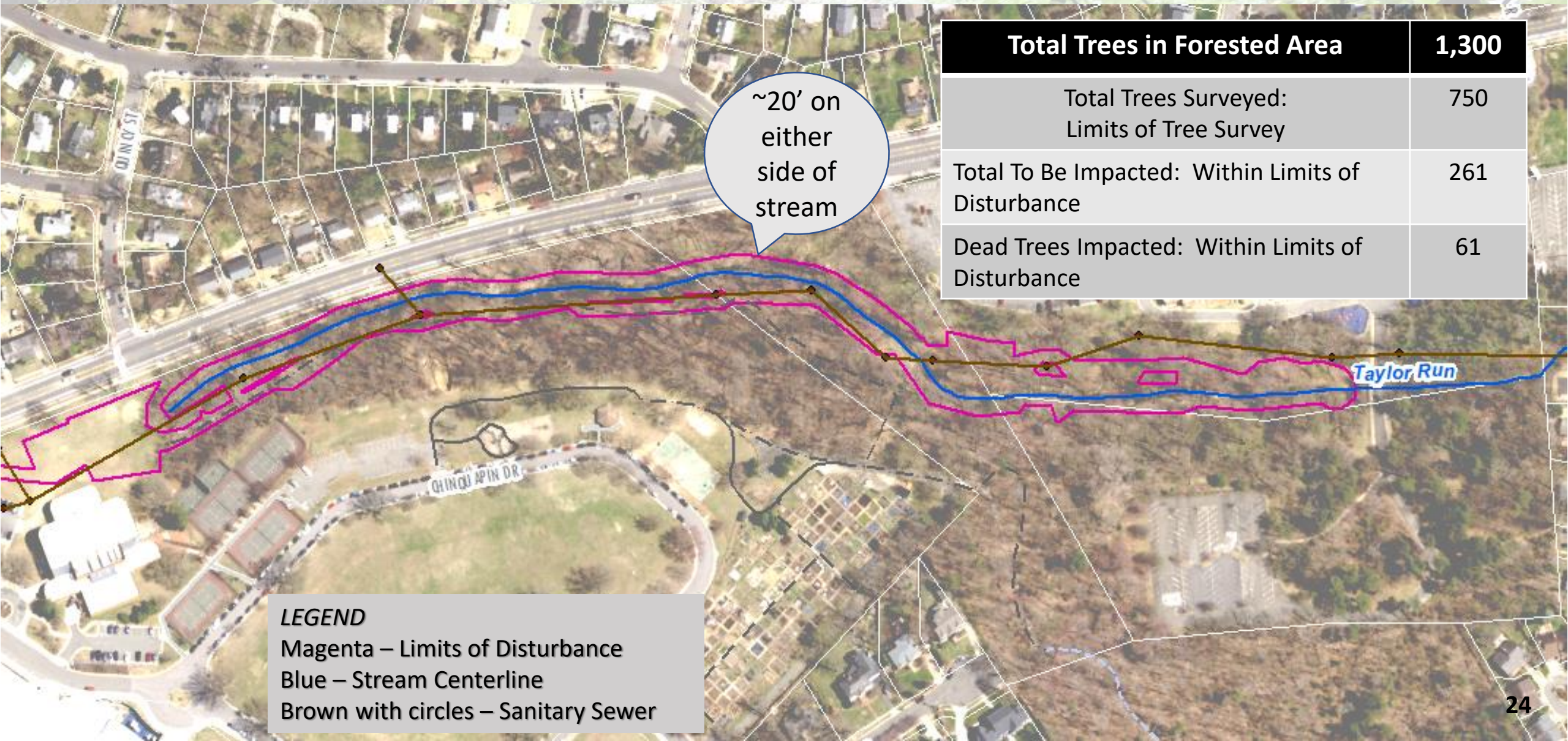
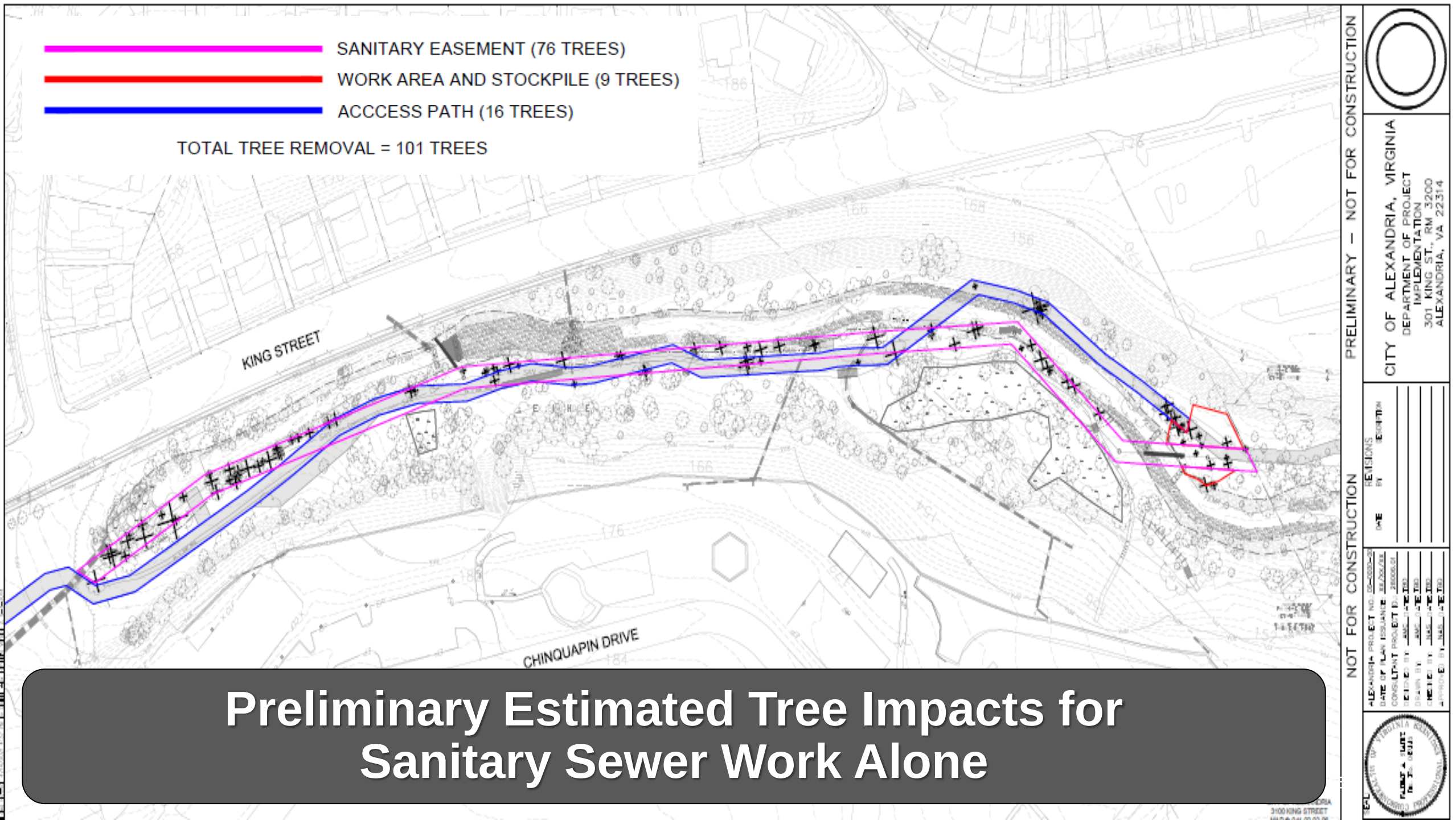
Forested Area and Limits of Disturbance



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



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

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

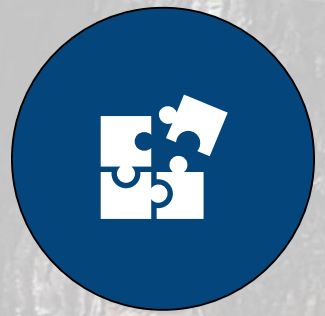
3. Build Lucky Run & Rely on CSO Credits Instead of Taylor/Strawberry

- 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

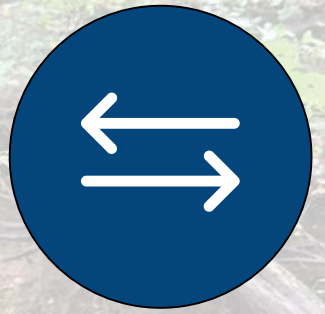
4. Use Fields' Design in Taylor Run (Large Woody Debris Instead of Restoration)

- 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	

*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?	

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**

City of Alexandria, Virginia

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MEMORANDUM

DATE: March 10, 2021

TO: THE HONORABLE MAYOR & MEMBERS OF CITY COUNCIL, AND CITY MANAGER MARK JINKS

FROM: VICE MAYOR ELIZABETH BENNETT-PARKER & COUNCILMAN JOHN TAYLOR CHAPMAN

SUBJECT: STREAM RESTORATION PROJECTS AT STRAWBERRY RUN AND TAYLOR RUN

Over the past several months, city council has received public comment, emails and other communication regarding the city's stream restoration projects at Strawberry Run and Taylor Run. Some of these communications challenge the design, the need of and the process for the stream projects.

Due in part to this recent community dialogue, as well as a letter from our Environmental Policy Commission recommending against the projects, and recent trips to both Strawberry Run and Taylor Run, we would like to ask you, our colleagues, to support asking City Manager Jinks to docket updates on the stream restoration projects at Strawberry Run and Taylor Run at a legislative meeting this spring, preferably in April.

These updates would allow city council to publicly ask questions of staff, particularly questions generated by our interactions with residents and civic associations. We are also hopeful, that given resident concerns, staff would be able to discuss the challenges and opportunities posed by alternatives that resident groups that come forward with, as well as any fiscal impact.

ATTACHMENT 2

Alexandria Stream Restoration:
Concerns and Staff Response Companion

Stakeholders have raised issues and concerns with stream restoration, which are outlined below.

Issue	Specific Concern	Staff Response
Strawberry Run		
Protocol (BANCS) Assessment and Plans	Residents have requested a specific BANCS assessment.	The Phase III Stream Assessment contains the BANCS assessment documentation. Staff has posted plans for all projects on the City website.
Outreach	Residents have expressed concern about City outreach prior to Sept 2018 City Council SLAF consideration.	Staff notes that 2018 outreach was performed in association with citywide stream assessments. Once the project was selected, the consultant received a notice to proceed with design in May 2019. Widespread public engagement began in Nov. 2019 which included letters to residents and presentations.
Restoration will wash away	Residents have expressed concerns the stream restoration is not designed for large storms.	The project has been designed to withstand large storm events; streams are not intended to hold the 100-yr event; flow spreads out to floodplain to further dissipate energy. Once the project has been implemented, the design seeks to ensure it will not degrade with larger storms.
Prior restoration downstream on Strawberry Run failed	Residents have expressed concerns that a prior (circa 2010) downstream restoration implemented by a developer has already failed.	Staff notes the prior project was an early natural channel design effort constructed by a developer as an opportunity to restore a portion of the overall stream segment that was identified as degraded in the preceeding Phase II Stream Assessment, but there was no current project funding to address. Staff acknowledges there are points of failure, but does not agree the entire project failed. The stream needs ongoing maintenance since it was designed for a two-year storm. The proposed upstream restoration is designed to handle the force and stresses associated with larger storm events. In hindsight, the upstream portion should have been completed first.

Issue	Specific Concern	Staff Response
Fill brought in to raise the stream bed	Residents have expressed concern the fill will erode.	Material is designed and sized to resist erosion during the "bankfull" flood, with an additional factor of safety to account for larger storms. These dimensions were selected by calculating the rock size that can be moved by a flood's erosive forces when the channel is completely full (i.e., bankfull condition). The project design proposes a rock size around twice as large to add a factor of safety.

Issue	Specific Concern	Response
Taylor Run		
Acidic Seepage Wetland (Swamp)	Stakeholders have expressed concerns that trees and the swamp will be destroyed during and after project implementation.	The wetland is outside of the project area. The design was modified to provide access from farther away than the earlier access.
	Stakeholders have expressed concerns that raising the streambed in Taylor Run will flood the swamp and destroy it.	Raising the bed will bring the stream bed closer to the historical elevation, which is just below the wetland. The project is designed to not impact the wetland according to engineers and wetland scientists for the consultant.
Calculated Total Phosphorus (TP) concentrations / Pollutant reductions will not be realized	Residents have raised concerns the total phosphorous concentrations are 4-5 times lower than the rates typically seen in similar streams.	Staff notes the soil analysis conducted by residents determines bioavailable phosphorus and not total phosphorus. Plant available phosphorus is only part of total phosphorus, the targeted pollutant, and typically 12% to 25% of TP[1].
	Expert Panel protocol has been updated and default rates should no longer be used.	Default rates were developed to provide consistency of approach. Use of the default rates is consistent with EPA/VDEQ guidelines that apply to this project.[2]
Expert Panel and Natural Channel Design (NCD)	Stakeholders have suggested NCD is not scientifically supported.	Staff acknowledges the ongoing debate in the scientific community about stream restorations. However, there is general consensus that stream restorations are effective, cost-efficient solutions given the need to provide stewardship to our urban streams and limited alternatives.

[1] *What Role Does Stream Restoration Play in Nutrient Management,* Roderick W. Lammers and Brian P. Bledsoe, 2017

[2] Paylor, David K. Letter to Environmental Council of Alexandria (ECA), April 20, 2021. TS.

Issue	Specific Concern	Response
Stream restoration should begin upstream	Stakeholders have suggested the City should focus restoration efforts upstream to limit intense stormwater events from impacting Taylor Run.	Staff notes the stream has been impacted over decades. It no longer has elements such as "meanders" that can naturally absorb intense flows. It has been straightened and continues to downcut; upstream efforts won't be able to fully reverse stream impacts.
Natural Channel Design (NCD) as an approach is outdated.	Stakeholders have expressed concerns that NCD will no longer be able to be used after July 1, 2021 because of changes to grant implementation protocols.	Even with recent updates to the Expert Panel protocols, NCD will continue to be employed. Protocol updates generally require more upfront onsite testing and more post-construction monitoring; NCD elements will remain and be likely continue to be refined similar to other scientific approaches.
Bay credits from stream restoration projects are short term.	Stakeholders have expressed concerns that any credits toward Bay goals will end after five years.	The City will perform post-construction monitoring, and ongoing inspection and maintenance. The credits will remain so long as the project remains stable.
Construction methods	Stakeholders have expressed concerns the area will be clear cut and the forest will be destroyed.	Forest will be protected, will not be bulldozed, and will not be destroyed. The forest and the stream has been impacted multiple times since the 1920s. Chinquapin and Forest Park areas include about 31.6 acres with about 1,300 trees (plus more on church property). The project limits of disturbance includes 2.2 acres of forest (plus additional disturbed area in the field adjacent to King Street) and would require removal of 261 trees, 61 of which are already dead. As part of the project, the City will replant 2,280 native trees and 7,200 shrubs using over 30 native species. The disturbed area includes the 30-foot wide stream and approximately 20 feet on each bank, which includes the sanitary sewer easement and trail areas, with 0.9 acres disturbed outside of the easement and stream areas. The project access road will be 16' wide on deck mats. The access road largely follows the existing 4-foot trail and sanitary sewer easement to minimize tree impacts. There will be an

Issue	Specific Concern	Response
		additional 1.7 acres of disturbance on church property.
Tree planting is preferred.	Stakeholders have expressed concerns the City should focus on tree planting alternatives instead of stream restoration.	Staff supports tree planting, bioretention, and other green practices. However, tree planting initiatives are extremely challenging since there are very few dedicated open spaces available in the City. The staff position is that the stream needs stewardship and the sanitary sewer pipes and manhole structure need to be protected to eliminate risk of pipe breakage and resulting downstream pollution.
Fill brought in to raise the stream bed	Residents have expressed concern the fill will erode.	Material is designed and sized to resist erosion during the "bankfull" flood, with an additional factor of safety to account for larger storms. These dimensions were selected by calculating the rock size that can be moved by a flood's erosive forces when the channel is completely full (i.e., bankfull condition). The project design proposes a rock size around twice as large to add a factor of safety.