Little Pimmit Run at Chesterbrook Road Stream Restoration
&
Little Pimmit Run Sanitary Sewer Realignment

Department of Public Works and Environmental Services
Working for You!

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Agenda

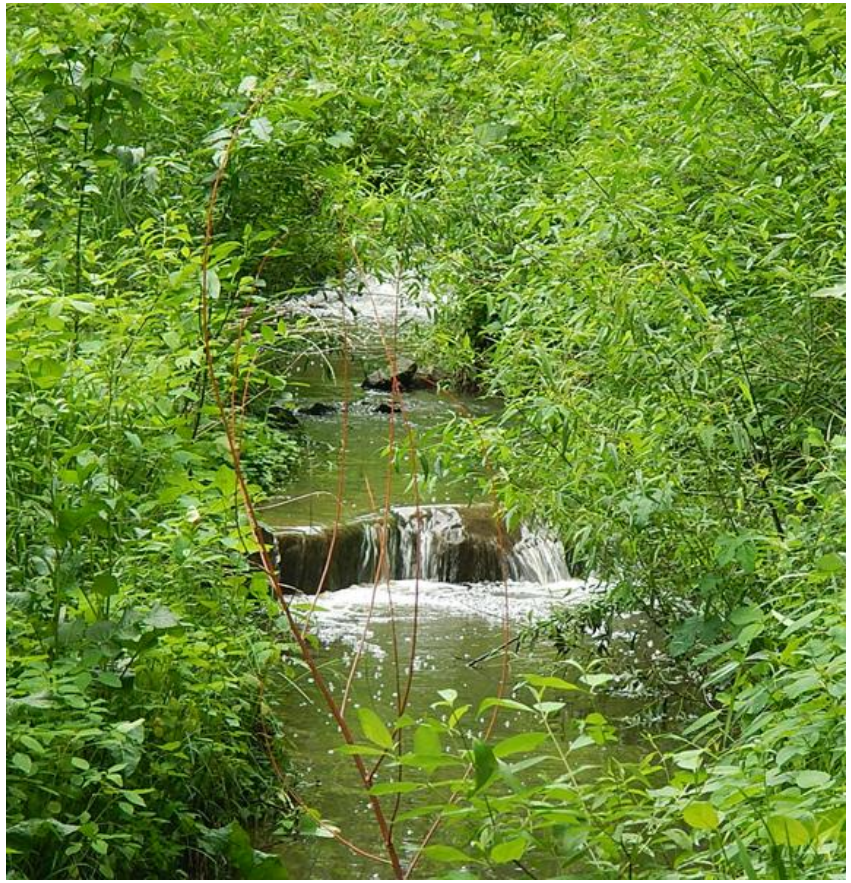
- Environmental Benefits
- Consequences
- Vicinity Maps
- Background
- Goals
- Channel Evolution Model
- Existing Conditions
- Design Options
- Typical Structures
- Community Teams
- Contact Information
- Questions

*Please hold questions until the end of the presentation.

Environmental Benefits

Improve watershed conditions and reduce downstream impacts through….

- Control velocity
  - *Reduce erosion*
  - *Protect infrastructure*
  - *Protect vegetation*
- Restore riparian corridor
- Restore instream habitat
- Reduce risks to public health



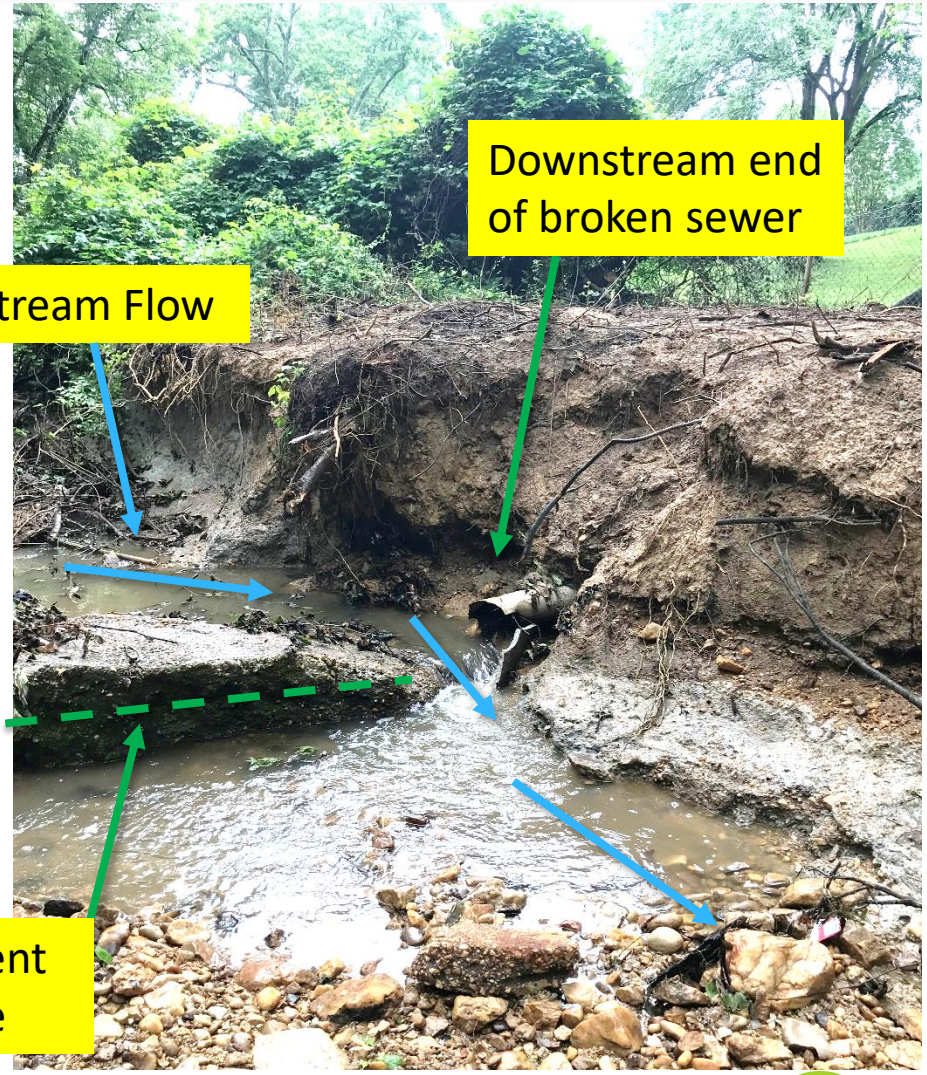
Stormwater Consequences of Inaction

1. Channel erosion will continue
2. Tree concerns increase
    - Greater risk near stream edge
    - Safety concerns
    - Future maintenance concerns

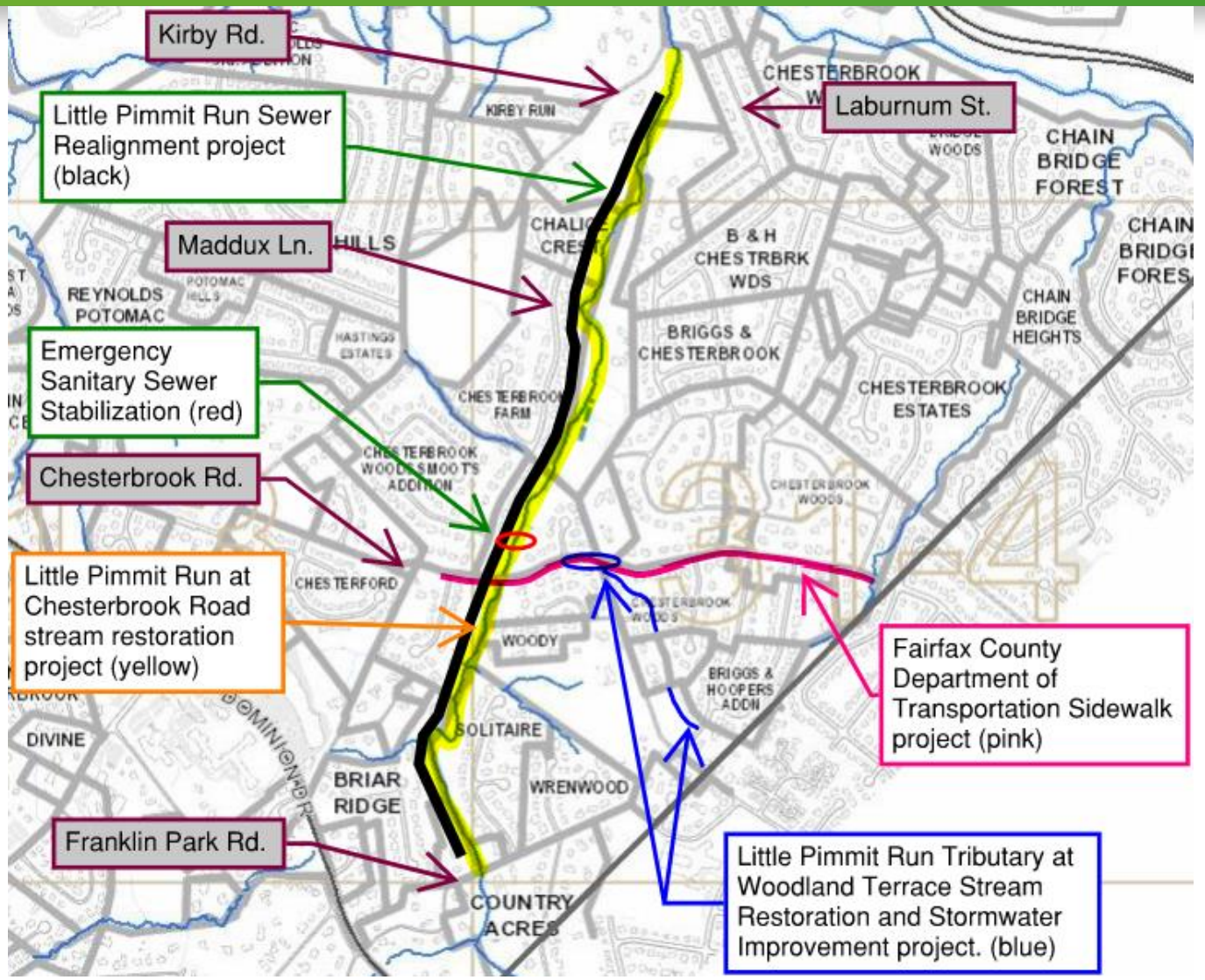
31-inch black walnut fell in August 2021

Wastewater Consequences of Inaction

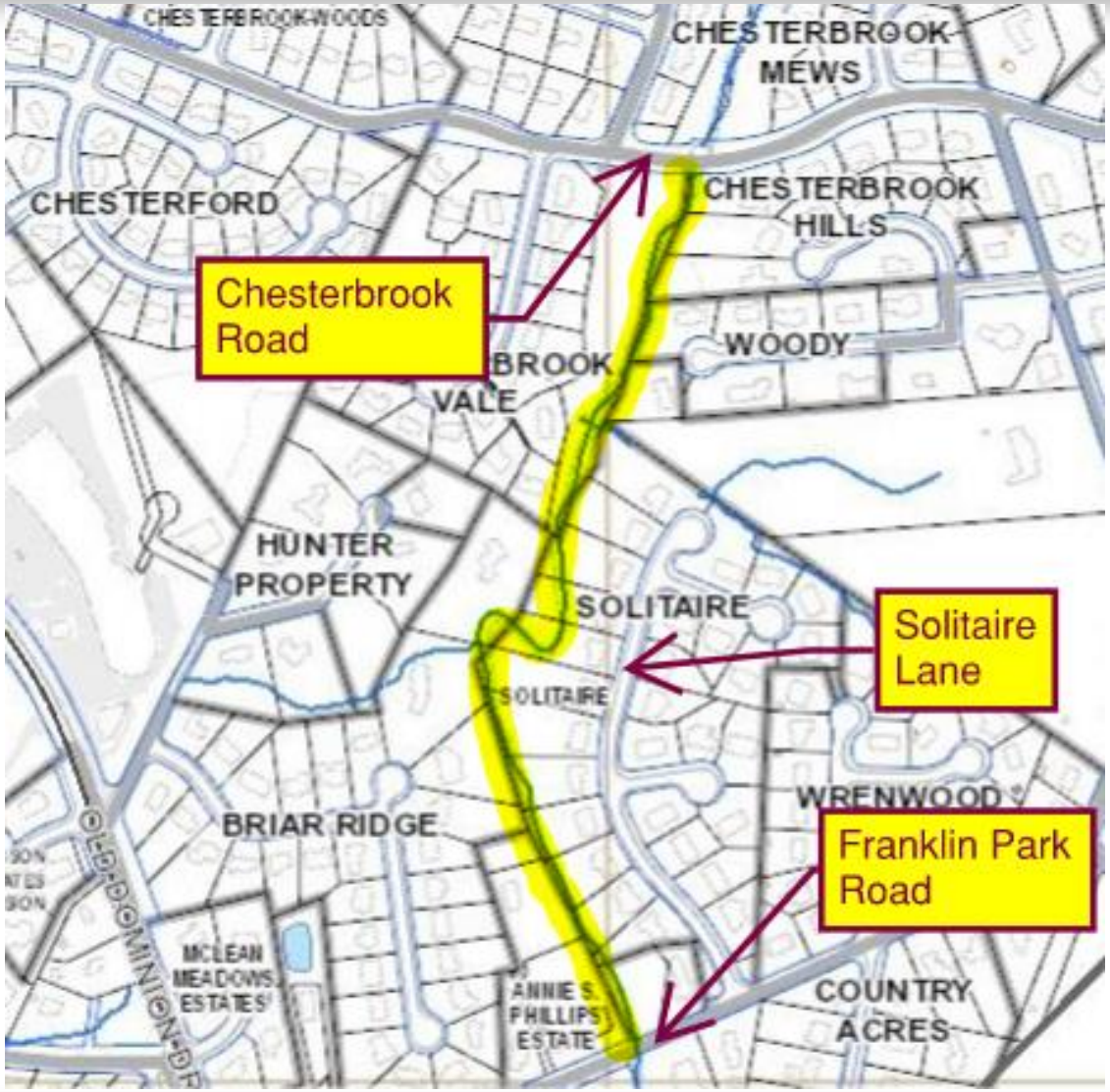
- Emergency Sanitary Sewer Projects
  - Sole focus on continuity of sanitary sewer service
  - Excessive cost
  - No opportunity to design around other environmental concerns, such as tree save issues
- Release of wastewater into the environment



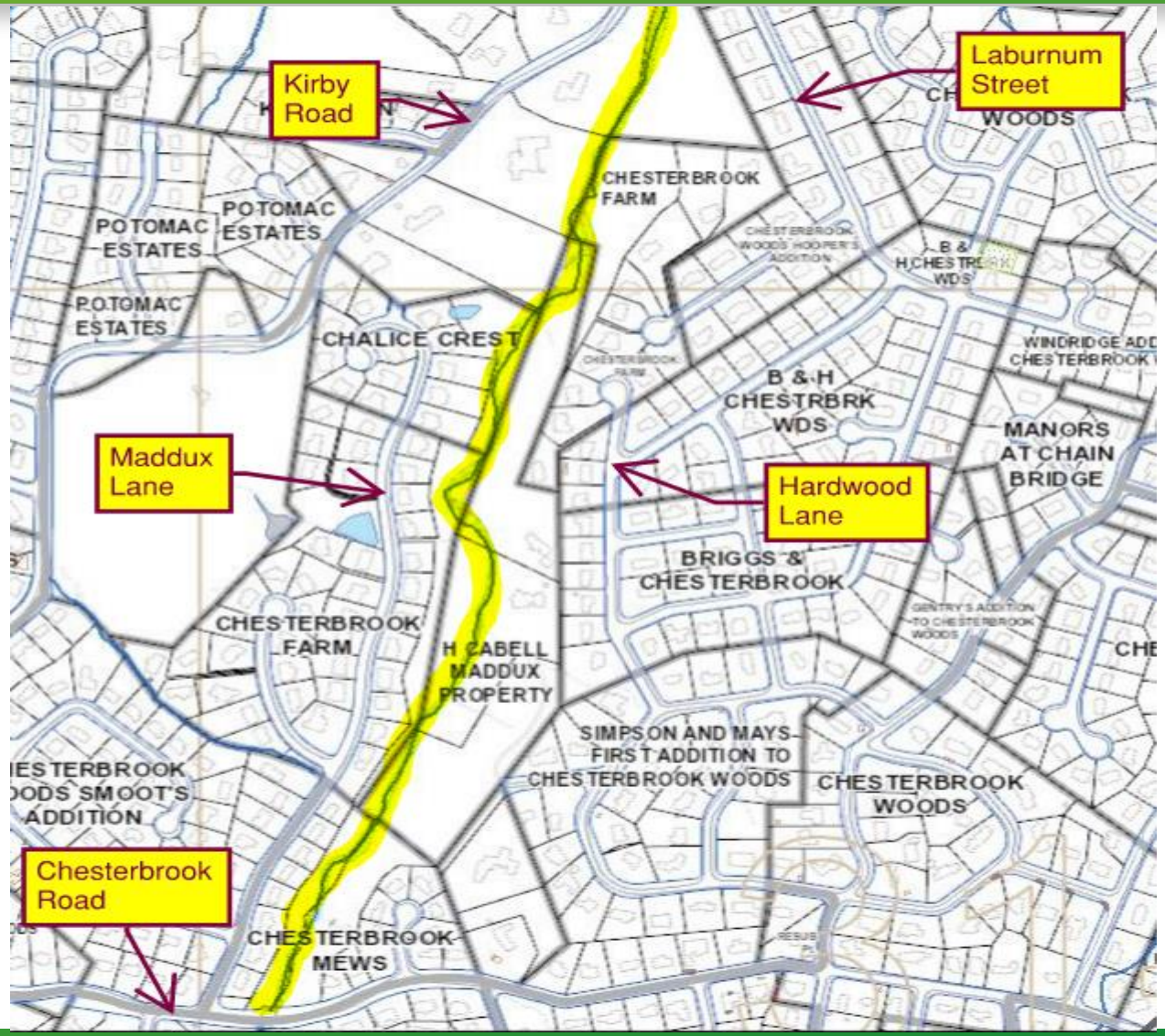
Vicinity Map (Big Picture)



Vicinity Map (Phase 1)



Vicinity Map (Phase 2)



Stream restoration background – How did we get here?

- Design initiation– May 2020
- Started meeting with property owners – February 2021
- Community meeting on pre-design/channel alignments – April 2021
- Concept design submission – August 2021
- Value Engineering Study completed – November 2021
- Community meeting with Board of Supervisor – December 2021
- Community meeting – January 2022
- Land Acquisition – **(We are at this step)**
  - Easements required prior to final design
- Complete Design – 12 months
- Construction – *To be determined*

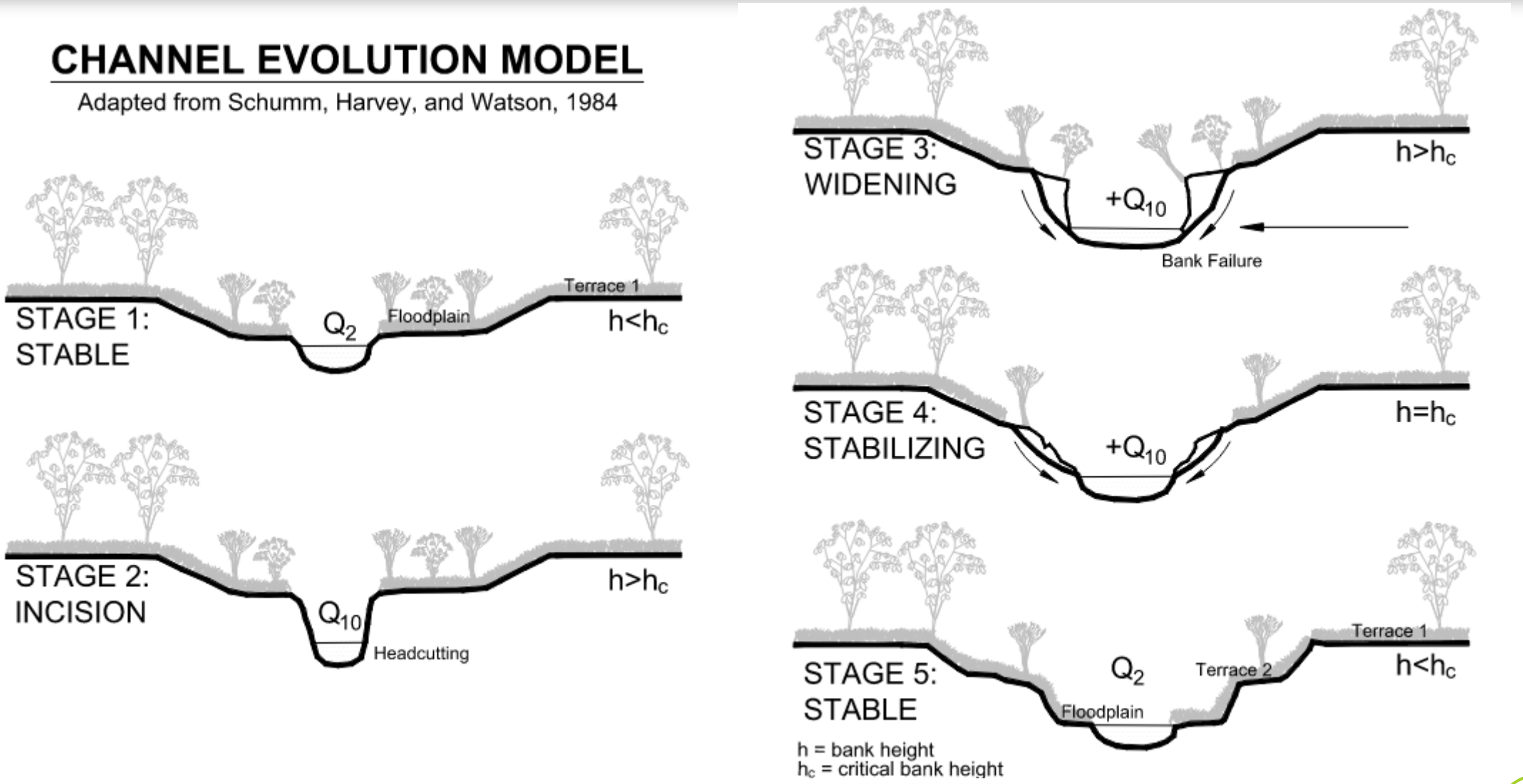
Wastewater background – How did we get here?

- Chesterbrook Road Emergency Project – Summer 2019
- Final Scoping Technical Memorandum – January 2020
- Professional Services Contract Execution – April 2021
- Community Meeting on stream restoration Pre-design/Channel alignments – April 2021
- Final Preliminary Engineering Report – October 2021
- Community Meeting on Sanitary Realignment Preliminary Engineering Report – October 2021
- Value Engineering Study completed – November 2021
  - One joint study for both projects
- Community Meeting with Board of Supervisor – December 2021
- Community meeting – January 2022
- Design Contract Development – **(We are at this step)**
- Land Acquisition – **(We are at this step)**
- Complete Design
- Construction

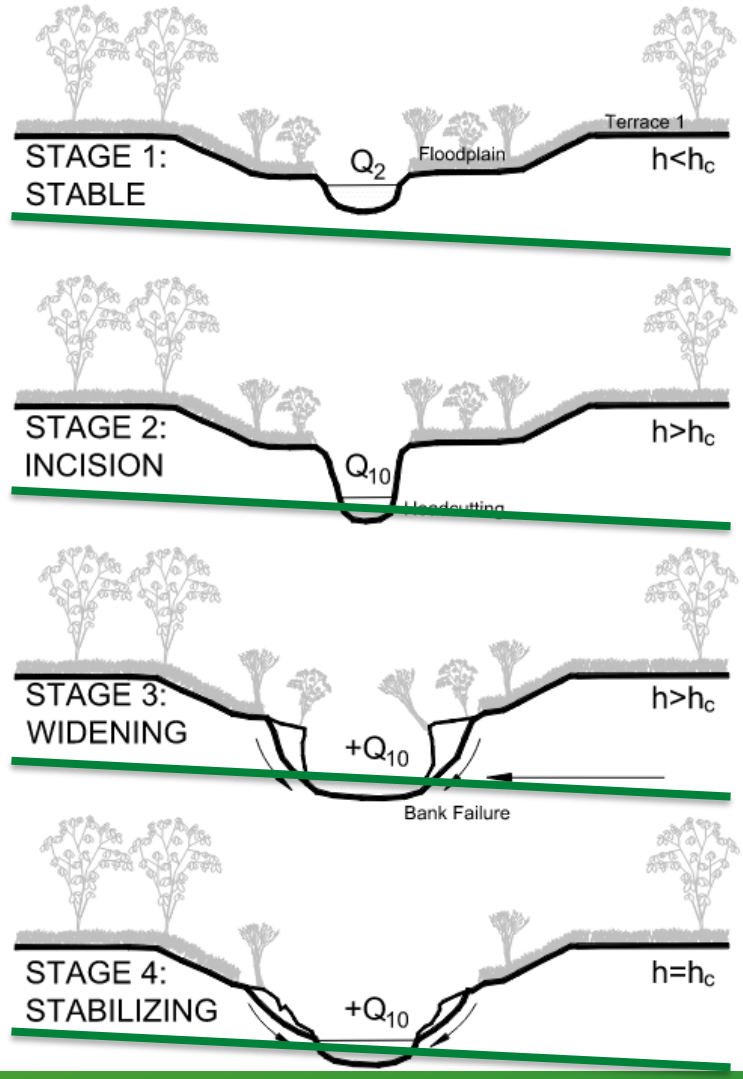
Goals

1. Restore up to 7,500 feet of stream channel and tributaries
   - Reduce erosion and sediment transport
2. Install new sanitary sewers serving over 500 single family homes
3. Improve watershed conditions and reduce downstream impacts
4. Improve and protect public infrastructure
5. Prevent costly emergency repairs
6. Reduce risk to public health and the environment
7. Maintain close coordination with stakeholders and community
   - Build partnerships with local organizations

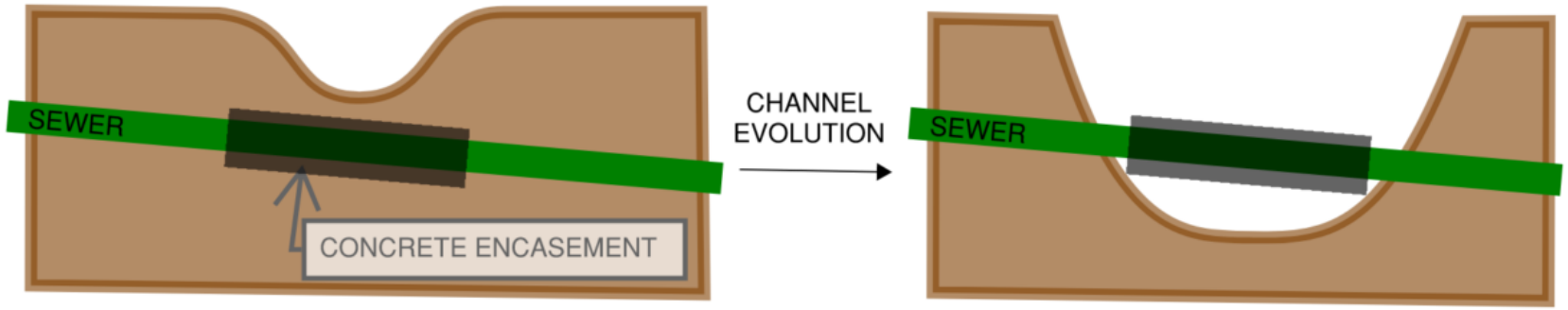
Channel Evolutionary Model



Channel Evolution Impacts to Sanitary Sewers

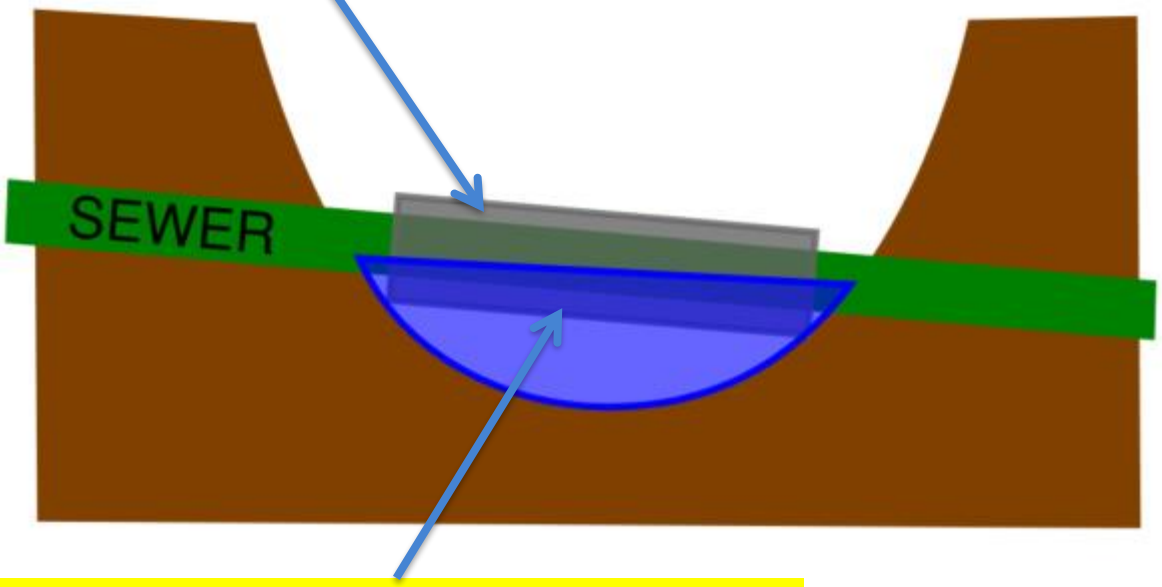


- Sanitary Sewers (green line) become uncovered as the stream channel evolves.
- Sewers with concrete encasements are vulnerable because of the weight of the encasement coupled with force from the stream flow (crossing X-5)
- Sewers without encasements lack protection against impacts (crossings X-3 and X-2)



Channel Evolution Impacts to Sanitary Sewers

Concrete Encasement



Sewer crossing reduces area of stream flow, which increases stream velocity and erosion of channel bed & banks

Stream flow upstream and downstream of this crossing is much deeper than further upstream or downstream.

Existing Bank Conditions – Phase 1

Existing Bank Conditions – Phase 1

Existing Bank Conditions – Phase 1

Existing Conditions – Phase 2

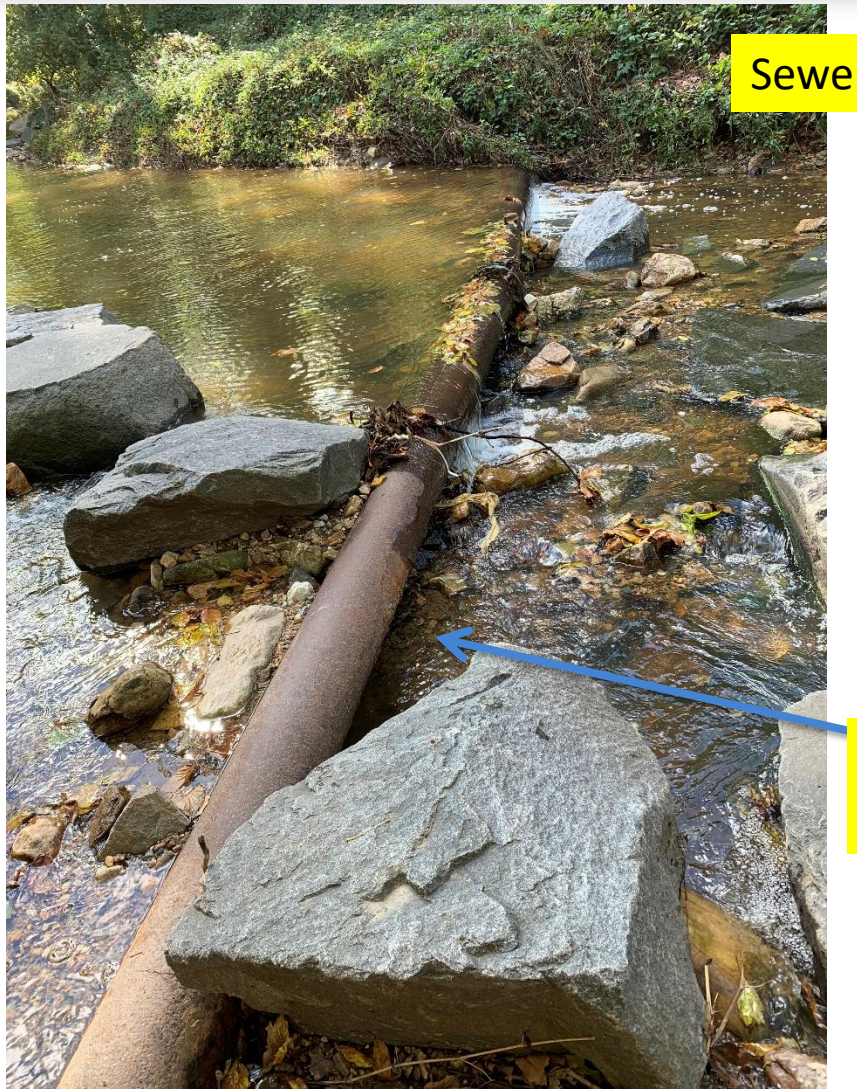
Existing Conditions – Phase 2

Existing Conditions – Phase 2

Existing Conditions – Phase 2

Existing Conditions – Phase 2

Sewer visibly bowed



Sewer crossing x2

Stream flow eroding under sewer

Existing Conditions – Phase 2

Stream Design Options

- More impervious area = more water in channel

Options:

1) Restore to historic floodplain.
2) Develop nested channel.
3) Attempt to stabilize eroded bed and banks in place.

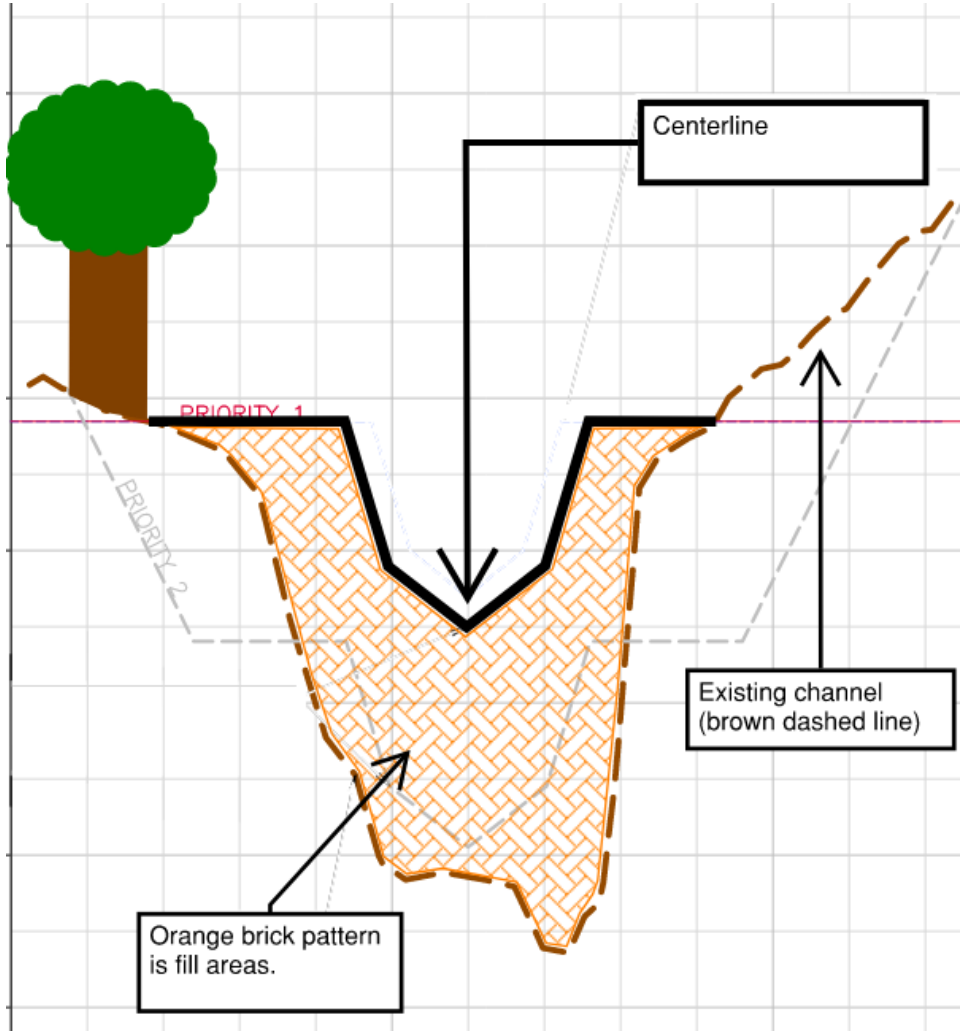
Options - Restore to historic floodplain

Pros

- Greater area to dissipate energy and reduce velocity.
- Reduce tree impacts compared to a nested channel approach.

Cons

- Historic floodplain would activate more often compared to the nested channel approach.
- Expanse of flood waters would be greater.
- Requires more fill to raise the channel.



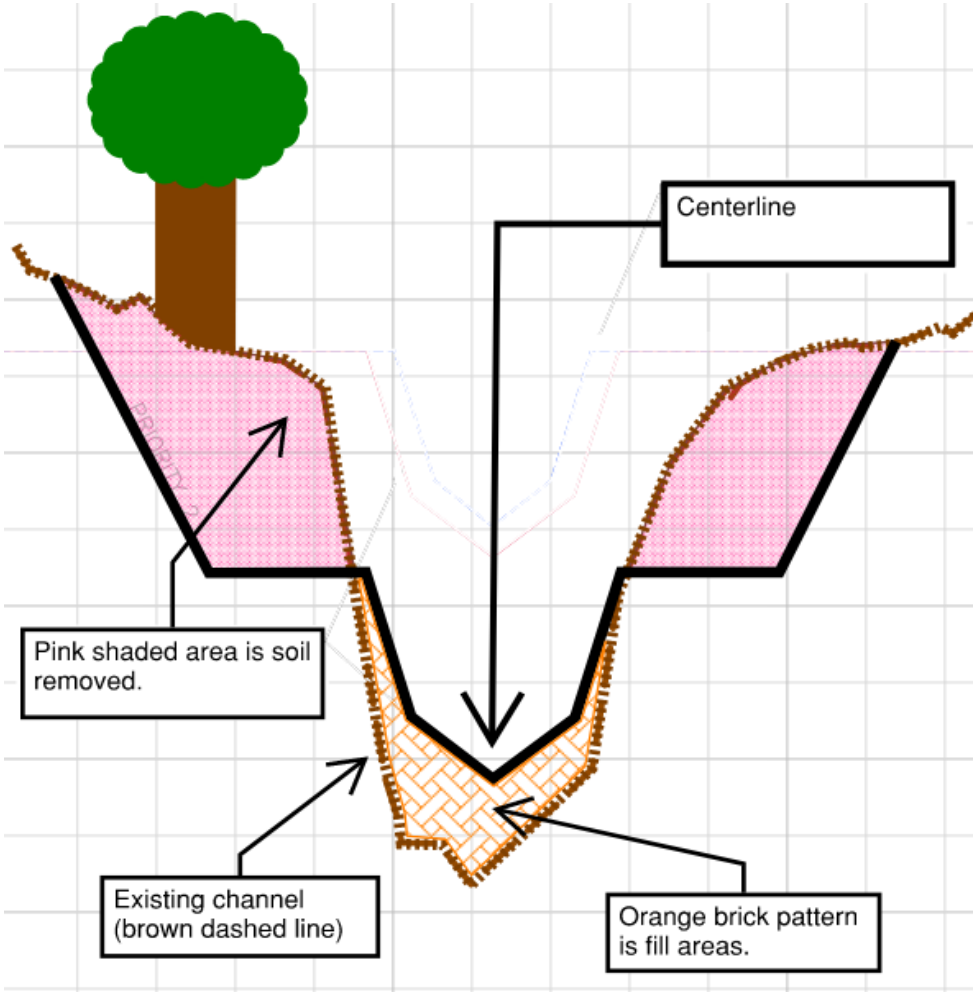
Options - Develop nested channel

Pros

- Targets the creation of the stage 5 channel in the channel evolutionary process.
- Reduces the impact to the 100-water surface elevation compared to restoring the channel to allow access to its historic floodplain.

Cons

- Benching can have a significant impact on trees near the channel edge.



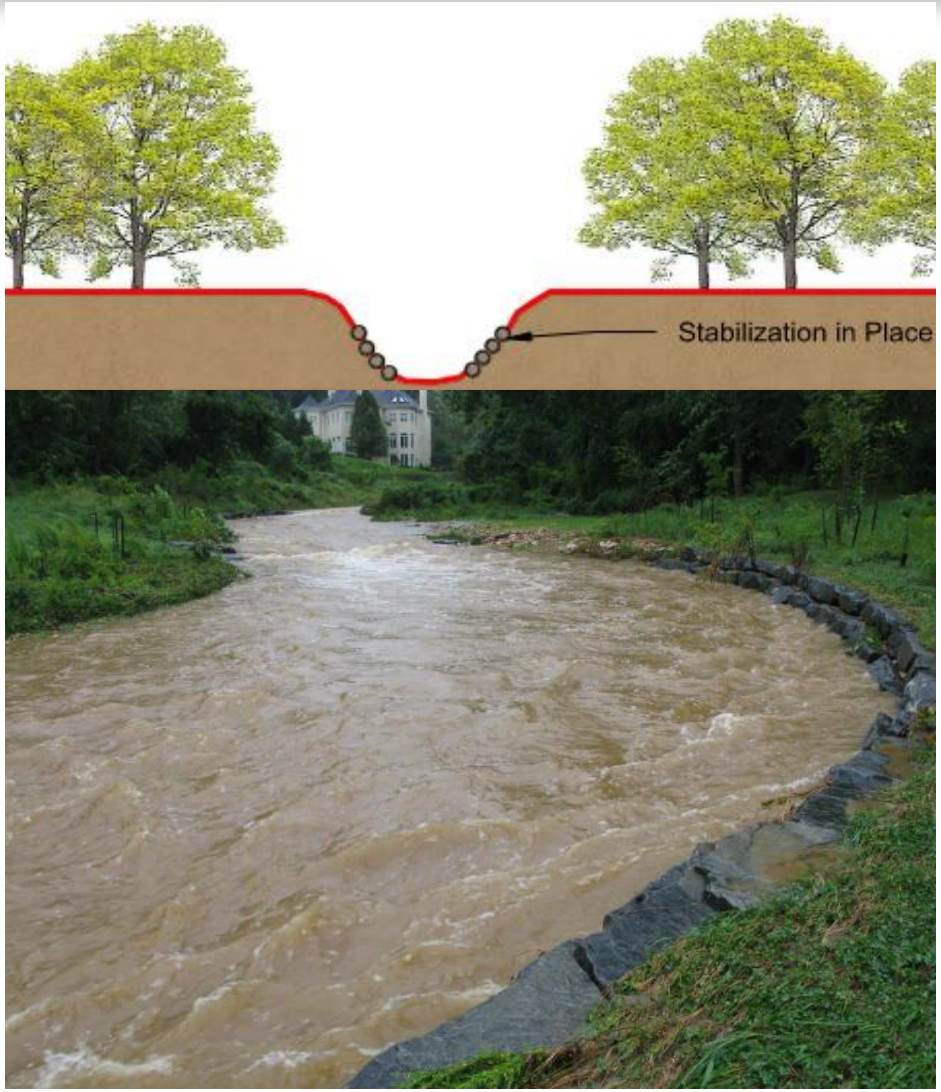
Options – Stabilize bed and banks in place

Pros

- Reduced tree impact.
- Reduced construction

Cons

- Long term stability remains a concern.
- Requires the use of more rock to provide localized protection.
- Tree impacts still occur due to access.



Sanitary Design Options

Options:

1) Realign sanitary sewers
2) Protect sanitary sewers in place
3) A mixture of 1 & 2

Sanitary Options – Realign Sanitary Sewers

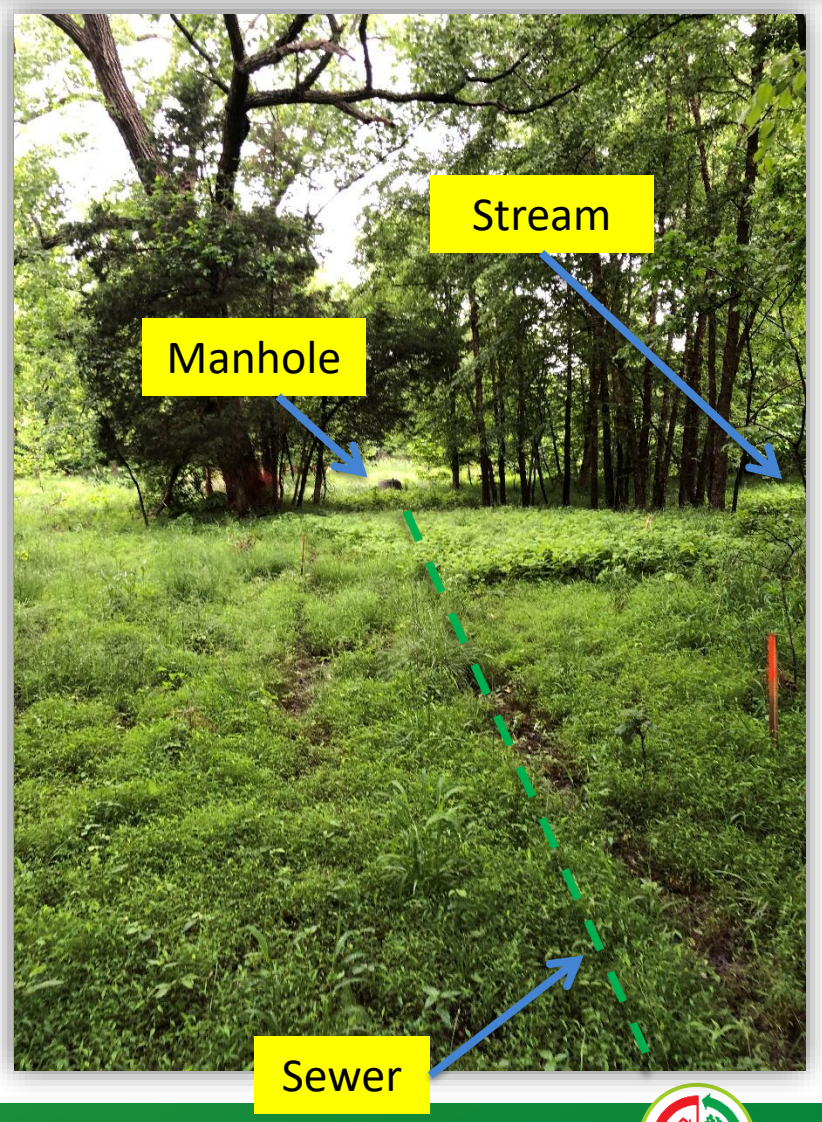
Install new sewers outside the stream channel

<u>Pros</u>

- Eliminates risks posed by the stream to the sanitary sewers
- Reduced consequence of sewer failure
- Reduced future maintenance needs
- More flexibility for the stream restoration design

<u>Cons</u>

- Easement acquisition needed
- Greater tree impact



Sanitary Options – Protect in Place

Replace aging pipes which are now 40-60 years old using current design standards

<u>Pros</u>

- No additional permanent easements needed
- Reduced construction footprint
- Reduced tree impact

<u>Cons</u>

- Stream Restoration designs around covering and protecting sanitary sewers
- Raised stream channel may have floodplain impacts
- Increased long term maintenance needs
- More rock will be needed to protect the pipes
- Some sanitary sewer crossings cannot be covered by the stream restoration project
- Stream meanders may circumvent armoring and threaten sanitary crossings again

Sanitary Options – Both Realigning and Protecting in Place

Realign segments which cannot be protected in place

<u>Pros</u>

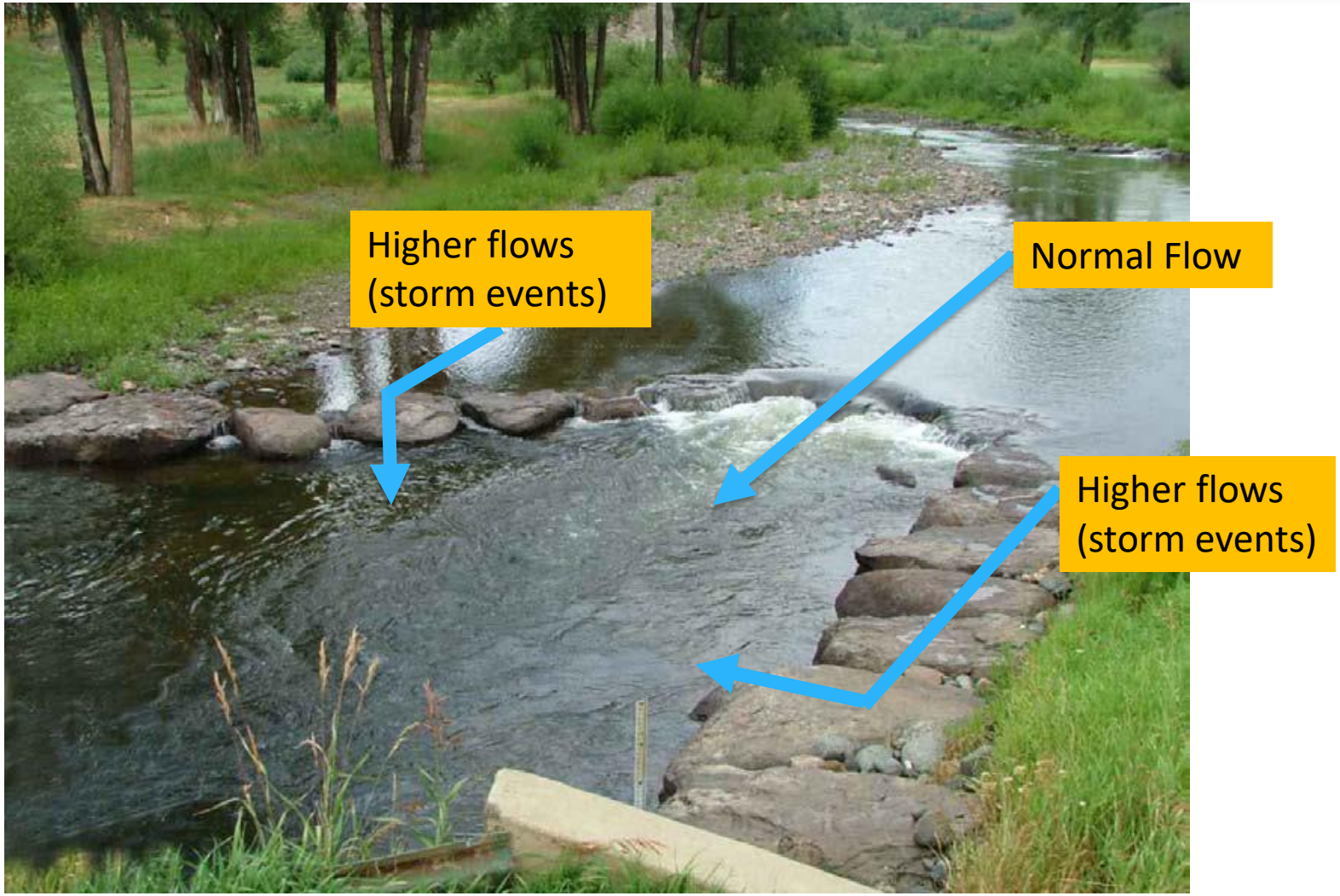
- Reduced tree impact
- Replace aging pipes which are now 40+ years old during Stream Restoration disturbance

<u>Cons</u>

- Stream Restoration must design around covering and reinforcing sanitary sewers
- Raised stream channel may have floodplain impacts
- Increased long term maintenance needs
- Construction will still require access
- More rock will be needed to protect the pipes
- Some sanitary sewer crossings cannot be covered by the stream restoration project

Typical Stream Structures Used – Cross Vanes

- Typical stream structures could be applied in any of the options.



Typical Stream Structures Used – Root Wads

Typical Stream Structures Used – Stone toe

Typical Stream Structures Used – Boulder Clusters

Construction Access Road

Develop Community Team

- Include the community in the design process.
  1. Develop community team
     - How many are interested?
     - Where on the project are they located?
  2. Participate in design meetings
     - Great opportunity to engage design team in detailed discussions.
     - Offer input into potential ideas for consideration.
     - Share information back to community.

Please contact the Dranesville District Office, Fred Wilkins, and Suzy Harding to join.

Contact Information

Stream Restoration Design

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To request this information in an alternate format call 703-324-5500, TTY 711

Website: https://www.fairfaxcounty.gov/publicworks/little-pimmit-run-chesterbrook-stream-restoration-sewer-alignment

Questions?