



Phase III Stream Assessment Study: Potential Stream Restoration Projects

Strawberry Run and Taylor Run

December 5, 2018





Tonight's Agenda

- Introduce the project team
- Why stream restoration?
- Healthy stream characteristics
- City's Stream Assessment Program
- Project selection
- Finished project examples
- Next steps

Project Team

Consultant



City Departments

Wood
Environment &
Infrastructure
Solutions

wood.

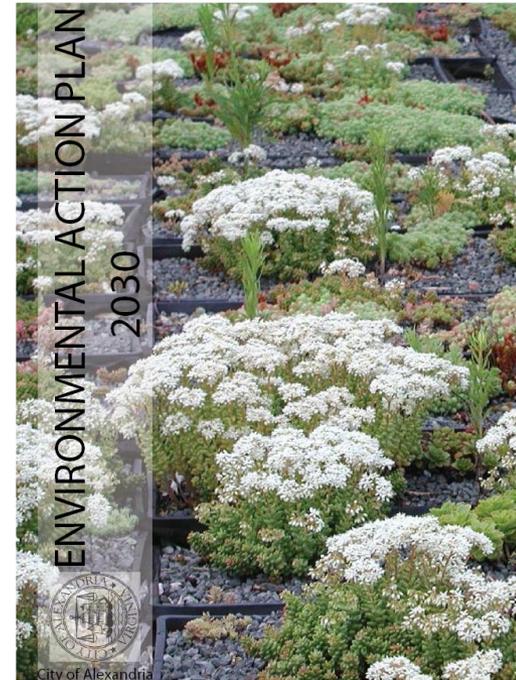
Transportation
and
Environmental
Services (T&ES)

Department of
Project
Implementation
(DPI)

Recreation, Parks
and Cultural
Activities (RPCA)

Project Drivers

1. Water quality and improving local streams is a City priority
2. Local benefits: enhanced water quality, improved habitat, protection of property
3. State and EPA require development of Total Maximum Daily Loads (TMDLs) for impaired streams



Chesapeake Bay TMDL





Chesapeake Bay TMDL Cleanup Mandates

- Enforced through the City's stormwater permit
- Requires ~1/4 of the City to be retrofit for water quality treatment before 2028
- Dense urban nature of the City limits potential solutions
- Stream restoration is one of the more cost-efficient approaches

<i>MS4 Permit Cycle</i>	% Total	Approx. Acres
Phase I (2013 - 2018)	5%	120 - 130
Phase II (2018 - 2023)	35%	660
Phase III (2023 - 2028)	60%	1,450
Total All Phases	100%	2,140

What Makes a Stream Healthy?

Physical

Chemical

Biological

1. Bed stability and diversity
 2. Sediment transport balance
 3. In-stream habitat & flow diversity
 4. Bank stability (native plant roots)
 5. Riparian buffer (streamside forest)
 6. Active floodplain
 7. Healthy watershed
- “Multiple Benefits” or “Co-Benefits”

Stream Pyramid

5 **BIOLOGY »**
Biodiversity and the life histories of aquatic and riparian life

4 **PHYSICOCHEMICAL »**
Temperature and oxygen regulation; processing of organic matter and nutrients

3 **GEOMORPHOLOGY »**
Transport of wood and sediment to create diverse bed forms and dynamic equilibrium

2 **HYDRAULIC »**
Transport of water in the channel, on the floodplain, and through sediments

1 **HYDROLOGY »**
Transport of water from the watershed to the channel

Courtesy of Stream Mechanics

Scour



Scour – Field Examples



Outfall to Holmes Run



Strawberry Run



Taylor Run

Stream Assessment Program

Phase I Stream Categorization

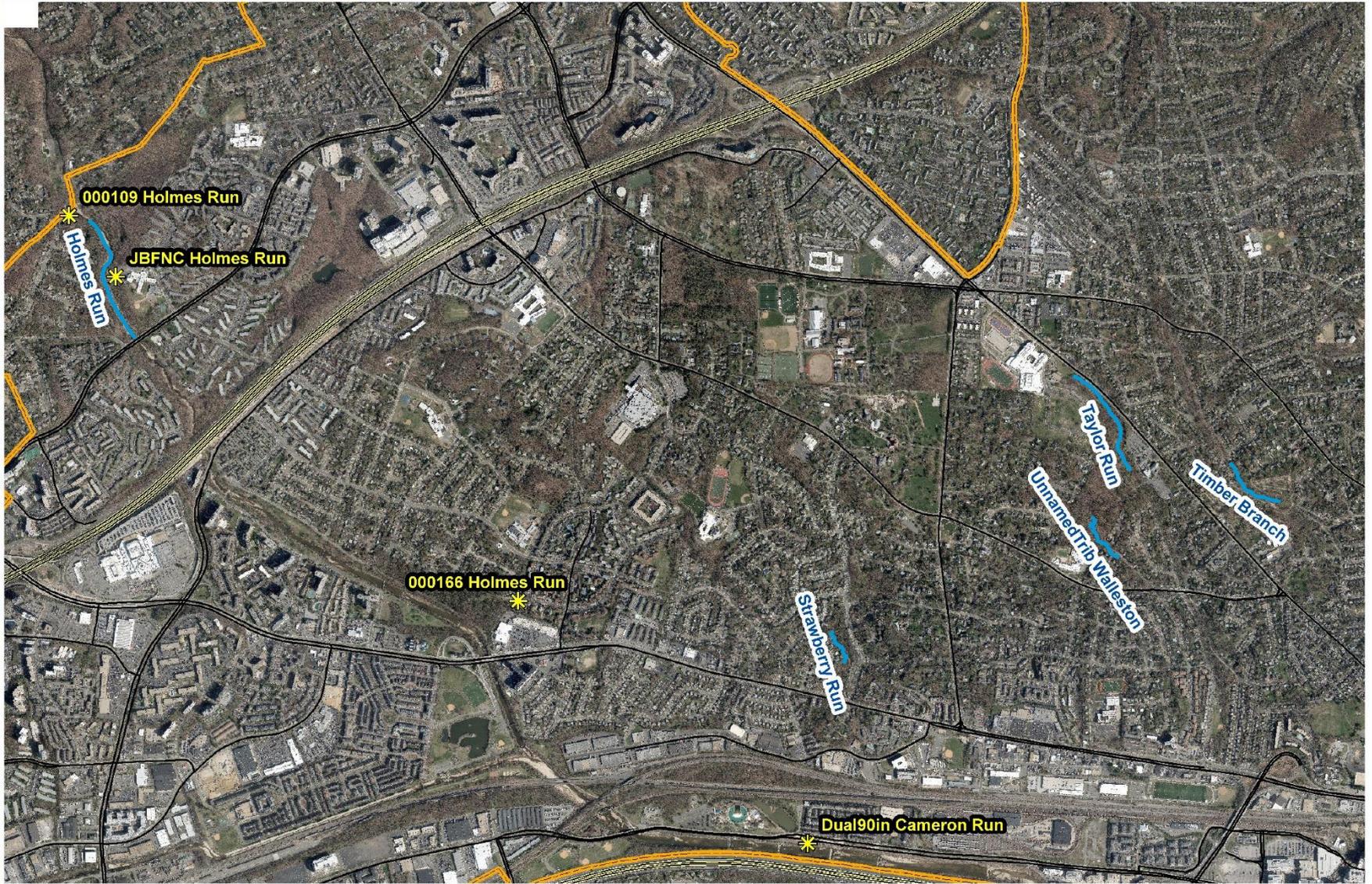
Mapping of streams, defining limits, and stream categorization

Phase II Assessment of Streams

Stream habitat, infrastructure impacts, problem areas, characteristics

Phase III Project Identification

Potential project sites evaluated and ranked. Conceptual designs for top projects.



-  Outfalls_For_Evaluation
-  Streams_For_Evaluation
-  City of Alexandria Boundary

ATTACHMENT 1 POTENTIAL PROJECTS FOR EVALUATION

1 inch = 2,000 feet



Potential Projects – Stream Segments



Unnamed Tributary near Walleston Ct.



Strawberry Run near Taft Avenue



Taylor Run near Chinquapin Park

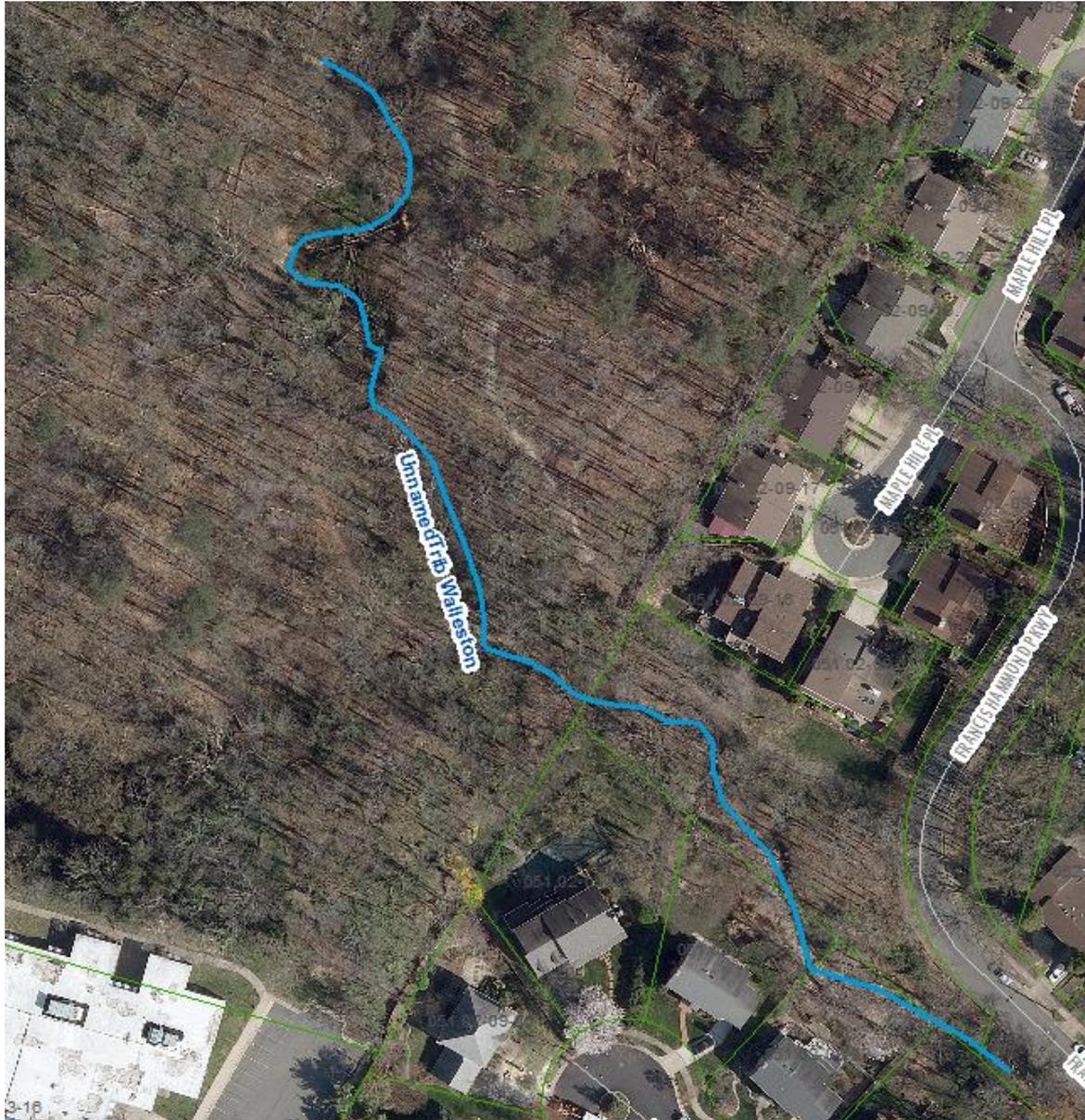


Holmes Run north of N. Beauregard St.

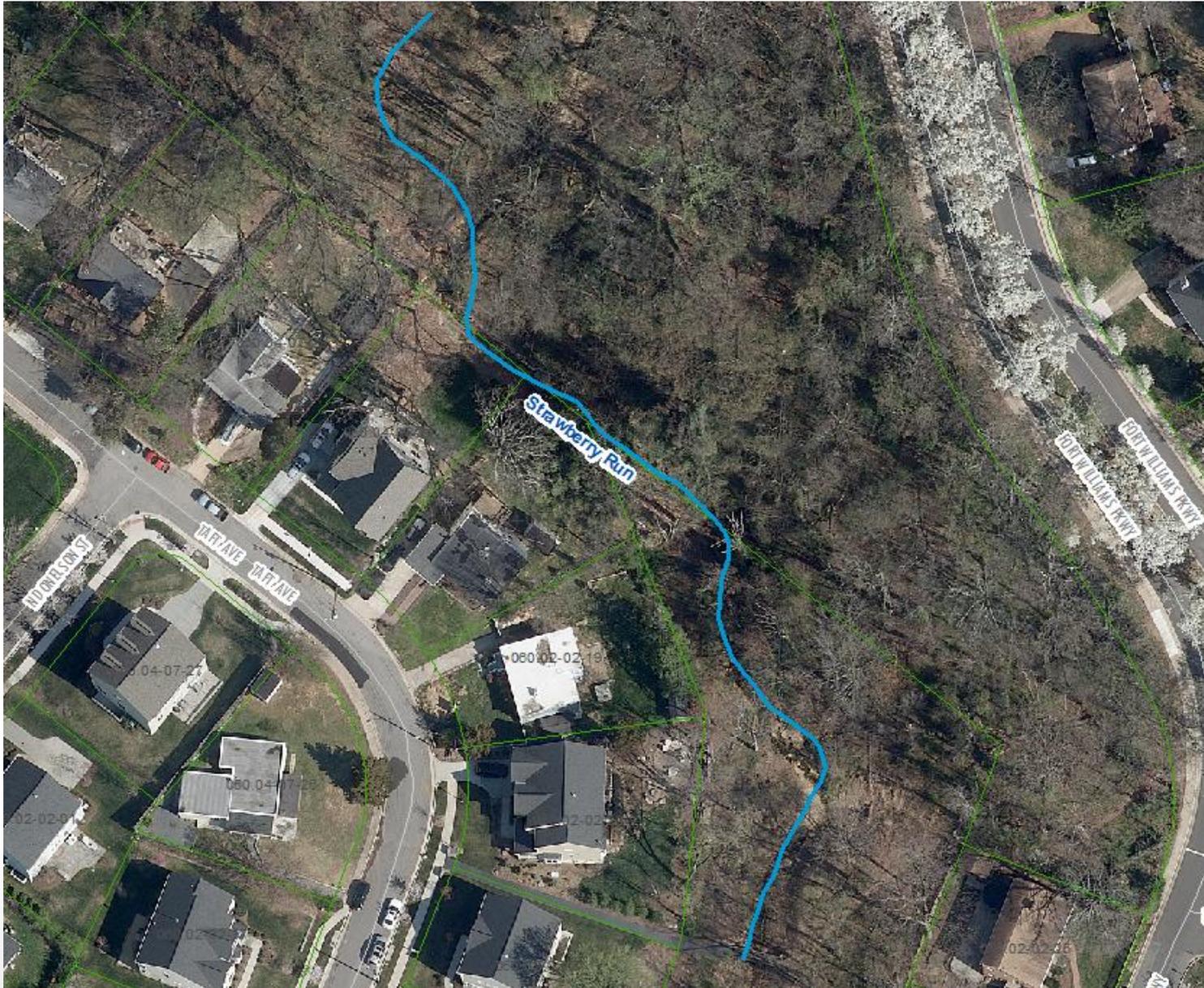


Timber Branch near Ivy Hill Cemetery

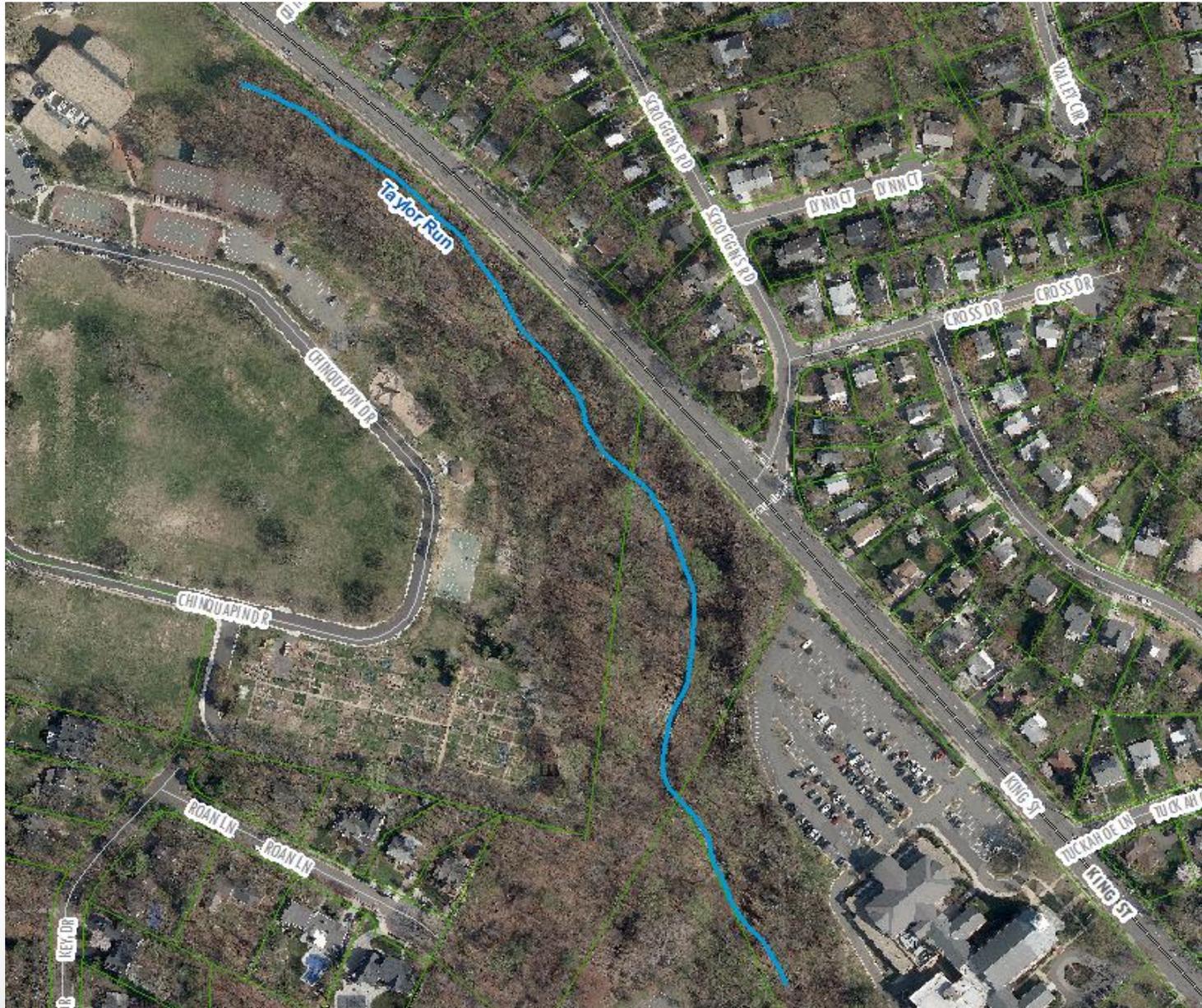
Unnamed Tributary near Walleston Ct.



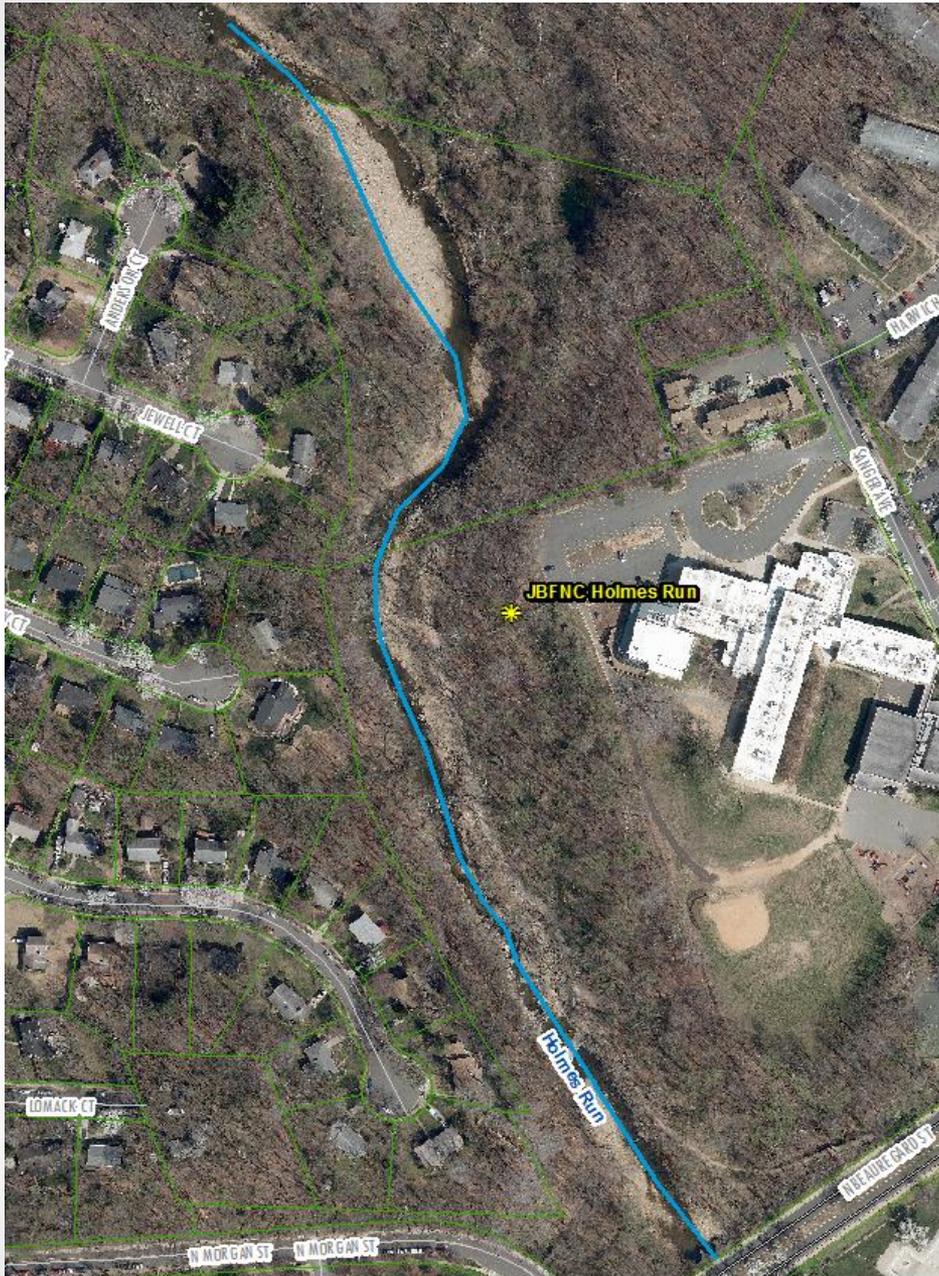
Strawberry Run near Taft Avenue



Taylor Run near Chinguapin Park



Holmes Run north of N. Beauregard St.



Timber Branch near Ivy Hill Cemetery



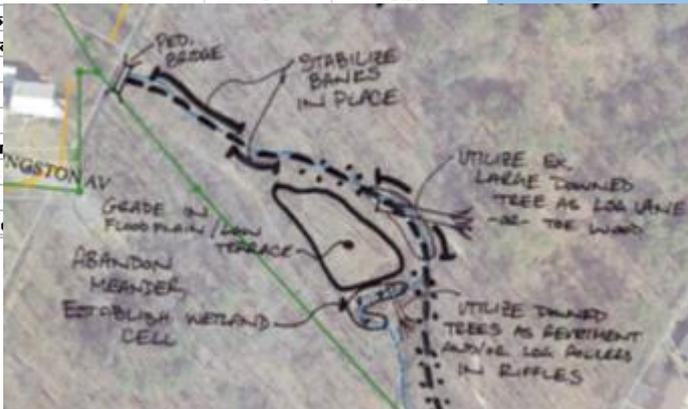
Phase III Stream Assessment



Evaluation of Potential Projects

- Field Assessment
- Recommendations
- Decision Matrix and Priority Ranking

Number	Ranking Criteria	Importance Score 1-10	Normalized Weight	Unnamed Tributary near Walleston Court	Strawberry Run near Taft Avenue	Taylor Run near Chinquapin Park	Holmes Run, north of N. Beauregard St.	Timber Branch near Ivy Hill Cemetery
1	Channel Dimension at Bankfull Cross-Section	7	5.0%	5	5	5	3	5
2	Channel Platform Pattern	7	5.0%	5	5	3	3	5
3	Channel Bed Longitudinal Profile	7	5.0%	3	5	5	3	3
4	Streambank Stability and Protection from Erosion	8	5.8%	3	5	1	1	5
5	Presence of Urbanite	4	2.9%	1	5	5		3
6	Channel Obstructions	4	2.9%	3	5	5		3
7	Riparian Vegetation	2	1.4%	1	5	3		1
8	Presence of desirable fish and wildlife	3	2.2%	1	3	3		1
9	Environmentally Sensitive Areas	4	2.9%	5	3	3		3
10	Impacts to Trees	5	3.6%	1	3	1		1
11	Construction Access	8	5.8%	5	1	3		3
12	Property Ownership	9	6.5%	1	1	3		1
13	Utility Conflicts	5	3.6%	5	5	1		3
14	Stakeholders	9	6.5%	1	3	3		1
15	Historically Sensitive Areas				1	3		3
16	Public Education and Outreach				1	5		1
17	Recreation Potential				3	3		3
18	Infrastructure at Risk				1	3		1
19	Public Safety Concerns				3	5		1
20	Associated Infrastructure Projects				1	5		3
21	Cost per lb. of Phosphorus				3	1		3
22	Cost per lb. of Phosphorus				3	1		5
23	MS4 Draining to Project Site				5	5		5



Strawberry Run



Strawberry Run



Strawberry Run



Strawberry Run



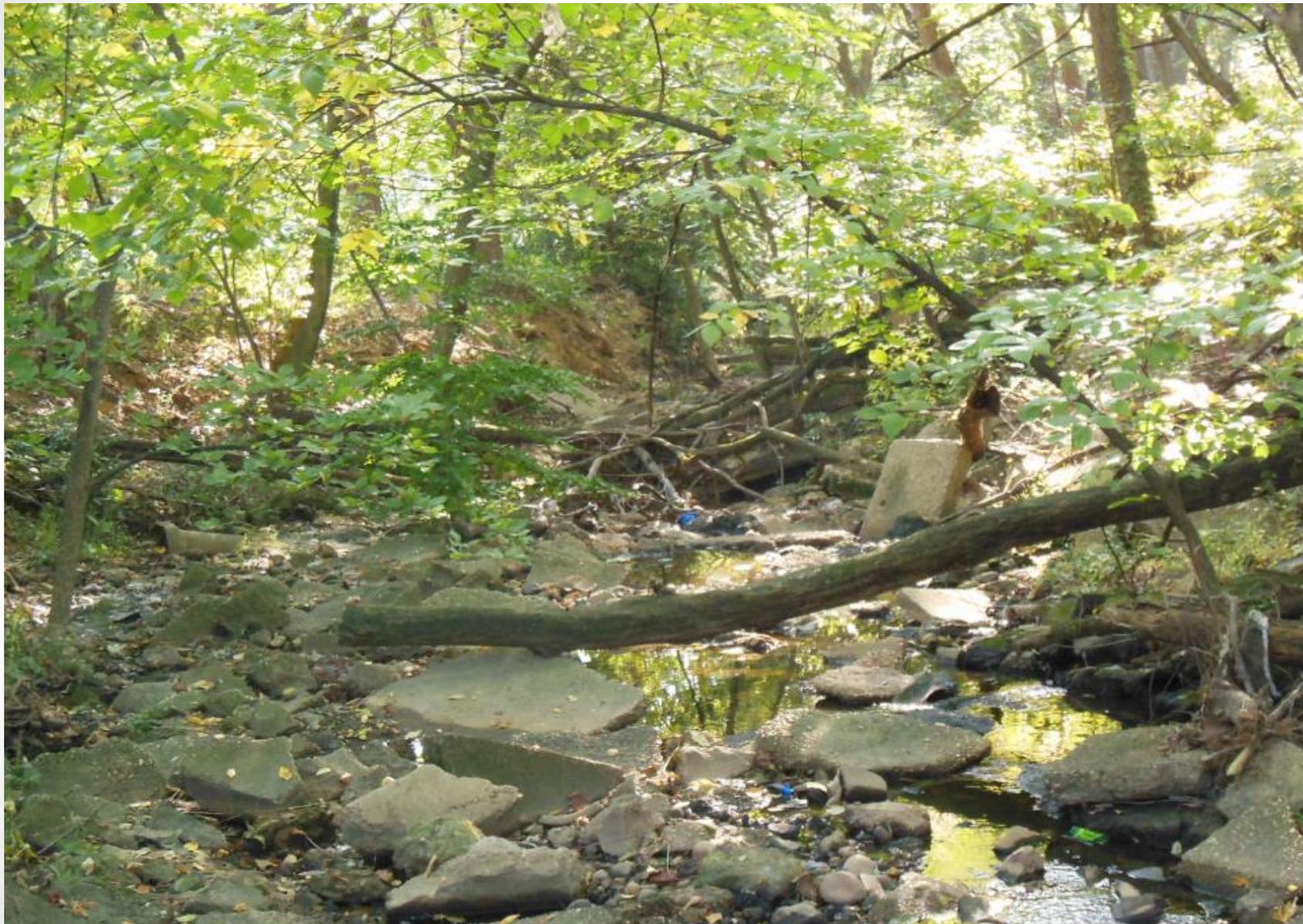
Strawberry Run



Taylor Run



Taylor Run



Taylor Run



Taylor Run

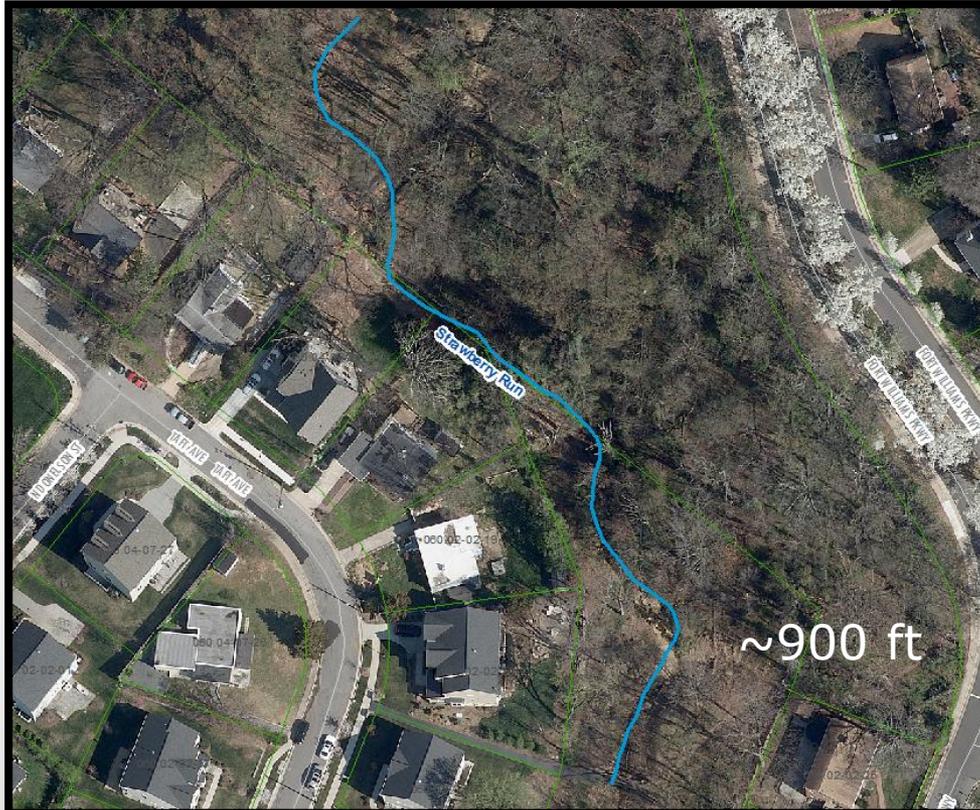


Phase III Stream Assessment



Conceptual Designs and Cost Estimates

- Conceptual Designs
- Using Natural Channel Design (NCD) which emulates natural river systems
- Planning Level Cost Estimates



Natural Channel Design



Riffle



Step-Pools

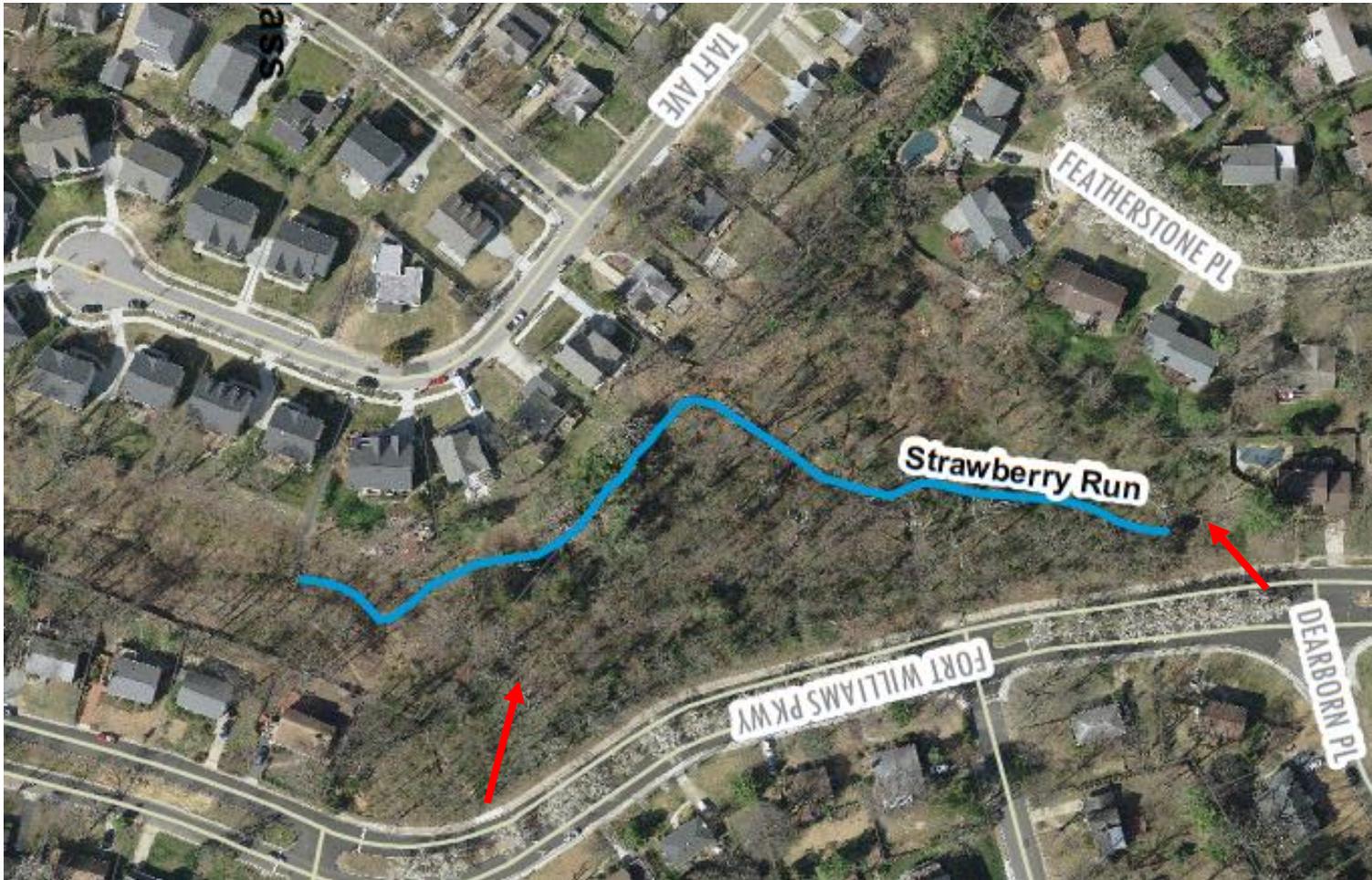


Cascade



Log Vane

Feasibility



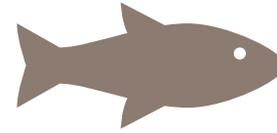
Potential Construction Access



Benefits



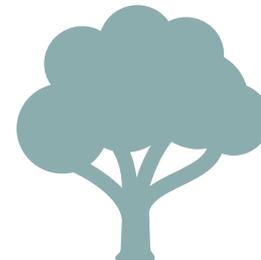
Habitat



Water
Quality



Native
Vegetation



Aesthetics

Strawberry Run – Downstream Project



Before

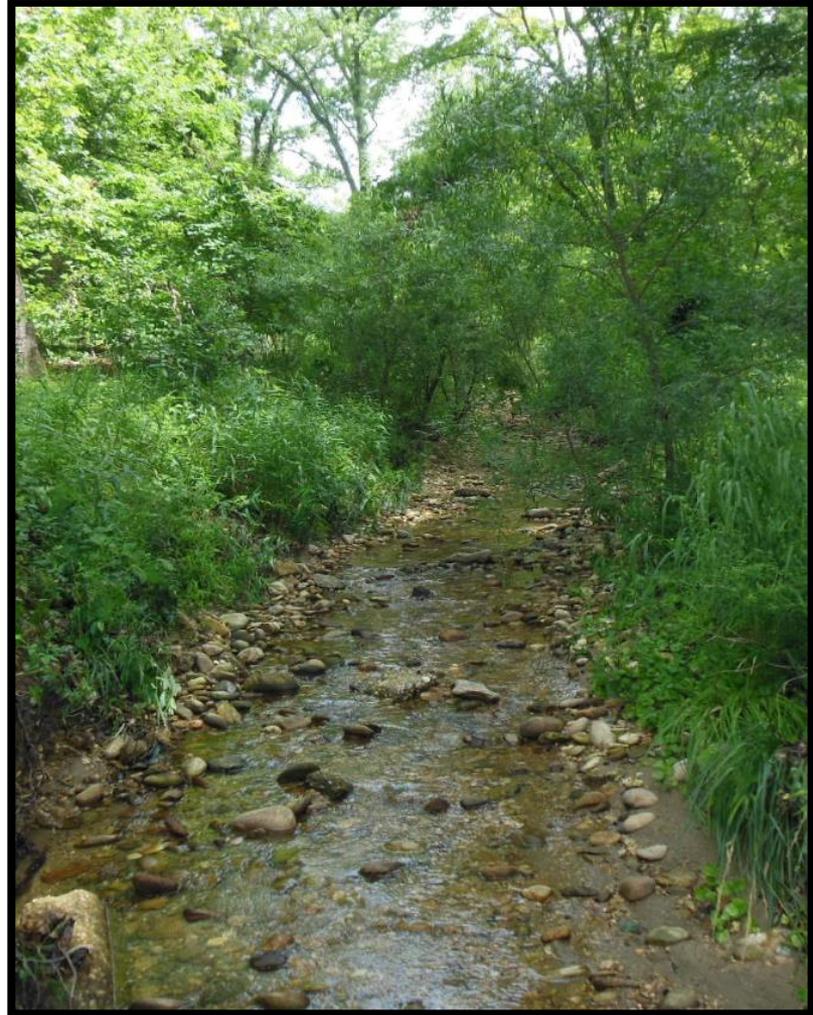


After

Strawberry Run – Downstream Project



Before

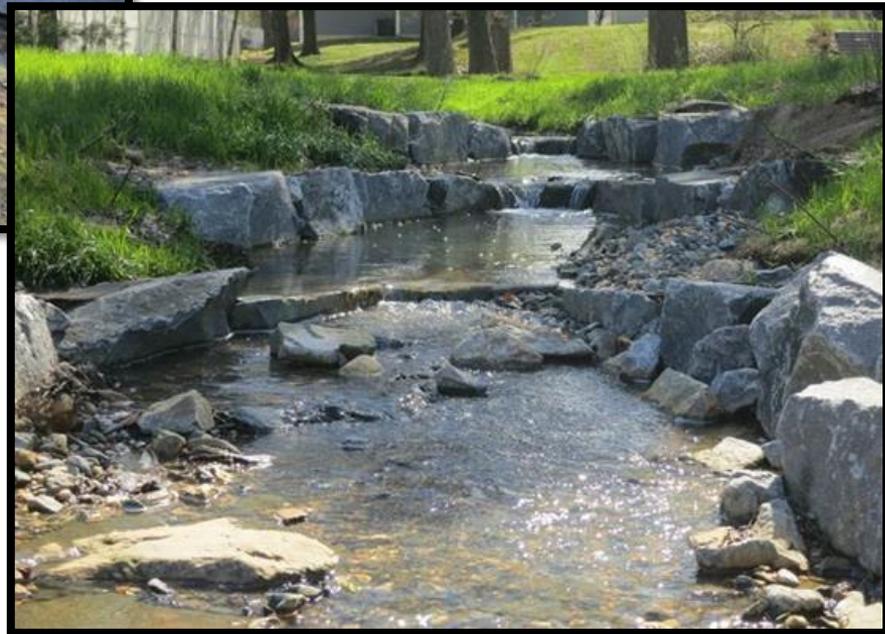


After

Joint Base Andrews



Before



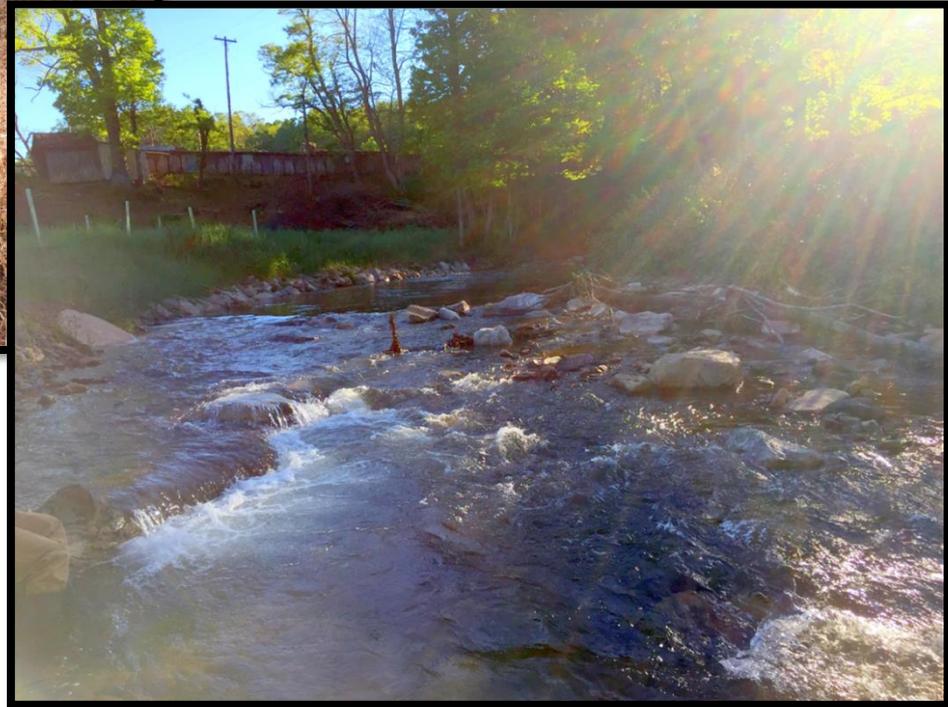
After

Courtesy of Wood Environment & Infrastructure Solutions

Cullers Run



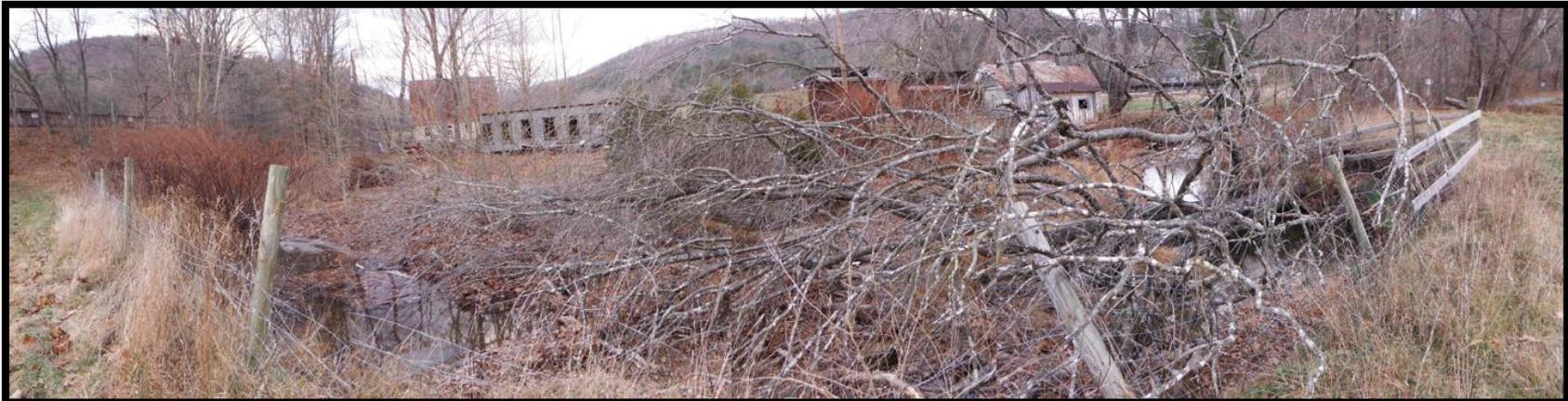
Before



After

Courtesy of Wood Environment & Infrastructure Solutions

Cullers Run



Courtesy of Wood Environment & Infrastructure Solutions

North Mill Creek



Before



After

Courtesy of Wood Environment & Infrastructure Solutions

Big Rocky Run



Before



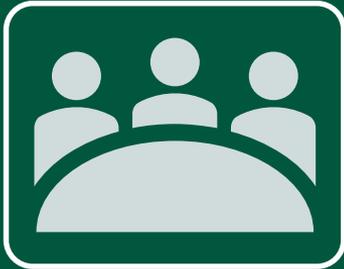
After

Courtesy of Wood Environment & Infrastructure Solutions

Habitat...



Next Steps & What To Expect



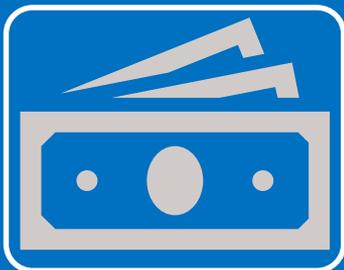
Outreach

- Public and Stakeholder Outreach
- Consider feedback in designs
- More outreach...



Finalize Phase III Stream Assessment

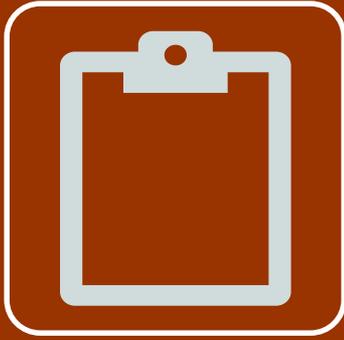
- Outfall Conceptual Designs – Dec. 2018
- Report – January 2019



Funding

- Applied for matching 50/50 state grants

Next Steps & What To Expect



Continue with Design

(may depend on grant funding)

- 30%, 60%, 90%, Final
- Topographic survey
- Tree survey
- Refine designs



City Contact Information

Joni Calmbacher, PE

Stormwater Management Division
Transportation & Environmental Services

City of Alexandria, VA

703.746.4174

Joni.Calmbacher@alexandriava.gov

Brian Meli, PE

Department of Project Implementation

City of Alexandria, VA

703.746.4110

Brian.Meli@alexandriava.gov

