

# NARROW GAUGE CREEK INSPECTION

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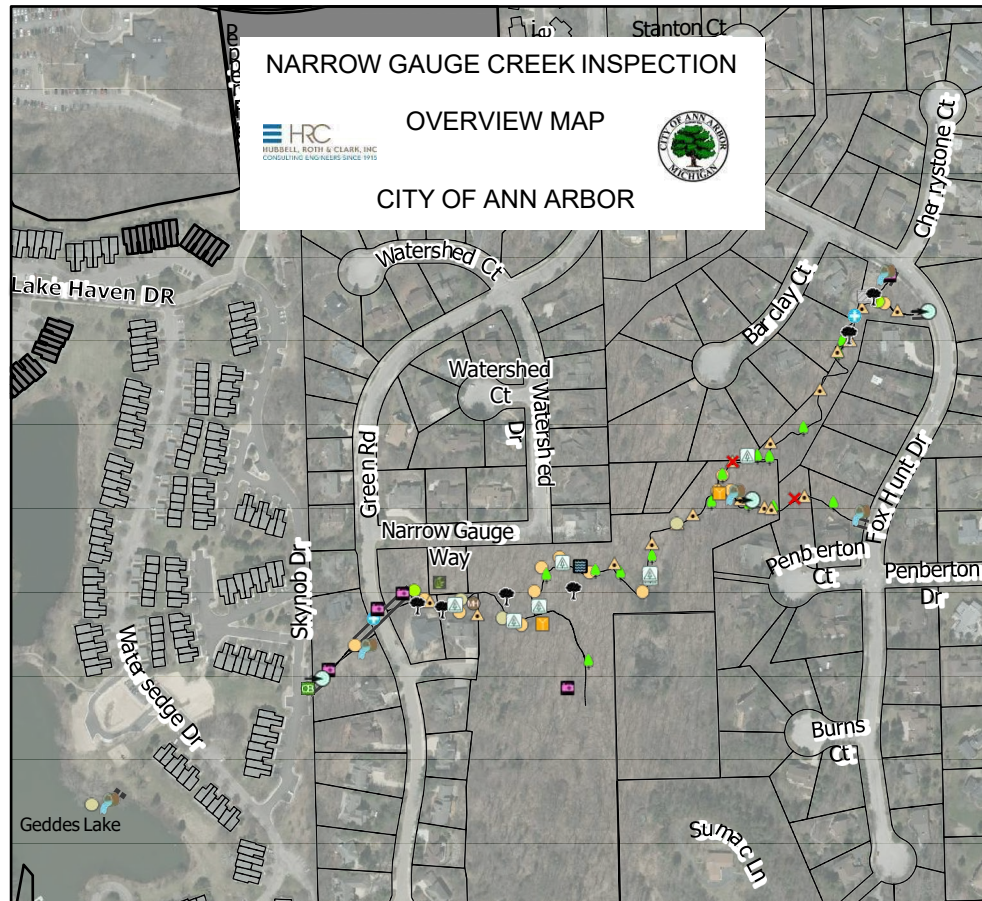
Prepared By: Hubbell, Roth & Clark  
September 2024



ANN ARBOR  
**WATER**

## Why Are We Here?

- Over the years, City staff has received complaints regarding flooding/standing water in the backyards at 645/665 Green Road.
- It was determined that this area is the stormwater detention area for the neighborhood.
- Concerns regarding sediment from the City-owned parcels at 3468/3478 Narrow Gauge Way.
- Opened a larger question of the sedimentation from upstream, and what could be done.
- City worked with a consultant to complete a drainage analysis of the upstream area.



| Legend               |                     |                         |                       |                            |
|----------------------|---------------------|-------------------------|-----------------------|----------------------------|
| Misc Line            | Catch Basin         | Side Drain              | Constructed Bank      | Beaver Activity            |
| Survey Control Point | Water Main          | Riffle                  | Bridge Crossing       | Barrier                    |
| Vegetative Debris    | Water Main Manhole  | Invasive Species Clump  | Excessive Vegetation  | Bank Erosion               |
| Electric             | Fiber Optics        | General Condition Photo | Fallen Tree           | Log Jam                    |
| Gas                  | Petroleum Pipeline  | Field Tile Outlet       | Sediment              | Agricultural Flooding      |
| Phone                | Other               | Existing Building       | Non-Vegetative Debris | Invasive Species Perimeter |
| Sanitary Sewer       | User Access         | Tree                    | Other                 | Drain Centerline           |
| Sanitary Manhole     | Surface Outlet Pipe | Dead Tree               |                       | Storm Pipes                |
| Storm Sewer          | Surface Inlet Pipe  | Culvert Crossing        |                       | TaxParcels                 |
| Storm Manhole        |                     |                         |                       |                            |

|        |                   |  |   |          |            |
|--------|-------------------|--|---|----------|------------|
| CLIENT | City of Ann Arbor | <br><b>HUBBELL, ROTH &amp; CLARK, INC</b><br>CONSULTING ENGINEERS SINCE 1915 | 555 Hulet Drive<br>P.O. Box 824<br>Bloomfield Hills, MI 48303-0824<br>(248) 454-6300<br><a href="http://www.hrcenr.com">http://www.hrcenr.com</a> | DATE     | 12/21/2022 |
|        | NOT               |  |   |          | SCALE:     |
|        |                   |  | SHEET #:  | Overview |            |
|        |                   |  | JOB #:  | 20210634 |            |



# NARROW GAUGE CREEK INSPECTIONS

Surface Inlet Pipe 1-5 Inspected November 2022

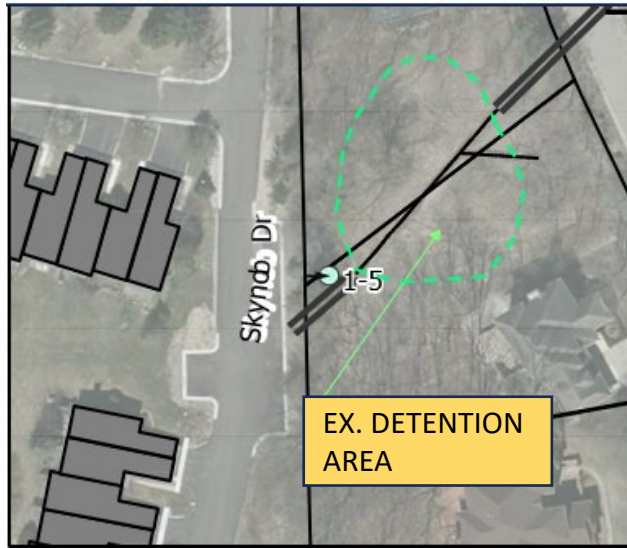


Photo 1 Direction: Facing Downstream



Photo 2 Direction: Facing Downstream

## What is an Outlet Pipe?

- A pipe that collects stormwater run-off from the roads and sidewalks and directs the water flow to a detention basin.
  - Detention basins allows excess sediment and pollutants to settle out before it reenters our water systems.
- Pipes can be made of Metal (CMP), Concrete (RCP), or Plastic (HDPE)
  - The pipe seen in the above photos is made of CMP with a 36-inch diameter.

## Recommendations:

- The pipe is in fair condition, no proposed repairs needed at this time.



Photo 1 Direction: Northeast

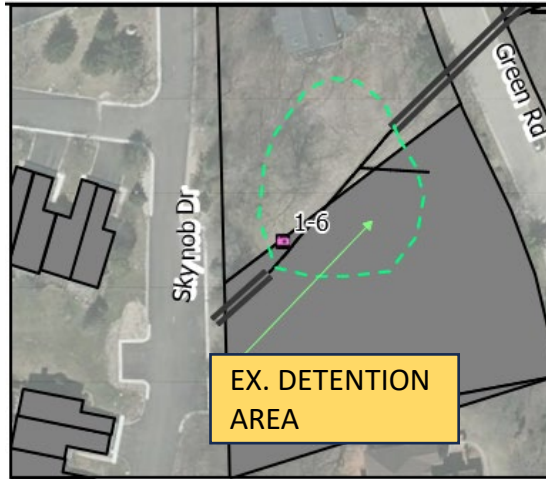


Photo 2: Stone Toe

**What is a Detention Area?**

- Designated space to hold rain during storm events

*Benefits:*

- Flood Control – The area can store stormwater and allows slow drainage either through an outlet pipe or the ground to prevent erosion
- Improves Water Quality – pollutants settle at the bottom of the basin before the water flow continues to other areas.

*Types:*

- Dry – No permanent pool of water and is meant to completely drain between storms.
- Wet – Permanent pool of water that does not completely drain.

The above photos show an existing dry detention area that contains 4' stone lined on the bottom of the creek.

Stabilization methods are put in place with straw blankets in this area.

- Stabilization helps prevent erosion and support plant growth to maintain the basin's functionality for longer.
- Once the straw blankets decompose, the plants can begin to take root and form a buffer around the sides of the basin to prevent additional chemical runoff.

**Recommendations:**

- Add Creek Stabilization.



# NARROW GAUGE CREEK INSPECTIONS

Surface Outlet Pipe 1-8 Inspected November 2022

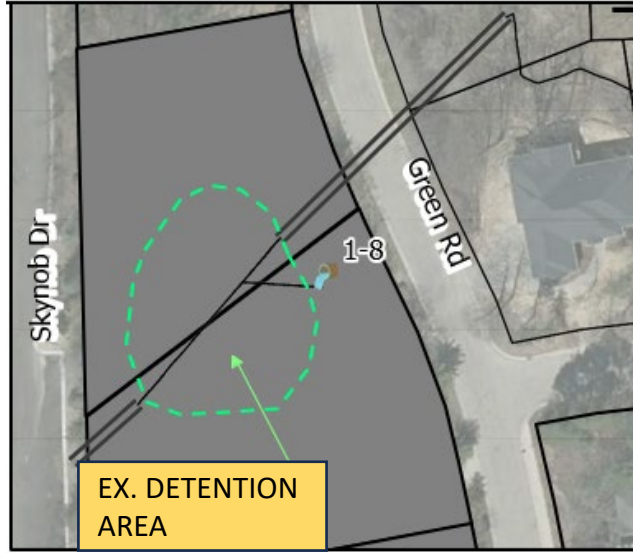


Photo 2 Direction: West



Photo 1 Direction: Northwest

## Why do inlet/outlet pipes have grates?

- Debris control - The grates help prevent larger objects and debris from going into the pipe so the water can continue to flow freely.

The above photos contain an 18-inch Diameter RCP (Concrete) Outlet Pipe with grates.

## Recommendations:

- None – pipe and gates are in fair condition.



Photo 1 Direction: Facing Upstream

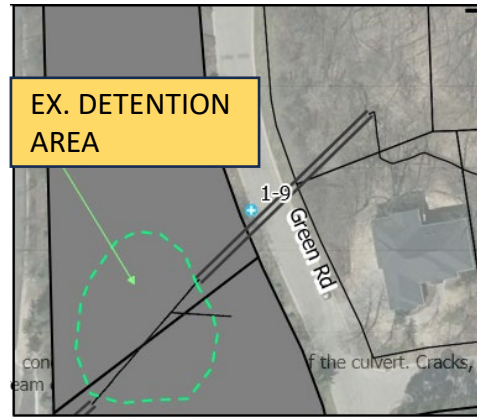


Photo 2 Direction: Facing Upstream

## What is a Culvert Crossing?

- Allows for water to flow under a road or trail to prevent flooding.

### Benefits:

- Drainage – Improves drainage and controls the flow of water through areas with ditches, streams, and stormwater runoff.
- Flood Control – help prevents flooding on roads to protect property, infrastructures, and roadways.

### Materials:

- Concrete, steel, or plastic.

A bituminous top surface contains an asphalt layer for smooth driving over the culvert.

The above photos contain a culvert crossing in severe condition under Green Rd. The crossing is made of a Corrugated Metal Pipe with a bituminous surface (asphalt or tar).

### Severe Condition:

- Cracks
- Breaks
- Rust spots
- Debris buildup upstream

### Recommendations:

- Clean and CCTV culvert
- Based on CCTV investigation, additional measures may be needed



## What are Invasive Species?

- Invasive species are plants that are not native to the area and may pose harm to the surrounding ecosystems.
- Detention Basins are known to possess three main invasive species in Michigan
  - Giant Reed/Phragmites
  - Cattails
  - Reed Canary Grass

### Disadvantages:

- Reduce Flood Storage Capacity – Invasive plants fill detention areas and trap sediment, which decreases the space available in the basin to hold water for flood events.
- Decreases presence of native species – Invasive plants overcrowd the area, resulting in native species decreasing and reducing biodiversity, damaging the natural ecosystems.

Based on the images below:

- *Blockage Type: Invasive Species – Primarily Phragmites*
- *Blockage Diameter: approximately 200 feet*
- *Density: High*

### Recommendations:

- Treat or remove invasive species.

Photo 1 Direction: East

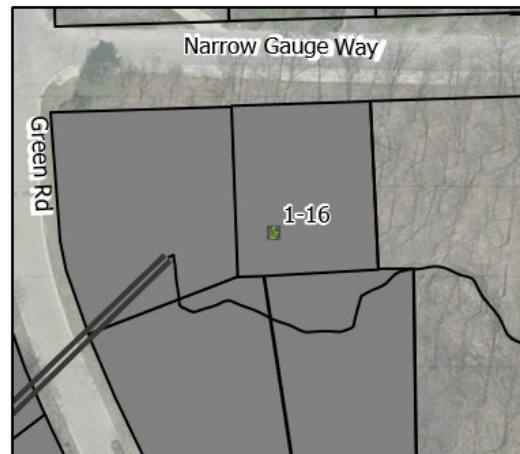


Photo 2 Direction: East





# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-22 Inspected November 2022

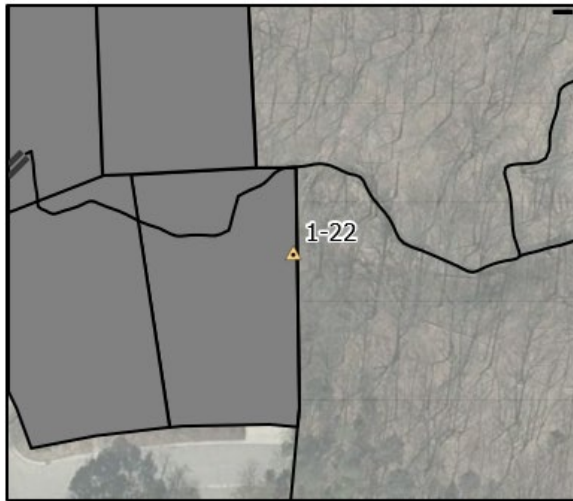


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Log Jam**

- Logs and large rocks obstructing stream route.
- *Blockage Length:* 10 ft located in the center of the creek.
- *Effects of Blockage:*
  - limit space available in the creek for larger rain events which may result in flooding
  - Cause excessive sand and debris build-up upstream of the blockage as the log slows down the speed at which water flows.

**Recommendations:** Remove log jam



# NARROW GAUGE CREEK INSPECTIONS

Bank Erosion 1-26 Inspected November 2022

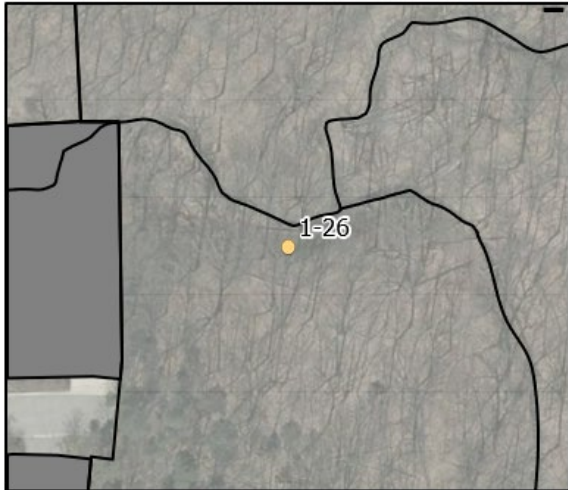


Photo 1 Direction: Facing Upstream



Photo 2: Wattle Logs



Photo 3: Wood Wattles

## What is Erosion?

- Materials, such as rocks and soil, are worn away and moved over time by water and wind.

### *Disadvantaged:*

- Buildup of Sediment – prevents streams from flowing smoothly which could cause flooding.
- Decreases nutrients in the soil affecting vegetation

The above photos show erosion in the creek.

- Length: 60ft on the right side.

## Recommendations:

- Stabilize slope and banks of creek utilizing vegetation and soft armor techniques such as dogwood wattles.



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-29 Inspected November 2022

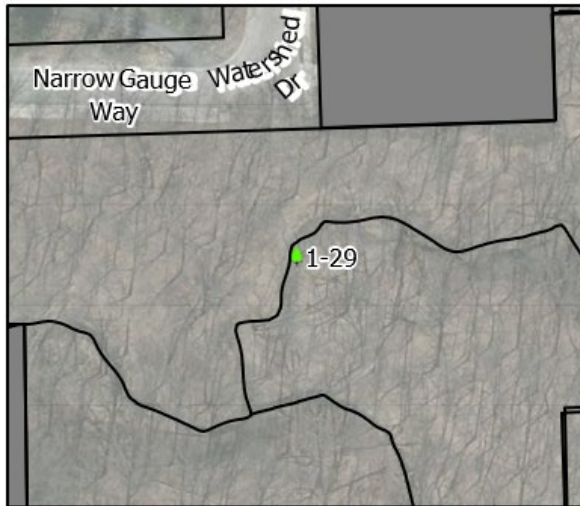


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Fallen Tree**

- *Blockage Length:* 50 ft
- *Effects of Blockage:*
  - Water flow – May obstruct water flow and may alter flow patterns, resulting in less space available in the basin to hold stormwater.
  - Water Quality – Trees introduce organic matter from leaves and branches which affects the water quality.
    - Decomposing trees may also release nutrients which affects the oxygen levels in the water.
  - Maintenance Challenges – Needs to be removed to prevent clogs in outlet pipes

**Recommendation:** Remove dead wood



# NARROW GAUGE CREEK INSPECTIONS

Riffle 1-34 Inspected November 2022

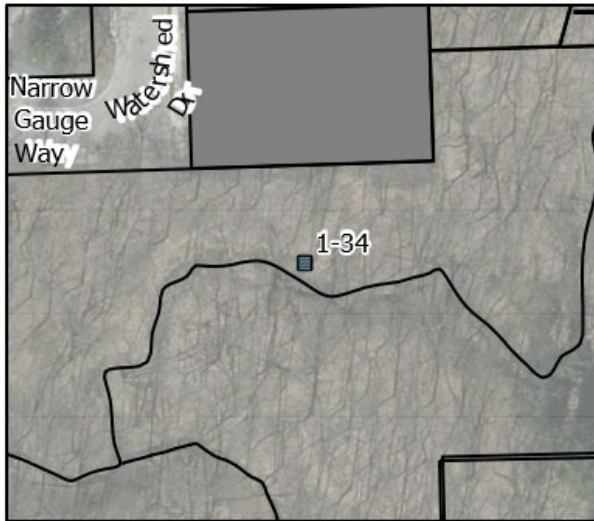


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Large rocks**

- *Effects of Blockage:*
  - Water flow – May obstruct water flow and may alter flow patterns, resulting in less space available in the creek to hold stormwater.
  - Water Quality – Despite rocks being a good natural filtration process, large rocks spaced further apart provide no benefits to filtering out pollutants and sedimentation.

## **Recommendation:**

- Leave area in current state as rock slow more intense storm water events.



# NARROW GAUGE CREEK INSPECTIONS

Bank Erosion 1-35 Inspected November 2022

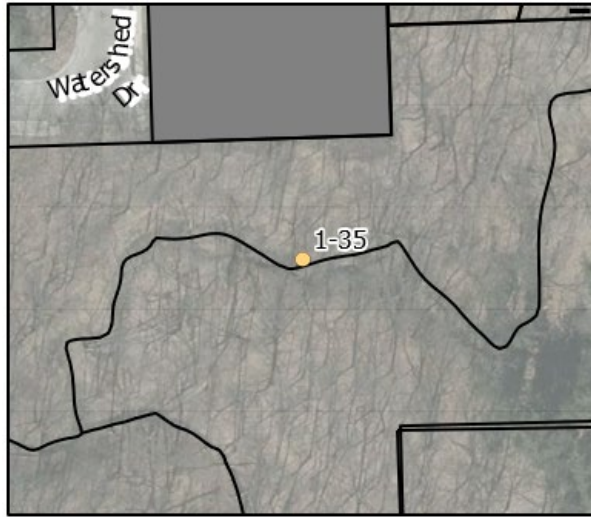


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## Severity of Erosion?

### *Erosion Indicators:*

- Sediment accumulation – excessive sand or silt at the bottom of the creek
- Condition – Steep banks with cracks in soil on side slopes

The above photos show approx. 150 ft of bank erosion located on both sides of the creek.

- The right side (photo 1) contains more severe erosion

## Recommendations:

- Stabilize slope and banks of creek utilizing vegetation and soft armor techniques such as stakes dogwood wattles



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-37 Inspected November 2022

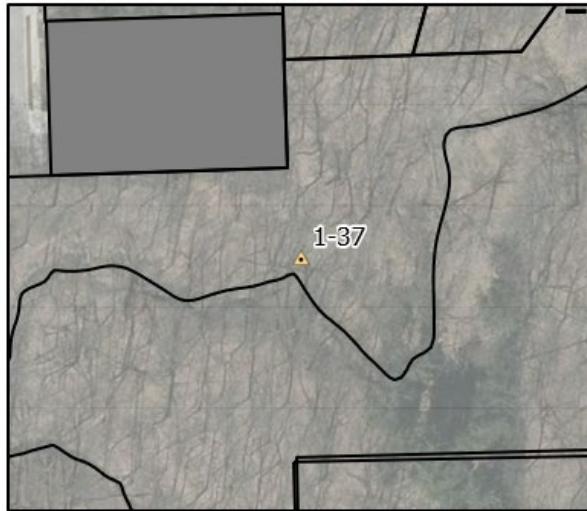


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Log Jam**

- Logs and large rocks obstructing stream route.
- *Blockage Length:* 10 ft located in the center of the creek.
- *Effects of Blockage:*
  - Approx. 10 ft long log jam causing heavy sediment buildup.

## **Recommendations:**

- Remove log jam.



# NARROW GAUGE CREEK INSPECTIONS

Bank Erosion 1-39 Inspected November 2022



Photo 1 Direction: Facing Upstream

## Effects of Erosion:

- Unstable sides- Creek may be more prone to collapse.

The above photos show approx. 200 ft of bank erosion on both sides of the creek.

## Recommendations:

- Stabilize slope and banks of creek utilizing vegetation and soft armor techniques such as dogwood wattles.



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-43 Inspected November 2022



Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Log Jam**

- Large log jam across the whole stream channel
- *Blockage Length:* 15 ft located in the center of the creek.
- *Debris Length:* 20 ft
- *Effects of Blockage:*
  - Limits space available in the creek for larger rain events which may result in flooding
  - Cause excessive sand and debris build up upstream of the blockage as the log slows down the speed at which water flows.

## **Recommendations:**

- Remove log jam



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-44 Inspected November 2022

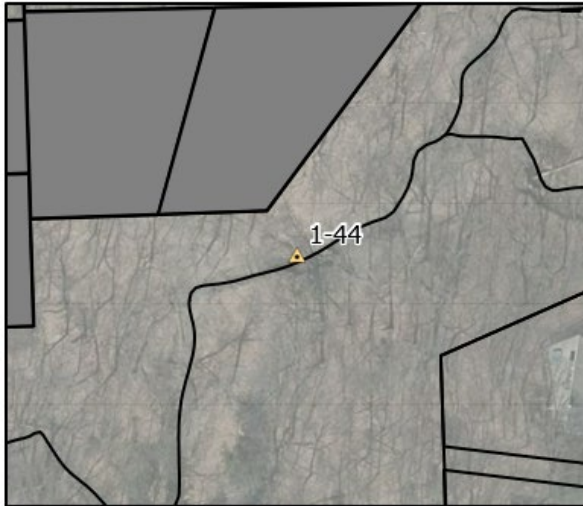


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Log Jam**

- *Blockage Length:* 15 ft located on both sides of the creek.
- *Effects of Blockage:*
  - limit space available in creek for larger rain events which may result in flooding
  - Cause excessive sand and debris build up upstream of the blockage as the log slows down the speed at which water flows.

## **Recommendations:**

- Remove log jam

# NARROW GAUGE CREEK INSPECTIONS

Bank Erosion 1-45 Inspected November 2022

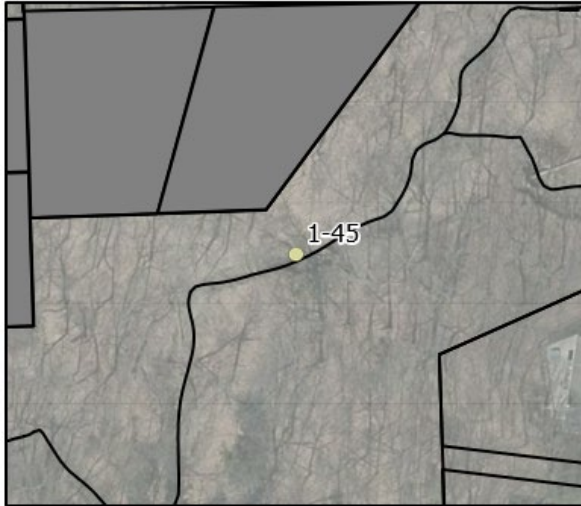


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## Erosion:

- Occurs due to moving water in rivers or streams
- Can be accelerated due to severe storm events
- Is reduced by protecting vulnerable soils

The above photos show severe bank erosion on both sides of the creek downstream to Wye.

## Recommendations:

- Provide bank stabilization. Potentially install a cross vane to direct flow away from the bank.



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-46 Inspected November 2022

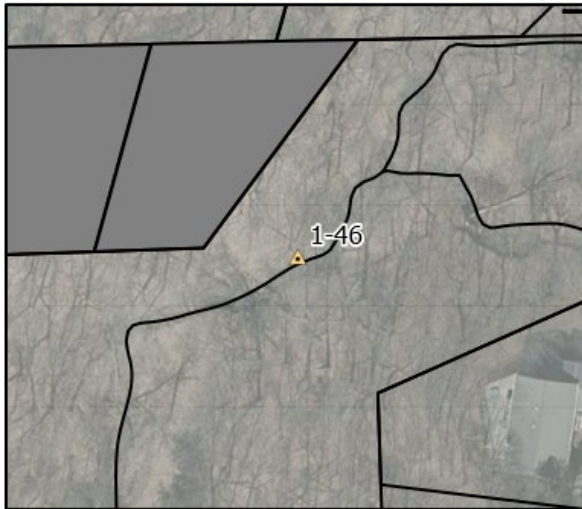


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Log Jam**

- *Blockage Length:* 5 ft located in the center of the creek.
- *Effects of Blockage:*
  - Sediment build-up directly behind logs

## **Recommendations:**

- Remove log jam



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-47 Inspected November 2022

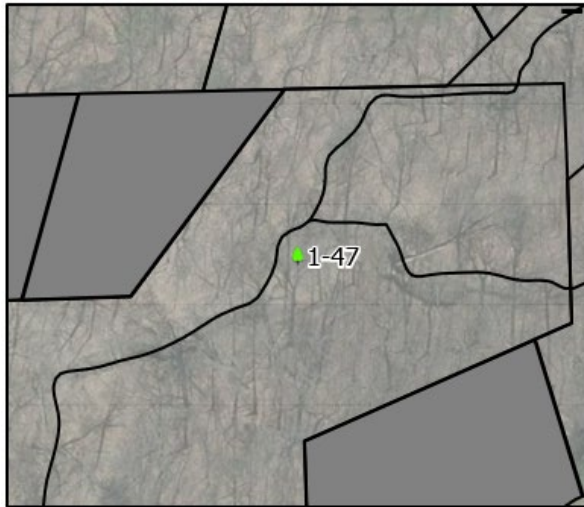


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Fallen Tree**

- *Location:* Center of Creek, across converging streams

## **What are Converging Streams?**

- The point where two separate watercourses meet and merge together.
- This creates a large river

## **Recommendations:**

- Leave area in current state as fallen trees and rocks are reducing/slowing erosion



# NARROW GAUGE CREEK INSPECTIONS

Bank Erosion 1-48 Inspected November 2022

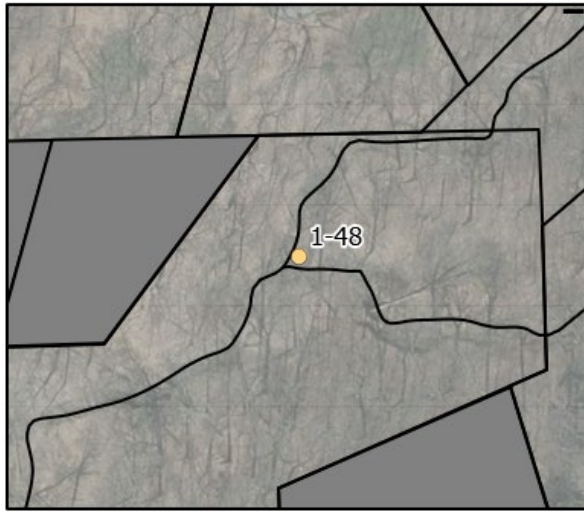


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## Erosion Indicators:

- Sediment accumulation – excessive sand or silt at the bottom of the creek
- Condition – Steep banks with cracks in soil on side slopes

The above photos shows severe bank erosion on both sides of the creek.

## Recommendations:

- Stabilize slope and banks of creek utilizing vegetation and soft armor techniques.



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-40 Inspected November 2022

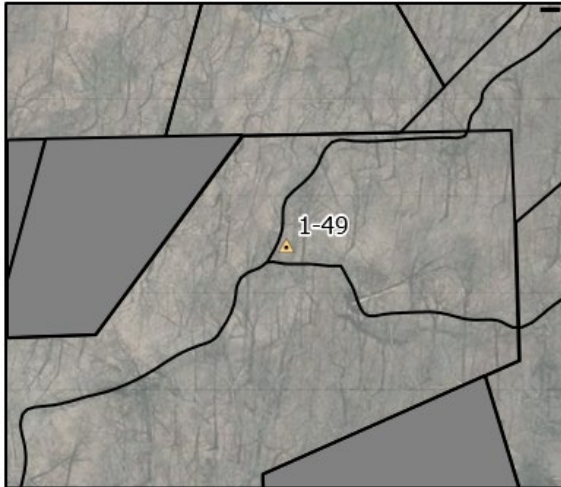


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Log Jam**

- Logs and large rocks obstructing stream route.
- *Blockage Length:* 50 ft located in the center of the creek.
- *Effects of Blockage:*
  - Log jam across the creek with large rocks and sediment build up.
  - Sediment build-up located behind logs and rocks

## **Recommendations:**

- Remove log jam



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-50 Inspected November 2022

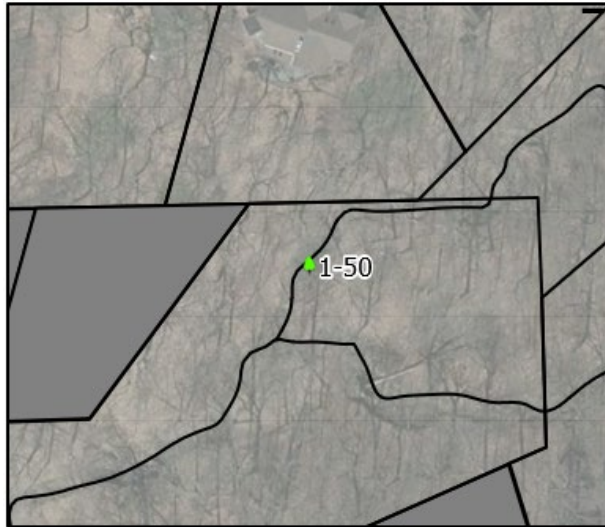


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Fallen Tree**

- Across creek and drain
- *Debris Length: 5 ft on both sides of creek*

## **Recommendations:**

- Removal dead wood



# NARROW GAUGE CREEK INSPECTIONS

Bank Erosion 1-51 Inspected November 2022

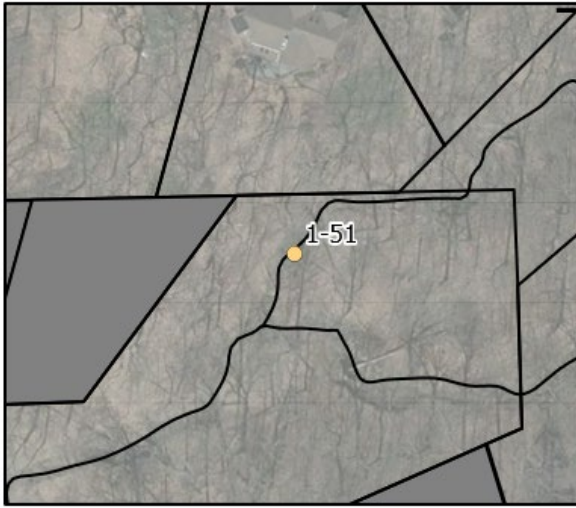


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Bank Erosion:**

- Materials, such as rocks and soil, are worn away and moved over time by water and wind causing a buildup of sediment and decreases nutrients in the soil effecting vegetation

The above photos show erosion in the creek.

- Length: 150ft on both sides

## **Recommendations:**

- Stabilize slope and banks of creek utilizing vegetation and soft armor techniques such as dogwood wattles.



# NARROW GAUGE CREEK INSPECTIONS

Utility 1-52 Inspected November 2022

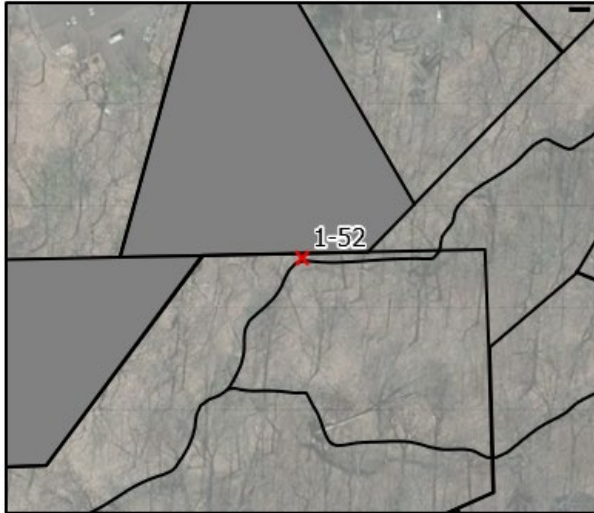


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

The following images show a fence that is approx. 5 ft above the bottom of the creek.

### Benefits of having a safety fence:

- Security and safety – Prevent unauthorized access to the area and reduces the risk of harm from potential hazardous
  - Hazardous can include the steep side slopes or deep waters
- Maintenance and Debris Control – Help to protect the area from trash and other pollutants that may need to be regularly cleaned.

### Recommendations:

- Remove existing fencing and install natural barrier.



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-53 Inspected November 2022

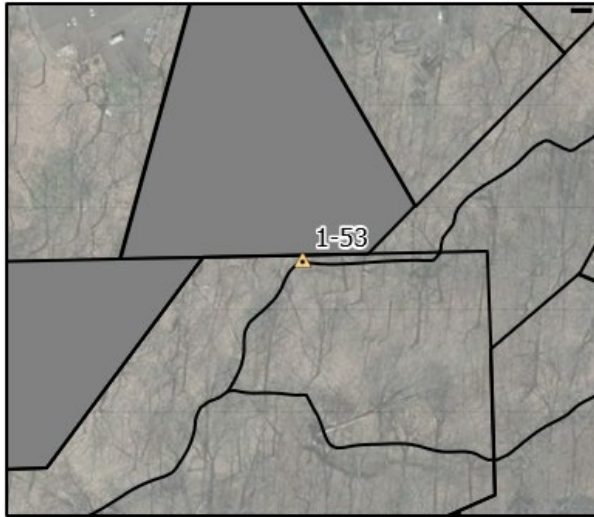


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Log Jam**

- Logs obstructing stream route across creek
- *Blockage Length:* 10 ft located in the center of the creek.
- *Debris Length:* 10 ft
- *Effects of Blockage:*
  - limit space available in the creek for larger rain events which may result in flooding
  - Cause excessive sand and debris build-up upstream of the blockage as the log slows down the speed at which water flows.

## **Recommendations:**

- Remove log jam



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-58 Inspected November 2022



Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Multiple Fallen Trees**

- *Blockage Length: 50 ft*
- *Effects of Blockage:*
  - Water flow
  - Water Quality
  - Maintenance Challenges

## **Recommendations:**

- Remove dead wood



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-59 Inspected November 2022

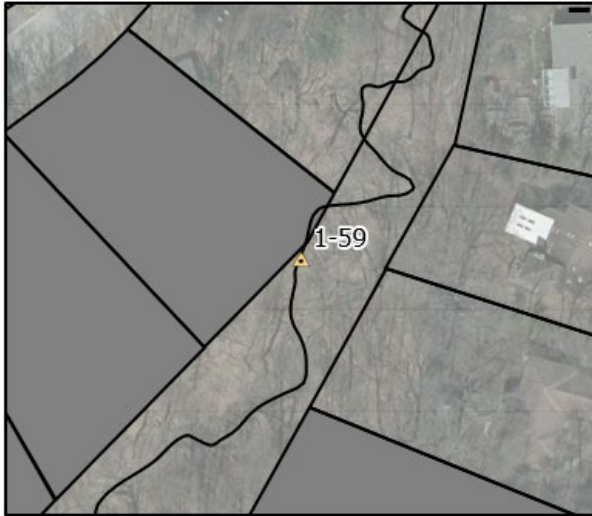


Photo 2 Direction: Facing Downstream



Photo 1 Direction: Facing Upstream

## Blockage Type: Log Jam

- Logs obstructing stream route.
- *Blockage Length:* 30 ft located on both sides of the creek.
- Effects of Blockage:
  - limit space available in the creek for larger rain events which may result in flooding
  - Cause excessive sand and debris build-up upstream of the blockage as the log slows down the speed at which water flows.

## **Recommendations:**

- Remove log jam



# NARROW GAUGE CREEK INSPECTIONS

Blockage 1-63 Inspected November 2022

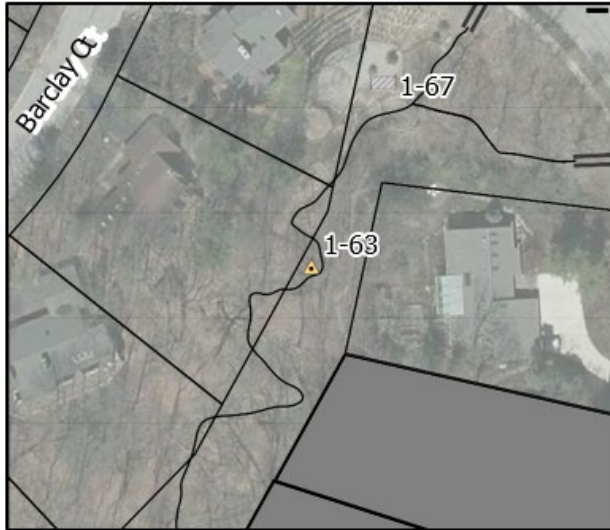


Photo 2 Direction: Facing Upstream



Photo 1 Direction: Facing Upstream

## **Blockage Type: Log Jam**

- Logs obstructing stream route and collecting dead vegetation
- *Blockage Length:* 50 ft located on the right side of the creek.
- *Effects of Blockage:*
  - limit space available in the creek for larger rain events which may result in flooding
  - Cause excessive sand and debris build-up upstream of the blockage as the log slows down the speed at which water flows.

## **Recommendations:**

- Remove log jam

### **City Responsibility**

- Evaluate removal of sediment from parcels on Narrow Gauge Way.
- Work with NAP for woody debris management.
- Work with NAP for low-impact streambank stabilization.

### **Private Responsibility**

- Inspect the private culvert under Green Road.
- Maintain detention basin.
- Riparian/adjacent property responsibilities.

# QUESTIONS?