# Becker Pond Dam Removal Sediment Monitoring Plan

**SUBMITTED TO**
The Nature Conservancy
In support of the 401 WQC Permit Application

**February 2024**

# Becker Pond Dam Removal
# Sediment Monitoring Plan

**SUBMITTED TO**

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**February 2024**

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# 1. Introduction

The Becker Pond Dam is located on an unnamed brook in the town of Mount Washington, Massachusetts. Mount Washington is located in the remote southwestern corner of the Commonwealth (Figure 1). The unnamed brook flows in and out of Becker Pond, through Sages Ravine, to Schenob Brook, a tributary to the Housatonic River. The dam and surrounding property are part of the 1500-acre Mount Plantain Preserve, owned by The Nature Conservancy (TNC), and accessible via East Street. The TNC property is used by the public for hunting, fishing, and other recreational activities.

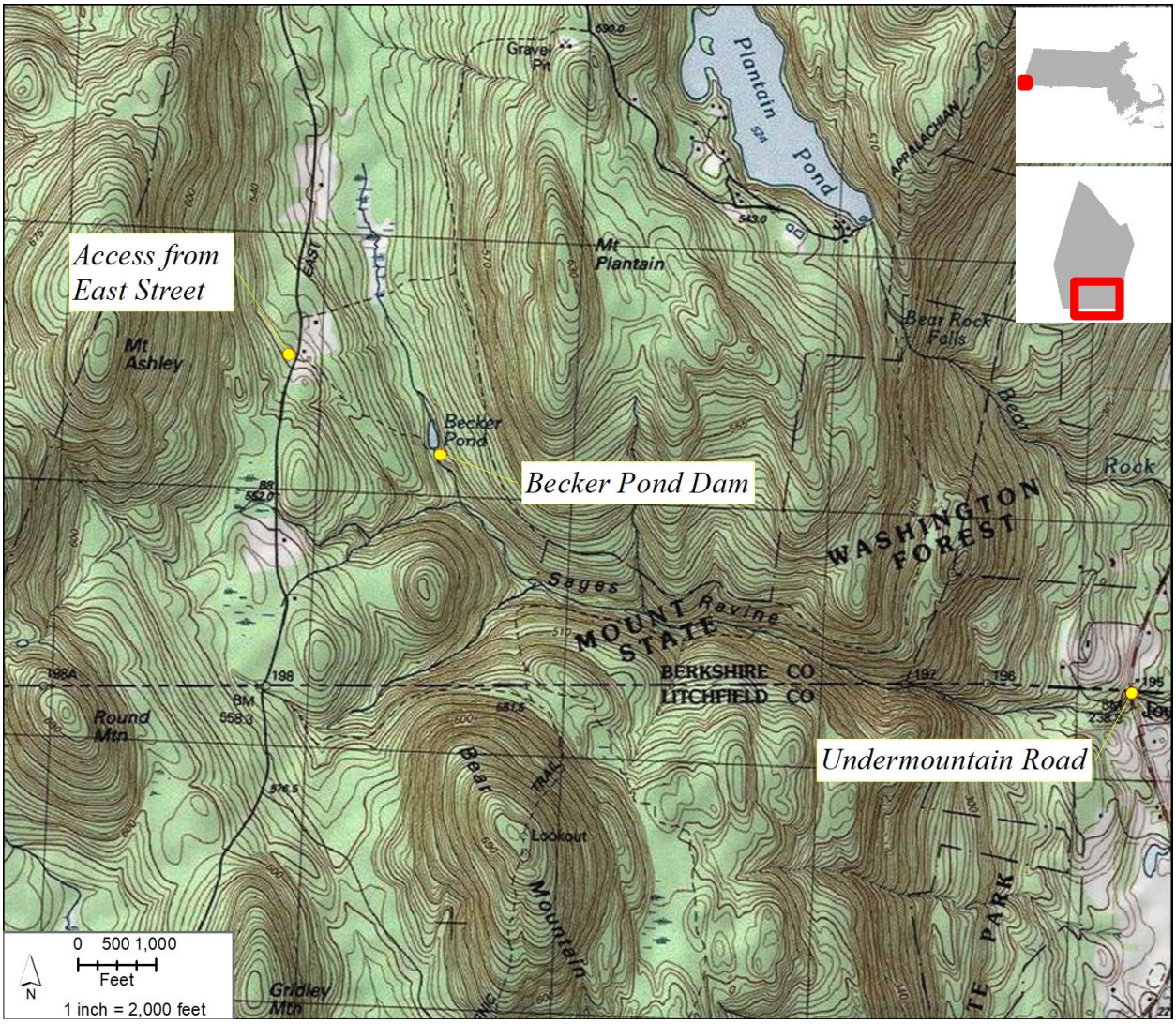



***Figure 1. Becker Pond Dam Locus Map.***

Becker Pond Dam is a 95-foot-long earthen embankment with a concrete core wall (see Cover Photo). The dam height is 14.3 feet. The primary spillway is a rectangular weir with a concrete apron and concrete training walls; it is set approximately 2.25 feet below the crest of the dam. The dam has

a low-level outlet, but it is understood to be inoperable. The dam impounds Becker Pond, which covers an area of approximately 0.65 acres.

In 2016, a visual inspection by Fuss & O'Neill determined the dam was in poor condition. No alterations have been made to the dam since the 2016 inspection.

Since 2016, TNC has been working with various project partners, including the Massachusetts Division of Ecological Restoration (MassDER), to design and permit a dam removal project at the site. Dam removal is anticipated to begin in late 2024 or early 2025 if funding and permits allow.

# 2. Background and Context

The process to design the Becker Pond Dam Removal Project included sediment investigations and evaluations. The investigations included collecting and analyzing sediment samples[1], estimating the volume of impounded (and the fraction of easily mobilized) sediment, and developing a sediment management plan[2] informed by regulatory input via the MEPA consolidated review process and the Section 401 WQC review process.

Removing the Becker Pond Dam will restore natural sediment transport processes within the unnamed brook. In future years, the currently sediment-starved channel will accumulate material and adjust to a new dynamic equilibrium. This sediment monitoring plan is designed to identify problematic changes in sediment deposition. Some changes are beneficial and expected.

## 2.1 SEDIMENT SAMPLING AND RESULTS

In 2019, MassDER performed a due diligence review and concluded that there is low potential for contamination of the impounded sediment at the site.

In 2019, Inter-Fluve collected sediment samples for analysis pursuant to relevant permitting requirements. The samples were analyzed for metals, polycyclic aromatic hydrocarbons (PAHs), extractable petroleum hydrocarbons (EPHs), polychlorinated biphenyls (PCBs), pesticides, total organic carbon, and grain size.

Grain-size analyses indicate that the impounded sediment is primarily sand with some gravel and fines. Chemical analyses indicate that concentrations of many of the analytes were below detection levels. Of the analytes that were detected, the measured concentrations were below freshwater probable effects concentrations (PECs).[3] Based on these findings, it was concluded that release of sediment from the impoundment is unlikely to result in adverse chemical impacts to the downstream environment.

[1]Inter-Fluve, 2020a. Becker Pond Dam Removal 75% Design Report, May 2020. Revised October 2020.
[2] Inter-Fluve, 2020b. Becker Pond Dam Sediment Management Plan. October 7, 2020.
[3] Massachusetts Department of Environmental Protection. Revised Sediment Screening Values. Update to Section 9 of *Guidance for Disposal Site Risk Characterization – In Support of Massachusetts Contingency Plan* (1996).

## 2.2 SEDIMENT VOLUME ESTIMATES

In 2018, Inter-Fluve conducted a bathymetric and depth-of-refusal survey of the Becker Pond Dam impoundment. The data collected during the depth-of-refusal survey was used to estimate the volume of impounded sediment. Table 1 summarizes the volumes. The bullets that precede the table provide narrative detail regarding specific quantities.

- The 75% Design Report indicates that the total volume of impounded sediment is estimated to be 1,500 cubic yards; the readily-mobile fraction of impounded sediment is estimated to be 550 cubic yards.
- Project correspondence[4] indicates that a total of 525 cubic yards of earthen dam material and impounded sediment will be excavated. Of the 525 cubic yards:
    - approximately 310 cubic yards is impounded sediment that will be removed from the impoundment and disposed of in an appropriate upland location. This volume represents the excavation to form the pilot channel shown on the plans.
    - approximately 215 cubic yards is soil currently forming the dam embankment. This material will be excavated and reused to restore the right bank at the location of the historical borrow pit.
- The Chapter 91 plan set refers to a total excavation volume of 644 cubic yards. This volume includes impounded sediment (310 cubic yards), earthen dam material (215 cubic yards), and concrete (119 cubic yards).
- The volume of impounded sediment that will be stabilized in place via bank treatments is 1,190 cubic yards.

The Sediment Management Plan[5] includes a discussion of the impounded sediment volumes within the context of the local watershed. A standard method for estimating natural sediment load[6] predicts that the natural annual sediment load for the unnamed brook is approximately 3,000 tons per year. This mass converts to a volume between 1,800 and 2,500 cubic yards per year[7].

The total estimated volume of impounded material is 1,500 cubic yards–between 45% and 80% of the estimated annual sediment load for the local watershed.

The total estimated mobile fraction of sediment (550 cubic yards) is relatively small in comparison–between 22% and 30% of the estimated annual load for the local watershed.

[4] Email communication between Alison Millman and Sarah Barnum (BSC Group) and Derek Standish (MassDEP) on June 15, 2023.
[5] Inter-Fluve, 2020b.
[6] Simon, A., Dickerson, W., and Heins, A., 2004. Suspended-sediment transport rates at the 1.5-year recurrence interval for ecoregions of the United States: transport conditions at the bankfull and effective discharge. *Geomorphology* 58 (2004): 243-262. doi: 10.1016/j.geomorph.2003.07.003
[7] Assumption: Sand typically ranges between 2400 and 3300 pounds per cubic yard depending on moisture content and compaction.

***Table 1. Summary Table of Volumes***

| Material | Description | Total Volume (cubic yards) | Excavate and Dispose (cubic yards) | Stabilize in Place (cubic yards) |
|---|---|---|---|---|
| Sediment | Mobile Fraction | 550 | 310 | 240 |
| | Stable | 950 | 0 | 950 |
| | ***Sub Total*** | ***1,500*** | ***310*** | ***1,190*** |
| | | | | |
| Dam | Earth/Soil | 215 | 215 | 0 |
| Dam | Concrete | 119 | 119 | 0 |
| | ***Sub Total*** | ***334*** | ***334*** | ***0*** |
| | | | | |
| | ***Total*** | | ***644*** | |

## 2.3 SEDIMENT MANAGEMENT PLAN

The construction project to remove the Becker Pond Dam will include mechanical removal of material from the Becker Pond Dam impoundment. Sediment will be removed by excavating a pilot channel through the impoundment to facilitate initial channel formation. The estimated volume of sediment within the footprint of the pilot channel is approximately 310 cubic yards. The remaining 1,190 cubic yards of impounded sediment will be stabilized in place via vegetation and bank treatments.

## 2.4 CONSTRUCTION PERIOD EROSION AND SEDIMENT CONTROLS

During the construction period, erosion and sediment controls will be implemented in accordance with permit requirements, including, but not limited to, the EPA NPDES CGP permit requirements.

# 3. Sediment Monitoring

The project to remove the Becker Pond Dam will include sediment monitoring. Sediment monitoring activities will be conducted during the construction phase and will continue for a period of two years following completion of construction activities. Due to the remoteness of the site and the difficult terrain, sediment monitoring activities will be adaptable to emerging conditions.

Monitoring stations are designated as **primary** or **contingent** sites. Primary sites will be observed during every monitoring activity. Contingent sites will be added to the monitoring schedule if prior observations indicate that material has reached or is likely to reach the site before the next scheduled monitoring activity.

## 3.1 MONITORING ACTIVITIES

Monitoring activities will include photographic survey and sediment probing of pools. Monitoring activities will begin immediately prior to construction. The first monitoring survey (Survey 0) will establish baseline conditions at all primary and contingent monitoring stations. Figure 2 illustrates the monitoring station locations. Table 2 provides the coordinates of each station with reference to the NAD83 Massachusetts State Plane coordinate system (units in feet). Monitoring activities will continue through construction to the post-project period in accordance with the frequencies specified in Table 3.

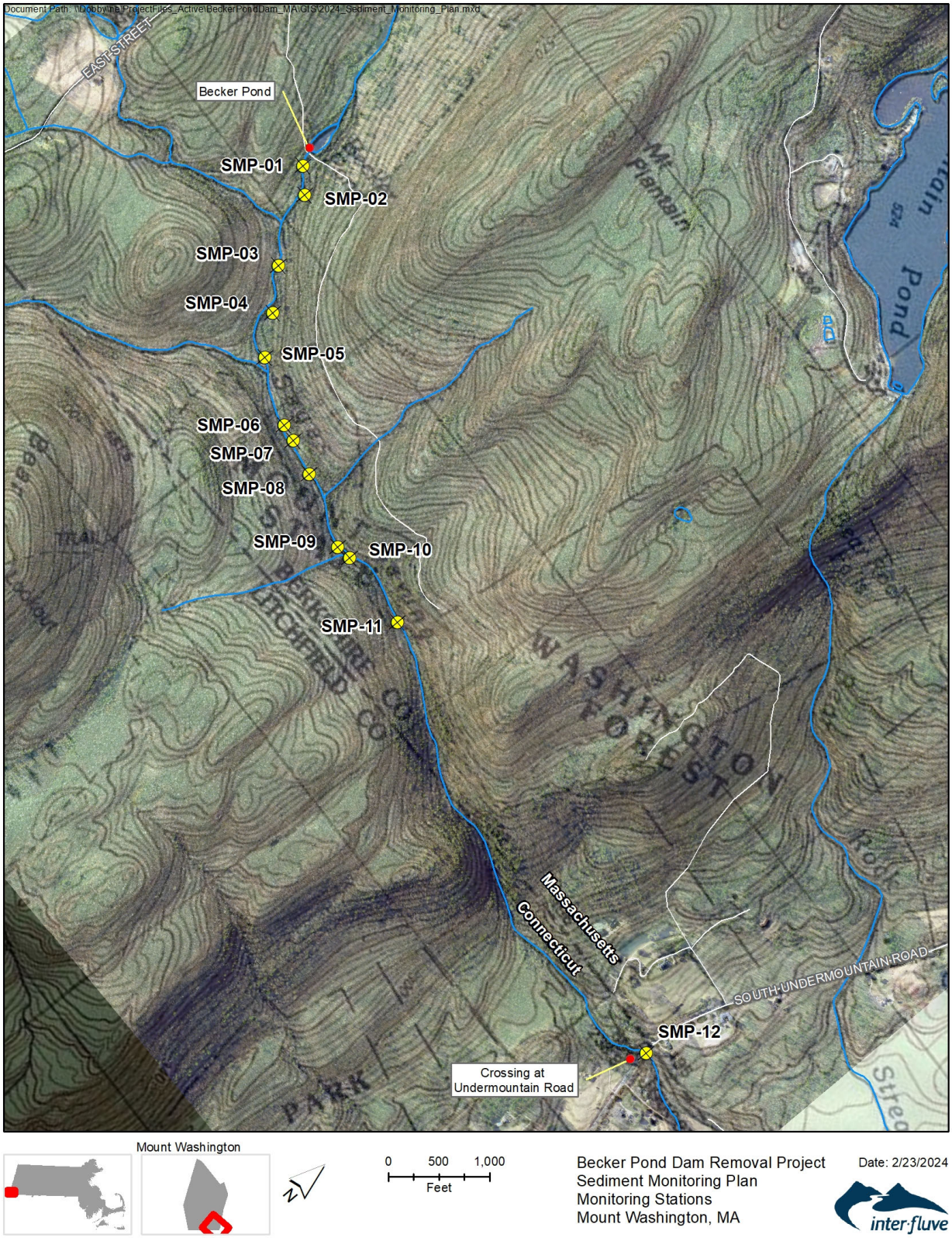



***Figure 2. Monitoring Station Locations***

***Table 2. Monitoring Station Locations***

| Site Name | Easting | Northing |
|---|---|---|
| SMP-01 | 124204.965170 | 2852230.58371 |
| SMP-02 | 124438.010010 | 2852061.78318 |
| SMP-03 | 124806.368438 | 2851415.37896 |
| SMP-04 | 125124.353764 | 2851070.55146 |
| SMP-05 | 125412.780174 | 2850726.55787 |
| SMP-06 | 126046.509243 | 2850441.91776 |
| SMP-07 | 126219.241699 | 2850417.38846 |
| SMP-08 | 126576.984914 | 2850322.13206 |
| SMP-09 | 127303.717802 | 2850076.33372 |
| SMP-10 | 127465.695040 | 2850100.54392 |
| SMP-11 | 128256.095692 | 2850052.08389 |
| SMP-12 | 133088.394918 | 2849201.24018 |

### 3.1.1 Photographic Survey

The photographic survey will provide a qualitative, visual record of conditions from fixed photo point locations for the duration of the monitoring period.

In February 2024, Inter-Fluve personnel established locations for a repeat photographic survey. Each location was recorded using GPS equipment and flagged and labeled with brightly-colored marking tape. At least four photographs were taken at each location, one facing each of the cardinal directions (North, South, East, and West). Appendix A to this Sediment Monitoring Plan contains the photographs taken in February 2024, designated as the Survey Year -1 (year negative 1) record.

#### *3.1.1.1 Baseline Activity*

The baseline survey (Survey Year 0) will be performed at the time of construction mobilization. The baseline monitoring activity will include taking photographs at all primary and contingent monitoring sites. Four (total) photographs will be taken at each location, one facing each of the cardinal directions (North, South, East, and West).

#### *3.1.1.2 Monitoring Activity*

The photographic survey monitoring activity will consist of taking photographs at each of the established locations in accordance with the monitoring schedule (Table 3). Four (total) photographs will be taken at each location, one facing each of the cardinal directions (North, South, East, and West). Primary monitoring locations will be photographed during every monitoring activity. Contingent monitoring locations will be added in sequence if sediment originating from the impoundment is observed at the preceding monitoring location. For example, if sediment is observed at SMP-4, the monitoring excursion will be extended to include SMP-5 and so on until the monitor either reaches a monitoring location that is free of sediment or the monitor reaches the last monitoring station (SMP-12).

### 3.1.2 Sediment Probe Survey

In February 2024, Inter-Fluve personnel identified the locations of pools along the unnamed brook for a repeat sediment probe survey. Each location was recorded using GPS equipment and flagged with brightly-colored marking tape. Sediment depths were not recorded at this time; pre-project sediment depths will be measured during the baseline survey activity.

#### *3.1.2.1 Baseline Activity*

The baseline survey (Survey 0) will be performed at the time of construction mobilization. The baseline monitoring activity will include probing and recording sediment depths at all primary and contingent monitoring sites.

#### *3.1.2.2 Monitoring Activity*

The sediment probe survey will consist of measuring the sediment depth in in-stream pools at established locations in accordance with the monitoring schedule (Table 3). Primary monitoring locations will be measured during every monitoring activity. Contingent monitoring locations will be added in sequence if sediment originating from the impoundment is observed at the preceding monitoring location. For example, if sediment is observed at SMP-4, the monitoring excursion will be extended to include SMP-5 and so on until the monitor either reaches a monitoring location that is free of sediment or the monitor reaches the last monitoring station (SMP-12).

## 3.2 MONITORING FREQUENCY, SCHEDULE, AND REPORTING

### 3.2.1 Construction Period Monitoring and Reporting

During the construction period, monitoring activities will be conducted once a week.

Findings will be included in the daily construction period observation logs. The daily observation logs will be distributed and reviewed by project partners on a weekly basis at project update meetings. Responses to adverse conditions will be addressed immediately in accordance with the EPA NPDES CGP and SWPPP.

Following the conclusion of the construction period, the weekly observations will be collated into one document, which will form an appendix to the post-project monitoring report.

### 3.2.2 Post-Project Period Monitoring and Reporting

During the post-project period, monitoring activities will be conducted annually for a period of 2 years or until TNC and relevant regulatory agencies determine it is no longer necessary. Monitoring activities will be scheduled to occur at the same time each year. Findings will be included in an annual report. The annual report will be submitted to MassDEP[8] on or before December 10 of the respective monitoring year.

[8] Submit to the MassDEP 401 WQC program (Derek Standish at derek.standish@mass.gov).

The annual report will include the following elements:

- A table summarizing monitoring activities and the dates they were performed
- A narrative analysis of the observations with statements about observable changes
- The data collected during each monitoring activity
- Appendix A – the comprehensive photographic survey record
- Appendix B – the comprehensive sediment probing record
- Appendix C – The collated construction observation logs (as pertaining to monitoring activities).

### 3.2.3 Summary of the Monitoring Schedule

Table 3 presents the monitoring schedule.

***Table 3. Monitoring Schedule***

| | | | Construction Period | | Post Construction Period | | |
|---|---|---|---|---|---|---|---|
| **Location** | **Designation** | **Baseline Survey 0*** | **Week 1** | **Week +** | **Year 0** | **Year 1** | **Year 2** |
| SMP-1 | Primary | x | x | x | x | x | x |
| SMP-2 | Primary | x | x | x | x | x | x |
| SMP-3 | Primary | x | x | x | x | x | x |
| SMP-4 | Primary | x | x | x | x | x | x |
| SMP-5 | Contingent | x | No | As needed | x | x | x |
| SMP-6 | Contingent | x | | | x | x | x |
| SMP-7 | Contingent | x | | | x | x | x |
| SMP-8 | Contingent | x | | | x | x | x |
| SMP-9 | Contingent | x | | | x | x | x |
| SMP-10 | Contingent | x | | | x | x | x |
| SMP-11 | Contingent | x | | | x | x | x |
| SMP-12 | Contingent | x | | | x | x | x |

**The Baseline Survey 0 will be scheduled to coincide with construction mobilization.*

# 4. Adaptive Management

The goal of the sediment monitoring plan is to provide a plan for identifying and tracking the movement of sediment following the removal of Becker Pond Dam. The information may be used to identify potential problematic outcomes before they occur.

During the project review process, stakeholders expressed concerns that released sediment could fill natural pools downstream. Project activities, including manual removal of impounded sediment will reduce the likelihood that this will occur. Project monitoring will be used to track and record

sediment movement from the Becker Pond Dam impoundment. Observations will be used to inform response actions to maintain compliance with project permit conditions.

# 5. Decision Making

If monitoring activities indicate that sediment from the dam removal site is depositing in areas and in depths that may be considered problematic, the project partners will initiate a process to respond and avert further impacts. First, the construction contractor will perform activities consistent with the project EPA NPDES CGP and SWPPP to eliminate the source of fugitive sediment. Then, the project partners will initiate contact with the regulatory agencies in accordance with all relevant permits to coordinate response actions.

# Appendix A| Photographs of Monitoring Locations

Photographs of the Photographic and Sediment Probe Monitoring Locations (Year -1)

*Table 1. SMP-01*

| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-01 River Right<br><br>Looking Up-stream |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |

*Table 2. SMP-02*

| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-02<br><br>Looking up-stream |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |
| Looking from River Right to River Left |  | | |

*Table 3. SMP-03*

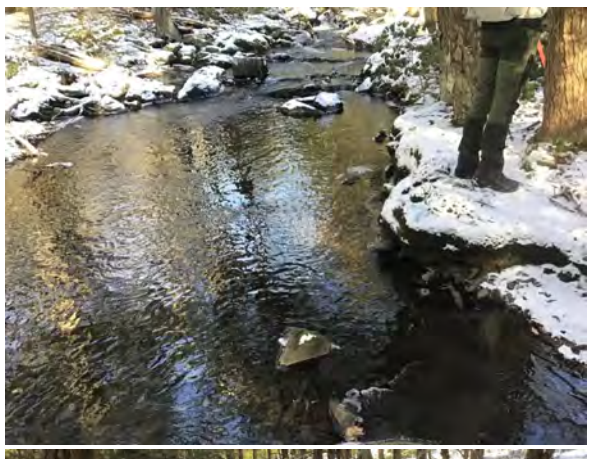
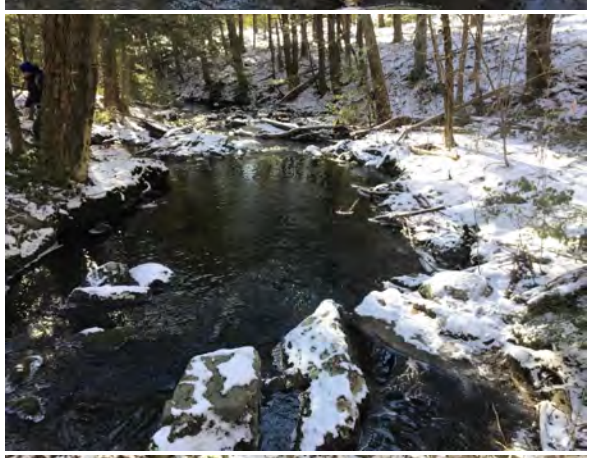
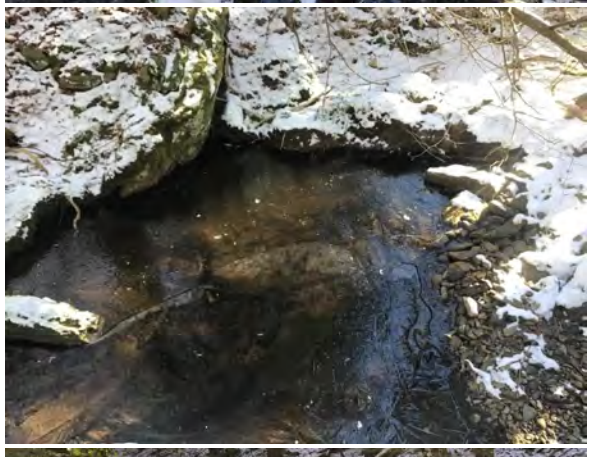
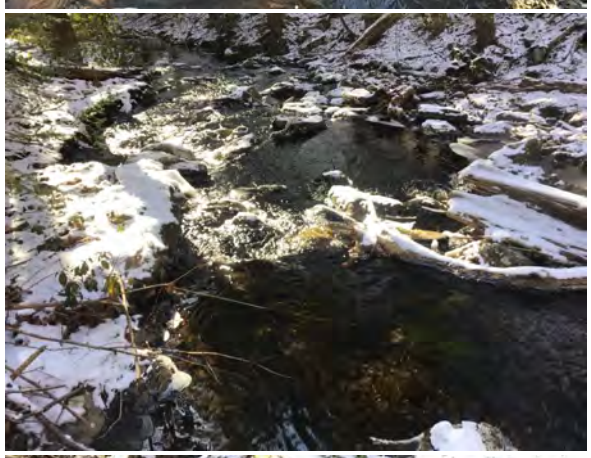
| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-03<br><br>Looking down-stream |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |

*Table 4. SMP-04*

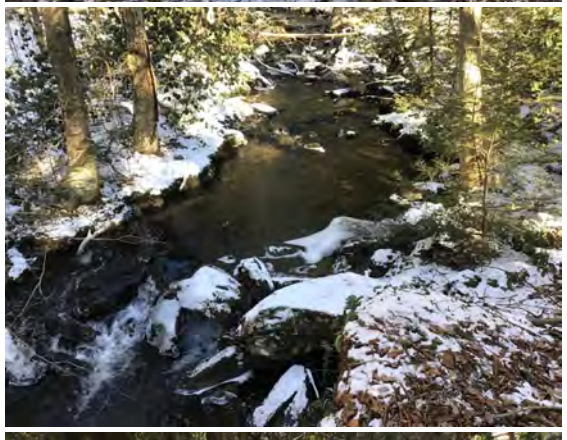
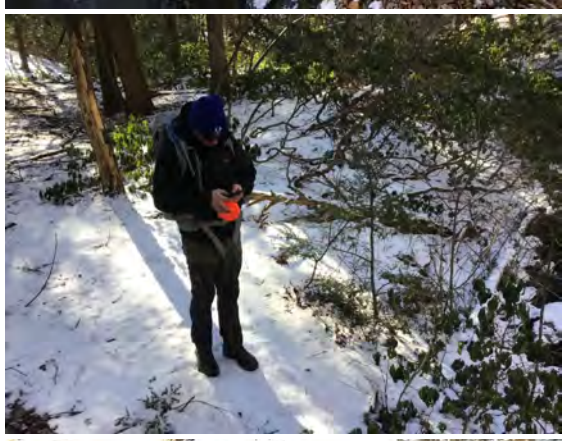
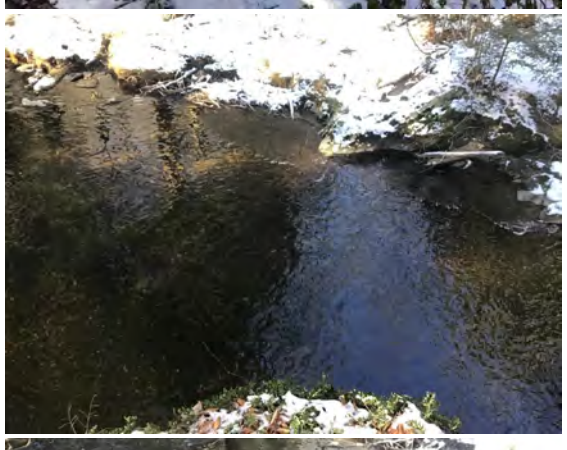
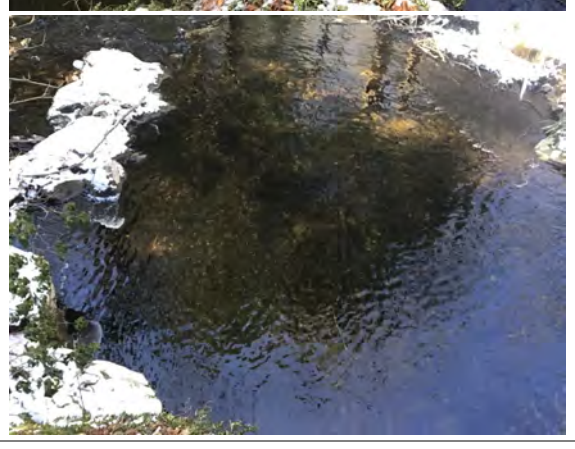
| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-04<br><br>Looking up-stream at pool and photo spot |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |
| Down-stream end of pool |  | | |

*Table 5. SMP-05*

| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-05<br><br>Looking at photo location |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |
| Down-stream pool |  | | |

*Table 6. SMP-06*

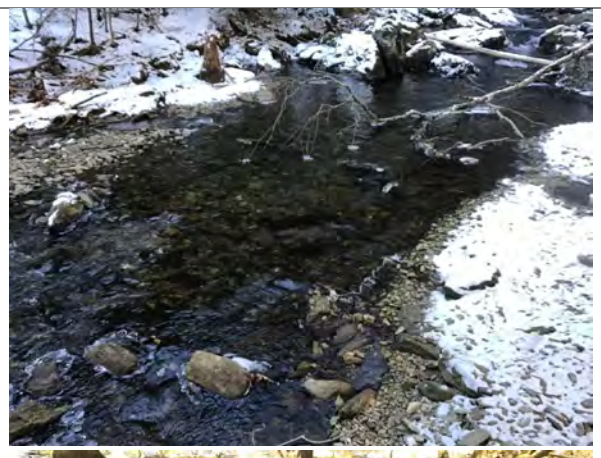
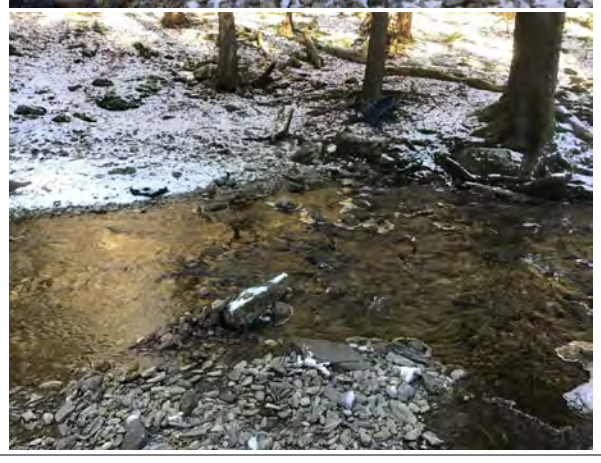
| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-06<br><br>Looking at photo spot |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |
| Pool |  | | |

*Table 7. SMP-07*

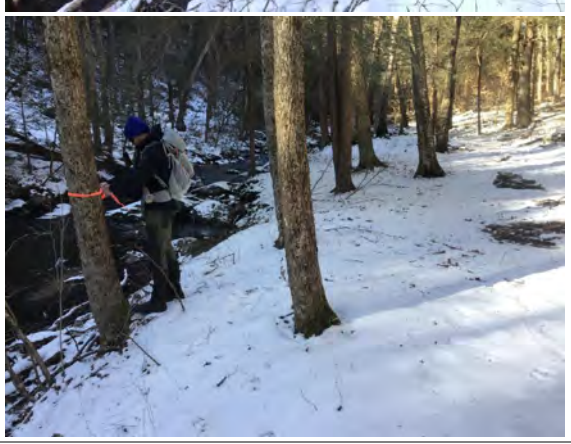
| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-07<br><br>Looking up-stream at pool |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |
| Photo spot and fire ring |  | | |

*Table 8. SMP-08*

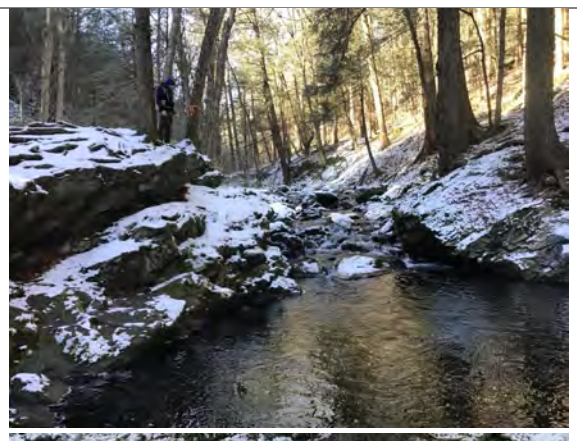
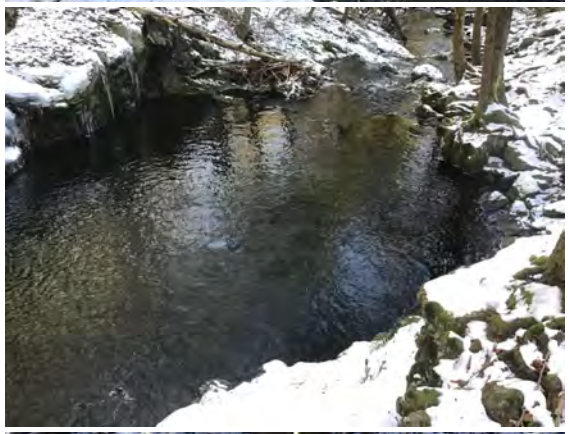
| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-08<br><br>Looking up-stream at photo spot |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |
| Photo spot from trail |  | | |

*Table 9. SMP-09*

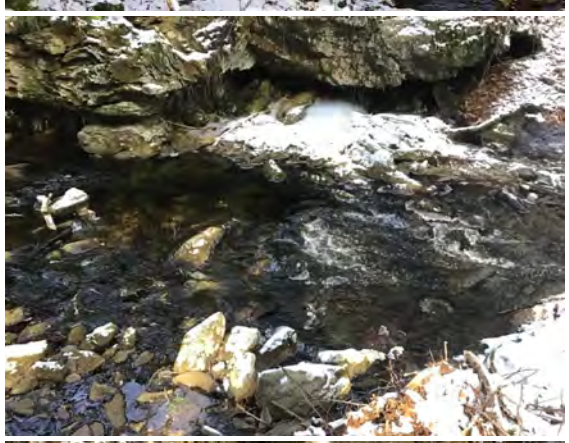
| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-09<br><br>Looking up-stream at photo spot |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |
| Photo spot |  | | |

*Table 10. SMP-10*

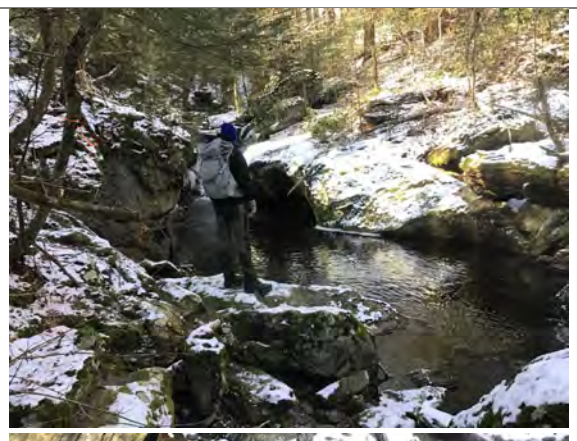
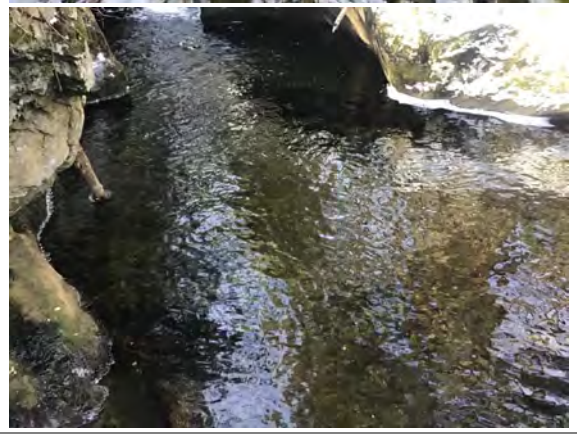
| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-10<br><br>Looking up-stream at photo spot |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |
| Pool |  | | |

*Table 11. SMP-11*

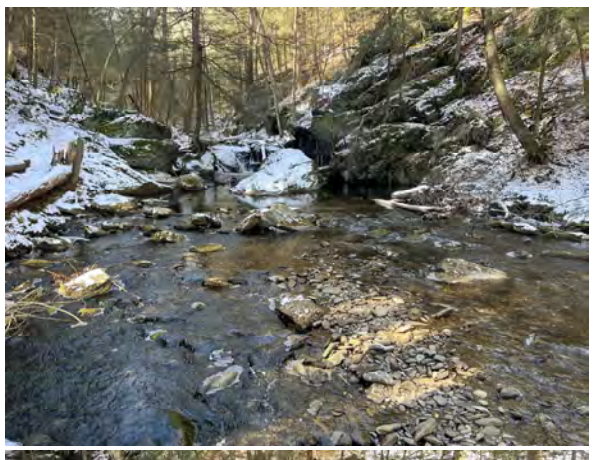
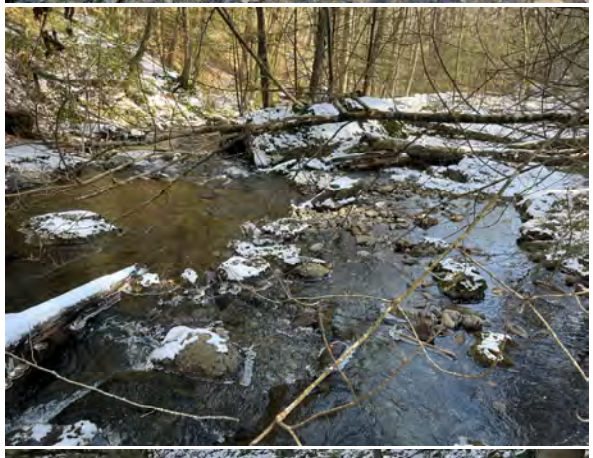
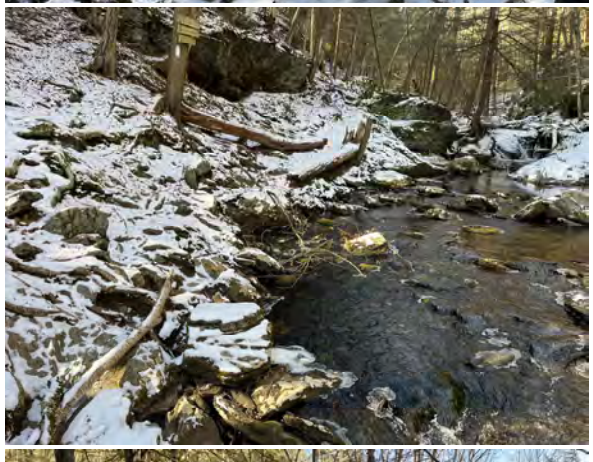
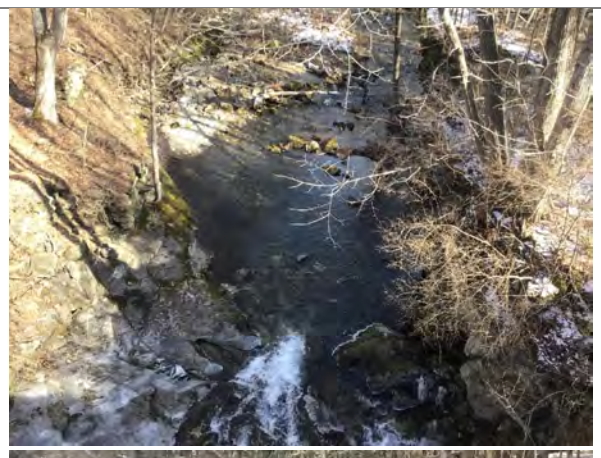
| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-11<br><br>Looking up-stream |  | | |
| *North* |  | | |
| *East* |  | | |
| *South* |  | | |
| *West* |  | | |
| Looking down-stream |  | | |

*Table 12. SMP-12*

| ID | Year -1 (February 2024) | Year 0 (202x) | Year 1 (202x) |
|---|---|---|---|
| SMP-12<br><br>Looking down-stream from bridge (*East*) |  | | |
| Looking up-stream *(West)* |  | | |
| Zoomed in looking down-stream *(East)* |  | | |