FINAL REPORT

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LOCKWOOD BROOK CULVERT REPLACEMENT

CONTACT INFORMATION

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EXECUTIVE SUMMARY

The project replaced an undersized, perched culvert where German Flats Road crosses Lockwood Brook in Fayston, Vermont that was vulnerable to flood damage and was a barrier to aquatic organism passage. In August-September 2023, Friends of the Winooski River installed a new open-bottomed arch culvert with a natural streambed. The wider culvert reduces the likelihood of an important town road washing out in a storm. Removal of this barrier reconnected 2.5 miles of upstream habitat, ensuring that native brook trout have access to the cold water habitat they need to thrive, and enabling passage for all aquatic organisms.

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1. PROJECT SYNOPSIS

The Mad River Aquatic Organism Passage team – Friends of the Mad River, Vermont Department of Environmental Conservation, Vermont Department of Fish & Wildlife, US Fish & Wildlife Service, US Forest Service – works together to identify and prioritize aquatic organism passage (AOP) improvement projects. Priority projects are determined based on habitat gain, partner and town interest, funding availability, headwater integrity, and estimated complexity/cost. The team identified the replacement of the Lockwood Brook culvert under German Flats Road as a high priority for implementation. To support Friends of the Mad River during their leadership transition, Friends of the Winooski River managed this project on their behalf.

Prior to this project, the culvert where Lockwood Brook flows beneath German Flats Road was a corrugated metal, closed-bottom pipe with a width of seven feet, which was only 49% of the bankfull width. The culvert outlet was perched by one to two feet between the invert and normal pool elevation. The perched outlet coupled with shallow and fast velocity inside the pipe blocked trout passage at all life stages. The increased velocity in the water exiting the pipe had created a scour pool that extended for 26 feet downstream of the outlet.

This undersized and outdated culvert was preventing aquatic organism passage, causing streambank erosion that contributes nutrient and sediment pollution to the Mad River system, and putting the road at risk of washing out in a flood. The Town of Fayston Hazard Mitigation Plan identifies German Flats Road as an area that has experienced flash flooding in the past. German Flats Road is highlighted, along with Route 17, as experiencing the most damage during Tropical Storm Irene in 2011. Upgrading culverts on this road was a Town priority for hazard mitigation.

The objective of the project was to replace an undersized, perched culvert on German Flats Road in Fayston with a new culvert that will reconnect Lockwood Brook. The new structure is an open-bottom arch that is fifteen feet wide, eight feet tall, and 58 feet long. The first task in this agreement was construction mobilization, which took place in August 2023, and final site tasks were completed in December 2023. Earlier project tasks – final design, permitting, contractor procurement – were completed prior to the period of performance using other funding sources.

Project outputs include fulfillment of an excavation contract, coordination among local, state, and federal partners, and construction oversight. Project outcomes include lower water temperatures, enhanced ecosystem integrity and stream equilibrium, improved flood resilience, and reconnection of 2.5 miles of upstream habitat that provides thermal refugia and spawning and foraging habitat for wild trout.

2. TASKS AND DELIVERABLES COMPLETED

Before beginning the Tasks outlined below, FWR procured the contract for engineering oversight and managed a competitive bid process for the excavation contract consistent with federal procurement policies, using other funding sources for our staff time expenses.

Task 1: Construction Mobilization

This Task was originally intended to take place in the last two weeks of June. The Department of Historic Preservation required two phases of archaeological assessment at the site, which delayed our start date. We received our SHPO Concurrence letter on Monday, August 14, and submitted it to the Army Corps of Engineers the same day. The contractor had all equipment and materials on site, prepared to start work, when we received our Army Corps of Engineers permit and Work Start notice on August 16, 2023.

We discussed measures to be taken to avoid introduction of Japanese knotweed at the preconstruction meeting on July 26. The concerned neighbors checked the construction equipment upon arrival for any presence of Japanese knotweed, and found none. USFS will provide the contractor with detailed instructions for cleaning equipment prior to arrival, in order to avoid introducing Japanese knotweed to the area.

Task 1 Deliverable: ACOE Work Start notification (Memo describing readiness to begin work as of a certain date)

Task 2: Construction to 50%

The consulting design team worked with the excavation contractor to identify in advance which steps of the project need to be completed to signify 50% completion. The design team visited the site six times from August 17 through August 30, and their reports include many photos of the progression of work on the site. The Task 8 deliverable, meeting notes, include FWR site visit notes and photos, as well.

Task 2 Deliverable: Construction Progress Reports to First Half, including photographs of site work progress

Task 3: Construction Oversight to 50%

The consulting design team visited the site six times between August 17 and August 30, and provided memoranda with photos and notes from each visit. They were supported by US FWS engineer Jesus Morales, and had additional consultations by Greg Russ of the White River Partnership and Jaron Borg of Vermont DEC. Once the agreed-upon steps were completed to achieve the 50% milestone, the consulting design team provided a status memo verifying that the 50% point in the project has been reached.

The project incorporated “Express Footers” fabricated by Contech, and it was the first time anyone involved had used them. They were intended to reduce the amount of time it took to assemble the structure, and everyone agreed that the structure went together very quickly on Tuesday, August 23, and was ready for concrete to be poured later that week. (See photo from August 24 below.) They were a successful innovation in the eyes of the project team.

Task 3 Deliverable: 50% Verification letter (Consultant memo confirming 50% completion)

Contech Express Footer and assembled arch, August 24, 2023, photo by Friends of the Winooski River

Task 4: Construction Completed

All construction tasks were completed consistent with the plans and any approved field adjustments, permits, and contracts. The Task 8 deliverable, meeting notes, include FWR site visit notes and photos, as well.

Task 4 Deliverable: Construction Project Reports for Second Half, including photographs of clean and stabilized site

Task 5: Construction Oversight Final

The consulting design team and FWR conducted the final site walk-through on October 26, after demobilization, and generated a punch list of items to complete. The consulting design team provided a final report verifying that the construction has been completed consistent with plans, permits, and contracts.

Task 5 Deliverable: Final Construction Report (Consultant memo confirming all tasks complete)

Task 6: Publicity

The Valley Reporter published an article on the project on July 27. The Valley Reporter's circulation is estimated to be 3,700. Friends of the Winooski River highlighted the project in our

August 29 enewsletter, which was read by 647 subscribers. We drafted a press release after project completion.

Task 6 Deliverables: FWR enews, Valley Reporter article, FWR press release, Times Argus article

Task 7: Site Restoration

The project required clearing of mature vegetation. There are four landowners whose properties were affected by the site clearing, and they requested that the project team restore this woody vegetation. The design team completed a restoration plan, and Friends of the Winooski's staff botanist reviewed and revised the construction notes related to restoration to ensure that the species selected were likely to thrive in the location. At the site inspection in October, we noticed that a few of the trees planted were already in poor condition and made a note to visit the site in the spring to assess survival and identify replanting needs.

Native trees and shrubs after installation, 10/26/2023, photo by Friends of the Winooski River

Task 7 Deliverables: Photos of native trees and shrubs installed and plant list, including Notes Revisions by FWR and Planting plan sheet

Task 8: Project Management

Project management activities were continuous throughout the period of performance, including coordination with Friends of the Mad River, the neighboring landowners, the Town Select Board, the Town Clerk, US Fish and Wildlife Service, US Forest Service, Vermont DEC, the design team, and the excavation contractor. We worked with funding partners to coordinate and schedule invoicing and reimbursements and tracked all of the expenses.

FWR staff coordinated team meetings such as the bid review meeting on May 8, the preconstruction meeting on July 26, and a Stream Alteration Permit review meeting on August

10. Staff managing the project were not able to be on site in the first week of construction due to covid. We visited the site on August 24, August 29, September 7, and October 26.

Task 8 Deliverables: Stakeholder Meeting and Site Visit Notes, including dates, attendance list and notes

Task 9: Reporting

FWR provided the Lake Champlain Basin Program with quarterly reports on July 10, 2023, October 10, 2023, and January 10, 2024. The final report, including all deliverables, was submitted by January 30, 2024.

Task 9 Deliverables: Quarterly Reports and Final Report

3. CONCLUSIONS

Friends of the Winooski River, with the support of several partners, managed the construction of a new culvert where German Flats Road crosses Lockwood Brook in Fayston, Vermont. The team originally planned to begin construction in mid-June, but archaeological investigation pushed the start time later in the summer. The project began mid-August, and was largely complete, with the stream restored to free flow conditions, by mid-September.

The design team selected “Express Footers” to be fabricated by Contech Engineered Solutions, which are intended to reduce the time needed to construct the culvert. The excavation contractor and the design team were extremely pleased with the performance of the structures. The construction of the streambed inside the culvert, and the tie-in of that streambed to upstream and downstream bed elevations and materials required quite a bit of consulting from two individuals who have completed the US Forest Service Stream Simulation course. We do anticipate that natural material will migrate downstream from above the culvert, and the streambed throughout the disturbed area will naturalize.

We had originally planned to plant trees with volunteers, but our organizational capacity was impacted by the demands of responding to the needs generated by the Great Vermont Flood of 2023, and then all of our staff having covid. The trees and shrubs were installed by the contractor, and we observed in October that some were not well-planted, and we have concerns about the survival rate. We plan to visit the site in the spring to assess replanting needs.

The new culvert is more than twice the width of the old culvert, making it wide enough to accommodate Lockwood Brook at bankfull flow. This improves flood resilience, decreasing the likelihood of a culvert failure washing out an important town road. The new culvert has an open bottom with a natural streambed, which will reconnect 2.5 miles of upstream habitat, ensuring that native brook trout have access to the cold water habitat they need to thrive.

4. APPENDICES

Appended Documents:

A. Deliverables

Task 1 ACOE Start Work notification
Task 2 Construction Progress Reports to first half

Task 3 50% Verification letter
Task 4 Construction Progress Reports to second half
Task 5 Final Construction Report 12-13-23
Task 6: FWR Aug 2023 enews
Task 6 The Valley Reporter article
Task 6 Press Release
Task 7 Planting Notes Revisions by FWR
Task 7 Planting plan sheet
Task 8 Stakeholder Meeting and Site Visit Notes
Task 9 Quarterly Reports and Final Report

B. Metrics table
C. Selected Project Photos