Final Design Report:

Long Meadow Brook Strategic Wood Additions

Table of Contents

Final Design Report: Long Meadow Brook Strategic Wood Additions.

Introduction

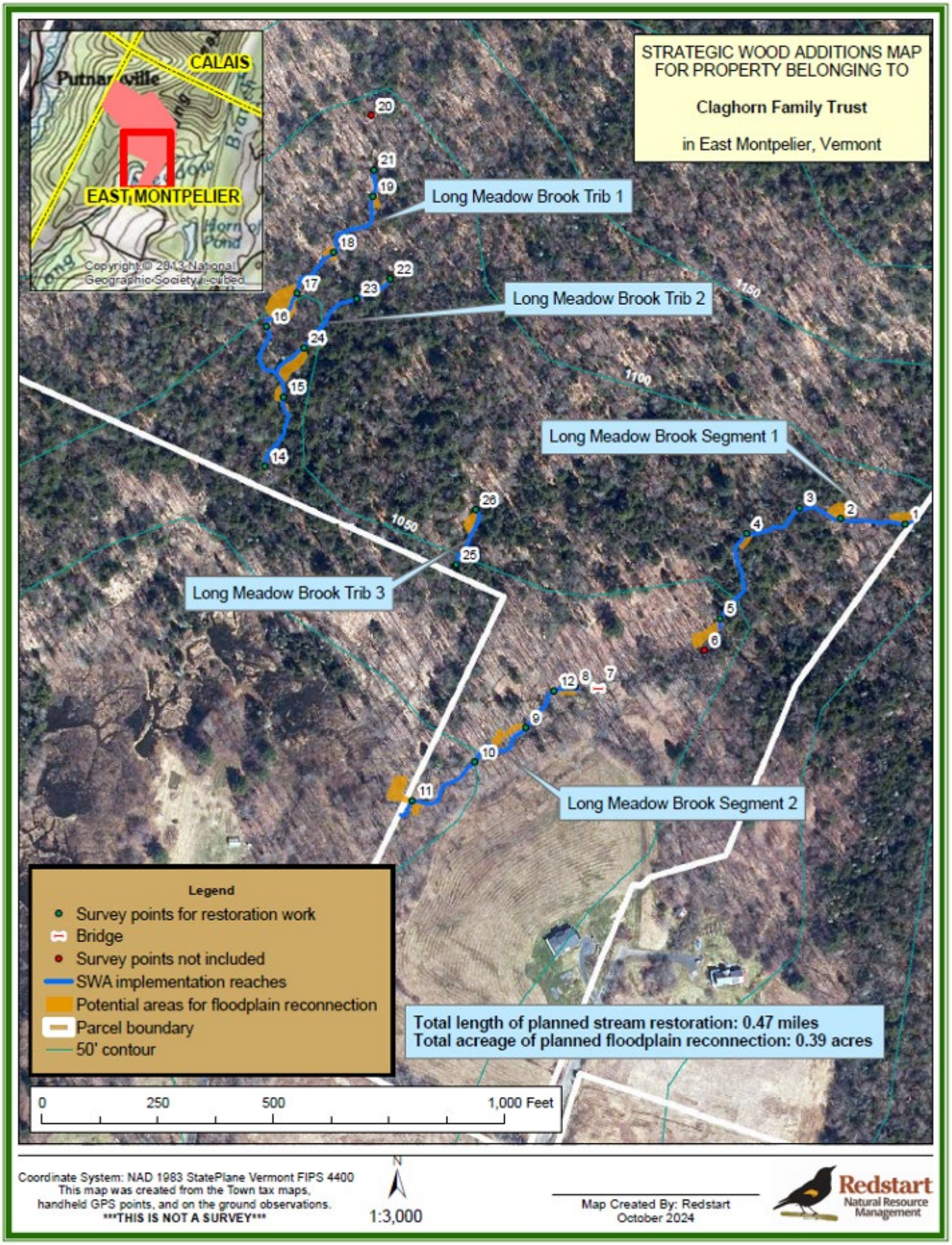
Stream/Floodplain Restoration Project: for submission by Friends of the Winooski River to the Central Vermont Regional Planning Commission and Vermont Department of Environmental Conservation.

In-field scoping work completed 8/6/2024/2024 and report/project design completed 10/25/2024, by Redstart, Inc.

This project is located along Long Meadow Brook and 3 of its 1st order tributaries. It intends to address a variety of goals. The specific primary goal is to improve water quality by reducing exports of phosphorous. The accredited mechanism for phosphorous reduction from this project is the reconnection of adjacent floodplains to the targeted streams, which is induced by the structural complexity of large, in-stream wood material. Additional goals are improve aquatic habitat by creating diversified instream habitat for brook trout which is considered a keystone species in this ecosystem and to reduce peak flood velocities to lessen future erosion and damage to downstream infrastructure (roads and culverts) that is expected to occur during increasingly problematic flood events. During implementation, skilled technicians will select locations for wood installation based on the feasibility of felling suitable riparian trees and securing them by hand in the stream. At all locations, the installed wood structures will be designed to withstand peak flows and are expected to retain fine sediments and organic debris in a way that will reduce channel incision over time.

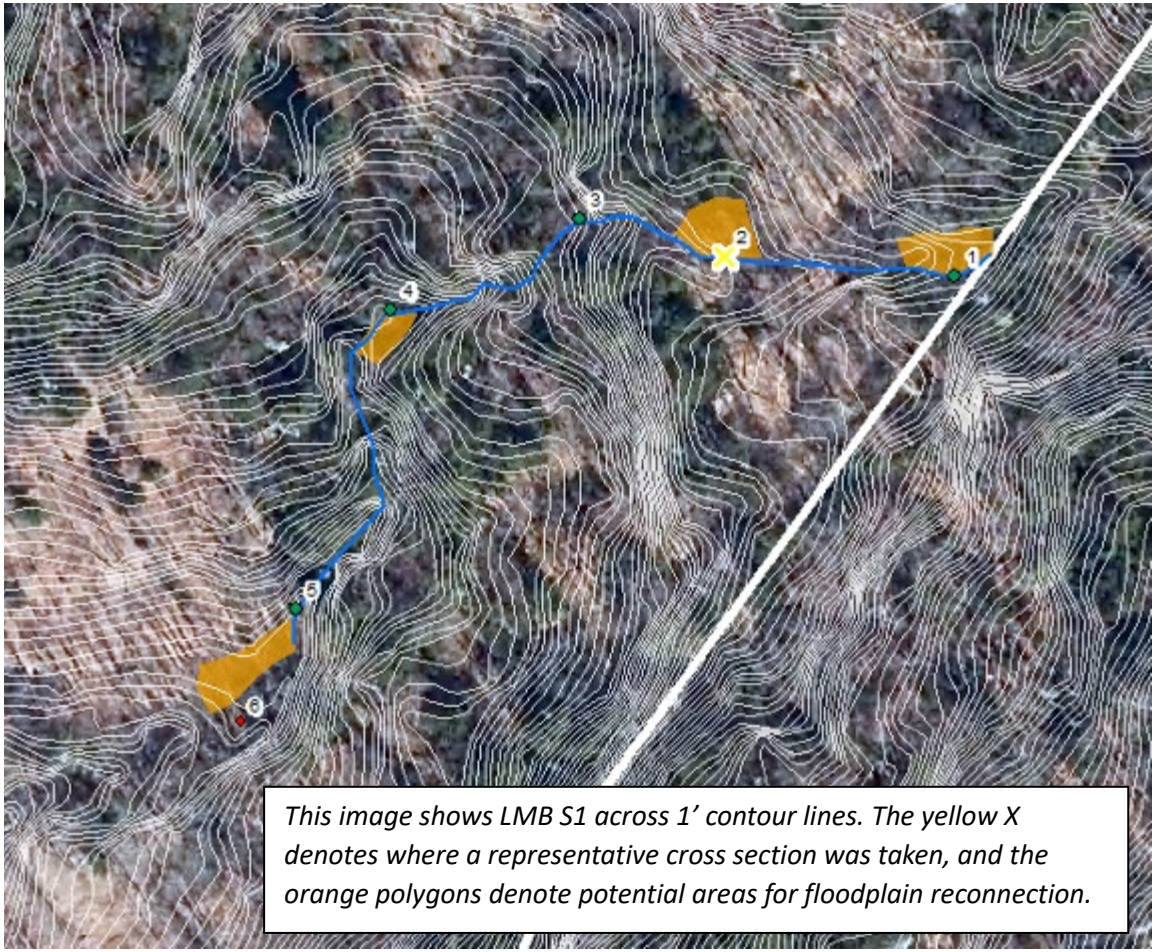
The work follows technical guidance found in the Vermont Strategic Wood Additions Handbook. At intervals averaging 100ft along each stream segment unless otherwise specified, 1-3 riparian trees with marginal wildlife/geomorphic value will be directionally felled, cut to length, and manually placed into the streams to create secure, channel-spanning structures. These structures will add structural heterogeneity to the water column, essentially creating obstacles that 1) reduce peak velocity of streamflow, often by creating a vertical connection to the adjacent floodplain, 2) induce hydrologic downflows and backflows that cause hyporheic exchange and nutrient processing in the benthic layer, 3) capture fine sediments that contain inorganic nutrients and would otherwise be exported, and 4) provide cover and food to aquatic organisms including brook trout.

Data collection for this report was taken at survey points located at 200 ft intervals, at notable or representative locations along the stream. These do not necessarily represent where wood structures will be placed, but rather the baseline conditions of the stream. Precise locations of installs with photographs and measurements of the immediate stream corridor will be provided after the completion of implementation, as part of the “red line” design.


STRATEGIC WOOD ADDITIONS MAP
FOR PROPERTY BELONGING TO
Claghorn Family Trust
in East Montpelier, Vermont
CALAIS
EAST MONTPELIER
Copyright © 2013 National Geographic Society, i-cubed
Long Meadow Brook Trib 1
Long Meadow Brook Trib 2
Long Meadow Brook Trib 3
Long Meadow Brook Segment 1
Long Meadow Brook Segment 2
1150
1100
1050
Legend
Survey points for restoration work
Bridge
Survey points not included
SWA implementation reaches
Potential areas for floodplain reconnection
Parcel boundary
50' contour
Total length of planned stream restoration: 0.47 miles
Total acreage of planned floodplain reconnection: 0.39 acres
0
250
500
1,000 Feet
Coordinate System: NAD 1983 StatePlane Vermont FIPS 4400
This map was created from the Town tax maps, handheld GPS points, and on the ground observations.
THIS IS NOT A SURVEY
N
1:3,000
Map Created By: Redstart
October 2024
Redstart
Natural Resource Management

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 1



This image shows LMB S1 across 1' contour lines. The yellow X denotes where a representative cross section was taken, and the orange polygons denote potential areas for floodplain reconnection.

This reach of Long Meadow Brook enters the property's western boundary as a fairly large 1st order stream that flows approximately southwest. Its longitudinal corridor follows a "bead and necklace" pattern that alternates between narrow rocky cascades and more open and gradual areas with potential floodplain engagement. The downstream extent of the restoration on this reach is located where the stream reaches a relatively major floodplain at the base of Long Meadow Hill.

The landowners commented that in the 50 years that they lived by and visited the stream, it has become dramatically more incised, especially between points 1 and 2. They used to have a wooden bridge in this area, but it was washed away in 2023. Recent 100 yr+ flood events have eroded the stream significantly, and mobilized much of the existing coarse wood material (previously 1-2 pieces per 100 ft were observed) the nearest major floodplain downstream where they formed a natural wood jam at point 6. No additional wood will be needed at this location. It has evidently helped the stream better access the floodplain. However. a wood installation at point 5 will help some of this floodplain become accessed at more freqent intervals, such as a 5 yr flood events.

The main objective of restoration along this reach will be maxmizing floodplain access by strategically installing wood at locations with feasible reconnection (moderate incision and wider floodplain areas). Installations will also contribute to sediment capture in other areas while reducing peak velocity and improving habitat as secondary objectives. See SWA Inventory Sheet for more details.

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 1 FID(see map): 1 Coordinates: 44.332887, -72.544741

Bank full width (ft): 13 Brook trout presence: Unknown Avg.#CWM per 100 ft: 0

Slope (looking upstream): 4% Dominant substrate: Cobble Riparian forest type: Mixed Woods Avg. DBH of riparian trees: 10-12”

Corridor type: lowgradefloodplain Bank full height (ft): 0.5 Low floodplain Elevation (ft): 0.5 Incision Ratio: 1

Feasible floodplain reconnection: YRB Predicted height of structure (ft): 1.5 Checkpoint log: no

Surveyor: JK(8/6/2024) Notes: Stream enters property. Lots of cobble deposition. Work should not disturb scour pool 50 ft ahead

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 1 | FID(see map): 2 | Coordinates: 44.33291, -72.545274

Bank full width (ft): 9.5 | Brook trout presence: Unknown | Avg.#CWM per 100 ft: 1

Slope (looking upstream): 6% | Dominant substrate: Cobble | Riparian forest type: Mixed Woods | Avg. DBH of riparian trees: 12-18”

Corridor type: lowgradefloodplain | Bank full height (ft): 0.8 | Low floodplain Elevation (ft): 1.5 | Incision Ratio: 1.875

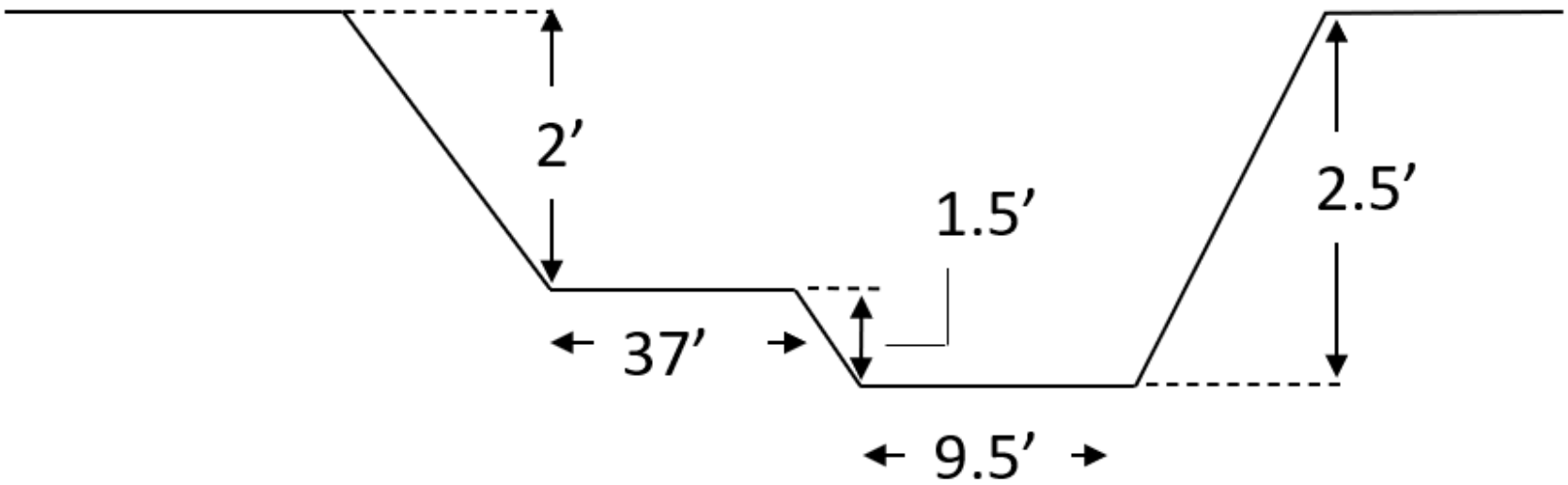
Feasible floodplain reconnection: YRB | Predicted height of structure (ft): 2 | Checkpoint log: yes

Surveyor: JK(8/6/2024) | Notes: Potential for re engagement with a large structure

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Long Meadow Brook Segment 1 –
Representative Cross section (FID 2)
looking upstream



Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 1 FID(see map): 3 Coordinates: 44.332971, -72.545613

Bank full width (ft): 9 Brook trout presence: Unknown Avg.#CWM per 100 ft: 1

Slope (looking upstream): 12% Dominant substrate: Bedrock Riparian forest type: Mixed Woods Avg. DBH of riparian trees: 10-12”

Corridor type: rock outcrops Bank full height (ft): 1.5 Low floodplain Elevation (ft): na Incision Ratio: na

Feasible floodplain reconnection: N Predicted height of structure (ft): 2.5 Checkpoint log: no

Surveyor: JK(8/6/2024) Notes: Good spot to secure wood for long term sediment capture

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 1 | FID(see map): 4 | Coordinates: 44.33282, -72.54605

Bank full width (ft): 11.5 | Brook trout presence: Unknown | Avg.#CWM per 100 ft: 1

Slope (looking upstream): 9% | Dominant substrate: Cobble | Riparian forest type: Mixed Woods | Avg. DBH of riparian trees: 12-18”

Corridor type: highgradefloodplain | Bank full height (ft): 1 | Low floodplain Elevation (ft): 1.3 | Incision Ratio: 1.3

Feasible floodplain reconnection: YLB | Predicted height of structure (ft): 1.5 | Checkpoint log: yes

Surveyor: JK(8/6/2024) | Notes: Riffle with good adjacent trees and small but feasible floodplain

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 1 FID(see map): 5 Coordinates: 44.332395, -72.546269

Bank full width (ft): 12 Brook trout presence: Unknown Avg.#CWM per 100 ft: 3

Slope (looking upstream): 5% Dominant substrate: Cobble Riparian forest type: Mixed Woods Avg. DBH of riparian trees: 12-18”

Corridor type: lowgradefloodplain Bank full height (ft): 1.3 Low floodplain Elevation (ft): 1.6 Incision Ratio: 1.23

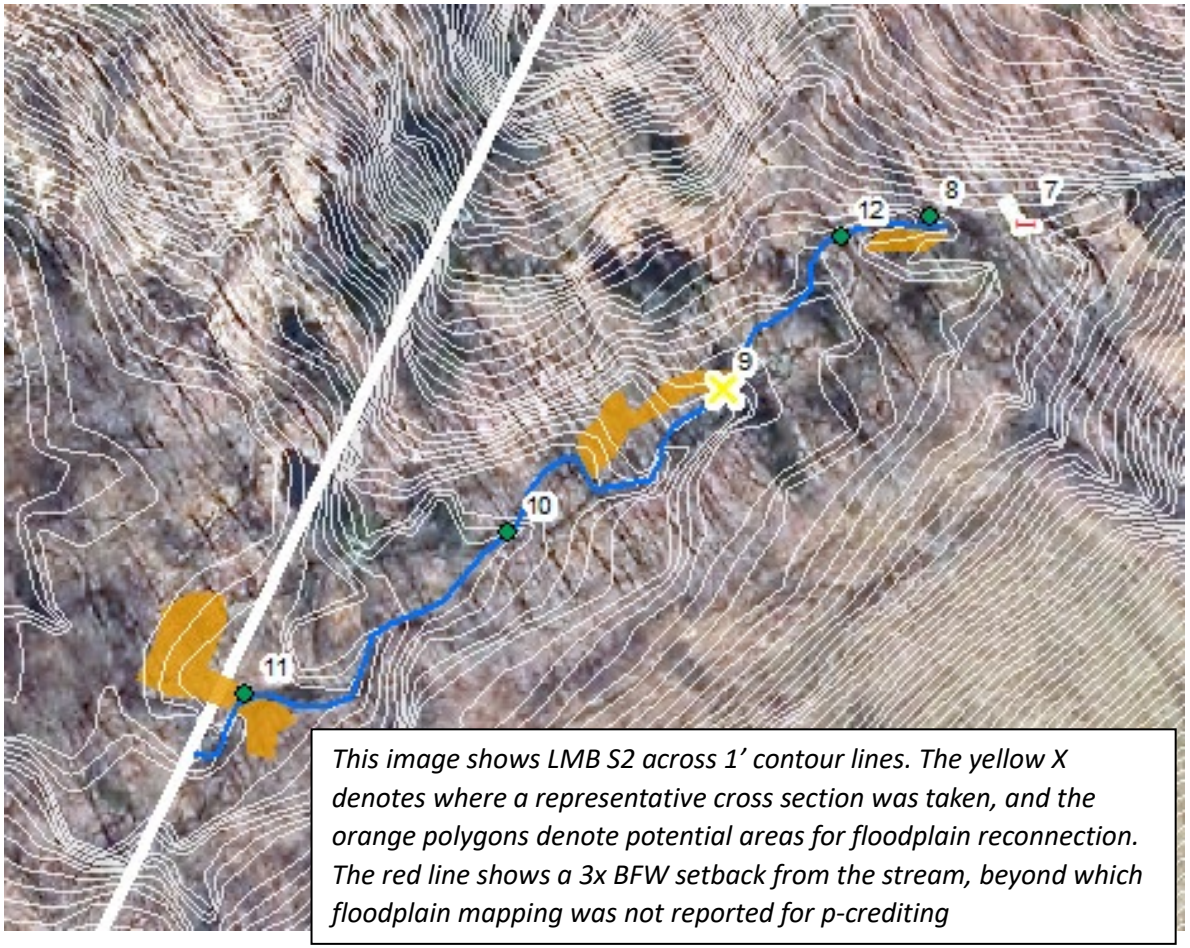
Feasible floodplain reconnection: YRB Predicted height of structure (ft): 2 Checkpoint log: no

Surveyor: JK(8/6/2024) Notes: Stream approaches large floodplain; potential reach break here. Floodplain has been frequently engaged in 2 seasons from extreme rain events particularly from a large wood jam 100 ft downstream. Wood here will reconnect floodplain at more frequent floods (5 yr flood).

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 2



This image shows LMB S2 across 1' contour lines. The yellow X denotes where a representative cross section was taken, and the orange polygons denote potential areas for floodplain reconnection. The red line shows a 3x BFW setback from the stream, beyond which floodplain mapping was not reported for p-crediting

This section of Long Meadow Brook flows southwest from just downstream of a permanent foot bridge to the western parcel boundary. Its stream corridor features low gradient floodplain along its entire reach, although this floodplain has vertically uneven terraces that indicate a dynamic history of connection, abandonment, partial reconnection from major floods, and potential frequent connection from added wood.

Almost non existent amounts of large wood indicate that evidence of recently floodplain engagement is from the severeity of recent flooding, not from structural roughness. It also indicates the stream's potential power for moving wood and that structures should emphazise weight and secureness by using as large of trees as are available without causing compromising the growth and health of the riparian forest. These feasibility constraints were considered in the data collection that follows for this reach.

Restoration objectives should maximize floodplain reengagement by adding large and secure installations. During implementation this may require spacing that is more irregular than usual (100-150 ft intervals rather than 100 ft intervals), but without compromising forest cover in any particular area. See SWA Inventory sheet for more details.

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 2	FID(see map): 8	Coordinates: 44.331916, -72.547467	
Bank full width (ft): 9	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 0	
Slope (looking upstream): 2%	Dominant substrate: Cobble	Riparian forest type: Hardwoods	Avg. DBH of riparian trees: 12-18”
Corridor type: lowgradefloodplain	Bank full height (ft): 1.5	Low floodplain Elevation (ft): 2.6	Incision Ratio: 1.73
Feasible floodplain reconnection: YLB	Predicted height of structure (ft): 3	Checkpoint log: yes	
Surveyor: JK(8/6/2024)	Notes: Good spot to engage floodplain and enhance downstream pool. Work here poses low risk to upstream bridge		

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 2	FID (see map): 9	Coordinates: 44.331674, -72.547876	
Bank full width (ft): 9.5	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 0	
Slope (looking upstream): 2%	Dominant substrate: Cobble	Riparian forest type: Hardwoods	Avg. DBH of riparian trees: 10-12”
Corridor type: lowgradefloodplain	Bank full height (ft): 1.6	Low floodplain Elevation (ft): 2.5	Incision Ratio: 1.56
Feasible floodplain reconnection: YRB	Predicted height of structure (ft): 2.5	Checkpoint log: yes	
Surveyor: JK(8/6/2024)	Notes: Anastomised above and disconnected above. Wood here at secure pinch point will capture a large floodplain		

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 2 FID(see map): 10 Coordinates: 44.331469, -72.548295

Bank full width (ft): 12 Brook trout presence: Unknown Avg.#CWM per 100 ft: 1

Slope (looking upstream): 3% Dominant substrate: Cobble Riparian forest type: Hardwoods Avg. DBH of riparian trees: 10-12”

Corridor type: lowgradefloodplain Bank full height (ft): 1.6 Low floodplain Elevation (ft): 2 Incision Ratio: 1.25

Feasible floodplain reconnection: YRB Predicted height of structure (ft): 2.2 Checkpoint log: yes

Surveyor: JK(8/6/2024) Notes: Limited potential for reconnecting floodplain due to size of trees. Banks have eroded significantly in past two years. Target lowest potential terrace

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 2 FID(see map): 11 Coordinates: 44.331215, -72.548882

Bank full width (ft): 12.5 Brook trout presence: Y Avg.#CWM per 100 ft: 0

Slope (looking upstream): 1% Dominant substrate: Cobble Riparian forest type: Hardwoods Avg. DBH of riparian trees: 10-12”

Corridor type: lowgradefloodplain Bank full height (ft): 2 Low floodplain Elevation (ft): 3 Incision Ratio: 1.5

Feasible floodplain reconnection: YBB Predicted height of structure (ft): 3 Checkpoint log: yes

Surveyor: JK(8/6/2024) Notes: Downstream end with large structure. Many small trout. Stream navigates sharp bend and leaves property and soon enters a wetland. The area has good floodplain engagement potential

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

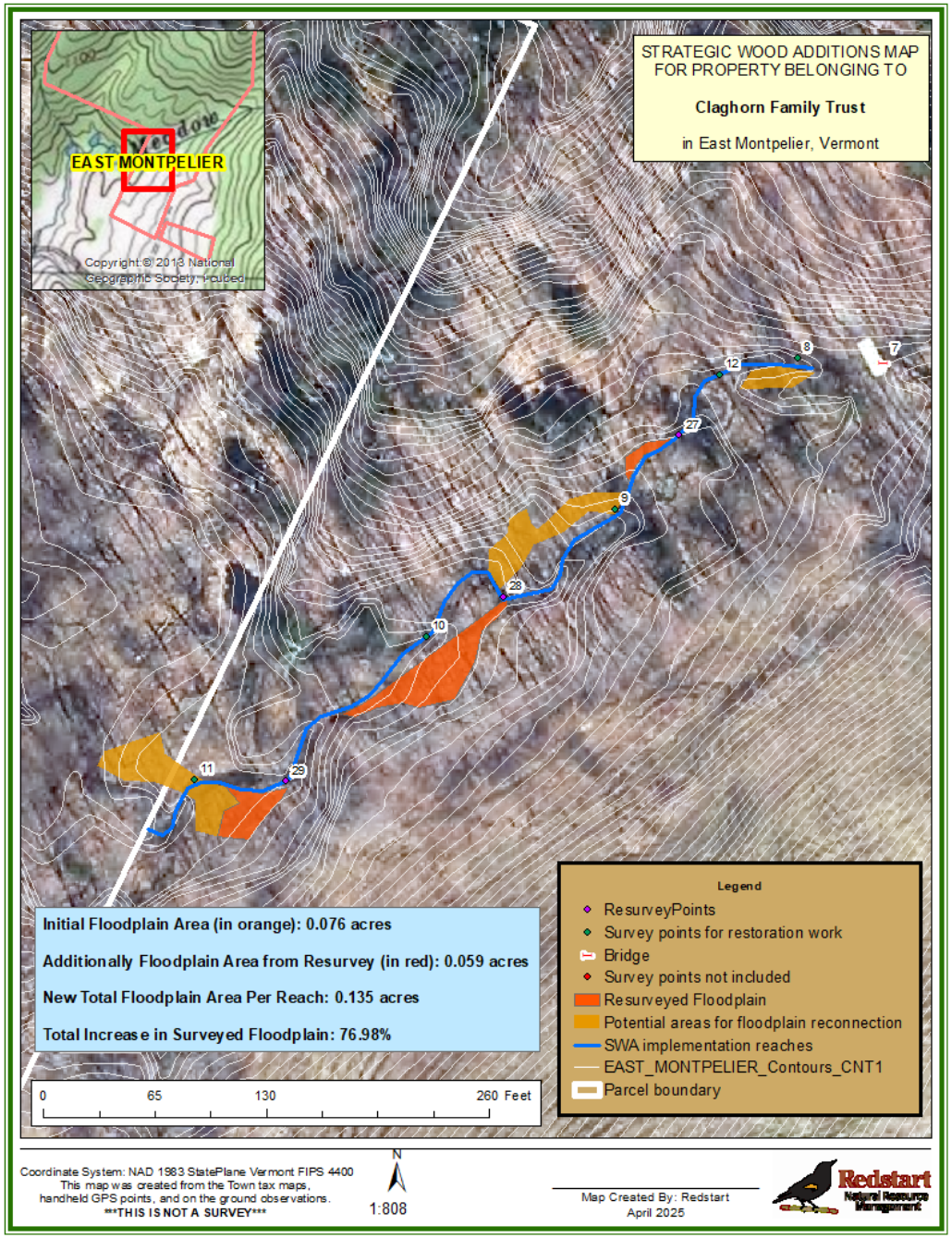
Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 2	FID(see map): 12	Coordinates: 44.331951, -72.547559	
Bank full width (ft): na	Brook trout presence: Y	Avg.#CWM per 100 ft: 0	
Slope (looking upstream): 5%	Dominant substrate: Cobble	Riparian forest type: Hardwoods	Avg. DBH of riparian trees: 10-12”
Corridor type: lowgradefloodplain	Bank full height (ft): na	Low floodplain Elevation (ft): 6	Incision Ratio: na
Feasible floodplain reconnection: YBB	Predicted height of structure (ft): na	Checkpoint log:	
Surveyor: JK(8/6/2024)	Notes: Severe downcutting. Brook trout abundant here and area seems very unstable Avoid working directly in this area and concentrate on more stable floodplains		

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 2 Resurvey



The original Final Design field scoping used a methodology based around taking representative sample points of the stream rather than a thorough scoping of all intended install points. To accomplish this, points were taken in unbiased locations at ~200ft intervals along each Segment. While this method was quite time efficient and captured the overall stream characteristics well, it also resulted in many accessible floodplains being omitted from the Final Design reporting, which subsequently skewed the projections for phosphorus reduction and overall project cost efficiency much lower than is realistic.

To remedy this, a subsampling of Long Meadow Brook was conducted. 20% of the project length was resurveyed at a more precise 100ft interval between points, representing the actual 100ft average distance between installs. The additional sampling increased the amount of potential floodplain by a total of 77% throughout the resurveyed segment. Understanding that this may not be an entirely constant increase across all of the reaches of the project, a Floodplain Ceiling and Floodplain Floor were established to offer a realistic range for the expected floodplain and associated phosphorus reduction. The Floor is the original Final Design floodplain acreage, while the ceiling extrapolates the 77% increase in floodplain across the entire project

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 2	FID(see map): 27	Coordinates: 44.3318,-72.5478	
Bank full width (ft): 10	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 0	
Slope (looking upstream): 5%	Dominant substrate: Cobble	Riparian forest type: Hardwoods	Avg. DBH of riparian trees: 10-12”
Corridor type: lowgradefloodplain	Bank full height (ft): 1.25	Low floodplain Elevation (ft): 1.75	Incision Ratio: 1.4
Feasible floodplain reconnection: YRB	Predicted height of structure (ft): 2.5	Checkpoint log: no	
Surveyor: FL(4/2/25)	Notes: Resurvey point		

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 2	FID(see map): 28	Coordinates: 44.3314,-72.5483	
Bank full width (ft): 17	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 0	
Slope (looking upstream): 5%	Dominant substrate: Cobble	Riparian forest type: Hardwoods	Avg. DBH of riparian trees: 10-12”
Corridor type: lowgradefloodplain	Bank full height (ft): 0.9	Low floodplain Elevation (ft): 1.1	Incision Ratio: 1.22
Feasible floodplain reconnection: YLB	Predicted height of structure (ft): 2.5	Checkpoint log: yes	
Surveyor: FL(4/2/2025)	Notes: Resurvey Point		

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Segment 2	FID(see map): 29	Coordinates: 44.3312,-72.5487	
Bank full width (ft): 9.7	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 0	
Slope (looking upstream): 5%	Dominant substrate: Cobble	Riparian forest type: Hardwoods	Avg. DBH of riparian trees: 10-12”
Corridor type: lowgradefloodplain	Bank full height (ft): 1.2	Low floodplain Elevation (ft): 1.9	Incision Ratio: 1.58
Feasible floodplain reconnection: YLB	Predicted height of structure (ft): 2.5	Checkpoint log: no	
Surveyor: FL(4/2/2025)	Notes: Resurvey Point		

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 1

This image shows LMB Trib 1 (highlighted in brighter blue) across 1' contour lines. The yellow X denotes where a representative cross section was taken, and the orange polygons denote potential areas for floodplain reconnection. The red lines show a 3x BFW setback from the stream, beyond which floodplain mapping was not reported for p-crediting

This 1st order stream flows south along a corridor that features high gradient floodplains and steady moderate slopes**.** It was noted that many drainages upstream of this stream experienced severe washouts in 2023, and lots of sediment was deposited upstream of point 21 where the reach begins.

2023 flooding had dramatic impacts along this stream, resulting in severe incision at certain locations and deposition of cobble, gravel, and sediment in others. A small wood jam has begun to occur at point 17 and this could be fortified by SWA to provide an obstacle that more frequently connects the downstream floodplain.

Floodplain reconnection would be the primary restoration objective along this reach. Most assessment points had feasible opportunities for floodplain reconnection. A few other areas had incision ratios that were greater than 2 that would likely be infeasible for locations for SWA to engage the floodplains. However, installing structures at regular 100 ft intervals that mostly align with floodplain reconnection, while in other locations reducing incision and providing stability and improved habitat will have a positive impact on the stream. See SWA Inventory Sheet for more details.

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 1 | FID(see map): 14 | Coordinates: 44.333215, -72.550015

Bank full width (ft): 6 | Brook trout presence: Y | Avg.#CWM per 100 ft: 2

Slope (looking upstream): 8% | Dominant substrate: Bedrock | Riparian forest type: Mixed Woods | Avg. DBH of riparian trees: 10-12”

Corridor type: rock outcrops | Bank full height (ft): 1.4 | Low floodplain Elevation (ft): na | Incision Ratio: na

Feasible floodplain reconnection: N | Predicted height of structure (ft): 2.5 | Checkpoint log: no

Surveyor: JK(8/6/2024) | Notes: Downstream end above steep cascade good place to catch sediment and aggrade stream bed

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 1	FID(see map): 15	Coordinates: 44.333624, -72.549859	
Bank full width (ft): 6.5	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 1	
Slope (looking upstream): 5%	Dominant substrate: Cobble	Riparian forest type: Softwoods	Avg. DBH of riparian trees: 10-12”
Corridor type: highgradefloodplain	Bank full height (ft): 0.6	Low floodplain Elevation (ft): 1.7	Incision Ratio: 2.83
Feasible floodplain reconnection: YBB	Predicted height of structure (ft): 2	Checkpoint log: no	
Surveyor: JK(8/6/2024)	Notes: A few small structures could provide consistent but limited area of floodplain engagement through here		

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 1	FID(see map): 16	Coordinates: 44.334045, -72.550018	
Bank full width (ft): 7	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 2	
Slope (looking upstream): 7%	Dominant substrate: Cobble	Riparian forest type: Mixed Woods	Avg. DBH of riparian trees: 10-12”
Corridor type: highgradefloodplain	Bank full height (ft): 0.8	Low floodplain Elevation (ft): 4	Incision Ratio: 5
Feasible floodplain reconnection: YBB	Predicted height of structure (ft): 2.5	Checkpoint log: yes	
Surveyor: JK(8/6/2024)	Notes: Very incised. Floodplain could be engaged from above but more sediment will be captured by large install here		

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 1	FID(see map): 17	Coordinates: 44.33424, -72.549767	
Bank full width (ft): 5	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 2	
Slope (looking upstream): 3%	Dominant substrate: Cobble	Riparian forest type: Mixed Woods	Avg. DBH of riparian trees: 10-12”
Corridor type: lowgradefloodplain	Bank full height (ft): 0.8	Low floodplain Elevation (ft): 0.8	Incision Ratio: 1
Feasible floodplain reconnection: YBB	Predicted height of structure (ft): 2	Checkpoint log: yes	

Surveyor: JK(8/6/2024) Notes: Stream is heavily disturbed and aggraded from washed out earth upstream. Channel measurements taken at nearest point upstream while floodplain reconnection target point is at flagging on dead hemlock. Wood is beginning to build up here and the largest area of potential floodplain reconnection is directly downstream of this point

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 1	FID(see map): 18	Coordinates: 44.334483, -72.549464	
Bank full width (ft): 6	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 0	
Slope (looking upstream): 7%	Dominant substrate: Cobble	Riparian forest type: Mixed Woods	Avg. DBH of riparian trees: 10-12”
Corridor type: highgradefloodplain	Bank full height (ft): 0.8	Low floodplain Elevation (ft): 1.2	Incision Ratio: 1.5
Feasible floodplain reconnection: YBB	Predicted height of structure (ft): 1.5	Checkpoint log: no	
Surveyor: JK(8/6/2024)	Notes:		

Photo looking downstream (flagging at bank full stage)

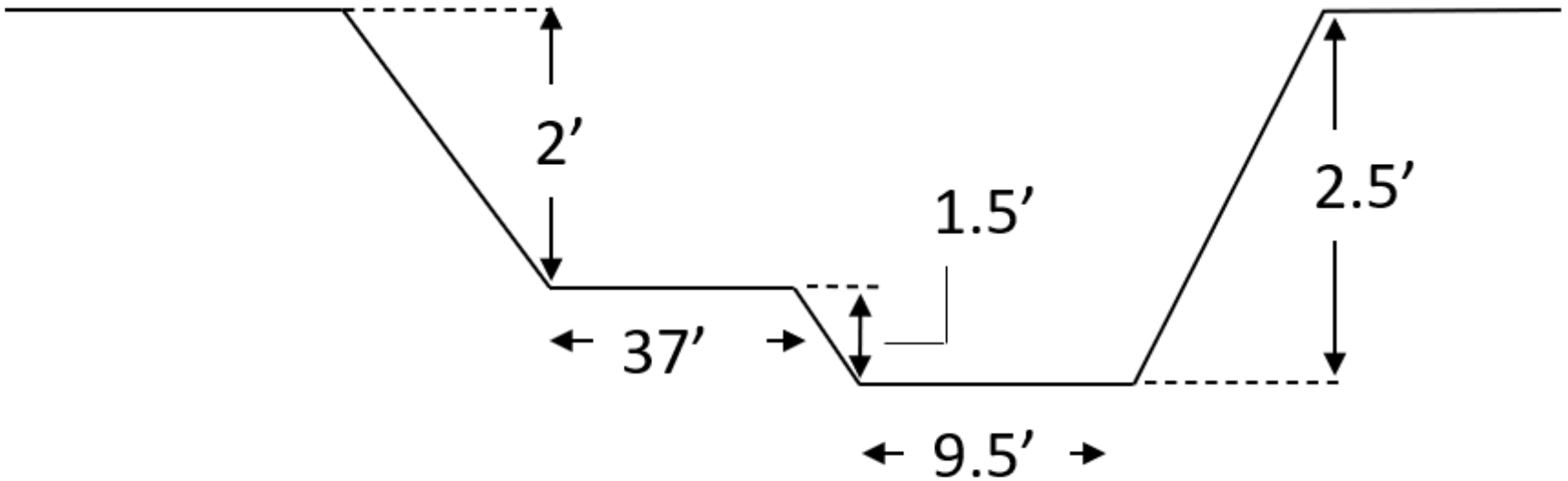
Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 1	FID(see map): 19	Coordinates: 44.334834, -72.54919	
Bank full width (ft): 6	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 0	
Slope (looking upstream): 3%	Dominant substrate: Cobble	Riparian forest type: Mixed Woods	Avg. DBH of riparian trees: 12-18”
Corridor type: lowgradefloodplain	Bank full height (ft): 1	Low floodplain Elevation (ft): 1.2	Incision Ratio: 1.2
Feasible floodplain reconnection: YLB	Predicted height of structure (ft): 1.5	Checkpoint log: no	
Surveyor: JK(8/6/2024)	Notes: Typical point along reach		

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Long Meadow Brook Segment 1 –
Representative Cross section (FID 2)
looking upstream



Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 1	FID(see map): 21	Coordinates: 44.334978, -72.549047	
Bank full width (ft): 5	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 0	
Slope (looking upstream): 3%	Dominant substrate: Gravel	Riparian forest type: Mixed Woods	Avg. DBH of riparian trees: 10-12”
Corridor type: lowgradefloodplain	Bank full height (ft): 1	Low floodplain Elevation (ft): 2.5	Incision Ratio: 2.5
Feasible floodplain reconnection: YLB	Predicted height of structure (ft): 2	Checkpoint log: no	
Surveyor: JK(8/6/2024)	Notes: Upstream start at area of severe downcutting		

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

This image shows LMB Trib 2 across 1' contour lines. The yellow X denotes where a representative cross section was taken, and the orange polygons denote potential areas for floodplain reconnection. The red lines show a 3x BFW setback from the stream, beyond which floodplain reconnection was not reported for p-crediting.

Stream Name: LMB Trib 2

Despite having a very small drainage area of 8 acres, this 1st order stream has undergone significant widening and deepening recently, and also clearly exported a log of sediments. This is likely to continue and worsen as it has become more incised.

The upstream start is located just below a foot trail crossing. Above this point the stream was less blown out and appeared to have more coarse wood material.

Although it is not a long proposed area of stream restoration, there are some significant areas for floodplain restoration along the reach. Along the middle section of the reach where the stream is steepest and most incised, wood additions will not create floodplain access but will help to reduce peak velocities and prevent further erosion. See SWA inventory sheet for more details.

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 2 FID(see map): 22 Coordinates: 44.334483, -72.549464

Bank full width (ft): 4 Brook trout presence: Unknown Avg.#CWM per 100 ft: 0

Slope (looking upstream): 10% Dominant substrate: Gravel Riparian forest type: Mixed Woods Avg. DBH of riparian trees: 10-12”

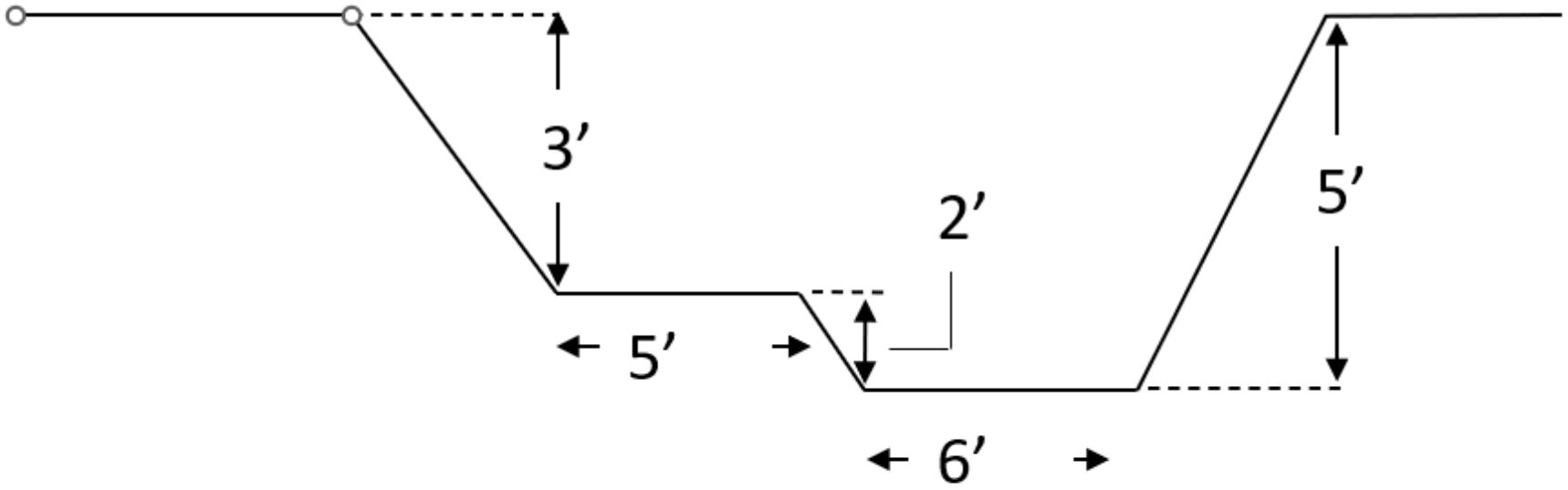
Corridor type: highgradefloodplain Bank full height (ft): 1 Low floodplain Elevation (ft): 2 Incision Ratio: 2

Feasible floodplain reconnection: YRB Predicted height of structure (ft): 2.2 Checkpoint log: no

Surveyor: JK(8/6/2024) Notes: Upstream start. Feasible to reconnect floodplain here

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Long Meadow Brook Tributary 2 – Representative Cross section (FID 22) looking upstream



Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 2	FID(see map): 23	Coordinates: 44.334195, -72.549262	
Bank full width (ft): 6	Brook trout presence: Unknown	Avg.#CWM per 100 ft: 1	
Slope (looking upstream): 14%	Dominant substrate: Gravel	Riparian forest type: Softwoods	Avg. DBH of riparian trees: 10-12”
Corridor type: highgradefloodplain	Bank full height (ft): 1.1	Low floodplain Elevation (ft): 2.8	Incision Ratio: 2.56
Feasible floodplain reconnection: N	Predicted height of structure (ft): 2.5	Checkpoint log: yes	
Surveyor: JK(8/6/2024)	Notes: Too incised to reconnect along here. Focus on sediment capture within channel		

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 2 FID(see map): 24 Coordinates: 44.333916, -72.549709

Bank full width (ft): 7.5 Brook trout presence: Unknown Avg.#CWM per 100 ft: 1

Slope (looking upstream): 10% Dominant substrate: Cobble Riparian forest type: Softwoods Avg. DBH of riparian trees: 12-18”

Corridor type: lowgradefloodplain Bank full height (ft): 0.8 Low floodplain Elevation (ft): 1.3 Incision Ratio: 1.625

Feasible floodplain reconnection: YLB Predicted height of structure (ft): 2 Checkpoint log: yes

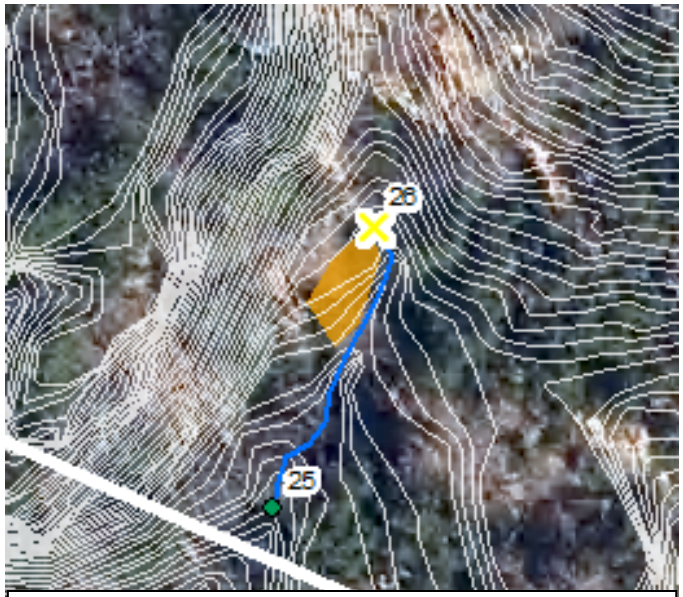
Surveyor: JK(8/6/2024) Notes: Stream flattens here at approach to trib 1 with opportunity for floodplain engagement. Large install at spot of flagged measurement will maximize floodplain connection here

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 3



This image shows LMB Trib 3 across 1' contour lines. The yellow X denotes where a representative cross section was taken, and the orange polygons denote potential areas for floodplain reconnection. The red line shows where a 3x BWF setback was applied to constrain crediting of floodplain reconnection.

Similar to Trib 2, this small 1st order stream has a very small watershed that experienced severe flooding and storm flow in recent years. It has undergone worsening incision and bank erosion, which will likely worsen now that coarse wood material has been flushed away. This headcutting and bank erosion occurs mostly at and below point 26 where the planned work begins. Above this point the channel is lower slope and has adequate amounts of wood material in the channel.

SWA implementation will concentrate on floodplain engagement where it is feasible, but added wood will also benefit the stream by capturing sediment in-stream and by reducing peak velocities. See SWA inventory sheet for more details.

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 3 FID(see map): 25 Coordinates: 44.332687, -72.548468

Bank full width (ft): 5.5 Brook trout presence: Unknown Avg.#CWM per 100 ft: 0

Slope (looking upstream): 7% Dominant substrate: Cobble Riparian forest type: Mixed Woods Avg. DBH of riparian trees: 10-12”

Corridor type: V-shaped Bank full height (ft): 0.7 Low floodplain Elevation (ft): na Incision Ratio: na

Feasible floodplain reconnection: N Predicted height of structure (ft): 2 Checkpoint log: no

Surveyor: JK(8/6/2024) Notes: Downstream end at property boundary (pink flag and barbed wire)

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: LMB Trib 3 FID(see map): 26 Coordinates: 44.332961, -72.54829

Bank full width (ft): 4 Brook trout presence: Unknown Avg.#CWM per 100 ft: 1

Slope (looking upstream): 8% Dominant substrate: Gravel Riparian forest type: Softwoods Avg. DBH of riparian trees: 12-18”

Corridor type: highgradefloodplain Bank full height (ft): 0.7 Low floodplain Elevation (ft): 1.2 Incision Ratio: 1.71

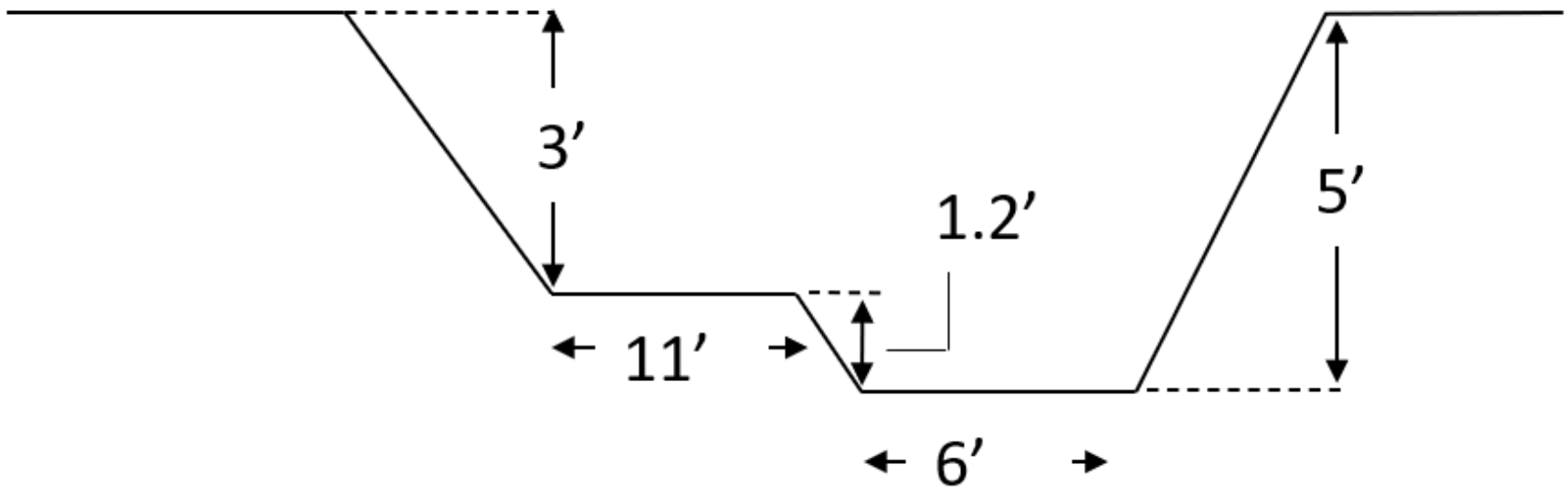
Feasible floodplain reconnection: YRB Predicted height of structure (ft): 2Checkpoint log: no

Surveyor: JK(8/6/2024) Notes: Severe bank erosion

Photo looking downstream (flagging at bank full stage)

Photo looking upstream: (flagging at bank full stage)

Long Meadow Brook Tributary 3 – Representative Cross section (FID 26) looking upstream



Additional documentation points not included in planned restoration areas.

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: NA FID(see map): 20 Coordinates: 44.335292, -72.549154

Surveyor: JK(8/6/2024) Notes: Massive deposition along here from washouts above. Stream is aggraded to low floodplain elevation

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: NA FID(see map): 6 Coordinates: 44.33282, -72.54605

Surveyor: JK(8/6/2024) Notes: large natural wood jam is inducing floodplain engagement (100 yr flood). Aggradation above and scouring below. Avoid restoration here and start next reach below bridge

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Final Design Report: Long Meadow Brook Strategic Wood Additions

Stream Name: Bridge FID(see map): 7 Coordinates: 44.331922, -72.547224

Surveyor: JK(8/6/2024) Notes: Bank spanning iron bridge with concrete abutments. Bridge is in floodplain with anastomising channel to south

	
Photo looking downstream (flagging at bank full stage)	Photo looking upstream: (flagging at bank full stage)

Glossary of Terms For SWA

Acronyms:

SWA: Strategic Wood Additions.

CWM: Coarse Wood Material. Defined as wood pieces within bankfull stage that are at least 4 inches diameter and 6 feet in length. Pieces are counted to the amount of coarse wood material in the stream channel per hundred feet.

YLB: Yes, Left Bank. Indicates the presence of an adjacent floodplain pocket on the left bank when facing downstream. It is assessed to be feasible for reconnection on a more frequent basis (2-5yr flood event) and will most likely be targeted for a wood addition structure during implementation.

YRB: Yes, Right Bank. Indicates the presence of an adjacent floodplain pocket on the right bank when facing downstream. It is assessed to be feasible for reconnection on a more frequent basis (2-5yr flood event) and will most likely be targeted for a wood addition structure during implementation.

YBB: Yes, Both Banks. Indicates the presence of a potential accessible floodplain on both banks. It will be attempted to reconnect both with SWA, either with one large structure or potentially two small wood installations if the pockets are staggered along the length of the stream.

DBH: Diameter at Breast Height. A measurement of tree diameter, typically taken at 4.5' from the base. Only stems of over 5 inches DBH are considered as viable trees for SWA and averaged when assessing the riparian forest.

Measurements:

Bankfull Width: The width of a given stream in a 2-year flood.

Bankfull Height: The height of a given stream in a 2-year flood. Bank full dimensions can be difficult to measure in headwater streams, and is indicated by a combination of terrain, riparian vegetation such as mosses, different levels of exposed rocks and roots, and alluvial deposits of sediment and organic matter.

Incision Ratio: The ratio of floodplain height compared to bankfull height. A higher incision indicates a more and more disconnected floodplain.

Floodplain Height: Measured as the distance from the channel thalweg to the lowest plane adjacent to the stream that has been flooded historically but is abandoned by the channel due to the removal of late-successional forest. In order to be seen as a potential accessible floodplain, the floodplain height may not exceed 2.5x bankfull height, or <2.5 incision ratio. Floodplains at areas of higher incision are not eligible for stability crediting, but may still be reconnected by SWA during higher magnitude flood events.

Floodplain Area: Floodplain areas are relatively even terrain adjacent to the stream, and often referred to individually as "pockets". When more frequent flooding is instigated by SWA, the reconnected floodplain areas can extend downstream alongside the channel, and in lower slope areas can also extend upstream. To be eligible for stability crediting, reconnected floodplain has a limit of up to 3x bankfull width lateral distance from the edge of stream channel, or up to 50ft in sub-corridor units recognized by the FFI tool.

Slope: Percent grade of the channel. Measured by taking dividing the difference in elevation between points 50ft upstream and downstream of the survey point, by the 100 ft reach centered on the survey point.

Channel Corridor Types:

Low Gradient Floodplain: A floodplain with a 0-5% slope.

High Gradient Floodplain: A floodplain with a >5% slope.

Trapezoidal: No accessible floodplain is adjacent to the stream channel. The corridor has gradual sloping banks on both sides, forming a typical trapezoid shape.

Rocky Outcrop: Much of the channel corridor is made up of bedrock or large boulder deposits. Small sized floodplains may be adjacent, but typically are not.