Geomorphology & Engineering survey
Site assessment and VT tools

VERMONT

Staci Pomeroy, River Scientist
Vermont Department of Conservation
Watershed Management, Rivers Program
111 West Street | Essex Jct., VT 05452
802-490-6191 cell
staci.pomeroy@vermont.gov
http://dec.vermont.gov/watershed/rivers

Assessment and Design Overview

Independent Variables

(Assessment)

- Physical Site Constraints
- Valley Slope
- Valley Confinement
- Discharge
- Stream Power ($\Omega=\gamma QS$)
- Existing Floodplain Dimensions
- Floodplain Connectivity
  - Entrenchment
  - Incision
- Channel Evolution
- Sediment and Large Wood

Increasing complexity and variables that may drop out of basic assessment during quick emergency repairs.

Dependent Variables

(Design)

- Floodplain Elevation, Width, Length, and Slope
- Floodplain Connectivity
- Channel Pattern, Sinuosity, and Dynamics
- Excavation or Fill Volume
- Fill Disposal Areas
- Stabilization Measures
- Vegetative cover
- Floodplain features (oxbows, wetlands, etc.)

(MMI and FEA, 2019)

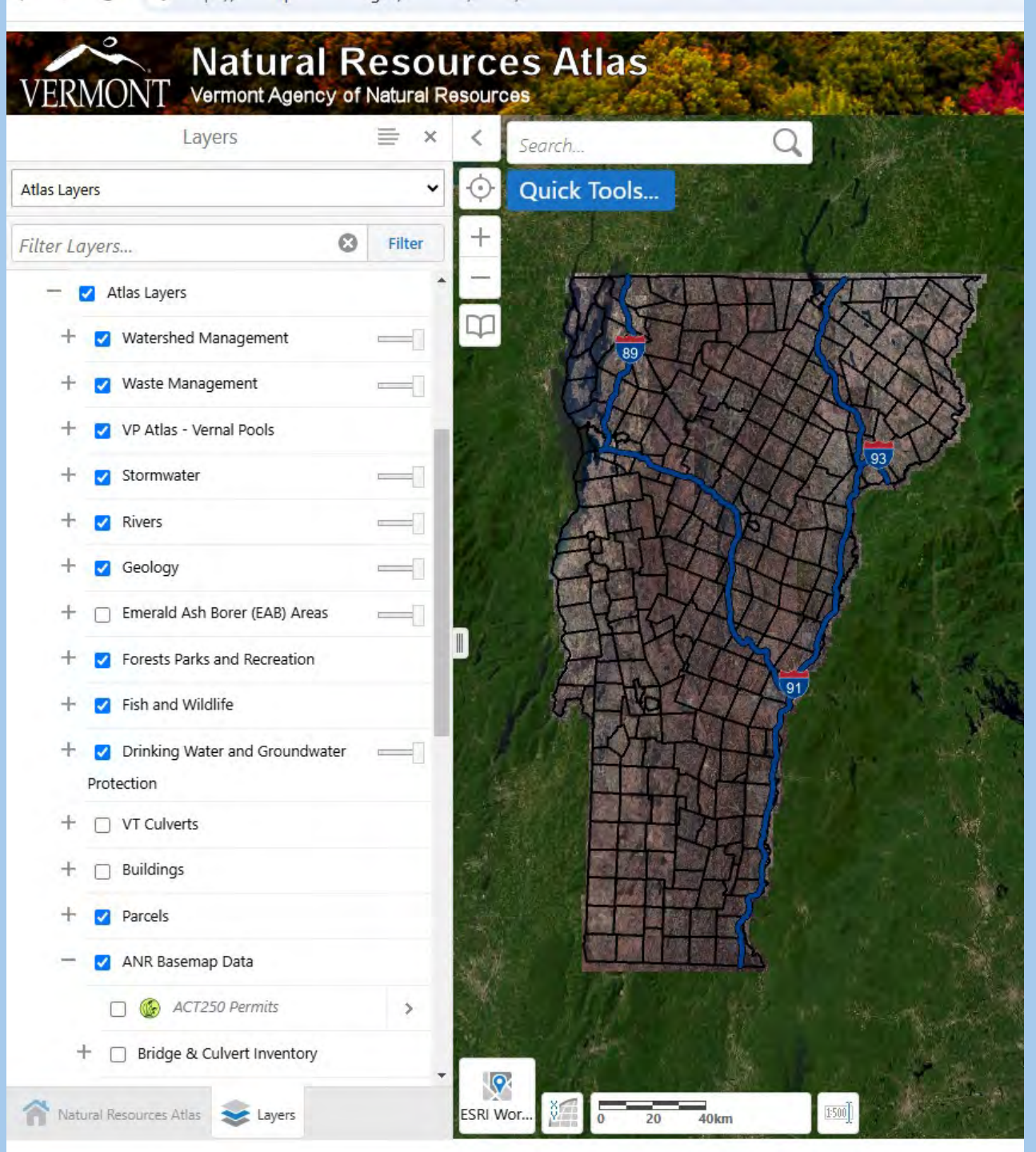
Additional Assessment and Water Quality Overview
At your site
&
Upstream & Downstream of your Site

- Dam Hazard Class
- Stream Geomorphic & Habitat Condition
- Stream Type
- River Corridor and Floodplain Areas
- Incision Ratio
- Sediment Transport & Storage potential
- Water Quality Monitoring Data – bugs, fish, & Chemistry
- Impaired Listings
- Wetlands
- Soil Types
- Other Barriers

Assessment – Site Constraints

1. Identify surrounding infrastructure
    1. Utility & Water lines
    2. Houses, retaining walls
    3. Roads, railroads
    4. Stormwater
2. Permission from one or more landowners.
3. Cultural resources in floodplain areas.
4. Hazardous waste materials
5. Soil Disposal Areas

ANR Atlas


VERMONT
Natural Resources Atlas
Vermont Agency of Natural Resources
Layers
Atlas Layers
Filter Layers...
Filter
Atlas Layers
Watershed Management
Waste Management
VP Atlas - Vernal Pools
Stormwater
Rivers
Geology
Emerald Ash Borer (EAB) Areas
Forests Parks and Recreation
Fish and Wildlife
Drinking Water and Groundwater Protection
VT Culverts
Buildings
Parcels
ANR Basemap Data
ACT250 Permits
Bridge & Culvert Inventory
Search...
Quick Tools...
89
93
91
ESRI Wor...
0
20
40km
Natural Resources Atlas
Layers

Phase 1 & Phase 2 SGA Data

SGAT_ID
177_T7S1.01-

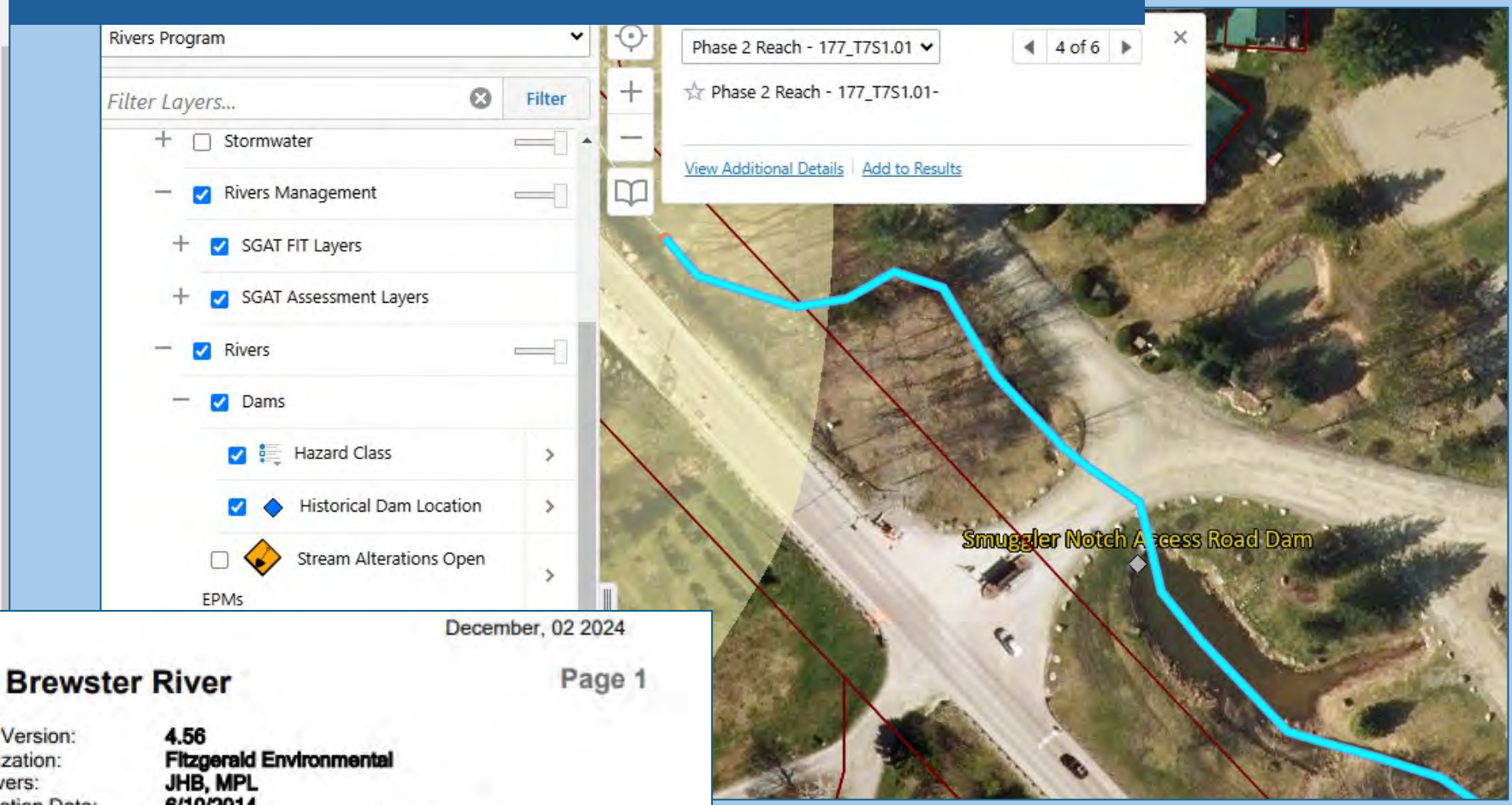
GlobalID
{B4A328AA-139F-4412-A482-E82664F51223}

Shape
N/A

ProjectName
Brewster River

URLPage1
https://anrweb.vt.gov/DEC/SGA/renderReport.aspx?repName=Phase2SegmentSummary&pid=177&rid=47&sid=0

URLPage2
https://anrweb.vt.gov/DEC/SGA/renderReport.aspx?repName=Phase2SegmentLegacySummary&pid=177&rid=47&sid=0



December, 02 2024

Phase 2 Segment Summary Report Brewster River

Page 1

Stream: **First tributary to T7**
Reach: **T7S1.01-0**
Segment Length(ft): **1,385**
Rain: **Yes**
Segment Version: Base

SGAT Version: **4.56**
Organization: **Fitzgerald Environmental**
Observers: **JHB, MPL**
Completion Date: **6/10/2014**
Qualtiy Control Status - Consultant: **Provisional**
Qualtiy Control Status - Staff: **Provisional**

Step 0 - Location: **Begins at T7.01, just downstream of the Rt 108 crossing; crosses the entrance road into Smuggler's Notch Village, follows Gateway Rd then ends 250 feet downstream of parking lot.**

Step 5 - Notes: **Man-made trout pond in the middle of the reach impounds approximately 150ft of channel and was not segmented out. Cross-section was collected in upper portion of reach but is representative of the lower reach.**

Step 7 - Narrative: **This heavily modified reach is departed to F-type and has very little opportunity to widen or adjust planform due to extensive encroachment and armoring. The majority of the reach is plane-bed likely due to bed scour and a combination of sedimentation and possible ditch maintenance dredging along the gravel parking area. Minimal erosion was indexed but the left bank was heavily scoured through most of the reach, right bank was near continuous rip-rap.**

Brewster River

River Corridor Plan

July 31, 2015

Prepared by:

Fitzgerald Environmental Associates, LLC.
18 Severance Green, Suite 203
Colchester, VT 05446

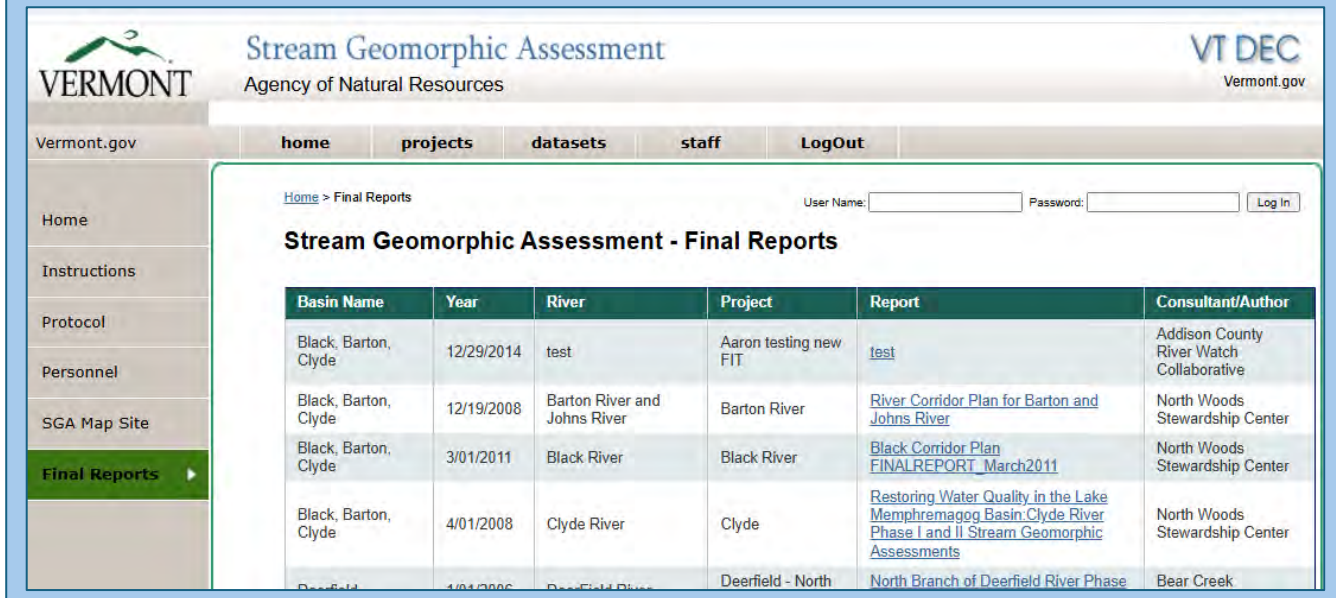
Fitzgerald Environmental Associates, LLC.
Applied Watershed Science & Ecology

Prepared under contract to:

Lamoille County Planning Commission
PO Box 1637

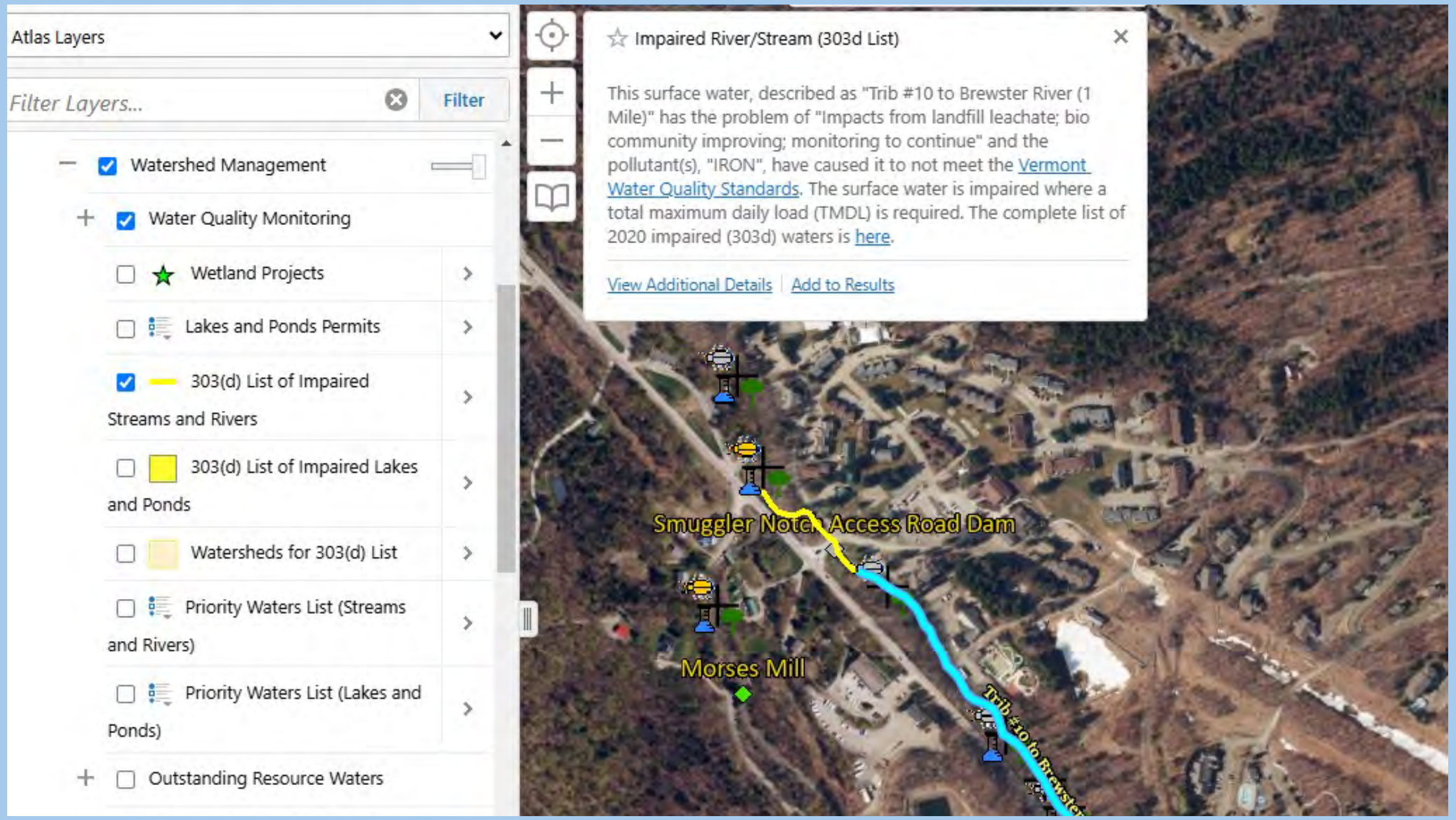
SGA Final Reports

https://anrweb.vt.gov/DEC/SGA/finalReports.aspx



Stormwater & Sediment Inputs

Impaired Listing



Monitoring Site Summary Data

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION

Monitoring Site Summary - River/Stream

Brewster River

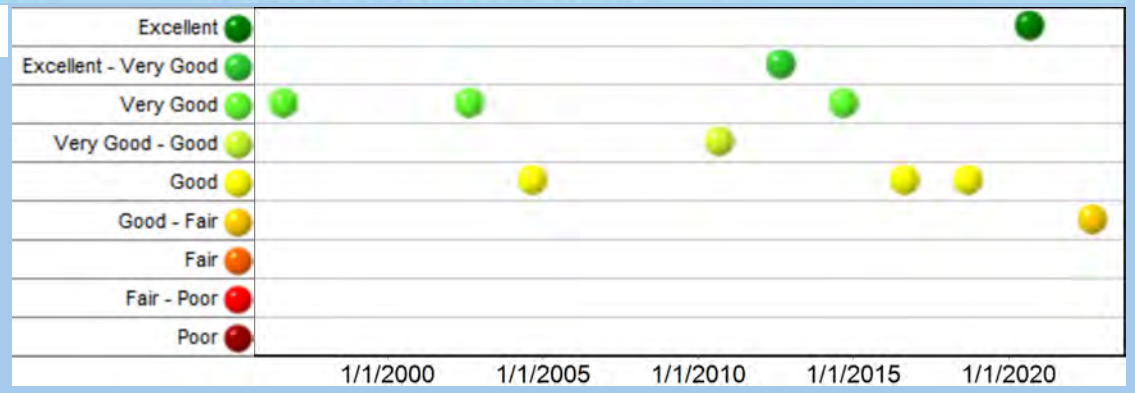
River Mile: 5.0

Located below Route 108 and Unnamed Brook at Smugglers Notch Ski area about 50m.
Cambridge, VT (44.58943, -72.79083)

Macroinvertebrate Assessment

Macroinvertebrate population Assessments are a measure of the biological integrity of the macroinvertebrate community and an indicator of the health of the aquatic biota. (For More Details)

More Info



Water Quality Measurements

Chemical and physical parameters provide a "snapshot" of current conditions and are used to detect changes in water quality and to make determinations about a waterbody and its watershed. (For More Details)

Raw Data

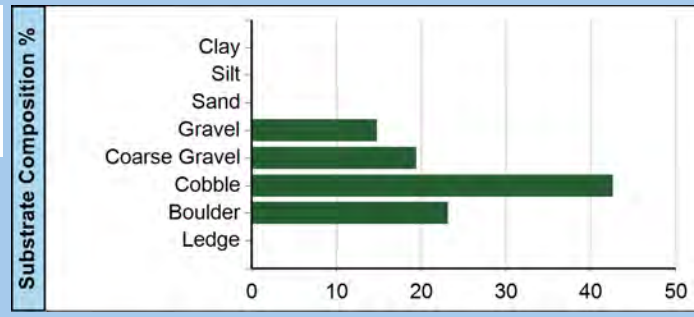
Characteristic	Description	Trend	Max	Mean	Min
Chloride (mg/L)	At elevated values mostly from deicing		13.4	13.4	13.4
Conductivity (umho/cm)			177.0	115.4	84.4

pH	Acidity		7.1	7.0	7.0
Phosphorus (ug/L)	Nutrient that may fuel algae blooms		5.0	5.0	5.0
Turbidity (NTU)	Measure of suspended sediment		0.5	0.4	0.5

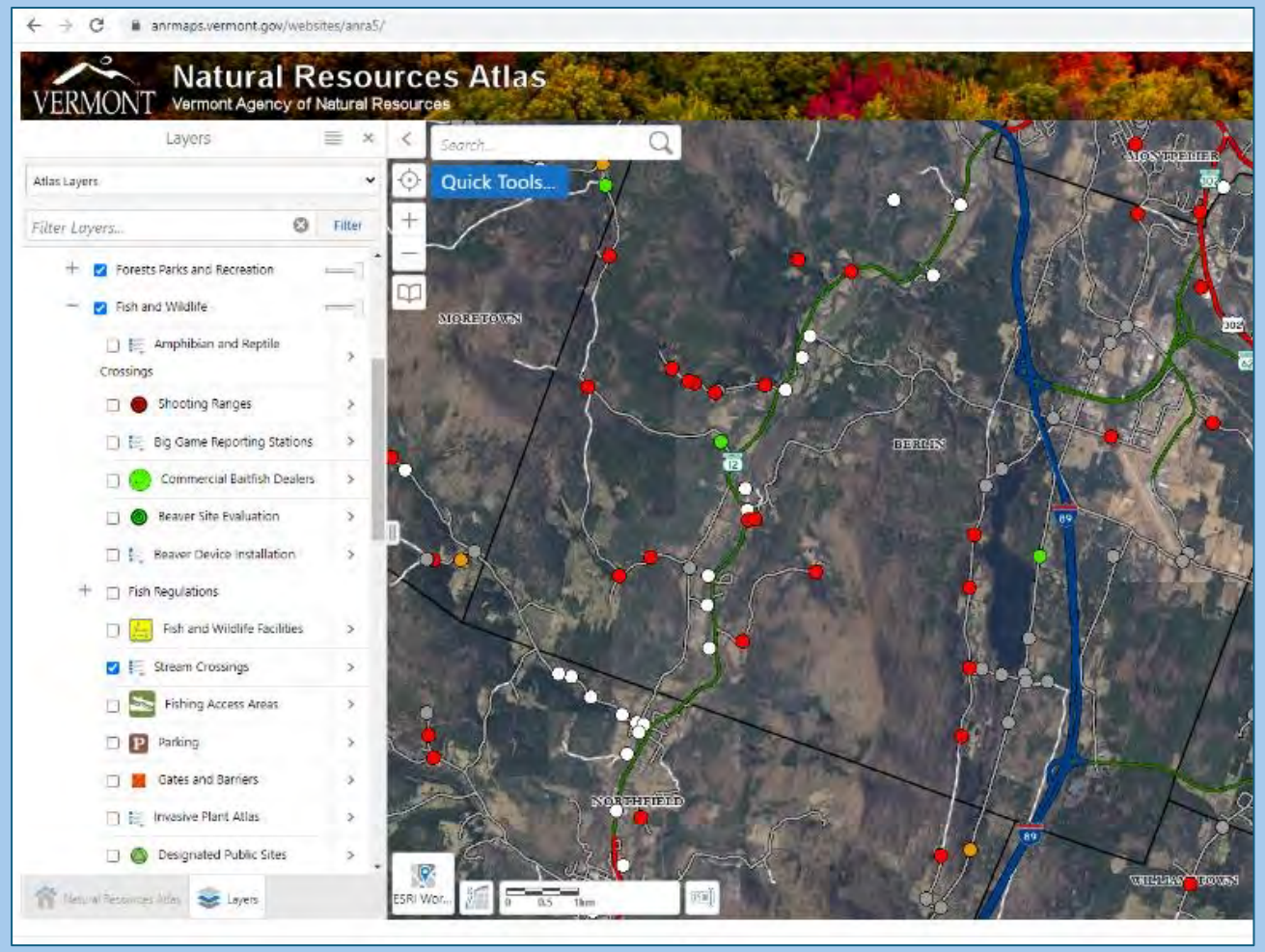
Habitat Observations

Observations on the physical condition of the waterbody can be useful in determining the habitat type present and if watershed stressors have degraded its ability to support a healthy community of aquatic biota. (For More Details)

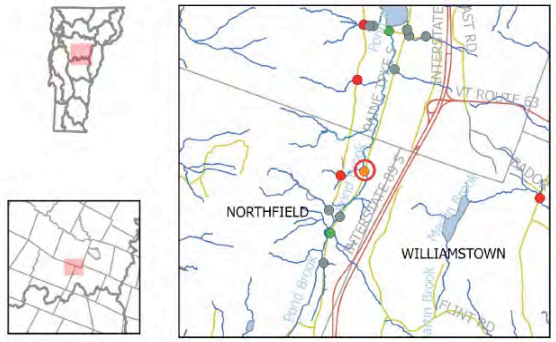
Observation Date: 9/25/2022
Habitat Type: Riffle
Embeddedness Estimated %: 25
Canopy %: 80



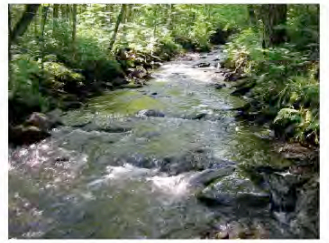
ANR Bridge & Culvert Assessments



SGAID: 401213000512131 **Assessment:** 7/26/2006 **Town:** Northfield
Stream: Pond Brook **Latitude:** 44.15657 **Longitude:** -72.59448
Location: Elevation - 1050' Last structure on Pond Brook before flowing into Berlin Pond **Road:** BERLIN POND RD, **Surface:** Gravel



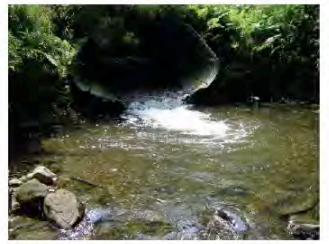
Upstream



Inlet

Downstream

Outlet



Structure

Structure (overflow):	Culvert (No)	Structure skewed:	Yes
Material:	Steel Corrugated	Floodplain filled:	Entirely
Width:	11.3 ft	Avulsion (distance):	Follow Road (500)
Height:	7.5 ft	U/S bed (bedrock):	Cobble (No)
Length:	57 ft	Struct. bed (bedrock):	Gravel ()
Footers:		D/S bed (bedrock):	Gravel (No)

Aquatic Organism Passage

Coarse screen	Orange	Pool present:	Yes
Outlet (drop):	Free Fall (0.6 ft)	Pool depth (at outlet):	ft
Backwater length:	ft	Pool depth (max):	ft
Depth at outlet:	0.3 ft	Substrate throughout:	No
Number of culverts:	1	Inlet obstructions:	None
Retrofit potential:	HHM	High Flow Stage:	No

Geomorphic Compatibility

Coarse Screen (25 max)	19	Structure slope:	Same
BFW:	14.3 ft (Measured)	Break in slope:	No
% BFW:	79.3%	U/S erosion:	None
U/S deposits (>50% BFH):	None (No)	D/S erosion:	Low
D/S scour:	Culvert	U/S armoring:	None
D/S bank > U/S Bank:	No	D/S armoring:	None
Approach angle:	Mild Bend	Steep riffle:	No

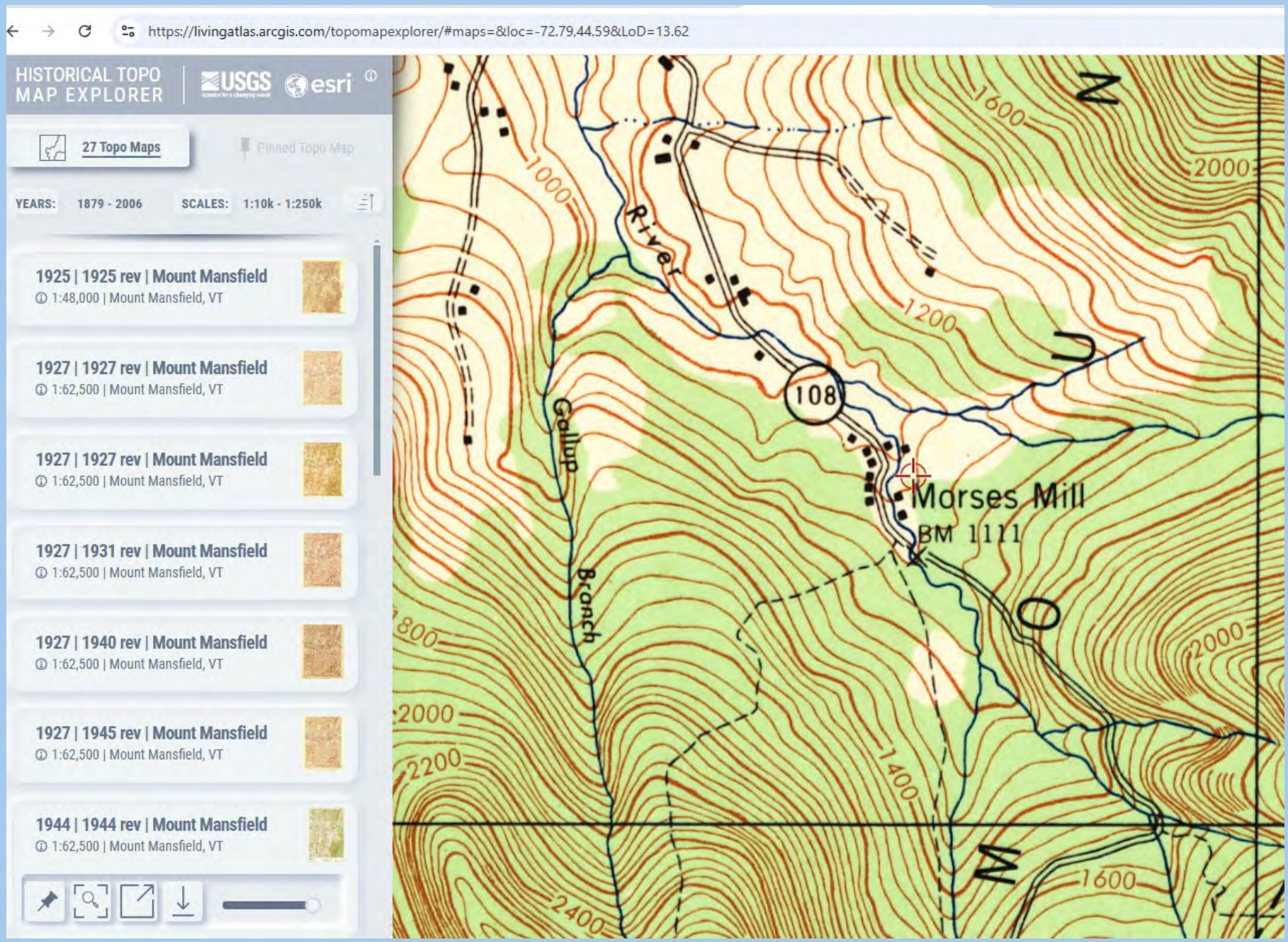
Stream Network

U/S Total:	8.9 mi	U/S Mainstem:	0.7 mi
U/S Net	1.4 mi	Net:	1.4 mi
U/S, D/S Barriers:	1, 4		

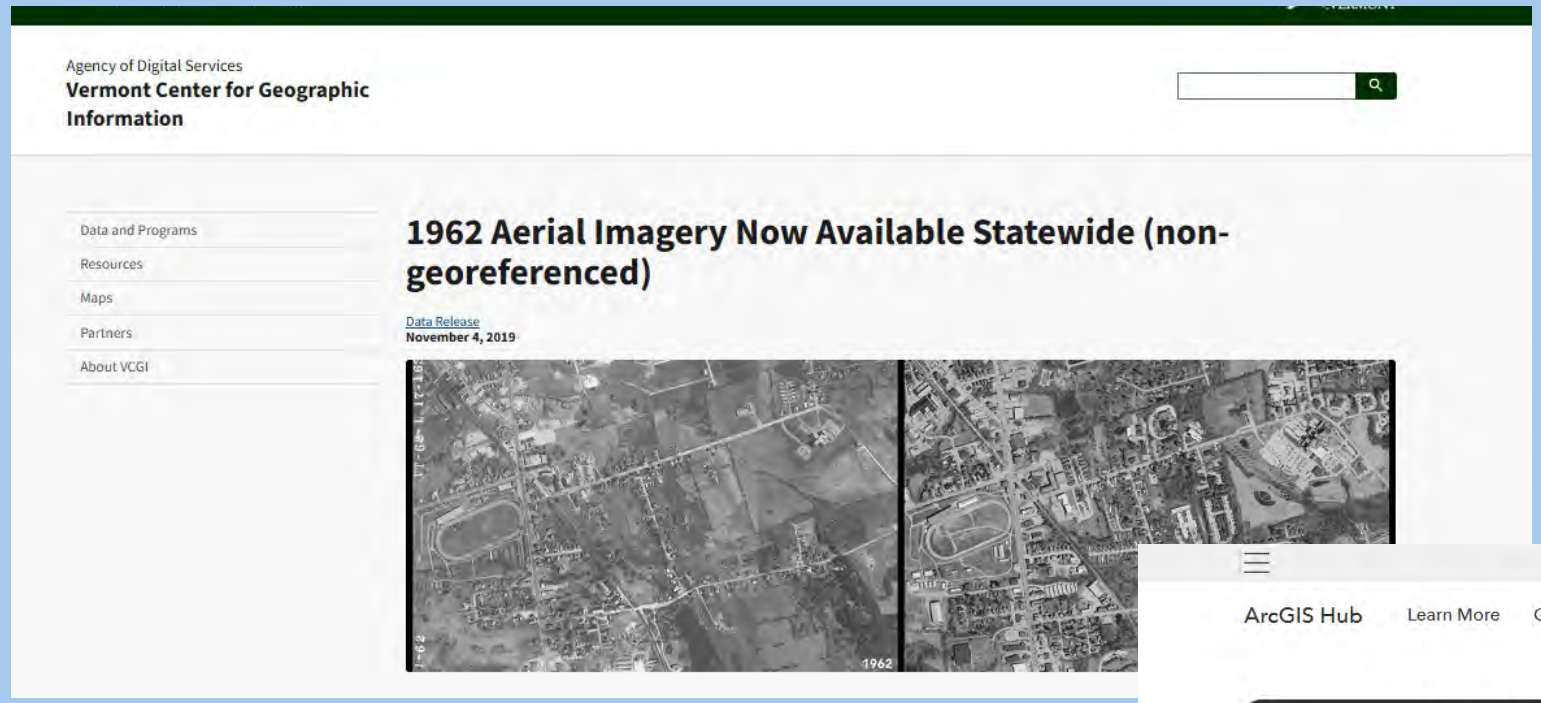
Comment: Squished culvert shapped like an arch culvert but all steel

USGS Historic Topo Maps

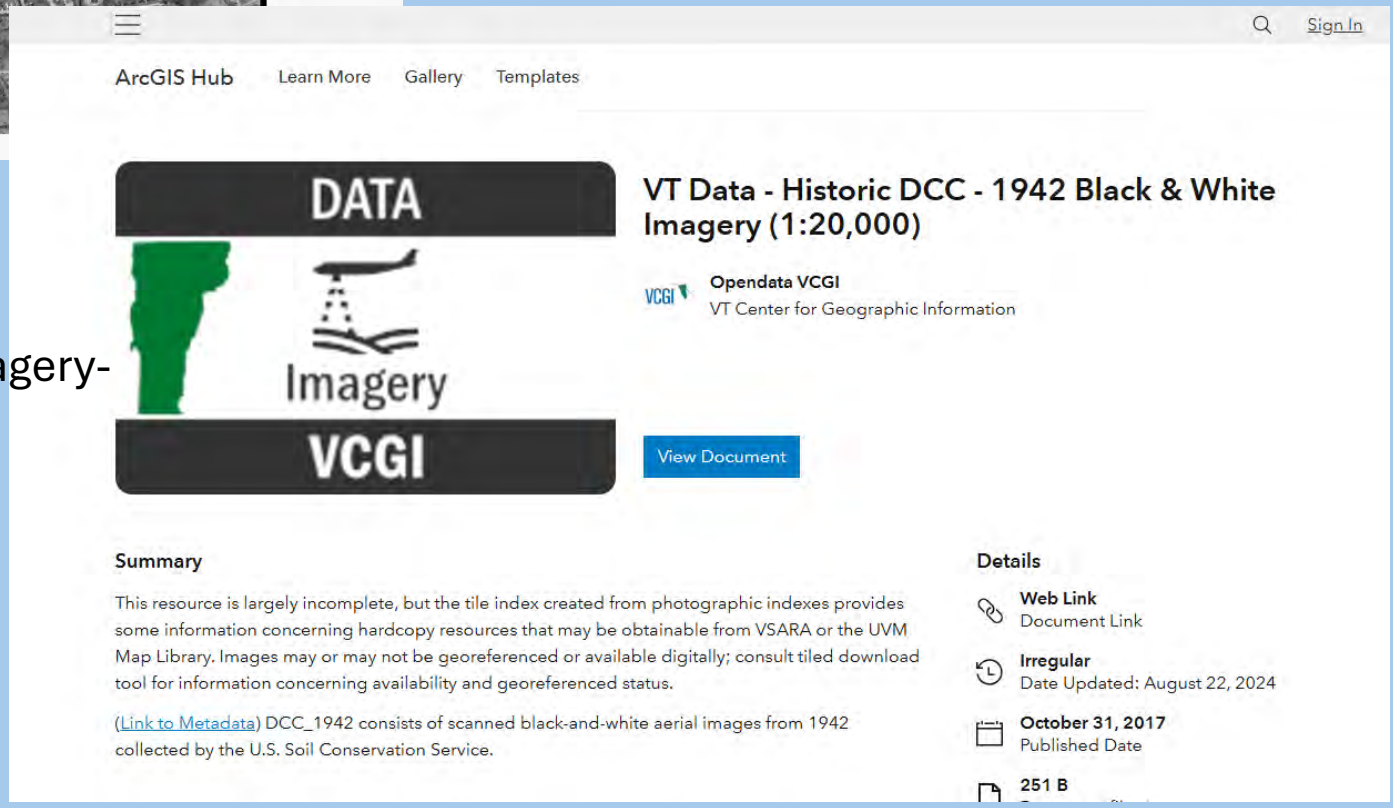
https://livingatlas.arcgis.com/topomapexplorer/#maps=&loc=-72.79,44.59&LoD=13.62



Historic & Recent Imagery



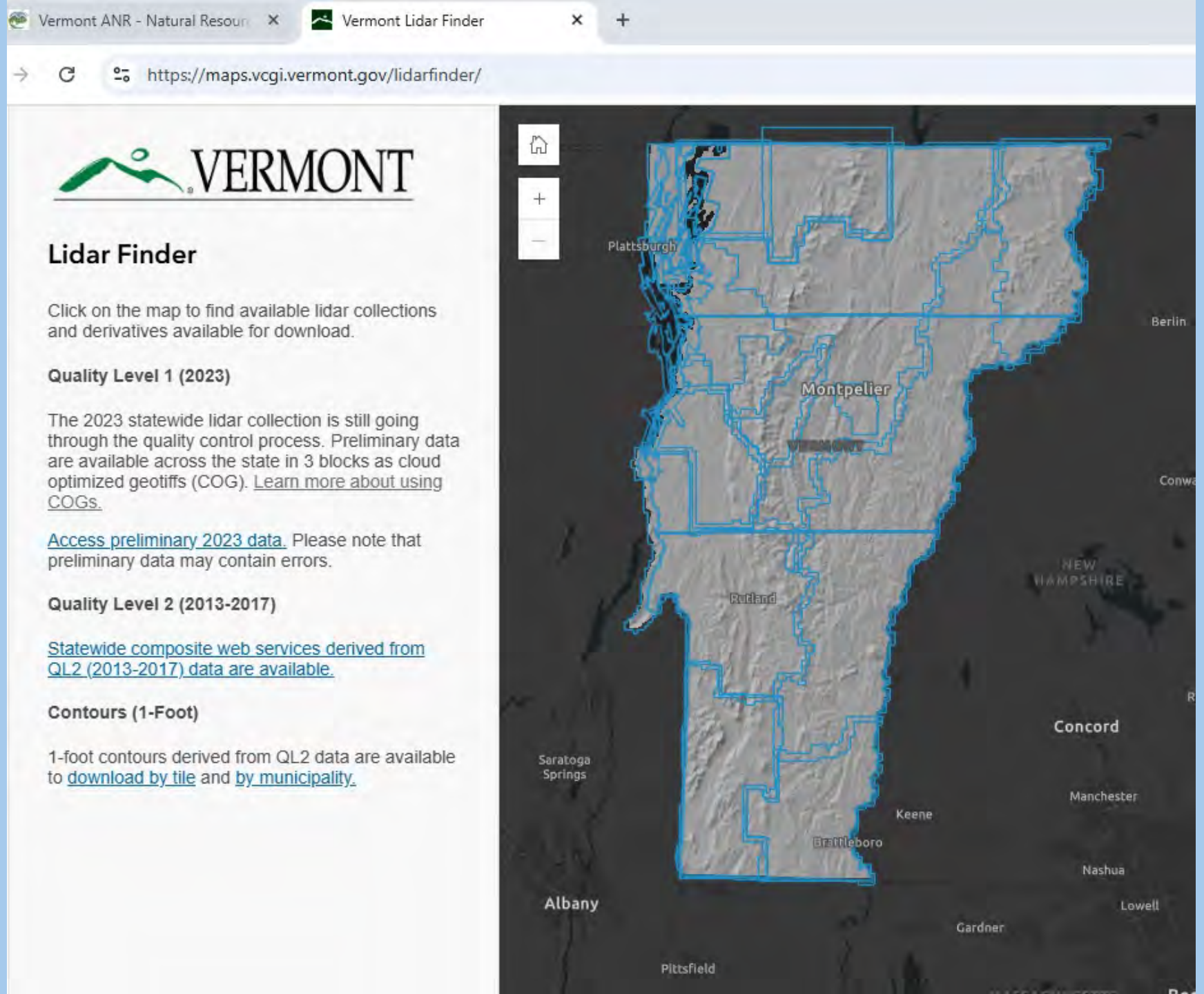
https://vcgi.vermont.gov/data-release/1962-aerial-imagery-now-available-statewide-non-georeferenced



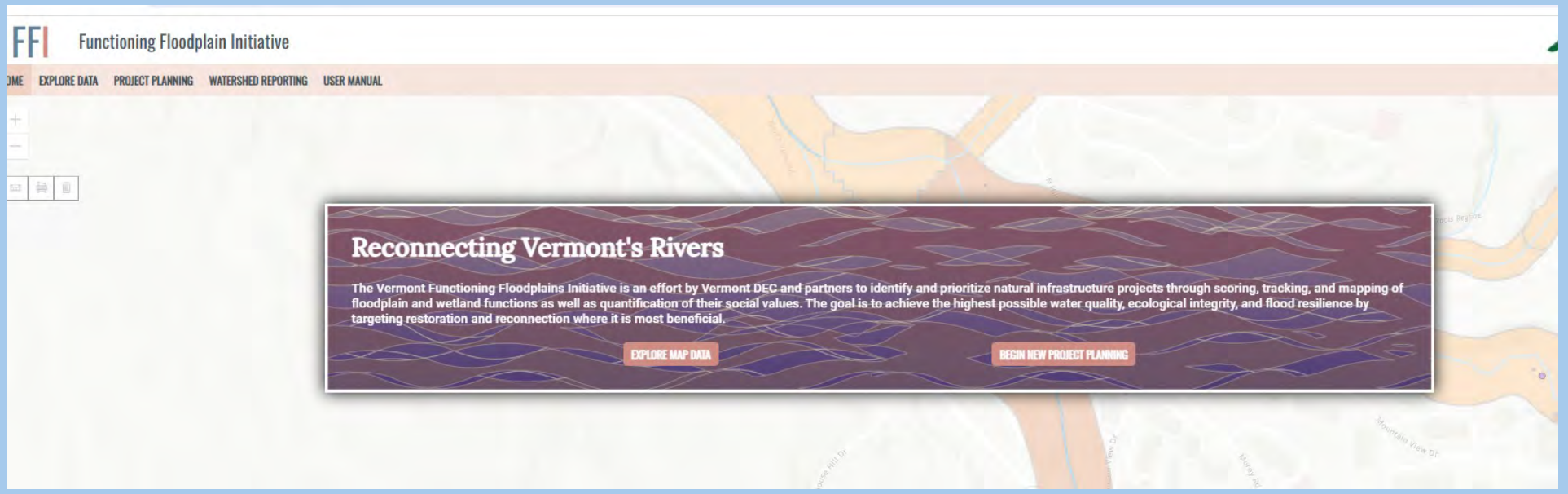
https://hub.arcgis.com/documents/VCGI::vt-data-historic-dcc-1942-black-white-imagery-120000/about

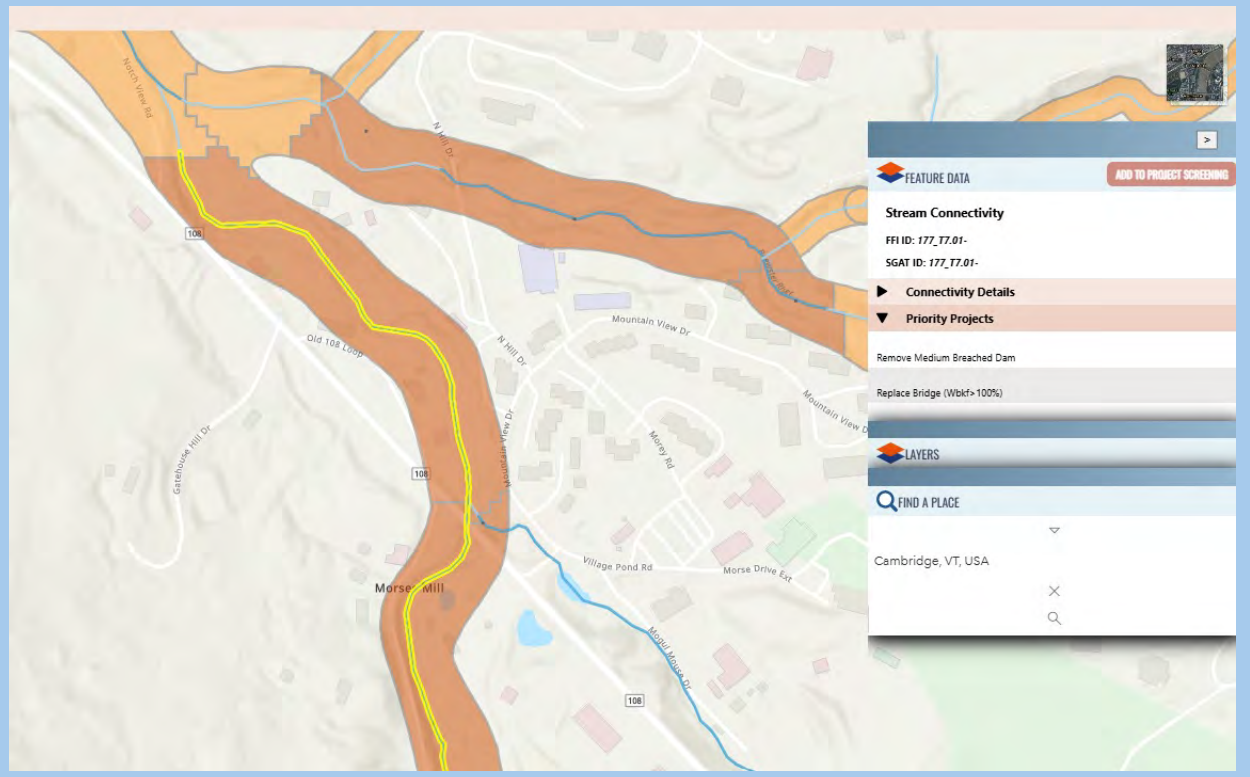
VT LIDAR & 1 ft contours

https://maps.vcgi.vermont.gov/lidarfinder/



FFI Tool


FFI
Functioning Floodplain Initiative
EXPLORE DATA
PROJECT PLANNING
WATERSHED REPORTING
USER MANUAL
Reconnecting Vermont's Rivers
The Vermont Functioning Floodplains Initiative is an effort by Vermont DEC and partners to identify and prioritize natural infrastructure projects through scoring, tracking, and mapping of floodplain and wetland functions as well as quantification of their social values. The goal is to achieve the highest possible water quality, ecological integrity, and flood resilience by targeting restoration and reconnection where it is most beneficial.
EXPLORE MAP DATA
BEGIN NEW PROJECT PLANNING


FEATURE DATA
ADD TO PROJECT SCREENING
Stream Connectivity
FFI ID: 177_T7.01-
SGAT ID: 177_T7.01-
Connectivity Details
Priority Projects
Remove Medium Breached Dam
Replace Bridge (Wbkf>100%)
LAYERS
FIND A PLACE
Cambridge, VT, USA
Morse Mill
Mountain View Dr
N Hill Dr
Old 108 Loop
Village Pond Rd
Morse Drive Ext
Morey Rd
Gatehouse Hill Dr
Notch View Rd