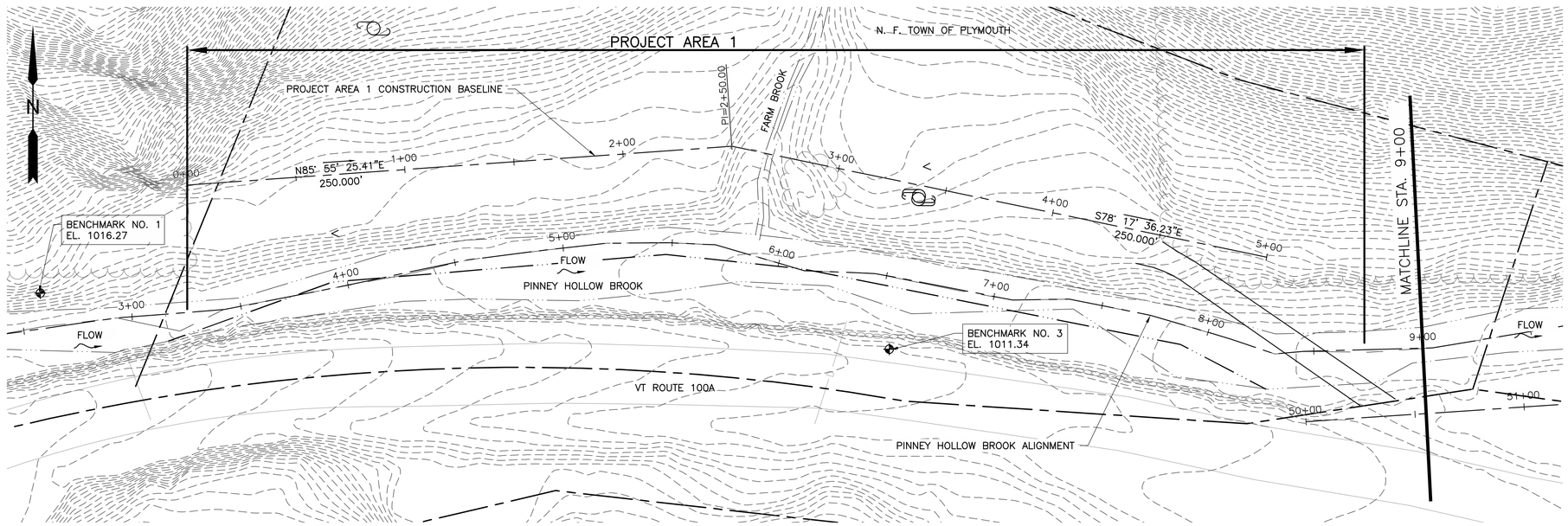
Google
Street View - Aug 2012

VOLVO
VOLVO

LEGEND

EXISTING

- PROPERTY LINE
- FENCE (SPLIT RAIL)
- FENCE (WOVEN WIRE)
- GUARD RAIL
- RAILROAD
- EDGE OF GRAVEL
- EDGE OF PAVEMENT
- WATER
- STRUCTURE
- CUT/FILL
- TREE LINE
- DITCH LINE
- STACKED STONE WALL
- DECIDUOUS TREE
- BENCH MARK
- SURVEY CONTROL POINT
- SIGN

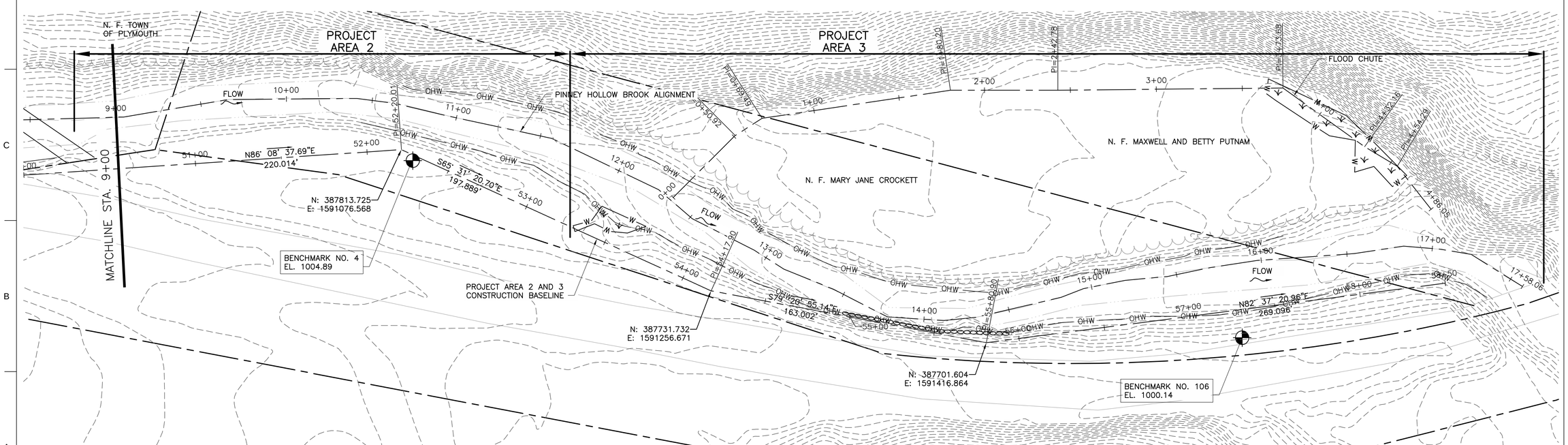


BASELINE LAYOUT TABLE		
STATION	NORTHING	EASTING
0+00	387907.1589	1590344.9373
2+50	387924.9301	1590594.3051
5+00	387902.1771	1590843.2674

SITE PLAN 1/2

30 15 0 30 90

SCALE IN FEET



BASELINE LAYOUT TABLE		
STATION	NORTHING	EASTING
50+00	387798.9285	1590857.0521
58+50	387736.1579	1591683.7322

SITE PLAN 2/2

30 15 0 30 90

SCALE IN FEET

Bear Creek Environmental

RIPPLE Natural Resources LLC
Ecological Restoration Specialists
802.522.2423 | www.RipplenRes.com

REV. #	DESCRIPTION	DATE

DESIGNED BY: MTM
DRAWN BY: MTM
CHECKED BY: MTM
DATE: 7/28/2022
RIPPLE PROJECT #: 2021104

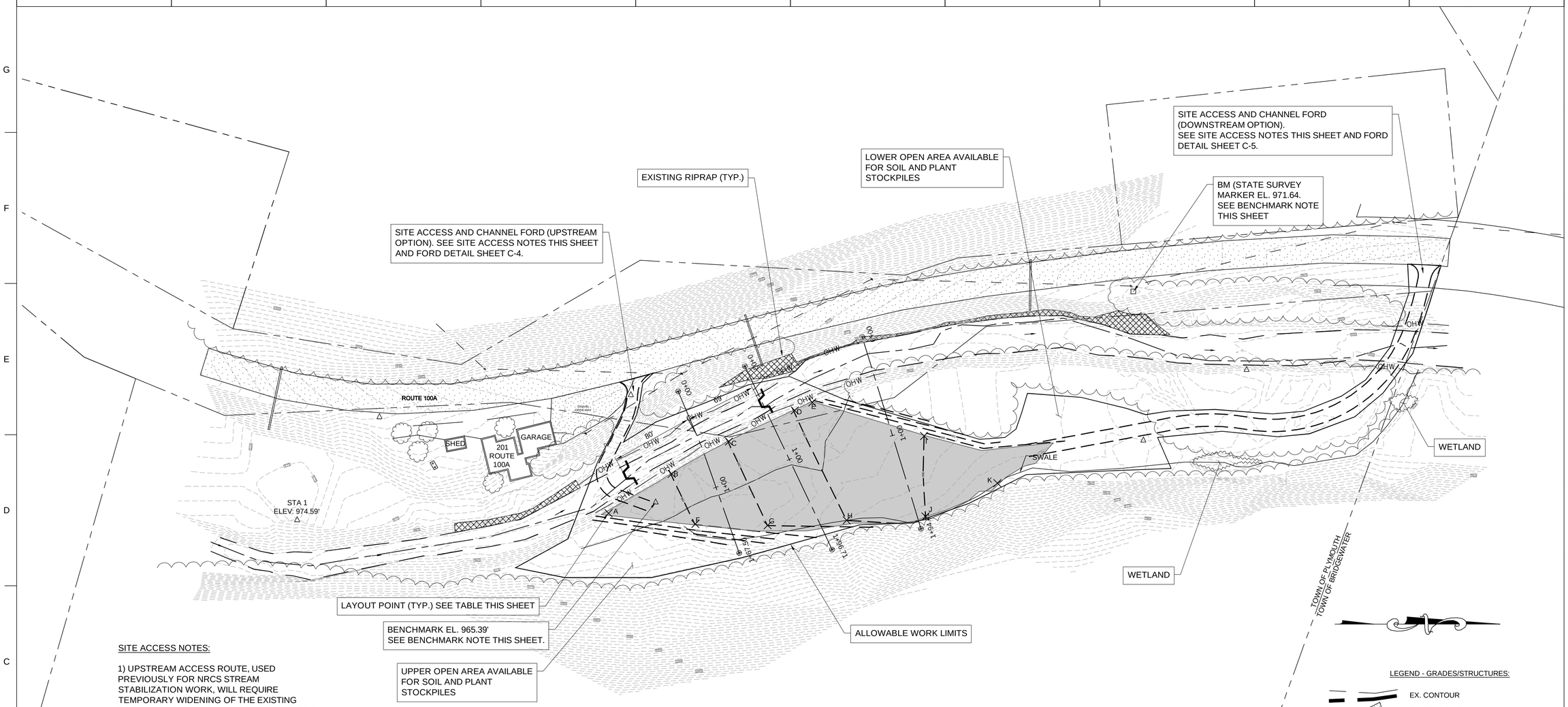
CLIENT: TRORC Two Rivers-Ottauquechee REGIONAL COMMISSION

PROJECT & LOCATION: PINNEY HOLLOW AT FARM BROOK RESTORATION PLYMOUTH, VERMONT

SHEET TITLE: OVERALL SITE PLAN AND BASELINE LAYOUT

SHEET ID C-2

3 of 7



SITE ACCESS NOTES:

1) UPSTREAM ACCESS ROUTE, USED PREVIOUSLY FOR NRCS STREAM STABILIZATION WORK, WILL REQUIRE TEMPORARY WIDENING OF THE EXISTING PATH AND RESTORATION OF ANY DAMAGE TO RESIDENTIAL DRIVEWAY.

2) DOWNSTREAM ACCESS ROUTE SHALL BE ADJUSTED TO AVOID WETLANDS TO THE EXTENT POSSIBLE AND TO MINIMIZE CLEARING OF TREES.

3) WHERE CONSTRUCTION REQUIRES HEAVY EQUIPMENT OPERATION IN WETLAND, THE EQUIPMENT SHALL: A) HAVE LOW GROUND PRESSURE (TYPICALLY <3PSI): B) BE PLACED ON CONSTRUCTION MATS THAT ARE ADEQUATE TO SUPPORT THE EQUIPMENT IN SUCH A WAY AS TO MINIMIZE DISTURBANCE OF WETLAND SOIL AND VEGETATION; OR C) BE OPERATED ON ADEQUATELY DRY WETLANDS SUCH THAT SHEAR PRESSURE DOES NOT CAUSE SUBSIDENCE OF THE WETLANDS IMMEDIATELY BENEATH THE EQUIPMENT AND UPHEAVAL OF ADJACENT WETLANDS.

4) BOTH OPTIONS REQUIRE TEMPORARY CHANNEL FORDS, WHICH SHALL BE CONSTRUCTED TO PASS THE ORDINARY FLOWS ANTICIPATED DURING CONSTRUCTION WITHOUT EROSION, AND TO MINIMIZE LOSS OF FORD MATERIAL DURING STORM FLOWS. SEE DETAIL SHEET C-5.

LAYOUT POINT TABLE

Point #	Raw Description	Elevation	Northing	Easting
1	A	963.6	388722.7606	1592829.0570
2	B	963.0	388783.9000	1592791.0444
3	C	962.0	388839.3306	1592759.6454
4	D	961.0	388903.1528	1592729.5116
5	E	960.6	388920.1473	1592721.7282
6	F	963.0	388806.8019	1592839.4659
7	G	962.0	388876.8984	1592840.8682
8	H	961.0	388953.5065	1592835.9283
9	I	960.0	389028.6184	1592754.2829
10	J	960.0	389029.8853	1592832.2223
11	K	959.0	389099.6013	1592799.9357

BENCHMARK NOTES:

1. ONLY THE BM ON STATE SURVEY MARKER NEAR RTE 100A IS VERIFIED TO EXIST.
2. CONTRACTOR IS RESPONSIBLE FOR TRANSFERRING THE ELEVATION TO THE WORK AREA.

LEGEND - GRADES/STRUCTURES:

- EX. CONTOUR
- EX. PAVEMENT
- EX. DRIVEWAY
- APPROX. PROPERTY LINE
- EX. OVERHEAD ELECTRIC
- PR. SWALE
- EDGE OF TREES
- EDGE OF WATER
- CHAIN LINK FENCE
- CONCRETE MONUMENT
- POWER POLE
- CONTROL STATION
- EX. TREE
- CROSS SECTION PIN
- OHW — ORDINARY HIGH WATER

0' 50' 100' 150'
BAR SCALE 1"=50'

REV. #	DESCRIPTION	DATE

DESIGNED BY: MTM
DRAWN BY: MTM
CHECKED BY: MTM
DATE: 3/17/2022
RIPPLE PROJECT #: 202101

CLIENT: Connecticut River Conservancy — Clean water. Healthy habitat. Thriving communities.

PROJECT & LOCATION: FLASTER FLOOD PLAIN RESTORATION PLYMOUTH, VERMONT

SHEET TITLE: OVERALL SITE PLAN AND LAYOUT

SHEET ID C-2

3 of 6

Alternate access route
* Orients trucks facing DOWN Rte 100, the direction they will be going.
* On left bank, involves same amount of tree clearing as already permitted (Corps already confirmed in the field a diagonal cut in the other direction to lesson the slope)
* Minor new tree clearing on right bank, and excavation to make a ramp
* Impacts below OHW comparable to what's already permitted.
*The red ASA was already cleared, and impacts from alternate access are comparable.

SITE ACCESS AND CHANNEL FORD (DOWNSTREAM OPTION). SEE SITE ACCESS NOTES THIS SHEET AND FORD DETAIL SHEET C-5.

BM (STATE SURVEY MARKER EL. 971.64. SEE BENCHMARK NOTE THIS SHEET

SITE ACCESS AND CHANNEL FORD (UPSTREAM OPTION). SEE SITE ACCESS NOTES THIS SHEET AND FORD DETAIL SHEET C-4.

May 2022 ASA

WETLAND

SWALE

Updated ASA

WETLAND

ROUTE 100A

SHED

201 ROUTE 100A

GARAGE

STA 1 ELEV. 974.59'

May 2022 ASA

LAYOUT POINT (TYP.) SEE TABLE THIS SHEET

BENCHMARK EL. 965.39' SEE BENCHMARK NOTE THIS SHEET.

UPPER OPEN AREA AVAILABLE FOR SOIL AND PLANT STOCKPILES

May 2022 ASA

ALLOWABLE WORK LIMITS

TOWN OF PLYMOUTH
TOWN OF BRIDGEWATER

SITE ACCESS NOTES:

1) UPSTREAM ACCESS ROUTE, USED PREVIOUSLY FOR NRCS STREAM STABILIZATION WORK, WILL REQUIRE

LEGEND - GRADES/STRUCTURES:

Bear Creek Environmental

RIPPLE Natural Resources LLC

REV #	DESCRIPTION	DATE

DESIGNED BY: MTM
DRAWN BY: MTM
CHECKED BY: MTM
DATE: 3/7/2022
RIPPLE PROJECT #: 203101

Connecticut River Conservancy

Farm Brook and Flaster Bid Tabulation 4/1/2023

FARM BROOK				Engineer (adjusted*)		Crown Point**		Adams ***		Markowski		Canonica	
		Units	Quantity	Unit Price	Total	Unit Price	Total	Unit Price	Total	Unit Price	Total	Unit Price	Total
101	Mob / Demob	LS	1	$ 14,430	$ 14,430	$ 20,000	$ 20,000	$ 5,000	$ 5,000	$ 30,900	$ 30,900	$ 11,000	$ 11,000
102	Site Access	LS	1	$ 2,600	$ 2,600	$ 25,000	$ 25,000	$ 15,000	$ 15,000	$ 22,141	$ 22,141	$ 30,250	$ 30,250
103	Utility Relocation / Removal	LS	1	$ 6,500	$ 6,500	$ 10,000	$ 10,000	$ 5,000	$ 5,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
104	Erosion Control and Surface Restoration	LS	1	$ 7,772	$ 7,772	$ 50,000	$ 50,000	$ 10,000	$ 10,000	$ 13,400	$ 13,400	$ 8,750	$ 8,750
105	Water Diversion and Control	LS	1	$ 7,800	$ 7,800	$ 5,000	$ 5,000	$ 20,000	$ 20,000	$ 7,150	$ 7,150	$ 5,000	$ 5,000
106	Knotweed Management	Hrs	8	$ 390	$ 3,120	$ 185	$ 1,480	$ 100	$ 800	$ 235	$ 1,880	$ 313	$ 2,504
108	Excavation and removal of material	CY	952	$ 33	$ 30,940	$ 14	$ 13,328	$ 40	$ 38,080	$ 30	$ 28,217	$ 23	$ 21,896
109	Rootwad Bench Installation (Upstream Area)	TOT	1	$ 84,604	$ 84,604	$ 204,000	$ 204,000	$ 30,000	$ 30,000	$ 139,184	$ 139,184	$ 81,800	$ 81,800
110	Channel excavation / shaping (Project Area 1)	Hrs	16	$ 390	$ 6,240	$ 250	$ 4,000	$ 250	$ 4,000	$ 235	$ 3,760	$ 313	$ 5,008
111	Rootwad Installation (Downstream Area)	TOT	1	$ 11,492	$ 11,492	$ 25,000	$ 25,000	$ 12,000	$ 12,000	$ 22,967	$ 22,967	$ 14,000	$ 14,000
113	Plantings (all Proj Areas)	LS	1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
114	Transplanted Trees	EA	10	$ 260	$ 2,600	$ 300	$ 3,000	$ 125	$ 1,250	$ 60	$ 600	$ 50	$ 500
115	Misc Work Items	LS	1	$ 3,900	$ 3,900	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 2,350	$ 2,350	$ 3,750	$ 3,750
	TOTAL		CONSTRUCTION TOTAL		**$ 181,998**		**$ 365,808**		**$ 146,130**		**$ 282,550**		**$ 194,458**
FLASTER				**Engineer**		**Crown Point**		**Adams**		**Markowski**		**Canonica**	
		Units	**Quantity**	**Unit Price**	**Total**	**Unit Price**	**Total**	**Unit Price**	**Total**	**Unit Price**	**Total**	**Unit Price**	**Total**
201	Mob / Demob	LS	1	$ 13,000	$ 13,000	$ 15,000	$ 15,000	$ 5,000	$ 5,000	$ 23,900	$ 23,900	$ 11,000	$ 11,000
202	Site Access	LS	1	$ 11,700	$ 11,700	$ 50,000	$ 50,000	$ 20,000	$ 20,000	$ 7,100	$ 7,100	$ 34,950	$ 34,950
204	Erosion Control and Surface Restoration	LS	1	$ 8,850	$ 8,850	$ 30,000	$ 30,000	$ 15,000	$ 15,000	$ 6,350	$ 6,350	$ 12,050	$ 12,050
205	Water Diversion and Control	LS	1	$ 6,500	$ 6,500	$ 5,000	$ 5,000	$ 20,000	$ 20,000	$ 3,000	$ 3,000	$ 6,000	$ 6,000
206	Knotweed Management	Hrs	8	$ 390	$ 3,120	$ 186	$ 1,488	$ 100	$ 800	$ 235	$ 1,880	$ 313	$ 2,504
207	Stockpile and Reuse Topsoil (4")	CY	410	$ 26	$ 10,660	$ 10	$ 4,100	$ 40	$ 16,400	$ 23	$ 9,360	$ 21	$ 8,610
208	Sediment Excavation and Removal	CY	2400	$ 33	$ 78,000	$ 14	$ 33,600	$ 40	$ 96,000	$ 24	$ 58,320	$ 23	$ 54,600
212.1	Weirs -- furnish stone	CY	113	$ 78	$ 8,814	$ 50	$ 5,650	$ 60	$ 6,780	$ 39	$ 4,461	$ 68	$ 7,684
212.2	Weirs -- Install	EA	2	$ 9,100	$ 18,200	$ 10,000	$ 20,000	$ 10,000	$ 20,000	$ 758	$ 1,516	$ 5,000	$ 10,000
213	ImportedPlantings	LS	1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
214	Transplanted Trees	EA	160	$ 85	$ 13,520	$ 125	$ 20,000	$ 250	$ 40,000	$ 38	$ 6,000	$ 50	$ 8,000
215	Misc Work Items	LS	1	$ 2,600	$ 2,600	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,068	$ 5,068	$ 3,750	$ 3,750
	TOTAL		CONSTRUCTION TOTAL		**$ 174,964**		**$ 189,838**		**$ 244,980**		**$ 126,955**		**$ 159,148**
BOTH					**$ 356,962**		**$ 555,646**		**$ 391,110**		**$ 409,505**		**$ 353,606**

* 100% design estimate inflated 30% to reflect current market

** Item 206 calc corrected. $8 discrepency

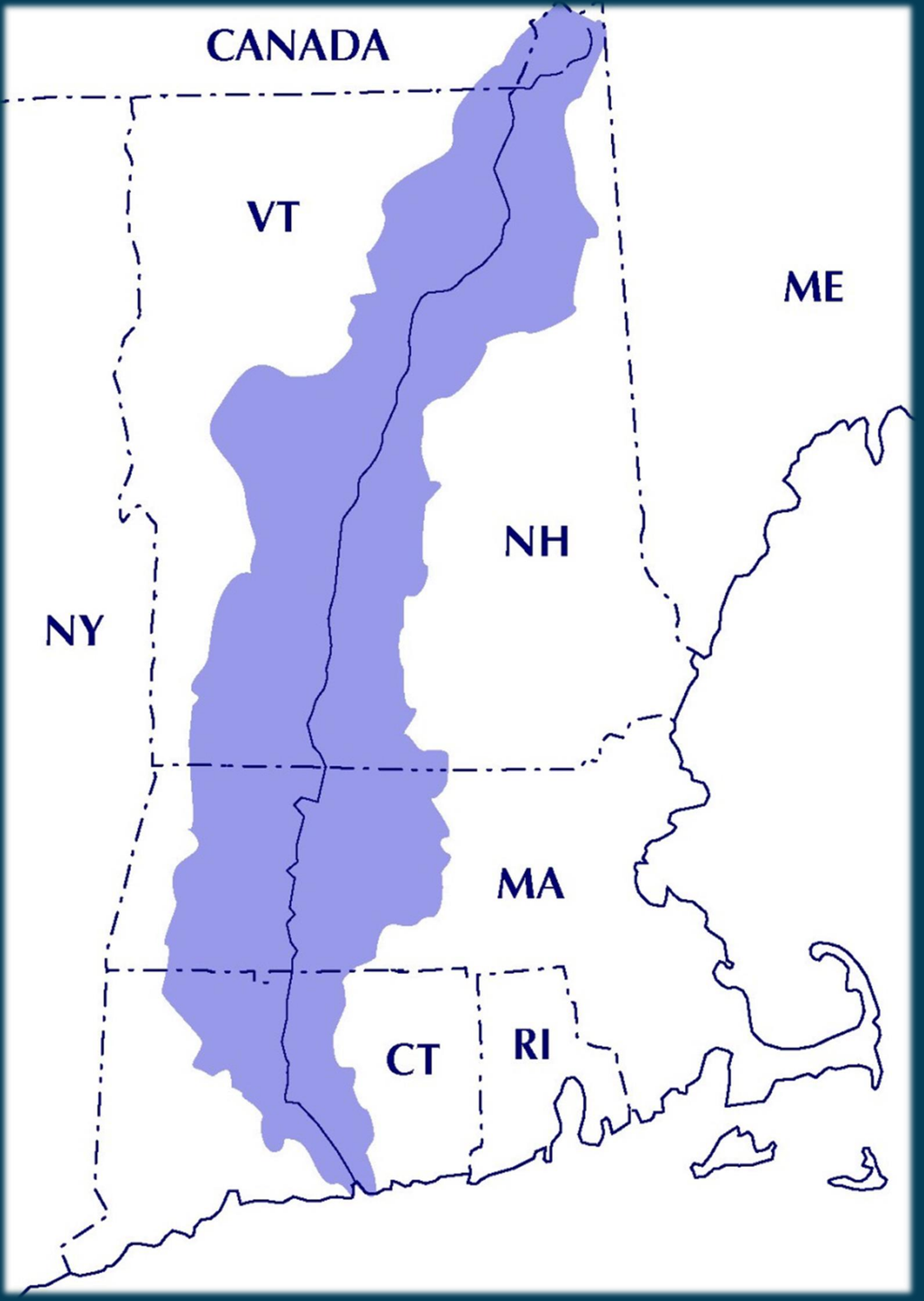
*** Item 113 was $25k. Changed to $0.

SLOW

Connecticut River Conservancy

West Windsor Dam Removal

Removing Old Dams in VT

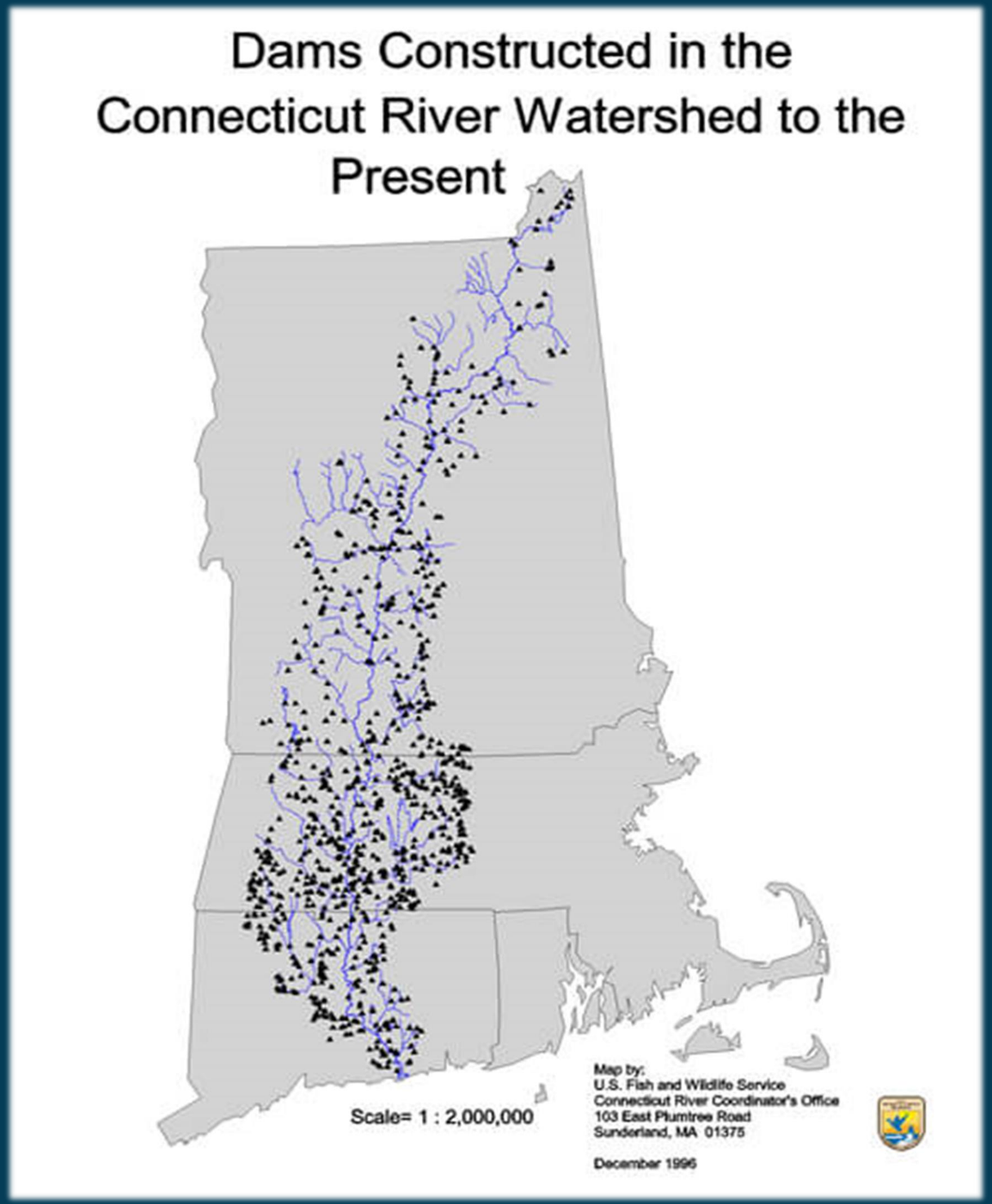


Connecticut River Conservancy

Created by community members 1952

- 410 miles
- 11,200 square miles
- 2.5 million people
- 70% of freshwater to LIS

- Advocacy & Education
- Restoration
- Water Quality Monitoring
- Source to Sea Cleanup



- 65 major dams

(hydro, flood control, water supply etc.)

- 1,000 small dams in use

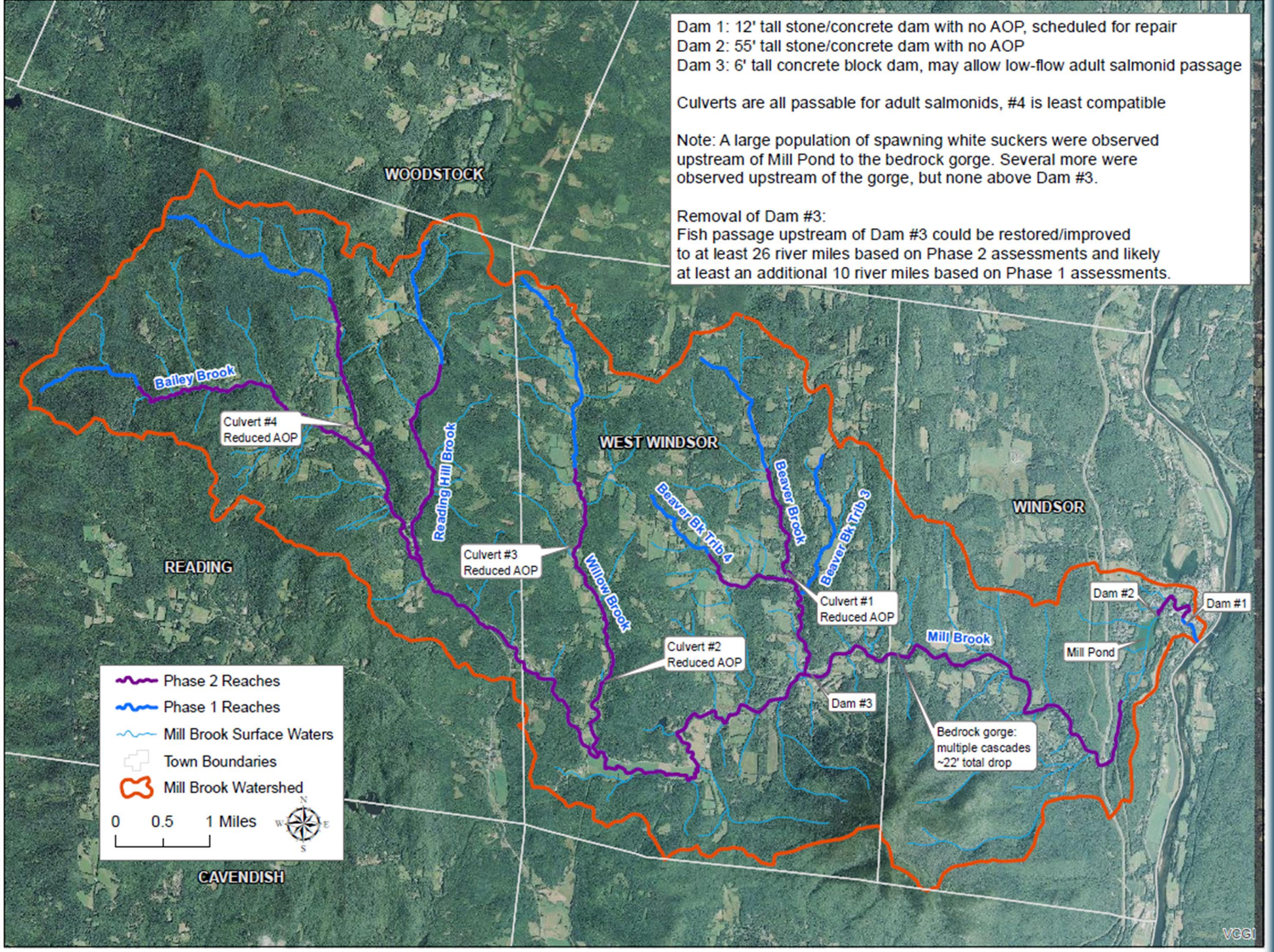
- 3,000 dams

no longer serving a useful purpose

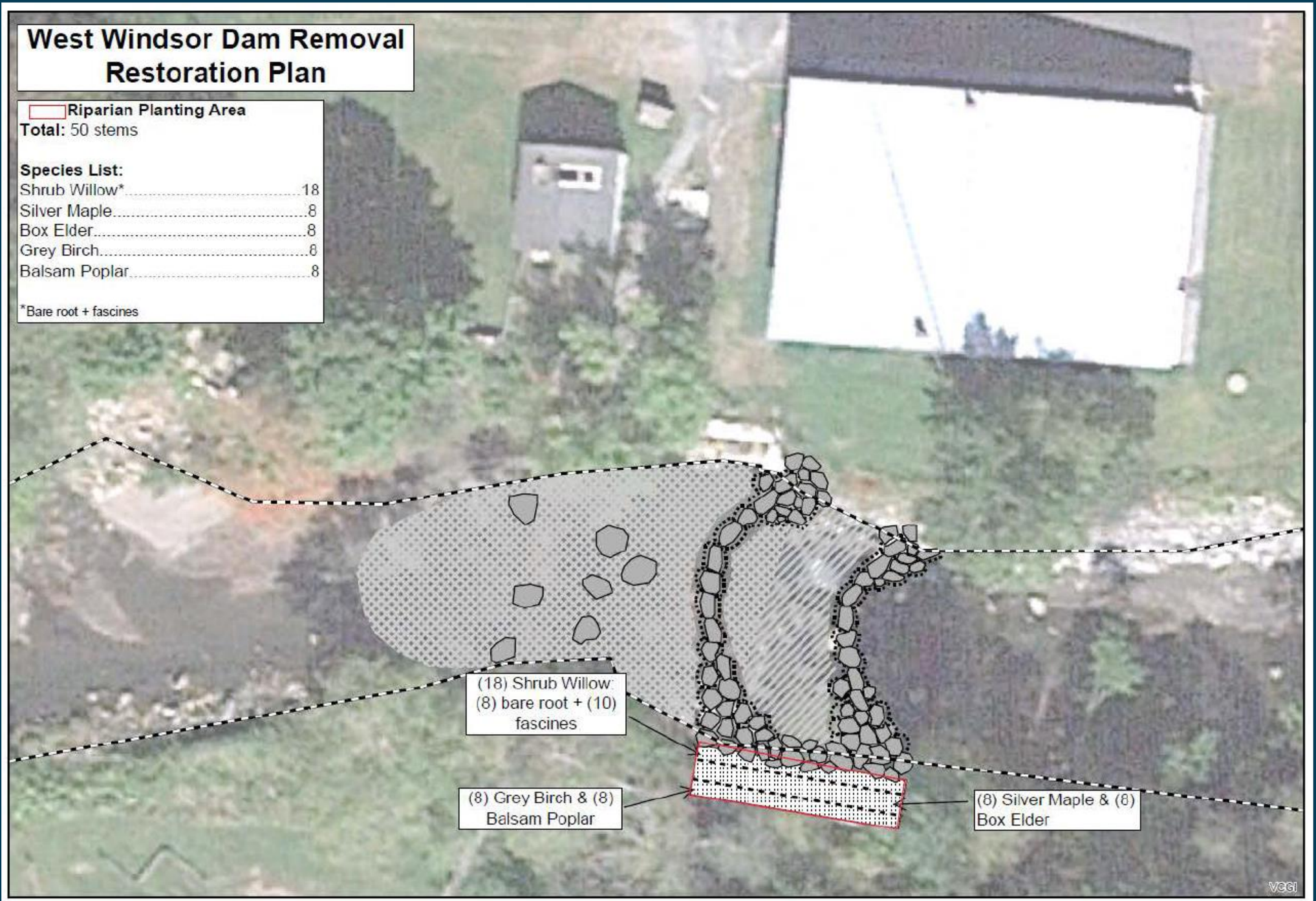
- 44,000 road & stream crossings

Why We Remove Old Dams

- Fish Passage
- Flood Resiliency
- Safety
- Water Quality


Dam 1: 12' tall stone/concrete dam with no AOP, scheduled for repair
Dam 2: 55' tall stone/concrete dam with no AOP
Dam 3: 6' tall concrete block dam, may allow low-flow adult salmonid passage
Culverts are all passable for adult salmonids, #4 is least compatible
Note: A large population of spawning white suckers were observed upstream of Mill Pond to the bedrock gorge. Several more were observed upstream of the gorge, but none above Dam #3.
Removal of Dam #3:
Fish passage upstream of Dam #3 could be restored/improved to at least 26 river miles based on Phase 2 assessments and likely at least an additional 10 river miles based on Phase 1 assessments.
WOODSTOCK
WEST WINDSOR
WINDSOR
READING
CAVENDISH
Bailey Brook
Reading Hill Brook
Willow Brook
Beaver Brook
Beaver Bk Trib 4
Beaver Bk Trib 3
Mill Brook
Culvert #4 Reduced AOP
Culvert #3 Reduced AOP
Culvert #2 Reduced AOP
Culvert #1 Reduced AOP
Dam #1
Dam #2
Dam #3
Mill Pond
Bedrock gorge: multiple cascades ~22' total drop
Phase 2 Reaches
Phase 1 Reaches
Mill Brook Surface Waters
Town Boundaries
Mill Brook Watershed
0 0.5 1 Miles
N
W
E
S
VCGI

2017/2018


West Windsor Dam Removal
Restoration Plan
Riparian Planting Area
Total: 50 stems
Species List:
Shrub Willow*.....18
Silver Maple.....8
Box Elder.....8
Grey Birch.....8
Balsam Poplar.....8
*Bare root + fascines
(18) Shrub Willow: (8) bare root + (10) fascines
(8) Grey Birch & (8) Balsam Poplar
(8) Silver Maple & (8) Box Elder
VCGI

Special thanks to:

- Mt. Ascutney Regional Planning Commission (project lead)
- Town of West Windsor & Brownsville Volunteer Firefighters
- Vermont ANR/DEC/F&W
- U.S. Fish & Wildlife Service

Since 2014, CRC and our partners have

- Removed 21 obsolete dams
- Upgraded 5 culverts
- Opened 425 miles of habitat

Credit: Kiley Briggs

THANK YOU
Connecticut River
Conservancy

SLRCONSULTING.COM

Melrose Terrace Floodplain Restoration

Christine Hazzard,
Executive Director, Brattleboro Housing Partnerships
Jessica Louisos, PE, MS
Senior Water Resource Engineer, SLR

VTDEC Clean Water Conversation
5/9/2024

SLR

Damage from Tropical Storm Irene

Housing flooded & evacuation needed

- Water jumped river bank and travelled behind and between buildings

Damage from Tropical Storm Irene

Significant damage to buildings, roads, property

- Volume & velocity of water caused erosion and scour
- The most damage was not closest to the river

Flood Mitigation Analysis / Project Identification

2012 – Whetstone Brook Flood Analysis

- Examined broad mitigation alternatives at Melrose Terrace, Hayes Court, Glen Park, and Mountain Home
- Sketch level alternatives for Melrose Terrace

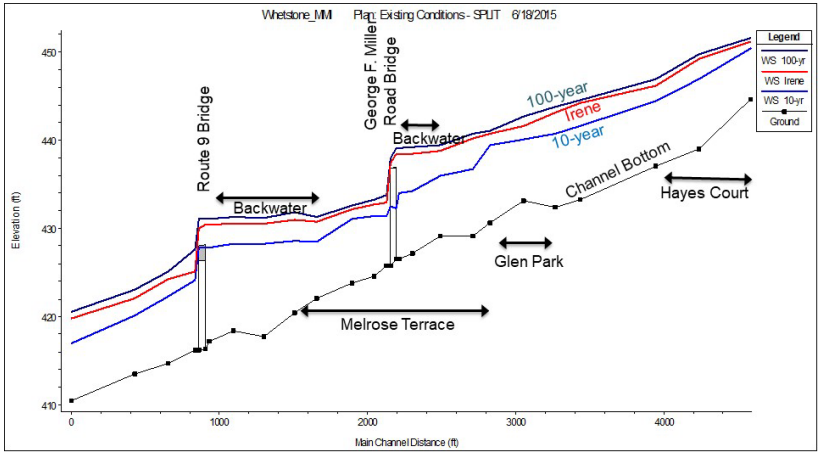
2015 – Vermont Economic Resilience Initiative (VERI)

- Examined broad mitigation alternatives across many municipalities
- Melrose Terrace project described / recommended

2015 – Hydraulic Modelling & Alternatives Analysis

- Detailed hydrologic and hydraulic modelling
- Alternatives for flood reduction
- Concept design

Profile: Existing Conditions



CHALLENGE

Who spearheads these efforts?

How are they paid for?

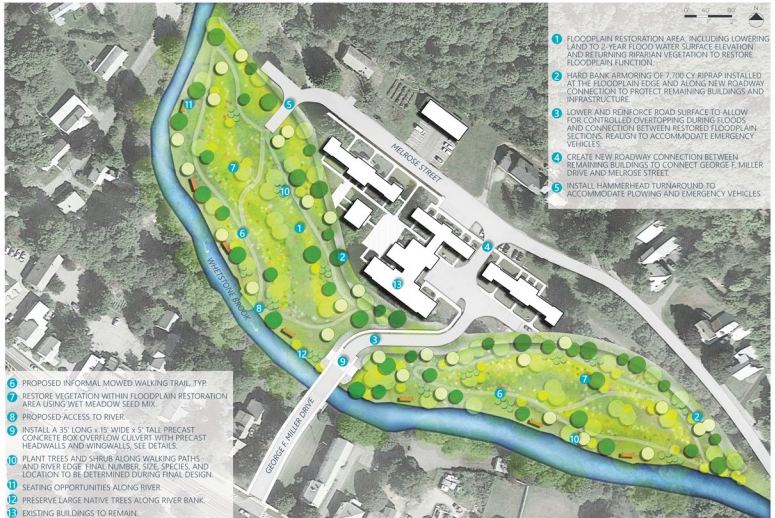
Melrose Terrace Floodplain Restoration

Removing buildings & people & infrastructure from most vulnerable locations

- Remove 11 buildings
- Relocate road
- Relocate sewer main / utilities

Increase floodplain storage capacity

- Remove 28,000 CY fill in floodplain & lower land average 5 feet
- Plant restored 4.4-acre floodplain with native vegetation

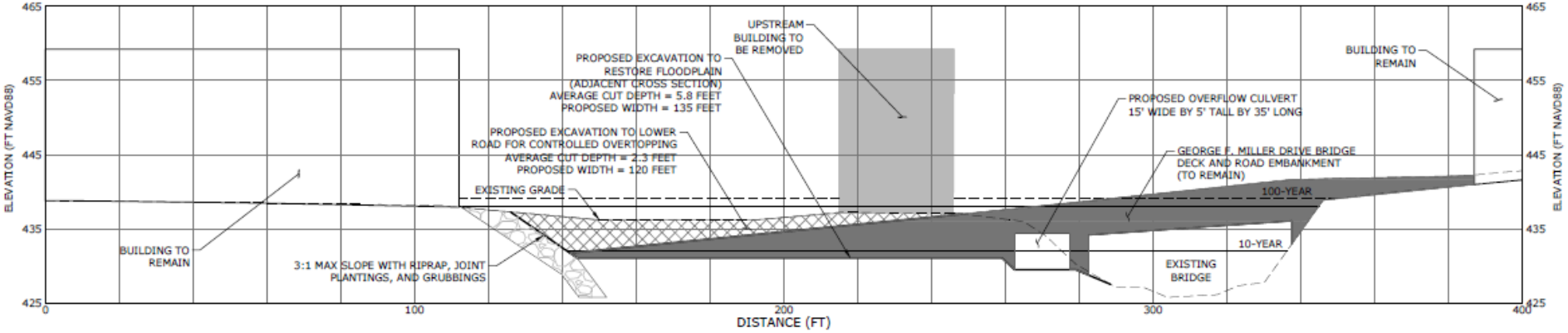


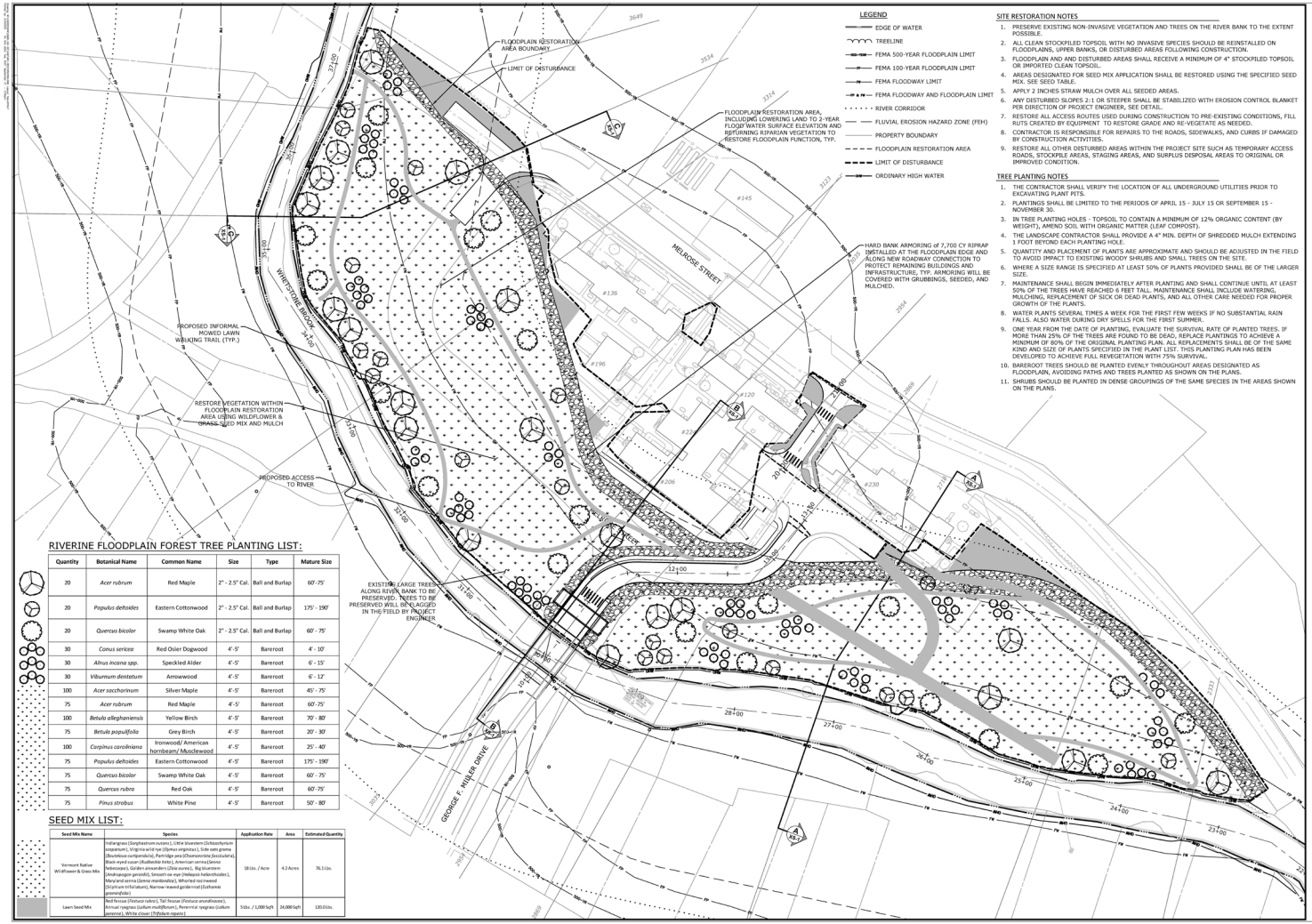
Melrose Terrace Floodplain Restoration

Bridge capacity improved

- Overflow culverts
- Lower road embankment to allow to overtop – road will flood before buildings and before bridge damaged
- Storms >25-year flood had overtopped
- Backwatering raised water 5.5 feet upstream for Irene flood

CROSS SECTION VIEW - B - 29+79





LEGEND

- EDGE OF WATER
- TREELINE
- FEMA 500-YEAR FLOODPLAIN LIMIT
- FEMA 100-YEAR FLOODPLAIN LIMIT
- FEMA FLOODWAY LIMIT
- FEMA FLOODWAY AND FLOODPLAIN LIMIT
- RIVER CORRIDOR
- FLUVIAL EROSION HAZARD ZONE (FEH)
- PROPERTY BOUNDARY
- FLOODPLAIN RESTORATION AREA
- LIMIT OF DISTURBANCE
- ORDINARY HIGH WATER

SITE RESTORATION NOTES

1. PRESERVE EXISTING NON-INVASIVE VEGETATION AND TREES ON THE RIVER BANK TO THE EXTENT POSSIBLE.
2. ALL CLEAN STOCKPILED TOPSOIL WITH NO INVASIVE SPECIES SHOULD BE REINSTALLED ON FLOODPLAINS, UPPER BANKS, OR DISTURBED AREAS FOLLOWING CONSTRUCTION.
3. FLOODPLAIN AND AND DISTURBED AREAS SHALL RECEIVE A MINIMUM OF 4" STOCKPILED TOPSOIL OR IMPORTED CLEAN TOPSOIL.
4. AREAS DESIGNATED FOR SEED MIX APPLICATION SHALL BE RESTORED USING THE SPECIFIED SEED MIX. SEE SEED TABLE.
5. APPLY 2 INCHES STRAW MULCH OVER ALL SEEDED AREAS.
6. ANY DISTURBED SLOPES 2:1 OR STEEPER SHALL BE STABILIZED WITH EROSION CONTROL BLANKET PER DIRECTION OF PROJECT ENGINEER, SEE DETAIL.
7. RESTORE ALL ACCESS ROUTES USED DURING CONSTRUCTION TO PRE-EXISTING CONDITIONS, FILL RUTS CREATED BY EQUIPMENT TO RESTORE GRADE AND RE-VEGETATE AS NEEDED.
8. CONTRACTOR IS RESPONSIBLE FOR REPAIRS TO THE ROADS, SIDEWALKS, AND CURBS IF DAMAGED BY CONSTRUCTION ACTIVITIES.
9. RESTORE ALL OTHER DISTURBED AREAS WITHIN THE PROJECT SITE SUCH AS TEMPORARY ACCESS ROADS, STOCKPILE AREAS, STAGING AREAS, AND SURPLUS DISPOSAL AREAS TO ORIGINAL OR IMPROVED CONDITION.

TREE PLANTING NOTES

1. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO EXCAVATING PLANT PITS.
2. PLANTINGS SHALL BE LIMITED TO THE PERIODS OF APRIL 15 - JULY 15 OR SEPTEMBER 15 - NOVEMBER 30.
3. IN TREE PLANTING HOLES - TOPSOIL TO CONTAIN A MINIMUM OF 12% ORGANIC CONTENT (BY WEIGHT), AMEND SOIL WITH ORGANIC MATTER (LEAF COMPOST).
4. THE LANDSCAPE CONTRACTOR SHALL PROVIDE A 4" MIN. DEPTH OF SHREDDED MULCH EXTENDING 1 FOOT BEYOND EACH PLANTING HOLE.
5. QUANTITY AND PLACEMENT OF PLANTS ARE APPROXIMATE AND SHOULD BE ADJUSTED IN THE FIELD TO AVOID IMPACT TO EXISTING WOODY SHRUBS AND SMALL TREES ON THE SITE.
6. WHERE A SIZE RANGE IS SPECIFIED AT LEAST 50% OF PLANTS PROVIDED SHALL BE OF THE LARGER SIZE.
7. MAINTENANCE SHALL BEGIN IMMEDIATELY AFTER PLANTING AND SHALL CONTINUE UNTIL AT LEAST 50% OF THE TREES HAVE REACHED 6 FEET TALL. MAINTENANCE SHALL INCLUDE WATERING, MULCHING, REPLACEMENT OF SICK OR DEAD PLANTS, AND ALL OTHER CARE NEEDED FOR PROPER GROWTH OF THE PLANTS.
8. WATER PLANTS SEVERAL TIMES A WEEK FOR THE FIRST FEW WEEKS IF NO SUBSTANTIAL RAIN FALLS. ALSO WATER DURING DRY SPELLS FOR THE FIRST SUMMER.
9. ONE YEAR FROM THE DATE OF PLANTING, EVALUATE THE SURVIVAL RATE OF PLANTED TREES. IF MORE THAN 25% OF THE TREES ARE FOUND TO BE DEAD, REPLACE PLANTINGS TO ACHIEVE A MINIMUM OF 80% OF THE ORIGINAL PLANTING PLAN. ALL REPLACEMENTS SHALL BE OF THE SAME KIND AND SIZE OF PLANTS SPECIFIED IN THE PLANT LIST. THIS PLANTING PLAN HAS BEEN DEVELOPED TO ACHIEVE FULL REVEGETATION WITH 75% SURVIVAL.
10. BAREROOT TREES SHOULD BE PLANTED EVENLY THROUGHOUT AREAS DESIGNATED AS FLOODPLAIN, AVOIDING PATHS AND TREES PLANTED AS SHOWN ON THE PLANS.
11. SHRUBS SHOULD BE PLANTED IN DENSE GROUPINGS OF THE SAME SPECIES IN THE AREAS SHOWN ON THE PLANS.

RIVERINE FLOODPLAIN FOREST TREE PLANTING LIST:

Quantity	Botanical Name	Common Name	Size	Type	Mature Size
20	*Acer rubrum*	Red Maple	2" - 2.5" Cal.	Ball and Burlap	60'-75'
20	*Populus deltoides*	Eastern Cottonwood	2" - 2.5" Cal.	Ball and Burlap	175' - 190'
20	*Quercus bicolor*	Swamp White Oak	2" - 2.5" Cal.	Ball and Burlap	60' - 75'
30	*Conus sericea*	Red Osier Dogwood	4'-5'	Bareroot	4' - 10'
30	*Alnus incana spp.*	Speckled Alder	4'-5'	Bareroot	6' - 15'
30	*Viburnum dentatum*	Arrowwood	4'-5'	Bareroot	6' - 12'
100	*Acer saccharinum*	Silver Maple	4'-5'	Bareroot	45' - 75'
75	*Acer rubrum*	Red Maple	4'-5'	Bareroot	60'-75'
100	*Betula alleghaniensis*	Yellow Birch	4'-5'	Bareroot	70' - 80'
75	*Betula populifolia*	Grey Birch	4'-5'	Bareroot	20' - 30'
100	*Carpinus caroliniana*	Ironwood/ American hornbeam/ Musclewood	4'-5'	Bareroot	25' - 40'
75	*Populus deltoides*	Eastern Cottonwood	4'-5'	Bareroot	175' - 190'
75	*Quercus bicolor*	Swamp White Oak	4'-5'	Bareroot	60' - 75'
75	*Quercus rubra*	Red Oak	4'-5'	Bareroot	60'-75'
75	*Pinus strobus*	White Pine	4'-5'	Bareroot	50' - 80'

SEED MIX LIST:

Seed Mix Name	Species	Application Rate	Area	Estimated Quantity
Vermont Native Wildflower & Grass Mix	Indiangrass (*Sorghastrum nutans*), Little bluestem (*Schizachyrium scoparium*), Virginia wild rye (*Elymus virginicus*), Side oats grama (*Bouteloua curtipendula*), Partridge pea (*Chamaecrista fasciculata*), Black-eyed susan (*Rudbeckia hirta*), American senna (*Senna hebecarpa*), Golden alexanders (*Zizia aurea*), Big bluestem (*Andropogon gerardii*), Smooth ox-eye (*Heliopsis helianthoides*), Maryland senna (*Senna marilandica*), Whorled rosinweed (*Silphium trifoliatum*), Narrow-leaved gayfeather (*Liatharis spicata*), Wild bergamot (*Monarda fistulosa*)	18 Lbs. / Acre	4.2 Acres	76.1 Lbs.
Lawn Seed Mix	Red fescue (*Festuca rubra*), Tall fescue (*Festuca arundinacea*), Annual ryegrass (*Lolium multiflorum*), Perennial ryegrass (*Lolium perenne*), White clover (*Trifolium repens*)	5 Lbs. / 1,000 Sqft	24,000 Sqft	120 Lbs.

SLR
SUSTAINABLE LAND REGENERATION
BURLINGTON, VT 05401
SLRCONSULTING.COM

DESCRIPTION	DATE	BY

FINAL DESIGN

PR - RESTORATION

FLOODPLAIN RESTORATION PROJECT
WHETSTONE BROOK AT MELROSE TERRACE
BRATTLEBORO HOUSING PARTNERSHIPS
BRATTLEBORO, VERMONT

JCL	JCL	RKS
DESIGNED	DRAWN	CHECKED

SCALE: 1"=40'

DATE: JULY 23, 2021

PROJECT NO: 5696-02

SHEET NO: 05 OF 18

SHEET NAME: PR-3

Copyright Wilcox & Blackburn, Inc. - 2021

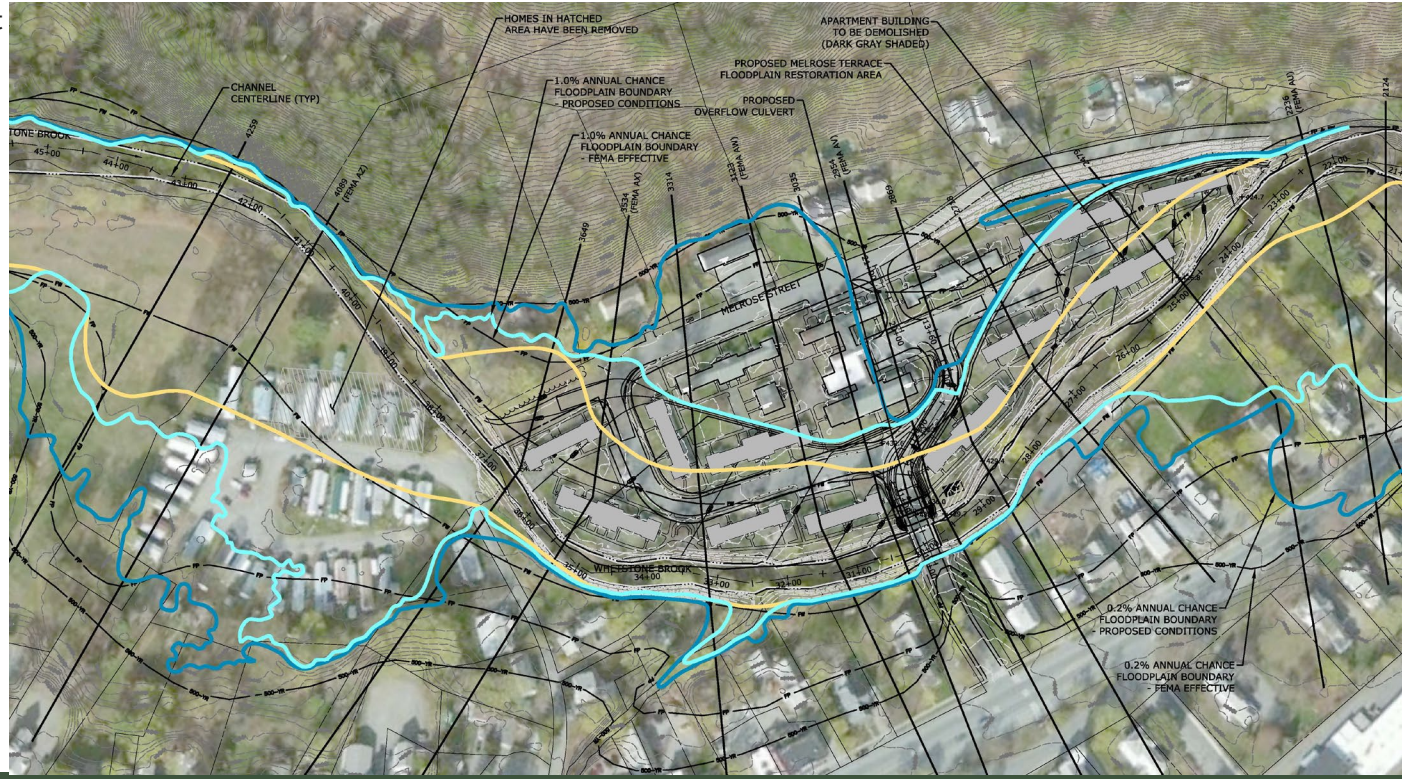
Melrose Terrace Project Benefits

2017 – FEMA Benefit-Cost Analysis

- Building acquisition
- Modelled flood elevation reduction at buildings
- Floodplain ecosystem benefits
- Benefit-Cost Ratio = 2.5

Flood Reduction

- Remaining onsite buildings removed from floodplain
- Reduced flooding across river and upstream
- Irene flood size water elevation reduced:
  - Glen Park = 1.9′
  - Upstream GF Miller = 2.9′
  - Downstream GF Miller = 1.1′
  - Melrose Street = 3.0′ - 7.0′
- Flood storage and debris catchment may reduce damages downstream



Melrose Terrace – Completed Project 2022

Pre-construction (Hartgen)

Post-construction

Melrose Terrace – Completed Project

Pre-construction

Post-construction

Melrose Terrace – Flooding Post-Construction

River using floodplain

- Meander bend created on upper floodplain, where previously straightened
- River accessed floodplain 4 times
- Flows are slowed, depositing sediment and reducing erosion capacity

7-12-2023

12-23-2022

Melrose Terrace – Flooding Post-Construction

Remaining buildings and infrastructure safe

- Water stayed within the designated onsite areas
- 4.4 acres floodplain covered with feet of water
- Buildings not flooded
- Road overtopped as planned

Flood elevations reduced

- July 10, 2023 estimated approximately 10-year flood based on rainfall (not gauged)
- Modelling predicts this flood had 1.0-2.5 feet lower flood elevations than if project not completed

10-17-2023

10-17-2023

VERMONT RIVER CONSERVANCY

PROTECTING EXCEPTIONAL LANDS ALONG OUR WATERS

DEC Clean Water Conversations - May 9 2024

Erin De Vries
Conservation Director
vermontriverconservancy.org

Kurt Budliger

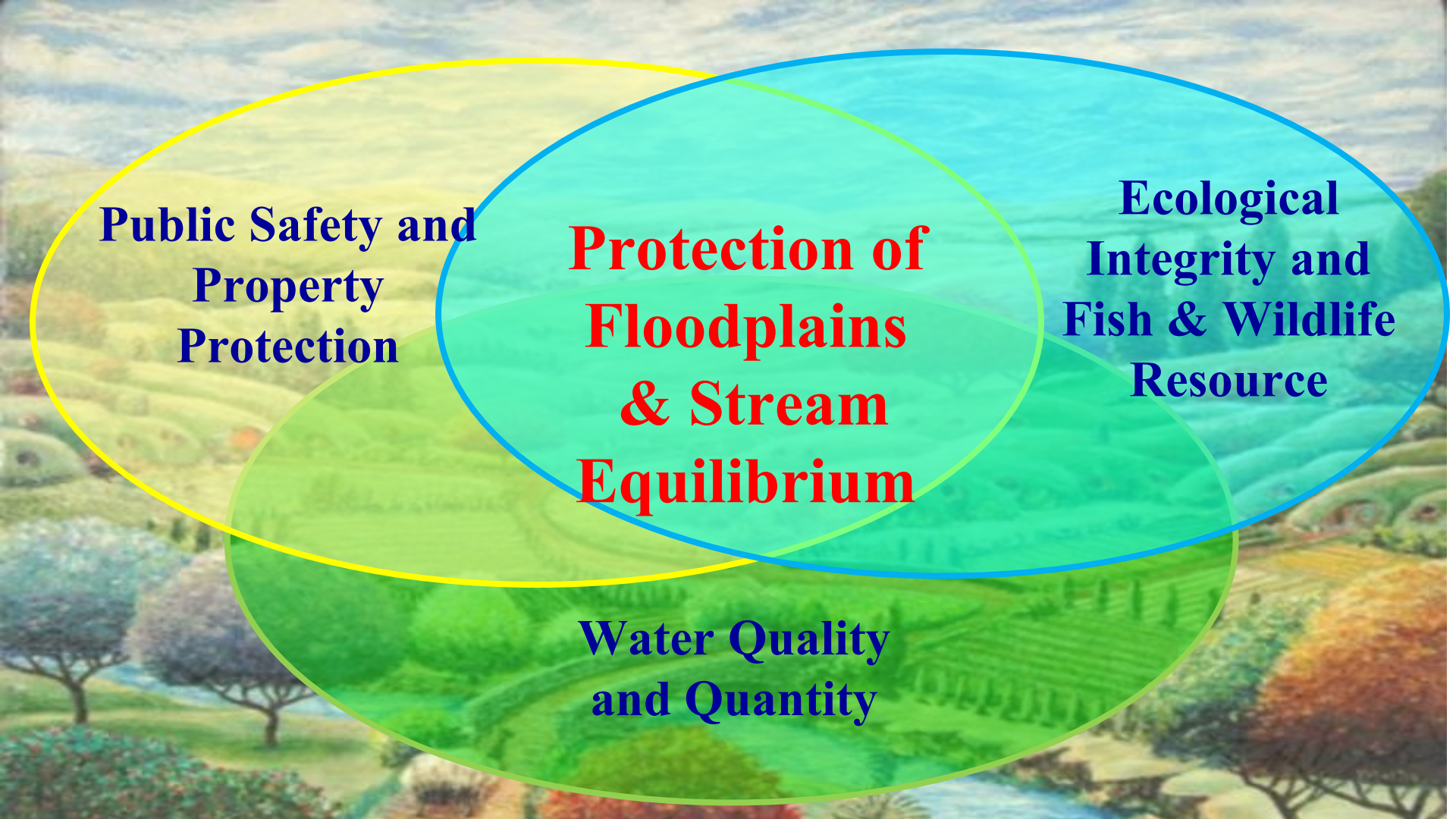
WHAT WE DO

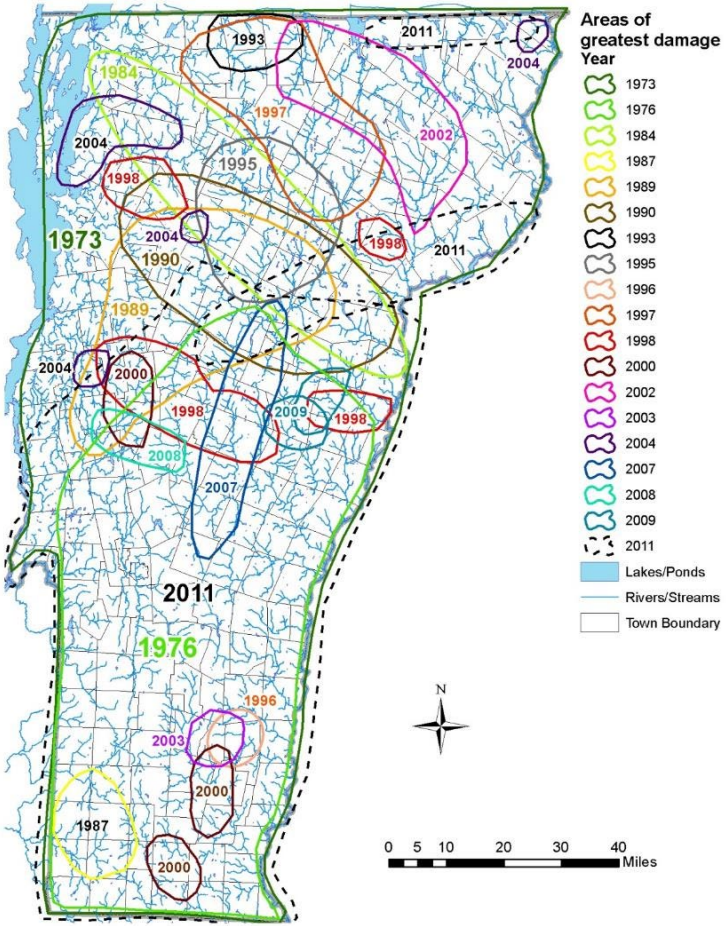
PROTECT PUBLIC ACCESS FOR ALL

RESTORE RIVERS FOR WILDLIFE AND PEOPLE

HELP COMMUNITIES THRIVE

VRC Vermont River Conservancy


Public Safety and Property Protection
Protection of Floodplains & Stream Equilibrium
Ecological Integrity and Fish & Wildlife Resource
Water Quality and Quantity



Selected flood disasters - Areas of greatest damage

Flood Disasters

Since 1927 Vermont has experienced a large-scale disastrous floods once every 14 years.

From 1973-2011, Vermont had suffered approximately 25 disastrous floods of regional-scale.

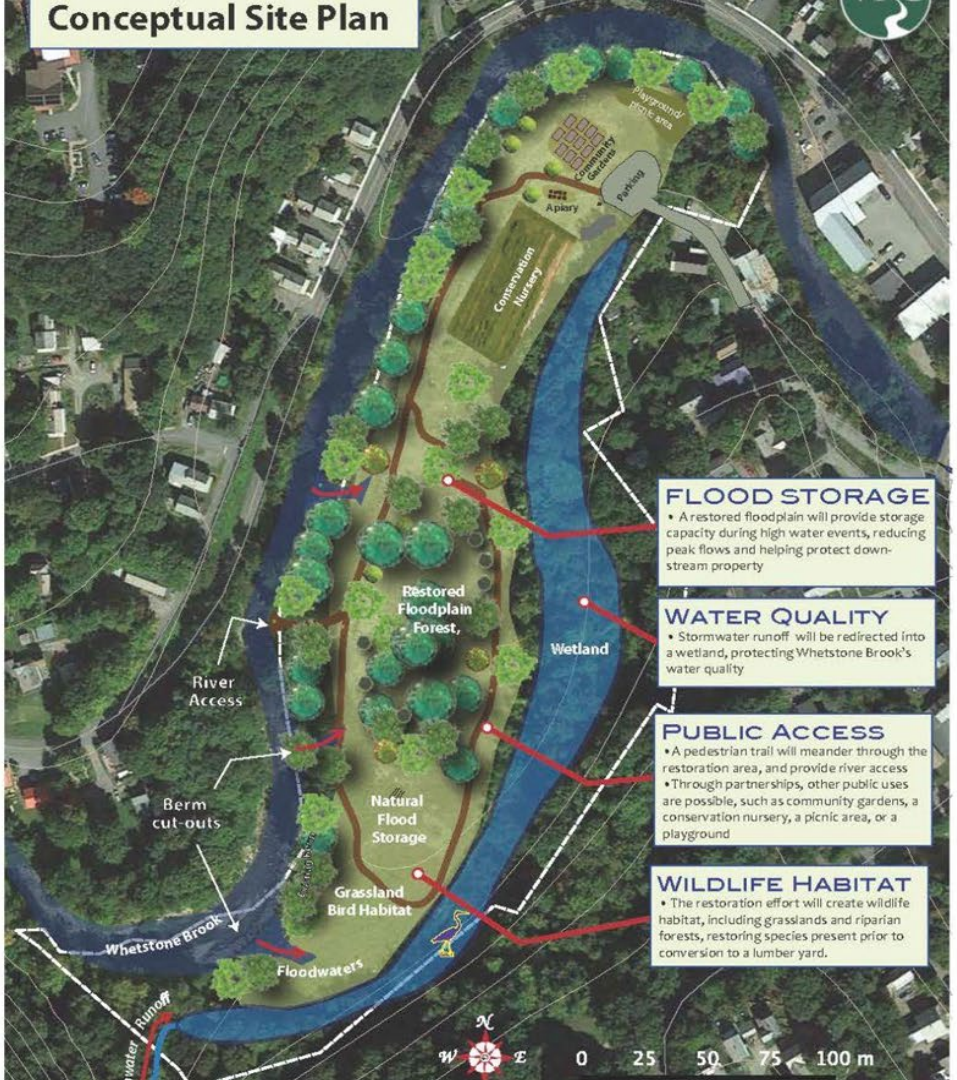
Since TSI 09/01/2011 an additional 11 Declared Disasters due to Severe Storms and Flooding have occurred

Data Source:
VT DEC Rivers Program and VT State Hazard Mitigation Plan.

PROTECT & RESTORE | Whetstone Brook

VRC Vermont River Conservancy

Before
Google Earth
N


Conceptual Site Plan
Playground/ picnic area
Community Gardens
Parking
Apiary
Conservation Nursery
Restored Floodplain Forest,
Wetland
River Access
Berm cut-outs
Natural Flood Storage
Grassland Bird Habitat
Whetstone Brook
Floodwaters
Runoff
FLOOD STORAGE
• A restored floodplain will provide storage capacity during high water events, reducing peak flows and helping protect downstream property
WATER QUALITY
• Stormwater runoff will be redirected into a wetland, protecting Whetstone Brook's water quality
PUBLIC ACCESS
• A pedestrian trail will meander through the restoration area, and provide river access
• Through partnerships, other public uses are possible, such as community gardens, a conservation nursery, a picnic area, or a playground
WILDLIFE HABITAT
• The restoration effort will create wildlife habitat, including grasslands and riparian forests, restoring species present prior to conversion to a lumber yard.
N
W
E
0
25
50
75
100 m

WHETSTONE BROOK - FLOODPLAIN RESTORATION SITE PLAN, BRATTLEBORO, VT

SLR

CONNECT| Public with Access

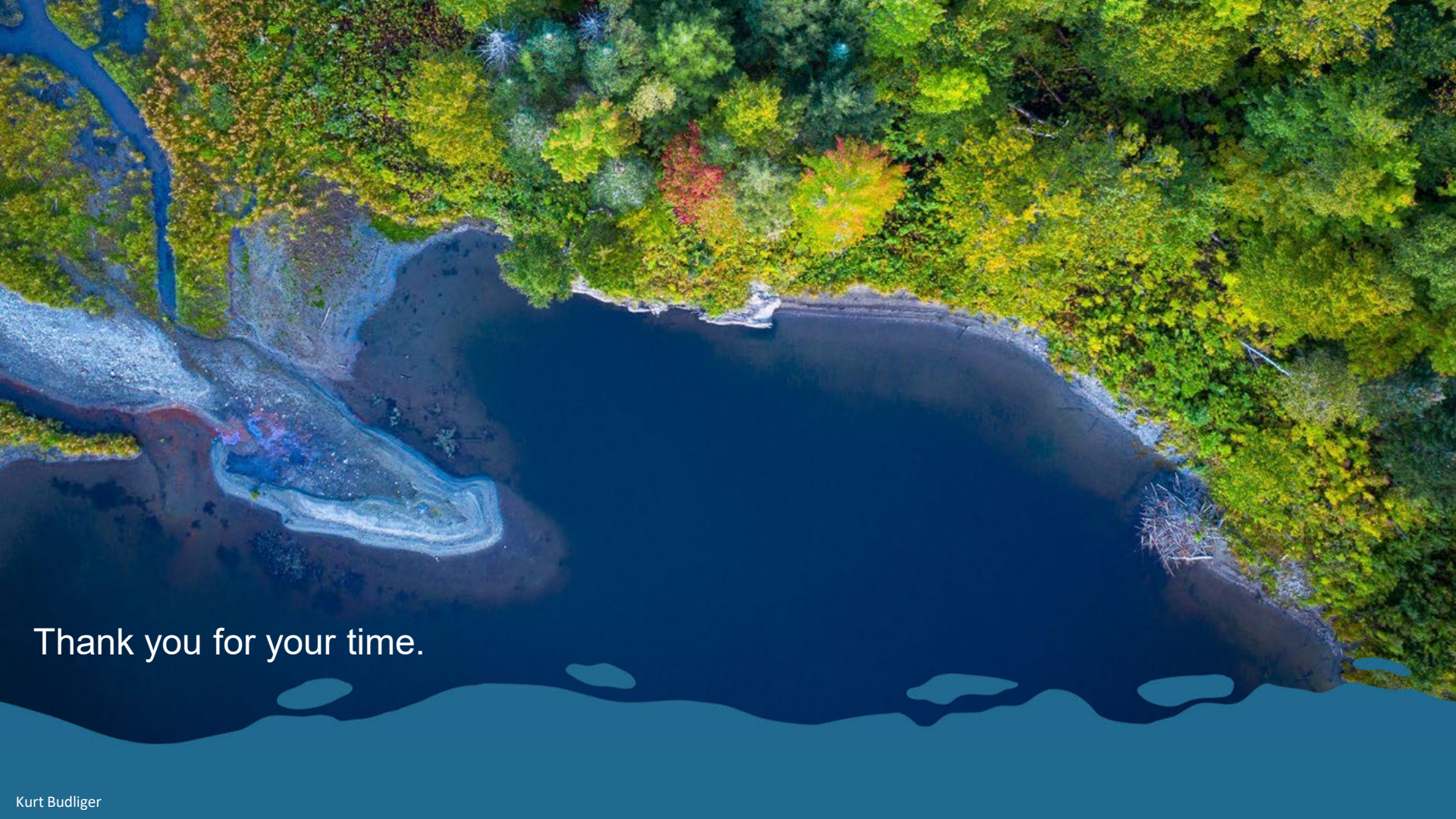
VRC Vermont River Conservancy

STRENGTHEN | Partnerships

VRC Vermont River Conservancy

River Corridor Easements

- Allow rivers to move over time, regaining braided channels
- Protect riparian vegetation
- Focus on natural wetlands and floodplains that provide natural water storage, and sediment attenuation



Thank you for your time.

Kurt Budliger