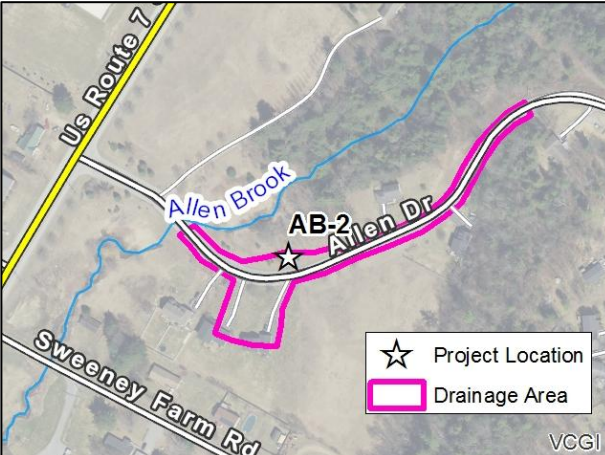


Project: AB-2		Problem Area Summary
Lake Segment	Malletts Bay Direct	
Location	Allen Drive	
Land Ownership	Town ROW	
BMP Type	Surface Infiltration	
Drainage Area/Impervious	1.10 / 0.74 acres	
% Impervious	67	
Estimated Project Cost	\$17,400	
P Efficiency (\$/lb removed)	\$13,200	
Project Priority	High	

Site Description: Two storm lines draining a wide residential road empty directly to Allen Brook. The eastern drainage is very steep and flows down a rock lined ditch with some gully erosion near the brook.



Photo 1: Top of drainage looking west towards Allen Brook



Photo 2: Location of proposed infiltration BMP – terrace located along the side of road above floodplain.

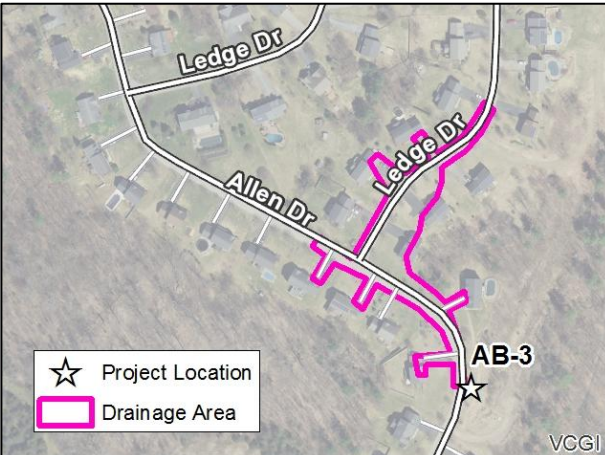
BMP Description: Route runoff from the two catchbasins to a new infiltration feature located on the terrace north of the road. The infiltration feature will have a stone lined overflow spillway to the floodplain. Underlying soils are mapped as having a high infiltration rate. **Subsurface infiltration may be possible for additional treatment volume.**

BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
1,500	1.43*	1.31	Low	Mod	Small Gully	Mod

Feasibility Comments: The project is located partially within the Town ROW and the remainder is likely within common land associated with the residential development. The project may have permitting considerations due to the proximity to a wetland buffer and a stream corridor. Utility conflicts are not anticipated.

Other Considerations/Benefits: Outfall erosion control, connected to receiving water

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: AB-3		Problem Area Summary
Lake Segment	Malletts Bay Direct	
Location	Allen Drive	
Land Ownership	Town ROW/Private	
BMP Type	Subsurface Infiltration	
Drainage Area/Impervious	1.18 / 0.90 acres	
% Impervious	76	
Estimated Project Cost	\$33,800	
P Efficiency (\$/lb removed)	\$26,400	
Project Priority	Moderate	

Site Description: A storm line drains a large portion of roadway and driveway, discharges to a stone lined outlet and surface flows to a large forested area within the Allen Brook watershed.



Photo 1: Area for subsurface infiltration feature adjacent to catchbasin discharging east (right)



Photo 2: Steep slope east of the proposed subsurface treatment feature.

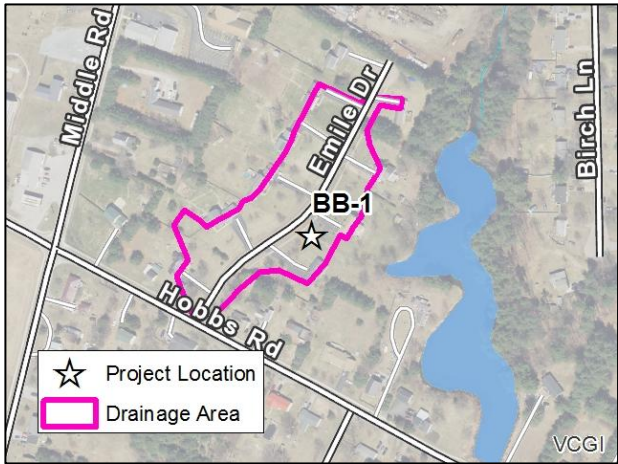
BMP Description: Retrofit the existing catchbasin to direct WQv to an underground treatment system in grassed area east of road

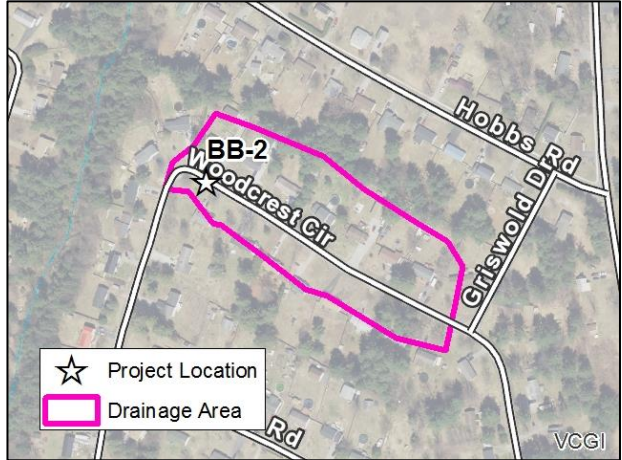
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
2,400	1.65	1.28	Low	Mod	None	Mod

Feasibility Comments: The project is located partially within the Town ROW and the remainder is on adjacent private land. An easement may be in place for the existing stormwater system. Based on soils mapping, depth to bedrock may be a significant constraint for project implementation.

Other Considerations/Benefits: Connected to receiving water

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: BB-1		Problem Area Summary				
Lake Segment	Malletts Bay Direct					
Location	Emile Dr					
Land Ownership	Private					
BMP Type	Surface Infiltration					
Drainage Area/Impervious	3.59 / 1.23 acres					
% Impervious	34					
Estimated Project Cost	\$8,300					
P Efficiency (\$/lb removed)	\$3,800					
Project Priority	High	Site Description: All paved surfaces and portions of roofs drain to grassed ditches along the road. A cross-culvert directs all runoff to a grassed swale leading to the pond.				
						
Photo 1: Swale from road to pond		Photo 2: Swale flows through a small forested area with pond in the background				
BMP Description: Widen the swale and install check dams to increase water storage volume to infiltrate most of the WQv.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
4,000	2.29	2.18	Low	High	None	Mod
Feasibility Comments: This project may require purchase of an easement from two private parcels, this cost was not included in the project budget estimate. No permitting or infrastructure concerns are expected.						
Other Considerations/Benefits: Connected to receiving water						

Project: BB-2		Problem Area Summary
Lake Segment	Malletts Bay Direct	
Location	Woodcrest Cir	
Land Ownership	Town	
BMP Type	Subsurface Infiltration	
Drainage Area/Impervious	5.15 / 1.47 acres	
% Impervious	29	
Estimated Project Cost	\$35,000	
P Efficiency (\$/lb removed)	\$29,400	
Project Priority	High	

Site Description: Two existing dry wells are likely insufficient for the size of the drainage area along the northern portion of Woodcrest Cir. Both dry wells have some pre-treatment from grassed swales. All runoff eventually infiltrates with the existing system.



Photo 1: Location of proposed dry wells (Picture from Google Street View)



Photo 2: Existing dry well with grassed swale pre-treatment (Picture from Google Street View)

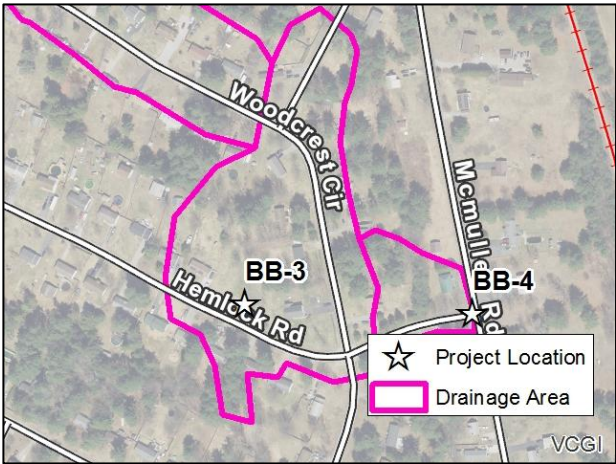
BMP Description: Clean the two existing dry wells and ensure that the grassed swales are providing sufficient pre-treatment. Install an additional pair of dry wells (with pre-treatment) near the intersection with Griswold Dr, and another pair near the northwest corner of the road.

BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
3,200	2.78	1.19**	Low	N/A	None	Low

Feasibility Comments: Groundwater elevations need to be verified to ensure that dry well replacement will have sufficient depth and area to infiltrate all runoff from the site. This project would be completed concurrently with water and sewer upgrades in the neighborhood, reducing infrastructure conflicts.

Other Considerations/Benefits: Infrastructure improvements, flood mitigation, existing local concern

**P reduction does not include amount currently removed by functioning BMPs within the drainage area

Project: BB-3		Problem Area Summary
Lake Segment	Malletts Bay Direct	
Location	Hemlock Rd	
Land Ownership	Town Property	
BMP Type	Subsurface Infiltration	
Drainage Area/Impervious	8.01 / 1.62 acres	
% Impervious	20	
Estimated Project Cost	\$43,400	
P Efficiency (\$/lb removed)	\$17,700	
Project Priority	High	

Site Description: A pair of dry wells (DW) located at Griswold and Woodcrest have an outlet pipe draining south to a new catch basin north of Hemlock Rd. This basin and three dry wells located at Woodcrest and Hemlock all connect to a pair of dry wells on Hemlock Rd. The DW south of Hemlock is old and appears to be non-functioning. This dry well has an overflow culvert to a swale south of the houses, the culvert is likely plugged or crushed, restricting flow. All existing dry wells take direct runoff with no pre-treatment.



Photo 1: 3 dry wells at Hemlock/Woodcrest



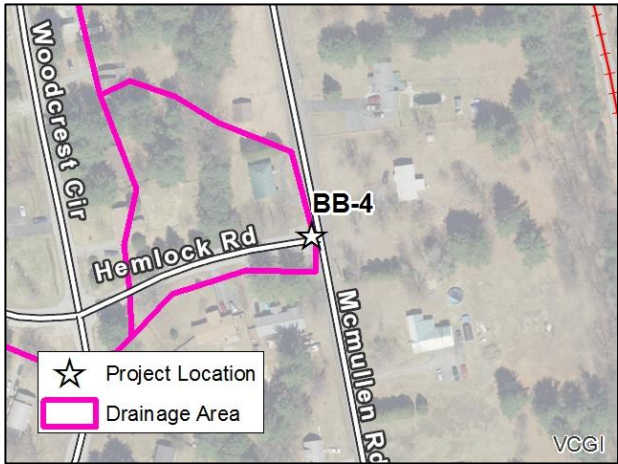
Photo 2: New 4-way shallow catch basin

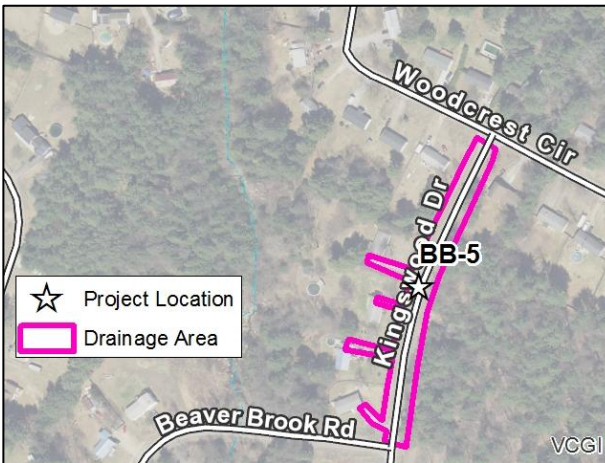
BMP Description: All 6-7 of the dry wells in the existing drainage network should be drained and cleaned. We expect that several of these should be replaced. Pre-treatment (deep sump catch basin) should be incorporated into any dry well replacements, or retrofits if possible. A large new dry well should replace the catch basin north of Hemlock Road. The overflow pipe from the 3 dry wells should be routed to the newer existing dry well north of Hemlock Road. The outlet pipe to the south should be cleaned or replaced.

BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
3,200	3.11	2.45	Low	High	None	Low

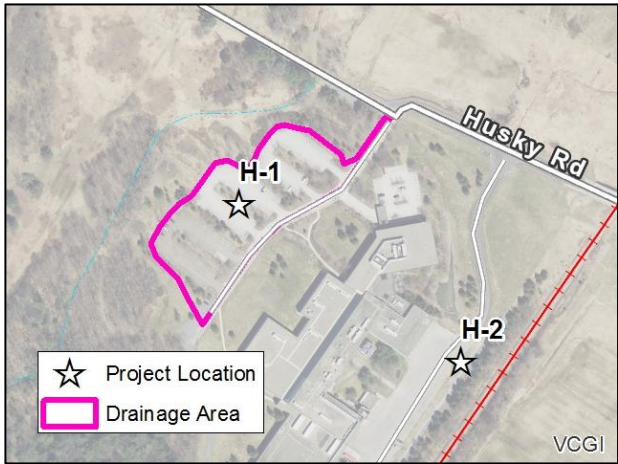
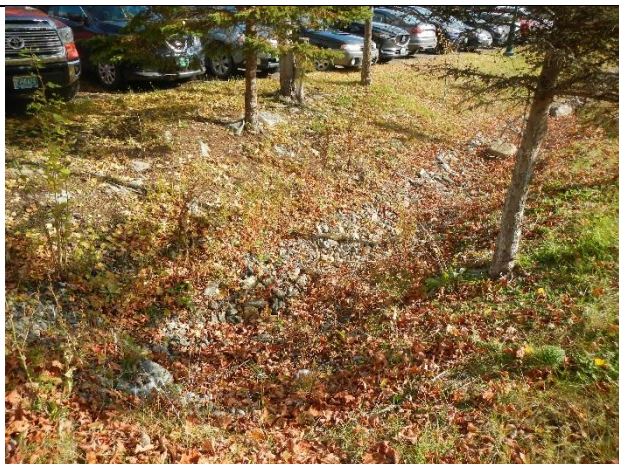
Feasibility Comments: This project is primarily located within the Town ROW. The new dry well installation and possible culvert replacement would be on private property. This project would be completed concurrently with water and sewer upgrades in the neighborhood, reducing infrastructure conflicts.

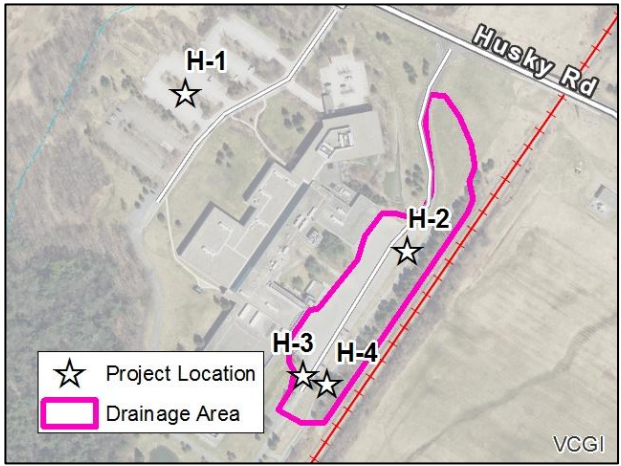
Other Considerations/Benefits: Connected to receiving water

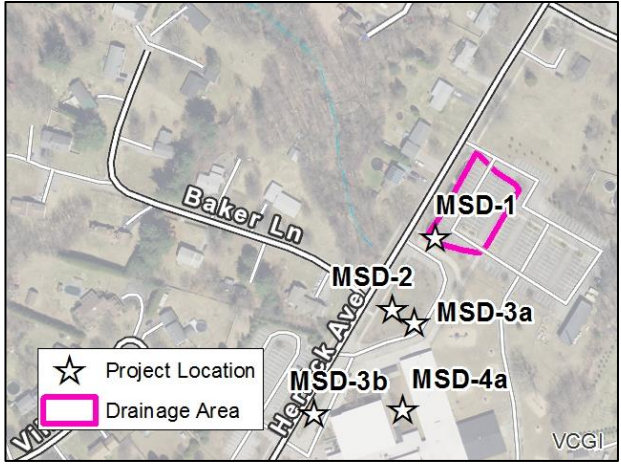
Project: BB-4		Problem Area Summary				
Lake Segment	Malletts Bay Direct					
Location	Hemlock Rd					
Land Ownership	Private					
BMP Type	Subsurface Infiltration					
Drainage Area/Impervious	1.38 / 0.20 acres					
% Impervious	15					
Estimated Project Cost	\$10,000					
P Efficiency (\$/lb removed)	\$28,300					
Project Priority	High					
Site Description: Two dry wells located at the intersection of Hemlock and McMullen are under performing, leading to frequent and sustained ponding at the intersection.						
						
Photo 1: Location of proposed grass ditch along Hemlock Rd Photo 2: Ponding 6" over dry well during a small runoff event						
BMP Description: Install grassed ditches on both sides of Hemlock Road to improve infiltration and function as pre-treatment. The ditch on the south side will require 2 driveway culverts. The two dry wells likely need to be replaced.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
800	0.40	0.35	Low	High	None	Low
Feasibility Comments: Groundwater elevations need to be verified to ensure that dry well replacement will have sufficient depth and area to infiltrate all runoff to the site. This project would be completed concurrently with water and sewer upgrades in the neighborhood, reducing infrastructure conflicts.						
Other Considerations/Benefits: Infrastructure improvements, flood mitigation, existing local concern						

Project: BB-5		Problem Area Summary				
Lake Segment	Malletts Bay Direct					
Location	Kingswood Dr					
Land Ownership	Town ROW					
BMP Type	Subsurface Infiltration					
Drainage Area/Impervious	0.97 / 0.77 acres					
% Impervious	79					
Estimated Project Cost	\$50,000					
P Efficiency (\$/lb removed)	\$76,900					
Project Priority	Moderate					
Site Description: High water table caused significant damage to the paved road winter 2018/2019. Existing road drainage is poor in the northern section, stormwater is collected in two catchbasins and piped north to the stream.						
						
Photo 1: Potholes and pavement damage in low point of road at catch basins.		Photo 2: Gravel and grass shoulder along the west side of Kingswood Drive provides some room for stormwater treatment.				
BMP Description: Improve road drainage and install shallow sand filters along road shoulder.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
2,000	1.41	0.65	Low	Mod	None	Low
Feasibility Comments: The project is located within the Town ROW. The sand filter installation and culvert replacement (with perforated pipe) will require significant disturbance along the road edges and will likely require relocation of utilities.						
Other Considerations/Benefits: Infrastructure improvement, connected to receiving water, existing local concerns						

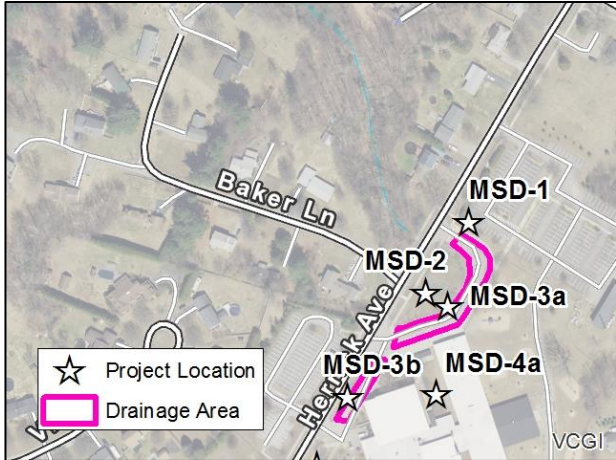
*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

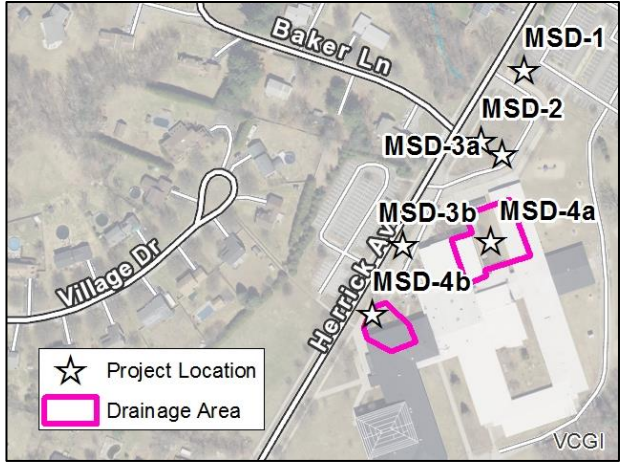
Project: H-1		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Employee Parking					
Land Ownership	Private (Husky)					
BMP Type	Rain Garden (Retrofit)					
Drainage Area/Impervious	3.14 / 1.54 acres					
% Impervious	49					
Estimated Project Cost	\$40,700					
P Efficiency (\$/lb removed)	\$9,500					
Project Priority	Very High					
Site Description: Three grassed and stone lined swales are located between employee parking areas. All three appear to receive additional runoff from catchbasins along the main road. The swales all drain to culverts located at grade and outlet northwest to a wetland area. Curb cuts and sheetflow convey runoff from the parking areas to the swales with no visible erosion.						
						
Photo 1: Stone lined swale between parking lots		Photo 2: Existing swale outlet limits ponding and retention				
BMP Description: Retrofit the outlet of each swale to increase ponding volume and retention time. Additional check dams will be necessary to maximize treatment volume. Each swale could be regraded to increase volume. Plantings or reduced mowing are recommended to improve nutrient removal.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
5,500	4.67	4.30	Mod	Mod	None	Mod
Feasibility Comments: This project is located on private land; however, this retrofit may be applicable to upcoming stormwater requirements for Husky. Stormwater drainage from the roadway may be modified to distribute runoff to each treatment feature. Any significant grading of the existing swales may require modifications to electric or other utilities. We do not anticipate any permitting requirements.						
Other Considerations/Benefits: Habitat creation, infrastructure improvement, connected to receiving water						

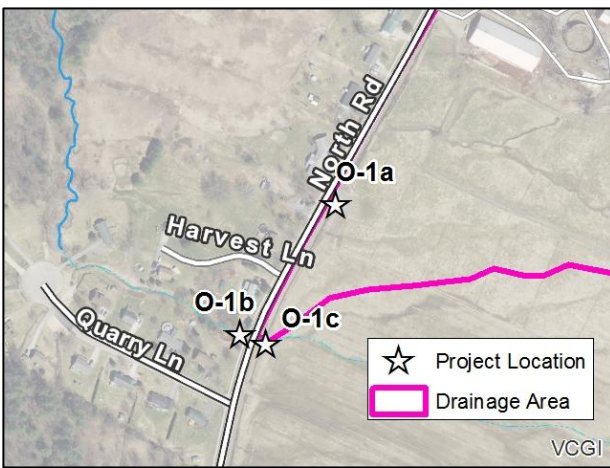
Project: H-4		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Shipping/Receiving					
Land Ownership	Private (Husky)					
BMP Type	Wet Pond (Retrofit)					
Drainage Area/Impervious	3.66 / 1.43 acres					
% Impervious	39					
Estimated Project Cost	\$18,000					
P Efficiency (\$/lb removed)	\$6,200					
Project Priority	High					
Site Description: The large parking area drains to a steep grassed bank and into an oversized stone lined swale flowing southwest along the railroad tracks. The swale empties into a vegetated ditch along the west side of the railroad tracks.						
						
Photo 1: Northeast end of stone swale and outlet structure with overflow from wet pond.		Photo 2: Outlet from wet pond draining to the southern end of the stone lined swale.				
BMP Description: Add a series of check dams or weirs to increase water storage capacity and detention times within the existing swale. Sufficient treatment volume is likely available to meet WQv and CPv treatment requirements. A stabilized overflow is required at the end of the swale and additional stabilization may be necessary along the railroad ditch.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
8,000	4.72	2.89	Mod	High	None	Mod
Feasibility Comments: This project is located on private land; however, this retrofit may be applicable to upcoming stormwater requirements for Husky. We do not anticipate any infrastructure conflicts or permitting requirements.						
Other Considerations/Benefits: Infrastructure improvement, connected to receiving water						

Project: MSD-1		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Milton Elementary					
Land Ownership	School District					
BMP Type	Surface Infiltration					
Drainage Area/Impervious	0.48/ 0.43 acres					
% Impervious	89					
Estimated Project Cost	\$11,600					
P Efficiency (\$/lb removed)	\$10,700					
Project Priority	Very High					
Site Description: A portion of a large parking lot drains southwest to a small grassed area with a catch basin. Runoff is piped south to the large dry well with an overflow into the stream to the west (project MSD-2).						
						
Photo 1: Parking lot draining to project area		Photo 2: Catch basin draining south to large dry well and stream				
BMP Description: Install a surface infiltration area with an overflow to the existing catch basin. Catch basin could be retrofitted to raise elevation or infiltration area could be designed to pond above the catch basin rim with a stable overflow. Plantings should be included to enhance the educational and aesthetic benefits of the project.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
1,400	1.10	1.08	Mod	High	None	Mod
Feasibility Comments: This project is entirely located on Town property. Existing stormwater infrastructure runs through the site, the proposed design may not require any modifications to the existing drainage. We do not anticipate any permitting requirements.						
Other Considerations/Benefits: Educational, infrastructure improvement, connected to receiving water						

Project: MSD-2		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Milton Elementary					
Land Ownership	School District					
BMP Type	Subsurface Infiltration					
Drainage Area/Impervious	14.54 / 7.61 acres					
% Impervious	52					
Estimated Project Cost	\$120,800					
P Efficiency (\$/lb removed)	\$8,400					
Project Priority	Very High					
Site Description: The Milton Elementary School property drains to a network of catch basins and dry wells that all connect to a single large dry well in a grassed area by the school entrance. This dry well has a large overflow culvert to the perennial stream channel west of Herrick Ave. Given the large drainage area and the limited storage depth in the drywell below the overflow pipe, it is unlikely the dry well can handle much of the WQV storm before overflowing to the nearby stream.						
  Photo 1: Grassed area at school entrance with multiple dry wells and catch basins Photo 2: Catch basin connecting north parking areas to main drainage system						
BMP Description: Install a large underground infiltration system in the grassed area adjacent to the existing drainage network. Retrofits to the existing drainage network may be required to adjust water elevations and to direct a portion of the runoff to the new infiltration feature. Existing closed drainage system needs to be better mapped/understood to determine required treatment volumes and benefits/costs.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
8,000	22.58	14.46	Low	Mod	None	Low
Feasibility Comments: This project will likely require significant alterations to the existing stormwater network and may require some utility reconfiguration. We do not anticipate any permitting requirements.						
Other Considerations/Benefits: Infrastructure improvement, connected to receiving water						

Project: MSD-3		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Milton Elementary					
Land Ownership	School District					
BMP Type	Rain Garden					
Drainage Area/Impervious	0.33/ 0.33 acres					
% Impervious	100					
Estimated Project Cost	\$15,400					
P Efficiency (\$/lb removed)	\$21,200					
Project Priority	Medium					
Site Description: Runoff from two sections of the school entrance roadway sheetflow to grassed areas with catch basins connected to the main drainage network. No erosion was observed in either area. Both areas are highly visible.						
						
Photo 1: Grassed area along inside of curved entrance road (6a)		Photo 2: Grassed area along Herrick Ave (photo from Google Street View)				
BMP Description: Install bioswale or other linear rain garden type feature along the edge of each paved area. For 6a it is recommended to leave a bench of grassed area to serve as a snow shelf. Bioswales should be designed for infiltration and planted with native vegetation.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
500	0.84	0.73	Low	Low	None	Mod
Feasibility Comments: This project is entirely located on school district property. We do not anticipate any infrastructure conflicts or permitting requirements.						
Other Considerations/Benefits: Educational, connected to receiving water						

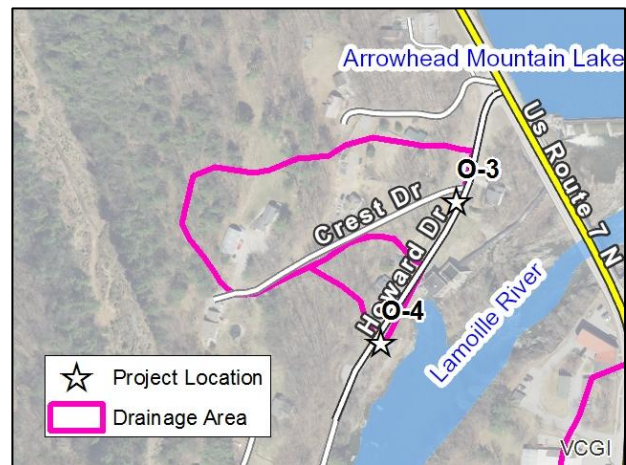
Project: MSD-4		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Milton Elementary					
Land Ownership	School District					
BMP Type	Rain Garden					
Drainage Area/Impervious	0.55/ 0.38 acres					
% Impervious	69					
Estimated Project Cost	\$11,200					
P Efficiency (\$/lb removed)	\$15,900					
Project Priority	Medium					
Site Description: Two catchbasins receive runoff from rooftop and paved sidewalk areas. Both basins are connected to the main drainage network (project MSD-2). Both basins are in highly visible locations, 4a is in the grassed area along the main entrance to the school.						
						
Photo 1: Catchbasin by main entrance (4a)		Photo 2: Catch basin along sidewalk in grassed area (4b)				
BMP Description: Install small rain garden features in a depression around each existing catchbasin. New rain garden features at each catch basin will increase sediment and nutrient retention and provide some additional infiltration. Minor modifications to the catchbasin may be necessary.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
300	1.04	0.71	Low	Low	None	Mod
Feasibility Comments: This project is entirely located on school district property. We do not anticipate any infrastructure conflicts or permitting requirements.						
Other Considerations/Benefits: Educational, infrastructure improvement, connected to receiving water						

Project: O-1		Problem Area Summary				
Lake Segment	Lamoille River					
Location	North Rd					
Land Ownership	Town ROW					
BMP Type	Grass Swale					
Drainage Area/Impervious	127.18 / 2.18 acres					
% Impervious	2					
Estimated Project Cost	\$16,900					
P Efficiency (\$/lb removed)	\$3,800					
Project Priority	Very High					
Site Description: A long roadside ditch/swale along the east side of North Road collects runoff from portions of the roadway and from a large agricultural field and dairy barn to the east. Several intermittent stream channels drain to the ditch and moderate to severe erosion was observed along the ditch at a farm road access. Vegetation cover was fair to good for most of the ditch, with some areas of ditch erosion.						
						
Photo 1: Ditch looking south from farm road crossing		Photo 2: Erosion on farm road crossing				
BMP Description: Farm road crossing should be stabilized and improved to reduce sediment loading (a). Water volume storage and treatment can be increased in the large ditch with check dam installation and improved vegetation coverage (b). Erosion areas on both sides of the North Rd culvert should be stabilized.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
8,000	69.1*	4.42	Very High	Low	Gully and Bank Erosion	Mod
Feasibility Comments: The project is located within the road ROW. Farm road improvements would likely require support of landowner. We do not anticipate any utility conflicts.						
Other Considerations/Benefits: Infrastructure improvement, outfall erosion control, connected to receiving water						

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: O-3	Problem Area Summary
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Lake Segment	Lamoille River
Location	Howard Dr at Crest Dr
Land Ownership	Town Property
BMP Type	Surface Infiltration
Drainage Area/Impervious	2.89/ 0.45 acres
% Impervious	15
Estimated Project Cost	\$3,200
P Efficiency (\$/lb removed)	\$6,300
Project Priority	High



Site Description: A steep gravel road (Crest Dr – Private) drains onto a town road (Howard Dr). A very steep turn at the intersection and poor grading directs runoff onto Howard Drive partially bypassing the grassed ditch. High sediment loads are delivered from Crest Dr and additional erosion was observed along Howard. The runoff flows down Howard or re-enters the ditch and is conveyed directly to the River through a cross-culvert.



Photo 1: Sharp bend at bottom of Crest Dr, runoff flows on to Howard Dr



Photo 2: Grassed ditch along Howard Drive

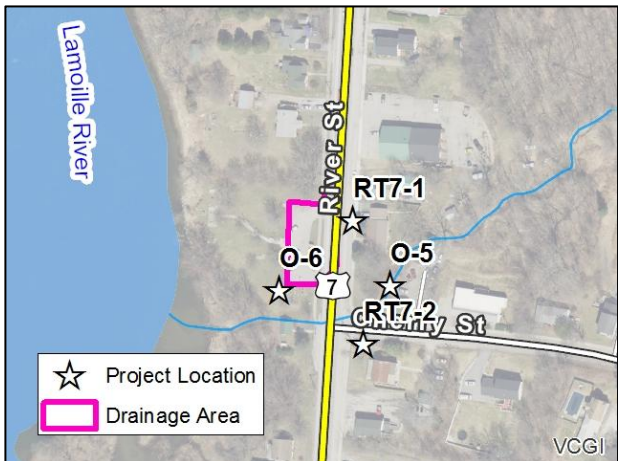
BMP Description: Improve the grassed swale running south along Howard Drive. Check dams and reduced mowing will increase retention of water and sediment. Install a small sediment basin at the intersection. **The ditch along Crest Dr should be stone lined, however this is not included as part of this project.**

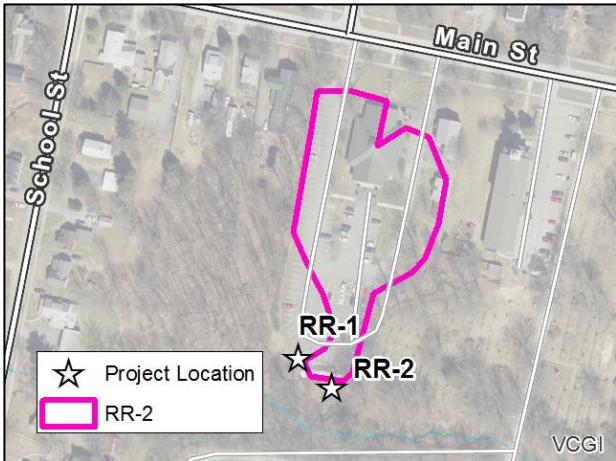
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
400	2.76*	0.51	Mod	Low	Small Gully	Mod

Feasibility Comments: This project is entirely located on Town property. We do not anticipate any utility conflicts or permitting requirements.

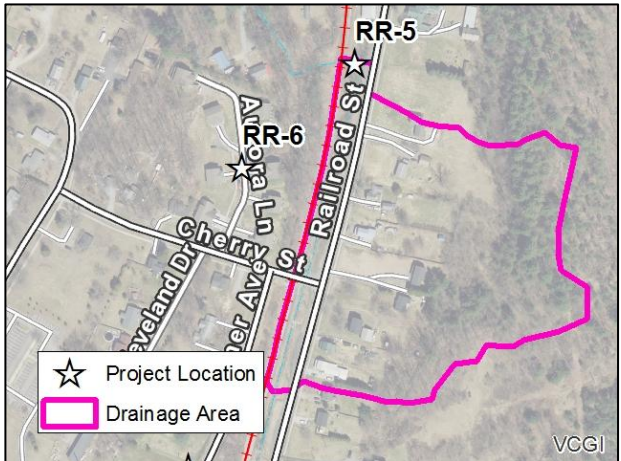
Other Considerations/Benefits: Connected to receiving water

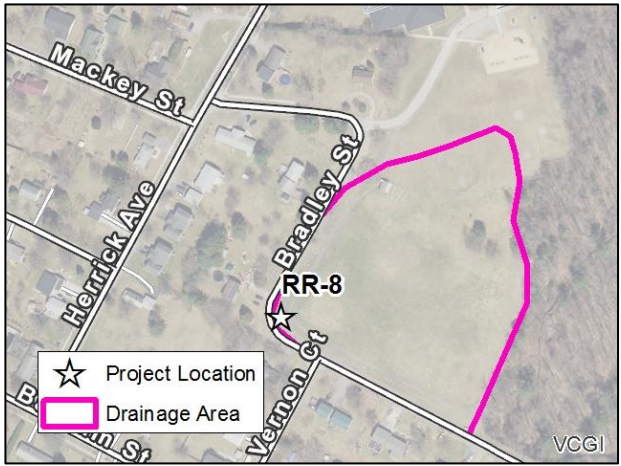
*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: O-6		Problem Area Summary				
Lake Segment	Lamoille River					
Location	River Street Park					
Land Ownership	Private (GMP)					
BMP Type	Rain Garden					
Drainage Area/Impervious	0.23 / 0.22 acres					
% Impervious	94					
Estimated Project Cost	\$15,400					
P Efficiency (\$/lb removed)	\$30,400					
Project Priority	Medium					
Site Description: The parking area for the River Street Park and a small portion of Route 7 drain to a grassed area off the southwest corner of the parking area. Runoff sheet flows directly to the perennial stream and into the River.						
						
Photo 1: Runoff draining to southwest corner of parking area		Photo 2: Location of proposed rain garden				
BMP Description: Install a rain garden in the grassed area between the parking lot and stream. Soils are mapped as very well drained; therefore, we do not anticipate needing an underdrain. A stable overflow should be constructed to convey excess runoff to the stream.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
750	0.55	0.51	Low	Mod	None	Mod
Feasibility Comments: This project will require excavation and construction in close proximity to a stream, the Lamoille River, and associated wetlands. The project is located on private land.						
Other Considerations/Benefits: Educational benefits, habit creation, connected to receiving water						

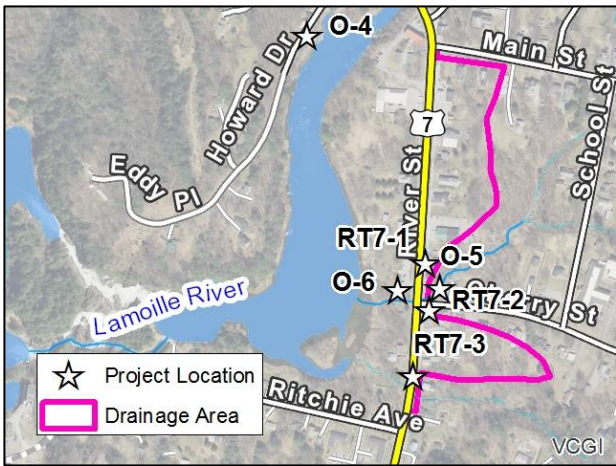
Project: RR-2		Problem Area Summary				
Lake Segment	Lamoille River					
Location	St. Ann's Church					
Land Ownership	Private					
BMP Type	Surface Infiltration					
Drainage Area/Impervious	1.48 / 0.89 acres					
% Impervious	60					
Estimated Project Cost	\$29,000					
P Efficiency (\$/lb removed)	\$22,600					
Project Priority	Medium					
Site Description: Runoff from a large parking area joins a small tributary piped under the parking lot at the southwest corner of the parking lot. A large gully has formed and continues south to a small perennial stream.						
						
Photo 1: Tributary flowing under parking lot to outlet at southwest corner (near car)		Photo 2: Large and active gully erosion from corner of parking lot to perennial stream channel				
BMP Description: Stabilize the gully with rock and install a surface infiltration feature to capture some of the parking lot runoff. The available treatment area is very small compared to the parking lot size. Further treatment is possible with underground storage; however, it would be very challenging and expensive to increase treatment volume to the WQv.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
150	3.34*	1.29	High	Minimal	Large Gully	Mod
Feasibility Comments: This project is entirely located on private property. We do not anticipate any infrastructure conflicts or permitting requirements.						
Other Considerations/Benefits: Connected to receiving water						

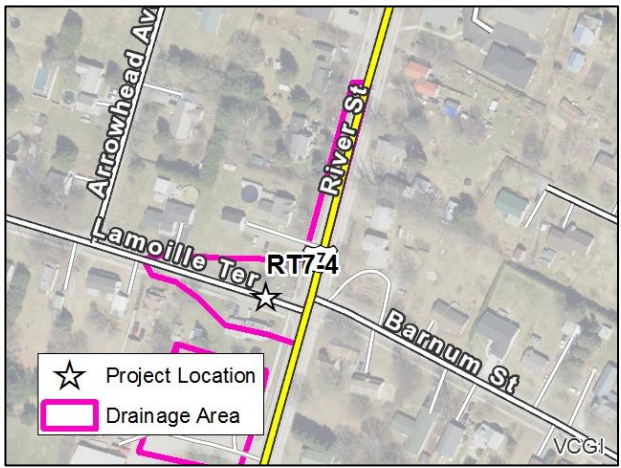
*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

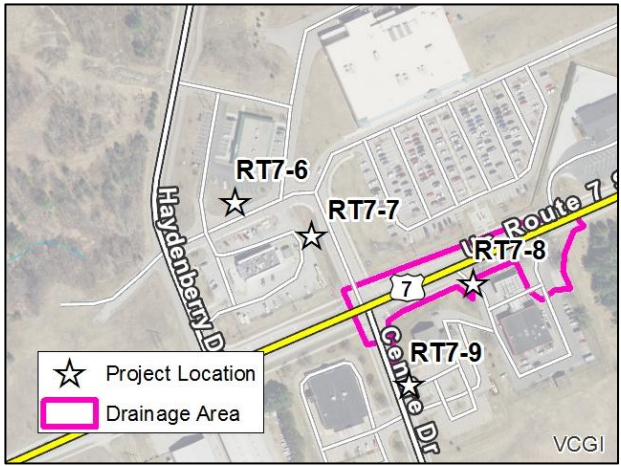
Project: RR-5		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Railroad St					
Land Ownership	Private (Railroad)					
BMP Type	Wet Pond (Retrofit)					
Drainage Area/Impervious	10.75 / 1.98 acres					
% Impervious	18					
Estimated Project Cost	\$38,300					
P Efficiency (\$/lb removed)	\$9,100					
Project Priority	Medium					
Site Description: A long vegetated swale between Railroad St and the railroad is mapped as having a small perennial stream channel. The swale slope is relatively flat with emergent wetland vegetation in the southern portion. The norther portion has more slope and steep forested banks. The swale crosses under the railroad and empties into a forested wetland.						
						
Photo 1: Incised channel and steep banks from the swale outlet under the railroad tracks						
BMP Description: Install earthen/stone check dams to create a series of small wet ponds along the swale. The outlet culvert could be outfitted with an outlet control device to increase ponding depth and volume.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
8,500	9.37	4.21	Mod	Mod	None	Mod
Feasibility Comments: This project is entirely located on the railroad ROW. The railroad may not allow any changes in hydrology in the project area. We do not anticipate any utility conflicts. The project may require wetland and stream alteration permits.						
Other Considerations/Benefits: Habitat creation, infrastructure improvement, connected to receiving water						

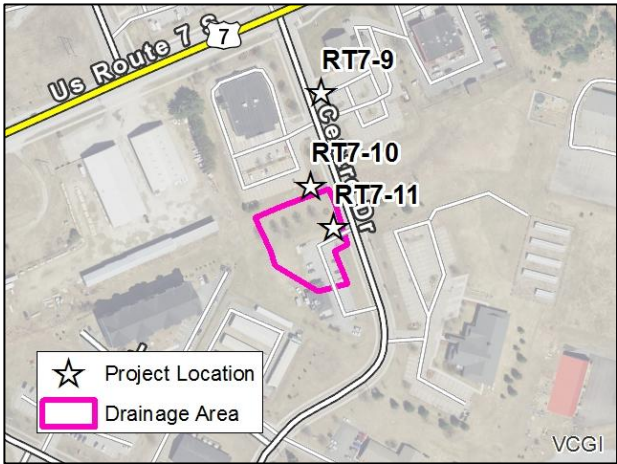
Project: RR-8		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Bradley St					
Land Ownership	Town					
BMP Type	Rain Garden					
Drainage Area/Impervious	5.10 / 0.18 acres					
% Impervious	4					
Estimated Project Cost	\$2,900					
P Efficiency (\$/lb removed)	\$2,600					
Project Priority	High					
						
Site Description: Portions of Bradley St and most of the playing field complex drain to a grassed swale along Bradley St. A low point is located near the Vernon Ct intersection, behind home plate. All runoff appears to infiltrate in the existing swale.						
 						
Photo 1: Grassy swale along Bradley Ave with a low point on bend.						
Photo 2: Grassy swale looking west (photo from Google Street View)						
BMP Description: Install a small rain garden in the low area behind home plate to increase P removal. A larger rain garden could be installed, however all runoff currently infiltrates in the existing swale.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
150	2.91**	1.12	Low	Low	None	Mod
Feasibility Comments: This project is entirely located on Town property. We do not expect that the proposed minor excavation will interfere with any utilities. We do not anticipate any permit requirements.						
Other Considerations/Benefits: Educational						

**P reduction does not include amount currently removed by functioning BMPs within the drainage area

Project: RT7-1		Problem Area Summary														
Lake Segment	Lamoille River															
Location	Route 7															
Land Ownership	VTrans															
BMP Type	Rain Garden															
Drainage Area/Impervious	7.70 / 2.88 acres															
% Impervious	37															
Estimated Project Cost	\$106,900															
P Efficiency (\$/lb removed)	\$17,900															
Project Priority	High															
Site Description: Catch basins and drain lines along the east side of Route 7 collect runoff from a large area of impervious surfaces and drain to two smaller perennial streams, emptying directly into the River. The roadway has a wide shoulder along the east side.  Photo 1: Wide shoulder and catch basin looking south from Cherry St Photo 2: Looking north up Route 7 from River St Park BMP Description: Install tree box filters or other rain garden type structures along the road shoulder. Treatment features should receive surface runoff and incorporate overflow drainage into the existing storm line. Additional subsurface detention could be incorporated to increase treatment and infiltration volume. <table><tr><th>BMP Volume (cf)</th><th>P Load (lbs)</th><th>P Reduction (lbs)</th><th>Sed Reduction</th><th>%WQv/CPv</th><th>Gully/Erosion</th><th>Maintenance</th></tr><tr><td>2,000</td><td>9.66</td><td>5.98</td><td>Mod</td><td>Low</td><td>None</td><td>Mod</td></tr></table> Feasibility Comments: This project will require modification to existing storm drainage. Sewer and water locations are not known. We do not anticipate any permitting requirements. Other Considerations/Benefits: Habitat creation, outfall erosion control, connected to receiving water			BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance	2,000	9.66	5.98	Mod	Low	None	Mod
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance										
2,000	9.66	5.98	Mod	Low	None	Mod										

Project: RT7-4		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Lamoille Terr at Rt7					
Land Ownership	Town Property					
BMP Type	Subsurface Infiltration					
Drainage Area/Impervious	0.71 / 0.43 acres					
% Impervious	61					
Estimated Project Cost	\$16,200					
P Efficiency (\$/lb removed)	\$15,600					
Project Priority	Medium					
Site Description: The intersection of Lamoille Terrace and Route 7 lacks appropriate drainage infrastructure. Runoff ponds on Lamoille Terrace and eventually infiltrates into the adjacent grassed areas. This intersection is a recurring issue for the Public Works Department, especially during winter months.						
						
Photo 1: 3 Culvert under entrance to storage facility		Photo 2: Runoff ponding on sidewalk along Checkerberry.				
BMP Description: Install a catch basin along the north side of Lamoille Terrace and connect to a new dry well in the grassed area. Minor road grade adjustments will improve drainage to new catch basin.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
800	1.21	1.04	Low	Mod	None	Mod
Feasibility Comments: This project is partially located in the Town ROW. The proposed dry well installation is on an open residential lot. We do not anticipate any permitting requirements; however utility conflicts are likely.						
Other Considerations/Benefits: Existing concern						

Project: RT7-7		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Milton Square					
Land Ownership	Private / VTrans					
BMP Type	Surface Infiltration					
Drainage Area/Impervious	1.12 / 0.76 acres					
% Impervious	68					
Estimated Project Cost	\$6,800					
P Efficiency (\$/lb removed)	\$5,900					
Project Priority	High					
Site Description: A portion of Route 7 drains to a deep grassed basin along the west side of the entrance to the shopping area. The grassed area has a roughly 0.5% slope to a recessed catch basin. The basin has steep side slopes however no significant erosion was observed. High volumes of trash were observed in the basin and trapped in the fabric filter installed under the catch basin grate. No outlet pipes are mapped, runoff may be directed to the large wet pond behind Hannafords.						
						
Photo 1: Grassed basin looking north from Route 7		Photo 2: Fabric filter installed under catch basin grate				
BMP Description: Install earthen/stone check dams and raise the outlet elevation by 1 foot to increase water storage volume and detention time. Side slopes should be stabilized and revegetated as needed. The outlet grate could be replaced with a beehive grate or similar structure to reduce the risk of blockage from trash and debris. Full WQv treatment may be possible if depth to SHWT is sufficient to include subsurface storage and infiltration. The existing Hannafords stormwater permit should be reviewed in more detail to determine whether this area is already treated for WQv.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
1,500	2.09	1.15	Mod	Low	None	Mod
Feasibility Comments: This project is a simple retrofit of an existing BMP. We do not anticipate any infrastructure conflicts or permitting requirements.						
Other Considerations/Benefits: Infrastructure improvement						

Project: RT7-11		Problem Area Summary
Lake Segment	Malletts Bay Direct	
Location	Rick's Grill	
Land Ownership	Private	
BMP Type	Subsurface Infiltration	
Drainage Area/Impervious	0.60 / 0.25 acres	
% Impervious	41	
Estimated Project Cost	\$2,000	
P Efficiency (\$/lb removed)	\$4,400	
Project Priority	High	

Site Description: The elevated grassed area along the north side of the parking entrance is preventing parking lot runoff from reaching a dry well. Runoff flows along the edge of the pavement and drains to Centre Dr. The existing dry well receives some runoff from the surrounding grassed area. Some erosion is visible along the edges of the pavement.



Photo 1: Grassed basin looking north from Route 7



Photo 2: Fabric filter installed under catch basin grate

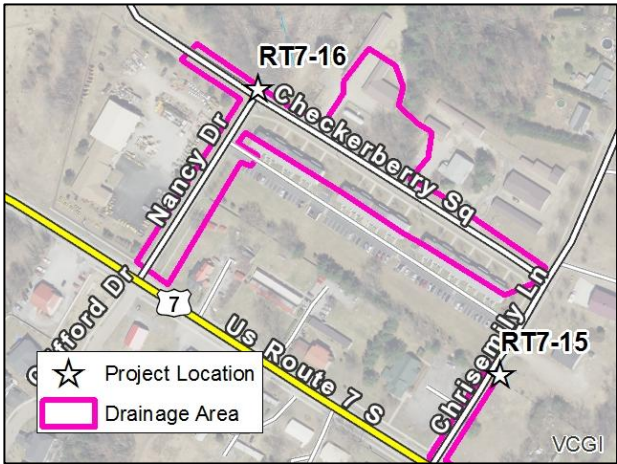
BMP Description: Regrade the grassed area north of the parking lot to allow for sheetflow to the existing dry well.

BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
600	0.50*	0.46	Low	High	None	Low

Feasibility Comments: This project is a simple grading improvement to increase the functionality of the existing dry well. We do not anticipate any infrastructure conflicts or permitting requirements.

Other Considerations/Benefits: Infrastructure improvement

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: RT7-16		Problem Area Summary
Lake Segment	Lamoille River	
Location	Checkerberry St	
Land Ownership	Town Property	
BMP Type	Wet Pond	
Drainage Area/Impervious	3.15 / 1.85 acres	
% Impervious	59	
Estimated Project Cost	\$30,000	
P Efficiency (\$/lb removed)	\$16,800	
Project Priority	Medium	

Site Description: A gully has formed where a cross culvert and roadside ditch drain to a small perennial stream. Checkerberry street has inadequate drainage with significant ponding along the southern side during runoff events. Nancy Drive has limited areas of grassed shoulder, runoff primarily flows down the roadway.



Photo 1: 3 Culvert under entrance to storage facility



Photo 2: Runoff ponding on sidewalk along Checkerberry.

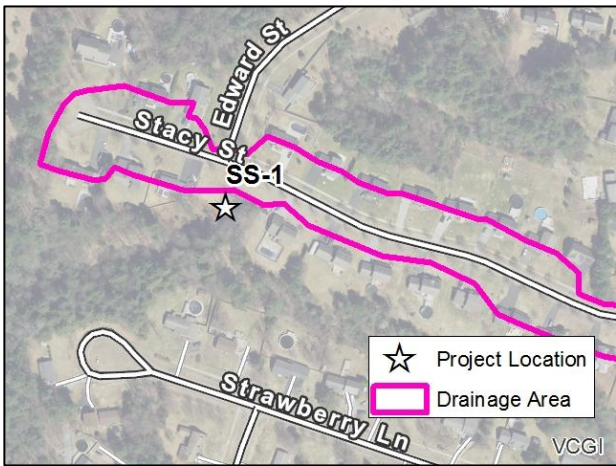
BMP Description: Install 2-3 small catchbasins and cross culverts along the south side of Checkerberry to improve drainage. Install grassed ditches along Nancy Dr. Improve grassed ditches northwest on Checkerberry. Install a flow control structure at the culvert inlet under the storage facility entrance to increase ponding volume in the existing ditch/wetland area. Stabilize the gully area as needed.

BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
2,000	5.29*	1.79	Mod	Low	Gully	Mod

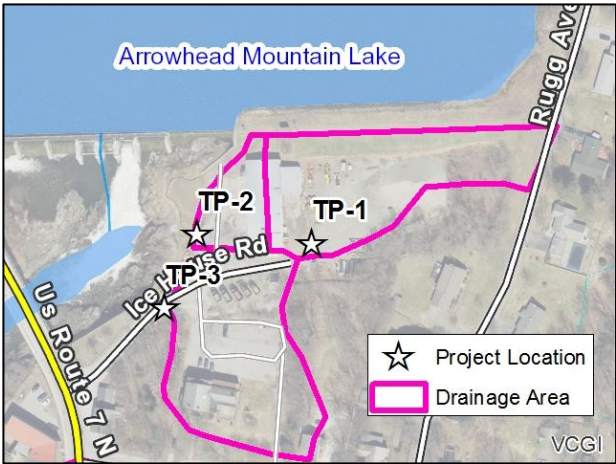
Feasibility Comments: This project is located within the Town ROW but does require modification of a culvert for the storage facility entrance. New catchbasin and cross culvert installation will likely require some utility work. Modifications to water levels within the small wetland are not likely to require permits.

Other Considerations/Benefits: Outfall erosion control, connected to receiving water, existing concern

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: SS-1		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Stacy Street					
Land Ownership	Town Property					
BMP Type	Subsurface Infiltration					
Drainage Area/Impervious	4.32 / 1.71 acres					
% Impervious	40					
Estimated Project Cost	\$129,900					
P Efficiency (\$/lb removed)	\$17,200					
Project Priority	Very High					
Site Description: The road surfaces and some of the houses and driveways along Stacy Street drain to a simple storm drainage system with a single outlet pipe south of the Edward St intersection. The runoff from this neighborhood has caused a very large gully to form.						
						
Photo 1: Large and active gully at the outlet of the Stacy St storm drainage system						
BMP Description: Replace existing catch basins with dry wells and install a new underground infiltration practice between the roadway and the gully. May be possible to reroute some of the runoff north into the Edward St drainage system, if this will not cause additional water quality issues.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
5,000	8.00*	7.54	High	Mod	Large Gully	Low
Feasibility Comments: This project will likely require significant alterations to the existing stormwater network. Electric and telecom utilities were observed in the area of the proposed underground feature. We do not anticipate any permitting requirements.						
Other Considerations/Benefits: Outfall erosion control, connected to receiving water, existing local concern						

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: TP-1		Problem Area Summary
Lake Segment	Lamoille River	
Location	Town Garage	
Land Ownership	Town Property	
BMP Type	Surface Infiltration	
Drainage Area/Impervious	1.34 / 0.60 acres	
% Impervious	45	
Estimated Project Cost	\$2,300	
P Efficiency (\$/lb removed)	\$1,600	
Project Priority	High	

Site Description: The back half of the Town garage drains onto a large gravel parking area with additional road sand and other materials stored nearby. Runoff flows to a single catch basin which is piped southwest and empties directly into the River. Rill erosion was observed at the catch basin inlet.



Photo 1: Large gravel/dirt area draining to catch basin



Photo 2: Deep catch basin with erosion

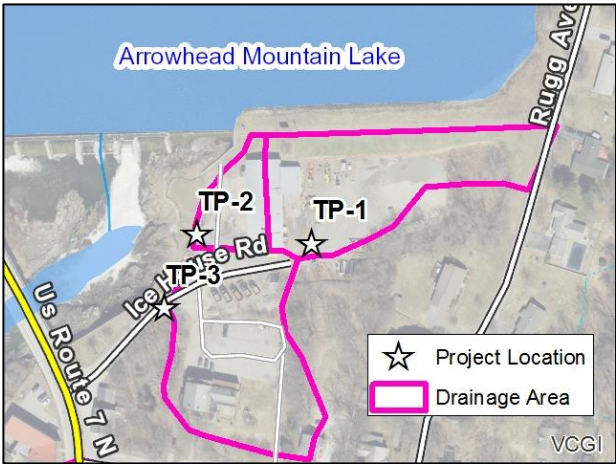
BMP Description: Excavate a depression around catch basin to create a sediment trap and raise the height of the catch basin inlet. Stabilize flow paths to new sediment trap. We anticipate this basin will require annual cleanouts, and will remove a minimum of 1CY of sediment from the annual load to the Lamoille River.

BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
50	3.07*	1.40	High	None	Small Gully	High

Feasibility Comments: This project should be relatively simple to install. We do not anticipate any utility conflicts or permitting requirements.

Other Considerations/Benefits: Connected to receiving water

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: TP-2		Problem Area Summary
Lake Segment	Lamoille River	
Location	Town Garage	
Land Ownership	Town Property	
BMP Type	Surface Infiltration	
Drainage Area/Impervious	0.34 / 0.26 acres	
% Impervious	76	
Estimated Project Cost	\$13,000	
P Efficiency (\$/lb removed)	\$12,000	
Project Priority	Very High	

Site Description: The front half of the Town garage drains onto a gravel parking area. Runoff concentrates to a single flow path and empties directly into the River after flowing across a narrow grassed strip used for equipment storage. The salt storage loading area is directly under the roof drip line.

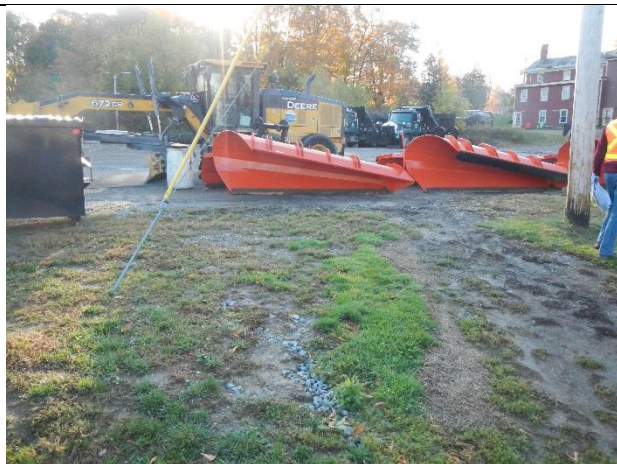


Photo 1: Flow path from parking lot



Photo 2: Roof drains onto parking area with high sediment and salt loads

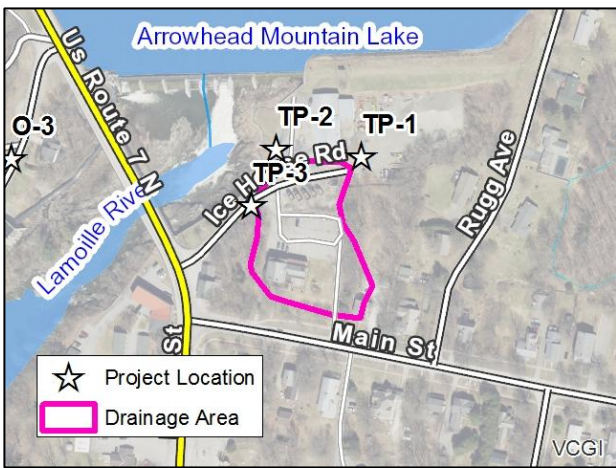
BMP Description: Install a sediment trap and surface infiltration feature in grassed area between parking lot and steep cliff to river. Divert roof runoff way from salt loading area. A grassed filter strip should be maintained along the edge of the parking area for pre-treatment.

BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
850	1.08*	1.08	Mod	High	None	Mod

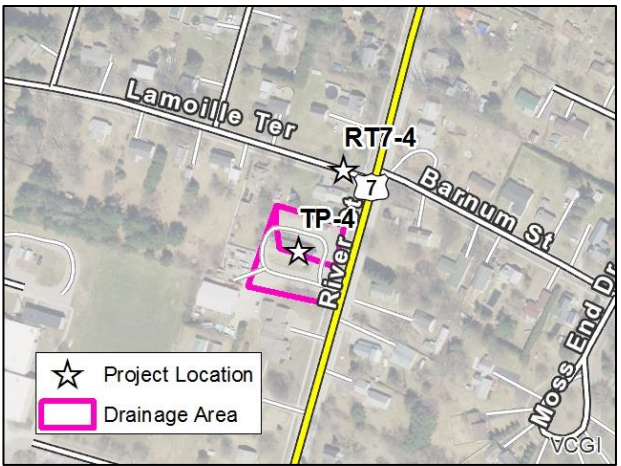
Feasibility Comments: This project should be relatively simple to install. We do not anticipate any utility conflicts or permitting requirements.

Other Considerations/Benefits: Connected to receiving water

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: TP-3		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Town Garage					
Land Ownership	Town Property / Private					
BMP Type	Surface Infiltration					
Drainage Area/Impervious	1.38 / 0.85 acres					
% Impervious	62					
Estimated Project Cost	\$3,500					
P Efficiency (\$/lb removed)	\$8,100					
Project Priority	Medium					
Site Description: Runoff from large gravel parking area (private) and portions of the paved and gravel road and parking area for the Town Garage drain to a catch basin that is piped directly to the Lamoille River.						
						
Photo 1: Flow path from parking lot		Photo 2: Roof drains onto parking area with high sediment and salt loads				
BMP Description: Install a small infiltration basin and sediment trap around the existing catch basin. May be able to raise the catch basin some to increase treatment volume. Bedrock is likely a constraint for underground detention.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
100	2.48*	0.43	Mod	Low	None	Mod
Feasibility Comments: This project should be relatively simple to install. We do not anticipate any utility conflicts or permitting requirements.						
Other Considerations/Benefits: Infrastructure improvement, connected to receiving water						

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: TP-4		Problem Area Summary
Lake Segment	Lamoille River	
Location	Milton Grange Hall	
Land Ownership	Town	
BMP Type	Subsurface Infiltration	
Drainage Area/Impervious	0.62 / 0.48 acres	
% Impervious	77	
Estimated Project Cost	\$39,900	
P Efficiency (\$/lb removed)	\$29,200	
Project Priority	High	

Site Description: The grange hall parking lot is approximately half paved and has a large dry well in the unpaved (northern) portion. Drainage is poor throughout the property and the dry well drains slowly, likely due to sediment clogging. A grassed space is located along the southern edge of the property.



Photo 1: Grassed area with ponded water along southern edge of parking lot



Photo 2: Dry well in unpaved portion of parking lot

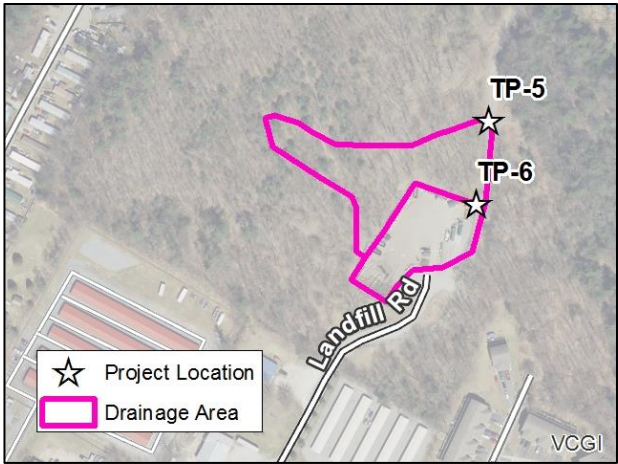
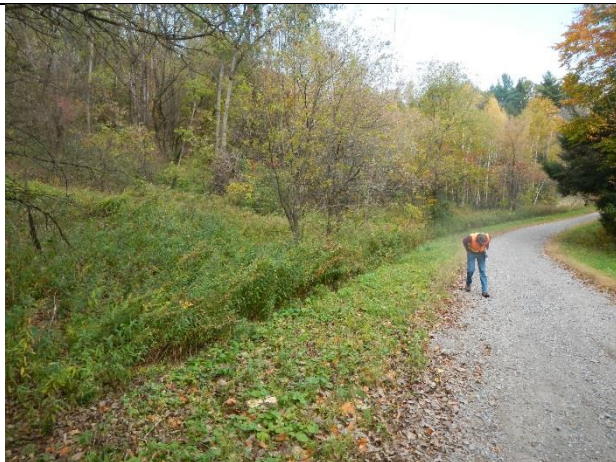
BMP Description: The existing dry well likely needs to be replaced. A deep sump catch basin could be installed as an inlet pre-treatment feature. We recommend paving the remainder of the property to improve drywell function. A new dry well should be installed along the southern edge of the property. The grassed area can be graded to function as a pre-treatment swale.

BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
1200	1.48*	1.37	Mod	High	None	Low

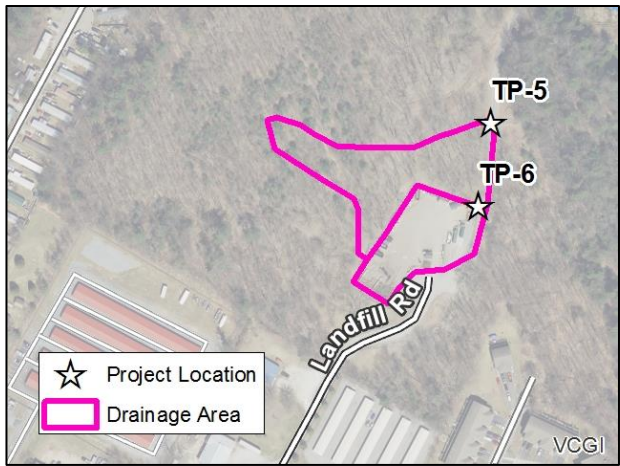
Feasibility Comments: Groundwater elevations need to be verified to ensure that dry well replacement will have sufficient depth and area to infiltrate all runoff to the site. Repaving is strongly recommended to ensure appropriate dry well function. We do not anticipate utility conflicts or permitting requirements.

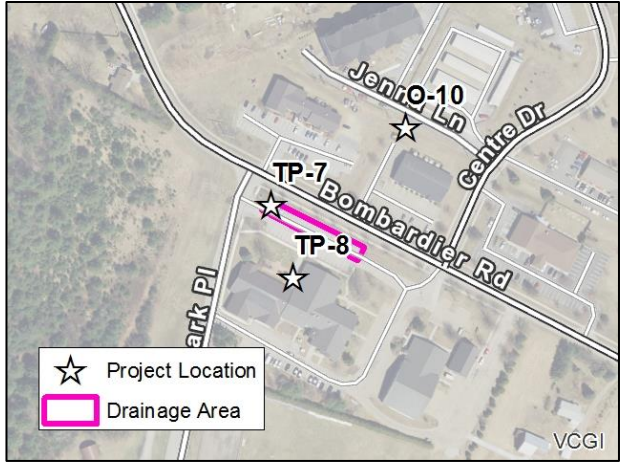
Other Considerations/Benefits: Infrastructure improvements, existing local concern

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: TP-5		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Landfill Rd					
Land Ownership	Town Property					
BMP Type	Road Drainage					
Drainage Area/Impervious	2.12 / 0.78 acres					
% Impervious	37					
Estimated Project Cost	\$9,000					
P Efficiency (\$/lb removed)	\$15,000					
Project Priority	Medium					
						
Site Description: An unmapped/unclassified road continuing north from the transfer station is maintained by the Town as an access to the sand and gravel storage areas by the capped landfill. The road drops at approximately 10-11% slope for a 300 ft length to the wetland complex. The road surface is poorly crowned with rill erosion and the west ditch has several areas of minor gully erosion.						
						
Photo 1: Minor gully erosion in ditch Photo 2: Rill erosion on road surface						
BMP Description: Improve the road crown and line the west ditch with stone for approximately 300ft of roadway length. Stabilize turnouts along the east side of road as needed.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
N/A	3.22*	0.60	Mod	N/A	Small Gully	Low
Feasibility Comments: This project is entirely located on Town property. We do not anticipate any utility conflicts or permitting requirements.						
Other Considerations/Benefits: Outfall erosion control, connected to receiving water						

*P load (annual) is estimated from land cover values for each lake segment. Estimates include additional P loading from erosion or other sources.

Project: TP-6		Problem Area Summary				
Lake Segment	Lamoille River					
Location	Transfer Station					
Land Ownership	Town Property					
BMP Type	Subsurface Infiltration					
Drainage Area/Impervious	0.79 / 0.77 acres					
% Impervious	97					
Estimated Project Cost	\$29,100					
P Efficiency (\$/lb removed)	\$15,500					
Project Priority	High					
Site Description: The Town transfer station drains the northeast corner and flows into a road ditch. The ditch drains north down the steep slope emptying into a large wetland complex. Some erosion was visible where the runoff exits the transfer station.						
						
Photo 1: Transfer station		Photo 2: Flow path from transfer station to ditch				
BMP Description: Stabilize flow path where runoff leaves the transfer station and stabilize receiving ditch. Install a cross-culvert under the gravel road, with a grassed swale at the culvert outlet. Construct a small pre-treatment forebay and an underground infiltration gallery.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
2,500	1.94	1.87	Low	High	None	Low
Feasibility Comments: This project is entirely located on Town property. We do not anticipate any utility conflicts or permitting requirements.						
Other Considerations/Benefits: Connected to receiving water						

Project: TP-7		Problem Area Summary				
Lake Segment	Malletts Bay Direct					
Location	Municipal Complex					
Land Ownership	Town					
BMP Type	Rain Garden					
Drainage Area/Impervious	0.16 / 0.15 acres					
% Impervious	94					
Estimated Project Cost	\$6,100					
P Efficiency (\$/lb removed)	\$27,700					
Project Priority	Medium					
Site Description: A portion of the main parking area for the Milton municipal complex drains to a grassed area between Park Place and Bombardier Rd.						
						
Photo 1: Grassed area receiving runoff from portion of parking lot						
Photo 2: View of project area from Bombardier Rd (photo from Google Street View)						
BMP Description: Install a rain garden designed for infiltration. Underlying soils are mapped as having a high infiltration rate. The available footprint for treatment is relatively small, additional volume required to meet WQv (500cf) could be attained through underground storage. The existing sign and spotlights should be incorporated into the rain garden design.						
BMP Volume (cf)	P Load (lbs)	P Reduction (lbs)	Sed Reduction	%WQv/CPv	Gully/Erosion	Maintenance
200	0.26	0.22	Low	Low	None	Mod
Feasibility Comments: This project is entirely located on Town property. Utilities and the sign will likely need to be temporarily moved during construction. Other utility conflicts may be present. We do not anticipate any permitting requirements.						
Other Considerations/Benefits: Educational						