



July 7, 2026

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Town of Richmond
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MEMO

From: Meghan Arpino, PH, CFM

Stone Project No. 20241145

Subject: Richmond Engineering Services for Hazard Mitigation Grant Program (HMGP) – Flood Mitigation Alternatives Analysis Update

Stone Environmental completed a flood mitigation project alternatives analysis under Task 5 Alternatives Analysis of the Engineering Services for Hazard Mitigation Grant Program (HMGP) – Flood Mitigation Scoping Study for the Town of Richmond. The following sections provide a general summary of the alternatives analysis methodology, results, and recommendations to inform project selection for Task 6 Conceptual Design. A detailed description of the alternatives analysis and resulting recommendations will be provided in the final project report.

1. Alternatives Analysis Methodology

Following the development of hydraulic models for the mainstem of the Winooski and tributaries in Richmond, Stone's team collaborated with the Town to identify and vet potential flood mitigation projects to progress to the conceptual design phase and eventually into HMGP funding applications. Project concepts considered included both targeted, immediate potential solutions to flooding challenges, and broader, more holistic projects that incorporate multiple approaches or types of engineering and nature-based solutions. Projects were scored based on their assumed effectiveness in lessening future flood damage from inundation and/or fluvial erosion along with other criteria. The project list and scoring were reviewed with the Town Manager, Water & Wastewater Superintendent, and Highway Foreman prior to sharing with the Richmond Selectboard for additional input and review.

Project alternatives were identified based on desktop review of geospatial data and town plan documents, field observations, stakeholder input, and hydraulic model development and review. Stone staff conducted field visits to key stream crossings and potential floodplain restoration sites within the project area (Figure 1). Project types were classified into four general categories, as shown in Table 1.

Hydraulic model scenarios were run for applicable design, engineering, and nature-based solution alternatives in the project list along with stream crossing and floodplain cut sensitivity scenarios. For stream crossings sensitivity scenarios, bridges and culverts were removed to simulate streamflow in the absence of a road crossing and estimate the order of magnitude potential flood inundation or erosion mitigation benefit that may be expected from upsizing or realigning existing crossings. To understand natural valley constraints on the effectiveness of floodplain reconnection measures for reducing flood inundation or fluvial erosion hazards several large, non-feasible, hypothetical floodplain excavation scenarios were run to test the system's sensitivity

to floodplain reconnection. . Note, these scenarios are useful for sensitivity testing to gain a better understanding of natural and built environment constraints but generally do not represent feasible design alternatives.

Following initial hydraulic model scenarios, each project alternative was evaluated using the standard criteria presented in Table 2.

Table 1. Flood resilience and mitigation strategies along with example project types.

Flood Resilience Strategy Category	Example Project Types
Design & Engineering	● Road relocation ● Road stabilization ● Bridge or culvert upsizing ● Structural elevation ● Structural floodproofing ● Stormwater ● Flood control
Nature-Based Solutions	● Floodplain reconnection ● Dam removal ● Stream and wetland restoration ● Bioengineering ● Green stormwater infrastructure
Land Use & Planning	● Property acquisition and demolition or relocation ● Zoning and land-use regulations ● Project scoping and development ● Emergency services
Operations & Maintenance	● Road repairs and maintenance ● Bridge and culvert repairs and maintenance ● Warning and communication systems



Figure 1. Photograph taken looking downstream at the Stage Road culvert inlet.

Table 2. Flood Mitigation Alternatives Matrix Criteria

Criteria	Scoring		
	Low (0) 	Moderate (1) 	High (2) 
Flood Mitigation Potential — Project ability to reduce flood inundation and/or erosion impact to private residences, businesses, and community assets in a long-term and sustainable manner. Project ability to address urgent risks in need of attention ahead of the next flood event.	No anticipated reduction to, or potential increase, of base flood elevation; potential increase in sediment erosion or deposition	Minimal to moderate reduction in flood level (< 1.0 ft) or mitigates fluvial erosion hazard. Minor to moderate impacts to sediment transport, erosion or deposition, anticipated.	Potential to reduce inundation by > 1ft or substantially mitigates fluvial erosion hazard. No to minimal negative impacts to sediment transport, erosion or deposition, anticipated.
Co-benefits — Project has recognizable co-benefits including economic development, housing stock improvements, water quality improvements, enhanced aquatic organism passage, riparian and aquatic habitat enhancement, historic and community layout preservation, and river access or recreation.	No anticipated co-benefits or potential negative impacts to co-benefits	Potential to recognize 1 or 2 co-benefits	Potential to recognize 3 or more co-benefits
Feasibility — Anticipated ease of project implementation based on current site conditions. Implementation feasibility takes site constraints, ownership, project complexity, permit requirements and regulatory coordination, and timeline into account.	Major site constraints; complex engineering or construction required; complex landownership; potential permitting or regulatory challenges	Site constraints that can be addressed through standard engineering and analysis; moderate level of permitting; easements may be needed	No specialized engineering required; landowner support likely or publicly owned; standard permitting anticipated

Criteria	Scoring		
	Low (0) 	Moderate (1) 	High (2) 
Cost — Project costs including analysis design, implementation, and ongoing programmatic, maintenance, and/or operation costs.	High-cost project (>\$1M)	Moderate cost project (\$100k to \$1M)	Low-cost project (<\$100k)
Community Alignment — Project's alignment with feedback received during the public workshop and/or from town representatives and with achieving erosion and inundation mitigation goals. Considers alignment with existing town plans and scope of potential flood mitigation benefit.	Does not directly align with existing plans or feedback received over the course of the project. Does not achieve flood inundation or erosion mitigation public benefit goals.	Public benefit exists but is minor. Private benefit for small cluster. Potential alignment with town plans and/or feedback received.	Clear public benefit. Clear alignment with feedback received during project and multiple town plans or projects.
HMGP Readiness/Eligibility — Project eligibility and potential competitiveness for FEMA Hazard Mitigation Assistance programs such as the Hazard Mitigation Grant Program (HMGP). Likelihood project will be cost-effective and pass a Benefit-Cost Analysis (BCA). Screening level criteria for progressing to conceptual design.	Project type not traditionally eligible for HMGP or may struggle to pass a FEMA Benefit-Cost Analysis given current conditions. Projects that score low in this category but high in others should be revisited by the Town for additional project development outside the current study.	Project type eligible but competitiveness and/or passing FEMA Benefit-Cost Analysis results are uncertain.	Project type clearly falls within the categories eligible for HMGP funding and a passing FEMA Benefit-Cost Analysis is anticipated. Developing application supporting documentation is feasible.

2. Alternatives Analysis Results

A total of 42 potential flood mitigation project alternatives were identified, varying in scope, complexity, and potential effectiveness. Of the 42 project alternatives, 22 fall into the Design and Engineering category (12 of which are culvert or bridge upsizing), 9 fall into the Nature-Based Solutions Category, 6 fall into the Land Use & Planning category, and 3 fall into the Operations and Maintenance Category. A total of eight projects had a High Flood Mitigation Potential score and 26 have a Moderate Flood Mitigation Potential score. Based on the screening level scoring and evaluation of projects, ten were classified as “Do Not Progress” due to limited anticipated flood mitigation, complexity, or low feasibility given current conditions and anticipated project costs. Multiple other projects were identified as needing additional development in terms of confirming community and landowner support prior to progressing to the design stage. The complete project list with scoring is provided in Attachment 1 and a map showing projects with location data is provided in Attachment 2.

The following key themes were identified through the alternatives analysis and will be described in detail in the final project report:

- Undersized culverts on tributaries to the Winooski can pose a flood hazard risk;
- Generally, the Winooski River accesses its floodplain through Richmond during high flows and no feasible opportunities to significantly lower flood elevations in the village during a large flood were

identified. Long-term planning, floodproofing, elevation, and relocation strategies become especially important in the absence of feasible engineered or nature-based solutions;

- Infrastructure and property at the confluence of tributaries and the mainstem of the Winooski are impacted by both flooding along the tributary and the mainstem, making identification of feasible engineering solutions for mitigating impacts complex.
- Historic encroachments of important infrastructure (interstate, railroads) may limit opportunities for floodplain reconnection.

Recommended next steps are listed for each project alternative evaluated. Recommendations generally fall into the following categories:

- **Advance** – advance to Task 6 Conceptual Design under this project.
- **Progress outside of current study** – This recommendation was applied to potentially feasible and effective flood mitigation projects that had lower scores in the FEMA HMGP eligibility screening category. Consider progressing to feasibility or design phase outside of the current study.
- **Requires additional development or scoping** – This recommendation was applied to project alternatives that require additional landowner or community outreach to understand feasibility and support before progressing to a design phase.
- **Pursue other funding** – This recommendation was applied to projects with clearer water quality benefits than flood mitigation benefits.
- **Do not prioritize** – This recommendation was applied to projects with limited to no anticipated flood mitigation benefit based on the alternatives analysis.

3. Recommendations for Conceptual Design Phase

While multiple feasible flood mitigation projects were identified, two were selected in coordination with town personnel and Vermont Emergency Management to recommend progressing to the conceptual design phase for the current flood mitigation project. These two projects are the Project #1 Stage Road Culvert Improvements and Project #11 Town Water Well Floodproofing. The proposed recommendation includes development of conceptual (30%) designs, FEMA BCA, hydraulic model refinement, and as needed technical support for development of HMGP application materials for the Stage Road Culvert Improvements project, with development of a FEMABCA for the Town Water Well Floodproofing projects pending available scope and budget. The Town Water Well Floodproofing BCA would be completed based on cost estimates for flood proofing doors already acquired by the Superintendent.

Attachment 1 – Project Alternatives Matrix

Project ID Number	Project Name	Project Type	Description	Risks Mitigated / Concerns Addressed	Flood Mitigation Potential	Co-Benefits	Feasibility	Cost	Community Alignment	FEMA HMGP Readiness / Eligibility	Recommendation
1	Stage Road Culvert Improvements	Culvert or Bridge Upsizing	Replacement and upsizing of two undersized culverts on Stage Road that have overtopped or exacerbated flood flows and led to extensive roadway damage on Stage Road. The two culverts are Culvert 75339 (Town #1410) and Culvert 63881. Culvert projects have been combined to address the system as a whole.	Stream crossing washout; Roadway damage; driveway culvert washout; private property damage; loss of access							Advance to Conceptual Design
11	Town Water System Well	Structural Floodproofing	Floodproofing of well pump house with installation of floodproof doors. The well pump is offline during flooding and flood cleanup (July & December 2023, July 2024). Flooding led to a boil water notice in 2023. Model results indicate inundation up to 4.5 ft deep at the building during 100-yr scenario and 1.5 ft deep during July 2023 Flood scenario. Advancing to the next phase involves completing a BCA to see if it would be eligible for HMGP or other FEMA funding.	Municipal infrastructure; Retrofit of floodprone structures identified in LHMP							Advance to Conceptual Design/BCA Evaluation
NEW	Emergency Shelter/Critical Facilities Supplies	Emergency Services and Preparedness	Purchase supplies needed for existing emergency shelter.	Public safety; emergency response and recovery							Progress outside of current study
41	Millet Street Gravel Wetland and Closed Drainage System Replacement	Stormwater	From SWMP - install gravel wetland or other BMP and culverts. Install gravel wetland at the corner of Millet Street where it enters the closed drainage network. Stormwater is conveyed through pipes and/or stone culverts/tunnels that become overwhelmed/damaged during high flow events causing stormwater to resurface at various locations throughout the village. Explore drainage infrastructure upgrades to railroad and downstream private properties to reduce flooding on Railroad Street and Route 2. Project overlaps with SWMP. Potential feasibly constraints due complex setting and multiple landowners.	Stormwater; loss of access; private property damage							Progress outside of current study
4	Stage Road - Drainage Improvements	Road Drainage Improvements	Improve stormwater drainage on Stage Road. May include road crown, shoulder, ditch, and culvert upgrades. Not directly integrated into hydraulic model. Drainage improvements could be eligible for HMGP, but may be other more suitable funding mechanisms.	Roadway damage							Progress outside of current study
2	Windy Woods Road - Culvert 90590, TH40007	Culvert or Bridge Upsizing	Replacement and upsizing of an undersized culvert on a private road. The 2015 VT Culverts inventory recorded a 72-inch-diameter CMP with a stone masonry header. This culvert washed out in 2024, making the road impassable, and has since been repaired.	Driveway washout; Roadway damage; loss of access							Progress outside of current study

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44	River Corridor Zoning	Policy & Planning	Review existing zoning and bylaws. Develop and implement River Corridor Zoning prior to statewide regulation under Act 121. DEC model bylaw with optional river corridor protection can be used as an example starting point.	Public safety; Private property damage; Municipal property damage							Progress outside of current study
12	Process Building Floodproofing for Esplanade Wastewater Treatment Facility	Structural Floodproofing	Hoyle Tanner plan recommendation to install flood barriers at all exterior doors at the Process Building to protect against 500 year flood. Plan found the Effluent check valve and sump pump are emergency fixes not sized for peak flows or redundancy. Estimated cost from plan \$26,000 for doors.	Municipal infrastructure; Critical facilities							Progress outside of current study
13	Effluent Pump Station at Esplanade Wastewater Treatment Facility	Structural Floodproofing	Hoyle Tanner plan recommendation to construct an effluent pump station to prevent the Winooski River from backing up and overtopping UV channel walls during 100 and 500 year events. Plan found the effluent check valve and sump pump are emergency fixes not sized for peak flows or redundancy. Estimated cost from plan \$514,000.	Municipal infrastructure; Critical facilities							Progress outside of current study
14	Bridge Street Pump Station and Force Main Replacement for the Town Sewer System	Structural Floodproofing/Relocation	HMGP pre-application submitted. Sewage Pump Station major upgrade or relocation, force main relocation, and manhole sealed covers. Bridge street pump station is below the 100-yr flood elevation and force main hangs underneath the bridge (Hoyle Tanner Plan). Estimated cost from plan \$1,068,000.	Municipal infrastructure; Critical facilities							Progress outside of current study
1	Stage Road - Culvert 75339, TH140010 (Town #1410)	Culvert or Bridge Upsizing	Replacement and upsizing of undersized 60" CMP. Long stretches of road wash out when culvert overtops. HMGP preapplication and VTrans Structures (FY26) grants were submitted. East Engineering completed a hydraulic study in 2018 and recommended a minimum 11' span. Stage Road is a community priority. Existing conditions modeling indicates culvert overtops in the 100-yr event without the overflow culvert and the 200-year event with the overflow culvert. Does not account for debris clogging. Does not account for river overtopping left bank and flowing along road. Potential to reduce costs associated with sites that sustain repeat damages.	Stream crossing washout; Roadway damage; driveway culvert washout; private property damage; loss of access							Combine with Culvert 63881 and advance to conceptual design.
3	Stage Road - Culvert 63881, TH140012	Culvert or Bridge Upsizing	Replacement and upsizing of an undersized, poorly aligned, and significantly perched 48-inch HDPE culvert. Long stretches of road wash out when the culvert overtops. Replacement could help keep flood flows in the channel rather than allowing backwater to flow down the road. Stage Road is a community priority. Existing conditions modeling indicates the culvert	Stream crossing washout; Roadway damage; driveway culvert washout; private property							Combine with Culvert 75339 and advance to conceptual design.

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			overtops in the 5-yr event. The significant elevation difference between the channel bed at the culvert inlet and the channel bed at the culvert outlet may pose a site constraint with potential to affect feasibility and cost.	damage; loss of access							
5	Snipe Ireland - Culvert 42162, TH120010	Culvert or Bridge Upsizing	Replacement and upsizing of an undersized, poorly aligned, failing 12.3-foot-wide corrugated metal pipe arch in poor condition. Existing conditions modeling indicates culvert overtops in the 25-yr event Design alternatives to be considered include realignment and potential incorporation of the driveway culvert replacement. The culvert was identified as an issue in prior selectboard meetings and reviews of July 2024 flooding impacts.	Stream crossing washout; Roadway damage; private property damage; loss of access							Progress outside of current study
31	Snipe Ireland Headwaters Flood Attenuation	Floodplain Restoration	Improve floodplain and wetland storage in the headwaters of Snipe Island Brook through Strategic Wood Additions (SWAs) and process-based restoration techniques downstream of Richmond Pond. These restoration techniques have potential flood mitigation benefits associated with attenuating flood flows along with habitat and water quality co-benefits.	Erosion; flood attenuation							Progress outside of current study
53	Combined Village Floodplain Restoration and Gravel Removal	Floodplain Restoration; Gravel Removal	Combination of floodplain reconnection projects at multiple private properties combined with Volunteers Green, and Bridge St along with strategic gravel removal from mainstem of the Winooski. Project concept involves multiple private property owners along with town owned land, increasing complexity. Modeling results indicate 100-yr flood level reduction of 0.3 - 0.6 ft in the village and approximately 1.5 ft immediately upstream of Bridge Street. Community and landowner support is uncertain. High complexity project.	Flood inundation; private and municipal property damage							Requires additional development and landowner outreach
45	Emergency Shelter Establishment south of Winooski River	Emergency Services and Preparedness	Residents south of the Winooski River can be cut off from the designated Camel's Hump Middle School emergency shelter during flood. This project concept includes identifying suitable emergency shelter that is accessible. FEMA funding may be available for items such as generators for a new shelter location or other retrofits and facility hardening measures. Cost scoring assumes an existing structure is used for this purpose.	Public safety; emergency response and recovery							Requires additional development; prioritize supplies and improvements to existing shelter.
43	Stage Road Tributary I89 Crossing	Culvert or Bridge Upsizing	Culvert plugged with debris during 2024 flood. Explore opportunities for improving culvert capacity and managing debris. High complexity since interstate culvert and drastic stream bed elevation difference between streambed at the culvert inlet and outlet. Flood mitigation benefits at immediately upstream properties and improved access along Stage Road.	Roadway damage; loss of access; property damage							Progress outside of current study

Project ID Number	Project Name	Project Type	Description	Risks Mitigated / Concerns Addressed	Flood Mitigation Potential	Co-Benefits	Feasibility	Cost	Community Alignment	FEMA HMGP Readiness / Eligibility	Recommendation
21	Floodplain Restoration (Red Barn and Lily Pond Buyouts on Snipe Island Brook)	Floodplain Restoration	Evaluate effectiveness of floodplain benching or other restoration approaches for mitigating flood impacts to private properties along this reach of Snipe Island Brook. Requires additional coordination with property owners. Initial modeling results indicate limited flood reduction benefit. Potential water quality and habitat co-benefits.	Private property damage; Roadway damage; Flood inundation							Pursue other funding; Progress outside of current study
34	Huntington River Confluence Restoration Options	Floodplain Restoration	Right bank field downstream of Cochran Road is owned by Richmond Land Trus and appears to be in hay. Potential to enhance floodplain connection and vegetation, alluvial fan restoration. Evaluate potential benefit to Jonesville neighborhood on river right of Winooski.	Flood inundation							Requires additional scoping
48	Jonesville - Jones Mill Road Acquisitions	Property Acquisition and/or Relocation	Support private property owners in high vulnerability areas who are interested in pursuing a buyout. Explore opportunities for relocating residents to alternate properties in Richmond. Riparian and stream restoration along the tributary. Community interest and alignment, along with funding mechanism, is uncertain.	Public safety; private property damage							Requires additional scoping to determine landowner support
49	Jonesville Post Office Relocation	Property Acquisition and/or Relocation	Relocate Jonesville Post Office, potentially to south side of Winooski River.	Property damage; critical facilities							Requires additional scoping
9	Bridge St Bridge over Winooski - Conveyance Improvements	Culvert or Bridge Upsizing	Elevate and extend the bridge to create floodplain area closer to the mainstem of the Winooski River. The bridge does not appear to cause a significant backwater effect in the FIS, but photos from 2023 and 2024 show water flowing around the bridge on river right and into the Stone's Throw parking area rather than overtopping the bridge. The model scenario with the bridge removed in isolation results in approximately 0.5 ft of flood reduction immediately upstream and approximately 0.1 ft of benefit extending upstream to the Snipe Island Brook confluence. These results show the order-of-magnitude maximum potential benefit. Alternatives to consider include the configuration of a new bridge approach. Low HMGP score due to potential high costs outweighing benefits.	Private property damage; municipal property damage							Do not prioritize – limited anticipated flood mitigation benefit compared to project cost and complexity

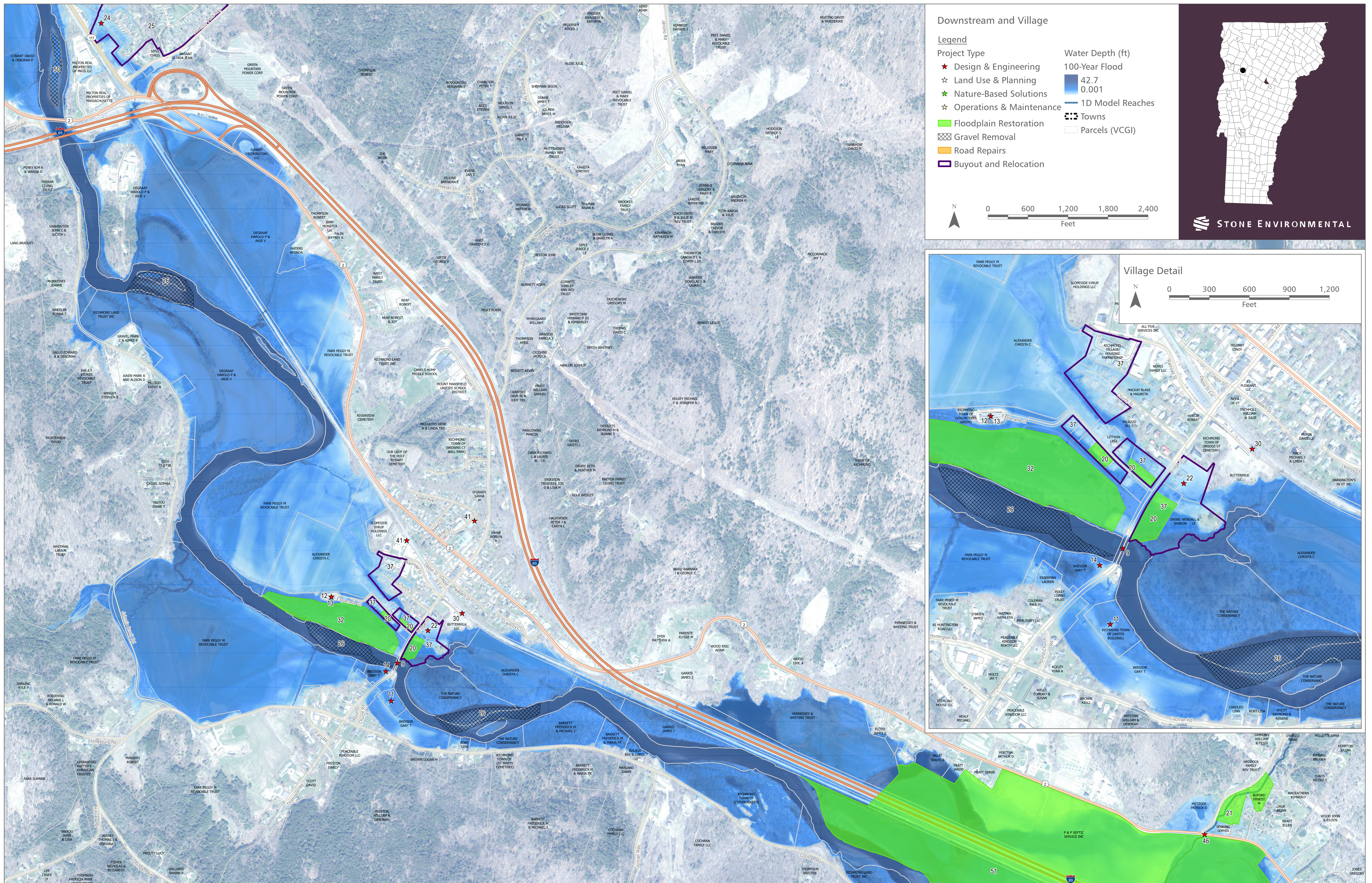
Project ID Number	Project Name	Project Type	Description	Risks Mitigated / Concerns Addressed	Flood Mitigation Potential	Co-Benefits	Feasibility	Cost	Community Alignment	FEMA HMGP Readiness / Eligibility	Recommendation
51	Winooski River Floodplain Reconnection between Cochran Rd and Bridge St	Floodplain Restoration	Project concept involves floodplain lowering and creation of additional or upsizing of existing culverts under I89 to increase floodplain connectivity and flood water storage upstream of the village. High project complexity due to involvement of railroad, interstate, and private property owners. High-cost project. Modeling results indicate that increased culvert capacity does not noticeably reduce flood levels and that floodplain lowering benefits are limited to a local reduction in the 100-yr WSE of 0.2 to 0.4 ft.	Flood inundation							Do not prioritize – limited anticipated flood mitigation benefit compared to project cost and complexity.
46	Route 2 Drainage Improvements at Snipe Ireland to Lily Pond Circle	Road Drainage Improvements	Installation of floodplain culverts under Route 2 to mitigate impacts of roadway elevation. Evaluation alongside drainage improvements. Selectboard meeting presentation notes indicate that Rt 2 was raised by 2 ft in this vicinity in 2023. Note, this would not be captured in the most recent state lidar data. Project concept involves confirming whether elevation of Rt 2 increased with recent repairs and developing strategies for reducing ponding on the upstream side of Rt 2 during flood events. Strategies could include regrading Rt 2 or installation of floodplain culverts. Project complexity is high due to roadway classification and involvement of multiple property owners. Preliminary modeling does not show a meaningful change in flood elevations with lowering the approaches and maintaining structure width.	Property damage							Do not prioritize - limited anticipated flood mitigation benefit compared to project cost.
50	Winooski River Gravel Removal DS I89	Gravel Removal	Remove gravel by lowering bar or opening flood chute downstream of I89 bridge. Project concept introduced during initial kickoff meeting. Modeling results indicate no meaningful impact to 100-yr WSE (~0.1 ft)	Flood inundation							Do not prioritize/progress – limited anticipated flood mitigation benefit
32	Volunteers Green Floodplain Restoration	Floodplain Restoration	Lower and restore the floodplain on Volunteers Green. Modeling results for a floodplain cut on Volunteers Green, approximately 8 ft of lowering, indicate a minimal reduction of 0.2 to 0.3 ft in the 100-yr WSE in the vicinity of Bridge Street and Esplanade Street. Additionally, the 100-yr WSE increases by approximately 0.1 ft on the south side of the wastewater treatment plant. Overall, this alternative has limited flood mitigation benefit.	Flood inundation							Do not prioritize/progress – limited anticipated flood mitigation benefit
35	Relocate Volunteers Green Functions	Property Acquisition and/or Relocation	Retain park as restored floodplain with naturalized walking trails and temporary uses. Relocate some of the functions requiring expensive to rebuild infrastructure (playground, fields, parking) to other locations. Potential options: property at the end of Railroad St (Slopeside Syrup Holdings LLC), Browns Court ballpark (Town Owned). Fields at the middle and elementary school.	Flood inundation; municipal property damage							Requires additional scoping

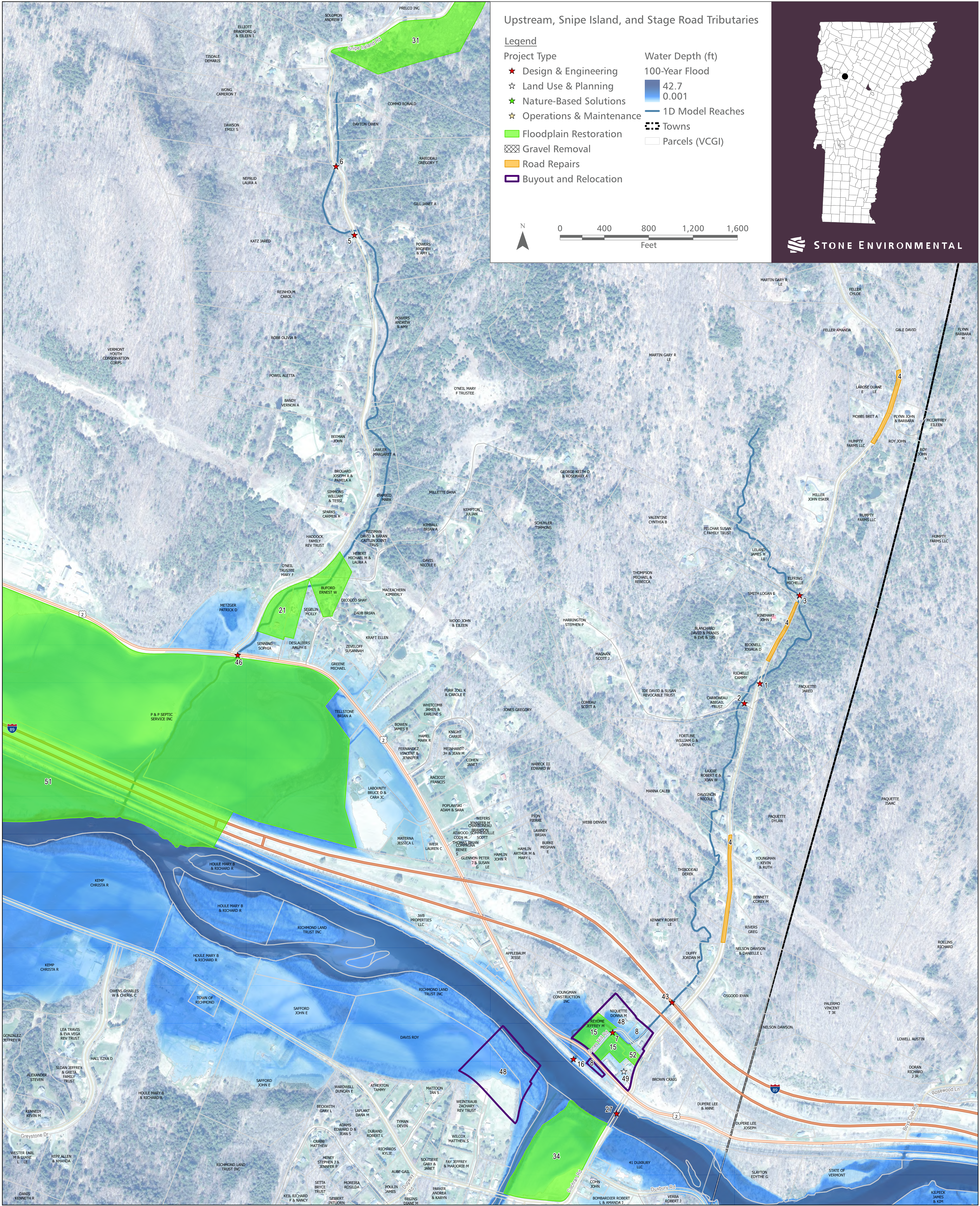
Project ID Number	Project Name	Project Type	Description	Risks Mitigated / Concerns Addressed	Flood Mitigation Potential	Co-Benefits	Feasibility	Cost	Community Alignment	FEMA HMGP Readiness / Eligibility	Recommendation
26	Gravel Removal	Gravel Removal	Lower gravel bars above and below Bridge Street and at Verburg Road by approximately 5 feet. Modeling results show that this alternative lowers the 100-year WSE in the village by 0.1 ft or less, indicating that this is not an effective alternative.	Flood inundation							Do not prioritize/progress – limited anticipated flood mitigation benefit
23	Dugway Road Improvements at Huntington River	Road Stabilization or Relocation	Multiple municipal damage points have been identified along Dugway Road at the Huntington River. Additional scoping is needed to determine whether road stabilization, drainage improvements, or road relocation would most effectively reduce roadway damage and loss of access.	Roadway damage; loss of access							Pursue other funding
39	Emergency Operations Planning	Emergency Services and Preparedness	Plan for reduced access during floods. Consider shelters, town garage functions, fire and EMT service, generator access for both sides of the Winooski and areas isolated by flooding. Consider available assistance from neighboring Towns. Identified as ongoing effort in other Town materials. Model can support identification of areas potentially cutoff during flood events. FEMA funding may be available for implementing Local Emergency Management Plans (LEMPs)	Public safety							Progress outside of current study
22	Richmond Town Center Floodproofing (Post office, art space)	Structural Floodproofing	HMGP pre-application submitted for floodproofing the Richmond Town Center, including the post office and art space. Additional project development is needed to define the floodproofing measures, estimate costs, and evaluate FEMA eligibility.	Municipal property damage; critical facilities							Progress outside of current study
15	Floodplain Restoration in Jones Mill Area	Floodplain Restoration	Floodplain restoration on properties with completed buyouts. Uncertain overall flood mitigation benefit, potential mitigation of tributary flooding but area is also backwatered from the Winooski during large flood events. While project type is eligible for HMGP or similar funding, unclear that flood reduction benefit is significant enough to outweigh costs.	Private property damage							Progress outside of current study
25	Riverview Commons Manufactured Housing Community Home Relocation	Property Acquisition and/or Relocation	Relocate manufactured homes in the floodplain to locations outside the floodplain within existing community.	Public safety; private property damage							Requires additional scoping

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38	Alternative Access Plan	Emergency Services and Preparedness	Identify areas isolated during floods and develop a plan for access. Evaluate options to retain critical alternate routes and reinforce them as needed. Potentially integrate this effort into Emergency Operations Planning (project #39). The project concept includes mapping potential alternative access routes and contacting landowners ahead of the next flood event.	Loss of access							Pursue other funding
52	Jones Mill Road Access	Floodplain Restoration; Road relocation	Pending buyouts on Jones Mill Road, consider alternatives for consolidating access to existing homes at one crossing. Alternatives could include using the driveway from 54 Jones Mill Road or creating access directly from Stage Road to 98 Jones Mill Road. Restore the stream channel and floodplain through any abandoned crossings.	Roadway damage; loss of access							Requires additional scoping to determine community support and feasibility
6	Snipe Ireland - Culvert 72718, TH120012	Culvert or Bridge Upsizing	Culvert replacement of 12.3' wide corrugated metal pipe arch. Second most downstream culvert on Snipe Ireland Road. Culvert is generally in good condition. Existing conditions modeling indicates culvert overtops in the 100-yr event. Does not account for debris clogging.	Stream crossing washout							Progress outside of current study
7	Jones Mill Road - Culvert 87166 TH150001	Culvert or Bridge Upsizing	Culvert replacement of existing 48" CMP with reduced capacity due to sediment deposition. Culvert overtops at high flows. HMGP preapplication was submitted. EWP project was completed. Underlying cause is sediment deposition which upsizing is unlikely to fully address due to slope in this reach. Existing culvert barely passes the 2 YR flow. Culvert needs to be considered as part of the entire system (I89 culvert all the way through RR culvert).	Undersized culvert							Do not prioritize/progress - limited anticipated flood mitigation benefit
16	Railroad Culvert at Stage Road Tributary	Culvert or Bridge Upsizing	Identified in the Local Hazard Mitigation Plan as a structure with a geomorphic compatibility ranking of "Mostly Incompatible" or "Incompatible" The concrete box structure is approximately 10 ft wide, which is about 60% of the 17-ft bankfull width. Modeling results indicate no meaningful reduction in flood levels for the 100-yr event.	Flood Inundation; Undersized culvert							Do not prioritize/progress - limited anticipated flood mitigation benefit
17	Winooski River Geomorphic Assessment and Corridor Plan	Project Identification/ Development	Identified in local hazard mitigation plan (#2022-1).	Flood inundation; Erosion; Habitat							Pursue other funding

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27	Cochran Road Bridge Upsizing	Culvert or Bridge Upsizing	Elevate and extend bridge to create floodplain area closer to the mainstem of the Winooski. Modeling indicated minimal benefit to homes and businesses to Cochran Road-Duxbury Road intersection. Costs likely outweigh flood mitigation benefit.	Flood inundation							Do not prioritize/progress
30	Jolina Court Culvert Replacement	Culvert or Bridge Upsizing	2018 SWMP project. Gravel wetland & culvert replacements to treat 123 ac drainage and stabilize eroding ditch.	Undersized culvert; roadway damage							Pursue other funding

Attachment 2 – Project Alternatives Location Maps





STONE ENVIRONMENTAL

