

Town of Jamaica Local Hazard Mitigation Plan



Draft April 8, 2020

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OR CALL 802-257-4547 EXT 113



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INTRODUCTION AND PURPOSE

This Single Jurisdiction Hazard Mitigation Plan is an UPDATE to a Plan approved by the Federal Emergency Management Agency (FEMA) effective February 19, 2015.

The purpose of this plan is to assist the Town of Jamaica in identifying all of the hazards facing the town and to identify new and continuing strategies to reduce long term risks from identified hazards.

Hazard mitigation is any sustained action that reduces or eliminates risk to people and property from natural and human-caused hazards and their effects. Based on the results of previous Project Impact efforts, FEMA and state agencies have come to recognize that it is less expensive to prevent damage from disasters than to repeatedly repair damage after a disaster has struck. This plan recognizes that communities also have opportunities to identify mitigation strategies and measures during all of the other phases of Emergency Management – preparedness, response and recovery. Hazards cannot be eliminated, but it is possible to determine what the hazards are, where the hazards are most severe and identify what local actions can be taken to reduce the severity of hazard-related damage.

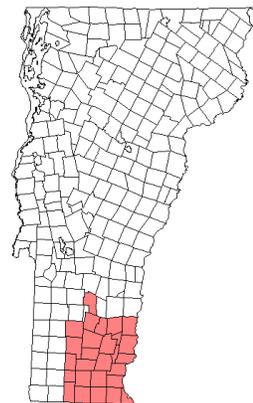
Hazard mitigation strategies and measures alter the hazard by: eliminating or reducing the frequency of occurrence; averting the hazard by redirecting the impact by means of a structure or land treatment; adapting to the hazard by modifying structures or standards; or avoiding the hazard by stopping or limiting development. Mitigation could include projects such as:

- Flood-proofing structures
- Tying down propane/fuel tanks in flood-prone areas
- Elevating furnaces and water heaters
- Identifying and modifying high traffic incident locations and routes
- Ensuring adequate water supply
- Elevating structures or utilities above flood levels
- Identifying and upgrading undersized culverts
- Planning for land use for floodplains and other flood-prone areas
- Proper road maintenance and construction
- Ensuring critical facilities are safely located
- Establishing and enforcing appropriate building codes
- Public information

WINDHAM REGION GEOGRAPHY

Situated in Vermont's southeastern corner, the Windham Region consists of 23 towns in Windham County, the neighboring towns of Readsboro, Searsburg, and Winhall in Bennington County, and Weston in Windsor County. The region is bordered by Massachusetts to the south and New Hampshire to the east. At over 920 square miles (590,000 acres), the region accounts for roughly 9.6% of the State's total land area. The Windham Region has several distinctive identities, largely defined by the diverse natural environment.

The Region's topography is relatively flat or gently rolling land in the Connecticut River valley in the east, while the western part of the region is characterized by the Green Mountain ridges and peaks with narrow



stream valleys. Stratton Mountain is the highest point in the region at 3,936 feet. The lowest point is along the Connecticut River in Vernon, at 200 feet.

In addition to the Connecticut, other major rivers of the region are the Deerfield, Green, North, Saxtons, West, and Williams, all tributaries of the Connecticut. There are two major flood control reservoirs on the West River, Ball Mountain and Townshend, and two major storage reservoirs for hydropower generation on the Deerfield River, Somerset and Harriman.

JAMAICA GEOGRAPHY & TOWN PROFILE



Jamaica is the largest town geographically in the Windham Region, consisting of approximately 31,000 acres or just over 48 square miles. The town's prominent features include Hamilton Falls (one of the state's larger water falls), Jamaica State Park, and Ball Mountain Dam, each reflective of Jamaica's rugged topography. Jamaica is situated in the eastern foothills of the Green Mountains and is primarily made up of steep forested hills and narrow river valleys with 90 percent of the land cover in forest. The forest cover is quite diverse, with 70 percent hardwood and 30 percent softwood. Elevations on Turkey Mountain, College Hill, Mundal Hill, Sage Hill rise to just over 2000 feet while the Pinnacle reaches 2,500 feet. The little remaining lower elevation open land is along the West River in East Jamaica and Jamaica Village and along the Winhall River in Rawsonville in the northwest corner of Town. These open areas and an area

near the old hamlet of West Jamaica contain the only sizable areas of relatively flat land in town. Much of the development that has occurred in Jamaica is located along or near Vermont Routes 30 and 100. Other minor developed areas are found along Pikes Falls Road, West Jamaica Road and Turkey Mountain Road, and in the Cole Pond and West Hill areas. Of the developed land in Jamaica, the principal land use is residential. Most of the town's commercial development is concentrated in Jamaica Village and Rawsonville.

There are approximately 104 miles of waterways in Jamaica. The West River is the only major river in Jamaica. Its course through the Town extends for nine miles. Jamaica's landscape is largely defined by numerous brooks, streams and rivers, which have naturally also become the location of settlements and the historically built environment. Jamaica Village is the town's cultural, civic, religious and educational center, also containing most of the town owned facilities. Jamaica has no town water or sewer system. The land in Jamaica Village is already heavily subdivided and built up. The structures in the village center of Jamaica are different from most village centers in southern Vermont in that the buildings are densely packed along Ball Mountain Brook. There are 110 parcels within the village district, totaling approximately 141 acres. Most of these existing lots are already developed with one or more residential units, and some contain commercial-residential or multi-unit residential buildings. Of the 110 existing parcels, 13.6% contain one-tenth acre or less, 50.8% contain one-half acre or less, 74.4% contain 1 acre or less, and 25.4% contain between one and ten acres. On-site sewage disposal

systems and individual water supplies are closely spaced in many parts of the village. This situation has been and remains of great concern to the town, and indications are that the village district is probably at, or very close to, its carrying capacity for development utilizing on-site wastewater disposal systems. Additionally, much of the Village center lies in floodplain and/or river corridor.

During Tropical Storm Irene on August 28, 2011, the water level in Ball Mountain Brook rose over 20-feet from its normal depth of approximately 2-feet. Four older wood-frame homes in Jamaica Village center were washed out from the flash flooding, and carried down the Brook. The bridge on Route 30 that crosses the brook in the Village center was also washed out causing a road closure for more than five weeks on this major thoroughfare.

Jamaica is in close proximity to three ski resorts, and as a result there are a large number of second homes in Jamaica, approximately 53% of the housing units are seasonal according to the 2010 census. For example, during the peaks of Presidents Day weekend and Christmas week, the population of Jamaica goes from approximately 1,000 to over 10,000. The number of trained professionals in emergency management to support people in crisis situations during these times does not change which increases vulnerability. Power outages are a particular concern in Jamaica, as restoration times can be lengthier than in other areas of the region. Residents and visitors can have varying degrees of readiness for power outage, particularly in the winter months when the cold can be deadly.

Much of the total area of Jamaica is not served by maintained roads or public utilities; this has contributed significantly towards keeping these areas undeveloped. These remote areas are primarily used for timber production and recreation. Jamaica State Park and the federal flood control reservation areas are the most significant undeveloped outdoor recreation areas in the Town. The State Park consists of two parcels totaling 656-acres along the West River and Shatterack Mountain.

The climate is generally temperate with moderately cool summers and cold winters, as in the rest of Vermont. The weather is unpredictable, and large variations in temperature, precipitation, and other conditions may occur both within and between seasons.



Emergency Services

The Emergency Management Director, who is appointed by the Selectboard, coordinates emergency preparedness and response for the Town. The Jamaica Volunteer Fire and Rescue (JVF&R) serves the Town as the primary first responder in emergencies and is composed of approximately 30 members. JVF&R serves the entire town and has mutual aid agreements with surrounding towns. There is a fire station in Jamaica Village. The parking area around the fire station was flooded and the entrance culvert was washed out during TS Irene. All equipment was pre-staged off-site and no equipment was lost. The access issue has since been mitigated by the small culvert under the entrance being replaced with a large box culvert under the access road. As with many small town fire departments in Vermont, getting volunteer firefighters is difficult. JVF&R makes all efforts to recruit volunteer fire-fighting personnel to protect Jamaica residents and visitors. Members attend training courses sponsored by Vermont Fire Academy and the various mutual aid associations. The Fire Department, Town Garage, Town Office and the Road Crew do not have interoperable radios and cell coverage is spotty, so communications during events can be difficult and a solution is sought. JVF&R is a member of Tri-Mountain Mutual Aid Association, which includes the towns of Londonderry, Peru, Weston, Winhall, Stratton, and Windham. Tri-Mountain Mutual Aid is also a member of the Keene Mutual Aid.

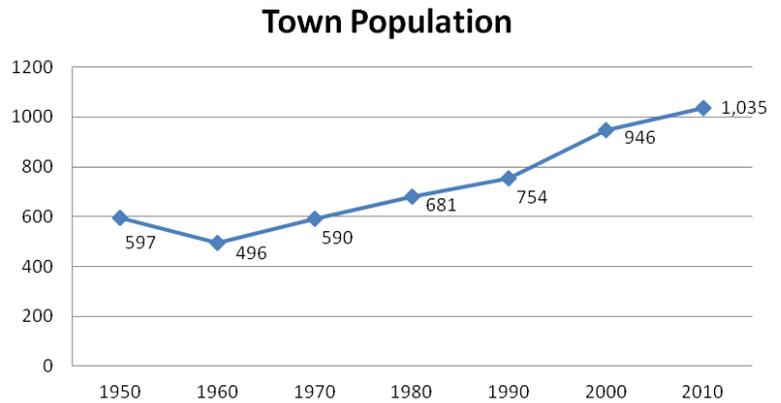
In Jamaica, many rural homes have fire ponds. Fire trucks and equipment in this area are designed for narrow driveways, have smaller turn radiuses, and hoses which are all adapted to work in these rural conditions. There are five cisterns throughout the Town. The two municipally owned cisterns are located in the Village center along with a hydrant, guaranteeing a consistent source of water to assist in the event of a major structure fire in the Village. There are three privately owned cisterns located on Sugar Lot Lane, Dalewood Road, and Trager Road, which provide fire protection. New developments may be required to install cisterns for fire protection if the JVF&R cannot provide adequate fire protection. JVF&R is a member of Tri-Mountain Mutual Aid Association, which includes the towns of Londonderry, Peru, Weston, Winhall, Stratton, and Windham. Tri-Mountain Mutual Aid is also a member of the Southwest New Hampshire Fire Mutual Aid. Mutual aid systems are associations of fire companies that allow local fire companies to receive fire-fighting assistance or back-up service from other member fire companies.

In the event of an emergency, the Town Clerk's Office has been designated as the Local Emergency Operations Center. It is here that the Emergency Management Director coordinates all involved service providers during an emergency. The Masonic Hall is the Evacuation Center during Town emergencies and it has a generator and can serve as an overnight shelter. Town Hall can be used as a day shelter and it also has a generator. The Jamaica Village School, which cannot be accessed in a flood because of a concrete bridge that can overtop during floods, also has a generator.

Emergency medical services are provided primarily by Rescue Inc. operating out of their West Townshend facility. Rescue Inc. is a non-profit organization funded through subscriptions and donations. Rescue Inc. provides numerous towns in the region with ambulance service, medical care, transport to and from area hospitals and large regional hospitals. The nearest hospital is Grace Cottage Hospital and then Brattleboro Memorial Hospital. The Town contracts annually with the Windham County Sheriff's Department for motor vehicle enforcement. The Vermont State Police handle criminal complaints and cases. Jamaica also elects a First Constable and a Second Constable. Constables are responsible for animal control and keeping the peace.

Development Trends

Jamaica’s population has been rising over the years since around 1960, with about a 9% increase between 2000 and 2010. The town saw a 26% jump in population between 1990 and 2000. Even with this growth in population here is little new built development on an annual basis in Jamaica. Only about one new home is built per year in Town.



| Town | 1990 | 2000 | 2010 | % Change 1990-2000 | % Change 2000-2010 |
|-------------|-------|-------|-------|--------------------|--------------------|
| Jamaica | 754 | 946 | 1,035 | 26% | 9% |
| Londonderry | 1,506 | 1,709 | 1,769 | 14% | 4% |
| Windham | 251 | 328 | 419 | 31% | 28% |
| Townshend | 1,019 | 1,149 | 1,232 | 13% | 7% |
| Wardsboro | 654 | 854 | 900 | 31% | 5% |
| Stratton | 121 | 136 | 216 | 12% | 59% |
| Winhall | 482 | 702 | 769 | 46% | 10% |

Compared to surrounding towns, Jamaica maintains a similar growth pattern with its neighbors, with the major exception of Stratton which grew by 59%. Jamaica has many of the impacts of being a town located in a ski resort area, but hasn’t seen the same amount of investment as towns like Stratton which have a resort within their bounds.

PLANNING PROCESS

Town residents who took part in the planning process for developing the Local Hazard Mitigation Plan for Jamaica tend to be affiliated with more than one association for the town. In rural areas of Vermont, it is typical that people who are most interested in the safety, health and welfare of their community will preside on more than one board and may for example, hold the role of Fire Chief, or school teacher, or be a small business owner, in addition to owning personal property in the town. Therefore, although the meeting may not have as many people in attendance as a more populated community would, those present at the meeting are representing not only a variety of roles, but many roles that would be held by numerous individuals in a more populated area.

Documentation of the Plan Update Process

This Single Jurisdiction Hazard Mitigation Plan is an UPDATE to a Plan approved by FEMA effective February 19, 2015.



The Town began the plan update process in October 2019. Alyssa Sabetto, Senior Planner with the Windham Regional Commission, talked with Planning Commission Chair Rebecca Ohm and planned the update process. Alyssa asked that the Selectboard review the

mitigation actions table to update the progress of each action. The Hazard Mitigation Planning participants convened two times on October 7th and November 4th, 2019 for public meetings to provide input into the plan update. They met with Alyssa at the Jamaica Town Office. Jackie directly invited town officials and those she knows with knowledge of hazard events experienced in Jamaica. The general public was informed through the normal means the town uses to advertise all public meetings, which included an advertisement on the town website.¹ Each meeting lasted for 2-3 hours. Over the course of the two meetings the group completed and discussed:

- a review of the 2015 Hazard Mitigation Plan and discussion of progress made on identified actions, and progress made that was not a mitigation action in the 2015 Plan;
- review of hazard events and discussion of events that have occurred since 2015;

¹ See appendix for meeting flyer, sign-in sheets, meeting agendas and website advertisement.

- Review of the 2015 hazard analysis and an update on what hazards the town would like this Plan to focus on. This involved completing the updated hazard analysis table as a group;
- Review of the mitigation goals of the Town set out in the 2015 Plan, and a discussion about update of those goals and any change in mitigation priorities in the Town;
- review of mapping of the town to note where hazard events are causing repeated or large scale damage;
- update of development changes in the Town since 2015, and how those changes impact vulnerability in the Town; and
- development of updated mitigation actions table, which includes maintaining of some of the incomplete mitigation actions from the 2015 Plan.

Alyssa updated the plan to meet the current standards and guidelines of FEMA for hazard mitigation plans. She took the information from the public meetings, along with follow-up information gathered in conversations with the Emergency Management Director and the Road Foreman. Alyssa also reviewed and utilized the data sources noted and cited throughout this plan to gather further information. The draft was presented for internal town review by the Committee, town personnel, Planning Commission and Selectboard on February 24, 2020. This internal town review period was from February 24 to March 17. Comments and corrections, were received back from EMD Paul Fraser, Planning Commission advisor Charlie Peck, and Planning Commission Chair Bryan Zieroff. Alyssa made the revisions and corrections to finalize the draft for public comment.

The revised draft plan was put out for public comment on April 13, 2020. This was done by posting an electronic copy on the town website and providing a mailed hard copy of the plan available to those that can't access website. Flyers were posted around town advertising its availability for review and comment. **No comments were received from the public during the two-week comment period.** It was simultaneously distributed to the adjacent towns of: Stratton, Wardsboro, Londonderry, Windham, Townshend, and Winhall.² **No comments received back.** The plan was finalized by Alyssa Sabetto for submittal to Vermont Emergency Management (VEM). This submittal allows VEM to make suggested revisions on the draft, and allows for any revisions to be made before the final draft is submitted to the Federal Emergency Management Agency Region 1 (FEMA) for review.

The following people were involved in the hazard mitigation planning process in one or more meetings:

| Contributors | Affiliations | Home |
|---------------------|---|-------------|
| Rebecca Ohm | Jamaica Planning Commission, Chair | Jamaica |
| Paul Fraser | Jamaica Selectboard, Chair Emergency Management Director | Jamaica |
| Chris Robbins | Jamaica Planning Commission | Jamaica |

² See appendix 3.

| | | |
|-------------------|--|---------|
| Charles Peck | Former Jamaica Planning Commission and former Jamaica Floodplain Administrator | Jamaica |
| Bob Stromski | Jamaica Volunteer Fire and Rescue | Jamaica |
| Greg Meulemans | Jamaica Selectboard | Jamaica |
| Joel Bluming | Jamaica Commissioner to the Windham Regional Commission | Jamaica |
| Dana West | Jamaica Volunteer Fire and Rescue, Fire Chief | Jamaica |
| Jason Kass | Jamaica Planning Commission | Jamaica |
| Bryan Zieroff | Jamaica Planning Commission | Jamaica |
| Judy Flowers | Longtime resident | Jamaica |
| Patrick McQuillan | Jamaica Planning Commission | Jamaica |
| Lou Bruso | Jamaica Zoning/Floodplain Administrator | Jamaica |
| Jessica Pollack | Interested resident | Jamaica |
| Alyssa Sabetto | Windham Regional Commission, Plan Developer | |



Public Involvement and Input from Neighboring Communities

Making the Jamaica Hazard Mitigation Plan available for public comment included the following efforts:

- All of the meetings discussed in the above sections were advertised and open to the public.³
- The Selectboard discussed the update of the Hazard Mitigation Plan at several meetings during the update process.
- The Planning Commission discussed the update of the Hazard Mitigation Plan at several meetings, and provided comment to Alyssa on the draft plan.
- The Hazard Mitigation Planning participants convened two times on October 7th and November 4th, 2019 for public meetings to provide input into the plan update.

³ See appendices 9 and 12 for public meeting advertisements.

- The draft plan was made available for public review and comment on the town website from April 13th to April 27th, 2020.
- Flyers were put up around town and there was a website announcement for public comment on the draft.⁴
- On April 8, 2020, an invitation was extended via email to neighboring towns to provide a means and opportunity to review and comment on the draft Jamaica Hazard Mitigation Plan.⁵ No comments were received. Inter-town communication will repeat for future revisions of this Plan.

RISK ASSESSMENT

The risk assessment portion of a Hazard Mitigation Plan contributes to the decision-making process for allocating available resources to mitigation projects. 44 CFR Part 201.6(c)(2) of FEMA’s mitigation planning regulations requires local municipalities to provide sufficient hazard and risk information from which to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

Methodology

A **vulnerability analysis** for each community begins with an inventory of possible hazards and an assessment of the risk that they pose. These are the questions to be answered. What hazards can affect your community? How bad can it get? What is the likelihood of future events occurring? What areas of your town are most vulnerable to these hazards? How does climate change impact your town currently and what are you worried about for future impacts? Information collected from the core planning team went into this vulnerability assessment to identify the hazards the town feels most vulnerable to.

The following table is the scale used to rank each hazard that is analyzed:

| Hazard Assessment Ranking Criteria | | |
|---|--|---|
| | Frequency of Occurrence: Probability of a plausibly significant event | Potential Impact: Severity and extent of damage and disruption to population, property, environment and the economy |
| 1 | Unlikely : <1% probability of occurrence in the next 100 years | Negligible: Isolated occurrences of minor property damage and environmental damage, potential for minor injuries, no to minimal economic impact |
| 2 | Occasionally: 1–10% probability of occurrence per year, or at least 1 chance in next 100 years | Minor: Isolated occurrences of moderate to severe property and environmental damage, potential for injuries, minor economic disruption |
| 3 | Likely: >10% but <75% probability per year, or at least 1 chance in next 10 years | Moderate: Severe property damage on a community scale, injuries or fatalities, short-term economic impact |
| 4 | Highly Likely: 100% probability in a year | Major: Severe property damage on a community or regional scale, multiple injuries or fatalities, significant economic impact |

⁴ See appendices 2 and 4.

⁵ See appendix 3.

Potential impact is considered and scored separately for impacts to infrastructure, life, economy and the environment. Additionally, seasonal patterns that may exist are considered, what areas are likely to be affected most, the probable duration of the hazard, the speed of onset (amount of warning time, considered with existing warning systems).

The combination of the impact scores for infrastructure, life, economy and environment, along with the probability (frequency of occurrence) score are used determine the hazard ranking score for each hazard. This score was used to determine which hazards the plan would address.

While all hazards were considered by the Hazard Mitigation Planning participants for inclusion in this plan, it is not feasible to study each in depth. For hazards that are not profiled in this plan, the reader is directed to the Vermont State Hazard Mitigation Plan. The rationale for not addressing all of the hazards is that Jamaica has a low level of risk associated with them and/or the town does not choose to mitigate for them at this time. This plan will only focus on the hazards that Jamaica has decided are pertinent to their community and they have chosen to mitigate for at this time which are Wind, Fluvial Erosion and Invasive Species. The below table shows the hazards in terms of their hazard ranking score as determined by the Hazard Mitigation Planning participants.

| HAZARD ASSESSMENT | | | | | | | | |
|-------------------|-------------|------------------|------|---------|-------------|----------|--------|--|
| Possible Hazard | Probability | Potential Impact | | | | Average: | Score: | Vulnerable facilities and populations/Notes |
| | | Infrastructure | Life | Economy | Environment | | | |
| Wind | 4 | 3 | 3 | 2 | 1 | 2.25 | 9 | Downed trees causing power outages are the primary concern, as outages can be lengthy because of difficult to access power lines. |
| Fluvial Erosion | 4 | 2 | 2 | 2 | 2 | 2 | 8 | Jamaica experienced severe fluvial erosion during TS Irene. Four homes were lost in Jamaica Village. |
| Invasive Species | 4 | 2 | 1 | 2 | 2 | 1.75 | 7 | Emerald Ash Borer is a concern, as it has been confirmed in adjacent Londonderry; Other concerns include wild parsnip and giant hogweed. |
| Ice | 4 | 2 | 2 | 2 | 1 | 1.75 | 7 | |

| Possible Hazard | Probability | Infrastructure | Life | Economy | Environment | Average: | Score: | Vulnerable facilities and populations/Notes |
|-----------------------------|-------------|----------------|------|---------|-------------|----------|--------|---|
| Snow | 4 | 2 | 2 | 1 | 1 | 1.5 | 6 | |
| Potential Impact | | | | | | | | |
| Landslides | 3 | 2 | 1 | 1 | 2 | 1.5 | 5 | Active area of landslide on Pikes Falls Road; three areas town-wide. |
| Inundation Flooding | 3 | 1 | 1 | 1 | 1 | 1 | 3 | Backwater flood storage area for Townshend and Ball Mountain dams are on lands under easement from the US Army Corps of Engineers; So backwater flooding is not a problem when it occurs. |
| Heat | 2 | 1 | 3 | 1 | 1 | 1.5 | 3 | |
| Hail | 2 | 1 | 2 | 1 | 2 | 1.5 | 3 | |
| Drought | 2 | 1 | 1 | 1 | 2 | 1.25 | 3 | |
| Infectious Disease Outbreak | 2 | 1 | 2 | 1 | 1 | 1.25 | 3 | Jamaica has a closed POD system for town employees that they are participating in. There is a public school in Jamaica. |
| Earthquake | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |

The above table shows vulnerability to some natural hazards that Jamaica—due to their small population and limited resources—at this point in time doesn't feel the risk posed by these hazards is high enough to justify the cost to further mitigate for them. The Town has chosen to focus this Plan on Wind, Fluvial Erosion and Invasive Species. In the prior Jamaica Local Hazard Mitigation Plan, adopted in 2015, the Town focused on flooding, severe winter storms, and high winds. These hazards were all considered as part of the hazard assessment for this current Plan. Wildfire, inundation flooding and landslide do pose some risk to Jamaica, but not enough that they feel the need to mitigate for these hazards at the current time. They feel their concerns to do with flooding are best addressed by addressing fluvial erosion, which is the true flooding hazard in Jamaica. The town feels that they deal adequately and comfortably with snow. Cold is something they feel their population is accustomed to dealing with, along with the fact that their emergency shelter equips them to handle anyone who might lose power and need a warm place to get shelter. Heat, infectious disease outbreak, hail and earthquake, drought are not hazards that Jamaica feels pose enough risk to consider mitigation. Current methods of

handling most hazards are deemed adequate at this time, though the town may choose to address these hazards in the future.

Identifying and Profiling Hazards

The following sections include a narrative with a Description, Geographic Area of the Hazard, Impact, Extent, Probability, and discussion of Past Occurrences of two natural hazards affecting Jamaica.

High Winds

Description and Impact

High winds are fairly common in Vermont all across the state. High wind events that are sufficient enough to cause damage to property and taking down trees can occur at any time of year. High wind can damage roofs, uproot trees, break branches from trees and take down power lines anywhere in Town. High winds can be associated with thunderstorms, snowstorms, hurricanes, tropical storms, or just wind storms. High winds tend to sweep through the region after the passage of a weather front. The National Climatic Data Center data indicates that 121 high wind events have occurred in Windham County since 1957, some of which involve thunderstorms⁶.

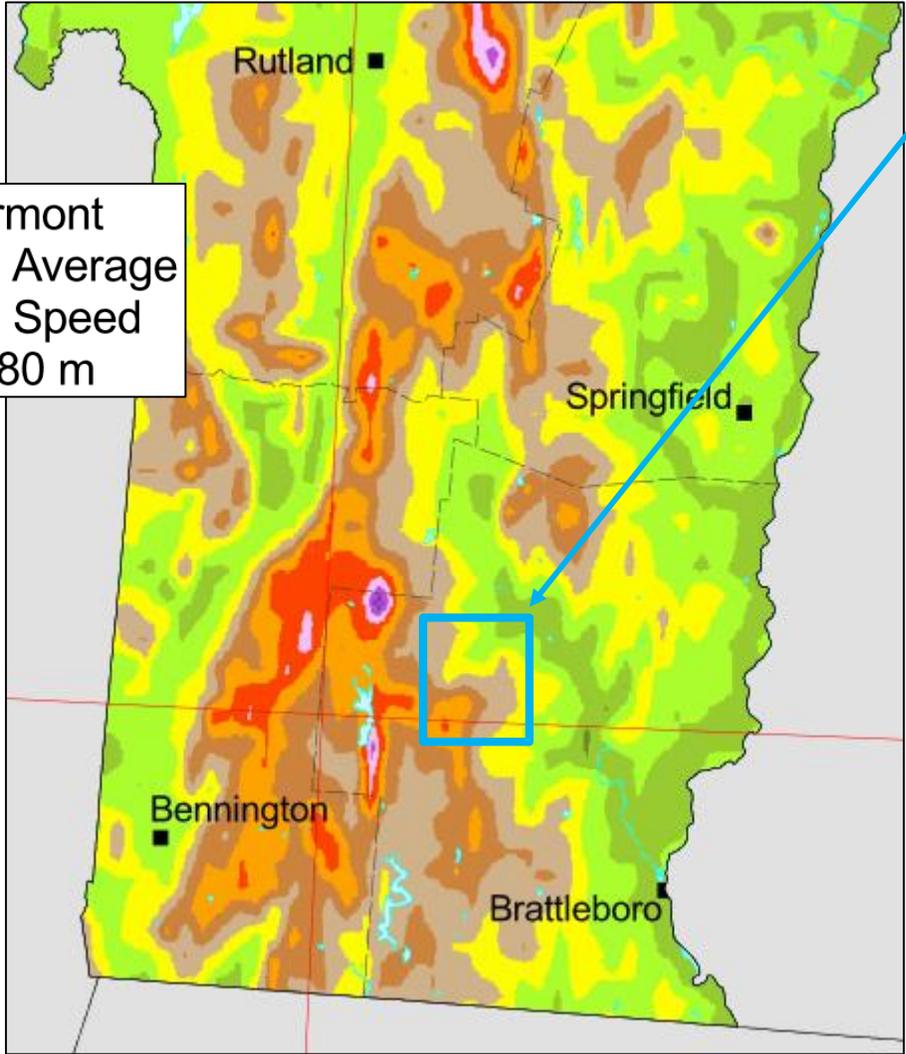
Power outage is the risk primarily to do with high winds. Wind causes more trees on wires than ice, although ice does weaken or weigh down trees. Wind after ice causes real damage.

Geographic Area of the Hazard

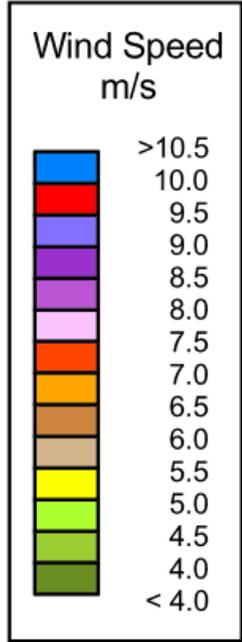
High wind events are not localized and can affect any part of the Town. Higher elevations are more susceptible. Jamaica has a mountainous rough topography, along with valleys where much of the settlement is located. Average wind speeds correspond with the highest elevations, though Plan participants noted that strong gusts do sweep through the valleys, as well. The map on the following page shows annual average wind speeds for southern Vermont south of Rutland. This gives an idea of wind speed in the town in comparison to its surroundings. The purple area to the west of the highlighted square is Stratton Mountain, which gets particularly high winds and can serve as a point of reference or comparison to the highlighted square indicating Jamaica.

⁶ NCDC storm event database provided 10/15/19.

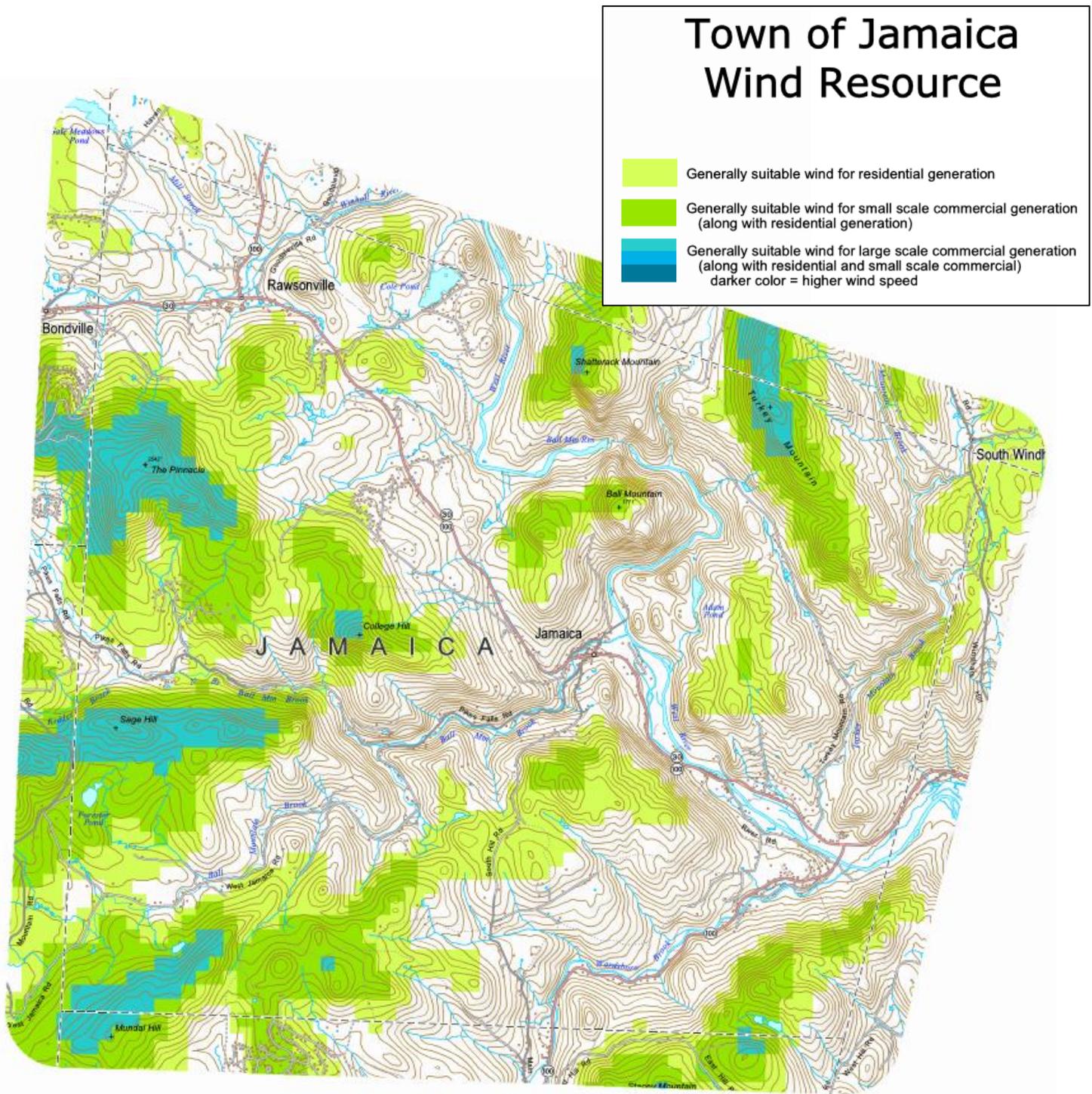
Vermont
Annual Average
Wind Speed
at 80 m



This map from Energy.gov shows the Annual Average Wind Speed at 80 Meters. The highlighted square roughly encompasses the Town of Jamaica.



For a more localized look at wind speed, the below map shows wind power opportunity correlated only to wind speed⁷. The highest points in town, areas such as the Pinnacle, Sage Hill, Mundal Hill, and Turkey Mountain have the highest wind speeds in the Town.



⁷ This map was developed by the Windham Regional Commission for use by the Town and Region in energy planning efforts. It is available online at: https://drive.google.com/drive/u/1/folders/0B2c_6utSGstLZjMtSHFHU3JIRnM.

Extent

Winds are brought into the region mainly due to low pressure systems coming out of the Canadian zone, or high pressures coming off the Gulf Coast.

Extent/magnitudes of Hurricanes and Tropical Storms are ranked using the Saffir-Simpson Scale in the Western Hemisphere, as follows: CAT1=74-95 mph winds, CAT2=96-110 mph winds, CAT3=111-129 mph winds, CAT4=130-156 mph winds, Tropical Storm=39-73 mph winds, Tropical Depression=0-38 mph winds.

Probability

The Hazard Mitigation Plan participants ranked wind as being highly likely, or having a 100% probability of occurring within any given year. Wind storms of varying degrees are experienced every year.

There are many trees in close proximity to roads, buildings and power lines throughout the town. Route 30 and Pikes Falls Road are the areas most frequently experiencing trees on wires causing power outages. Route 30 is managed by GMP most often compared to side roads. There are areas where power lines go through the forest, so tree trimming is not practical. That being said, otherwise in Jamaica trees on power lines is an issue at times during and after wind events or ice and snow events, meaning power outages are a secondary effect and a hazard to vulnerable populations.

Past Occurrences

October 31, 2019 – Intense Halloween wind event left many trees and limbs down, taking down many power lines and snapping a couple of poles. Power outage lasted a couple of days in some places, as restoration efforts were needed region-wide.

May 4, 2018 - A powerful low pressure system formed on May 4th, pushing a strong cold front across New York and New England. A line of thunderstorms developed along this front and pushed into southern Vermont in the evening, resulting in dozens of downed trees and wires. Over 2,500 customers lost power as a result of the storms. Trees down on Route 30.

August 22, 2017 – Strong to severe thunderstorms developed along and ahead of a cold frontal boundary as it moved through eastern New York and western New England. Prior to convective initiation, a Tornado Watch (#461) was issued for the western Adirondacks and Mohawk Valley and a Severe Thunderstorm Watch (#463) was issued for much of eastern New York and western New England. These storms resulted in reports of trees down across southern Vermont. Trees and wires were downed throughout Jamaica.

July 19, 2013 – A very warm and humid air mass was in place over southern Vermont on Friday, July 19th. With temperatures into the 90s, the air mass was very unstable. A cold front was upstream of the region across the Great Lakes. Ahead of this front, a complex of thunderstorms developed across Lake Ontario during the evening hours of July 19th. As these thunderstorms moved eastward, they strengthened as they interacted with a lake-breeze boundary over central New York. The thunderstorms raced eastward across eastern New York and reached southern Vermont by the late evening hours. Due to the quick movement of the

storms and the very unstable air mass in place, the thunderstorms produced several reports of damaging winds, mainly to trees. The thunderstorms moved east of the region by midnight, ending the threat for severe weather. Trees and wires were reported down on Route 30 in Jamaica as a result of thunderstorm winds.

June 2, 2013 - A warm and humid air mass was in place across the region on Sunday, June 2nd with temperatures well into the 80s. A cold front and associated pre-frontal surface trough was moving towards the area during the afternoon hours. With plenty of moisture and instability in place, showers and thunderstorms developed across the region. These thunderstorms were aided by very strong winds aloft and a few storms became severe across southern Vermont, producing large hail and wind damage. The thunderstorms also produced very heavy rainfall, which caused flash flooding within the town of Bennington. The thunderstorms weakened by evening as the cold front moved across the area, ending the threat for severe weather and flooding. Several large tree limbs were reported down as a result of thunderstorm winds in East Jamaica.

Aug. 28, 2011 - Tropical Storm Irene tracked north northeast across eastern New York and western New England during Sunday, August 28th, producing widespread flooding, and damaging winds across the region. Strong winds occurred across southern Vermont, with frequent wind gusts of approximately 30 mph in Grafton. The strongest winds occurred from the north to northeast during the morning hours, then from the west to northwest during Sunday evening. The combination of strong winds, and extremely saturated soil led to numerous downed trees and power lines across the region. This also resulted in widespread long duration power outages.

October 29, 2006 - A low pressure system moved northeast from the Tennessee Valley into the eastern Great Lakes by Saturday evening on October 28th, and intensified rapidly before moving into eastern Canada on Sunday, October 29th. Strong southeast winds ahead of the low developed Saturday morning, with some gusts exceeding 60 mph, particularly across the higher elevations, and within channeled valley locations. Once the storm lifted into eastern Canada, strong west to northwest winds. Trees down on Route 100 in Jamaica.

Mar. 10, 2002 - The pressure gradient between deep low pressure over Ontario, and high pressure off the southeast coast, produced a strong southerly flow across southern Vermont on the evening of March 9. Then, a strong cold front moved across the region shortly after midnight, early on March 10th. A line of showers and embedded thunderstorms accompanied the front. Strong winds ahead of and along the front produced some damage across Windham County. Law enforcement personnel reported a large number of trees and power lines down throughout the county.

December 12, 2000 - An area of low pressure developed across the Tennessee Valley late on December 11th. The storm then rapidly deepened as it moved northeast into the Ohio Valley, Saint Lawrence Valley and eventually across the Canadian Maritimes on December 12th. The pressure difference between this intensifying storm and a large arctic high pressure building over the Southeast, produce a high wind event across southern Vermont on December 12th. The strongest winds with the storm came after the passage of the cold front, during the midday hours. A strong westerly wind brought down large limbs, trees and power lines across Bennington county. Large limbs were blown down at Stratton Mountain in Windham County.

September 16, 1999 - The remnants of Hurricane Floyd moved up the eastern seaboard on September 16 and during the early hours on September 17. The storm brought both high winds and heavy rainfall to Southern Vermont. Winds from the passage of Floyd were estimated to have gusted to over 60 mph, especially over hill towns. The combination of the wind and very saturated ground, produce widespread downing of trees and power lines across much of Southern Vermont. A woman was injured on Tavern Hill in Putney, Windham County when a tree came crashing down on her Volvo, destroying the vehicle. Some trees fell on vehicles and houses. The rain and wind produced power outages across the region. As many as 2,000 people lost power in Southern Vermont. Over \$175,000 in damages countywide.

Nov. 27, 1997 - The passage of a cold front produced strong winds across southern Vermont during the early morning hours of November 27. Winds gusting to 40-50 miles an hour downed trees and power lines in Bennington and Windham Counties. Approximately 1,500 customers lost power for a six- to eight-hour period.

Jul 20, 1996 - An unusually intense low pressure system tracked across the northern Great Lakes to Quebec, Canada during July 19 and 20. The system generated strong northwest winds, which downed trees and power lines over parts of Windham County in southern Vermont.

Feb. 24, 1996 - A rapidly deepening low pressure system moved from southern New Jersey northeast to northern Maine by the morning of February 25. This system brought damaging winds to southern Vermont including Bennington and Windham counties, which downed many trees across the area and produced scattered power outages.

Jan 19, 1996 - An intense area of low pressure located over the Mid-Atlantic Region on Friday morning January 19th produced damaging winds across southern Vermont. This storm was associated with a strong southerly flow which resulted in scattered reports of downed trees, limbs and power lines.

July 15, 1995 - A widespread severe weather outbreak hit Vermont during the morning hours of July 15th. A long lived squall line, known as a Derecho, crossed Vermont during the morning hours. Southern Vermont was hardest hit especially across Windham, Windsor, Rutland and Bennington Counties. About \$10,000 in damages in Jamaica.

Sept. 21, 1938 - Hurricane Igor hit the region of Southeast Vermont to include the Town of Jamaica, paralyzing the region and the state for weeks. As it was coming, packing winds over 100 miles an hour, authorities were unaware of the magnitude so no evacuation procedures were instituted and very few precautions were taken. As a result, over 600 people lost their lives and tens of thousands were left homeless. Wind, rain and flash flooding wiped out trees, church steeples and buildings, leaving behind nearly \$400 million in damage statewide.

Fluvial Erosion

Fluvial Erosion Description

Fluvial erosion is always associated with flood events. Because of Jamaica's topography, they are much more subject to the hazard of moving fluvial eroding flood waters versus standing flooding waters, which is why fluvial erosion is the focus of this section. Flooding is the most widespread and destructive hazard in the United States. Flooding has also been the most

common and costly hazard to affect Jamaica. Flooding can occur anytime of the year as a result of heavy rains, thunderstorms, tropical storms, hurricanes or Nor'easters. It can result from the overflow of major rivers and their smaller tributaries, or inadequate local drainage. Historically, floods have been a factor in over 80 percent of all federally declared disasters. People living in close proximity to bodies of water such as rivers, lakes, and streams are at greater risk from flooding than those not living in the floodplain. There is a 26 percent chance of experiencing a flood during the life of a 30-year mortgage compared to a 4 percent chance of a fire. Jamaica has an NFIP compliant floodplain ordinance, which gives residents access to discount flood insurance and enables the Town to regulate development within the Special Flood Hazard Area (SFHA). SFHAs are subject to inundation by the 1% annual chance flood (100-year flood). Maps of these areas can be found at the Town Office or online at the FEMA Map Service Center⁸ or the Vermont Agency of Natural Resources online Atlas.

There are approximately 104 miles of waterways in Jamaica. The West River is the only major river in Jamaica. Its course through the Town extends for nine miles. Small rivers include the Winhall River, Ball Mountain Brook (below the North Branch), and Wardsboro Brook. There are 16 miles of major brooks. These include Mill Brook, Cobb Brook, North Branch of Ball Mountain Brook, Ball Mountain Brook (above the North Branch) and Turkey Mountain Brook. Additionally, there are numerous small brooks⁹. The FEMA mapped SFHA runs along the Wardsboro Brook (Route 100), the West River (Routes 30 and 100), Ball Mountain Brook (Pikes Falls Road and West Jamaica Road), the North Branch of Ball Mountain Brook (Pikes Falls Road), and the Winhall River (Route 30 and Goodaleville Road). FEMA SFHA also encompasses the Ball Mountain Dam reservoir area and the West River north of the Ball Mountain Dam. Due to the historic development pattern and the topography of Jamaica, the road system follows the waterways closely in Jamaica. Due to this fact, Jamaica has experienced numerous instances of damage to roadways and development. This damage is primarily caused by the erosive forces of fluvial erosion.

Fluvial erosion is the destruction of river banks caused by the movement of rivers and streams, when stream power overcomes resistance of bed and bank material. This can range from gradual bank erosion to catastrophic changes in river channel location and dimension during flood events. This occurs when the stream has more energy than is needed to transport its sediment load, due to channel alterations or

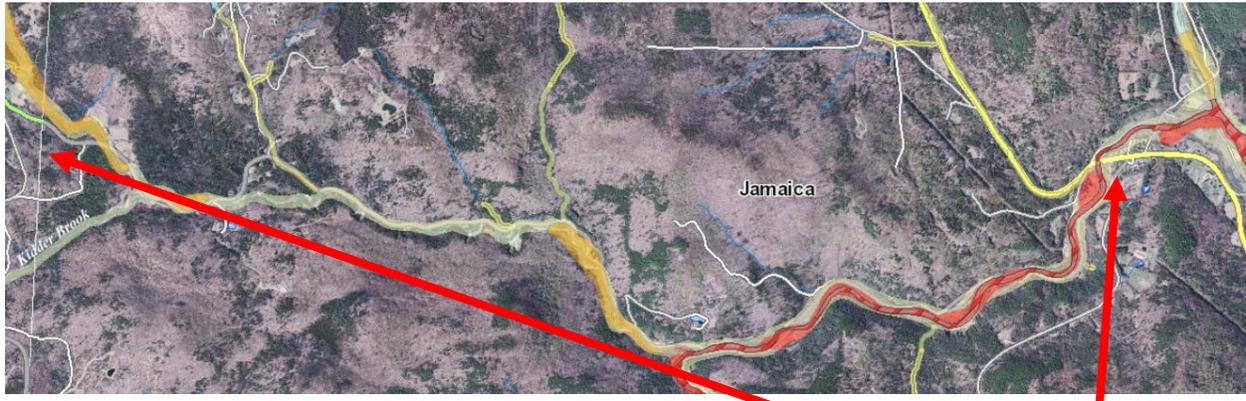


Active fluvial erosion at Depot and Water Streets during TS Irene in 2011.

⁸ <https://msc.fema.gov/portal>

⁹ 2017 Jamaica Town Plan

runoff events that increase water speed in the channel, leading to erosion. Particular areas of concern in Jamaica are along Ball Mountain Brook and then the North Branch of Ball Mountain Brook, following Pikes Falls Road into Stratton. Both Kidder Brook and the North Branch of Ball Mountain Brook have their headwaters in Stratton. Jamaica feels that they see increased flows in these streams, and resulting increased fluvial erosion, due to the development intensity of Stratton Mountain Resort.



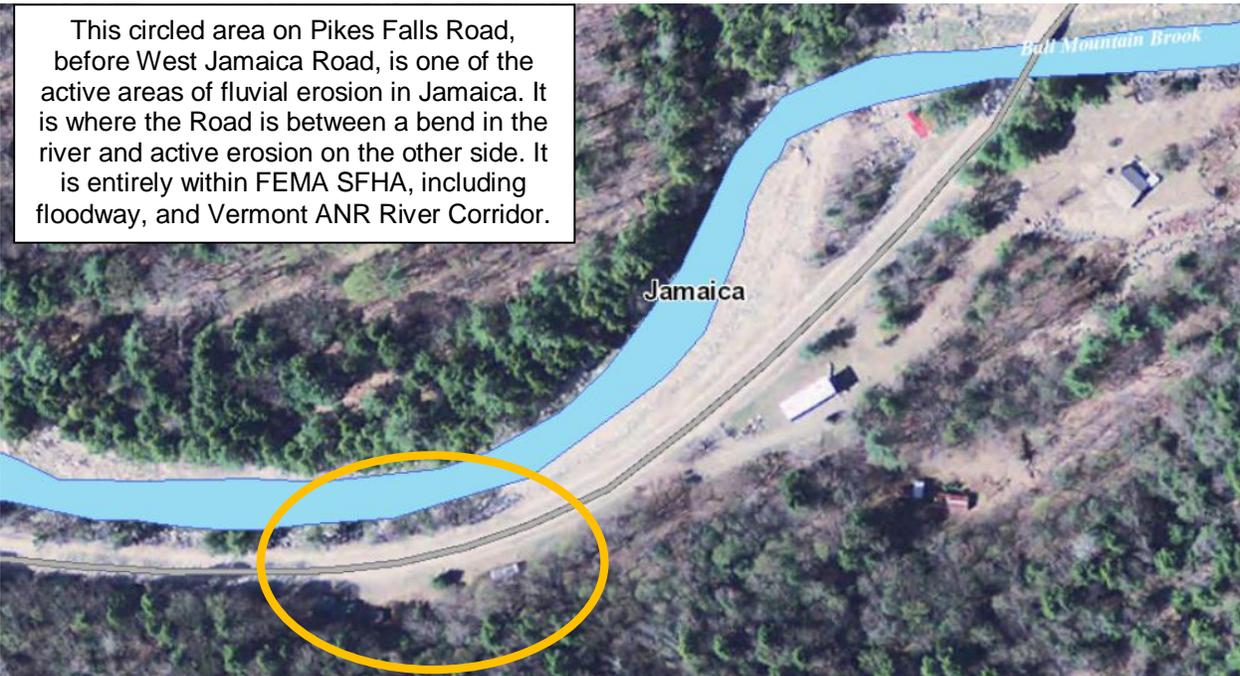
All areas of concern are ongoing maintenance issues for the Town Road Crew. Pikes Falls Road, West Jamaica Road and areas along the West River floodplain were devastated by Tropical Storm Irene in August 2011, taking out several homes on Water Street in the Village, the bridge on Route 30 in the Village, and major sections of Pikes Falls Road. West Jamaica Road is much narrower and closer to the river than Pikes Falls Road. There are many places on West Jamaica Road that are extremely close to the river. There is an area in downtown on Water Street where improperly round and small rip rap was used after TS Irene, and this remains a concern for the EMD and the Road Foreman as an area that could potentially experience fluvial erosion again during a large event.

The length of Pikes Falls Road, about a 4-mile stretch is prone to fluvial erosion. It is entirely encumbered by FEMA SFHA and/or Vermont ANR River Corridor.

Gravity and water power are the forces driving fluvial erosion. Factors that allow the force of gravity to overcome the resistance of earth material to erosion include: saturation by water, steepening of slopes by erosion or construction, alternate freezing or thawing, removal of trees and other vegetation and earthquake shaking. Major erosion events are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompany these events. Associated issues in Jamaica are related to road cutting and bank erosion for the most part, areas where roads have been built between steep slopes on one side of the road, and slopes to a river or brook on the opposite side. Existing homes are dotted on the landscape along these roads which have existed for 200 years or more, so cannot be easily closed or relocated.

The historic road network of many Vermont towns and villages typically follows waterways. This historic settlement pattern creates vulnerability for the road network, infrastructure and development within and along what are called River Corridors. River Corridor mapping was released by the Vermont Agency of Natural Resources in early December 2014; small stream mapping was released in January 2016. This mapping delineates fluvial erosion hazard areas and includes a 50-foot buffer beyond those designated areas. For small streams, a 50-foot

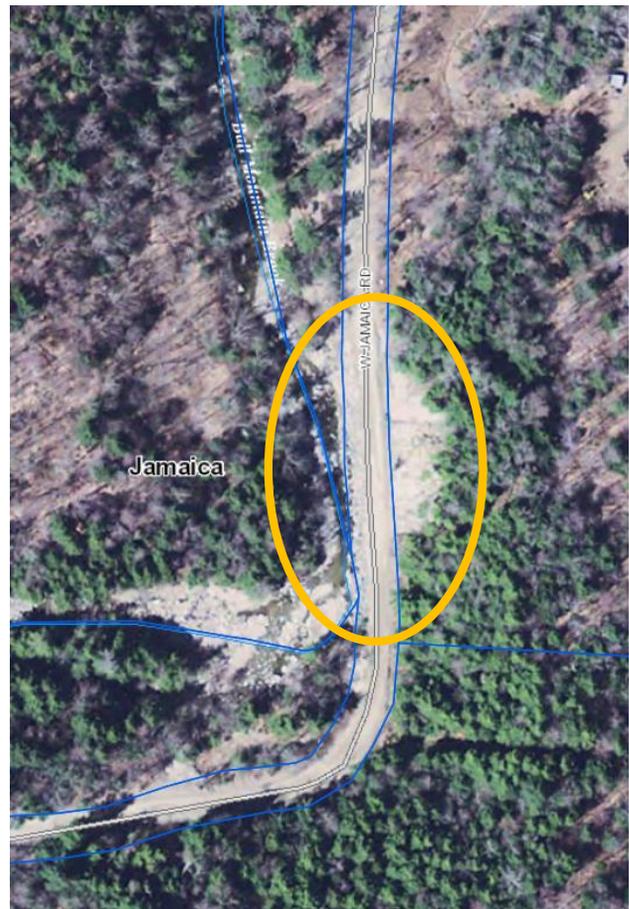
buffer from top-of-bank on either side of the waterway constitutes the River Corridor. This mapping can assist municipalities in developing bylaws and effective mitigation strategies to



regulate development within fluvial erosion hazard zones. Jamaica does not currently have a fluvial erosion bylaw, but is considering adding this to their floodplain regulations.

Pictured above is Pike's Falls Road and the adjacent Ball Mountain Brook. Note the proximity of the road to the waterway, especially close to some of the meander bends. These bends in the river are prone to movement as part of natural river processes, and their movements can be even more dramatic when manmade impacts and development upstream impinges on these natural stabilizing forces. The interaction of the natural and unnaturally dramatic forces of river movement, combined with the stationary location of the closely located roads is what leads to road damages during heavy weather events.

Pictured to the right is the largest area of fluvial erosion in Jamaica, and it is on West Jamaica Road. This Road in this area was completely taken out by fluvial erosion and a slope failure, which is visible on the aerial image. As in the instance on Pike's Falls Road, the meander bend in the River was exaggerated with the increased flows during TS Irene and overtook the Road,



which lies within the River's natural River Corridor. Photos on the next page show during the damages and after the Road was repaired. These instances are continual concerns with large rain events and storms. The slide remains a continual issue and mud comes down incrementally after rain events. There was consideration of a retaining wall but the cost of the wall would be \$250,000 and the cost was considered not necessary. The top of the slide is 90' out of the road right of way. This is the largest area of concern in Jamaica, according to the Road Foreman. He does not think that the severity of damage experienced during Irene will occur again. Because of the mitigation work that was completed after TS Irene, the Road Foreman feels that is not probable that there will be another erosion event of the scale of TS Irene in this location, but this will continue to be a maintenance issue for the Road Crew. The slide is on private land so the town is limited with what they can do.

Impact of Flooding and Fluvial Erosion

Area of extreme fluvial erosion on West Jamaica Road just after TS Irene, while the River was still high. Repairs in process.



Due to the mountainous and upland terrain of much of Jamaica, there is limited FEMA designated floodplain in Jamaica. Due to the historic development patterns in Jamaica, with the main transportation routes following the waterways, much of the built environment is also located in this



West Jamaica Road after repairs following TS Irene. Note the proximity of River and Road.

hazardous area or along tributaries to West River. The tributaries are generally in mapped River Corridors, and because of the terrain, are more subject to fluvial erosion than rising and standing flooding such as is more common in wide lowlands. Jamaica was heavily impacted by most recent large storm in memory, Tropical Storm Irene in 2011. There was flooding throughout Jamaica Village and erosion damage on Ball Mountain Brook and it's North Branch. Numerous buildings were damaged, resulting in 4 buyouts, and there were damages to public infrastructure,

including to the Route 30/Main Street bridge and a bridge on Pikes Falls Road. The roads are the most expensive infrastructure maintenance cost

in Jamaica. Wash outs on rural roads cause forest debris to enter streams and this can clog culverts.

Eroding banks that encroach on properties is one issue seen in Jamaica. The rocks and debris come downstream and slow down the flow of water, deposits in the floodplains and wider areas of the river nearer downtown. Four homes on Water Street, one home on West Jamaica Road, a camp on Pikes Falls Road were all destroyed, and a home on Factory Street lost its kitchen. Turkey Mountain Road does have some fluvial erosion, but there is not much that can be done because there is very little space in a valley that contains the road and the river. The Town has rip rapped in some areas throughout town.

The trailer park on River Road commonly gets flooded, but not always that badly. Spring floods commonly cause the land in the trailer park to become saturated. The trailers have been raised over the years because of the flooding that area. There have been swift water rescues performed in this trailer park due to high water events. The park floods so frequently, though, that residents don't always even call for help. There have not been efforts to move residents from this trailer park. This area experiences more inundation flooding than fluvial erosion damage. There is another nearby trailer park on Route 30 across from Cota and Cota, but this park hasn't experienced flooding during the memory of the EMD.

Route 30 goes uphill for the most part through Jamaica, so other than the bridge being taken out during Irene, Route 30 was not damaged during TS Irene. Where Route 100 and 30 split, in Rawsonville, that area has flooded, including during a microburst three days after TS Irene. The prior bridge on Route 30 had a center structure to it, which is what caused debris to catch and send water over the bridge. The replacement bridge has no center structure, so the debris concern is lessened with that mitigation.

Flash floods are likely in Jamaica, and potential damage to Route 30 or Route 100 could limit access to town, as they are the major transportation corridors through the community. Drainage

ditches and culverts are the biggest concern for local flash flooding events. West Jamaica Road approximately 3 miles from the Village center, has inadequate ditching because of ledge and terrain, therefore floods easily.

Roadways in floodplains and undersized bridges and culverts are a big cause of stream instability



Bridge taken out on Pikes Falls Road by large swells of water carrying huge debris during TS Irene in 2011.

generally, not just in Jamaica. A waterway that is constrained is unable to reach geomorphic equilibrium which increases flooding in that area and puts increased pressure and larger flood loads on upstream and downstream sections, as well as causing more flooding damage. A river is in geomorphic equilibrium when its water, energy, sediment, and debris are in balance. In this condition a river is neither building up sediment in the channel nor losing sediment from its bed. Importantly, a river in equilibrium has not become overly deep and can continue to overflow onto its floodplains. The water that spills onto the floodplain slows down, and the velocity of the water still in the channel does not become excessively powerful. Mitigation actions are intended to assist with achieving greater equilibrium which will also lessen or even eliminate flooding levels and damages to buildings and infrastructure. Historic development patterns limit or complicate mitigation in some areas.

Flash floods typically occur in high elevation drainage areas as a result of summer thunderstorm activity. Drainage ditches and culverts are the biggest concern for local flash flooding events. Other areas of concern during flooding events are homes located along small brooks throughout town that are subject to rise during quick flash flooding events.

Ice jam flooding is fairly common in the early springtime, generally around March. The heavy rainfall, combined with runoff from snowmelt due to the mild temperatures, results in flooding of rivers, streams and creeks, mainly from the formation of ice jams. Jamaica doesn't have mapped ice jams.¹⁰ There are sometimes ice jams that form on the West River near the intersection of River Road and Route 30, in the vicinity of Wilkin's Mobile Home Park. Flooding has occurred in the trailer park with water 'getting up to the steps of the homes'. There are also periodic ice jams on the Ball Mountain Brook that cause flooding on Pikes Falls Road, sometimes damaging culverts and the road. Damage varies by event.

Extent

The extent of a flood event can vary from a minor event due to a typical rain event or could be a major event as a result of rapid snow melt in spring, rain on frozen ground, or as a result of a tropical depression or storm. It's important to note that this report is looking at flooding data for this section in the light that flooding is the cause of fluvial erosion. TS Irene was the worst flooding damage to structures (4 homes on Water Street, 1 second home on West Jamaica Road and 1 camp on Pikes Falls Road were all destroyed and either bought out or never repaired) in the town's recent history, according to recollection of longtime residents. In 1869 a great flood carried away "a mile of bridges" and damaged every dam on Ball Mountain Brook, so this may be the worst flood on record in Jamaica.

The highest recorded measurement on the West River at the nearest stream gauge, which is in Jamaica, was 14.87 feet, which was measured on December 31, 1948.¹¹

Extent for thunderstorms/heavy rain events: The tables below shows the top 10 rain events at a former USGS weather monitoring station in Jamaica. This table shows that TS Irene in 2011 was the second-highest 1-day precipitation value between 1969 and 2016. Most stations take their observations in the morning (7 and 8am are the most common times), so the precipitation would have fallen between 7am on the previous date to 7 am on the date listed in the table.

¹⁰ CRELL Ice jam database/map <http://icejams.crrel.usace.army.mil/apex/f?p=524:5:0::NO>

¹¹ USGS Stream gauge 01155500 West River at Jamaica, VT (66 years of record)
<http://waterwatch.usgs.gov/index.php>

| Maximum 1-Day Total Precipitation ¹² for Ball Mountain Lake, VT | | |
|---|----------------|-------------|
| Rank | Value (inches) | Ending Date |
| 1 | 5.60 | 1973-06-30 |
| 2 | 4.90 | 2011-08-29 |
| 3 | 4.36 | 1999-09-17 |
| 4 | 3.97 | 2005-10-09 |
| 5 | 3.32 | 1987-06-23 |
| 6 | 3.30 | 1975-08-08 |
| 7 | 3.21 | 2003-08-02 |
| 8 | 3.14 | 1988-04-29 |
| 9 | 3.07 | 2010-10-01 |
| 10 | 3.02 | 2000-12-18 |
| Period of record: 1969-05-01 to 2016-06-19 | | |

To give context to this data, the “Precipitation Frequency Estimates” table below allows one to determine the event frequency based on the rainfall amount. This table puts Irene (24-hour value) at between a 10 and 25-year event specifically for Jamaica. It is important to remember that precipitation levels vary throughout the region.

The table below is specific for Jamaica, and has the values associated with the size of an event in order to determine the storm frequency¹³. This is for reference. Jamaica should consider what size event is reasonable to set standards to build to, for both infrastructure and buildings. Some experts advise that towns should be using the 10 year one hour or two-hour frequency estimates to reflect the monsoon type storms that are seen in the region. Infrastructure built for 24 hour events often can’t keep up with high intensity storms leading to erosion and street flooding. This should be a consideration in the future.

| PRECIPITATION FREQUENCY ESTIMATES (in inches) | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|
| by duration for ARI (years): | 1 | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500 | 1000 |
| 5-min: | 0.281 | 0.331 | 0.412 | 0.478 | 0.57 | 0.64 | 0.712 | 0.79 | 0.899 | 0.986 |
| 10-min: | 0.399 | 0.469 | 0.583 | 0.678 | 0.808 | 0.907 | 1.01 | 1.12 | 1.27 | 1.4 |
| 15-min: | 0.469 | 0.551 | 0.685 | 0.797 | 0.95 | 1.07 | 1.19 | 1.32 | 1.5 | 1.64 |
| 30-min: | 0.667 | 0.781 | 0.968 | 1.12 | 1.34 | 1.5 | 1.67 | 1.85 | 2.1 | 2.29 |
| 60-min: | 0.864 | 1.01 | 1.25 | 1.45 | 1.73 | 1.94 | 2.15 | 2.38 | 2.69 | 2.94 |
| 2-hr: | 1.14 | 1.32 | 1.63 | 1.88 | 2.23 | 2.5 | 2.77 | 3.06 | 3.45 | 3.76 |
| 3-hr: | 1.32 | 1.54 | 1.89 | 2.18 | 2.58 | 2.89 | 3.2 | 3.54 | 4 | 4.36 |
| 6-hr: | 1.68 | 1.96 | 2.41 | 2.79 | 3.31 | 3.71 | 4.12 | 4.56 | 5.19 | 5.69 |
| 12-hr: | 2.08 | 2.44 | 3.04 | 3.53 | 4.21 | 4.73 | 5.26 | 5.87 | 6.73 | 7.44 |
| 24-hr: | 2.5 | 2.96 | 3.71 | 4.33 | 5.19 | 5.83 | 6.51 | 7.29 | 8.42 | 9.37 |
| 2-day: | 2.92 | 3.48 | 4.38 | 5.13 | 6.16 | 6.93 | 7.75 | 8.7 | 10.1 | 11.3 |
| 3-day: | 3.23 | 3.84 | 4.83 | 5.65 | 6.78 | 7.62 | 8.52 | 9.57 | 11.1 | 12.4 |

¹² Data provided by the NOAA, Northeast Regional Climate Center at Cornell University. <http://www.nrcc.cornell.edu/>. 10/10/18.

¹³ NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: Jamaica, VT <https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=vt> accessed 1/13/20.

| | | | | | | | | | | |
|---------|------|------|------|------|------|------|------|------|------|------|
| 4-day: | 3.5 | 4.14 | 5.19 | 6.06 | 7.26 | 8.16 | 9.11 | 10.2 | 11.9 | 13.2 |
| 7-day: | 4.23 | 4.94 | 6.1 | 7.06 | 8.38 | 9.37 | 10.4 | 11.6 | 13.4 | 14.8 |
| 10-day: | 4.93 | 5.68 | 6.91 | 7.93 | 9.33 | 10.4 | 11.5 | 12.7 | 14.5 | 15.9 |
| 20-day: | 7.09 | 7.93 | 9.31 | 10.5 | 12 | 13.2 | 14.4 | 15.7 | 17.4 | 18.7 |
| 30-day: | 8.89 | 9.8 | 11.3 | 12.5 | 14.2 | 15.5 | 16.8 | 18.1 | 19.7 | 20.9 |
| 45-day: | 11.1 | 12.1 | 13.7 | 15.1 | 16.9 | 18.4 | 19.8 | 21.1 | 22.7 | 23.8 |
| 60-day: | 13 | 14 | 15.8 | 17.2 | 19.2 | 20.8 | 22.3 | 23.6 | 25.2 | 26.3 |

Extent of Fluvial Erosion

There is an active erosion zone that is 250' long and 100'+ tall in the River Corridor of the stream along West Jamaica Road, with trees falling.



Probability of Flooding and Fluvial Erosion

Flooding is highly likely, as determined by the number of past events and the local knowledge of the Hazard Mitigation Planning

Committee. There are events every year, especially during spring snow melt and late summer rains. With areas of high elevation drainage, Jamaica is subject to flash flood events that erode stream banks and adjacent areas. There are events every year, especially during spring snow melt and late summer season rains.

Active fluvial erosion event along West Jamaica Road. Note the live trees that have recently fallen into the slide. The River is on the opposite side of the Road, but the fluvial erosion so damaged the toe that the slide remains active years later.

Fluvial erosion is highly likely and exists in Jamaica, especially due to the damage caused by TS Irene in 2011, where fluvial erosion hazard flooding de-stabilized many steep-sloped areas and washed out riparian zones next to roads and streams. Fluvial erosion is directly associated with flooding and large scale rain events and spring snow melt. Inundation flooding events are less of a hazard in Jamaica, but fluvial erosion caused by moving flood waters does present a hazard.

Past Occurrences

Since 1996, when National Climatic Data Center detailed records start, there have been 42 flood events in Windham County, Vermont¹⁴. Jamaica experiences routine spring flooding, but this is not always documented. There have been 16 Presidential Disaster Declarations in Windham County since 1953. Of these, 7 were severe storms, 5 were floods, 2 hurricanes, 1 snow event and 1 severe ice storm.¹⁵

| Disaster Declarations for Windham County, VT | | | | | | |
|---|----------------------------|--------------------------|-------------------------|---------------------------|---------------------------------------|--------------------------------|
| Disaster Number | Incident Begin Date | Incident End Date | Declaration Date | Incident Type | Title | Disaster Close Out Date |
| 4356 | 10/29/2017 | 10/30/2017 | 01/02/2018 | Severe Storm and Flooding | SEVERE STORMS AND FLOODING | |
| 4043 | 5/20/2011 | 5/20/2011 | 11/8/2011 | Severe Storm(s) | SEVERE STORMS AND FLOODING | |
| 4022 | 8/27/2011 | 9/2/2011 | 9/1/2011 | Hurricane | TROPICAL STORM IRENE | |
| 3338 | 8/26/2011 | 9/2/2011 | 8/29/2011 | Hurricane | HURRICANE IRENE | 3/10/2014 |
| 1816 | 12/11/2008 | 12/18/2008 | 1/14/2009 | Severe Ice Storm | SEVERE WINTER STORM | 10/15/2014 |
| 1698 | 4/15/2007 | 4/21/2007 | 5/4/2007 | Severe Storm(s) | SEVERE STORMS AND FLOODING | 3/13/2013 |
| 1559 | 8/12/2004 | 9/12/2004 | 9/23/2004 | Severe Storm(s) | SEVERE STORMS AND FLOODING | 1/4/2011 |
| 1488 | 7/21/2003 | 8/18/2003 | 9/12/2003 | Severe Storm(s) | SEVERE STORMS AND FLOODING | 1/4/2011 |
| 3167 | 3/5/2001 | 3/7/2001 | 4/10/2001 | Snow | SNOW | 2/28/2005 |
| 1336 | 7/14/2000 | 7/18/2000 | 7/27/2000 | Severe Storm(s) | SEVERE STORMS AND FLOODING | 6/30/2008 |
| 1307 | 9/16/1999 | 9/21/1999 | 11/10/1999 | Severe Storm(s) | TROPICAL STORM FLOYD | 6/30/2008 |
| 1124 | 6/12/1996 | 6/14/1996 | 6/27/1996 | Flood | EXTREME RAINFALL AND FLOODING | 2/23/2005 |
| 1101 | 1/19/1996 | 2/2/1996 | 2/13/1996 | Flood | ICE JAMS AND FLOODING | 2/17/2005 |
| 518 | 8/5/1976 | 8/5/1976 | 8/5/1976 | Flood | SEVERE STORMS, HIGH WINDS & FLOODING | 4/16/1981 |
| 397 | 7/6/1973 | 7/6/1973 | 7/6/1973 | Flood | SEVERE STORMS, FLOODING, & LANDSLIDES | 11/12/1976 |
| 277 | 8/30/1969 | 8/30/1969 | 8/30/1969 | Flood | SEVERE STORMS & FLOODING | 5/26/1972 |

Detail on Specific Flooding Events that have Affected Jamaica and Windham County:

January 12, 2018 - After a frigid end of December and beginning of January, an unseasonably warm air-mass was pumped into western New England on January 12th on southerly winds. The temperatures reached the 50s and 60s during the day. Showers also developed in the warm air-mass ahead of a cold front and were heavy at times, with some locations receiving one to two inches of rainfall. The combination of warm temperatures and heavy rainfall caused river ice to dislodge and resulted in ice jams in spots in East Jamaica. Flooding occurred due to a combination of ice jam movement and heavy rainfall. The West River overflowed its banks, flooding River Road and a trailer park in the town of Jamaica. Water was over Pikes Falls Road in Jamaica.

October 29-30, 2017 rain storm – Resulted in FEMA declaration 4356. Jamaica was reimbursed \$18,470.41 from FEMA for damages. Road washouts on South Hill, West Hill Road South, West Jamaica Road, and Dalewood Roads.

¹⁴ NCDC data provided on 10/8/19 by NOAA's National Centers for Environmental Information (NCEI) Center for Weather & Climate (CWC).

¹⁵ FEMA tool: Data Visualization: Disaster Declarations for States and Counties: Windham County, VT <http://www.fema.gov/data-visualization-disaster-declarations-states-and-counties> Accessed 5/14/18.

July 14, 2014 - As a strong area of low pressure moved across upstate New York on Monday, July 28th, repeated rounds of thunderstorms occurred during the afternoon and evening hours. This led to flash flooding across northern Windham County, as small streams and creeks rapidly overspread their banks. In addition, the Williams River reached flood stage due to the rapid surge in water. Although the worst of the flooding remained north of Windham County in Windsor County, many residents reported this flooding to be the worst seen in the area since Tropical Storm Irene in 2011. Heavy rain from thunderstorms led to flash flooding in Windham. The access road to the Tater Hill Golf Course was washed out as a result of the flooding.

July 7, 2014 - A warm and humid air mass was in place across southern Vermont on the afternoon of Monday, July 7th. A cluster of showers and thunderstorms moved from upstate New York into southern Vermont during the mid-afternoon hours. These thunderstorms had previously weakened, but were still associated with very strong winds aloft. As these thunderstorms interacted with the high terrain of the southern Green Mountains, they produced gusty winds. These winds caused damage to trees and power lines near Readsboro. The thunderstorm continued eastward towards the Connecticut River Valley, but did not produce any additional severe weather before exiting the state to the east.

Tropical Storm Irene – August 28, 2011 - The Federally Declared Disaster DR-4022, Tropical Storm Irene, tracked northeast across eastern New York and western New England during Sunday, August 28th, producing widespread flooding, fluvial erosion, and damaging winds across the region, including Jamaica. Rainfall amounts generally averaged 4 to 8 inches. Much of the rain which fell occurred within a 12-hour period, beginning early Sunday morning, and ending Sunday evening. This heavy to extreme rainfall resulted in widespread flash flooding and river flooding across southern Vermont. This also resulted in widespread long duration power outages. In particular, the approximate number of customers affected by power outages included 18,000 in Windham County. Route 100 in Windham County was closed due to flooding and wash outs. Portions of Route 100 remained closed after the flood waters receded due to significant damage. The North Branch Deerfield River runs along a portion of Route 100 from the Mount Snow area to Wilmington. Along Dover Road, one house was destroyed and floated down the North Branch Deerfield River and other houses were destroyed or significantly damage. Much of the road was reported washed away. A woman drowned when the car she was in became trapped by flood waters from the North Branch Deerfield River in Wilmington. Strong winds also occurred across southern Vermont, with frequent wind gusts of 35 to 55 mph, along with locally stronger wind gusts exceeding 60 mph. The strongest winds occurred from the north to



Roof floating down the Ball Mountain Brook during TS Irene

northeast during the morning hours, then from the west to northwest during Sunday evening. The combination of strong winds, and extremely saturated soil led to numerous downed trees and power lines across the region. This also resulted in widespread long duration power outages. In particular, the approximate number of customers affected by power outages included: Windham County, 18000. President Obama raised the federal match share to 90% from 75% for TS Irene relief, therefore lowering the state and local shares by 5% each, though the state capped the town cost to 3% of the grand list.

Total public damage funds received from FEMA for Jamaica was \$4,382,213.59. Rains from TS Irene caused an extreme flash flooding and fluvial erosion hazard event for the region. This event was Presidential Disaster Declaration DR 4022. Tropical Storm Irene devastated southern Vermont

and totaled the town of Jamaica, as had happened in the major floods of days past. Most of the town's bridges and roads were compromised or destroyed completely.

Jamaica, as well as most of the southern Vermont, was in a "can't get there from here" state of affairs. It took about five years to get the town back to a "Pre-Irene" condition¹⁶.



August 5, 2008 -

The passage of a strong upper level disturbance, combined with a moist and unstable air mass in place, led to the development of numerous thunderstorms across southern Vermont during Thursday afternoon on August 7th, some of which contained large hail. In addition, locally very heavy rainfall led to flash flooding in some areas.

April 15-21, 2007 - Flash floods and inundation flooding over a period of several days - The Town of Halifax got 8 inches of snow in the morning of April 15, followed by 6-8 inches of rain. The snow caused a berm at the Town Offices holding in the rainwater which caused a lot of inundation flooding. Rain and snow caused damage to roads and utility lines across Windham County. Across the state, nearly \$3.6 million was obligated as part of the FEMA Public Assistance Program. Initially, the precipitation fell as a mixture of wet snow, sleet and rain, with snow and sleet more prevalent across the higher elevations. The precipitation then changed to plain rain by late Monday morning. Liquid equivalent precipitation totals from this storm ranged from 3 to 6 inches. Rain and snow caused damage to roads and utility lines across Windham County and Jamaica. Across the State, nearly 3.6 million dollars were obligated as part of the FEMA Public Assistance Program under DR1698.

¹⁶ Jamaica 2017 Town Plan

June 29, 2006 - After being nearly stationary while deepening for several days, an upper-level trough from the Great Lakes to the lower Ohio Valley was accelerating eastward at daybreak on June 29. An associated weak low pressure over Lake Erie trailed a cold front through the Ohio Valley. During the day, this system moved rapidly eastward and touched off thunderstorms in the warm, humid air mass over western New England in the early evening. Torrential rainfall produced flash flooding in Windham County.

October 8, 2005 - On October 8 at daybreak, a nearly stationary cold front was over southwestern New England. The air over the northeastern United States was very moist. Low pressure in the vicinity of the eastern Carolina states moved slowly north northeast along the cold front. Heavy rain fell over southern Vermont through the early morning hours of October 9. During this period, there was over 6 inches of rainfall in southern Vermont, triggering widespread flooding. Several evacuations of people from their homes occurred. Route 100 was closed in portions.

The following year, another severe period of flooding and thunderstorms, which lasted from the period of August 12- September 12, 2004 engendered Presidential Disaster Declaration DR – 1559. These two events triggered funding from the FEMA Public Assistance Program which helped to pay for debris removal and overtime hours for emergency response workers. Flash flooding resulted in washouts of small bridges at Ames Hill, Hescock and Cook Roads. Canoe Brook Road in Dummerston impassable, with a culvert washed away, and a 20-foot wide by 20-foot deep hole in the road.

October 29, 2003 – Areas of low pressure moved northeast along a frontal boundary across New York and western New England from Sunday night, October 26th into Monday night, October 27th. Rainfall ranged from 1 1/2 to 2 1/2 inches with the greatest amounts in and east of the Green Mountains.

August 3, 2003 – A tropical air mass was in place over southern Vermont on August 3. With a strong disturbance over the Great Lakes adding weak lift to a very unstable atmosphere, scattered showers and thunderstorms erupted during the afternoon hours. A slow moving storm over Windham County produced Doppler radar estimated rainfalls of 3 to 4 inches in about four hours. The torrential rains took a toll, washing out roads in Londonderry. County Highway 121 was washed out in the Town of Windham. Massive flooding occurred in the city of Grafton at the base of Fire Pond and Hinkley Brook roads, where water, debris and mud washed those roads out. The raging debris knocked a house off its foundation and damaged several other ones. This was the same area affected by the infamous Flood of 96 which was even more severe. Nearly constant rain and thunderstorms from the period of July 21 through August 18, 2003 led to FEMA Declaration 1488. Many roads were washed out and culverts needed replacing throughout town.

July 2000 - A stalled frontal boundary across extreme southern Vermont interacted with a strong upper level disturbance from July 15 into early July 16. Two to four inches of widespread rain fell, with locally higher amounts across the higher terrain of Windham County. Specific amounts included 3.00 inches at Bennington and 5.17 inches at West Wardsboro, in Windham County. This rain produced enough runoff to cause the Deerfield River rose 6 feet above unofficial flood stage in Wilmington. Several roads were reported under water. The widespread heavy rain event set the stage for more widespread flooding later Sunday. The air remained very moist and unstable in wake of the rainstorm. More thunderstorms erupted late in the day across

southern Vermont. These storms moved very slowly, trained over the same region, and were further enhanced by the steep terrain. The thunderstorm rainfall, as well as the earlier rainstorm, dumped in excess of 8 inches locally at Newfane. Since the ground was already saturated, the heavy rains from the thunderstorms produced flooding and flash flooding across the region. In Windham County, a five-mile stretch of State Route 30 was closed due to flooding and residents were evacuated. Street flooding was reported at Brattleboro.

September 17, 1999 - The remnants of Hurricane Floyd moved up the eastern seaboard on September 16 and during the early hours on September 17. The storm brought both high winds and heavy rainfall to Southern Vermont, which included a large swath of 3 to 6 inch amounts. Specific rainfall amounts included 2.91 inches in Bennington, 3.89 inches in Sunderland, 4.54 inches at Peru and 5.70 inches at Brattleboro. The rain produced significant flooding across the region, which proved destructive. Many smaller tributaries reached or exceeded bank full. Water from the Millbrook in Weathersfield washed away a portion of State Route 5. The World's Fair in Tunbridge was cancelled for the first time in many years. Winds from the passage of Floyd were estimated to have gusted to over 60 mph, especially over hill towns. The combination of the wind and very saturated ground, produce widespread downing of trees and power lines across much of Southern Vermont. A woman was injured on Tavern Hill in Putney, Windham County when a tree came crashing down on her Volvo, destroying the vehicle. Some trees fell on vehicles and houses. The rain and wind produced power outages across the region. As many as 2,000 people lost power in Southern Vermont. The 1999/2000 Town Report said that \$22,149 was received from FEMA for "several washed out roads" resulting from this event.

June 19, 1998 - Thunderstorms with torrential downpours produced flash floods across parts of Windham County. Shoulders of routes 100 and 112 were washed out near Jacksonville and Halifax. Flooding also occurred in the Putney area and at Rawsonville. Several mountain roads were washed out throughout the County.

In 1996, Between Saturday morning July 13 and Sunday morning July 14 rainfall from three to five inches was common across southern Vermont resulting in significant damage and a Presidential Declaration of Emergency. Flooding occurred throughout New England causing millions of dollars in damage. The remnants of Hurricane Bertha tracked from the Mid-Atlantic region northeast to Quebec, Canada. Several roads and streams were flooded throughout the region, including low-land flooding along the Hoosic River in Bennington County. Scattered power outages also occurred over the area, when strong winds downed water-laden tree branches onto wires.

January 19, 1996 - An intense area of low pressure which was located over the Mid-Atlantic region on Friday morning January 19th produced unseasonably warm temperatures, high dewpoints and strong winds. This resulted in rapid melting of one to three feet of snow. In addition to the rapid snowmelt one to three inches of rain fell as the system moved northeast along the coast. Many small streams across the county flooded, including Whetstone Brook, resulting in several road washouts.

During 1976, flooding occurred throughout New England, as result of Hurricane Belle, causing millions of dollars in damage.

In 1973 there was an extreme rainfall event from June 28-30 that affected all areas of Vermont except the northwest section. Rainfall amounts as much as 6 inches in 24 hours in some locations. This was the largest rain event since the 1927 flood. Highway damage was

extensive in the south-central, southeastern, and northeastern areas of the State. Three persons were killed in the 1973 flood, and damage was estimated at \$64 million. Sizable crop loss was reported, and damage to State highways was estimated to be \$10 million. The entire State was declared a disaster area.¹⁷ After this event, there was extensive dredging, berming and windrowing in an attempt to control channel location and reduce future flood impacts.

Another flood in 1948 gutted Water Street and left 14 without homes.

The Spring Floods of 1938, which had an effect on all of New England, caused \$113 million in damage, killed 24 people and made 77,000 people homeless. During this flood alone, the main street of Hooksett, New Hampshire was 18 to 20 feet underwater. Five days of rain thoroughly saturated the ground. A hurricane rapidly dropped three more inches of rain on Jamaica, ripping out 12 bridges, the telephone and electrical lines, and covering Water Street with 3-5 feet of water.

In March 1936, 3 inches of overnight rain, along with melting mountain snow, threw Jamaica into a state of emergency. It took roughly 11 months to clean up the mess from that storm.

The Vermont Flood of 1927 was the deadliest flooding event in the history of the State; eighty-four people were killed with over \$28 million in property damage. Flooding from 4.12 inches of rain in 24 hours carried several mill dams downstream while covering several roadways with mudslides. Twelve bridges in Jamaica were severely damaged in this flood.

In 1869 a great flood carried away “a mile of bridges” and damaged every dam on Ball Mountain Brook. During this period Jamaica and other towns in the West River Valley bonded together in a venture that was seen as the salvation of the area’s economic woes, the West River Railroad. Originally chartered in 1867, the proposed railroad was to run from Brattleboro to Whitehall, NY. In 1877, financing provided by the valley towns moved the languishing project forward with the first segment from Brattleboro to Londonderry. Although it was never extended further, the railroad provided valuable public transportation for the lower West River Valley until the 1930’s, by which time automobile ownership had become almost universal¹⁸.

Sources used

Local knowledge of areas of concern and impacts, Discussions and emails with Jamaica EMD, Road Foreman, and Town Clerk in January/February 2020

Geographic Area of Hazard/Location/Occurrence of Fluvial Erosion and Flooding/Special Flood Hazard Area and River Corridor Mapping

The river Corridor mapping (included in this plan) shows the ANR defined River Corridors, which are likely to have fluvial erosion. The map also points out some of the issues discussed in the text of particular problem spots. Mitigation projects on private land require the consent of the land owner to complete.

FEMA has mapped “AE” zones, including “AE with Floodway” in Jamaica. “AE” zones have Base Flood Elevations determined. Floodways are considered areas with moving flood waters and are the highest regulated flood hazard areas according to FEMA. FEMA does not map

¹⁷ USGS “Vermont Floods and Droughts” information page <http://md.water.usgs.gov/publications/wsp-2375/vt/>. Accessed 4/3/15.

¹⁸ 2017 Jamaica Town Plan, page 4.

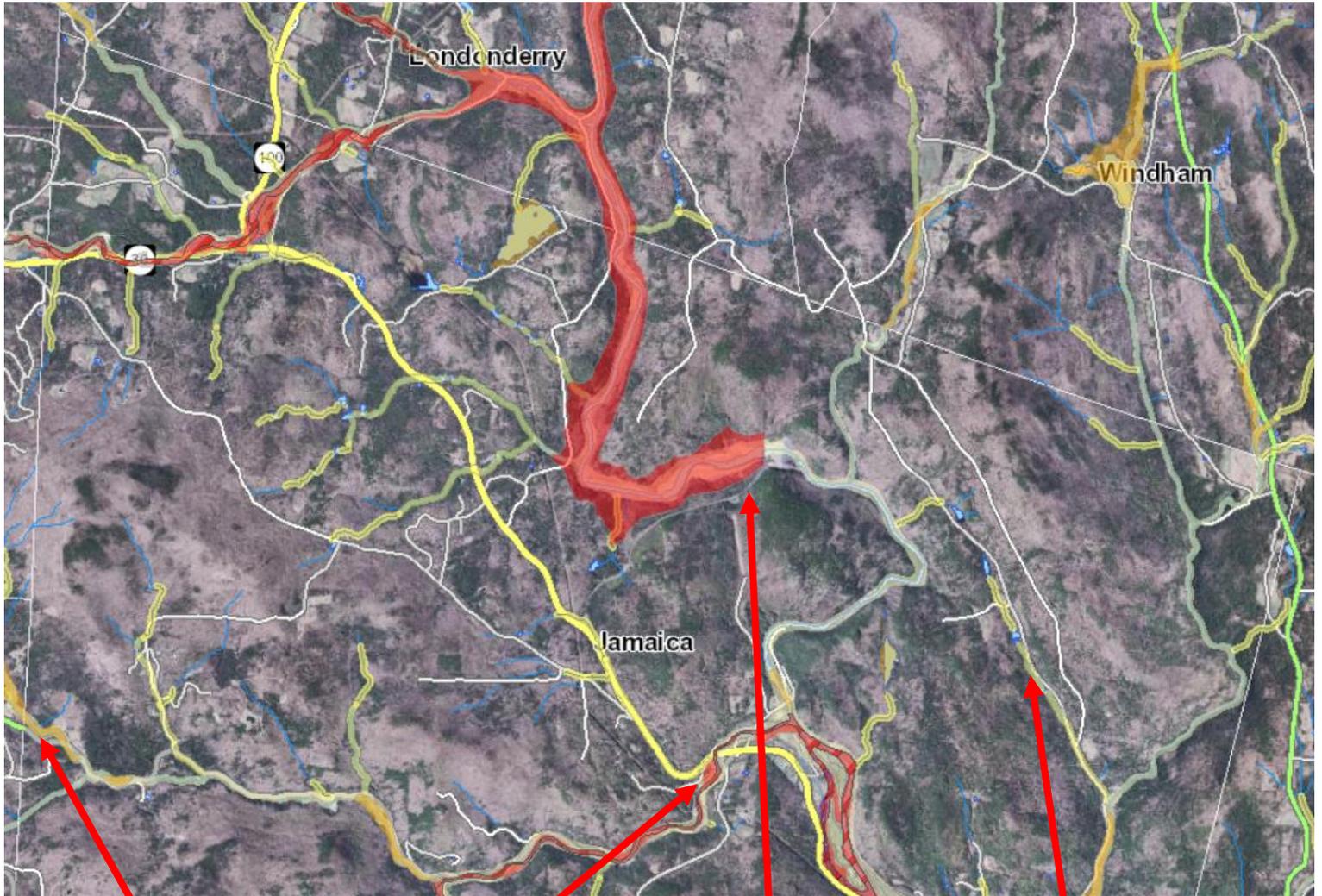
fluvial erosion. Properties within the SFHA, that have a mortgage, are required to carry flood insurance, and properties without a mortgage are advised to. Jamaica's participation in the NFIP gives residents access to discount flood insurance through the National Flood Insurance Program (NFIP). The Flood Hazard Summary Sheets on FloodReady Vermont's website says there are 120 structures in the Special Flood Hazard Area.

The maps on the following pages were created using the Vermont Agency of Natural Resources 'Natural Resources Atlas. The legend pertains to the accompanying maps. FEMA SFHA is shown in red. The floodplains shown in these maps are based on the FEMA Flood Insurance Rate Maps (FIRMs) available through the FEMA Map Service Center.¹⁹ This map shows the River Corridors that Vermont Agency of Natural Resources (ANR) has mapped. The ANR defined River Corridor also includes a 50-foot setback requirement on all streams with a watershed between .5 and 2 square miles. Together the mapped area and the small stream buffers constitute the River Corridor. River Corridors encompass an area around the present channel where fluvial erosion, channel evolution and down-valley meander migration are most likely to occur.

The following maps show the Special Flood Hazard Areas (SFHAs) in red (AE zone) and the River Corridors in cream color. Within Jamaica, FEMA SFHA lies on the Wardsboro Brook (Route 100), the West River (Routes 30 and 100), Ball Mountain Brook (Pikes Falls Road and West Jamaica Road), the North Branch of Ball Mountain Brook (Pikes Falls Road), and the Winhall River (Route 30 and Goodaleville Road). FEMA SFHA also encompasses the Ball Mountain Dam reservoir area and the West River north of the Ball Mountain Dam. River Corridor is scattered along many smaller streams throughout the Town.

¹⁹ FEMA Map Service Center <https://msc.fema.gov/portal>

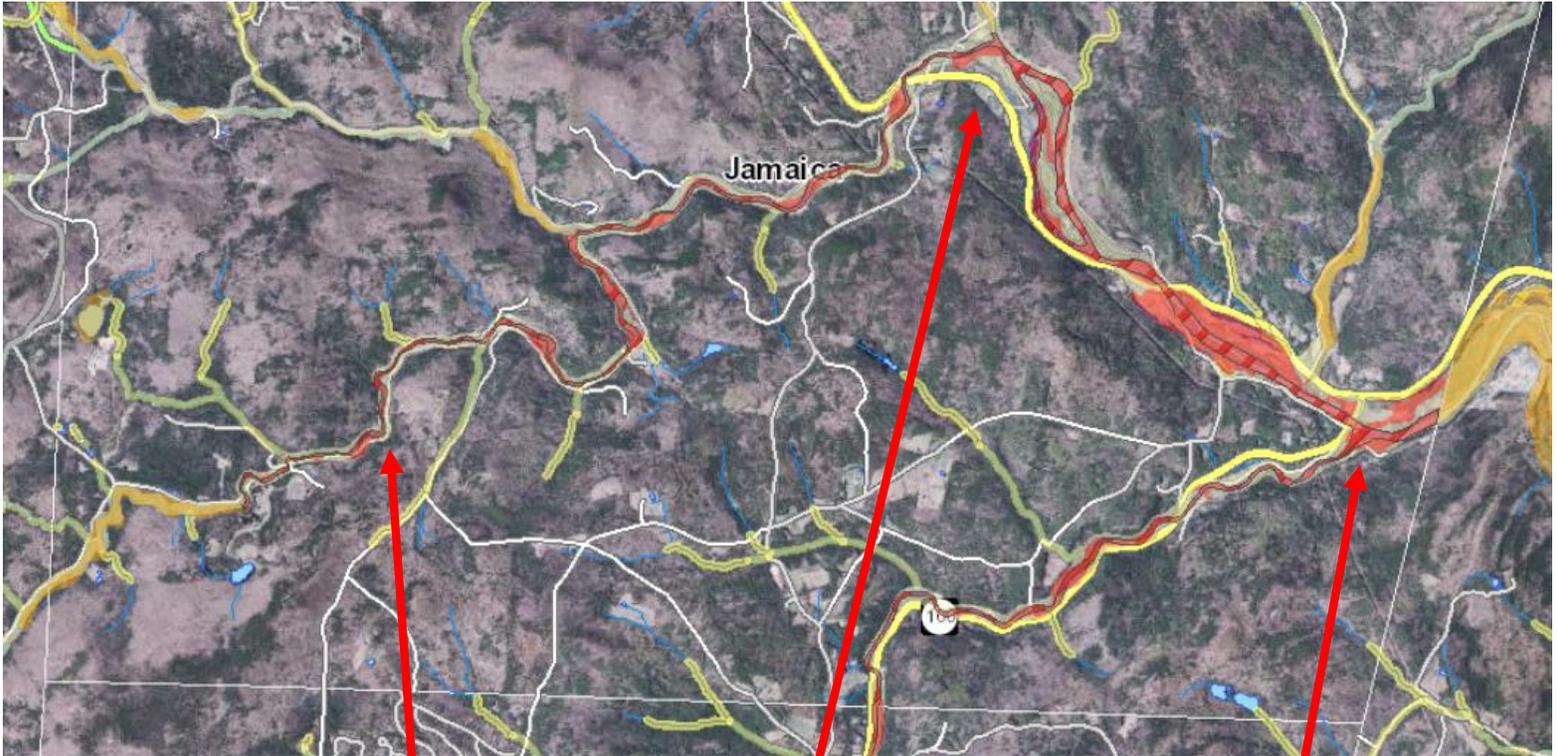
This map shows the northern portion of Jamaica and the map on the following page shows the southern portion.



The stretch of stream between these arrows is Ball Mountain Brook, which is subject to fluvial erosion.

This is Ball Mountain Dam, which is owned by the US Army Corps of Engineers. The red floodplain lies behind it and assumes a 100-year flood and the backwaters that would create.

Little Turkey Mountain Brook is a confined stream and is subject to fluvial erosion and ice jams.



Location of a large slide along West Jamaica Road and the Ball Mountain Brook (pictured below)

Area of Jamaica Village where a large number of structures are within the FEMA SFHA or the River Corridor

Area of East Jamaica Village which contains River Corridor and backwaters from the Townshend Dam



Slide is the top arrow here. Note the proximity of the stream bend to the road, immediately adjacent

Ball Mountain Dam

The Ball Mountain Dam is a US Army Corps of Engineers (USACE) owned dam. It was built with the primary purpose of temporarily impounding flood flows on the West River, which is a Connecticut River tributary, in order to mitigate flooding downstream along the main stem of the Connecticut River. The dam secondarily is a 2.2 MW electric generation facility. It has a height of 265 feet above the river bed. It has a design capacity of almost 55,000 acre-feet of water before overflowing its spillway. This volume of water is equivalent to six inches of water over the entire 172 square miles of drainage area upstream from the dam. The drainage area controlled by the dam represents about 40 percent of the total drainage area of the West River.

The level of flow in the West River as it passes through Jamaica varies tremendously due to the fact that the river passes between two federally controlled flood control dams, the Ball Mountain Dam in Jamaica and the Townshend Dam in downstream neighboring Townshend. The average flow over the years has been about 400 cubic feet per second (cfs). Currently, there are two annual controlled recreational releases (if sufficient stored water is available in the reservoir), with flow maintained at about 1,500 cfs during daylight hours for recreational canoe, kayak, and raft events downstream of the dam. If necessary, the USACE can, and will, discharge substantially more than 1,500 cfs for both flood control and dam safety reasons.

Sediment accumulation in the pool behind Ball Mountain Dam poses a continuing serious risk to water quality and aquatic and riparian habitat in the West River both upstream and downstream of the dam. Ball Mountain Dam was not designed to impound a permanent pool, but a pool has been maintained behind the dam since shortly after it was constructed in 1960. Several hundred thousand cubic yards of sediment have accumulated in and near the historic river channel underneath the surface of the pool. In the mid 1990's two successive accidental sediment releases from the dam caused severe damage to aquatic and riparian habitat along the West River. Major fish kills resulted from both of these releases, and ecological and economic losses were significant²⁰. Future accidental sediment releases are possible because the accumulated sediment in the pool cannot be prevented from being swept through the gate works if automated pool-depth regulation mechanisms fail due to improper maintenance, component failure or human error.



The USACE has determined that Ball Mountain Dam is structurally unsound due to internal erosion damage causing seep holes through the dam. The Town has been briefed by the Army Corps about different failure scenarios, including both incremental and catastrophic failure. The EMD considered putting sirens up to alert the population, but the timeframe that would be

²⁰ 2017 Jamaica Town Plan.

required to get mutual aid to set off the sirens made the plan unfeasible. The fact is that an immediate dam failure of Ball Mountain dam would be devastating for parts Jamaica. However, because of the structurally unsound condition of the dam, the USACE is not currently using the Ball Mountain Dam for floodwater impoundment and storage purposes, so flood flows in the upper West River above the dam are passed through the structure and the pool is not filled. The USACE has told the Town that it will not allow the impoundment reservoir to fill to the point where the structure is unsafe. The USACE is studying means to gain access to build a coffer dam in order to do future maintenance, including intense caulking to fill the holes in the dam that were caused by the erosion through it. The completion of the repair, including dredging out and safe disposal of the contaminant laden sediment within the pool, is many years off and the total cost is considered “astronomical”. If the work is ever to be completed is unknown. Communication between the USACE and Town emergency personnel should be open and frequent, to enable collaborative planning for dam related emergencies.

Invasive Species

Invasive species are a region-wide hazard; however, each location will be confronted with a distinct mix of invasive species that thrive under the particular ecological conditions of that place. Each invasive species has a different potential to spread to other areas based on the rate at which it spreads and the ecological suitability of the ecosystem that it is expanding into.

Black Swallowwort carpets a bank to the exclusion of almost everything else. It even twines up a utility pole guy wire. Note the abundant seed pods. (Photo courtesy of John Anderson, Dummerston)



Many species of plants and animals have been introduced into our ecosystem for various uses; these exotic species have varying propensities for becoming invasive. An invasive species is an exotic species whose introduction into an ecosystem in which the species is not native causes or is likely to cause environmental or economic harm or harm to human health. Many species of invasive plants and animals are currently affecting Southeastern Vermont and can have significant levels of impact to the native flora and fauna.

Invasive Plant Species

In the absence or near absence of natural predators or controls, invasive non-native plants are able to spread quickly and out-compete native plants. Invasive plant species can create monocultures, which often provide poor habitat for native animals that have not evolved with the non-native species, resulting in degraded habitat value and increased vulnerability. The invasive plant issue really escalated in the early 1990's. Invasive plants tend to thrive in disturbed areas. Within the Windham region, they are more prolific in the towns along the Connecticut River than they are to the west, because the eastern towns are more populated, contain major transportation routes such as I-91 and the rail corridor, which serve as vectors for their expansion, and tend to have significant land disturbance. Some of these plants were originally planted because of their positive aspects such as their ability to grow in difficult growing conditions, long growing season length, their large seed production and their ornamental value. These same reasons are a big part of why they have become invasive.

Heavy travel corridors like I-91, Route 100 and Route 30 In Jamaica are also highways for the spread of invasives. Black swallowwort (pictured above), an aggressive invasive vine plant with small purplish black flowers, is rampant along Route 30 and is working its way up the West River Trail. Some plants can't take the use of salt on roads, but a newer invasive – slender cottonweed – is working its way up I-91 and along Route 5 sparsely – and it appears to be a salt tolerant plant.

Waterways and riparian areas are also corridors that invasives can overtake and spread along. The West River Trail, particularly around the Ball Mountain Dam reservoir in Jamaica, is “just filled with invasives” according to plan participants. A section of the trail within the dam reservoir area, out towards Angel Falls, is one of the hardest hit areas for invasives. The West River Trail Club want to focus on that section of trail and work on seeking grants. This is a catchment for flood waters, so the dam waters bring in the seeds. The trail gets maintained through the summer so invasive plan control could be added to that maintenance in an effort to curb the problem.

Particular invasive plant concerns for Jamaica are wild parsnip, giant hogweed, Japanese knotweed, and purple loosestrife. Knotweed is particularly seen along waterways. When an area gets eroded by flooding or over eaten by deer (who desire natives by choice), it is easy for non-natives to get established which in turn makes it difficult for re-establishment of desirable natives. Beech bark disease is also causing the die off of older beech trees, leading to beech suckers growing from the roots which the deer don't eat by choice, but the tree clone sucker shoots are doomed to die after 10-15 years because of the beech bark disease. This means other healthy trees can't establish themselves, leaving the forest worse off in the long term.²¹

Quote from Jamaica Fire Chief, Dana West, about his view of one of the main ways that seeds from invasive plants are spread: “The seeds come with the road salt. When it rains, the salt flows with the runoff into the ditches and culverts, and it spreads the seeds to the streams and rivers and the riverbanks.”

There are increasing infestations of invasive species in Jamaica. Japanese Knotweed is a particular plant of concern as it presents water quality concerns due to the fact that it out-competes other vegetation and dies back in the winter, leaving shorelines susceptible to erosion because there is no other vegetation stabilizing the stream bank (Basin 11 Management Plan, Preliminary Draft 2007). TS Irene eroded the banks so much and allowed for the flourishing of invasives on the bare soil left in its wake. Six years later, the trees are starting to get reestablished in these riparian areas, and they are knocking back the Japanese knotweed somewhat by shading it out. This tree-cover may self-contain it until the next storm. Purple loosestrife is commonly seen in many riparian and wetland habitats in the region. Phragmites is a newer invasive, a tall grass, that invades wet areas to the point where nothing else will grow. It has even been spotted in remote areas away from roadways, so is possibly wind-



Yellow Rattle, pictured here, is hemi-parasitic on grasses. It can devastate hayfields. It is primarily confined to power line rights of way. (Photo courtesy of John Anderson, Dummerston)

²¹ “Press Release: Sadawga Plant Survey” <http://townofwhitingham-vt.org/press-release-sadawga-plant-survey> accessed 7/31/18.

spread. Other species such as Oriental bittersweet, certain species of honeysuckle, Japanese barberry, yellow flag iris, and common and glossy (European) buckthorn have become well established in many locations. Knapweed is semi-invasive that has been found along the power line corridors and railroad tracks—where it seems capable of withstanding spraying. Yellow rattle (pictured below) is another invasive flowering plant, a parasite on grass, is now being seen on power lines.

Elevations generally below 1,500 feet are most susceptible to invasive species, though any land with some sort of major disturbance (from wind, water, logging, or land clearing and development) could potentially host them. Invasives tend to come up early and flower early, allowing them to get established before native plants have the chance. It may be possible to slow down or even halt the spread of these species by identifying and removing plants as soon as they appear. Early detection is the key. This detection can be aided by educating residents about the identification of and problems caused by invasive species. One local conservationist in the region says it is harder to find native wildflowers now, and sees the future Vermont forest as resembling southern forests more and more—with compositions consisting of sassafras, white oak and gum trees, though he says it's hard to tell what will overtake the hemlock habitat.

The following table is a list of invasive plants that the Vermont Fish and Wildlife Department have on the watch list.²²

| List of Watch Species in Vermont | |
|---|------------------------|
| Scientific Name | Common Name |
| <i>Acer ginnala</i> Maxim. | Amur maple |
| <i>Acer platanoides</i> L. | Norway maple |
| <i>Alnus glutinosa</i> (L.) Gaertner | European black alder |
| <i>Amorpha fruticosa</i> L. | False indigo |
| <i>Ampelopsis brevipedunculata</i> (Maxim.) Trautv. | Porcelainberry |
| <i>Anthriscus sylvestris</i> (L.) Hoffm. | Wild chervil |
| <i>Berberis thunbergii</i> DC. | Japanese barberry |
| <i>Berberis vulgaris</i> L. | Common barberry |
| <i>Callitriche stagnalis</i> Scop. | Pond water-starwort |
| <i>Cardamine impatiens</i> L. | Narrowleaf bittercress |
| <i>Centaurea maculosa</i> L. Syn.: <i>Centaurea biebersteinii</i> DC | Spotted knapweed |
| <i>Elaeagnus angustifolia</i> L. | Russian olive |
| <i>Elaeagnus umbellata</i> Thunb. | Autumn olive |
| <i>Euonymus alata</i> (Thunb.) Sieb. | Winged euonymus |
| <i>Euphorbia cyparissias</i> L. | Cypress spurge |
| <i>Glyceria maxima</i> (Hartman) Holmberg | Reed mannagrass |
| <i>Hesperis matronalis</i> L. | Dame's rocket |
| <i>Iris pseudacorus</i> L. | Yellow iris |
| <i>Ligustrum obtusifolium</i> Sieb. & Zucc. | Border privet |
| <i>Lonicera xylosteum</i> L. | Dwarf honeysuckle |
| <i>Lysimachia vulgaris</i> L. | Garden Loosestrife |
| <i>Marsilea quadrifolia</i> L. | European waterclover |
| <i>Microstegium vimineum</i> (Trin.) A. Camus | Japanese stilt grass |
| <i>Najas minor</i> Allioni | Brittle waternymph |
| <i>Paulownia tomentosa</i> (Thunb.) Sieb & Zucc. Ex Ste. | Princess tree |
| <i>Phalaris arundinacea</i> L. | Reed canary grass |
| <i>Polygonum perfoliatum</i> L. | Mile-a-minute vine |
| <i>Polygonum sachalinense</i> F. Schmidt ex Maxim. Syn: <i>Fallopia sachalinensis</i> (F. Schmidt ex Maxim.) Dcne. | Giant knotweed |
| <i>Populus alba</i> L. | White poplar |
| <i>Robinia pseudoacacia</i> L. | Black locust |
| <i>Rorripa nasturtium-aquaticum</i> (L.) Hayek Syn: <i>Nasturtium officinale</i> Ait. f. | Watercress |
| <i>Rosa multiflora</i> Thunb. ex Murr. | Multiflora rose |

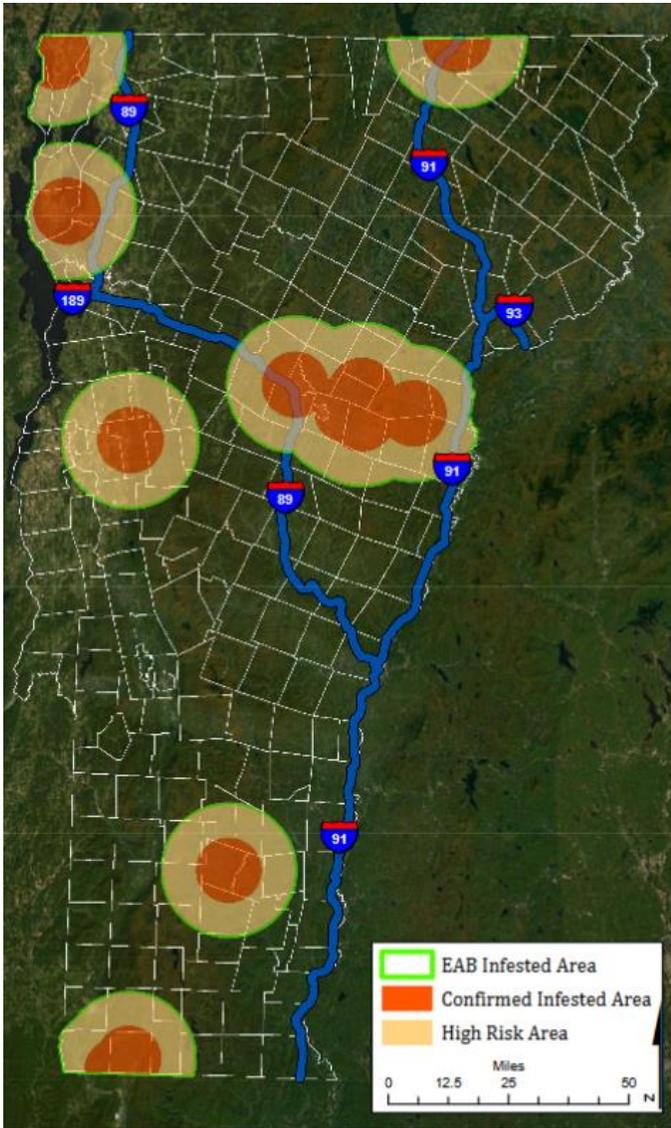
Preventing the spread of invasive plants is something that everyone can assist with. The first step is to not plant non-native plants on your property and to remove invasives that exist. Additionally, it is important that when soil is disturbed, to plant native cover before invasives have a chance to establish themselves. Proper disposal of non-native vegetation is critical to avoid its spread, safely burning the material when possible. Avoid transporting non-native plants, including firewood and garden debris, as this is critical to prevent the spread of non-native seeds and insects. Mowing roadsides from the north to the south can also help prevent the migration of invasive seeds on-site.

²² Vermont Fish and Wildlife Department: Wildlife Action Plan. Developed 11/22/05. Accessed 3/2/15.
http://www.vtfishandwildlife.com/library/reports_and_documents/vermonts_wildlife_action_plan/_report/7_appendix/k_invasive_exotic_and_pest_species.pdf

Top Invasive Forest Pests and their Impacts

Non-native invasive species cause irreversible impacts on tree health, forest composition, and biodiversity. Three non-native insects which currently threaten Vermont are the emerald ash borer (EAB), Asian longhorned beetle (ALB) and hemlock woolly adelgid (HWA). Hemlock woolly adelgid is currently present throughout the state. Initially discovered in Orange County in February 2018, Emerald ash borer (EAB) has been spread quickly and as of this writing

has been determined the in orange areas on the below map. Asian longhorned beetle are within fifty miles of Vermont’s border. Over half of the trees in Vermont are host species of one of these three invasive insects.²³



Map provided by VTinvasives.org and current as of January 2020.



Emerald ash borer (shown above)

Emerald ash borer (EAB), *Agrilus planipennis*, is an exotic beetle that was discovered in southeastern Michigan near Detroit in the summer of 2002. The larvae feed in the cambium between the bark and wood, producing S-shaped galleries that girdle and kill branches and trees. Emerald ash borer probably arrived in the United States on solid wood packing material carried in cargo ships or airplanes originating in its native Asia. It first came into Detroit and killed off all the ash trees in the city, which had been planted after the city’s elm trees had been killed by Dutch elm disease. The United States Department of Agriculture

Animal and Plant Health Inspection Service (APHIS) does inspections at ports and terminals, but only inspects about 7% of materials coming into the US. Emerald ash borer has spread rapidly in the United States, killing millions of trees. In October 2019, Emerald ash borer was confirmed in Londonderry, VT, which is the northern adjacent town to Jamaica. Jamaica is now nearly entirely covered under what VTinvasives.org calls the “Slow the Spread Movement”. Carefully planning and managing the movement of infested or potentially infested material will

²³ vtinvasives.org (accessed 2/20/15)

slow the spread and provide greater protection for uninfested forests. EAB is currently present in 33 states (most recently in Maine).

White ash is one of the ten most common tree species in Vermont, so this insect will have a major impact in Vermont. EAB only feeds on Ash trees, but that is 7% of Vermont's tree species. EAB can travel faster than Asian longhorned beetle. EAB is often moved around on firewood that people transport. Eradicating the insect on wood requires heating it to at least 140 degrees or higher for greater than 60 minutes.

Signs and Symptoms: Symptoms and signs include D-shaped adult exit holes, bark splitting, serpentine frass-filled (sawdust-like waste) feeding galleries, wood pecker feeding, crown dieback, and epicormic shoots (whips growing off the trunk and branches). Many of these symptoms and signs are similar to other insects and diseases of ash.



Blonding with pecked holes on ash trees is a sign of EAB infestation.

EAB essentially girdles the ash trees, killing them. It lives between the inner bark and the wood, so it isn't that deep. Woodpeckers like feeding on EAB, but the woodpecker population isn't large enough to significantly impact the EAB population. Also the woodpeckers don't generally detect the insects in the trees until they have been present for about two years, which is too late to save the tree. One of the best diagnostic methods for detecting EAB is called "blonding". "Blonding" is a clear symptom of EAB infestation. It occurs when woodpeckers, while foraging for the succulent EAB larvae, flake off outer layers of bark, revealing the lighter or blond-colored inner layers of bark.²⁴

A native ground-nesting wasp, *Cerceris fumipennis*, is providing a handy solution to the EAB detection problem. This wasp will prey on the adult emerald ash borers (as well as related native beetles) and carry them, paralyzed, back to its burrow. The paralyzed beetle is then stored underground as food for the wasp's larva. To the EMD's knowledge, purple traps have not been put up in Londonderry by the State ANR to catch the EAB for early detection.

Hemlock woolly adelgid

The hemlock woolly adelgid (HWA), *Adelges tsugae*, is a tiny insect from east Asia that attacks forest and ornamental hemlock trees. It feeds on young twigs, causing needles to dry out and drop prematurely. Trees may die in four to six years. Some survive, but with sparse foliage, losing value as shelter for wildlife and their ability to shade streams.

²⁴ University of New Hampshire Cooperative Extension – Blonding on Ash trees information sheet.
<http://extension.unh.edu/resources/files/Resource004103_Rep5824.pdf> Accessed 3/2/15.

The HWA first arrived in the southeast U.S. and spread to the northeast through the Long Island Sound. Sustained cold leads to kill off of the adelgid insects. Mortality rates of even 91%, however, can still lead to population growth through the warm season because they reproduce asexually so it only takes one for the population to expand. The HWA mortality rate shifts each year based on temperature patterns throughout the year, especially cold winter temperatures cause die off.



HWA is present in Jamaica, including in Jamaica State Park. In the Windham region, it was initially found in Brattleboro and the Guilford area. It is now found in 14-15 Windham Region towns, and has been recently found in Springfield in Windsor County. It has not been found in Weston, Winhall, Somerset, Searsburg or Readsboro. HWA is moving south to north in lower elevations first, and is mostly throughout southern Vermont at this point. Dead or dying hemlocks are a sadly regular sight in the region. It was first found at the SIT campus in 2010 and is now found throughout the town of Brattleboro.

Hemlock trees and even whole stands are showing signs of decline, but trees in Vermont have not been reported to have been killed from HWA alone. Foresters have been watching infested trees for eight years, and the trees haven't been killed yet most likely because winter temperatures kill off enough of the HWA to give the tree a temporary reprieve. HWA does weaken the trees to the point that other secondary stresses, such as funguses and disease, may result in their mortality. Another pest, Hemlock elongate scale was found recently for the first time in Guilford, Vernon and Brattleboro.

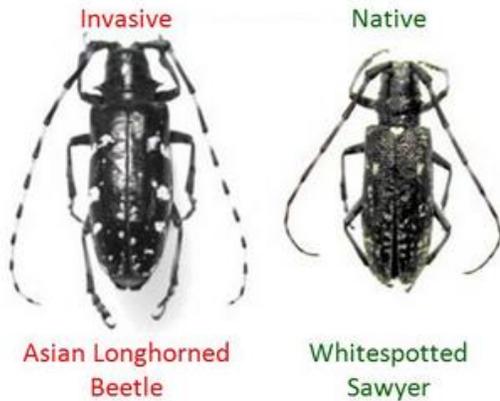
Asian longhorned beetle²⁵

The Asian longhorned beetle (ALB), *Anoplophora glabripennis*, is an invasive insect that feeds on certain species of hardwood trees, eventually killing them. Also known as the Starry Sky or Sky Beetle, the ALB is native to eastern Japan, and Korea. It was brought to the US, to New York City first, in packing material from Asia. ALB attacks a variety of native hardwood species, including maple, birch, elm, poplar, horse chestnut and willow. ALB prefers maples and does not like trees in the oak family. Upon hatching, the larvae tunnel through the heartwood of a host tree until fully grown. They then burrow out of the trunk as adult beetles. This process weakens the wood, making it prone to breakage, and can cause tree health to decline. Outbreaks of this beetle pose a severe threat to even perfectly healthy trees in both forests and urban and suburban landscapes. The beetle has caused tens of thousands of trees to be destroyed in Illinois, Massachusetts, New Jersey, New York and Ohio. Trees that aren't destroyed by people trying to prevent the spread are usually killed by the pest within a couple years. About half of



²⁵ <http://www.maine.gov/dacf/php/caps/ALB/ALBdamagepics.shtml>

Vermont's trees are susceptible to Asian longhorned beetle. This insect will have a major impact if it becomes established in Vermont.



Signs and Symptoms of Infestation: Oval to round wounds on the bark where the females have chewed out a site to deposit their eggs. Round emergence holes in the trunks and branches of trees. Piles of coarse sawdust at the base of trees.

The closest area to the Windham region that has the pest is Worcester County, Massachusetts in 2008. And they have an active quarantine and public notification campaign about the pest.²⁶ They are having to destroy every host tree, infected or not, and will be replanting in the oaks. Boston had a small outbreak which they believe was caught in time. New York and Ohio also have quarantines in affect

in their boundaries to prevent the spread. ALB has not been detected in upstate NY or in NH. It is difficult to spot infected trees from the ground, so inspectors need to climb trees. To treat wood for transport it needs to be heated to at least 160 degrees for longer than 75 minutes.

Impact

The impacts of invasive species have ripple effects that go on and on. Hemlock is a foundation tree species, and when it goes away invasive plant species tend to take over, causing wildlife habitat and water quality to decrease. Deer use hemlock stands to winter over in because of the cover a healthy tree provides, so there could be a detrimental impact to the deer population, and hunting, caused by the loss of hemlock. Hemlocks provide shade to waterways, so their loss could mean warmer streams and lower water quality, potentially impacting aquatic life. The hemlock isn't a comparatively very valuable wood product, but it is used for logging and wood products, so there are economic threats to its loss. The large deer population is causing the loss of new trees to regenerate the forest hardwoods, thereby leaving vulnerability for invasives to come in.

Ash logs are more valuable than hemlock logs, but the bigger concern with the loss of ash is the cascading ecological impacts. There are over 40 arthropod obligate species that are threatened by the loss of ash trees (they depend on ash for their survival), and ripple effects of the loss of these arthropods and the interrelationships aren't even fully known at this point. Ash is a valuable tree for wood products and logging, so the economic impacts could be severe. Not to mention, the cost to towns for removing dead or dying trees, and the aesthetic and community open space impacts caused by their loss. Ash trees are about 12% of the forest cover in Vermont, and there are pockets of lots of ash in Jamaica. Jamaica has not done an ash tree survey to know where vulnerable trees are located. They have also not completed an EAB plan. Interested private citizens can obtain purple traps for assistance with early detection of EAB on their property.

The loss of maple trees to ALB, could mean a devastation to the maple industry, which is a big industry in Vermont, including in Jamaica. A lot of people sugar in Whitingham, not all commercially, but it is a big activity in town. Economic impacts could be great. Sap can't be used once a maple is treated with insecticide, and the lag time before it can be used again is

²⁶ <http://www.worcesterma.gov/city-manager/asian-longhorned-beetles>. Accessed 3/2/15.

unknown. Fall foliage tourism is a big draw for visitors to Vermont and this would be big loss of “leaf peepers” who are a big driver of the economy for the area.

Probability

As mentioned earlier in this section, emerald ash borer and hemlock wooly adelgid are currently known to be present in the state of Vermont. Asian longhorned beetle has been found within fifty miles of Vermont’s border. Jamaica’s proximity to a known EAB infestation area makes them highly susceptible to EAB. HWA has been confirmed in Jamaica and 13-14 other towns in the Windham region. Additionally, certain invasive plant species are present in every town in the region.

Extent

Over half of the trees in Vermont are host species of one of these three main pests, so the potential impact is great. EAB only feeds on Ash trees, which are 7% of Vermont’s tree species and a strong component of beech/birch forest stands. Southeastern Vermont has primarily white ash and green ash, while black ash is less common here, they are found more so to the north. Green ash is common in urban environments because they are good shade trees and do well in an urban setting. Newfane is an example of a town in the Windham region that has planted a lot of green ash trees, so they are particularly vulnerable to EAB.

Ash planted on roadside rights of way have the highest potential for infestation of EAB. There is the potential for hundreds of dead Ash trees along roadways throughout the state and near extinction of Ash trees. The current mortality rate is 99.8% of trees. Cutting dead trees is a very hazardous activity and the potential for a lot of dead trees along road ways is a concern for protecting public safety and infrastructure. Green Mountain Power expects EAB to severely impact their grid over time, so they are proactively removing vulnerable Ash trees near their power lines in confirmed affected areas. Areas that haven’t been confirmed must contract for tree removal for trees they are concerned with.

Being proactive is key for stopping, or at least curtailing, the spread when pests are detected. Inventories of roadside ash trees are a good thing for towns to do now. Training road crews to identify threats and who to alert of outbreaks is also a good idea. Numerous towns (including Brattleboro) in Vermont have developed EAB preparedness plans. Ash trees can be treated to prevent EAB, and weighing the cost of proactive treatment versus removal of dead trees and replacement is something a community must weigh.

There are EAB insecticides that are registered for use in VT and they are fairly effective at protecting trees, but they have to be applied to each tree individually so this isn’t practical to protect all ash trees in a forest environment, but is a good option for an urban tree canopy. Additionally, trees have to be retreated every one to two years because of the insect’s life cycle. ALB eradication is to cut and chip all the trees that are infested. There is another insecticide that works for ALB, but it is only effective if the tree is treated before the larvae burrow too deeply into the wood beyond the tree’s vascular system. The ALB larvae spend a lot of time in the interior wood, out of the vessel system of the tree so they aren’t exposed to the insecticide.

The worst example of the potential impact of ALB infestation in the U.S. is Worcester County, Massachusetts. This problem has been going on since 2008, although upon detection it was well established, as much as 15 years went by before it was discovered. The Massachusetts ALB Cooperative has confirmed a regulated area of 110 square miles, which has been expanded over time from the original 17 square miles considered infested. This area is under

strict regulation by order of the Commonwealth of Massachusetts, no one can cut, move, harvest, carry, transport or ship firewood, green lumber and other material within or outside of the affected area unless authorized. These are significant restrictions, so the impact of ALB detection should be taken very seriously as it affects numerous hardwood species.

ALB can be eradicated when discovered early. It is usually found in industrial settings, because it usually arrives in pallets from an Asian shipment. ALB is now being moved around through human activities, especially through the movement of firewood. It is easier to detect ALB than EAB because the ALB is larger.

Invasive plants are also a threat to the ecology and economy of Jamaica. Invasive plants are present in Jamaica. Long-standing and spreading forest threats in the Windham Region are glossy buckthorn, purple loosestrife, Japanese barberry, multi-flora rose, Japanese knotweed, cow parsley, and garlic mustard, and Asiatic bittersweet. There are more and more invasive plants moving up along roadways and waterways from lowland areas. All threaten forest regeneration, and multi-flora rose and Asiatic bittersweet can destroy mature trees. Smaller invasive plants such as garlic mustard, purple loosestrife, and goutweed present a threat to native herbaceous plants. The health threat posed by Japanese barberry should be noted: According to Jeffrey Ward, Chief Scientist at the Connecticut Agricultural Experiment Station, a forest infested with Japanese barberry harbors an average of 120 black-legged ticks per acre while a forest without barberry harbors an average of only 10 black-legged ticks per acre. Black-legged ticks are known to transmit the causal agents of several diseases, including Lyme disease. TS Irene spread a lot of invasive plants around the region through the transport of seed material from various sources, including flood waters. Logging, and particularly clear cutting, create areas that are particularly susceptible to invasives. Logging is a frequent occurrence in Jamaica as approximately 34% of the town is in the Current Use program. Logging is recognized as an important industry in Jamaica and statewide.

VTinvasives.org is a great resource for towns interested in engaging in activities around invasives, including using their template to develop a custom invasive species plan for your town.²⁷ The idea is to continue to create as much awareness as you can so residents know who to call when they see things. The sooner an outbreak is found, the better the chances of containment. Bio-controls are being worked out currently but aren't yet a solution. Insect pests are often found first by concerned citizens, arborists and foresters.

Sources Used

Email with VT State Forester Jim Esden on 2/21/20 (802-885-8822 or jim.esden@vermont.gov); Email with Windham County Forester Sam Schneski on 2/21/20 (sam.schneski@vermont.gov); Interview with Windham County forester Bill Guenther on 3/2/15 (802-257-7967 or bill.guenther@vermont.gov); Interview with First Detector Jordan Fletcher on 4/29/15; VT Fish and Wildlife website; VTinvasives.org; Cerceris.info webpage; Maine Forest Service webpage²⁸; Images courtesy of Google images and Maine Forest Service.

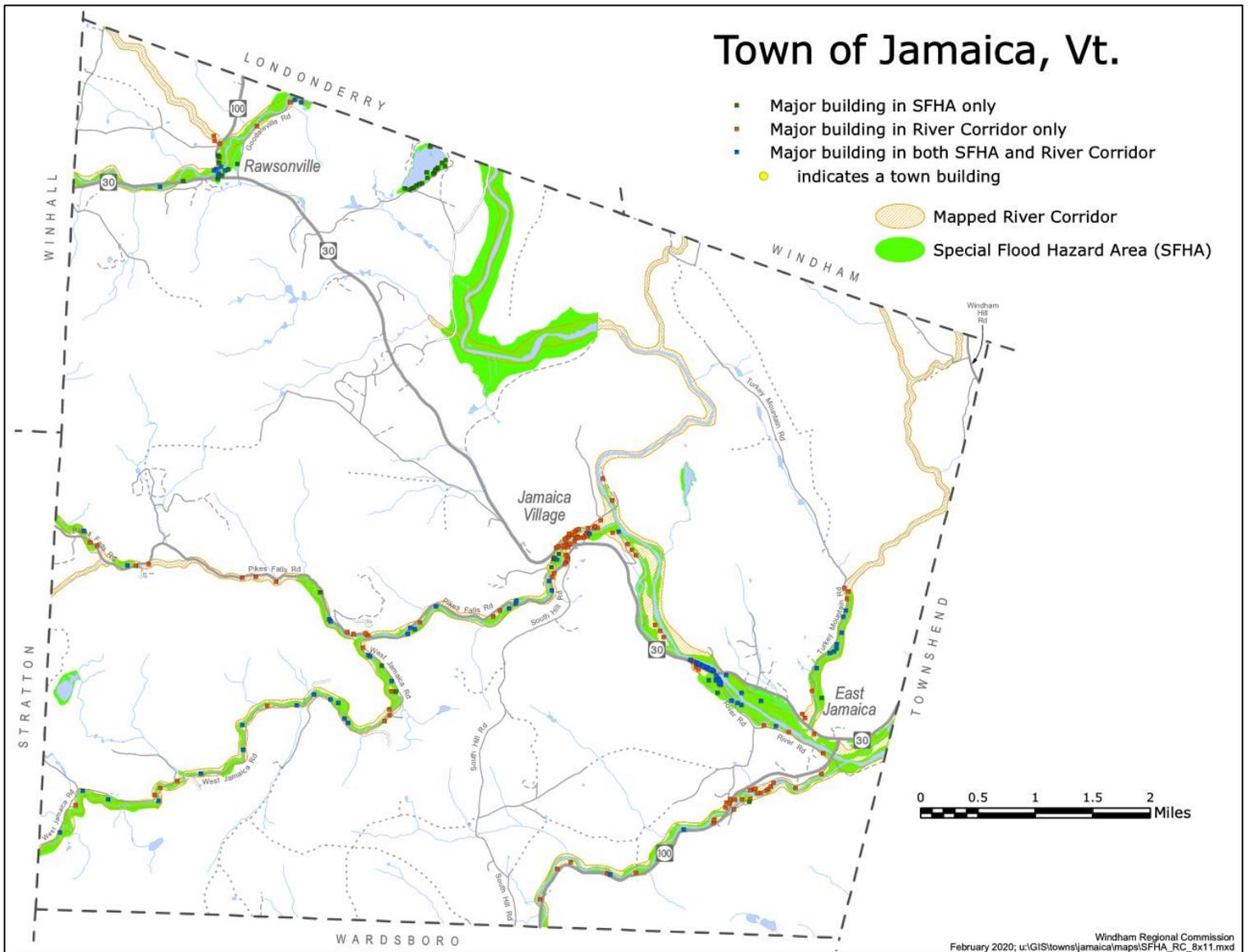
²⁷ < <http://www.vtinvasives.org/tree-pests/community-preparedness> >

²⁸ http://www.maine.gov/dacf/mfs/forest_health/invasive_threats/index.htm

ASSESSING VULNERABILITY

Structures in the SFHA or River Corridor

There are 120 buildings within FEMA-designated Special Flood Hazard Areas (SFHAs).²⁹ There are 210 structures that lie in the River Corridor (some may also lie in the SFHA). The map below shows the location of these structures. The affected structures are primarily in Jamaica Village and along Routes 30 and 100, with some also on Pikes Falls Road, West Jamaica Road, and in Rawsonville. Public infrastructure vulnerabilities in Jamaica are primarily to roads and other associated infrastructure, though the Town Garage and the Fire Station are in both the SFHA and the RC. There are two Tier II facilities located in either the SFHA or the River Corridor, and they are Cota and Cota and the GMP East Jamaica substation.



²⁹ 2019 Flood Hazard Summary Sheet for Jamaica

Structures within SFHAs, that are under a mortgage, are required to purchase flood insurance. Jamaica's participation in the National Flood Insurance Program (NFIP) gives residents access to discount flood insurance through the National Flood Insurance Program. Flood insurance can still be purchased privately, however, it is more expensive. Development in SFHAs must meet the construction standards as outlined in Jamaica's floodplain regulations that were most recently adopted in 2007.

Repetitive Loss Structures

According to FloodReady.Vermont.gov, Jamaica has no repetitive loss claims.³⁰ A Repetitive loss structure is an NFIP-insured structure that has had at least 2 paid flood losses of more than \$1,000 each in any 10-year period since 1978.³¹ Severe repetitive loss (SRL) structures are NFIP-insured buildings that, on the basis of paid flood losses since 1978, meet either of the loss criteria described in the SRL section. SRL properties with policy effective dates of January 1, 2007 and later will be afforded coverage (new business or renewal) only through the NFIP Servicing Agent's Special Direct Facility (SDF) so that they can be considered for possible mitigation activities. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and:

- That has at least four NFIP claim payments (including building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or
- For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.
- For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart.

Participation in and Compliance with the National Flood Insurance Program (NFIP)

The National Flood Insurance Program (NFIP) is a voluntary program organized by FEMA that includes participation from 20,000 communities nationwide and 247 Vermont towns and cities. Combined with floodplain mapping and floodplain management at the municipal level, the NFIP participation makes affordable flood insurance available to all homeowners, renters, and businesses, regardless of whether they are located in a floodplain.



³⁰ Report listing repetitive losses is available here:
<https://floodready.vermont.gov/sites/floodready/files/documents/cisrpt_RL%206.26.18.PDF>
³¹ <https://www.fema.gov/national-flood-insurance-program/definitions>

The NFIP was instituted in 1968 to make flood insurance available in those communities agreeing to regulate future floodplain development. As a participant in the NFIP, a community must adopt regulations that: 1) require any new residential construction within the FEMA designated floodplain to have the lowest floor, including the basement, elevated above the 100-year flood elevation; 2) allow non-residential structures to be elevated or dry flood proofed (the flood proofing must be certified by a registered professional engineer or architect); 3) require anchoring of manufactured homes in flood prone areas. The community must also maintain a record of all lowest floor elevations or the elevations to which buildings in flood hazard areas have been flood proofed.

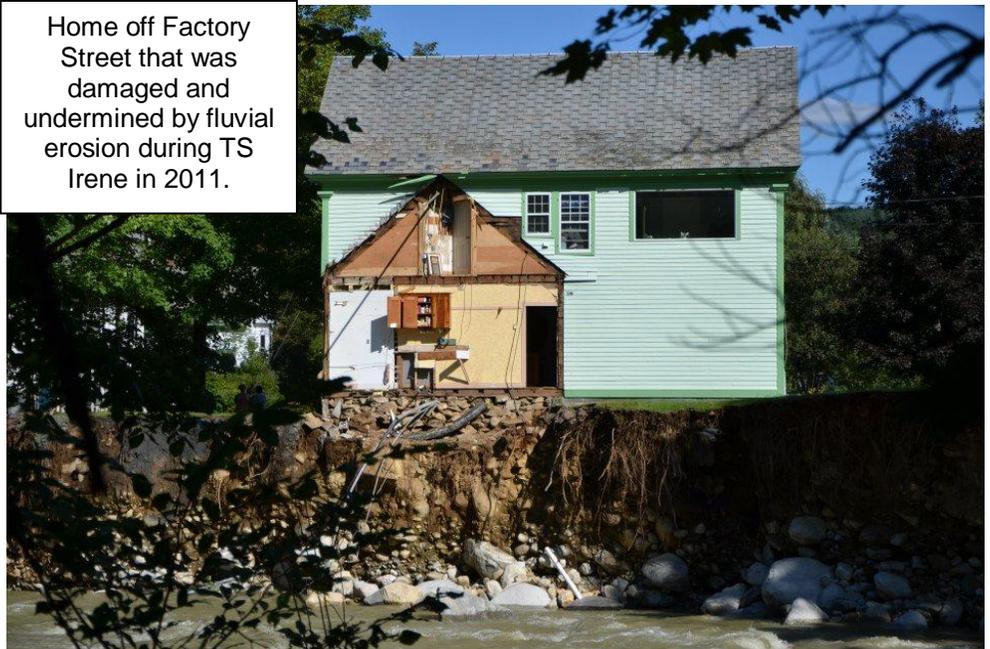
In return for adopting floodplain management regulations, the federal government makes flood insurance available to the citizens of the community. In 1973, the NFIP was amended to mandate the purchase of flood insurance as a condition of any federally regulated, supervised or insured loan on any construction or building within the FEMA designated floodplain. In 2012, Congress passed the Biggert-Waters Flood Insurance Reform Act to reduce subsidies for structures built before the NFIP was instituted (called pre-FIRM structures). Over 50 percent of Vermont's NFIP policies are pre-FIRM, which means that flood insurance premiums for many will increase over the ensuing years.

While the NFIP floodplain management criteria are administered by states and communities through their floodplain management regulations, FEMA's role is to provide

technical assistance and to monitor communities for compliance with the minimum NFIP criteria. Jamaica joined the NFIP on May 5, 1981 and is a member in good standing (CID 500131). The latest floodplain ordinance was adopted in 2007 and is a stand-alone ordinance. The latest Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) referred to in the development of this plan have an effective date of September 28, 2007.

The latest record indicates that there are twenty-four (24) active NFIP policies in Jamaica. These policies have a total value of \$9,892,000. There have been twenty-five (25) NFIP claims filed in Jamaica since they joined the NFIP with a total payout of \$431,173.³² Jamaica may want to do public outreach to encourage the purchase of flood insurance for people in the River Corridor and the FEMA 500-year floodplain (Zone X on the FIRMs). Flood insurance is reasonably priced in these areas, and covers damage from fluvial erosion, as well as inundation

Home off Factory Street that was damaged and undermined by fluvial erosion during TS Irene in 2011.



³² FEMA NFIP Insurance Report, June 2018, accessed January 9, 2020.
http://floodready.vermont.gov/sites/floodready/files/documents/cisrpt_NFIP%206.26.18.PDF

flooding. Nearly 20% of flood insurance claims nationally are for flood damage to buildings located outside the SFHA.

The Town works with the elected officials, Windham Regional Commission, the state and FEMA to correct any compliance issues and prevent further NFIP compliance issues through continuous communications, training and education. The NFIP is administered locally by the Zoning Administrator, who also fulfills the role of Floodplain Administrator.

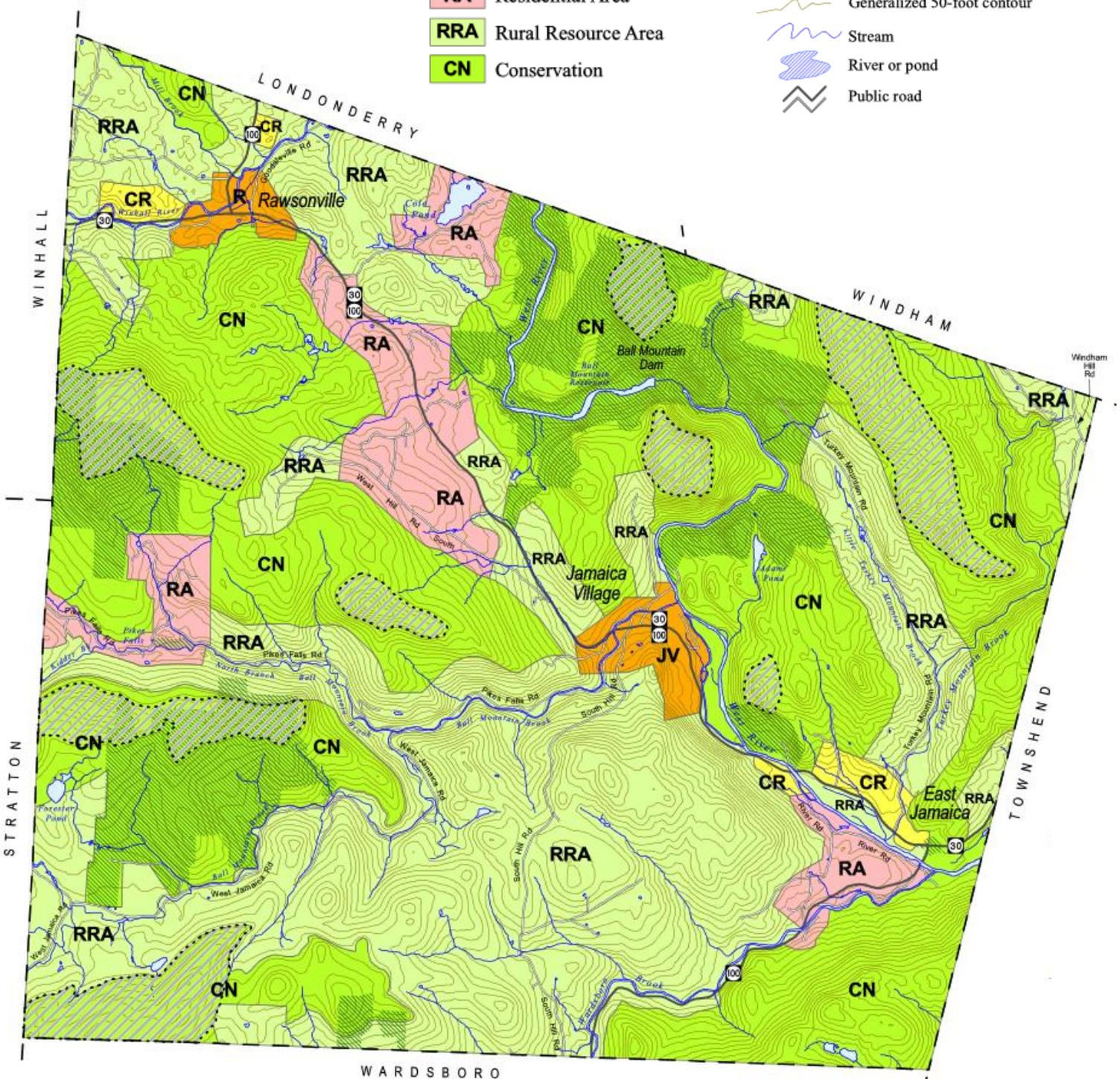
Proposed Land Use Map from 2017 Jamaica Town Plan

Proposed Land Use districts:

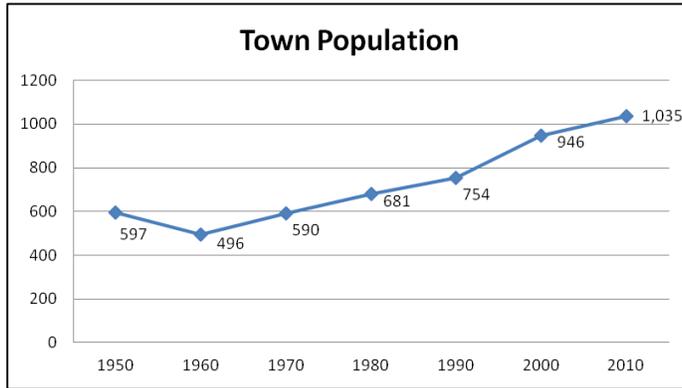
- JV/R** Village
- CR** Commercial-Residential Area
- RA** Residential Area
- RRA** Rural Resource Area
- CN** Conservation

Overlay Districts:

-  Special Sites and Areas
-  Conserved Land
-  Generalized 50-foot contour
-  Stream
-  River or pond
-  Public road



Development Trends



The Town population has been steadily increasing over the years. The population of Jamaica rose between 2000 and 2010 from 946 to 1,035 people, an increase of 9%. Most of the population increase is second home owners moving here full time. The population is aging. School enrollment has dropped in part due to school consolidations. In 2010, of the 1,055 housing units in Jamaica, 556 units or approximately 53%, were seasonal second homes³³. This shows how much Jamaica's population can vary between ski season

and non-ski season. Jamaica is a Vermont mountain town with three nearby ski areas. Most of the newly built homes, and there is only about one new home built a year, are for second home owners and typically built on higher elevations and outside of flood hazard areas. Second home owners are attracted to the proximity of Stratton Resort for skiing. It is considered a bedroom community to Stratton resort. The resort provides employment opportunities, both at the resorts or being self-employed. Stratton Resort has become self-sufficient with its own lodging and food options; and because the economy of the town has been built on serving Stratton guests, the economic structure of Jamaica has suffered somewhat in recent years.

Jamaica does not have zoning. The development pattern has not changed appreciably over the years, so the historic settlement pattern remains predominant, and unfortunately much of the built environment in Jamaica is located within land vulnerable to flooding and fluvial erosion. New development has merely extended along the road frontages in all sections of town. There is only about one new building permit issued per year. Taxes are considered high so building or owning a home in Jamaica is expensive. Property values are high for ski homes, due to the proximity to the resorts, which affects everyone's ability to buy a home or maintain living in Jamaica.



There is not a lot of commercial development in Jamaica. There is a public school.

Fluvial erosion damage along Ball Mountain Brook following TS Irene in 2011.

³³ Windham Regional Commission Town Profile 2018: Wardsboro

MITIGATION STRATEGY

Local Hazard Mitigation Goals

The below Hazard Mitigation Goals, which were contained in the prior Jamaica Local Hazard Mitigation Plan, were reviewed by the planning participants as part of the Plan update process. The participants unanimously felt that the overall goals outlined here remain the town's overall hazard mitigation goals.

- Reduce the loss of life and injury resulting from all hazards.
- Reduce the impact of hazards on the town's water bodies, natural resources, and historic resources.
- Reduce the economic impacts from hazard events.
 - Minimize disruption to the road network and maintain access,
 - Mitigate financial losses incurred by municipal, residential, industrial, agricultural and commercial establishments due to disasters,
 - Ensure that community infrastructure is not significantly damaged by a hazard event.
 - Being proactive in implementing any needed mitigation projects for public infrastructure such as roads, bridges, culverts, municipal buildings, etc.
- Encourage hazard mitigation planning to be incorporated into other community planning projects, such as the Town Plan and Town Local Emergency Management Plan.
- Ensure that members of the general public continue to be part of the hazard mitigation planning process.

In addition to the above goals, there were two specific problem statements and goals listed in the 2015 Jamaica Local Hazard Mitigation Plan. Here again are the problem statements and goals, along with the current status for each:

Problem Statement 1: There is inadequate documentation of culverts, roads, ditches, and bridge maintenance in town.

Goal 1: Establish standard operating procedures for scheduling of maintenance and documentation of work.

- *Action Item:* The Road Commissioner to implement action plan.

Current Status: This has been happening and continues to be an important goal of the town to keep good records. The Town is currently working with the Windham Regional Commission to do a culvert inventory update and a road erosion inventory. The Road Foreman does document damages and he understands the importance of doing that.

Problem Statement 2: Town needs a replacement dry hydrant at the fire house because it was washed out during Tropical Storm Irene. It was the primary water supply for fighting fires in the Village.

Goal 2: To replace dry hydrant as soon as possible and to research additional locations for additional dry hydrants.

- *Action Item:* Fire Department, EMD and Selectboard are charged with this problem.

Current Status: The town has abandoned replacing the dry hydrant in the same location as the prior one near the fire house. The town has identified and cleared an area next to the river

upstream to gain access to the river to pump water. The town is considering putting in underground storage tanks for emergency supplies when the river is too low to draw from.

Town Plan Policies and Recommendations that Support Mitigation

The 2017 Jamaica Town Plan presents an indirect focus on mitigation, which is highlighted by the number of policies and action items that relate to mitigation. I will highlight them here, but not include the entire section that they are a part of:

Natural Resource Policies

Biological Diversity Policies:

1. Protect all viable occurrences of known rare, threatened, and endangered species. Sites or areas of rare, threatened, or endangered species of plants and animals shall not be developed and shall not be used in a manner that will destroy those species.

5. Prevent the spread of and support efforts to remove invasive species.

6. Prohibit the distribution of any plant on the Federal Noxious Plant list.

Earth and Mineral Resources Policies:

5. Require those responsible for extracting earth and mineral resources to prepare a site rehabilitation plan that provides for the restoration of the natural and aesthetic character of the land and that ensures a safe, attractive and useful condition of the land.

Natural Areas Policies:

2. Protect the natural character of roadless stream segments.

3. Protect important wetlands, including the areas surrounding them, from land uses that would diminish the benefits and functions they provide.

Natural Resource Priorities for Action:

2. Continue to administer the provisions of the Flood Hazard Bylaw. Update as needed to maintain eligibility in the National Flood Insurance Program. (Selectboard, Planning Commission)

Community Services Priority Actions

1. Continue providing an annual Town appropriation to the JVF&R.(Selectboard)

2. Establish a procedure for JVF&R to review subdivision proposals so that they can work with developers to minimize the risks of fires and maximize their ability to combat fires. (Planning Commission, Selectboard, JVF&R)

3. Participate in local emergency planning efforts (Planning Commission, Selectboard, JVF&R, Emergency Management Director)

4. Stock the emergency shelter at Jamaica Village School with emergency supplies. (Selectboard, JVF&R, Emergency Management Director)

Flood Resilience Policies

1. It is the policy of the Town to foster the protection and restoration of floodplains, wetlands, and upland forested areas that attenuate and moderate flooding and fluvial erosion, in order to reduce the risk of flood damage to infrastructure, improved property, people, and the environment.
2. Development activities in identified flood hazard, fluvial erosion, and River Corridor Protection Areas should be avoided. If new development is to be built in such areas, it should not exacerbate flooding and fluvial erosion.
3. The protection and restoration of floodplains and upland forested areas that attenuate and moderate flooding and fluvial erosion should be encouraged.
4. The Town of Jamaica shall engage in flood emergency preparedness and response planning.

Flood Resilience Priorities for Action

1.2. The Town will be familiar with Flood Insurance Rate Maps (FIRMs) that delineate areas that could be covered or inundated by water during flooding. (Planning Commission, Selectboard, Zoning Board of Adjustment, Floodplain Administrator)

2.1. The Town will regulate any new development in identified flood hazard areas to ensure that development does not exacerbate flooding and fluvial erosion, and extend these provisions to development activities that might increase the amount and/or rate of runoff and soil erosion from upland areas. (Selectboard, Zoning Board of Adjustment, Floodplain Administrator)

3.1. The Town will update the Flood Hazard Area Regulations and include provisions for advance notification of and specific limits on development activities in identified flood hazard areas, fluvial erosion areas, and/or upland forested areas based on regulatory templates developed by the ANR Department of Environmental Conservation Rivers Program. (Planning Commission, Selectboard, Zoning Board of Adjustment, Floodplain Administrator)

4.1. The Town will pursue a flood resilience management approach whose essential components are to identify and map flood hazard and fluvial erosion areas based on stream geomorphic assessment studies and maps provided by the Vermont ANR Rivers Program, and designate those areas for protection to reduce the risk of flood damage to infrastructure and private property. (Planning Commission, Selectboard, Zoning Board of Adjustment, Floodplain Administrator).

Past and Ongoing Mitigation and Maintenance Efforts

Below is an update on prior identified hazard mitigation projects that were listed in the 2015 Jamaica LHMP. The Town Selectboard and Plan participants reviewed these actions at two meetings in fall/winter 2019 and provided the current status on each item. Current status is listed here in the last column, and prioritization changes are called out where applicable.

| HAZARD | MITIGATION ACTION | RESPONSIBLE PARTY | TIMEFRAME | FUNDING SOURCE | PROJECT PRIORITY | CURRENT STATUS AS OF FEB 2020 |
|--------|---|------------------------------|-------------|------------------------|------------------|---|
| Flood | Upsizing culverts on Dalewoods Road area, and back roads along the North Branch of the Ball Mountain Brook. | Road Foreman and Selectboard | 0-24 months | VTrans Funding or HMGP | High | Completed and converted to box culvert in 2016. |

Town of Jamaica, VT 56
Local Hazard Mitigation Plan

| HAZARD | MITIGATION ACTION | RESPONSIBLE PARTY | TIMEFRAME | FUNDING SOURCE | PROJECT PRIORITY | CURRENT STATUS AS OF FEB 2020 |
|-----------------------|---|---|--|---|---------------------------|---|
| Flood | Replacement of culvert #32 on Pikes Falls Road | Road Foreman and Selectboard | Completed in 2014 | FEMA disaster recovery funds | High | Completed. Converted to box culvert in 2012. |
| Flood | Acquisition/Demolition of 4 homes on Water Street in the village of Jamaica | Selectboard | 2014 | CDBG and Town Match | High | Completed between 2012-2014. |
| All Hazards | Provide backup power supply for emergency shelter and critical facilities | Selectboard, Town Officials | 0-24 months, hopeful completion by Winter 14/15 | Community Grant | High | Completed for Town Office (EOC) Town Garage, and Fire Station. Town hall doesn't have a generator. |
| Dam Failure | Ball Mountain Dam Emergency Evacuation Plan | Selectboard, Road Comm; Fire Chief | 0-12 months | Town Budget | High | Not complete. |
| Dam Failure | Install an emergency alert horn for community notification, particularly in relation to Ball Mtn dam failure | Selectboard | 12 months, expected mid 2015 completion | Town Budget / grant funding in progress | High No longer a priority | Not completed, but no longer a feasible action that the town is considering. |
| Flood | Flood Zone Administrator communication/education outreach to residents - Floodplain maps will be printed and distributed to residents in SFHA with documentation stating where to get further info on safe floodplain development | Flood Zone Administrator | Fall 2014 | Town Budget or Federal Assistance | Medium | The FPA sent a letter to all residents in the SFHA letting people know that development permits are required. Completed summer 2019. |
| High Winds | Potentially Hazardous Tree Assessment – Removal dead or dangerous tree limbs near power lines | Road Foremen / Green Mountain Power | Continual Basis - Annually | Town's Highway General Fund | Medium | There has been no formal assessment done, but Road Crew does address hazardous trees in the right of way, usually after they are an issue not proactively. GMP is contacted about hazardous trees. |
| High Winds/ Ice Storm | Maintenance of municipal buildings and infrastructure vulnerable to structural damage from wind or ice. | Selectboard | Continual Basis - Annually | Town's Building Maintenance Fund | Medium | The Town Hall was just completed. The Fire Station access was mitigated for flooding. Roof repairs to library and town office were completed. Complete and ongoing as things are needed. |
| All Hazards | Education to citizens to keep emergency kits in cars, at home, etc. Education to location of emergency shelter. Fire Dept. does system checks or resources prior to storms; information provided at Town Meeting | Schools, Town Officials, EMD, Assistance from National Weather Service for preparations of weather and flood warning plans. | Information continually available at Town office and included in annual report | Selectmen Budget | Medium | Fire Department has sent out booklets to school kids about preparing for emergencies, and put out at TMD. Town office has information displayed. Town has also done education about 211 CARES program and encouraging them to sign up. Actions are ongoing. |

| HAZARD | MITIGATION ACTION | RESPONSIBLE PARTY | TIMEFRAME | FUNDING SOURCE | PROJECT PRIORITY | CURRENT STATUS AS OF FEB 2020 |
|-------------|---|----------------------|---------------------------------------|-----------------------------------|--------------------------------------|---|
| All Hazards | Interoperability of communications between Road Crew, Town Office/ EMD/ Command Post | EMD and Road Foreman | 0-24 months | State or VTrans Funding | Medium | New radios in town vehicles, and there is now a radio system at the EOC, but the frequency issue still exists. Considered complete with current technology. |
| All Hazards | Quarterly meeting with Fire Chiefs in region to realign Mutual Aid, based upon road conditions. | Fire Chief | Quarterly each year | Tri-Mountain Fire & Rescue Assoc. | Medium | Mutual aid agreements are in place with all adjacent towns. Mutual aid is exercised more often and is better than what it used to be. Better communications, better dispatch capabilities and better technology has enabled this. |
| All Hazards | Maintenance for purpose of an Emergency Access Road – Stratton Gate Rd. to Cole Pond | Fire Chief | Maintained as needed for emerg access | Town's Highway General Fund | Low No longer a priority. | This action is not considered feasible and is no longer an action that the town wishes to pursue. This area is a swamp. |
| All Hazards | Resident Survey to assess vulnerable populations and populations with surplus resources | EMD | 36 months | Selectmen Budget | Low | There is connection with social service agencies; HIPAA constraints make this action not individualized. Connection with Grace Cottage Community Health Team exists. Vulnerable Population Phone Tree exists as a new resource. |

There are certain efforts in the town that serve to either mitigate for hazards, assist with readiness of town to deal with a hazard, or both. Those efforts and actions are listed here:

1. Leaf removal, tree trimming and ditch cleaning are maintenance activities done every spring by the road crew. If ditches are being eroded, the crew may also stone line them.
2. Road Foreman and Road Crew members routinely attend chainsaw and other training classes that help to improve safety and maintenance protocols in the town.
3. The town manages a local emergency operations center (EOC) during disasters.
4. The town maintains an emergency shelter at the Jamaica Masonic Hall, and it is capable of being an overnight shelter. The town office has operated as a day shelter. The Town Hall was used as a triage location. The Town has agreements with the Three Mountain Inn and the House of Prayer for emergency shelter needs.
5. Jamaica is a member in good standing of the National Flood Insurance Program. The floodplain ordinance is kept compliant and the town maintains SFHA maps at the town office.
6. Jamaica upgraded and replaced the Goodaleville Road bridge. This was done by Contractors in January 2016. The supporting structures were destroyed in TS Irene. Originally it was just going to be repaired and not replaced, but eventually it was replaced. The project cost \$954,000 and this project was funded by FEMA.

Identification of Mitigation Actions

The Jamaica Hazard Mitigation Planning participants identified the following hazard mitigation activities based on an evaluation of hazard event vulnerability not addressed by existing hazard mitigation initiatives and the feasibility of new activities.

Mitigation actions are listed in priority order by hazard. Actions were prioritized by the plan participants. These are new actions so any shifts in prioritization of actions came out through the multi-year plan development process. The following criteria were used in establishing project priorities. The ranking of these criteria is largely based on the best available information and best judgment as many projects are not fully scoped out at this time. Prioritization was done during the meetings for the plan development in discussions among participants and guided by WRC’s Emergency Planner. Actions relating to future development were considered, but the plan participants did not find them to be feasible at this time due to lack of political will/community support.

- Does the action reduce damage?
- Does the action contribute to community objectives?
- Does the action meet existing regulations?
- Does the action protect historic structures or structures critical to town operations?
- Can the action be implemented quickly?
- Is the action socially acceptable?
- Is the action technically feasible?
- Is the action administratively possible?
- Is the action politically acceptable?
- Is the action legal?
- Does the action offer reasonable benefits compared to its cost of implementation?
- Is the action environmentally sound?

Cost-Benefit Analysis

As part of public involvement discussions, there was a rough cost/benefit analysis done for each action listed in the table and those results are shown in the table. The below cost and benefits tables address the priorities for the mitigation strategies that are stated in the Mitigation Actions Table. This was how the mitigation actions were assessed by the Hazard Mitigation Planning participants. Priority was assessed somewhat independently of cost/benefit and was based more on the perceived need of each action and availability of funding, versus what the action costs and benefits.

At the time of applying for FEMA’s PDM-C, FMA or HMGP grant programs, each project listed below will undergo full benefit-cost analysis (BCA) methodology, version 5.1 or higher to maximize savings. Whenever possible, Jamaica will utilize 406 mitigation funding.

Cost Estimates

| | |
|--------|----------------------|
| High | = >\$100,000 |
| Medium | = \$25,000 – 100,000 |
| Low | = < \$25,000 |

Benefit Estimates

| | |
|--------|---------------------------------|
| High | Public Safety |
| Medium | Infrastructure/ Functionality |
| Low | Aesthetics/ General Maintenance |

Mitigation Actions Identified by the Hazard Mitigation Planning participants

| HAZARD | ISSUE AND ACTION | RESPONSIBLE PARTY | TIME-FRAME | FUNDING SOURCE | MITIGATION OR PREPAREDNESS | COST / BENEFIT | PRIORITY | STATUS |
|-------------------------------|---|--------------------------------------|-----------------------|-------------------------|----------------------------|----------------|----------|---|
| High Winds / Invasive Species | All road crew members will attend road maintenance and/or chainsaw safety classes as the Road Foreman sees they each could use. This is to enhance knowledge and experience for tree trimming as the Crew has to deal with increasing tree cutting. | Road Foreman | This is ongoing | Town Funds | Mitigation | Low / High | High | Road Foreman monitors classes available within 2 hours and sends Crew members or attends himself, as appropriate. |
| High Winds | Significant building construction or replacement will incorporate underground wiring. | Selectboard | New policy as of 2020 | Town Funds | Mitigation | Low/ High | Medium | No plans in place now for new buildings, but this is a new policy for the Town. |
| Fluvial Erosion | Depot Street concrete bridge upgrade with new deck pending VTrans review and inspection. Four homes have been washed under this bridge. | Road Foreman | 2024 or 2025 | VTrans Structures grant | Mitigation | High / High | High | This bridge is currently on the candidate list with VTrans. |
| Fluvial Erosion | Upgrade the bridge to Jamaica State Park. The current bridge is not able to handle large heavy loads. The bridge is a one lane wooden deck bridge and is undersized and incapable of adequately handling truck traffic. Main route to Jamaica State Park. | VTrans, Road Foreman and contractors | 2024-2025 | VTrans grant | Mitigation | High / High | High | VTrans has measured for the replacement structure and done the engineering plans. |

| HAZARD | ISSUE AND ACTION | RESPONSIBLE PARTY | TIME-FRAME | FUNDING SOURCE | MITIGATION OR PREPAREDNESS | COST / BENEFIT | PRIORITY | STATUS |
|------------------------------|--|---|--|---|----------------------------|----------------|----------|---|
| Flooding and Fluvial Erosion | Floodplain Administrator to attend trainings to enhance knowledge about administrative responsibilities around the NFIP. | Floodplain Administrator | Starting summer 2020; ongoing | Town Funds | Preparedness / Mitigation | Low / Medium | High | Floodplain Administrator will research available trainings and attend as able. |
| Fluvial Erosion | in an area just above where FEMA riprapped after TS Irene, there is an area on Water Street that is experiencing fluvial erosion. Mitigation is to add to or replace rip rap on the bank to reinforce its effectiveness. This needs shot rock, which will have to be trucked in. | Contractor | Summer 2020 start and finish | Grant thru USDA or FEMA | Mitigation | Low / Medium | High | The Selectboard Chair has communicated with the property owner about this project. Grant funding is needed. |
| Fluvial Erosion | South Hill Road, upgrade 2 large culverts (#37 and 38) about 500' south of Mowrey Road intersection. They are not failing now but they are not far from it. One is steel 6' and the other is boiler tube 4'. Streams meet after they pass through each of these culverts. Replacement with concrete box culverts for each. | Road Foreman, with contractor doing the work. | 2024 and 2026, one each of those years. Work would take several weeks. | VTrans Structures grant, or another grant, as available | Mitigation | High / Medium | Medium | VTrans hydraulic will be requested by the Road Foreman. The road does get overtopped during large events. |

| HAZARD | ISSUE AND ACTION | RESPONSIBLE PARTY | TIME-FRAME | FUNDING SOURCE | MITIGATION OR PREPAREDNESS | COST / BENEFIT | PRIORITY | STATUS |
|------------------|---|---|---|---|----------------------------|----------------|----------|--|
| Fluvial Erosion | Upgrade 3 major culverts (#s 47, 48, 49) located on Pikes Falls Road, near the Stratton town line. During winter flooding when ice floats these get overtopped. Road has needed to be closed at least 2x over the last couple of years. The Road Crew is continually having to address ice buildup or black top damage to middle culvert and road above it. Currently they are corrugated squashed 8' culverts and they are in rough shape. They all need to be replaced/upgraded to concrete box culverts. | Road Foreman, with contractor doing the work. | Middle culvert 2025 (first priority), other two in each succeeding year, Work would take several weeks. | VTrans or FEMA grant funding, as possible | Mitigation | High/High | Medium | The hydraulic studies have been done for each. The Road Foreman says the one in the middle is the highest priority. Cost estimate is \$300,000 each. |
| Invasive Species | Invasives are brought in along the river and the roadways; Japanese knotweed is a particular issue. Action is for "Friends of the West River Trail" to work on invasive species control, in association with the USACE, particularly with training summer workers to do invasive plant species identification and removal. | West River Trail Board | Summer 2020 | USACE funds/ grants and potentially Dept of Ag grants | Mitigation | Low / Low | High | In development. Conversations to begin when seasonal work is being planned and workers are being hired. |
| Invasive Species | Distribute educational materials about EAB/invasives at TMD | Tree Warden | TMD 2020 or 2021 | Town Funds | Mitigation | Low / Low | High | The Selectboard will discuss this with the Tree Warden and materials will be developed or found. |

| HAZARD | ISSUE AND ACTION | RESPONSIBLE PARTY | TIME-FRAME | FUNDING SOURCE | MITIGATION OR PREPAREDNESS | COST / BENEFIT | PRIORITY | STATUS |
|------------------|---|--|----------------------------|----------------|----------------------------|----------------|----------|---|
| Invasive Species | Develop a timing protocol for roadside mowing to control invasives. Work with town contracted mowing company to mow before invasives go to seed. | Road Foreman in consultation with the Selectboard | Spring 2020 | Town Funds | Mitigation | Low / Low | High | Road Crew currently does the mowing and likely will for the next year or so. The Road Crew will consider this and consult with local knowledgeable residents about timing for mowing. |
| Invasive Species | Educational campaign for private land owners about identifying Ash trees and EAB infestation | Town Staff using VTInvasives.org developed resources | Start Spring 2021; ongoing | Town Funds | Preparedness / Mitigation | Low / Medium | High | Selectboard and Planning Commission starting to look into this. |
| Invasive Species | Put information about invasives up on the town website, and pamphlets at the Post Office | Tree Warden | Summer 2020 | Town Funds | Mitigation | Low / Low | Medium | The Selectboard will discuss this with the Tree Warden and materials will be developed or found. |
| Invasive Species | Host a first detector training in Jamaica to train first detectors to spot invasive insects. | Tree Warden | Summer 2021 | Town Funds | Mitigation | Low / Low | Medium | The Selectboard will discuss this with the Tree Warden. Tree Warden will reach out to the County Forester. |
| Dam Failure | EMD seeks better communication with USACE around dam failure planning and dam condition. EMD to reach out to USACE about establishing a communication protocol. | EMD | By Spring 2021 | Town Funds | Mitigation / Preparedness | Low / High | Medium | Planning stage now with EMD |

Implementation of Mitigation Actions / Capabilities

Barriers to Implementation:

1. Aging population with little in-migration of younger residents
2. Limited population base, though this also lowers risk
3. Emergency planning director (EMD) is a volunteer –reliance upon volunteers can be risky in terms of turnover and availability
4. Not a lot of industry or commercial entities in Jamaica
5. Jamaica does not currently regulate development in the River Corridor through its zoning, which limits control of this hazardous area.
6. There is no Conservation Commission in town
7. Transportation projects can get drawn out for 2-3 years between getting an engineering study, getting engineering design work completed, and getting funded.
8. Turnover within town boards and difficulty finding replacements or new members makes taking on longer term project difficult.
9. Jamaica Fire Department is small and volunteer.
10. Limited tax base to draw funds from for major projects. Raising funds is a hardship.
11. Environmental permitting and state regulatory requirements are often difficult for volunteers and town employees to understand and comply with.

Capabilities to build upon for implementation:

1. 4 full-time road crew staff
2. 4 full and part-time town staff
3. Grant writing capacity among town staff is limited.
4. Two different populations in town. The local population is good about looking out for each other. The second homeowners rely on locals to watch their homes. Road Crew knows the property maintenance entities in the area and gets in touch with them if they notice an issue at a second home. Neighborly attitude amongst locals.
5. Selectboard with lots of local knowledge
6. Well-functioning EOC
7. Small set-aside fund for road repairs
8. Windham Regional Commission assistance when needed
9. Floodplain ordinance in place.
10. Zoning Board of Adjustment exists per NFIP requirement.
11. Contingency fund exists to fund unexpected expenses
12. Residents are generally the hearty and self-sufficient type

Recognizing that there is no place that doesn't have barriers to overcome in project implementation, Jamaica should focus on engaging around emergency management at the town level. There are a limited number of committed volunteers and staff who make this town function well. They are invested and plan to remain in the area. The Town has a hard time recruiting new volunteers. They are located along Route 30/100, which is a semi-major travel corridor of the region, yet many residents live on back dirt roads that can be difficult to access during certain times of the year. This lends to a "do it yourself" mentality that serves Jamaica positively.

The town looks to and works closely with the Windham Regional Commission. They look to the Regional Plan policies for guidance on land use decisions which influence their town plan policies and goals. The town works closely with VT Department of Environmental Conservation Agency of Natural Resources and the Army Corps of Engineers when performing any work in streams or rivers. Additionally, the town adopts the latest VTrans Road Standards for

road/culvert/bridge improvement projects. With the support of these agencies and the Windham Regional Commission, Jamaica is capable of carrying out all of the mitigation actions outlined in this plan.

Existing Planning Mechanisms / Integration

The following policies, programs and activities related to hazard mitigation are currently in place and/or being implemented in the Town of Jamaica. The Hazard Mitigation Planning participants analyzed these programs for their effectiveness and noted improvements needed. Jamaica uses all of the tools listed below to help plan for current and future activities with the town. For example: the Local Emergency Management Plan has a contact list that is used for response purposes in the case of a hazard



event, and is updated every year after Town Meeting. Town Road and Bridge Standards are followed by the town and Jamaica completed their last culvert inventory in 2019. In the development of this plan, the latest 2017 Town Plan was used.

As Jamaica goes through the update process for the planning mechanisms outlined in the table below, they will look to the Hazard Mitigation Plan's Table of Actions and Risk and Vulnerability Assessments to help guide land use district decisions, and guide goals and policies for those districts. The Local Emergency Management Plan contact list is updated after Town Meeting each year, including updates to vulnerable geographic locations, as well as locations of vulnerable populations. Updates to each of the planning mechanisms outlined in the table below are handled by the responsible party identified. There is no timeframe for updating the below referenced plans and regulations to better incorporate hazard mitigation, however, as each document is updated the hazard mitigation plan will be reviewed for incorporation. The goals of this hazard mitigation plan will be incorporated in the upcoming town plan update to ensure that emergency preparedness and mitigation planning efforts are included in the Town Plan, with particular attention to including the projects in the Mitigation Actions Table. This will assist with ensuring that this plan is utilized and project follow-through occurs.

This updated hazard mitigation plan will be considered and incorporated in the next Town Plan update, as appropriate. The LEMP is updated yearly and was updated last in 2019. Other mitigation/emergency planning related documents and their status are outlined in the following table:

| Type of Existing Authority / Policy / Program / Action | Description | Effectiveness/Enforcement/Hazard that is addressed | Gaps in Existing Protection/Improvements Needed |
|--|--|--|--|
| Town Plan | Plan for coordinated town-wide planning for land use, municipal facilities, etc. | Flood Resilience is addressed | Current Town Plan incorporates flood resiliency. The Town Plan was last updated by the Planning Commission with assistance from the Windham Regional Commission in 2017. |
| Town Local Emergency Management Plan | Municipal procedures for emergency response | Incident Command; Hazard Annexes included | LEMP and adopted by Town Select board in 2019; next LEMP should include all of the appendices. LEMP is completed by Town Clerk and Selectboard. |
| School Emergency Response Protocol | School procedures for emergency response | They do have a crisis plan in place. The EMD assisted in putting it together. | Ensure that the school works with Vermont Emergency Management, State Police and local emergency management director to continue to keep the plan relevant. |
| Mutual Aid – Emergency Services | Agreement for regional coordinated emergency services | Keene (NH) Dispatch; EMS – Rescue Inc. contract, out of West Townshend facility; Mutual Aid agreements with adjacent towns for fire support; contract with Windham County Sheriff's Department | None identified |
| Mutual Aid – Public Works / Road Crew | This would address sharing of equipment or services between towns. | There is nothing in writing, though the town operates from an element of trust with their neighbors. | It would be beneficial for all towns to have formalized agreements in place before needs arise. Not having this creates unnecessary legwork during and following events. |
| Road Standards | Design and construction standards for roads and drainage systems | Adopted new VTrans Road Standards in 2019. | No gaps identified. Jamaica Road Crew will continue to comply with the most recent Town Road and Bridge standards set by VTrans. |
| Zoning regulations | Regulates the division of land, standards for site access and utilities | No zoning in place, other than floodplain regulations | Consideration of stricter standards when updating the bylaw. |
| Sewage Regulations | Regulates on-site sewage systems | State Regulations apply | None Identified |
| Flood Hazard Area Regulations | Regulates development in FEMA identified SFHAs | Stand-alone bylaw; regulates only to BFE, no freeboard | Revised in 2007 to include new FEMA DFIRM's. |
| Maintenance Programs | Bridge & Culvert Inventory | Updated in 2019, and on VTculverts.org | NA |
| Building Code | Regulates building construction standards | No building codes in place | NA |

| Type of Existing Authority / Policy / Program / Action | Description | Effectiveness/Enforcement/ Hazard that is addressed | Gaps in Existing Protection/Improvements Needed |
|--|---|---|---|
| Wetland protection – VT Wetland Rules | Protected by 1990 Vermont Wetland Rules | Protection of environment, water resources, wildlife, biota | None identified |

PLAN MAINTENANCE PROCESS

Monitoring and Updating the Plan – Yearly Review

Once the plan is approved and adopted, the Emergency Management Director (EMD), along with interested and appointed volunteers and stakeholders, will continue to work with the Windham Regional Commission to monitor, evaluate, and update the plan throughout the next 5-year cycle. The plan will be reviewed annually before Town Meeting Day at a Selectboard meeting along with the review of the town’s Local Emergency Management Plan (LEMP). This meeting will allow town officials and the public to discuss the town’s progress in implementing mitigation actions and determine if the town is interested in applying for grant funding for projects that can help mitigate future hazardous events; e.g., bridge and culvert replacements, road replacements and grading, as well as buying out any repetitive loss structures that may be in the Special Flood Hazard Area, and revise the plan as needed. Windham Regional Commission’s emergency planner will assist the EMD in Jamaica with this review, as requested by the Town. Progress on actions will be kept track of using a table that WRC will provide to the Emergency Committee to update. There will be no changes to the plan, unless deemed necessary by the Town. If so, the post disaster review procedure will be followed.

Plan Maintenance – 5 Year Update and Evaluation Process

The Hazard Mitigation Plan is dynamic. To ensure that the plan remains current and relevant, it is important that it undergo a major update periodically as required in 44 CFR § 201.6(c)(4)(i). This update process will be thorough and occur every five years. This update will include a thorough evaluation of the plan and incorporate any new requirements that FEMA has for Hazard Mitigation Plans. Participants outlined below will work with the Emergency Planner at the Windham Regional Commission (WRC) in accordance with the following procedure:

1. The Jamaica Selectboard will appoint a team to convene a meeting of the hazard mitigation planning committee. The town’s EMD will chair the committee, and other members should include local officials such as Selectboard members, fire chief, zoning administrator, constable/police chief, road commissioner, Planning Commission members, health officer, interested stakeholders, etc. The EMD will work with the Windham Regional Commission Emergency Planner and be the point person for the Town.
2. The WRC Emergency Planner will guide the Committee through the update process. This update process will include several advertised public meetings. At these meetings the Committee will use the existing plan and update as appropriately guided by the WRC Emergency Planner to address:
 - Update of hazard events and data gathered since the last plan update.

- Changes in community and government processes, which are hazard-related and have occurred since the last review.
 - Changes in community growth and development trends and their effect on vulnerability.
 - Progress in implementation of plan initiatives and projects.
 - Incorporation of new mitigation initiatives and projects.
 - Effectiveness of previously implemented initiatives and projects.
 - Evaluation of the plan for its effectiveness at achieving its stated purpose and goals.
 - Evaluation of unanticipated challenges or opportunities that may have occurred between the date of adoption and the date of the report, and their effect on capabilities of the town.
 - Evaluation of hazard-related public policies, initiatives and projects.
 - How mitigation strategy has been incorporated into other planning mechanisms
 - Review and discussion of the effectiveness of public and private sector coordination and cooperation.
 - Impacts of climate change and how the local environment is changing due to climate impacts
3. From the information gathered at these meetings, and other interactions the Emergency Planner has with the Town, along with data collected independently during research for the update, the WRC Emergency Planner will prepare the updated draft in conformance with the latest FEMA Region 1 *Local Hazard Mitigation Plan Review Crosswalk* document.
 4. The Selectboard will review the draft report. Consensus will be reached on changes to the draft. Emphasis in plan updates will be put on critically looking at how the plan can become more effective at achieving its stated purpose and goals.
 5. Changes will be incorporated into the Plan by the WRC Emergency Planner.
 6. The Selectboard will notify the public that the draft is available for public comment and review. The Town will advertise and make available the draft plan to provide comments both electronically and in hard copy. The draft plan will simultaneously be distributed electronically to adjacent towns for review and comment.
 7. Public and adjacent town comments will be incorporated by the WRC Emergency Planner. The final draft will be provided to the Town Clerk, and interested individuals that participated in the update, for final review and comment, with review comments provided to the Committee and incorporated into the plan.
 8. WRC Emergency Planner will finalize the plan with any remaining comments from the Emergency Management Director and others, and submit electronically to Vermont Emergency Management (VEM).
 9. The Plan will be reviewed by the VEM State Hazard Mitigation Officer (SHMO) and FEMA Region 1.

10. SHMO and FEMA comments will be addressed in the plan by the WRC Emergency Planner.
11. The plan will be resubmitted as needed until the plan is approved pending adoption. Once the plan is approved by FEMA, it will be ready for adoption.
12. The Selectboard will adopt the plan and distribute to interested parties.
13. The final adopted plan will be submitted by the WRC Emergency Planner to VEM and FEMA.
14. FEMA will issue final approval of the adopted plan and the five year clock will begin again.

Post-Disaster Review/Update Procedure

Should a declared disaster occur, a special review will occur amongst the Selectboard, the EMD, the WRC Emergency Planner, and those involved in the five-year update process described above. This review will occur in accordance with the following procedures:

1. Within six months of a declared emergency event, the town will initiate a post disaster review and assessment. Members of the State Hazard Mitigation Committee will be notified that the assessment process has commenced.
2. This post disaster review and assessment will document the facts of the event and assess whether existing Hazard Mitigation projects effectively lowered community vulnerability/damages. New mitigation projects will be discussed, as needed.
3. A draft After Action Report of the review and assessment will be distributed to the hazard mitigation committee.
4. A meeting of the committee will be convened by the Selectboard to make a determination of whether the plan needs to be amended. If the committee determines that NO modification of the plan is needed, then the report is distributed to local communities.
5. If the committee determines that modification of the plan IS needed, then the committee drafts an amended plan based on the recommendations and forwards to the Selectboard for public input.
6. The Selectboard adopts the amended plan after receiving approval-pending-adoption notification from FEMA.

Continued Public Participation

Maintenance of this plan and implementation of the mitigation strategy will require the continued participation of local citizens, agencies, and other organizations. To keep the public aware of and involved in local hazard mitigation efforts, the town will take the following measures:

- Provide hazard mitigation information at Town Meeting
- Schedule and advertise a planning meeting each year, soon after Town Meeting

- Seeking participation from key players in addition to general public interest:
 - Select board
 - Planning Commission
 - Public Works
 - School
 - Fire & Rescue
 - Emergency Management/ 911 Coordinator
- Post the hazard mitigation plan on the town website
- Selectboard will review current hazard mitigation committee members and consider whether new members should be added. Representatives of local businesses, nonprofits, academia, etc. should especially be considered.
- Notify the public of committee meetings or public document for review through town website and at the regular posting locations.

APPENDIX

1. Adoption Certificate
2. Town website advertisement for Draft Hazard Mitigation Plan (4/13-4/27/20)
3. Email sent to adjacent towns for public comment on the draft plan
4. Flyer advertising availability of Draft Hazard Mitigation Plan for public comment
5. Email sent 2/24/20 to town staff and Hazard Mitigation Planning Committee for review of the draft
6. Response received from 3/16/20 from the Planning Commission on comment solicitation on the draft plan. November 4, 2019 Hazard Mitigation Committee meeting sign-in sheet
7. November 4, 2019 Hazard Mitigation Committee meeting sign-in
8. October 7, 2019 Hazard Mitigation Committee meeting sign-in sheet
9. Town website advertisement for two plan development public meetings
10. November 4, 2019 Meeting agenda
11. October 7, 2019 Meeting agenda
12. Public Meeting flyer that was posted around town in advance

2. Town website advertisement for Draft Hazard Mitigation Plan (4/13-4/27/20)

3. Email sent to adjacent towns for public comment on the draft plan

4. Flyer advertising availability of Draft Hazard Mitigation Plan for public comment

5. Email sent 2/24/20 to town staff and Hazard Mitigation Planning Committee for review of the draft

Mon 2/24/2020 11:12 AM

 Alyssa Sabetto <asabetto@windhamregional.org>

Jamaica Local Hazard Mitigation Plan for internal town comment until March 16

To: 'Paul Fraser'; jamaicatownclerk@svcable.net; 'Joel Bluming'; andrews@svcable.net; 'Rebecca Ohm'; 'Jamaica Planning Commission'; 'Bryan Zieroff'; lbruso@gmail.com; jamaicaroads@svcable.net; 'Charlie Peck'; bobstomski@gmail.com; redneckemt68@hotmail.com; pmj4321@gmail.com; 'Caroline Robbins'; 'Jason Kass'; flower@sover.net; meulemans@myfairpoint.net

Cc: 'Alyssa Sabetto'

 Jamaica_2019 Haz Mit...
6 MB

Hello Jamaica,

Attached is the first draft of the Jamaica Local Hazard Mitigation Plan. **This draft is just being passed around at this point for internal town review and is not yet out for public comment. Please review the attached draft and provide comment back to me by March 16TH.** I'll incorporate comments and then put the plan out for public comment. If you don't get the chance to comment during this internal opportunity, you can comment during the public opportunity. You can mark up the attached document and scan it back to me, call me with comments or email me back a list of comments. I'm not able to send in a word version, as the file is too large for email.

Please note that the **yellow highlighted** sections of the plan are *not yet completed* for Jamaica and are awaiting further information. They will be customized for Jamaica and un-highlighted as the process moves forward. There are also a few of the appendices that are not yet developed, but will be in the final plan.

If there are any town staff who are not getting this email that should, please forward it on to them.

Thank you,

Alyssa Sabetto, CFM

6. Response received from 3/16/20 from the Planning Commission on comment solicitation on the draft plan. Additional comments received from Charlie Peck and Paul Fraser are not included here.

Mon 3/16/2020 12:17 PM



Jamaica Planning Commission <jamaicapanningcommission@gmail.com>
Jamaica Planning Commission Comments on Draft Local Hazard Mitigation Plan

To Alyssa Sabetto
Cc Chris Robbins; Patrick McQuillan

Alyssa,

The Jamaica Planning Commission (JPC) has received and reviewed the draft LHMP you sent on February 24. We discussed this at our last meeting, and the members authorized me to prepare and send these comments to you. We are favorably impressed with the draft, but we are also all fairly new to the planning commission and to Jamaica and do not have experience with the LHMP process and requirements, so we are not well prepared at this point to comment on many of the technical matters and local issues presented in the draft. There is, however, one issue that we feel is important to call to your attention, as it directly relates to the language in our Town Plan and the JPC's current recommendation to amend that language in the near future.

Your draft contains several references to the Action Steps in the current (2017) Jamaica Town Plan that state that the town intends to enact local regulations applying to development in state-designated River Corridor Areas (RCA's). Reference to local regulation of RCAs was likely included in the 2017 Town Plan as part of standard template language, but unfortunately we didn't have the experience to understand that this is beyond Jamaica's present capability to achieve. The implications of locally regulating development in RCA's became apparent after the JPC started a process to update our confusing flood zone regulations, with a goal to make them easier to understand and administer. We quickly realized that we could not effectively apply and enforce local RCA regulations in present day Jamaica, and decided that this should not be a part of the current flood regulation revision. We held a joint discussion on this with our Selectboard, and there was consensus that local RCA regulation is beyond our present capability. Accordingly, we have prepared a package of amendments to the Town Plan, including an Enhanced Energy Element and revisions to the Flood Resilience Element that remove references to local regulation of RCA's. We intend to publish notice of these proposed amendments and conduct the planning commission hearing in the near future. Once we successfully revise and learn how to administer our basic NFIP regulation, we will likely revisit the issue and determine whether future promulgation of RCA regulations in Jamaica makes sense to us. We suggest that you should remove references to the Action Steps related to local RCA regulations from the draft in order to make the LHMP consistent with the soon-to-be-amended Town Plan that will be in place shortly after the LHMP is adopted.

Thank you for your time and effort in creating such a detailed and impressive draft LHMP!

Bryan Zieroff, Acting Chairperson
Jamaica Planning Commission

7. November 4, 2019 Hazard Mitigation Committee meeting sign-in sheet

| Jamaica, VT Local Hazard Mitigation Plan Development Meeting November 4, 2019 Location: Jamaica Town Office SIGN IN SHEET | | |
|---|--------------------------------|---------------------|
| Name and email address | Affiliations – Please list all | Town where you live |
| Rebecca Chm rebeccachm@gmail.com | JPC resident | Jamaica |
| CHRIS ROBBINS net crobbs@myfairpoint.net | JPC RESIDENT | JAMAICA |
| Charles Peck chaspeck@myfairpoint.net | former JPC, SFZA resident | Jamaica |
| PAUL FRASER FRASERCREW@Aol.com | Jamaica Select Board | Jamaica |
| Joel Blumberg | WRC | Jamaica |
| Greg Meulemans | Jamaica Select Board | Jamaica |
| Bob STAMSKI | JAMAICA Vol FIRE & RESCUE | JAMAICA |
| Dana Wesley | Jamaica Vol Fire & Resce | Jamaica |
| JASON KAASS jason.jacobkaass@gmail.com | JPC | Jamaica |
| Bryan Zieroff zieroff@snet.net | JPC | Jamaica |
| JUDY FLOWER | | |
| | | |

8. October 7, 2019 Hazard Mitigation Committee meeting sign-in sheet

| Jamaica, VT Local Hazard Mitigation Plan Development Meeting October 7, 2019 Location: Jamaica Town Office SIGN IN SHEET | | |
|--|--|---------------------|
| Name and email address | Affiliations – Please list all | Town where you live |
| Charles Peck | former planning commission former FZA | JAMAICA |
| Rebecca Ahn rebeccaahn@gmail.com | JPC resident | JAMAICA |
| Chris Robbins mytempemail.net aboutrobbs.com | JPC RESIDENT | JAMAICA |
| Joel Bluminy Joel.Bluminy@gmail.com | WRC Transp/Comm development SEVT | Jamaica |
| Bob Stomski bobstomski@gmail.com | Jamaica Vol. Fire & Rescue, Inc. | Jamaica |
| Dana West redneckmt68@hotmail.com | Jamaica Vol Fire Rescue INC. | Jamaica |
| PAUL FRASER Frasercrew@AOL.com | SO Chair, EMO, | |
| PATRICK McQUILLAN | JPC | |
| JESSICA POLLACK | RESIDENT | |
| Lon Bruno | FZA | Jamaica |
| Judy Jensen | Select Bd, Jamaica | |
| gwh | Select Board Jamaica | |
| Bryan Zieroff zieroff@snet.net | JPC Resident | Jamaica |

9. Town website advertisement for two plan development public meetings

www.jamaicavermont.org/jamaica-lhmp/

News & Announcements

update of Jamaica Local Hazard Mitigation Plan

🕒 August 29, 2019 👤 Sara

**Update of the Jamaica
Local Hazard Mitigation Plan
Public Meeting Announcement**

2 Meeting Dates: October 7th and November 4th, 2019

Time: 5:30-7:30 PM

Location: Jamaica Town Office

28 Town Office Road, Jamaica, VT 05343

Come learn about and help to update Jamaica's Local Hazard Mitigation Plan!
What hazards does the town face? What actions can the town take now to
lower vulnerability before the next natural hazard strikes?

For more information contact

Alyssa Sabetto at 802-257-4547 x113

10. November 4, 2019 Meeting agenda

**Jamaica Hazard Mitigation Plan Update
& Community Resiliency Meeting**
Jamaica Town Office – November 4, 2019

Agenda

1. Let's look at a map together

- a) Mark up the town vulnerability/hazard location map as a group

2. Mitigation Goals and Actions

- a) Review/edit Mitigation Goals
- b) Create an updated Mitigation Actions Table for the updated Plan
- c) Identify gaps and capabilities with implementation

3. Other Updates

- a) Discuss recent mitigation work completed by the town
- b) Discuss development trends – new developments, upcoming developments
- c) Overall resiliency concerns or ideas
- d) Review of other elements and address questions that weren't discussed

4. Next Steps

11. October 7, 2019 Meeting agenda

**Jamaica Hazard Mitigation Plan Update
& Community Resiliency Meeting
Jamaica Town Office – October 7, 2019**

Agenda

1. Update of the current Jamaica Local Hazard Mitigation Plan

- a) Purpose
- b) Process

2. Hazards

- a) Review and update the Hazard Ranking Table / Worksheet
- b) Discuss hazard events that have occurred since the last Plan
- c) Mark up the town vulnerability/hazard location map as a group

3. Mitigation Goals and Actions

- a) Review/edit Mitigation Goals
- b) Review the current Mitigation Actions Table that the Selectboard updated
- c) Create an updated Mitigation Actions Table for the updated Plan
- d) Identify gaps and capabilities with implementation

4. Other Updates

- a) Discuss recent mitigation work completed by the town
- b) Discuss development trends – new developments, upcoming developments
- c) Overall resiliency concerns or ideas
- d) Review of other elements and address questions that weren't discussed

5. Next Steps

12. Public Meeting flyer that was posted around town in advance

Update of the Jamaica Local Hazard Mitigation Plan Public Meeting Announcement



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Time: 5:30-7:30 PM

Location: Jamaica Town Office
28 Town Office Road, Jamaica, VT 05343

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For more information contact
Alyssa Sabetto at 802-257-4547 x113

