



LEBANON



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Community Resilience Building Summary of Findings

January 2024



City of Lebanon, New Hampshire

Community Resilience Building

Summary of Findings

Overview

The need for municipalities, regional planning organizations, academic institutions, corporations, states, and federal agencies to increase resilience to extreme weather events and a changing climate is strikingly evident amongst communities across the state of New Hampshire. Relatively recent events such as Super Storm Sandy, major flooding events (2019), COVID-19 pandemic, and flooding and landslides (2023) have reinforced this urgency and compelled leading communities like the City of Lebanon to proactively collaborate on planning and mitigating risks. Ultimately, this type of leadership is to be commended because it will reinforce the strengths and reduce the vulnerability of people, infrastructure, and ecosystems and serve as a model for other communities in New Hampshire, New England, and the nation.

Recently, the City of Lebanon signed on with The Nature Conservancy (TNC) to complete a Community Resilience Building process in partnership with the University of New Hampshire Extension. The process included community-driven steps and tasks designed to assess current hazard and climate change impacts and to generate prioritized solutions to improve resilience, sustainability, and equity. In January 2024, Lebanon's Core Team helped organize a Community Resilience Building workshop facilitated by TNC in partnership with University of New Hampshire Extension and Dartmouth College. The core directive of this effort was the engagement with and between community members to define strengths and vulnerabilities and the development of agreeable, priority resilience actions for the City of Lebanon.

The Lebanon Community Resilience Building workshop's central objectives were to:

- Define top local, natural, and climate-related hazards of concern.
- Identify existing and future strengths and vulnerabilities.
- Identify and prioritize actions for the City.
- Identify opportunities to collaboratively advance actions to increase resilience in accord with residents and organizations from across the City, and beyond.

The City of Lebanon employed an “anywhere at any scale”, community-driven process called Community Resilience Building (CRB) (www.CommunityResilienceBuilding.org). The CRB’s tools, reports, other relevant planning documents, and local maps were integrated into the workshop process to provide both decision-support and visualization around shared issues and existing priorities across Lebanon. The Lebanon Hazard Mitigation Plan (updated 2016; draft 2023), Master Plan (2012), Open Space Plan (2022), and maps via the City’s LebGIS Mapping Tool (2024) were particularly instructive as references. Using the CRB process, the participants produced the findings presented in this summary report. This Summary of Findings includes an overview of the top hazards, current concerns and challenges, existing strengths, and proposed actions to improve Lebanon’s resilience to hazards and climate change today, and in the future.

The Summary of Findings transcribed in this report, like any that concern the evolving nature of risk assessment and associated action, is proffered for comments, corrections, and updates from workshop attendees and other stakeholders alike. The leadership displayed by the City of Lebanon on community resilience building will benefit from the continuous participation of all those concerned.

Summary of Findings

Top Hazards and Vulnerable Areas for the Community

Prior to the CRB Workshop, the Lebanon CRB Core Team identified the top hazards for the City. The hazards of greatest concern included flooding from rivers and streams, extreme wind events and ice storms, and landslides. Additional hazards highlighted by participants during the CRB workshop included drought, infectious disease outbreaks resulting in public health emergencies, extreme temperature periods (heat and cold), and Nor’easters and blizzards during the fall and spring months. These hazards have direct and increasing impacts on the infrastructure, environment, and residents of and visitors to Lebanon. These effects are seen more specifically in residential areas, open space, businesses, public transportation, social support services, health care systems, and other assets in Lebanon.

Current Concerns and Challenges Presented by Hazards

The City of Lebanon has several concerns and faces multiple challenges related to the impacts of natural hazards and climate change. In the last few decades, Lebanon has experienced a series of highly disruptive and damaging weather events including major regional ice storm (December 2008), Super Storm Sandy (October 2012), Nor'easter Nemo (February 2013), major wind and rainstorm (July 2017), major flooding event (April 2019), flooding and landslides (July 2023), and other less impactful but more frequent events. Impacts from many of these extreme weather events have included inland flooding in low lying areas coupled with wind damage across large portions of Lebanon. Large winter storms have dropped several feet of snow on the City, knocking out power and isolating residents and neighborhoods for periods of 72 hours or more. The magnitude and intensity of these events and others across New Hampshire have increased awareness of natural hazards and climate change, while motivating communities such as Lebanon to proactively improve their overall resilience.

This series of extreme weather events demonstrates that the impacts from hazards are diverse. In Lebanon this ranges from riverine flooding of critical infrastructure, bridges, roads, commercial districts, and low-lying areas; localized flooding from stormwater runoff during intense storms and heavy precipitation events; road closures due to flooding and road washouts; and property damage from trees, wind, snow, and ice. Longer periods of elevated heat, particularly in July and August, have raised concerns about vulnerable segments of the population including elderly, disabled, and/or isolated residents. Short-term summer droughts are causing low river flows in late summer from Mascoma Lake, potentially affecting the City's primary drinking water source. The combination of these issues presents a challenge to preparedness and mitigation priorities and requires comprehensive, yet tailored actions for various locations and/or areas across Lebanon.

The CRB workshop participants were generally in agreement that Lebanon is experiencing more intense and frequent storm events, associated flooding, short-term seasonal drought, as well as heat waves. Additionally, there was a general concern about the increasing challenges of being prepared for the worst-case scenarios (e.g., major thunderstorms and hurricanes (Cat-3 or above)) particularly in the late summer and in the fall/winter months when more intense storms coincide with colder weather (i.e., snow/ice storms, Nor'easters, blizzards). The impact of the recent COVID-19 pandemic was raised by workshop participants as well.

Specific Categories of Concerns and Challenges

As in any community, Lebanon is not uniformly vulnerable to hazards and climate change. Certain locations, assets, and populations have been and will be affected to a greater degree than others. Workshop participants identified the following items as their community's key areas of concern and challenges across several broad categories.

Municipal Functions, Operations, & Growth:

- Lack of affordable, denser housing that is not flood-prone (such as Route 12A area in Connecticut River floodplain). Challenges include flooding, high building costs, municipal infrastructure for new development, lack of contractors, general attitudinal resistance to change the character of the community, specific resistance from strip mall owners on Route 12A, lack of buildable land, and monopoly of cash buyers turning homes into high-end rentals.
- The Mall area and commercial districts flood repeatedly causing direct impacts to structure as well as interruptions to commerce and economic stability among associated businesses.
- Pressure to build more housing is pushing new affordable housing towards vulnerable lands with steep slopes or near floodplains subjected to routine flooding events.
- Ongoing tensions between the land conservation community and the needs for re-zoning to accommodate further housing and development desires. Additionally, there is a need to build densely in already populated areas, but these areas are currently vulnerable to riverine flooding.
- Growing populations of un-housed and under-housed individuals and families are vulnerable to climate impacts due to lack of durable shelter (the current shelter is temporary) and housing options. Unhoused populations are forced into the floodplains because that's the only available land. Growing population pressures, including additional climate refugees occupying hotels (i.e., during 2023 VT flooding), put further strain on options for the unhoused.
- Limited overall distribution of power generation elevates dependence and vulnerability of current energy generation and distribution system to natural disasters.
- Steep slope topography leads to mobility and transportation challenges in the winter and although excellent progress has been made on bike/pedestrian mobility, continued access and mobility investments are needed.
- Ongoing traffic congestion along the Exit 18 corridor.
- Transportation corridors are lined with old trees with a high frequency of falling and creating road closures which can create capacity issues within the Department of Public Works.

Specific Categories of Concerns and Challenges (cont'd)

- High cost of senior living facilities presents challenges resulting in more community members aging in place residentially.
- Second highest number of “no-vehicle” households within a region of 27 municipalities presents challenges in the event evacuation is deemed mandatory.
- Concerns about the increased financial impact on agriculture due to changes in the freeze-thaw cycles and other erratic weather events including the maple syrup and apple orchard industries.
- Commercial timber harvesting has been impacted by warmer temperatures from climate change which create muddy ground conditions that are difficult for operating heavy machinery, thereby threatening an important part of the region’s economy.
- Unlike Lebanon and Hanover, other parts of the region suffer from fairly high poverty rates, especially the southern part of the Upper Valley.
- Upper Valley is made up of many municipalities across two states, and while there is a strong regional identity as the Upper Valley, individual communities can be very different with diverse needs, which has created friction between some residents of neighboring communities and made it more challenging to deliver regional scale services and investments.
- Limited number of community centers or hubs in Lebanon identified as a current vulnerability (i.e., see example of centralized community center in Claremont).
- Relatively high cost of living coupled with limited availability of affordable housing results in 70% of people commuting to work in Lebanon but living elsewhere.
- Region is generally underprepared for the mounting impacts of climate migration or the voluntary relocation and movement of people into the area from other locations.
- Concerns regarding equitable access to waterways in Lebanon for cooling purposes during heat waves as well as recreational uses.
- Extended drought periods limit the viability of hydroelectric power options in the greater Lebanon area (i.e., unpredictable and unreliable generation).
- Lack of infrastructure and public services with the new housing coming in on the Route 120 corridor (which could see 1,000-2,000 new residents) all the way to the Hanover line.
- The workforce for public servants, the trades, and frontline jobs is depleted due to a lack of affordable housing, training programs, affordable daycare, and interest from young people in these types of jobs.
- Difficulty filling open positions within the Fire and Police Departments.

Specific Categories of Concerns and Challenges (cont'd)

- Lebanon may not be fully prepared for major shifts related to safety around the fast-moving technologies, grid limitations, and limited workforce i.e., shortage of airplane mechanics). Examples include safety around electric and/or hydrogen powered planes at the airport, or the capacity to put out electric vehicle fires.

Emergency Management & Preparedness:

- City is not currently equipped to respond fully to major disasters that displace large numbers of residents as well as people from neighboring communities that look to Lebanon as a regional hub for public health, safety, and sheltering.
- Limited capacity at existing sheltering facilities in the City.
- Lack of “worst case” emergency management plan to address and enable a full response to a major disaster including sheltering, transportation, staff and volunteer capacity, and outreach/communication networks (i.e., “neighbor helping neighbor”).
- Concerns amongst emergency management staff of the ability to reach seniors in time during extended periods of power outages and winter storms, which results in limited to no heating and access to drinking water if on private well (reference to major winter storm and power outages in 2010).
- High number of critical facilities for the City are located within recognized and mapped floodplains.
- Ongoing flooding issues at multiple properties located adjacent to the Mascoma River.
- Saturated slopes due to more intense storms of longer duration resulting in landslides.
- Flooding resulting in unsafe and/or unpassable roads has caused delays in emergency management services during major storm events.
- Ongoing flooding issues on Ramona Circle and Riverdale resulting in regular responses from emergency management personnel.
- Routine flooding of basements in residential neighborhoods of the Prospect Hill area.
- Lebanon has a lot of steep slopes with loose soil that makes the community vulnerable to landslides due to direct impacts to downslope properties and transportation impacts due to road closures.
- Emergency services have trouble accessing rural parts of the region during certain times of year, either due to dirt roads that become difficult to navigate during mud season or roads that washout and remain closed for long periods of time.
- Slow emergency response time and no proximate fire station on Route 10 towards Hanover and anything north of Etna Road.

Specific Categories of Concerns and Challenges (cont'd)

Roads, Bridges, Road Networks, & Dams:

- All road infrastructure, including major highways (I-89 and I-91) and rural, town-owned roads throughout the region require ongoing maintenance and improvements in multiple locations.
- Reoccurring flooding events along Tracy Street and Main Street.
- Reoccurring flooding impacts and risk at the Route 12A Plaza.

Stormwater System, Waste Systems, & Drinking Water Supply:

- City's culverts, drainage systems, and other stormwater infrastructure are undersized and unable to convey the increasingly longer duration and more intense precipitation events.
- Culverts designed for major storms during the 1970s resulting in many undersized culverts given the significantly greater precipitation-related volumes in 2024 (50 years later).
- Lebanon has relatively high amounts of development with impervious surface area (privately and publicly owned and maintained) within the Connecticut River floodplain, which puts private and publicly owned land at risk of stormwater runoff and flooding.
- Increasingly intense storms and microbursts are causing stormwater runoff and flash floods to washout roads, like the recent Stevens Road washout.
- Downtown Lebanon is in the Mascoma River floodplain and the Route 12A commercial corridor in West Lebanon, which includes critical supplies like food and medicine, is in the Connecticut River floodplain. Other areas, including Valley Street Cemetery and Spencer Street, are particularly vulnerable.
- Higher rainfall volumes are causing more and longer periods of ground saturation and a higher water table, so areas like the airport are seeing more surface runoff than ever before due to the reduction in the storage capacity of soils.
- Existing wastewater system for Lebanon is projected to face future capacity issues as the community continues to grow.
- Primary drinking water source is from Mascoma Lake which has experienced droughts in recent years resulting in growing concerns about the long-term reliability of the current resource for Lebanon.
- Short-term droughts are causing low river flows in late summer from Mascoma Lake, potentially affecting the primary drinking water source.

Specific Categories of Concerns and Challenges (cont'd)

- Algal blooms and other water quality impairments have become more prevalent due to climate change and increased development, threatening drinking water and recreation.
- Growing number of private drinking water well running dry during longer, more intense drought periods in the mid to late summer months.

Watersheds, Wetlands, Rivers, Open Space, & Trees:

- Although Lebanon still has large tracts of undeveloped land, very little has been fully conserved and the most critical natural resources in those areas have not been permanently protected - particularly those natural areas that add to the overall resilience of Lebanon (i.e., flood storage, heat amelioration, unstable slopes prone to landslides, wind buffers, water filtration, etc.).
- Wildlife and critical habitats are threatened by climate change while invasive species are generally expanding their range into Lebanon and the Upper Valley region.
- Growing concerns regarding the presence and establishment of invasive species across the forested landscape of Lebanon and adjoining municipalities coupled with over browsing by white-tailed deer.
- Risk of disease and exposure to pathogens among humans and wildlife is on the rise, exemplified by the increasing number of ticks and their ability to survive through winter, as well as insects like that emerald ash borer that threaten forest health.
- Noticeable increases in the incidents of tick-borne illnesses in recent years which may be linked to milder winters and early springs.
- Route 89 is the biggest barrier for wildlife in the whole region and is a hot spot for wildlife vehicle collisions, including moose, deer, and bear.
- Ongoing issue with white-tailed deer near and/or on the runways and other facilities at the airport.



Credit: Mascoma Lake Association

Current Strengths and Assets

Just as certain locations, facilities, and populations in Lebanon stand out as particularly vulnerable to the effects of hazards and climate change, other features are notable assets for Lebanon's resilience building. Workshop participants identified the following items as their community's key strengths and expressed interest in centering them as the core of future resilience building actions.

Municipal Functions, Operations, & Growth:

- Clearly, the responsive and committed engagement exhibited by leadership, staff, volunteers, and residents is a very appreciated strength within and across Lebanon. Ongoing collaboration between municipal staff, committee/commission/board volunteers, business community, faith-based organizations, non-profit organizations, adjoining municipalities, and various regional and state-wide organizations (i.e., Public Health Council of the Upper Valley, Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC), Upper Valley Adaptation Working Group, University of New Hampshire Extension, The Nature Conservancy, among others), on priorities identified herein will help advance comprehensive, cost-effective, community resilience-building actions.
- Forward-looking leadership within Lebanon with a will and vision that is proactively addressing issues that help to increase the resilience of the overall community (i.e., case in point – Lebanon's Community Resilience Building process).
- Cultural mindset of community is to solve difficult challenges directly via collaborative partnerships.
- Community was repeatedly described as one that pulls together in times of need and helps one another.
- Multi-generational and deep connection to Lebanon amongst many community members (i.e., "strong sense of community and place").
- Community members have diverse backgrounds which leads to social diversity across the City.
- Lebanon is an intellectually curious, civically engaged, and highly educated community.
- Lebanon is a regional hub for outstanding health care with an integrated system designed to support community members at all stages of life via the Dartmouth Hitchcock Medical Center (DHMC) and Alice Peck Day Memorial Hospital, which is rare for rural communities to have easy access to world class medical care.
- Lebanon has a relatively robust economy and is considered wealthy compared to other surrounding, more rural communities.

Current Strengths and Assets (cont'd)

- Upper Valley Strong and other regional social service groups are effective at working across municipal boundaries.
- High quality municipal services provided to residents which represents a great deal of value for the taxes collected.
- Committed engagement by Lebanon leadership in the UVLSRPC and the Public Health Council of the Upper Valley efforts and planning for the region.
- Active Boards and Commissions in Lebanon with routine and full participation by community volunteers.
- Lebanon has great corporate citizens, such as Hypertherm, DMHC, and other employers that support the community by providing childcare, participating in public transportation initiatives, and allowing the city to use their facilities for emergency operations.
- Significant improvements to the City's broadband coverage, linking most residents to high-speed internet.
- Development patterns in Lebanon have generally followed a smart growth model, where development is dense and concentrated in certain areas with only a few major transportation corridors, allowing large tracts of forested land to remain undeveloped and unfragmented.
- Concentration of commercial and service facilities (landfill, airport, grocery stores, pharmacies, commercial hub) along the Route 12A is viewed as a strength despite the corridors vulnerability to flooding.
- Lebanon has established a strong set of building codes and regulations for new construction projects that improve public safety.
- Region has a robust public transportation system and investments are being made to expand coverage and add new routes.
- Local airport that can provide easy access to emergency response resources, if needed.
- Recycling center fully functional and respected as an asset within the community.
- Library system services as a hub for information sharing during times of crises.
- Community power programs are growing in the state and in the region which could serve to be a strength in the future with continued investment in renewable energy, energy storage, and power distribution.
- Landfill represents a potential energy capture as well as a potential location for solar array installation to help increase and distribute energy generation sources and locations.

Current Strengths and Assets (cont'd)

- Wilder Dam is a 41-megawatt hydro power plant on the Connecticut River that generates locally produced and available electricity.

Emergency Management & Preparedness:

- Strong disaster response expertise and capabilities across and between departments such as Public Works Department, Police Department, and Fire Department.
- Lebanon's various emergency services-related departments have a dependable fleet of police cars, fire trucks, and plow trucks.
- Many parts of Lebanon are elevated above the 100-year floodplain, which has prevented the City from experiencing the same level of flood damage as low-lying neighboring communities during recent major storms.

Roads, Bridges, Road Networks, & Dams:

- Public Works Department has done an effective job at plowing the roads during storms as well as ensuring proper drainage and other road system safety considerations are in place to the greatest extent possible.
- Accessible transportation network that includes free bus service, bike, and pedestrian friendly roadways, airport and associated facilities, and an extensive network of paths and trails.

Stormwater System, Waste Systems, & Drinking Water Supply:

- Lebanon's drinking water treatment and water distribution infrastructure is reliable and in good shape, and there are ample sources of freshwater in the region.
- Culvert size upgrade along Reservoir Road resulted in reduced flooding impacts.
- Secondary source of drinking water identified in Route 12A although further assessment and discussion are ongoing in hopes of helping to reduce pressure on the current single source (Mascoma Lake).

Watersheds, Wetlands, Rivers, Open Space, & Trees:

- Thoughtful open space planning has led to a substantial amount of accessible green and protected open space distributed across much of Lebanon.
- Forested landscape (80%) with intact forest soils that help to increase infiltration and storage of precipitation and subsequently limit flooding in the lower slopes and valleys.

Current Strengths and Assets (cont'd)

- Largely intact headwaters of major watershed across the City, which is increasingly recognized as crucial for controlling and minimizing the impacts of downstream flooding (i.e., Slayton Hill - example of building in upstream area and negative impacts on downstream flooding).
- Tree Advisory Board established and focused on issues of urban tree canopy and “heat island” effects in the downtown Lebanon area.
- Open space, parks, trail systems, and nature programming are central to Lebanon’s identity as a community.
- Connecticut River is a landmark natural resource and a historic point of connection between Lebanon and neighboring communities.



Credit: LandSearch



Credit: FirstLight Fiber



Credit: firenews.org

Recommendations to Improve Resilience

A common theme among workshop participants was the need to continue community-based planning efforts focused on developing adaptive measures to reinforce Lebanon's strengths and reduce vulnerability to extreme weather, climate change, and other common concerns raised. To that end, the workshop participants helped to identify several priority topics requiring more immediate and/or ongoing attention including:

- **Long-term vision and growth** (i.e., affordable housing, sustainable growth, volunteerism, conservation and recreation, economic development, health care and safety);
- **Infrastructure improvements** (i.e., roads/bridges/culverts, green stormwater infrastructure/management systems, riverine flood infrastructure, transportation);
- **Quality of life improvements** (i.e., housing, affordability, recreation, arts, and parks, accessibility, sustainability, health & safety, economic prosperity, elderly, transportation);
- **Emergency management** (i.e., communications, outreach, education, continuation of services, business recovery, evacuation, vulnerable populations).

In direct response, the Community Resilience Building workshop participants developed the following actions and identified (but not ranked) them as priority or as additional actions to advance. Mitigation actions from the Lebanon Hazard Mitigation Plan (2016) are provided in Appendix A for cross-reference with actions presented herein. Maps provided during the CRB workshop, gathered from the Lebanon Hazard Mitigation Plan, Master Plan (2016), Open Space Plan (2022), LebGIS Mapping Tool (2024), and the Public Health Council of the Upper Valley, are provided in Appendix B.

Priority Actions

- Identify a housing issue engagement process to develop inclusive and collaborative discussions in the spirit of building more affordable housing, building a permanent homeless shelter with adequate associated services, and charting out a vision to address homelessness in the upcoming Master Plan update. Include all housing stakeholders, planners, developers, conservation community, social workers in the dialogues.

Priority Actions (cont'd)

- Help to advance equity within Lebanon and across the region through the work of the Environmental Justice Task Force that is in the process of defining what is needed and develop an action plan for a more equitable and sustainable community.
- Maintain and strengthen Lebanon's "80:20 ratio" of undeveloped land to developed land by formalizing the City's urban growth boundaries, implementing policies that promote compact development away from vulnerable areas, and working with large landowners and local land trusts to permanently protect the remaining large tracts of resilient, unfragmented lands.
- Formalize Lebanon's urban growth boundaries in zoning maps and conditions to keep development compact and walkable while maintaining the City's unfragmented tracks of forested land.
- Build coalitional strength through collaboration and tension reduction between conservation community and re-zoning advocates ahead of the consequential 2025 re-zoning ballot initiative. Balance of tensions is needed between the demands for increasing density, preserving open space, improving wildlife passage, and minimizing development in flood-prone areas.
- Develop a conservation project pipeline in collaboration with local land trusts that prioritizes the most naturally resilient landscapes (per sources like TNC's Resilient and Connected Lands maps) and prepares the city to take advantage of available funding opportunities and demonstrates the need for additional funding allocated to the City's conservation fund.
- Develop a comprehensive Stormwater Management Plan and any associated regulations and enforcement, to become more proactive and less reactionary around flood events. Include a full culvert assessment or management plan, consider a transportation asset management system, investigate an expansion of the stormwater drainage system. Consider innovations in water retention and road surfaces, such as grooving roads, permeable pavement, or municipal rain gardens.

Priority Actions (cont'd)

- Work with partners (e.g., neighboring municipalities, state of New Hampshire, Upper Valley Lake Sunapee Regional Planning Commission, private employers, developers, local social service providers, among others) to further study the region's social vulnerabilities related to housing, poverty, and mental health and work together to find solutions that may involve resource sharing and regional programs co-development.
- Incorporate recommendations from forthcoming Mascoma watershed study into stormwater quantity and water quality policies, practices, projects, and public education. This includes adequately resourcing the solutions, improving regional coordination with other communities in the watershed, conducting water testing to identify and fix the root causes of the harmful algal blooms in Lake Mascoma.
- Continue to explore options to secure a second regional water source (i.e., drinking water well) to help reduce dependence on a single source via the Mascoma Lake and expand provisioning to additional municipalities such as Hanover and Hartford, as needed. Communicate updates on these developments to the public.
- Continue to implement the Mascoma Watershed Management Plan with particular emphasis placed on actions and measures that will help to maintain the viability of the drinking water supply associated with Mascoma Lake.
- Through the Mascoma Lake Advisory Committee work to expand the involvement of more municipalities within the Mascoma Watershed on action items across the watershed including the protection of vegetated buffers around streams and lakes for flood water retention and water quality enhancement.
- Look to deepen connections and coordination between the Upper Valley Subcommittee of the Connecticut River Joint Commission and the Mascoma Lake Advisory Committee in hopes of filling capacity gaps due to the low levels of volunteerism, currently.
- Look to expand and include a more diverse array of community members and organizations in emergency management planning including more regional stakeholders from the public health and economic development sectors.

Priority Actions (cont'd)

- Continue to emphasize the importance of emergency management readiness via supportive exercises, training, and scenario drills that help to improve implementation of plans and responsiveness of staff.
- Cross-reference actions generated through the Lebanon Community Resilience Building process with mitigation actions (see Appendix A for list of mitigation actions) identified in the Lebanon Hazard Mitigation Plan (updated 2016). Regularly revisit and revise as needed the mitigation projects identified in the Lebanon Hazard Mitigation Plan including a semi-annual review by multiple Departments.
- Continue to work to improve the reach and effectiveness of emergency communications so that every resident is given the opportunity to voluntarily receive critical information during major events.
- Develop a climate migration plan that prepares the City and the region for increases in population, investigates the potential benefits that climate migration could have on the size of the City's workforce, and provides lessons learned from other parts of the country that may have already experienced climate migration influxes in their communities.



Credit: Town Square



Credit: VBH



Credit: National Weather Service

Additional Actions

Municipal Functions, Operations, & Growth:

- Create and share a contact list for all participants at the Lebanon Community Resilience Building workshop in hopes of fostering greater collaboration on identified actions.
- Per the Master Plan, work to make necessary improvements to the floodplain maps for Lebanon to better inform assessment of current vulnerabilities under various flooding scenarios as well as in support of future decisions about where not to redevelop existing or place new structures.
- Begin planning for and investing in the construction of a community center in Lebanon to bring people together, hold events, and establish new social programs to further support and centralize community needs.
- Assess the feasibility of permitting and installing microgrids in Lebanon to help maintain continuity of critical services during more and more frequent power outages.
- Initiate discussions focused on how to regionalize electric vehicle fleet coupled with off-grid energy sources to help support and maintain municipal services more sustainably.
- Explore feasibility of solar panels and microgrid at the airport to support electrification of the airport, additional electric vehicle chargers and electric planes.
- Continue to support the new Community Power program to ensure it is successfully implemented and that new renewable energy is increased as part of the effort.
- Position the City to advocate for a state statute that would provide a tax incentive for property owners to voluntarily reduce impervious surfaces and to implement other green stormwater improvements such as rain gardens and impervious surface options as well as tree planting.
- Work to update building codes that help to increase the overall resilience of redevelopment and new builds.

Additional Actions (cont'd)

- Bolster building codes to increase resilience by requiring the elevation of utilities in flood zones and imposing parking minimums as the new maximums to reduce impervious area.
- Explore ways to attract additional grocery stores to Lebanon to help further decentralize the location (i.e., “more in downtown area”) and provision of food and supplies for residents during times of crises. Explore possibility of re-zoning select locations to allow for the establishment of additional grocery stores in areas not in proximity of existing resources.
- Assess steep slopes to determine landslide risk, identify assets that could be impacted by landslides, and determine any gaps in existing development policies pertaining to steep slopes.
- Explore options for increasing the use of low impact development measures in new, retrofit, or redevelopment projects in Lebanon.
- Encourage mixed use development or redevelopment in downtown areas of Lebanon as well as other areas where appropriate and feasible.
- Work with private entities and developers to better understand challenges and possible solutions associated with building more affordable housing units.
- Encourage accessory dwelling units and consider AirBnB restrictions to alleviate issues with insufficient housing for lower income community members.
- Complete Lebanon Housing Study which the Planning Department is slated to draft in summer 2024.
- Build more affordable housing.
- Incorporate plans to address homelessness in the 2024 Master Plan update, which currently has no mention of this growing issue.

Additional Actions (cont'd)

- Analyze any changes to current policies and practices to produce a decriminalizing effect on homelessness.
- Make the temporary homeless shelter permanent or find another site to create a permanent shelter. Additionally increase the associated services, staff capacity, and resources to assist the unhoused populations, especially regarding specialty services, such as for those with mental health needs.
- Identify and activate enforcement mechanisms to ensure the new parking lot requirements – 30% shade after 10 years – are met and potentially exceeded.
- Advance discussions regarding the likely influx of new residents (“climate migrants”) that include proactive measures to protect Lebanon’s environment and high quality of life as well as help prevent urban sprawl.
- Look to expand the community-based nursing program in Lebanon and adjoining municipalities.
- Increase investments in mental health treatment, substance abuse treatment, and other social services at the regional as well as local levels.
- Identify programs, policies, and partnerships to help increase the quantity and quality of workforce housing in Lebanon and the adjoining communities particularly for healthcare workers and primary care providers (health, dental, vision) given the growing demand due to population increases.
- Design and initiate education/vocational training programs to assist with the building of primary care services workforce.
- Invest in workforce training, public education, and apprenticeships to build a pipeline of local, skilled workers in the trades and public service (i.e., police, fire, emergency management).

Additional Actions (cont'd)

- Work to ensure existing substance abuse support networks and awareness building are maintained and expanded as needed in response to ongoing community needs.
- Increase support for social service organizations such as Twin Pines and Housing Trust that can facilitate resource sharing across municipal boundaries.
- Hire an economic development staff member to build relationships with major employers, increase public support of employers, and continue to explore resource sharing opportunities with employers during emergency situations.
- Increase the resiliency of broadband and power distribution by placing powerlines underground to build out residential fiber.
- Review and seek to support efforts to expand broadband via the Grafton County Broadband Initiative.
- Work to increase cell coverage along Route 120 between Lebanon and Claremont.
- Explore ways to increase diversity and representation on volunteer boards and commissions.
- Make Lebanon more pedestrian and commuter friendly by investing in alternative transportation options, bus stops, sidewalks, and crosswalks.
- Increase public education (e.g., Dartmouth game lab, etc.) on ticks and other insect borne diseases as well as access to primary care needs for those who cannot afford to visit a doctor immediately after getting bitten.
- Increase investments and continue to bring funding to the momentum of successful partnerships and projects focused on 'safe streets' and bike/pedestrian mobility.
- Consider expansion of municipal infrastructure and public services, including sewer, water, bus route expansion, and new housing along the Route 120 corridor.

Additional Actions (cont'd)

Emergency Management & Preparedness:

- Conduct emergency management planning exercises focused specifically on power loss during extreme heat and cold scenarios and concerns regarding isolated elderly residents.
- Look to foster the establishment of neighborhood groups that can pay attention to the condition and needs of residents before, during, and after extreme weather events.
- Work with neighborhood groups to set up or improve gathering spaces to facilitate greater social cohesion and coordination amongst residents (i.e., “expand the safety net for residents”).
- Explore the potential of setting up a Lebanon Community Emergency Response Team (CERT) to help extend the reach and support of the emergency management professionals during times of crises as well as help establish a workforce pipeline for community members looking to get into the field as a career.
- Establish a regional evacuation plan complete with the establishment of a regional shelter capable of accommodating residents and their pets for longer durations beyond the ability of municipalities such as Lebanon.
- Expand training programs in collaboration with local high schools to increase the workforce within critical disciplines such as public works, fire/emergency services, and health care.
- Develop a plan to maintain power to critical facilities when the grid goes down by diversifying energy sources through investments in renewables and back-up battery systems.
- Leverage the airport and its location as a resiliency hub where backup power can be stored, solar panels can be installed, communications maintained, and electric vehicle charging stations are available.

Additional Actions (cont'd)

- Check in with the Public Health Council of the Upper Valley on status of Heat and Elders project outcomes such as the maps of where elders live is being operationalized in anticipation of power outages during extreme heat and cold periods.
- Expand or create additional cool station capacity for residents during heat waves in mid to late summer.
- Install a third fire station up near the hospital, old Etna Road, Route 120 area. Consider an additional road between Rt. 10 and Rt. 120 to create emergency access between this new fire station and the Rt. 10 area near Sachem Village.

Roads, Bridges, Road Networks, & Dams:

- Conduct a regional vulnerability assessment of road infrastructure that builds on Lebanon's asset management program, integrates live cycle cost, and provides recommendations that focus more on maintenance opportunities as opposed to new capital projects. Ensure culvert mapping efforts are integrated into assessments.
- Look for ways to improve bike use and safety by modifying how streets are designed with an initial focus on improving bike use and traffic calming on High Street.
- Conduct a comprehensive assessment of dirt roads in Lebanon with a focus on short and long-term viability of maintenance or discontinued use due to high costs, low usage, and more viable alternate transportation routes.

Stormwater System, Waste Systems, & Drinking Water Supply:

- Continue to pursue permitting for a new drinking water well located at the confluence of the Mascoma River and the Connecticut River and ensure that potential social, cultural, and environmental impacts are minimized.
- Fully pursue programmatic and funding opportunities for more resilient infrastructure including green stormwater infrastructure through the state's PROTECT program.

Additional Actions (cont'd)

- Explore further groundbreaking examples from other municipalities for application in Lebanon including the stormwater to street tree program in Dover, New Hampshire. In addition, connect with University of New Hampshire Extension for further resources and guidance.
- Improve management of public and private stormwater runoff by reviewing NHDES model ordinances for low impact development and drinking water source protection, implementing policies that incentivize low impact development and on-site stormwater management, encouraging alternative modes of transportation that reduce the amount of parking space needed, and allowing existing undeveloped floodplains to remain in their natural state to alleviate peak flows.
- Create a culvert replacement plan with an attached capital budget allocation that clearly articulates how many culverts will be replaced with properly sized stream/road crossings each year.
- Explore stormwater funding strategies such as a stormwater utility that will generate funding for the implementation of stormwater management practices and incentive private property owners to reduce stormwater runoff on their properties (“progressive and innovative stormwater management programs and policies”).
- Work with partners such as the regional planning commission to support and fund progressive stormwater management efforts to help reduce current challenges and create opportunities to fund projects.
- Look to strengthen encouragement in current building codes for porous/pervious surfaces so that more stormwater is required to be retained onsite including the use of green stormwater infrastructure (i.e., raingardens to capture roof downspout runoff, etc.) (i.e., example – Hypertherm’s property management).
- Investigate ways through Federal Emergency Management Agency to replace failed infrastructure with resilient structures, beyond the standard in-kind replacements including the use of nature-based solutions such as green stormwater infrastructure.

Additional Actions (cont'd)

Watersheds, Wetlands, Rivers, Open Space, & Trees:

- Conduct more robust outreach to residents about how to properly manage and dispose of yard waste and the basics of proper fertilizer application procedures and quantities.
- Assess current constraints of natural floodplains to properly capture and retain flood waters and seek ways to enhance the functionality of this natural infrastructure during peak flow events within Lebanon and across upstream communities.
- Identify locations in Lebanon where streams and rivers have been hardened via structural engineering projects and seek ways to replace with nature-based solutions including daylighting streams that have been covered or paved over, where appropriate and feasible.
- Ensure future investment of public funds on infrastructure are focused in areas away from critical natural lands.
- Work with landowners with important open space to help them make informed choices that enhance the long-term viability of privately held lands as a critical strategy to help maintain the livability, resilience, and sustainability of Lebanon (consider incentives to facilitate informed choices that favor the local environment).
- Increase support of Tree Advisory Board and identify priority areas for tree plantings (native and climate resilient species) along pedestrian corridors.
- Encourage private landowners with large tracts of forested land to develop forest management plans for their property, perhaps through the Family Forest Carbon Program.
- Create a water education program that informs residents on actions they can take to help improve local water quality as well as conserve water during times of drought.
- Engage a broader audience in conservation efforts, such as snowmobilers that recognize the importance and beauty of the region's natural landscapes.

Additional Actions (cont'd)

- Build upon the 2017-18 wildlife corridor study to develop, fund and implement a new Wildlife Passage Plan, which will analyze wildlife habitat, wildlife-vehicle collisions and options for retrofitting of current infrastructure (culvert and/or bridge upsizing for under-road passage).



Credit: Getty Image – Lebanon New Hampshire

CRB Workshop Participants: Department/Organization

City of Lebanon – City Council

City of Lebanon – Office of the City Manager

City of Lebanon – Department of Public Works

City of Lebanon – Planning and Development Department

City of Lebanon – Fire Department

City of Lebanon – Recreation, Arts, and Parks Department

City of Lebanon – Landfill and Recycling Facility

City of Lebanon – Emergency Management

City of Lebanon – School District

City of Lebanon – Lebanon Airport District

City of Lebanon – Conservation Commission

City of Lebanon – Diversity, Equity & Inclusion Commission

Sustainable Lebanon

Public Health Council of the Upper Valley

Upper Valley Land Trust

Upper Valley Lake Sunapee Regional Planning Commission

Advance Transit

Vital Communities

Dartmouth College

Upper Valley Adaptation Working Group

Hypertherm, Inc.

City of Hartford (Vermont) – Office of Environmental Sustainability

City of Claremont – Office of the City Manager

City of Hanover – Office of the City Manager

Lebanon CRB Core Project Team

Shaun Mulholland – City Manager – City of Lebanon

Nathan Reichert – Planning Director – City of Lebanon

Alice Ely – Executive Director - Public Health Council of the Upper Valley

Rebecca Owens – Senior Planner – City of Lebanon

Mark Goodwin – Planner – City of Lebanon

CRB Workshop Facilitation Team

The Nature Conservancy – Adam Whelchel, Ph.D. (Co-Project Lead - Lead Facilitator)

The Nature Conservancy – Matthew Thorne (Co-Project Lead - Small Group Facilitator)

University of New Hampshire Extension – Lisa Wise (Small Group Facilitator)

The Nature Conservancy – Drew Goldsman (Small Group Facilitator)

Dartmouth College & Upper Valley Adaptation Workgroup – Erich Osterberg, Ph.D. (Scribe)

The Nature Conservancy – Ben Sweeney (Scribe)

The Nature Conservancy – Brenda Gail Bergman (Scribe)

Dartmouth College – Jacob Ian Chalif (Scribe)

Recommended Citation

City of Lebanon Community Resilience Building Process - Summary of Findings Report. (2024). Community Resilience Building Program. The Nature Conservancy and University of New Hampshire Extension. Lebanon, New Hampshire.

Acknowledgements

Special thanks to the City leadership, staff, and community members for their willingness to embrace the process in hopes of a more resilient future for Lebanon. This in-person Community Resilience Building process was made possible in large part through the dedicated contribution of the facilitation team members who skillfully conducted the Lebanon Community Resilience Building process in close partnership with the City's CRB Core Project Team.

Appendix A

City of Lebanon Mitigation Actions*



***Gathered from City of Lebanon's Hazard Mitigation Plan Update (2016).**

Table VI-4: PROPOSED NEW MITIGATION ACTIONS

Proposed New Mitigation Action Description	Problem Statement	Hazard Addressed	Responsible Party	If Recommended in Previous Plan, why was it not put into place?
Connecticut River - Stream Bank Stabilization projects-Stream bank stabilization work is needed in an area on the Connecticut River to decrease siltation and flooding impacts on commercial properties.	The stream Bank along the Connecticut river has stabilization issues and causes siltation and flooding issues to commercial Properties. (in the City's Capital Improvement Plan)	Erosion, Flooding	NH DOT	Not completed due to lack of resources.
Mill Road Trail - Correct Drainage and slope stabilization	Mill Road Trail has drainage and slope stabilization issues and is up stream from the Water Treatment Plant Intake area	Erosion, Landslide	DPW Engineer	Not completed due to lack of resources.
Mascoma River - City will work with USGS and FEMA to update the NFIP study for the Mascoma River.	Detailed Engineering flood study of Mascoma-The FEMA study is outdated and flood maps need updating	Flooding	DPW Engineer	Not completed due to lack of resources.
Ruddsboro Road - Study and correct drainage	Ruddsboro Road has yard drainage, street and bank washouts	Erosion, Flooding	DPW Engineer	Not completed due to lack of resources.
Pumping Station Road - Study and correct the cross drains drainage and river bank stabilization issues	Pumping Station Road has cross drainage and bank stabilization issues along the Mascoma, River – sink hole around culvert pipe between Route 4 and Pumping Station Road	Erosion, Flooding	DPW Engineer	Not completed due to lack of resources.
Pasture Lane - Study and correct, New drainage system and change inflow	Pasture Lane has drainage problems	Erosion, Flooding	DPW Engineer	Not completed due to lack of resources.
Kinne Street Neighborhood - Study and introduce a Closed Drainage System	Kinne Street neighborhood has drainage problems due to an open drainage system and steep slopes	Erosion, Flooding	DPW Engineer	Not completed due to lack of resources.
Early Ridge and Stevens Road - Study and Change drainage characteristics	Eagle Ridge and Stevens Road has drainage problems	Erosion, Flooding	DPW Engineer	Not completed due to lack of resources.
Brook Road & Hardy Hill - Study and improve drainage; concrete headers on culverts	Brook Road & Hardy Hill has drainage problems	Erosion, Flooding	DPW Engineer	Not completed due to lack of resources.

Proposed New Mitigation Action Description	Problem Statement	Hazard Addressed	Responsible Party	If Recommended in Previous Plan, why was it not put into place?
Eastman Hill Road - Study and improve drainage, culverts and ditching	Eastman Hill Road has drainage problems	Erosion, Flooding	DPW Engineer	Not completed due to lack of resources.
Interchange Drive - Study and correct drainage	Interchange Drive has drainage problems.	Erosion, Flooding	DPW Engineer	Not completed due to lack of resources.
Westview Lane and Hardy Hill Road - Study and correct Drainage	Westview Lane Area; Hardy Hill Road has drainage problems	Erosion, Flooding	DPW Engineer	Not completed due to lack of resources.
Manchester Drive & Monica Street - Study and improve drainage with dykes	Manchester Drive & Monica Street has drainage problems	Erosion, Flooding	DPW Engineer	Not completed due to lack of resources.
Riverside Drive - Study and correct drainage	Riverside Drive drainage issues	Erosion, Flooding	DPW Engineer	Not in previous plan
Blueberry Hill - Study and correct drainage	Blueberry Hill Deteriorated storm drainage pipes and drainage issues	Erosion, Flooding	DPW Engineer	Not in previous plan
Pleasant/Mack/Maple - Study and correct drainage from cemetery road to new drainage infrastructure on Main Street	Pleasant/ Mack/Maple very poor storm water drainage	Erosion, Flooding	DPW Engineer	Not in previous plan
Buckingham Place/King's Grant area - Study and Correct drainage	Buckingham Place drainage issues	Erosion, Flooding	DPW Engineer	Not in previous plan

Table VI-5: PRIORITIZING EXISTING AND PROPOSED MITIGATION STRATEGY IMPROVEMENTS

Rank	Strategy Improvement	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemented	Socially Acceptable	Technically Feasible	Administratively Possible	Benefit to Cost	TOTAL SCORE	Mitigate Existing, or New Development
7	Connecticut River - Stream Bank Stabilization projects-Stream bank stabilization work is needed in an area on the Connecticut River to decrease siltation on commercial properties.	2	2	1	1	2	3	2	1	14	Both
6	Mill Road Trail - Correct Drainage and slope stabilization	2	2	1	1	2	3	2	2	15	Existing
8	Mascoma River - City will work with USGS and FEMA to update the NFIP study for the Mascoma River.	1	1	1	2	2	2	2	1	12	Both
8	Ruddsboro Road - Study and correct drainage	1	1	1	2	2	2	2	1	12	Both
8	Pumping Station Road - Study and correct the cross drains drainage and river bank stabilization issues	1	1	1	2	2	2	2	1	12	Both
8	Pasture Lane - Study and correct, New drainage system and change inflow	1	1	1	2	2	2	2	1	12	Both
9	Kinne Street Neighborhood - Study and introduce a Closed Drainage System	1	1	1	1	2	2	2	1	11	Both
8	Eagle Ridge and Stevens Road - Study and Change drainage characteristics	1	1	1	2	2	2	2	1	12	Both
8	Eastman Hill Road - Study and improve drainage, culverts and ditching	1	1	1	2	2	2	2	1	12	Both
8	Manchester Drive & Monica Street - Study and improve drainage with dikes	1	1	1	2	2	2	2	1	12	Both
5	Pleasant/Mack/Maple - Study and correct drainage from cemetery road to new drainage infrastructure on Main Street	2	3	3	1	2	2	2	1	16	Both
5	Buckingham Place - Study and Correct drainage	2	3	3	1	2	2	2	1	16	Both
2	Subdivision and Site Plan Review Regulations – Complete amendments for erosion control	1	3	3	3	3	3	3	3	22	Both
2	Public Education – Add information to the City website	3	2	3	2	3	3	3	3	22	Both
4	Zoning Ordinance – Expand steep slopes requirements to entire City	2	2	3	1	2	3	2	3	18	New
1	Site Plan & Subdivision Regulations – More stringent erosion and sedimentation control requirements including 50-year storm with 100 year detention capability	3	3	3	3	2	3	3	3	23	New
3	Zoning Ordinance - Amend ordinance to require conservation design subdivisions with no development in hazard areas.	2	3	3	2	2	3	3	3	21	New
3	Floodplain Management Ordinance - Review need for required compensatory flood storage areas.	3	3	3	2	2	3	2	3	21	Both

Table VI-6: EMERGENCY PREPAREDNESS ACTIONS

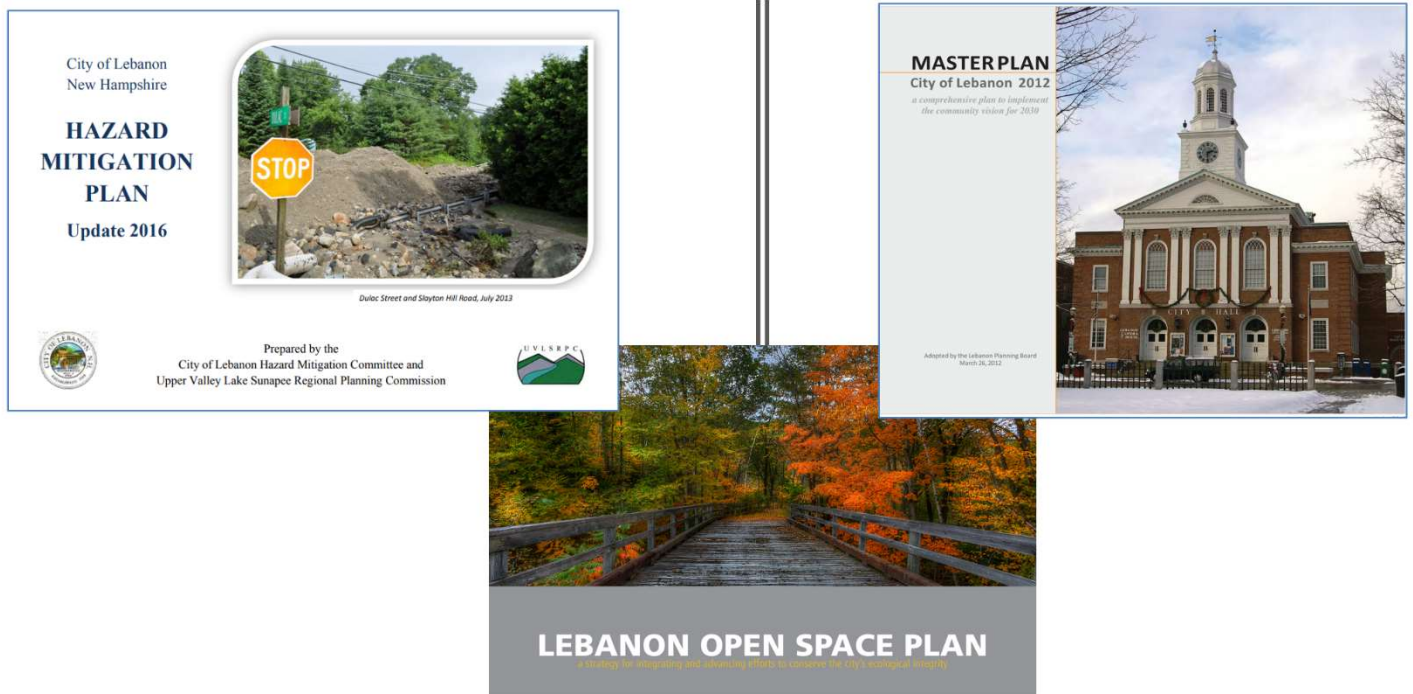
Existing Emergency Preparedness Action & Description	Hazard Type/ Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/Actions Taken to Meet Recommendations or Not Met	Update/Future Proposed Improvements
911 Number System – Numbering system for emergency response location	Multi-Hazard/ Entire City	City Engineer	High	Replace illegible numbers for emergency notification and location; GIS system/ON-GOING	On-going updating and training
Emergency Notification System – Door-to-door notification if anticipated hazard event	Multi-Hazard/ Entire City	EMD & Fire Chief	Low	Explore use of Code Red reverse notification system with Grafton County and implement statewide reverse 911 system/COMPLETED	City has trained key emergency staff on the use of the Statewide emergency notification system.
ICS (Incident Command System) & NIMS (National Incident Management System) – Provides training for City personnel	Multi-Hazard/ Entire City	EMD	Average	Provide additional training to City and school personnel/COMPLETED	All key Emergency Management Leadership has completed ICS 300 & ICS 400 Advanced Incident Command Training.
Comprehensive Emergency Management Program for Schools (CEMPS) - Lebanon schools have been involved in this NH Office of Emergency Management program.	Multi-Hazard/ Entire City	SAU, State, EMD	Low	Update plan per State requirement; provide more training for key SAU personnel/ON-GOING	City EM Staff continues to work with the Lebanon SAU on implementing the School EM Plan.

Existing Emergency Preparedness Action & Description	Hazard Type/ Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/Actions Taken to Meet Recommendations or Not Met	Update/Future Proposed Improvements
City Emergency Management Plan - Describes the preparation and response necessary for the city to address emergency situations	Multi-Hazard/ Entire City	EMD	Average	Provide training and exercises for key city personnel/ON-GOING	On-going training
Mutual Aid Compact - Lebanon has an informal compact with all communities in the Upper Valley, to maximize use of resources to address and respond to hazard events for fire, police and EMS.	Multi-Hazard/ Entire City	Fire Chief	High	Formalize mutual aid agreements among municipalities/ INCOMPLETE; Not done due to lack of resources	Formalize mutual aid agreements among municipalities
Hazardous Materials Plan – Provides emergency response to hazardous materials spills	HazMat/ Entire City & the Town of Hanover	Local Emergency Planning Committee	Average/ Currently updating plan	Provide more training and exercises/ON-GOING	LEPC Plan will be updated in 2017.

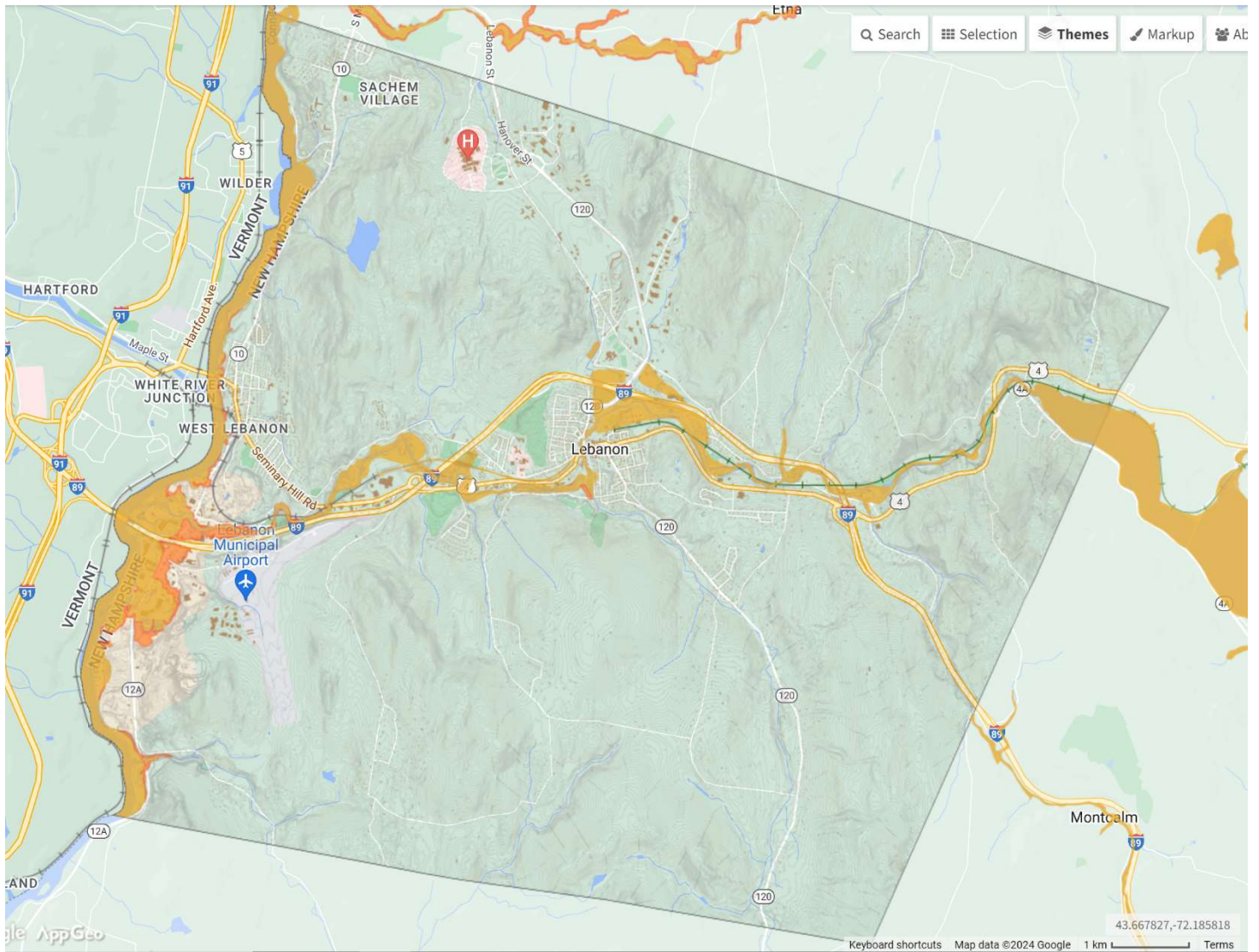
*On-going projects will continue throughout the life of the plan.

Appendix B

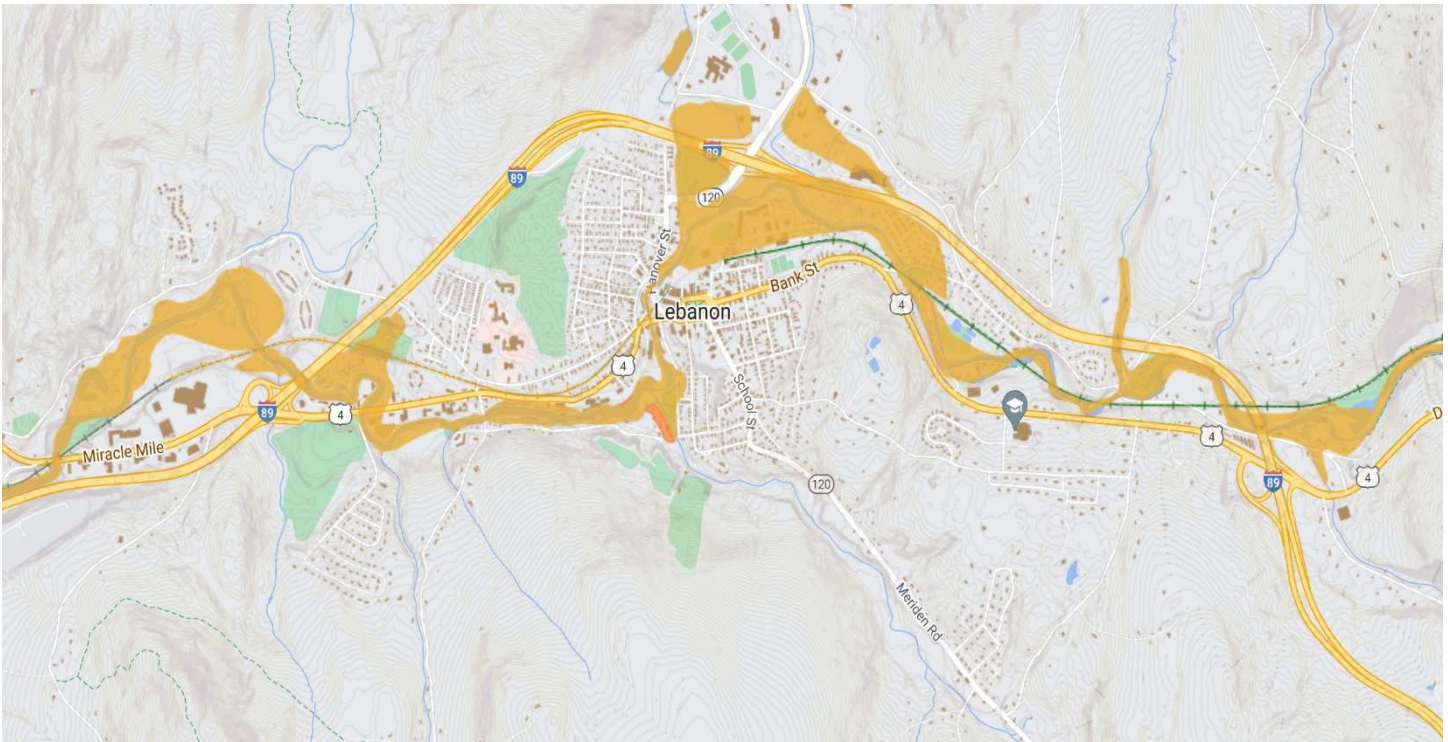
City of Lebanon Map Resource Packet* Used During Community Resilience Building Workshop



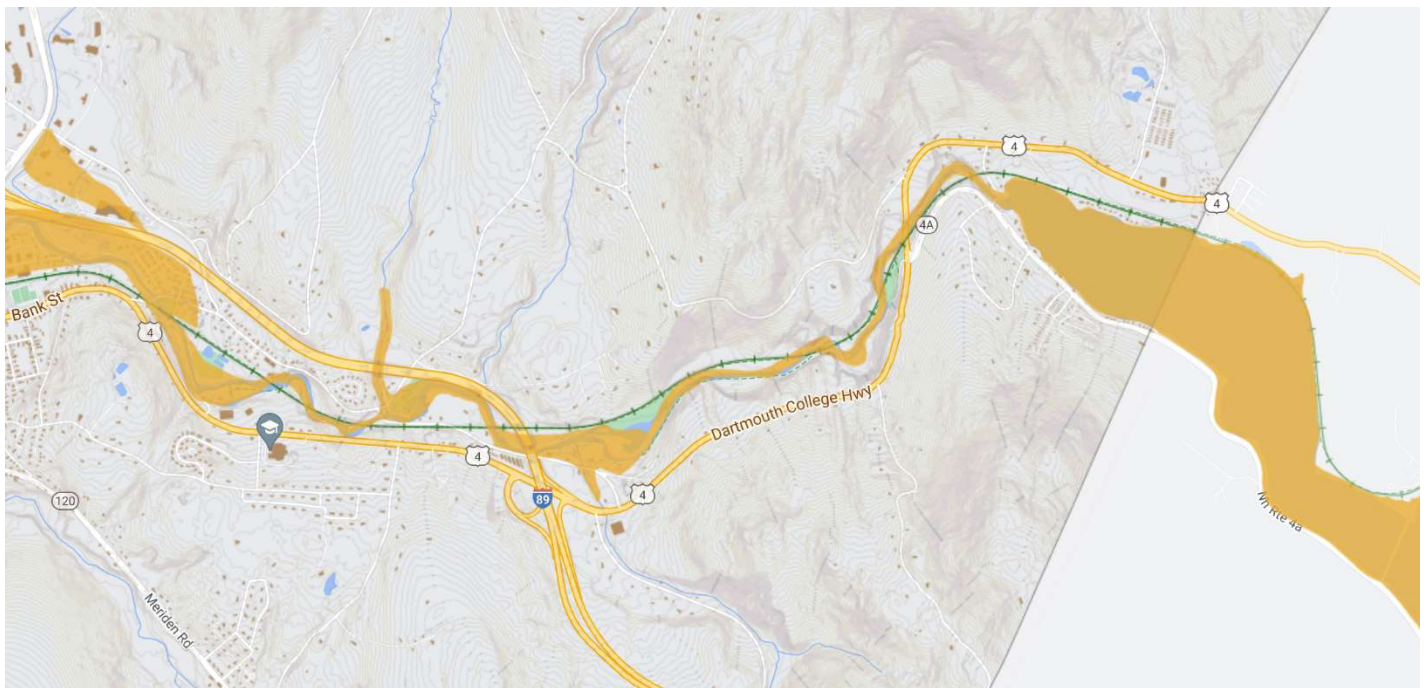
***Gathered from Lebanon's Hazard Mitigation Plan (2016), Master Plan (2012), Open Space Plan (2022), and LebGIS Mapping Tool (2024). Additional resources were gathered from the Public Health Council of the Upper Valley.**



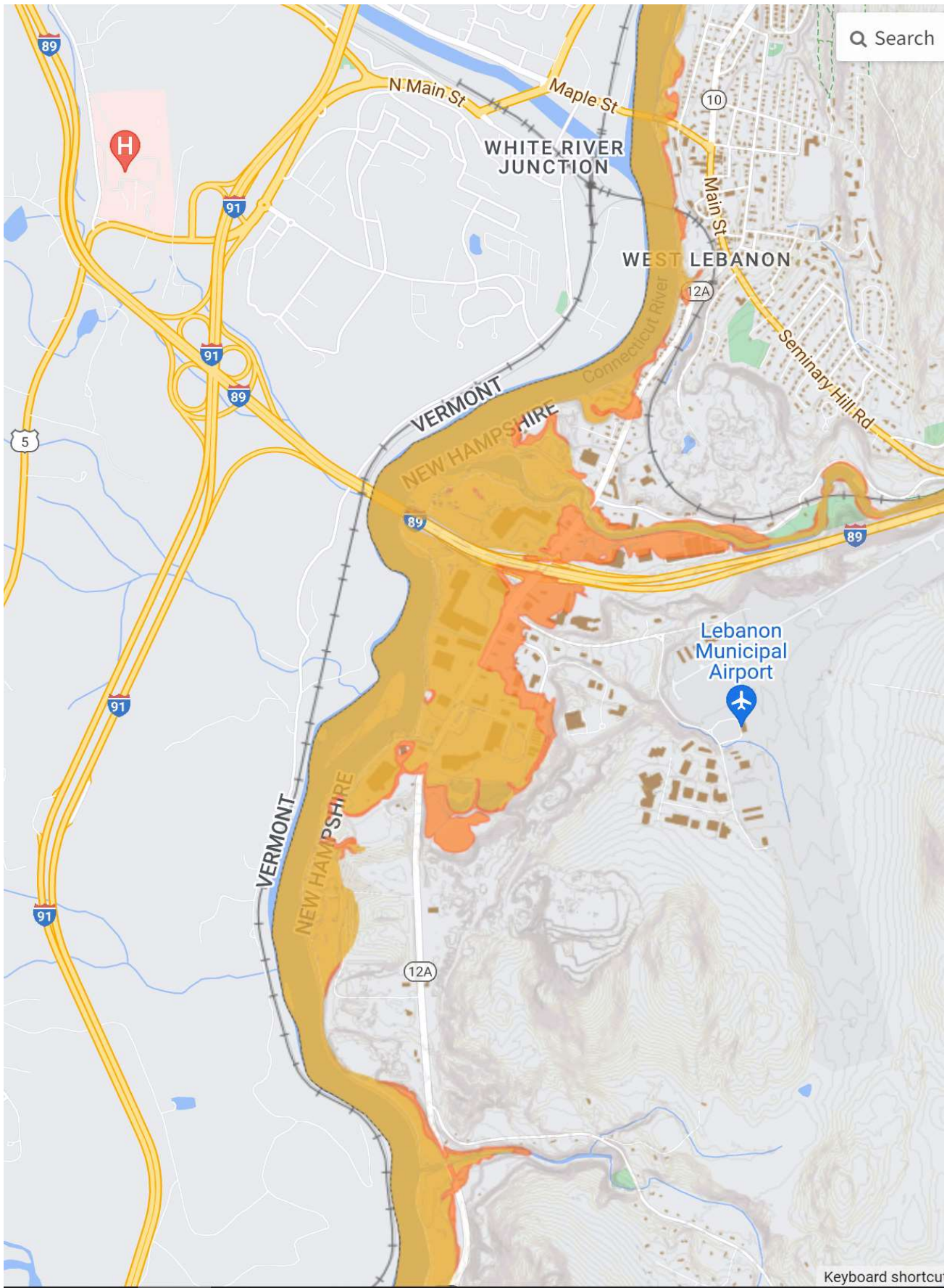
Source: City of Lebanon – LebGIS Mapping Tool



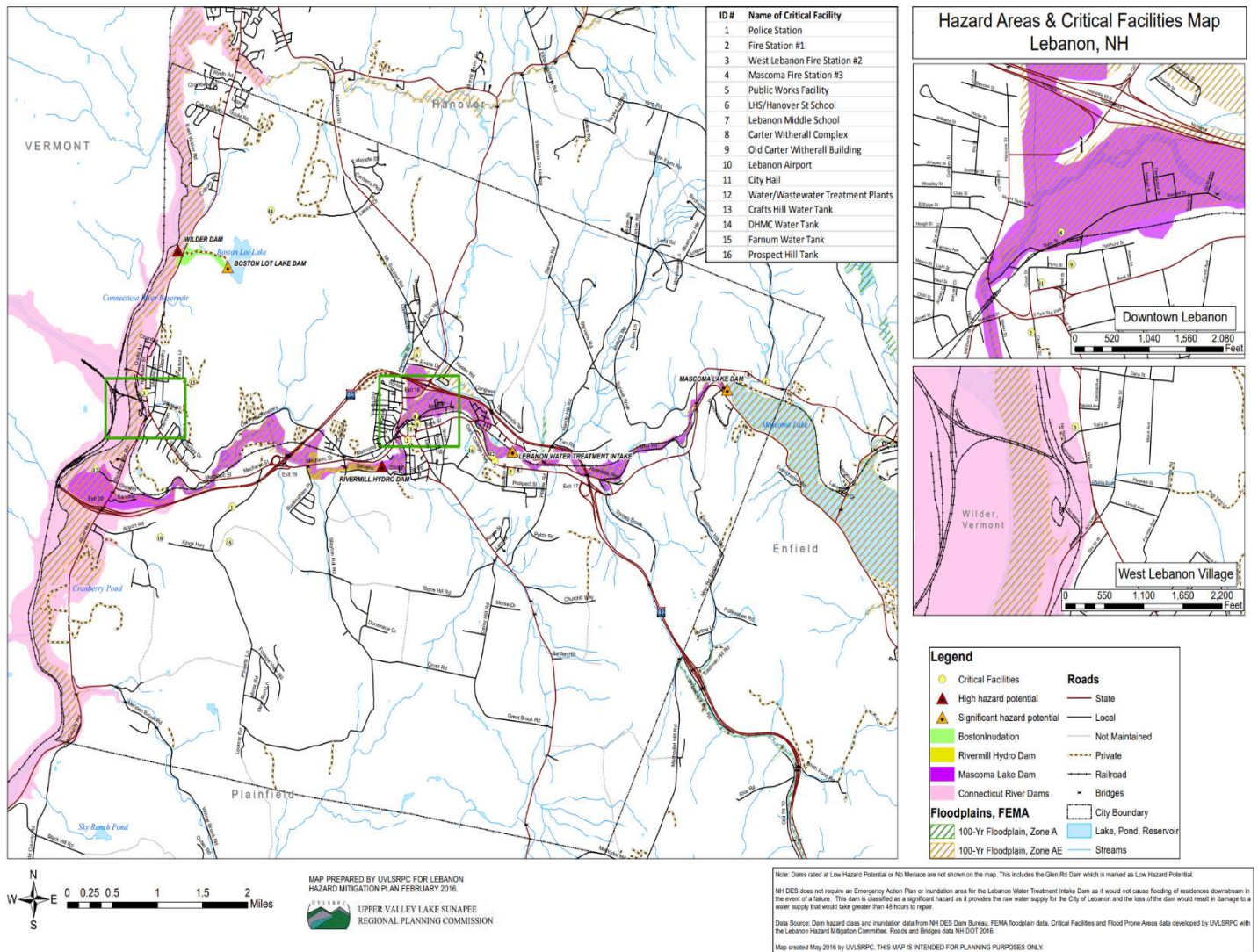
Source: City of Lebanon – LebGIS Mapping Tool



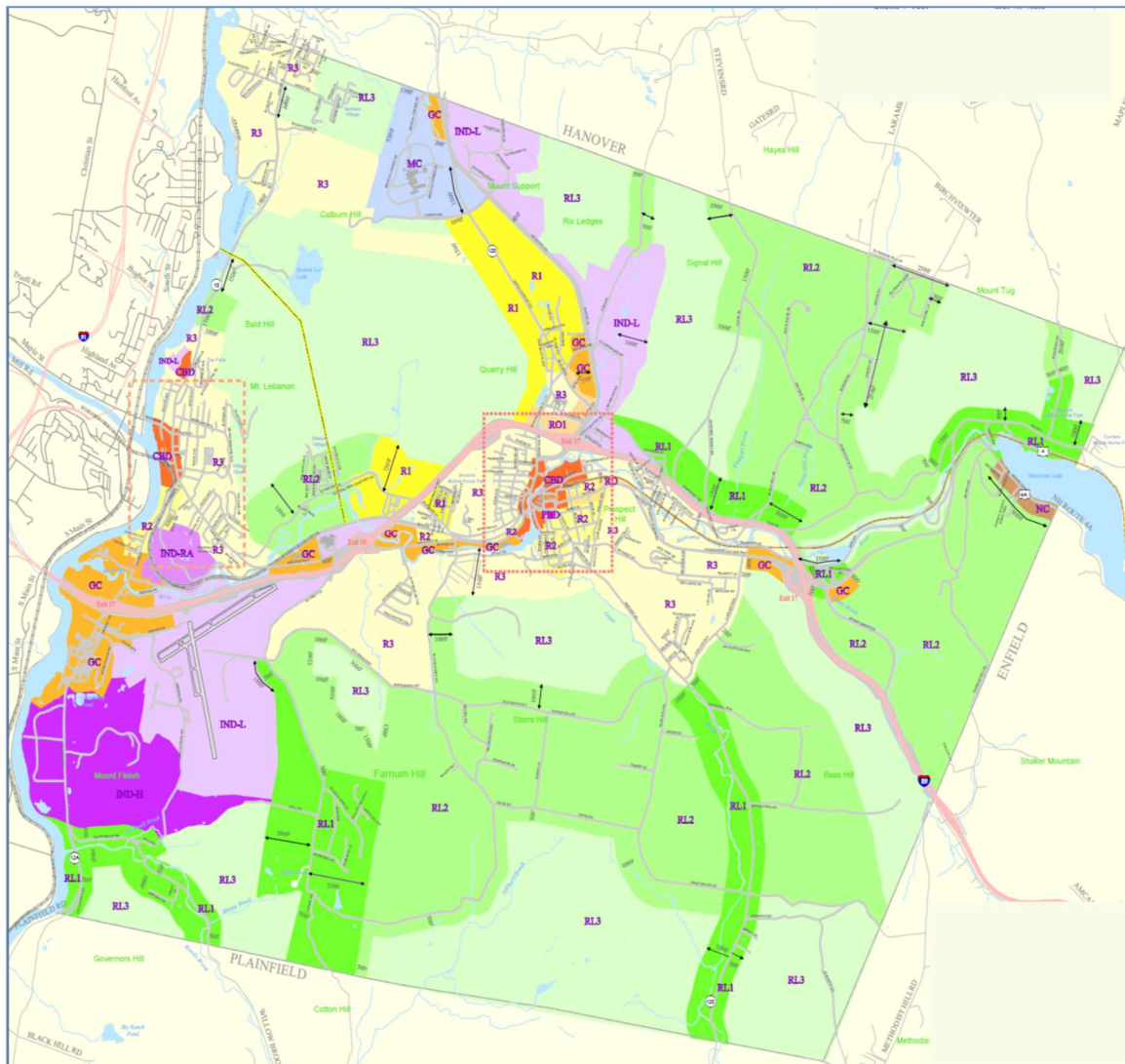
Source: City of Lebanon – LebGIS Mapping Tool



Source: City of Lebanon – LebGIS Mapping Tool



Source: Lebanon Hazard Mitigation Plan (2016 update)



Current Zoning Map 2017

34

City of Lebanon – Community Resilience Building – January 2024

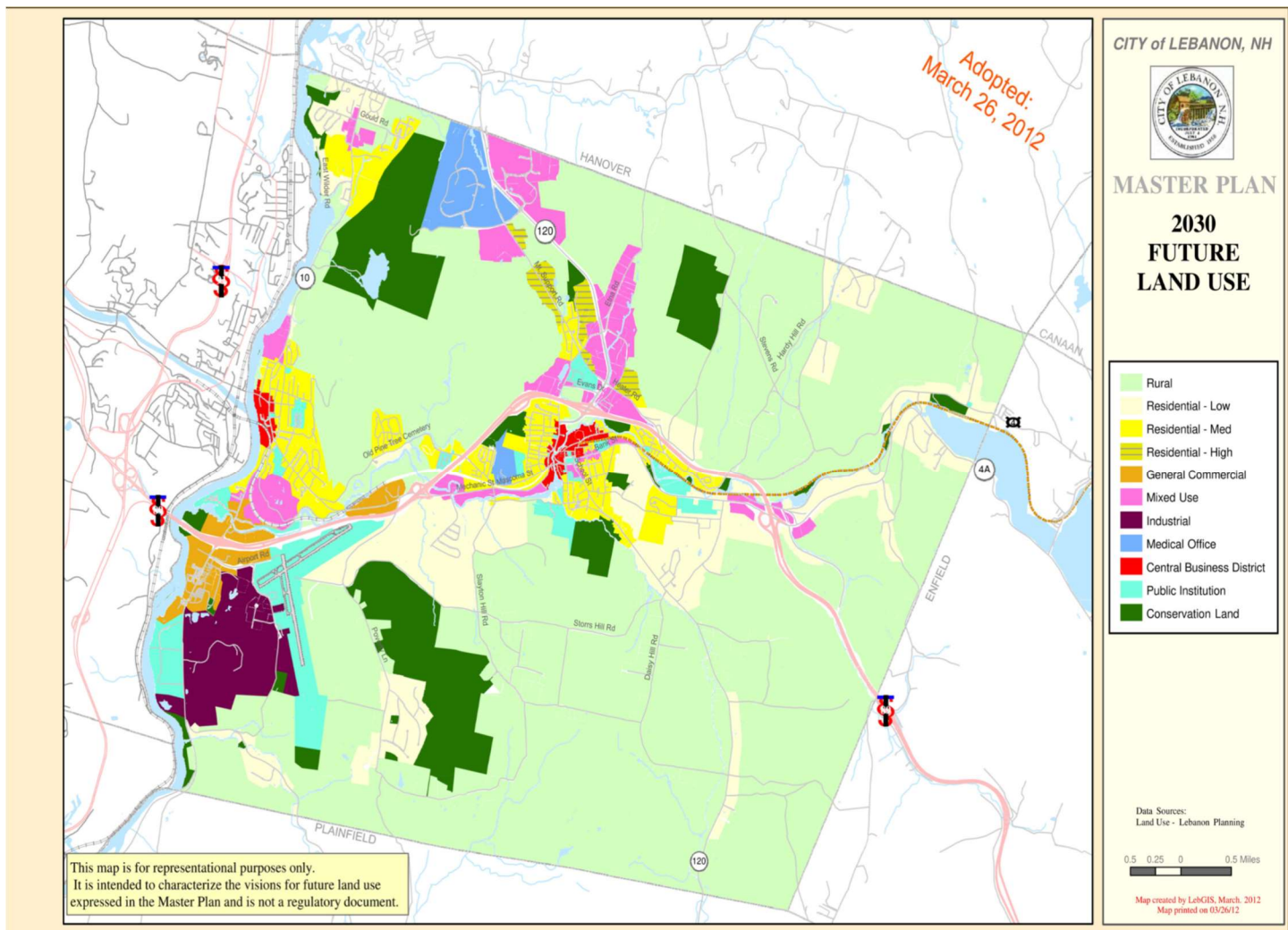
Land Use / Land Cover Type Map

LebanonGIS

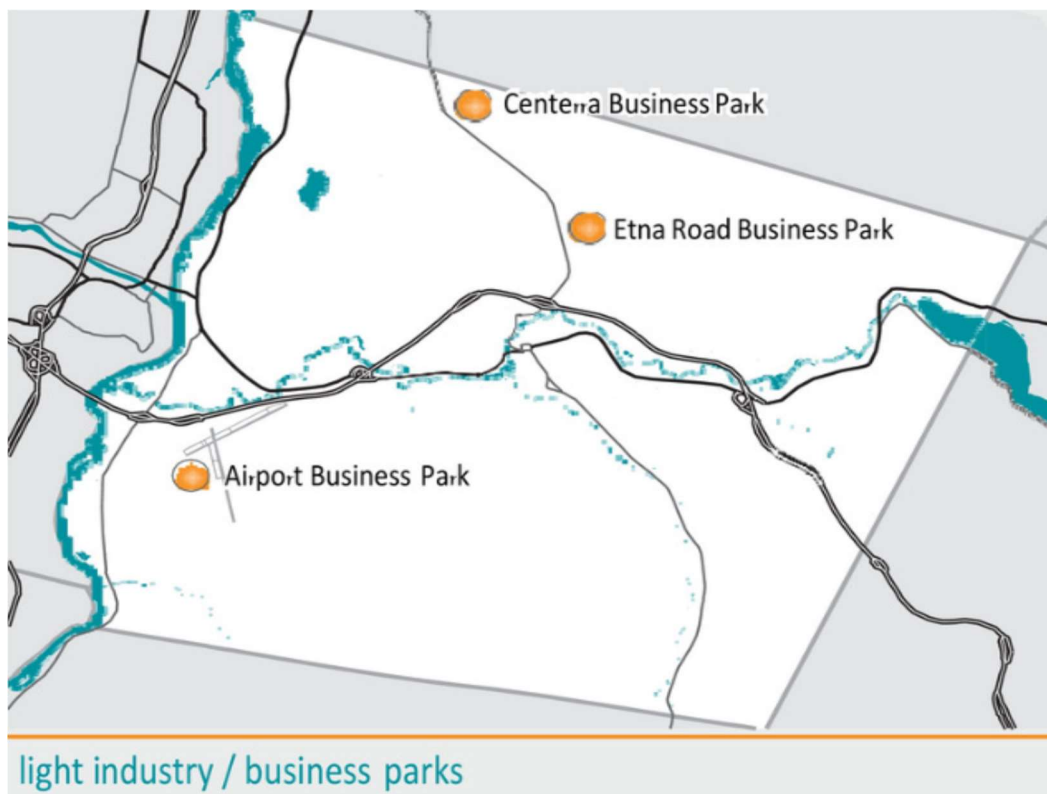
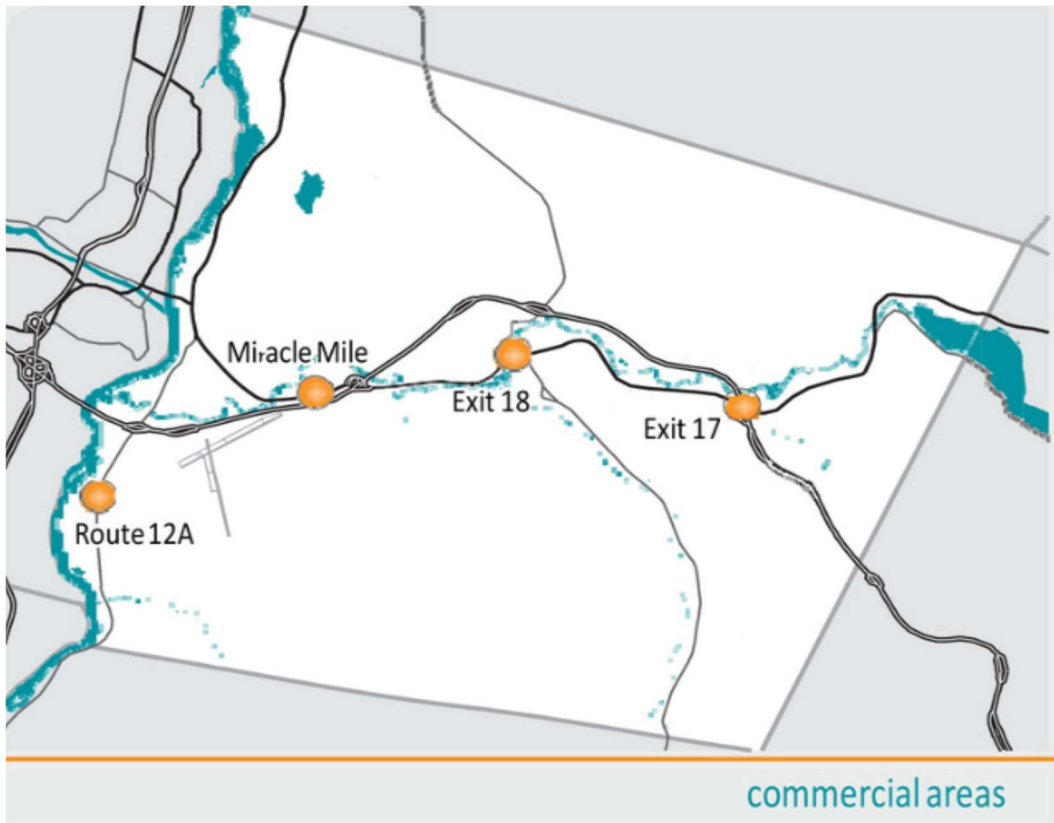
Areas colored yellow to green are undeveloped forestland, protected open space, and working lands. Areas colored orange, brown and gray are developed. Blue areas are rivers, streams, ponds and wetlands.



City of Lebanon – Community Resilience Building – January 2024



Source: Lebanon Master Plan (2012)



Source: Lebanon Master Plan (2012)

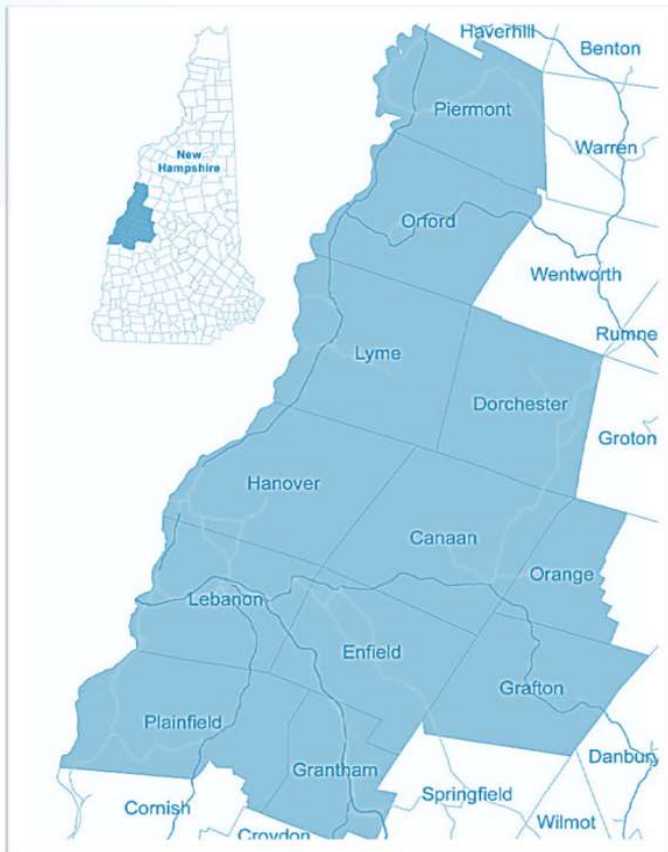


About the Public Health Council

The Public Health Council of the Upper Valley (PHC) is hosted in partnership with Dartmouth-Hitchcock Community Health.

The PHC is a group of organizations, municipalities, schools, advocates, and businesses working together to create a more healthy, safe, supportive, and vital Upper Valley. The PHC is one of thirteen Regional Public Health Networks in New Hampshire and is distinct in that its partner organizations serve communities in New Hampshire and Vermont.

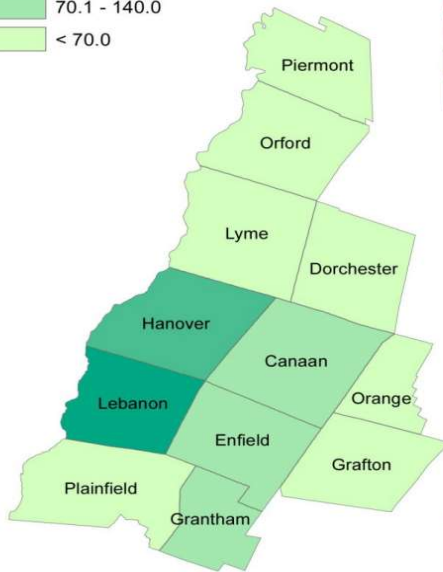
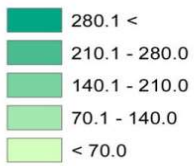
The New Hampshire communities in the PHC's region are Piermont, Orford, Lyme, Hanover, Lebanon, Plainfield, Dorchester, Canaan, Enfield, Grantham, Orange, and Grafton.



Source: UVClimate Health Adaptation Plan (Nov2015)

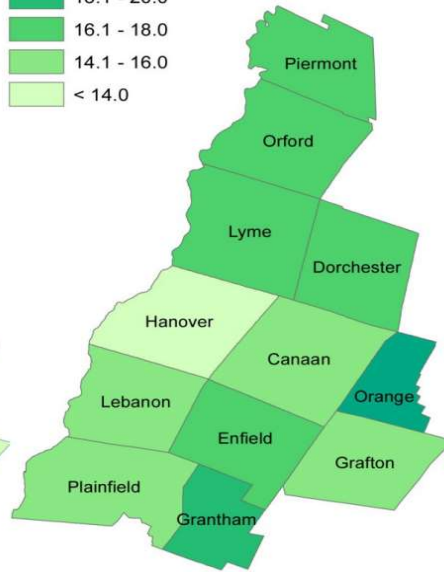
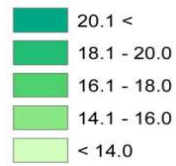
Appendix - Analysis Maps

Population Density



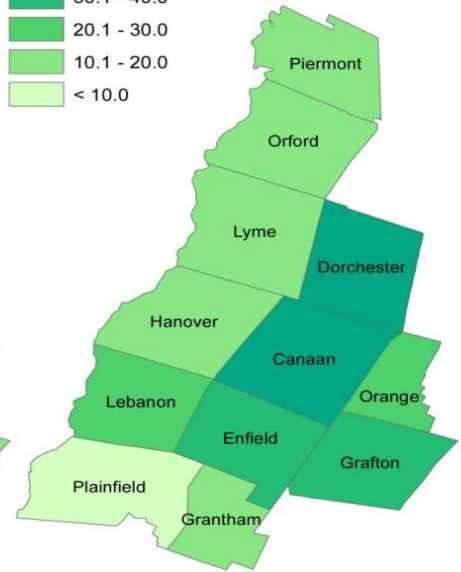
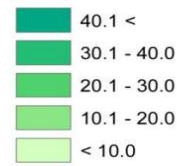
Data Source: 2013 Population Density data from the Economic & Labor Market Information Bureau, NH Employment Security, December 2014.

Senior Population as a Percentage of Total Population (65+ Years Old)



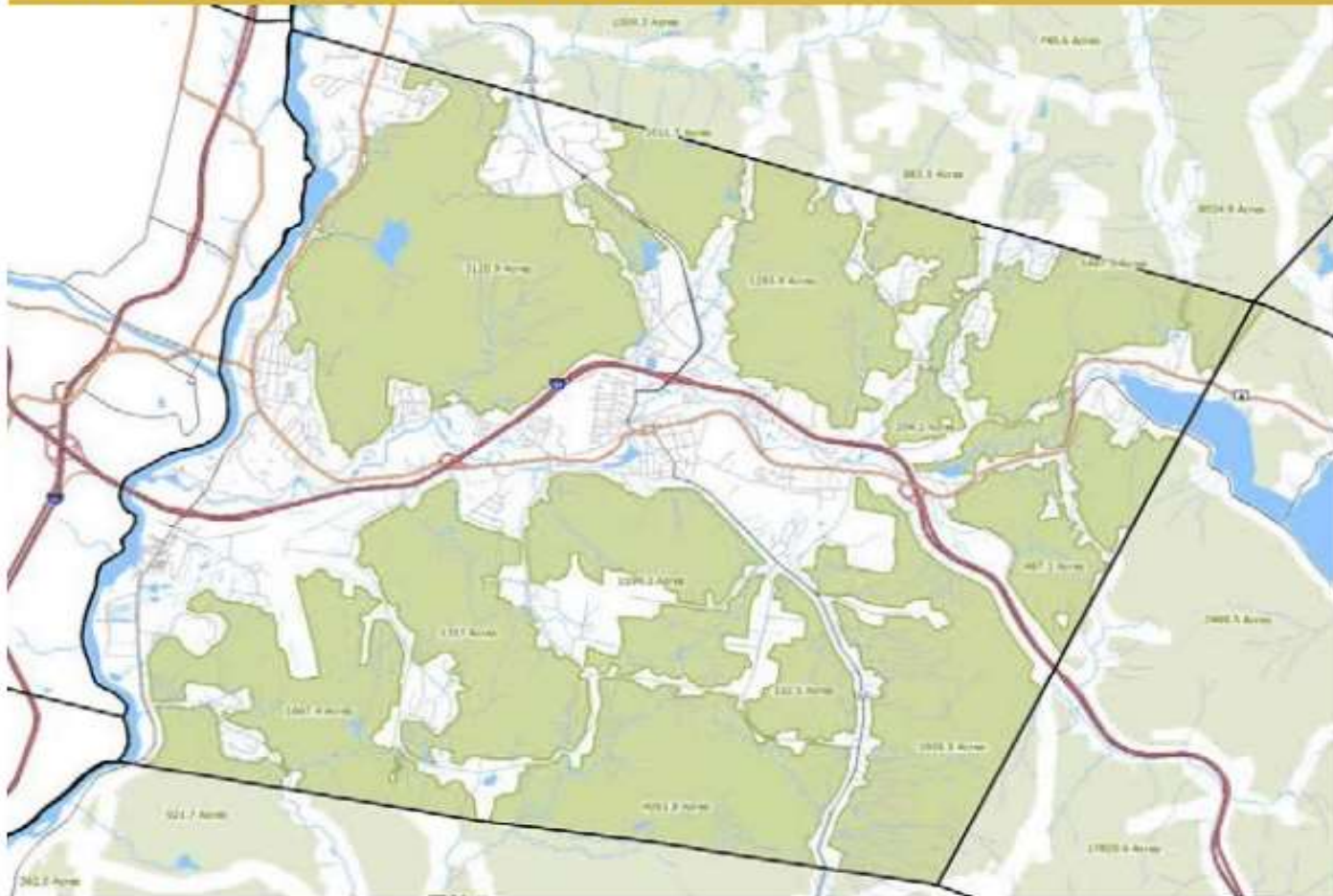
Data Source: 2013 Population Density data from the Economic & Labor Market Information Bureau, NH Employment Security, December

Percentage of Senior Population with Income Under 200% Poverty Level



Data Source: U.S. Census Poverty Aggregation Data 2014.
Map created by UVLSRPC September 2015.

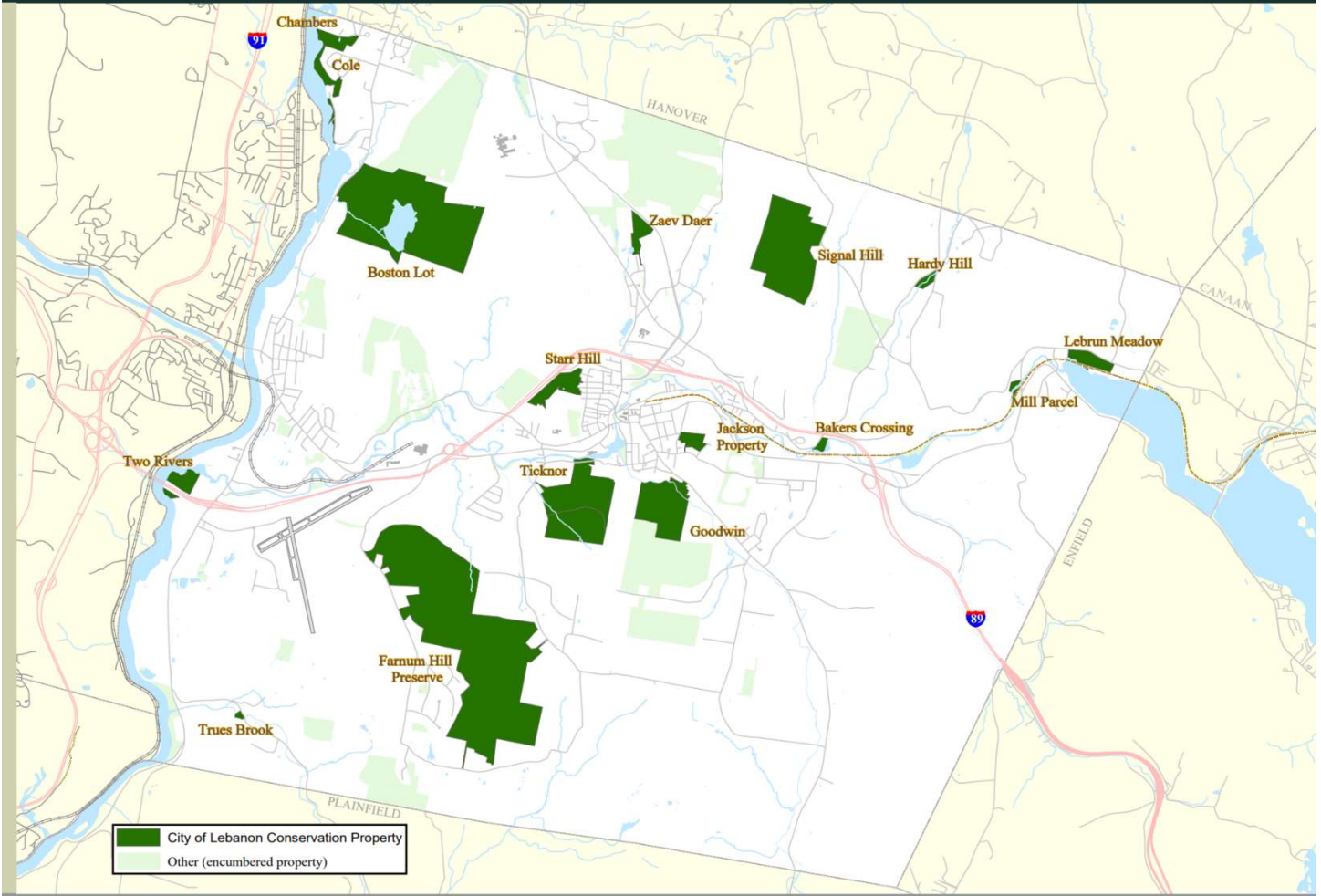
LARGE PATCHES



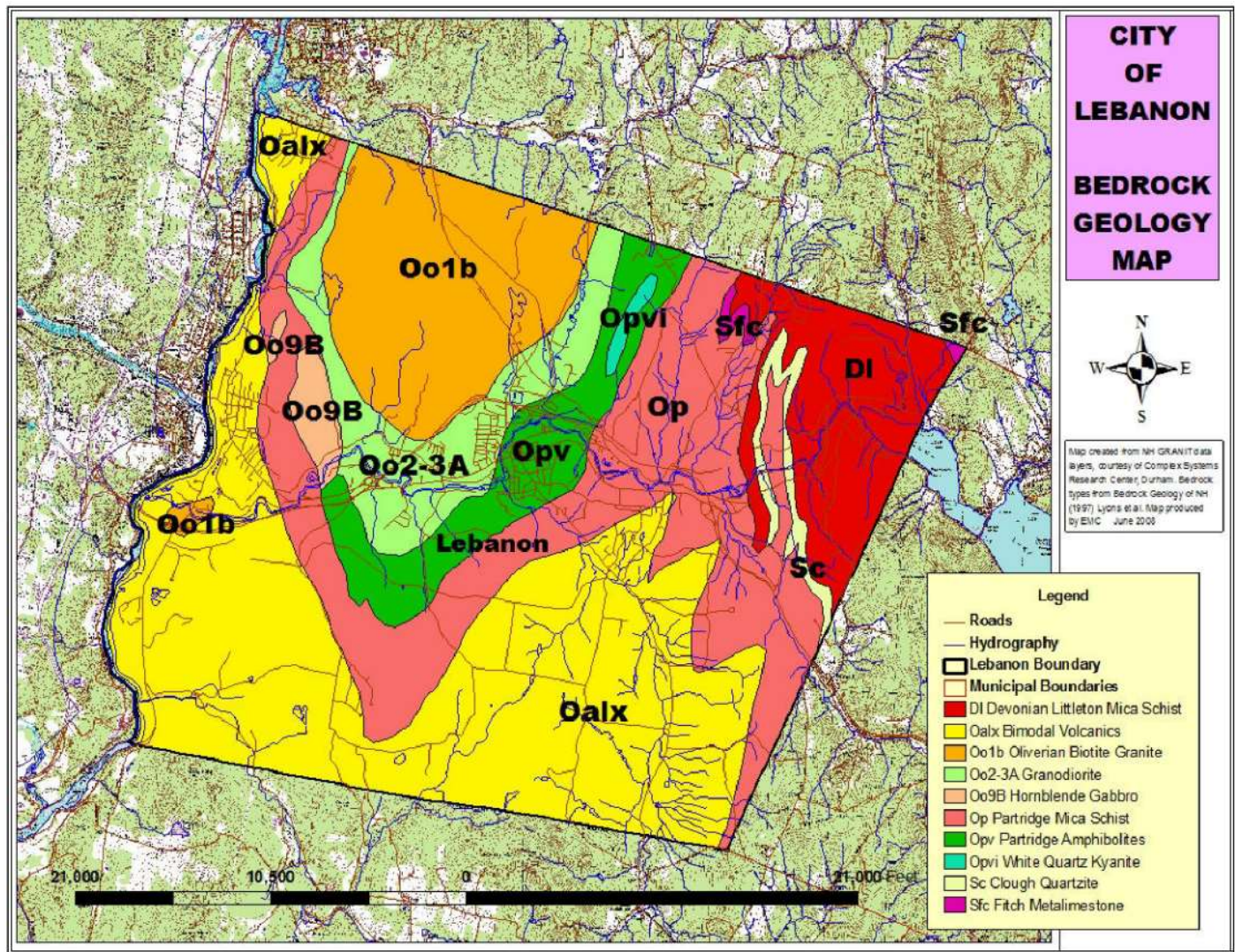
Source: Lebanon Open Space Plan (2022)

ADDENDUM: CITY OF LEBANON CONSERVATION PROPERTIES

More information about the city's conservation properties, including trail maps, is available on the [city website](#).

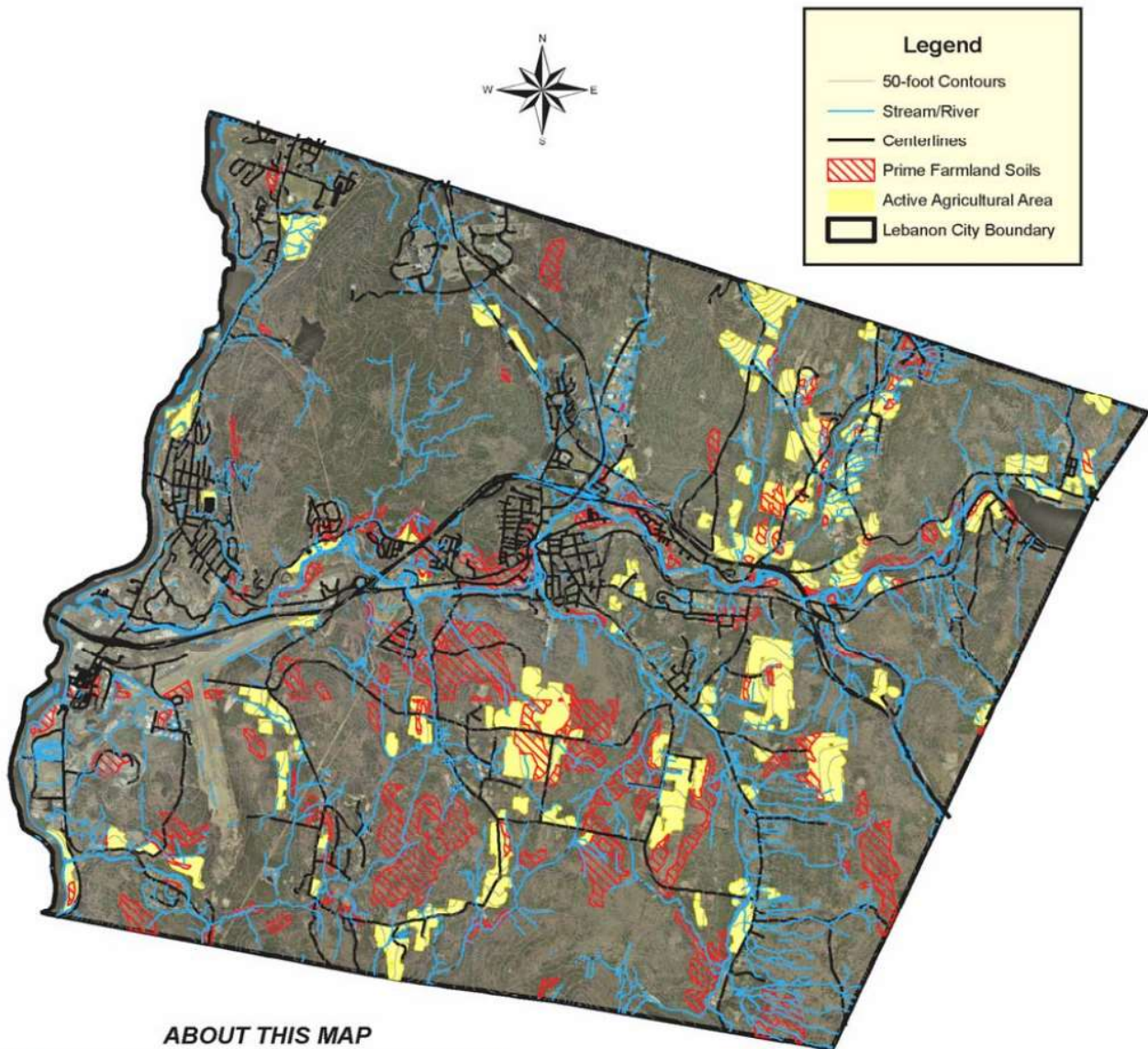


Source: Lebanon Open Space Plan (2022)



Source: Lebanon Natural Resource Inventory 2010

Best Agricultural Areas in Lebanon, NH

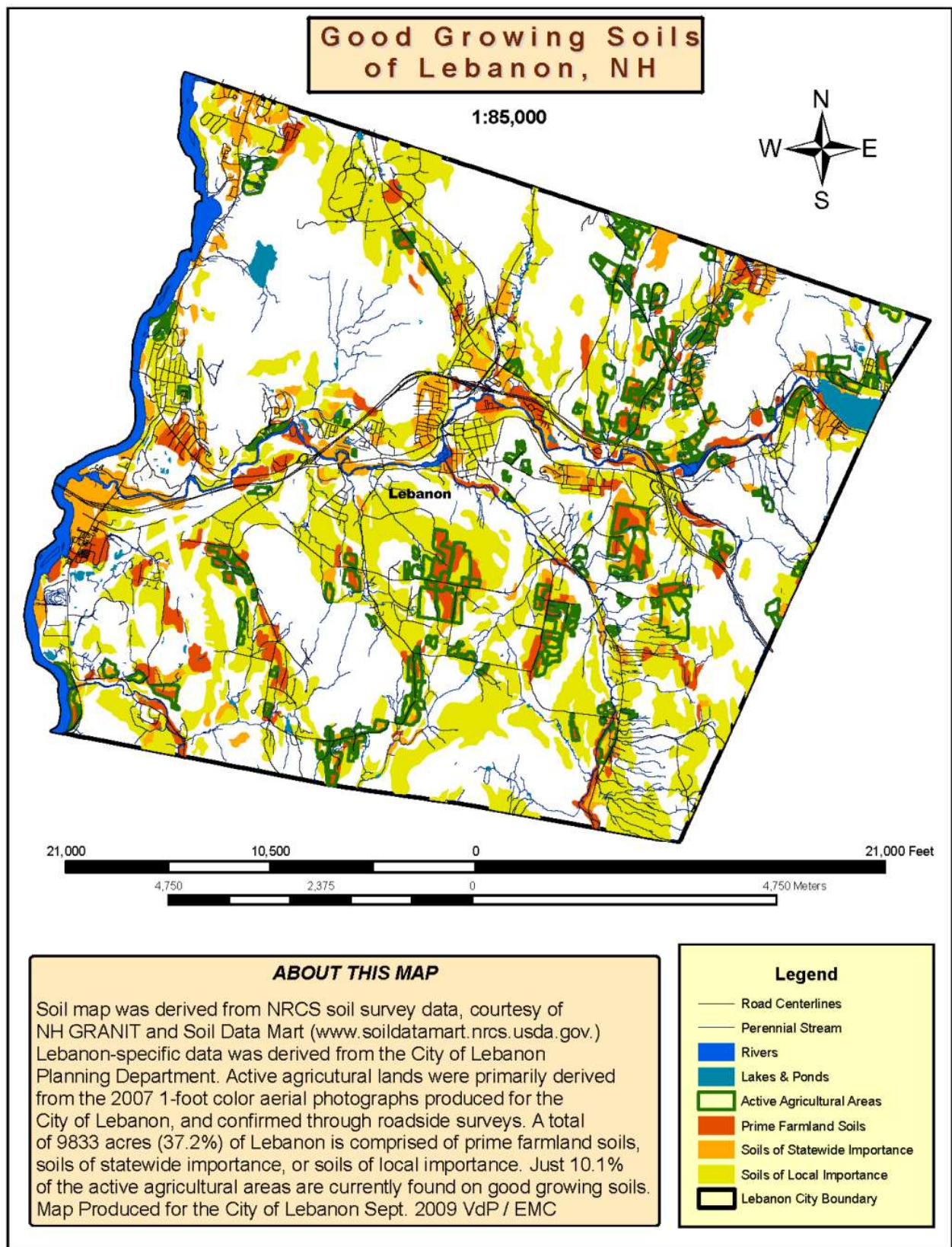


ABOUT THIS MAP

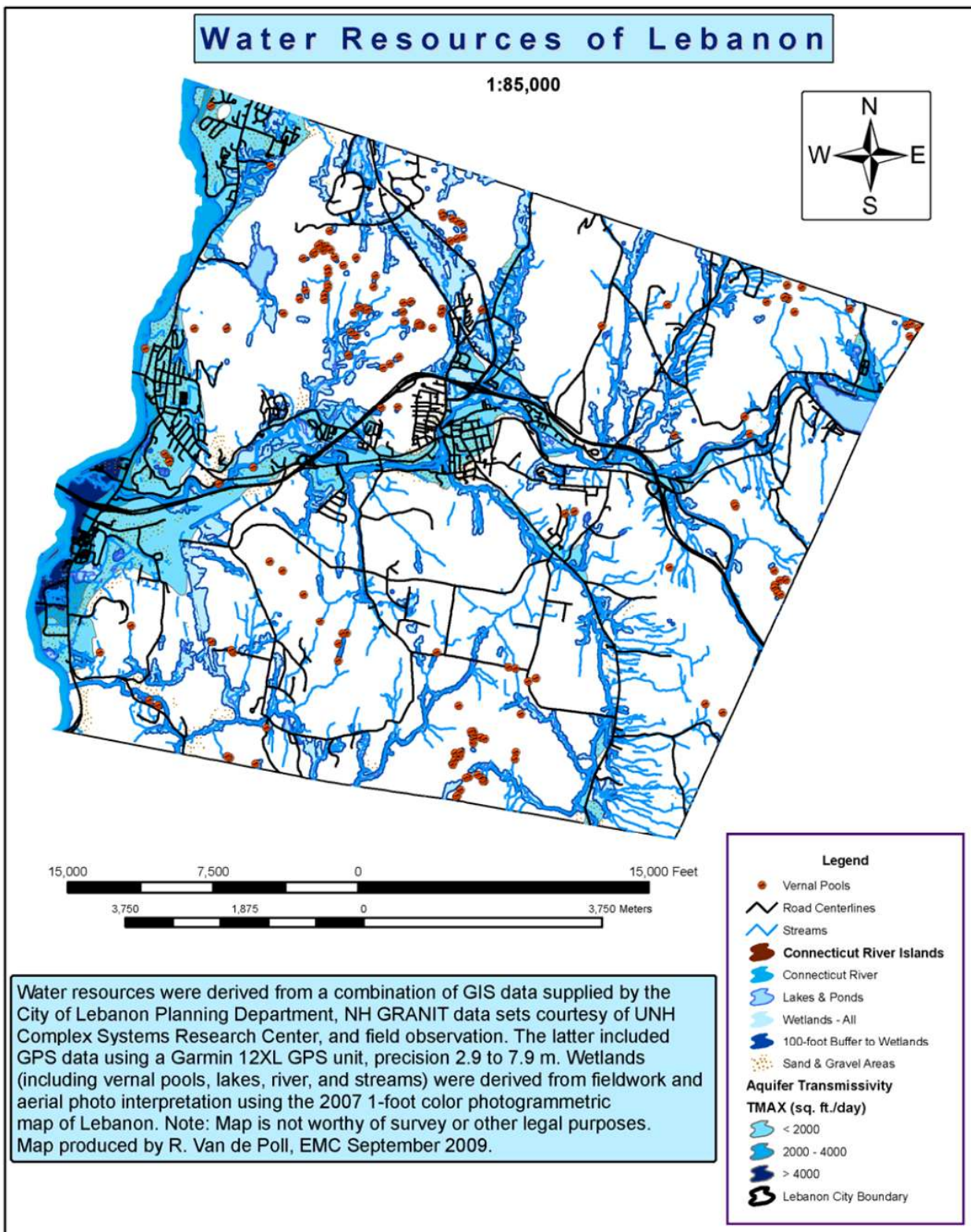
Best agricultural areas were determined by selecting prime farmland soils from the NRCS soil survey of Grafton County, and overlaying areas where active agriculture is taking place. The latter is based on an interpretation of the 2007 1-foot color aerial photographs provided by the City of Lebanon plus field-based surveys that confirmed active areas in 2008-2009. Of the 1374 ac. of active agricultural land, just 23% is on prime farmland soil.
Map produced by R. Van de Poll / EMC.



Source: Lebanon Natural Resource Inventory 2010



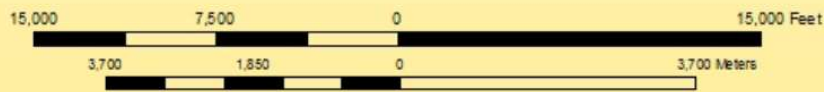
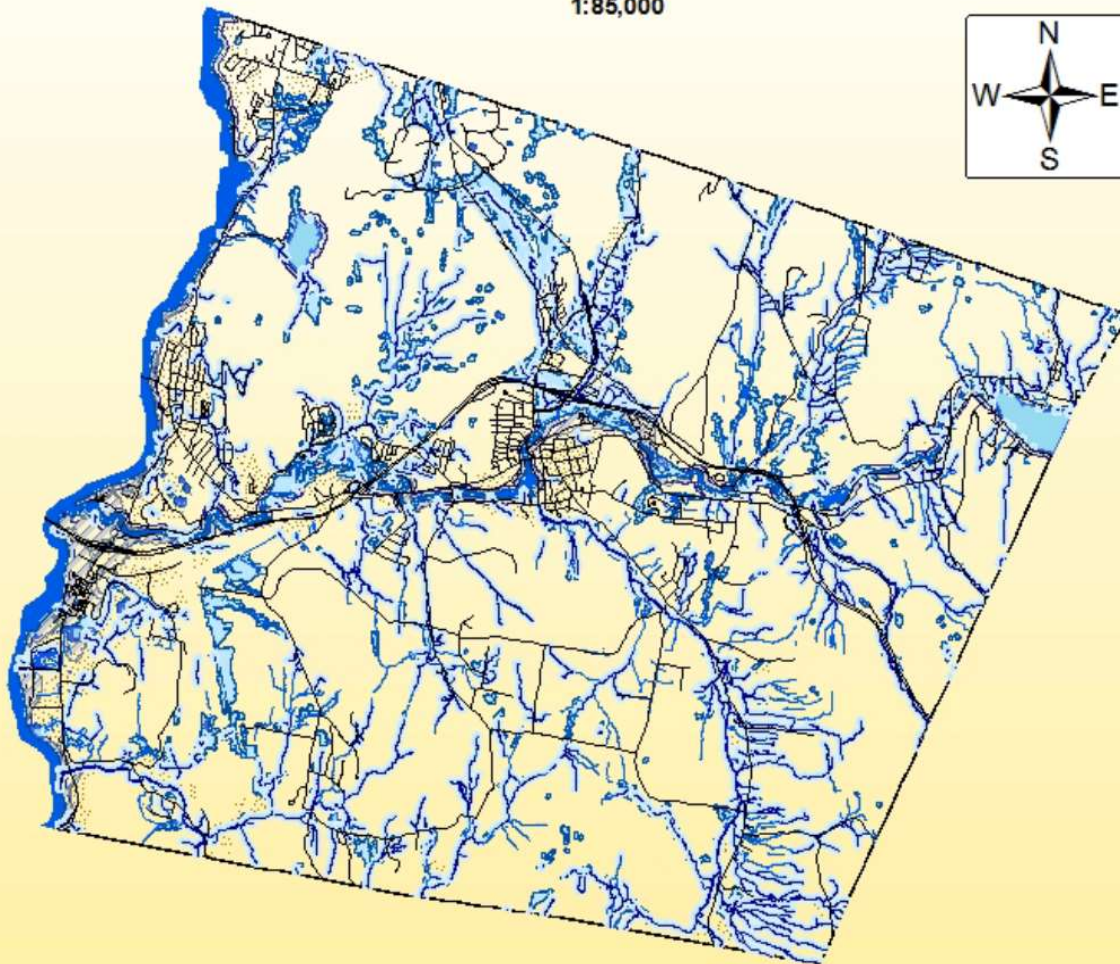
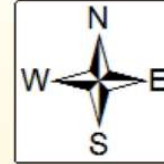
Source: Lebanon Natural Resource Inventory 2010



Source: Lebanon Natural Resource Inventory 2010

Water Resource Buffers of Lebanon

1:85,000



ABOUT THIS MAP

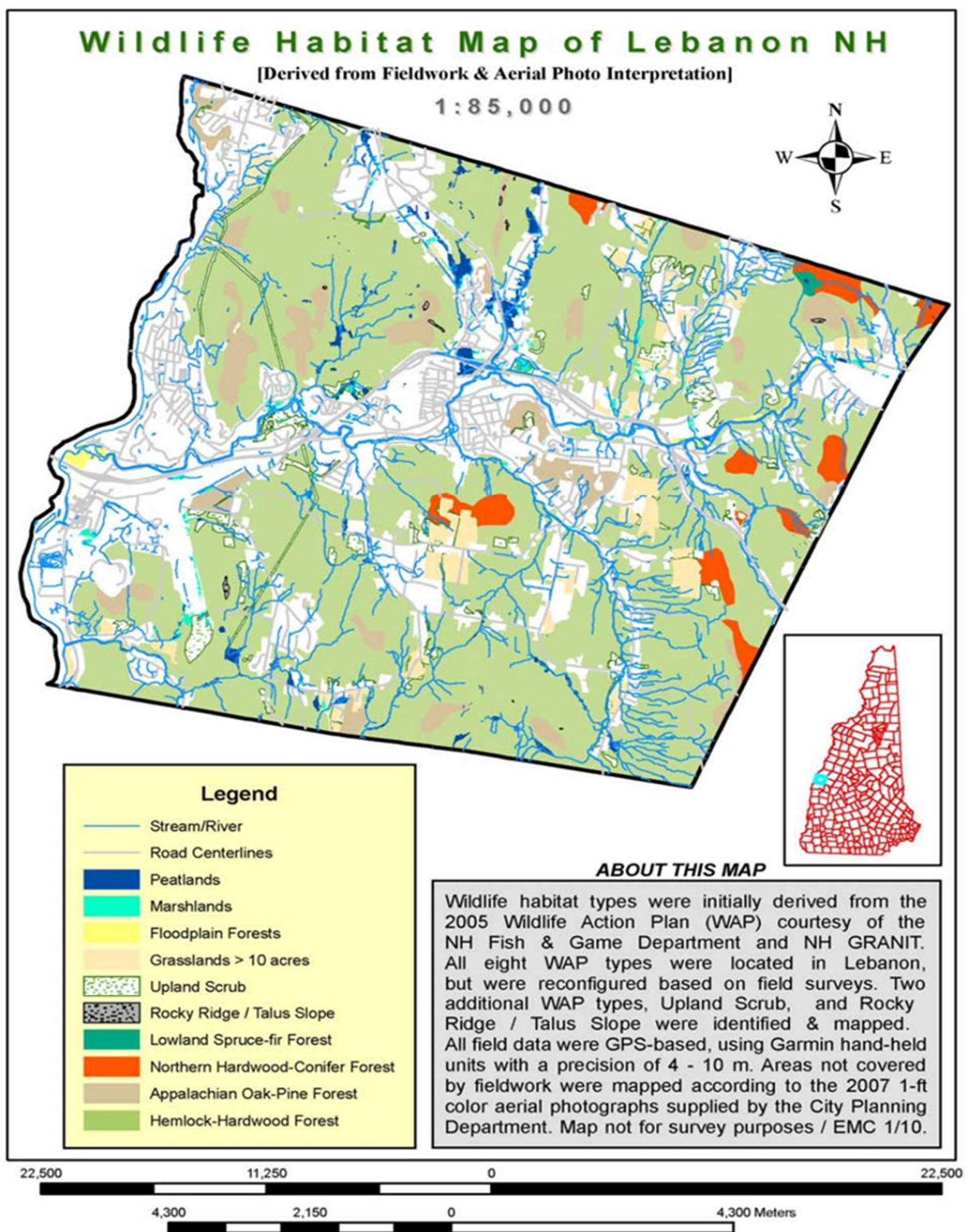
Water resources were derived from a combination of GIS data supplied by the City of Lebanon Planning Department, NH GRANIT data sets courtesy of UNH Complex Systems Research Center, and field observation. The latter included GPS data using a Garmin 12XL GPS unit, precision 2.9 to 7.9 m. Specific buffers were applied using standard criteria for water resource setbacks. The latter are intended to provide an example of possible distances and are not intended to suggest regulatory guidance. Note: Map is not worthy of survey or other legal purposes.

Map produced by R. Van de Poll, EMC September 2009.

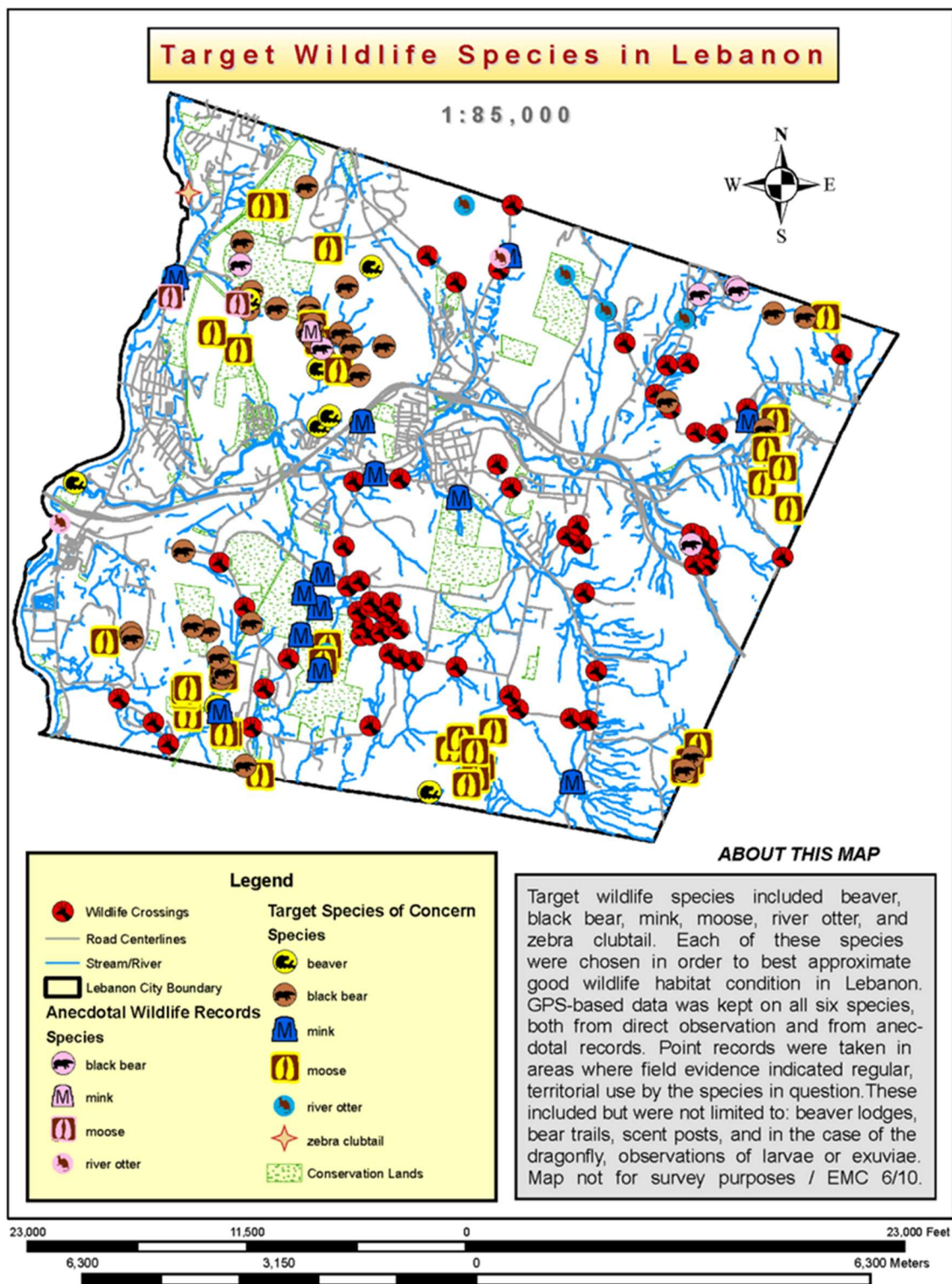
Legend

- Road Centerlines
- 25-foot Buffer to Intermittent Streams
- 100-foot Buffer to Perennial Streams
- 200-foot Buffer to Perennial Streams
- Lakes & Ponds
- Wetlands - All
- 100-foot Buffer to Wetlands
- Floodplains
- 250-foot Shoreland Buffer
- Lebanon City Boundary

Source: Lebanon Natural Resource Inventory 2010



Source: Lebanon Natural Resource Inventory 2010



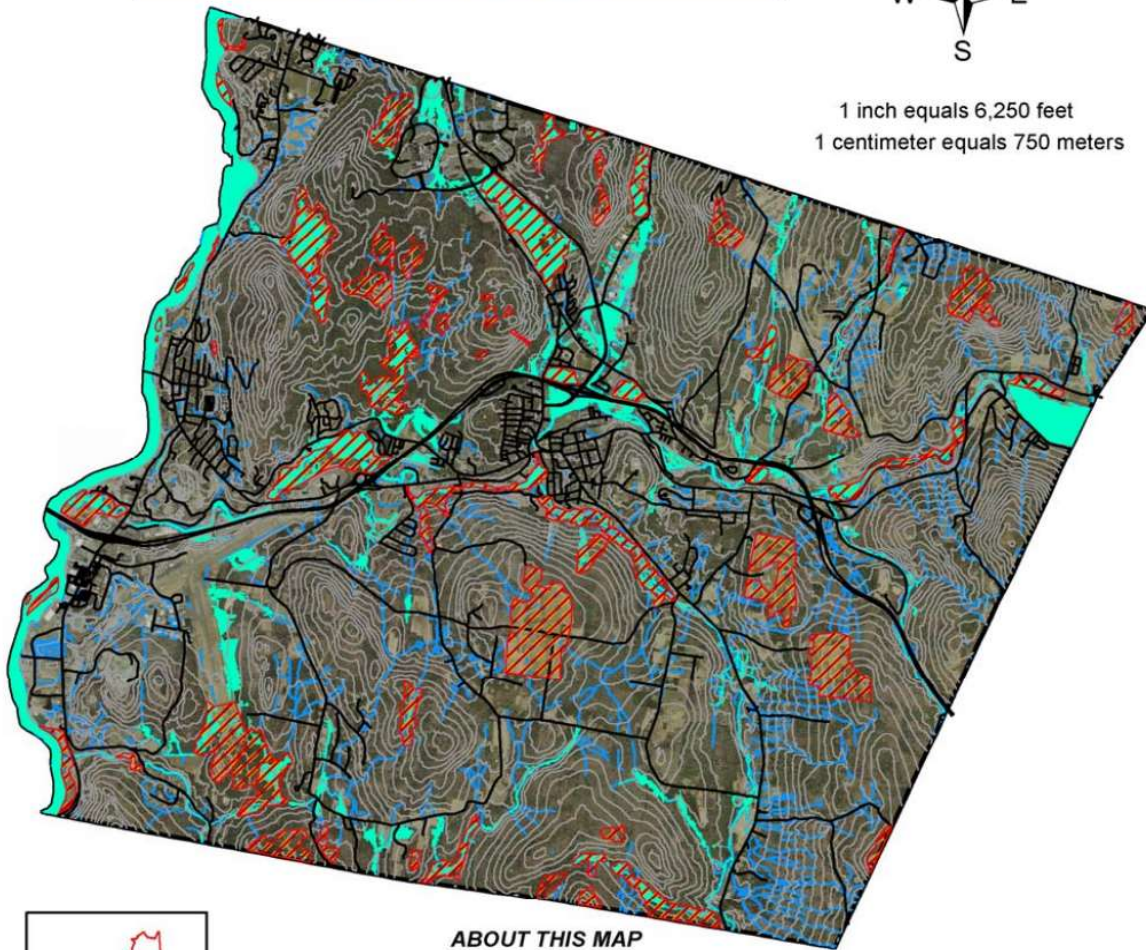
Source: Lebanon Natural Resource Inventory 2010

Significant Ecological Areas of Lebanon, NH

Significant Ecological Areas are those sites that, because of their sensitive nature and unique set of natural resource characteristics, require special treatment in terms of long-term conservation and/or protection from human impacts.

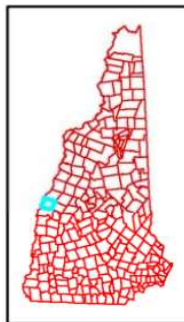


1 inch equals 6,250 feet
1 centimeter equals 750 meters

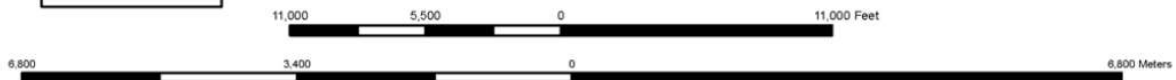


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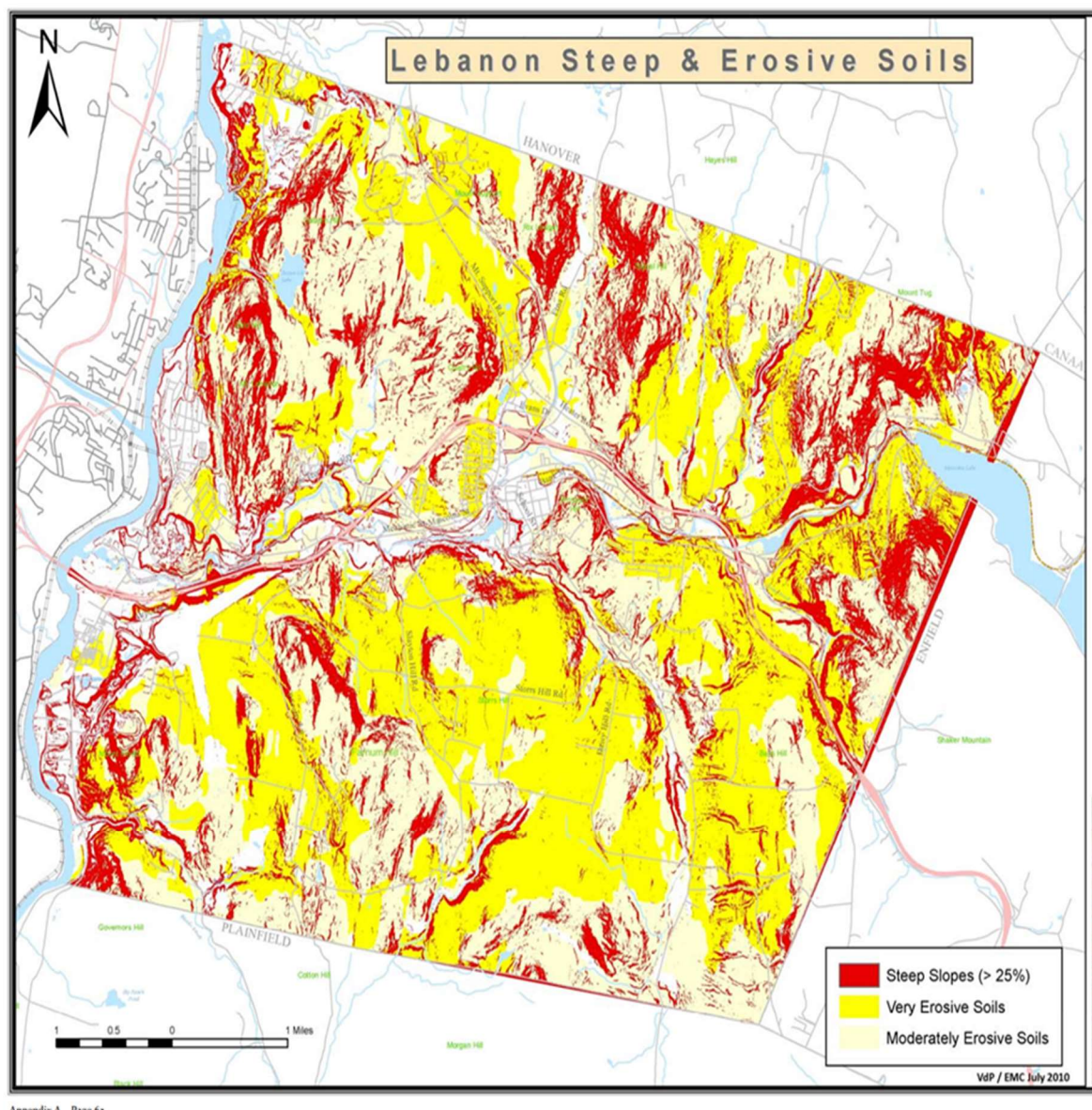
Map created from NHGRANIT data, City of Lebanon GIS data, and GPS data using a Garmin 12XL unit, 3.2 - 7.7 m precision. Property permission obtained for all parcels visited although not all parcels were field-checked. See accompanying list of SEA's. Note: Map data NOT for survey purposes. VdP / EMC 2009



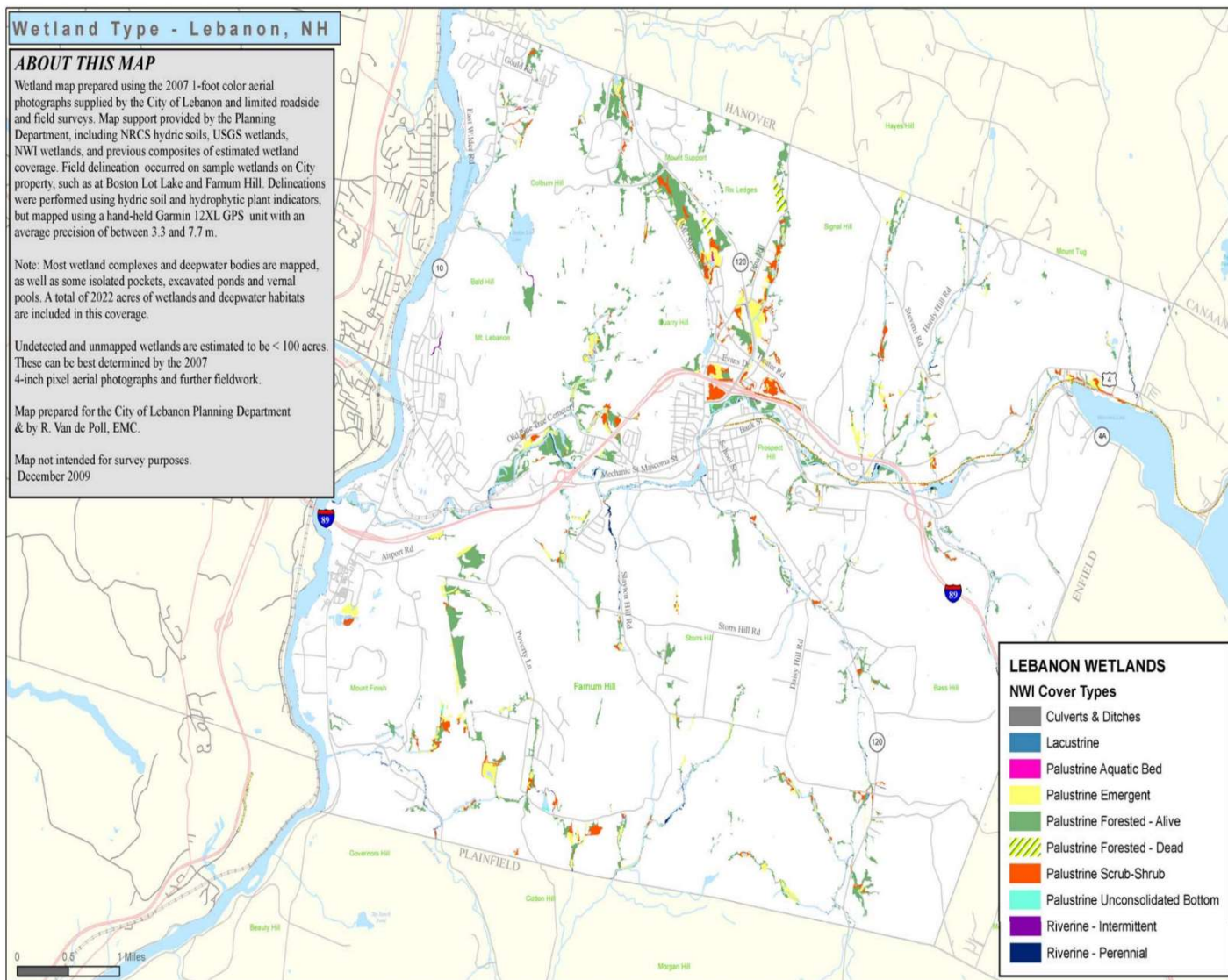
Legend	
	Significant Ecological Areas
	Lebanon Principal Wetlands
	Centerlines
	50-foot Contours
	Stream/River
	Lebanon City Boundary



Source: Lebanon Natural Resource Inventory 2010



Source: Lebanon Natural Resource Inventory 2010



Source: Lebanon Natural Resource Inventory 2010

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