LACONIA, NH NRI SUPPLEMENTAL STUDY | CO-OCCURRENCE

TO: Dean Anson, Chairman Laconia, NH Conservation Commission
FROM: Sarah Sullivan, FB Environmental Associates (FBE)
SUBJECT: **Laconia, NH Co-occurrence Analysis of Natural Resources**
DATE: August 3, 2026
CC: Christine Bunyon & Forrest Bell, FBE

EXECUTIVE SUMMARY

As a supplement to the City of Laconia's Natural Resources Inventory, FB Environmental (FBE) conducted a geographic information system (GIS) analysis, referred to as a co-occurrence analysis, of natural resources and natural resource protection areas to identify high value environmental and ecological areas. (Referred to as priority areas throughout the report.) The purpose of this analysis was to identify high priority natural resource areas to guide the Laconia Conservation Commission and Planning Department in development reviews, citywide strategic planning, and conservation planning. Additionally, this analysis will serve as a data driven tool for the Commission to reference and justify their decisions and recommendations to developers on areas that should be left undeveloped.

FBE gathered 36 geospatial data layers related to natural resources and natural resource protection in Laconia. From this analysis **fifteen areas** within the City of Laconia stand out as high priority areas, or areas with the highest density of natural resources and natural resource protections. Many of these high priority natural resource areas are protected by existing conservation. High priority areas generally fall into one of two categories:

1. Large, unfragmented priority corridors that dominate the residential outskirts/forest blocks (crucial for landscape-scale protection),
2. Smaller, discrete priority patches that exist along lake shorelines and urban streams (acting as critical micro-refuges and stormwater buffers).

The intended use of this data driven tool is to serve as a guide to ensure development and conservation grow in balance and the Commission is well positioned to identify areas throughout the City that warrant higher protection due to their environmental value. This tool should be used to establish a conservation planning roadmap, strengthen or inspire new municipal natural resource ordinances, and directly inform the City's Natural Resources Inventory report and Master Plan. We recommend targeted field investigations within identified priority areas to ground-truth desktop data, refine site-specific ecological values, and bolster the documentation needed to support land conservation or development restrictions.

METHODS

To identify the density of natural resources in Laconia, FBE conducted a co-occurrence analysis. A co-occurrence analysis identifies areas with the highest density of resources within a given area utilizing GIS. These high-density areas contain multiple and overlapping natural resources and resource protection areas. (These areas are referred to as high priority areas). Ultimately, the final compilation can serve as an aid in identifying zones to prioritize limiting development and/or expanding conservation efforts while protecting natural resources including waterbodies, wetlands, and terrestrial habitats for the community to enjoy into the future.

FBE gathered 36 geospatial data layers related to natural resources and natural resource protection in Laconia. The data used in the analysis represented publicly available data sets obtained from national, state, and city records including NH Geographically Referenced Analysis and Information Transfer System (NH GRANIT), U.S. Department of Agriculture (USDA), U.S. Natural Resource Conservation Service (NRCS) U.S. Federal Emergency Management Agency (FEMA), National Wetlands Inventory Plus (NWI+), National Hydrography Dataset (NHD), New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFG), and The City of Laconia (Table 1). Many of these data layers were created from remotely sensed data (e.g., aerial photography, digital orthophotos, and satellite images) and large, landscape-level mapping projects (e.g., Soil Units). As a result, the data layers are intended to be viewed at certain scales (generally 1:24,000 or 1:25,000) due to the level of accuracy of the source data. NH GRANIT maintains a continuing program to identify and correct errors in these data but make no claims as to the validity or reliability or to any implied uses of these datasets. As a result, the data presented herein should be used for planning purposes only. If greater data precision is required at the parcel level, this report should be supplemented with field surveys or other on-the-ground methods of data collection. There may also be minor data discrepancies throughout this document due to the variety of source materials and mapping standards used. The reader is encouraged to refer to the original referenced sources if specific data inconsistencies need to be resolved.

Spatial data (i.e., GIS data layers for surface waters, wetlands, streams, etc.) used in the GIS analysis were kept in polygon form to maintain feature shapes and accuracy. Next, to visually display the density gradation, each data layer was categorized into one of two categories. If the feature of interest (i.e., a surface water), was present, those polygons were given a value of 1. Where if a feature was absent (i.e., no surface water), those polygons were given a value of 0 (Figure 1). Through the graphical representation shown in Figure 1 as an example, areas with aquifers, surface waters, and a wellhead protection area would get a score of 3. The higher the score, the more resources are present.

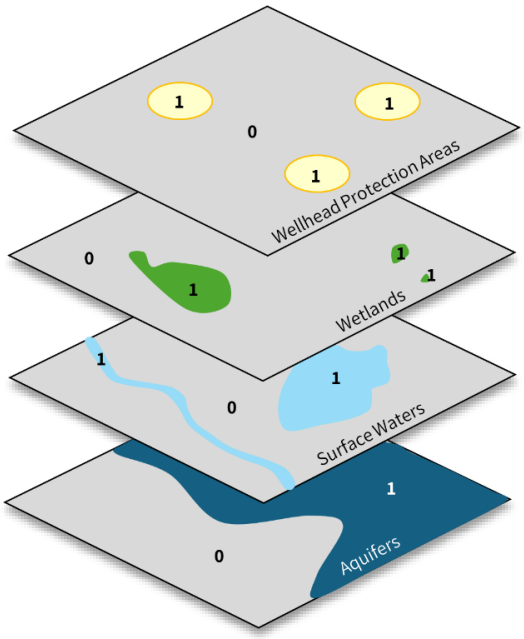

Figure 1. Graphical visualization of spatial data layers used in the GIS co-occurrence analysis with their reclassification of either 0 (absent) or 1 (present).

These 36 individual data layers were first classified with their features being present or absent. The data layers were then grouped into nine categories based on the type of natural resource they represent: **wetlands, lakes and ponds, rivers and streams, groundwater, flood areas, soils, unfragmented land, viewsheds, and terrestrial wildlife habitat** (Table 1). FBE then transposed all the data layers per category into a single data layer representing the category, where the presence scores (values of 1) were summed together for overlapping features. Because the nine categories had a range of one data layer up to six data layers within them, FBE then rescaled, or normalized the scores for each category to be from 0 to 1 so each category would hold the same weight, and the number of data layers present in a category would not skew the results (Table 2). These resulting nine data layers were then summed together to identify the overall density of natural resources present throughout the City of Laconia. An alternative method evaluated entailed prioritizing the categories by assigning weights. This would assign more emphasis to certain categories over others within the final co-occurrence scoring. Instead of all categories being rescaled from 0-1, some would be 0-1, others may be 0-2, and a few may be 0-3 and so on, based on an assigned importance to the category. This approach was not selected by the City of Laconia as to not introduce bias into the co-occurrence analysis and identification of priority areas.

Table 1. Spatial data gathered for the natural resource co-occurrence analysis for the City of Laconia, NH.

Category	Data Layer	Data Source	Last Date of Data Update
Wetlands	Wetlands	National Wetlands Inventory Plus (NWI+)	2025
	Wetland setbacks	FBE created from NWI+ and City standards	2025
	Vernal pools	City of Laconia	2026
	Vernal pool setbacks	FBE created from the City of Laconia	2026
	High function and value wetlands	FBE created from the NWI+ and a list from the City of Laconia	2025 data, early 2000's list
Lakes and ponds	Lakes and ponds	National Wetlands Inventory Plus (NWI+)	2025
	NH Shoreland Protection Act Shoreland Zone - waterbodies	FBE created from NWI+	2025
	Shoreland Protection Overlay District	City of Laconia	Unknown
	Laconia special waterbodies	FBE created from the NWI+ and zoning list from the City	2025 data, 2022 list
	Impaired waterbodies	FBE created from the NWI+ and a list from NHDES	2025 data, 2024 assessment
Rivers and streams	Rivers and streams	National Wetlands Inventory Plus (NWI+)	2025
	NH Shoreland Protection Act Shoreland Zone - rivers	FBE created from NWI+	2025
	Laconia Wetlands Conservation & Water Quality Overlay District	FBE created from NWI+ and Laconia setback regulations	2025
	Laconia special rivers and streams	FBE created from NWI+, used National Hydrography Dataset to identify stream names, and zoning list from the City of Laconia	2025
	Impaired rivers and streams	FBE created from the NWI+ and a list from NHDES	2025 data, 2024 assessment
Groundwater	Aquifers	NH GRANIT	2025
	GA2 groundwater classifications	NH DES	2025
	Wellhead protection areas	NHDES	2025
	Water Supply Protection Overlay District	City of Laconia	Unknown
Flood areas	Preliminary FEMA flood zones	FEMA	2024
Unfragmented land	Unfragmented land greater than 50 acres	City of Laconia	From the 2022 NRI

Category	Data Layer	Data Source	Last Date of Data Update
Soils	Prime forest soils	USDA NRCS, through NH GRANIT	2025
	Prime agricultural soils	USDA NRCS, through NH GRANIT	2025
	Poorly and very poorly drained soils	USDA NRCS Web Soil Survey	2025
	Steep slopes	City of Laconia	Unknown
	Precautionary slopes (15-24%)	City of Laconia	Unknown
Viewsheds	Winnipesaukee Scenic Railroad corridor	FBE created from the NH GRANIT Railroad data layer	2025
	Scenic Byway corridor	NH GRANIT	2025
	Laconia Rural Residential 2 corridors	City of Laconia	Unknown
	The Lakeport Neighborhood	City of Laconia	Unknown
Terrestrial wildlife habitat	Non-urban wildlife habitats	NH FGD Wildlife Action Plan	2025
	Wildlife habitat tiers	NH FGD Wildlife Action Plan	2025
	Wildlife corridors	NH FGD	2022
	Wildlife secondary corridors	NH FGD	2021
	Permanent wildlife openings	City of Laconia	From the 2022 NRI
	Prioritized habitat blocks	NH FGD	2020

Table 2. Co-occurrence analysis process ensures uniform weighting so categories with more data layers do not skew the results.

Data Layer	Initial Presence/ Absence Score	Category	Initial Category Score Range	Normalized (rescaled) Data Layer Score	Normalized (rescaled) Category Score Range
Wetlands	1	Wetlands	0 - 5	0.2	0.00 – 1.00
Wetland setbacks	1			0.2	
Vernal pools	1			0.2	
Vernal pool setbacks	1			0.2	
High function and value wetlands	1			0.2	
Lakes and ponds	1	Lakes and ponds	0 - 5	0.2	0.00 – 1.00
Shoreland Protection Act Shoreland Zone - waterbodies	1			0.2	
Shoreland Protection Overlay District	1			0.2	
Laconia special waterbodies	1			0.2	

Data Layer	Initial Presence/ Absence Score	Category	Initial Category Score Range	Normalized (rescaled) Data Layer Score	Normalized (rescaled) Category Score Range
Impaired waterbodies	1			0.2	
Rivers and streams	1	Rivers and streams	0 - 5	0.2	0.00 – 1.00
Shoreland Protection Act Shoreland Zone - rivers	1			0.2	
Laconia Wetlands Conservation & Water Quality Overlay District	1			0.2	
Laconia special rivers and streams	1			0.2	
Impaired rivers and streams	1			0.2	
Aquifers	1	Groundwater	0 - 4	0.25	0.00 – 1.00
GA2 groundwater classifications	1			0.25	
Wellhead protection areas	1			0.25	
Water Supply Protection Overlay District	1			0.25	
Preliminary FEMA flood zones	1	Flood areas	0 - 1	1.0	0.00 – 1.00
Unfragmented land greater than 50 acres	1	Unfragmented land	0 - 1	1.0	0.00 – 1.00
Prime forest soils	1	Soils	0 - 5	0.2	0.00 – 1.00
Prime agricultural soils	1			0.2	
Poorly and very poorly drained soils	1			0.2	
Steep slopes	1			0.2	
Precautionary slopes (15-24%)	1			0.2	
Winnipesaukee Scenic Railroad corridor	1	Viewsheds	0 - 4	0.25	0.00 – 1.00
Scenic Byway corridor	1			0.25	
Laconia Rural Residential 2 corridors	1			0.25	
The Lakeport Neighborhood	1			0.25	
Non-urban wildlife habitats	1	Terrestrial wildlife habitat	0 - 6	0.167	0.00 – 1.00
Wildlife habitat tiers	1			0.167	
Wildlife corridors	1			0.167	
Wildlife secondary corridors	1			0.167	
Permanent wildlife openings	1			0.167	
Prioritized habitat blocks	1			0.167	
Sum	**36**				**0.00 – 9.00**

RESULTS

With a possible range of co-occurrence scores from 0 to 9, scores of 0 through 4.3 were found within the City of Laconia. It is important to note that a score of or near 9 would have been impossible because that would have meant every single data layer was present in a given location, yet certain data layers will never overlap. For example, priority forest soils will never overlap with a lake.

Forty-six percent (46%) of the city (approximately 7,527 acres) was found to have a co-occurrence score that rounds to 2.0. Thirty-four percent (34%) of the city (approximately 5,655 acres) has a co-occurrence score that rounds to 1.0 (Figure 2). Less than 1% of the city (approximately 33 acres) has the highest co-occurrence scores, rounding to 4.0.

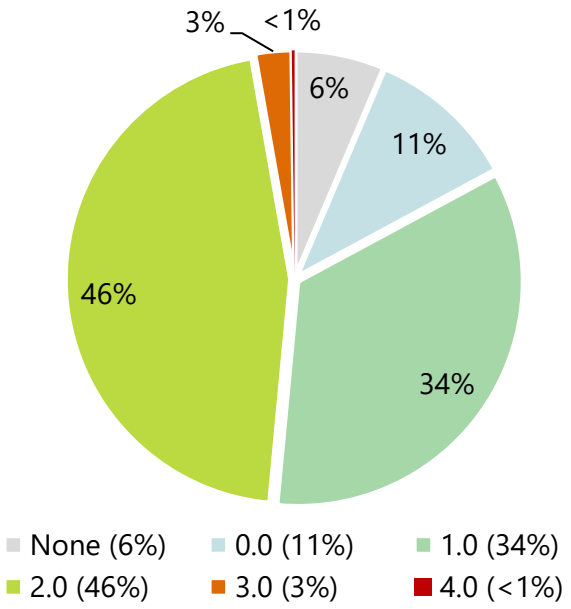

Figure 2. Percent of the city that rounds to co-occurrence scores by the whole number.

Fifteen areas within the City of Laconia stand out as having the highest co-occurrence or density of natural resources and natural resource protections (Figure 3). These were determined by looking at the co-occurrence scores that rounded to a 3.0 or 4.0. These include, areas along the Lake Winnipesaukee shoreline, Pickerel Cove, White Oaks Road wetlands and stream, Lily Pond, areas of the Paugus Bay shoreline, Black Brook, Jewett Brook, Durkee Brook, areas along the Lake Winnisquam shoreline, Leigh Cort wetland, an unnamed wetland system to the west of Outerbridge Drive, Hamel State Forest, Pickerel Pond Complex, the Upper Pickerel Wetland Complex, and Beaver Pond. These areas are referred to as 'priority areas' throughout the remainder of the report. Nine percent of the high priority areas (areas that round to a 3.0 or 4.0), **are already conserved**.

The largest areas of co-occurring natural resources include the Pickerel Pond Complex, the Hamel State Forest, the Upper Pickerel Wetland Complex, and the shoreline of Lake Winnipesaukee (Figure 3). Note the scale of the map in Figure 3 to show the full city makes it difficult to see smaller areas at a larger scale. A digital copy of the Natural Resource Priority Index data layer shown on the map was provided to the city for interactive viewing in mapping programs.

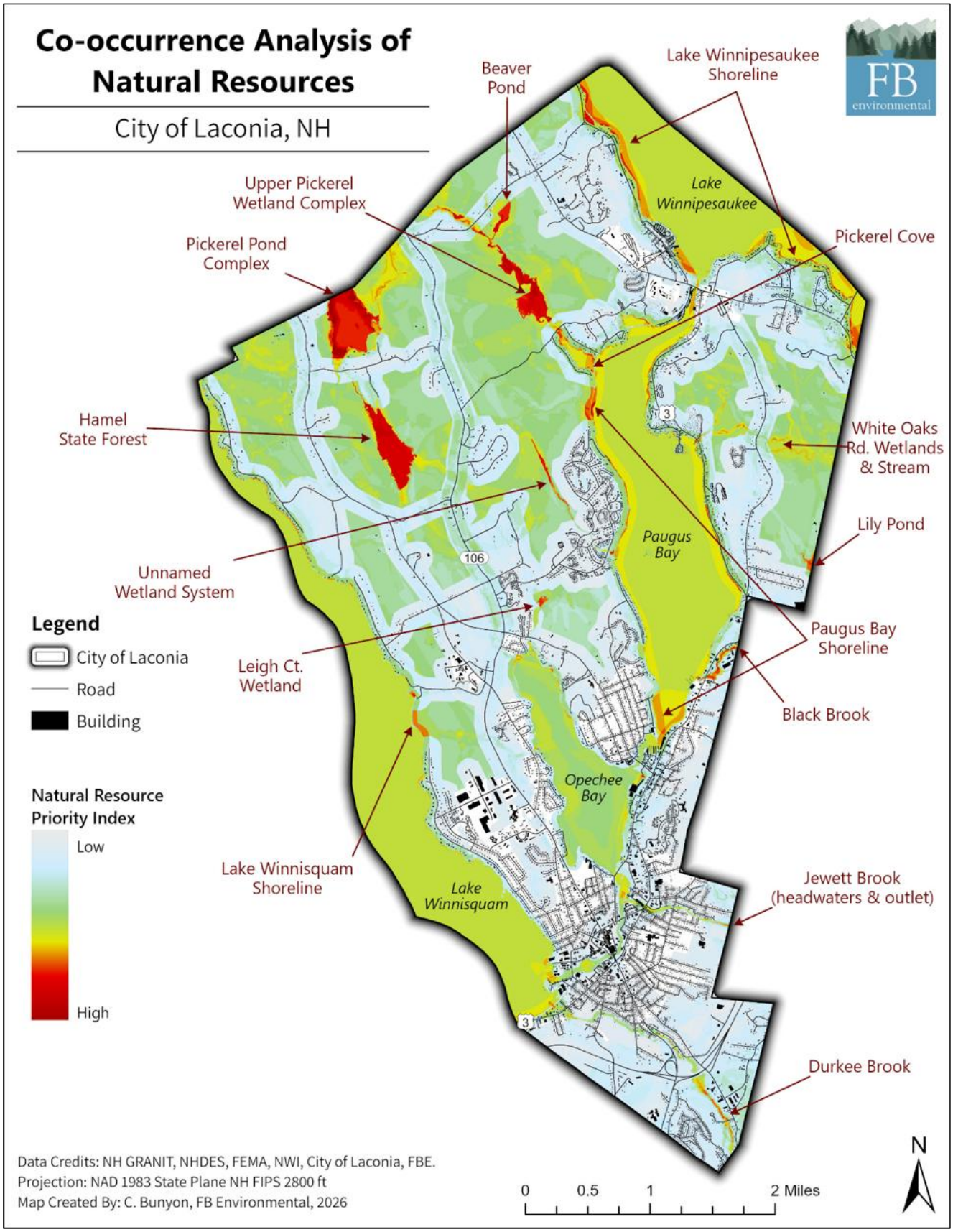

Figure 3. Co-occurrence analysis of natural resources within the City of Laconia, NH.

DISCUSSION

Spatial Patterns and Themes

When looking at the co-occurrence analysis results across the entire city, a few trends and themes are evident. These are described below and are organized by geography.

Rural, unfragmented land in North Laconia: Both the largest continuous areas (Pickeral Pond Complex, Hamel State Forest, Upper Pickerel Wetland Complex & Beaver Pond) and the majority of priority areas are in the northern half of the City. These areas strongly coincide with unfragmented blocks of land. These areas scored well for wildlife habitat and connectivity, likely due to water and wetland resources located in the region.

Lake Winnipesaukee, Paugus Bay, and Lake Winnisquam Shorelines: The shoreline along Lake Winnipesaukee and discrete areas along Paugus Bay and Lake Winnisquam rise as priority areas because of their water and wetland resources and regulatory protection mechanisms (Shoreland Zone) in addition to the presence of prime agricultural soils, prime forest soils, precautionary slopes (15-24%). The shorelines also score high because of high-value habitat.

Urban Opportunities: Smaller discrete priority areas are located along Durkee, Jewett, and Black Brook. Because these areas overlap with Laconia's urban core and heavily developed lakefronts, which constrain natural resources and impede upon natural resource protection areas, the remaining natural resources are especially unique and valuable to protect. While high priority resource areas in these developed zones are fragmented they remain vital ecological assets within the City's built environment. The priority areas within the developed downtown and lake shorelines should be protected to protect the quality and condition of these resources.

Existing Conservation: As noted previously, many portions of these priority areas are already conserved (Hamel State Forest, Pickerel Pond Complex, and Upper Pickerel Wetland Complex). This existing protection provides a strong foundation for citywide conservation, as these high-density resource areas are vital for safeguarding wildlife, protecting water quality, and preserving the natural character of the Lakes Regions. Pursuing new conservation properties that abut currently conserved lands (such as the Huston-Morgan State Forest parcels, Puleo Farm Conservation Easement, Prescott State Forest, Shad Path (Rice) property, and the Paugus Bay State Forest) will strengthen the conserved landscape. Conversely, development of parcels immediately adjacent to conserved lands should be discouraged and/or low impact development should be strongly encouraged.

Connectivity and Corridors

Most priority areas (big or small) are connected through or associated with the network of stream and river corridors present throughout the City. Additionally, most of the priority areas themselves form continuous corridors, with a few exceptions of isolated islands, and the smaller and discrete priority areas discussed above. These contiguous tracts are more resilient to change and pressures from development and climate change and serve as important habitat refugia for wildlife. Smaller discrete priority areas among the urban core can serve as important points of connection for residents to experience Laconia's natural resources.

Both scales and sizes of priority areas are critical to protect from development however, the Commission may approach goals and priorities differently. For example, goals for the large priority areas could focus on supporting wildlife habitat and migration, preserving contiguous forested blocks and wetlands, and maintaining climate resilience. Conservation strategies and actions for these areas include land acquisition and

easements, recommending or enforcing open space residential cluster development in the vicinity of the large priority areas while requesting the high priority areas be left as open space, or implementing tax incentives like the current use taxation program which incentivizes landowners to keep their land undeveloped.

The small discrete priority areas may be highly fragmented but are incredibly valuable because in some cases and locations in the city, these areas are the last remaining natural spaces in the highly urbanized downtown or dense residential development. These areas provide ecosystem services critical to urban areas such as stormwater mitigation and management, reducing urban heat island effects, water filtration, and community access to nature and the health benefits provided. Conservation strategies for the smaller areas could include implementing strict regulatory oversight, such as no-disturbance zones; requiring developers to implement low impact development strategies like pervious pavement, rain gardens, swales; and strict buffer ordinances. The City should also consider identifying and formally protecting some of these key areas as pocket parks or natural buffers to urban properties. Protection of the smaller priority areas should be driven by restricting development. Conserving these areas will be less fruitful because isolated pockets of land tend to be harder to manage.

Specific geographic areas of concern for development pressure include the Durkee Brook, Black Brook, and Jewett Brook riparian corridors as they are surrounded by urban development but are critical natural resources that connect the landscape with three out of the four major waterbodies in Laconia (Lake Winnisquam, Paugus Bay, and Opechee Bay). Another critical natural resource area that is highly developed and under continuous developmental stress are the shorelines of Lake Winnipesaukee, Paugus Bay, Lake Winnisquam, and Opechee Bay. Retaining riparian buffers along both stream and lakes is critical for upkeeping the quality and health of these resources which in turn provide health and economic benefits to the City.

Recommended Site-Specific Evaluation

FBE recommends field investigation and/or supplemental field-based studies within priority areas to further refine the ecological importance of the identified sites. FBE also recommends investigations of areas with median natural resource priority indexes (areas shown in orange or yellow in Figures 3 and 4) to explore if there are additional features or resources to consider for these areas to be higher priority. Targeted field investigations at select high environmental and ecological value priority areas will bolster and enhance documentation into why each area should be left undeveloped and/or conserved.

To further refine the ecological importance of both high and median priority areas, field investigations could include:

- Ecological Inventories: classification and description of the natural resources, natural community and cover type mapping, vernal pool surveys, rare, threatened, and endangered wildlife and botanical surveys, stream corridor habitat assessments;
- Water Quality & Shoreline Inventories: water quality monitoring of lakes and rivers, shoreline condition and buffer integrity assessments, macroinvertebrate sampling;
- Threat & Management Assessments: invasive species inventorying, property-based stewardship and management planning, and trail assessments to determine ideal locations for new trails or evaluating ways to improve existing trail systems for both people and wildlife.

Conducting fieldwork at existing conservation properties that overlap high priority area, such as at Prescott State Forest, Puleo Farm Conservation Easement, and the Huston – Morgan State Forest parcels which overlap with the Hamel Forest priority area, will enhance the Commission's knowledge of the natural resources present

on site. Additionally, these insights gained about the landscape and resources found can be extrapolated to the adjacent unprotected potions of the priority areas, further bolstering data and justification for leaving the priority area undeveloped and/or reasons to conserve the land. This concept is applicable to all the City's conservation properties that overlap or are near priority areas. Please note that access and permission are key factors necessary for field investigations.

Ground truthing desktop derived information used in the co-occurrence analysis is valuable and necessary to make site-specific determinations to pursue a new conservation parcel or providing comment and limiting development at a proposed development project site. However, fieldwork citywide is resource-intensive. Table 3 outlines a tiered approach to identifying and prioritizing locations for field investigations.

Table 3. A framework for identifying, prioritizing, and selecting areas to conduct fieldwork investigations.

Priority Level	Location Criteria	Why This Area?
Tier 1: High Urgency	High-priority areas currently facing active development pressure or up for subdivision review.	Site specific information provides field verified findings which is critical for decision making. An applicant likely completed this site level work.
Tier 2: Strategic Expansion	High priority areas (red) directly adjacent to existing conservation lands. (E.g. Abutting Hamel Forest)	Permanent protection of large contiguous blocks of land are more resilient to change and pressures from development and climate change.
Tier 3: Filling in Data Gaps	Median priority areas (orange or yellow) adjacent to high-priority (red) areas AND existing conservation properties or other city owned land.	Explore if there are additional features or resources to take into account and reason for these areas to be higher priority.

NEXT STEPS

With the spatial patterns established and a framework for field investigations, the true value of this co-occurrence analysis lies in its application and use by the Conservation Commission and Planning Department. The intended use of this data driven tool is to serve as a guide to ensure development and conservation grow in balance and position the Commission to identify areas throughout the City that warrant higher protection due to their environmental value. Additionally, this tool can be used to establish a roadmap for conservation planning and prioritizing land acquisition efforts, provides the empirical support needed to strengthen existing municipal natural resource ordinances, and directly informs concurrent municipal updates to the City's Natural Resources Inventory report and Master Plan.

Strategic Land Protection & Regional Collaboration

Strategic planning will enable the City to prioritize conservation actions where they will yield the greatest benefit and impact.

- Prioritize High-Scoring Parcels: FBE recommends the Commission focus proactive conservation efforts (e.g. land acquisitions, donations, or conservation easements) on large, unfragmented priority blocks identified in the analysis such as land in the vicinity of Hamel State Forest, Pickerel Pond Complex, and the Upper Pickerel Wetland Complex in combination with the Beaver Pond priority areas. Additionally, the Commission should prioritize conserving land adjacent to existing conservation properties.

    - FBE recommends that the Commission prepare a Conservation Plan. The Commission can utilize the co-occurrence analysis as a catalyst for developing the outline and guidance for prioritizing conservation efforts.
    - Review the Lakes Region Conservation Plan to find synergies between the City of Laconia's priorities with regional priorities.

- Partner with Local Land Trusts and Neighboring Towns: Partner with regional organizations, such as the Lakes Region Conservation Trust (LRCT), to collaborate and brainstorm ideas, pool resources, share grant opportunities (e.g., LCHIP or State Revolving Funds), and pursue joint acquisitions for parcels extending beyond municipal borders.
    - Local and regional conservation partners:
        i. Lakes Region Conservation Trust
        ii. New England Forestry Foundation
        iii. NH Audubon
        iv. Society for the Protection of NH Forests
        v. The Nature Conservancy NH
        vi. Trust for Public Land
        vii. Towns of Gilford, Meredith, Belmont, and Sanbornton
- Engage Willing Landowners: Develop targeted outreach for private landowners within designated high-priority corridors to introduce voluntary land conservation options and Current Use benefits.

Municipal Regulatory Alignment

While conservation and land acquisition are ideal for permanently protecting natural resources, land protection must also occur through sound municipal regulation. The co-occurrence analysis provides the baseline needed to review and strengthen existing City ordinances.

- Evaluate the Wetlands Conservation & Water Quality Overlay District: Cross-reference the GIS co-occurrence layers with the current overlay boundaries to identify sensitive aquatic habitats, vernal pool clusters, or steep-slope riparian buffers that may fall outside current municipal protections. Consider amending the ordinance to include buffers along the "high function and value wetlands" named in the 2000 Natural Resources Inventory report, which coincide with many of the priority areas.
- Strengthen the Shoreline Protection Ordinance: Given Laconia's extensive frontage along Lake Winnipesaukee, Paugus Bay, Lake Winnisquam, and Opechee Bay, the City should consult the Lake Winnipesaukee Alliance (LWA) to evaluate whether current local shoreline setbacks and impervious surface restrictions are sufficient to protect high-priority shorelines mapped in this project.
- Integrate into the Natural Resources Inventory and Master Plan: Embed this analysis directly into the Natural Resources Inventory Report and Natural Resources chapter of the City's Master Plan to ensure consistent backing during Planning Board and Zoning Board of Adjustment reviews.

Supplemental Studies

To further enhance municipal decision-making, evaluate anthropogenic and development influences on the landscape, and adapt to changing climate conditions, FBE recommends considering the following supplemental studies:

1. Build-Out Analysis: Collaborate with the LWA and FBE to review existing build-out analyses conducted based on current zoning ordinances that modeled a future development scenario within the Paugus Bay, Meredith Bay, and Sanders Bay watersheds that include portions of the City of Laconia. Consider expanding the build-out analysis to cover the full city. Additionally, consider using the build-out analysis as a tool to model proposed ordinance amendments to evaluate potential impacts on development and local water quality, municipal infrastructure, and habitat fragmentation.
2. Trails Assessment: Conduct an inventory and mapping existing trails at City conservation properties and completing a trails assessment utilizing the NH Fish and Game Department's Trails for People and Wildlife model and analysis methodology.
3. Vernal Pool Identification: Conducting a GIS analysis to model potential locations of vernal pools. Followed by field verification, inventorying, and documentation.
4. Municipal Sewer and Septic System Vulnerability Assessment: Conduct a sewer and septic system vulnerability assessment and septic system inventory or other on-site wastewater planning projects to evaluate potential vulnerable areas to deteriorating wastewater infrastructures.
5. Climate Resilience – Flood Vulnerability: Conduct a Flood Vulnerability Study to evaluate the City's vulnerability to flooding and increased frequency of high volume rain events. Since the FEMA flood hazard areas are dated, an updated hydrologic evaluation is necessary to evaluate flooding concerns. Assess vulnerability of the municipal water, stormwater, and wastewater infrastructure systems to flooding and increased frequency of high volume rain events.

Data Accessibility and Interactive Web Mapping

To maximize the utility of the co-occurrence analysis and translate the static map into a dynamic tool, the City can view the co-occurrence data layer in GIS. Alternatively and subsequent to this project, FBE could assist the Commission with creating an online mapper to display and facilitate interaction with the data. The mapper could be used solely as an internal municipal tool or be made publicly available through the City's website. We encourage the City to consider the pros and cons of making the co-occurrence analysis data publicly available.

CONCLUSION

The GIS co-occurrence analysis provides the City of Laconia and its Conservation Commission with a defensible, data-driven framework for municipal decision-making. By identifying high-priority resource areas, this tool bridges the gap between raw spatial data and proactive land conservation. Moving forward, integrating these findings into municipal ordinances, field-validating priority areas, and collaborating with local land trust partners on conservation actions will ensure that Laconia's critical natural resources and water quality are protected for future generations.

Attachment 1

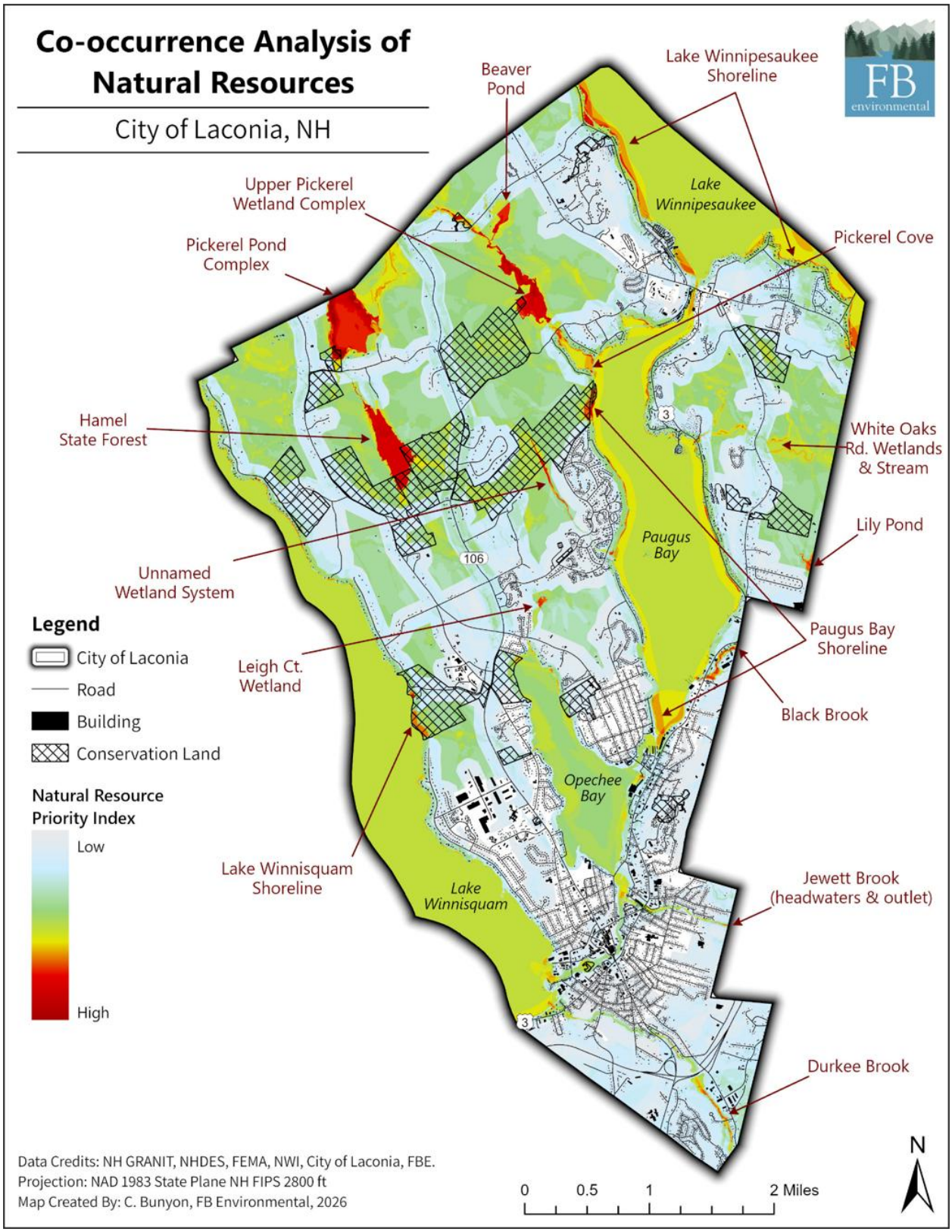

Figure 4. Co-occurrence analysis of natural resources within the City of Laconia, NH without existing conservation lands overlaid.