2017 Culvert Assessment Report
Ashland, New Hampshire

Picture taken on Leavitt Hill Road during assessments in Ashland, NH.

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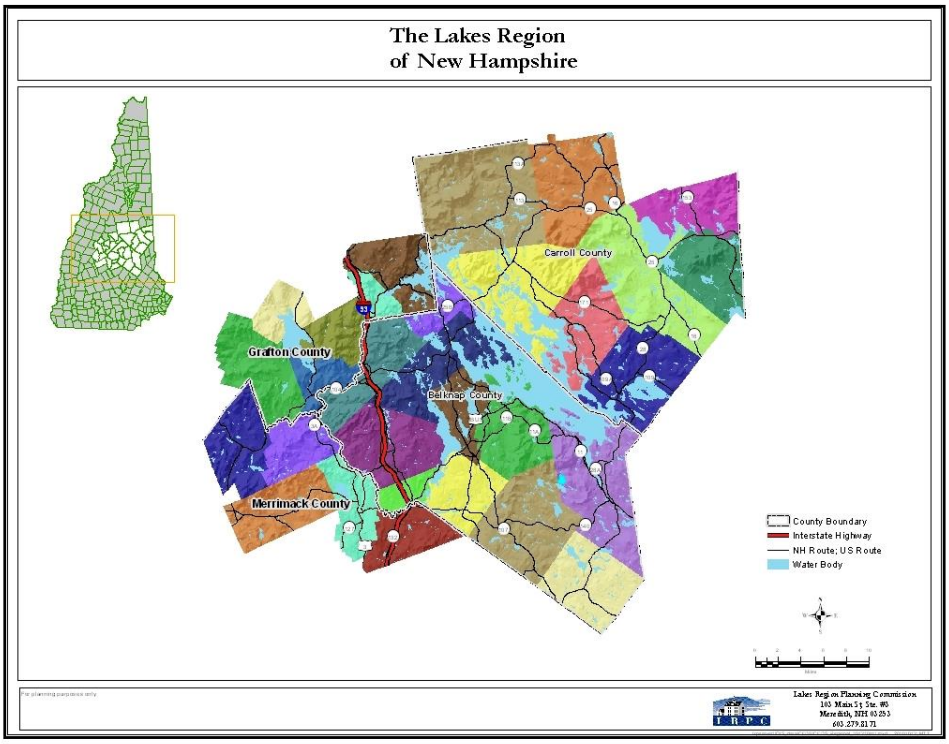

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I. Introduction

The Lakes Region Planning Commission (LRPC) conducted a GPS inventory of culverts on Class V roads in Ashland, NH. The inventory included not only GPS locations of culverts, but also collection of certain attributes related to the culvert (including overall condition) as identified in the Statewide Asset Data Exchange System (SADES) Data Collection Specification Guide for Culverts, updated and published in 2017 by UNH Technology Transfer Center in partnership with NH DES, NHDOT, and New Hampshire's Regional Planning Commissions (Appendix A). This work was conducted under a contract with the town and with financial support through the NH DOT.

This report explains the process used, summarizes the overall results, and explains how this information might be used to assist the town in maintaining its drainage infrastructure. Products include: this summary report with charts, graphs, and maps, larger versions of these maps, an Excel database showing the full assessment results for each feature, the GPS points for all features, and a GIS Shapefile can be provided. There are additional resources listed in Appendix B. Parameters used in this guide and definitions of terms are included in Appendix C. Maps referenced in this report are located in Appendix D and a more detailed description of the SADES program is in Appendix E.

II. Crossing Types

After meeting with the Ashland Road Agent and Town Administrator, and reviewing the methodology for culvert assessments, three trained transportation technicians under the supervision of LRPC staff located and assessed 216 culverts and catch basin inlets. Assessments took place between June 29, 2017 and July 14, 2017 with Quality Assurance/Quality Control (QA/QC) extending into August. Figure 1 below shows that of the 216 structures, about 88% were considered to be drainage features (typically water is not present except in the case of a heavy rainfall), about 10% were culverts at the locations of streams (water is present most of the year and has defined banks), and the remaining were either surface water (pond or lake), wetlands (water is present most of the year and have no defined banks), or not surveyable for a variety of reasons (usually due to private property boundary lines). The crossing type and locations are shown in Map 1 "Ashland, NH-Crossing Type 2017." The summer of 2017 was quite rainy; as a result, many drainage culverts had some amount of water in them.

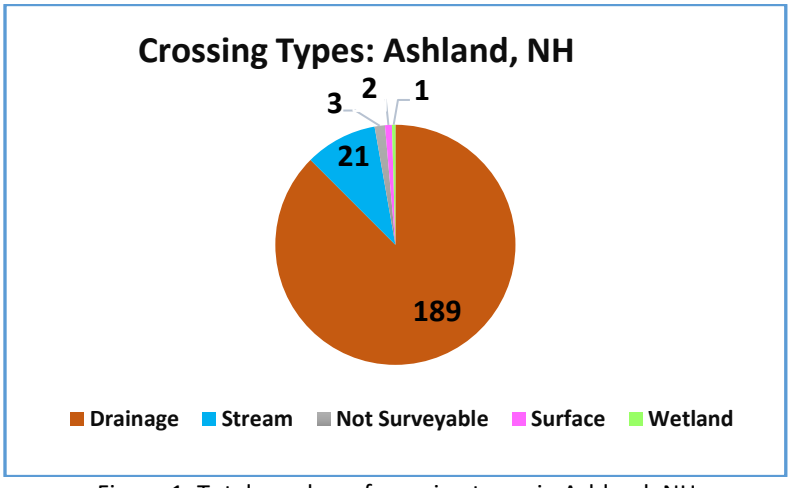


Figure 1: Total number of crossing types in Ashland, NH

III. Drainage Structures

Culverts and other drainage features such as: catch basin inlets, elliptical culvert, round culvert, and bridges were found along most but not every municipal road. A high number of drainage features such as storm drains and catch basin inlets were found near the center of town on roads such as Highland Street and Thompson Street. Though there is a difference between storm drains and catch basins, this culvert assessment classified both structure types as 'catch basin inlets,' with a total of 123 structures. Figure 2 displays examples of the most common catch basin inlets in Ashland. Map 2, "Ashland, NH - Structure Type," shows locations of the types of culverts and drainage features.

Figure 2: Examples of commonly found 'Catch Basin Inlets' in Ashland, NH.
(Left: North Ashland Road near Route 3, Right: Highland Street near Cottage Street)

The assessment of culverts followed the NH Department of Transportation protocol with the addition of some other parameters, this resulted in the collection of twenty-seven attributes regarding the setting, condition, and use of the feature. The list of attributes collected is included as Appendix A. Where conditions made it difficult to collect all the information, detailed comments were made regarding the feature and conditions.

IV. Materials

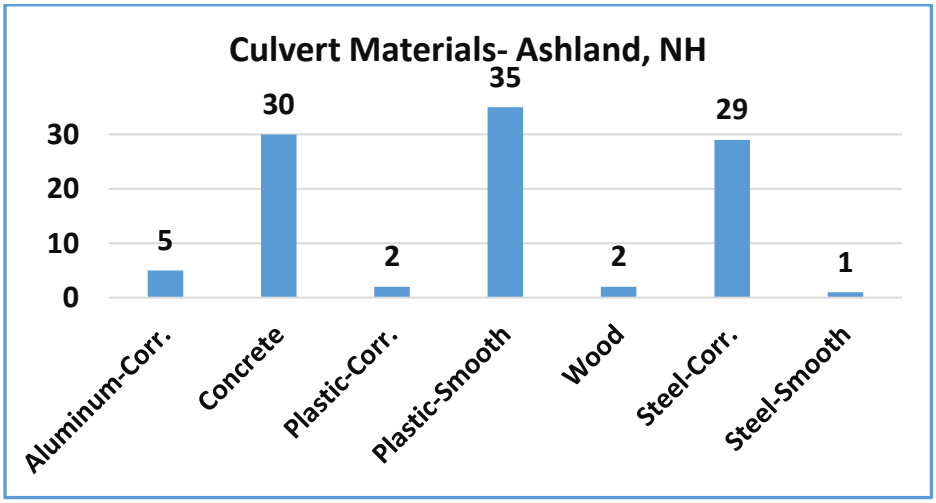


Figure 3: Number of Culverts in Ashland, NH.

The features in Ashland were found to be composed of seven different types of materials. These include: concrete, wood, plastic-corrugated, plastic-smooth, steel-corrugated, steel-smooth, and aluminum corrugated. Figure 3 summarizes the materials identified (not including the 112 storm drain features) and illustrates that the most common material used in Ashland's culverts is plastic-smooth (35 features). We found there were almost as many concrete and steel-corrugated features as plastic-smooth, examples of these materials are shown in Figure 4. There were limited numbers of wood, aluminum-corrugated, plastic-corrugated, and steel-smooth features. The location of these are shown in Map 3 "Ashland, NH- Structure Materials."

Figure 4: Examples of the most common culvert materials in Ashland, NH.
(Left: Plastic-Smooth* on Peppercorn Road, Middle: Steel-Corrugated intersection of Hill Ave and Winter Street, Right: Concrete on Owl Brook Road)
*Determined by the inside surface of the pipe.

V. Sediment Buildup

Culverts were assessed for the amount of sediment buildup, they were categorized into five groups (open, ¼ full, ½ full, ¾ full, and entirely full). The majority of culverts that were assessed for sediment build up are 'open' and free of any obstructions. However, ten of the 80 assessed structures (12.5%) were found to be at least half full. Examples of open, ½ full, and entirely full culverts are shown in Figure 5. The locations of these are shown in Map 4 "Ashland, NH – Structure Sediment Buildup." Catch basin inlets and some other drainage features were not assessed for this specific attribute, due to inaccessibility.

Figure 5: Examples of various amounts of sediment build up in Ashland, NH.
(Left: Open on Partridge Ln, Middle: ½ Full on Leavitt Hill Rd near Loon Ln, Right: Entirely Full on Sanborn Rd)

VI. Condition

Our trained transportation technicians looked at a couple other attribute ratings such as, headwall materials and condition, as well as the amount of sediment built up in the structure. They also took into consideration a general visual inspection such as: if the pipe is deformed, spalled, excessively rusted, filled with standing water, or any other factor that would show a degradation in the overall condition.

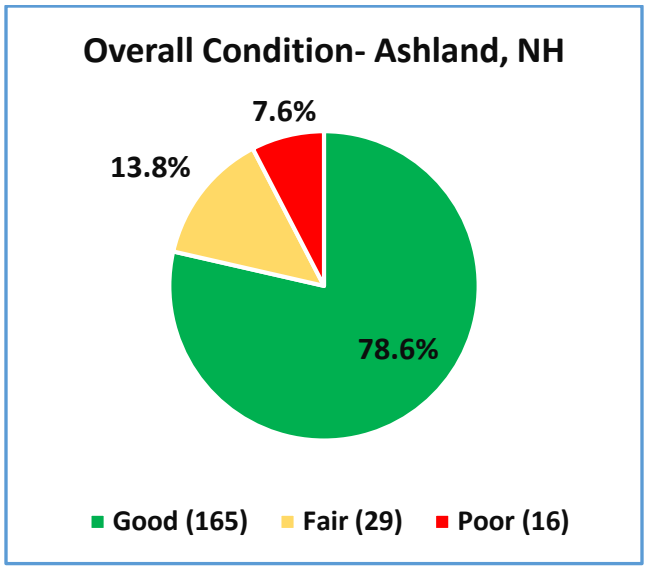


Figure 6: Overall condition of structures in Ashland.

At the end of each culvert and drainage feature assessment the field crew took into consideration the overall structure condition and categorize it as being: good, fair, or poor. Locations of these are illustrated in Map 5 “Ashland, NH – Overall Condition.” Most of the structures in Ashland are considered to be in good condition, but nearly 8% were characterized as “poor” overall structure condition (Figure 6).

VII. Summary

The 2017 Ashland culvert assessments have provided data that allows culverts and drainage features to be categorized by a variety of parameters. Some parameters covered in this report include: crossing type, drainage structures, structure materials, sediment build up, and overall condition. The most common crossing types in Ashland are drainage and the second most common are classified as stream crossings. The three most prevalent structure materials are plastic-smooth, steel-corrugated, and concrete. Overall, the majority of Ashland’s features are in good condition with about 21% of features falling into the fair or poor category.

Accompanying this report are poster-sized versions of the five maps included in this report, a searchable Excel database, and a shapefile of the features for use in GIS mapping. This report presents information from a half dozen attribute fields associated with Ashland's drainage features. With the assessment data in the spreadsheet and shapefile the town can search, sort, and present information related to any of the categories listed. If more information on the attribute definitions and ratings is needed, please contact LRPC.

Road drainage structures are an important part of any community's infrastructure. They are situated at the intersection of the built (road network) and natural (watershed) environments. With more than 200 structures in Ashland, these represent a significant investment by the town. They should be properly maintained and, if necessary replaced/upgraded to avoid flooding, erosion, washout and the resulting damage to roads, property, and even life. There are several very useful resources in Appendix B that the town should explore to help in maintaining and upgrading its road drainage structures.

This report and accompanying materials are provided as tools for locating the town's drainage infrastructure as well as to assist in sorting features by selected attributes. The database and shapefile can also be used for tracking maintenance and upgrade activity in the future.

Appendix A

SADES Culvert Assessment

Specification Guide

SADES Culvert Assessment

Specification Guide

1) Basic Information

a) Assessment Date
b) Observer(s)
c) Organization
d) Project Name (Town)
e) Road Name

2) General Culvert Information

a) Crossing Type (Stream, Drainage, Wetland) *
b) Structure Skewed to Roadway*
c) Structure Type
d) Structure Material
e) Structure Condition Overall

3) Upstream Assessment

a) Upstream Waterbody*
b) Upstream Dimensions (ft)
c) Inlet Headwall Materials*
d) Inlet Headwall Condition*
e) Inlet Invert Elevation (ft)
f) Roadway Elevation (ft)
g) Cover Depth (ft)

4) Downstream Assessment

a) Downstream Waterbody*
b) Downstream Dimensions (ft)
c) Outlet Headwall Materials*
d) Outlet Headwall Condition*
e) Outlet Invert Elevation (ft)
f) Outfall Treatment

5) In/Through Structure Assessment

a) Length of Stream through Crossing (ft)
b) Crossing Slope (%)
c) Structure Clogged with Sediment*
d) Depth of Substrate in Structure (ft)

6) Comments

Pictures (6)

*These parameters supplement the DOT core assessment.

Appendix B

Useful Resources

- **University of New Hampshire Technology Transfer (UNH T²)**
  - *SADES* (Statewide Asset Data Exchange System) - establishes a primary transportation inventory of assets including a maintainable condition assessment process for many state and local agencies
    - https://t2.unh.edu/sades-0
  - *Culvert Maintainer Certification Training* - Provides a course that covers the basics of culvert maintenance. NH Department of Environmental Services provides the Certification.
    - https://t2.unh.edu/culvert-maintainer-certification-training-information
  - *T2 Workshops* - Provides workshops relative to culvert installation & maintenance, proper drainage techniques, stream crossings, and many other technical assisstance topics.
    - https://t2.unh.edu/t2-workshops
- **New Hampshire Homeland Security and Emergency Management (NH HSEM)**
  - A state agency responsible for coordinating the planning, responding to, and recovery from major natural (such as flooding) and manmade diasters. NH HSEM offers a grant program focusing on hazard mitigation planning to assist municipalities with flood reduction efforts.
    - https://www.nh.gov/safety/divisions/hsem/
- **Department of Environmental Services - Water Division (DES)**
  - Provides updates, rules, education/outreach, technical assistance, and more in regards to stormwater management. Provides the New Hampshire Culvert Certification.
    - https://www.des.nh.gov/organization/divisions/water/stormwater/index.htm
    - https://www.des.nh.gov/organization/divisions/water/wetlands/streams_crossings.htm
- **New Hampshire Department of Transportation (NHDOT)**
  - Provides information and support regarding statewide and municipal transportation projects.
    - https://www.nh.gov/dot/index.htm
- **Lakes Region Planning Commission (LRPC)**
  - Provides additional information about the SADES program that LRPC participates in.
    - http://www.lakesrpc.org/servicestransportation.asp

Appendix C

Definitions

Crossing Type

Drainge - A crossing at a depression or indentation in the landscape that conveys or stores water only during or directly following precipitation events. Engineered landforms such as storm water retention ponds and roadside ditches should be classified as drainages.

Stream - A crossing through a depression in the landscape that has defined channel banks and transports water either intermittently or perennially to lower elevations.

Wetland - A crossing with an upstream waterbody that does not have defined channel banks and is in an area where the water table is at or above the land surface throughout the year. The soil is saturated with water and vegetation and there is often standing or flowing water in areas.

Surface - A crossing at a depression in the land surface that stores water, such as a lake or pond, and does not have defined channel banks.

Not Surveryable - A crossing that cannot be surveyed due to safety or access issues, such as a crossing on a busy street, or a culvert on private land.

Structure Skewed to Roadway -This has implications for how water and materials flow through the opening.

No - The crossing struture is situated at (roughly) a 90 degree angle (perpendicular) to the road.

Yes - The crossing structure is **not** situated at (roughly) a 90 degree angle (perpendicular) to the road.

Headwall Condition

Good - Headwall is concrete or stone: spalling (deterioration) of no more than ¼" thickness is present, joints between headwall and wingwalls may be broken, or some mortar could be missing from joints. Metal: pitting or superficial rust may be present.

Fair - Headwall is concrete or stone: spalling of no more than ¼" thickness is present but no reinforcement is present, joints between headwall and wingwalls are beginning to separate, or joints between stones are broken. Metal: flaking rust is present and some loss of wall thickness is present, or a hole can be poked through the wall with a sharp point.

Poor - Headwall is concrete or stone: reinforcement is visible, stones are loose, or large cracks run through the headwall. Metal: holes due to corrosion are present, full length cracks or tears are present, joints are seperated, or severe deformation is present.

Overall Structure Condition

Good - Like new, with little or no deterioration, consistent shape, minor joint misalignment, no movement, structurally sound and functionally adequate.

Fair - Some deterioration or cracking, joint speration with minor inflitration but struturally sound, localized distorion in shape, and funtionally adequte.

Poor - Significant deterioration or extensive cracking and/or spalling, extreme deflection in shape, joint seperation with potential to create voids, significant movement and/or functionally inadequate requiring maintainance or repair.

Appendix D

Maps

Appendix E

SADES Program and Lakes Region Planning Commission

SADES Data Collection Program and Lakes Region Planning Commission (LRPC)

The SADES (Statewide Asset Data Exchange System) is a joint program among regional planning commissions, NHDOT, NHDES and UNH T^2 that establishes a primary transportation asset inventory system and maintainable condition assessment process for many state and local agencies. This unique approach to statewide asset management utilizes modern technology for accurate, sustainable, efficient, and cost effective data collection and analysis. Even though the UNH Technology Transfer Center (UNH T^2) has made asset management software packages available for over 25 years, alignment of recent technological changes with new electronic devices and software advances has made dynamic data management much more manageable.

The SADES training program brings LRPC technicians and planners together with experts from NHDOT, NHDES, UNH T^2, and the private sector to learn about structural and environmental factors, how to inventory and assess the condition of these factors, and how to efficiently use the state-wide data collection system. By requiring this training of all technicians along with rigorous quality assurance and quality control (QA/QC) and ongoing technical support, a high standard and level of consistency is assured.

SADES Training is required and on-going support provided to LRPC planners and technicians in the use of the SADES inventory and analysis and forecasting software. The development, piloting, and implementation of these transportation management modules was completed in large and small communities across the state to ensure that the software formulas could accommodate and properly reflect the conditions encountered in most New Hampshire communities.

Trained and certified LRPC planners and technicians can utilize the SADES protocol to inventory and assess the following transportation assets:

Stream Crossings and Culverts;

Sidewalks;

Crosswalks;

Curb Ramps;

Pavement Conditions (RSMS);

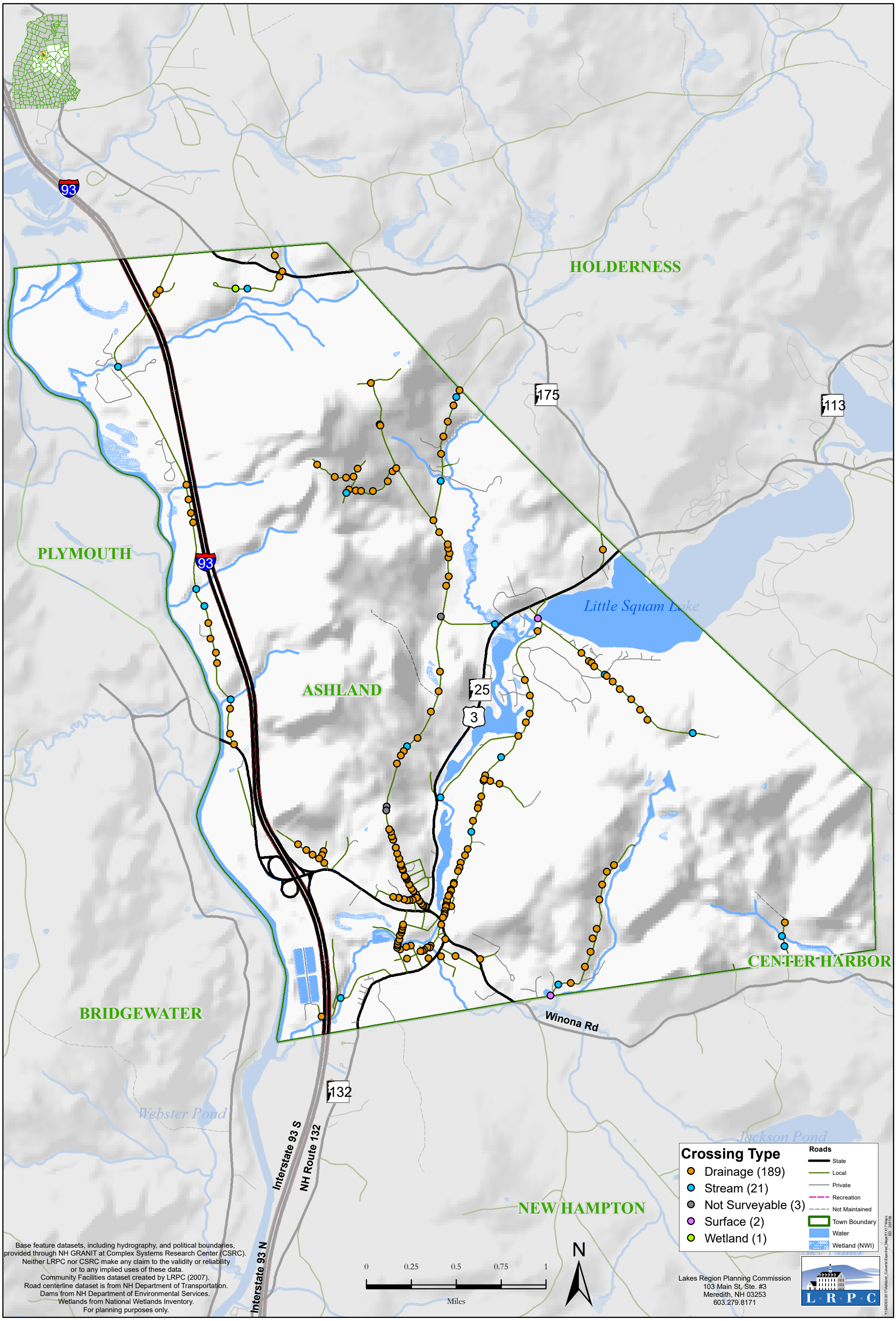
Guardrails; and also investigating

Closed System Drainage (such as Catch Basins); and

Municipal Bridge Inventories

Crossing Type

Ashland, NH



Base feature datasets, including hydrography, and political boundaries, provided through NH GRANIT at Complex Systems Research Center (CSRC). Neither LRPC nor CSRC make any claim to the validity or reliability or to any implied uses of these data.
Community Facilities dataset created by LRPC (2007).
Road centerline dataset is from NH Department of Transportation.
Dams from NH Department of Environmental Services.
Wetlands from National Wetlands Inventory.
For planning purposes only.

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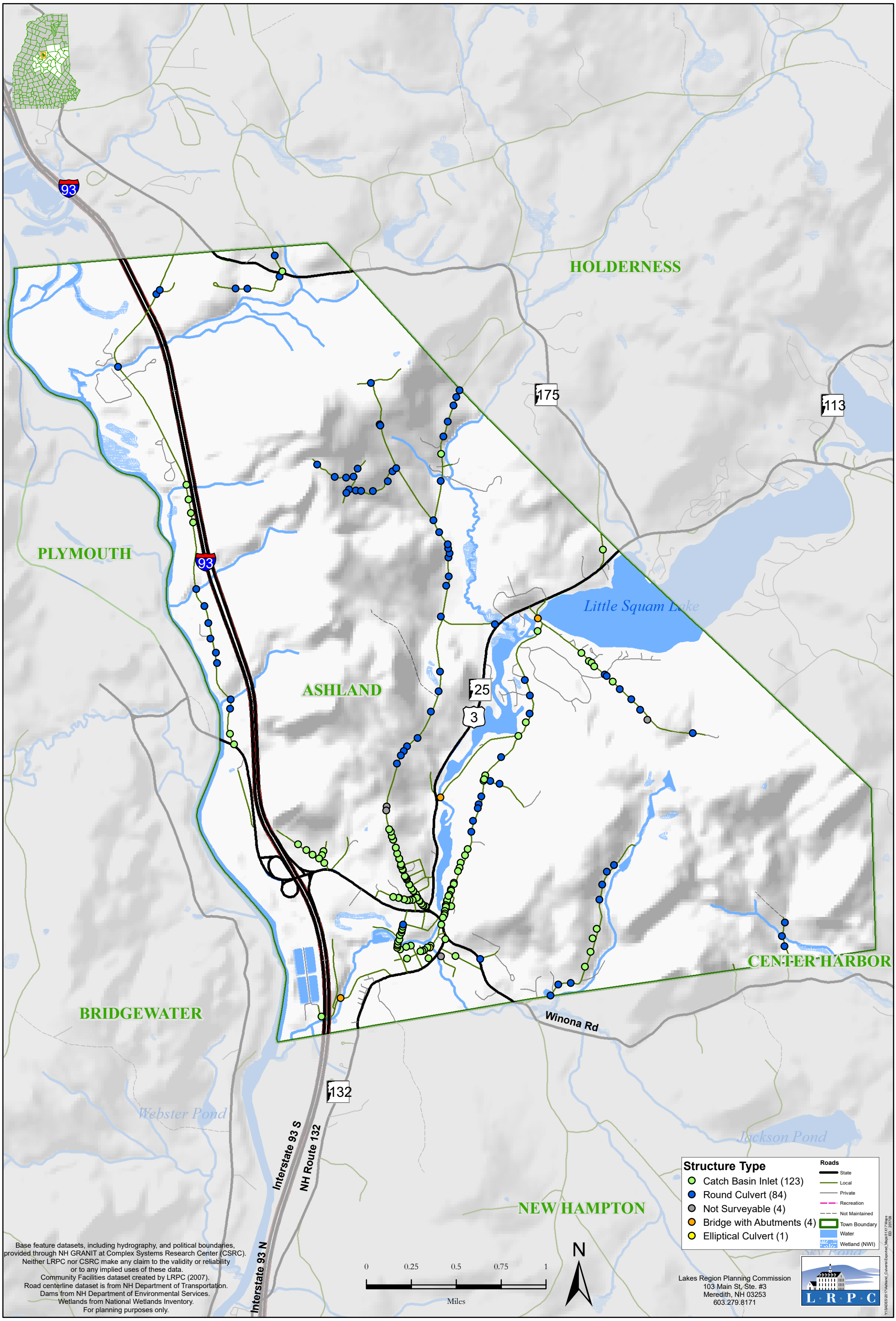
Structure Type

Ashland, NH



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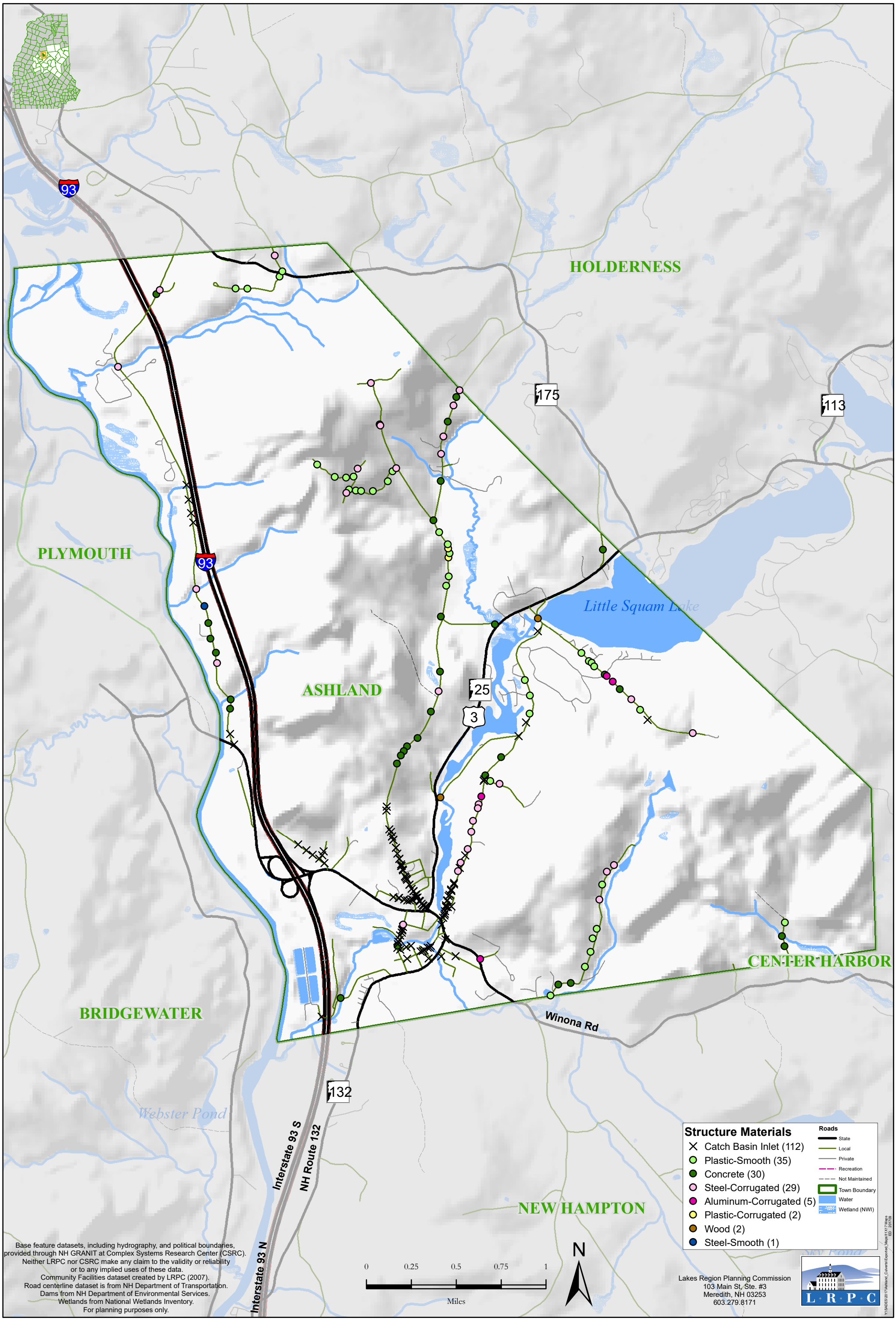
Structure Materials

Ashland, NH



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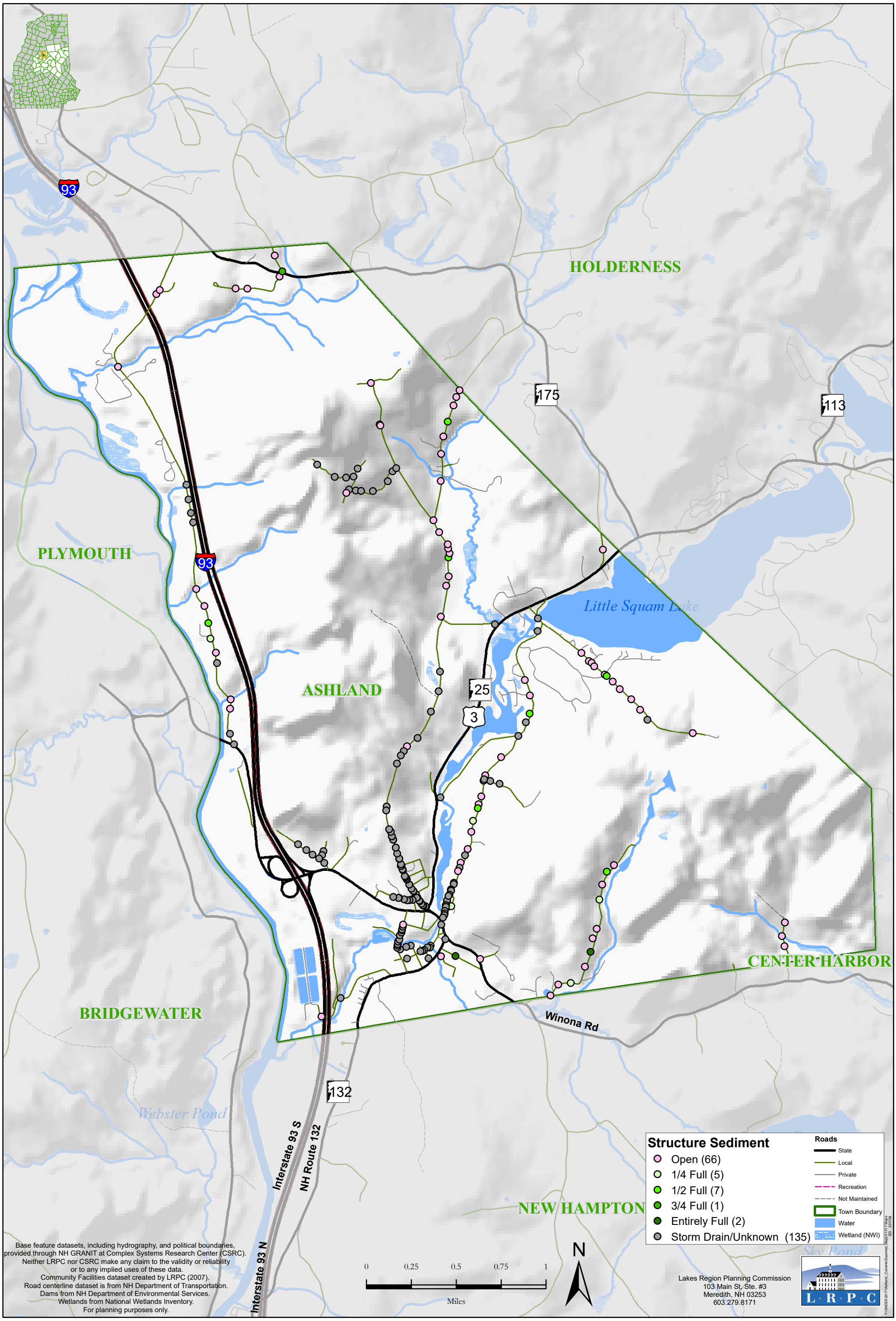
Structure Sediment

Ashland, NH



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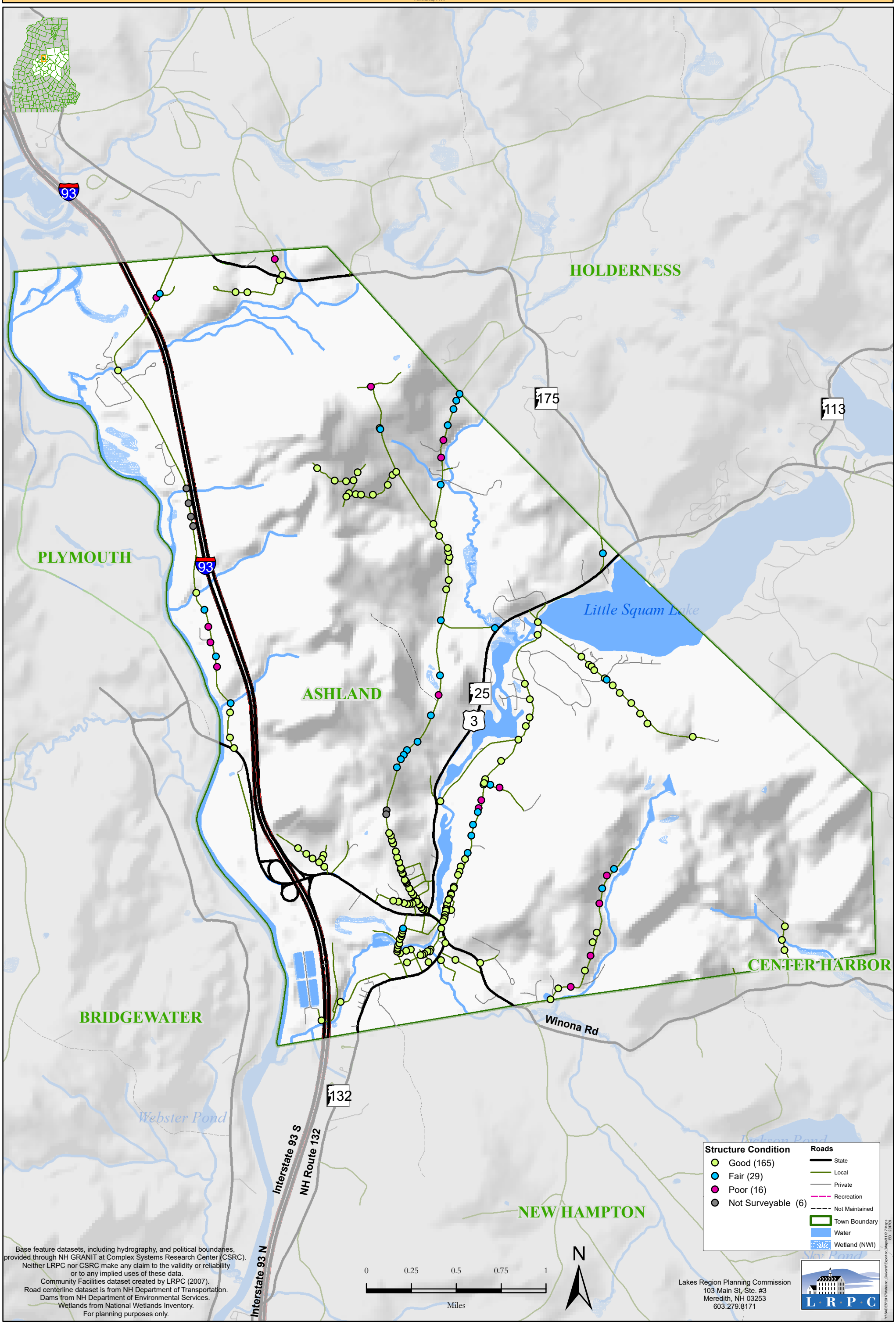
Structure Condition

Ashland, NH



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