MEMORANDUM

TO: Bruce Woodruff, Moultonborough Town Planner
FROM: Kevin Ryan and Forrest Bell, FB Environmental Associates
SUBJECT: Town of Moultonborough Build-Out Analysis
DATE: March 19, 2015
ATTACHMENT: Table - Soil groupings for establishing lot size

"Build-out" is a theoretical condition which represents the period when all available land suitable for residential, commercial, and industrial construction has been developed to the maximum conditions permitted by local ordinances. A build-out analysis is a planning tool which identifies areas with development potential and projects future development based on a set of conditions (e.g., zoning regulations) and assumptions (e.g., population growth rate).

This memo presents the conditions and assumptions used to conduct a build-out analysis for the Town of Moultonborough, which encompasses 75 square miles (Figure 1) in Carroll County, New Hampshire. The analysis was conducted using CommunityViz version 4.3, an extension for program for ArcMap Geographic Information System (GIS) software.

The build-out analysis was conducted according to the following general steps:

1) Collect information on existing conditions within the Town: parcel boundaries, zone boundaries, and locations of existing buildings.
2) Collect and/or create development constraints layers (i.e., areas where no development may occur) in a GIS.
3) Analyze build-out potential using CommunityViz's Build-out Wizard tool, which utilizes information gathered in the previous two steps.
4) Determine potential future rate of development (including projected dates of full build-out attainment) using CommunityViz's TimeScope Analysis tool.
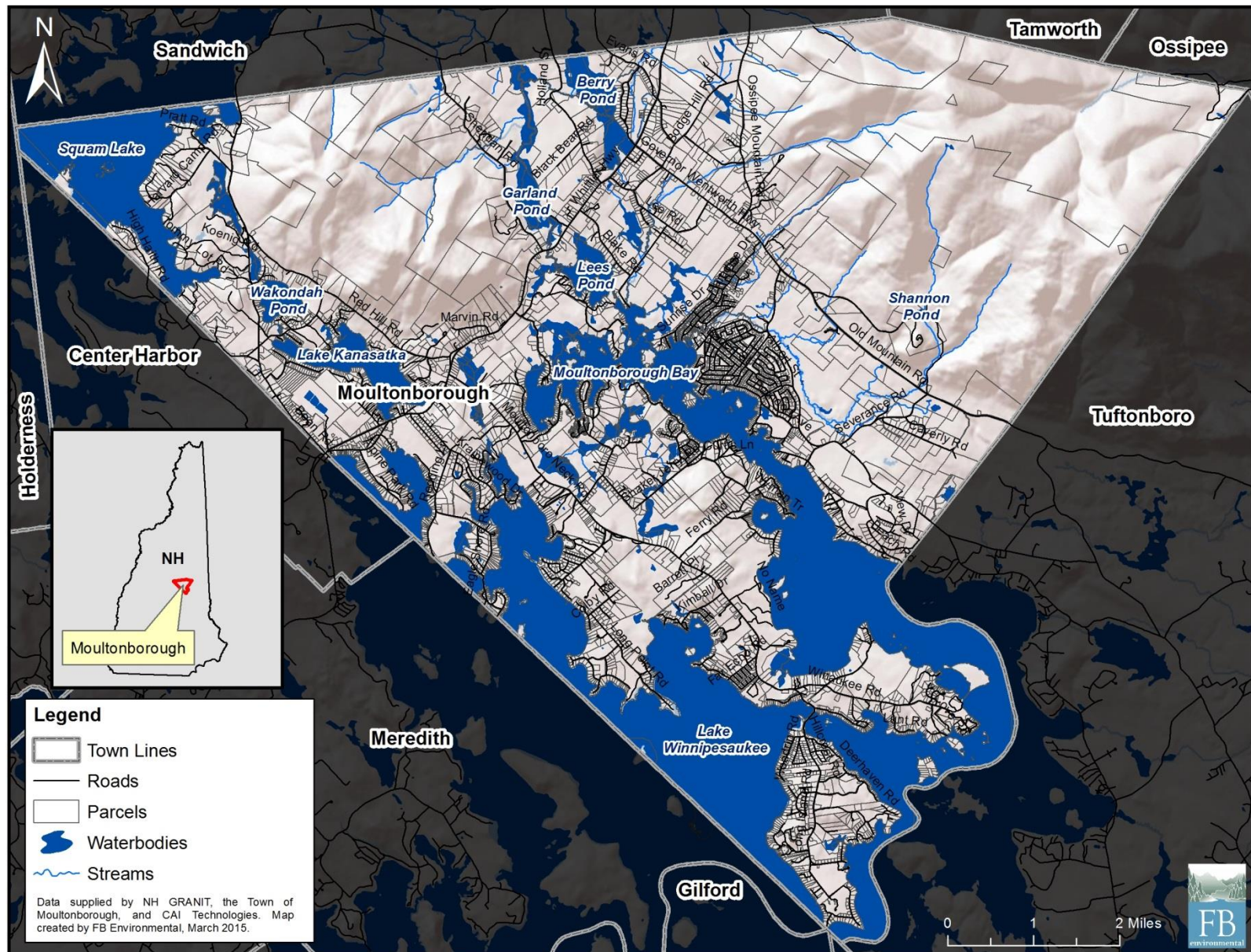
Figure 1. The Town of Moultonborough, New Hampshire.

Existing Conditions

Existing Buildings

The number and location of existing buildings within the Town was determined using a polygon shapefile obtained from the Town[1] which depicts the location and size of *all* structures within the Town's boundaries (i.e., principal and accessory structures). The shapefile contains 9,980 individual polygons representing buildings; this number was reduced to 4,814 buildings for use with the analysis, as accessory structures were not included in the analysis. That is, the build-out analysis concerns only principal use buildings. (Also, in some cases the original buildings shapefile has more than one polygon representing a single building; it would therefore be inaccurate to conclude that 5,166 [9,980-4,814] is the correct number of accessory buildings within the town.)

The existing buildings (containing 4,814 principal structures) layer was created by selecting all parcels containing at least one building polygon and then generating a single point to represent a principal use building in each of those parcels. This layer was spot-checked using high-resolution digital orthophotographs collected in 2011, obtained from the Environmental Systems Research Institute (ESRI) via its ArcMap software.

Zoning & Minimum Lot Sizes

Crucial to a build-out analysis is the feasibility of modeling zoning requirements. Certain stipulations are too site-specific to incorporate into the analysis. With that in mind, the following caveats were used in the determination of build-out zoning restrictions:

- ➢ Future lots were the smallest size allowable for the zoning district, taking into account minimum lot size and minimum buildable area.
- ➢ Unit types were not specified.
- ➢ Road and shoreland frontage requirements were not specified.

As stated in the Town's zoning ordinance, the minimum lot size upon which a dwelling, structure, building, mobile home, camper, R.V., or house trailer may be constructed or located is 40,000 square feet (just under one acre). However, lot size requirements may increase based on soil type (see Attachment) and slope. For the build-out projections, lot sizes were determined according to the standards set forth in the Town's Zoning Ordinance (Table 1, adapted from Table I on page 3 in Moultonborough's Zoning Ordinance). Minimum lot sizes within the Town were assigned based on the dominant soil type within a given parcel. (A shapefile depicting soils within the Town was obtained from New Hampshire's GIS Clearinghouse website, NH GRANIT.)

---

[1] The shapefile was created by CAI Technologies.

Table 1. Minimum lot sizes (square feet) based on soil type and slope. This table is adapted from Table I in Moultonborough's Zoning Ordinance.

Slope	Soil Group					
	1	2	3	4	5	6
0-8%	40,000 ft^2	45,000 ft^2	60,000 ft^2	60,000 ft^2	Not buildable	Not buildable
8-15%	45,000 ft^2	60,000 ft^2	90,000 ft^2	90,000 ft^2	Not buildable	Not buildable
15-25%	60,000 ft^2	80,000 ft^2	100,000 ft^2	120,000 ft^2	Not buildable	Not buildable

Development Constraints

To determine where development could occur within the Town, build-out calculations deduct land with physical constraints to development including environmental restrictions (e.g., steep slopes, wetlands) (Figure 2), zoning restrictions (e.g. minimum lot size [Table 1]), and practical design considerations (e.g. lot layout inefficiencies). Existing buildings of course also reduce the available capacity for new development. The following GIS data were used to model development constraints within the Town:

- ➢ Conserved land (obtained from NH GRANIT website)
- ➢ Steep slopes (>25%) (created from soils layer)
- ➢ Wetlands appearing on the New Hampshire Wetlands Base Map (obtained from NH GRANIT)
- ➢ Hydric soils (created from soils layer)
- ➢ FEMA 100-year Flood Zones (obtained from the Town of Moultonborough)
- ➢ Existing buildings (created from a buildings layer obtained from the Town)
- ➢ Unbuildable parcels [i.e., parcels with an existing building and less than double the minimum lot size (lots that cannot be subdivided)] (created by FBE using CommunityViz software)

Build-out Assumptions

To determine how many units can be built on the available buildable land within the Town, various density and other design factors based on zoning requirements were considered. Any build-out analysis requires simplifying assumptions; below are those that were used in the build-out analysis, based on Moultonborough's zoning ordinance. These assumptions were an important component of the model because they facilitated prediction of whether development can occur on a given lot, given Moultonborough's standards for development.
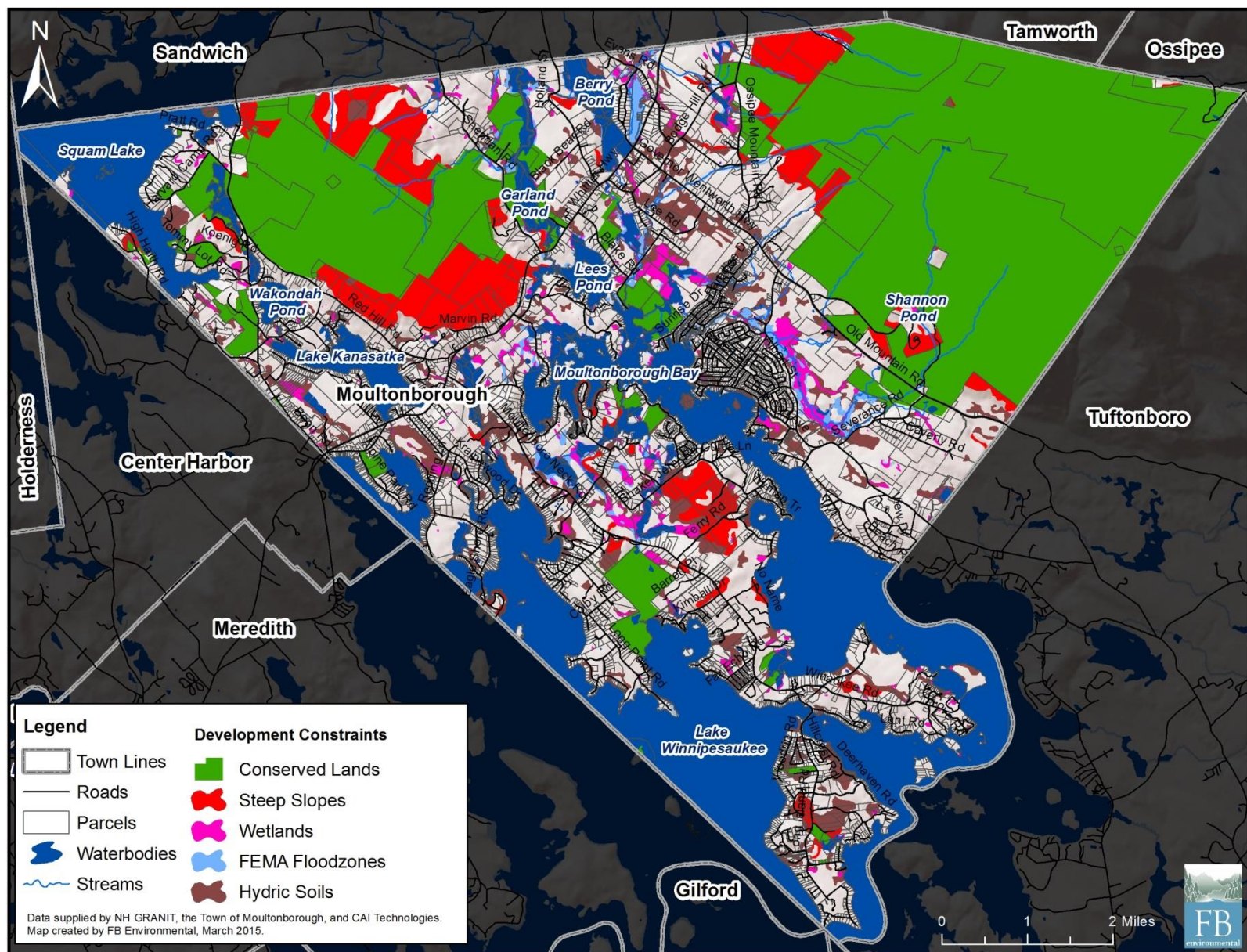
Figure 2. Development constraints within the Town of Moultonborough.

- **Building setbacks** were based on those set forth in Moultonborough's zoning ordinance, which are 50 feet from road centerlines[2] and 20 feet from any lot line. Setbacks are measured from building center points in CommunityViz. To account for this, building footprints need to be estimated to avoid building overlap. Dimensions of the minimum building footprint were estimated to be 45 feet x 45 feet. This number was then was added to the average front/rear setback for each zone to estimate the "Minimum Separation Distance" used in Community Viz.

- **Minimum lot size** requirements used were based on soil type and slope (Table 1).

- **Efficiency factors** adjust density values to account for common density losses. Lot efficiency refers to the amount of land on a parcel that is available for construction after addressing such considerations as drainage facilities, parcel contiguity, Rights-of-Way, setbacks, and conservation restrictions. They are entered as a percentage where 100% means complete efficiency (no density lost), and 0% means no buildings will be estimated for that land use. A 50% efficiency factor was used for all zones in the build-out analysis, as many lots are small, and newly constructed roads and other design considerations will likely take up a substantial amount of space on each lot.

Results

Buildable Area

The build-out analysis shows 28 percent of the land within the Town as buildable (Table 2, Figure 3). Note however that the development constraints described above do not represent the full range of possible restrictions to development. For example, unmapped wetlands or rare/endangered species may be present in an area but cannot be considered here as data concerning their presence and specific locations are not available.

Table 2. Buildable land by zone within the Town. Areal calculations below exclude area encompassed by roads and waterbodies.

Zone	Total Area (Acres)	Total Buildable Area (Acres)	Percent Buildable Area
Residential/Agricultural	36,760	10,149	28
Commercial Zone A	1367	448	33
Commercial Zone B	413	200	48
Commercial Zone C	273	109	40
Total	**38,813**	**10,906**	**28**

---

[2] The road setback may also be 25 feet from the edge of a right of way. The 50-foot setback is more appropriate, and therefore used, for the build-out analysis as distance is measured from the center of a given road.

Projected Buildings

The aforementioned digitization of existing buildings within the Town identified 4,814 principal use buildings. Based on the current input parameters, the build-out analysis projected that an additional 4,318 buildings could be constructed in the future, resulting in a total of 9,132 buildings (Table 3, Figure 4).

Approximately 1,683 buildings currently exist, and an additional 341 buildings are projected to exist within 250 feet of a waterbody. Note however that locations of points representing existing buildings on parcels may not match up exactly with actual building locations. Also, the build-out analysis cannot predict exactly where buildings will occur on a given lot. Therefore, the actual number of existing and projected buildings within 250 feet of waterbodies might actually be somewhat greater than or less than 1,683 and 341, respectively.

Table 3. Existing and projected buildings within the Town.

Zone	No. Existing Buildings	No. Projected Buildings	No. Buildings at Full Build-Out
Residential/Agricultural	4,588	4,221	8,809
Commercial Zone A	175	64	239
Commercial Zone B	17	21	38
Commercial Zone C	34	12	46
Total	**4,814**	**4,318**	**9,132**

Projected Full Build-Out Dates

CommunityViz's TimeScope tool was used to look at changes in the amount of development within the Town over time. The tool assigned a "build date" to features within a projected buildings layer based on a specific set of rules including (most importantly) population growth rate and building sequence type (e.g., random or near roads).

Examination of data obtained from the US Census Bureau shows that Moultonborough has experienced steady population growth since 1970, with the exception of the 10-year period from 2000-2010 which saw a slight decrease. From 1970 to 2010, Moultonborough's population increased 209% from 1,310 to 4,044 individuals. Compound annual growth rates (CAGRs) for the 10-, 20-, 30-, and 40-year periods preceding 2010 range from -1.03 to 2.86%. (
Table 4). The 20-, 30-, and 40-year figures were used for three iterations of the TimeScope analysis. Full build-out is achieved in 2056, 2047, and 2038 for the 20-, 30-, and 40-year CAGR's, respectively (Figure 5).

Table 4. US census population estimates and compound annual growth rates for Moultonborough, NH.

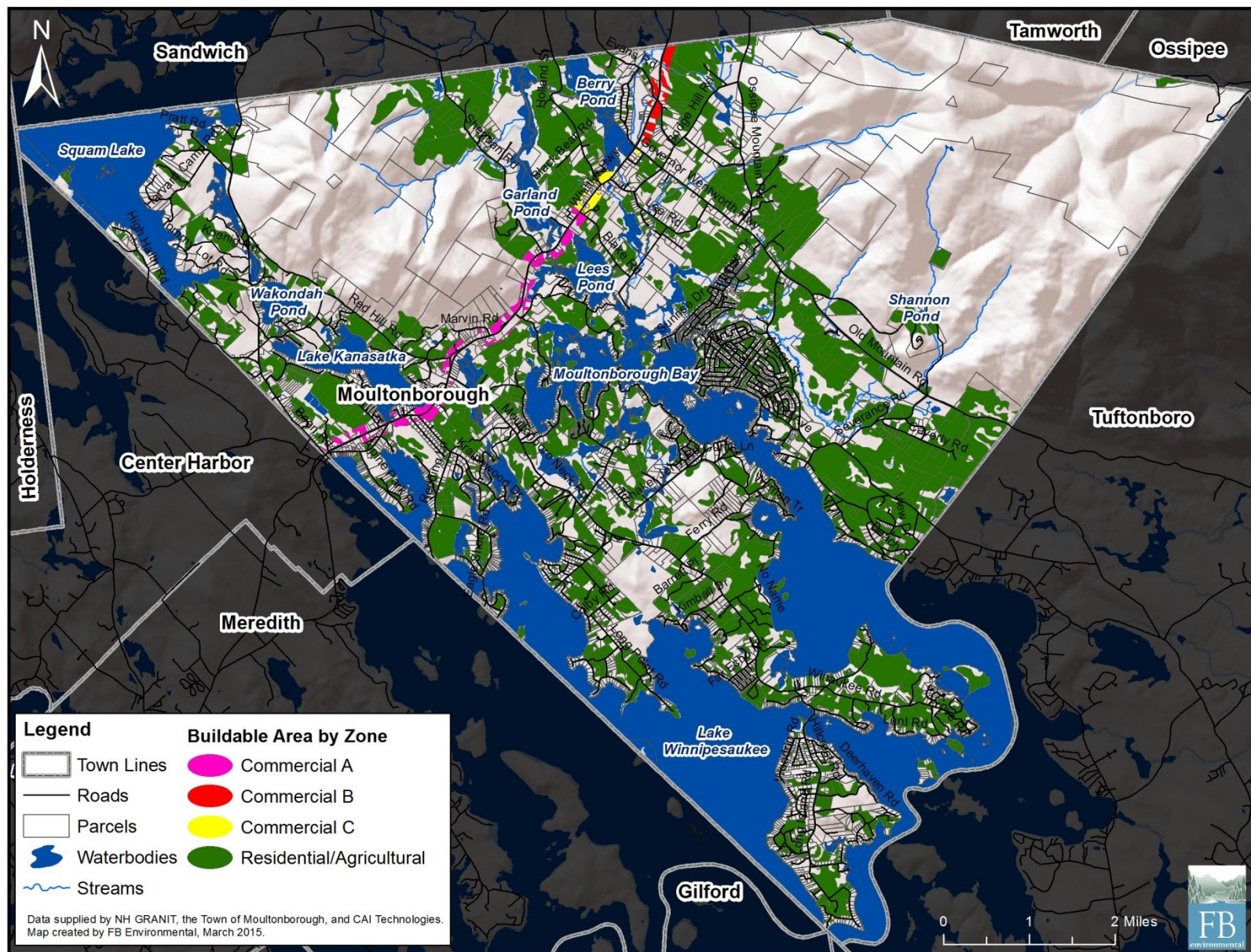| 1970	1980	1990	2000	2010	40 yr. Avg. Annual Growth Rate 1970-2010	30 yr. Avg. Annual Growth Rate 1980-2010	20 yr. Avg. Annual Growth Rate 1990-2010	10 yr. Avg. Annual Growth Rate 2000-2010
1,310	2,206	2,956	4,484	4,044	2.86	2.04	1.58	-1.03

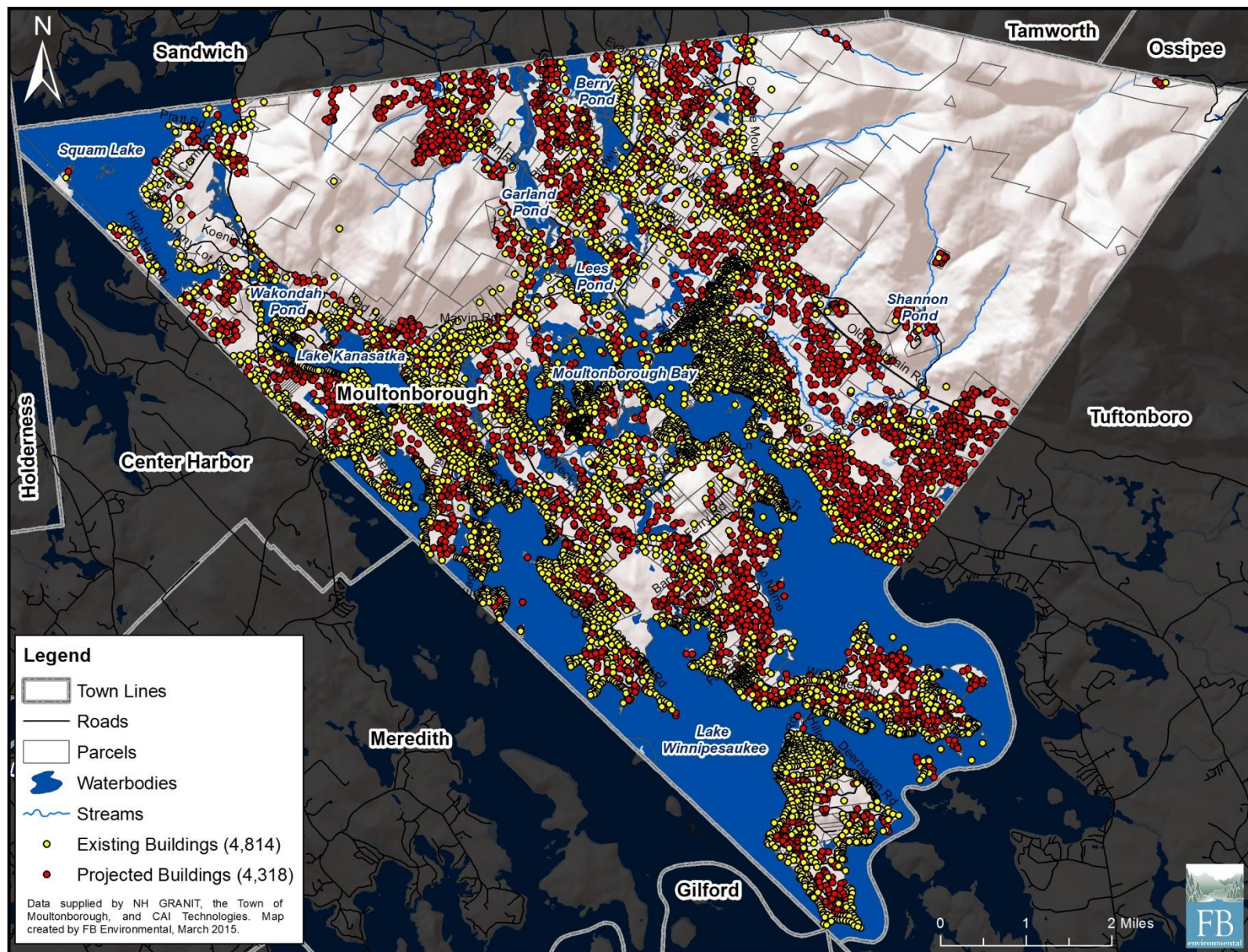**Figure 3.** Buildable area by zone within the Town of Moultonborough.

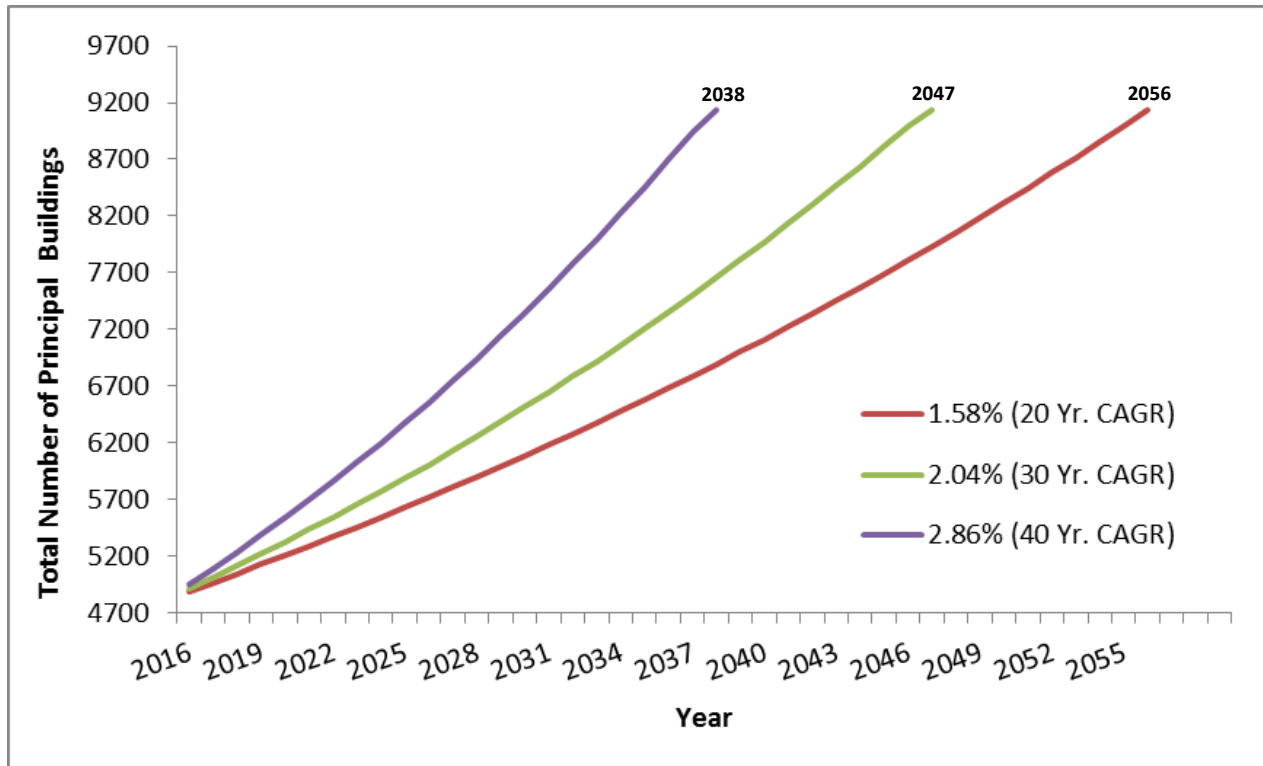**Figure 4.** Existing and projected buildings within the Town of Moultonborough.

Figure 5. Full build-out projections of the Town of Moultonborough using 20-, 30-, and 40-year compound annual growth rates (Table 4).

Attachment: Soil groupings for establishing lot size from Moultonborough's Zoning Ordinance.

REVISED SOIL GROUPING FOR ESTABLISHING LOT SIZE

Group 1	Group 2	Group 3		Group 4	Group 5		Group 6
Excessively drained and somewhat excessively drained soils with rapidly or very rapidly permeable receiving layer.	Well-drained soils with moderately permeable surface and subsoil layers and having a moderate to rapidly permeable receiving layer.	Somewhat poorly drained or moederately well drained soils, and well drained soils with a slowly or very slowly permeable receiving layer.		Soils with bedrock within 4 feet of the soil surface.	Poorly drained soil		Very poorly drained soils
Adams	Abenaki	Acton	Melrose	Canaan	Au Gres	**Scantic	Biddeford
Boscawen	Agawam	Acton Variant	Metacomet	Cardigan	Bemis	**Scitico	Borohemists
Cessar	Allagash	Becket	*Metallak	Charfield	Binghamville	Shaker	Bucksport
Champlain	Bangor	Belgrade	Mills	Elliotsville	Brayton	Squamscott	Burnham
Colton	Berkshire	Barnardston	Montauk	Glebe	Cabot	Stissing	Chocorua
Gloucester	Bice	Barnardston Variant	Mundal	Hogback	*Charles	Swanton	Greenwood
Glover	Canton	Boxford	Newfields	Hollis	*Cohas	Walpole	Ipswich
Hermon	Charlton	Buckland	Nicholville	Kearsarge	Grange	Warham	Matunuck
Hinckley	Dutchess	Buxton	Nicholville Variant	Lyman	Kinsman		Maybid
Hoosic	*Fryeburg	Canterbury	Ninigret	Macomber	Leicester		*Medomak Variant
Masardis	Groveton	Chatfield	Paxton	Milsite	Leicester Variant		*Medomak
Merrimac	*Hadley	Chesuncook	Peru	Monson	*Lim		Muck
Success	Hartland	Colonel	Pittstown	Pennichuck	*Limerick		Ossipee
*Suncook	Haven	Colonel Variant	Pittstown Variant	Rawsonville	*Limerick Variant		Pawcatuck
*Sunday	Houghtonville	Croghan	Plaisted	Ricker	Lyme		Peacham
Redstone	Lombard	Dartmouth	Plaisted Variant	Saddleback	Monarda		Peat
Warwick	Monadnock	Deerfield	*Podunk	Shapleigh	Moosilauke		Pondicherry
Windsor	Occum	Dixmont	*Podunk Variant	Stratton	Naumburg		*Saco
Windsor Variant	Ondawa	Duane	Poocham	Thorndike	Pemi		*Saco Variant
	Ondawa Variant	Eldridge	*Potatuck	Tunbridge	Pillsbury		Scarboro
	Salmon	Elmridge	Roundabout	Winnecook	Pillsbury Variant		*Searsport
	Salmon Variant	Elmwood	Scio	Woodstock	Pipestone		Vassalboro
	Stetson	Finch	Scituate		Raynham		Waskish
	Unidilla	Henniker	Shaker		Raynham Variant		Westbrook
		Hitchcock	*Sheepscot		Raypole		Whitman
		**Howland	Salk		Ridgebury		Wonsqueak
		Lanesboro	Skerry		*Rippowam		
		*Lovewell	Sudbury		Roundabout		
		Machais	Suffield		*Rumney		
		Madawaska	Sunapee		*Rumney Variant		
		Marlow	Sutton		Saugatuck		

Notes:
1. This chart should be used as a general guide to enable people to make lot size determination. In no way does the series name and description replace an on-site evaluation of conditions in the field.

* These soils are subject to periodic or frequent flooding.

** These soils should be evaluated particularly closely because of possible site problems