BUILD-OUT ANALYSIS

TOWN OF LOVELL, MAINE

September, 2016

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1. INTRODUCTION

1.1 LOVELL, MAINE

The town of Lovell encompasses 47.89 square miles in Oxford County, Maine, within the state's Lakes and Mountains region (Figure 1). Lovell is well-known for its largest body of water, Kezar Lake. The lake is one of the most scenic waterbodies in the state; in fact, National Geographic magazine considers it to be one of the most scenic lakes in the world. Bradley, Cushman, Heald, Trout, Horseshoe, and Farrington ponds are within Kezar's watershed and are equally as scenic, as are the lake's tributaries - Great Brook, Cold Brook, Coffin Brook, and Boulder Brook. The Kezar Outlet drains the lake from its Lower Bay into the Saco River. As the "Lakes and Mountains" name implies, Lovell is heavily forested with mountainous topography that offers spectacular views of New Hampshire's White Mountains from various vantage points throughout the town.

Lovell has a fairly small permanent population. The 2010 census listed the town's population at 1,140 people. In the summer, however, this number likely increases three-fold due to the influx of seasonal residents who come to enjoy Lovell's aforementioned lakes, mountains, and rural atmosphere.

1.2 GREATER LOVELL LAND TRUST (GLLT)

The Greater Lovell Land Trust is a private, non-profit organization committed to the protection of Kezar Lake and its adjacent watersheds; it helps to maintain the scenic quality and ecological integrity of the Town of Lovell and the neighboring towns of Stow and Stoneham. The Mission of the Greater Lovell Land Trust is "To protect the ecosystems of the Kezar Lake, Kezar River, and Cold River watersheds, in perpetuity, for the benefit of this region's natural and human communities." GLLT's preservation activities consist of holding and monitoring conservation easements and fee-acquisition of land in order to limit development and thus protect natural resources.

Land trusts are generally held in high regard within the areas they operate because they work to maintain a town's character through preserving open space via conservation easements and outright purchase of parcels of land. Properties owned by land trusts are often open to the public and provide year-round recreational opportunities including hiking, hunting, fishing, and snowmobiling. While their activities are for the most part appreciated, a complaint sometimes leveled against land trusts is that they increasingly make land unavailable for development and may drive up property values in a given town.

1.3 BUILD-OUT ANALYSIS

To address this concern, FB Environmental (FBE) conducted several build-out analyses for the town of Lovell. "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).

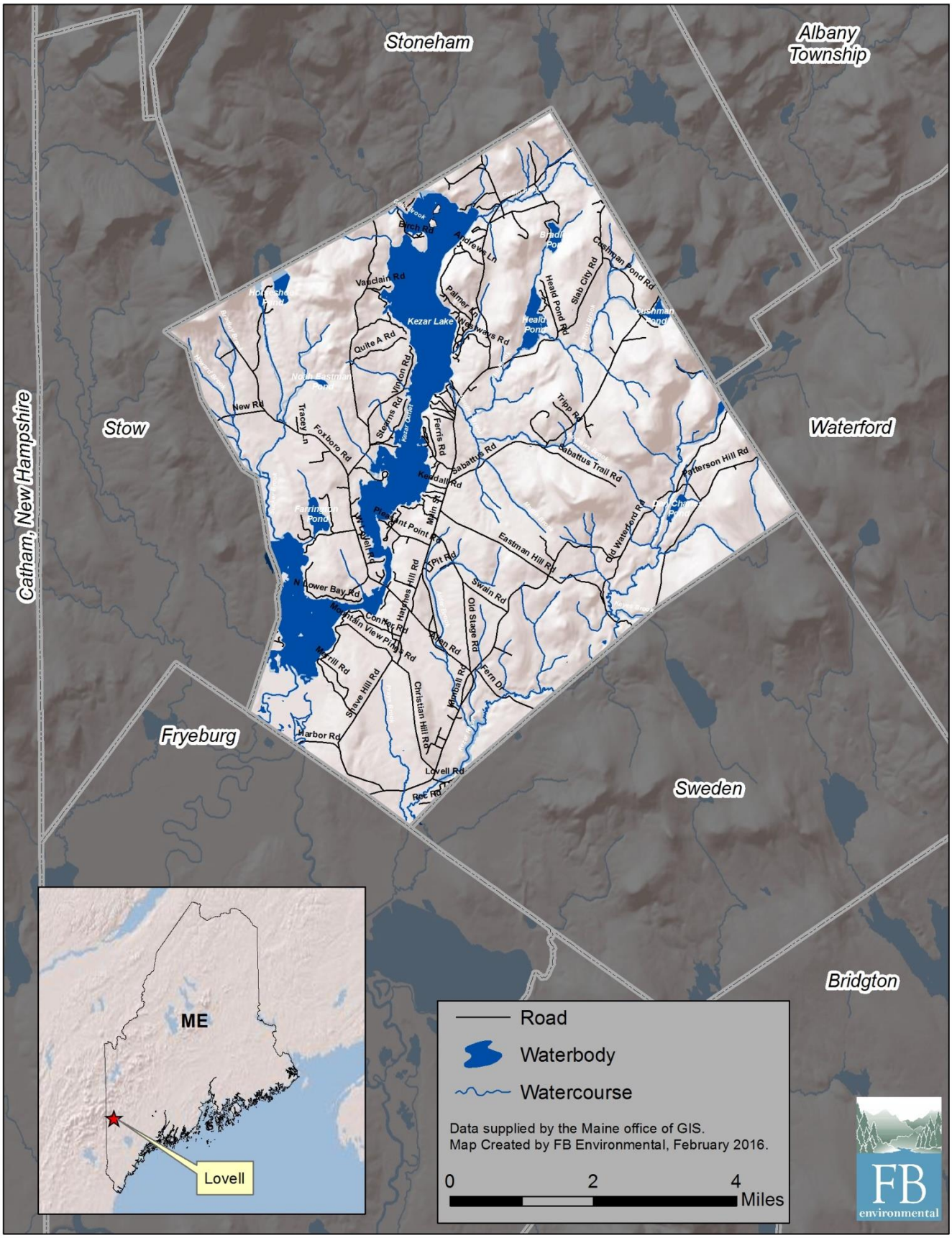

Figure 1. Map depicting the location of Lovell, Maine.

FBE performed build-out analyses for the Town of Lovell to examine several aspects of the relationship between the GLLT and development within the town. Specifically, four separate scenarios were run:

- The first examines how many buildings have been erected in the town from 1968 to 2010 versus how many *could* have been built, based on current zoning and the population growth rate from 1970 to 2010.
- The second examines how many buildings could theoretically be placed on lands currently owned by the GLLT, based on current zoning requirements.
- The third examines current build-out potential within the Town of Lovell and determines potential future dates of full build-out attainment based on several different growth rates.
- The fourth examines how many buildings could theoretically be placed on lands targeted for conservation by the GLLT.

2. METHODS

2.1 COMMUNITY VIZ SOFTWARE

FBE conducted the build-out analysis using ESRI ArcMap version 10.0 geographic information system (GIS) software and CommunityViz version 4.3. CommunityViz is a GIS-based decision-support tool designed to help planners and resource managers visualize, analyze, and communicate about important land-use decisions. The software's 'Build-out Wizard' was used to calculate the development capacity of the study area (numerically and spatially), and its 'Time Scope Analysis' tool was used to project and visualize how future development might occur over time.

The build-out analyses were performed according to the following general steps:

1. Collect information on existing conditions in the study area (e.g., zoning regulations and growth rates).

2. Collect and/or create relevant GIS data (e.g., existing buildings, zoning boundaries, development constraints layers).

3. Obtain input on developable and non-developable land from town officials and other project stakeholders (e.g., citizens).

4. Analyze build-out potential using CommunityViz's Build-Out Wizard tool.

5. Determine potential dates in the future at which full build-out is reached using CommunityViz's TimeScope Analysis tool.

2.2 DISCLAIMER AND DATA LIMITATIONS

Much of the data utilized in this report represent stock data sets obtained from the Maine Office of GIS (MEGIS) database. Many of these data layers were created from remotely sensed data (e.g. aerial photography, digital orthophotos) and large landscape-level mapping projects (e.g. soil units). As a result, the data layers are intended to be viewed at certain scales and have specific accuracy levels. MEGIS 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, 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.

2.3 EXISTING BUILDINGS

FBE used aerial imagery to determine the number and locations of buildings within Lovell in both 1968 (Figure 2) and 2013 (Figure 3). Large, printed aerial photographs were observed in the Lovell Town Office. The photos were taken by Col-East, Inc. in May of 1968. FBE obtained digital images of these photographs from the company and imported them into a GIS. The 1968 images were georeferenced to 2013 aerial imagery by matching up roads still in existence since 1968. The 2013 aerial imagery was used to determine the number and location of buildings in the present day.

2.4 ZONING

Crucial to a build-out analysis is the feasibility of modeling zoning requirements (Table 1). Certain zoning requirements are too site-specific to be able to incorporate into the analysis. With that in mind, FBE made use of the following caveats in the determination of build-out zoning restrictions:

- Potential unit types (e.g., house, commercial building) are not specified.
- A minimum lot size of five acres (as opposed to two) was used for the Rural zone. This was done to more accurately reflect actual lot sizes within Lovell and to provide a more conservative estimate of the number of buildings that can be erected in the town.

Note that Lovell did not adopt a zoning ordinance until 1996. For the purposes of the build-out analyses presented herein, current zoning standards were used to project development from 1968. Doing so made the results of analyses based on 1968 and 2013 comparable. Projecting development from 1968 using no zoning standards would undoubtedly result in very unrealistic results. Also, as per the zoning ordinance lot size in the Village District is determined by site conditions. A small lot size of ½ acre was used for this zone in the analyses.

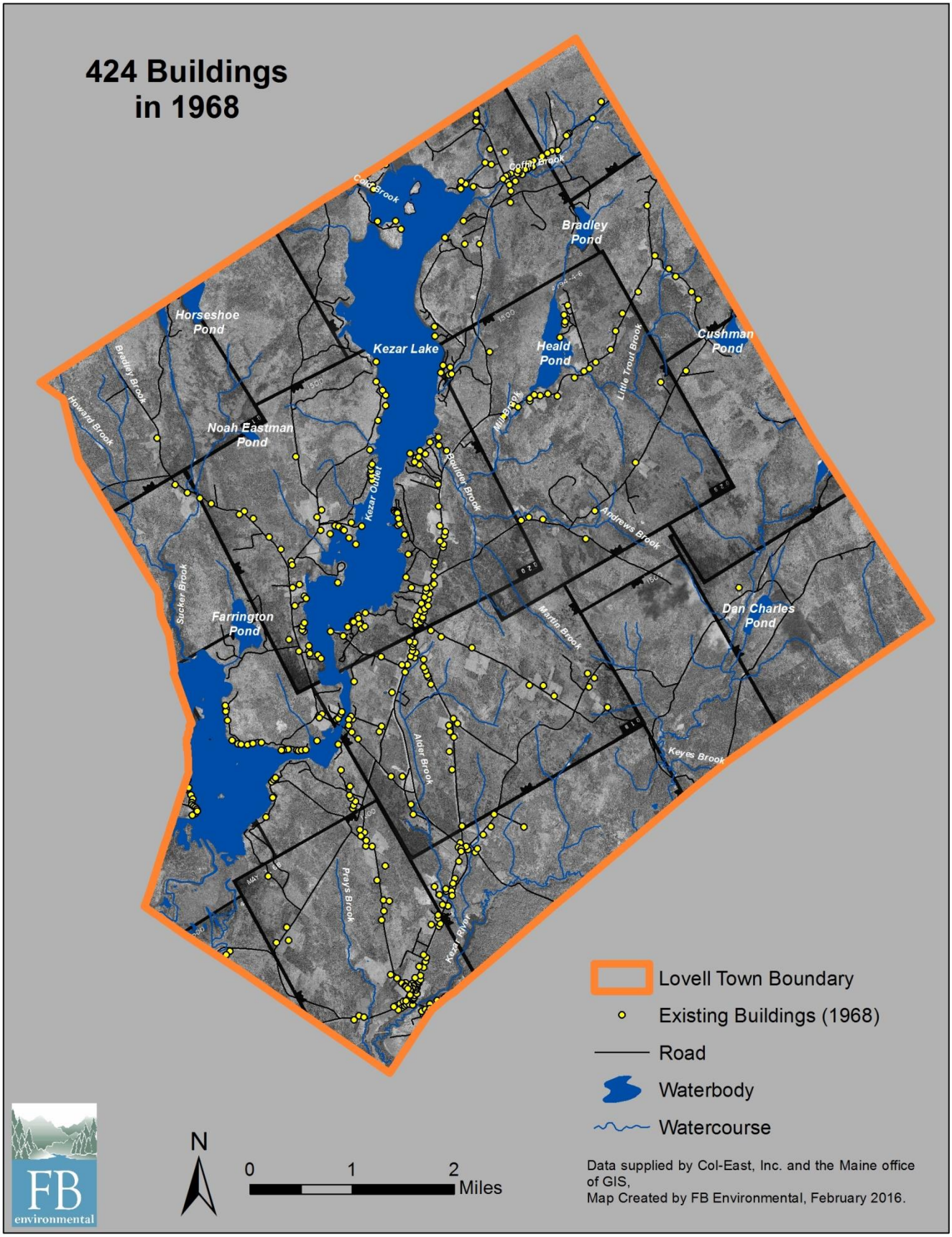

Figure 2. Existing buildings in Lovell, Maine in 1968. Dark black, straight lines are edges of scanned aerial photography.

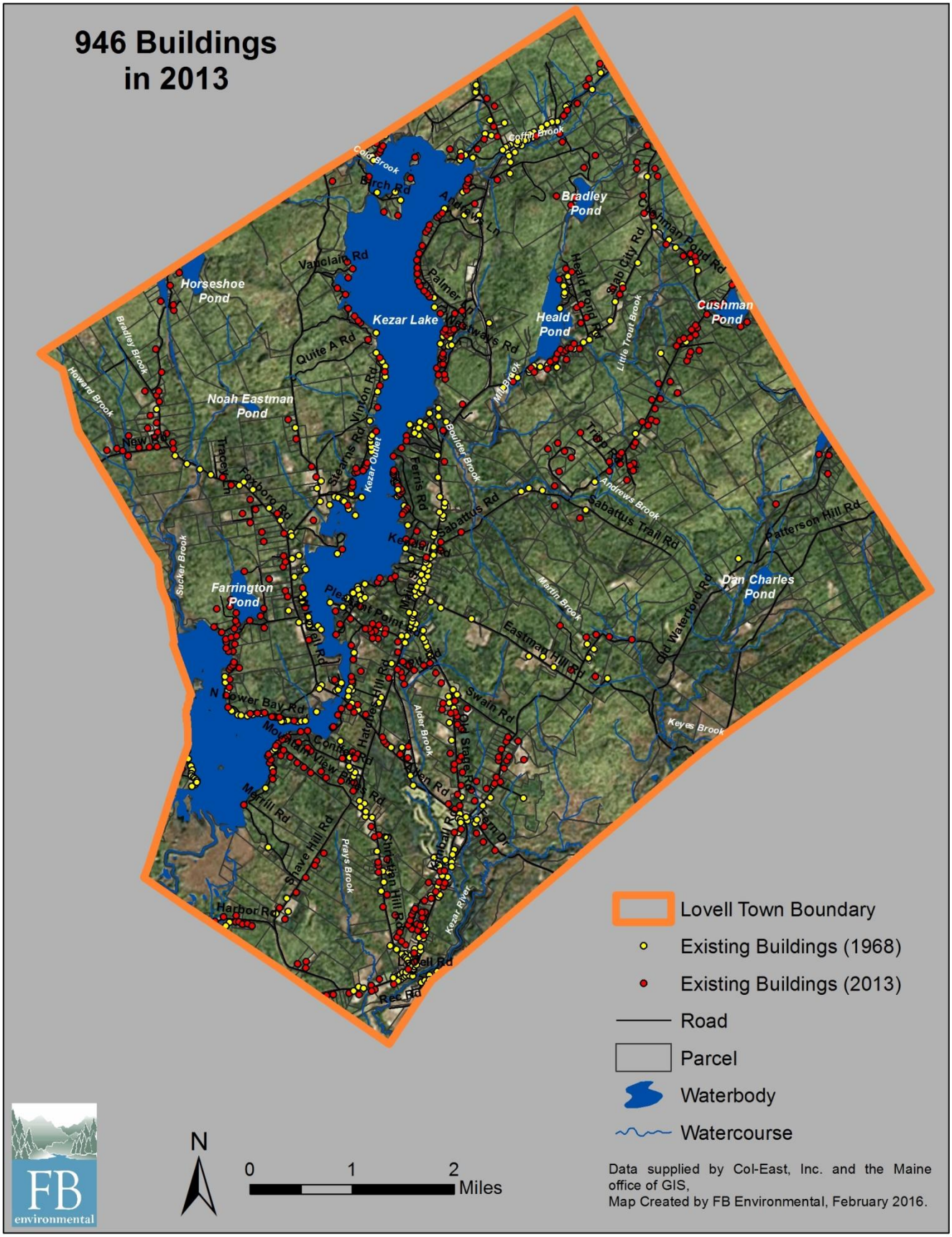

Figure 3. Existing buildings in Lovell, Maine in 2013.

Table 1. Base zoning standards for Lovell, Maine.

Zone	Building Setbacks	Road Setbacks	Minimum Lot Size
Village	side - 20 ft. rear - 20 ft.	private rd. - 50 ft. public rd. - 75 ft.	*
Medium Density Residential	side - 20 ft. rear - 20 ft.	private rd. - 50 ft. public rd. - 75 ft.	85,000 ft^2
Rural	side - 20 ft. rear - 20 ft.	private rd. - 50 ft. public rd. - 75 ft.	85,000 ft^2
Route 5 Rural	side - 20 ft. rear - 20 ft.	private rd. - 50 ft. public rd. - 75 ft.	85,000 ft^2
Limited Commercial	side - 20 ft. rear - 20 ft.	private rd. - 50 ft. public rd. - 75 ft.	85,000 ft^2
Commercial Industrial	side - 20 ft. rear - 20 ft.	private rd. - 50 ft. public rd. - 75 ft.	42,500 ft^2

*Maximum lot coverage in the Village District is determined by site conditions.

2.5 POPULATION GROWTH RATE

According to US Census Bureau data, Lovell has experienced steady population growth toward the late part of the last century (Table 2). The population of the town has grown from 607 people in 1970 to 1140 people in 2010, an increase of 87%. This amounts to a 1.59% compound annual growth rate (CAGR) over the 40-year period.

Table 2. Lovell population estimates, 1970-2010.

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
607	767	888	974	1,140	1.59	1.33	1.26	1.59

2.6 DEVELOPMENT CONSTRAINTS

To determine where development may occur in the study area, build-out calculations deduct land unavailable to development due to physical constraints including environmental restrictions (e.g., steep slopes and wetlands) (Figure 4), zoning restrictions (e.g. shoreland zoning, street Right-of-Ways, building setbacks), and practical design considerations (e.g. lot layout inefficiencies). Existing buildings also reduce the capacity for new development.

GIS data used to model development constraints are listed below. With the exception of existing buildings, all these datasets were obtained from the MEGIS website.

- Conserved land
- Steep slopes (>25%, derived from a soils layer)
- Wetlands appearing on National Wetlands Inventory (NWI) maps
- Waterbodies and Watercourses appearing in the National Hydrography Dataset
- Existing buildings

The development constraints considered above do not represent the full range of possible restrictions of resources that may be found in the field. For example, rare and/or State listed species may be present in a given area but are not considered because data regarding their specific location(s) are not available.

2.7 BUILD-OUT ASSUMPTIONS

To determine how many building units can be erected on the available buildable land, various density and other design factors are considered, based on the zoning requirements for a given town. Any build-out analysis requires simplifying assumptions. Below are five assumptions used in the build-out analysis that based on zoning requirements in Lovell.

- **Building setbacks** were estimated based on the average front and rear setbacks specified in Lovell's zoning ordinance (Table 1). Setbacks are measured from building center points in CommunityViz. To account for this, building footprints need to be estimated to avoid building overlap. The dimensions of the minimum building footprint were estimated to be 30 feet x 30 feet. This number was then was added to the average front and rear setback for each zone to estimate the "Minimum Separation Distance" used in CommunityViz.
- **Minimum lot size requirements** used were based on requirements for each zone (Table 1).
- A 100-foot setback was used for **waterbodies**.
- A 75-foot setback was used for **wetlands and watercourses.**

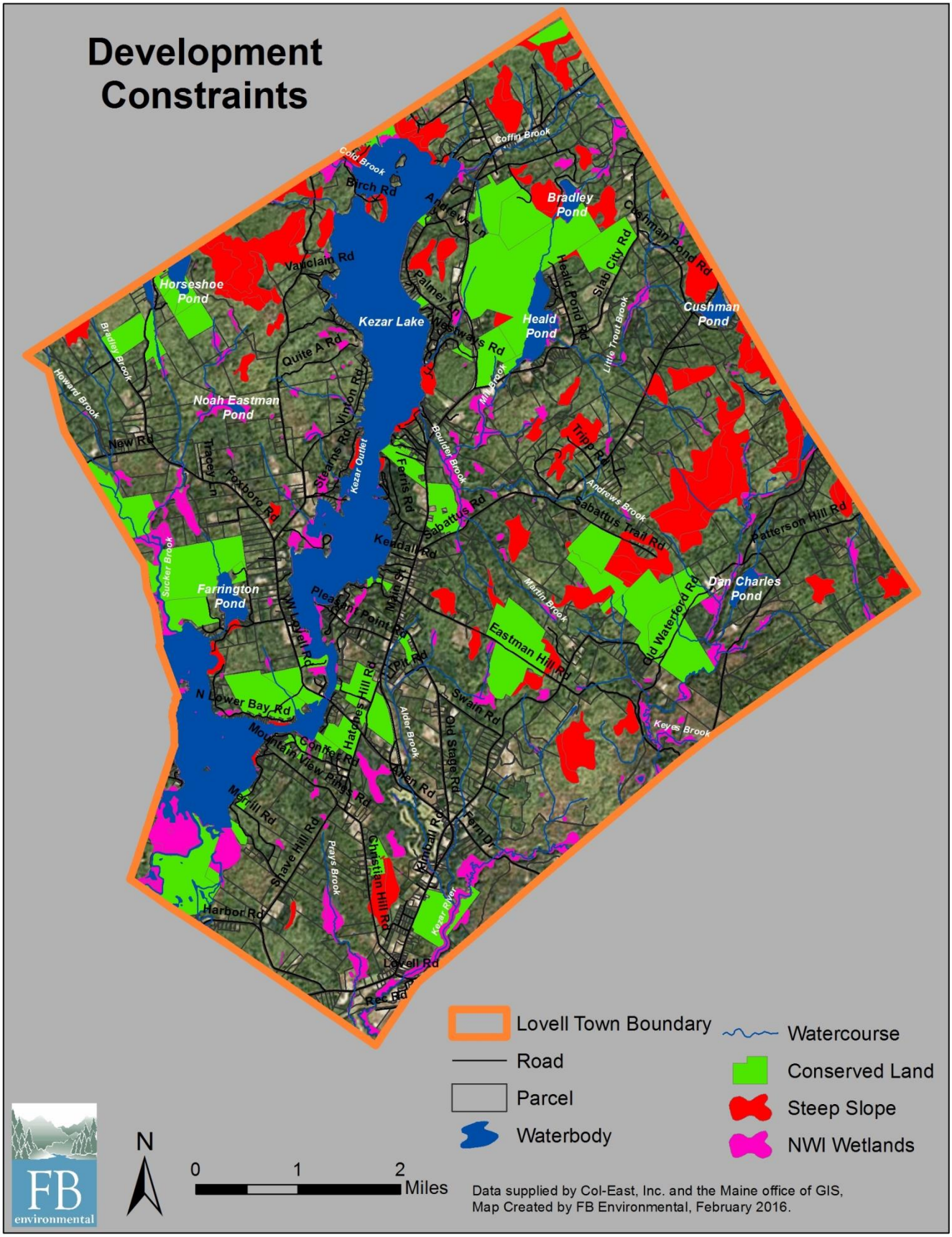

Figure 4. Development constraints within the Town of Lovell. The development constraints considered above do not represent the full range of possible restrictions of resources that may be found in the field.

- **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, ROWs, setbacks, road frontage, conservation restrictions, and anything else that can reduce the amount of buildable land within a given zone. They are entered as a percentage, where 100% means complete efficiency (no density lost), and 0% means no buildings will be estimated for a particular zone. An efficiency factor of 80% was used for all iterations of the build-out.

3. RESULTS

3.1 BUILDABLE AREA

Since its inception, GLLT has removed 3,284 acres of land from development through its fee-owned properties (1,992 acres) and conservation easements (1,292 acres). The build out analysis indicates that there are currently approximately 16,873 developable acres remaining in the Town of Lovell.

3.2 PROJECTED BUILDINGS

Projected Buildings 1968 to 2013

Based on the actual growth rate from 1970 to 2010 (1.59%), the build-out predicted that 417 additional buildings could be added in the town for a total of 841 buildings. The actual total number of buildings in the town in 2013 is 946, 105 more than the analysis predicted. From 1970 to 2010, the population increased by 533 people and the number of buildings increased by 522. This amounts to just over one building for each person added to the population.

Projected Buildings on GLLT Fee-Owned Land

GLLT fee-owned lands encompass 1,992 acres within the town, which accounts for approximately seven percent of the town's area. If development were permitted on these lands, the analysis indicates that a total of 187 buildings could be built upon them (Table 3, Figure 5).

Projected Buildings 2013 to Full Build-Out

The number of building units within the study area is projected to increase by 3,747 units from 946 buildings in 2010 to 4,693 units at full build-out, a 396% increase (Table 4, Figure 6). (Note that the analysis assumes that development will occur on parcels closest to existing roads first.) New buildings are projected to occur in all zones within the town. The Commercial Industrial and Route 5 Rural zones are predicted to experience the largest increase in new buildings.

Three iterations of the TimeScope analysis were run using compound annual growth rates for 10-, 20-, 30- and 40-year periods. These periods represent from 2000-2010 and 1970-2010 (1.59%), 1990-2010 (1.26%), and 1980-2010 (1.33%) (Table 2). At the 10- and 40-, 20-, and 30-year growth rates, full build-out is projected to occur by 2117, 2144, and 2137, respectively.

Projected Buildings on Land Targeted by GLLT for Conservation

If the 3,986 acres targeted for conservation by the GLLT (Figure 7) were acquired by the land trust, the full build-out projection above would be reduced by 555 buildings. This would reduce the number of buildings at full build-out by approximately 12%, from 4,693 units to 4,138 units.

Table 3. Projected buildings on GLLT fee-owned lands.

Property Name	Acres	Number of Potential Buildings
Bishop Cardinal Reserve	66	10
Chip Stockford Reserve	155	18
Conifer	17	10
Heald Bradley Ponds Reserve	804	77
Horseshoe Pond II	52	0
Kezar Outlet Fen	265	0
Kezar River Tract (Mill Pond)	114	21
Mudjekeewis	10	6
Sucker Brook	249	38
Sucker Brook II	214	3
Wing Preserve	14	1
Wing Preserve/Sucker Brook	32	3
Total	**1,992**	**187**

Table 4. Projected buildings by zone in Lovell, Maine. Year 2013 to full build-out.

Zone	Existing Buildings	Projected Buildings	Total Number of Buildings at Full Build-Out	Percent Increase
Commercial Industrial	8	196	204	2,350
Limited Commercial	37	49	86	32
Medium Density Residential	209	742	951	255
Rural	592	2,396	2,988	305
Route 5 Rural	16	97	113	506
Village	84	267	351	218
Total	**946**	**3,747**	**4,693**	**396**

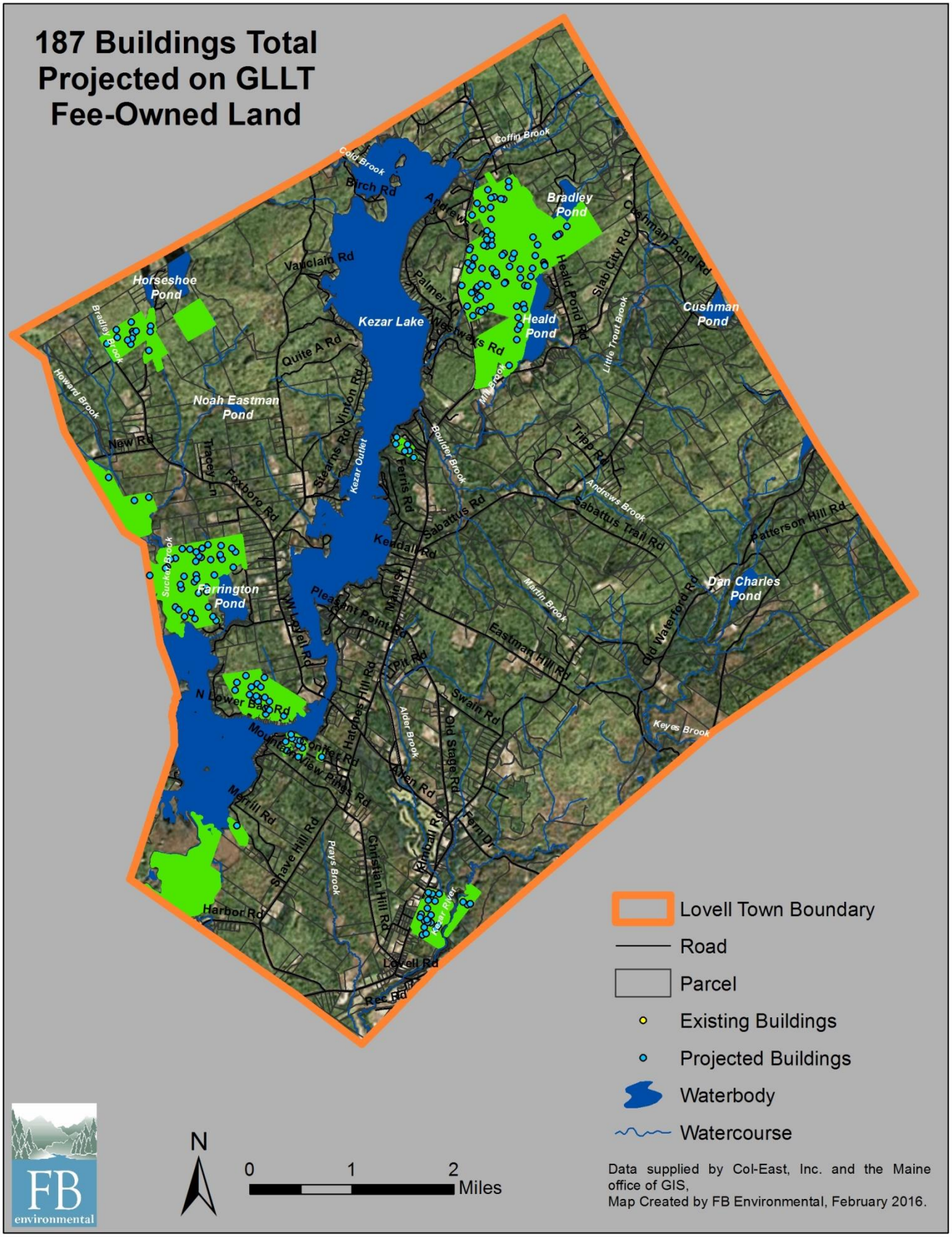

Figure 5. Map depicting buildings projected on GLLT fee-owned lands.

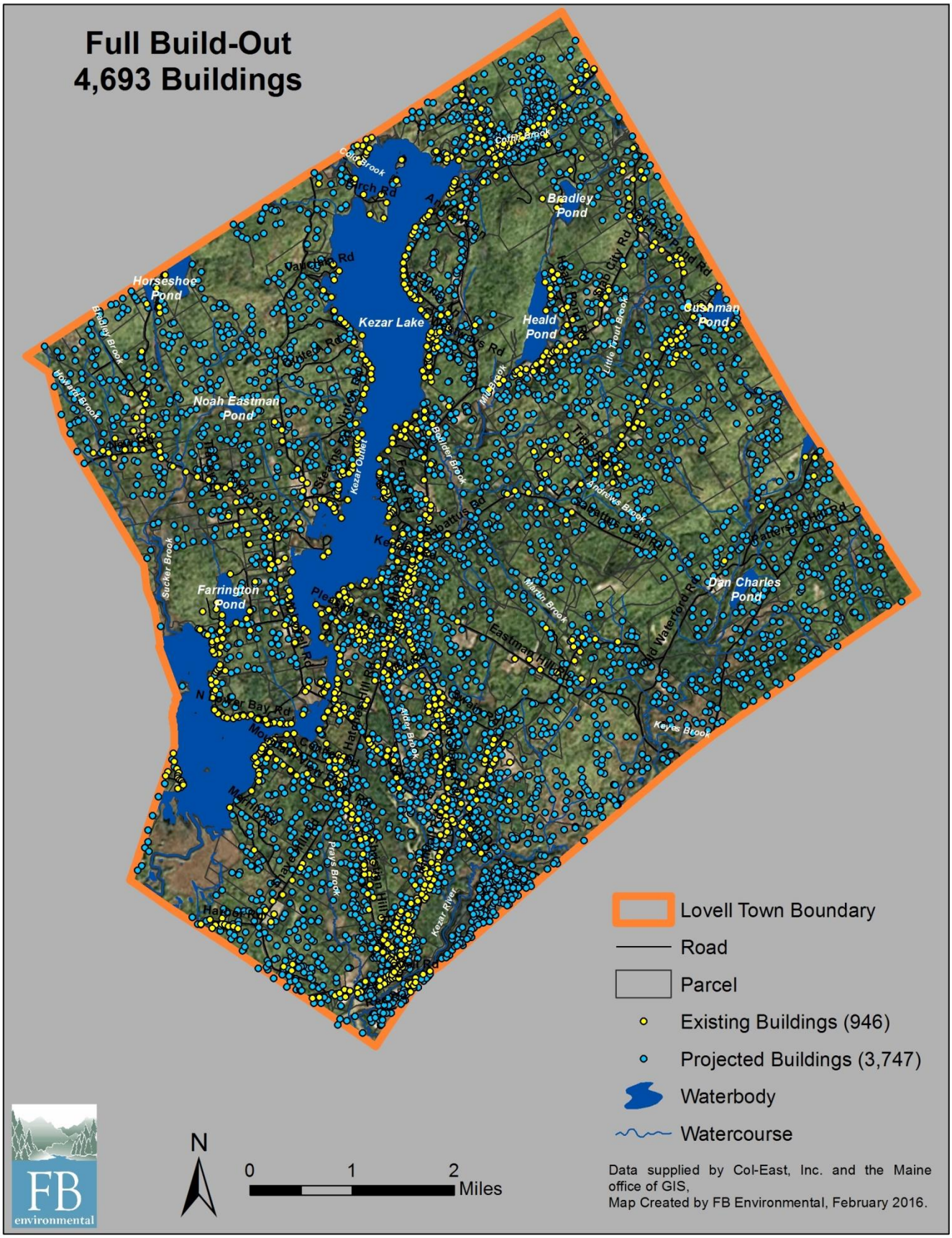

Figure 6. Map depicting currently existing buildings and projected buildings at full build-out.

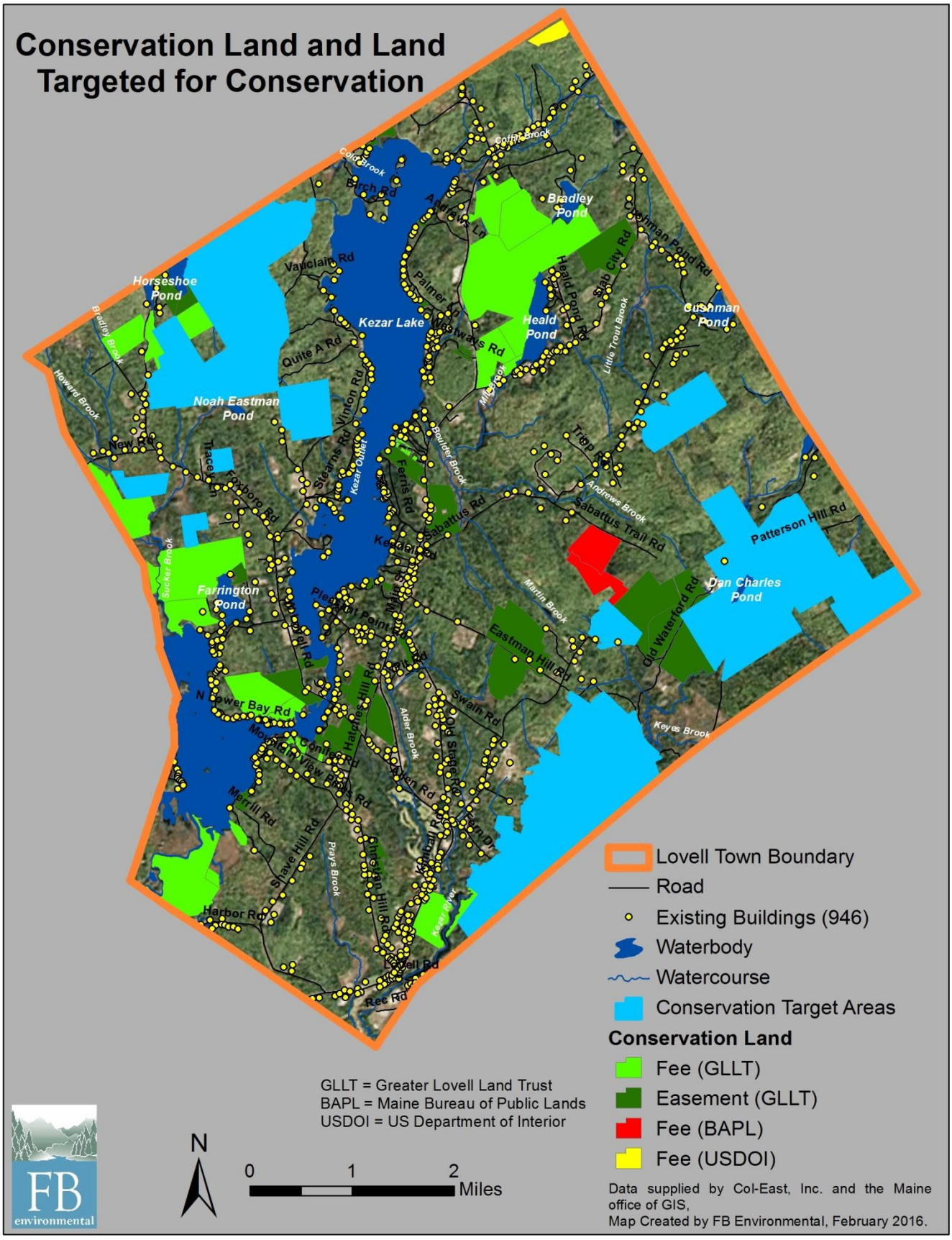

Figure 7. Land targeted for conservation by GLLT.

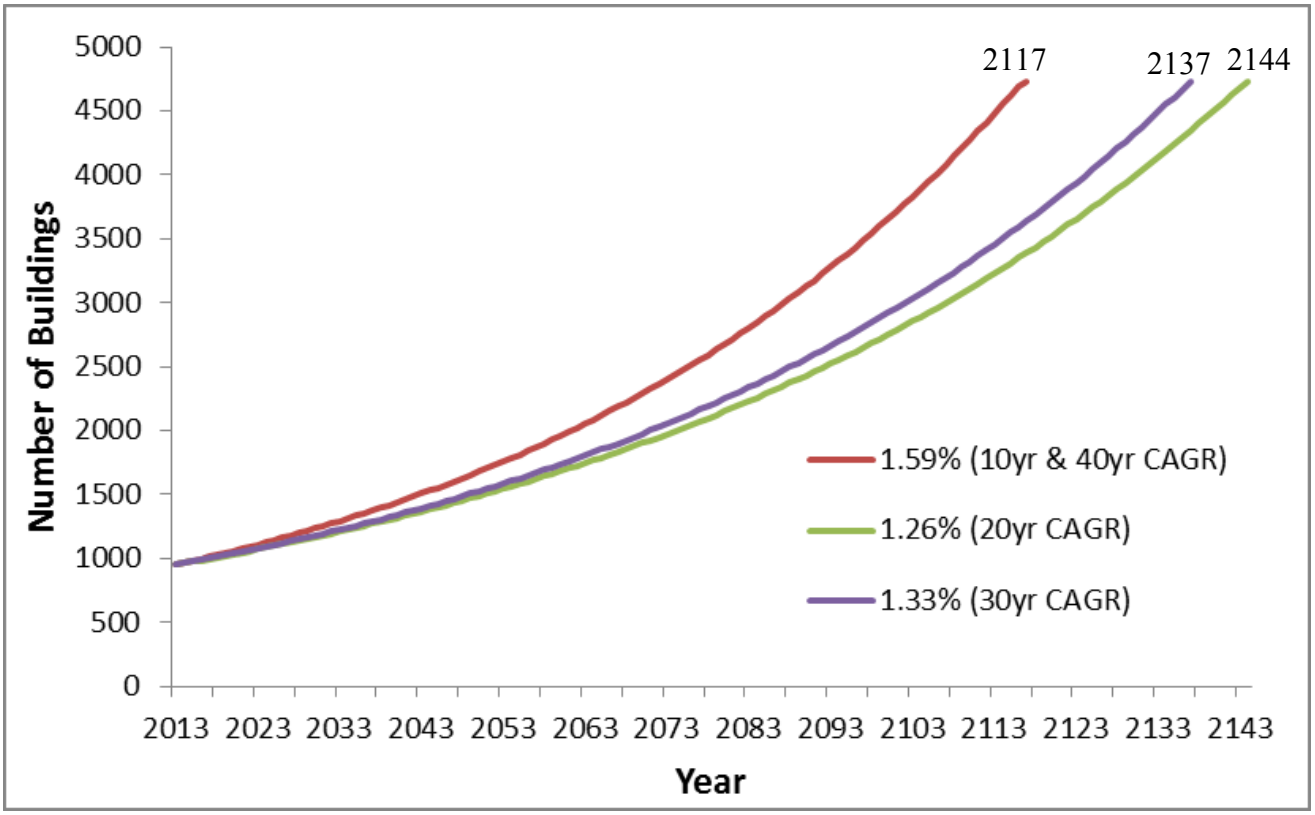

Figure 8. Full build-out projections for Lovell using 10-, 20-, 30-, and 40-year compound annual growth rates (Table 2).

4.0 DISCUSSION

The analyses presented herein provide full build-out scenarios based on current zoning standards; the numbers provided should be viewed as estimates only. The analyses provide estimates regarding the potential for new residential development, including the number of new buildings (Table 4) and the amount of land area that could be developed in Lovell based on current zoning standards. The build-out also presents information about where the development is expected to occur (Figure 6).

In regard to the difference in number of buildings projected from 1968 to 2013 versus those actually existing, the former number is lower by 105 buildings. While there is undoubtedly error associated with the projected numbers, the smaller number of buildings projected versus what actually occurred could be due in part to the presence of second homes in the town. That is, population increase may not be the sole driver of development in Lovell. Rather, due to the scenic nature of the town, many of the houses may in fact be second homes.

Given current zoning and development constraints the build-out projected that 187 buildings could theoretically be built on GLLT fee-owned land. While 187 mays seem like a significant amount of houses, the full build-out from the present day (not including GLLT fee-owned land) indicates that an additional 3,747 buildings may be built throughout the rest of the town. The GLLT currently has 3,986 acres

targeted for conservation (Figure 7). If development were restricted on these lands, build-out results show that the number additional buildings at full build-out would be reduced by 555, reducing the number of projected buildings to 3,192.

The build-out analysis estimates that full build-out might be reached by the years 2117, 2137, or 2144 (dependent upon growth rate used), thus affecting the estimated 16,873 acres of buildable land remaining in the town. This future development will increase the amount of runoff that drains to Kezar Lake, its tributaries, and other waterbodies within the town. This will result in greater amounts of phosphorus entering these waterbodies. Significant increases in phosphorus loading can result in dire consequences for lake systems that by nature are phosphorus-limited. Any new increases of phosphorus in a lake can "tip the scales" of nature to favor increased algal growth, and thus decreased water clarity. The increased phosphorus may also increase the presence of other aquatic plant growth in the shore zone, including undesirable invasive plants.

Development standards that result in no net increase of stormwater should be considered for all new development, including low impact development (LID), which utilizes smart site design principles to capture and treat polluted runoff from rooftops, driveways and other impervious surfaces so that they don't end up in nearby streams and lakes. Similarly, phosphorus control standards that require the installation of best management practices (BMPs), including LID, could be adopted to limit the amount of phosphorus allowed to be exported from an individual property. Other tools such as conservation or cluster subdivisions should also be encouraged in order to protect open space, wildlife habitat, water quality, and to discourage sprawl.