BUILD-OUT ANALYSIS

CITY OF ELLSWORTH

FOR THE FRENCHMAN BAY CONSERVANCY

April 2020

Frenchman Bay Conservancy

FB environmental

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EXECUTIVE SUMMARY

As part of the Ellsworth Green Plan FB Environmental (FBE) was hired by Frenchman Bay Conservancy (FBC) to perform a build-out analysis of the City of Ellsworth. "Full Build-out" is a theoretical condition which represents the period when all available land suitable for residential, commercial, and industrial uses has been developed to the maximum conditions permitted by local ordinances. A build-out analysis is a planning tool that identifies areas with development potential and projects future development based on a set of conditions (e.g., zoning regulations, environmental constraints) and assumptions (e.g., population growth rate). **The results of the build-out analysis can be used for planning purposes to help guide future development activities in the city, as well as target specific areas for conservation.** Note that the analyses presented herein provide a full build-out scenario based on Ellsworth's current zoning standards (which are subject to amendment) and should be viewed as estimates only.

The City of Ellsworth consists of approximately 7,925 parcels, ranging in size from less than one acre to 1,472 acres. **The baseline build-out analysis showed that 52% (25,167 acres) of the city is theoretically buildable under current zoning regulations.** The Rural zone has the most acreage of land available for development at 14,307 acres. FBE identified 4,119 buildings within the City of Ellsworth, and the build-out analysis projected that an additional 18,610 buildings could be constructed in the future, resulting in a total of 22,729 buildings.

Three iterations of the TimeScope Analysis (a tool facilitating analysis of change over time) were run using compound annual growth rates for 10-, 20- and 30-year periods from 2000-2010 (1.83%), 1990-2010 (1.30%), and 1980-2010 (1.35%), respectively. Full build-out is projected to occur in 2115 at the 10-year growth rate, 2153 at the 20-year growth rate, and 2148 for the 30-year growth rate. **This analysis shows that if growth rates, zoning, and other development constraints remain the same, Ellsworth will be fully built out by the early to mid-22nd century.**

A 25-year retrospective view of the existing buildings in the City of Ellsworth built prior to 25 years ago (1995) shows that approximately 74% (3,037) of the existing buildings in Ellsworth were built prior to 1995. A prospective view of existing buildings in the City of Ellsworth and projected buildings built in the next 25 years, using a 30-year compound annual growth rate of 1.35%, shows that approximately 1,682 buildings will be built between 2020 and 2045.

Alternative build-out scenarios can provide opportunities to understand how hypothetical changes to the City of Ellsworth's zoning ordinances or development exclusion in certain portions of the city may affect projected buildings and buildable area. The alternative scenario used by FBE in this project is multi-faceted and uses alternative zoning regulations and additional conserved land opportunities to provide stronger natural resource protection and conservation. **The alternative build-out analysis showed that 34% (16,430 acres) of the city would be buildable under the hypothetical changes and projects an additional 6,395 buildings, resulting in a total of 10,514 buildings.**

Aerial view of downtown Ellsworth. Photo credit: https://www.ellsworthmaine.gov/

1. INTRODUCTION

In April of 2017, the Ellsworth Green Plan Steering Committee was formed to create a comprehensive Green Plan – a step by step process to becoming a model green community. As part of the *Conserving Land* focus area, one of ten focus areas of the Green Plan, FB Environmental Associates (FBE) was hired to perform a build-out analysis of the City of Ellsworth (FIGURE 1). A build-out analysis is a computer model of community growth and development that can be used to investigate how much land is available for development, how a community might change in appearance and function over time, and what the potential impacts from future development might be. Performing a build-out analysis shows a locality what land is available for development, how much development can occur, and at what densities. The results of the analysis provide estimates of the numbers of potential lots and new building units the study area may see developed at some point in the future. "Full build-out" refers to the hypothetical time and circumstances in the future whereby no more building construction may occur, or the point at which lots have been subdivided to the minimum size allowed and there is no more "developable" land.

2. METHODS

2.1 COMMUNITY VIZ SOFTWARE

FBE conducted the build-out analysis using ESRI ArcMap v. 10.6.1 geographic information system (GIS) software and CommunityViz v. 5.2. CommunityViz is a GIS-based, decision-support tool designed to help planners and resource managers visualize, analyze, and communicate about important land use decisions. FBE utilized the software's 'Build-out Wizard' to calculate the development capacity of the study area (numerically and spatially), as well as the 'Time Scope Analysis' tool to project and visualize how future development might occur over time.

The baseline build-out analysis and alternative build-out analysis were both performed according to the following general steps:

1. Collect data on existing conditions in the study area: existing buildings, zoning, and growth rates.
2. Collect and/or create relevant GIS data (e.g., development constraints layers such as wetlands and conserved lands).
3. Analyze build-out potential using CommunityViz's Build-Out Wizard tool.
4. Determine potential dates at which full build-out is reached using CommunityViz's TimeScope Analysis tool.

2.2 DISCLAIMER AND DATA LIMITATIONS

Much of the data used in the analysis were publicly available datasets obtained from Maine's Geographic Information System online data library (Maine GeoLibrary). 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). Due to their inherent levels of accuracy, the data layers were originally intended to be viewed at certain scales (generally 1:24,000 or 1:25,000). Maine GeoLibrary 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 between datasets used in this analysis due to the variety of source materials and mapping standards used by the original creators of the datasets. 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 2016 ESRI World Imagery to create a GIS layer of existing buildings within the study area. Examination of aerial imagery resulted in the creation of a shapefile with 4,119 points representing principal structures such as homes and office buildings (secondary structures such as garages and barns were not included) (FIGURE 2). In areas where it was difficult to discern the presence of a dwelling (typically due to shadows or the presence of trees), FBE referred to an Excel spreadsheet containing information regarding Ellsworth parcels that was provided to FBE by the Ellsworth City Assessor. This provided increased accuracy in the development of the existing buildings layer. The existing buildings layer was cross referenced with the City Assessor's data to assign construction dates to existing buildings.

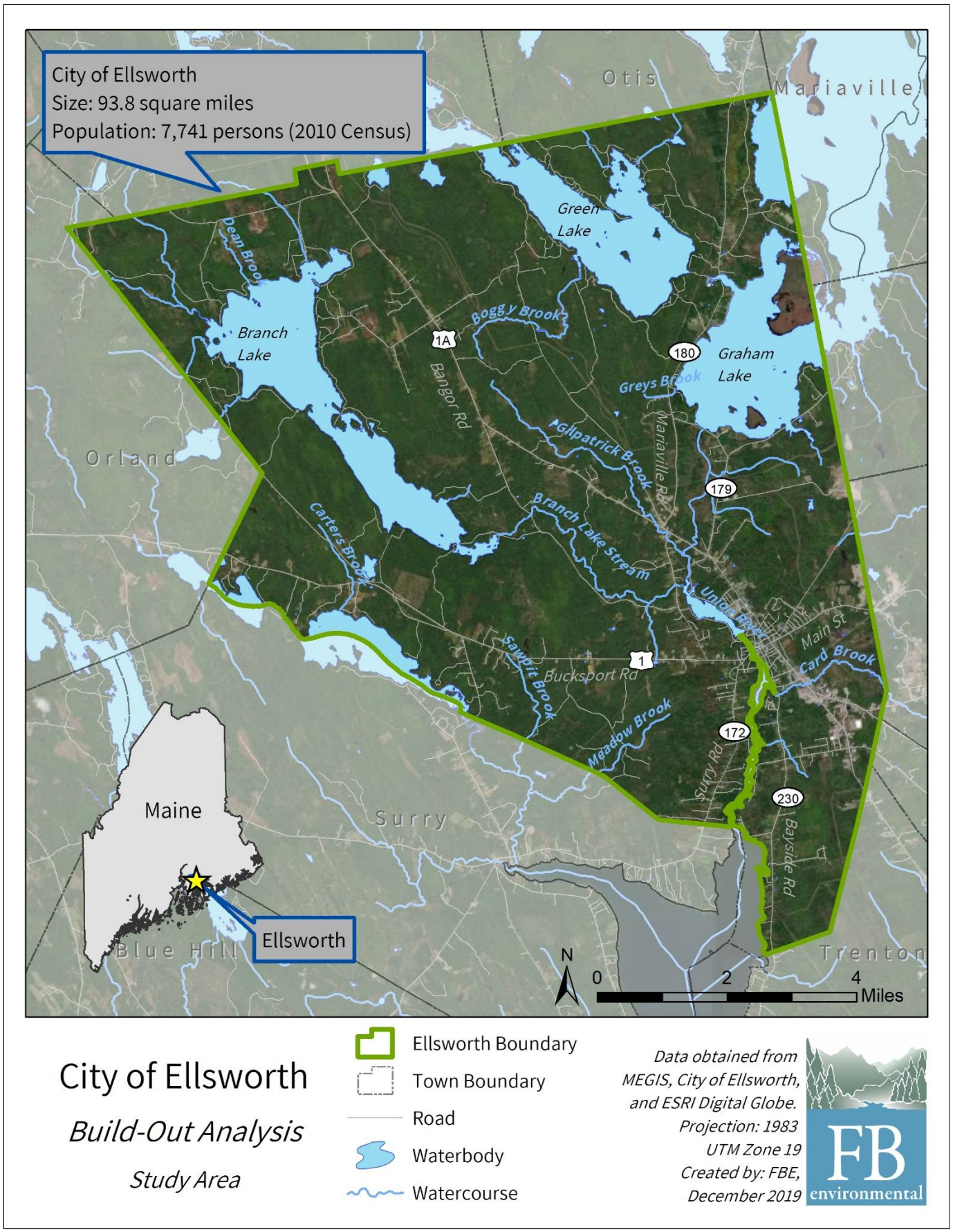

FIGURE 1. The City of Ellsworth, in Hancock County, Maine.

2.4 ZONING

Crucial to a build-out analysis is the process of modeling zoning requirements to create spatial datasets of development restrictions (TABLE 1). The City of Ellsworth is comprised of fourteen zones. FBE obtained a digital layer of zoning from Sewall Company and zoning standards from the *City of Ellsworth Unified Development Ordinance*. FBE obtained a parcels layer from the Maine GeoLibrary and additional parcel information from the City of Ellsworth. Ellsworth's zoning ordinance sets forth a minimum lot size for new development by zone.

TABLE 1. Base zoning standards used in the buildout for the City of Ellsworth.

Zone	Front Setback (ft)	Side/Rear Setback (ft)	Minimum Lot Size (sq. ft)	Minimum Lot Size (acres)
Business Park	0	0	0	0.00
Commerce Park	40	20	40,000	0.92
Commercial	0	10	20,000	0.46
Downtown	*0	5	N/A	N/A
Drinking Water	50	15/20	80,000	1.84
Drinking Water Protection	20	25	90,000	2.07
General Development	20	10	10,000	0.23
Industrial	0	0	0	0.00
Limited Residential	20	15	40,000	0.92
Neighborhood	20	10/20	20,000	0.46
Rural	20	15	40,000	0.92
Urban	N/A	5	10,000	0.23
Resource Protection	**250	**250	N/A	N/A
Stream Protection	**250	**250	N/A	N/A

The Drinking Water Zone/Drinking Water Protection Zone, and Commercial Zone/Commerce Park Zone were combined for buildout analysis display tables.

**No front setback requirements except for certain streets (see City Development Ordinance)*

***See Section 2.6 Development Constraints*

2.5 POPULATION GROWTH RATES

According to the US Census Bureau, Ellsworth has experienced steady population growth since the middle part of the 20th century (TABLE 2), increasing from 4,444 people in 1960 to 7,741 people in 2010. Ellsworth has experienced a faster growth rate than the state of Maine, on average.

TABLE 2. US Census Bureau population and growth rates for Ellsworth compared to the state of Maine, 1960-2010. Data from www.census.gov.

Town	1960	1970	1980	1990	2000	2010	Compound Annual Growth Rate		
							30 yr. Avg. 1980-2010	20 yr. Avg. 1990-2010	10 yr. Avg. 2000-2010
Ellsworth	4,444	4,603	5,179	5,975	6,456	7,741	1.35%	1.30%	1.83%
Maine	969,265	993,722	1,125,043	1,227,928	1,274,923	1,328,361	0.56%	0.39%	0.41%

2.6 DEVELOPMENT CONSTRAINTS

To determine where development may occur in the study area, the build-out analysis first subtracts land unavailable for development due to physical constraints, including environmental restrictions (e.g., wetlands, resource protection zones, hydric soils), zoning restrictions (e.g., shoreland zoning, street Right-of-Ways (ROWs), and building setbacks), and practical design considerations (e.g., lot layout inefficiencies). Existing buildings also reduce the capacity for new development (FIGURE 2).

FBE built the development constraints dataset by obtaining Hydric Soils data the SSURGO Database, Resource and Stream Protection Districts from the Sewall Company, Conserved Lands from the Frenchman Bay Conservancy, and City-Owned Parcels from the City of Ellsworth. FBE creating the existing buildings layer. All other data were acquired from Maine GeoLibrary and used to model the development constraints. A detailed list of development constraints:

- **Building setbacks** were estimated based on the average front and rear setbacks specified by the 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. FBE estimated the dimensions of the minimum building footprint to be 35 feet x 35 feet. This number was added to the average front/rear setback for each zone to estimate the "Minimum Separation Distance" used in CommunityViz.
- The **Resource Protection Zone** and **Stream Protection Zone** serve as minimum setbacks from protected resources (TABLE 3). Both zones were excluded from the buildout.
- **Minimum lot sizes** were based on requirements for each zone (TABLE 1). Future lots were made the smallest size allowable for the zoning district, and unit types (e.g., residential house, commercial building) were not specified.
- **City Owned Land** and **Conserved Land** parcels were both treated as non-buildable.
- **Hydric Soils** were considered non-buildable. While hydric soils are not a complete barrier to development, they were treated as a barrier in the analysis to err on the conservative side. If this barrier is overcome in areas, the quantity of projected buildings may be larger.

This list does not represent the full range of possible restrictions or natural features that may be encountered in the field. For example, rare and/or state-listed species may be present but no data regarding their specific location(s) are available. Small, unmapped wetlands may also be present that would further restrict development.

Building density is difficult to predict with precision in a build-out analysis because the exact siting of construction and development occurs in a somewhat unpredictable fashion. A wide range of factors (in addition to those mentioned above) can decrease the permitted density: stormwater drainage facilities, parcel contiguity, ROWs, setbacks, road frontage, conservation restrictions, etc. A standard approach to account for these density losses is to use an "efficiency factor," a simple multiplier that adjusts the "lot efficiency," the amount of land on a parcel that is available for construction after addressing all constraints. Simply stated, an efficiency factor is used to account for information that can only be obtained upon on-the-ground inspection of particular parcels. Efficiency factors are entered as a percentage, where 100% means complete efficiency (no density lost) and 0% means no buildings are estimated for a zone. FBE used an efficiency factor of 66% for all zones based on prior experience, with the exception of the Commercial Zone and the Downtown Zone, for which an efficiency factor of 75% was used due to increased density in downtown areas as advised by a town planner.

TABLE 3. Resource Protection and Stream Protection Districts within the Shoreland Zoning District.

District	Resource	Setback (ft)
Resource Protection	Rated Wetlands, Floodplains, Steep Slopes, Hydric Soils, Erodible Areas, Significant Natural Areas*	250
Stream Protection	Watercourse	75
**See City Development Ordinance for specific constraint explanations*		

2.7 PROJECTED BUILDINGS

The build-out analysis is comprised of a numeric build-out and a spatial build-out. A numeric buildout is completed first in order to obtain a number of total projected buildings based on minimum lot size and total area of buildable land. A spatial buildout is then run which places building points on the map, converting numeric building counts into points representing individual structures. The spatial build-out takes into account the size of projected buildings, geometry of lots, and setbacks

to various spatial features incorporated into the build-out (e.g., lot lines, roads, natural features). For example, an oddly shaped lot may have enough total area for two buildings, but due to setback rules or minimum separation distances, it may only fit one unit. Along with development constraints and lot size, the spatial buildout also considers the minimum allowable separation distance between buildings or parcel shapes.

During the placement of projected buildings onto buildable area, the user has control over whether the spatial buildout building points are distributed in a random or grid pattern, and if the points should follow existing roads. The grid pattern is best suited for new urbanist type development, and the random layout is best for suburban type development.[1] For the City of Ellsworth build-out analysis, the random layout was implemented as it was deemed most appropriate.

2.8 TIMESCOPE ANALYSIS

The TimeScope Analysis is a computer model of community growth that simulates change over time in a study area. In our analysis, each projected building within the City of Ellsworth was assigned a future build date based on a population growth rate for the city. FBE used compound annual growth rates representing 10-, 20-, and 30-year periods, from 2000-2010 (1.83%), 1990-2010 (1.30%), and 1980-2010 (1.35%) respectively, to run three iterations of the TimeScope analysis. The projection also provides a date of full build-out based on each population growth rate, to provide a range of estimated dates.

This tool provides an analysis of how the number of buildings within the City of Ellsworth will grow based on projected population rates, but it does not take into account future zoning amendments or design considerations as the population grows, which may increase or decrease population (e.g. changes is residential zoning, road additions). It is also important to note that the growth rates used in the TimeScope Analysis are based on town-wide census statistics. Using census data to project population increase and/or decrease development has the inherent limitation of extrapolating future growth based on past conditions. As such, the TimeScope Analysis might over- or underestimate the time required for the study area to reach full build-out. Numerous social and economic factors influence population change and development rates, including policies adopted by federal, state, and local governments. The relationships among the various factors may be complex and therefore difficult to model.

[1] CommunityViz (2018)

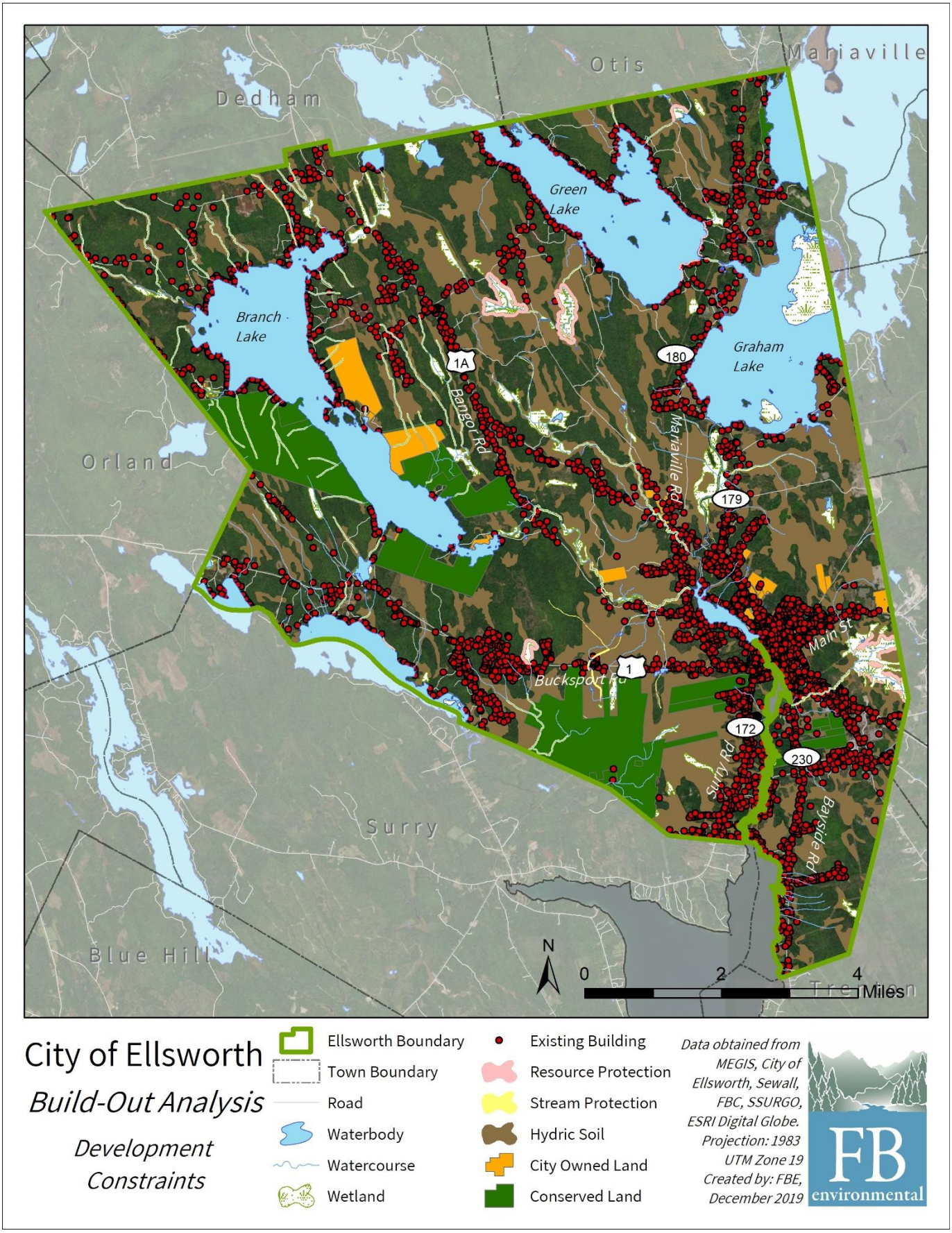

FIGURE 2. Development constraints (including existing buildings) in the City of Ellsworth, Maine.

3. RESULTS

3.1 PARCELS

There are 7,925 parcels within the study area, ranging in size from less than one acre to 1,472 acres.

3.2 BUILDABLE AREA

The build-out analysis showed that 52% (25,167 acres) of the study area is buildable under current zoning regulations. In Ellsworth, the Rural Zone has the most acreage of land available for development, with 14,307 acres available of 24,794 acres total in this zone (58%) (TABLE 4, FIGURE 3). The Business Park Zone has least acreage of land available for development, with 38 acres available of 103 acres total in this zone (37%). The commercial zone has the largest percent buildable area at 67%, and the Downtown Zone has the smallest percent buildable area at 32%.

TABLE 4. Amount of buildable land within the City of Ellsworth, Maine.

Zone	Total Area (Acres)	Zone Percentage of Total City Area	Buildable Area (Acres)	Percent Buildable Area by Zone
Commercial	886.48	1.83%	598.33	67%
General Development	63.72	0.13%	40.13	63%
Rural	24,794.40	51.14%	14,307.60	58%
Drinking Water Protection	11,525.67	23.77%	6,561.52	57%
Urban	2,454.69	5.06%	1,082.44	44%
Limited Residential	2,816.15	5.81%	1,115.89	40%
Neighborhood	3,240.22	6.68%	1,200.85	37%
Business Park	102.83	0.21%	37.57	37%
Industrial	488.57	1.01%	165.07	34%
Downtown	180.69	0.37%	57.36	32%
Water	453.92	0.94%	-	0%
Wetlands	1,477.82	3.05%	-	0%
Total	**48,485**	**100%**	**25,167**	**52**

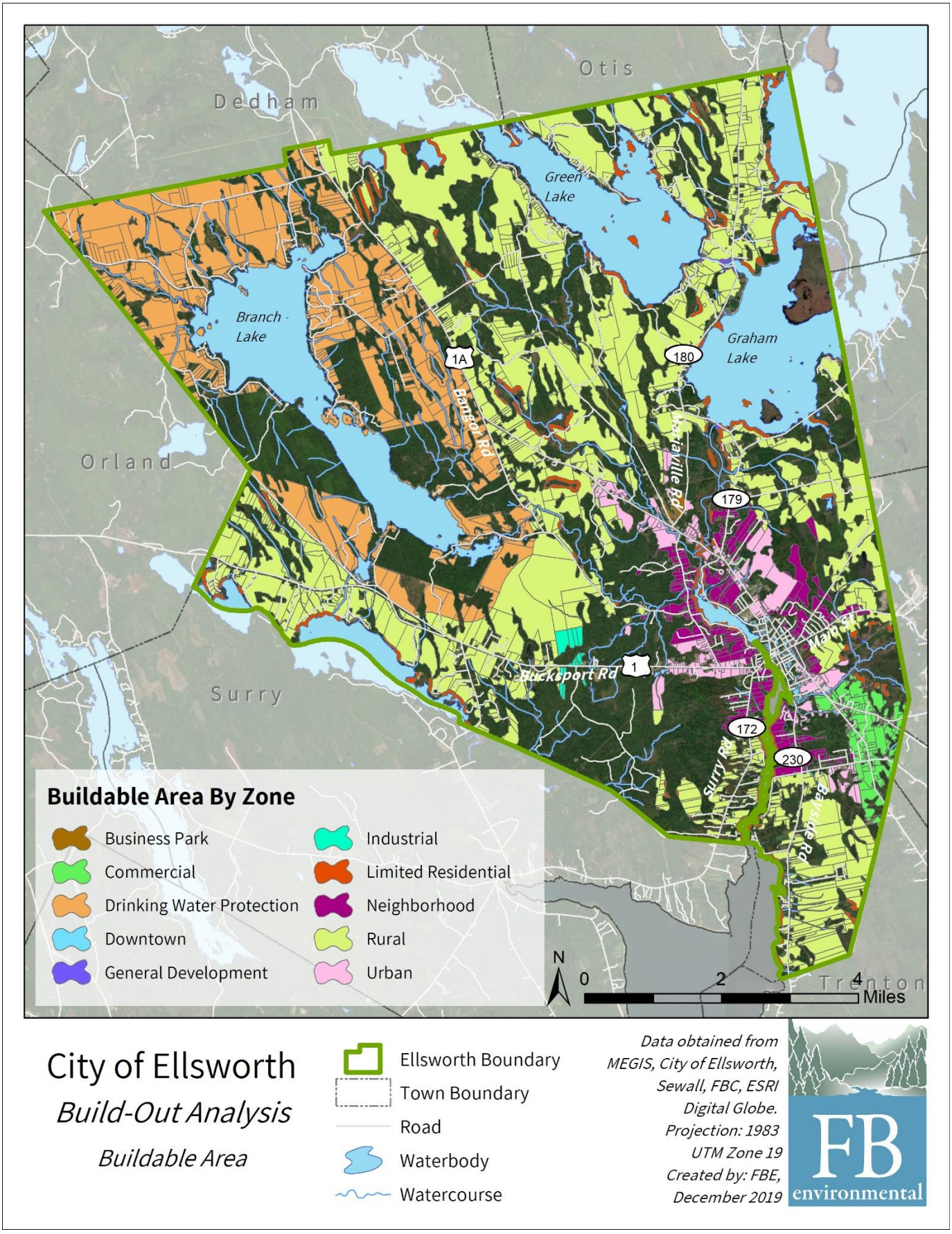

FIGURE 3. Buildable area in the City of Ellsworth, Maine.

3.3 PROJECTED BUILDINGS

The existing buildings layer contains 4,119 principal buildings. Based on the current input parameters, the build-out analysis projected that an additional 18,610 buildings could be constructed in the future, resulting in a total of 22,729 buildings (TABLE 5, FIGURE 4). As the analysis cannot predict where new roads will be built, projected buildings are placed at random within buildable area. Ellsworth's Rural Zone has the largest number of projected buildings at 10,839 buildings and the business park has the smallest number of projected buildings at 106 buildings. The Urban Zone has the highest percent increase of projected buildings by zone at 903%, and the Downtown Zone has the least percent increase of projected buildings at 39%.

TABLE 5. Projected increase in buildings by zone within the City of Ellsworth, Maine.

Zone	No. Existing Buildings	No. Projected Buildings	Total No. Buildings	Percent Increase
Urban	310	2,798	3,108	**903**
Rural	1,154	9,685	10,839	**839**
Industrial	41	302	343	**737**
Commercial	141	854	995	**606**
Drinking Water Protection	567	2,325	2,892	**410**
Business Park	23	83	106	**361**
General Development	44	95	139	**216**
Limited Residential	513	831	1,344	**162**
Neighborhood	945	1,487	2,432	**157**
Downtown	381	150	531	**39**
Total	**4,119**	**18,610**	**22,729**	**452**

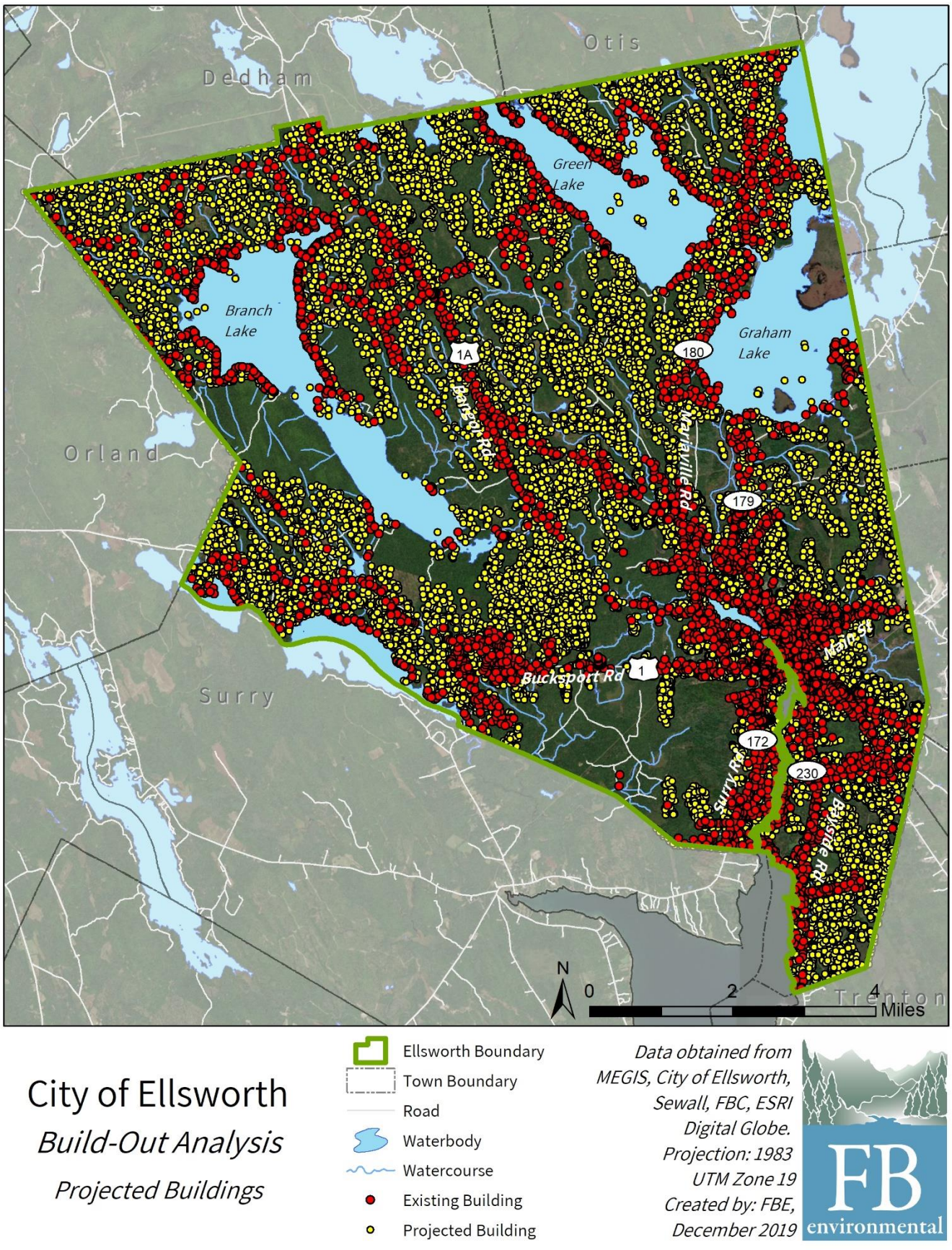

FIGURE 4. Projected buildings in the City of Ellsworth, Maine.

3.4 TIMESCOPE ANALYSIS

Three iterations of the TimeScope Analysis were run using compound annual growth rates (CAGR) for 10-, 20- and 30-year periods from 2000-2010 (1.83%), 1990-2010 (1.30%), and 1980-2010 (1.35%), respectively (TABLE 2). Full build-out is projected to occur in 2115 at the 10-year CAGR, 2153 at the 20-year CAGR, and 2148 for the 30-year CAGR (FIGURE 5). This analysis shows that if Ellsworth continues to grow at recent rates, and current zoning and other development constraints remain the same, full build-out will occur in the early to mid-22nd century.

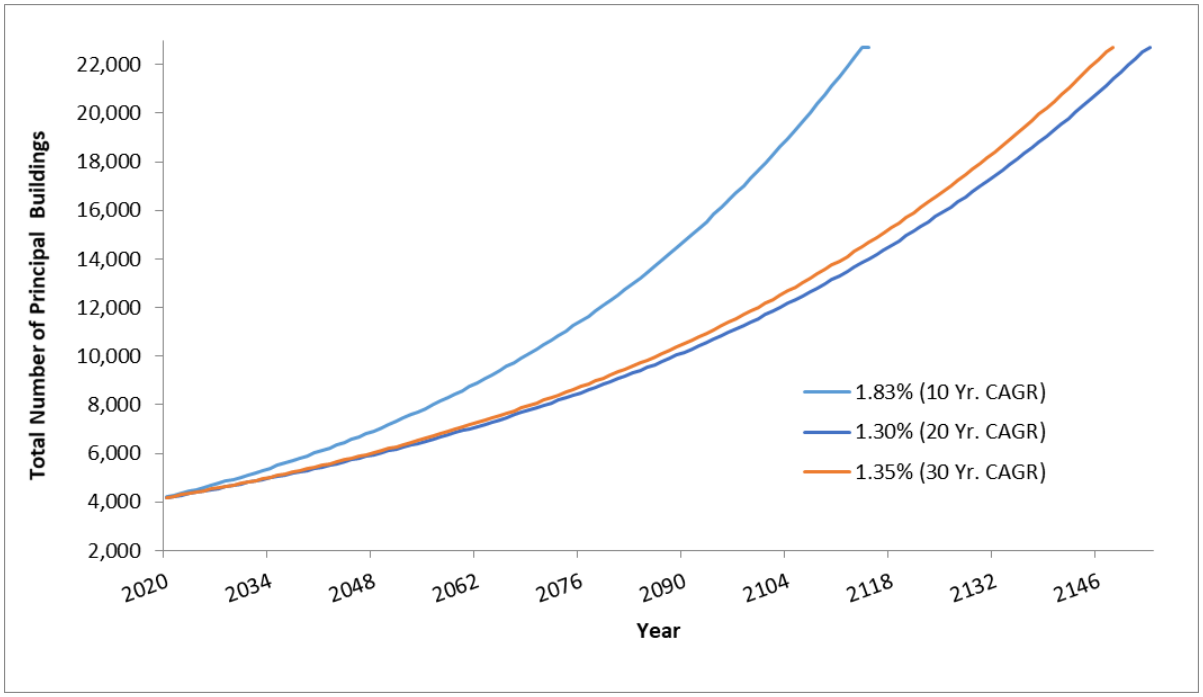

FIGURE 5. Full build-out projections of the City of Ellsworth (based on compound annual growth rates reported in Table 2).

4. 25 YEAR RETROSPECTIVE VIEW

4.1 RETROSPECTIVE VIEW

A retrospective view of existing buildings in the City of Ellsworth built prior to 25 years ago (1995) is shown in Figure 6. Approximately 74% (3,037) of the existing buildings in Ellsworth were built prior to 1995. 89% of existing buildings had a building date assigned to the structure. The analysis assumes an equivalent ratio of buildings with an unknown build date to a known build date in the projection of existing buildings and buildings built prior to 1995.

5. 25 YEAR FUTURE VIEW

5.1 PROSPECTIVE VIEW

A view of existing buildings in the City of Ellsworth and projected buildings built in the next 25 years, up to 2045, is shown in Figure 7 using a 30-year compound annual growth rate of 1.35%. At this population growth rate, 1,682 buildings will be built between 2020 and 2045. As the analysis cannot predict where future roads will be built, the placement of projected buildings is populated at random in buildable area (refer to Section 2.7). It is likely that development over the next 25 years will continue the pattern of development along waterfront and existing roads, as reflected in the retrospective view (FIGURE 6).

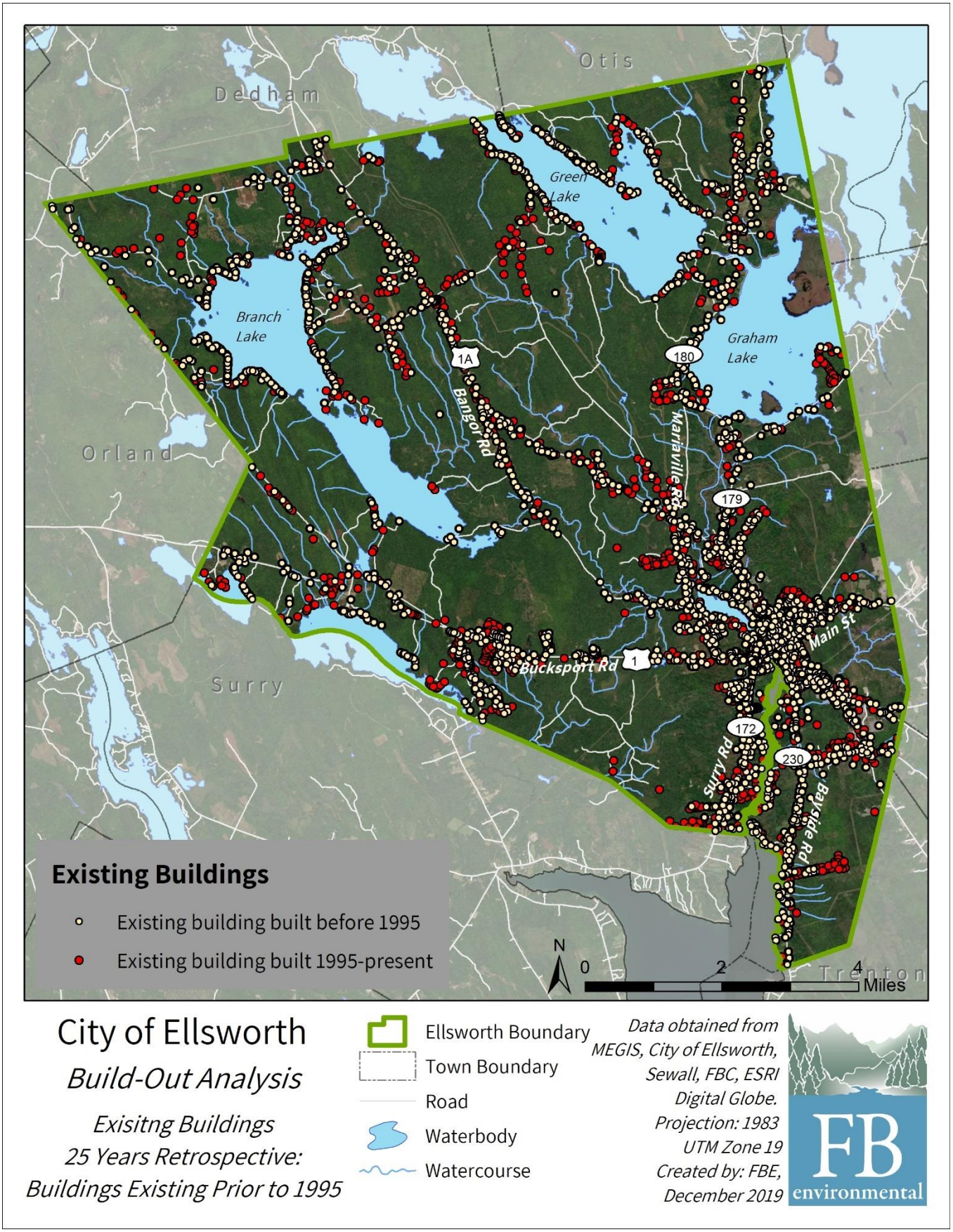

FIGURE 6. A 25-year retrospective view of buildings built prior to 1995 (white) with buildings built between 1995 and present in red.

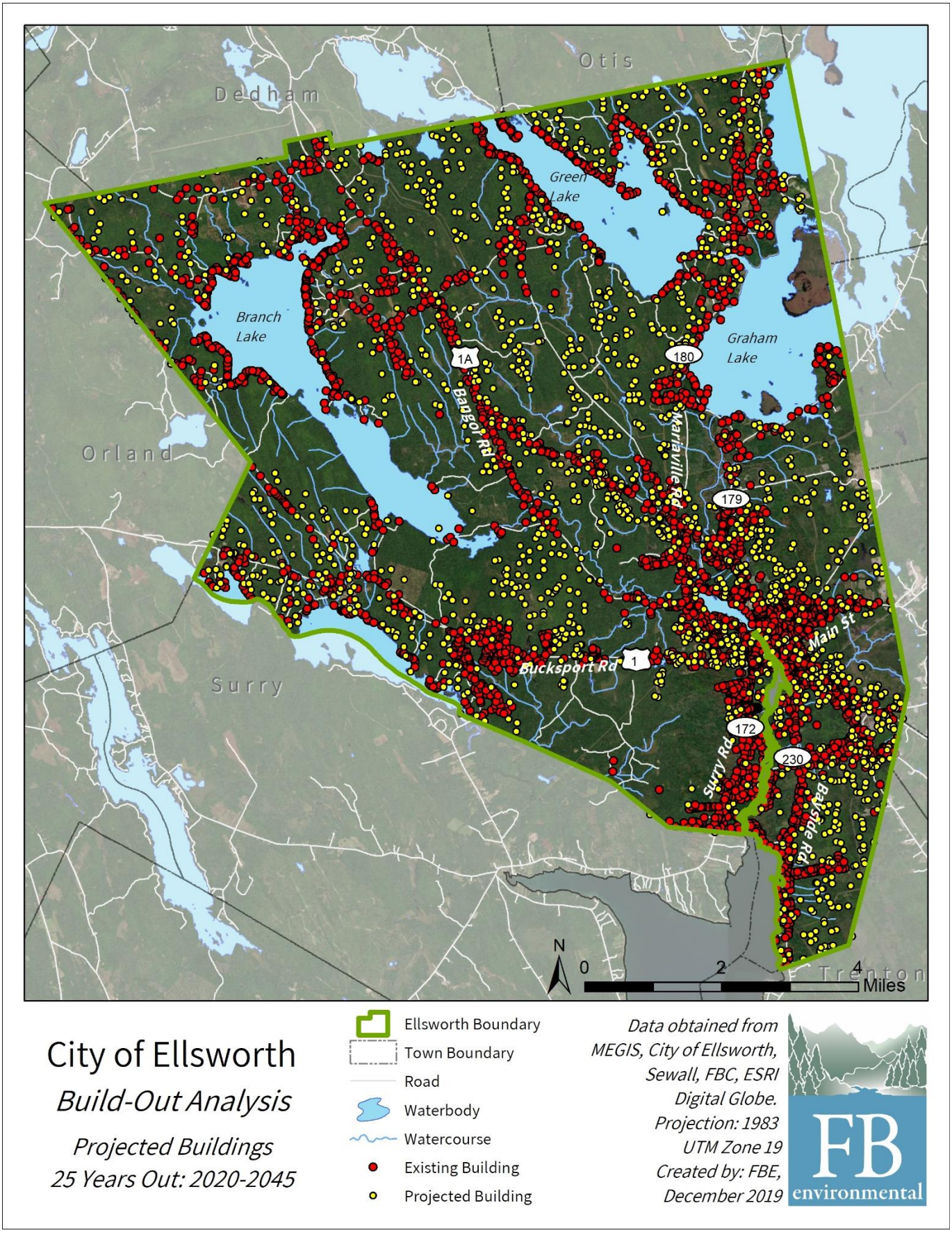

FIGURE 7. Projected buildings built between 2020 and 2045 (yellow points) and existing buildings (red points).

6. ALTERNATIVE CONSERVATION SCENARIO

6.1 OBJECTIVE

An alternative build-out scenario provides an opportunity to understand how hypothetical changes to the City of Ellsworth's zoning ordinances or development exclusion in certain portions of the city may affect projected buildings and buildable area. The additional scenario analyzed below is multi-faceted and uses alternative zoning regulations and additional conserved land opportunities to provide stronger natural resource protection and conservation.

Due to the fact that the alternative conservation scenario is multi-faceted and changes in buildable area and projected buildings from the baseline scenario are due to multiple confounding factors, the results of the scenario should be viewed holistically. For example, viewing the change in buildable area as a whole – buildable area in the alternative scenario is 34% as compared to 52% in the baseline scenario – better demonstrates the effect of the alternative scenario's development constraints than viewing buildable area changes for each zone within the city, for which each had slightly different resulting changes from the application of the additional alternative scenario development constraints.

Using the Ellsworth Green Plan's Conservation Goals to guide the analysis's focus, the alternative scenario, hereafter referred to as the conservation scenario, addresses the conservation goals of the Ellsworth Green by altering and adding development constraints to the baseline build-out analysis (TABLE 6). The conservation goals are: (1) habitat conservation, including protecting open space and preventing future landscape fragmentation; (2) clean water, including protecting water quality and access to water; and (3) protecting farmland.

TABLE 6. Overview of development constraints used to address Conservation Goals for the Ellsworth Green Plan.

Conservation Goal	Protection Measure	Development Constraint used in Alternative Scenario
Habitat Conservation	Increase urban development density	Decrease the minimum lot size in certain zones of Ellsworth that have access to city services (sewer and water services)
	Decrease rural development density	Increase the minimum lot size in the Rural and Drinking Water Zones to 15 acres
Clean Water	Increase shoreline development setback distance within Drinking Water Protection area	Double the shoreline setback in the Drinking Water Protection Zone to 500 feet around Branch Lake
	Increase wetland buffers	Use a 250-foot setback from all wetlands in the National Wetlands Inventory.
	Increase watercourse and waterbody buffers	Use a 250-foot setback from all watercourses and waterbodies identified in the National Hydrography Dataset.
Farmland	Protect farmland soils	Exclude farmland of statewide importance and prime farmland from potential buildable area

6.2 DEVELOPMENT CONSTRAINTS

The conservation scenario includes all development constraints used in the baseline scenario (Section 2.6) in addition to the following constraints:

- The Downtown Zone, which currently has the smallest minimum lot size, was expanded to include parcels that have access to city services which facilitates a modelled increased urban density. Specifically, this expansion included all parcels in the Commercial, General Development, Limited Residential, Urban, and Business Park Zones that are within 1,000 feet of the existing sewer line (sewer line data was supplied by the City of Ellsworth). The Neighborhood Zone, although partially within 1,000 feet of the sewer line, was not rezoned to be in the Downtown

Zone, at the request of the Frenchman Bay Conservancy to keep its zone size the same in both scenarios. It is important to note that because of the expansion of the Downtown Zone, other zones were reduced in size in this hypothetical scenario. This allows the analysis to use a consistent minimum lot size among parcels within 1,000 feet of city services, thus achieving the high downtown density aimed for in the conservation scenario.

- The minimum lot size in the Rural Zone and Drinking Water Protection Zone was increased from 0.92 acres and 2.07 acres, respectively, to 15 acres to allow for decreased rural density and increased open space.
- The shoreline setback around Branch Lake within the Drinking Water Protection Zone was increased from 250 feet to 500 feet.
- The setback from all wetlands in the National Wetlands Inventory was increased to 250 feet (previously included rated wetlands only as designated within Ellsworth Resource Protection Zone).
- The setback from watercourses and waterbodies in the National Hydrography Dataset was increased to 250 feet (previously was a 75-foot setback within the Ellsworth Stream Protection Zone).
- Areas with prime farmland and farmland of statewide importance[2] were excluded from buildable area (farmland soil data sourced from SSURGO Database).

As a result of the additional development constraints and the expansion of the Downtown Zone discussed above, the factors that cause changes in the buildable area and projected buildings are difficult to isolate, and the reader is again encouraged to view the scenario holistically.

Figure 8 displays the development constraints used in the alternative scenario. Figure 9 displays current agricultural land use and farmland soils.

[2] Prime Farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Farmland of statewide importance is farmland that does not meet the requirements for prime or unique farmland (SDA 2020).

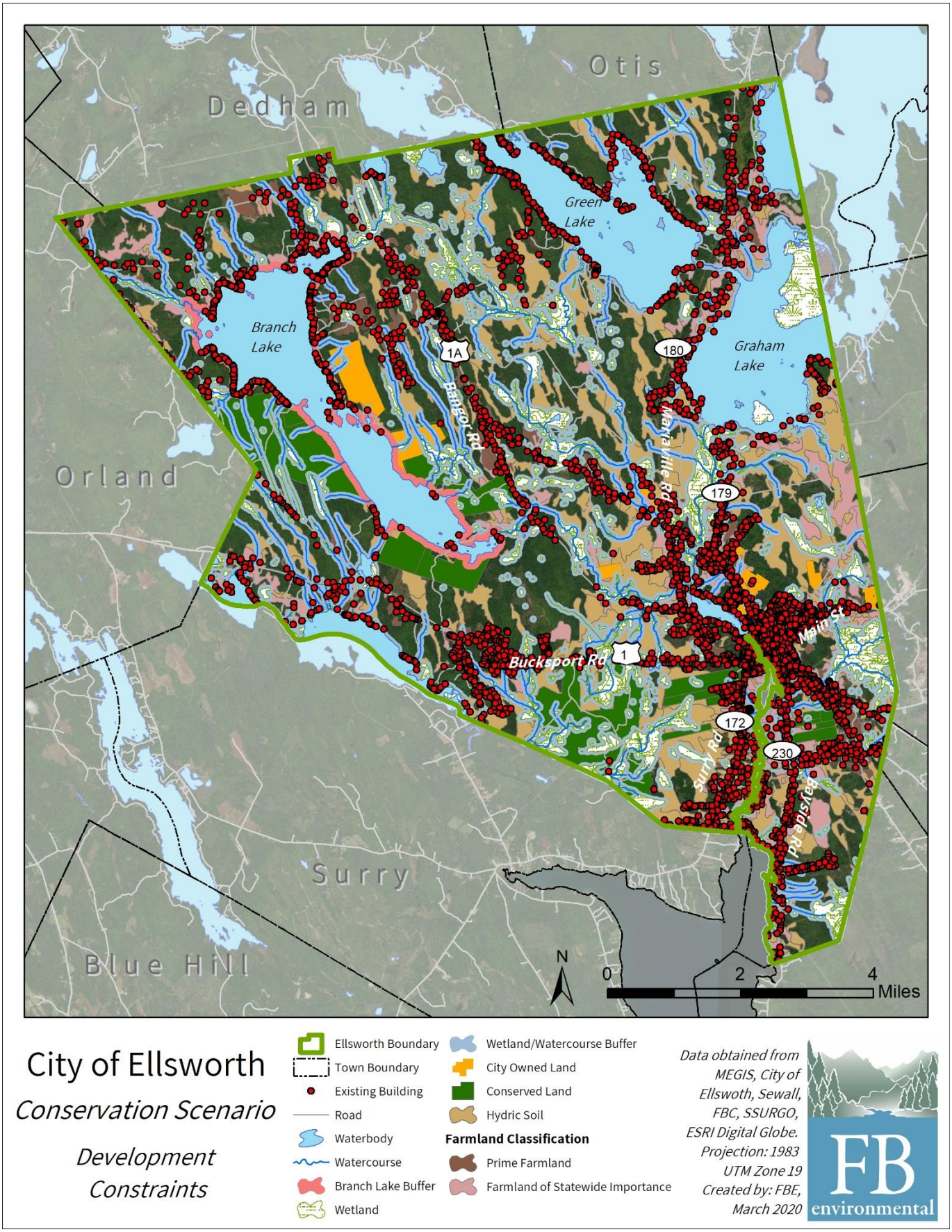

FIGURE 8. Development constraints used for the conservation scenario in the City of Ellsworth, Maine.

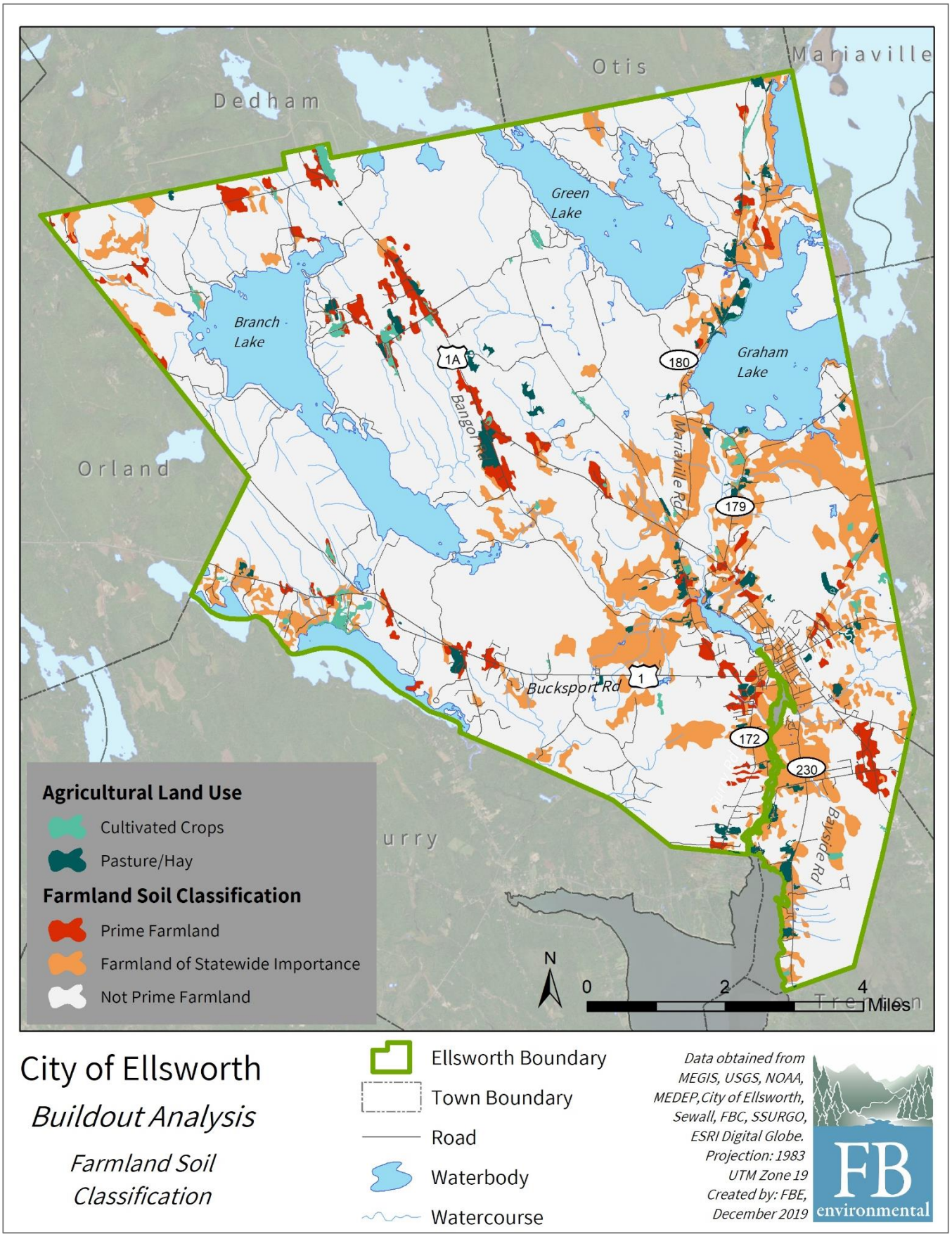

FIGURE 9. Farmland soil classification and agricultural land use in the City of Ellsworth.

6.3 BUILDABLE AREA

The conservation scenario build-out analysis showed that 34% (16,430 acres) of the study area would be buildable under the conservation scenario. It is important to note that parcels in the Commercial, General Development, Limited Residential, Urban, and Business Park Zones that were within 1,000 feet of city services were rezoned to be within the Downtown Zone in this analysis. This allowed the minimum lot size to be consistent among all parcels within 1,000 feet of city services, achieving a high downtown density to be modelled in the hypothetical conservation scenario. As a result, the total area available for each zone has been altered for this scenario's analysis. The Neighborhood Zone, although partially within 1,000 feet of city services, was not rezoned.

In the conservation scenario, the Rural Zone has the most acreage of land available for development, with 9,386 acres available of that zone (38%) (TABLE 7, FIGURE 10). The General Development Zone has least acreage of land available for development, with 10.69 acres available of that zone (41%) (note that the rezoning changes resulted in the Business Park having no buildable area). The Commercial Zone has the largest percent buildable area at 50%, and the Neighborhood Zone has the smallest percent buildable area at 14% (aside from Water, Wetland, and Business Park zones with no available buildable acres).

TABLE 7. Amount of buildable land within the alternative scenario within the City of Ellsworth, Maine.

Zone	Total Area (Acres)	Zone Percentage of Total City Area	Buildable Area (Acres)	Percent Buildable Area by Zone
Commercial*	231.58	0.48%	114.84	50%
Downtown	2,400.45	4.95%	983.51	41%
General Development*	26.35	0.05%	10.69	41%
Drinking Water Protection	11,525.67	23.77%	4,469.65	39%
Rural	24,634.13	50.81%	9,386.56	38%
Limited Residential*	2,689.63	5.55%	651.19	24%
Urban*	1,316.37	2.72%	293.98	22%
Industrial	488.57	1.01%	74.13	15%
Neighborhood	3,240.22	6.68%	444.95	14%
Business Park*	0.45	0.00%	-	0%
Water	453.92	0.94%	-	0%
Wetlands	1,477.82	3.05%	-	0%
Total	**48,485**	**100%**	**16,430**	**34**

**Denotes zones that were partially rezoned to the Downtown Zone for the conservation scenario, resulting in reduced area remaining. The Neighborhood Zone, though it is within 1,000 feet of the city services, was not rezoned.*

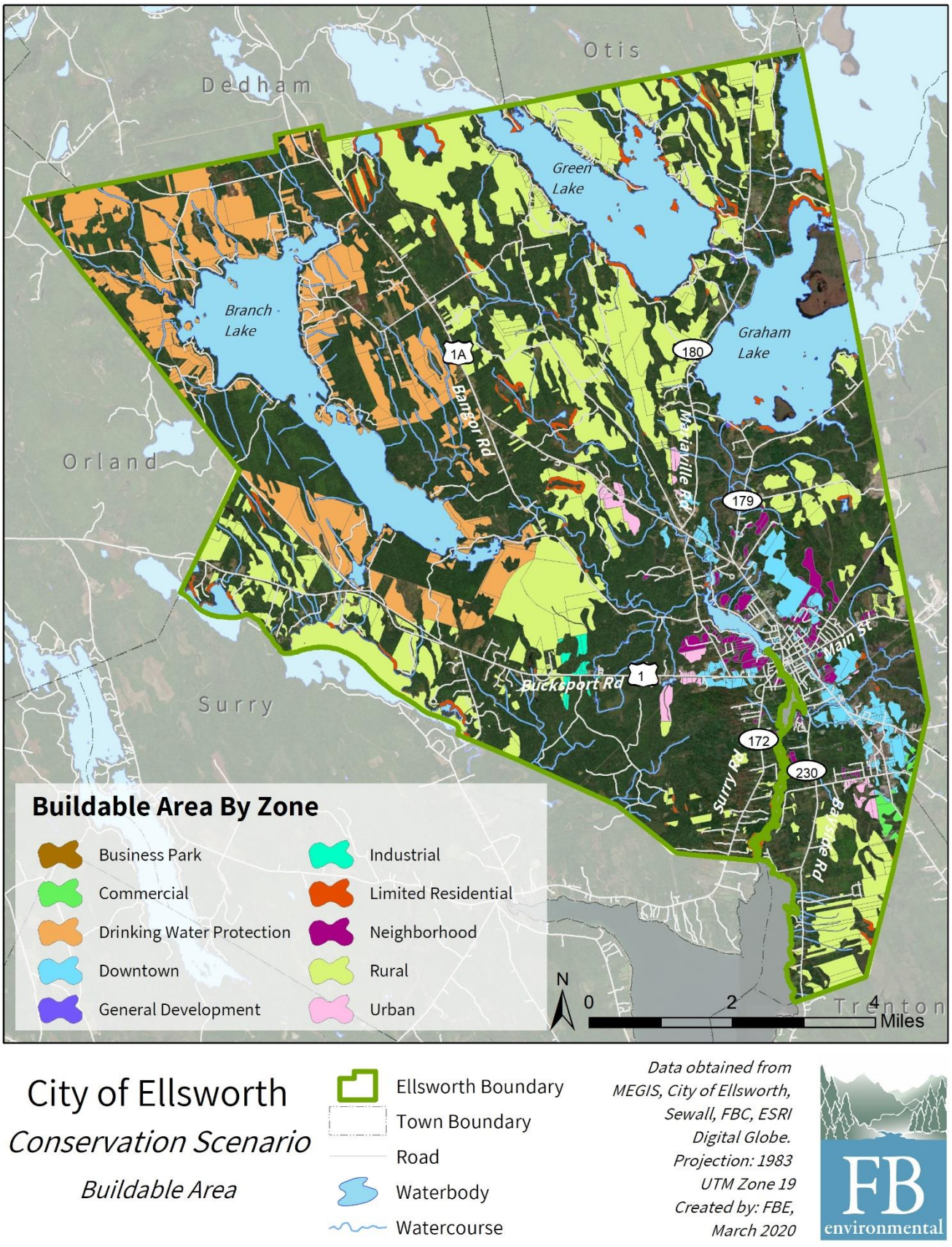

FIGURE 10. Buildable area in the conservation scenario in the City of Ellsworth, Maine.

6.4 PROJECTED BUILDINGS

Based on the conservation scenario input parameters, the build-out analysis projected that an additional 6,395 buildings could be constructed in the future, resulting in a total of 10,514 buildings (TABLE 8, FIGURE 11). Ellsworth's Downtown Zone would have the largest number of projected buildings at 3,222 buildings and the largest percent increase at 746%. It is important to note that parcels in the Commercial, General Development, Limited Residential, Urban, and Business Park Zones that were within 1,000 feet of city services was rezoned to be within the Downtown Zone, allowing a high urban density to be modelled downtown in the hypothetical conservation scenario. The General Development Zone would have the smallest number of projected buildings at 29 buildings (note that the Business Park zone has no projected buildings). The neighborhood zone would have the least percent increase of projected buildings at 60%.

TABLE 8. Projected increase in buildings by zone for the conservation scenario within the City of Ellsworth, Maine.

Zone	No. Existing Buildings	No. Projected Buildings	Total No. Buildings	Percent Increase
Downtown	381	2,841	3,222	**746**
Industrial	41	200	241	**488**
Urban*	310	789	1,099	**255**
Commercial*	141	176	317	**125**
Limited Residential*	513	523	1,036	**102**
Drinking Water Protection	567	544	1,111	**96**
General Development*	44	29	73	**66**
Rural	1,154	723	1,877	**63**
Neighborhood	945	570	1,515	**60**
Business Park*	23	-	23	**-**
Total	**4,119**	**6,395**	**10,514**	**155**

**Denotes zones that were partially rezoned to the Downtown Zone for the conservation scenario.*

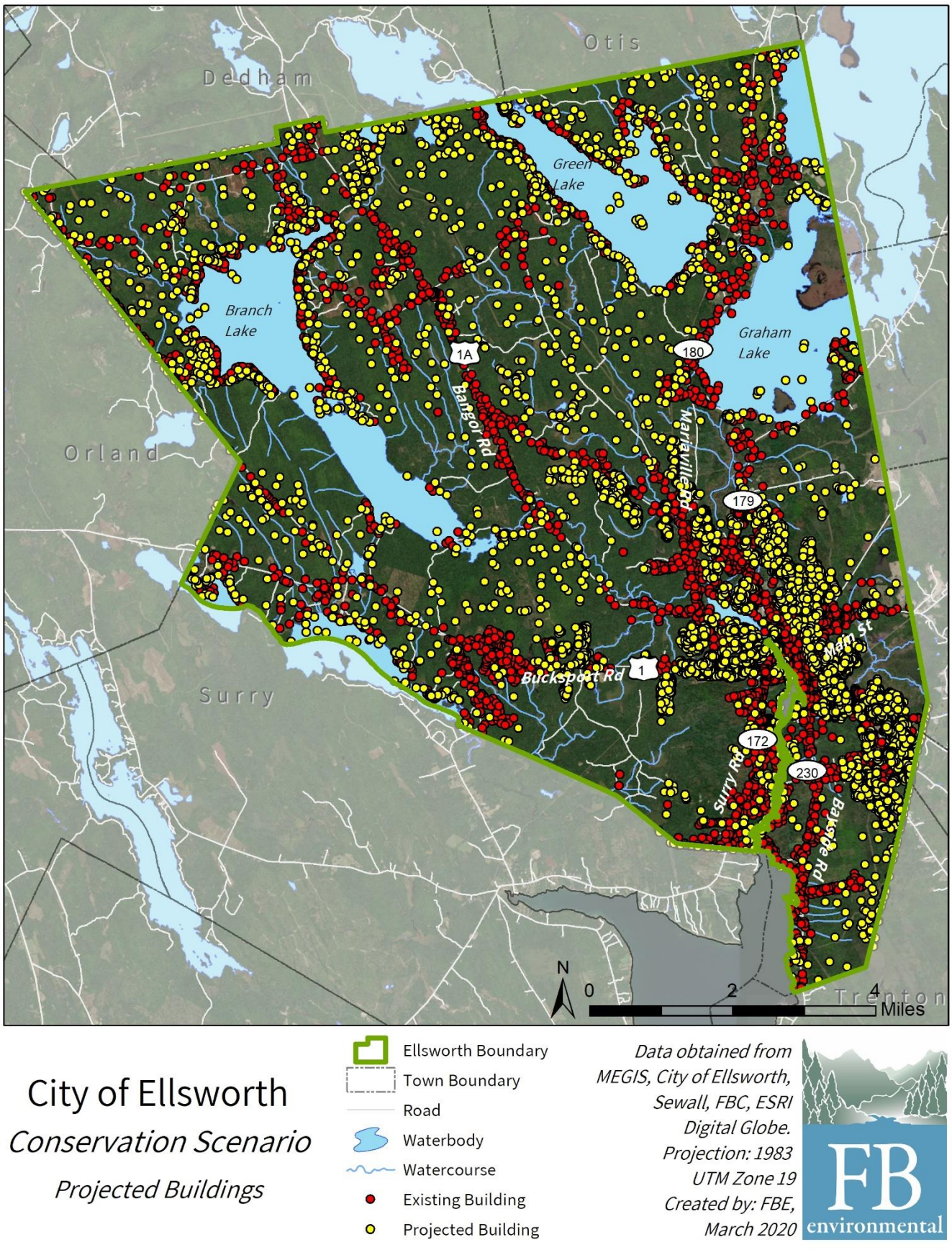

FIGURE 11. Projected buildings (yellow) and existing buildings (red) for the conservation scenario in the City of Ellsworth.

6.5 TIMESCOPE ANALYSIS

Three iterations of the TimeScope Analysis were run for the conservation scenario using compound annual growth rates (CAGR) for 10-, 20- and 30-year periods from 2000-2010 (1.83%), 1990-2010 (1.30%), and 1980-2010 (1.35%), respectively (TABLE 2). Full build-out under the conservation scenario is projected to occur in 2072 at the 10-year CAGR, 2094 at the 20-year CAGR, and 2091 for the 30-year CAGR (FIGURE 12). This analysis shows that if Ellsworth continues to grow at recent rates, under the conservation scenario development constraints, full build-out will occur in the mid to late 21st century, a century earlier than under the status quo build-out scenario.

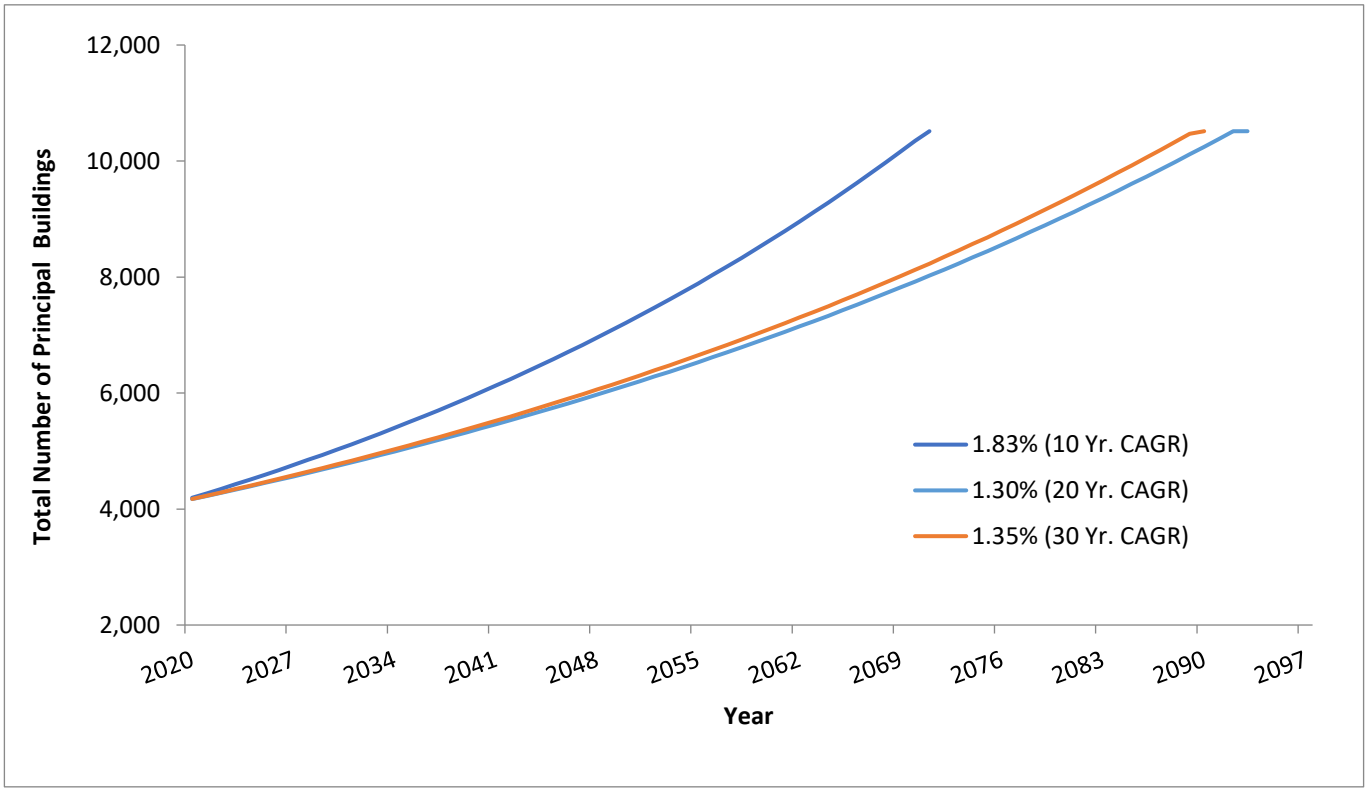

FIGURE 12. Full build-out projections of the City of Ellsworth under the conservation scenario (based on compound annual growth rates reported in Table 2).

7. CONCLUSION

The baseline scenario and conservation scenario build-out analyses provide a tool to help guide future development and conservation activities in the City of Ellsworth. In tandem, the two analyses provide a lens to understand how development constraints and zoning regulations may affect future development.

The baseline or conservation scenario can be viewed overlaid with other information to prioritize future conservation goals. For example, to address additional Ellsworth Green Plan Conservation Goals such as prioritizing climate resiliency and preventing further landscape fragmentation, identified climate resiliency corridors for landscape connectivity can be overlaid on the conservation scenario. Similarly, to address development goals within the City of Ellsworth, the two analyses indicate how current zoning regulations may affect the city's development objectives and future activities. The build-out analysis serves as a useful planning tool, but the reader is cautioned that the spatial and numerical information provided herein are estimates and should be treated accordingly.

8. REFERENCES

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