



Upper Valley Lake Sunapee
Regional Planning Commission

Memorandum

TO: City of Lebanon
FROM: Olivia Uyizeye, GIS Analyst / Assistant Planner
DATE: October 30, 2020
RE: **Urban Services District Build Out**

The attached report and documents contain the results of the Urban Services District performed for the City of Lebanon during 2019 and 2020. The report includes a scope of the work performed, build out results, and directions on how to use the build out tool for future analysis. The following documents are also included in the report package:

- Map Package of the Urban Services District build out including spatial analysis layers and results
- Excel Worksheets used to perform the Urban Services District build out, including the subzone preprocess, development potential, and results for GIS template
- Blank Excel Worksheets to be used and modified for future analysis, including the subzone preprocess, development potential, and results for GIS templates
- PDFs of maps illustrating the results of the Urban Services District build out, including parcel potential, maximum commercial gross floor area, and maximum residential units
- Word Document of this memorandum and report

In recent discussions on this project it has been determined that the original impetus for the results of this project has changed. The resulting analysis and corresponding tool may be used for the benefit of the City in additional ways, including the following topics of recent discussion:

- Identify areas prime for redevelopment
- Understand potential future development impact on infrastructure and natural resources (municipal water/sewer, septic/wells, roads, culverts/bridges, parking, transit, etc.)
- Understand where protections of ecologically significant areas may be warranted
- Integrate analysis from this build out with other regional data analysis efforts, including Urban3 value per acre, Regional Corridor Transportation Plan, and Keys to the Valley
- Utilize these analyses to understand how the current zoning ordinance is of service and where adjustments may benefit community thriving and resilience

We look forward to continuing to support the City of Lebanon both locally and regionally.

City of Lebanon
Urban Services District Build Out

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Introduction

This build out model assesses near maximum development potential for the proposed Urban Services District (USD) in the City of Lebanon, New Hampshire, under current zoning (Last Amended: March 9, 2019). The parcel level analysis allows us to best incorporate available data and optimize accuracy; however, the result does not incorporate multiple site-specific details that would be considered under real conditions by the planning board and developers, thus it is not meant to be understood at the parcel level.

Development Options and Current Zoning

Current zoning in the City allows for a wide array of development. It uses tools such as minimum lot size and building coverage to control allowable development in relation to the number of units, building footprint and/or gross floor area for residential, commercial and industrial uses. This build out considers the following **development options** where parcels are not fully developed.

- 1) Residential: single family dwellings, two-family, multifamily, accessory dwelling unit (ADU), planned unit residential development (PURD)
- 2) Commercial/ Industrial: subdivision and planned unit development (PUD).
- 3) Mixed Use: subdivision and PUD (no conversion of use or unit density is considered)

All parcels that fall within the USD to a significant extent are assessed for potential development¹. Those parcels with land in **multiple districts** are analyzed for each significant *subzone* and then merged and categorized under the largest subzone, also called the “dominant district”².

Existing development acts as the baseline for potential growth. This present state is incorporated using parcel assessing and building data. A list of **permitted** development has been included and treated in the model as existing. A list of **redevelopment** parcels is treated as vacant. While a list of conservation easements, which prescribe no further development, is identified as unbuildable area within a parcel. An entire parcel is deemed “**Conserved**” if the remaining buildable land is less than half the required minimum lot size. All details for permitted development, redevelopment potential, and conserved land were provided by the City of Lebanon Planning Department.

¹ Parcels that straddle the USD (generally small slivers and conserved areas) have only that area within the boundary considered. This area will not be considered if it is less than 3,000 sq.ft. or 5% of the total parcel area (including that outside of the USD).

² Subzones with an area less than 3,000 sq.ft. or 5% of the total parcel area are not separately considered, but rather combined with the dominant district.

Overlay Districts

Current zoning lays out guidelines for multiple **overlay districts**. This build out incorporates these as follows:

- Historic District – If a parcel falls within this district, covering 75% of the area, it is considered “Historic” and unavailable for further development
- Airport Protection District – This zone is not considered as the height restrictions are deemed to have minimal impact to developable units on a neighboring parcel.
- Landfill Reclamation District – Parcels in this district are unavailable for future development.
- Riverbank Protection, Wetlands Conservation, Flood Plain, and Steep Slopes Districts – All these districts are included in the build out’s accounting of natural and ecological features (discussed next). The wetlands, flood plain and steep slopes districts are applied to PUD and PURD as described in current zoning (Article V, Section 501).

Current zoning also lays out guidelines for road intersection sight, setbacks, adequate width, and frontage. These are not considered in this analysis as they are deemed to have minimal impact.

Natural and Ecological Features

This build out accounts for **natural and ecological features** (NEF). The City has identified the following as those limiting development or listed as a City priority due to their ecological function –

- Wetlands, Lakes and Ponds
- Wetlands buffer of 100 feet for wetlands of high or very high value (Article IV, Section 401.2B)
- Slopes greater than 25%
- Riverbank protection, buffer of 50 feet along designated rivers, streams and lakes
- Shoreland protection, buffer of 250 feet along those protected by the Shoreland Water Quality Protection Act
- Subject to inundation by the 1-percent-annual-chance flood event according to FEMA
- Designated significant ecological areas

NEF does not include area that is conserved as it is accounted for separately in this model. In current zoning, NEF is taken into consideration during the proposed development review process, however, a computer based build out does not allow for this type of social interpretation. Therefore, this build out has removed 50% of NEF area, that covered by one or more feature, from the available parcel area. The resulting area is incorporated into calculations to identify fully developed parcels and potential new units. As the PURD use incorporates NEF in a different capacity, the model applies this calculation rather than the 50% NEF removal.

Assessing Maximum Development

Parcels with existing development are considered **fully developed** if they pass one of the following thresholds:

- a. Potential new residential units (by subdivision) is at or less than 25% existing units according to the available area (Equation 1).

Equation 1. $Available\ Area = (Parcel\ Area - Conserved - 50\% NEF) - Building\ Ft - Est.\ Parking$

- b. Available building area is at or less than zero (Equation 2) that incorporates building coverage, NEF, existing building footprint and estimated current parking.

Equation 2. $Building\ Area = [Building\ Coverage\ in\ District \times (Parcel\ Area - Conserved - 50\% NEF)] - Building\ Ft - Est.\ Parking$

- c. The existing building footprint covers 75% or more of the allowed building coverage (Equation 3).

Equation 3. $Building\ Ft. \geq 75\% ((Parcel\ Area - Conserved) \times Building\ Coverage\ in\ District)$

Parking area has been estimated in this build out. The parking area is calculated using a multiplier given to each zoning district (Table 1). This multiplier is then applied to the gross floor area of existing buildings for the final parking area estimate. This multiplier is based on both review of the 2015 Lebanon aerial image and parking requirements, found in the Zoning Ordinance Article VI Section 607 Parking.

Table 1. Parking area multiplier by District.

District	Parking Area Multiplier
CBD & GC	2.0
IND-H, IND-L & IND-RA	1.0
MC, PBD, RO & RO1	1.2
R1, R2, R3, RL1, RL2 & RL3	0.4

Assessing Development Options

For those parcels found to allow development, details are provided on **development options** based on the following assumptions for each use.

Commercial or industrial uses are measured as future building footprint and gross floor area. For subdivisions, the future building footprint is also the building area, found in Equation 1. From this, the gross floor area is calculated by multiplying the future building footprint by the number of possible floors, according to height restrictions in that district. Buildings in industrial districts (Ind-H, Ind-L and Ind-RA) are assumed to require a height of 24 feet per floor. Buildings in all other districts are assumed to require a height of 15 feet per floor. For a PUD, the results are the same as long as the PUD is allowed in the district and the parcel area is of sufficient size, considering flood zones (Article V, Section 500).

Residential uses are measured as the number of units. For subdivisions (including single and two-family dwellings), this number is found by calculating the available area (Equation 2), relating it to the minimum lot size rules in the district, and then subtracting the number of existing residential units. For a multifamily, the number of future units is based on historical development patterns. Using assessing data, the median parcel area for each multifamily unit is determined for the relevant districts (Table 2). Units are then determined by dividing the available area (Equation 2) by the median parcel area in that district.

Table 2. Median Sq.Ft. per Unit for Existing Multifamily Development by District.

District	Median Sq.Ft./ Unit
CB	2500
PB	5500
R1	5800

For a PURD, the number of future units is determined by applying the 12% density bonus after following rules under current zoning (Article V, Section 500) that consider flood zones, wetlands and steep slopes.

Mixed-Use is measured as number of units, building footprint and gross floor area. For subdivisions, future units and building footprint remain the same as that calculated for single use subdivision options. For mixed-use PUDs, future building footprint remains the same. Residential units are calculated at 13 units for 25% of each available acre (Equation 2). The future gross floor area in both subdivision and PUD options is found by removing one floor from the maximum used in a single use development, allowing for sufficient area for residential use.

Under current zoning, the development option for each parcel that results in a **maximum** number of units or building footprint is identified. The maximum for both residential and commercial/industrial uses are identified, unless found to be mixed use.

Realistic Future Development

To reflect realistic growth in the City, rather than the maximum zoning allows, the expected distribution of uses by zoning district was estimated. The development option applied to buildable parcels is based on this distribution (Table 3) while still maintaining the maximum overall. These distributions are based on 1) historical development since 1970³ and 2) input from the City of Lebanon Planning Department, particularly in relation to mixed use. In addition to these development options, ADUs are built on 2% of existing and future single-family dwellings.

Table 3. Type of New Development Applied in a District by Percent of Available Parcels.

* indicates that a use can be applied under certain conditions.

District	<i>Commercial or Industrial</i>		<i>Mixed-Use</i>	<i>Residential</i>				
	Subdivision	PUD	Subdivision or PUD	Single Family	Two Family	Multifamily	Subdivision	PURD
CBD	25%	5%	20%			50%		
GC	80%	10%	10%					
IND-H	100%							
IND-L	95%	5%						
IND-RA	100%							
MC							100%	
PB	75%					25%		
R1 ⁴				5%	85%	10%	*	*
R2				25%			*	75%
R3				40%	55%		*	5%
RL1				100%			*	
RL2				70%	20%		*	10%
RL3					100%		*	
RO	45%		10%	30%			*	15%
RO-1 ⁵	60%		10				*	30%

Results Summary

The City of Lebanon USD build out shows significant development potential under current zoning. Of the 2,941 parcels analyzed, 22% or 648 were considered buildable. When limited by the uses expected to develop within each district (Table 3), these parcels increased total development in the City by more than 75%. See Tables 4-7 and Figures 1-3 for summary information.

³ True, unless insufficient development has occurred in which case all historical development is considered

⁴ Both new multifamily and PURD development are permitted. Thus, it is assumed that multifamily development will take place unless the parcel is 5 acres or greater, in which case PURD density has been applied.

⁵ A PURD is permitted while a Special Exception is allowed for a multifamily with four or more units. In this case a PURD is always assumed to occur due to the higher restriction.

Table 4.

COMPARISON of future built out and maximum

Use & Measurement		FUTURE BUILT OUT	MAXIMUM	Percent Maximum Built Out		
Residential	Units	5,614	8,569	66%		
	ADUs	360	360	100%		
Commercial	Building Footprint	431,920	1,090,420	40%		
	Gross Floor Area	1,293,410	3,271,230	40%		
Industrial	Building Footprint	9,250,970	9,250,970	100%		
	Gross Floor Area	18,508,790	18,508,790	100%		
Mixed Use	Units	188	108	174%		
	Building Footprint	921,190	626,980	147%		
	Gross Floor Area	1,842,370	1,253,950	147%	Existing Development	Build Out Increase
Total	Units	6,162	9,037	68%	7,502	82%
	Building Footprint	10,604,080	10,968,370	97%	13,975,560	76%
	Gross Floor Area	21,644,570	23,033,970	94%	27,716,880	78%

Table 5.

FUTURE BUILT OUT parcel breakdown

	No Change	Residential Subdivision	Two Family	Single Family	PURD	Commercial or Industrial Subdivision	PUD	Mixed Use PUD	Mixed Use Subdivision	Multifamily	Total Built Out Parcels
CBD	174	-	-	-	-	12	-	1	6	19	38
GC	104	-	-	-	-	17	-	1	-	-	18
IND-H	8	-	-	-	-	1	-	-	-	-	1
IND-L	95	-	-	-	-	49	2	-	-	-	51
IND-RA	2	-	-	-	-	4	-	-	-	-	4
PBD	4	-	-	-	-	-	-	-	-	-	-
R1	66	-	53	21	2	-	-	-	-	8	84
R2	298	54	-	18	-	-	-	-	-	-	72
R3	1,330	1	171	148	16	-	-	-	-	-	336
RL1	2	-	-	-	-	-	-	-	-	-	-
RL2	125	-	2	10	1	-	-	-	-	-	13
RL3	23	-	6	3	-	-	-	-	-	-	9
RO	47	2	1	3	-	5	-	-	1	-	12
RO1	11	1	-	-	1	3	-	-	-	-	5
MC	4	5	-	-	-	-	-	-	-	-	5
Totals	2,293	63	233	203	20	91	2	2	7	27	648

Table 6.

FUTURE BUILT OUT summary by use and district

Measurement		Residential Units					Commercial or Industrial				Mixed Use					
		PURD	Multifamily	Subdivision	Two-Family	Single Family	PUD		Subdivision		PUD			Subdivision		
							Building Footprint	Gross Floor Area	Building Footprint	Gross Floor Area	Units	Building Footprint	Gross Floor Area	Units	Building Footprint	Gross Floor Area
By District	CBD	-	95	-	-	-	-	-	52,290	156,880	28	382,920	765,840	108	350,210	700,420
	GC	-	-	-	-	-	-	-	352,810	1,056,080	17	177,860	355,720	-	-	-
	IND-H	-	-	-	-	-	-	-	558,080	1,116,170	-	-	-	-	-	-
	IND-L	-	-	-	-	-	1,773,920	3,547,840	4,971,620	9,943,240	-	-	-	-	-	-
	IND-RA	-	-	-	-	-	-	-	1,947,350	3,901,540	-	-	-	-	-	-
	PBD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	R1	165	1,316	-	106	21	-	-	-	-	-	-	-	-	-	-
	R2	-	-	311	-	18	-	-	-	-	-	-	-	-	-	-
	R3	2,854	-	40	342	148	-	-	-	-	-	-	-	-	-	-
	RL1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	RL2	28	-	-	4	10	-	-	-	-	-	-	-	-	-	-
	RL3	-	-	-	12	3	-	-	-	-	-	-	-	-	-	-
	RO	-	-	12	2	3	-	-	10,310	30,920	-	-	-	35	10,200	20,390
	RO1	15	-	7	-	-	-	-	16,510	49,530	-	-	-	-	-	-
MC	-	-	102	-	-	-	-	-	-	-	-	-	-	-	-	
TOTAL		3,062	1,411	472	466	203	1,773,920	3,547,840	7,908,970	16,254,360	45	560,780	1,121,560	143	360,410	720,810

Table 7.

MAXIMUM summary by use and district

Measurement		Residential			Commercial or Industrial				Mixed Use					
		PURD	Multifamily	Subdivision	PUD		Subdivision		PUD			Subdivision		
					Building Footprint	Gross Floor Area	Building Footprint	Gross Floor Area	Units	Building Footprint	Gross Floor Area	Units	Building Footprint	Gross Floor Area
By District	CBD	-	375	-	-	-	964,450	2,893,350	-	-	-	24	84,490	168,980
	GC	-	-	-	-	-	35,310	105,920	17	177,860	355,720	29	313,620	627,230
	IND-H	-	-	-	-	-	558,080	1,116,170	-	-	-	-	-	-
	IND-L	-	-	-	-	-	6,745,540	13,491,080	-	-	-	-	-	-
	IND-RA	-	-	-	-	-	1,947,350	3,901,540	-	-	-	-	-	-
	PBD	-	-	-	-	-	-	-	-	-	-	-	-	-
	R1	1,650	341	1,154	-	-	-	-	-	-	-	-	-	-
	R2	-	-	329	-	-	-	-	-	-	-	-	-	-
	R3	2,438	-	1,683	-	-	-	-	-	-	-	-	-	-
	RL1	-	-	-	-	-	-	-	-	-	-	-	-	-
	RL2	28	-	36	-	-	-	-	-	-	-	-	-	-
	RL3	-	-	356	-	-	-	-	-	-	-	-	-	-
	RO	56	-	4	-	-	16,230	48,680	-	-	-	29	16,170	32,330
	RO1	15	-	2	-	-	74,430	223,280	-	-	-	9	34,840	69,690
MC	-	-	102	-	-	-	-	-	-	-	-	-	-	
TOTAL		4,187	716	3,666	-	-	10,341,390	21,780,020	17	177,860	355,720	91	449,120	898,230

Figure 1.

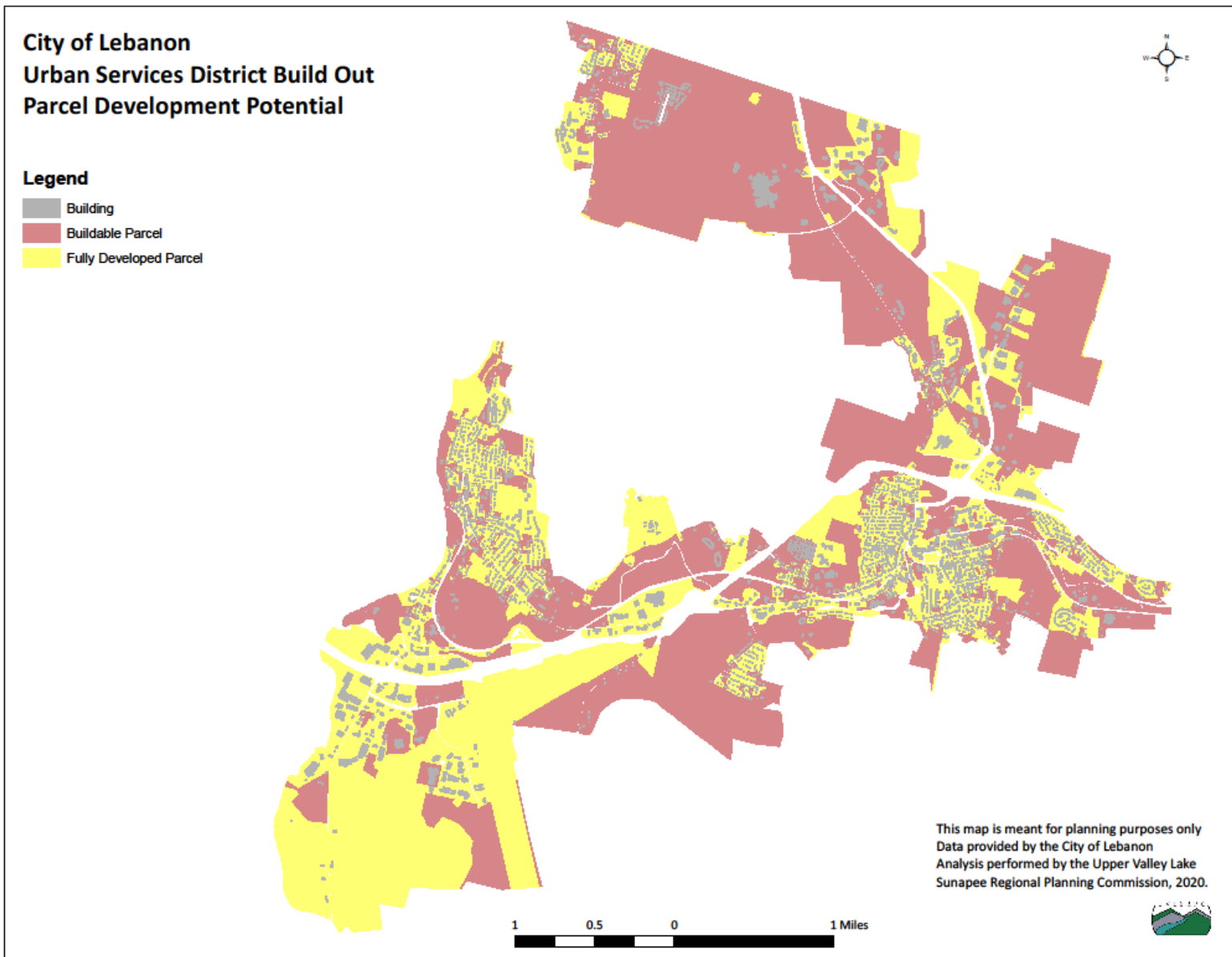


Figure 2. Note that ADUs are not included in this visual.

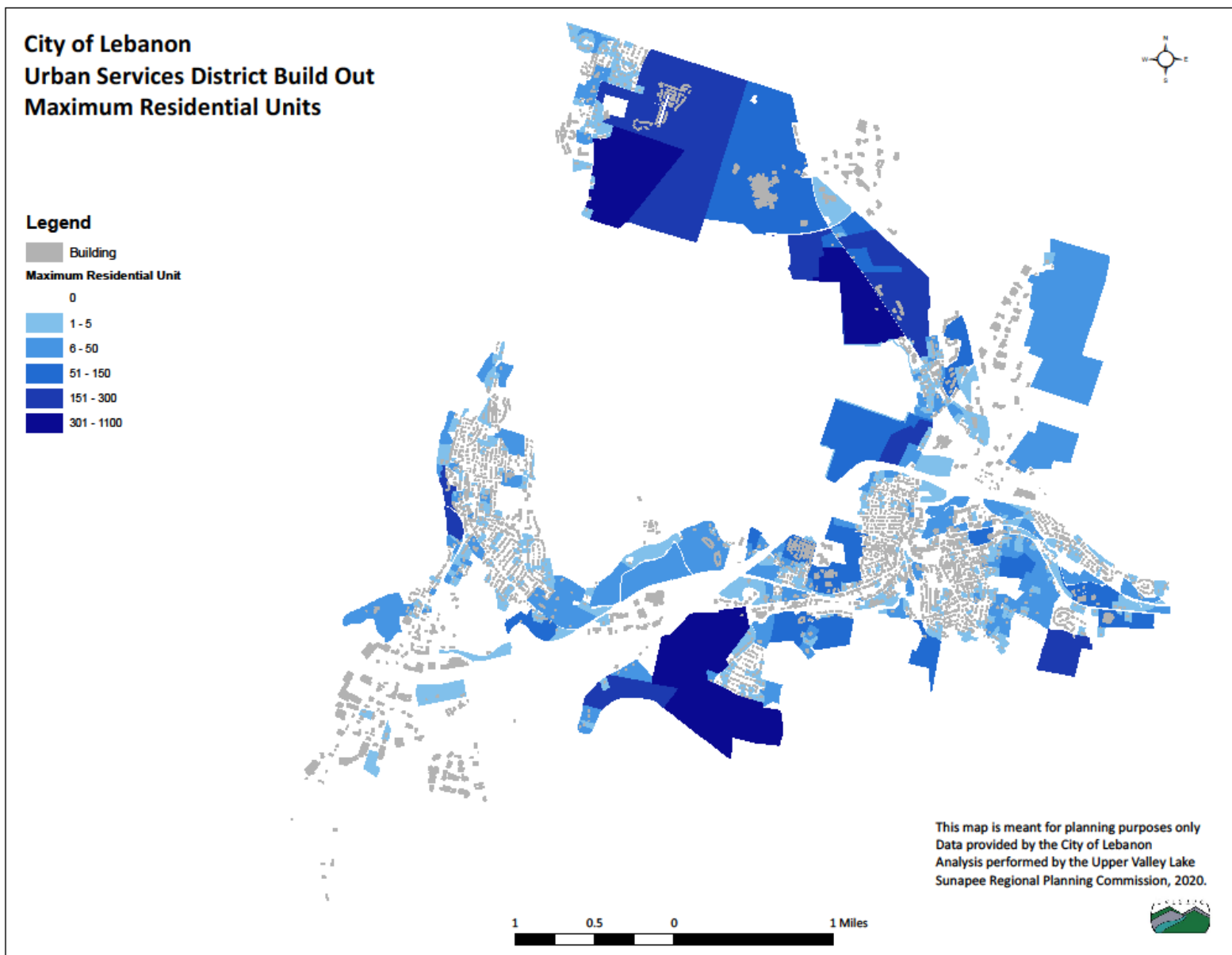
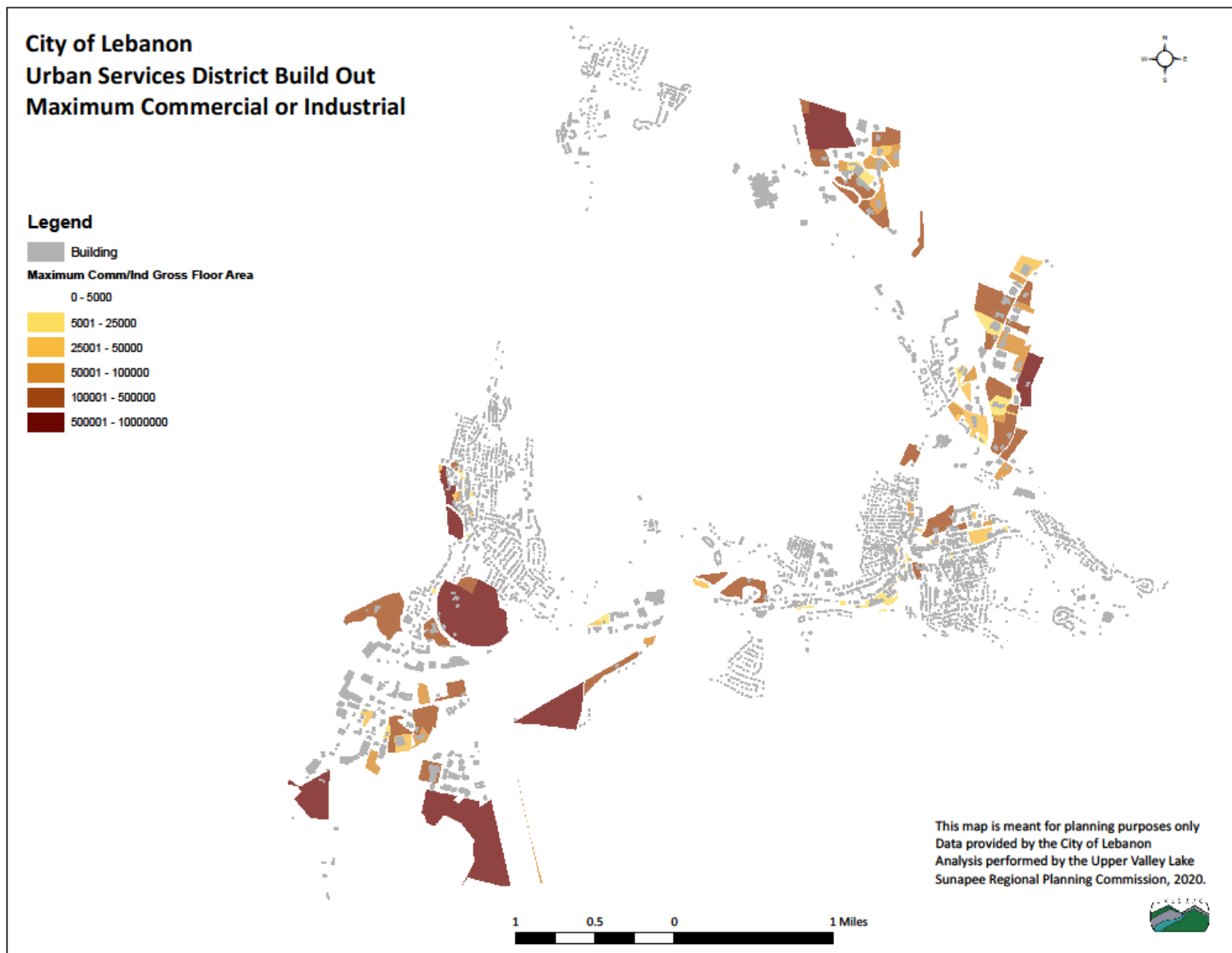


Figure 3.



Build Out Tool - Directions for Use

1. Establish your goals for the analysis.

Spatial Analysis

2. Identify your area of interest.
3. Collect the needed GIS data for that area. This data should include parcels with assessing details, buildings, conserved lands, overlay districts, and NEF datasets.
4. Spatial Join the parcel boundaries and zoning district. Edit to remove fields where FIDs = -1 and add new field that combines Map-lot and Zone fields (ML-Zone). Dissolve by ML-Zone field, allowing multipart features. Result Subzones.
5. Clip all parcel detail datasets to your area of interest. Erase conserved lands from all but building and overlay district layers.
6. Export parcel detail dataset to only include relevant features (where appropriate). This might include:
 - a. Slope. Grid code 3-5 designated those greater than 25% slope
 - b. Riverbank protection, ≤50ft
 - c. Flood zones, A/AE flood zones
 - d. Conserved Lands – those that are fully restrictive only
7. Merge datasets where integrated analysis is needed. This includes wetlands and slope, and all NEF datasets.
8. Further data prep on buildings dataset is needed. Recategorize Land Use labels to either Residential or Commercial uses. Spatial join Subzones with this buildings dataset. Edit to remove fields where FIDs = -1. Dissolve by ML-Zone field, allowing multipart features, and adding the following statistics fields.

a. Sum units residential	c. Building count
b. Sum units commercial (or non-residential)	d. Sum building footprint
	e. Sum gross floor area
9. Spatial join Subzones with all other parcel detail datasets. Edit to remove fields where FIDs = -1. Dissolve by ML-Zone field, allowing multipart features. Outputs should include area details for each by Subzone:

e. Conserved	k. Wetlands and/or Slope > 25%
f. Historic District	l. Shoreland Buffer
g. Wetlands and Surface	m. Riverbank Protection ≤50ft
h. Wetlands Buffer	n. Floodplain A/AE
i. SEA	o. All NEF
j. Slope > 25%	
10. Join all final datasets to the original Subzones dataset from Step 4 by the ML-Zone or Map-Lot field to include all variables shown in Figure 4. This should include the original parcel layer with details on total parcel acreage and municipal water and sewer access. All areas are in square feet except the original parcel area (in and outside area of interest) that is in acres. Convert this table to an excel file using the Table to Excel tool.

Subzone Preprocess

11. Open an empty subzone preprocess excel document, save with a new name to identify your specific project.
12. Open the “GIS Output” Tab. Double check that the column headers from your spatial analysis table align with “GIS Output” columns J through AF (also show in the image below). Adjust your spatial analysis table if needed.

Figure 4.

J							Q
Map-Lo	Zoning District	Original Parcel Area (Acres)	SubZone Area	ML-Zoning District	Municipal Sewer	Municipal Water	Wetlands/Surface
R						X	
Wetlands Buffer	SEA	Slope >25%	Wetlands and/or Slopes >25%	Shoreland Buffer	Riverbank Protection <50ft	Floodplain A/AE	
Y							AF
Physical Features Merge	Conserve	Historic	Re	Non Re	Building Coun	Building Footprint	Building Gross Area

13. Copy data from the spatial analysis table into the “GIS Output” tab starting in cell J2. The workbook allows you to fill in data up to row 6000. If you have more data, you will need to split it into pieces and run more than once. Once the data is added, wait for the workbook to finish calculating. Progress is shown in the bottom right corner.
14. Go to the “Model Input” tab. In the “Data” toolbar under “Sort&Filter”, select “Reapply filter”. This will show you processed results without blank rows.
15. Copy the data in the “Model Input” tab – Columns A through X, Rows 2 through 6000 (where visible).

Additional Notes on Subzone Preprocess Workbook

- ✚ Tab “Combine Data” runs through the identification and merging of parcel subzone where needed.
- ✚ Tab “Preprocess Summary” gives detail on the total number of parcels analyzed and how many fall in multiple districts to a significant extent.

Development Potential

16. Open an empty development potential excel document, save with a new name to identify your specific project.
17. Paste the copied data from the subzone preprocess to the “Input” tab starting with cell A3.
18. Adjust the reference tab information to reflect the desired analysis and updated information. This includes the following tabs -
 - a. “District Detail” Information on City districts, such as height restrictions and minimum lot size. If you do/do not want certain uses to apply, such as PUD, PURD and Mixed Use, change these values using only the permitted tract size, “NA”, or “Yes”. This sheet also include assumptions on building story height, parking, unbuildable NEF area, and the fully developed threshold, all of which can be adjusted for future analysis by district
 - b. “Future Use” Distribution of uses for your future build out scenario. Only adjust numbers in Rows 3-17. If you would like a use to be considered when others are not available, note this with a *.
 - c. “Adjustments” Overwrite your GIS parcel data here. This sheet allows you to note a parcel as fully developed, poised for redevelopment (actively eliminates existing development), or permitted for development.
 - d. All other tabs are not meant to be manipulated.

19. Go to the “ResultsParcels” tab. In the “Data” toolbar under “Sort&Filter”, select “Reapply filter”. This will show you processed results without blank rows.
20. View your summary table results in the “ResultsSum” tab.
21. If you would like to display your results in GIS, copy the data in the “ResultsParcels” tab – Columns A through X, Rows 3 through 6000 (where visible).

Display Results in GIS

22. Open an empty results4gis excel document, save with a new name to identify your specific project.
23. Paste the copied data from the development potential to the “Headers Reference” tab starting with cell A4. (Note – this tab also shows you the GIS attribute labels that correspond to the different data points for each parcel)
24. Open your GIS software that includes the parcel data for your area of interest. Convert the “GIS sheet” from your new results4gis document to a table (Excel to Table tool in ArcGIS). Join this table to your parcel data using the map-lot fields.
25. Display your results as desired