4.0 FUTURE CONDITIONS

4.1 Future Land Use Projections

The SWCRPC and WRC projected the potential for future residential development along and adjacent to the VT103 corridor using the Community Buildout Analysis Program for the towns of Chester and Rockingham, respectively.[1] These projections were based on a number of factors including existing development, future development potential and zoning. Various constraints were also considered, such as wetlands, floodplains, public lands, slopes, and water and sewer service areas.

Figure 35 and Figure 36 show the existing conditions in the two towns, including zoning districts for parcels adjacent to the corridor and the locations of existing structures.

[1] The Community Buildout Analysis Program was developed by the Addison County Regional Planning Commission; http://www.acrpc.org/pages/activities/GIS/buildout.htm

Figure 35: Chester Existing Conditions

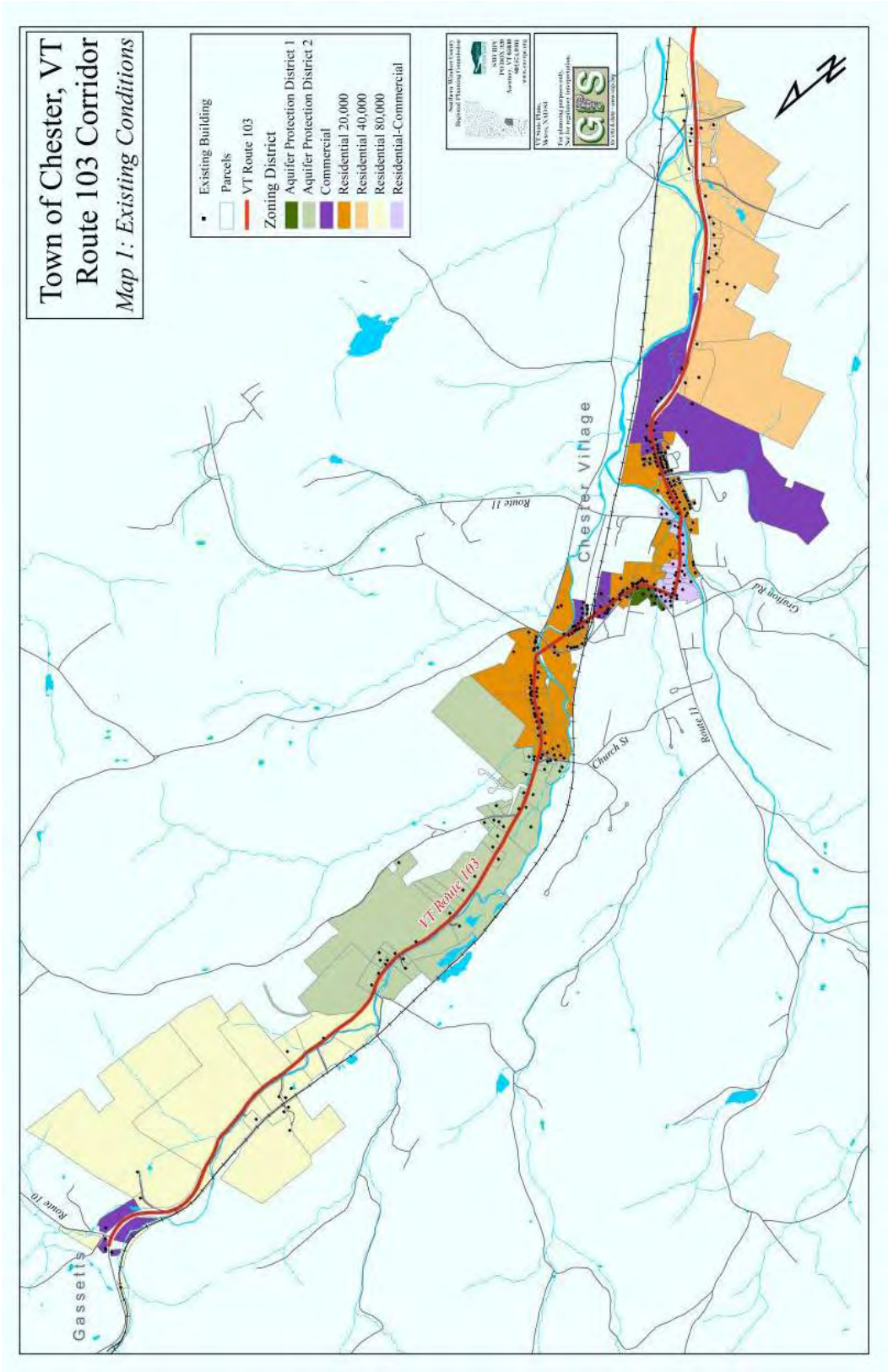


Figure 36: Rockingham Existing Conditions

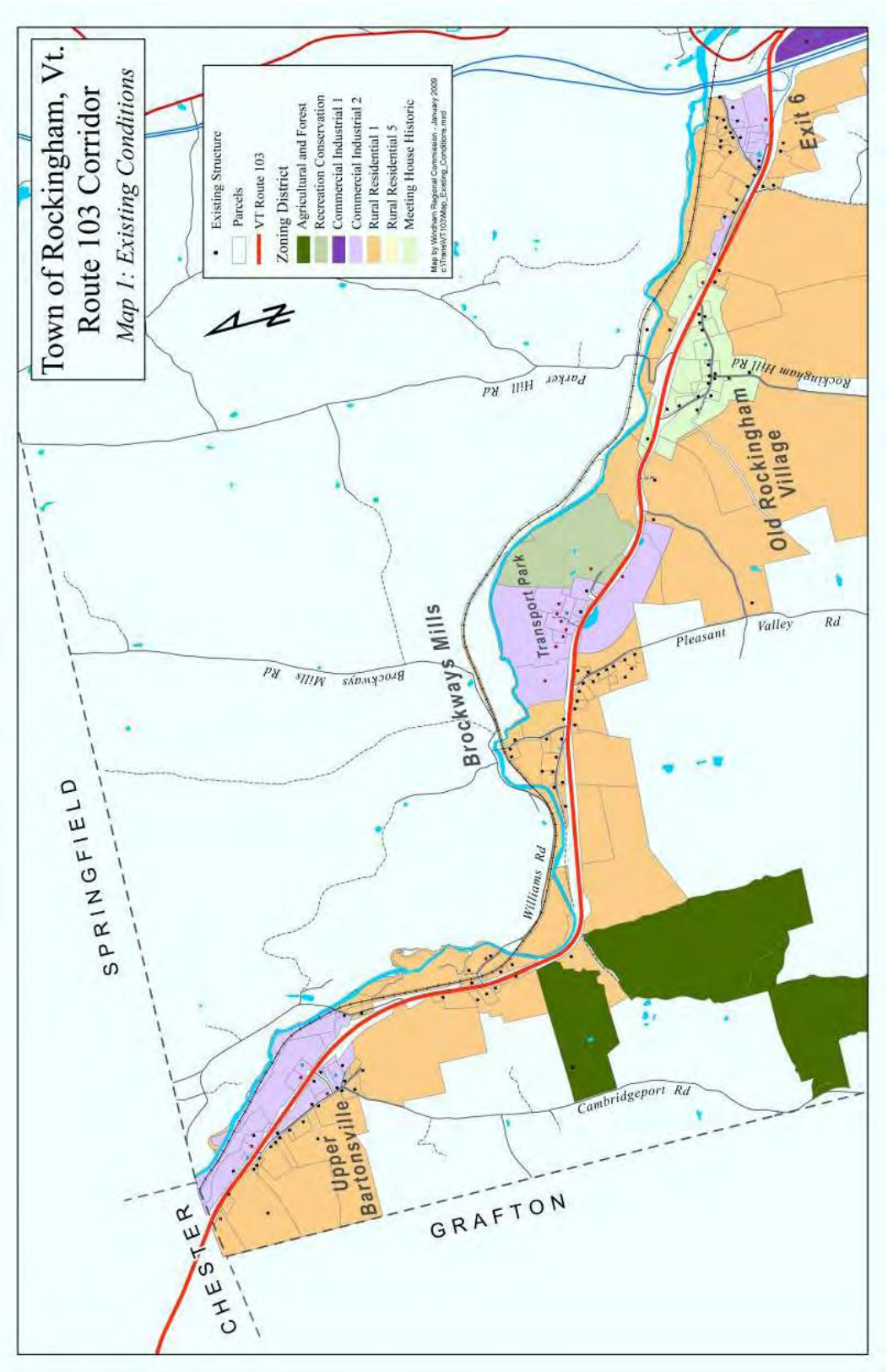


Figure 37 and Figure 38 show the total potential buildout, based on existing municipal land use regulations in the two towns. Red dots indicate the capacity of each parcel for potential new buildings. Note that these dots are representative of potential quantity, but do not indicate the optimal or likely location of those buildings. Existing land use regulations are used as the framework for determining potential buildout; therefore any subsequent modifications to land use regulations are not reflected.

Figure 37: Chester Total Buildout

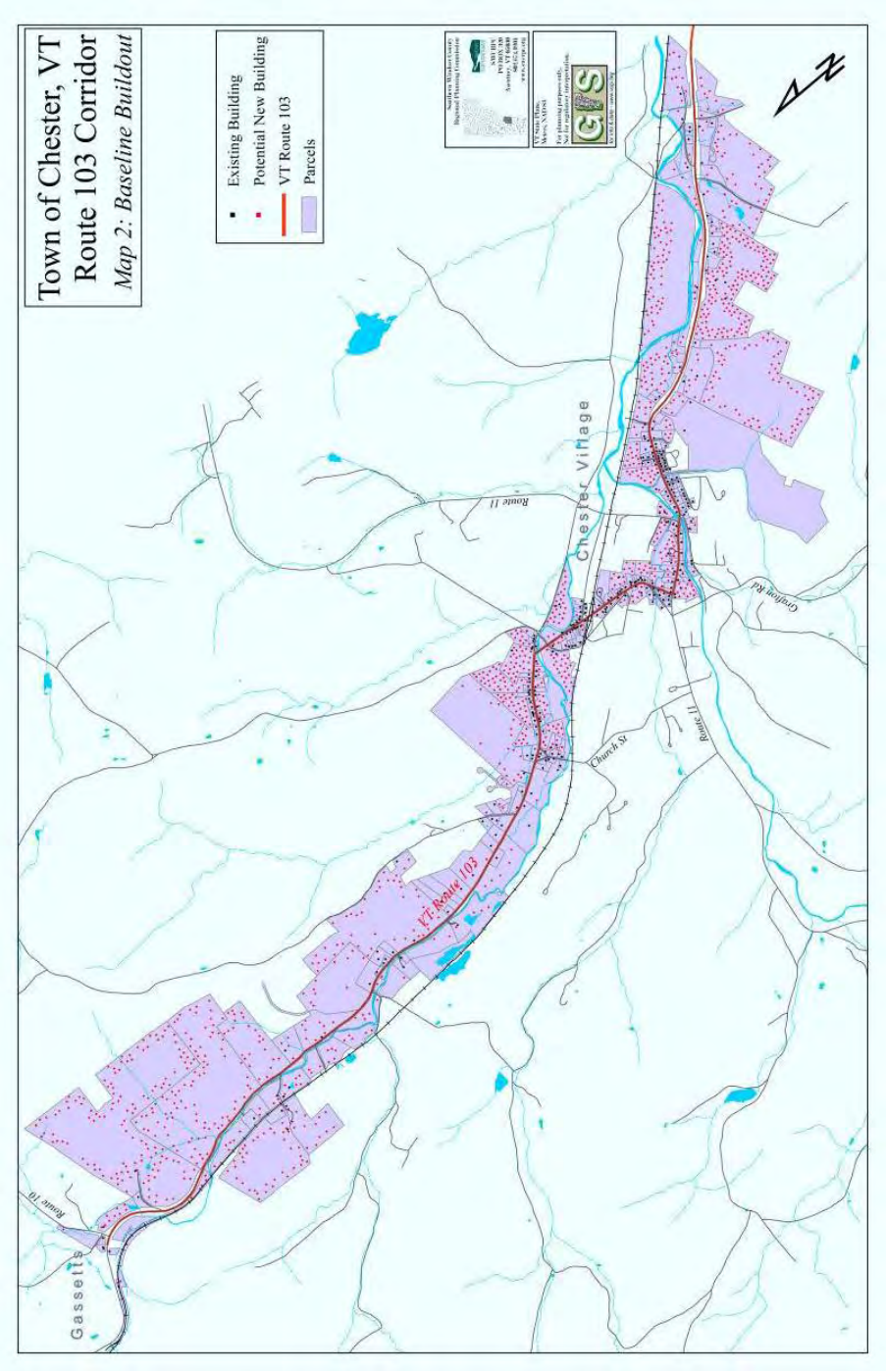


Figure 38: Rockingham Total Buildout

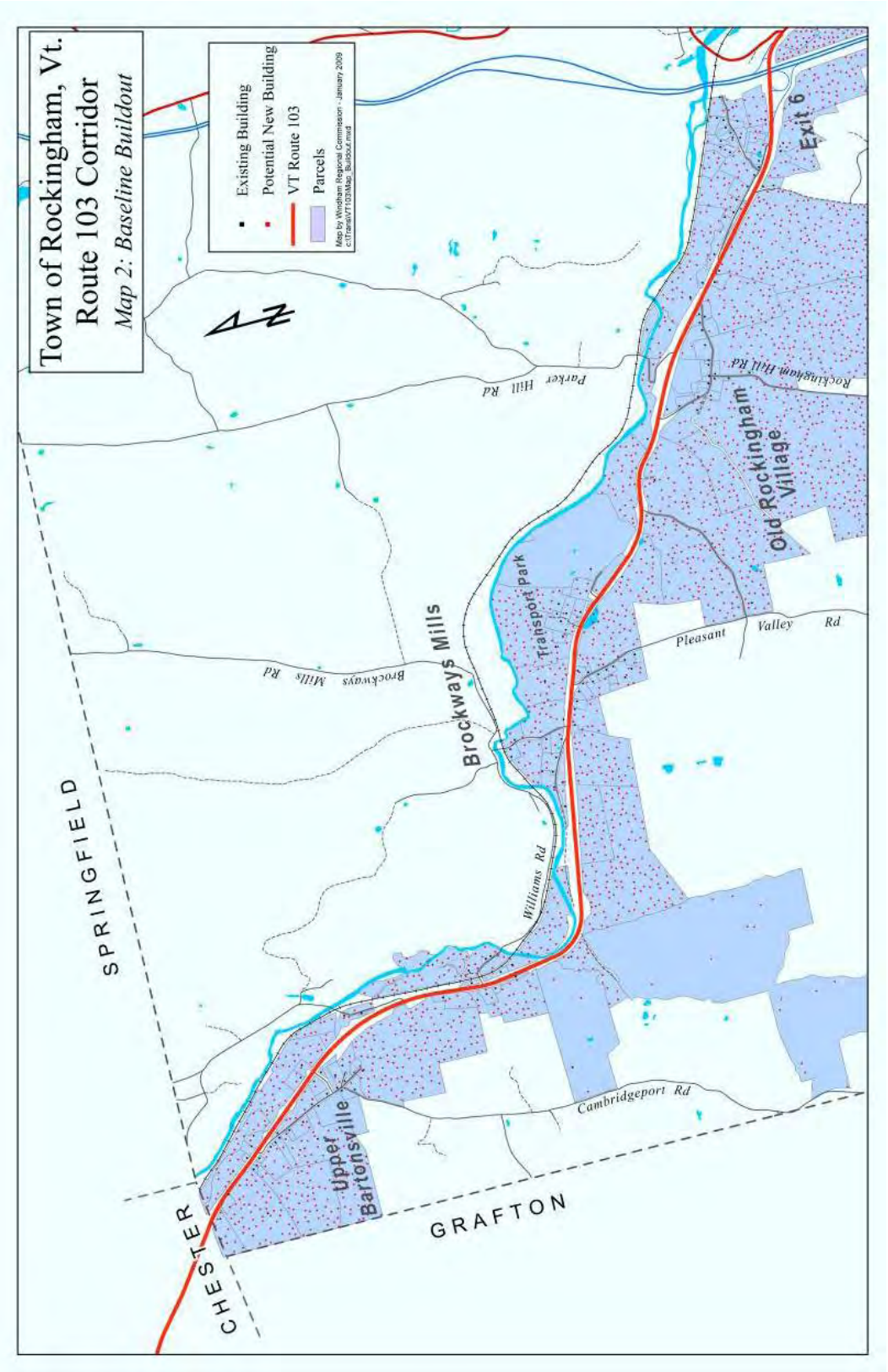


Figure 39 and Figure 40 take the analysis from the baseline buildout (Figure 37 and Figure 38) and subtract projected development due to constraints such as wetlands, floodplains, steep slopes, and other environmental factors. Note that they do not necessarily indicate expected, anticipated, or desired buildout; rather they are a tool for visualization by the community to understand the potential impact of existing land use regulations, and to make changes as determined to be necessary. As they represent the total theoretical potential development under current land use regulations, this buildout analysis is not intended to be a realistic projection. Rather, it is most useful in assessing the impact of proposed regulatory changes.

Figure 39: Chester Potential New Buildings and Natural Constraints

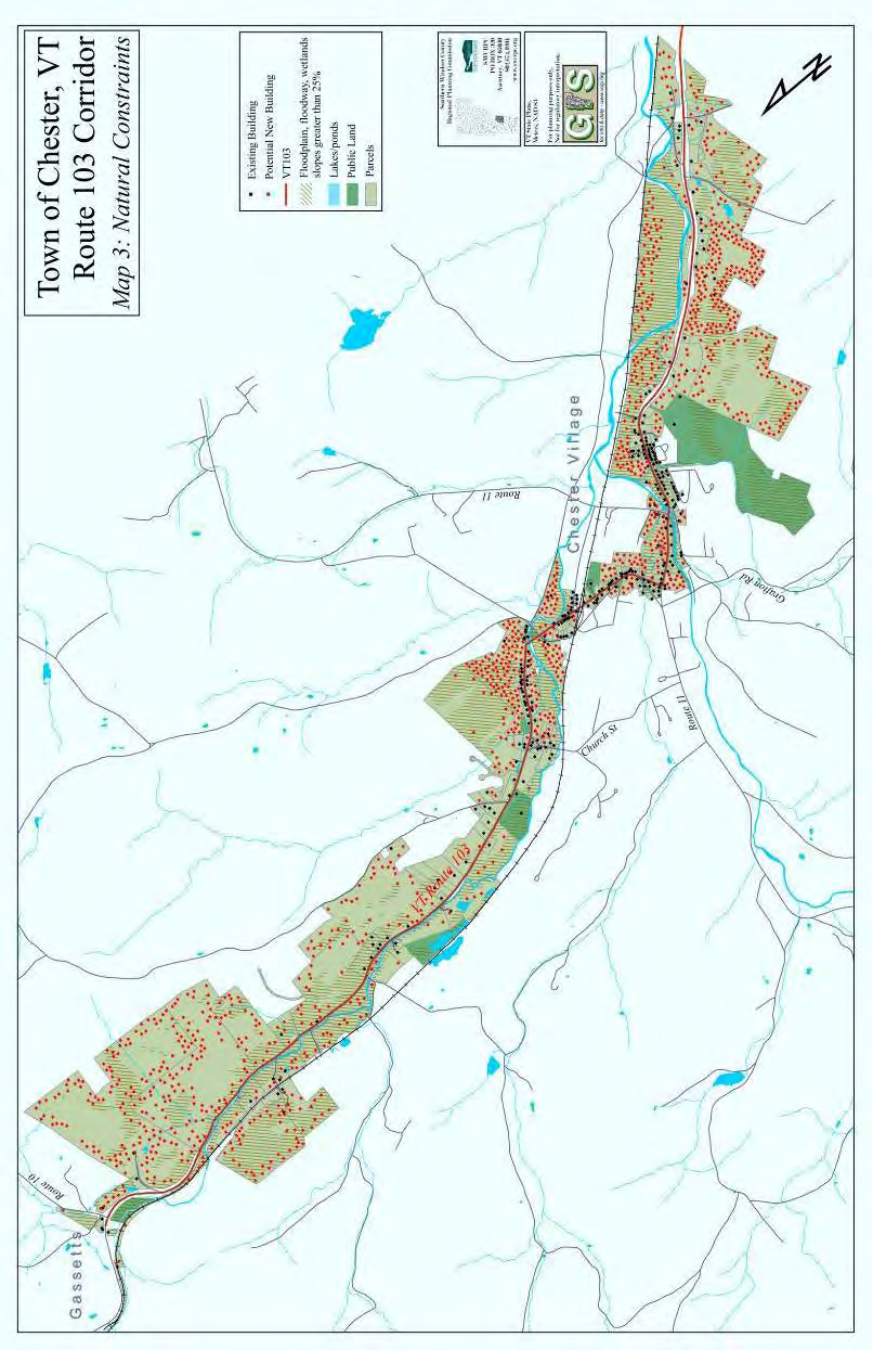
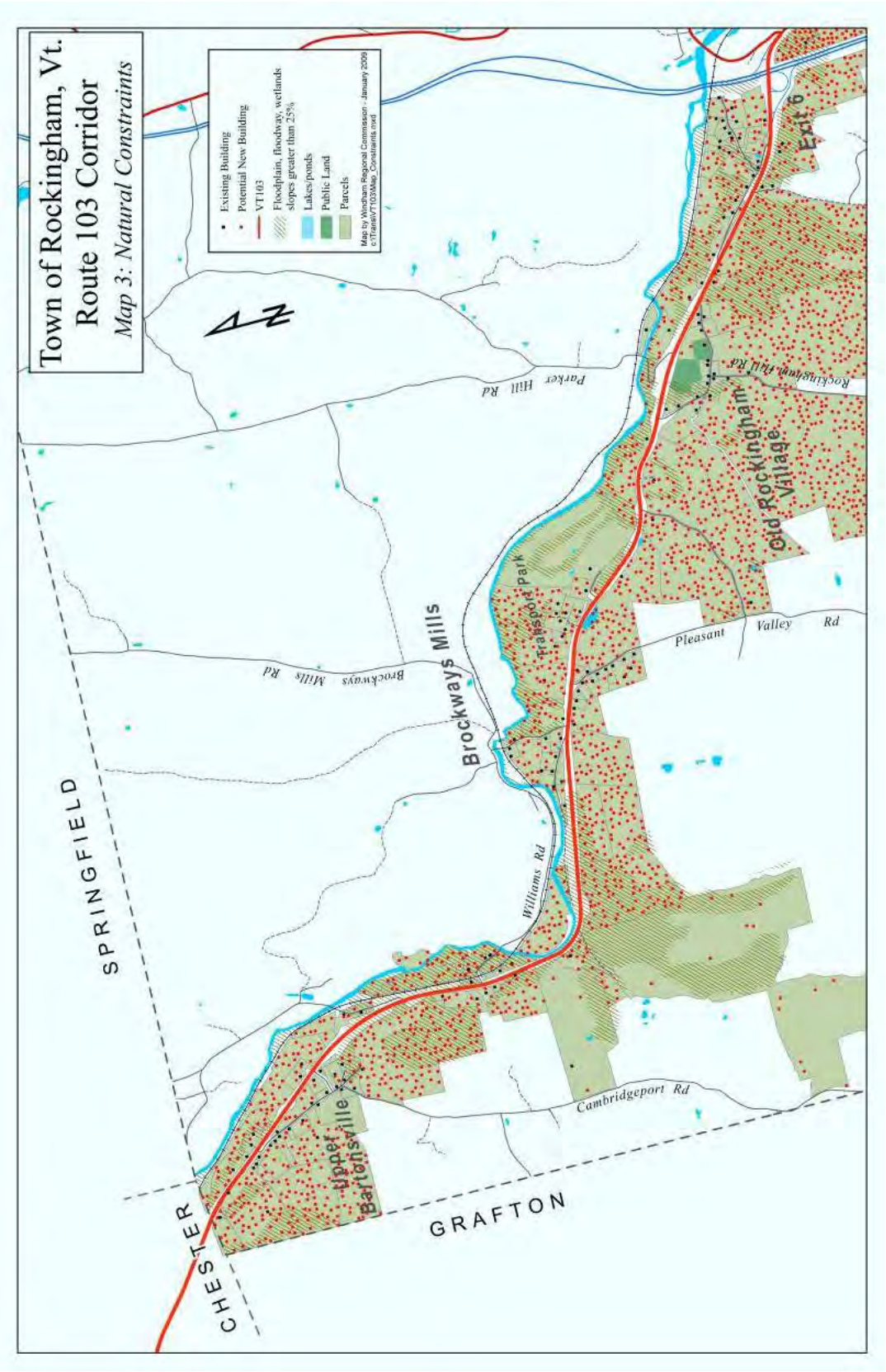


Figure 40: Rockingham Potential New Buildings and Natural Constraints



4.1.1 Summary of Buildout Analysis Results - Chester

Land use regulations in Chester theoretically allow future residential development that is 4.6 times the number of existing units (374 existing units) corridor-wide. Current land use regulations do not have strong natural resource protections, with the exception of flood hazard regulations.

A revised approach was considered, which examined the impact of establishing 50-foot buffers along surface waters and not allowing structures to be built on slopes greater than 25%, but still allowing these areas to contribute to the minimum lot size. These added protections did not meaningfully reduce the number of potential new units, as structures were able to locate outside of those protected natural resource areas.

The most pronounced future growth potential is in the Commercial and Residential 40,000 zoning districts along VT 103 South. A summary of the buildout analysis and scenarios are listed below.

4.1.1.1 Gassetts

The Gassetts area surrounding the intersection of VT Routes 103 and 10 is largely built out; future growth is primarily limited to re-development. This intersection exhibits poor geometrics, access management problems and a history of unsafe driving behaviors. Future growth and redevelopment provides an opportunity to create a more pleasant hamlet environment and improve existing overly-wide accesses.

4.1.1.2 VT 103 North

VT 103 between the Stone Village and Gassetts includes portions of both the Residential 80,000 zoning district and Aquifer Protection District 2. There are significant natural constraints in this area that limit future development, including the Williams River, Green Mountain Railroad, flood hazard areas, prime agricultural soils and steep slopes. Future development is more feasible on the "back lot" portions of the large lots north of VT 103. Individual driveways for each new lot may not be practical in many locations due to steep slopes and ledge. Therefore, shared driveways and access roads should be considered wherever feasible.

4.1.1.3 Stone Village

Historic Stone Village is within the Residential 20,000 zoning district. Most of the existing historic homes are on small lots that cannot be subdivided. However, the large lots with open fields to the north of Stone Village could experience significant future development if subdivided. The Town does not consider this level of development likely. However, if it were to occur even at a small scale it could alter the historic character of Stone Village.

4.1.1.4 Chester Depot

The Chester-Depot area is largely built out, with re-development as the most likely future growth driver.

4.1.1.5 Chester Triangle

The Chester Triangle, which is the area roughly bounded by Main Street, Maple Street and Depot Street, is also largely built out. Re-development is the most likely driver of future growth.

4.1.1.6 Chester Village East

This area is located south of the Chester Triangle area, extending southeast to the Green Mountain Union High School, and is comprised of three distinct sub-areas defined roughly by the existing zoning districts: Residential-Commercial (R-C), Residential 20,000 (R20), and Commercial (C). The Commercial district is where the town currently encourages future commercial and job growth. Public water and sewer is available.

There are 104 existing units in this focus area. Full theoretical future growth would more than double the existing units, and commercial uses are most likely to dominate in the R-C and C districts. The R-C and C zoning districts exhibit emerging strip development and automobile-oriented land use development patterns. Tourist-oriented commercial growth is highly probable.

4.1.1.7 Residential 40,000 South

This area is comprised of the Residential 40,000 zoning district located between the Green Mountain Union High School and the Rockingham Town Line. No water and sewer services are available at this time. The Zoning Bylaws currently allow a mix of residential and commercial uses. This area today is notable for its rural character, which is comprised of very low-density residential uses with a few commercial uses, open fields and forested areas. This rural character helps to form a visual separation between Rockingham and Chester Village.

Future growth in this area could be significant under current land use regulations and only a few streams and areas of steep slope limit development potential. The 40,000 square foot minimum lot size and 120 foot minimum frontage would allow for residential densities that are far denser than the state access management guidelines for this section of road. The Access Management Program Guidelines (VTrans, July 22, 2005) indicate a desired spacing of 425 feet between driveways along a 50 mph speed zone. The resulting future growth densities could diminish rural character, threaten traffic safety and possibly result in a reduced posted speed limit. Furthermore, current regulations allow for a variety of commercial uses that might negatively impact the rural character, businesses in the villages and trip generation. Some of these commercial uses include but are not limited to restaurants, retail stores and motels.

This area includes 30 existing units, mostly residential. Under a full theoretical buildout, a total of 301 new units are possible. While full build out is unlikely, the less than one acre minimum lot size allowed under current zoning allows for densities that are much higher than the current character of the area. A revised land use scenario examined increasing the minimum lot size to 80,000 square feet and increasing the minimum frontage to 200 feet, which resulted in a 29% reduction in total new units under buildout.

4.1.1.8 Residential 80,000 South

The Residential 80,000 (R80) zoning district along VT 103 South is limited in the potential for future development due to the Williams River, floodway and flood plain areas and prime agricultural soils. Similar to the Residential 40,000 South area, current regulations allow for a variety of commercial uses in the R80 district including but not limited to restaurants, retail stores and motels. While more limited in development potential, these uses could negatively impact rural character, existing Village businesses and traffic congestion.

4.1.2 Summary of Buildout Analysis Results - Rockingham

4.1.2.1 Meeting House to Transport Park Zone

This area includes the Meeting House District, the Vermont Country Store, and the Transport Park. There are no natural resources restrictions to development in the Town's land use regulations. Figure 41, Figure 42 and Figure 43 provide an overlay for the existing natural constraints within the focus area, and propose the amount of unconstrained acreage per parcel for the Meeting House, Upper Bartonsville, and Transport Park areas, respectively. The unconstrained acreage in these graphics is the area free from natural constraints and land use regulation restrictions.

As with the preceding graphics, these three figures are not intended to dictate specifically where future development will go, but rather to provide an indication of the currently built out parcels (shown in purple) and the total unconstrained acreage in each area. For example, the Meeting House Historic area, future development could occur along VT103, to the south and north of the Meeting House, and/or along Meeting House Road. Around the Vermont Country Store, potential development could occur on the west side of VT103, close to the Country Store. Around the Transport Park, any potential development would likely occur immediately to the south or north of the industrial park.

Figure 41: Advanced Buildout – Meeting House Area

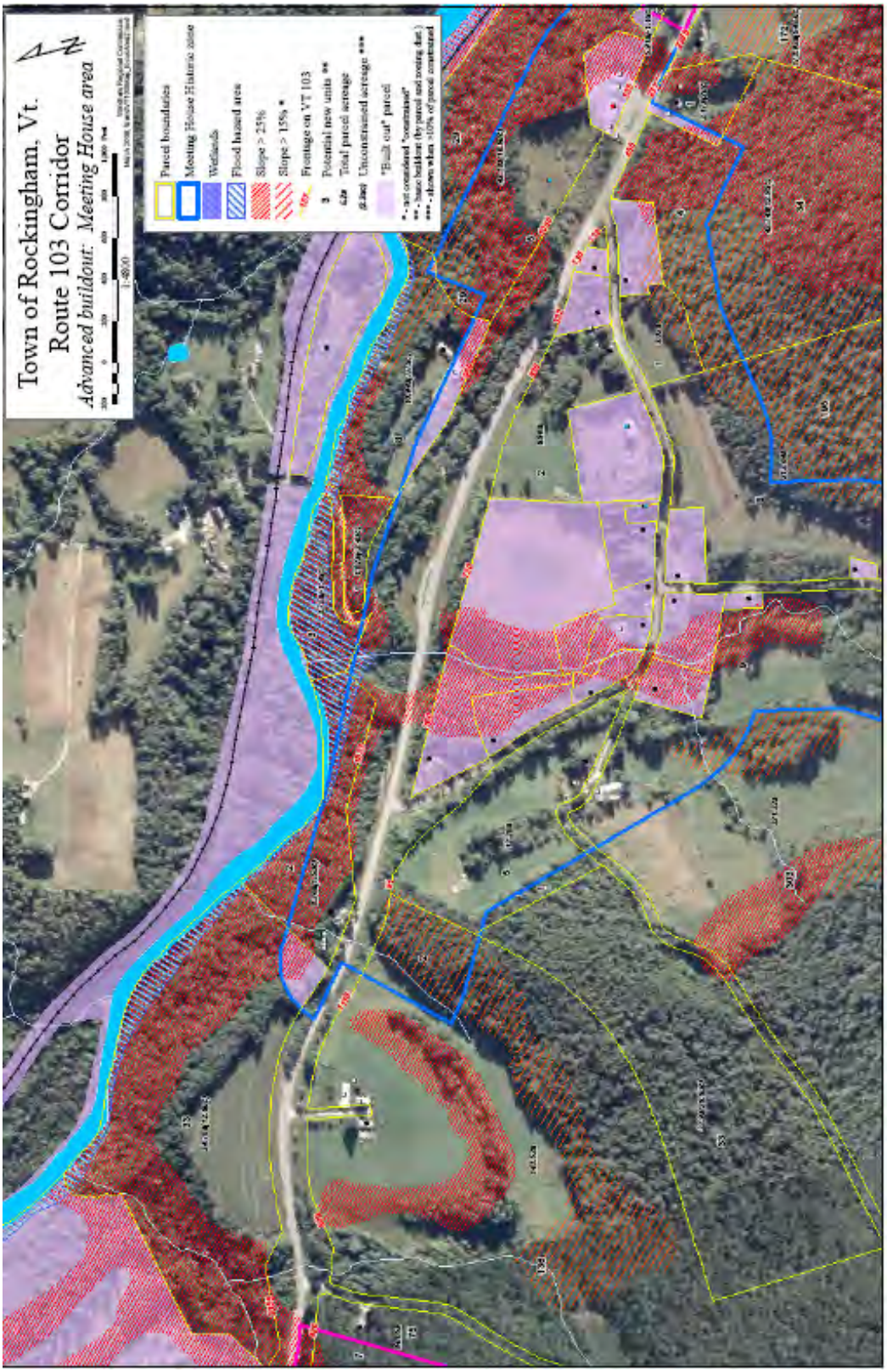


Figure 42: Advanced Buildout – Upper Bartonsville

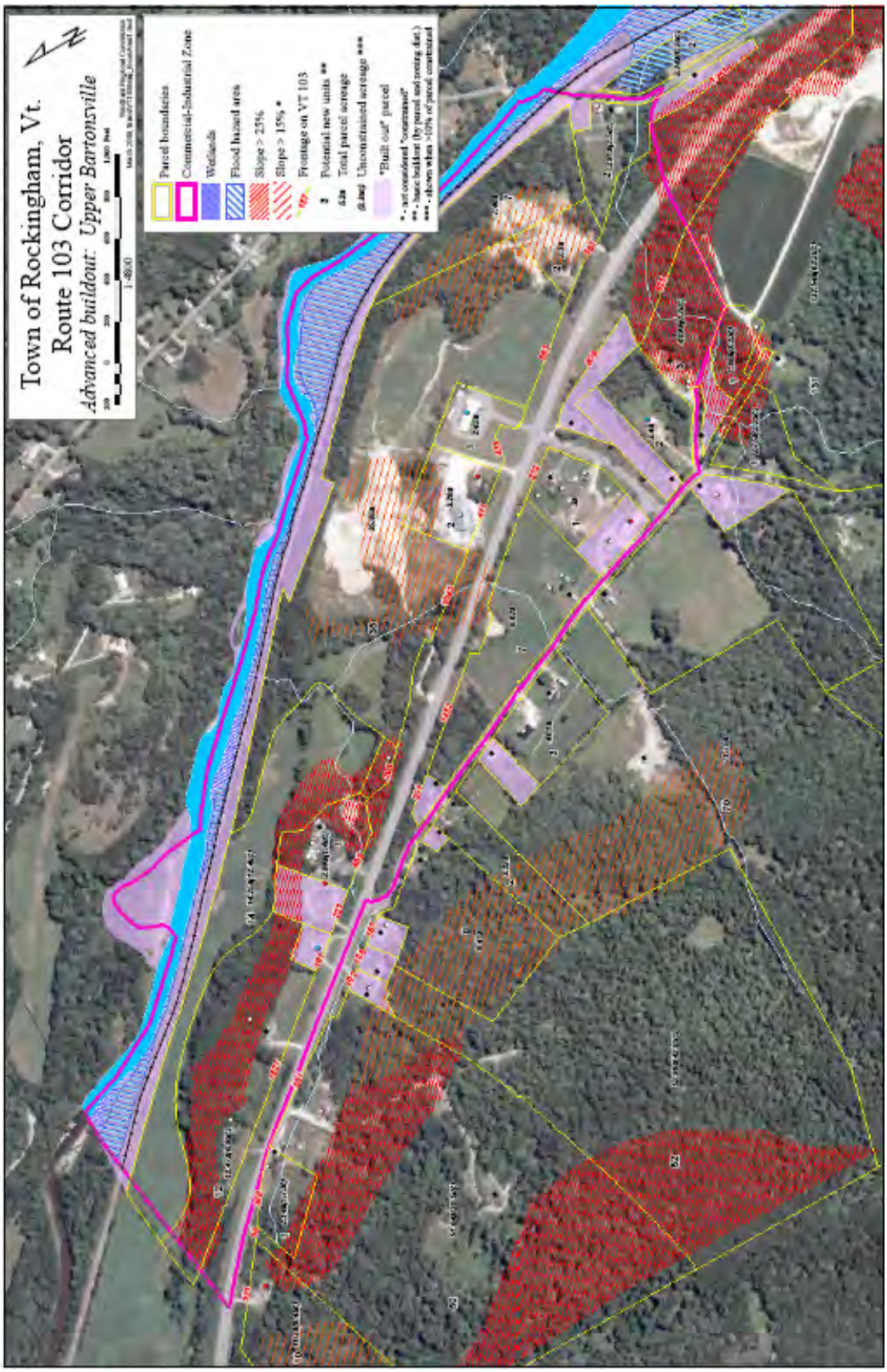
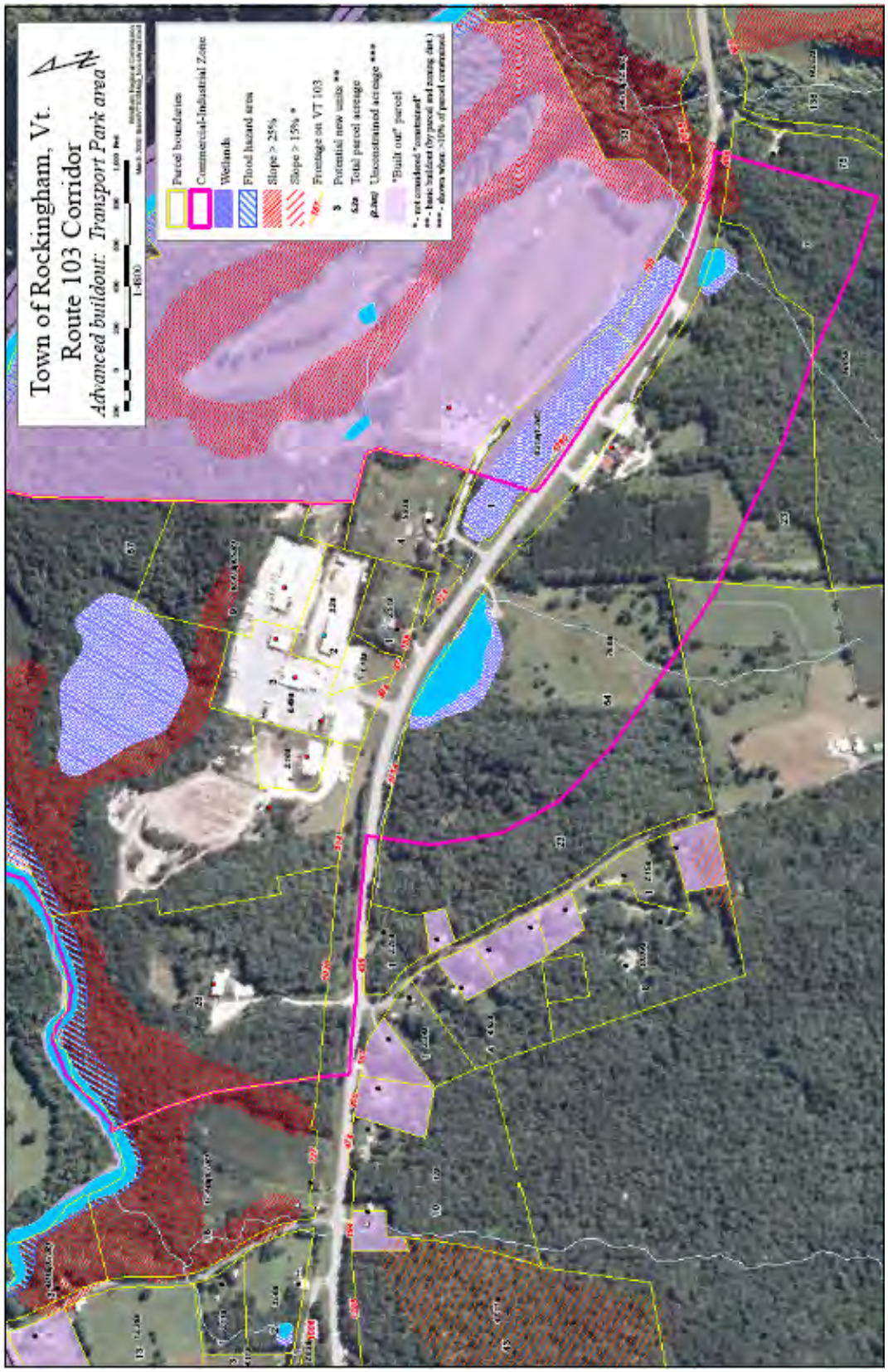


Figure 43: Advanced Buildout –Transport Park



4.1.2.2 Upper and Lower Bartonsville Zone

This area includes Upper and Lower Bartonsville. Based on the acreage of open space, lack of natural constraints and the Industrial/Commercial zoning, this section of VT103 would support future development that might not be able to fit into other areas along the corridor or in the Village of Bellows Falls (e.g. concrete trucking industry). Compared to the Meeting House to Transport Park zone, there are significantly fewer natural constraints in the Bartonsville area. This allows any future development to set back farther from VT103. Any development in this zone should seek to combine and limit the number of new access points onto VT 103.

4.1.3 Land Use Alternatives Analysis

Within the discussion of future land use alternatives, three specific areas were highlighted for a more extensive analysis of future land use pattern. These areas are 1) the section of VT 103 east of Chester Village in the vicinity of the Green Mountain High School, the Residential 40 District in Chester from the Green Mountain High School south to the Rockingham town line, and 3) the Upper Bartonsville area. An overview of the conditions and discussions leading to a preferred recommendation for both areas is provided below.

4.1.3.1 Chester Village East

This area is located south and east of Chester Village, extending to the Green Mountain Union High School, and includes area in two zoning districts: Residential 20,000 (R20), and Commercial (C). The Commercial district is where the town currently encourages future commercial and job growth. Public water and sewer is available.

Concern was raised over the emerging strip development in this area, and a desire to explore alternative land use patterns that could extend the village feel through this area. To facilitate this discussion, a relatively large parcel across from Green Mountain High School was selected to provide the framework for three land use scenarios. The three scenarios are depicted on the following pages and are generally characterized as 1) status-quo development pattern, 2) status-quo development pattern with access management enhancements, 3) more traditional mixed-use, clustered development pattern.

The three scenarios were presented to public meeting attendees and they were asked to rank their choices. On a scale of +3 to -3, the public ranked Scenario #3 first with an average score of 1.1, Scenario #2 second with an average score of -0.1, and Scenario #1 third with an average score of -1.3.

Figure 44: Chester Village East - Land Use Scenario #1

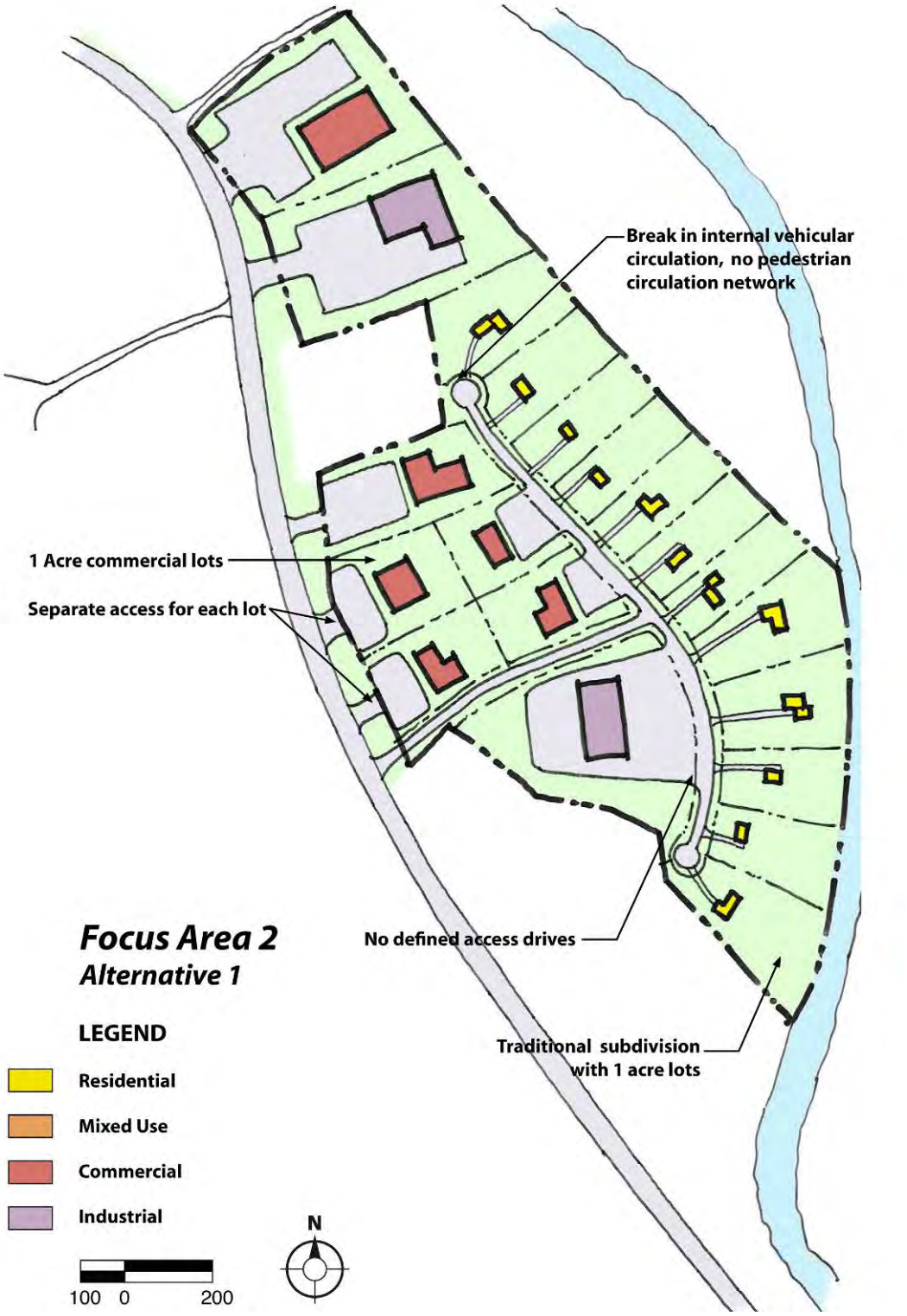


Figure 45: Chester Village East - Land Use Scenario #2

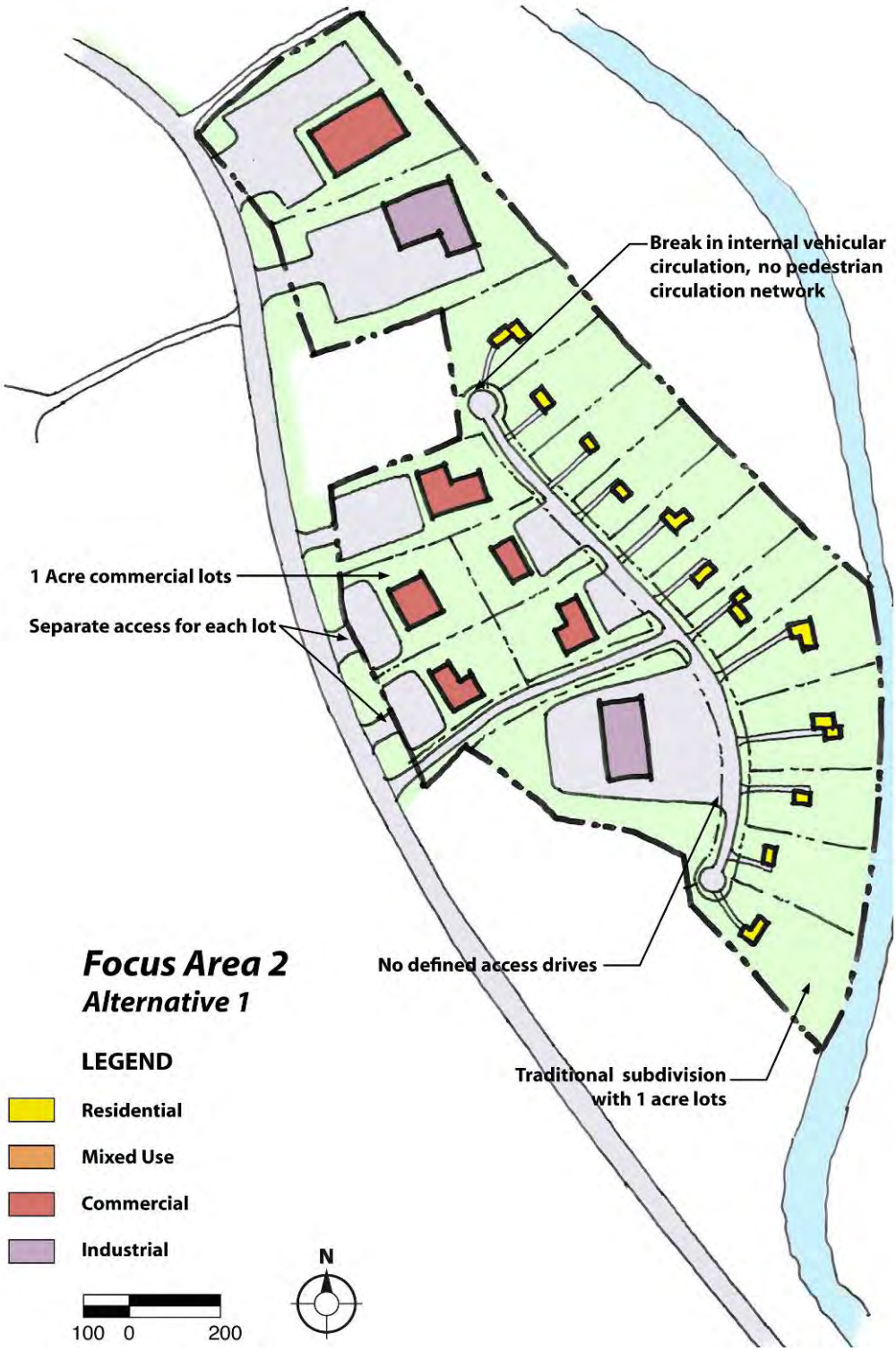
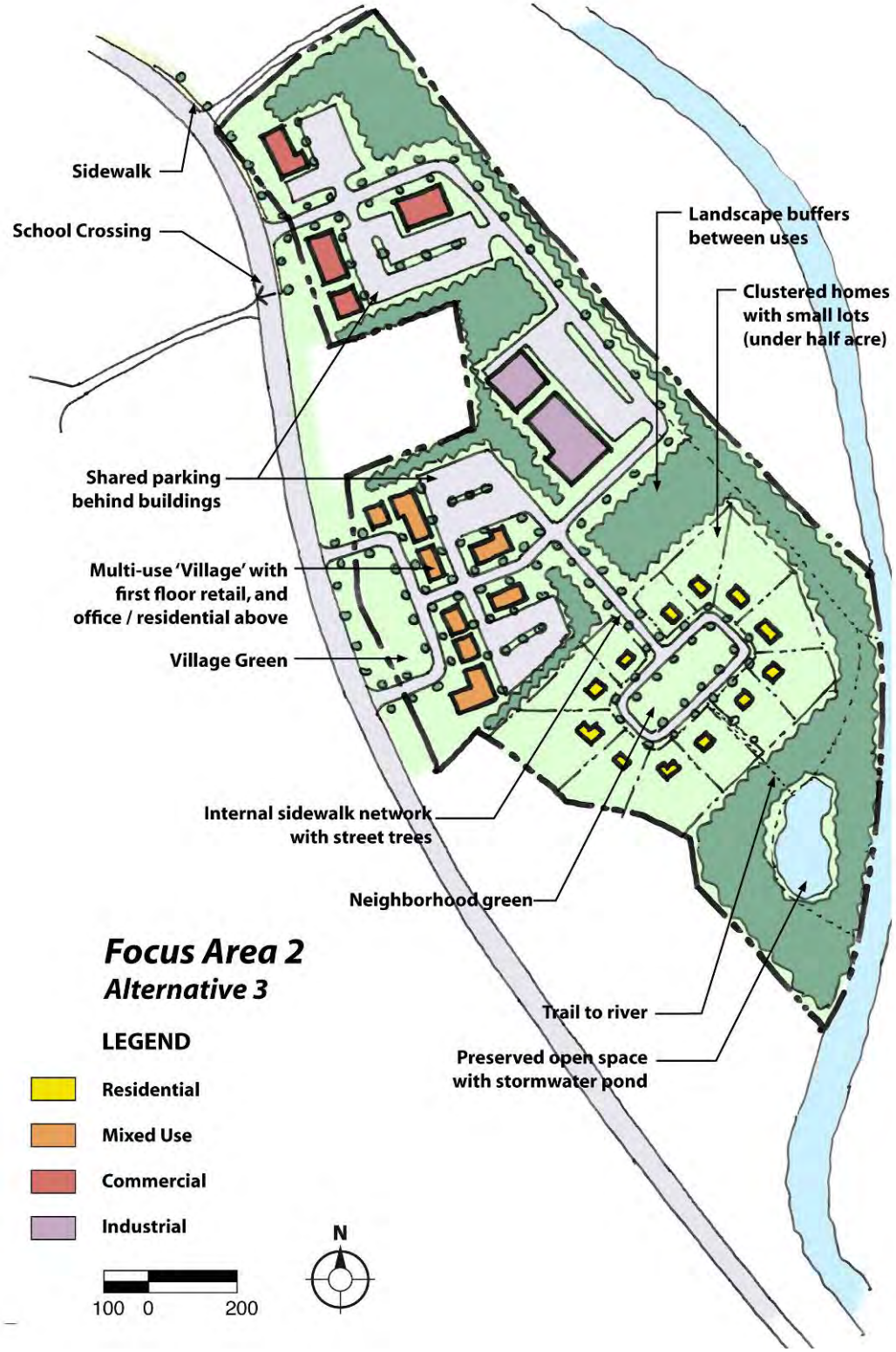


Figure 46: Chester Village East - Land Use Scenario #3



4.1.3.2 Chester Residential 40 District

This area is comprised of the Residential 40,000 zoning district located between the Green Mountain Union High School and the Rockingham Town Line. No water and sewer services are available at this time. The Zoning Bylaws currently allow a mix of residential and commercial uses. This area today is notable for its rural character, which is comprised of very low-density residential uses with a few commercial uses, open fields and forested areas. This rural character helps to form a visual separation between Rockingham and Chester Village.

The concern over the potential for significant future residential and strip commercial uses within this area resulting in future growth densities that could diminish rural character and traffic safety prompted a closer examination of different land use options. Three different scenarios were developed for a small section to help visualize the potential impacts and differences. The three scenarios, which are shown on the following pages can be categorized as: 1) status-quo residential development pattern, 2) status-quo residential and frontage commercial development pattern, and 3) conservation subdivision development pattern.

The three scenarios were presented to public meeting attendees and they were asked to rank their choices. On a scale of +3 to -3, the public ranked Scenario #3 first with an average score of +0.7, Scenario #2 second with an average score of -0.7, and Scenario #1 third with an average score of -1.0.

Figure 47: Chester R40 South District - Land Use Scenario #1

Figure 48: Chester R40 South District - Land Use Scenario #2

Figure 49: Chester R40 South District - Land Use Scenario #3

4.1.3.3 Upper Bartonsville Area

The Upper Bartonsville area of Rockingham is located above the historic hamlet of Bartonsville, in the area of VT 103, Upper Bartonsville Road, and Town Farm Road. This area is described in the Rockingham Town Plan as land adjacent to Route 103 that currently includes a mix of residential and commercial uses, but has been zoned primarily for commercial and industrial development.

Upper Bartonsville is currently zoned Commercial-Industrial (C-I) along much of Route 103 extending to the Chester Town line, and is bordered by the Rural Residential (RR-1) District along a portion of VT103 to the west. These zoning districts allow for a variety of potentially incompatible uses, if developed in close proximity – including large scale, vehicle-oriented commercial and industrial development in the C-I district and residential and limited commercial development across the highway in the RR-1 district.

There is the potential for significant development in Upper Bartonsville, most notably at the Town's spent gravel pits and at the State Police Barracks, which may be closing in the next couple of years.

A couple land use alternatives were examined for the Upper Bartonsville area, as shown in the figures below. These alternatives generally sought to cluster land uses, minimize access points onto VT 103, locate parking behind buildings, and accommodate commercial, industrial and residential development.

Figure 50: Upper Bartonsville - Land Use Scenario #1

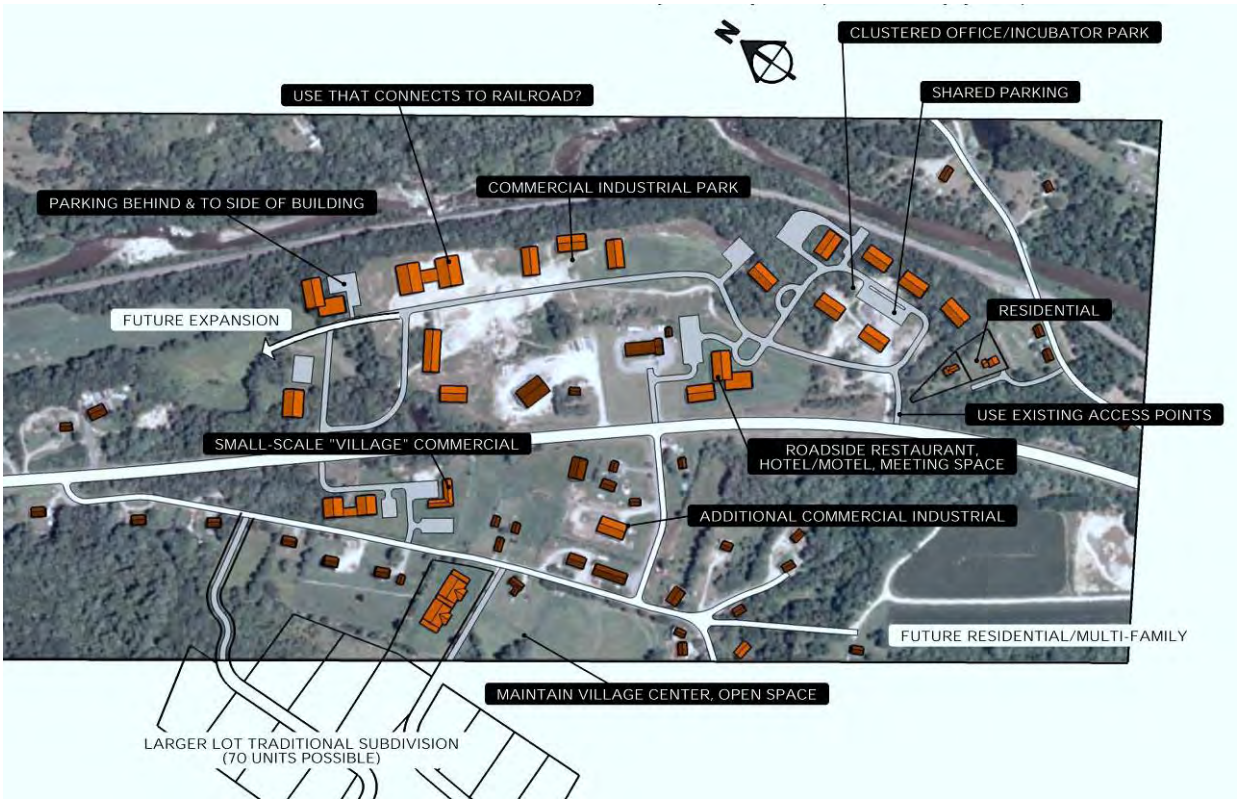
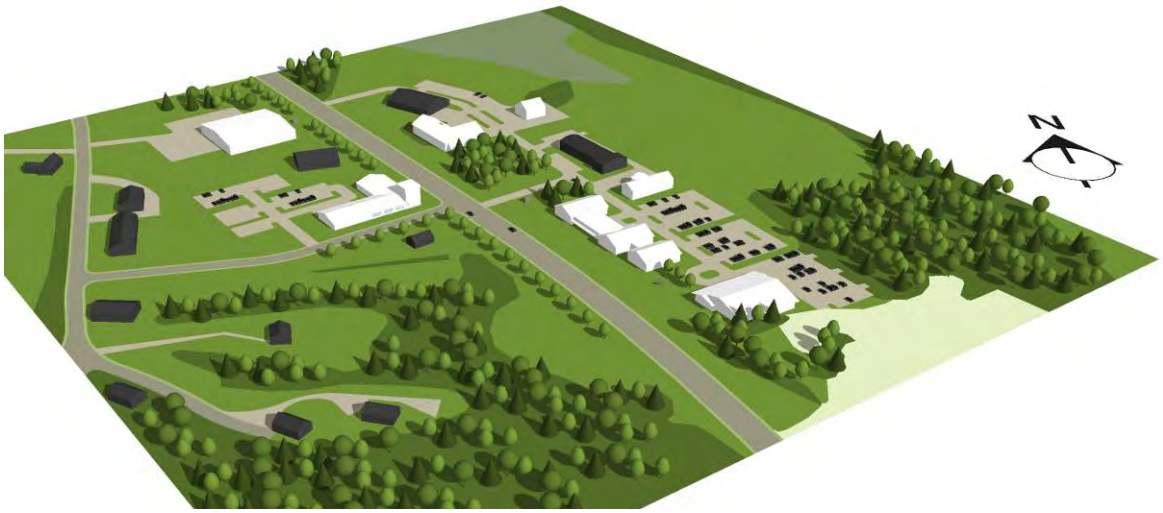


Figure 51: Upper Bartonsville - Land Use Scenario #2

Figure 52: Upper Bartonsville - Land Use Scenario - Perspective View



4.2 Future Traffic Assessment

This section establishes 2030 traffic volumes along the corridor and provides an assessment of congestion, delay, queuing, and safety along the corridor in the future assuming no improvements to the roadway capacity.

4.2.1 Development and Background Traffic Growth

As described in the previous section, background traffic growth is defined as growth related to development in and outside the study area, such as increases to tourist-related traffic; increases to through truck traffic, and development along the corridor. The VTrans Continuous Traffic Counter (P6X249) located on VT 103 near Rockingham Hill Road was used to estimate traffic volume growth for the future growth year. This counter's data results in an annual adjustment factor of 0.95% annually, or a growth of 22.0% between 2009 and 2030.

4.2.2 2030 Volumes

The estimated 2030 AM and PM peak hour turning movement volumes are shown below in Figure 53 and Figure 54, respectively.

Figure 53: 2030 AM Peak Hour Volumes

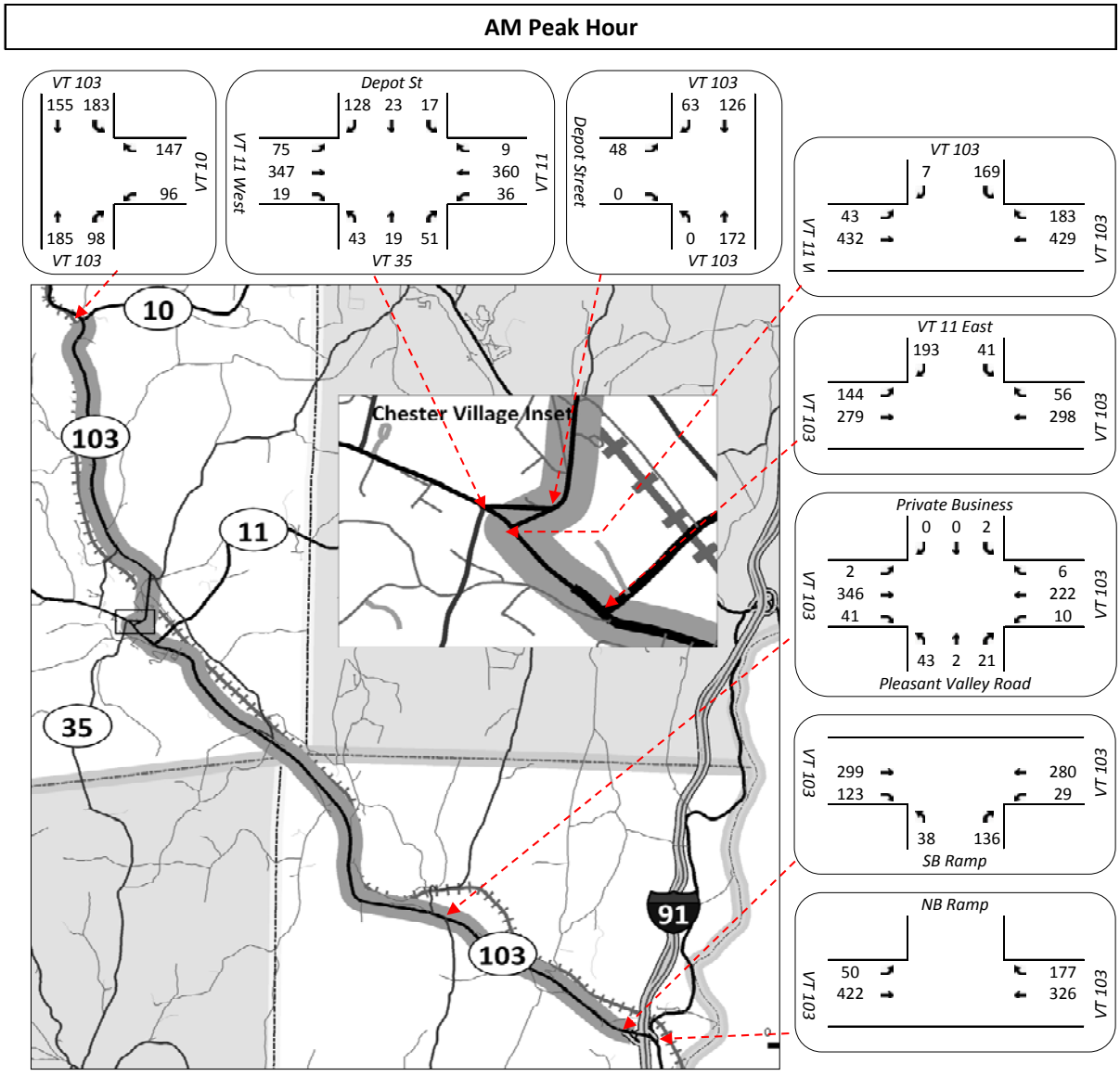
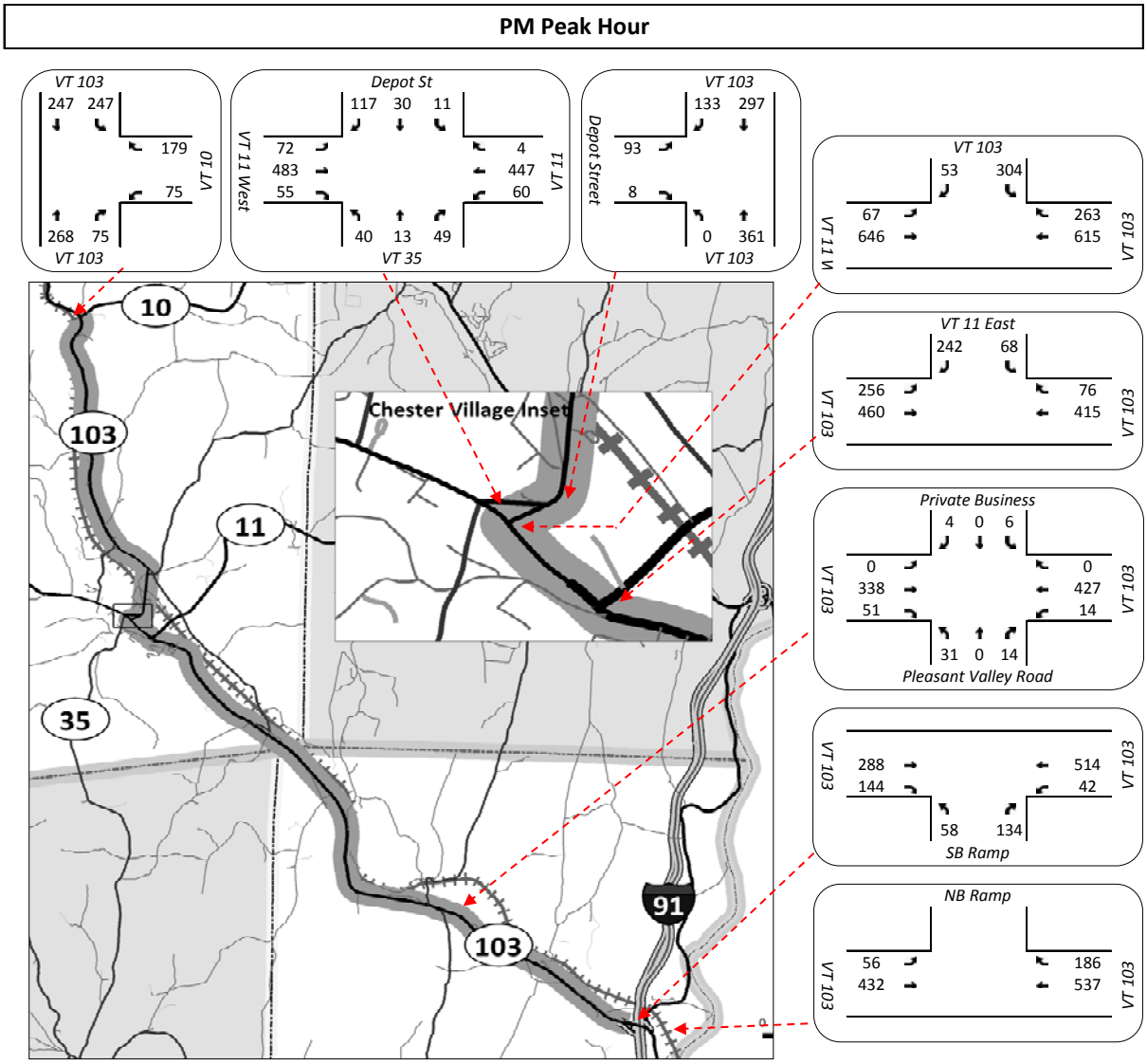


Figure 54: 2030 PM Peak Hour Volumes



4.3 Future Year Traffic Congestion Assessment

The 2030 intersection traffic volumes are analyzed in this section to identify future year capacity and queuing issues along the corridor.

4.3.1 Congestion Analysis

Level of Service (LOS) grades, average delays, and volume-to-capacity (v/c) ratios are calculated for the eight study intersections during the 2009 and 2030 AM and PM peak hours

(Table 5).[1] Approaches that operate at LOS D, E or F, which is below the VTrans standard, are highlighted in yellow in the table.

The key results are as follows:

- VT 11 West/VT 35/Depot Street – The northbound approach at the intersection operates at LOS D/F in the 2030 AM Peak and both PM scenarios.
- VT 103/VT 11 West – The southbound approach at the intersection operates at LOS D/F in all scenarios.
- VT 103/VT 11 East - The southbound approach at the intersection operates at LOS D/F in both PM scenarios.

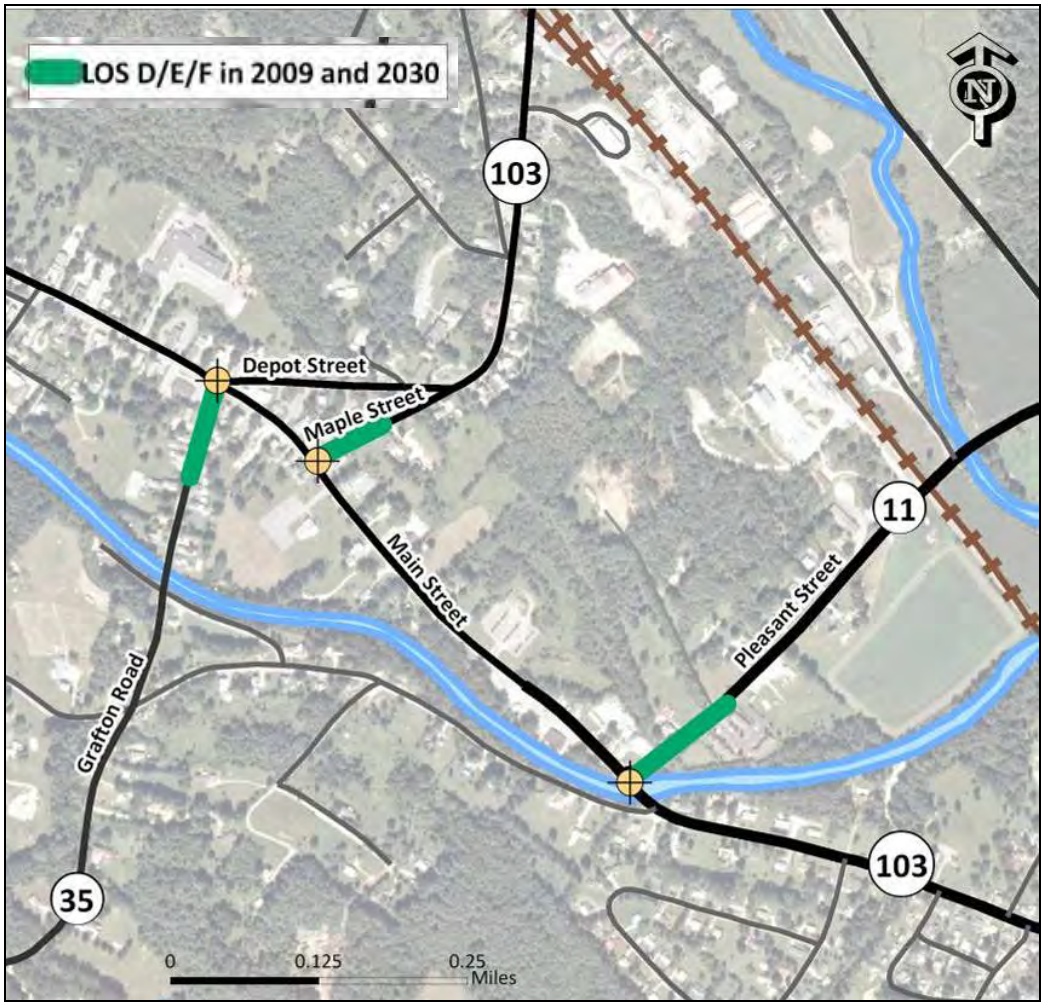
Table 5: AM and PM Peak Hour LOS, Average Delay (seconds) and v/c Ratios

	AM Peak Hour						PM Peak Hour					
	Existing Conditions						Existing Conditions					
	2009			2030			2009			2030		
	LOS	Delay	v/c	LOS	Delay	v/c	LOS	Delay	v/c	LOS	Delay	v/c
VT 103/VT 10												
Westbound Approach, from VT 10	B	12	0.19	B	14	0.28	B	14	0.21	C	17	0.36
Northbound Approach, along VT 103 from Chester	A	<1	0.09	A	<1	0.11	A	<1	0.13	A	<1	0.16
Southbound Approach, along VT 103 from Ludlow	A	4	0.12	A	5	0.15	A	4	0.16	A	5	0.21
VT 103/Depot Street												
Eastbound Approach, along Depot Street	B	10	0.17	B	11	0.25	B	14	0.17	C	17	0.25
Northbound Approach, along VT 103 from Rockingham	A	<1	<0.01	A	<1	<0.01	A	<1	<0.01	A	<1	<0.01
Southbound Approach, along VT 103 from Ludlow	A	<1	0.21	A	<1	0.25	A	<1	0.21	A	<1	0.25
VT 11West/VT 35/Depot Street												
Eastbound Approach, along VT 11 from Reedville	A	2	0.05	A	2	0.06	A	2	0.05	A	2	0.06
Westbound Approach, along VT 11 from Rockingham	A	<1	0.02	A	1	0.03	A	1	0.04	A	2	0.06
Northbound Approach, along VT 35	C	20	0.28	D	33	0.47	D	28	0.35	F	75	0.68
Southbound Approach, along Depot Street	B	14	0.26	B	18	0.38	B	17	0.31	C	27	0.49
VT 103/VT 11West												
Southbound Approach, along VT 103 from Ludlow	D	28	0.48	F	67	0.77	F	>100	1.62	F	>100	2.99
Westbound Approach, along VT 103 from Rockingham	A	<1	0.30	A	<1	0.36	A	<1	0.42	A	<1	0.52
Eastbound Approach, along VT 11 West from Reedville	A	1	0.04	A	1	0.05	A	2	0.06	A	2	0.09
VT 103/VT 11East												
Southbound Approach, along VT 11 East	B	13	0.30	C	16	0.42	D	28	0.62	F	>100	1.01
Westbound Approach, along VT 103 from Rockingham	A	<1	0.17	A	<1	0.21	A	<1	0.24	A	<1	0.29
Eastbound Approach, along VT 103 from Chester	A	3	0.09	A	4	0.12	A	5	0.18	A	5	0.24
VT 103/Pleasant Valley Road												
Eastbound Approach, along VT 103 from Chester	A	<1	0.19	A	<1	0.23	A	<1	0.19	A	<1	0.23
Westbound Approach, along VT 103 from Bellows Falls	A	<1	0.01	A	<1	0.01	A	<1	0.01	A	<1	0.01
Northbound Approach, along Pleasant Valley Road	B	12	0.10	B	14	0.13	B	14	0.08	C	16	0.12
VT 103/I91SB Ramps												
Eastbound Approach, along VT 103 from Chester	A	<1	0.20	A	<1	0.25	A	<1	0.21	A	<1	0.25
Westbound Approach, along VT 103 from Bellows Falls	A	<1	0.02	A	1	0.02	A	<1	0.03	A	1	0.03
Northbound Approach, along I-91 Ramps	B	11	0.15	B	12	0.20	B	13	0.15	B	15	0.21
VT 103/I91 NB Ramps												
Eastbound Approach, along VT 103 from Chester	A	1	0.04	A	1	0.05	A	2	0.05	A	2	0.07
Westbound Approach, along VT 103 from Bellows Falls	A	<1	0.16	A	<1	0.19	A	<1	0.26	A	<1	0.32

The locations of these substandard approaches are shown in Figure 20.

[1] Congestion and queue estimates were calculated using the Highway Capacity Manual reports from Synchro 7.

Figure 55: Level of Service (LOS) D, E or F Intersections and Approaches



4.3.2 Queuing Analysis

The results from five one-hour SimTraffic (v7) simulations of the 2009 and 2030 scenario volumes were averaged in order to project AM and PM peak hour queues.

Projected queues at most of the VT 103 intersections remain relatively minor even in 2030 (Table 6). However, there are two locations where projected future queues are notable:

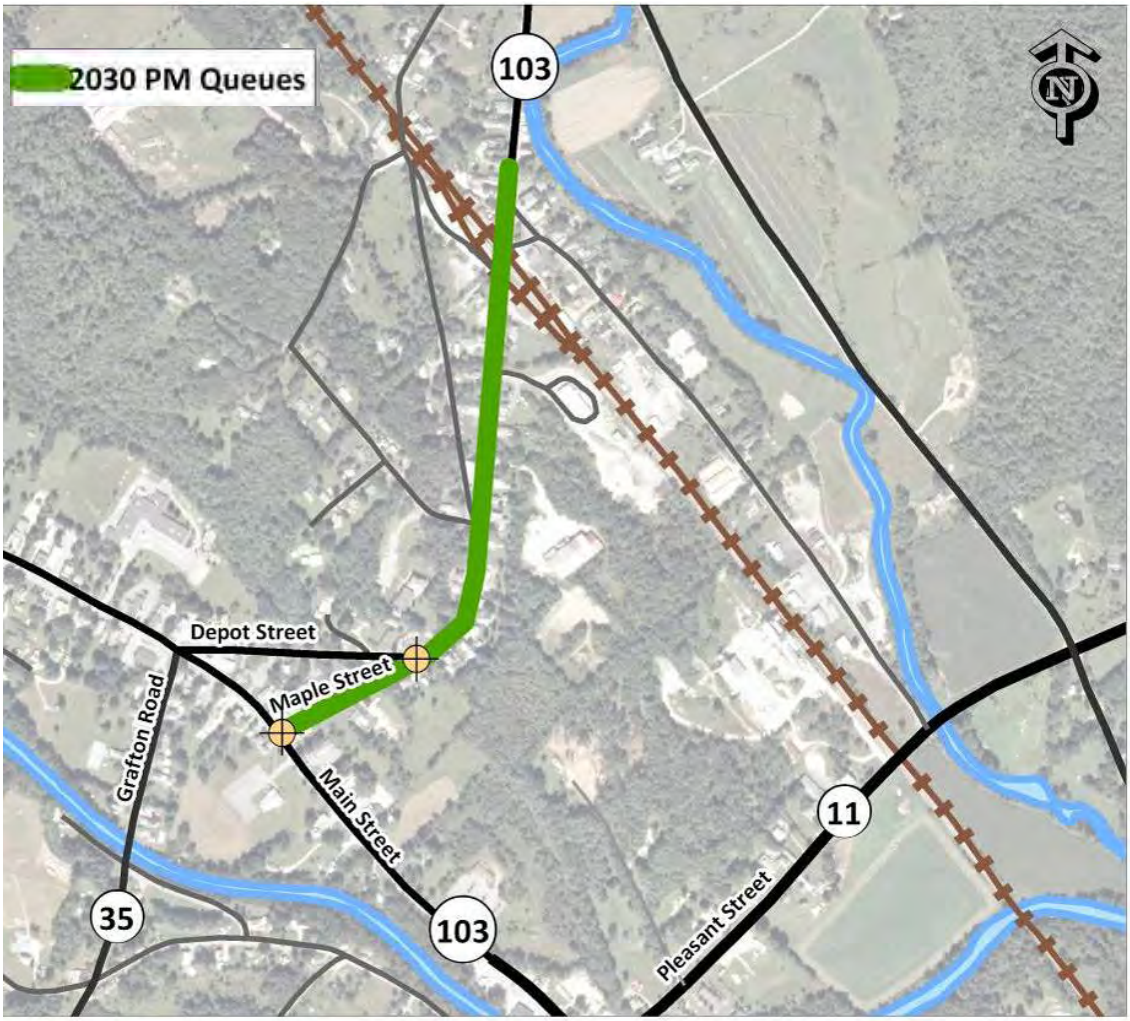
- VT 103/VT 11 West –2009 and 2030 queues are projected to extend northward into the Depot Street intersection.
- VT 103/Depot Street –2030 queues southbound on VT 103 are projected to extend well beyond Chester Depot and the Town Hall. These queues are an extension of queues from the VT 103/VT 11 West intersection.

Table 6: AM and PM Peak Hour Queues (feet)

	AM Peak Hour Queue Length (ft)		PM Peak Hour Queue Length (ft)		Link Distance
	2009	2030	2009	2030	
VT 103/VT 10					
Westbound Approach, from VT 10	36	46	34	39	>1000
Northbound Approach, along VT 103 from Chester	1	1	1	1	250
Southbound Approach, along VT 103 from Ludlow	25	32	36	47	250
VT 103/Depot Street					
Eastbound Approach, along Depot Street	19	20	37	161	1000
Northbound Approach, along VT 103 from Rockingham	0	0	0	0	700
Southbound Approach, along VT 103 from Ludlow	0	0	199	2913	>1000
VT 11West/VT 35/Depot Street					
Eastbound Approach, along VT 11 from Reedville	35	50	41	59	>1000
Westbound Approach, along VT 11 from Rockingham	10	15	25	45	500
Northbound Approach, along VT 35	41	48	39	57	>1000
Southbound Approach, along Depot Street	17	39	20	23	1000
VT 103/VT 11West					
Southbound Approach, along VT 103 from Ludlow	85	138	500	602	>1000
Westbound Approach, along VT 103 from Rockingham	29	2	4	3	>1000
Eastbound Approach, along VT 11 West from Reedville	0	44	86	204	700
VT 103/VT 11East					
Southbound Approach, along VT 11 East	52	69	104	243	>1000
Westbound Approach, along VT 103 from Rockingham	0	1	1	1	>1000
Eastbound Approach, along VT 103 from Chester	1	74	104	147	>1000
VT 103/Pleasant Valley Road					
Eastbound Approach, along VT 103 from Chester	0	0	0	0	>1000
Westbound Approach, along VT 103 from Bellows Falls	0	2	31	2	>1000
Northbound Approach, along Pleasant Valley Road	2	43	0	33	>1000
VT 103/VT 10					
Eastbound Approach, along VT 103 from Chester	1	8	4	5	>1000
Westbound Approach, along VT 103 from Bellows Falls	11	16	21	34	>1000
Northbound Approach, along I-91 Ramps	20	22	28	34	>1000
VT 103/VT 10					
Eastbound Approach, along VT 103 from Chester	12	26	18	30	>1000
Westbound Approach, along VT 103 from Bellows Falls	1	1	0	0	350

The estimated average maximum queue lengths at each of the critical intersection are shown in Figure 56.

Figure 56: Projected 2030 PM Peak Hour Queues



4.3.3 Volume to Capacity Threshold Analysis

Whereas the LOS analysis provides insight into anticipated congestion at intersections, a volume to capacity (v/c) threshold analysis is necessary to understand the level of congestion on a section of the roadway. Some factors that are used to determine the amount of congestion include total traffic volume and proportion of trucks, directional split of traffic, shoulder and lane width, number of access points (driveways and intersections), and length of passing zones.

The *Vermont Highway System Policy Plan* (HSPP)[1] recommends the following V/C thresholds for state highway sections:

- 0.7 for Rural corridors
- 0.8 for Village areas/small towns/suburban corridors/growth areas, etc.
- 0.9 for Urban downtown areas

[1] VTrans, *Vermont Highway System Policy Plan*, June 2004.

These thresholds were used to identify potential problem areas in 2009 and 2030 along the VT 103 corridor.

The segments shown in Table 8 were assessed using HCS 2000 Highway Capacity Software. The roadway type designation and respective V/C threshold is also given.

Table 7: Road Segments and V/C Thresholds

	Area Type	Maximum V/C Threshold
I-91 Ramps to Pleasant Valley Rd	Rural	0.7
Pleasant Valley Rd to VT 11 E	Rural	0.7
VT 11 East to Church St	Village	0.8
Church St to VT 10	Rural	0.7

Table 8 shows the calculated V/C for each road segment in the AM and PM peak hours in 2009 and 2030. Note that none of the road segments exceed the VTrans V/C threshold in any scenario.

Table 8: V/C by Road Segment

		AM V/C		PM V/C	
	Length (mi)	2009	2030	2009	2030
I-91 Ramps to Pleasant Valley Rd	3.3	0.22	0.27	0.29	0.37
Pleasant Valley Rd to VT 11 E	5.7	0.24	0.29	0.31	0.37
VT 11 East to Church St	1.6	0.32	0.39	0.44	0.54
Church St to VT 10	3.4	0.17	0.20	0.24	0.29

4.3.4 Future Traffic Signal Warrants

A signal warrant analysis is a set of tests that are run to determine whether a traffic signal would significantly improve operations, mobility, and safety at an intersection. There are a total of 8 warrants:

1. Eight-Hour Vehicular Traffic Warrant: when a large amount of intersecting traffic occurring over an 8-hour period is the principal reason for installing a traffic signal, or where excessive delays occur on minor approaches to an intersection.
2. Four-Hour Vehicular Traffic Warrant: when a large amount of intersecting traffic occurring over a 4-hour period is the principal reason for installing a traffic signal.
3. Peak Hour Warrant: when the minor-street traffic suffers unduly delay when entering or crossing the major-street during the average peak hour is the principal reason for installing a traffic signal.
4. Pedestrian Volume Warrant: when the traffic volumes on a major street are so heavy that pedestrians experience excessive delays.
5. School Crossing Warrant: when school children crossing a major street are the principal reason for installing a traffic signal.
6. Coordinated Signal System Warrant: when maintaining proper platooning of vehicles is the principal reason for installing a traffic signal.

7. Crash Experience Warrant: when the severity and frequency of accidents is the principal reason for installing a traffic signal.
8. Roadway Network Warrant: when the concentration and organization of traffic flow is the principal reason for installing a traffic signal.

A twelve-hour turning movement count was conducted at the intersection of VT 103/VT 11East (Pleasant St) on 27 and 28 July 2006. Traffic volumes were adjusted to represent average traffic conditions in 2009 and 2030 assuming development growth and background growth. The results of this signal warrant analysis are presented in Table 9.

Table 9: Signal Warrant Summary

	2009	2030
Warrant 1: Eight-Hour Vehicular Volume Warrant	Yes	Yes
Warrant 2: Four-Hour Vehicular Volume Warrant	Yes	Yes
Warrant 3: Peak Hour Warrant	Yes	Yes
Warrant 4: Pedestrian Volume Warrant	No	No
Warrant 5: School Crossing Warrant	n/a	n/a
Warrant 6: Coordinated Signal System Warrant	n/a	n/a
Warrant 7: Crash Experience Warrant	No	No
Warrant 8: Roadway Network Warrant	No	Yes
Total Warrants Met:	**3**	**4**

A signal warrant analysis is considered advisory only. This means that simply meeting any warrant may not be sufficient cause for installing a traffic signal. For example, meeting the peak hour warrant is usually not sufficient in and of itself to warrant installing a traffic signal. The rationale for this is that one hour (or less) of congestion in a day is probably not severe enough to justify the investment in the traffic signal controller and related equipment and software. Experience in Vermont suggests that meeting at least two other warrants is needed to justify investment in a traffic signal. This condition is met at this intersection even under current (2009) traffic volumes.

4.4 Future Transit Service

The Connecticut River Transit (CRT) current provides daily commuter service between Ludlow and Bellows Falls via Springfield. Seasonal service between Okemo Mountain and Bellows Falls is also provided during winter months, but does not extend into the spring/summer/fall seasons.

The CRT has currently identified the need to connect Chester to Bellows Falls and Springfield. The proposed service would potentially be in the form of a tri-town shuttle that would interconnect with the service to Ludlow, thereby also allowing access to Rutland and Brattleboro. As of July 2009, CRT is applying for additional Congestion Mitigation Air Quality (CMAQ) funding to support this potential year-round route.

The US Census Bureau's Worker Flow data, based on the 2000 US Census, captures where residents go to work and where they commute from. The findings from this worker flow data is summarized in Figure 57 for the towns of Chester and Rockingham. Based on these figures, a commuter bus route between Ludlow and Bellows Falls (note that Bellows Falls falls under the category of Rockingham Town in this data) would provide tremendous benefit to those commuting to and from Chester and Rockingham.

Figure 57: Journey to Work Data

Journey to Work Summary

	From Chester, To:		From Rockingham, To:
1	Chester town Windsor Co. VT	1	Rockingham town Windham Co. VT
2	Springfield town Windsor Co. VT	2	Brattleboro town Windham Co. VT
3	Ludlow town Windsor Co. VT	3	Springfield town Windsor Co. VT
4	Rockingham town Windham Co. VT	4	Westminster town Windham Co. VT

Legend
Direct Benefit
Connection Benefit

4.5 Future Safety

There were 147 reported crashes on VT 103 in the study area from 2003 to 2007. Of those crashes, 34 (23%) were major collisions (involving a fatality, serious injury, or moderate injury).

One of the goals of this study is to reduce major crashes by 5% between 2009 and 2030. This would result in a reduction of 2 collisions over the five-year period, or 0.4 crashes per year (Table 10).

Table 10: Crash Reduction Goals

Total Major Crashes 2003-2007	34
-5%	-2
2030 Goal	**32**