


3-2017

GIS MAPPING AND ANALYSIS FOR THE CENTRAL MASSACHUSETTS REGIONAL PLANNING COMMISSION'S WEST BROOKFIELD MASTER PLAN PROJECT

Laurel Oolie
loolie@clarku.edu

Follow this and additional works at: https://commons.clarku.edu/idce_masters_papers

 Part of the [Environmental Studies Commons](#), and the [Urban Studies and Planning Commons](#)

Recommended Citation

Oolie, Laurel, "GIS MAPPING AND ANALYSIS FOR THE CENTRAL MASSACHUSETTS REGIONAL PLANNING COMMISSION'S WEST BROOKFIELD MASTER PLAN PROJECT" (2017). *International Development, Community and Environment (IDCE)*. 210.

https://commons.clarku.edu/idce_masters_papers/210

This Capstone is brought to you for free and open access by the Master's Papers at Clark Digital Commons. It has been accepted for inclusion in International Development, Community and Environment (IDCE) by an authorized administrator of Clark Digital Commons. For more information, please contact mkrikonis@clarku.edu, jodolan@clarku.edu.

**GIS MAPPING AND ANALYSIS FOR THE CENTRAL MASSACHUSETTS
REGIONAL PLANNING COMMISSION'S WEST BROOKFIELD MASTER
PLAN PROJECT**

LAUREL OOLIE

MARCH 21, 2018

A MASTER'S PRACTITIONER REPORT

**Submitted to the faculty of Clark University, Worcester,
Massachusetts, in partial fulfillment of the requirements for the degree of the
Master of Science in Environmental Science and Policy in the department of
International Development, Community, and Environment**

And accepted on the recommendation of:

Dr. Yelena Ogneva-Himmelberger, Project Advisor

Background

West Brookfield is a small, scenic town located between Worcester and Springfield in Massachusetts (see Figure 1). The residents take great pride in their town's rural character and seek to preserve its natural landscapes. Simultaneously, the community members feel it is necessary to improve the economic well-being for the residents by creating jobs, supporting income growth, and increasing the tax base. The Town of West Brookfield values these priorities and seeks to identify ways to increase the tax base to improve economic well-being, and its aging facilities and infrastructure, while being cautious to identify business development options outside of its scenic areas.

The Town of West Brookfield selected The Central Massachusetts Regional Planning Commission (CMRPC) to develop West Brookfield's first Master Plan, which was completed in January 2018, and laid out a vision for the community's future over the next decade and beyond. To enable Planners to visualize the area's land use, development, and environmental data, CMRPC worked with me to develop and execute an analysis of the major corridors running through West Brookfield. This project is called the Route 9 and Route 67 Corridor Analysis, and the effort supported the Central Massachusetts Regional Planning Commission's (CMRPC) work on creating the Master Plan for the Town of West Brookfield, Massachusetts, and helped Planners to form policy recommendations for West Brookfield's land use.

The Route 9 and Route 67 Corridor Analysis built on a previous study titled, "Identifying Conservation and Development Opportunities in West Brookfield, MA" that was completed by me, and a Geographic Information System for Development and Environment graduate student, Daniel Lassila in an Advanced Vector GIS course taken with Professor Yelena Ogneva-Himmelberger in the 2017 spring semester at Clark University. The initial study yielded a Multi-Criteria Evaluation (MCE) of the most suitable areas within the Town of West Brookfield for preservation (see Figure 2) and a second MCE that identified areas most suitable for commercial development (see Figure 3). It also identified the Route 9 and Route 67 intersection as the best area for commercial development based on several factors, but noted challenges to developing there such as a lack of undeveloped parcels and a large ground water protection area.

Project Reflection

In addition to the initial GIS analysis, community events and a town-wide survey also identified the Route 9 and Route 67 corridor as a central component of the town, being the main thoroughfare and gateway. Therefore, this analysis focused solely on land along the Route 9 and Route 67 corridor. The study area was divided into 3 sections: an Eastern Section, a Central Section, and a Western Section, to enable Planners to zoom into the areas, and view them in greater detail (Figure 4).

A series of maps were created using numerous data sources and queries to visualize various characteristics of West Brookfield, highlighting existing land uses, constraints, and potential development or preservation opportunities within the town. The maps illustrated:

1. An ArcGIS Online Aerial/Orthophoto (World Imagery Basemap) (Western, Central, and Eastern zones) (see Figures 5-7).
2. Existing land use (Western, Central, and Eastern zones) (see Figures 8-10).
3. The General Zoning District Aerial/Orthophoto (see Figure 11).
4. The General Zoning District Land Use (see Figure 12).
5. The Primary Constraints (Western, Central, and Eastern zones) (see Figures 13-15).
6. The Secondary Constraints (Western, Central, and Eastern zones) (see Figures 16-18).
7. The Composite of Primary and Secondary Constraints (Western, Central, and Eastern zones) (see Figures 19-21).
8. The Environmental and Development Constraints (Western, Central, and Eastern zones) (see Figures 22-24).

The Planners at CMRPC used these maps along with annual Town reports, regional plans, and their expertise to form recommendations for the Route 9/Route 67 Corridor. Ultimately, CMRPC expects the town will use this analysis as a basis for developing future policies focused on development and conservation in West Brookfield.

Data

The data used in the Route 9/ Route 67 Analysis was taken from the Commonwealth of Massachusetts Office of Geographic Information website, MassGIS, and from CMRPC. The data layers are described below.

Data	Year	File Type	Source
MassDOT Roads	2014	ESRI Shapefile	MassGIS
Level 3 Assessor’s Parcel Maps (2017)	2017	ESRI Shapefile polygon	MassGIS
Elevation Data (5m)	2005	Digital Elevation Model	MassGIS
Protected and Recreational Open Space	2017	ESRI Shapefile	MassGIS
Land Use	2005	ESRI Shapefile	MassGIS
Land Use	1951 -1999	ESRI Shapefile	MassGIS
Proposed Rural Landscape Conservation Districts	2004	ESRI Shapefile	CMRPC
Community (Town) Boundaries	2017	ESRI Shapefile	MassGIS
Census Blocks	2010	ESRI Shapefile	MassGIS
Build-out Analysis (developable parcels and zoning)	2017	ESRI Shapefile	CMRPC
MassDEP Hydrography (1:25,000)	2017	ESRI Shapefile	MassGIS
BioMap2 Critical Environments	2011	ESRI Shapefile	MassGIS
Zoning Polygons	2001	ESRI Shapefile	CMRPC

Methods

ArcGIS was used to import data and create the maps. The constraint maps highlighted the limitations of the land for consideration in its development or protection. The primary and secondary constraints were chosen based on the Build-Out analysis (The Central Massachusetts Regional Planning Commission, 2018, p.79-80). The primary constraint maps included slopes greater than 25%, streams, 100-year FEMA Q3 flood zones, a 100ft river protection buffer, protected open space, and developed land. The secondary constraint maps included slopes between 8%-25%, wetlands, a 100ft-200ft river protection buffer, areas of critical environmental concern (ACECs), BioMap2 core habitats, and BioMap2 critical natural landscapes.

The environmental and development constraint maps designate developed land as of 2005 and a land use update layer from the Build-out analysis as “Primary Development” constraints. The “Primary Environmental” constraints in this map consist of slopes greater than 25%, streams, 100-year FEMA Q3 flood zones, a 100ft river protection buffer, and protected

open space. The secondary environmental constraints were designated as the slopes between 8%-25% and wetlands, as these constraints are limiting but could possibly be overcome if the town finds areas that overlap with them as suitable for development. These constraints were specified according to the “Developed Lands & Absolute Development Constraints” map made from the Build-Out analysis (The Central Massachusetts Regional Planning Commission, 2018, p.83).

Results

The Route 9 / Route 67 analysis helped lead to CMRPC suggesting the following:

Goals and Actions (The Central Massachusetts Regional Planning Commission, 2018, p.99-101) (see Figures 24-26):

1. “Preserve and enhance the existing Town Center area and Route 9 and Route 6 corridors”
2. “Preserve and protect important scenic landscapes and rural character of outlying areas through permanent protection or conservation-oriented zoning provisions”
3. “Explore ways to moderate lake-side growth and protection of water resources”
4. “Make permitting processes clearer and more predictable for applicants and town officials”
5. “Conduct a site assessment and evaluation for 1 East Main Street. Such an evaluation should consider zoning constraints, sanitary sewer capacity, building code requirements for changes in use, and other factors necessary to preserve, restore, and/or revitalize the building”
6. “Review and amend portions of the Town Common Overlay District to incorporate newer best practices associated with adaptive reuse of existing historic structures and preserve community character”
7. “Consider adoption of a comprehensive solar bylaw incorporating new best practices for appropriate siting and preservation of community character”
8. “Review and amend the sign bylaw requirements to ensure that the new future signs are compatible with the characteristics of a certain area or the town as a whole. This effort should include consideration of suitably located tourist-oriented wayfinding signs”

Recommendations relating to Issues and Opportunities (The Central Massachusetts Regional Planning Commission, 2018, p.96) (see Figures 27-28):

1. “Consider adopting a series of Village Center related zoning districts to ensure that residential and business growth is compatible with the uses desired in those areas”
2. “Consider adopting design guidelines for any Village Center or commercial zoning district along the Route 9 corridor to ensure that building and site changes will protect and enhance the town”
3. “Consider establishing a Local Historic District (LHD) in certain designated areas, including but not limited to the Town Common and Town Center areas”
4. “Consider completing a complete build-out and fiscal impact analysis to more clearly and accurately assess the location and extent of developable land in Town. Specifically, key areas along the corridor which provide scenic views are not protected. Such a study and effort must be followed by or correspond with efforts to identify funding sources for open space preservation, especially Community Preservation Act”
5. “Consider zoning bylaw amendments aimed at protecting scenic views, farmland, or forested lands. Unless land is protected, certain zoning measures may be appropriate to steer, direct, limit, and/or guide future growth so that it does not erode the rural character of the Town. Such methods are outlined in the Land Use chapter and include, but are not limited to: Lot size requirements, Building citing requirements, Tree clearing provisions, Steep slope provisions, Driveway and Common Driveway standards, Scenic Road designations, Subdivision standards, Natural Resource Protection Zoning, Other special overlay districts
6. “Within the Town Center area and portions of Route 9 heading west, sidewalks and the pedestrian network (including bicycles) should be examined and improvements sought. Continued participation in the State’s Complete Street’s program is specifically designed to accomplish this type of evaluation and in some cases can provide funding for actual infrastructure improvements”
7. “Consider the creation of designated light industrial zoning to allow for the continuation and expansion of existing businesses and identifying areas for new commercial and light industrial growth. As outlined in the Economic Development chapter, creating the ability for existing businesses to grow and new businesses to locate in West Brookfield is essential to offset the tax burden on residents”
8. “Consider working with MassDOT to ensure that plans for significant road improvements

on West Main Street from Laurel Street to the Ware line maintain and protect scenic views and the character of the road. The project is currently listed on the 2026 Transportation Improvement Project (TIP) list”

Conclusion

Working with CMRPC to analyze land use, zoning, and environmental and development constraints was a rewarding experience that enabled me to enhance my analytical and GIS skills while also developing my knowledge around project development, management, and CMRPC, a talented planning organization. It was compelling to speak with community members and glean from surveys the value of preserving the Town’s rural character, especially as the Town experiences financial duress. The residents and local government understand that development could be a crucial piece to expanding the Town’s tax base to fund repairs on its aging infrastructure and support a pinched school system and other Town services.

The Route 9/Route 67 Corridor analysis highlighted a variety of land use conditions along the major routes in West Brookfield, MA. It helped inform CMRPC of current conditions along the corridor so they could determine the best strategies that could enable the Town of West Brookfield to achieve their land use goals if adopted in the future. The land use policies CMRPC ultimately recommended to the Town of West Brookfield, including making zoning and bylaw amendments that are summarized in this report, are detailed at length in the Land Use chapter of West Brookfield’s 2017 Master Plan.

Figures

Figure 1: The Study Area: West Brookfield, MA

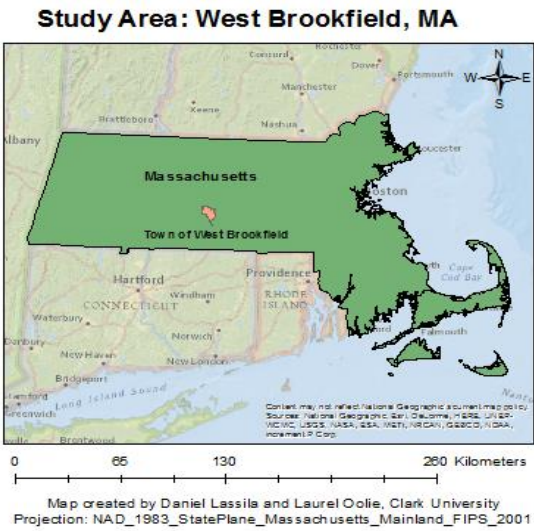


Figure 2: MCE Showing Suitability for Conservation

Suitability of Land for Conservation in West Brookfield, MA

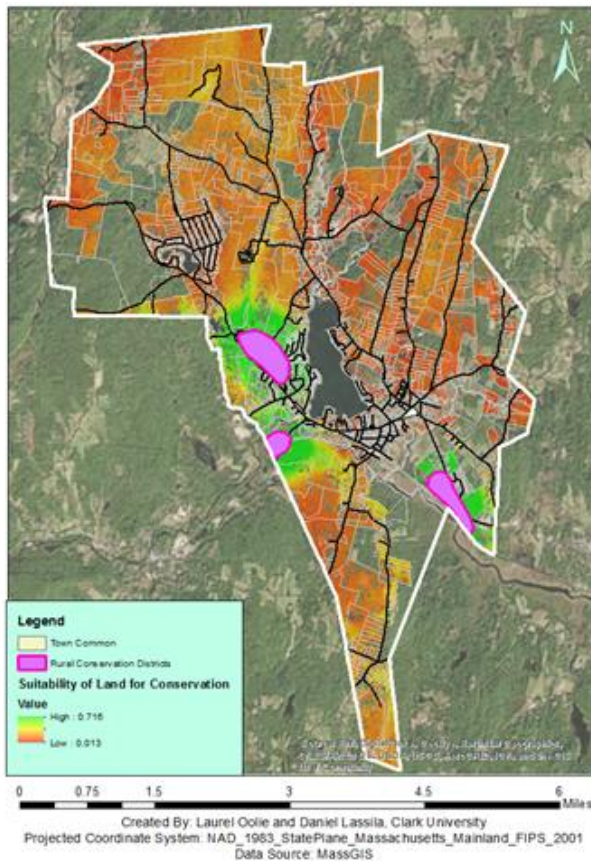


Figure 3: MCE Showing Suitability for Commercial Development

Suitability of Land for Commercial Development in West Brookfield, MA

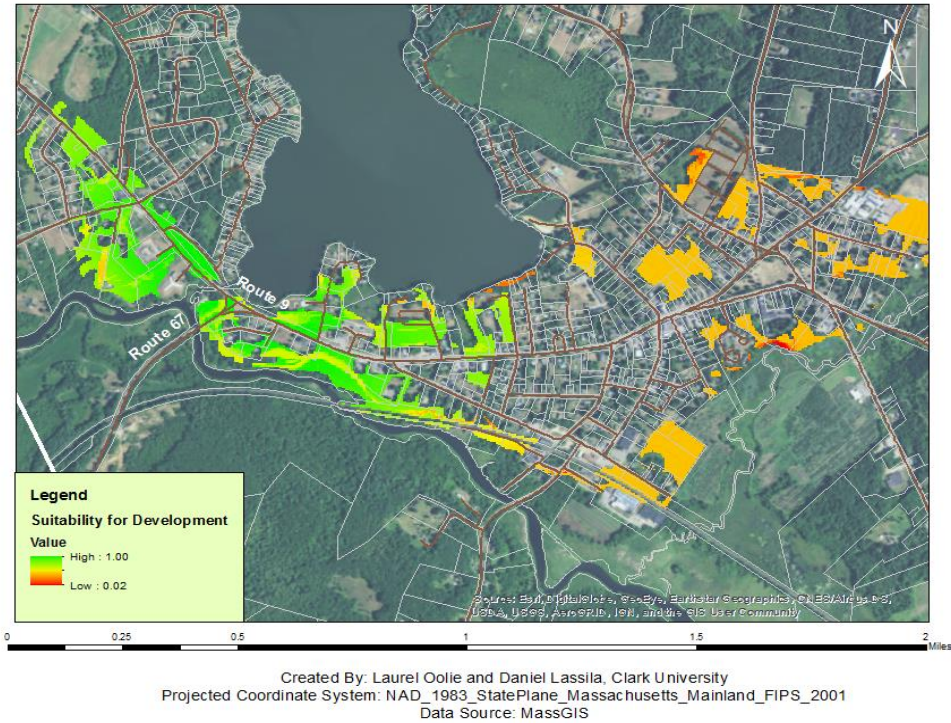


Figure 4: The Route 9/Route 67 Corridor Sections: Western, Central, and Eastern

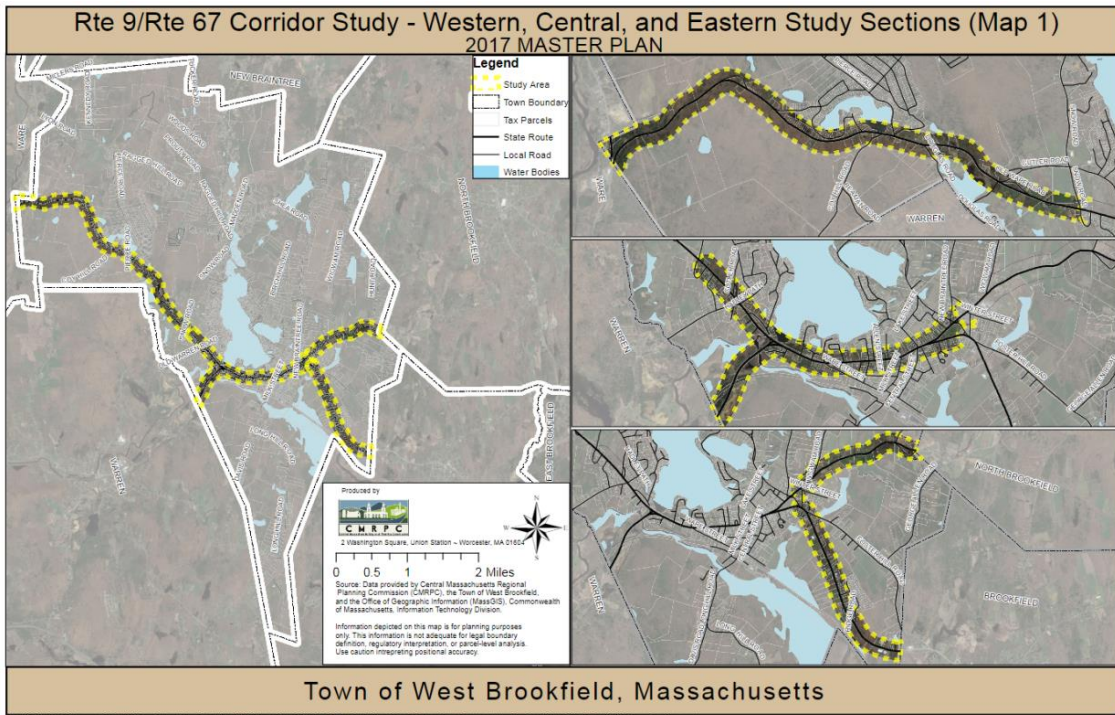


Figure 5: ArcGIS Online World Imagery Aerial/Orthophoto: Western Zone

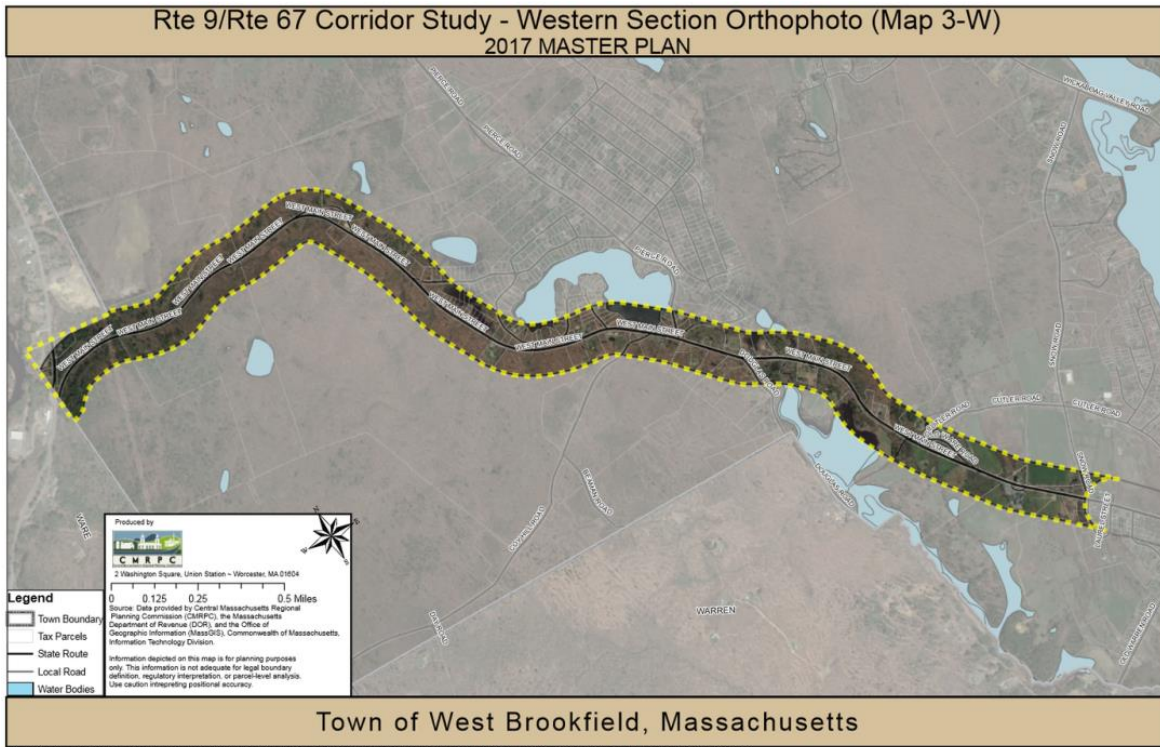


Figure 6: ArcGIS Online World Imagery Aerial/Orthophoto: Central Zone

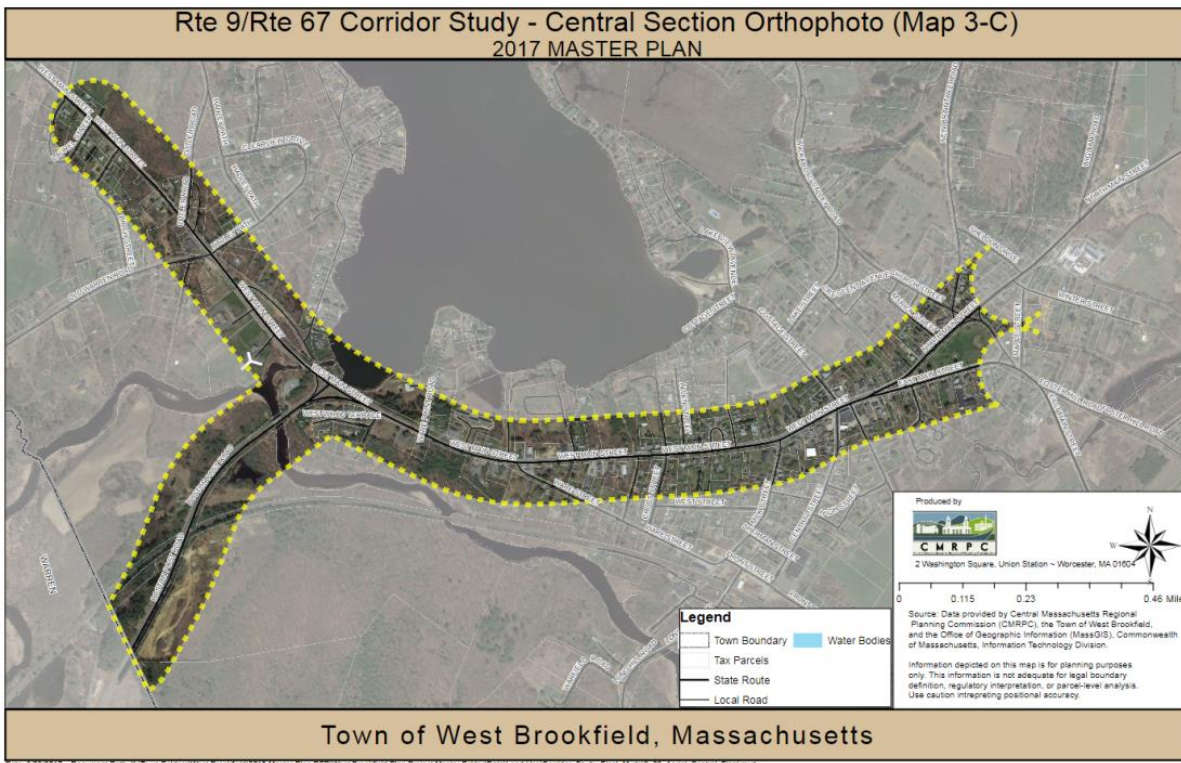


Figure 7: ArcGIS Online World Imagery Aerial/Orthophoto: Eastern Zone

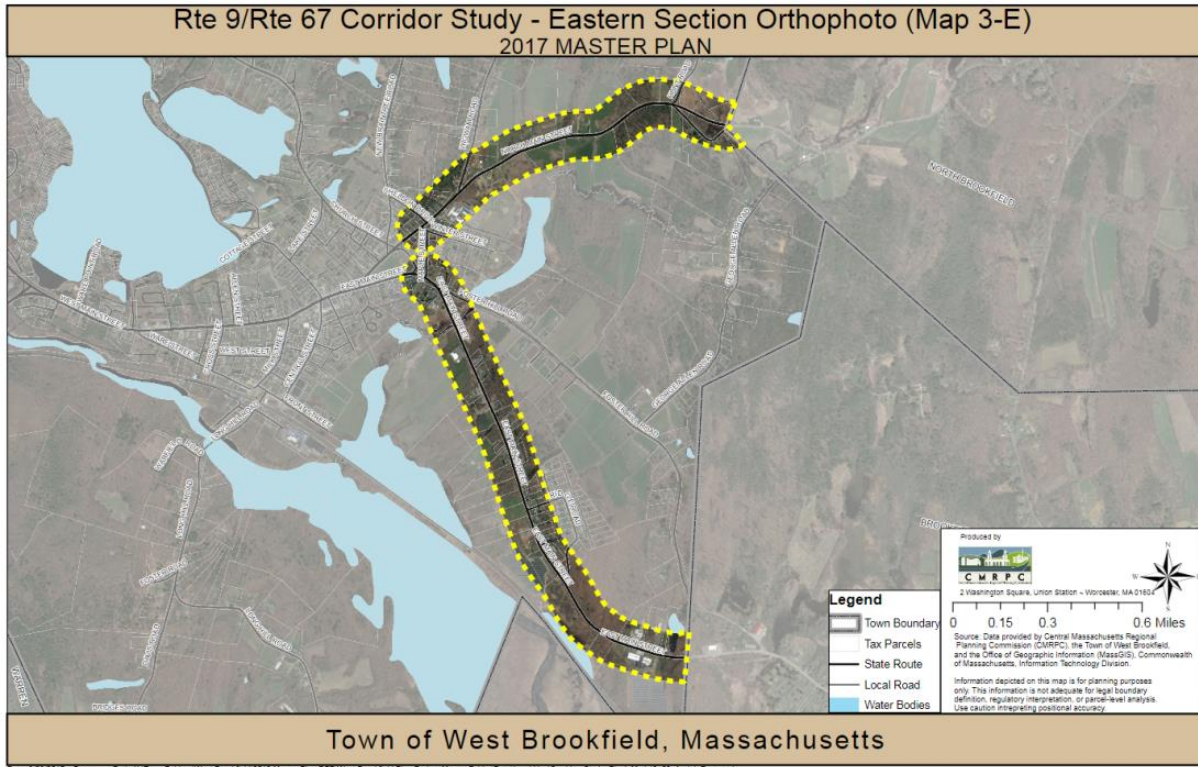


Figure 8: Existing Land Use: Western Zone

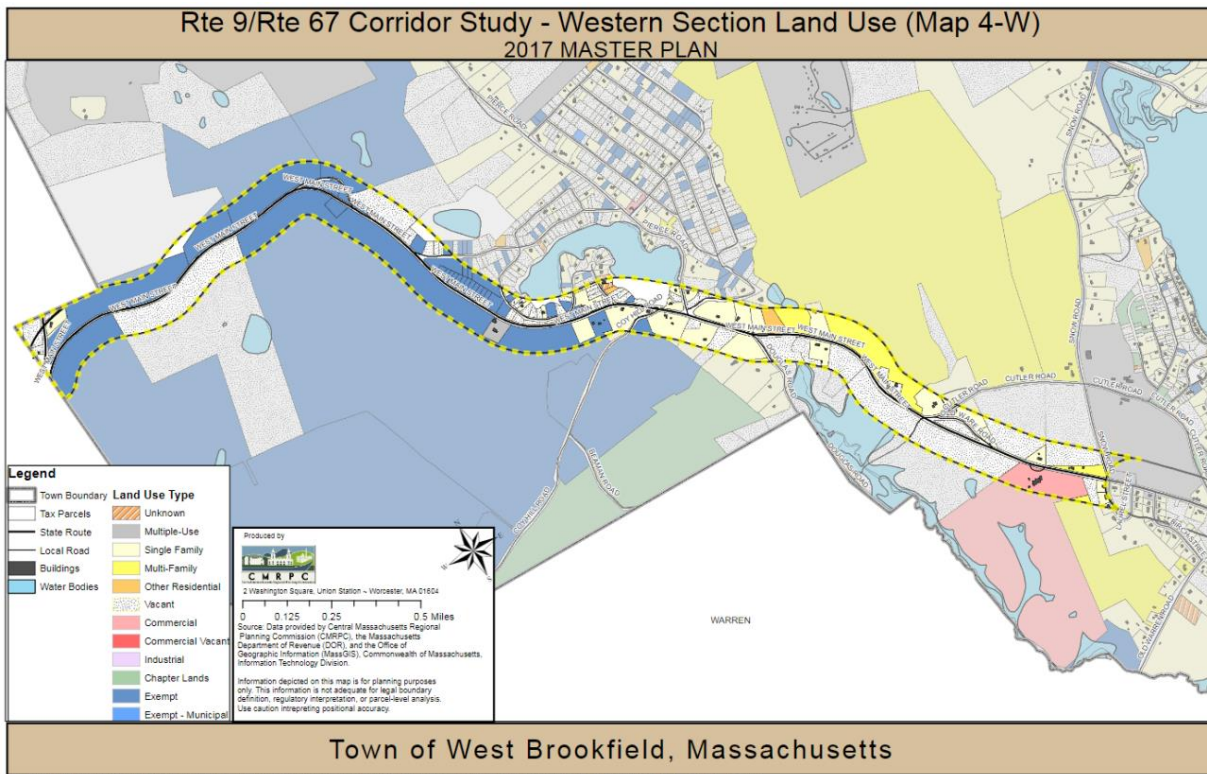


Figure 9: Existing Land Use: Central Zone

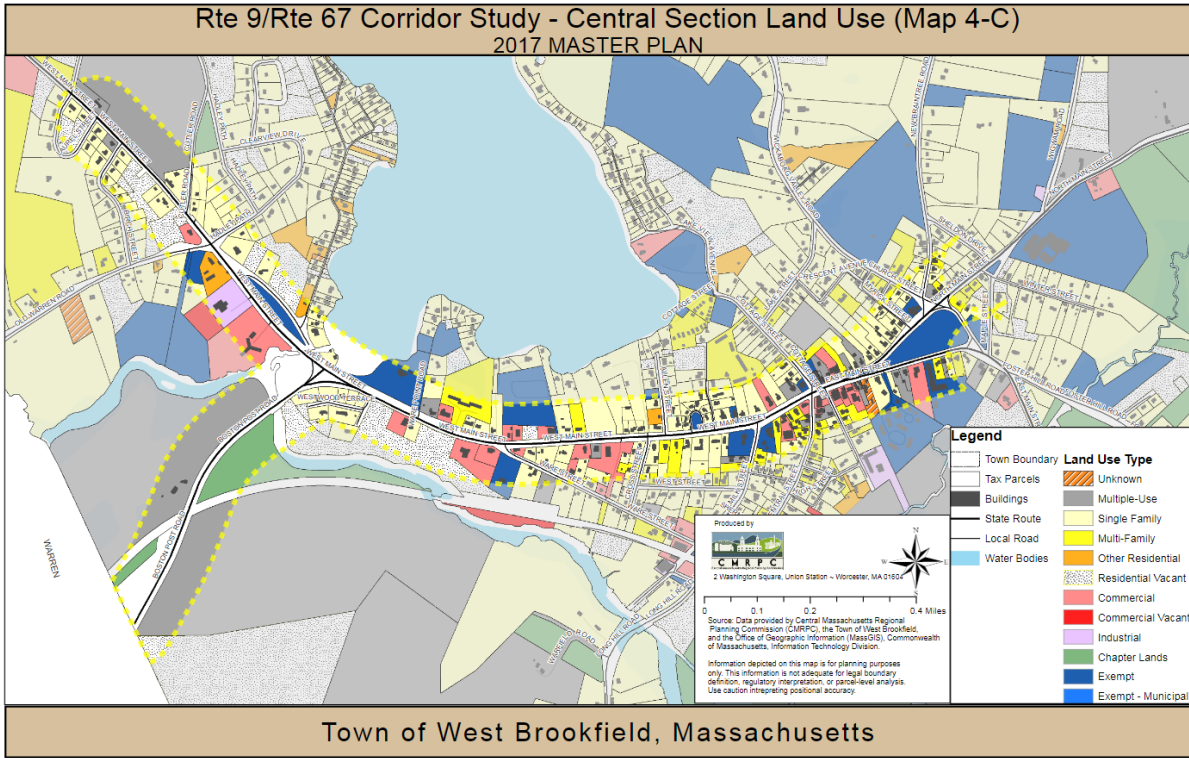


Figure 10: Existing Land Use: Eastern Zone

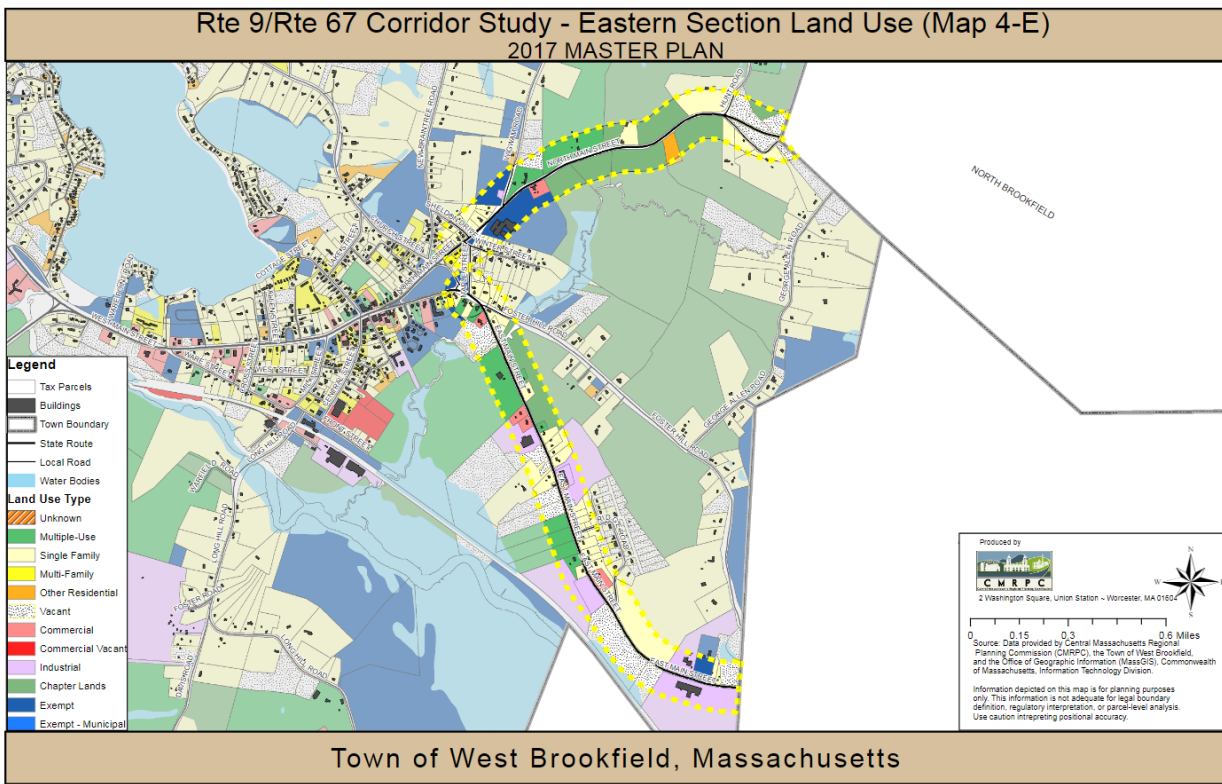


Figure 11: The General Zoning District Aerial/Orthophoto

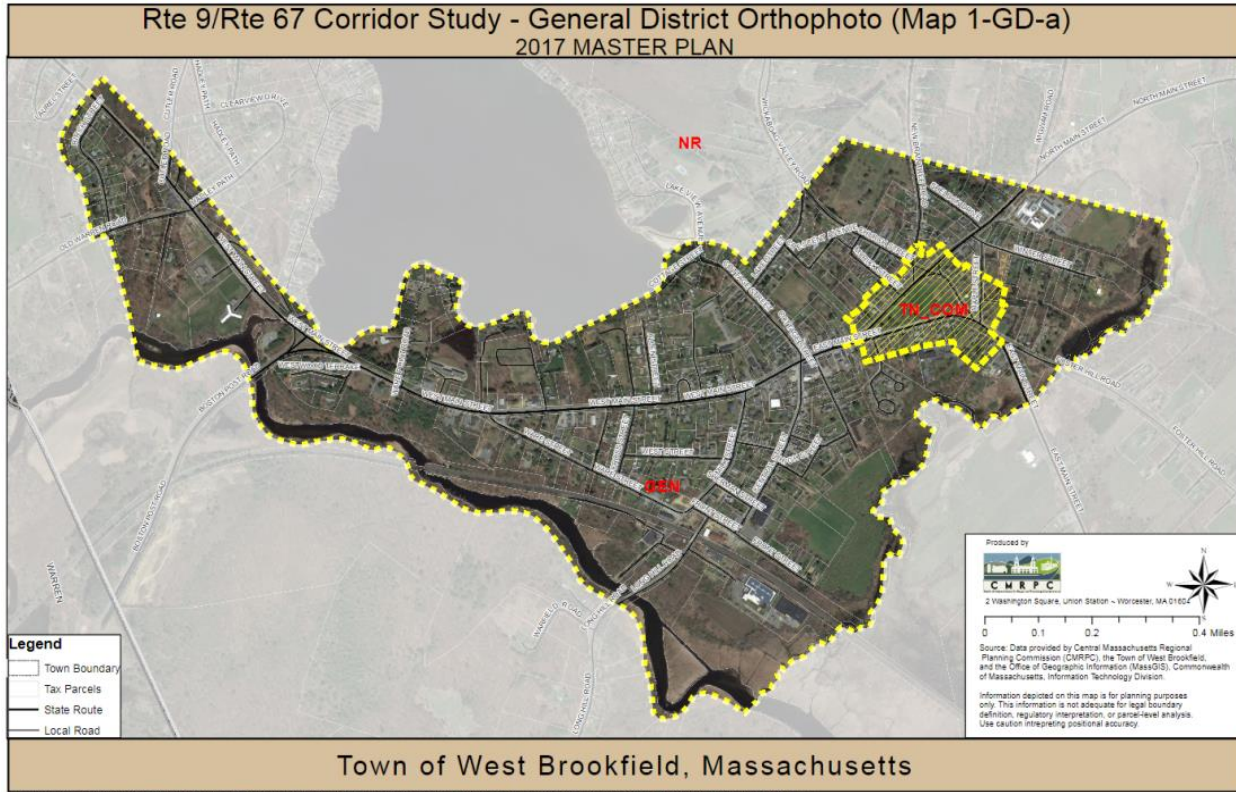


Figure 12: The General Zoning Plan District Existing Land Use

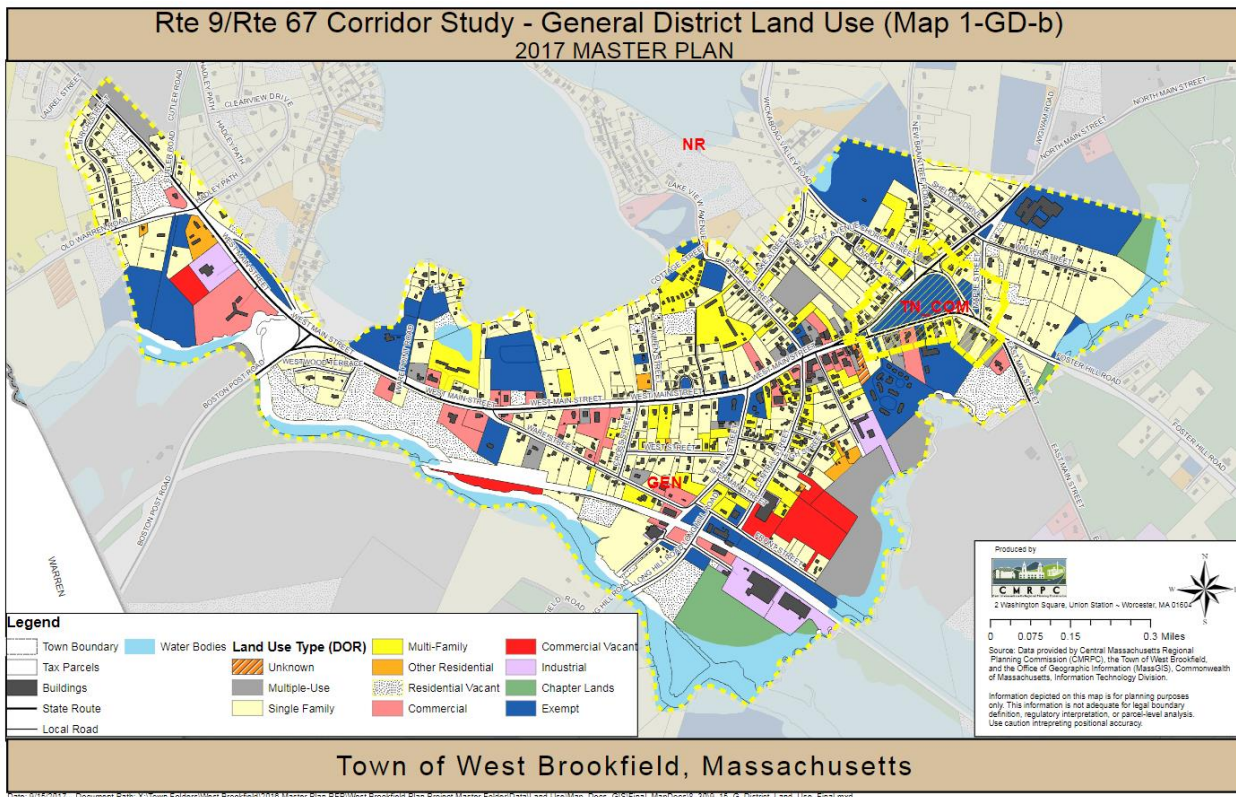


Figure 13: The Primary Constraints: Western Zone

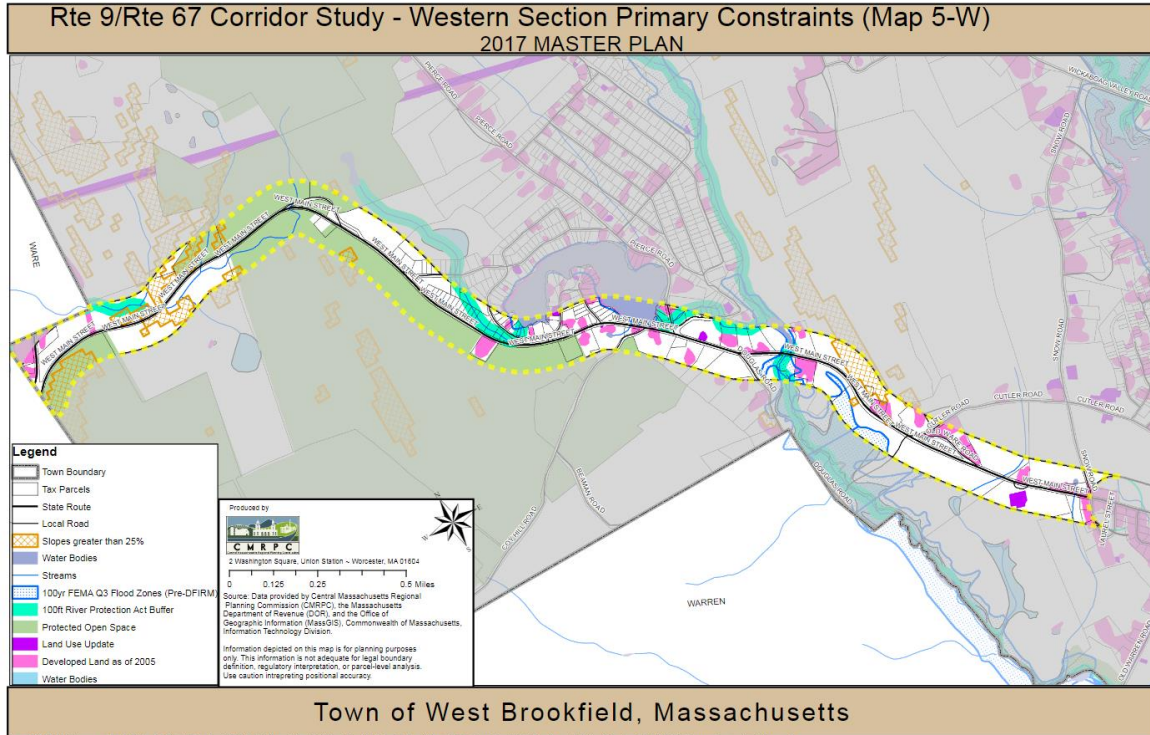


Figure 14: The Primary Constraints: Central Zone

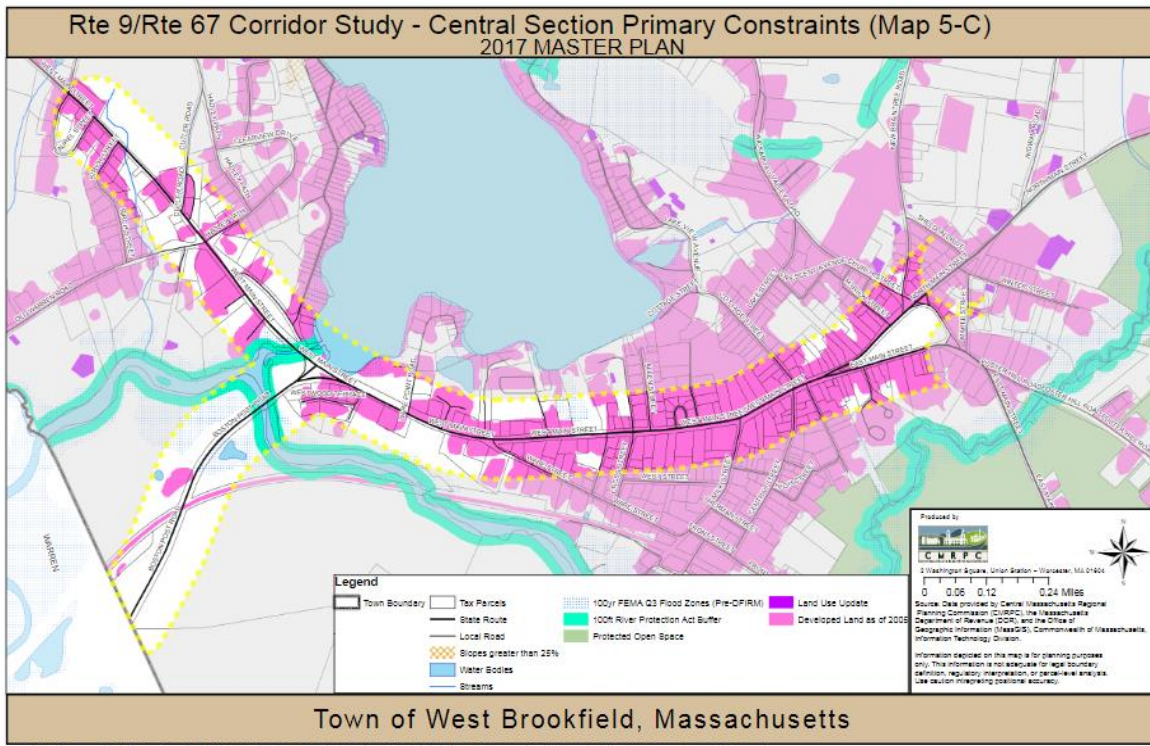


Figure 15: The Primary Constraints: Eastern Zone

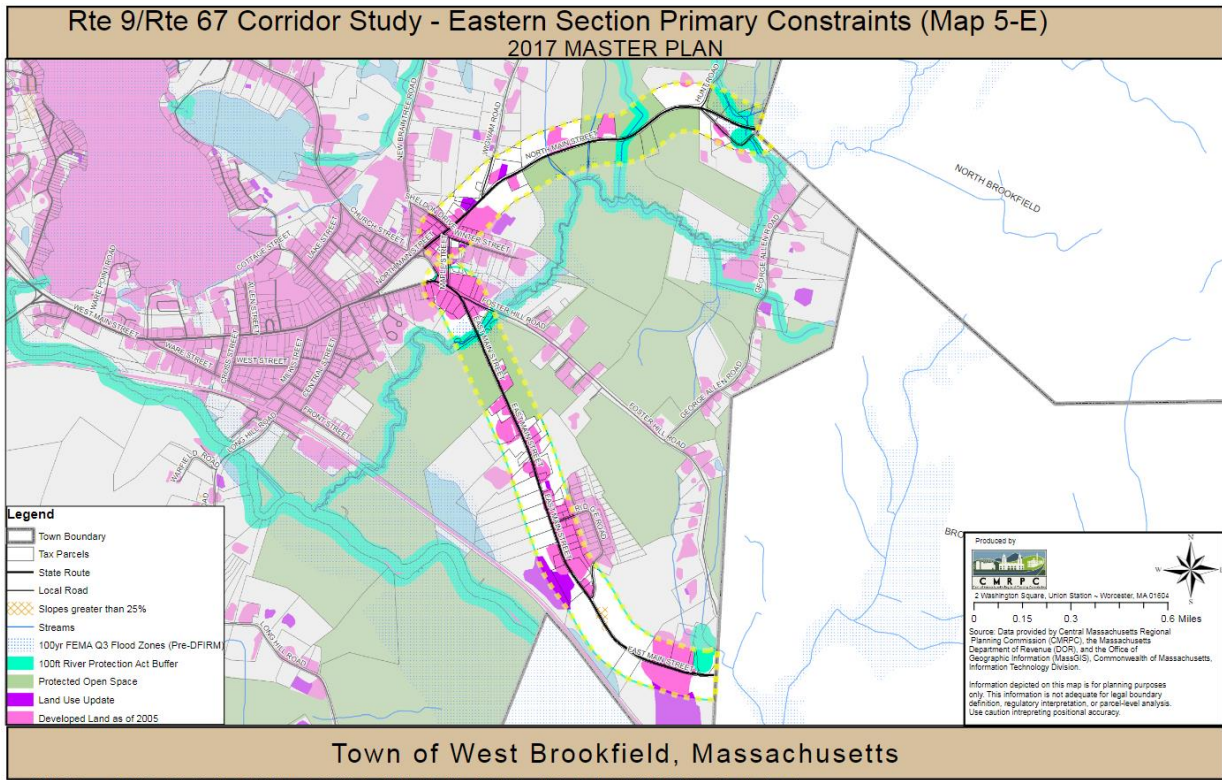


Figure 16: The Secondary Constraints: Western Zone

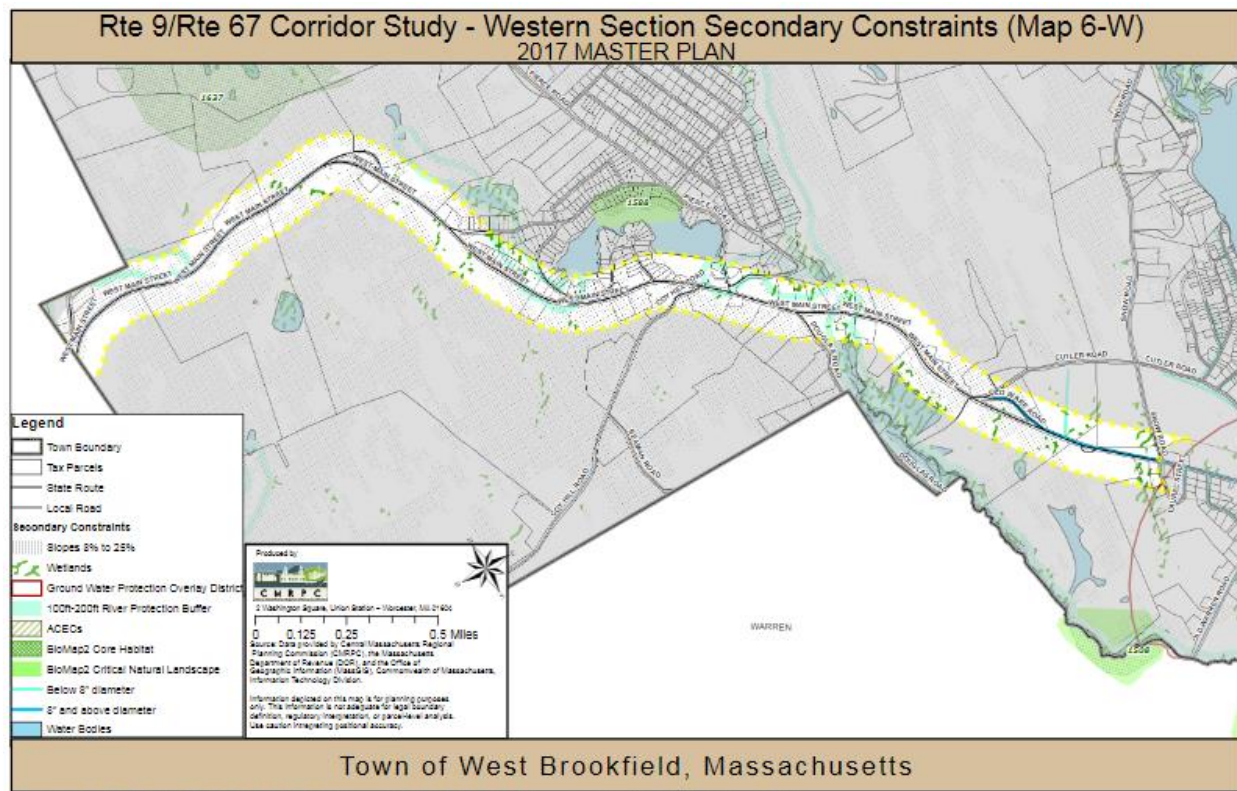


Figure 17: The Secondary Constraints: Central Zone

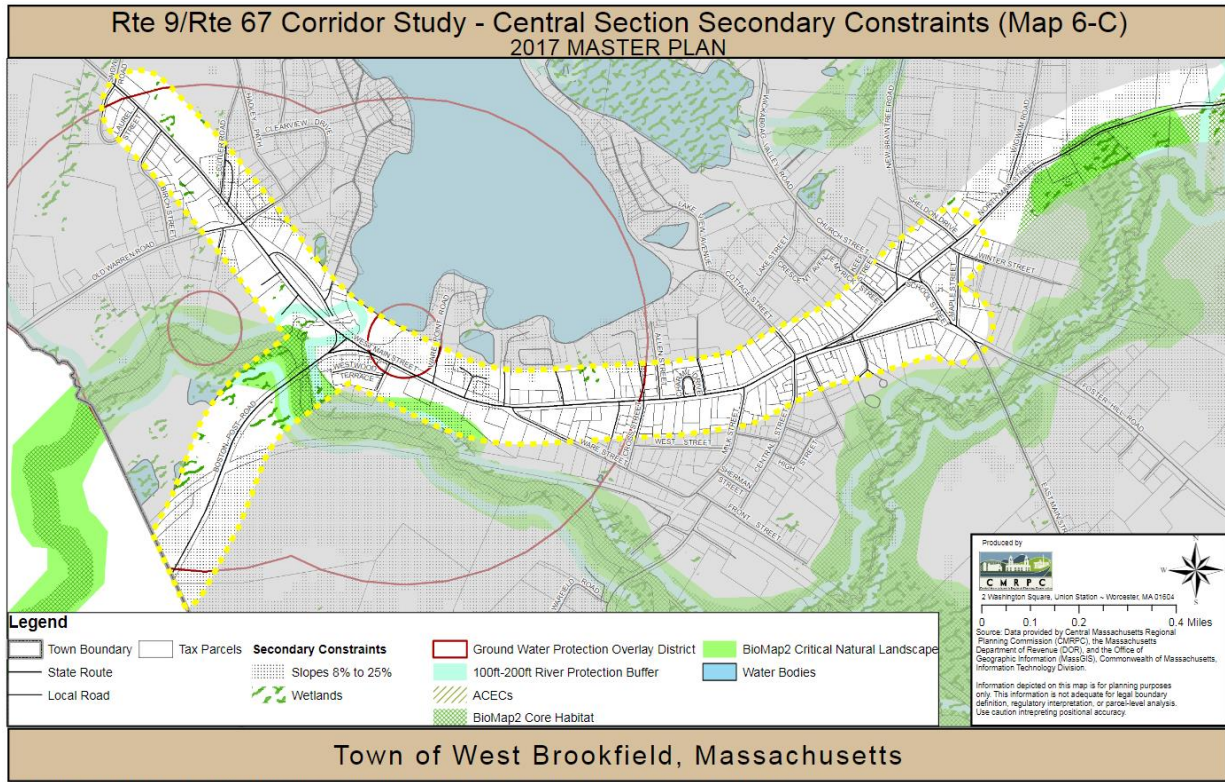


Figure 18: The Secondary Constraints: Eastern Zone

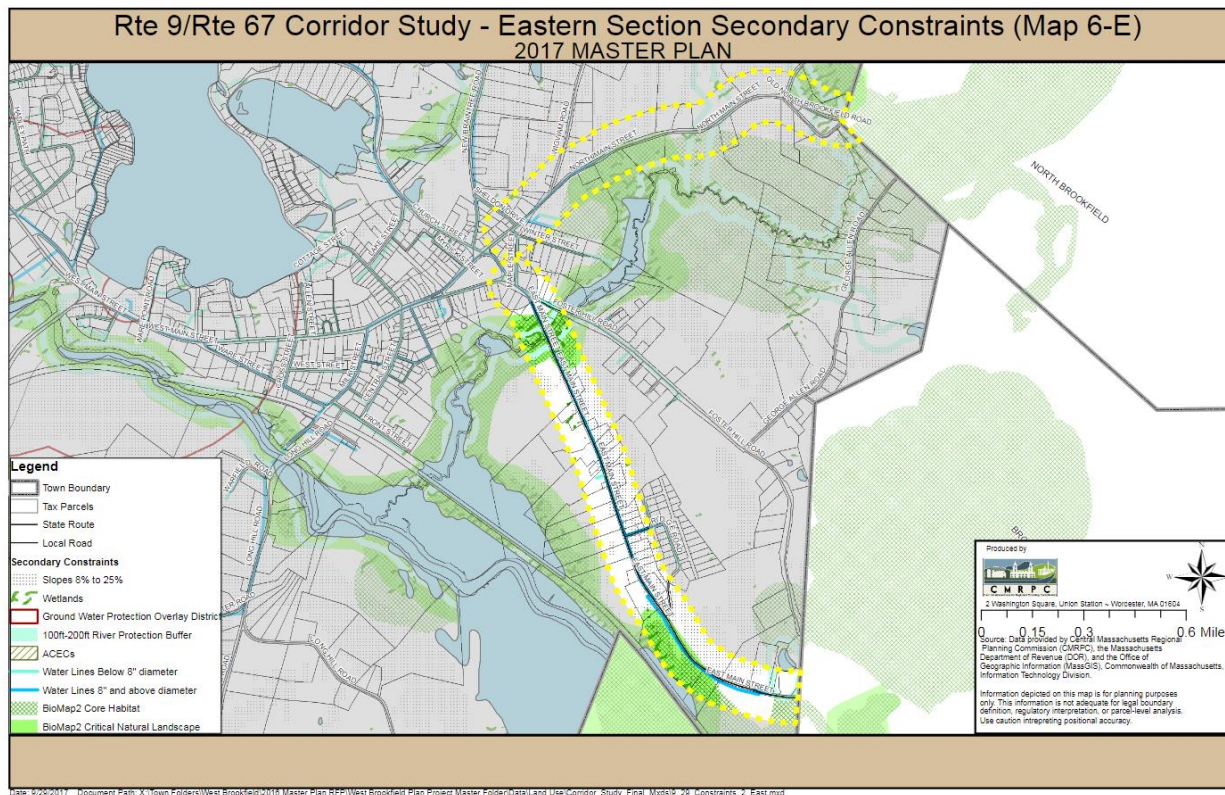


Figure 19: The Composite of Primary and Secondary Constraints: Western Zone

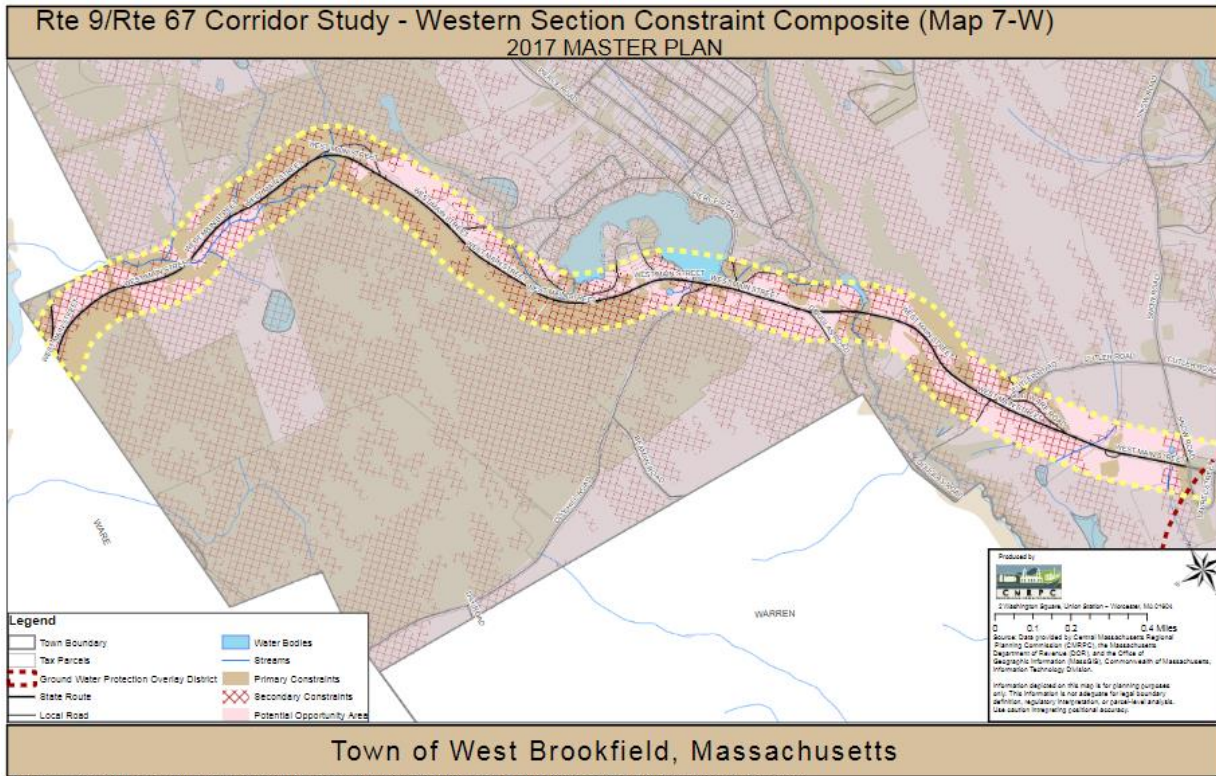


Figure 20: The Composite of Primary and Secondary Constraints: Central Zone

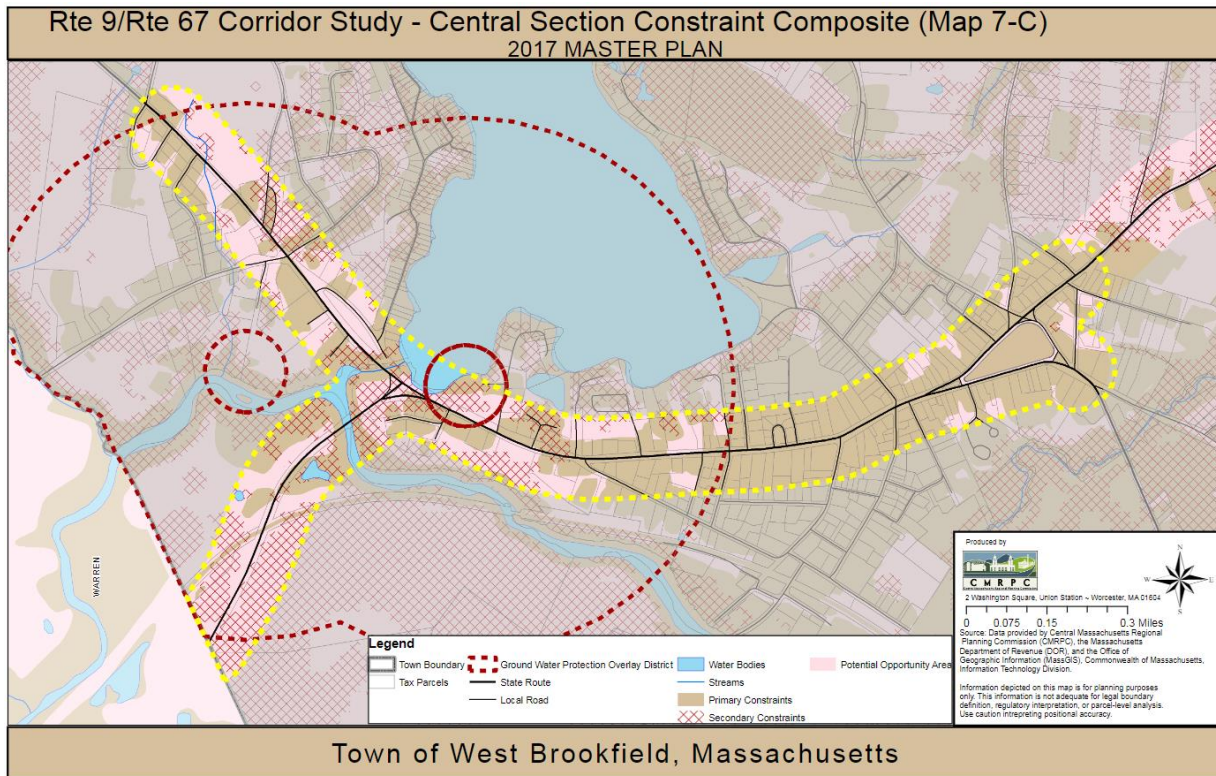


Figure 21: The Composite of Primary and Secondary Constraints: Eastern Zone

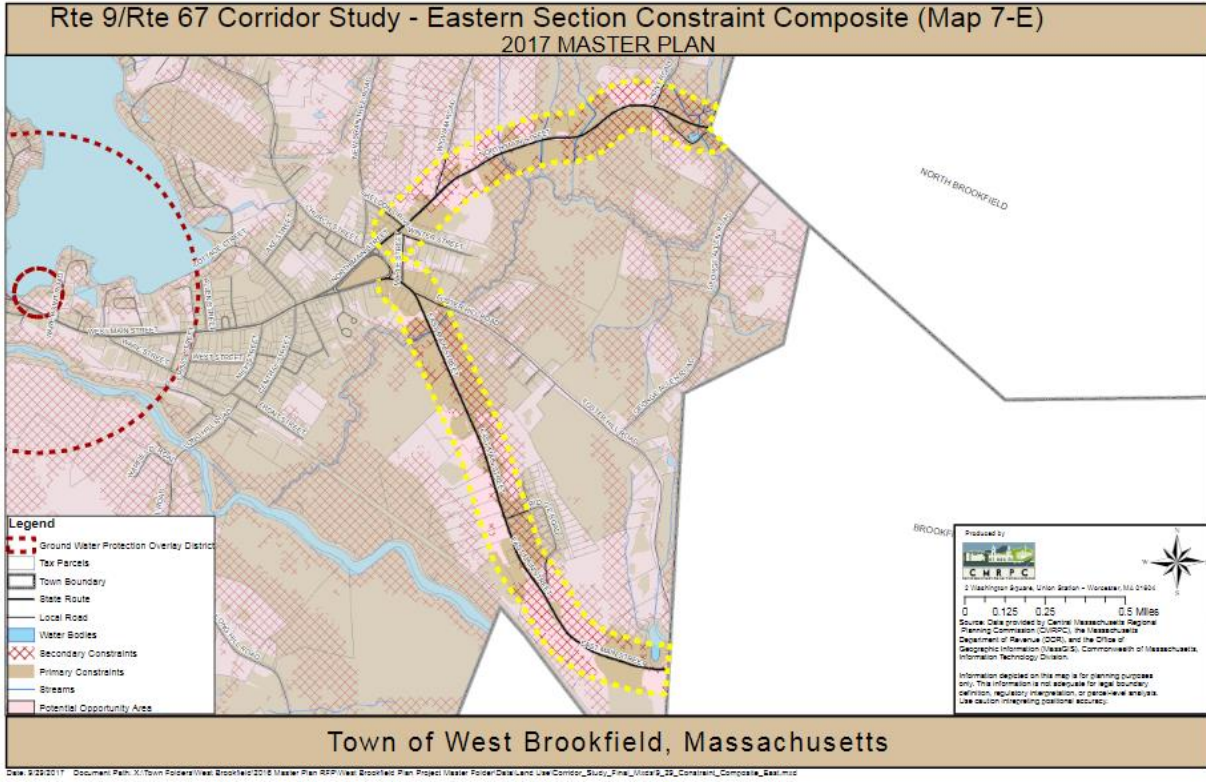


Figure 22: The Environmental and Development Constraints: Western Zone

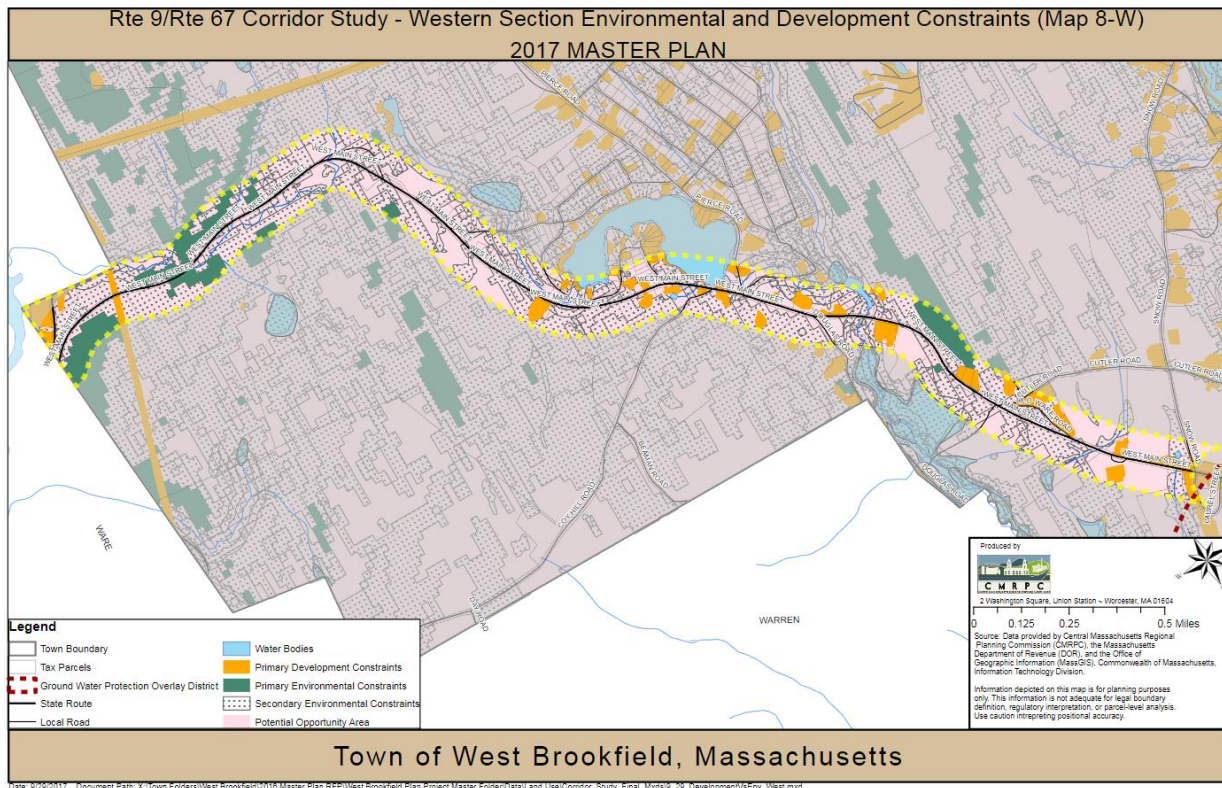


Figure 23: The Environmental and Development Constraints: Central Zone

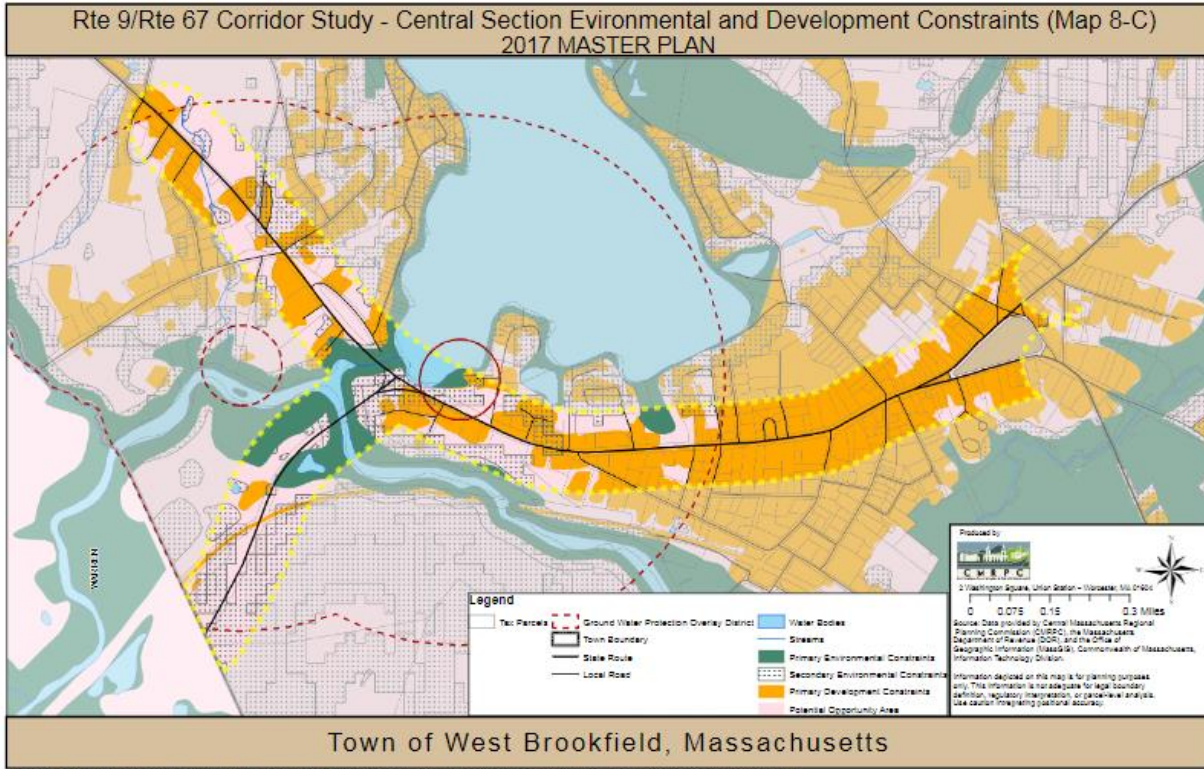


Figure 24: The Environmental and Development Constraints: Eastern Zone

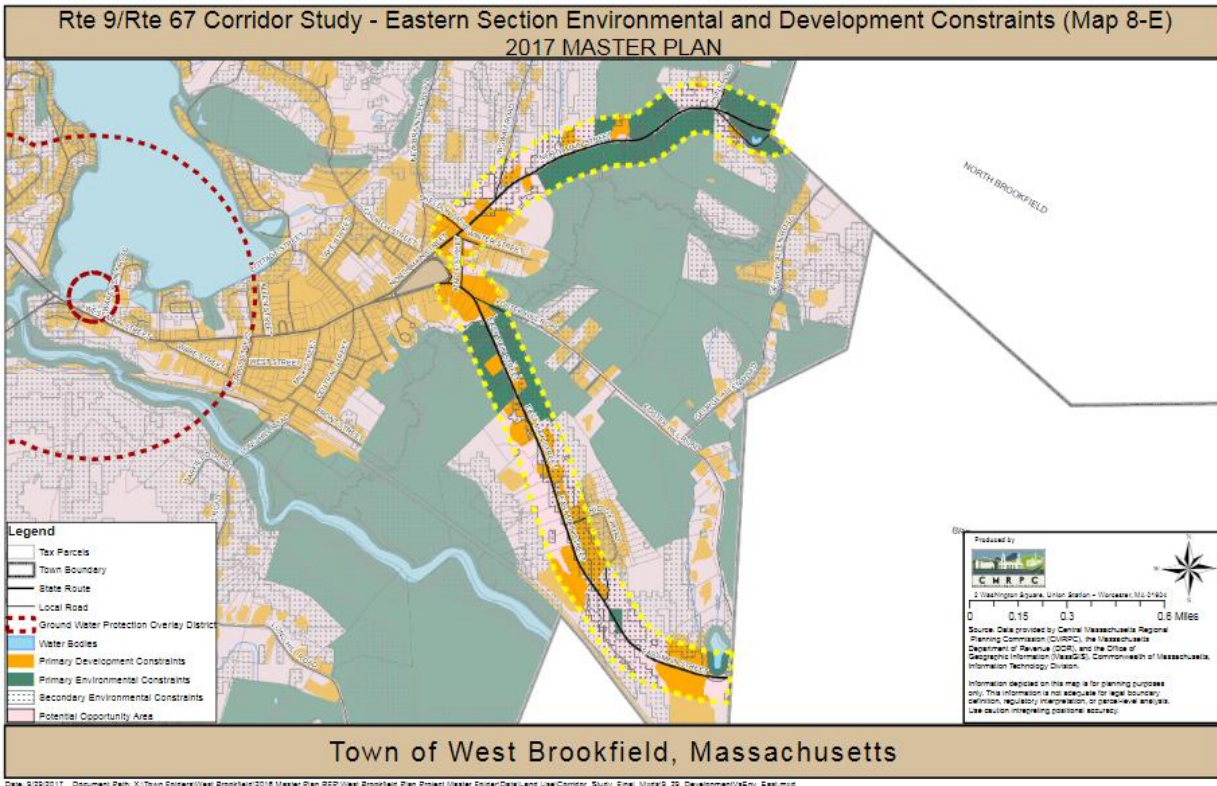
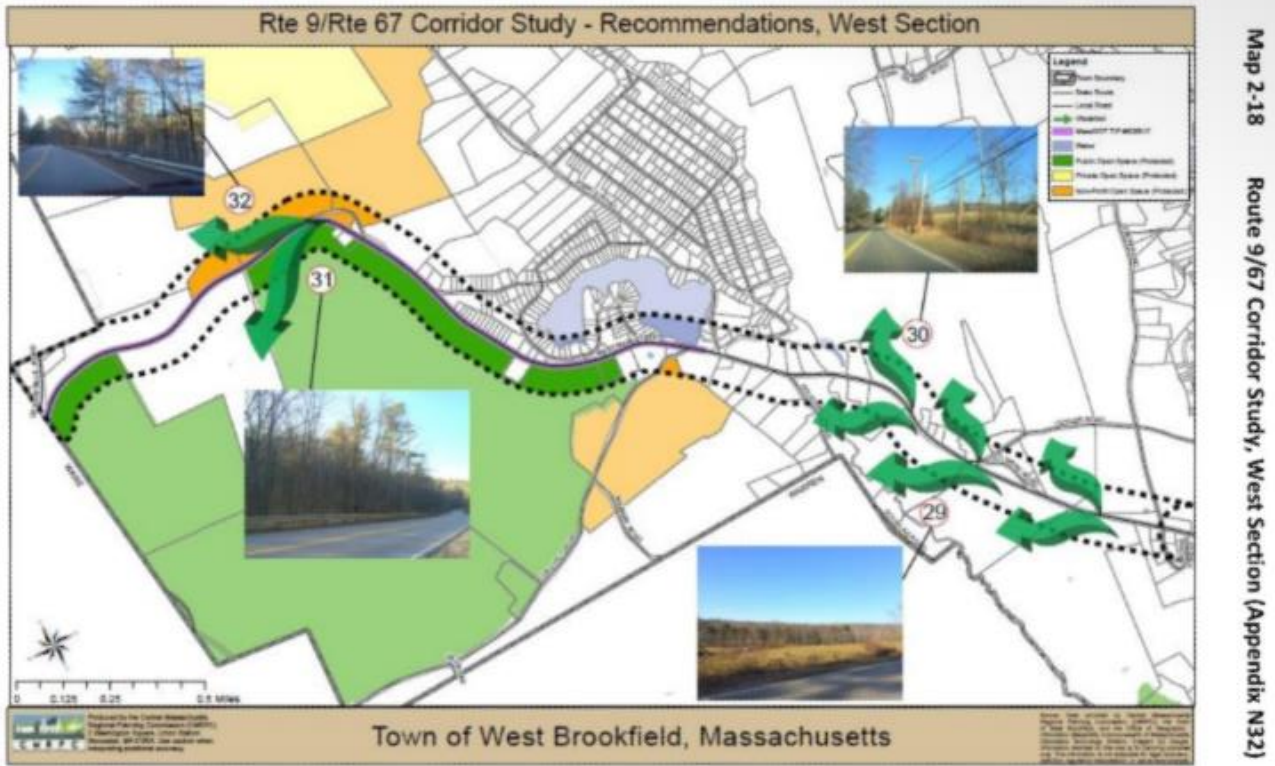
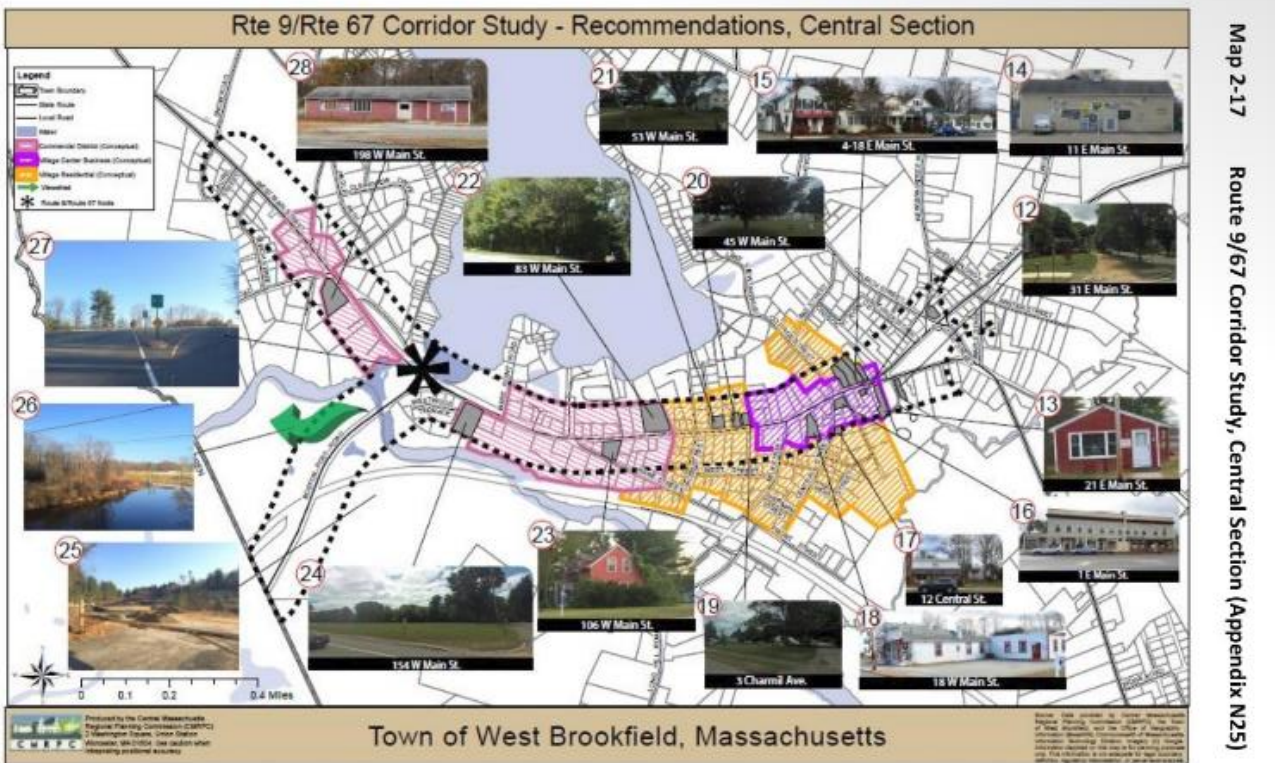


Figure 24: CMRPC's Recommendations for the Western Zone of the Route 9/Route 67 Corridor



Map 2-18 Route 9/67 Corridor Study, West Section (Appendix N32)

Figure 25: CMRPC's Recommendations for the Central Zone of the Route 9/Route 67 Corridor



Map 2-17 Route 9/67 Corridor Study, Central Section (Appendix N25)

Figure 26: CMRPC's Recommendations for the Eastern Zone of the Route 9/Route 67 Corridor

Map 2-16 Route 9/67 Corridor Study, East Section (Appendix N18)

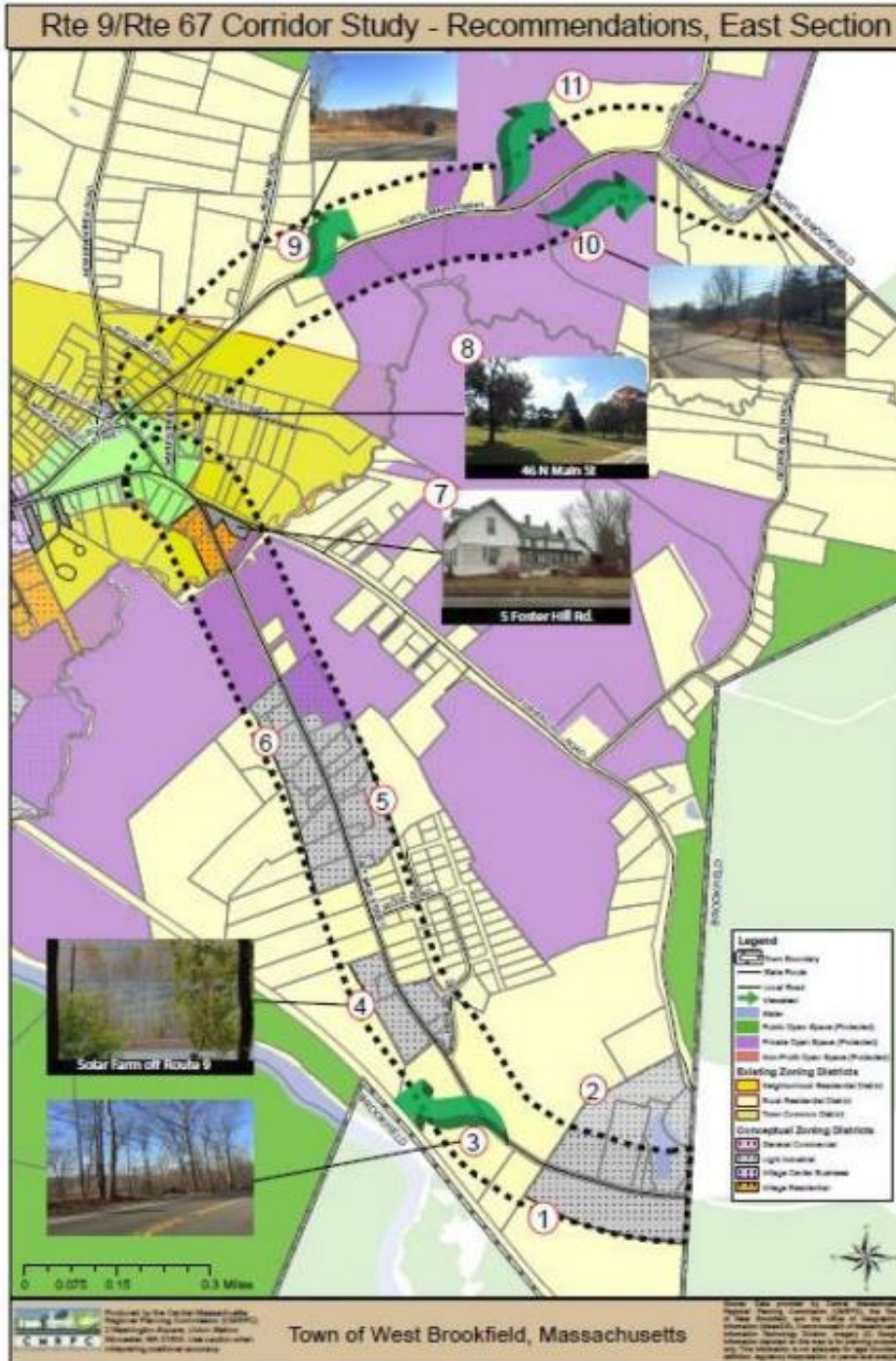


Figure 27: CMRPC's Conceptual Zoning Map for Use in the Future

Map 2-7 Conceptual Village Center Zoning (Appendix N11)

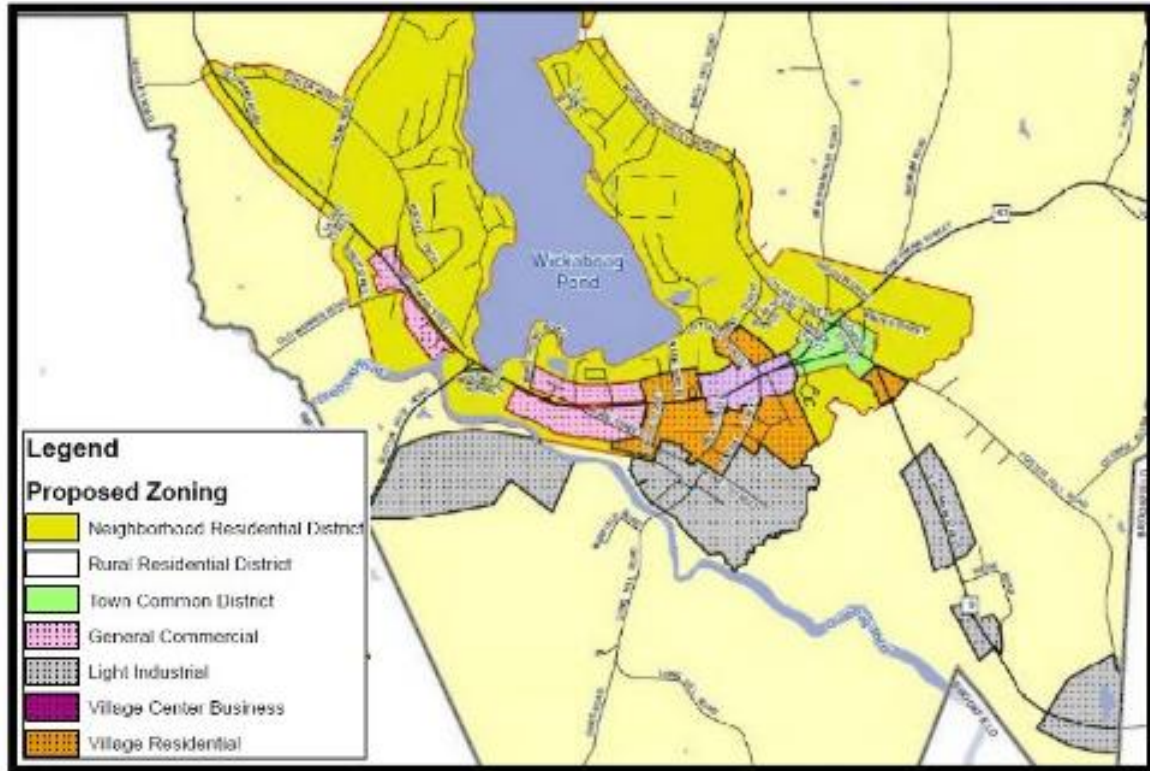
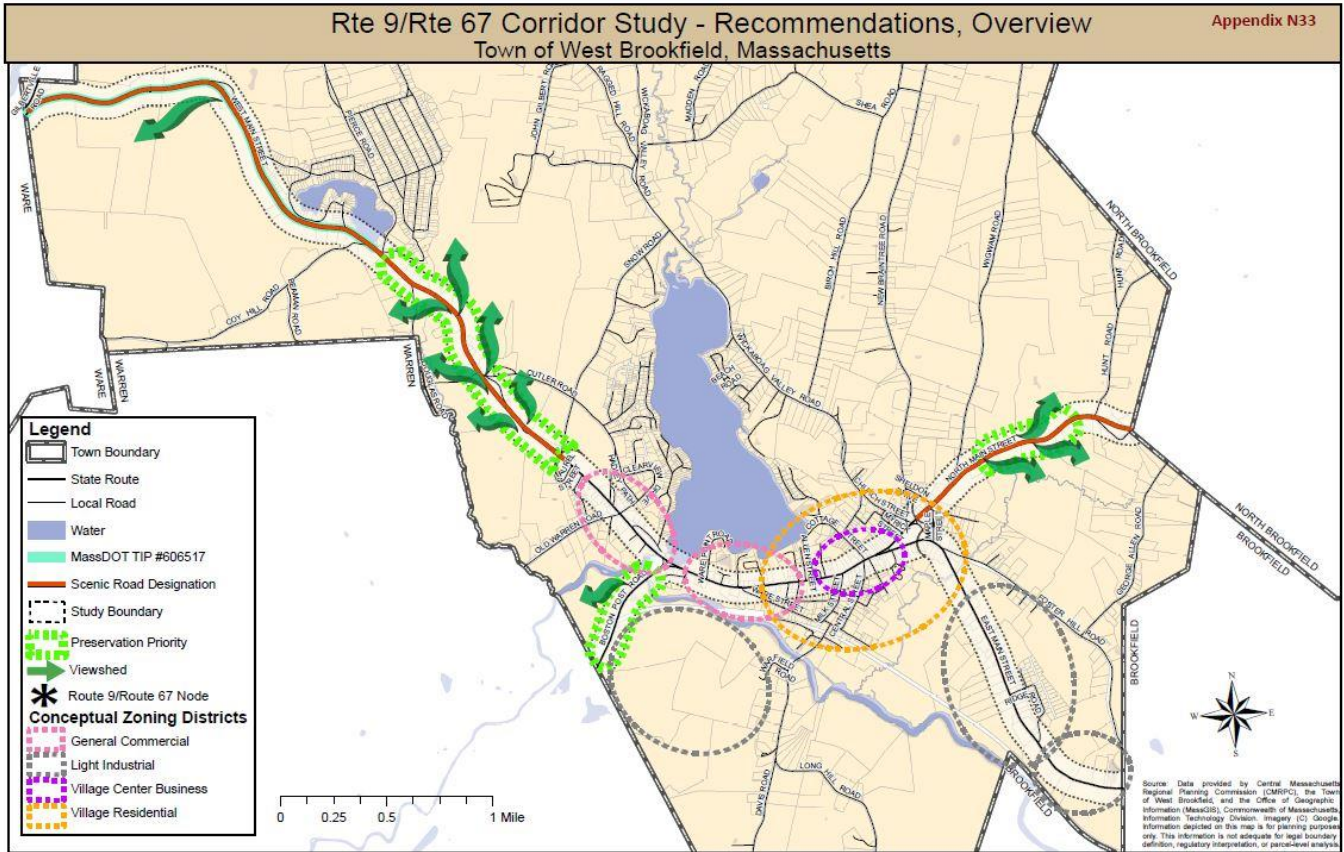


Figure 28: CMRPC's Recommendations Overview for the Route 9/ Route 67 Corridor



References

Master Plan: The Central Massachusetts Regional Planning Commission. (January 2018). West Brookfield 2017 Master Plan: Today's Plan for Tomorrow's West Brookfield. Worcester, MA: The Central Massachusetts Regional Planning Commission. Retrieved from:
<http://online.fliphtml5.com/vvitm/hmjg/#p=1>.

Maps:

The Central Massachusetts Regional Planning Commission. (January 2018). West Brookfield 2017 Master Plan: Today's Plan for Tomorrow's West Brookfield. Worcester, MA: The Central Massachusetts Regional Planning Commission. Retrieved from:
<https://www.dropbox.com/s/cx3tns8443k353r/West%20Brookfield%20Master%20Plan%20maps.pdf?dl=0>.