



DRY

Tighe & Bond

Planning Study – Route 20 Corridor

Prepared For:

City of Worcester, MA

September 2012

Executive Summary

As a center of commerce and industry, the City of Worcester is a strong force in the regional economy, and the City has actively improved its infrastructure to support economic development and growth. Currently, the City is proposing an approximately 3.7 mile extension of the municipal sewer service within U.S. Route 20, from its intersection with Sunderland Road west to the Upper Blackstone Wastewater Treatment Facility. This portion of the Route 20 corridor is served by other major utilities but lacks municipal sewer system, except at very limited locations adjacent to existing wastewater pump stations. Limitations on development related to on-site septic systems is likely preventing businesses and facilities from expanding and/or relocating in this area. Current development consists primarily of truck, automobile, and boat sales/maintenance/service facilities and warehousing/storage facilities. These are largely "low use" occupants with low rates of water use and wastewater generation.

This report evaluates the potential economic benefits of the proposed sewer extension project within the Route 20 corridor. Specifically, the study evaluated the parcels fronting on Route 20 between the interchange with Route 146 east to the intersection with Sunderland Road. The purpose of the study is to assist the City in identifying opportunities for infill, redevelopment, or new development. The study located the corridor's features and environmental resources to identify potential constraints to development and potential opportunities for increased development and better and higher uses that may be facilitated by the proposed sewer project.

Poor soils and small lot sizes are the biggest constraints to development in the study area. Poor soils limit the amount of wastewater flow that can be generated and disposed of on-site, and can result in a larger soil absorption field that further reduces the lot acreage available for redevelopment. By providing municipal sewer service along this corridor, restrictions to potential development and redevelopment presented by the need for on-site wastewater treatment and disposal systems are eliminated.

Existing Conditions

The study area encompasses a total of 113 parcels in Worcester, totaling approximately 305 acres. The majority of the study area is comprised of manufacturing districts, accounting for approximately 89% of the land area. The remaining portions of the study area are comprised of a business district (2%) and single family residence districts (9%). The zoning allows a broad list of commercial and industrial land uses. Zoning does not appear to be a constraint to development or redevelopment in the study area.

The study area is currently heavily developed with many viable businesses. Few vacant buildings are scattered throughout the corridor, most notably vacant anchor tenants within the Southwest Commons shopping center.

A windshield survey and desktop analysis were used to identify important environmental resources including soil types, wetlands, rare species habitat, and protected and recreational open space that may constrain or effect future development. The central portion of the study area, along Broad Meadow Brook, contains several environmental resources including wetlands and rare species habitats. However, much of this area is already protected open space. These protected natural resources, particularly the Massachusetts Audubon Society's Broad Meadow Brook Conservation Center and Wildlife Sanctuary, can be used as a positive selling point for development within the corridor.

Development Opportunities

The 2012 Greater Worcester Area Comprehensive Economic Development Strategy Report identified four industries that represent nearly 50% of all employment in the greater Worcester region: Health

Care, Education, Retail, and Manufacturing and noted that the greatest demand in the Worcester region has been for light manufacturing and distribution space. As the lot sizes in the study area are relatively small, the Route 20 corridor may easily be able to accommodate these uses as the parking requirements associated with light manufacturing and distribution space are not very high.

Additionally, the eastern portion of the study area is adjacent to a large residential population that may support additional services within the area such as restaurant, retail or service industry businesses. This portion of the corridor also contains large parcels that can accommodate the parking associated with higher intensity uses and could be a target area for future redevelopment. The western portion consists primarily of smaller lots that can offer opportunities for light industry or research and development, uses that typically require less area for development as that tend to require less parking. Encouraging infill and redevelopment in this area will also preserve the surrounding natural resources and recreational areas such as the Broad Meadow Brook Conservation Center and Wildlife Sanctuary and the Oakland Heights Playground and will help to maintain the existing buffer between the corridor and adjacent residential areas. The central portion of the study area is intersected by Massasoit Road and Grafton Street that both provide access to large residential areas north and south of Route 20 and are part of the Worcester Regional Transit Authority (WRTA) Bus Route. Opportunities at the intersections with Massasoit Road and Grafton Street can focus on providing services or employment to the WRTA ridership population and seek to draw patrons from the adjacent north and south residential areas.

Though the entire corridor contains many small lots, it also contains many adjacent parcels under common ownership that can be consolidated in the future to facilitate redevelopment efforts. Figure 3-1 identifies adjacent parcels that are under common ownership. Combining parcels to create large lots can allow for a greater range of land uses that make this area more attractive for future development.

As the majority of the corridor is currently developed, future redevelopment of the area will primarily occur through redevelopment. Siting a septic system and associated soil absorption system on a property to comply with the required septic and soil absorption system setbacks can considerably reduce the developable area for buildings and parking lots. Providing municipal sewer service can serve to free up land for development, allow expansions to existing uses, and remove the development constraint of septic system siting. The synergy created by the extension of the sewer, the market desire for light manufacturing/distribution space and potential for parcel assemblage create opportunities for "high-value" redevelopment and economic growth along this corridor, which results in an increase in tax revenues for the City.

Funding Opportunities

The projected cost of extending the municipal sewer service along the Route 20 corridor is budgeted at approximately \$20 million. The sewer project has been designed to address other sewer system capacity and needs, as well as providing sewer service to this section of the Route 20 corridor. One potential funding opportunity for this project is the State Revolving Fund (SRF), a common program for obtaining low-interest loans for wastewater infrastructure projects. Alternatively, if a private developer is interested in redeveloping a site and is willing to commit to bringing in new jobs and entering a Public/Private partnership with the City, then economic-related grants opportunities may be available such as the MassWorks Infrastructure Program and the Infrastructure Investment Incentive Program (I-Cubed) program. A summary of potential funding programs is provided in Table 4-1.

J:\W\W3831 Rte 20 Sewer\Rte 20 Corridor Study\REPORT\Executive Summary.docx



Tighe & Bond

CONTENTS

Executive Summary

Section 1 Introduction

Section 2 Existing Conditions

2.1 General Description & Background 2-1
2.2 Zoning 2-1
2.3 Land Use 2-5
2.4 Municipal Sewer System 2-8
2.5 Environmental 2-8
2.6 Soils 2-11

Section 3 Development Opportunities

3.1 Market Considerations 3-1
3.2 Development Constraints 3-1
3.3 Development Opportunities 3-4

Section 4 Funding Opportunities

Appendices

- A** Article IV, Section 2 (Permitted Uses) of Worcester’s Zoning Ordinance
- B** Septic Tank Absorption Field soil data from the NRCS

J:\W\W3831 Rte 20 Sewer\Rte 20 Corridor Study\REPORT\Route 20 corridor study.docx



Tighe & Bond

Section 1

Introduction

Worcester, as Massachusetts' second largest City, provides employment and commerce opportunities for the Greater Worcester region. The City continues to identify projects for improving its infrastructure to support economic growth and development. Several large regional infrastructure projects have been completed within the past decade, most notably the completion of the Massachusetts Turnpike - Route 146 Connector, which provides easy access from the Massachusetts Turnpike to downtown Worcester and improves the connection between Worcester and Providence, Rhode Island along Route 146.

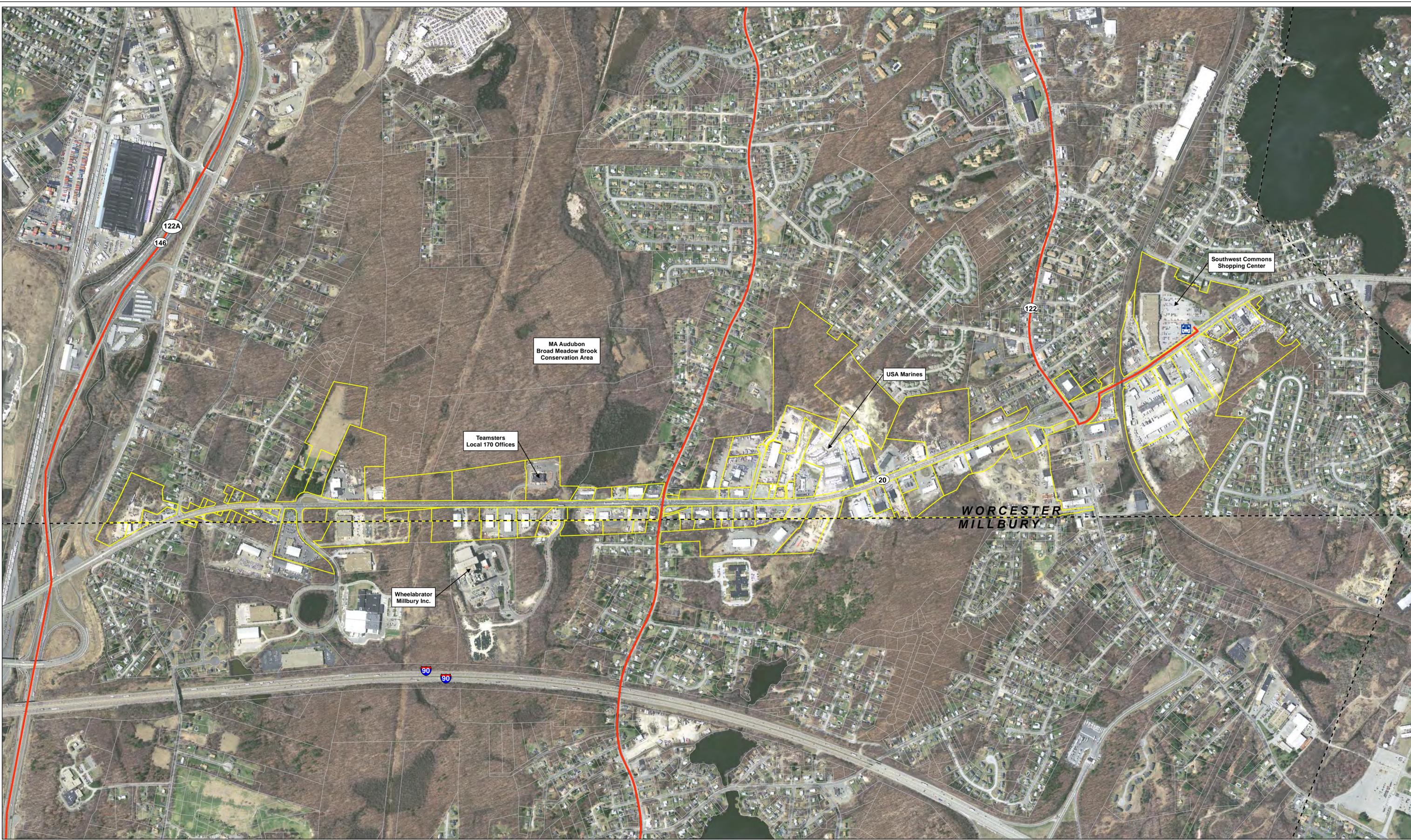
In an effort to build upon existing infrastructure and assets and to stimulate economic development, the City of Worcester is proposing an approximately 3.7 mile sewer main within U.S. Route 20, from its intersection with Sunderland Road west to the Upper Blackstone Wastewater Treatment Facility. Route 20 is currently served by municipal water, a substantial storm drainage system and has access to electric, cable, and telephone systems; however, the Route 20 corridor between Sunderland Road and Route 146 lacks municipal sewer except at very limited locations adjacent to the existing wastewater pump stations. Limitations on development related to on-site septic systems may prevent businesses and facilities from expanding or relocating in this area.

Though substantial development exists in the area it does not reflect zoning allowances or higher value uses in the target land area. Current development is predominated by truck, automobile and boat sales/maintenance/service facilities, with some building materials supply, retail and entertainment outlets. These are largely "low use" occupants with low rates of water use and wastewater generation

The City is interested in the potential economic benefits of the proposed sewer extension project to the Route 20 corridor. The purpose of this land use study along the Route 20 corridor is to assist the City in identifying opportunities for infill, redevelopment, or new development. The study located the corridor's features and environmental resources to identify potential constraints to development and determined potential opportunities for increased development and better and higher uses that may be facilitated by the proposed sewer extension project.

The portion of Route 20 that was evaluated as part of the Land Use study includes the parcels fronting on Route 20 between the interchange with Route 146 east to the intersection with Sunderland Road. Figure 1-1 below depicts the study area and the City's zoning districts.

The results of the study are provided in the remainder of this report and are broken down into the following sections: 2) Existing Conditions, 3) Development Evaluation and 4) Funding Opportunities.

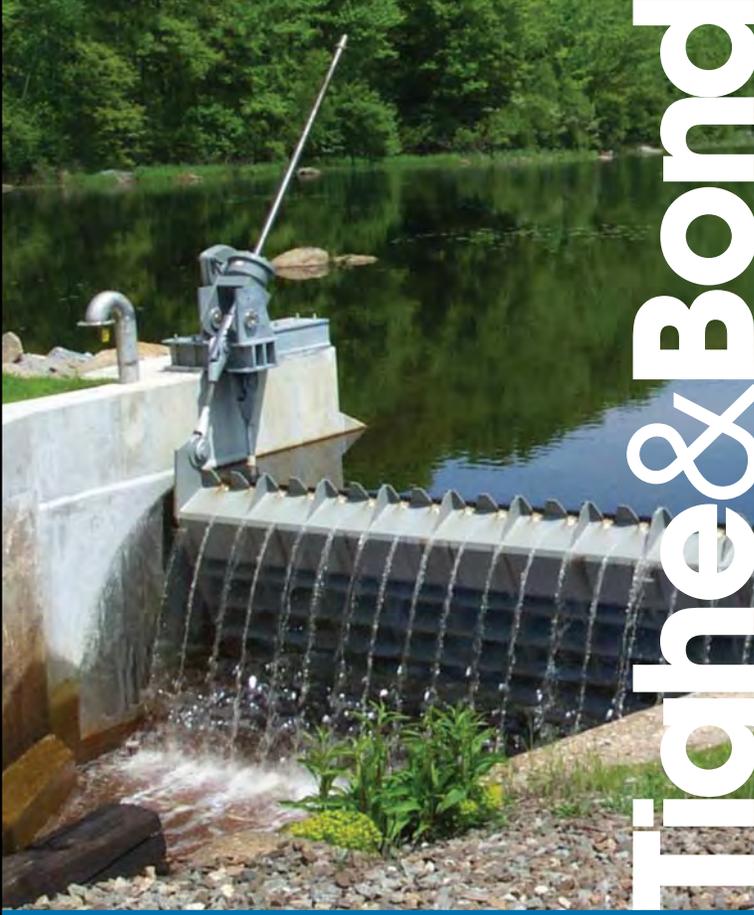


- Legend**
- Study Area Parcels
 - Assessors' Parcels
 - Town Boundary
 - WRTA Bus Route



FIGURE 1-1
Study Area
Route 20 Corridor Planning Study
Worcester, MA





Tighe & Bond

Section 2 Existing Conditions

2.1 General Description & Background

U.S. Route 20 is approximately 152 miles long and essentially crosses the entire state of Massachusetts. It enters the Commonwealth from New York at Hancock, MA and runs eastward into Boston where it ends in Kenmore Square. The majority of the route parallels the Massachusetts Turnpike (Interstate 90, I-90). Of the 152 mile route, approximately three miles cross through Worcester, paralleling the City's southern border and turning south at the westerly border into Millbury for a short distance. It provides easy and direct access to the recently constructed Route 146/Massachusetts Turnpike Interchange. The portion of Route 20 in this area of the state is also known as the Southwest Cutoff and was constructed as a bypass highway in 1931 for through traffic from Boston to Hartford and New York City. The Southwest Cutoff was functionally replaced by the Massachusetts Turnpike. According to data provided by the Central Massachusetts Regional Planning Commission (CMRPC), this portion of Route 20 conveys 15,000 – 30,000 vehicle trips per day.

2.2 Zoning

The three mile long study area encompasses a total of 113 parcels in Worcester totaling approximately 305 acres and is located within business, manufacturing, and residential zoning districts. See Figure 2-1, attached at the end of this Section, for a Zoning Map of the parcels within the study area. The majority of the study area is comprised of land within a manufacturing zoning district. Parcels zoned as business use are located immediately west of the study area on the east side of Route 122A and at the intersection of Grafton Street with Route 20 in the eastern end of the study area. The areas zoned as residential are primarily located on the outer limits of the study area north of Route 20 near Granite Street at the western area of the site and east of Sunderland Road in close proximity to Lake Quinsigamond and Flint Pond at the eastern end of the study area. No zoning overlay districts were identified within the study area. Table 2-1, below provides a summary of the zoning districts within the study area and the percentage of the study area that each district represents.

Table 2-1
Zoning Summary Table

Type of District	District Name	Description	% of Land Within Study Area ¹
Manufacturing	MG-2.0	General Manufacturing	44%
	ML-0.5	Limited Manufacturing	26%
	ML-2.0	Limited Manufacturing	19%
Business	BL-1.0	Limited Business	2%
Residential	RL-7	Limited Residence	3%
	RS-7	Single Family Residence	6%

¹ Does not account for portions of parcels that extend into Millbury.

The Manufacturing Districts within the study area include Manufacturing, General (MG) and Manufacturing, Limited (ML). These districts allow a variety of uses including manufacturing, research and development, office, school, food service, motel and hotel, and motor vehicle/boat sales and repair uses by-right. These districts generally prohibit any form of residential facility or dwelling. In total, approximately 265 acres accounting for 89% of the total land area within the Worcester limits of the study area are contained within a manufacturing zoning districts.

The Business District allows residential facilities and dwellings by-right in addition to a wide variety of retail and service uses, including food service establishments, recreation facilities, offices, nursing homes, and clinics. Many of the manufacturing and motor vehicle sales and repair uses allowed by-right in the Manufacturing Districts require a Special Permit in the Business District. In total, 7.4 acres accounting for 2% of the total land area within the Worcester limits of the study area are zoned as Limited Business.

The Single Family Residence district primarily permits single-family detached dwellings by-right and prohibits other types of residential uses. The Limited Residence district primarily permits group residences and single or two-family dwellings. In total, 32.8 acres, accounting for 9% of the total land area within the study area is zoned as Residential.

As uses that are not expressly permitted in the Zoning Ordinance are prohibited (except those permitted as an accessory use); Table 2-2 below provides a summary of the uses that are allowed by-right and those that are allowed by Special Permit. Refer to Appendix A which is an annotated version of Article IV, Section 2 (Permitted Uses) of Worcester's Zoning Ordinance for a comprehensive list of allowed uses within the zoning districts that encompass the study area. As demonstrated above, the zoning is not very restrictive regarding allowed land uses. The dimensional requirements for each Zoning District are summarized below in Table 2-3.

Table 2-3

Summary of Dimensional Requirements

District	Use	Area (min. s.f.)	Frontage (min. l.f.)	Yard Setbacks			Maximum Height (ft)	Floor to Area Ratio (max)
				Front	Side	Rear		
MG-2.0	All	NA	NA	15	NA	15	NA	2 to 1
ML-0.5	All	NA	NA	25	NA	25	50	1 to 2
ML-1.0	All	NA	NA	10	NA	15	50	1 to 1
ML-2.0	All	NA	NA	10	NA	25	NA	2 to 1
BL-1.0	Residential	5,000	40 per du	10	10	20	40	1 to 1
	Non-Res.	NA	NA					

RL-7	Single-Fam. Detached	7,000	65	20	8	20	35	NA
	Single-Fam. Semi-Detached	4,000 per du	35 per du					
	Single-Fam. attached	3,000 per du	25 per du					
	2-Family dwelling	8,000	70					
	3-Family Dwelling	9,000	75				50	
RS-7	Single- Fam. Detached	7,000	65	20	8	20	35	NA
	Limited Residential Hospice House	30,000		25	10	20		
	Other Permitted	7,000		25	20	50		0.4 to 1

Review of the City’s Zoning Map indicates that zoning districts are used as a land use tool to allow the same uses within an area while varying the setback requirements, maximum building height, and the Floor to Area Ratio (FAR). Within the study area, the ML-0.5 district serves as a buffer between the adjacent residential district and the MG-2.0 district. These districts have the same use allowances and restrictions; however the ML-0.5 district requires greater setbacks, imposes building height restrictions and a decreased FAR (density).

2.3 Land Use

A site visit and review of Worcester GIS data confirmed that the parcels with frontage on Route 20 primarily contain manufacturing, industrial, or vehicle sales/service facilities. Table 2-4, below presents data for differing land use categories based on GIS data provided by the City of Worcester. This information is also presented graphically on Figure 2-2, Existing Land Use.

Table 2-4

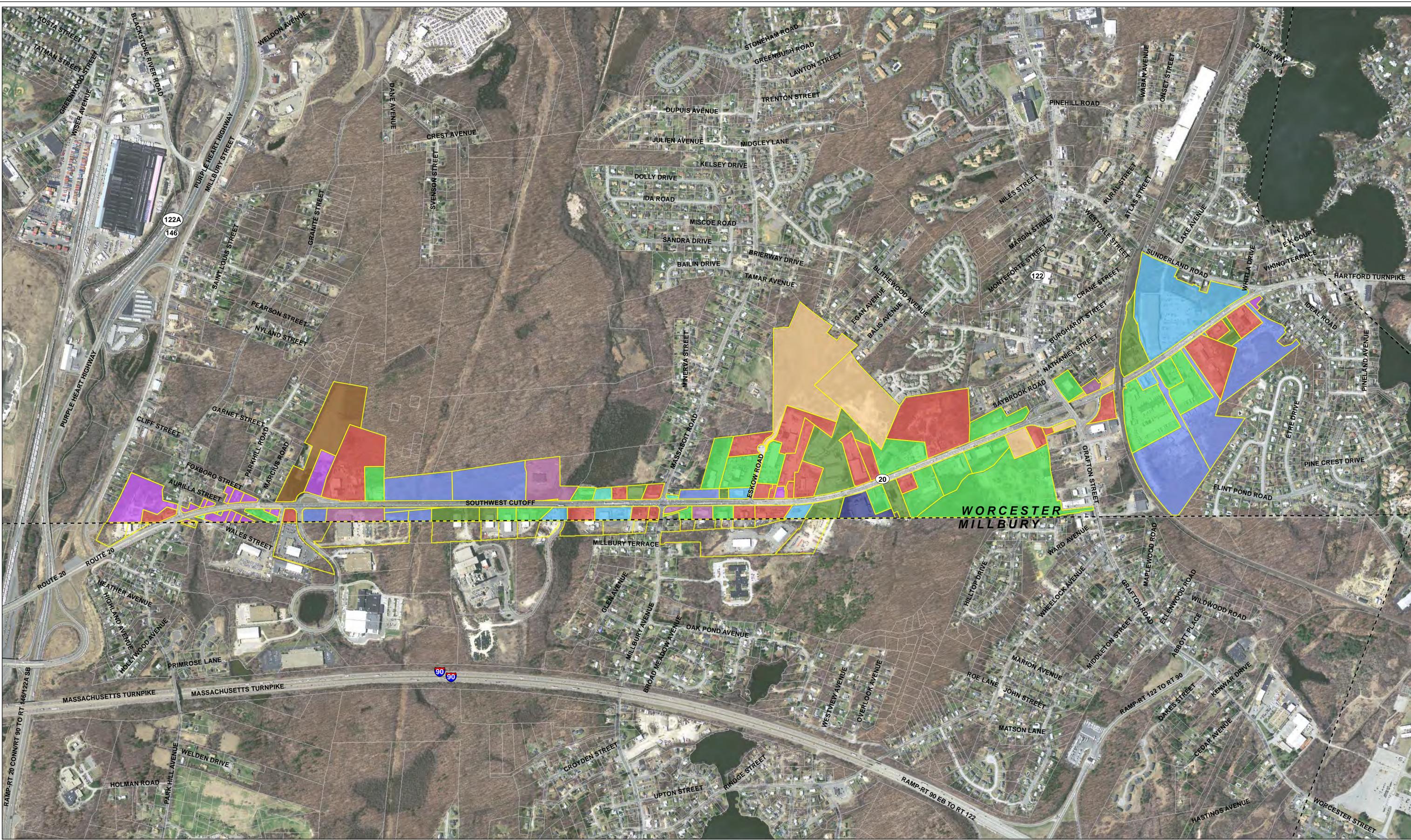
Existing Land Uses

Existing Use	Number of Parcels	Parcel Acreage	% Total Acreage
Commercial (Automotive, Marine Craft, Other Vehicles, Sales and Service)	27	64.2	21.0%
Commercial (Office Buildings)	5	9.6	3.1%
Commercial (Retail)	7	24.4	8.0%
Commercial (Storage Warehouses & Distribution Facilities)	22	71.6	23.4%
Commercial (Vacant)	7	39.6	13.0%
Industrial (Manufacturing & Processing)	9	20.8	6.8%
Industrial (Utility Properties)	1	2.7	0.9%
Industrial (Vacant)	13	48.6	15.9%
Religious or Institutional	1	11.1	3.6%
Residential (Single-Family, Apartments, Vacant, Other)	17	12.2	4.0%
Tax Exempt (State or Municipally Owned)	3	0.9	0.3%

Some parcels along the south side of the study area extend into Millbury. These parcels add a total of approximately 40 acres of land to the parcels that front on Route 20. The zoning and use data presented above are for the land within Worcester only.

Most of the development within the corridor appears to be viable businesses. There are a few vacant buildings, including a lot adjacent to the west of USA Marine (200 Southwest Cutoff/Route 20), a lot to the northwest of the intersection with Route 122, and anchor tenants within the Southwest Commons shopping center.

DRAFT



- Legend**
- Commercial (Automotive, Marine Craft, and Other Engine Propelled Vehicles, Sales and Service)
 - Commercial (Office Buildings)
 - Commercial (Retail)
 - Commercial (Storage Warehouses and Distribution Facilities)
 - Commercial (Vacant)
 - Industrial (Manufacturing and Processing)
 - Industrial (Utility Properties)
 - Industrial (Vacant)
 - Religious or Institutional
 - Residential (Single-Family, Apartments, Vacant, Other)
 - Tax Exempt (State or Municipality Owned)
 - Assessor's Parcels
 - Town Boundary



FIGURE 2-2
Existing Land Use
Route 20 Corridor Planning Study
Worcester, MA



August 2012

2.4 Municipal Sewer System

The area north of Route 20 from Massasoit Road east to Lake Quinsigamond is currently served by the City's municipal sewer infrastructure. The residential area southeast of Route 20 between the railroad tracks and the Lake is also served by the City's infrastructure. In this area, it appears the residences located on Route 20 east of Sunderland Road to the Shrewsbury Town line are nearly all connected to the municipal sewer system. The parcels zoned as residential along Route 20 that are west of Sunderland are served by sewer via abutting Nathaniel Court. In this same area sewer lines cross Route 20 via Grafton Street and provide service to a residential area south of Route 20.

Currently, there is no sewer service provided to parcels fronting on Route 20 between Grafton Street and Massasoit Road. As noted earlier, the length of Massasoit Road and the majority of the associated side streets are serviced by municipal sewer. The existing sewer extends along Route 20 for approximately 1,000 feet west of Massasoit Road to the Broadmeadow Pump Station. These parcels are all zoned as Limited Manufacturing and according to Worcester GIS data, contain a gas station with convenience store, a commercial warehouse, automotive repair business, and an industrial manufacturing facility. The sewer service crosses Route 20 and provides service to parcels fronting Route 20 to the west of Millbury Avenue. Worcester GIS data indicates these parcels are zoned General Manufacturing and contain an automotive sales business, automotive repair business, and a retail store. In total, within the study area, 7 parcels containing 7 businesses fronting on Route 20 are currently served by the City's sewer services.

2.5 Environmental

The analysis of environmental resources provided below consisted of a windshield survey of the area and the use of MassGIS data layers to identify important environmental resources including soil types, wetlands, rare species habitat, and protected and recreational open space which may constrain or effect future development. Refer to Figure 2-3, Environmental Constraints Map, for a depiction of the environmental resources referenced below.

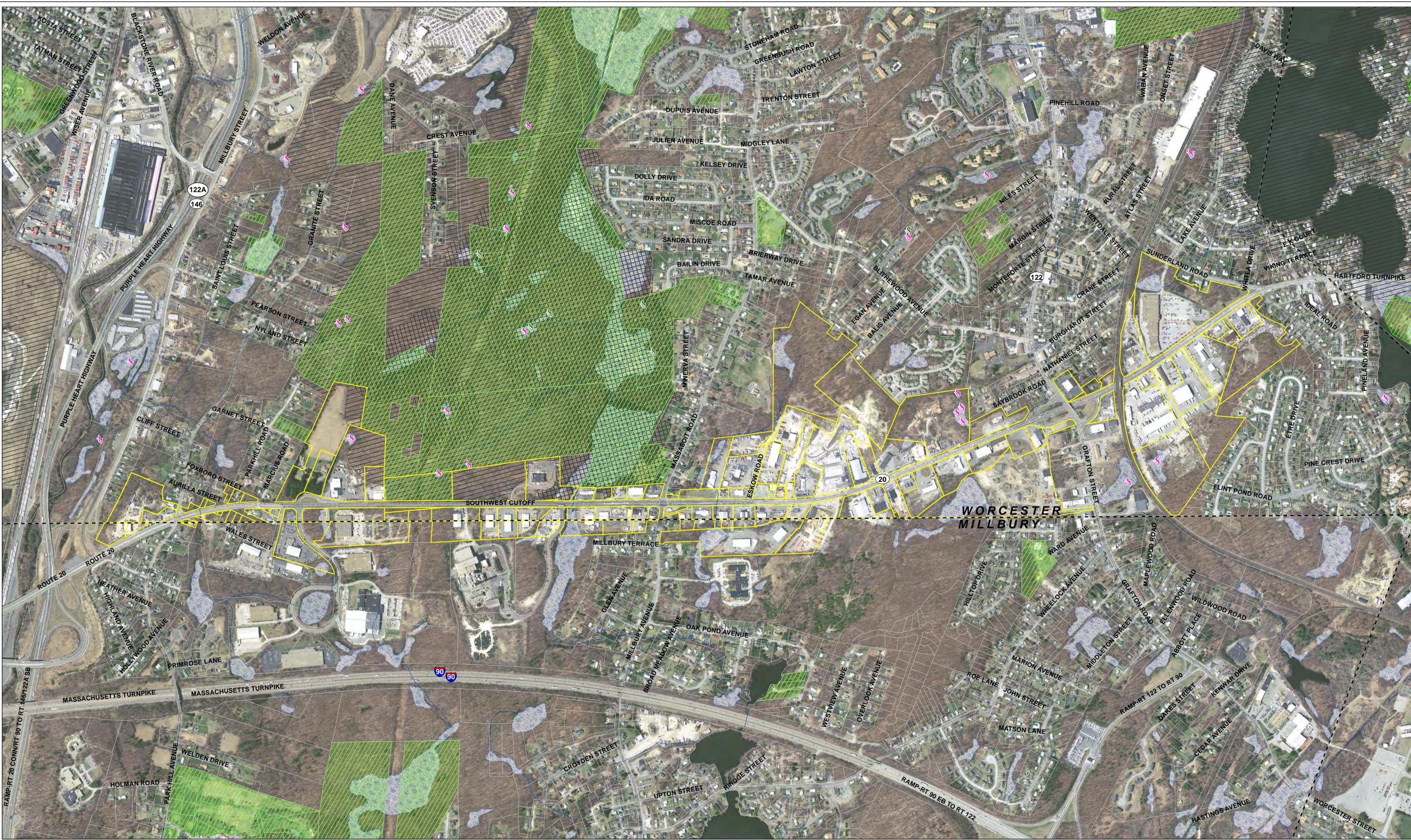
As noted above, the eastern portion of the study area (Massasoit Road to the east) is bound to the north and south by developed residential areas. The majority of the natural resource areas that may impact development are located near the central portion of the study area, along Broad Meadow Brook. This area includes wetlands, rare species habitats, Broad Meadow Brook and protected open space. North of Route 20, near Broad Meadow Brook, the land use primarily consists of protected open space (The Massachusetts Audubon Society's Broad Meadow Brook Conservation Center and Wildlife Sanctuary) while the southwest portion contains larger lots, and undeveloped land bordering Broad Meadow Brook.

As shown on Figure 2-3, a large area of land located north of Route 20, between Granite Street and Massasoit Road, is mapped by the Natural Heritage and Endangered Species Program (NHESP) as Estimated Habitats for Rare Wildlife and Priority Habitats for Rare Species. The majority of this area is contained within the bounds of the Broad Meadow Brook Conservation Center; however, the mapped habitat limits extend onto a few parcels fronting on Route 20. New development within these areas will require review by NHESP pursuant to the Massachusetts Endangered Species Act (MESA). While NHESP habitat mapping does not preclude development, it can significantly restrict the density of development that occurs.

There are also a number of certified and potential vernal pools identified within the area as depicted on Figure 2-3. Vernal pools are adjacent to or within 3 parcels within the study area. Due to other constraints on these properties, including rare species habitat and wetland resource areas, the vernal pools are anticipated to have limited additional impact on the development of these properties.

A desktop analysis using MassGIS indicates that portions of the study area contain inland wetland resource areas. Work in these resource areas and their associated jurisdictional buffer zones is regulated under the Massachusetts Wetlands Protection Act (WPA), MGL c. 131 § 40 and Worcester's Wetlands Protection Ordinance, which is more protective than the WPA. There is a large wetland system located just west of Massasoit Road associated with Broad Meadow Brook that flows parallel to Massasoit Road, crosses Route 20, and flows east to discharge in Dorothy Pond. A smaller unnamed intermittent stream located to the east of Massasoit Road flows south across Route 20, eventually flowing into the Broad Meadow Brook. Another unnamed intermittent stream crosses Route 20 at the western boundary of the study area. Isolated wetland areas are also located on parcels fronting Route 20 to the west of Massasoit Road. These wetlands are depicted in Figure 2-3. Note that the above is a general assessment of the wetland resource areas in the study area based on available information from MassGIS. A formal delineation of wetland resource areas was not performed.

In conclusion, the environmental resources within the study area impact discrete parcels, many of which are already protected as open space, and therefore do not pose significant constraints to future redevelopment or infill efforts.



- Legend**
- Protected and Recreational Open Space
 - Study Area Parcels
 - Assessors' Parcels
 - Town Boundary
 - Stream/Intermittent Stream
 - Wetlands
 - NHESP Certified Vernal Pools
 - NHESP Potential Vernal Pools
 - NHESP Estimated Habitats for Rare Wildlife
 - NHESP Priority Habitats for Rare Species

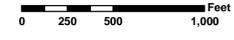


FIGURE 2-3
Environmental Constraints
Route 20 Corridor Planning Study
Worcester, MA



August 2012

2.6 Soils

Because the majority of the study area is served by on-site septic systems, soils are an important development factor. Permeability is a measure of how quickly water can flow through soil. The less permeable the soil, the larger the soil absorption system has to be to comply with Title 5 regulations and to prevent problems such as breakout or backups.

Soil suitability for siting septic systems within the study area was evaluated using soil permeability measured by the Natural Resources Conservation Service (NRCS, formerly Soil Conservation Service) based on city-wide soil mapping. This mapping provides us with planning level data to identify potential areas of concern for siting septic systems. When siting soil absorption systems, on-site percolation tests are performed to measure the site's ability to accept wastewater effluent. Discussion with the Worcester Board of Health indicated that there were some areas, but not all, of the Route 20 corridor that had issues meeting the Title 5 requirements.

City-wide soil mapping for Worcester is summarized in the NRCS Soil Survey of Worcester County, Massachusetts, Northeastern and Southern Parts. According to Title 5, soils with permeability slower than 1 inch per hour (in/hr) or 60 minutes per inch are considered unsuitable for on-site wastewater disposal systems. Soils meeting or exceeding this criterion are generally classified by the NRCS Soil Survey as moderately slow, slow, and very slow permeability.

Soils considered unsuitable for septic system construction are identified in Figure 2-4, Physical Constraints. As depicted on the figure, the Chatfield-Hollis-Rock outcrop complex (3 to 15 percent slope) and Udorthents (smoothed) comprise the majority of the study area. The majority of the soils within the study area are classified as Class II soils by Title 5 (310 CMR 15.00), indicating soils consisting of sandy loams or loams. According to NRCS, the Chatfield-Hollis-Rock outcrop soil complex is not ideal for sewage disposal due to the shallow depth to bedrock and seepage characteristics of the bottom layer. The parent material consists of friable, moderately-deep coarse-loamy basal till derived from gneiss over gneiss. The Udorthents soil layer consists primarily of fill over firm coarse-loamy basal till and/or dense coarse-loamy lodgment till. It is generally associated with urban fill, and disturbed sites. According to NRCS, the water movement in the most restrictive layer is moderately slow.

Septic Tank Absorption Field soil data from the NRCS was evaluated to better determine the soil permeability within the study area (see Appendix B). The majority of the soil within the study area was classified as "very limited", indicating that the soil has one or more features that are unfavorable for a soil absorption system and cannot be overcome without major soil reclamation, special septic design, or expensive installation procedures. The limitations include flooding, slow permeability, shallow depth to groundwater, shallow bedrock, and steep slope. Some of these soils may still be viable for siting septic systems and soil absorption systems, however, these soil limitations indicate that soil absorption systems would likely be more expensive and potentially less reliable because more sophisticated pumped distribution systems, fill and extensive grading may be required in order to compensate for the slow draining soil or shallow depth to groundwater.

The remaining soils in the study area were not rated. These soils matched the Udorthents soils type, which is typically associated with urban fill, where soil characteristics can vary widely.

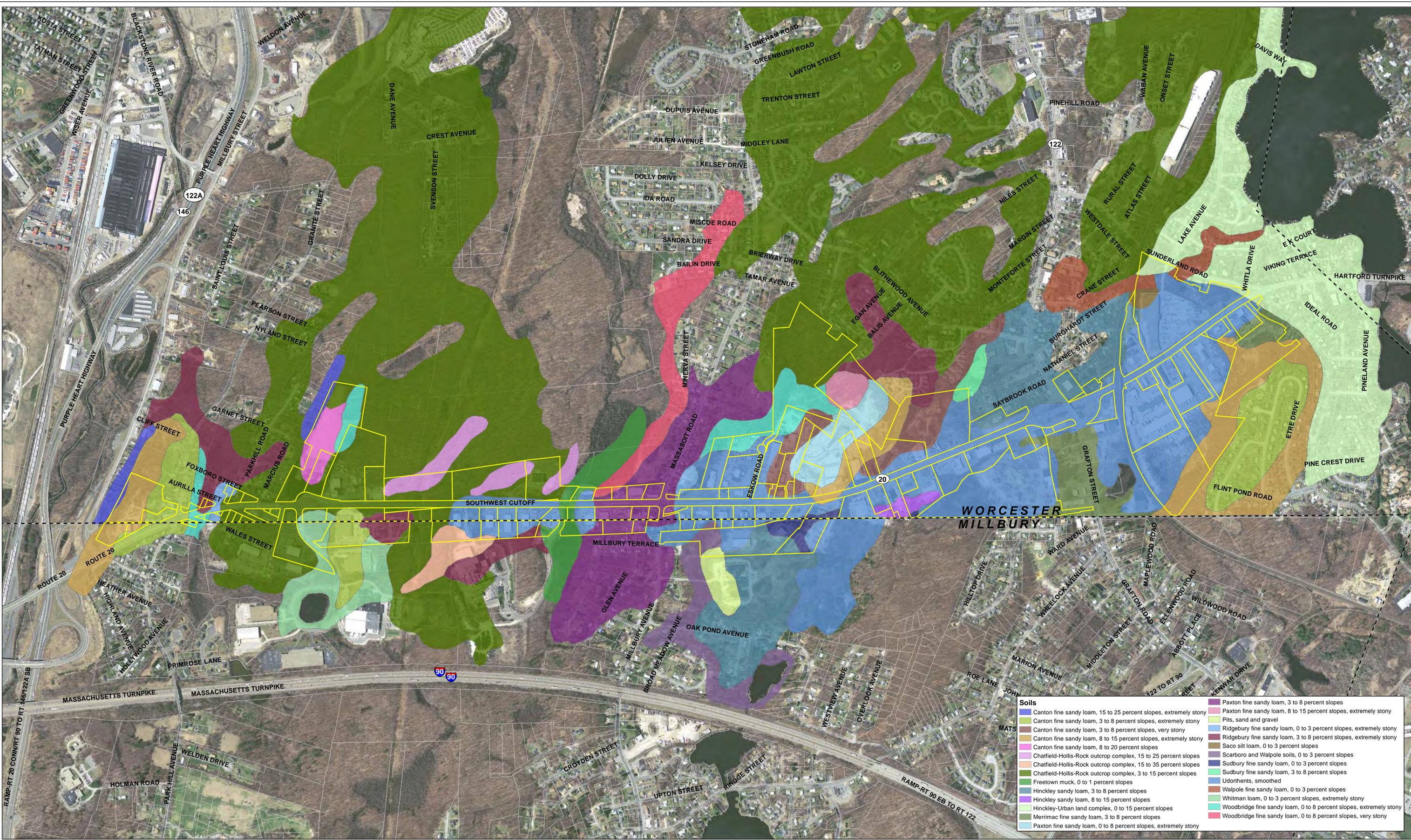


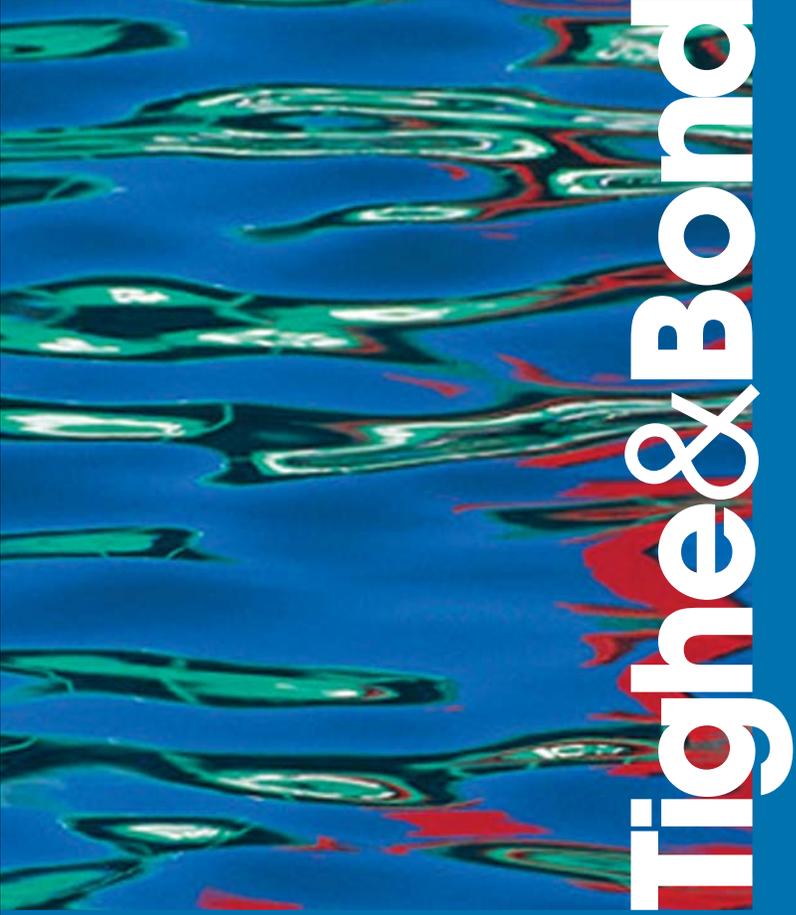
FIGURE 2-4
Physical Constraints
 Route 20 Corridor Planning Study
 Worcester, MA



August 2012

Note: Figure only depicts soils which extend into study area parcels.

Path: V:\Projects\WV3831\Maps\Report Figures\Physical_Constraints.mxd



Tighe & Bond

Section 3

Development Opportunities

The evaluation of development constraints and opportunities summarizes the data collected during the land use study for the City to use as a tool for decision making about future economic development opportunities along the Route 20 corridor.

3.1 Market Considerations

Worcester's tax base is increasingly based on residential development and the service industry. A report by the Worcester Regional Research Bureau found that the service sector represents 90% of the jobs in the City of Worcester; however, the service industries that dominate the City's economy are primarily tax-exempt, such as University of Massachusetts (UMass) Memorial Healthcare, UMass Medical School, the City of Worcester, and Reliant Medical Group. Roughly 21% of Worcester's tax base consists of similar tax-exempt properties, substantially higher than the state average (13%). Accordingly, approximately 80% of the city's tax base is residential and this number has been increasing steadily since the early 1980s (Benchmarking Economic Development in Worcester: 2012, Worcester Regional Research Bureau, Inc. March 2012).

The 2012 Greater Worcester Area Comprehensive Economic Development Strategy Report (CEDS Report) identified four industries that represent nearly 50% of all employment in the greater Worcester region: Health Care, Education, Retail, and Manufacturing. Though the manufacturing sector has fallen from 10.5% of employment in Worcester to 7.1% of total jobs; the manufacturing sector is showing positive signs when metrics such as by efficiency, productivity and revenues are analyzed. Health care is one of the four sectors that showed signs of employment growth between 2007-2010; the other three being Arts and Entertainment, Transportation and Warehousing, and Education (CEDS 2012). Recent examples of growth in the Health Care sector include Gateway Park in Lincoln Square and the expansion of the Massachusetts Biotechnology Research Park (2012 CEDS Report). However, the greatest demand in the Worcester region has been for light manufacturing and distribution space (CEDS 2012), uses that the Route 20 corridor may be able to accommodate.

3.2 Development Constraints

From the Route 146 interchange to the intersection with Sunderland Road, the character of Route 20 and existing land uses are tailored towards manufacturing, warehousing and vehicle sale and repair uses. Accordingly, this portion of the Route 20 corridor is automobile oriented, with the eastern and western portions of the corridor comprised of two lanes in each direct direction. The development through the corridor is characterized by broad setbacks with buildings set behind large parking areas that are adjacent to the street. The Route 20 corridor provides economic development opportunities to support the local economy but also must continue to serve the function of a major east-west corridor designed to facilitate traffic flow in a safe and efficient manner which may impact the types of development that are most appropriate for the corridor. The challenge for this corridor will be to support economic development that takes advantage of the corridor's primary purpose as an east-west thoroughfare.

The median size of the parcels within the study area is approximately 1.3 acres in size, when accounting for the total acreage of parcels that extend into Millbury. While lot sizes range from 0.02 to 20 acres, the average lot size is 2.86 acres. Nearly all the parcels within the study area are currently developed. The small parcel size discourages uses with higher parking requirements, such as office, retail or hotel uses, that cannot be accommodated on smaller parcels. Additionally, as the corridor is currently developed, future redevelopment of the area will primarily occur through redevelopment.

A small lot, not served by a municipal sewer system, also impacts the type of development that can occur by indirectly limiting the wastewater flows. Groundwater disposal is regulated by two state programs. The applicable program depends on the quantity of effluent to be discharged. Flows less than 10,000 gallons per day (gpd) fall under the jurisdiction of Title 5 (310 CMR 15.00). Flows greater than 10,000 gpd are regulated under MassDEP's groundwater discharge program (314 CMR 5.00). Examples of uses that would likely generate greater than 10,000 gpd include a large hotel that had more than 90 rooms, a mixed-use plaza under common ownership that contains restaurant and retail facilities, or a movie theater. Generally, denser, more intensive land uses generate larger wastewater flows that would typically require a groundwater discharge permit. A review of MassGIS data indicated that there are no groundwater discharge permits issued within the study area. Existing land uses served by on-site septic systems within the study area do not have large effluent flows and are regulated pursuant to Title 5. This may be partially due to the fact that a groundwater discharge permit process is much more involved than the Title 5 process, and groundwater discharge permits require a wastewater treatment plant that is typically much more expensive to construct and operate and maintain than an on-site septic system. These systems require regular sampling, reporting, and proper operation and maintenance to comply with permit criteria. The need to construct and maintain a wastewater treatment plant may be a deterrent to businesses with more intensive uses that may want to relocate in this area but generate wastewater flows greater than 10,000 gpd.

As noted above, Title 5 regulates wastewater treatment and disposal systems up to design flows of 10,000 gallons per day (gpd). Per Title 5, septic systems must be designed and sized to accommodate a defined quantity (gpd) of sanitary sewage based on the structure's use. Title 5 also specifies system design requirements based on soil types and groundwater depths and includes minimum siting setbacks from features such as property lines, slab foundations, wetlands, and other environmental features. For example, a septic tank and soil absorption system must maintain a ten foot setback from property lines and a ten foot setback from slab foundations and the tank must also maintain a 25 foot setback and the soil absorption system must maintain a 50 foot setback from bordering vegetated wetlands.

Septic system design and physical size is also dependent upon soil permeability. The less permeable the soil, the larger the soil absorption system needs to be to comply with Title 5 regulations and to prevent problems such as breakout or backups. As discussed above, Septic Tank Absorption Field soil data from the NRCS was evaluated to determine the soil permeability within the study area. The majority of the soil within the study area was classified as "very limited", indicating that the soil has one or more features that are unfavorable for a soil absorption system and cannot be overcome without major soil reclamation, special septic design, or expensive installation procedures. Generally, this indicates that soil absorption systems would likely be more expensive and potentially less reliable because more sophisticated pumped distribution systems, fill and extensive

grading may be required in order to compensate for the slow draining soil or shallow depth to groundwater.

Lot size can also impede the siting of a complying septic system, especially if there are other constraints proximate to the site such as wetlands or drinking water wells that require larger setbacks, low permeability soils, or high groundwater. The median lot size within the study area is approximately 1.3 acres. The following assumptions (based on the dimensional requirements of the MG-2.0 district) were made in an effort to approximate whether a septic system for a “high value” use could be sited on a typical size lot in the study area:

- 1-acre parcel
- No development constraints
- Maximize building size based on 2:1 Floor Area Ratio
- No building height restrictions
- Title 5 Design Flows and required septic setbacks
- Soil percolation rate of 30 minutes per inch
- Class II soils (sandy loams, loams) per 310 CMR 10.15

The Title 5 design flow and resulting septic size was approximated using the above assumptions for the following uses:

- 20,000 Gross Floor Area (GFA) office building with a 10,000 s.f. footprint
- 20,000 GFA retail building with a 10,000 s.f. footprint
- 20,000 GFA hotel building with 10,000 s.f. footprint and 35 rooms

The results are summarized below in Table 3-1.

Table 3-1

Septic System Summary for High-Value Use on 1 Acre Parcel

Use	Title 5 Design Flow	Soil Absorption System Size¹	Remaining Land
Office	1,500 gpd	9,000 s.f.	34,560 sf
Retail	1,000 gpd	6,100 s.f.	37,460 sf
Hotel	3,850 gpd	23,340 s.f.	20,220 sf

¹ Septic System Size accounts for the primary soil absorption system and a 100% reserve area as required by Title 5 regulation.

Siting a septic system and associated soil absorption system on a property to comply with the required setbacks can reduce the developable area for buildings and parking lots. Providing municipal sewer service can serve to free up land for development, allow expansions to existing uses, and remove the development constraint of septic system siting.

3.3 Development Opportunities

The Route 20 corridor is a heavily traveled thoroughfare and provides easy access to Interstate 90 (I-90, the Massachusetts Turnpike), I-290, Route 146, and Route 122. It is also in close proximity to a highly used park and ride located along the Route 20 connector west of Route 146, is transected by three Worcester Regional Transit Authority (WRTA) bus routes (bus route numbers 4, 22, 5), and is bound by two rail lines. While the recently reconstructed Route 146 and Route 20 connector have improved vehicular movement and access to this area of Route 20, the Route 146 corridor is currently attracting development that may otherwise be sited along Route 20.

For the purposes of this study, the corridor has been divided into three distinct sections: 1) the eastern gateway extending from the city/town line with Shrewsbury west to the Route 122 interchange; 2) the western gateway, extending from the Route 146 interchange east to Massasoit Road, and 3) the central district, between Massasoit Road and the Route 122 interchange.

In addition to being easily accessible from I-90 and Route 122, the eastern gateway portion of Route 20 contains two travel lanes in each direction, facilitating easy access to Route 122. This portion also serves as a transitional area from the residential areas that border Lake Quinsigamond and Flint Pond to retail and industrial uses. The residential population adjoining this portion of Route 20 may support additional services within this area such as restaurant, retail or service industry businesses. This portion of the corridor (notably the Southwest Commons shopping center) contains large parcels able to accommodate the parking associated with higher intensity uses and could be a target area for future redevelopment efforts. The Southwest Commons shopping center is ripe for redevelopment, as the previous anchor tenants, Big Y grocery store and Blockbusters, recently closed.

The western gateway also contains two travel lanes in each direction until the intersection with Massasoit Road, a north-south road that provides access to a large residential area. The area north of this portion of Route 20 contains conservation land associated with the Massachusetts Audubon Broad Meadow Brook Conservation Center and Wildlife Sanctuary. The area to the south of Route 20 consists of parcels that extend from Worcester into Millbury, and include industrial development including the Millbury Industrial Park, which includes Herb Chambers auto sales, Jen Manufacturing and the Telegram and Gazette, and the Wheelabrator Millbury waste-to-energy facility.

As this area consists primarily of small lot sizes, opportunities in this area can focus on light industrial uses that typically have less of a parking requirement. Encouraging infill and redevelopment along the corridor will also preserve the surrounding natural resources and recreational areas such as the Broad Meadow Brook Conservation Center and Wildlife Sanctuary and the Oakland Heights Playground, and will also help to maintain the existing buffer between the corridor and adjacent residential areas.

The central district consists of one travel lane in each direction from Massasoit Road to the Route 122 Interchange/Grafton Street. Both of these intersecting streets provide access to large residential areas to the north and south of the Route 20 corridor. WRTA Bus Route #22 begins in Millbury and travels north, crossing Route 20 and continuing north along Massasoit Road to downtown Worcester. WRTA Bus Route 5 also travels south from Millbury into Worcester, crossing Route 20 and traveling north along Grafton Street. This bus also stops at the Southwest Commons shopping center, in the eastern gateway district. Opportunities at the intersections with Massasoit Road and Grafton

Street can focus on providing services or employment to the WRTA ridership population or seek to draw patrons from the adjacent north and south residential areas.

As noted earlier, the study area contains many small lots, which are difficult to develop and may constrain potential land uses. However, the study area also contains adjacent parcels under common ownership that can be consolidated in the future to facilitate redevelopment efforts. Parcel assemblage can expand the range of potential land uses and take advantage of any physical opportunities specific to the parcels. Combining parcels can also allow site constraints that may affect future development to be overcome. GIS data from Worcester and Millbury was utilized to identify adjacent parcels that are under common ownership. This information is depicted on Figure 3-1. Combining adjacent lots under common ownership creates larger parcels that allow for a greater range of developable land uses. Combining these parcels also results in increased acreage by “eliminating” shared parcel boundaries and the required zoning setbacks; allowing a greater percentage of the site to be developed. Along the entire corridor, a sewer extension project will enable the existing businesses to expand as they can increase their flows without needing to increase the size of their septic system and develop portions of the site that previously contained a septic system with soil absorption system. While the generally small lot size and existing development may cause redevelopment by attrition, the majority of the zoning within the study area is very permissive and allows for a large variety of uses such as hotel/motel, office, Movie Theater, and food service. Extending sewer service in this area may create an opportunity for these services and eliminate the potential need for construction and maintenance of a wastewater treatment facility, which is a significant financial barrier to development. It will also benefit existing businesses by eliminating the need for annual septic system pumping and maintenance.

As noted earlier, the CEDS report indicated a demand in the region for light manufacturing and distribution space. These uses may be easily accommodated within the western and central sections of the corridor where parcel sizes are typically smaller, as the parking requirements for these uses are not very high. This portion of the corridor also maintains one travel lane in each direction, facilitating traffic flow at a more moderate pace and enabling easy turning movements to businesses off of Route 20. The eastern gateway portion of Route 20 provides opportunity for retail redevelopment and infill. Nearly all the parcels within the study area to the east of the railroad tracks are greater than two acres and can easily accommodate a variety of “high-value” uses and the associated parking requirements.

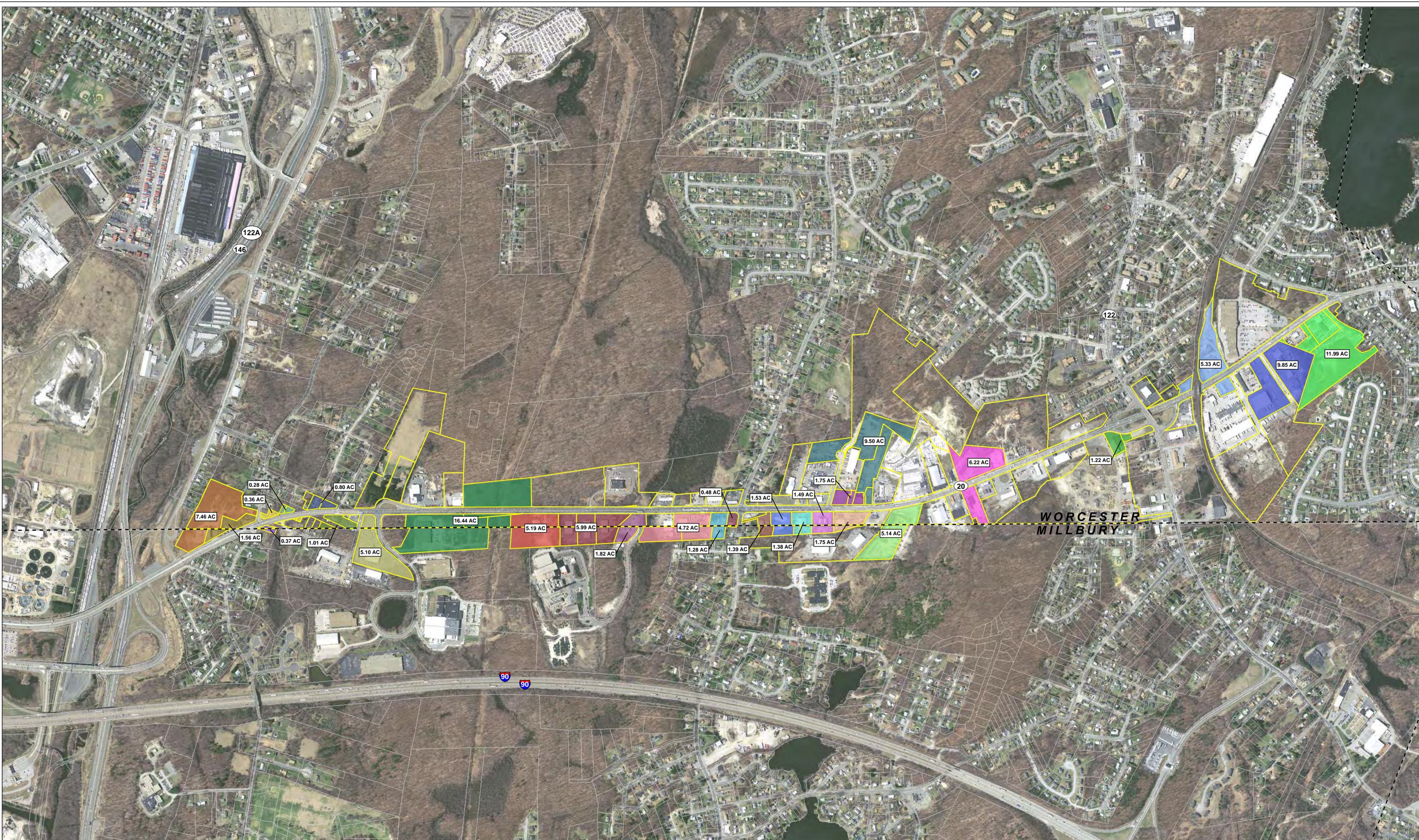


FIGURE 3-1
Common Ownership
Route 20 Corridor Planning Study
Worcester, MA

- Legend**
- | | | | | |
|---------------------------------|-----------------------------|---|--------------------------------|--|
| ABRAMO, DAVID M | HOWARD, JOSEPH M JR TRUSTEE | MASSACHUSETTS ELECTRIC CO/
NEW ENGLAND POWER COMPANY | RUGGIERI, MICHAEL G + JANICE M | Outline |
| BELITO, PAUL M | J. RUSS CORP | MCCABE, RICHARD | SABATINI, DARIO D | Assessors' Parcels |
| BOUTOT-BILL, DENISE + | JETTY ENTERPRISES LLC | MILLER, JOSEPH | SHARP, WILLIAM E TRUSTEE | Town Boundary |
| CAMOSSE REALTY CORP | JLD REALTY LLC | MILAL REALTY LLC | SODERMAN, MARYLAN H | 1.82 AC Combined Acreage of Parcels
by Common Ownership |
| D + P RUSSELL FAMILY SERIES LLC | KASPUTIS, NORMAN | NELSON, DONNA L TRUSTEE | STANKUS, KENNETH J + MARY ANN | |
| DER HOVANESSIAN, ROBERT | KEL EQUIPMENT LEASING | PERRO, KENNETH D + JEAN M TRUSTEES | STULTZ, RONALD JR | |
| FARMER, EARL R JR | LINDER, KENNETH E | PJM FAMILY ENTERPRISES LLC | TRUSSWAN INC | |
| HERB CHAMBERS LATTI FARM | MARARIAN, JEFFERSON | | | |



August 2012



Tighe & Bond

Section 4

Funding Opportunities

The projected cost of extending the sewer main down Route 20 is approximately \$20 million. The sewer project has been designed to address other sewer system capacity and needs, as well as providing sewer service to this section of the Route 20 corridor. The initial concept behind the Route 20 sewer extension focused on three (3) project goals:

1. Provide sewer service to the Route 20 corridor between Massasoit Road and Sunderland Road.
2. Combine existing sewerage systems in the Route 20 area into the new "single" system to make the overall system more efficient, and eliminate pumping stations and ageing cast iron force main within Broad Meadow Brook.
3. Avoid adding additional sanitary loads to existing sensitive downstream City sewerage infrastructure

Betterment assessments are the funding mechanism commonly used to assess initial capital costs to the system. A betterment is a one-time charge to property owners within a service area that have the right to connect to the system. In Massachusetts, assessment options to determine individual property costs can be based on parcel frontage, parcel area, an equivalent flow basis, or a combination of these options. In Worcester, the assessment is based on \$1 per square foot of parcel area. The parcel area is calculated by multiplying the frontage of the property by the depth of the property (to a maximum of 100 feet).

Distributing the large costs of new sewer infrastructure over a few new users along the Route 20 corridor would result in financial hardship. Typically, funding for new wastewater systems, including installation of new sewers, pump stations and construction of new wastewater treatment systems, is limited to Clean Water Act State Revolving Fund (SRF) loans or US Department of Agriculture (USDA) Rural Development (RD) loans or grants. These funding sources are competitive and have specific requirements that need to be met. Worcester would not meet the eligibility requirements (populations less than 10,000) for RD funding.

With strategic planning and leveraging various funding sources the capital project can prove viable without severely impacting property owners. Furthermore, economic development and redevelopment along the Route 20 corridor may provide opportunities to tap into economic development related funding sources. As requested by the City, Tighe & Bond researched a wide variety of funding programs. These programs are summarized in Table 4-1.

SRF is a common program for obtaining low-interest loans for wastewater infrastructure projects. If a private developer is interested in redeveloping a site, is willing to commit to bringing in new jobs, and is willing to entering a Public/Private partnership with the City, then economic-related grants opportunities may be available such as the MassWorks Infrastructure Program and the Infrastructure Investment Incentive Program (I-Cubed) program.

The Infrastructure Investment Incentive Program (I-Cubed) authorized up to \$250M to be invested in public infrastructure improvement projects (ranging in cost from \$10M to \$50M) to support “certified” economic development projects. To be considered a “certified” project, the private project must obtain approval from the Secretary of Administration and Finance, the Municipality, and MassDevelopment. The I-Cubed program was created to support job growth and economic development and empowers the Massachusetts Development Finance Agency to issue Bonds to finance Public Infrastructure Improvements. The increased state tax revenues generated from the economic development project (such as retail, business, or service industry projects) will cover the costs of the bonding for the necessary public infrastructure improvements. The general categories of state tax revenues that are accounted for are personal income taxes on wages and partnership distributions, sales taxes on the sale of tangible personal property, and hotel/motel room occupancy excises taxes. If the tax revenues do not cover the debt service on the bonds, the Municipality is responsible for the shortfall. A clear public/private partnership is required to make the I-Cubed funding viable. The criteria for approval are briefly discussed below.

The criteria for approval include demonstrating that the public infrastructure investment is needed for the private project to succeed. The private development project must be financially feasible, utilize sustainable development principles, and the expected annual New State Tax Revenues will be at least 1.5x the projected annual Debt Service on the Bonds allocable to the infrastructure project. Additionally, not more than one other economic development project in the municipality may be approved for financing under the I-Cubed program. The cost of the public infrastructure improvements financed by this program must be between \$10M-\$50M, and \$50M of the total available \$250M must be used in economically distressed municipalities with either an unemployment rate of at least 1.5% higher than the statewide average, or in which the median income is 80% or less than the state median income. Priority is given to projects in municipalities that meet the unemployment / income criteria, or projects located in growth districts or are committed to obtaining LEED silver certification. The US Census Bureau reports Worcester’s median income (2006-2010) as \$45,036 or about 70% of the Commonwealth’s median income of \$64,509. According to the US Department of Labor, the 2011 Worcester’s average unemployment rate was 8.9%, or 1.5% more than the state-wide rate of 7.4% (note these represent non-seasonally adjusted numbers); therefore, Worcester appears to meet these qualifying priority project criteria.

The MassWorks Infrastructure Program combines the following six public infrastructure funding programs supporting economic development and job creation:

- Public Works Economic Development (PWED)
- Community Development Action Grant (CDAG)
- Growth Districts Initiative (GDI) Grant Program
- Massachusetts Opportunity Relocation and Expansion Program (MORE)
- Small Town Rural Assistance Program (STRAP)
- Transit Oriented Development (TOD) Program

The primary goals of the MassWorks Infrastructure Program is to provide a funding source for municipalities seeking public infrastructure funding to support:

- Economic development and job creation and retention
- Housing development at density of at least 4 units to the acre (both market and affordable units)
- Transportation improvements to enhancing safety in small, rural communities

The 2012 spending goals for the MassWorks Infrastructure Program are:

- 50% or more of the total funding be in support of developments in Gateway Cities (including Worcester);
- 67% or more of the total funding be in support of transit-oriented developments (that is, developments located within one-half mile of a transit station; further, transit station is defined as a subway or rail station, or a bus stop serving as the convergence of two or more bus fixed routes that serve commuters);
- 80% or more of the total funding be in support of developments that are re-using previously developed sites;
- 50% or more of the total funding be in support of developments that contain a mix of residential and commercial uses, with a residential unit density of at least four units to the acre;
- 100% of the funding that is committed in support of housing (or mixed use including housing) be in support of developments with a residential unit density of at least four units to the acre;
- 25% or more of the total funding be in support of projects of regional significance that are supported by two or more communities.

The MassWorks Infrastructure Program is administered by the Executive Office of Housing and Economic Development, in cooperation with the Department of Transportation and Executive Office for Administration & Finance. This is a very competitive grant program. In 2011, the first year of MassWorks program, the state received 158 applications requesting \$400M. The state funded 42 grants totaling \$63.5M. The average grant amounts were less than \$2M.

TABLE 4-1
Potential Grant and Loan Funding Matrix (Alphabetical Order)

No.	Funding Program	Agency	Goal	Money Available	Funding Cycle/Competition	Comments
1	Business Improvement Districts (MGL Chapter 400)	Worcester City Council Copy of petition to the Director of Housing and Community Development	Restore or promote business activity in targeted commercial areas.	Maximum one-half of one percent of participating members assessed property values	Non-competitive	Not applicable - funding focuses on district management services; maintenance and security; promotion and marketing services; business services; and physical improvements and property management above and beyond available municipal services
2	Chapter 40R Funding - Smart Growth Zoning District	EOHED - DHCD	City develops smart growth district for primarily residential use; state funding decreases the cost of new housing on a community	One time density bonus and zoning incentive payment; bonus for new housing units; additional school aid; funding preference	Non-competitive	Payments from state are when town rezones, and when new housing is constructed. Requires town to rezone; minimum density requirements.
3	Chapter 43D Grants	MassDevelopment	For designated Priority Development Sites subject to expedited permitting	Technical Assistance	Non-competitive	Technical assistance funds can be applied to removing barriers to permitting the recently designated Priority Development Site
4	Community Development Block Grants (CDBG)	EOHED - DHCD Division of Community Services	Competitive grants that address a broad range of community development needs including infrastructure.	Worcester is an "entitlement community" and receives funding directly from HUD.	Worcester is an "entitlement community" and receives funding directly from HUD.	Funds housing, community, and economic development projects that assist low and moderate-income residents, or that revitalize areas of slum or blight.
5	District Improvement Financing	Economic Assistance Coordinating Council (EACC) / Massachusetts Office of Business Development (MOBD)	Fund public works, infrastructure and development projects by allocating future, incremental tax revenues from a defined district	Variable - plan to pay off within life of the infrastructure (15 to 20 years - plan allows up to 30 years)	Town driven - Town Meeting needed to designate district Non-competitive	Private for-profit partner required District and development program need to be defined and approved by Town Meeting and certified by EACC
6	Economic Development Administration	Economic Development Administration	Economic development/neighborhood reinvestment			Funding funneled through states
7	Gateway Cities Action Grant	EOHED - DHCD	Assistance for neighborhood or downtown planning activities that expand housing opportunities and that support the revitalization of neighborhoods	\$75,000	Competitive	For communities with populations of more than 35,000. Community-based non-profit organizations are the only eligible applicants.
8	Infrastructure Investment Incentive Act (I-cubed or I3)	EOHED	To support job growth and economic development through financing public infrastructure improvements necessary to support major new private development.	Funds infrastructure projects between \$10M and \$50M	Competitive	Requires public/private partnership. Funding must be used to support a "certified" economic development project. To be considered "certified", the private project must obtain approval from the Secretary of Administration & Finance, the Municipality, and MassDevelopment.
9	MA Sewer Rate Relief Fund	Department of Revenue	Grant offset up to 20% of debt payments in sewer rates (recent awards in 5-6% range)	For FY12, \$500,000 was been appropriated and awards were substantially reduced from past years.	annual budget appropriation - applications due in Sept. Available for projects not receiving other state funding (MWPAT, grants or SRF loans) - most money went to MWRA	

TABLE 4-1
Potential Grant and Loan Funding Matrix (Alphabetical Order)

No.	Funding Program	Agency	Goal	Money Available	Funding Cycle/Competition	Comments
10	MassWorks Infrastructure Program	EOHED	Consolidated review of several infrastructure programs: Public Works Economic Development (PWED) Community Development Action Grant (CDAG) Growth Districts Initiative (GDI) Grant Program Massachusetts Opportunity Relocation and Expansion Program (MORE) Small Town Rural Assistance Program (STRAP) Transit Oriented Development (TOD) Program	In 2011, \$63.5 M of projects were funded	Can be used for variety of infrastructure improvements; public/private partnership required Competitive Applications are due by September 10, 2012; expected to be open again next year	Funding goals for MassWorks are: - 50% or more of the total funding be in support of developments in Gateway Cities; - 67% or more of the total funding be in support of transit-oriented developments (that is, developments located within one-half mile of a transit station; further, transit station is defined as a subway or rail station, or a bus stop serving as the convergence of two or more bus fixed routes that serve commuters); - 80% or more of the total funding be in support of developments that are re-using previously developed sites; - 50% or more of the total funding be in support of developments that contain a mix of residential and commercial uses, with a residential unit density of at least four units to the acre; - 100% of the funding that is committed in support of housing (or mixed use including housing) be in support of developments with a residential unit density of at least four units to the acre; - 25% or more of the total funding be in support of projects of regional significance that are supported by two or more communities.
11	Priority Development Fund	DHCH on behalf of MassHousing	Increase available housing, both rental and homeownership	Total \$213, 134 available. Communities may apply to DHCD for PDF assistance of up to \$15,000.	Applications are accepted on a rolling basis, and awards are made to qualifying applications on a first-come, first-served basis.	Priority for funding will be given to applications that support creation of as of right zoning districts; address/encourage new housing production within city/town centers, on brownfields or underutilized commercial or institutional land, or as part of a transit-oriented development opportunity; and the adaptive re-use of existing structures not currently used for housing purposes.
12	State and Federal Earmark Appropriations	Legislatures	Earmarks for specific projects	Variable	Subject to political budgets	Subject to political priorities
13	State Revolving Loan Fund (SRF) - 2%	MassDEP and MWPAT (Massachusetts Water Pollution Abatement Trust)	Fund wastewater planning and construction infrastructure projects	- Regulatory funding cap 33% of available funding in a given year - \$303M total available in 2012 with additional subsidies available for renewable energy generation and environmental justice projects	- Competitive: Prior to 2009 IUP list, most projects were funded - now many can't make the cut - Project Evaluation Forms (PEF) are due August 31	- Does not cover design - Projects addressing existing pollution issues receive priority
14	State Revolving Loan Fund (SRF) - 0%	MassDEP and MWPAT (Massachusetts Water Pollution Abatement Trust)	Provide funding for nutrient-related wastewater construction projects	Up to 35% of the SRF pool	- Available for 10 years: 2009-2019 - Same funding cycle and PEF process as 2% loan program - Additional justification of how project meets requirements for 0% including those listed in next column	- New program authorized in Section 5 of the Environmental Bond Bill in 2008 with implementation details laid out in MassDEP regulation 310 CMR 44. - Funding for construction, not planning and design - Requires MassDEP-approved CWMP - Requires project to remediate or prevent nutrient-related impacts - Adoption of land use controls to ensure project is flow neutral

Draft for Discussion

TABLE 4-1
Potential Grant and Loan Funding Matrix (Alphabetical Order)

No.	Funding Program	Agency	Goal	Money Available	Funding Cycle/Competition	Comments
15	Tax Increment Financing	EOHCD-MOBD	<p>Provide flexible targeted incentives to stimulate job-creating development; must be in Economic Opportunity Area or designated Exceptional Opportunity Area</p> <p>Provides tax relief for property owner to encourage reinvestment</p>	Variable - negotiated agreement between town and private party	<p>Terms negotiated between project proponent and municipality. Can cover time period between 5 and 20 years.</p> <p>Non-competitive</p>	<p>- Incentives to developers/project proponents by reducing tax requirements</p> <p>-May help fund needed infrastructure for project</p>



Tighe & Bond

PERMITTED USES BY ZONING DISTRICTS – TABLE 4.1 RESIDENTIAL USE

	RS 10	RS 7	RL 7	RG 5	BO 1	BO 2	BL 1	BG 2	BG 3	BG 4	BG 6	ML 0.5	ML 1	ML 2	MG 0.5	MG 1	MG 2	IP 0.33	IN S	IN H	A 1
1. Bed and Breakfast Establishment	SP	SP	SP	SP	SP	SP	SP	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2. Continuing care retirement community	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	N	N	N	N	N	N	N	SP	SP	N
3. Dormitory	SP	SP	SP	SP	SP	SP	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	Y	Y	N
4. Family day care home	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5. Fraternity/sorority/ cooperative residence	SP	SP	SP	SP	SP	SP	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	Y	Y	N
6. Group residence (general or limited)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7. Limited Residential Hospice House	SP	SP	SP	SP	N	SP	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
8. Lodging house	N	N	N	SP	N	N	N	N	N	N	N	N	N	N							
9. Mobile homes	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
10. Multi-family dwelling, high rise	N	N	N	Y	N	N	N	Y	Y	Y	Y	N	N	N	N	N	N	N	N	SP	N
11. Multi-family dwelling, low rise	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	SP	SP	N
12. Single-family attached dwelling	N	N	SP	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	Y	Y	N
13. Single-family detached dwelling	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	Y	Y	N
14. Single-family semi-detached dwelling	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	Y	Y	N
15. Temporary shelter	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
16. Three-family detached dwelling	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	Y	Y	N
17. Two-family detached dwelling	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	Y	Y	N

Y – Yes; N – No;
SP – Special Permit

**PERMITTED USES BY ZONING DISTRICTS – Table 4.1
GENERAL USE**

	RS 10	RS 7	RL 7	RG 5	BO 1	BO 2	BL 1	BG 2	BG 3	BG 4	BG 6	ML 0.5	ML 1	ML 2	MG 0.5	MG 1	MG 2	IP 0.33	IN S	IN H	A 1
1. Agriculture, horticulture, viticulture, flora culture on parcels less than five (5) acres	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2. Cemetery, crematory, memorial park	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3. Clinic	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	SP	SP	SP	SP	SP	SP	N	N	Y	N
4. Club, lodge, other private grounds (non-profit and private)	SP	SP	SP	SP	SP	SP	Y	Y	Y	Y	Y	SP	SP	SP	SP	SP	SP	N	N	N	N
5. Day Care Center	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6. Heliport	N	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	Y
7. Library/Museum (non-profit)	SP	SP	SP	SP	Y	Y	Y	Y	Y	Y	Y	SP	SP	SP	SP	SP	SP	N	Y	Y	N
8. Library/Museum (profit)	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	SP	SP	SP	SP	SP	SP	N	N	N	N
9. Licensed hospital, Sanitarium	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	Y	Y	N
10. Non-accessory residential parking	SP	SP	SP	SP	SP	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
11. Non-residential parking facility (non-accessory)	N	N	N	N	SP	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
12. Nursing or convalescent home/institution/facility	N	SP	SP	SP	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	Y	N
13. Open lot storage of more than one (1) unregistered automobile in excess of (7) seven days	N	N	N	N	N	N	SP	SP	SP	SP	N	SP	SP	SP	SP	SP	SP	N	N	N	N
14. Personal Wireless Service Facilities Interior-Mounted and Side-Mounted	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
15. Personal Wireless Service Facilities Roof-Mounted, Ground-Mounted, and Structure-Mounted	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP						

Y – Yes; N – No;
SP – Special Permit

**PERMITTED USES BY ZONING DISTRICTS – Table 4.1
GENERAL USE - Continued**

	RS 10	RS 7	RL 7	RG 5	BO 1	BO 2	BL 1	BG 2	BG 3	BG 4	BG 6	ML 0.5	ML 1	ML 2	MG 0.5	MG 1	MG 2	IP 0.33	IN S	IN H	A 1
16. Place of worship	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
17. Radio/TV Transmission Tower	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	N	N	N	N						
18. Recreational/service facility (non-profit)	SP	SP	SP	SP	Y	Y	Y	Y	Y	Y	Y	SP	SP	SP	SP	SP	SP	N	Y	Y	N
19. Religious or educational use (EXEMPT)(See Art. XVII; M.G.L.c.40A, s.3)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
20. Schools (K-12, college, University, technical institute) non-profit	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
21. Schools (vocational, professional, other) profit	N	N	N	N	SP	SP	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	SP
22. Shooting Ranges – Indoor/Outdoor (see note 11)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	SP	N	N	N	N
23. Teen/Youth Center	N	N	N	N	SP	SP	SP	SP	SP	SP	N	N	N	N							
24. Transformer, pumping station, sub-station, telephone exchange	SP	SP	SP	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
25. Wind Energy Conversion Facilities, Large	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
26. Wind Energy Conversion Facilities, Small	SP	SP	SP	SP	SP	SP	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	SP
27. Meteorological Tower (MET) – 85’ or less in height	SP	SP	SP	SP	SP	SP	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	SP
28. Meteorological Tower (MET) – greater than 85’ in height	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
Y – Yes; N – No SP – Special Permit																					

**PERMITTED USES BY ZONING DISTRICTS – Table 4.1
BUSINESS USES**

	RS 10	RS 7	RL 7	RG 5	BO 1	BO 2	BL 1	BG 2	BG 3	BG 4	BG 6	ML 0.5	ML 1	ML 2	MG 0.5	MG 1	MG 2	IP 0.33	IN S	IN H	A 1
1. Adult entertainment establishments	N	N	N	N	N	N	N	N	N	N	SP	N	N	N	N	N	N	N	N	N	N
2. Animal hospital, clinic, pet shop	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
3. Bank, credit union	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	SP
4. Bank, credit union with drive thru	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP							
5. Bus station or terminal, RR passenger station	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y
6. Food service (drive-thru)	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	N	N	N	N
7. Food service (excludes consumption/sale of alcoholic beverages)	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	SP	SP	Y
8. Food service (includes consumption/sale of alcoholic beverages) and/or providing dancing or entertainment	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	SP	SP	Y
9. Funeral undertaking establishment	N	N	SP	SP	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N
10. In-door recreation, health club-profit	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
11. Indoor rental & service of equipment for home and recreational uses	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
12. Kennel	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	N	N	N	N
13. Marina	N	N	N	N	N	N	SP	N	N	N	N	N	N	N	N	N	N	N	N	N	N
14. Motel, hotel, inn	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Y – Yes; N – No; SP – Special Permit																					

**PERMITTED USES BY ZONING DISTRICTS – Table 4.1
BUSINESS USES - Continued**

	RS 10	RS 7	RL 7	RG 5	BO 1	BO 2	BL 1	BG 2	BG 3	BG 4	BG 6	ML 0.5	ML 1	ML 2	MG 0.5	MG 1	MG 2	IP 0.33	IN S	IN H	A 1
15. Motor vehicle/trailer/boat sales, rental	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y
16. Motor vehicle service, repair, garage, display	N	N	N	N	N	N	SP	Y	Y	Y	SP	Y	Y	Y	Y	Y	Y	N	N	N	Y
17. Automobile Refueling Station	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	N	N	N	SP
18. Office, general (travel agency, auto driving school)	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y
19. Office, professional	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N
20. Outdoor recreation (for Profit)	N	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	N	N	N	N
21. Package store (alcoholic beverage sale not to be consumed on premise)	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
22. Radio/TV studio	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
23. Research lab. w/o manufacturing abilities	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
24. Retail Food Sales	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	SP	SP	Y
25. Retail greater than 50% display space outdoors	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	N	N	N	N
26. Retail sales, including retail with incidental fabrication assembly	N	N	N	N	N	N	Y	Y	Y	Y	Y	SP	SP	SP	SP	SP	SP	N	SP	SP	Y
27. Service shop, personal services	N	N	SP	SP	SP	SP	Y	Y	Y	Y	Y	SP	SP	SP	SP	SP	SP	N	SP	SP	Y
28. Theatre, motion picture theatre, concert hall	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N
29. Wholesale business or storage conducted entirely within an enclosed structure (with noise, dust, fumes, gases and odors confined to the premises)	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y

Y – Yes; N – No;
SP – Special Permit

**PERMITTED USES BY ZONING DISTRICTS – Table 4.1
MANUFACTURING USE**

	RS 10	RS 7	RL 7	RG 5	BO 1	BO 2	BL 1	BG 2	BG 3	BG 4	BG 6	ML 0.5	ML 1	ML 2	MG 0.5	MG 1	MG 2	IP 0.33	IN S	IN H	A 1
1. Accessory storage of flammable liquids/gases/ explosives (excluding residential use up to 1,000 gallons)	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
2. Auction house	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	N	N	N	N
3. Auto/truck body or paint shop	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N
4. Flea Market	N	N	N	N	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	N	N	N	N
5. Manufacturing, assembly, processing, packaging, research and other industrial operations, including alternative and/or renewable energy systems, provided standards in Notes to Table 4.1, Note (7) are met. (See, Notes to Table 4.1, Note (12))	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y
6. Manufacturing, assembly, processing, packaging or other industrial operations not otherwise permitted above, including alternative and/or renewable energy systems (See, Notes to Table 4.1, Note (12)), provided there will not be a nuisance of such magnitude as to prevent a reasonable use of nearby premises for the purpose for which they are zoned	N	N	N	N	N	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	N	N	N
7. Motor freight terminal; truck/trailer/bus storage or servicing	N	N	N	N	N	N	N	N	N	N	N	SP	SP	SP	Y	Y	Y	N	N	N	SP
8. Open lot storage, underground storage, salvage recycling operations, refuse transfer station facility: includes flammable liquids/gas	N	N	N	N	N	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	N	N	N	SP
9. Rail freight terminal & accessory storage place	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N

Y – Yes; N – No

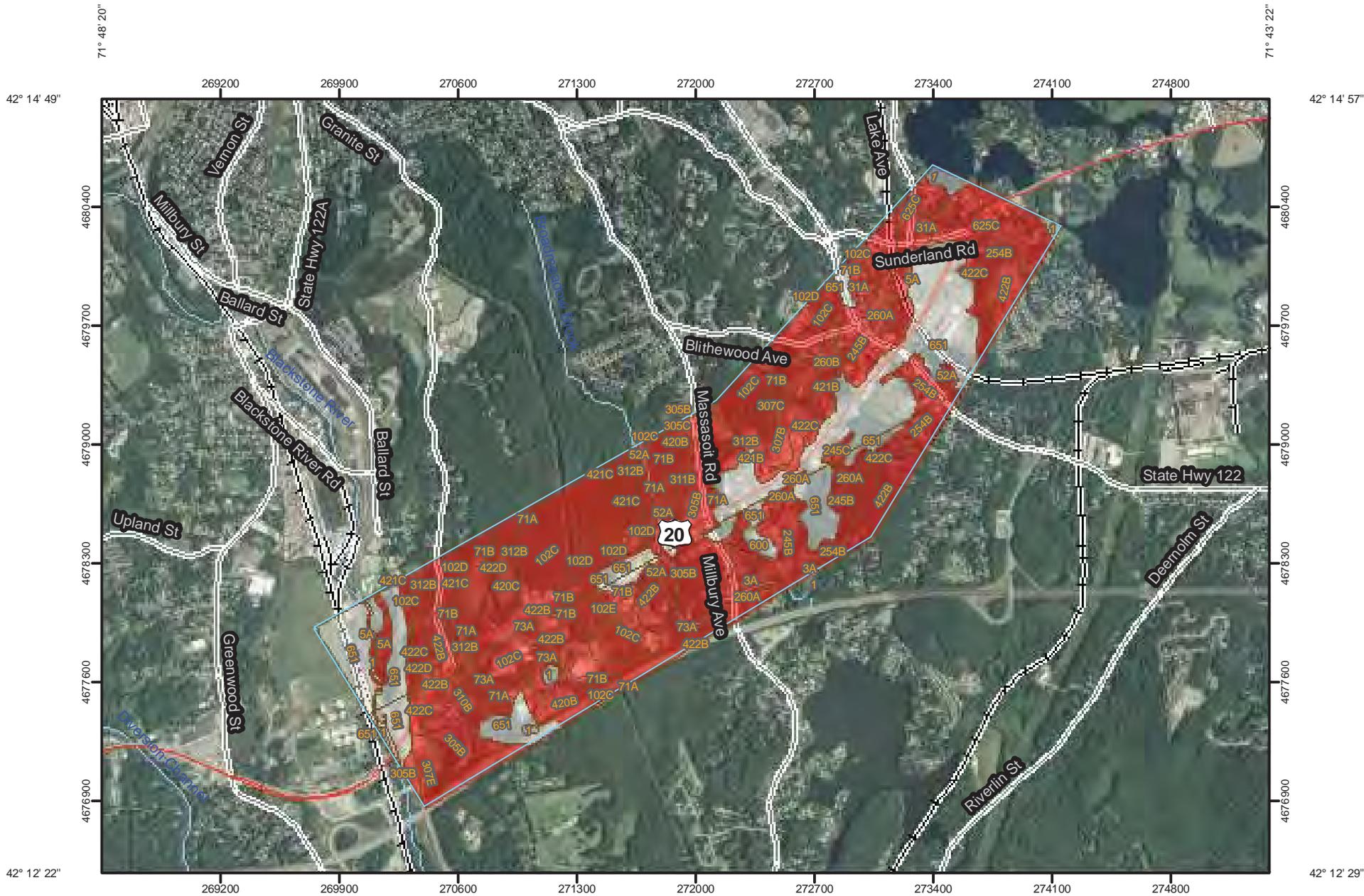
SP – Special Permit

**PERMITTED USES BY ZONING DISTRICTS – Table 4.1
MANUFACTURING USE - Continued**

	RS 10	RS 7	RL 7	RG 5	BO 1	BO 2	BL 1	BG 2	BG 3	BG 4	BG 6	ML 0.5	ML 1	ML 2	MG 0.5	MG 1	MG 2	IP 0.33	IN S	IN H	A 1
10. Rendering works and slaughter house	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
11. Stable	N	N	N	N	N	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	N	N	N	N
12. Steam laundry, dry cleaning, rug cleaning establishment or plant	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
13. Storage of materials and equipment not enclosed buildings (excluding flammable liquids, gas and/or explosives)	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N
14. Truck sales/agencies/showroom	N	N	N	N	N	N	N	SP	SP	SP	N	Y	Y	Y	Y	Y	Y	N	N	N	N
15. Truck servicing and repair garages	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N
16. Research and Development Facility with Manufacturing Abilities (See, Notes to Table 4.1, Note (12))	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Y – Yes; N – No SP – Special Permit																					



Tighe & Bond



Map Scale: 1:32,600 if printed on A size (8.5" x 11") sheet.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units

Soil Ratings

 Very limited

 Somewhat limited

 Not limited

 Not rated or not available

Political Features

 Cities

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

MAP INFORMATION

Map Scale: 1:32,600 if printed on A size (8.5" x 11") sheet.

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:25,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Worcester County, Massachusetts,
Northeastern Part

Survey Area Data: Version 7, May 5, 2008

Soil Survey Area: Worcester County, Massachusetts, Southern
Part

Survey Area Data: Version 5, Jan 30, 2007

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 8/19/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Septic Tank Absorption Fields

Septic Tank Absorption Fields— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part (MA613)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
1	Water	Not rated	Water (100%)		9.8	0.7%
5A	Saco silt loam, 0 to 3 percent slopes	Very limited	Saco (85%)	Flooding (1.00)	10.5	0.8%
				Depth to saturated zone (1.00)		
				Slow water movement (0.46)		
31A	Walpole fine sandy loam, 0 to 3 percent slopes	Very limited	Walpole (80%)	Depth to saturated zone (1.00)	14.0	1.0%
				Seepage, bottom layer (1.00)		
52A	Freetown muck, 0 to 1 percent slopes	Very limited	Freetown (75%)	Depth to saturated zone (1.00)	13.6	1.0%
				Seepage, bottom layer (1.00)		
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	Very limited	Ridgebury (75%)	Slow water movement (1.00)	12.9	0.9%
				Depth to saturated zone (1.00)		
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	Very limited	Ridgebury (75%)	Slow water movement (1.00)	44.5	3.3%
				Depth to saturated zone (1.00)		
73A	Whitman loam, 0 to 3 percent slopes, extremely stony	Very limited	Whitman (70%)	Slow water movement (1.00)	1.2	0.1%
				Ponding (1.00)		
				Depth to saturated zone (1.00)		
102C	Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes	Very limited	Chatfield (45%)	Depth to bedrock (1.00)	180.7	13.3%
				Seepage, bottom layer (1.00)		
				Slope (0.63)		
			Hollis (25%)	Depth to bedrock (1.00)		
				Seepage, bottom layer (1.00)		
				Slope (0.63)		

Septic Tank Absorption Fields— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part (MA613)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
102D	Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes	Very limited	Chatfield (40%)	Slope (1.00)	18.0	1.3%
				Depth to bedrock (1.00)		
				Seepage, bottom layer (1.00)		
			Hollis (25%)	Depth to bedrock (1.00)		
				Slope (1.00)		
				Seepage, bottom layer (1.00)		
245B	Hinckley sandy loam, 3 to 8 percent slopes	Very limited	Hinckley (80%)	Filtering capacity (1.00)	36.4	2.7%
				Seepage, bottom layer (1.00)		
			Merrimac (5%)	Seepage, bottom layer (1.00)		
245C	Hinckley sandy loam, 8 to 15 percent slopes	Very limited	Hinckley (80%)	Filtering capacity (1.00)	3.0	0.2%
				Seepage, bottom layer (1.00)		
				Slope (0.63)		
			Merrimac (10%)	Seepage, bottom layer (1.00)		
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	Very limited	Merrimac (85%)	Seepage, bottom layer (1.00)	19.6	1.4%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	Very limited	Sudbury (80%)	Depth to saturated zone (1.00)	7.2	0.5%
				Seepage, bottom layer (1.00)		
			Merrimac (5%)	Seepage, bottom layer (1.00)		
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	Very limited	Sudbury (80%)	Depth to saturated zone (1.00)	2.9	0.2%
				Seepage, bottom layer (1.00)		
			Merrimac (5%)	Seepage, bottom layer (1.00)		
305B	Paxton fine sandy loam, 3 to 8 percent slopes	Very limited	Paxton (85%)	Depth to saturated zone (1.00)	30.1	2.2%
				Slow water movement (0.46)		
305C	Paxton fine sandy loam, 8 to 15 percent slopes	Very limited	Paxton (85%)	Depth to saturated zone (1.00)	5.6	0.4%
				Slope (0.63)		
				Slow water movement (0.46)		

Septic Tank Absorption Fields— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part (MA613)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
306C	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	Very limited	Paxton (85%)	Depth to saturated zone (1.00)	0.0	0.0%
				Slope (0.63)		
				Slow water movement (0.46)		
307B	Paxton fine sandy loam, 3 to 8 percent slopes, extremely stony	Very limited	Paxton (85%)	Depth to saturated zone (1.00)	13.2	1.0%
				Slow water movement (0.46)		
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	Very limited	Paxton (85%)	Depth to saturated zone (1.00)	3.9	0.3%
				Slope (0.63)		
				Slow water movement (0.46)		
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	Very limited	Woodbridge (85%)	Depth to saturated zone (1.00)	9.0	0.7%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	Very limited	Woodbridge (85%)	Depth to saturated zone (1.00)	30.6	2.3%
420B	Canton fine sandy loam, 3 to 8 percent slopes	Very limited	Canton (75%)	Seepage, bottom layer (1.00)	1.8	0.1%
420C	Canton fine sandy loam, 8 to 15 percent slopes	Very limited	Canton (80%)	Seepage, bottom layer (1.00)	6.3	0.5%
				Slope (0.63)		
421B	Canton fine sandy loam, 3 to 8 percent slopes, very stony	Very limited	Canton (80%)	Seepage, bottom layer (1.00)	20.3	1.5%
421C	Canton fine sandy loam, 8 to 15 percent slopes, very stony	Very limited	Canton (85%)	Seepage, bottom layer (1.00)	18.2	1.3%
				Slope (0.63)		
422B	Canton fine sandy loam, 3 to 8 percent slopes, extremely stony	Very limited	Canton (80%)	Seepage, bottom layer (1.00)	25.8	1.9%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	Very limited	Canton (85%)	Seepage, bottom layer (1.00)	41.3	3.0%
				Slope (0.63)		
422D	Canton fine sandy loam, 15 to 25 percent slopes, extremely stony	Very limited	Canton (85%)	Slope (1.00)	7.7	0.6%
				Seepage, bottom layer (1.00)		

Septic Tank Absorption Fields— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part (MA613)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
625C	Hinckley-Urban land complex, 0 to 15 percent slopes	Very limited	Hinckley (50%)	Filtering capacity (1.00)	64.0	4.7%
				Seepage, bottom layer (1.00)		
			Slope (0.00)			
			Merrimac (5%)	Seepage, bottom layer (1.00)		
651	Udorthents, smoothed	Not rated	Udorthents (80%)		213.0	15.7%
			Urban land (20%)			
Subtotals for Soil Survey Area					865.2	63.7%
Totals for Area of Interest					1,359.3	100.0%

Septic Tank Absorption Fields— Summary by Map Unit — Worcester County, Massachusetts, Southern Part (MA615)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
1	Water	Not rated	Water (100%)		5.4	0.4%
3A	Scarboro and Walpole soils, 0 to 3 percent slopes	Very limited	Scarboro (40%)	Ponding (1.00)	12.8	0.9%
				Depth to saturated zone (1.00)		
				Filtering capacity (1.00)		
				Seepage, bottom layer (1.00)		
			Walpole (40%)	Depth to saturated zone (1.00)		
				Filtering capacity (1.00)		
	Seepage, bottom layer (1.00)					
52A	Freetown muck, 0 to 1 percent slopes	Very limited	Freetown (80%)	Depth to saturated zone (1.00)	6.5	0.5%
				Seepage, bottom layer (1.00)		
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	Very limited	Ridgebury (85%)	Depth to saturated zone (1.00)	7.4	0.5%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	Very limited	Ridgebury (80%)	Depth to saturated zone (1.00)	13.5	1.0%
73A	Whitman sandy loam, 0 to 3 percent slopes, extremely stony	Very limited	Whitman (70%)	Ponding (1.00)	31.2	2.3%
				Depth to saturated zone (1.00)		

Septic Tank Absorption Fields— Summary by Map Unit — Worcester County, Massachusetts, Southern Part (MA615)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
102C	Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes	Very limited	Chatfield (40%)	Depth to bedrock (1.00)	48.7	3.6%
				Seepage, bottom layer (1.00)		
				Slope (0.04)		
			Hollis (25%)	Depth to bedrock (1.00)		
				Seepage, bottom layer (1.00)		
				Slope (0.04)		
102E	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	Very limited	Chatfield (35%)	Slope (1.00)	7.3	0.5%
				Depth to bedrock (1.00)		
				Seepage, bottom layer (1.00)		
			Hollis (30%)	Depth to bedrock (1.00)		
				Slope (1.00)		
				Seepage, bottom layer (1.00)		
245B	Hinckley sandy loam, 3 to 8 percent slopes	Very limited	Hinckley (85%)	Filtering capacity (1.00)	40.4	3.0%
				Seepage, bottom layer (1.00)		
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	Very limited	Merrimac (80%)	Seepage, bottom layer (1.00)	21.8	1.6%
				Filtering capacity (1.00)		
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	Very limited	Sudbury (75%)	Depth to saturated zone (1.00)	25.8	1.9%
				Filtering capacity (1.00)		
				Seepage, bottom layer (1.00)		
305B	Paxton fine sandy loam, 3 to 8 percent slopes	Very limited	Paxton (80%)	Depth to saturated zone (1.00)	72.2	5.3%
				Slow water movement (0.46)		
307E	Paxton fine sandy loam, 15 to 35 percent slopes, extremely stony	Very limited	Paxton (70%)	Depth to saturated zone (1.00)	12.7	0.9%
				Slope (1.00)		
				Slow water movement (0.46)		
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	Very limited	Woodbridge (80%)	Depth to saturated zone (1.00)	9.1	0.7%

Septic Tank Absorption Fields— Summary by Map Unit — Worcester County, Massachusetts, Southern Part (MA615)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
312B	Woodbridge fine sandy loam, 3 to 8 percent slopes, extremely stony	Very limited	Woodbridge (70%)	Depth to saturated zone (1.00)	0.7	0.0%
420B	Canton fine sandy loam, 3 to 8 percent slopes	Very limited	Canton (85%)	Filtering capacity (1.00)	17.9	1.3%
				Seepage, bottom layer (1.00)		
422B	Canton fine sandy loam, 3 to 8 percent slopes, extremely stony	Very limited	Canton (75%)	Filtering capacity (1.00)	70.2	5.2%
				Seepage, bottom layer (1.00)		
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	Very limited	Canton (80%)	Filtering capacity (1.00)	18.7	1.4%
				Seepage, bottom layer (1.00)		
				Slope (0.63)		
422E	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	Very limited	Canton (75%)	Filtering capacity (1.00)	0.3	0.0%
				Slope (1.00)		
				Seepage, bottom layer (1.00)		
600	Pits, gravel	Not rated	Pits, gravel (100%)		5.1	0.4%
651	Udorthents, smoothed	Not rated	Udorthents (80%)		66.5	4.9%
			Urban land (20%)			
Subtotals for Soil Survey Area					494.1	36.4%
Totals for Area of Interest					1,359.3	100.0%

Septic Tank Absorption Fields— Summary by Rating Value		
Rating	Acres in AOI	Percent of AOI
Very limited	1,059.5	77.9%
Null or Not Rated	299.9	22.1%
Totals for Area of Interest	1,359.3	100.0%

Description

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Saturated hydraulic conductivity (Ksat), depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher