DUDLEY ECONOMIC DEVELOPMENT PARK

Feasibility Study

June 30, 2023

DUDLEY ECONOMIC DEVELOPMENT PARK FEASIBILITY STUDY

Memorandum

June 30, 2023

MassDevelopment

Amanda Gregoire
Vice President, Real Estate Services

Town of Dudley

Bill Scanlan
Town Planner

Jonathan Ruda
Town Administrator

VHB

Luke Mitchell
Senior Urban Planner

Michael Franceschi
Landscape/Urban Designer

Jennifer Nelson
Urban Planner

Jeff Black
Senior Project Engineer

Brittany Gesner
Director of Land Development, Worcester

Matthew Kealey
Senior Project Manager

Derek Masionis
Site/Civil Designer

Dean Anastas
Civil Designer

Bridget Hilgendorff
Environmental Scientist

CONTENTS

1 PROJECT BACKGROUND

1. PROJECT BACKGROUND

In December 2022, MassDevelopment (the Client) requested VHB's services to provide site due diligence and concept planning services for an Economic Development Park (the Project) in the Town of Dudley, Massachusetts (the Site).

The intent of the study was to assess the feasibility of an economic development project within an approximately 58-acre parcel of land in Dudley. The Project Team worked to identify the property's highest and best use with respect to light manufacturing land uses. The purpose of the project is to explore options for creating jobs in building the commercial tax base in Dudley, and benefit the broader region. The Project scope included environmental due diligence, high-level market analysis, site layout and development concepts, and considerations for site work, site access, and utilities.

2 MARKET CONDITIONS

2. MARKET CONDITIONS

Driving this feasibility study was Dudley's desire to strengthen and diversify its economic profile. VHB explored market conditions at a high level to identify the most appropriate land uses on the site, relative to real estate market and workforce conditions.

VHB identified the following market considerations:

Demographic Overview

Dudley has a population of approximately 11,800 residents, with a median age of 41.[1] The town has experienced modest population growth in recent years, indicating stability in the local community. The median household income in Dudley ($75,465) is below the state average ($89,026), indicating slower economic growth.

Industry and Employment

Manufacturing is the second highest employment sector in Dudley with 803 average monthly employees (13.1% of Dudley's employed population; in comparison, the statewide manufacturing accounts for only 8.9% of the employed population). Manufacturing companies in sectors such as machinery, fabricated metal products, and plastics have a strong presence. Supporting and expanding the manufacturing sector by leveraging the existing network of businesses and expertise can be a key focus for economic development.

Infrastructure and Transportation

Dudley's proximity to Interstate 395 can facilitate the movement of goods and services, providing a logistical advantage for businesses. Further investment in transportation infrastructure, such as road maintenance and improvements, could strengthen connectivity and attract businesses seeking efficient and reliable transportation networks.

Education and Workforce

Dudley is home to Nichols College, a private four-year institution specializing in business and liberal arts education. The college contributes to the local economy through employment and attracts students and faculty from diverse backgrounds. Collaborative initiatives between local businesses and educational institutions can foster workforce development, ensuring a skilled labor pool for growing industries.

[1] U.S. Census Bureau (ACS 2017-2021). Census QuickFacts.

Market Opportunities

Biomanufacturing: In recent years, Worcester has created a favorable environment for healthcare and biomanufacturing companies looking to expand from Boston and Cambridge. WuXi Biologics and Galaxy Life Sciences are driving the creation of life sciences parks like The Reactory. Dudley's proximity to Worcester also provides development opportunities in the healthcare sector. Collaborations with healthcare providers and related services—including medical device manufacturing—can spur commercial development.

Warehousing: The rise of e-commerce—especially since the COVID-19 pandemic—has significantly increased demand for warehousing in Worcester County. With the increasing popularity of online shopping and the expectation of faster delivery times, there is a growing demand for last-mile warehousing and fulfillment centers to support the storage and distribution of products. Developers often seek flex space that allows for easy expansion or contraction of inventory space to meet seasonal demands or changing market conditions.

Market Challenges

Infrastructure: Transportation routes to and from Worcester present a challenge to industrial development on the Site. Roadway improvements along Route 197, such as additional signage and designated turn lanes, can improve the efficiency and safety of commercial transport.

Workforce Development: A skilled local workforce is crucial for attracting new businesses and supporting existing ones. Dudley's smaller labor force is a liability with regard to market appeal. While Nichols College provides quality post-secondary education and opportunities for professional development, the lack of degree programs in manufacturing, biotech, and related fields make the area less appealing for younger talent pools that drive innovation in these sectors. Regional collegiate partnerships with schools that have educational opportunities specifically designed for a career in manufacturing, biotech, and business management (for example Worcester Polytechnic Institute, Worcester State University, Quinsigamond Community College, etc.,), in addition to continuing education opportunities can address skill gaps in Dudley.

Conclusion

Dudley possesses several strengths and opportunities for economic development, including a strong manufacturing sector, collaborative opportunities with local education centers, and strategic transportation links. To maximize its potential, the town should focus on upgrading connections with Interstate 395, strengthening workforce development initiatives, and revitalizing its downtown area. By leveraging these opportunities and addressing challenges, Dudley can strengthen its position relative to continued commercial and industrial development.

3 SITE CONSTRAINTS

3. SITE CONSTRAINTS

The 57.8-acre Site is located along West Main Street (Route 197) and is owned by the Town of Dudley. The Site is mostly forested, has sloping topography, and contains multiple intermittent streams and pockets of wetland. It is bounded by West Main Street to the north, Knollwood Road to the east, and both residential and undeveloped forested areas to the south and west.

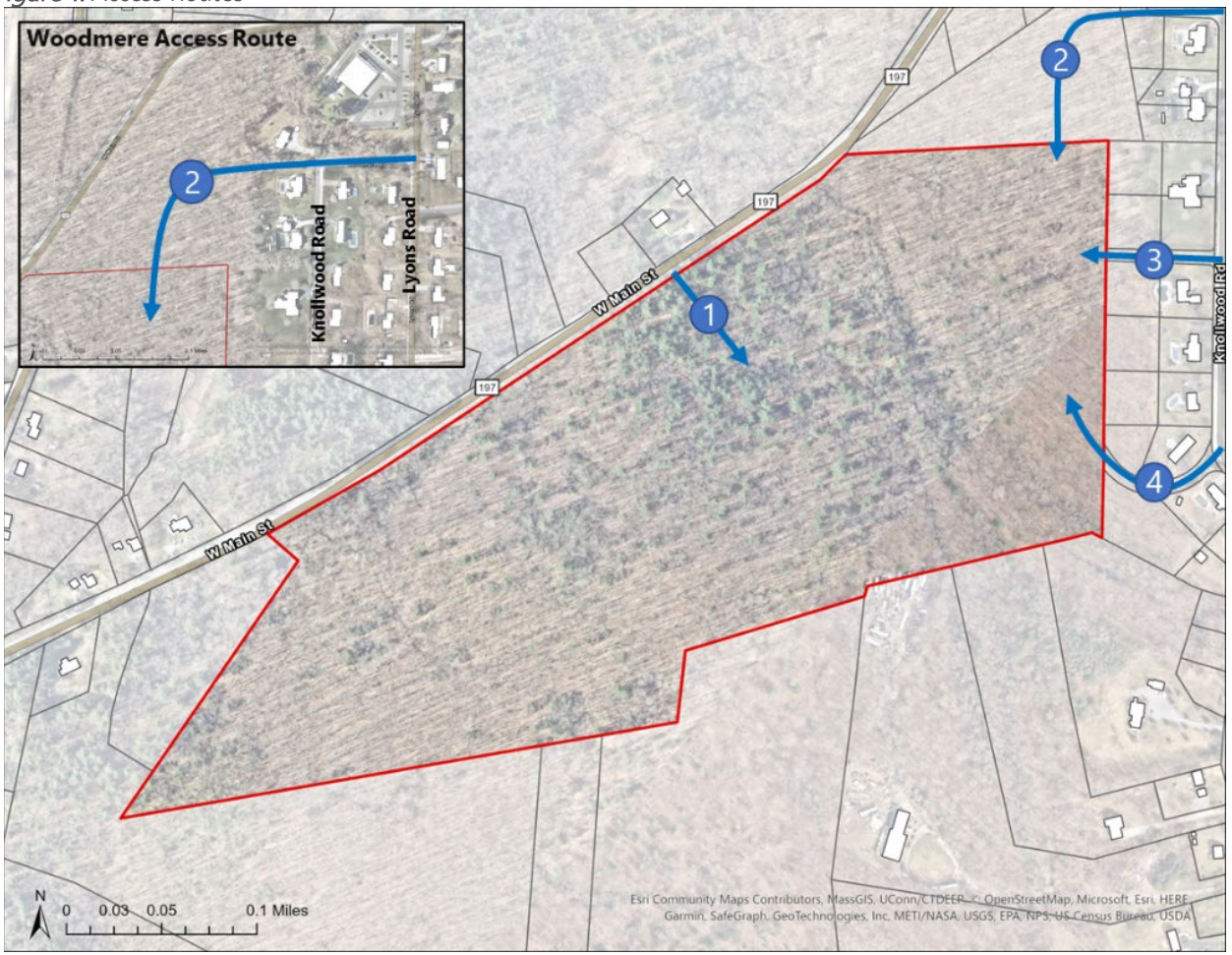
Access and Traffic

VHB identified four access routes (**Figure 1**) that could service the park:

1. Entrance from Route 197
2. Entrance from Woodmere Road
3. Entrance from Knollwood Road (middle)
4. Entrance from Knollwood Road (far end).

All options possibilities would require regrading, construction of new bridges, and installation of proper signage to provide adequate access for tractor-trailers and other commercial vehicles.

Figure 1. Access Routes



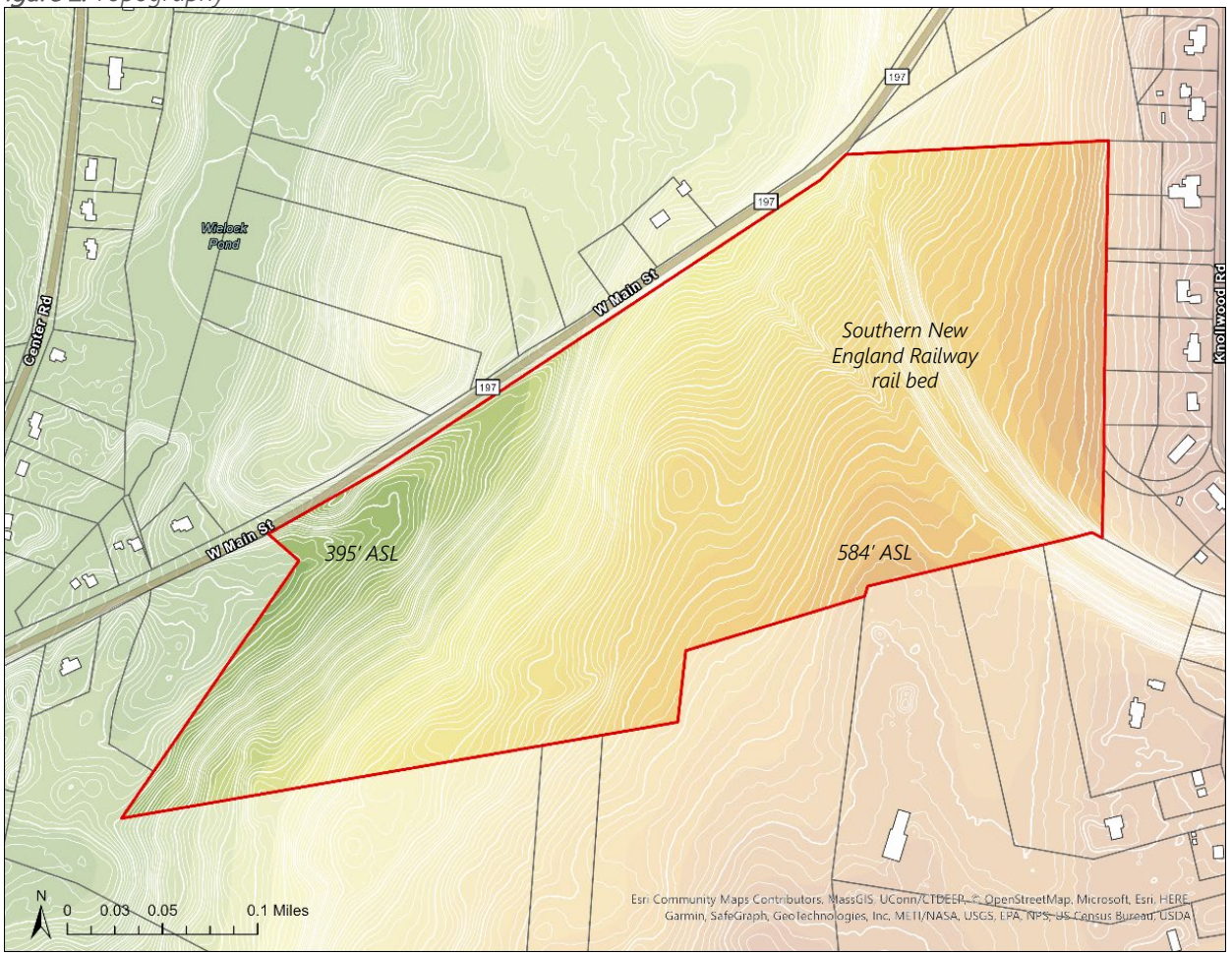
Four potential access routes could serve the economic development park.

Topography

Existing grading of the Site consists of continuous steep slopes. The Site is at its highest elevation at the southeast corner of the property line, at elevation ±596', based on North American Vertical Datum of 1988 (NAVD 1988). From the high point, the Site slopes downward towards Route 197, where elevations vary from ±506' (to the east) and ±480' (to the west) at the property limits. The Site generally slopes at 14% from the southern property line to the northern property line.

The Site also contains a man-made ditch identified as the rail bed for the incomplete Southern New England Railway. Chartered and plotted in 1910, the Southern New England Railway was anticipated to connect Woonsocket, RI to Palmer, MA. Over 100 years later, the remnant of the rail bed carves thirty feet into the hillside on the Dudley Site. An intermittent stream now flows along the deepest sections and is culverted under Route 197.

Figure 2. Topography

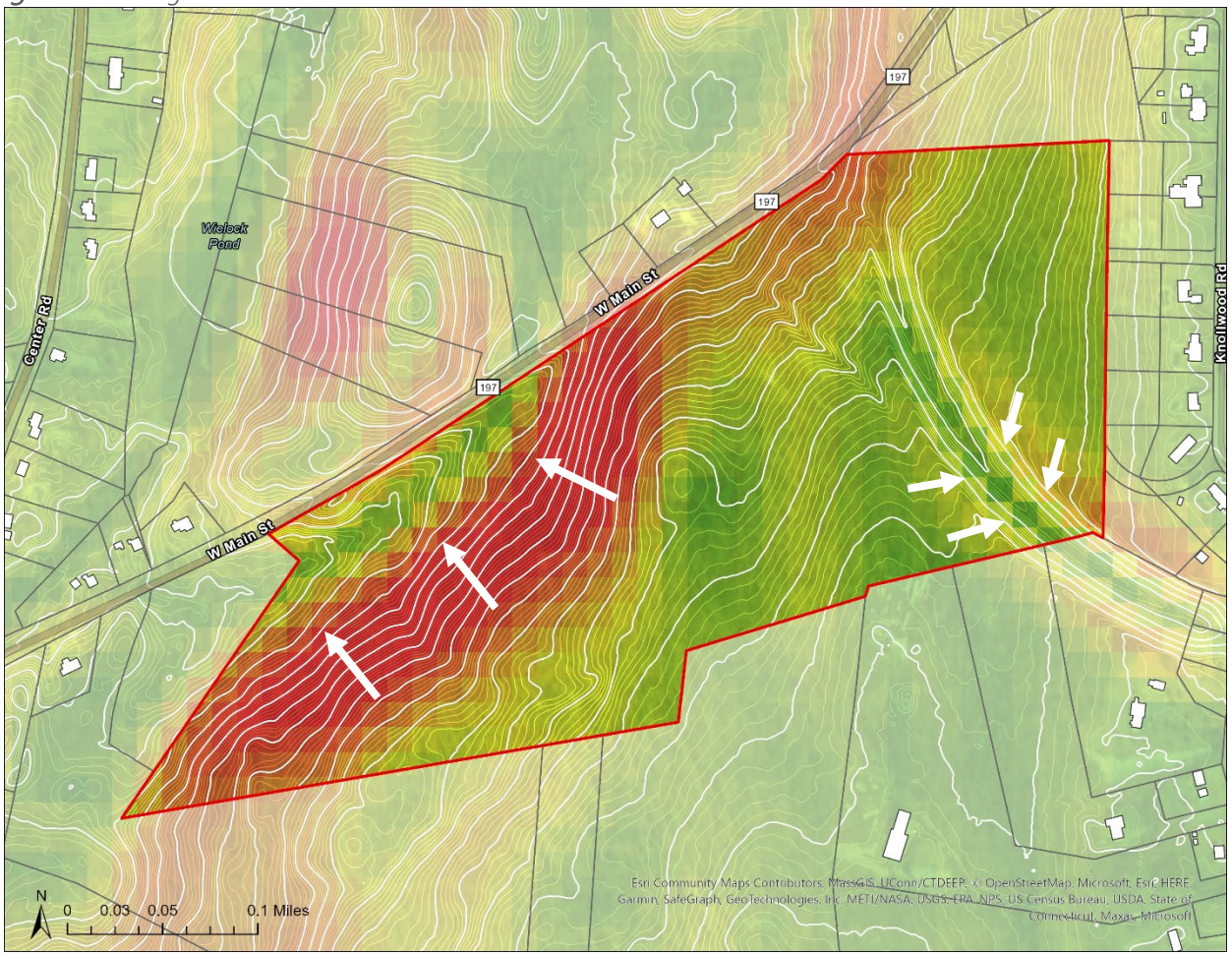


The elevation change from southeast to northwest is roughly 200 feet. Man-made changes to the landscape include the incomplete Southern New England Railway.

The Site has two areas with extreme grade change (**Figure 3**). The hill on which the Site is located has a maximum slope of 20°, located on the western half of the Site and facing Route 197.

The Southern New England Railway ravine slope maxes out around 10°.

Figure 3. Grading



The most prominent slope, facing Route 197, maxes out at 20°. Slope on each side of the Southern New England Railway ravine is 10°.

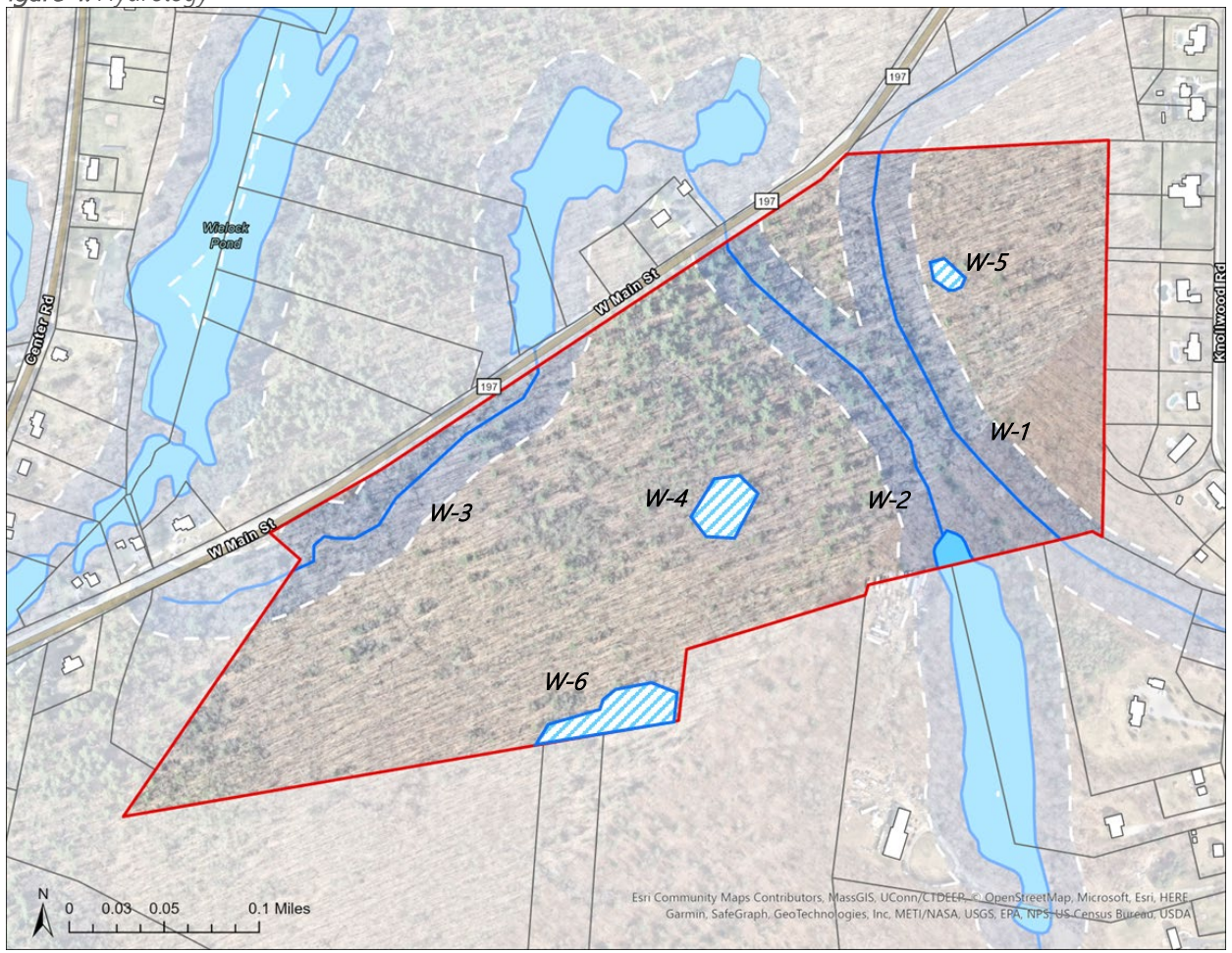
Hydrology

Public USGS and DEP GIS data (collected from MassGIS) identified three intermittent streams that cross the center of Site and one wetland that breaches the southern parcel boundary.

Additional hydrological features were observed during the project kick off, and their approximate locations were later mapped by a VHB wetland scientist (**Figure 4**). Based on preliminary field observations, all wetland areas within the Site would be considered jurisdictional under some combination of the Clean Water Act (CWA), the Massachusetts Wetlands Protection Act (WPA), and the Dudley Wetlands Protection Code (the Bylaw).

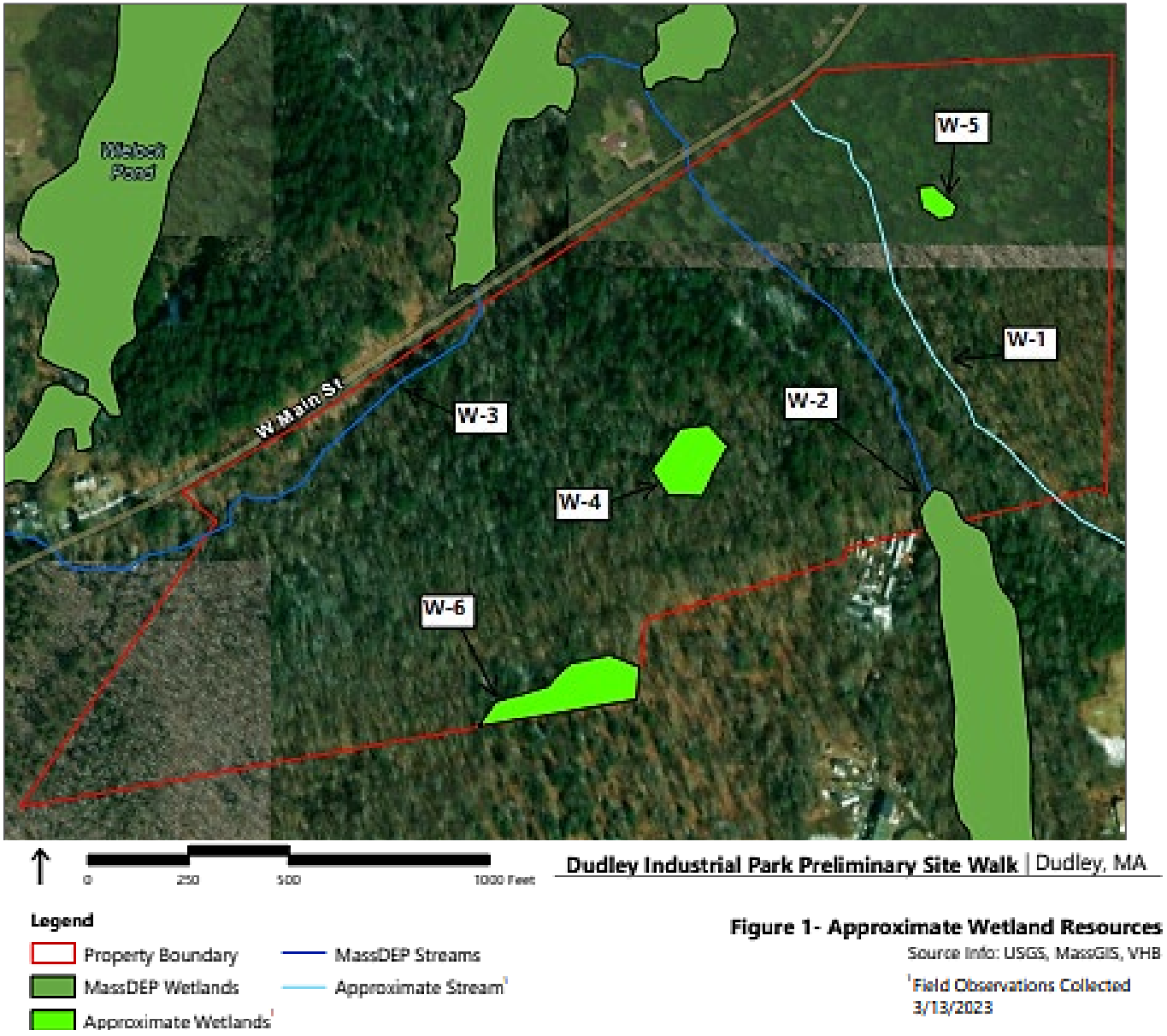
The WPA and the Bylaw require a 100-foot buffer zone extending from intermittent stream banks, bordering vegetated wetlands (BVWs), and isolated wetlands. No activity can take place within these buffer zones without a permit from Dudley's Conservation Commission. In addition, the Bylaw mandates a 75-foot no-build zone and a 50-foot no-disturb zone from the wetland line.

Figure 4. Hydrology



Three intermittent streams and four wetlands exist within the Site's boundaries. Wetlands 1, 2, and 3 are documented by MassDEP. Wetlands 4, 5, and 6 (represented by hatched blue and white polygons) represent wetland resource areas identified by VHB's wetland scientist.

Figure 5. Site walk documentation with additional wetlands identified



Wetland 1: Wetland 1 includes an intermittent stream and an associated Bordering Vegetated Wetland (BVW). The stream flows within the Southern New England Railway rail bed on the eastern side of the parcel. On the day of the site walk, the stream was between one and two feet wide. The stream extended offsite to the south of the parcel, where it was approximately three to five feet wide and contained stagnant water. BVW extended approximately one to fifteen feet from the channel edge. Based on field observations, the wetland appears to be jurisdictional under the CWA, the WPA, and the Bylaw. Under the WPA and the Bylaw, a 100-foot buffer zone extends from the stream bank and BVW. Under the Bylaw, an additional 50-foot no-disturb zone and 75-foot no-build setback extend from the bank and BVW.

Wetland 2: Wetland 2 includes an intermittent stream and an associated BVW. The stream flows from south to north, beginning within a wetland on the southeastern border of the parcel, and exiting the parcel through a culvert beneath West Main Street. The stream was flowing on the day of the site walk and was generally between one and five feet wide, with a distinct central channel and areas of diffuse flow as it exited the BVW at the southern end of the parcel. BVW appeared to extend approximately one to twenty feet from the channel. BVW extended north along the stream until reaching the center of the parcel. Based on field observations, the wetland appears to be jurisdictional under the CWA, the WPA, and the Bylaw. Under the WPA and the Bylaw, a 100-foot buffer zone extends from the stream bank and BVW. Under the Bylaw, an additional 50-foot no-disturb zone and 75-foot no-build zone extend from Bank and BVW.

Wetland 3: Wetland 3 includes an intermittent stream and an associated BVW. The stream flows from northeast to southwest from a culvert beneath West Main Street and continues offsite in the northwest corner of the parcel. The stream was flowing on the day of the site walk and was generally between one and seven feet wide with a distinct central channel. BVW extended approximately thirty feet from the channel. Based on field observations, the wetland appears to be jurisdictional under the CWA, the WPA, and the Bylaw. Under the WPA and the Bylaw, a 100-foot buffer zone extends from the stream Bank and BVW. Under the Bylaw, an additional 50-foot no-disturb zone and 75-foot no-build zone extend from Bank and BVW.

Wetland 4: Wetland 4 is a small isolated vegetated wetland (IVW) located within a forested area at the center of the Site. The IVW was located within a topographic depression and contained saturated soil conditions, standing water within the soil test hole, moss trim lines, and wetland vegetation. Based on the field observations, the wetland is likely jurisdictional as an isolated wetland under the CWA and the Bylaw. Under the Bylaw, a 100-foot buffer zone, 50-foot no-disturb zone, and 75-foot no-build zone extend from the IVW.

Wetland 5: Wetland 5 is a small isolated vegetated wetland (IVW) located within a forested area in the northeast corner of the Site. The IVW was located within a topographic depression and contained saturated soil conditions, high water table, and wetland vegetation. Based on the field observations, the wetland is likely jurisdictional as an isolated wetland under the CWA and the Bylaw. Under the Bylaw, a 100-foot buffer zone, 50-foot no-disturb zone, and 75- foot no-build zone extend from the IVW.

Wetland 6: Wetland 6 is a vegetated wetland located centrally along the southern border of the Site. The wetland extended offsite, south of the parcel. The portion of the wetland that extended offsite was not investigated during the site walk and the wetland could not be confirmed as an isolated or bordering wetland. The wetland contained saturated soil conditions, soils with a depleted matrix, standing water, and wetland vegetation. Based on the field observations, the wetland is likely jurisdictional under the CWA, WPA and the Bylaw. Under the Bylaw, a 100-foot buffer zone, 50-foot no-disturb zone, and 75-foot no-build zone extend from the wetland line.

Utilities

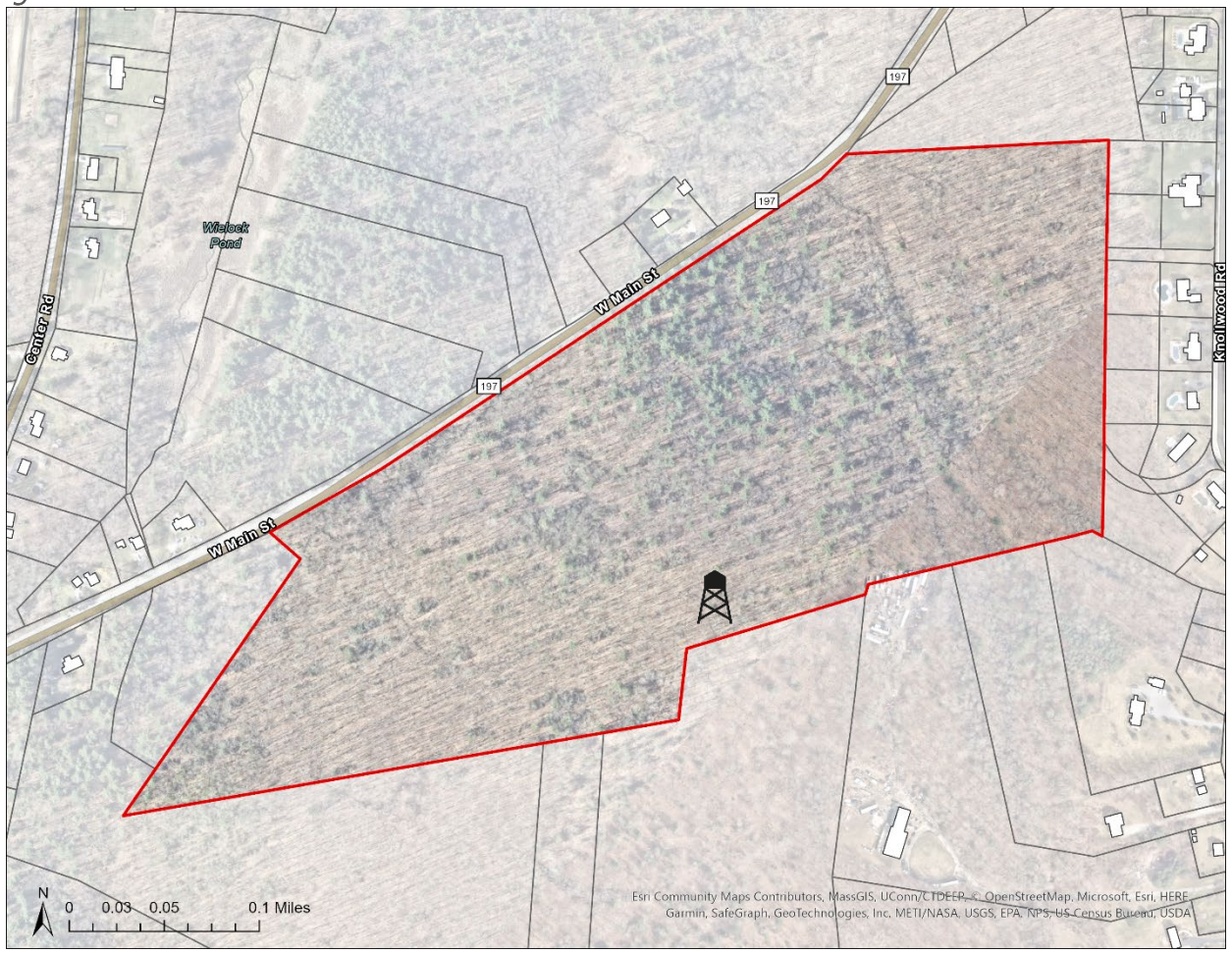
No utilities currently serve the site (**Figure 6**).

A water/sewer line ends at the courthouse to the northeast, just outside of the Site. New pipes could be extended to service the economic development park.

A second option currently being explored by the Water Department is installing a new gravity-fed water system using an aquifer source near Lyons Road. If the source is established off Lyons Road, the Water Department would likely install a fill tank on the top of the hill within the economic development park.

See "Utilities" in section 4: Concept Planning for additional details concerning utility access and capacity.

Figure 6. Utilities



The Site is not currently served by water or sewer. The water tower icon represents a possible location of a future tank, if a new aquifer source is located off Lyons Road.

Zoning

The Site is in both the Light Industrial 43 (LI-43) and Residential 87 (RES-87) Zoning Districts (**Figure 7**). District regulations are outlined in **Table 1**.

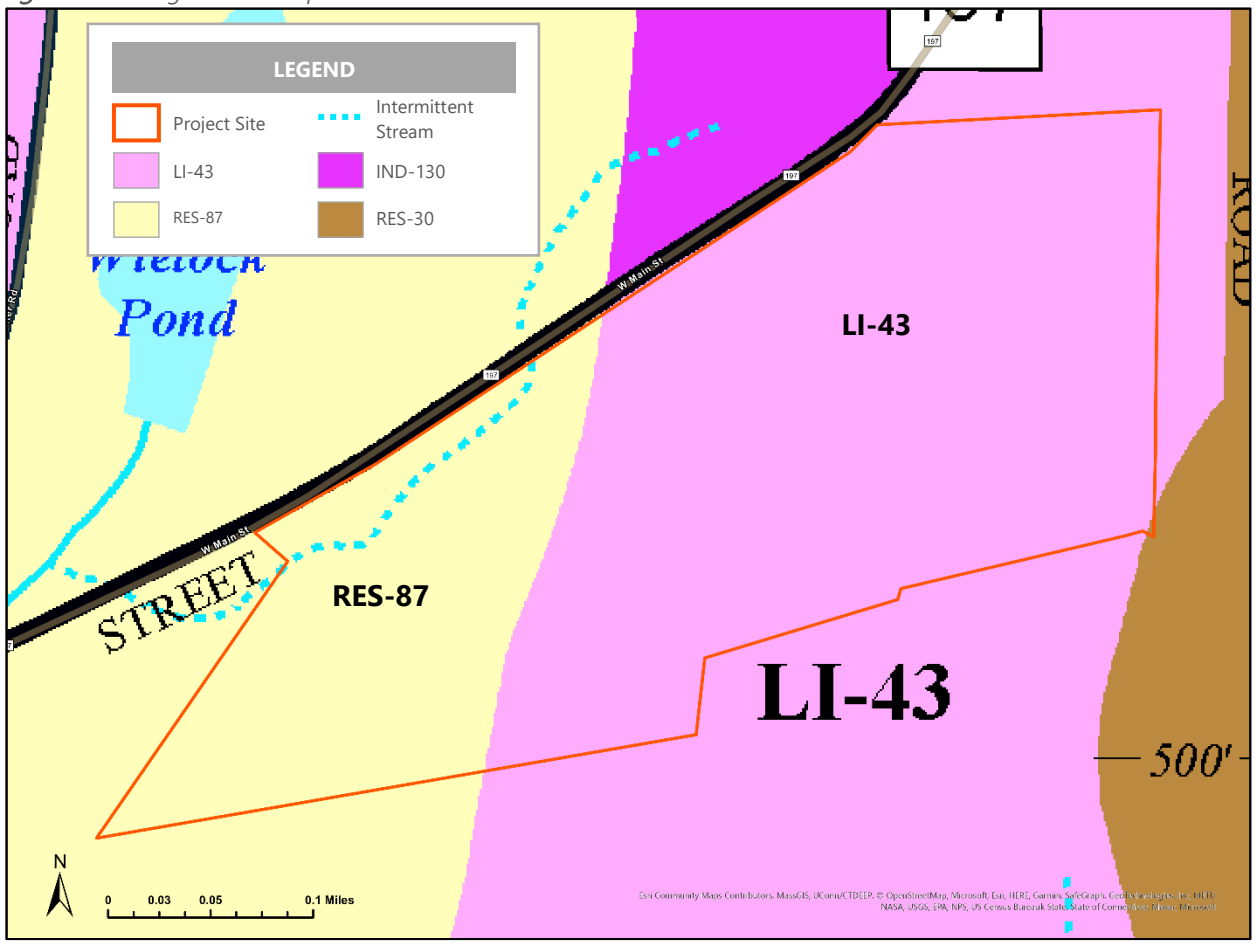
Table 1. Zoning regulations

Regulations	**LI-43** Light Industrial	**RES-87** Residential, Single Family
Min Lot Area	43,560 SF	87,000 SF
Min Lot Frontage	100 Feet	150 Feet
Min Front Yard	30 Feet	40 Feet
Min Side Yard	30 Feet	25 Feet
Min Rear Yard	30 Feet	25 Feet
Max Lot Coverage	65%	20%
Max Building Height	45 Feet	35 Feet

Adjacent zoning districts include Industrial 130 (IND-130) and Residential 30 (RES-30).

To increase the feasibility of this project, VHB recommends rezoning the entire parcel as Light Industrial 43.

Figure 7. Zoning district map



The Site is in the LI-43 and RES-87 Districts.

4 CONCEPT PLANS

4. CONCEPT PLANS

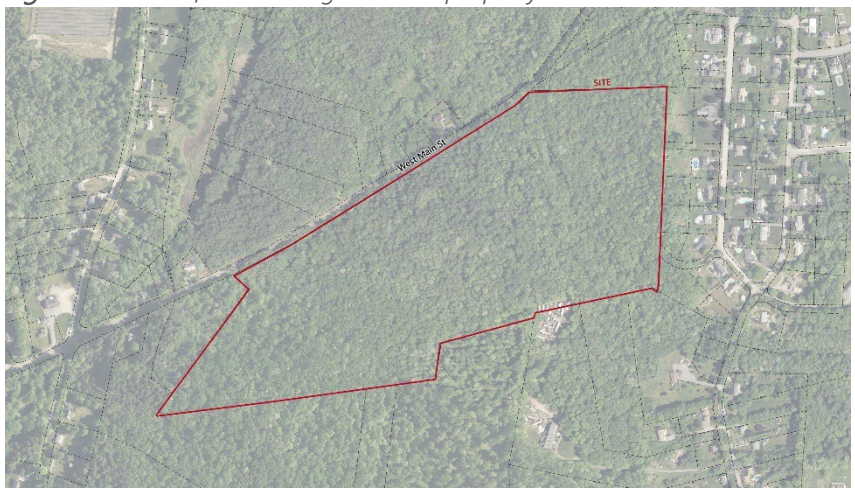
Based on the market considerations, due diligence, and dialogue with town staff, VHB prepared three alternative site concepts.

Proposed Grading

The proposed grading for each concept was designed to mimic the existing topography to the maximum extent practicable. The overarching goal of the proposed grading is to balance bulk earthworks on-site, minimizing the amount of material that needs to be exported from or imported onto the Site. Raw materials will need to be brought onto the Site to support construction, including gravel, asphalt, concrete, etc. However, the bulk soil will, ideally, remain on-site to allow for generally balanced earthworks.

Typical design standards were followed to develop the grading for all concepts. Slopes along access roads vary from 2%, at driveway entrances and intersections to 7% maximum, along linear sections of the road. Parking lot slopes do not exceed 5% and all pavement at loading areas is assumed four (4) feet below the established finished floor elevation. Off-grading is mostly at 3:1 slopes and does not exceed slopes of 2:1. Areas for stormwater management have been identified but are just approximate and are not fully designed.

Figure 8. Views of the existing Site with property lines outlined in red



Plan view of existing conditions

Bird's eye view of existing conditions.

Utilities

In February 2023, VHB met with representatives from the Town of Dudley's public offices to determine utility availability and capacity near the project Site. From these conversations, VHB concludes the following utility improvements must be fulfilled for each concept to achieve the capacity required to support light manufacturing on the Site.

Water

There is currently no public water service available along the frontage of the Site. Water could be supplied to the Site in a variety of ways including, but not limited to:

- Extend public water along West Main Street (Route 197)
    - Approximate ½ - mile extension of existing service to the Site
    - DOT Access Permit since West Main Street (Route 197) is state highway
    - Pressure analysis for existing town service
    - Confirm whether fire storage tanks would be required on-Site
- Extend public water from Knollwood Road
    - Neighborhood directly abuts the Site
    - Utility easement through abutting residential property
    - Pressure analysis for existing town service
    - Confirm whether fire storage tanks would be required on-Site
- Install new public well
    - Determine aquifer source and public well location
    - Public well design will require state review and approval via Massachusetts Department of Environmental Protection (MassDEP)
    - Fire storage tanks likely required on-Site

Sewer

Based on Massachusetts Title V regulations, the Project (assumed warehouse with no cafeteria) is expected to generate 15 gallons per day (GPD) of wastewater per employee. Therefore, at a maximum buildout of 375,000 square feet, the Project is likely to generate up to:

- 1 employee per 2,000 square feet = 188 employees = 2,820 GPD
- 1 employee per 1,500 square feet = 250 employees = 3,750 GPD
- 1 employee per 1,000 square feet = 375 employees = 5,625 GPD

There is currently no public sanitary sewer available along the frontage of the Site. Sewer could be supplied to the Site in a variety of ways including, but not limited to:

- Extend public sewer along West Main Street (Route 197)
    - Approximate ½ - mile extension of existing service to the Site
    - DOT Access Permit since West Main Street (Route 197) is state highway
    - Existing sewer capacity analysis
    - Pump station may be required since Site is lower in elevation
- Extend public sewer from Knollwood Road
    - Neighborhood directly abuts the Site
    - Utility easement through abutting residential property
    - Existing sewer capacity analysis
    - Pump station may be required since Site is lower in elevation
- Install on-Site private sewer disposal
    - The Project is anticipated to generate less than 10,000 gallons per day of sewer flow and therefore can be handled via septic system
    - Soil analysis – test pits and percolation tests to determine leach field feasibility/location
    - Septic system design will require state review and approval via Massachusetts Board of Health

Stormwater

The existing 57.8-acre Site is entirely forested, pervious area that slopes up at 14% to the southern portion of the Site. Any development on the Site would result in significant addition of impervious area to the Site. Accordingly, any site development would require the design of a comprehensive stormwater management system to collect, treat and mitigate stormwater runoff in accordance with the Massachusetts Stormwater Handbook. Due to the existing steep slopes on the Site, available land area for surface stormwater basins will be limited and the Project will likely be dependent upon structured subsurface stormwater solutions. VHB has noted on the Site concepts approximate areas for stormwater management solutions, however the final stormwater management solution will be subject to verification by further design.

Electric

National Grid is the electricity provider in the Town of Dudley. There is existing overhead electric service available to the Site via West Main Street (Route 197). VHB recommends confirming the capacity of this service with the utility provider to determine its ability to support the proposed development on-Site.

Telecommunications

Charter is the telecommunications provider in the Town of Dudley. There appears to be is existing overhead service available to the Site along West Main Street (Route 197). VHB recommends confirming the availability of telecommunications services with the utility provider to determine its ability to support the proposed development on-Site.

Natural Gas

National Grid is the natural gas provider in the Town of Dudley. No natural gas gate valves are visible on Google Earth along West Main Street (Route 197). VHB recommends confirming the availability of natural gas with the utility provider to determine its ability to support the proposed development on-Site.

Permitting

All concepts require permitting for alterations to the existing wetlands and access paths from the Route 197, a state highway.

Federal

EPA NPDES

All Concepts would disturb more than one acre of land and therefore falls within the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) jurisdiction. Prior to the start of construction, a Stormwater Pollution Prevention Plan (SWPPP) shall be prepared and Notice of Intent shall be filed with the EPA in accordance with the NPDES CGP regulations.

Army Corps of Engineers

All Concepts would involve fill within wetlands and/or stream crossings and therefore falls within the jurisdiction of the Army Corps of Engineers (ACOE) Massachusetts General Permit (MAGP) under GP 23. *Linear Transportation projects and wetland/stream crossings (Authorities §10 & §404)*. Prior to the start of construction, a Pre-Construction Notification (PCN) will be required as a result of the project exceeding the threshold of five thousand (5,000) SF of fill within wetland resource areas and given the extent of tree clearing required. If the Project results in more than one acre of fill within wetland resource areas, an Individual Permit will be required. The ACOE may consider the Project to be jurisdictional under GP. 17 *Residential, commercial, and industrial developments and recreational facilities (Authorities §404)*. Under these circumstances, the Project will require an Individual Permit if it results in the loss of more than half (½) an acre of wetland resource areas.

U.S. Fish and Wildlife Service

The Site is jurisdictional under Section 404 of the Clean Water Act (CWA) and will therefore require Section 7 Consultation with the United States Fish and Wildlife Service (USFWS) under the Endangered Species Act. Due to potential impacts on endangered and threatened species, resulting from the proposed fill within wetlands and tree clearing, the action will likely result in a "May Affect: Likely to Adversely Affect" determination. This determination will require formal consultation with USFWS.

Commonwealth of Massachusetts

MEPA

All Concepts would require review under the Massachusetts Environmental Policy Act (MEPA) at an Environmental Impact Review (EIR) level because (at a minimum) it is anticipated to create more than ten acres of new impervious area and will also require a MassDOT Access Permit due to new direct access off of Route 197 under state highway layout. The Project may exceed additional MEPA review thresholds (parking, vehicular trips, new land disturbance, etc) and may also be subject to additional state actions (state funding, MassDEP permits, etc.). MEPA review for the Project will be subject to MEPA's environmental justice (EJ) protocol because the Site is located within a mapped environmental justice community for its minority population.

MassDOT Access Permit

All Concepts would require an access permit from the Massachusetts Department of Transportation (MassDOT) because it will require new direct access from Route 197 which is within state highway layout.

MassDEP

Concepts 1A and 1B will require the filing of a Notice of Intent (NOI) for a limited project under 310 CMR 10.53(e) with the Massachusetts Department of Environmental protection (MassDEP) in order to obtain an Order of Conditions (OOC) because more than five thousand (5,000) SF of fill within Bordering Vegetated Wetlands (BVW) and Isolated Vegetated Wetlands (IVW) is proposed. The NOI should include an alternatives analysis that discusses why alternative means of access to the Project Site that do not involve fill within wetlands are not available, in addition to associated wetland replication and mitigation plans. The Project will also require an Individual Water Quality Certification from MassDEP as more than five thousand (5,000) SF of fill within wetland resource areas is proposed and federal permits are required.

Town of Dudley

Zone Change by Town Meeting

A portion of the Site is zoned Res-87, which prohibits all industrial uses. A zone change at Town Meeting will be required to allow for permitting and construction of all Concepts as proposed.

Planning Board

All Concepts would require Major Site Plan Review through the Town of Dudley Planning Board since it exceeds the threshold of five thousand (5,000) GSF of building construction and ten (10) parking spaces.

Conservation Commission

Concepts 1A and 1B would require a Waiver Request with the Dudley Conservation Commission as the Project proposes fill within BVW and IVW. Per the approval of the Conservation Commission, the Project will then require the filing of a Notice of Intent (NOI) with the Dudley Conservation Commission as state and locally jurisdiction resource areas, in addition to their associated buffer zones, will be impacted. The NOI should include an alternatives analysis providing reasonable alternative means of access to the Project Site, in addition to associated wetland replication and mitigation plans.

CONCEPT 1:
Maximum Yield

The intent of Concept 1A and 1B was to provide the largest building footprint on the Site while avoiding the wetland system along the southern property line and intermittent stream along the northern property line.

Both concepts assume filling the 23,000-square-foot isolated wetland in the middle of the Site. Concept 1A yields a 230,000-square-foot building at a finished floor elevation of 520'. Concept 1B yields a 300,000-square-foot building at a finished floor elevation of 520' but requires a 1,000-linear-foot retaining wall with a maximum height of 35'. In both concepts, the building, loading and parking area are cut into the slope and require substantial off grading on both the north and south sides of the proposed development.

A separate 75,000-square-foot building at a finished floor elevation of 584' is located along the eastern property line which is also cut into the slope allowing for a natural berm from the abutting residential properties. This assumes filling the 5,000-square-foot isolated wetland system just west of the development.

CONCEPT 1A: Maximum Yield

Building Footprint (square feet)	Cut (cubic yards)	Fill (cubic yards)	Total Earthworks (cubic yards)
305,000	415,000	395,000	20,000 (Cut)

Figure 9. Plan view of Concept 1A with property outline in red, wetlands in dark blue, 100ft buffers in light blue

Figure 10. Bird's eye view of Concept 1A with property outline in red, wetlands in dark blue, 100ft buffers in light blue

CONCEPT 1B:
Maximum Yield with Retaining Wall

Building Footprint (square feet)	Cut (cubic yards)	Fill (cubic yards)	Total Earthworks (cubic yards)
375,000	420,000	515,000	95,000 (Fill)

Figure 11. Plan view of Concept 1B with property outline in red, wetlands in dark blue, 100ft buffers in light blue

Figure 12. Bird's eye view of Concept 1B with property outline in red, wetlands in dark blue, 100ft buffers in light blue.

Access and Traffic

As shown on the Figures 9-14, the Site Driveway is located on W. Main Street (Route 197) across from an existing residential driveway for all three concepts. Based on the assumption that a traffic signal would not be warranted at the Site Driveway, it is important to evaluate sight distance approaching the Site (Stopping Sight Distance) and exiting the Site (Intersection Sight Distance). Logistically, it is not feasible to conduct formal sight distance measurements at this time due to the existing vegetation and slopes along the site frontage. As such, a qualitative desktop assessment has been conducted to get a preliminary understanding of any potential concerns related to site access.

Based on the currently proposed location of the Site Driveway, the existing vertical and horizontal profiles of W. Main Street (Route 197) do not appear to pose any major concerns based on available imagery. The curvature W. Main Street (Route 197) east of the Site Driveway provides a benefit for Intersection Sight Distance (ISD) looking to the east. Under existing conditions, the slopes along the site frontage, particularly to the west of the proposed driveway location, would likely impact ISD. Regrading a portion of the site will likely be necessary to flatten those slopes to achieve desirable sight lines for vehicles exiting the Site. In terms of Stopping Sight Distance (SSD), W. Main Street is relatively straight and flat along this section of the site frontage. As such, it appears that no significant obstructions exist that would inhibit SSD. More detailed sight distance measurements in accordance with the American Association of State Highway and Transportation Officials (AASHTO) guidelines will need to be conducted once a final concept plan has been chosen.

The internal site roadways for Concepts 1A and 1B are essentially identical in terms of site circulation. One internal intersection is created with the site driveway just east of the larger building. This intersection includes the site driveway, the connector roadway to the eastern building, two drive aisles for the larger building parking lot, and the outer circulation road for the larger building. Based on this layout, VHB recommends placing the two drive aisles and the connector roadway under STOP sign control. In addition, due to the curvature of the internal roadways throughout the site and the existing slopes along these roadways, it will be important to ensure that adequate sight lines are provided. It should also be noted that based on the trip generation projections, VHB would not anticipate vehicle queues to back up into the internal intersection.

The rate at which any development generates traffic is dependent upon several factors including size, location, and concentration of surrounding developments. The number of vehicle-trips to be generated by the potential development was estimated based on trip generation rates published by the Institute of Transportation Engineers (ITE). ITE land use code 140 (Manufacturing) was determined to be the most appropriate land use code for this development. **Table 2** summarizes the projected trip generation associated with the proposed industrial development based on the standardized ITE rates.

As shown in Table 2, Concept 1A could generate, on average, 1,352 daily trips, with weekday morning peak hour averaging 196 trips and weekday evening peak hour averaging 248 trips.

In contrast, Concept 1B could generate, on average, 1,616 daily trips, with weekday morning peak hour averaging 238 trips and weekday evening peak hour averaging 309 trips.

With this level of trip generation, VHB does not anticipate the need for exclusive turning lanes or installation of a traffic signal at the driveway intersection with Route 197. However, daily traffic counts will need to be taken along Route 197 to verify and a formal traffic signal warrant analysis may be needed.

Table 2. Trip Generation Summary

Time Period	Movement	Concept 1A [a]	Concept 1B [b]
Weekday Daily [c]	Enter	676	808
	Exit	676	808
	Total	1,352	1,616
Weekday Morning Peak Hour [d]	Enter	149	181
	Exit	47	57
	Total	196	238
Weekday Evening Peak Hour	Enter	77	96
	Exit	171	213
	Total	248	309

Source: VHB; ITE Trip Generation, 11th Edition; Institute of Transportation Engineers [ITE]; Washington, D.C. [2021]

a Based on ITE land use code 140 (Manufacturing) for 305,000 sf

b Based on ITE land use code 140 (Manufacturing) for 375,000 sf

c vehicles per day

d vehicles per hour

It should also be noted that these preliminary trip generation calculations were based on manufacturing use. If the development were to service a less intense use (like general warehousing, for example) the trip generation would be expected to be approximately 60% lower than the projections summarized in Table 2.

CONCEPT 2: Wetland Preservation Approach

The intent of Concept 2 was to provide multiple developments that avoid impacts to any environmental features on the Site.

There are four proposed buildings totaling 244,600 square feet with adequate parking and loading areas for each building. Finished floor elevations at each building were established based on the elevation of the adjacent wetland systems on the Site. This results in a substantial fill across the entire front of the Site.

CONCEPT 2:
Wetland Preservation

Building Footprint (square feet)	Cut (cubic yards)	Fill (cubic yards)	Total Earthworks (cubic yards)
244,600	80,000	650,000	580,000 (Fill)

Figure 13. Plan view of Concept 2 with property outline in red, wetlands in dark blue, 100ft buffers in light blue.

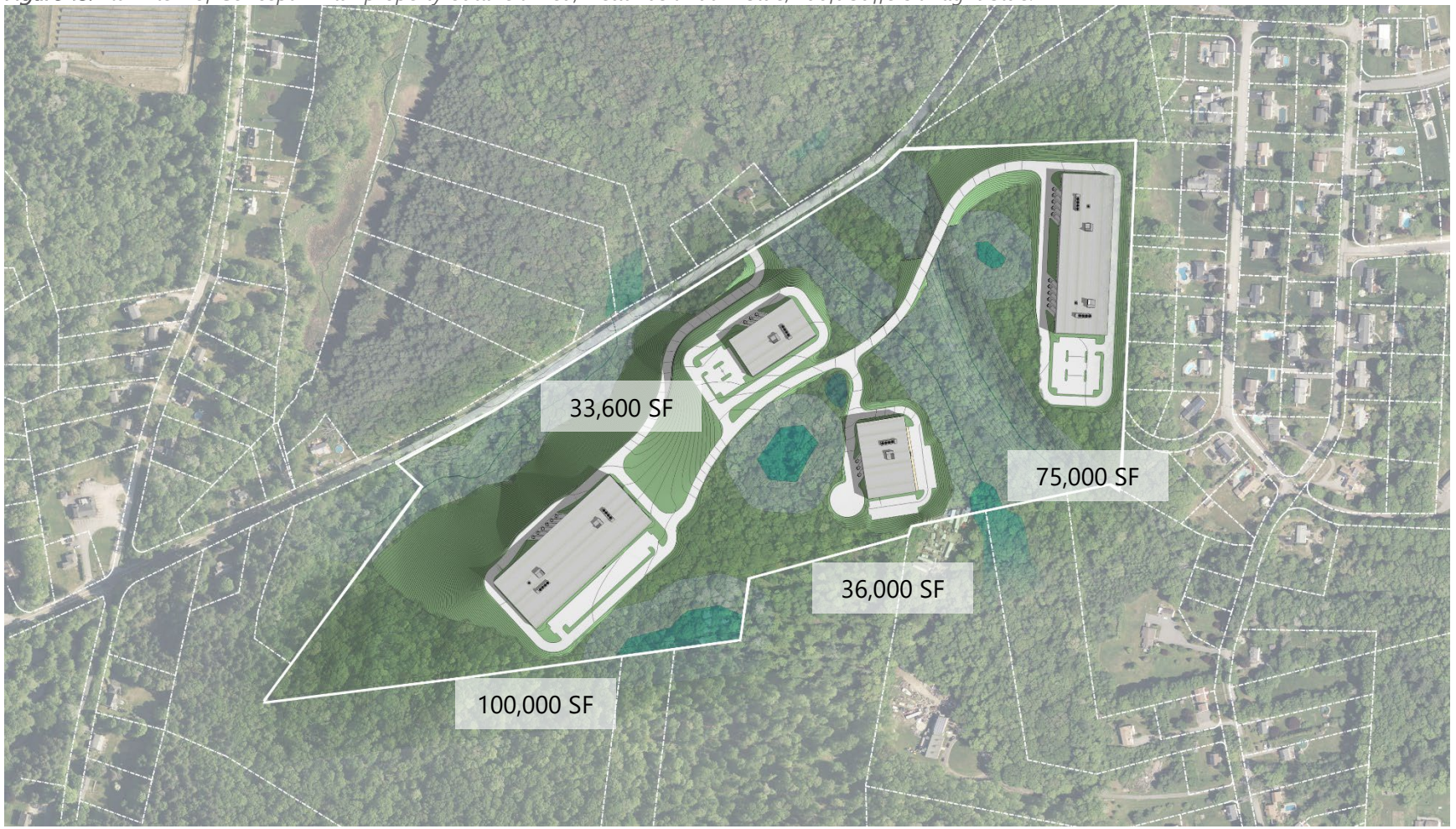


Figure 14. Bird's eye view of Concept 2 with property outline in red, wetlands in dark blue, 100ft buffers in light blue

Access and Traffic

The internal roadway layout of Concept 2 is significantly different than that of Concept 1A and 1B. The internal intersections created between the primary circulation roadway and the access drives for each building are standard "T-type" intersections, which can be controlled by placing a STOP sign on the minor volume approach. Based on the trip generation projections, we would not anticipate vehicle queues to back up into the first internal intersection. Like the discussion of Concepts 1A and 1B, the curvature of the internal roadways throughout the site and existing slopes along these roadways underscores the importance of creating adequate sight lines.

As shown in **Table 3**, Concept 2 could generate, on average, 1,124 daily trips, with weekday morning peak hour averaging 159 trips and weekday evening peak hour averaging 196 trips.

With this level of trip generation, VHB does not anticipate the need for exclusive turning lanes or installation of a traffic signal at the driveway intersection with Route 197. However, daily traffic counts will need to be taken along Route 197 to verify and a formal traffic signal warrant analysis may be needed.

Table 3. Trip Generation Summary

Time Period	Movement	Concept 2 [a]
Weekday Daily [b]	Enter	562
	Exit	562
	Total	1,124
Weekday Morning Peak Hour [c]	Enter	121
	Exit	38
	Total	159
Weekday Evening Peak Hour	Enter	61
	Exit	135
	Total	196

Source: VHB; ITE Trip Generation, 11th Edition; Institute of Transportation Engineers [ITE]; Washington, D.C. [2021]

a Based on ITE land use code 140 (Manufacturing) for 244,600 sf

b Vehicles per day

c Vehicles per hour

It should also be noted that these preliminary trip generation calculations were based on manufacturing use. If the development were to service a less intense use (like general warehousing, for example) the trip generation would be expected to be approximately 60% lower than the projections summarized in Table 3.

5 CONCLUSION AND NEXT STEPS

5. CONCLUSION AND NEXT STEPS

In collaboration with the Town of Dudley and MassDevelopment, VHB identified the advantages and disadvantages of each concept relating to building footprint, wetlands preservation, and earthworks, as shown in **Table 4**.

Table 4. Proposed Development Advantages and Disadvantages

	Advantages	Disadvantages
Concept 1A	Least earthworks requirement (20,000 cubic yards cut)	Wetlands must be filled / recreated elsewhere
Concept 1B	Largest total building footprint (375,000 SF)	Wetlands must be filled / recreated elsewhere
Concept 2	Most individual buildings (4) Wetlands preserved	Smallest total building footprint (244,600 SF) Greatest earthworks requirement (580,000 cubic yards of fill)

While there are some obvious environmental challenges to the site, the overall feasibility of commercial or industrial development at the site remains high, especially for industrial or biomanufacturing companies outgrowing their spaces in Worcester, Cambridge, or Boston.

Through creative placement of building pads and relocation of wetland areas, several building pads could be constructed to support warehousing or Current Good Manufacturing Practice (cGMP) facilities of various footprints. The largest building in Concept 1A and Concept 1B could potentially accommodate multiple tenants, creating multiple revenue streams for the developer or owner. This economic development park would provide employment opportunities for Dudley residents who are experienced in the manufacturing sectors.

Next Steps

1. **Rezone for Industrial Development**

   A portion of the Site is currently zoned Res-87, which prohibits all industrial uses. A zone change at Town Meeting will be required to allow for permitting and construction of an economic development park.

2. **Expand Utility Access and Capacity**

   To prepare the Site for pad development, the Town should develop the necessary infrastructure to support light manufacturing or warehousing. This would include extending the existing water/sewer lines from the courthouse or Knollwood Road or, in the case a new aquifer source is accessed off Knollwood Road, designing a new tank system on-Site.

   Other preparatory actions include working with National Grid and Charter to determine electric, telecommunications, and natural gas demand for the economic development park.

3. **Plan Development Pads and Acquire Permits**

   The Town should engage with architects and engineering firms to create a master plan for the industrial park, which would detail plot sizes, internal road networks, parking, and loading. After the plan is confirmed, the necessary environmental and construction permitting can be pursued in accordance with federal, state, and local laws and regulations (for details on environmental permitting, see "Permitting" in section 4: Concept Planning).

4. **Market and Promote the Park**

   To attract prospective tenants and investors to the park, the Town should develop a marketing strategy that highlights the Site's key advantages (e.g., strategic location close to Worcester, utility capacity, a promising workforce, partnerships with local colleges and schools, etc.). Engaging with industry associations such as Massachusetts Biomedical Initiatives (MBI), WorcLab, or Worcester Regional Chamber of Commerce could garner additional interest in the Site as a developable parcel.

APPENDIX

APPENDIX I: Wetland Summary

The following is a summary of wetland conditions based on observations by a VHB wetland scientist. It **does not** constitute a formal wetland delineation.

March 20, 2023

Ref: 15812.02

Ms. Amanda Gregoire
Massachusetts Development Finance Agency
99 High Street, 11th Floor
Boston, MA 02110

Re: Wetland Summary Report – West Main Street, Dudley, Massachusetts

Dear Ms. Gregoire:

On March 13, 2023, a VHB Environmental Scientist performed a preliminary walk to observe wetland resource areas on an approximately 57.8 acre parcel along West Main Street (Parcel ID: 234_29) in Dudley, MA (the Site). The Site is bounded by West Main Street to the north, Knollwood Road to the east, and both residential and undeveloped forested areas to the south and west. Much of the Site consists of upland forested areas on the eastern and western-most sides of the parcel. The center of the Site consists of intermittent streams and associated wetlands. At the time of the Site walk, GPS data were collected to represent the approximate locations of wetland resource areas on the property; however, no formal wetland delineation was conducted at this time. This report describes the wetland resource areas located on/proximal to the site and their regulatory status with respect to the federal Clean Water Act (CWA), the Massachusetts Wetlands Protection Act (WPA), and the Dudley Wetlands Protection Code (the Bylaw), based on preliminary field observations. A formal wetland delineation is required to verify the boundaries of the wetlands described below.

Wetland Descriptions

Figure 1 shows the approximate resource areas based on Site walk observations. The attached photo log contains representative photographs of each resource area.

Wetlands

All observed wetland areas would be considered jurisdictional under some combination of the CWA, the WPA, and the Bylaw.

Wetland 1

Wetland 1 includes an intermittent stream and an associated bordering vegetated wetland (BVW). The stream flows within a former rail bed on the eastern side of the parcel. The stream was flowing on the day of the site walk and was generally between one and two feet wide, with a distinct central channel. The stream extended offsite to the south of the parcel, where it was approximately three to five feet wide and contained stagnant water. BVW appeared to extend approximately one to fifteen feet from the channel edge. Based on field observations, the wetland appears to be jurisdictional under the CWA, the WPA, and the Bylaw. Under the WPA and the Bylaw, a 100-foot buffer zone extends from the stream Bank and BVW. Under the Bylaw, an additional 50-foot no-disturb zone and 75-foot no-build setback extend from the Bank and BVW.

Wetland 2

Wetland 2 includes an intermittent stream and an associated BVW. The stream flows from south to north, beginning within a wetland on the southeastern border of the parcel, and exiting the parcel through a culvert beneath West Main Street. The stream was flowing on the day of the site walk and was generally between one and five feet wide, with a distinct central channel and areas of diffuse flow as it exited the BVW at the southern end of the parcel. BVW appeared to extend approximately one to twenty feet from the channel. BVW extended north along the stream until reaching the center of the parcel. Based on field observations, the wetland appears to be jurisdictional under the CWA, the WPA, and the Bylaw. Under the WPA and the Bylaw, a 100-foot buffer zone extends from the stream Bank and BVW. Under the Bylaw, an additional 50-foot no-disturb zone and 75-foot no-build zone extend from Bank and BVW.

Wetland 3

Wetland 3 includes an intermittent stream and an associated BVW. The stream flows from northeast to southwest from a culvert beneath West Main Street, and continues offsite in the northwest corner of the parcel. The stream was flowing on the day of the site walk and was generally between one and seven feet wide with a distinct central channel. BVW extended approximately thirty feet from the channel. Based on field observations, the wetland appears to be jurisdictional under the CWA, the WPA, and the Bylaw. Under the WPA and the Bylaw, a 100-foot buffer zone extends from the stream Bank and BVW. Under the Bylaw, an additional 50-foot no-disturb zone and 75-foot no-build zone extend from Bank and BVW.

Wetland 4

Wetland 4 is a small isolated vegetated wetland (IVW) located within a forested area at the center of the Site. The IVW was located within a topographic depression and contained saturated soil conditions, standing water within the soil test hole, moss trim lines, and wetland vegetation. Based on the field observations, the wetland is likely jurisdictional as an isolated wetland under the CWA and the Bylaw. Under the Bylaw, a 100-foot buffer zone, 50-foot no-disturb zone, and 75-foot no-build zone extend from the IVW.

Wetland 5

Wetland 5 is a small isolated vegetated wetland (IVW) located within a forested area in the northeast corner of the Site. The IVW was located within a topographic depression and contained saturated soil conditions, high water table, and wetland vegetation. Based on the field observations, the wetland is likely jurisdictional as an isolated wetland under the CWA and the Bylaw. Under the Bylaw, a 100-foot buffer zone, 50-foot no-disturb zone, and 75-foot no-build zone extend from the IVW.

Wetland 6

Wetland 6 is a vegetated wetland located centrally along the southern border of the Site. The wetland extended offsite, south of the parcel. The portion of the wetland that extended offsite was not investigated during the site walk and the wetland could not be confirmed as an isolated or bordering wetland. The wetland contained saturated soil conditions, soils with a depleted matrix, standing water, and wetland vegetation. Based on the field observations, the wetland is likely jurisdictional under the CWA, WPA and the Bylaw. Under the Bylaw, a 100-foot buffer zone, 50-foot no-disturb zone, and 75-foot no-build zone extend from the wetland line.

Summary

The wetlands observed on the Site include areas subject to jurisdiction under the CWA, the WPA, and the Bylaw. Regulated areas include the wetlands described above as well as their associated buffer zones. Proposed work within these areas would require coordination and/or permits from the appropriate regulatory authorities. In addition, a formal wetland delineation is required to confirm wetland boundaries.

If you have any questions concerning this submittal or require additional information, feel free to contact me at 617-607-2709.

Regards,

Bridget Hilgendorff

Bridget Hilgendorff
Environmental Scientist

att: Photo Log
Figure 1

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment	**Site Location:** West Main St, Dudley, MA 01571	**Project No**: 15812.02

Photo No.: 1 **Date:** 3/13/2023

Description:

Northern view of Wetland 1, located within an old rail bed on the eastern side of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment	**Site Location:** West Main St, Dudley, MA 01571	**Project No**: 15812.02

Photo No.: 2 **Date:** 3/13/2023

Description:

Southern view Wetland 1 located within an old rail bed on the southeastern side of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment	**Site Location:** West Main St, Dudley, MA 01571	**Project No**: 15812.02

Photo No.: 3 **Date:** 3/13/2023

Description:

Northern view of Wetland 2, located west of the railbed on the southeastern side of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment	**Site Location:** West Main St, Dudley, MA 01571	**Project No**: 15812.02

Photo No.: 4 **Date:** 3/13/2023

Description:

Southern view of Wetland 2, located west of the railbed on the northeastern side of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment | **Site Location:** West Main St, Dudley, MA 01571 | **Project No**: 15812.02

Photo No.: 5 | **Date:** 3/13/2023

Description:

Eastern view of upland area, located east of the railbed in the northeastern corner of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment | **Site Location:** West Main St, Dudley, MA 01571 | **Project No**: 15812.02

Photo No.: 6 | **Date:** 3/13/2023

Description:

Eastern view of Wetland 5, located east of the railbed in the northeastern corner of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment	**Site Location:** West Main St, Dudley, MA 01571	**Project No**: 15812.02

Photo No.: 7 **Date:** 3/13/2023

Description:

Southern view of upland area, located centrally on the northern side of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment **Site Location:** West Main St, Dudley, MA 01571 **Project No**: 15812.02

Photo No.: 8 **Date:** 3/13/2023

Description:

Northern view of the upland area, located at the center of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment	**Site Location:** West Main St, Dudley, MA 01571	**Project No**: 15812.02

Photo No.: 9 **Date:** 3/13/2023

Description:

Southwestern view of Wetland 3, located in the northwest corner of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment **Site Location:** West Main St, Dudley, MA 01571 **Project No**: 15812.02

Photo No.: 10 **Date:** 3/13/2023

Description:

Northeastern view of Wetland 3, located in the northwest corner of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment | **Site Location:** West Main St, Dudley, MA 01571 | **Project No**: 15812.02

Photo No.: 11 | **Date:** 3/13/2023

Description:

Southwestern view of Wetland 3, located in the northwest corner of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment | **Site Location:** West Main St, Dudley, MA 01571 | **Project No**: 15812.02

Photo No.: 12 | **Date:** 3/13/2023

Description:

Southern view of Wetland 4, located at the center of the Site.

Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: MassDevelopment	**Site Location:** West Main St, Dudley, MA 01571	**Project No**: 15812.02

Photo No.: 13 **Date:** 3/13/2023

Description:

Northern view of Wetland 6, located centrally on the southern border of the Site.

Engineers | Scientists | Planners | Designers

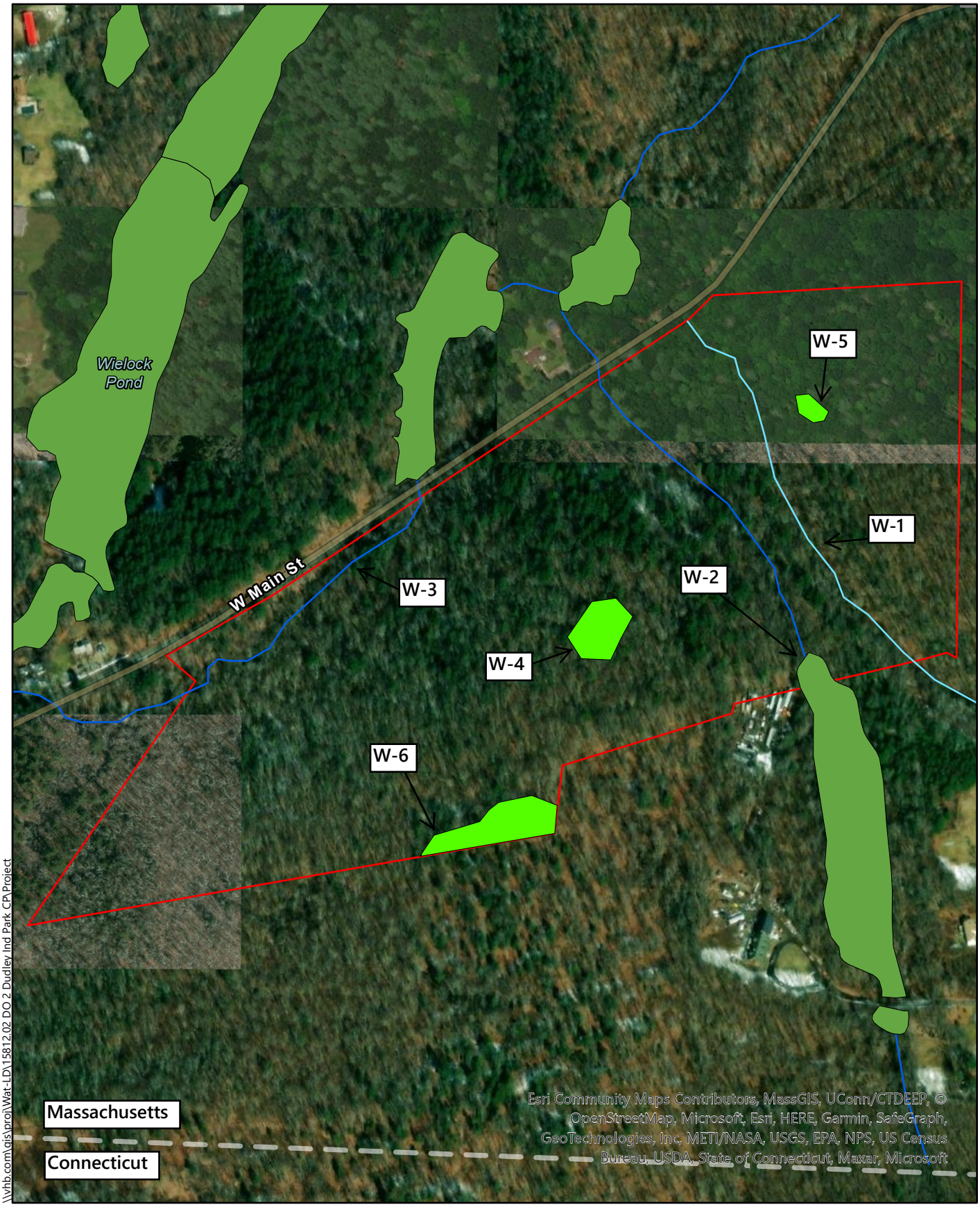
Photographic Log

Client Name: MassDevelopment	**Site Location:** West Main St, Dudley, MA 01571	**Project No**: 15812.02

Photo No.: 14 **Date:** 3/13/2023

Description:

Western view of Wetland 6, located centrally on the southern border of the Site.



\\vhb.com\gis\proj\Wat-LD\15812.02 DO 2 Dudley Ind Park CPA Project

0 250 500 1000 Feet

Dudley Industrial Park Preliminary Site Walk | Dudley, MA

Legend

- Property Boundary
- MassDEP Wetlands
- Approximate Wetlands[1]
- MassDEP Streams
- Approximate Stream[1]

Figure 1- Approximate Wetland Resources

Source Info: USGS, MassGIS, VHB

[1] Field Observations Collected 3/13/2023