ABBREVIATED NOTICE OF RESOURCE AREA DELINEATION

Filing Under the Massachusetts Wetlands Protection Act
M.G.L. Chapter 131, Section 40 and the Town of Shutesbury Wetland Bylaw

Leverett West Project
Leverett Road
Shutesbury, Massachusetts

Submitted to:

Shutesbury Conservation Commission
Shutesbury Town Hall
1 Cooleyville Road
Shutesbury, Massachusetts 01072

Filed by:

W.D. Cowls, Inc.
134 Montague Road, P.O. Box 9677
North Amherst, Massachusetts 01059

Prepared by:

TRC Companies
650 Suffolk Street
Lowell, Massachusetts 01854

October 2020

650 Suffolk St., Suite 200
Lowell, MA 01854

T 978.970.5600
TRCcompanies.com

October 26, 2020

Town of Shutesbury Conservation Commission
Shutesbury Town Hall
1 Cooleyville Road
Shutesbury, MA 01072

RE: Leverett West Project
Leverett Road
Abbreviated Notice of Resource Area Delineation (ANRAD)

Dear Commissioners:

TRC Companies (TRC) is writing on behalf of AMP Solar Development to file an ANRAD for a parcel off Leverett Road, Shutesbury, MA (Site) (Figure 1 in Attachment B). The Site consists of approximately 25 acres of a 296.8-acre parcel (listed by the Shutesbury tax assessor as Parcel ID ZF-15).

TRC conducted a wetland and waterbody delineation survey on August 6, 2020. This survey resulted in an overall delineation of three wetlands and two streams. The total linear feet of wetland edge and other resource areas delineated during the wetland and waterbody survey effort for the Site, the focus of this ANRAD filing, are summarized in the following table:

Resource Area	Delineated Length (linear feet)
Bordering Vegetated Wetland	1,035
Isolated Vegetated Wetland	1,091
Bank	2,494
Bank/Mean Annual High Water Line	394

Please refer to Attachment B for survey methodology, delineated wetland descriptions, US Army Corps of Engineers Wetland Determination forms, site photographs, and figures showing the resource areas.

To assist your review, we have provided the following attachments:

1. Attachment A – Abbreviated Notice of Resource Area Delineation Form & Wetland Fee Transmittal Form
2. Attachment B – Wetland and Waterbody Delineation Report
3. Attachment C – Abutter Information (Certified Abutter List, Abutter Notification & Affidavit of Service)
4. Attachment D – Figure 1: Delineated Resources Map (September 2020)

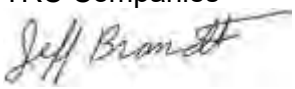
Attachment B also includes the following figures:

Figure 1 – Project Location (September 2020)
Figure 2 – Wetland Delineation (September 2020)

We very much appreciate your review of this information. If you should have any questions, please do not hesitate to contact me at 978-656-3662 or via email at JBrandt@TRCcompanies.com.

Sincerely,

TRC Companies



Jeff Brandt
Senior Project Manager

ATTACHMENT A
Abbreviated Notice of Resource Area Delineation Form & Wetland Fee Transmittal Form

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 4A – Abbreviated Notice of Resource Area Delineation

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Shutesbury
City/Town

A. General Information

1. Project Location (**Note:** electronic filers will click on button for GIS locator):

Leverett Road
a. Street Address

Shutesbury
b. City/Town

01072
c. Zip Code

Latitude and Longitude:

42.45249
d. Latitude

-72.43256
e. Longitude

Map ZF
f. Assessors Map/Plat Number

15
g. Parcel /Lot Number

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

2. Applicant:

a. First Name

b. Last Name

W.D. Cowls, Inc.
c. Organization

P.O. Box 9677
d. Mailing Address

North Amherst
e. City/Town

MA
f. State

01059
g. Zip Code

336-314-1702
h. Phone Number

i. Fax Number

eturner@ariespowersystems.com
j. Email Address

3. Property owner (if different from applicant):

☐ Check if more than one owner (attach additional sheet with names and contact information)

a. First Name

b. Last Name

c. Organization

d. Mailing Address

Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

e. City/Town

f. State

g. Zip Code

h. Phone Number

i. Fax Number

j. Email Address

4. Representative (if any):

Jeff
a. Contact Person First Name

Brandt
b. Contact Person Last Name

TRC
c. Organization

650 Suffolk Street
d. Mailing Address

Lowell
e. City/Town

MA
f. State

01854
g. Zip Code

978-656-3662
h. Phone Number

i. Fax Number

JBrandt@TRCcompanies.com
j. Email Address

Fees will be calculated for online users.

5. Total WPA Fee Paid (from attached ANRAD Wetland Fee Transmittal Form):

$2,000.00
a. Total Fee Paid

$987.50
b. State Fee Paid

$1,012.50
c. City/Town Fee Paid

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 4A – Abbreviated Notice of Resource Area Delineation

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Shutesbury
City/Town

B. Area(s) Delineated

1. Bordering Vegetated Wetland (BVW) — 1,035 Linear Feet of Boundary Delineated

2. Check all methods used to delineate the Bordering Vegetated Wetland (BVW) boundary:

   a. ☐ MassDEP BVW Field Data Form (attached)

   b. ☒ Other Methods for Determining the BVW boundary (attach documentation):

      1. ☒ 50% or more wetland indicator plants
      2. ☐ Saturated/inundated conditions exist
      3. ☐ Groundwater indicators
      4. ☒ Direct observation
      5. ☒ Hydric soil indicators
      6. ☐ Credible evidence of conditions prior to disturbance

3. Indicate any other resource area boundaries that are delineated:

a. Resource Area	b. Linear Feet Delineated
Isolated Vegetated Wetland	1,091
Bank and Bank/Mean Annual High Water Line	2,888

c. Resource Area	d. Linear Feet Delineated

C. Additional Information

Applicants must include the following plans with this Abbreviated Notice of Resource Area Delineation. See instructions for details. **Online Users:** Attach the Document Transaction Number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ ANRAD (Delineation Plans only)
2. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)
3. ☒ Plans identifying the boundaries of the Bordering Vegetated Wetlands (BVW) (and/or other resource areas, if applicable).
4. ☒ List the titles and final revision dates for all plans and other materials submitted with this Abbreviated Notice of Resource Area Delineation.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 4A – Abbreviated Notice of Resource Area Delineation

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Shutesbury
City/Town

D. Fees

The fees for work proposed under each Abbreviated Notice of Resource Area Delineation must be calculated and submitted to the Conservation Commission and the Department (see Instructions and Wetland Fee Transmittal Form).

1. ☐ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to the attached Wetland Fee Transmittal Form) to confirm fee payment:

1205025	September 14, 2020
2. Municipal Check Number	3. Check date
1205033	September 14, 2020
4. State Check Number	5. Check date
TRC	
6. Payor name on check: First Name	7. Payor name on check: Last Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 4A – Abbreviated Notice of Resource Area Delineation

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Shutesbury
City/Town

E. Signatures

I certify under the penalties of perjury that the foregoing Abbreviated Notice of Resource Area Delineation and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

I hereby grant permission, to the Agent or member of the Conservation Commission and the Department of Environmental Protection, to enter and inspect the area subject to this Notice at reasonable hours to evaluate the wetland resource boundaries subject to this Notice, and to require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

I acknowledge that failure to comply with these certification requirements is grounds for the Conservation Commission or the Department to take enforcement action.

1. Signature of Applicant

2. Date: Oct 2020

3. Signature of Property Owner (if different)

4. Date: Oct 2020

5. Signature of Representative (if any)

6. Date

For Conservation Commission:
Two copies of the completed Abbreviated Notice of Resource Area Delineation (Form 4A), including supporting plans and documents; two copies of the ANRAD Wetland Fee Transmittal Form; and the city/town fee payment must be sent to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Abbreviated Notice of Resource Area Delineation (Form 4A), including supporting plans and documents; one copy of the ANRAD Wetland Fee Transmittal Form; and a copy of the state fee payment must be sent to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery. (E-filers may submit these electronically.)

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

ANRAD Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A. Applicant Information

1. Location of Project:

Leverett Road (Parcel ID: ZF-15)	Shutesbury
a. Street Address	b. City/Town
$987.50	
c. Fee amount	d. Check number

2. Applicant:

		W.D. Cowls, Inc.
a. First Name	b. Last Name	c. Company
P.O. Box 9677		
d. Mailing Address		
North Amherst	MA	01059
e. City/Town	f. State	g. Zip Code
336-314-1702		
h. Phone Number		

3. Property Owner (if different):

a. First Name	b. Last Name	c. Company
d. Mailing Address		
e. City/Town	f. State	g. Zip Code
h. Phone Number		

B. Fees

The fee is calculated as follows for each Resource Area Delineation included in the ANRAD (check applicable project type). The maximum fee for each ANRAD, regardless of the number of Resource Area Delineations, is $200 activities associated with a single-family house and $2,000 for any other activity.

☐ **Online users:** check box if fee exempt.

Bordering Vegetated Wetland Delineation Fee:

1. ☐	single family house project	a. feet of BVW	x $2.00 =	b. Fee for BVW
2. ☒	all other projects	1,035 a. feet of BVW	$2,070 x $2.00 =	$2,000 (maximum fee) b. Fee for BVW

Other Resource Area (e.g., bank, riverfront area, etc.):

3. ☐	single family house project	a. linear feet	x $2.00 =	b. Fee
4. ☒	all other projects	3,979 a. linear feet	$7,958 x $2.00 =	$0 (maximum fee) b. Fee

Total Fee for all Resource Areas:	$2,000 Fee
State share of filing fee:	$987.50 5. 1/2 of total fee **less** $12.50
City/Town share of filing fee:	$1,012.50 6. 1/2 of total fee **plus** $12.50

ANRAD Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

C. Submittal Requirements

a.) Send a copy of this form, with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts, to:

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Abbreviated Notice of Resource Area Delineation; a **copy** of this form; and the city/town fee payment.

c.) **To DEP Regional Office**: Send one copy of the Abbreviated Notice of Resource Area Delineation (and any additional documentation required as part of a Simplified Review Buffer Zone Project); a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

ATTACHMENT B
Wetland and Waterbody Delineation Report

Leverett West Project

Leverett Road
Shutesbury, Massachusetts

Prepared By:

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, Massachusetts 01854

Wetland and Waterbody Delineation Report

September 2020

TABLE OF CONTENTS

TABLES

APPENDICES

1.0 Introduction

This report presents the results of a wetland and waterbody delineation conducted on August 6, 2020 by TRC Companies, Inc. (TRC) off Leverett Road in the Town of Shutesbury, Franklin County, Massachusetts (Site). The survey included approximately 25 acres of the 296.8-acre parcel listed by the Shutesbury Tax Assessor as Parcel ID ZF-15.

The survey for wetlands and streams focused on the entire Site as well as adjacent parcels, when accessible, within 200 feet.

This report documents wetlands, streams, and other aquatic resources (ponds, lakes, impoundments, etc.) at the Site regardless of assumed jurisdictional status and addresses the implementation of local and state regulated buffer areas. To the extent practicable, the delineated resources were investigated to determine drainage patterns and a physical nexus to Waters of the United States (WOUS).

Appendix A provides a Site location map (Figure 1) and a map of the resources delineated by TRC (Figure 2). Appendix B includes representative photographs of the Site, Appendix C includes wetland determination data forms, and Appendix D contains the Natural Resources Conservation Service (NRCS) Soil Report. Appendix E contains the U.S. Geological Survey (USGS) StreamStats Report.

2.0 Regulatory Authority

2.1 United States Army Corps of Engineers

In accordance with Section 404 of the Clean Water Act (CWA), the United States Army Corps of Engineers (USACE) asserts jurisdiction over WOUS, defined as wetlands, streams, and other aquatic resources under the regulatory authority per Title 33 Code of Federal Regulations (CFR) Part 328, and the United States Environmental Protection Agency (EPA) per Title 40 CFR Part 230.3(s). Wetlands are defined as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (EPA, 2019).

The USACE will assert jurisdiction over the following waters:

- Traditional navigable waters;
- Wetlands adjacent to traditional navigable waters;
- Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months); and
- Wetlands that directly abut such tributaries.

The USACE will decide jurisdiction over the following waters based on analysis to determine whether they have significant nexus with a traditional navigable water:

- Non-navigable tributaries that are not relatively permanent;
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent; and
- Wetlands adjacent to, but that do not directly abut, a relatively permanent non-navigable tributary.

The USACE generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow); and
- Ditches (including roadside ditches) excavated wholly in and draining only uplands, and that do not carry a relatively permanent flow of water.

The USACE will apply the significant nexus standard as follows:

- A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of downstream traditional navigable waters; and
- Significant nexus includes consideration of hydrologic and ecologic factors.

The USACE also regulates navigable waters under Section 10 of the Rivers and Harbor Act (33 U.S.C. 401 et seq.), which requires that a permit must be issued by the USACE to construct any structure in or over any navigable WOUS, as well as any proposed action (such as excavation/dredging or deposition of materials) that would alter or disturb these waters. If the proposed structure or activity affects the course, location, condition, or capacity of the navigable water, even if the proposed activity is outside the boundaries of the stream in associated wetlands, a Section 10 permit from the USACE is required.

2.2 Massachusetts Department of Environmental Protection

The Massachusetts Wetlands Protection Act (WPA) (Section 40 of Chapter 131 of the General Laws of Massachusetts and regulated under 310 Code of Massachusetts Regulations [CMR] section 10.00) defines multiple coastal (310 CMR 10.25-10.37) and inland resource areas (310 CMR 10.54-10.59) and gives the Massachusetts Department of Environmental Protection (MassDEP) jurisdiction over these resource areas. In most cases, the WPA also gives MassDEP jurisdiction over buffer zone extending 100 feet from the edge of the resource area. In addition to MassDEP, local municipalities' Conservation Commissions are responsible for administering the WPA and any local wetlands ordinance or bylaw.

The WPA defines two types of Land Subject to Flooding (310 CMR 10.57): isolated and bordering. Isolated Land Subject to Flooding (ILSF) is defined as "an isolated depression or a closed basin which serves as a ponding area for run-off or high ground water which has risen above the ground surface." Bordering Land Subject to Flooding (BLSF) is defined as "an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds or lakes. It extends from the banks of these waterways and water bodies; where a bordering vegetated wetland occurs, it extends from said wetland." The boundary of BLSF is further defined as "the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm" as shown on the most recently available flood profile data prepared for the community by the National Flood Insurance Program (NFIP), currently administered by the Federal Emergency Management Agency (FEMA), successor to the U.S. Department of Housing and Urban Development). Under the WPA, ILSF and BLSF do not have associated buffer zones.

The WPA defines Bordering Vegetated Wetland (BVW) under 310 CMR 10.55 as any freshwater wetland which borders on creeks, rivers, stream ponds or lakes. Under the WPA, a 100-foot buffer zone is associated with BVWs. Isolated wetlands (IWs) are not connected to a waterway or waterbody and, therefore, are not regulated under the WPA and do not have an associated buffer zone under the WPA. IWs may have an associated buffer zone or similar zone associated with them under the local ordinance or bylaw. In some cases, IWs may qualify as ILSF and, in those instances, are regulated under the WPA.

The WPA defines Bank (310 CMR 10.54) as the portion of the land surface which normally abuts and confines a waterbody, occurring between a waterbody and a BVW and adjacent floodplain, or between a waterbody and an upland. Under the WPA, a 100-foot buffer zone is associated with Banks.

The WPA defines Riverfront Area (310 CMR 10.58) as the 200-foot area of land measured horizontally from a river's Mean Annual High Water (MAHW) line. The section defines a river as any stream that is perennial and includes, but is not limited to, streams shown as perennial on current USGS maps or that have a watershed size greater than or equal to one square mile. Riverfront Area is not associated with intermittent streams as they do not flow throughout the year. Under the WPA, Riverfront Area does not have an associated buffer zone.

A Notice of Intent filing is required from the MassDEP for any disturbance, including the removal of vegetation or alteration to a Banks, BVW, ILSF, BLSF, Riverfront Area, or buffer zone.

2.3 Town of Shutesbury Conservation Commission

The Shutesbury Conservation Commission (SCC) administers a local wetlands bylaw and regulations in addition to the WPA. The SCC has jurisdiction over any freshwater wetland, marsh, wet meadow, bog, swamp, isolated wetland, lake, pond, river, and stream (surface or subsurface) and land within 100 feet of any of these areas. The SCC also has jurisdiction over land under waterbodies and land subject to flooding or inundation by groundwater, surface water, storm flowage, or within a 100-year floodplain.

3.0 Project Site Characteristics

TRC reviewed publicly available literature and materials used for the investigation, survey, and report preparation, including:

- MassGIS OLIVER[1], the National Hydrography Dataset;
- The Shutesbury, Massachusetts 7.5 Minute Quadrangle (USGS, 2018);
- The FEMA Flood Insurance Rate Map (FIRM) Panels 2501280015A (effective date June 18, 1980) and 2501280020A (effective date June 18, 1980);
- The U.S. Fish and Wildlife Service (USFWS), National Wetlands Inventory (NWI);
- The U.S. Department of Agriculture (USDA), NRCS Web Soil Survey;
- Recent aerial orthoimagery.

The following sections summarize TRC's review of each of these resources.

3.1 Hydrology

The Site is gently sloping with some steep slopes in the northeastern portion. The Site generally drains northward and westward beyond the survey area to wetlands and tributaries to Roaring Brook to the north.

[1] The MassDEP Wetlands Conservancy Program uses aerial photography and photo interpretation to delineate and map wetland boundaries. These boundaries are available via the Massachusetts Office of Geographic Information (MassGIS) online mapping tool, OLIVER. Desktop review consisted of utilizing MassGIS OLIVER to gather a general understanding of existing conditions and potential regulated resource areas.

3.1.1 *Floodplains*

Flood hazard areas identified on the FEMA's FIRMs are identified as Special Flood Hazard Areas (SFHAs). SFHAs are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. FEMA uses a variety of labels for SFHAs:

Zone A	Zone A99	Zone AR/A
Zone AO	Zone AR	Zone V
Zone AH	Zone AR/AE	Zone VE, and
Zones A1-A30	Zone AR/AO	Zones V1-V30
Zone AE	Zone AR/A1-A30	

Moderate flood hazard areas, labeled Zone B or Zone X (shaded on FEMA mapping) are also shown on the FIRM, and are the areas between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood. The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood, are labeled Zone C or Zone X (unshaded on FEMA mapping).

According to the FEMA FIRMs 2501280015A (effective date June 18, 1980) and 2501280020A (effective date June 18, 1980) the Site is located within a Zone C area of minimal flood disturbance zone. Base flood elevations and flood hazard factors are not available for this area.

3.2 Federal and State Mapped Wetlands and Streams

The USFWS is the principal federal agency tasked with providing information to the public on the status and trends of wetlands on a national scale. The USFWS NWI is a publicly available resource that provides detailed information on the abundance, characteristics, and distribution of nationwide wetlands (where mapped). NWI mapping data is offered to promote the understanding, conservation, and restoration of wetlands. The online MassGIS OLIVER mapping tool was accessed to determine the extent of state-mapped aquatic resources.

According to TRC's review of MassGIS OLIVER mapping, NWI does not map any wetlands onsite and MassDEP maps two wetlands onsite: one in the northwest corner of the Site and one along the eastern border. Both of these wetlands extend off-site to the north. NWI and MassDEP also map two streams: the perennial Roaring Brook along the northern edge of the Site and an unnamed intermittent stream along the eastern edge of the Site.

3.3 Mapped Soils

The NRCS's Web Soil Survey identifies five soil map units within the Site. Map units can represent a type of soil, a combination of soils, or miscellaneous land cover types (e.g., water, rock outcrop, developed impervious surface). Map units are usually named for the predominant soil series or land types within the map unit. A summary of soil characteristics for soils mapped at the Site are included in Table 1, below. The following sections provide details about hydric ratings, drainage class, prime farmland, and hydrologic soil groups (HSGs). Details about soil map unit descriptions are provided in the NRCS Soil Report included as Appendix D.

Table 1: Mapped Soils

Symbol	Soil Name	Hydric Rating (%)	Drainage Class	Hydrologic Soil Group	Farmland Classification
75B	Pillsbury fine sandy loam, 0 to 8 percent slopes, very stony	88	Poorly drained	D	Not prime farmland
229F	Windsor and Merrimac soils, 25 to 60 percent slopes	0	Windsor: Excessively drained Merrimac: Somewhat excessively drained	Windsor: A Merrimac: A	Not prime farmland
245B	Hinckley loamy sand, 3 to 8 percent slopes	0	Excessively drained	A	Farmland of statewide importance
245C	Hinckley loamy sand, 8 to 15 percent slopes	0	Excessively drained	A	Farmland of statewide importance
444C	Chichester fine sandy loam, 8 to 15 percent slopes	0	Well drained	A	Farmland of statewide importance

3.3.1 Hydric Rating

The *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) (1987 Manual) defines a hydric soil as "…a soil that in its undrained condition, is saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation."

Due to limitations imposed by the small scale of the soil survey mapping, it is not uncommon to identify wetlands within areas not mapped as hydric soil while areas mapped as hydric often do not support wetlands. This concept is emphasized by the NRCS:

> *Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.*

Hydric Soil Rating (HSR) indicates the percentage of a map unit that meets the criteria for hydric soils.

Map unit 75B has an HSR of 88 percent and map units 229F, 245B, 245C, and 444C have an HSR of 0 percent. For map unit 75B, the hydric components within the map unit are Pillsbury, very stony; Peacham, very stony; and Wonsqueak.

3.3.2 Natural Drainage Class

Natural drainage class refers to the frequency and duration of wet periods under conditions similar to those under which the soil developed. Anthropogenic alteration of the water regime, either through drainage or irrigation, is not a consideration unless the alterations have significantly changed the morphology of the soil.

Map unit 75B is rated as poorly drained. For map unit 229F, the Windsor component is rated as excessively drained and the Merrimac component is rated as somewhat excessively drained. Map units 245B and 245C are rated as excessively drained. Map unit 444C is rated as well drained.

3.3.3 Prime Farmland

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses (the land could be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water). Land used for a specific high-value food or fiber crop is classified as "unique farmland." Generally, additional "farmlands of statewide importance" include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. In some local areas, there is concern for certain additional farmlands, even though these lands are not identified as having national or statewide importance. These farmlands are identified as being of "local importance" through ordinances adopted by local government. The NRCS State Conservationist reviews and certifies lists of farmland of state and local importance. These lists, along with state and locally established Land Evaluation and Site Assessment (LESA) systems where applicable, are used by federal agencies to review and evaluate activities that may impact farmland. As defined in 7 CFR Part 657, important farmland encompasses prime and unique farmland, as well as farmland of statewide and local importance.

According to the NRCS, map units 75B and 229F are classified as "not prime farmland" and map units 245B, 245C, and 444C are classified as "farmland of statewide importance."

3.3.4 Hydrologic Soil Groups

Soils are assigned to a HSG based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

> Group A: Soils have a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
>
> Group B: Soils have a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
>
> Group C: Soils have a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
>
> Group D: Soils have a very slow infiltration rate (high runoff potential) when thoroughly wet. Soils consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition in Group D are assigned to dual classes.

Map unit 75B is in HSG D. Map units 229F (both components), 245B, 245C and 444C are in HSG A.

4.0 Wetland and Stream Delineation Methodology

In addition to the desktop review described in Section 3.0, TRC biologists performed field investigations at the Site to identify wetlands, waterbodies, and other surface waters on August 6, 2020.

4.1 Non-wetland Aquatic Resource Methodology

Streams and other non-wetland aquatic features within the Site were identified by the presence of an OHWM, which is the line established by the fluctuations of water (33 CFR 328.3). The OHWM line is indicated by physical characteristics, which can include: a clear, natural line impressed on the bank; shelving; changes in the character of soil; destruction of terrestrial vegetation; the presence of litter and debris; or other characteristics of the surrounding areas. Each stream bank was delineated with blue flagging. Flags were located with a handheld global positioning system (GPS) unit and the data post-processed to achieve sub-meter accuracy.

4.2 Wetland Delineation Methodologies

The delineation of wetlands was conducted in accordance with criteria set forth in the 1987 Manual, the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)* (USACE, 2012) (Supplement), and the *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act- A Handbook* (MassDEP, 1995) (the MassDEP Handbook).

The three-parameter approach to identify and delineate wetlands presented in the 1987 Manual and the Supplement requires that, except for atypical and disturbed situations, wetlands possess hydrophytic vegetation, hydric soils, and wetland hydrology. A two-parameter approach that considers only vegetation and hydrology indicators is presented in the MassDEP Handbook. Per the MassDEP Handbook, hydric soil is included as evidence of wetland hydrology.

Wetland boundary flags were located with a handheld GPS unit and the data were post-processed to achieve sub-meter accuracy. Delineated resources were classified in accordance with the system presented in *The Classification of Wetlands and Deepwater Habitats of the United States, Second Edition* (Federal Geographic Data Committee, 2013).

4.2.1 Hydrophytic Vegetation Methodologies

Hydrophytic vegetation is defined in the 1987 Manual as:

> …the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present.

Plants are categorized according to their occurrence in wetlands. Scientific names and wetland indicator statuses for vegetation are those listed in *The National Wetland Plant List: 2016 Wetland Ratings* (NWPL) (Lichvar et al., 2016). The indicator statuses specific to the “Northcentral and Northeast Region” as defined by the USACE apply to the Site. For upland species that are not listed on the NWPL, the Integrated

Taxonomic Information System was referenced for currently accepted scientific names. The official short definitions for wetland indicator statuses are as follows:

- Obligate Wetland (OBL): Almost always occur in wetlands;
- Facultative Wetland (FACW): Usually occur in wetlands, but may occur in non-wetlands;
- Facultative (FAC): Occur in wetlands and non-wetlands (50/50 mix);
- Facultative Upland (FACU): Usually occur in non-wetlands, but may occur in wetlands; and
- Upland (UPL): Almost never occur in wetlands.

Plants that are not found in a region, but are found in an adjacent region, take on the indicator status of that adjacent region for dominance calculations. Plants that are included on the NWPL, but not within the Site region or an adjacent region, are not included in dominance calculations. Plants that are not found in wetlands in any region are considered "UPL" for dominance calculations.

Vegetation community sampling was accomplished using the methodologies outlined in the 2012 Supplement. The "50/20 rule" was applied to determine whether a species was dominant in its stratum. In using the 50/20 rule, the plants that comprise each stratum are ranked from highest to lowest in percent cover. The species that cumulatively equal or exceed 50 percent of the total percent cover for each stratum are dominant species, and any additional species that individually provides 20 percent or more percent cover is also considered dominant species of its respective strata.

A hydrophytic vegetation community is present when: 1) all of the dominant species are FACW and/or OBL (Rapid Test for Hydrophytic Vegetation); 2) greater than 50 percent of the dominant species' (as determined by the 50/20 rule) indicator statuses are FAC, FACW, or OBL (Dominance Test); and/or 3) when the calculated Prevalence Index is equal to or less than 3.0. When applying the Prevalence Index, all plants are assigned a numeric value based on indicator status (OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5) and their abundance (absolute percent cover) is used to calculate the prevalence index.

Cover types are also assigned to each wetland and waterbody in accordance with the system presented in *The Classification of Wetlands and Deepwater Habitats of the United States, Second Edition* (Federal Geographic Data Committee, 2013).

4.2.2 Hydric Soil Methodologies

Hydric soil indicators described in *Field Indicators for Identifying Hydric Soils in New England, Version 4* (New England Hydric Soils Technical Committee, 2017) and in *Field Indicators of Hydric Soils in the United States, Version 8.2* (NRCS, 2018) were used to determine the presence of characteristic soil morphologies resulting from prolonged saturation and/or inundation. Soil color was described using standard color notations provided on Munsell® soil color charts (X-Rite, Inc., 2015). Soil texture was determined using the methods described by Thien (1979). Soil test pits were dug using a spade shovel to a depth of approximately 20 inches or more (if needed).

Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin (MLRA Handbook) (USDA NRCS, 2006) was referenced to determine the hydric soil indicators that apply to the Site. Per the MLRA Handbook, the Site is within Major Land Resource Area (MLRA) 144A (New England and Eastern New York Upland, Southern Part) of Land Resource Region (LRR) R (Northeastern Forage and Forest Region). Hydric soil indicators that do not apply to this MLRA were not considered on the wetland determination data forms.

The presence or absence of hydric soils was determined through examination of samples extracted with a hand shovel or hand auger from the upper horizons of the soil profile. Soils were examined to depths of approximately 18 to 20 inches, unless restrictive layers such as hard pan, rock, densely packed fill materials, etc. were encountered at shallower depths.

4.2.3 Wetland Hydrology Methodologies

Per the 1987 Manual:

> *The term "wetland hydrology" encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on characteristics of vegetation and soils due to anaerobic and reducing conditions, respectively. Such characteristics are usually present in areas that are inundated or have soils that are saturated to the surface for sufficient duration to develop hydric soils and support vegetation typically adapted for life in periodically anaerobic soil conditions. Hydrology is often the least exact of the parameters, and indicators of wetland hydrology are sometimes difficult to find in the field. However, it is essential to establish that a wetland area is periodically inundated or has saturated soils during the growing season.* (Environmental Laboratory, 1987)

Wetland hydrology indicators are grouped into 18 primary and 11 secondary indicators presented in the Supplement. The USACE considers wetland hydrology to be present when at least one primary indicator or two secondary indicators are identified.

5.0 Results

5.1 Upland Areas

The upland areas consist of successional forests throughout most the Site. The dominant vegetation in the uplands consists of red maple (*Acer rubrum*), northern red oak (*Quercus rubra*), American beech (*Fagus grandifolia*), American wintergreen (*Pyrola americana*), marginal wood fern (*Dryopteris marginalis*), eastern hemlock (*Tsuga canadensis*), yellow birch (*Betula allegheniensis*), eastern white pine (*Pinus strobus*), American witch-hazel (*Hamamelis virginiana*), cinnamon fern (*Osmundastrum cinnamomeum*), false lily-of-the-valley (*Maianthemum canadense*), and late lowbush blueberry (*Vaccinium angustifolium*). The terrain of the Site is gently sloping to the north and west. The soils observed throughout upland portions of the Site were generally classified as silt loam or loamy sand.

5.2 Delineated Wetlands and Waterbodies

TRC identified three wetlands and two waterbodies within the Site during the August 2020 resource delineation effort (Figure 2 in Appendix A). Delineated areas are described in the following sections and summarized at the end of this section in Table 2. Refer to the photographs in Appendix B and the wetland determination data forms in Appendix C for further details about each delineated area.

5.2.1 Delineated Wetlands

Wetland W-GAR-1 is a palustrine forested (PFO) wetland associated with stream S-GAR-1. This wetland is located along the eastern edge of the Site and extends off-site to the east. The dominant vegetation included green ash (*Fraxinus pennsylvanica*), red maple, smooth arrow-wood (*Viburnum recognitum*), highbush blueberry (*Vaccinium corymbosum*), sensitive fern (*Onoclea sensibilis*), and jack-in-the-pulpit

(*Arisaema triphyllum*). Indicators of wetland hydrology included saturation and sparsely vegetated concave surface. Soils were composed of a thick layer of dark silt loam on top of rock. This soil meets Hydric Soil Indicator A1 as described in *Field Indicators of Hydric Soils in the United States, Version 8.2* (Field Indicators) (USDA NRCS, 2018). ***This wetland is SCC and MassDEP jurisdictional and it also falls under USACE jurisdiction, as it is likely connected to other WOUS.***

Wetland W-GAR-2 is a PFO wetland associated with streams S-GAR-1 and S-GAR-2. This wetland is located in the northwestern corner of the Site and is located almost completely within the Site, but a small portion extends off-site to the west and north. The dominant vegetation included yellow birch, red maple, New York fern (*Parathelypteris noveboracensis*), Japanese Stilt Grass (*Microstegium vimineum*), and bristly dewberry (*Rubus hispidus*). Indicators of wetland hydrology included saturation, drainage patterns, moss trim lines, and microtopographic relief. Soils were composed of a layer of dark silty clay loam over dark gray silt loam on top of rock. This soil meets Hydric Soil Indicator A11 as described in *Field Indicators of Hydric Soils in the United States, Version 8.2* (Field Indicators) (USDA NRCS, 2018). ***This wetland is SCC and MassDEP jurisdictional and it also falls under USACE jurisdiction, as it is likely connected to other WOUS.***

Wetland W-GAR-3 is an isolated PFO wetland located along the western edge of the Site and extends off-site to the west. The dominant vegetation included eastern hemlock, red maple, and shallow sedge (*Carex lurida*). Indicators of wetland hydrology included saturation, sparsely vegetated concave surface, water-stained leaves, moss trim lines, and microtopographic relief. Soils were composed of a layer of dark silty clay loam over dark gray sandy loam on top of rock. This soil meets Hydric Soil Indicator A11 as described in *Field Indicators of Hydric Soils in the United States, Version 8.2* (Field Indicators) (USDA NRCS, 2018). This wetland has a delineated area of 9,973 square feet. Based on the vegetation and soil conditions, this wetland may be inundated during non-drought conditions. A standing water depth of 12 to 13.5 inches would result in the ¼ acre-feet volume required to meet the ILSF definition at 310 CMR 10.57(2)(b)(1). ***This wetland is SCC jurisdictional as an isolated wetland and may be MassDEP jurisdictional as ILSF. It likely does not fall under USACE jurisdiction, as it is not connected to other WOUS.***

5.2.2 Delineated Waterbodies

Stream S-GAR-1 is an intermittent stream (R4, NWI classification) that flows northwestward along the eastern boundary of the Site. This stream enters the Site in the central portion of the eastern border and enters stream S-GAR-2 along the northern boundary. The streambed was comprised of cobble and gravel. TRC observed an average width of approximately 7 feet. Stream S-GAR-1 has defined banks such that the OHWM and the banks are coincident. The OHWM was delineated on both sides of the stream.

The USGS maps stream S-GAR-1 as intermittent. The USGS StreamStats analysis in Appendix E shows that it has a predicted flow rate greater than 0.01 cubic feet per second at the 99% flow duration but has a watershed that is less than 0.5 square miles. Therefore, this stream is considered intermittent. ***This stream is SCC and MassDEP jurisdictional and falls under USACE jurisdiction, as it is likely connected to other WOUS.***

Stream S-GAR-2 is Roaring Brook, a perennial stream (R3, NWI classification) that flows southwestward along the northwestern boundary of the Site. This stream enters the Site in the central portion of the northern border and extends off-site in the northwest corner. The streambed was comprised of cobble and gravel. TRC observed an average width of approximately 15 feet. Stream S-GAR-2 has defined banks such that the OHWM and the banks are coincident. The OHWM was delineated on one side of the stream.

The USGS maps stream S-GAR-2 as perennial and the USGS StreamStats analysis in Appendix E shows that it has a watershed of at least 0.5 square miles and has a predicted flow rate greater than 0.01 cubic feet per second at the 99% flow duration. Therefore, this stream qualifies as perennial under 310 CMR 10.58(2)(a)(1)(a) and has an associated 200-foot Riverfront Area measured horizontally from the MAHW line. ***This stream is SCC and MassDEP jurisdictional, falls under USACE jurisdiction, as it is likely connected to other WOUS, and is SCC jurisdictional as a river.***

Table 2. Delineated Wetlands and Waterbodies

Wetland Field Designation	Field Designated NWI Classification [1]	Assumed Jurisdictional Status	Assumed Buffer/ Setback Requirements
W-GAR-1	PFO	USACE/MassDEP/Local	100-ft buffer zone
W-GAR-2	PFO	USACE/MassDEP/Local	100-ft buffer zone
W-GAR-3	PFO	MassDEP/Local	100-ft buffer zone
S-GAR-1	R4	USACE/MassDEP/Local	100-ft buffer zone
S-GAR-2	R3	USACE/MassDEP/Local	200-ft Riverfront Area

[1] *The Classification of Wetlands and Deepwater Habitats of the United States, Second Edition* (Federal Geographic Data Committee, 2013). Categories include: Palustrine Forested (PFO), Riverine Perennial (R3), and Riverine Intermittent (R4).

6.0 Conclusions

It is TRC's opinion that delineated wetlands W-GAR-1 and W-GAR-2 are BVWs regulated by the SCC and MassDEP and are also likely under USACE jurisdiction. W-GAR-3 is an isolated wetland regulated by the SCC and may be regulated as ILSF by MassDEP. W-GAR-3 likely does not fall under USACE jurisdiction. There are no buffers or setbacks associated with USACE-regulated wetlands. However, there is a 100-foot buffer zone associated with MassDEP- and SCC-regulated wetlands.

Perennial stream S-GAR-2 and intermittent stream S-GAR-1 are USACE jurisdictional, as they are hydrologically connected to WOUS. There streams are also regulated by the SCC and MassDEP, as they flow within, into, or out of a MassDEP-regulated wetland resource area.

Final determination of jurisdictional status for on-site wetlands and waterbodies must be made by the regulators.

7.0 References

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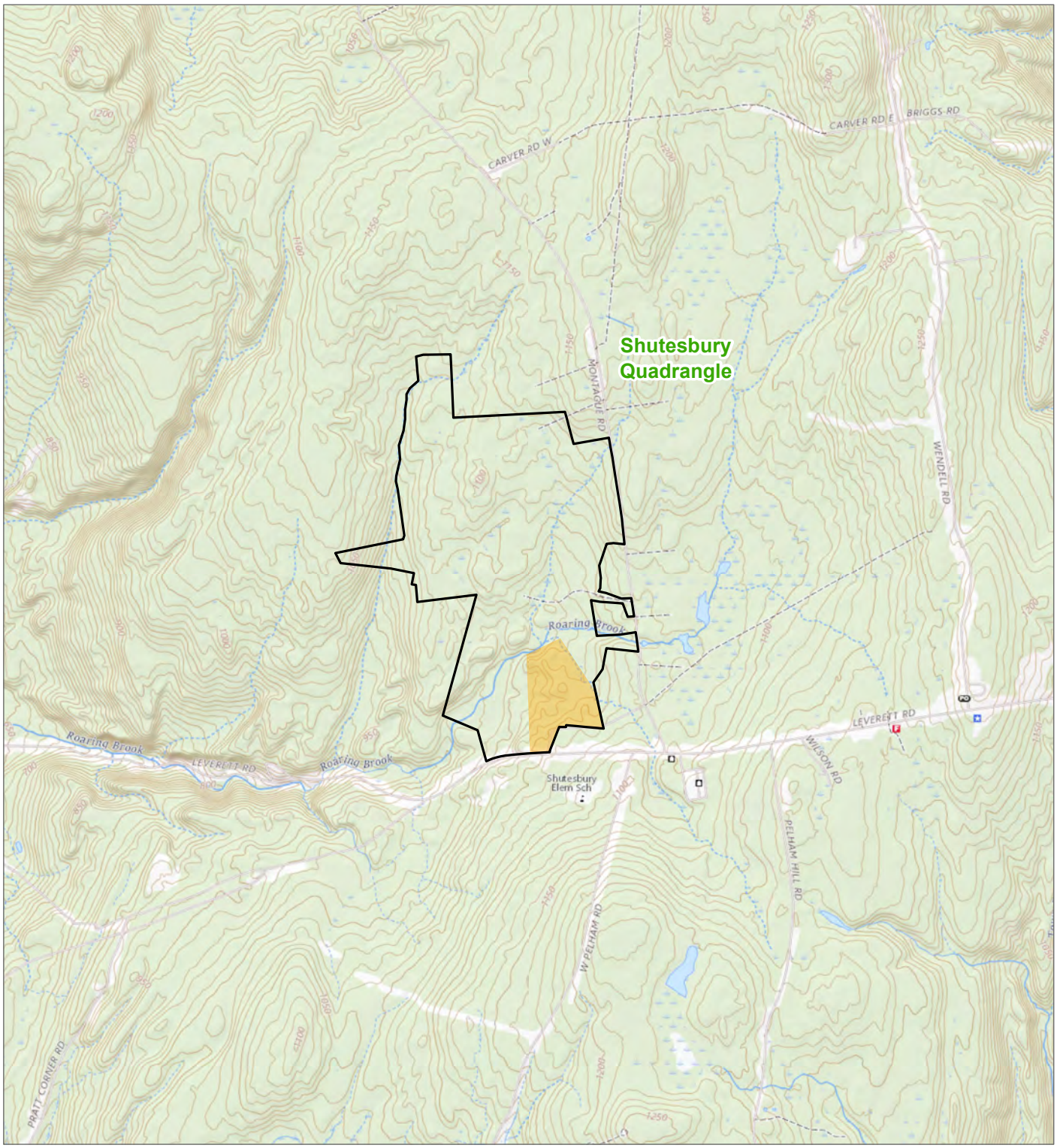
Appendix A: Figures



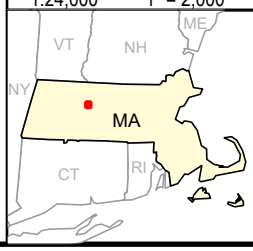
PROJECT PARCEL

STUDY AREA

0 1,000 2,000

FEET

1:24,000 1" = 2,000'



BASE MAP: THE NATIONAL MAP, "USGS TOPO" SERVICE LAYER
DATA SOURCES: TRC

PROJECT:

LEVERETT WEST PROJECT
SHUTESBURY, MA

TITLE:

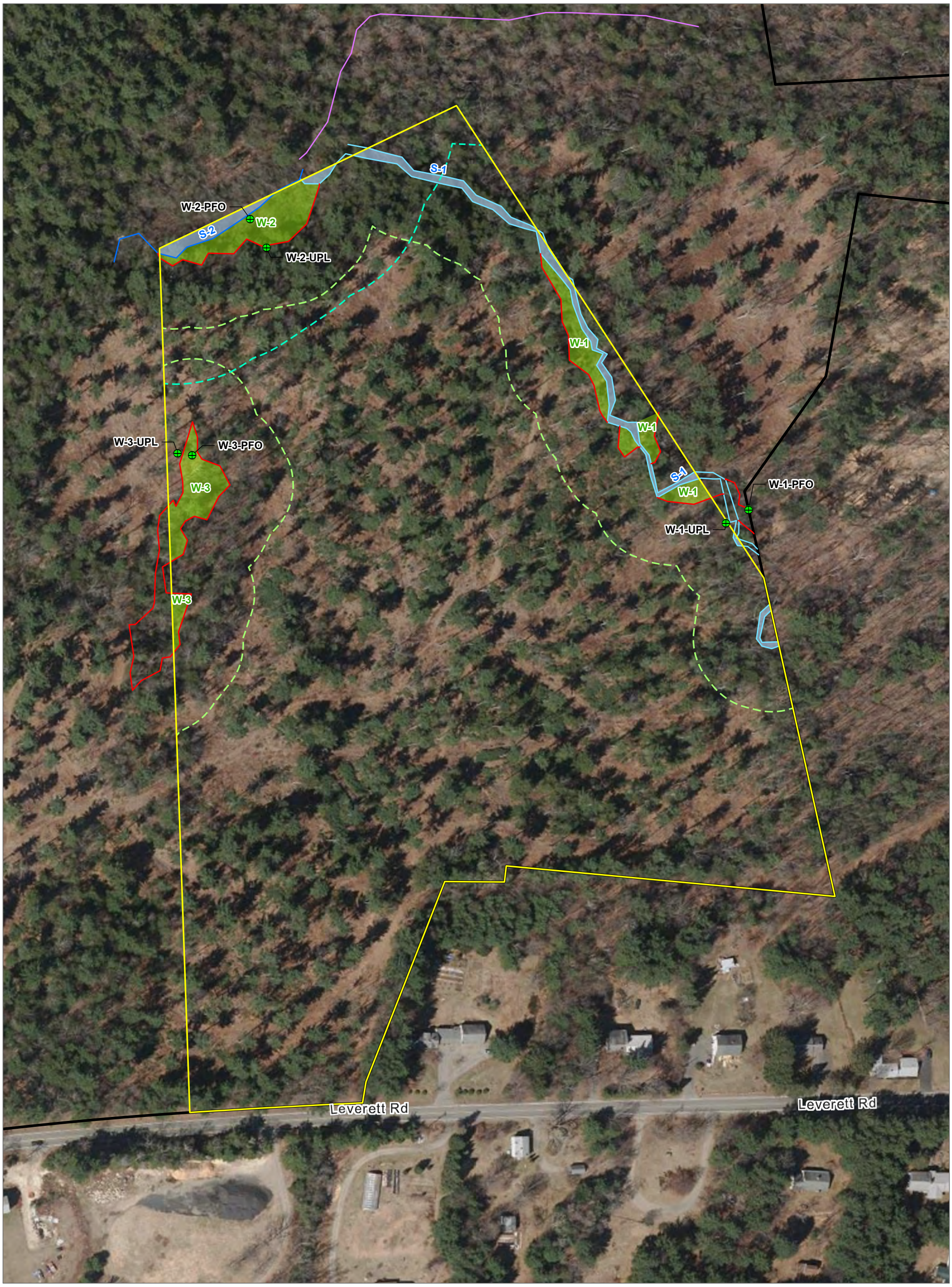
SITE LOCATION MAP

DRAWN BY:	S. MOTURI	PROJ. NO.:	336892
CHECKED BY:	C. MCELROY		
APPROVED BY:	M. FIRSTENBERG		**FIGURE 1**
DATE:	SEPTEMBER 2020		

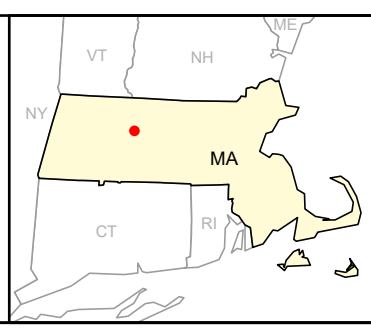
TRC

FILE: Fig2_Leverett_Del_11x17

Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001; Map Rotation: 0
-- Saved By: SMOTURI on 9/17/2020, 11:54:15 AM; File Path: S:\1-PROJECTS\AMP\336892_Leverett\5-MXD\PRO\Fig2_Leverett_Del_11x17\Fig2_Leverett_Del_11x17.aprx; Layout Name: Fig 2 Leverett West Delineation Map



Project Area
Project Parcel
USACE Plot
Delineated Perennial Stream
Delineated Intermittent Stream
Estimated Stream Centerline (USGS)
Delineated Waterbody
Wetland Boundary Line
Delineated Wetland
100-ft Wetland Buffer
200-ft Riverfront Area



BASE MAP: USGS COLOR ORTHO IMAGERY, 2019
DATA SOURCES: TRC, USGS 25K STREAMS, MASSGIS

N

0 75 150 FEET

1:1,800 1" = 150'

PROJECT:
LEVERETT WEST PROJECT
SHUTESBURY, MA

TITLE:
WETLAND DELINEATION

DRAWN BY:	S. MOTURI	PROJ. NO.:	336892
CHECKED BY:	M. LENNON		
APPROVED BY:	M. FIRSTENBERG		
DATE:	SEPTEMBER 2020		

FIGURE 2

TRC
650 Suffolk Street
Suite 200
Lowell, MA 01854

FILE: Fig2_Leverett_Del_11x17

Appendix B: Photographs

LEVERETT WEST PROJECT

CARVER ROAD WEST, SHUTESBURY, MASSACHUSETTS

Photograph: 1 Date: 8/6/2020 Direction: South Description: Upstream view of perennial stream S1	
Photograph: 2 Date: 8/6/2020 Direction: West Description: Downstream view of perennial stream S2. Roaring Brook.	

LEVERETT WEST PROJECT CARVER ROAD WEST, SHUTESBURY, MASSACHUSETTS	
Photograph: 3 Date: 8/6/2020 Direction: West Description: Wetland data point for W-1-PFO.	
Photograph: 4 Date: 8/6/2020 Direction: North Description: Upland data point for W-1-UPL.	

LEVERETT WEST PROJECT

CARVER ROAD WEST, SHUTESBURY, MASSACHUSETTS

Photograph: 5 Date: 8/6/2020 Direction: South Description: Wetland data point for W-2-PFO.	
Photograph: 6 Date: 8/6/2020 Direction: West Description: Upland data point for W-2-UPL.	

LEVERETT WEST PROJECT **CARVER ROAD WEST, SHUTESBURY, MASSACHUSETTS**	
Photograph: 7 Date: 8/6/2020 Direction: East Description: Wetland data point for W-3-PFO.	
Photograph: 8 Date: 8/6/2020 Direction: West Description: Upland data point for W-3-UPL.	

Appendix C: Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Leverett West City/County: Schutesbury, Franklin County Sampling Date: 8/6/2020

Applicant/Owner: AMP State: MA Sampling Point: W-GAR-1-PFO

Investigator(s): G. Russo, D. Pizarro Section, Township, Range: Schutesbury

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1-3

Subregion (LRR or MLRA): LRR R; MLRA 144A Lat: Long: Datum:

Soil Map Unit Name: NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes X	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

Wetland hydrology, hydrophytic vegetation, and hydric soil are all present in this area. Area can be classified as a palustrine forested (PFO) wetland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland hydrology is present in this area.

VEGETATION – Use scientific names of plants.

Sampling Point: W-GAR-1-PFO

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus pennsylvanica	30	Yes	FACW
2. Acer rubrum	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	40	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Viburnum recognitum	20	Yes	FAC
2. Vaccinium corymbosum	5	Yes	OBL
3.			
4.			
5.			
6.			
7.			
	25	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Viburnum recognitum	15	Yes	FAC
2. Onoclea sensibilis	10	Yes	FAC
3. Arisaema triphyllum	10	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	30	x 2 =	60
FAC species	65	x 3 =	195
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		260 (B)

Prevalence Index = B/A = 2.6

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is dominant in this area.

SOIL

Sampling Point: W-GAR-1-PFO

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR 2/1	100					Silt Loam	High organic content
16	Refusal							Rock

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- X Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock

Depth (inches): 16

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Hydric soil is present in this area.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Leverett West City/County: Schutesbury, Franklin County Sampling Date: 8/6/2020

Applicant/Owner: AMP State: MA Sampling Point: W-GAR-1-UPL

Investigator(s): G. Russo, D. Pizarro Section, Township, Range: Schutesbury

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 1-3

Subregion (LRR or MLRA): LRR R; MLRA 144A Lat: Long: Datum:

Soil Map Unit Name: NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes _____	No X	

Remarks: (Explain alternative procedures here or in a separate report.)

Wetland hydrology, hydrophytic vegetation, and hydric soil are not present in this area. Area can be classified as an upland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland hydrology is not present in this area.

VEGETATION – Use scientific names of plants. Sampling Point: W-GAR-1-UPL

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	40	Yes	FAC
2. Quercus rubra	30	Yes	FACU
3. Pinus strobus	15	No	FACU
4.			
5.			
6.			
7.			
	85	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1. Fagus grandifolia	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10	= Total Cover	

Herb Stratum (Plot size: 5)			
1. Pyrola americana	70	Yes	FAC
2. Dryopteris marginalis	20	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	110	x 3 =	330
FACU species	75	x 4 =	300
UPL species	0	x 5 =	0
Column Totals:	185 (A)		630 (B)

Prevalence Index = B/A = 3.40

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ -3 Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _____ **No** x

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is not dominant in this area.

SOIL

Sampling Point: W-GAR-1-UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-6	10YR 2/1	100					Silt Loam	
6-10	5YR 4/3	100					Silt Loam	
10-20	7.5 YR 4/6	100					Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

Hydric soil is not present in this area.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Leverett West City/County: Schutesbury, Franklin County Sampling Date: 8/6/2020

Applicant/Owner: AMP State: MA Sampling Point: W-GAR-2-PFO

Investigator(s): G. Russo, D. Pizarro Section, Township, Range: Schutesbury

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Undulating Slope (%): 1-3

Subregion (LRR or MLRA): LRR R; MLRA 144A Lat: Long: Datum:

Soil Map Unit Name: NWI classification: PSS1E

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____
Wetland Hydrology Present?	Yes X	No ____	

Remarks: (Explain alternative procedures here or in a separate report.)

Wetland hydrology, hydrophytic vegetation, and hydric soil are present in this area. Area can be classified as a palustrine forested (PFO) wetland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- X Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland hydrology is present in this area.

VEGETATION – Use scientific names of plants.

Sampling Point: W-GAR-2-PFO

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Betula alleghaniensis	70	Yes	FAC
2. Acer rubrum	15	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	85	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. Betula alleghaniensis	50	Yes	FAC
2. Tsuga canadensis	10	No	FAC
3.			
4.			
5.			
6.			
7.			
	60	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Parathelypteris noveboracensis	30	Yes	FAC
2. Microstegium vimineum	20	Yes	FAC
3. Rubus huspidus	15	Yes	FACW
4. Onoclea sensibilis	5	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	15	x 2 =	30
FAC species	182	x 3 =	546
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	197 (A)		576 (B)

Prevalence Index = B/A = 2.92

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X -3 Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is dominant in this area.

SOIL

Sampling Point: W-GAR-2-PFO

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10YR 2/1	100					Silty Clay Loam	
4-12	10YR 5/1	100					Silt Loam	
12	Refusal							Rock

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock

Depth (inches): 12

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Hydric soil is present in this area.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Leverett West City/County: Schutesbury, Franklin County Sampling Date: 8/6/2020

Applicant/Owner: AMP State: MA Sampling Point: W-GAR-2-UPL

Investigator(s): G. Russo, D. Pizarro Section, Township, Range: Schutesbury

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): 5-10

Subregion (LRR or MLRA): LRR R; MLRA 144A Lat: Long: Datum:

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____
Wetland Hydrology Present?	Yes ____	No X	

Remarks: (Explain alternative procedures here or in a separate report.)

Wetland hydrology, hydrophytic vegetation, and hydric soil are not present in this area. Area can be classified as an upland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland hydrology is not present in this area.

VEGETATION – Use scientific names of plants.

Sampling Point: W-GAR-2-UPL

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Tsuga canadensis	85	Yes	FAC
2. Betula alleghaniensis	5	No	FAC
3.			
4.			
5.			
6.			
7.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		= Total Cover	

Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	90	x 3 =	270
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		270 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X -3 Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _____ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is not dominant in this area. Although the prevalence index is me, hydrology and hydric soils are absent.

SOIL

Sampling Point: W-GAR-2-UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-6	10YR 2/2	100					Silt Loam	
6-10	5YR 4/4	100					Silt Loam	
10-20	10YR 4/6	100					Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

Hydric soil is not present in this area.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Leverett West City/County: Schutesbury, Franklin County Sampling Date: 8/6/2020

Applicant/Owner: AMP State: MA Sampling Point: W-GAR-3-PFO

Investigator(s): G. Russo, D. Pizarro Section, Township, Range: Schutesbury

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): None Slope (%): 1-3

Subregion (LRR or MLRA): LRR R; MLRA 144A Lat: Long: Datum:

Soil Map Unit Name: NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____
Wetland Hydrology Present?	Yes X	No ____	

Remarks: (Explain alternative procedures here or in a separate report.)

Wetland hydrology, hydrophytic vegetation, and hydric soil are present in this area. Area can be classified as a palustrine forested (PFO) wetland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- X Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland hydrology is present in this area.

VEGETATION – Use scientific names of plants.

Sampling Point: W-GAR-3-PFO

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Tsuga canadensis	15	Yes	FAC
2. Acer rubrum	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	25	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1. Acer rubrum	25	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	25	= Total Cover	

Herb Stratum (Plot size: 5)			
1. Acer rubrum	20	Yes	FAC
2. Carex lurida	10	Yes	OBL
3. Rubus hispidus	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.3 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	5	x 2 =	10
FAC species	70	x 3 =	210
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	85 (A)		230 (B)

Prevalence Index = B/A = 2.70

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X -3 Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is dominant in this area.

SOIL

Sampling Point: W-GAR-3-PFO

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8	10YR 2/1	100					Silty Clay Loam	
8-16	5Y 5/1	100					Sandy Loam	
16	Refusal							Rock

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock

Depth (inches): 12

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Hydric soil is present in this area.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Leverett West City/County: Schutesbury, Franklin County Sampling Date: 8/6/2020

Applicant/Owner: AMP State: MA Sampling Point: W-GAR-3-UPL

Investigator(s): G. Russo, D. Pizarro Section, Township, Range: Schutesbury

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): 1-3

Subregion (LRR or MLRA): LRR R; MLRA 144A Lat: Long: Datum:

Soil Map Unit Name: NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes _____	No X	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes _____	No X	

Remarks: (Explain alternative procedures here or in a separate report.)

Wetland hydrology, hydrophytic vegetation, and hydric soil are not present in this area. Area can be classified as an upland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): _____
Water Table Present?	Yes X	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland hydrology is not present in this area.

VEGETATION – Use scientific names of plants.

Sampling Point: W-GAR-3-UPL

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	30	Yes	FAC
2. Betula allegheniensis	20	Yes	FAC
3. Pinus strobus	15	Yes	FACU
4.			
5.			
6.			
7.			
	65	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1. Hamamelis virginiana	20	Yes	FACU
2. Acer rubrum	15	Yes	FAC
3. Quercus alba	5	No	FACU
4.			
5.			
6.			
7.			
	40	= Total Cover	

Herb Stratum (Plot size: 5)			
1. Osmundastrum cinnamomeum	20	Yes	FACW
2. Maianthemum canadense	15	Yes	FACU
3. Vaccinium angustifolium	10	Yes	FACU
4. Pinus strobus	5	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	65	x 3 =	195
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column Totals:	155 (A)		515 (B)

Prevalence Index = B/A = 3.32

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for HydrophyticVegetation

___ 2 - Dominance Test is >50%

___ -3 Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _____ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation is not dominant in this area.

SOIL

Sampling Point: W-GAR-3-UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3	10YR 2/2	100					Silt Loam	
3-16	10YR 3/4	100					Loamy Sand	
16-20	10YR 4/6	100					Loamy Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

Hydric soil is not present in this area.

Appendix D: NRCS Soil Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Franklin County, Massachusetts

August 20, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,690 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Franklin County, Massachusetts
Survey Area Data: Version 15, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 29, 2013—Oct 16, 2016

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
75B	Pillsbury fine sandy loam, 0 to 8 percent slopes, very stony	1.2	4.9%
229F	Windsor and Merrimac soils, 25 to 60 percent slopes	1.2	4.9%
245B	Hinckley loamy sand, 3 to 8 percent slopes	1.5	6.1%
245C	Hinckley loamy sand, 8 to 15 percent slopes	9.0	37.3%
444C	Chichester fine sandy loam, 8 to 15 percent slopes	11.2	46.8%
Totals for Area of Interest		**24.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Franklin County, Massachusetts

75B—Pillsbury fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2ty6x
Elevation: 360 to 2,070 feet
Mean annual precipitation: 31 to 95 inches
Mean annual air temperature: 27 to 52 degrees F
Frost-free period: 90 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Pillsbury, very stony, and similar soils: 79 percent
Minor components: 21 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pillsbury, Very Stony

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Mountainbase, base slope, interfluve
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy lodgment till derived from gneiss and/or loamy lodgment till derived from mica schist and/or loamy lodgment till derived from granite

Typical profile

Oe - 0 to 1 inches: mucky peat
A - 1 to 6 inches: fine sandy loam
Bg1 - 6 to 13 inches: cobbly fine sandy loam
Bg2 - 13 to 23 inches: cobbly fine sandy loam
Cd - 23 to 65 inches: cobbly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.1 percent
Depth to restrictive feature: 21 to 43 inches to densic material
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Peru, very stony

Percent of map unit: 9 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Mountainbase, interfluve, base slope
Microfeatures of landform position: Rises, rises
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Peacham, very stony

Percent of map unit: 5 percent
Landform: Mountains, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Mountainbase, base slope, interfluve
Microfeatures of landform position: Closed depressions, closed depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Wonsqueak

Percent of map unit: 4 percent
Landform: Hills, mountains
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Mountainbase, base slope, interfluve
Microfeatures of landform position: Closed depressions, closed depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Lyman, very stony

Percent of map unit: 3 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Mountainbase, interfluve, base slope
Microfeatures of landform position: Rises, rises
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

229F—Windsor and Merrimac soils, 25 to 60 percent slopes

Map Unit Setting

National map unit symbol: 2w2wr
Elevation: 100 to 1,150 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Windsor and similar soils: 60 percent
Merrimac and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: Dunes, outwash plains, outwash terraces, deltas
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 25 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Merrimac

Setting

Landform: Eskers, moraines, outwash terraces, outwash plains, kames
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 25 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 10 percent
Landform: Kames, deltas, outwash plains, eskers
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Agawam

Percent of map unit: 5 percent
Landform: Outwash terraces, outwash plains, kame terraces, kames, moraines
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Pollux

Percent of map unit: 5 percent
Landform: Plains, deltas, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear

Hydric soil rating: No

245B—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svm8
Elevation: 0 to 1,430 feet
Mean annual precipitation: 36 to 53 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Kames, outwash terraces, outwash deltas, outwash plains, eskers, moraines, kame terraces
Landform position (two-dimensional): Summit, backslope, footslope, shoulder
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 8 percent
Landform: Eskers, moraines, outwash terraces, outwash deltas, kame terraces, outwash plains, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash deltas, kame terraces, outwash plains, moraines, outwash terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope, head slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Outwash terraces, outwash deltas, kame terraces, outwash plains, kames, eskers, moraines
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

245C—Hinckley loamy sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svm9
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Kames, eskers, moraines, outwash terraces, outwash deltas, kame terraces, outwash plains
Landform position (two-dimensional): Shoulder, toeslope, footslope, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Linear, concave, convex
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Moraines, outwash terraces, outwash plains, kames, eskers
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser
Down-slope shape: Convex

Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash terraces, outwash deltas, kames, eskers, moraines, kame terraces, outwash plains
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser
Down-slope shape: Linear, concave, convex
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Kame terraces, outwash plains, moraines, outwash deltas, outwash terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

444C—Chichester fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9cfl
Elevation: 380 to 1,040 feet
Mean annual precipitation: 39 to 53 inches
Mean annual air temperature: 34 to 56 degrees F
Frost-free period: 140 to 174 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Chichester and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chichester

Setting

Landform: Valley sides, ground moraines
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear, convex
Parent material: Loamy over sandy supraglacial meltout till derived from gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

A - 1 to 3 inches: fine sandy loam
Ap - 3 to 7 inches: fine sandy loam
Bw1 - 7 to 10 inches: fine sandy loam
Bw2 - 10 to 20 inches: fine sandy loam
C1 - 20 to 28 inches: gravelly loamy coarse sand
C2 - 28 to 35 inches: sand
C3 - 35 to 44 inches: stony sand
C4 - 44 to 65 inches: stony sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Henniker

Percent of map unit: 10 percent
Landform: Ground moraines, drumlins
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

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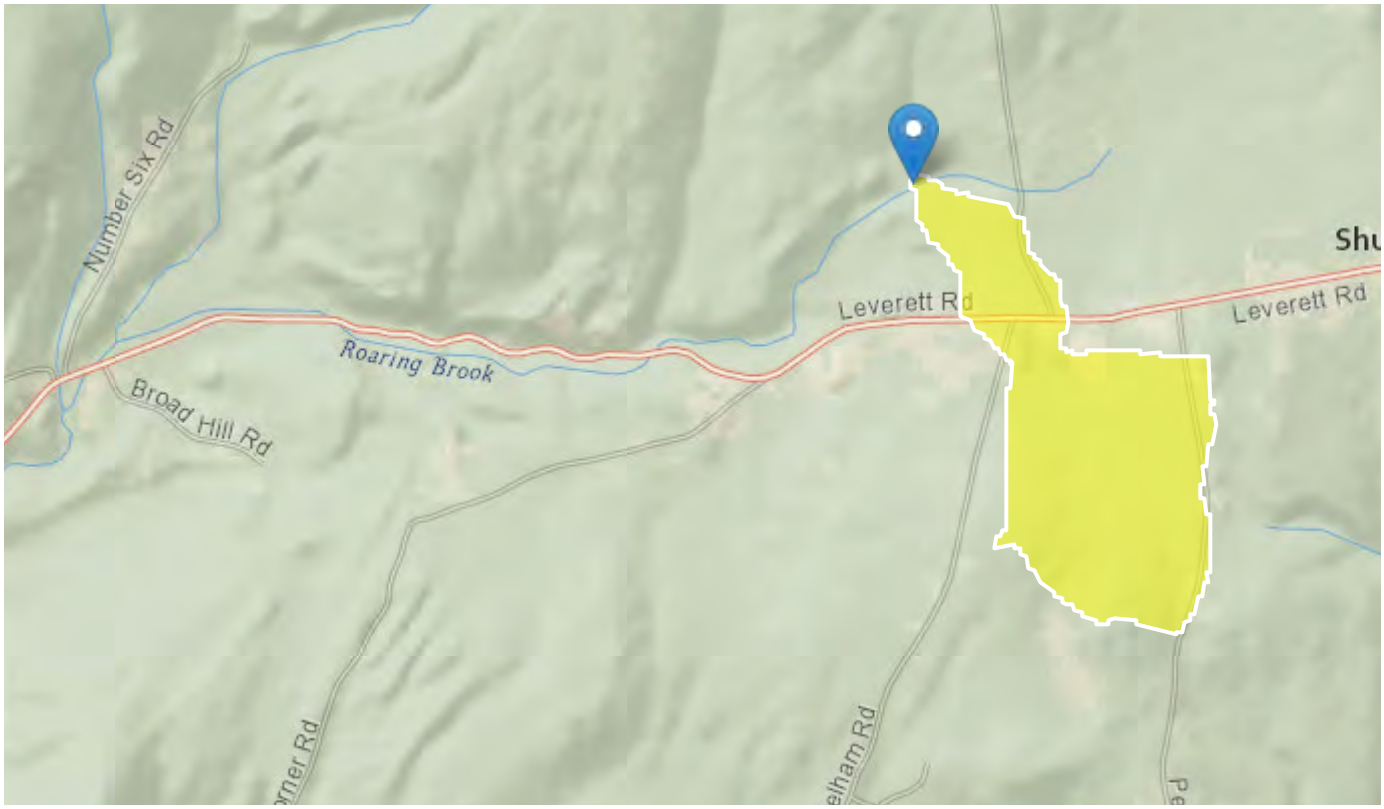
Appendix E: USGS StreamStats Report

S-GR-1 StreamStats Report

Region ID: MA
Workspace ID: MA20200827231104296000
Clicked Point (Latitude, Longitude): 42.45465, -72.43151
Time: 2020-08-27 19:11:23 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.32	square miles
ELEV	Mean Basin Elevation	1150	feet
LC06STOR	Percentage of water bodies and wetlands determined from the NLCD 2006	0.98	percent
BSLDEM250	Mean basin slope computed from 1:250K DEM	3.909	percent
DRFTPERSTR	Area of stratified drift per unit of stream length	0.0652	square mile per mile

Parameter Code	Parameter Description	Value	Unit
MAREGION	Region of Massachusetts 0 for Eastern 1 for Western	1	dimensionless
BSLDEM10M	Mean basin slope computed from 10 m DEM	5.78	percent
PCTSNDGRV	Percentage of land surface underlain by sand and gravel deposits	24.08	percent
FOREST	Percentage of area covered by forest	78.81	percent
ACRSDFT	Area underlain by stratified drift	0.0743	square miles
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	123972.8	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	911104.7	meters
CRSDFT	Percentage of area of coarse-grained stratified drift	24.08	percent
LAKEAREA	Percentage of Lakes and Ponds	0	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	7.02	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	1.02	percent
MAXTEMPC	Mean annual maximum air temperature over basin area, in degrees Centigrade	13.2	feet per mi
OUTLETX	Basin outlet horizontal (x) location in state plane coordinates	123375	feet
OUTLETY	Basin outlet vertical (y) location in state plane coordinates	911985	feet
PRECPRIS00	Basin average mean annual precipitation for 1971 to 2000 from PRISM	50.3	inches
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	1.14	miles
WETLAND	Percentage of Wetlands	5.22	percent

Peak-Flow Statistics Parameters[Peak Statewide 2016 5156]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.32	square miles	0.16	512
ELEV	Mean Basin Elevation	1150	feet	80.6	1948
LC06STOR	Percent Storage from NLCD2006	0.98	percent	0	32.3

Peak-Flow Statistics Flow Report[Peak Statewide 2016 5156]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	SEp
2 Year Peak Flood	26.9	ft^3/s	13.1	55.2	42.3
5 Year Peak Flood	47.2	ft^3/s	22.6	98.5	43.4
10 Year Peak Flood	64.6	ft^3/s	30.1	138	44.7
25 Year Peak Flood	91	ft^3/s	40.8	203	47.1
50 Year Peak Flood	114	ft^3/s	49.3	264	49.4
100 Year Peak Flood	139	ft^3/s	58.1	333	51.8
200 Year Peak Flood	167	ft^3/s	67.4	414	54.1
500 Year Peak Flood	208	ft^3/s	79.7	543	57.6

Peak-Flow Statistics Citations

Zarriello, P.J.,2017, Magnitude of flood flows at selected annual exceedance probabilities for streams in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2016–5156, 99 p. (https://dx.doi.org/10.3133/sir20165156)

Low-Flow Statistics Parameters[Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.32	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	3.909	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.0652	square mile per mile	0	1.29

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
MAREGION	Massachusetts Region	1	dimensionless	0	1

Low-Flow Statistics Disclaimers[Statewide Low Flow WRIR00 4135]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Low-Flow Statistics Flow Report[Statewide Low Flow WRIR00 4135]

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.0233	ft^3/s
7 Day 10 Year Low Flow	0.00924	ft^3/s

Low-Flow Statistics Citations

Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p. (http://pubs.usgs.gov/wri/wri004135/)

Flow-Duration Statistics Parameters[Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.32	square miles	1.61	149
DRFTPERSTR	Stratified Drift per Stream Length	0.0652	square mile per mile	0	1.29
MAREGION	Massachusetts Region	1	dimensionless	0	1
BSLDEM250	Mean Basin Slope from 250K DEM	3.909	percent	0.32	24.6

Flow-Duration Statistics Disclaimers[Statewide Low Flow WRIR00 4135]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Flow-Duration Statistics Flow Report[Statewide Low Flow WRIR00 4135]

Statistic	Value	Unit

Statistic	Value	Unit
50 Percent Duration	0.299	ft^3/s
60 Percent Duration	0.185	ft^3/s
70 Percent Duration	0.125	ft^3/s
75 Percent Duration	0.0983	ft^3/s
80 Percent Duration	0.0788	ft^3/s
85 Percent Duration	0.0568	ft^3/s
90 Percent Duration	0.0405	ft^3/s
95 Percent Duration	0.0228	ft^3/s
98 Percent Duration	0.0155	ft^3/s
99 Percent Duration	0.0106	ft^3/s

Flow-Duration Statistics Citations

Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p. (http://pubs.usgs.gov/wri/wri004135/)

August Flow-Duration Statistics Parameters[Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.32	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	3.909	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.0652	square mile per mile	0	1.29
MAREGION	Massachusetts Region	1	dimensionless	0	1

August Flow-Duration Statistics Disclaimers[Statewide Low Flow WRIR00 4135]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

August Flow-Duration Statistics Flow Report[Statewide Low Flow WRIR00 4135]

Statistic	Value	Unit

Statistic	Value	Unit
August 50 Percent Duration	0.0631	ft^3/s

August Flow-Duration Statistics Citations

Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p. (http://pubs.usgs.gov/wri/wri004135/)

Bankfull Statistics Parameters[Bankfull Statewide SIR2013 5155]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.32	square miles	0.6	329
BSLDEM10M	Mean Basin Slope from 10m DEM	5.78	percent	2.2	23.9

Bankfull Statistics Disclaimers[Bankfull Statewide SIR2013 5155]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Bankfull Statistics Flow Report[Bankfull Statewide SIR2013 5155]

Statistic	Value	Unit
Bankfull Width	9.26	ft
Bankfull Depth	0.665	ft
Bankfull Area	6.07	ft^2
Bankfull Streamflow	13.4	ft^3/s

Bankfull Statistics Citations

Bent, G.C., and Waite, A.M.,2013, Equations for estimating bankfull channel geometry and discharge for streams in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2013–5155, 62 p., (http://pubs.usgs.gov/sir/2013/5155/)

Probability Statistics Parameters[Perennial Flow Probability]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.32	square miles	0.01	1.99
PCTSNDGRV	Percent Underlain By Sand And Gravel	24.08	percent	0	100
FOREST	Percent Forest	78.81	percent	0	100
MAREGION	Massachusetts Region	1	dimensionless	0	1

Probability Statistics Flow Report[Perennial Flow Probability]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PC
Probability Stream Flowing Perennially	0.703	dim	71

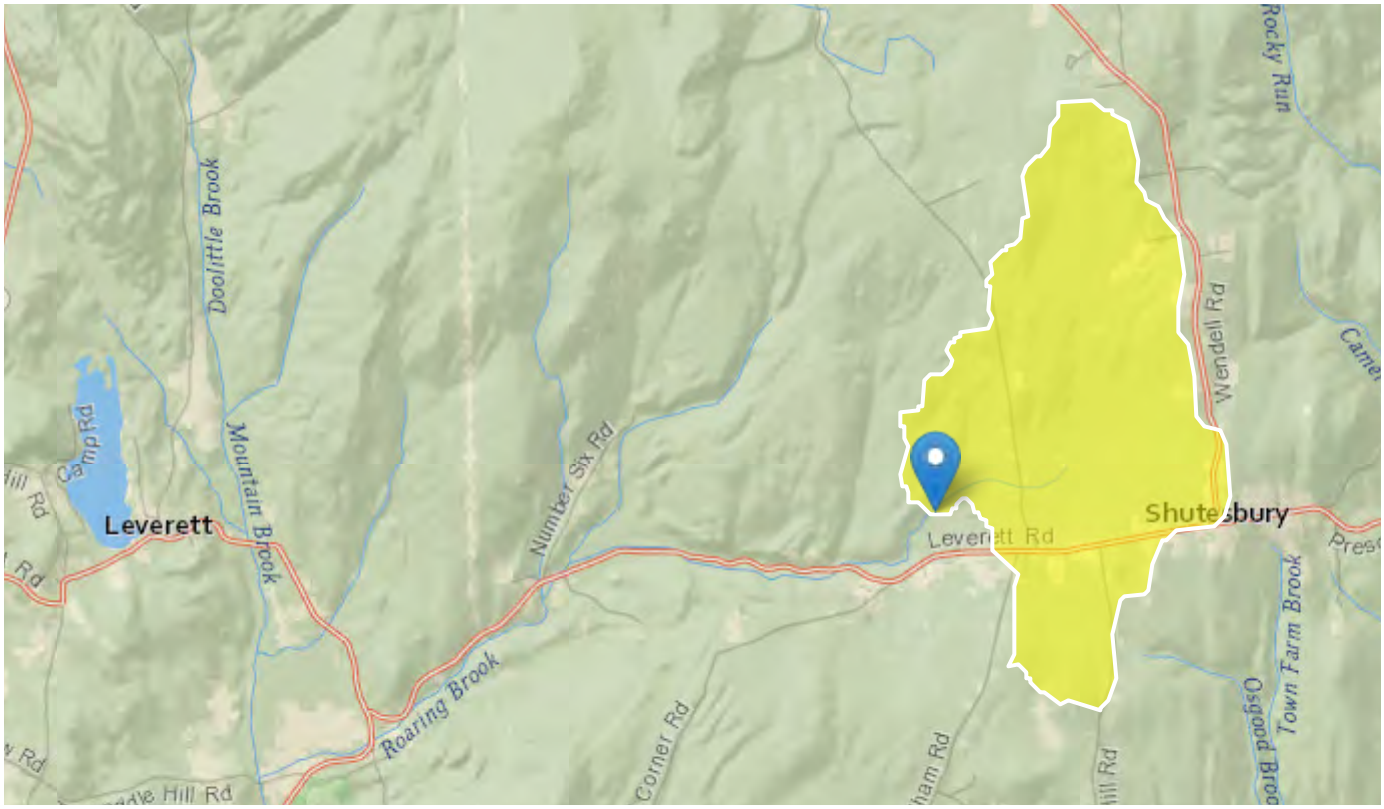
Probability Statistics Citations

Bent, G.C., and Steeves, P.A.,2006, A revised logistic regression equation and an automated procedure for mapping the probability of a stream flowing perennially in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2006–5031, 107 p. (http://pubs.usgs.gov/sir/2006/5031/pdfs/SIR_2006-5031rev.pdf)

Application Version: 4.4.0

S-GR-2 StreamStats Report

Region ID: MA
Workspace ID: MA20200827234828642000
Clicked Point (Latitude, Longitude): 42.45279, -72.43444
Time: 2020-08-27 19:48:47 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	2.07	square miles
ELEV	Mean Basin Elevation	1140	feet
LC06STOR	Percentage of water bodies and wetlands determined from the NLCD 2006	14.51	percent
BSLDEM250	Mean basin slope computed from 1:250K DEM	2.851	percent
DRFTPERSTR	Area of stratified drift per unit of stream length	0.046	square mile per mile

Parameter Code	Parameter Description	Value	Unit
MAREGION	Region of Massachusetts 0 for Eastern 1 for Western	1	dimensionless
BSLDEM10M	Mean basin slope computed from 10 m DEM	5.208	percent
PCTSNDGRV	Percentage of land surface underlain by sand and gravel deposits	11.68	percent
FOREST	Percentage of area covered by forest	72.31	percent
ACRSDFT	Area underlain by stratified drift	0.25	square miles
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	124137.5	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	912512.9	meters
CRSDFT	Percentage of area of coarse-grained stratified drift	11.68	percent
LAKEAREA	Percentage of Lakes and Ponds	0	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	5.53	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0.77	percent
MAXTEMPC	Mean annual maximum air temperature over basin area, in degrees Centigrade	13.2	feet per mi
OUTLETX	Basin outlet horizontal (x) location in state plane coordinates	123135	feet
OUTLETY	Basin outlet vertical (y) location in state plane coordinates	911785	feet
PRECPRIS00	Basin average mean annual precipitation for 1971 to 2000 from PRISM	50.6	inches
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	5.48	miles
WETLAND	Percentage of Wetlands	10.6	percent

Peak-Flow Statistics Parameters[Peak Statewide 2016 5156]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.07	square miles	0.16	512
ELEV	Mean Basin Elevation	1140	feet	80.6	1948
LC06STOR	Percent Storage from NLCD2006	14.51	percent	0	32.3

Peak-Flow Statistics Flow Report[Peak Statewide 2016 5156]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	SEp
2 Year Peak Flood	83.9	ft^3/s	41.3	170	42.3
5 Year Peak Flood	144	ft^3/s	69.9	297	43.4
10 Year Peak Flood	195	ft^3/s	92.2	412	44.7
25 Year Peak Flood	271	ft^3/s	123	595	47.1
50 Year Peak Flood	335	ft^3/s	147	761	49.4
100 Year Peak Flood	405	ft^3/s	172	952	51.8
200 Year Peak Flood	482	ft^3/s	199	1170	54.1
500 Year Peak Flood	596	ft^3/s	234	1520	57.6

Peak-Flow Statistics Citations

Zarriello, P.J.,2017, Magnitude of flood flows at selected annual exceedance probabilities for streams in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2016–5156, 99 p. (https://dx.doi.org/10.3133/sir20165156)

Low-Flow Statistics Parameters[Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.07	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	2.851	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.046	square mile per mile	0	1.29

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
MAREGION	Massachusetts Region	1	dimensionless	0	1

Low-Flow Statistics Flow Report[Statewide Low Flow WRIR00 4135]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	SE	SEp
7 Day 2 Year Low Flow	0.159	ft^3/s	0.0399	0.61	49.5	49.5
7 Day 10 Year Low Flow	0.0603	ft^3/s	0.0121	0.28	70.8	70.8

Low-Flow Statistics Citations

Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p. (http://pubs.usgs.gov/wri/wri004135/)

Flow-Duration Statistics Parameters[Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.07	square miles	1.61	149
DRFTPERSTR	Stratified Drift per Stream Length	0.046	square mile per mile	0	1.29
MAREGION	Massachusetts Region	1	dimensionless	0	1
BSLDEM250	Mean Basin Slope from 250K DEM	2.851	percent	0.32	24.6

Flow-Duration Statistics Flow Report[Statewide Low Flow WRIR00 4135]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	SE	SEp
50 Percent Duration	2.01	ft^3/s	0.785	5.11	17.6	17.6
60 Percent Duration	1.29	ft^3/s	0.5	3.31	19.8	19.8
70 Percent Duration	0.879	ft^3/s	0.319	2.4	23.5	23.5
75 Percent Duration	0.7	ft^3/s	0.256	1.89	25.8	25.8
80 Percent Duration	0.493	ft^3/s	0.159	1.51	28.4	28.4

Statistic	Value	Unit	PIl	PIu	SE	SEp
85 Percent Duration	0.359	ft^3/s	0.108	1.17	31.9	31.9
90 Percent Duration	0.237	ft^3/s	0.0692	0.794	36.6	36.6
95 Percent Duration	0.141	ft^3/s	0.0385	0.5	45.6	45.6
98 Percent Duration	0.0989	ft^3/s	0.0236	0.392	60.3	60.3
99 Percent Duration	0.0712	ft^3/s	0.016	0.298	65.1	65.1

Flow-Duration Statistics Citations

Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p. (http://pubs.usgs.gov/wri/wri004135/)

August Flow-Duration Statistics Parameters[Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.07	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	2.851	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.046	square mile per mile	0	1.29
MAREGION	Massachusetts Region	1	dimensionless	0	1

August Flow-Duration Statistics Flow Report[Statewide Low Flow WRIR00 4135]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIl	PIu	SE	SEp
August 50 Percent Duration	0.409	ft^3/s	0.124	1.32	33.2	33.2

August Flow-Duration Statistics Citations

Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p. (http://pubs.usgs.gov/wri/wri004135/)

Bankfull Statistics Parameters[Bankfull Statewide SIR2013 5155]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.07	square miles	0.6	329
BSLDEM10M	Mean Basin Slope from 10m DEM	5.208	percent	2.2	23.9

Bankfull Statistics Flow Report[Bankfull Statewide SIR2013 5155]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
Bankfull Width	19	ft	21.3
Bankfull Depth	1.12	ft	19.8
Bankfull Area	21.1	ft^2	29
Bankfull Streamflow	50.5	ft^3/s	55

Bankfull Statistics Citations

Bent, G.C., and Waite, A.M.,2013, Equations for estimating bankfull channel geometry and discharge for streams in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2013–5155, 62 p., (http://pubs.usgs.gov/sir/2013/5155/)

Probability Statistics Parameters[Perennial Flow Probability]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.07	square miles	0.01	1.99
PCTSNDGRV	Percent Underlain By Sand And Gravel	11.68	percent	0	100
FOREST	Percent Forest	72.31	percent	0	100
MAREGION	Massachusetts Region	1	dimensionless	0	1

Probability Statistics Disclaimers[Perennial Flow Probability]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Probability Statistics Flow Report[Perennial Flow Probability]

Statistic	Value	Unit
Probability Stream Flowing Perennially	0.938	dim

Probability Statistics Citations

Bent, G.C., and Steeves, P.A.,2006, A revised logistic regression equation and an automated procedure for mapping the probability of a stream flowing perennially in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2006–5031, 107 p. (http://pubs.usgs.gov/sir/2006/5031/pdfs/SIR_2006-5031rev.pdf)

Application Version: 4.4.0

ATTACHMENT C
Abutter Information
(Certified Abutter List, Abutter Notification & Affidavit of Service)

TOWN OF SHUTESBURY CERTIFIED 100' ABUTTERS LIST FOR PARCEL ZF-15 OFF MONTAGUE RD

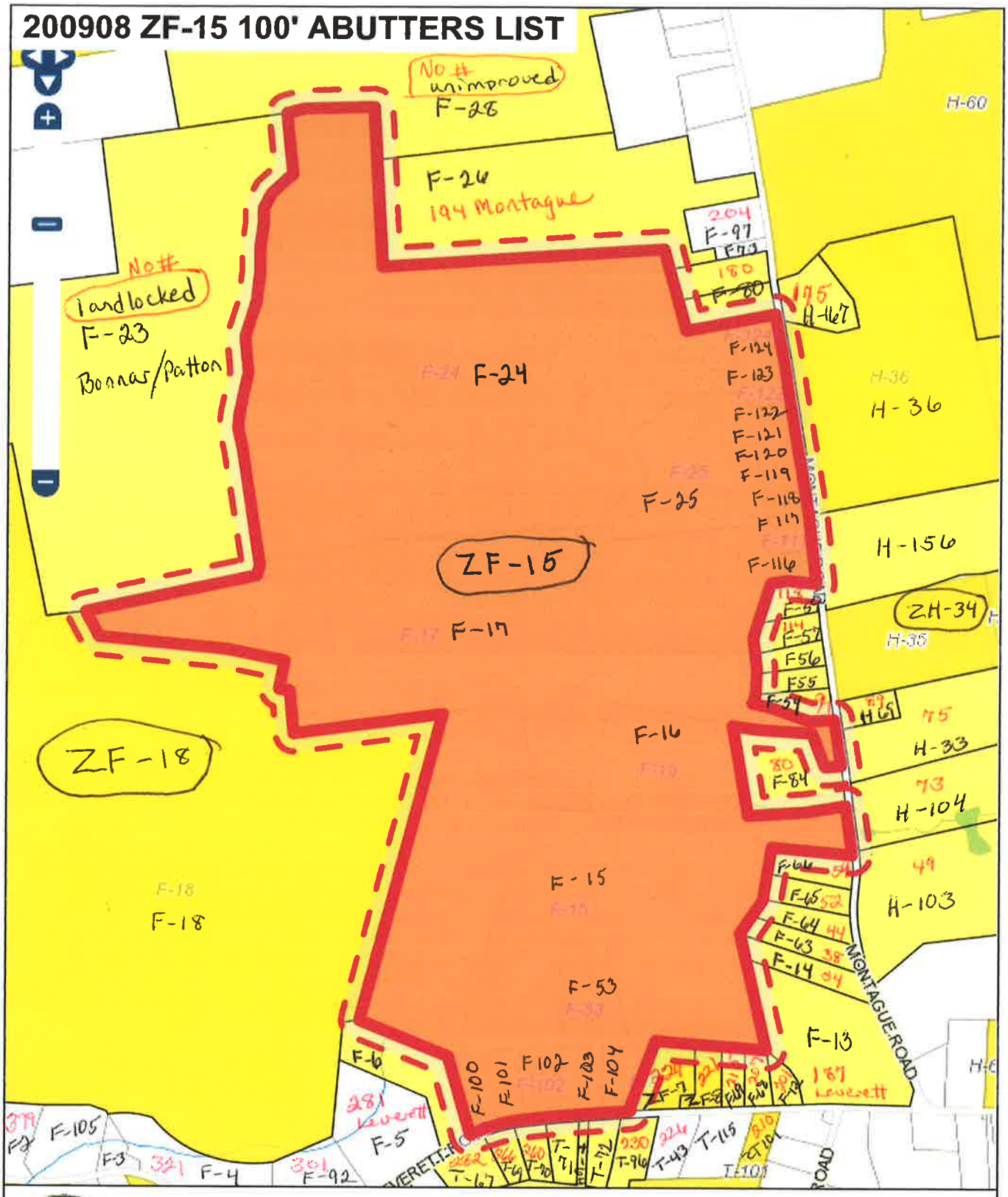
MAP	LOT	OWNER	CO-OWNER	MAILING ADDRESS	TOWN	ST	ZIP	LOCATION
ZF	15	W D COWLS INC		PO BOX 9677	N AMHERST	MA	01059	LEVERETT RD
ZF	18	W D COWLS INC		PO BOX 9677	N AMHERST	MA	01059	LEVERETT RD
F	6	STOKES ELISABETH FAIRFIELD	C/O FAIRFIELD SARAH JANE	281 LEVERETT RD	SHUTESBURY	MA	01072	LEVERETT RD
F	12	SKARZYNSKI	WILLIAMS THOMAS W	201 LEVERETT RD	SHUTESBURY	MA	01072	201 LEVERETT RD
F	13	KIM, DAVID L & KIM, MELISSA L	KIM, PENELOPE (LIFE ESTATE)	187 LEVERETT RD	SHUTESBURY	MA	01072	187 LEVERETT RD
F	14	KURTZ ALAN	STEIN APRIL J	34 MONTAGUE ROAD	SHUTESBURY	MA	01072	34 MONTAGUE RD
F	23	BONNAR D, & PATTON SARAH, & PATTON SUSAN		276 MONTAGUE RD	SHUTESBURY	MA	01072	LEVERETT RD
F	26	KELLOGG JEREMY G.	RASKEVITZ WENDY A.	194 MONTAGUE RD	SHUTESBURY	MA	01072	194 MONTAGUE RD
F	28	BONNAR DEACON, & PATTON SARAH, &	PATTON SUSAN	276 MONTAGUE RD	SHUTESBURY	MA	01072	MONTAGUE RD
F	54	WHITE EMANUEL J	WHITE ALICE T	94 MONTAGUE RD	SHUTESBURY	MA	01072	94 MONTAGUE RD
F	55	POLLOCK MARK		114 MONTAGUE RD	SHUTESBURY	MA	01072	MONTAGUE RD
F	56	POLLOCK MARK		114 MONTAGUE RD	SHUTESBURY	MA	01072	MONTAGUE RD
F	57	POLLOCK MARK		114 MONTAGUE RD	SHUTESBURY	MA	01072	114 MONTAGUE RD
F	59	RUBENSTEIN, JAYNE D		118 MONTAGUE RD	SHUTESBURY	MA	01072	118 MONTAGUE RD
F	63	RHODES LESTER A	RHODES CHERYL A	38 MONTAGUE ROAD	SHUTESBURY	MA	01072	38 MONTAGUE RD
F	64	DUNCAN, JASON E AND SUSAN F		44 MONTAGUE RD	SHUTESBURY	MA	01072	44 MONTAGUE RD
F	65	PARKIN BRUCE E	PARKIN GEORGIANNA E	52 MONTAGUE ROAD	SHUTESBURY	MA	01072	52 MONTAGUE RD
F	66	TUOMINEN MARK T	TUOMINEN LORI P	54 MONTAGUE ROAD	SHUTESBURY	MA	01072	54 MONTAGUE RD
F	68	SPRING ASSOCIATES INC		664 MAIN STREET STE 51	AMHERST	MA	01004	207 LEVERETT RD
F	69	WAKOLUK DONALD	WAKOLUK NARDA	215 LEVERETT RD	SHUTESBURY	MA	01072	215 LEVERETT RD
F	80	SMITH LESLEY A	REDONNET EDWARD C	180 MONTAGUE ROAD	SHUTESBURY	MA	01072	180 MONTAGUE RD
F	81	KITTREDGE, THE DAVID B. REVOCABLE T	C/O KITTREDGE, DAVID B. JR	196 MONTAGUE RD	SHUTESBURY	MA	01072	196 MONTAGUE RD
F	84	PADDOCK STEPHEN & MICKI	MCWILLIAMS ROSEMARY & JAY	80 MONTAGUE RD	SHUTESBURY	MA	01072	80 MONTAGUE RD
H	33	HOLT KENNETH G	OSTROFF LAUREN S	75 MONTAGUE ROAD	SHUTESBURY	MA	01072	75 MONTAGUE RD
H	69	YOUNG SUZAN L		89 MONTAGUE ROAD	SHUTESBURY	MA	01072	89 MONTAGUE RD
H	103	ROSEN JEANNE (JEWELL)		49 MONTAGUE ROAD	SHUTESBURY	MA	01072	49 MONTAGUE RD
H	104	DEVITO GUY J	DEVITO DONNA J	73 MONTAGUE ROAD	SHUTESBURY	MA	01072	73 MONTAGUE RD
H	156	RICHTER STUART D & ALICIA L		283 PELHAM HILL RD	SHUTESBURY	MA	01072	135 MONTAGUE RD
H	167	RICHARD, RENEE A		PO BOX 14	SHUTESBURY	MA	01072	175 MONTAGUE RD
T	64	CLARK WILLIAM W TRUST	C/ O CLARK, & PILL, MICHAEL, TRUS	22 PRATT CORNER ROAD	SHUTESBURY	MA	01072	PRATT CORNER RD
T	67	CLARK, VIRGINIA NOMINEE TRUST	C/O CLARK, V. & JANKOWSKI, D., TRUT	22 PRATT CORNER RD	SHUTESBURY	MA	01072	282 LEVERETT RD
T	69	FUNK CHARLES W	FUNK AUDREY M	P O BOX 33	SHUTESBURY	MA	01072	266 LEVERETT RD
T	70	HICKS LYNDA M		P O BOX 64	SHUTESBURY	MA	01072	260 LEVERETT RD
T	71	CLARK WILLIAM W	CLARK VIRGINIA P	22 PRATT CORNER ROAD	SHUTESBURY	MA	01072	PRATT CORNER RD
T	72	CLARK WILLIAM W	CLARK VIRGINIA P	22 PRATT CORNER ROAD	SHUTESBURY	MA	01072	PRATT CORNER RD
T	96	DORMAN & JACOBY 2010 REV. TR	C/O JACOBY, DIANE C. & DORMAN, E.	230 LEVERETT RD	SHUTESBURY	MA	01072	230 LEVERETT RD
ZF	7	KENNY JACOB E	KENNEY NATALYA	229 LEVERETT RD	SHUTESBURY	MA	01072	229 LEVERETT RD
ZF	8	KNIPES BRADFORD J		221 LEVERETT ROAD	SHUTESBURY	MA	01072	221 LEVERETT RD
ZH	36	RICHTER SCOTT S & VERONICA		153 MONTAGUE RD	SHUTESBURY	MA	01072	153 MONTAGUE RD

FOR: TRC

650 Suffolk ST, Lowell, MA 01854
Molly Lennon, Environmental Scientist
Mlennon@trccompanies.com

Respectfully,
Leslie Bracebridge, Assessors Clerk for
Kevin Rudden, Administratve Assessor
9/8/2020

200908 ZF-15 100' ABUTTERS LIST



Town of Shutesbury, Massachusetts

Selected Parcel: LEVERETT RD ID: ZF-15

200 m
1000 ft

N

MainStreetMaps
MainStreetGIS, LLC
www.mainstreetgis.com

Printed 9/8/2020 from http://www.mainstreetmaps.com/ma/shutesbury/public.asp

SHUTESBURY CONSERVATION COMMISSION
NOTIFICATION TO ABUTTERS

In accordance with the second paragraph of the Massachusetts Wetlands Protection Act (G.L. Ch. 131 §40), and §10.05(4)(a) of 310 CMR 10.00, and the Shutesbury Wetlands Protection Bylaw and regulations, you are hereby notified of a public hearing on the matter described below.

A. An ANRAD has been filed with the Shutesbury Conservation Commission.

B. The name of the applicant is: W.D. Cowls, Inc.

C. The address/lot number of the land where the activity is proposed: Leverett Road, Shutesbury, MA (Parcel ID: ZF-15)

D. The proposed activity is: Review of delineated wetland resources.

E. A Public Hearing regarding this ANRAD will be held on: November 12, 2020

F. **Public Participation will be via Virtual Means Only:** Governor Baker issued an Emergency Order on March 12, 2020 allowing public bodies greater flexibility in utilizing technology in the conduct of meetings under the Open Meeting Law. The Shutesbury Conservation Commission greatly values the participation of its citizens in the public meeting process, but given the current circumstances and recommendations to limit or avoid public gatherings, including Governor Baker's State of Emergency, together with the present closure of Shutesbury Town Hall, the Town has decided to implement the "remote participation" procedures allowed under Governor Baker's Emergency Order for all boards, committees, and commissions.
Remote access information will be published on the Shutesbury meeting calendar: www.shutesbury.org/node/2. Click on the agenda for the meeting you wish to attend.

G. The ANRAD may be examined on the Shutesbury Conservation Commission website: shutesbury.org/concom. A paper copy may be obtained, for a fee, from the Shutesbury Town Clerk: townclerk@shutesbury.org or 413.259.1204. Copies may also be obtained from the applicant or the applicant's representative.

Notice of the public hearing, including date, time, and place will be published at least five business days in advance in **Greenfield Recorder** or the **Hampshire Daily Gazette**.

For more information about this application or the Wetlands Protection Act, contact the Shutesbury Conservation Commission (concom@shutesbury.org or 413.259.3792) or the Department of Environmental Protection (DEP) Western Region Office at (413.784.1100). For information about the Shutesbury Wetlands Protection Bylaw, contact the Shutesbury Conservation Commission.

AFFIDAVIT OF SERVICE

I, Jeff Brandt, hereby certify under the pains and penalties of perjury that on October 26, 2020 I gave notification to abutters in compliance with the Shutesbury Wetlands Protection Bylaw and regulations as well as the second paragraph of the Massachusetts General Laws, Chapter 131, Section 40 and the DEP Guide to Abutter Notification in connection with the following matter:

> An Abbreviated Notice of Resource Area Delineation application was filed under the Massachusetts Wetlands Protection Act by W.D. Cowls, Inc. with the Shutesbury Conservation Commission on October 26, 2020 for the property located off Leverett Road, Shutesbury, Massachusetts (Assessor's ID ZF-15).

The form of the notification, and a list of the abutters to whom it was given and their addresses, are attached to this Affidavit of Service.

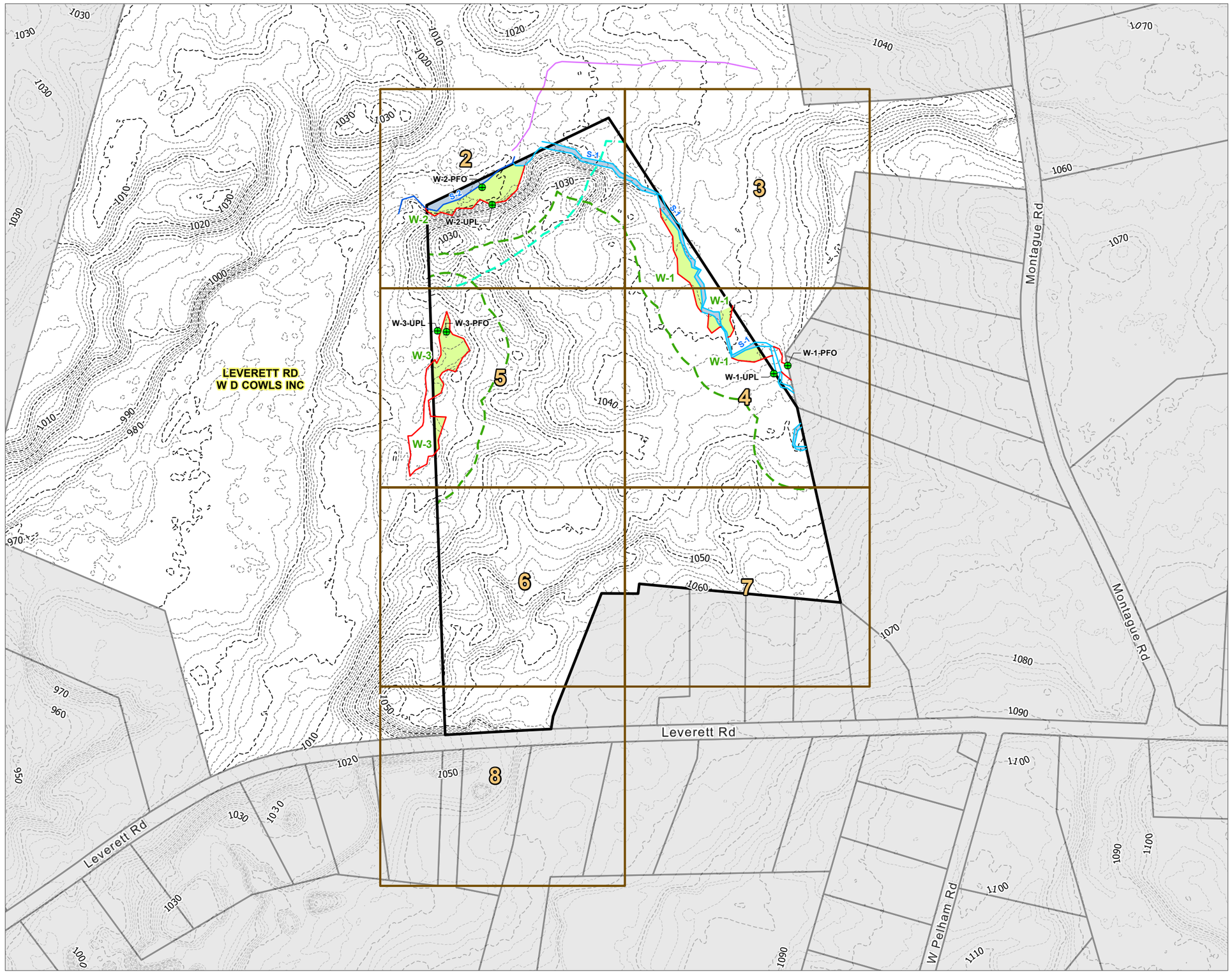
Jeff Brandt

Signature

10/26/2020

Date

ATTACHMENT D
Figure 1: Delineated Resources Map (September 2020)



- STUDY AREA
- PROJECT PARCEL
- ABUTTER PARCEL
- SHEET INDEX
- USACE PLOT
- DELINEATED PERENNIAL STREAM
- DELINEATED INTERMITTENT STREAM
- ESTIMATED STREAM CENTERLINE (USGS)
- DELINEATED WETLAND BOUNDARY
- DELINEATED WETLAND
- DELINEATED WATERBODY
- 100-FT WETLAND BUFFER
- 200-FT RIVERFRONT AREA
- MAJOR CONTOUR
- MINOR CONTOUR

NOTES:

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6. CONTOURS GENERATED FROM USGS ONE METER DIGITAL ELEVATION MODEL, 2020 MARCH.

N

1:3,000
1" = 250'
0 125 250 FEET

PROJECT:	LEVERETT WEST PROJECT SHUTESBURY, MA
TITLE:	WETLAND DELINEATION
DRAWN BY: S. MOTURI	PROJ. NO.: 336892
CHECKED BY: M. LENNON	FIGURE 2
APPROVED BY: M. FIRSTENBERG	SHEET 1 OF 8
DATE: SEPTEMBER 2020	

TRC
650 Suffolk Street
Suite 200
Lowell, MA 01854

FILE: Fig2_Leverett_Del_11x17

Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Map Rotation: 0
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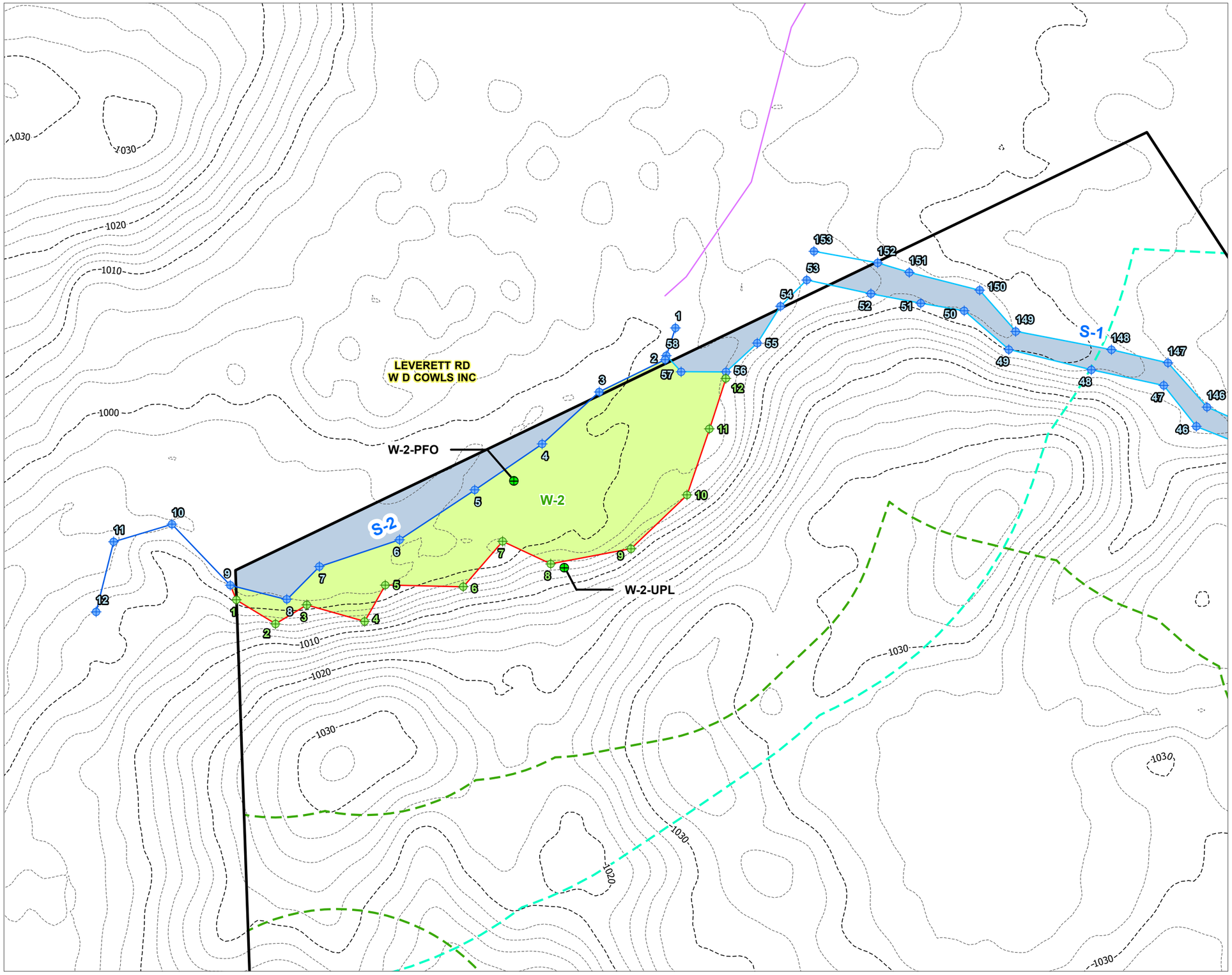

STUDY AREA
PROJECT PARCEL
ABUTTER PARCEL
USACE PLOT
WETLAND FLAG
STREAM FLAG
DELINEATED PERENNIAL STREAM
DELINEATED INTERMITTENT STREAM
ESTIMATED STREAM CENTERLINE (USGS)
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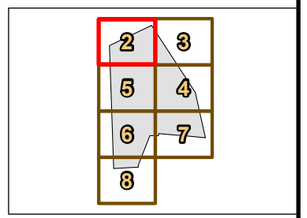

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1" = 50'
0 25 50 FEET

PROJECT:
LEVERETT WEST PROJECT
SHUTESBURY, MA

TITLE:
WETLAND DELINEATION

DRAWN BY:	S. MOTURI	PROJ. NO.:	336892
CHECKED BY:	M. LENNON		
APPROVED BY:	M. FIRSTENBERG		
DATE:	SEPTEMBER 2020		

FIGURE 2
SHEET 2 OF 8

TRC
650 Suffolk Street
Suite 200
Lowell, MA 01854

FILE: Fig2_Leverett_Del_11x17

Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001; Map Rotation: 0
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F-84
80 MONTAGUE RD
PADDOCK STEPHEN C & PADDOCK MICKI L

LEVERETT RD
W D COWLS INC

F-66
54 MONTAGUE RD
TUOMINEN MARK T

F-65
52 MONTAGUE RD
PARKIN BRUCE E

F-64
44 MONTAGUE RD
DUNCAN, JASON E AND SUSAN F

1020
1030
1040
1050

S-1
W-1

- STUDY AREA
- PROJECT PARCEL
- ABUTTER PARCEL
- USACE PLOT
- WETLAND FLAG
- STREAM FLAG
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2-FT CONTOUR
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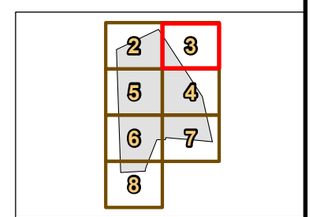

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1" = 50'
0 25 50 FEET

PROJECT:
LEVERETT WEST PROJECT
SHUTESBURY, MA

TITLE:
WETLAND DELINEATION

DRAWN BY:	S. MOTURI	PROJ. NO.:	336892
CHECKED BY:	M. LENNON	**FIGURE 2**	
APPROVED BY:	M. FIRSTENBERG	**SHEET 3 OF 8**	
DATE:	SEPTEMBER 2020		

TRC
650 Suffolk Street
Suite 200
Lowell, MA 01854

FILE: Fig2_Leverett_Del_11x17

Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001; Map Rotation: 0
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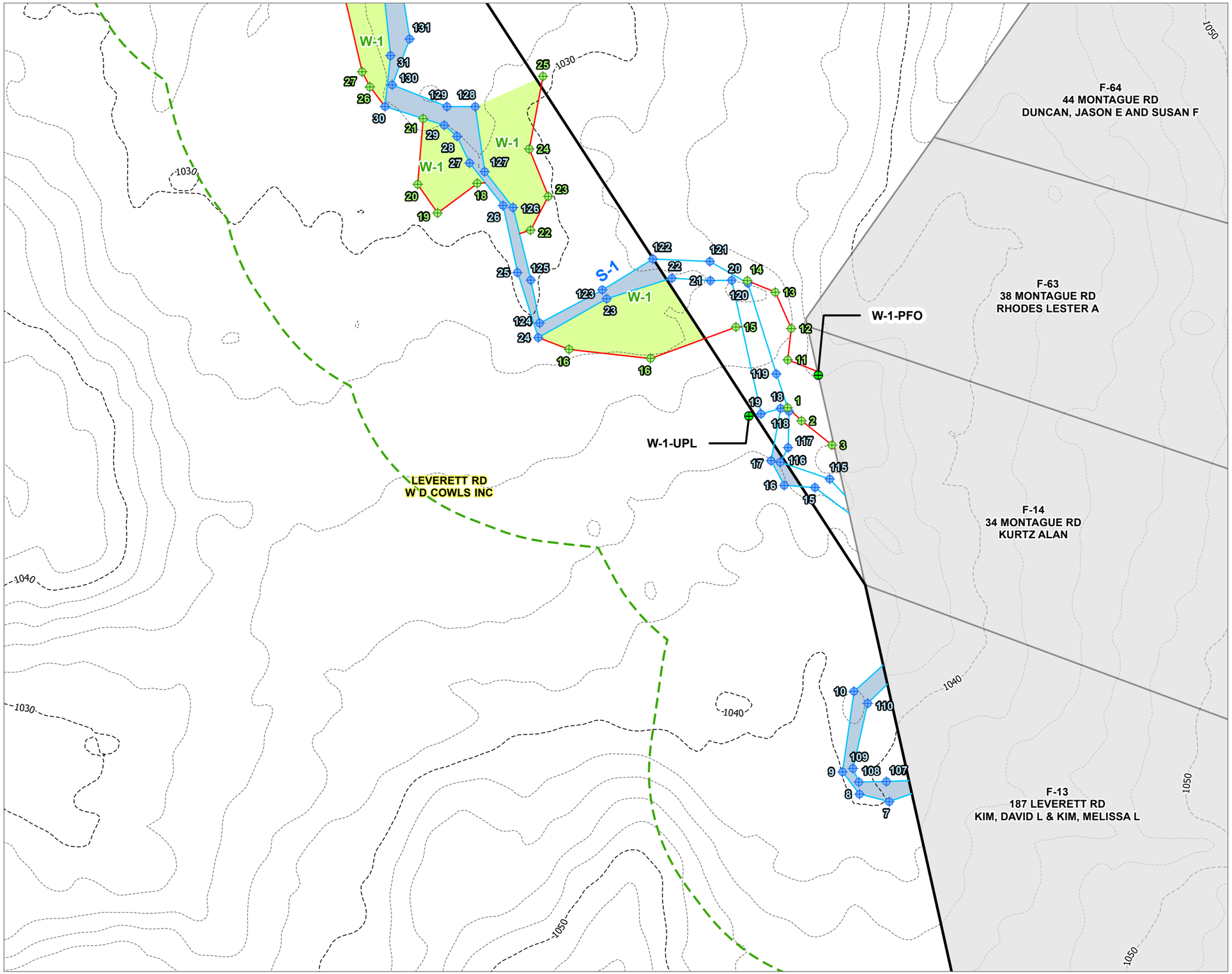

STUDY AREA
PROJECT PARCEL
ABUTTER PARCEL
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WETLAND FLAG
STREAM FLAG
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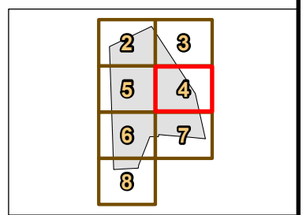

1:600
1" = 50'
0 25 50 FEET

PROJECT:
LEVERETT WEST PROJECT
SHUTESBURY, MA

TITLE:
WETLAND DELINEATION

DRAWN BY:	S. MOTURI	PROJ. NO.:	336892
CHECKED BY:	M. LENNON	**FIGURE 2**	
APPROVED BY:	M. FIRSTENBERG	**SHEET 4 OF 8**	
DATE:	SEPTEMBER 2020		

650 Suffolk Street
Suite 200
Lowell, MA 01854

FILE: Fig2_Leverett_Del_11x17

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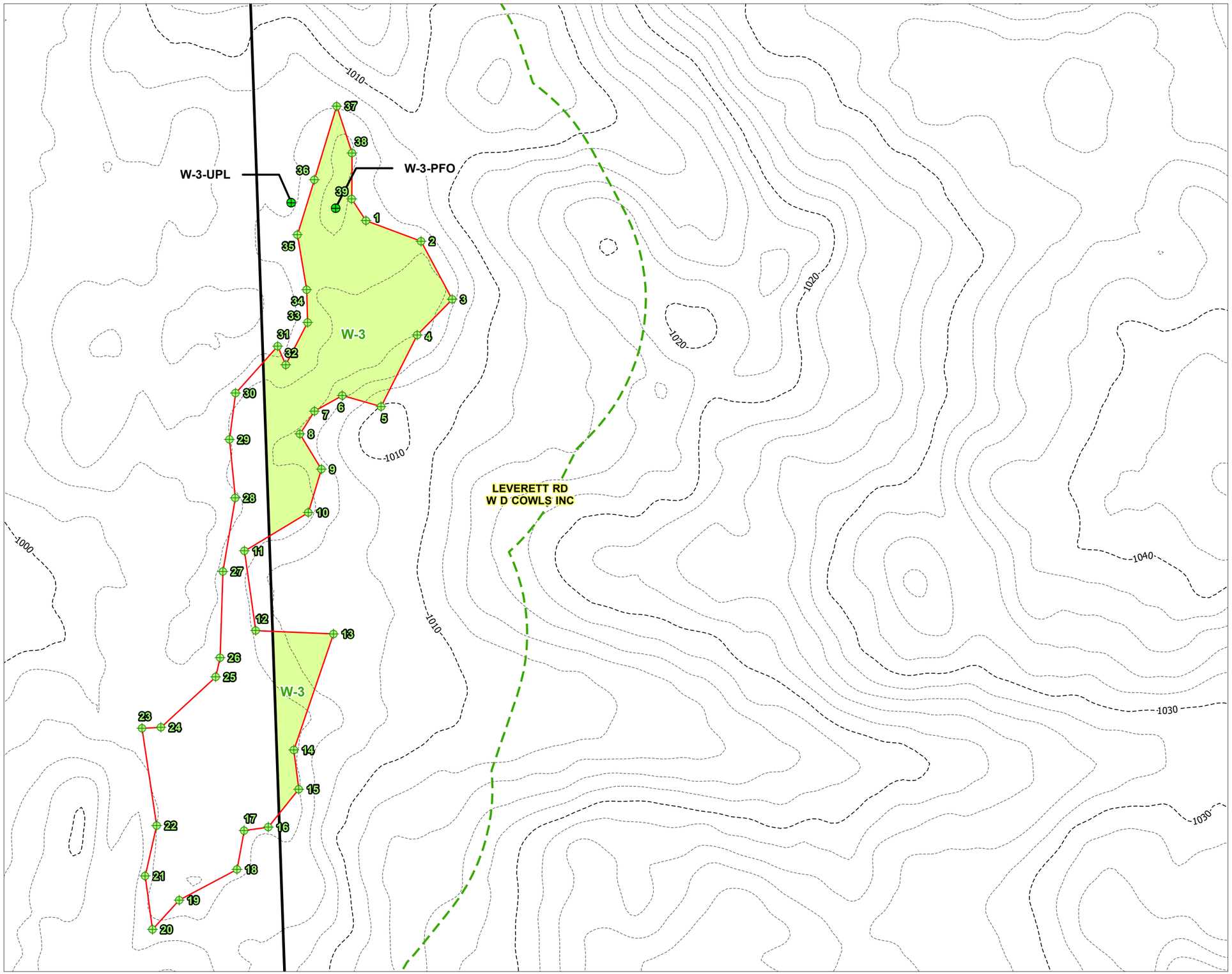

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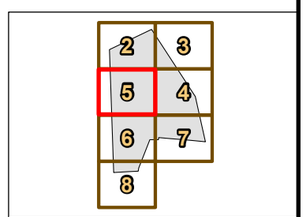

1:600
1" = 50'

0 25 50 FEET

PROJECT:
LEVERETT WEST PROJECT
SHUTESBURY, MA

TITLE:
WETLAND DELINEATION

DRAWN BY:	S. MOTURI	PROJ. NO.:	336892
CHECKED BY:	M. LENNON	**FIGURE 2**	
APPROVED BY:	M. FIRSTENBERG	**SHEET 5 OF 8**	
DATE:	SEPTEMBER 2020		

TRC
650 Suffolk Street
Suite 200
Lowell, MA 01854

FILE: Fig2_Leverett_Del_11x17

Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001; Map Rotation: 0
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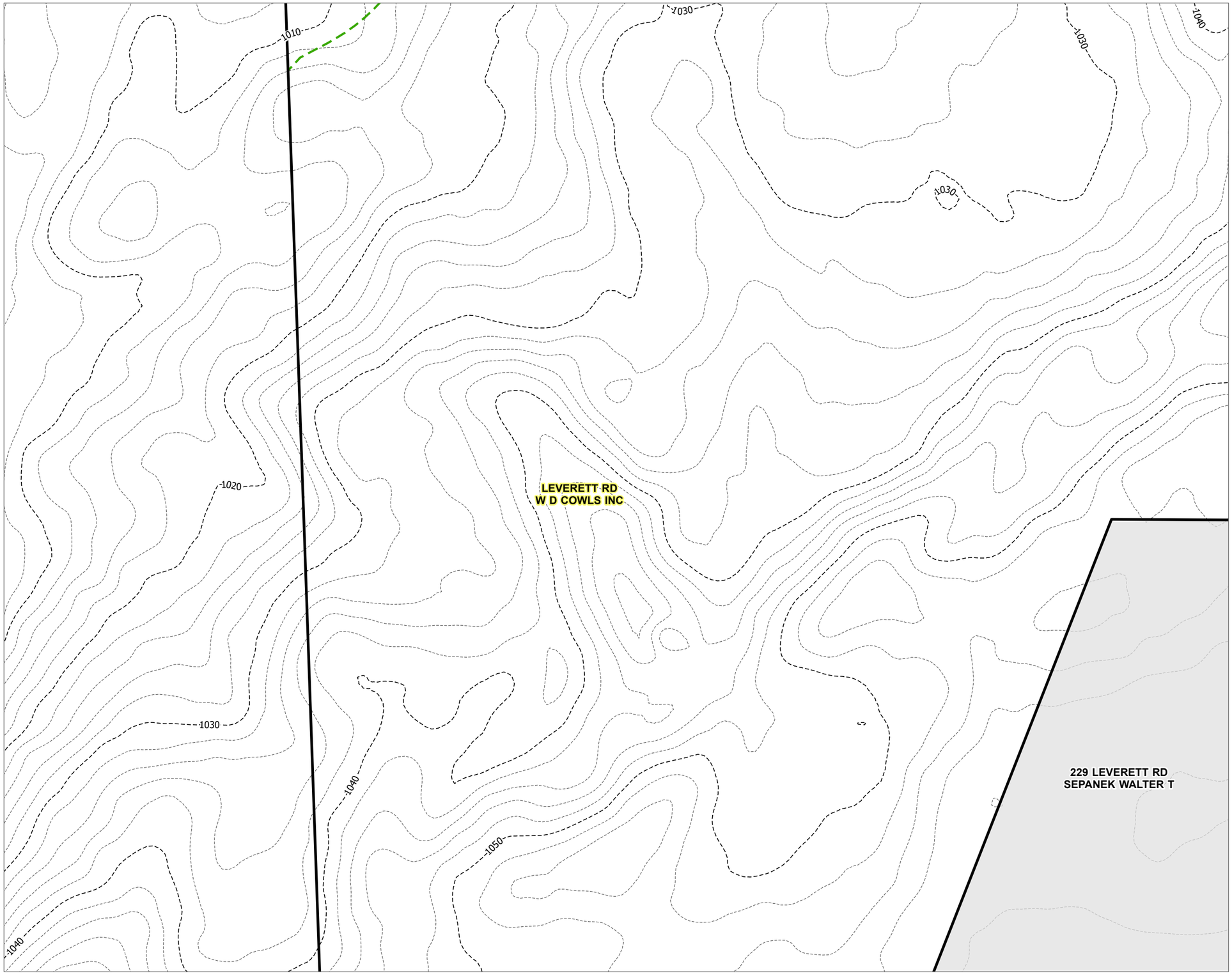

- STUDY AREA
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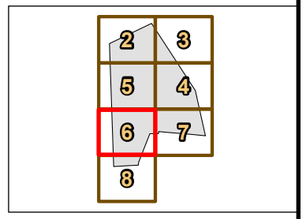

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1" = 50'

0 25 50 FEET

PROJECT:
LEVERETT WEST PROJECT
SHUTESBURY, MA

TITLE:
WETLAND DELINEATION

DRAWN BY:	S. MOTURI	PROJ. NO.:	336892
CHECKED BY:	M. LENNON		
APPROVED BY:	M. FIRSTENBERG		
DATE:	SEPTEMBER 2020		

FIGURE 2
SHEET 6 OF 8

650 Suffolk Street
Suite 200
Lowell, MA 01854

FILE: Fig2_Leverett_Del_11x17

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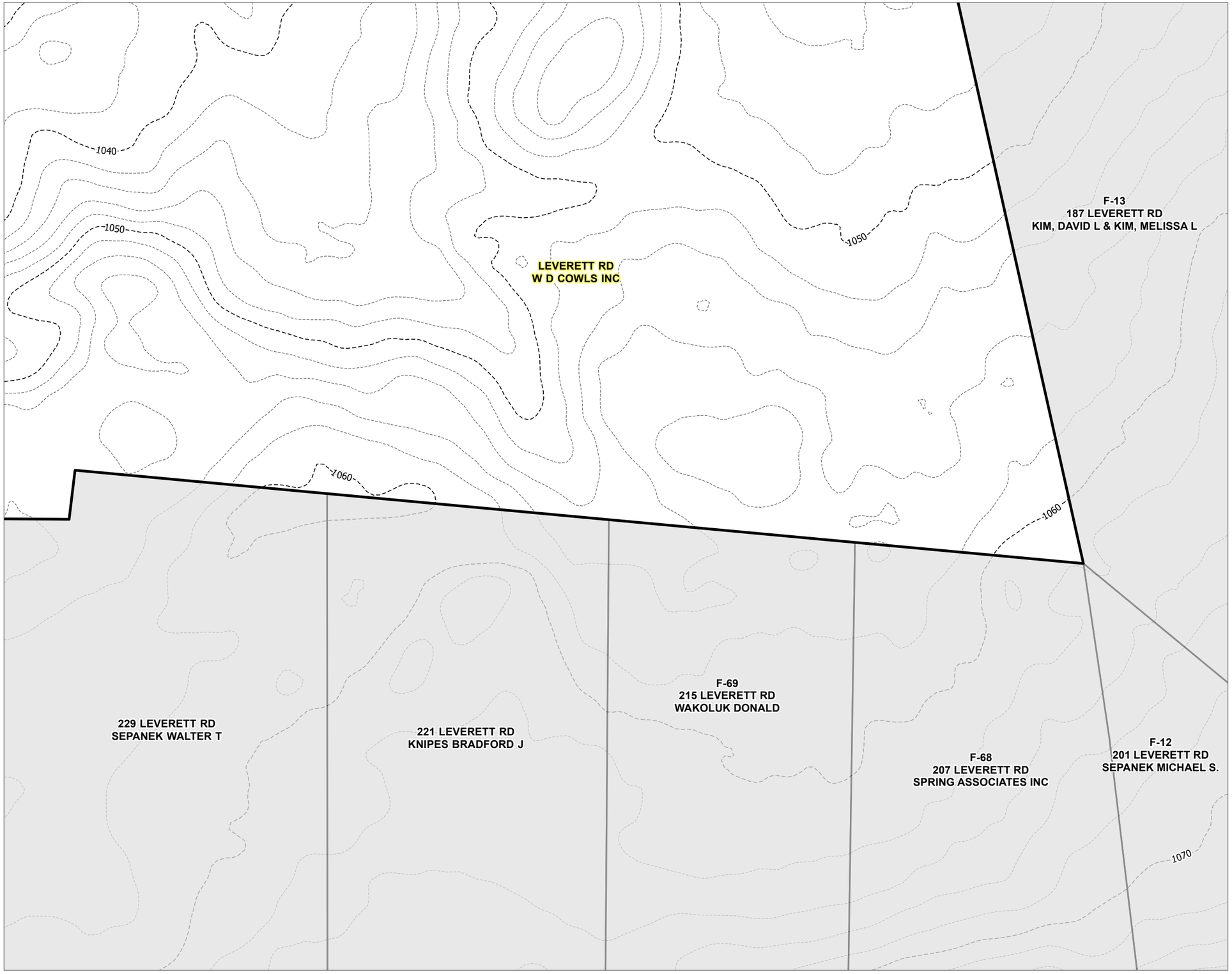

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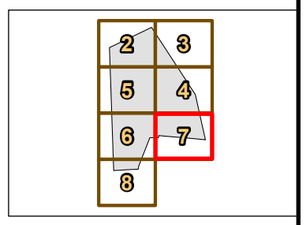

N

1:600
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0 25 50 FEET

PROJECT:
LEVERETT WEST PROJECT
SHUTESBURY, MA

TITLE:
WETLAND DELINEATION

DRAWN BY:	S. MOTURI	PROJ. NO.:	336892
CHECKED BY:	M. LENNON	**FIGURE 2**	
APPROVED BY:	M. FIRSTENBERG	**SHEET 7 OF 8**	
DATE:	SEPTEMBER 2020		

TRC
650 Suffolk Street
Suite 200
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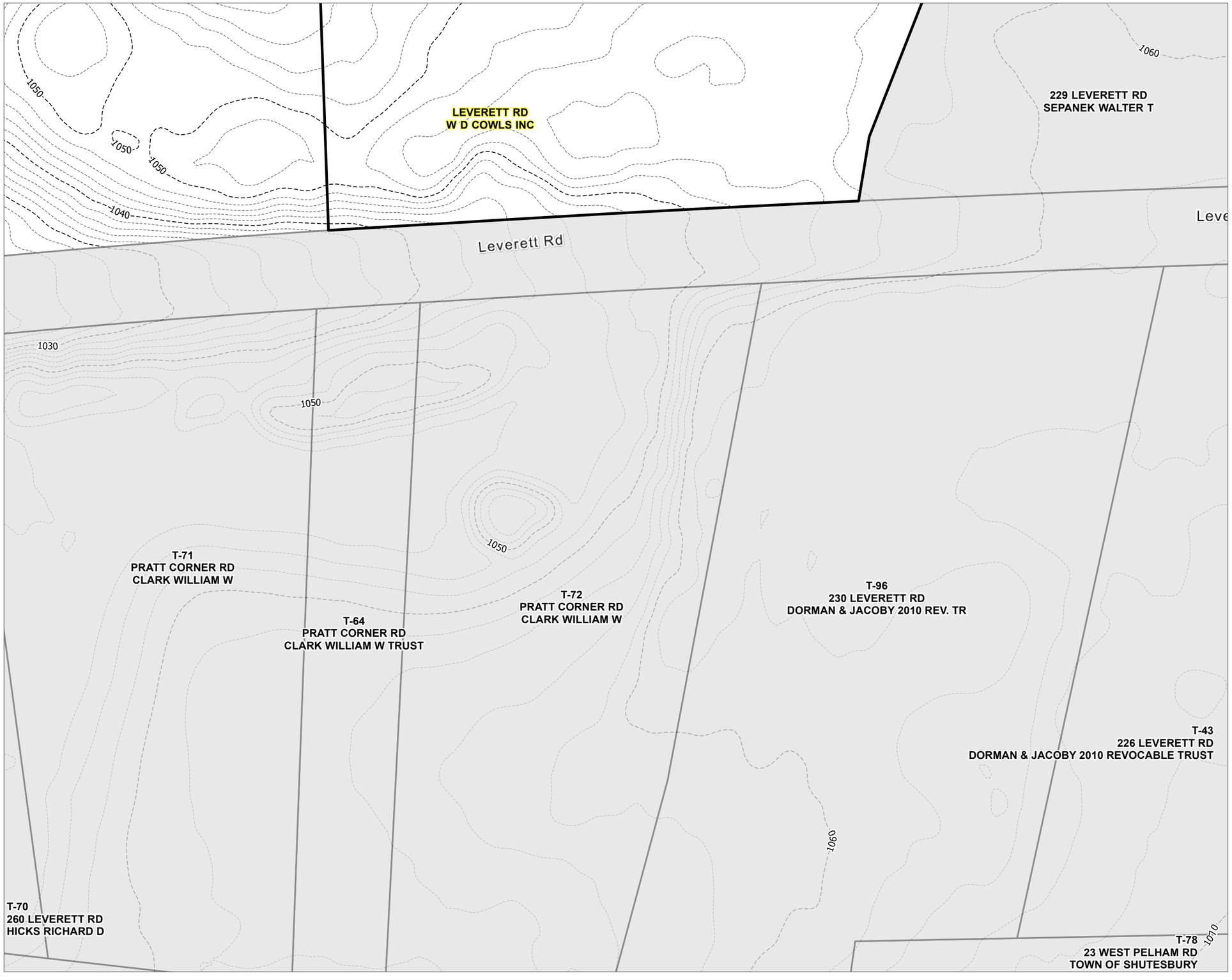

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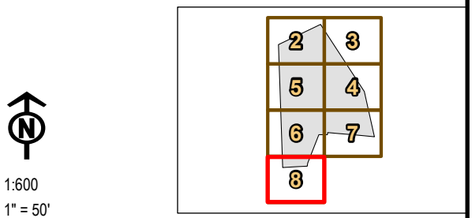

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DRAWN BY:	S. MOTURI	PROJ. NO.:	336892
CHECKED BY:	M. LENNON	**FIGURE 2**	
APPROVED BY:	M. FIRSTENBERG	**SHEET 8 OF 8**	
DATE:	SEPTEMBER 2020		

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FILE: Fig2_Leverett_Del_11x17

Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001; Map Rotation: 0
Stored By: SMOTURI on 9/7/2020 - 7:12:37 PM - File Path: S:\1_PROJECTS\MA\336892_Leverett\5-MXD\PROFig2_Leverett_Del_11x17\Fig2_Leverett_Del_11x17.aprx - Layout Name: Fig 2 Lev West_ANRAD_Detail Map