Appendix C

Post-Restoration and Mitigation Information

FUSS & O'NEILL

MEMORANDUM

TO: Shutesbury Conservation Commission

FROM: April Doroski, PWS, CPSS, Fuss & O'Neill

DATE: July 27, 2023

RE: Lot O-32 Wetland Restoration Project (MassDEP File #: 286-0298)
Wetland Restoration Initial Report

This memorandum has been prepared in compliance with Special Condition #22 of the Order of Conditions issued on May 26, 2023, by the Shutesbury Conservation Commission for the Lot O-32 Wetland Restoration Project.

The wetland restoration at BVW 2 and BVW 3 was completed on June 22, 2023. Below is a description of the results of restoration at BVW 3 between flags wf 3a-114 and wf 3a-115 and a summary of the restoration at BVW 2.

BVW 3 Reference Point

A soil auger hole was advanced within BVW 3 (42.4499527, -72.4166316) to serve as a reference point to determine if the excavation area soil conditions matched hydric soil conditions within the reference point. The soil profile in the reference point meets the criteria of hydric soil indicators Depleted Matrix (F3) and Sandy Redox (S5). The soil profile description of this reference point is described in *Table 1* below. Refer to Figure 5 for the location of the BVW 3 Reference Point.

Table 1
BVW 3 Reference Point Soil Profile Description

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Texture	Remarks
0-1	10 YR 2/1	100			Decomposed leaf litter	
1-7	2.5Y 4/2	98	10 YR 3/6 concentration	2	Sandy Loam	
7-13	2.5Y 6/2	95	10YR 5/8 concentration	5	Loamy Sand	

BVW 3 Restoration

Soil Test Pit #1 was observed on the south face of Trench 1 (42.449954, -72.416624). Trench 1 was dug from the west to east, approximately 7 feet north of the southern treeline in the Potential Restoration Area. The location of the soil description was selected based on the observation of a darker soil horizon at 8 inches of depth beneath a lighter soil horizon. On the north side of the trench, this potential buried soil layer was not observed at the same latitude, indicating that soils were not buried as high up on the slope towards the north (towards flag wf 3A-115). Upgradient of Soil Test Pit #1, no buried topsoil was observed. Upgradient of Test Pit #1 the topsoil was at the surface. At Test Pit #1 the location that topsoil was buried was at approximately 8 inches below grade. Within the trench the buried topsoil tapered to a shallower depth as the trench was dug closer to the silt fence (to the west). The range in depth of the buried topsoil indicates decreasing fill as you move closer to BVW 3. Observations from Soil Test Pit #1 are detailed in *Table 2* below. Refer to Figure 5 for the location of Trench 1 and Soil Test Pit #1.

Based on the gentle slope of the buried horizon at Test Pit #1, it appears the buried horizon may have been the result of erosion and sedimentation. The shallow depth (8 inches maximum), tapering of the buried horizon, and lack of observation of buried trash in this horizon supports erosion and sedimentation as a plausible process causing the fill, rather than anthropogenic dumping. The cause of the erosion cannot be determined but may have been a result of disturbed soils eroding from previous tree clearing activities and depositing downgradient.

The soil beneath the buried horizon does not meet the criteria of a hydric soil. Redoximorphic concentrations were observed within the layer beneath the buried topsoil, indicating that the water table does fluctuate within this layer. Although the buried soils do not meet the criteria for a hydric soil, that area was excavated to remove the fill material and was conservatively included within the new BVW wetland boundary. It is anticipated that with the shrub plantings and seeding with New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites, this area along the BVW boundary will give rise to hydrophytic vegetation and indicators of hydrology.

Photo 1 View south of Test Pit #1 in Trench 1. The buried topsoil visible on the south side of the trench was observed approximately 8 inches from the soil surface (6/22/23).

Photo 2 View south of the Trench 1 where topsoil transitions from at the ground surface to being buried (6/22/23).

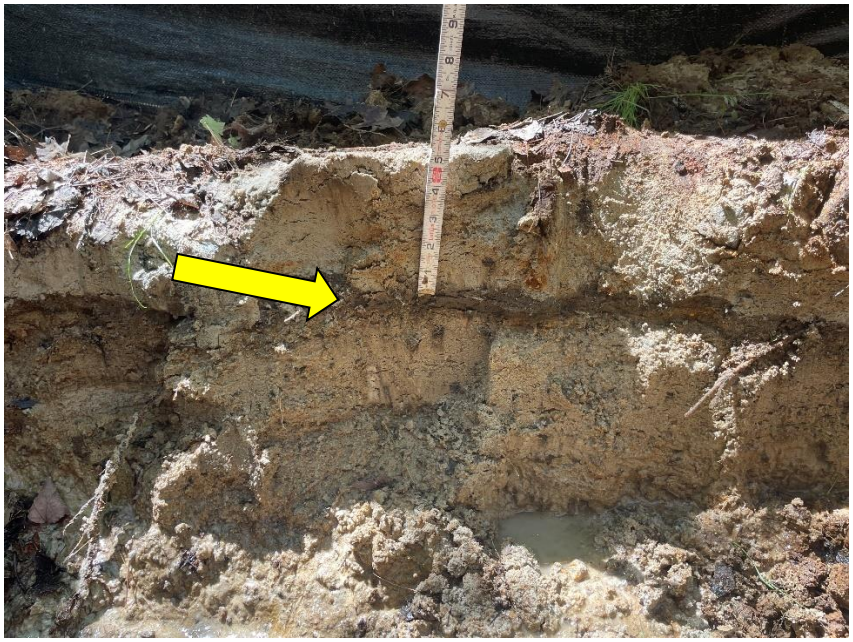

Photo 3 View of the western-most extent of Trench 1 within BVW 3, directly adjacent to the silt fence. The darker horizon was observed at a depth of 5 inches at the toe of slope. This darker horizon may indicate buried topsoil and is indicated with the yellow arrow (6/22/23).

Photo 4 View north of the north side of Tench 1. The dark, buried horizon observed on the south and west side was not observed on the north side. An illuvial horizon enriched with iron and/or organic material was observed on the north side as indicated by the yellow arrow (6/22/23).

Table 2
Soil Test Pit #1 Profile Description

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Texture	Remarks
0-1	10 YR 2/1	100			Decomposed leaf litter	
1-8	2.5Y 5/3	50	10 YR 3/6 concentration	30	Sandy Loam	With 20% 10YR 3/2 mixed from layer below
8-10	10 YR 3/2	100			Sandy Loam	Buried horizon
10-28	2.5Y 5/3	95	10YR 5/8 concentration	5	Sandy Loam	

Soil Test Pit #2 was observed on the south face of Trench 2 (42.4499349, -72.4166383). Trench 2 was dug from the west to east, directly adjacent to the southern treeline in the Potential Restoration Area, adjacent to flag wf 3a-114. Trench 2 was dug south of Trench 1 to investigate the extent of fill that was observed on the south side of Trench 1. The location of the soil description was selected because of observations of buried trash at this location that were noted during a peer review process in support of the previously submitted ANRAD. No buried horizon was observed in Soil Text Pit #2 or within Trench 2. Observations from Soil Test Pit #2 are detailed in *Table 3* below. Refer to Figure 5 for the location of Trench 2 and Soil Test Pit #2.

Trash observed buried in the topsoil in the vicinity of Test Pit #2 consisted of household refuse (mostly cigarette cartons) and was all contained within the darker topsoil horizon at the base of a tree. The topsoil at this location was thicker, likely due to the tree roots contributions of organic material. No buried horizon was observed at the base of the tree where the household refuse was removed. The presence of trash within the topsoil may have been the result of soil formation atop the trash.

Photo 5 View south of Trench 2. No buried soils were observed at this location (6/22/23).

Photo 6 Closeup view south of the Test Pit #2 location at the base of a tree adjacent to flag wf 3a-114. A thick topsoil was observed. No buried soil horizon was observed at Test Pit #2 or within Trench 2 (6/22/23).

Photo 7 View north of Trench 2 in the forefront and Trench 1 in the background (6/22/23).

Table 3
Soil Test Pit #2 Profile Description

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Texture	Remarks
0-1	10 YR 2/1	100			Decomposed leaf litter	
1-9	10YR 2/2	100			Sandy Loam	
9-29	10YR 6/2	100	10YR 5/8 concentration	5	Loamy Sand	

BVW 3 New Wetland Boundary

The wetland boundary between flags wf 3a-114 and wf 3a-115 was delineated based on the observations of the 1) soil test pits described above, 2) slope characteristics and relative elevation of buried horizon and existing wetland, and 3) soil characteristics north of the trenches. Although buried soils were not underlain by hydric soil, the area of fill removal was conservatively included within the new BVW 3

wetland area. Refer to Figure 3 for the location of the new BVW 3 boundary between flags wf 3a-114 and wf 3a-115.

BVW 3 Restoration Summary

- Approximately 78 square feet (sf) of fill removed
- Less than 2 cubic yards (cy) of fill (sandy loam) removed
- Buried soils were not underlain by hydric soil, but fill was still removed and conservatively included within the new BVW 3 wetland area
- No oil or hazardous materials were observed during restoration activities
- 4 new flags were hung to define the boundary between wf 3A-114 and 3A-115
    - wf 3A-114.1 through wf 3a-114.4
- 7 shrubs and 1 tree were planted; New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites and straw mulch was applied
    - 4 Highbush Blueberry (*Vaccinium corymbosum*), 3 Spicebush (*Lindera benzoin*)
    - 1 Red Maple (*Acer rubrum*)
    - Note: the original plan included 7 shrubs and 0 trees
- Biodegradable erosion control blanket installed along the side slope and seeded with New England Erosion Control/Restoration Mix for Dry Sites. Disturbed uplands upgradient of the erosion control blanket were seeded with New England Erosion Control/Restoration Mix for Dry Sites and mulched with straw.

Photo 8 Overview of the BVW 3 restoration area facing south (6/22/23).

Photo 9 Trash removed from the BVW 3 and adjacent areas during restoration activities (6/22/23).

BVW 2 Restoration

- Fill pile removed (approximately 40 cy of fill) and area restored to existing grade
- No oil or hazardous materials were observed during restoration activities
- 11 shrubs and 4 trees installed in BVW 2, and 2 shrubs installed in the adjacent upland
    - BVW 2 species: 4 Red Maple (*Acer rubrum)*, 4 Highbush Blueberry (*Vaccinium corymobosum*), 4 Silky Dogwood (*Cornus amomum*), and 3 Arrowwood Viburnum (*Viburnum dentaum*)
    - Upland species: 2 Serviceberry (*Amelanchier canadensis*)
    - Note: the original plan included 10 shrubs and 3 trees in the wetland and 2 shrubs in the adjacent upland
- BVW 2 seeded with New England Wetland Seed Mix and mulched with straw
- Adjacent disturbed upland seeded with New England Erosion Control/Restoration Mix for Dry Sites and mulched with straw

Photo 10 BVW 2 post fill removal and wetland restoration (6/22/23).

Photo 11 View of debris removed from BVW 2 during wetland restoration (6/22/23).

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ATTACHMENTS

A Figures

N

wf 3a-115

wf 3a-114.4

Reference Point

wf 3a-114.3

wf 3a-114.2

BVW 3

Soil Test Pit #1

wf 3a-114.1

Trench 1

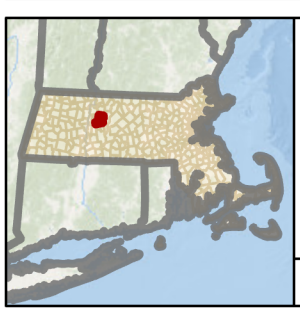
wf 3a-114

Trench 2

Soil Test Pit #2

Data Source(s):
1. MASS GIS L3 Parcels
2. World Imagery

0 3 5 10 Feet



Existing Treeline
Existing Wetland Flag (Approved by ORAD)
Existing BVW Boundary (Approved by ORAD)
Existing BVW Area
Potential Restoration Area
Limit of Work
Access Route
New Wetland Flag
New BVW 3 Area (Fill Removed)
Trench
Soil Test Pit

Notes:
Wetland Delineation conducted by Fuss & O'Neill on August 5 and 16, November 10 and 28, 2022.
Wetland flag locations located by a Harold L. Eaton & Associates, Inc., Massachusetts PLS #35032.

BVW 3 Restoration Area
66 Leverett Road
Shutesbury, Massachusetts
July 2023

FUSS & O'NEILL
1550 Main Street, Suite 400
Springfield, MA 01103
413.452.0445| www.fando.com

Figure 5

Folder: K:\P2009\1032\A22\MXD\ShutesburyWetland RestorationNOI\ Project: ShutesburyWetlandRestoNOI Layout: 5-PostRestoPlanBVW3-Jul23 Map: Main Data Frame Map Frame
Date Exported: 7/27/2023 9:54 AM User: ADoroski Date Saved: 7/27/2023 9:54 AM

Wendell Wetland Services

105 Montague Road
Wendell, MA 01379
(978) 544-5607
ward.ves@gmail.com

October 16, 2023

Shutesbury Conservation Commission
P.O. Box 274
Shutesbury, MA 01330-0560
Via electronic mail

Re: DEP file # 286-298, Wetland Restoration Inspection, 66 Leverett Road

Dear Commission Members:

I am submitting this Monitoring Report in partial compliance with the *Order of Conditions* for the above referenced project. The site was most recently visited on October 4, 2023, near the end of the first growing season.

BVW 2 Restoration:

Prior to my initial site visit, soils had been removed down to the pre-existing grade. The area was planted with wetland shrubs and trees, and was then sown with the NEE Wetland Seed Mix.

Vegetation

As shown in the following photograph, the western 70% of the restoration area is well vegetated by herbaceous plants, with the eastern 30% of the area more sparsely covered. Most of the herbaceous stratum is not yet identifiable at the end of the first growing season, although many plants appear to be sedges (*Carex* spp.). However, the majority of the identifiable plants are wetland species, including: sensitive fern (*Onoclea sensibilis*); soft rush (*Juncus effusus*); dark-green bulrush (*Scirpus atrovirens*); nutsedge (*Cyperus esculentus*); and lady's thumb smartweed (*Persicaria maculosa*).

All of the planted trees and shrubs are alive. Due to browsing by deer, wire cages were placed around the red maple (*Acer rubrum*) trees.

Hydrology

The soils in the center of the area were not saturated, despite the unusually heavy rainfall the preceding summer. There were some small locations where it was clear that water had ponded during rainfall events. However, these areas were completely dry at the time of my site visit. In addition, the excavated soil

pit did not appear to meet the criteria as outlined in the interagency document *Field Indicators for Identifying Hydric Soils in New England, Version 4* (2019).

BVW 2 Restoration Area

Since the soils in the undisturbed wetland to the east were saturated in the B horizon, and the soils met the hydric soils criterion, I am not certain that the entire Restoration Area was a wetland prior to the unauthorized fill placement.

Proposed Remediation

The eastern third of the Restoration Area should be either sown with another pound of NEE Wetmix, and/or planted with native plant plugs (also available from New England Wetland Plants).

The area will be revisited in the spring (April or early May 2024) in order to determine if wetland hydrology is present during the "wettest" part of the growing season. Additional soils pits will be excavated and the soil profiles documented at that time.

BVW 3 Restoration:

BVW 3 Restoration Area

Vegetation

As shown in the above photograph, it appears that most of the herbaceous plants are non-wetland grasses that were washed into the area by rainstorms after the non-wetland seed mixture was sown in the adjacent upland. However, there are scattered wetland plant species including soft rush (*Juncus effusus*); beggar's ticks (*Bidens* spp.), and sedges (*Carex* spp.).

One of the planted shrubs is dead, a spicebush (*Lindera benzoin*). This may be due to the unusually rainy Summer and the very high water table in the Restoration Area.

Hydrology

The area has obvious wetland hydrology. There was standing water at the edge of the Restoration Area, the water table was within two inches throughout, and the soils were saturated to the surface. Further, it appears that soil saturation exists above the wetland flags and up the adjacent slope due to capillary action.

Proposed Remediation

The dead spicebush shrub should be replaced in a slightly drier (upgradient) location. Given that the area has obvious wetland hydrology, it is likely that the non-wetland species will die out over time and will be replaced with wetland species. Additional seeding will be recommended at the end of the second growing season if this does not occur naturally.

Discussion

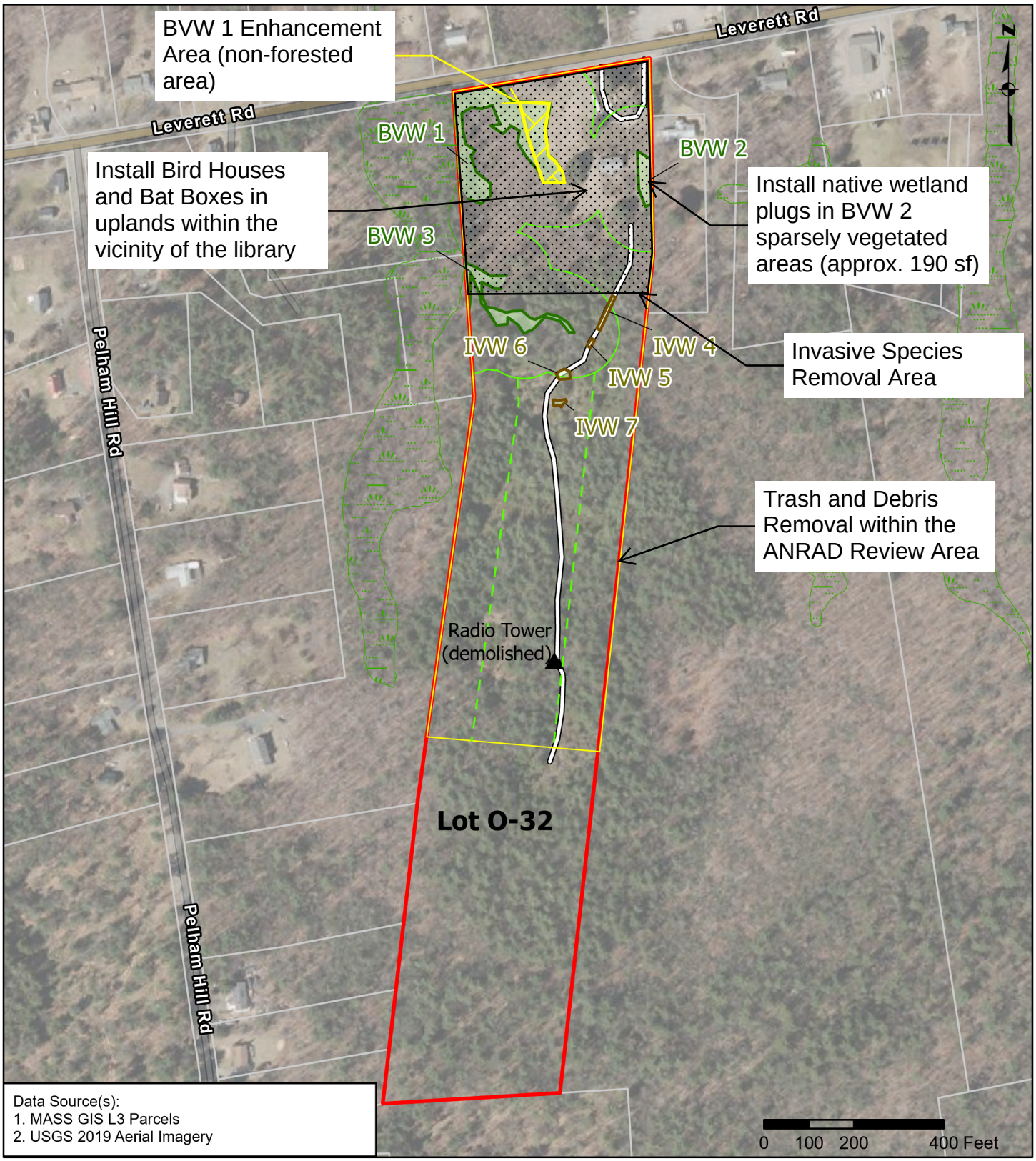
In summary, I believe that the BVW 3 will not have any problem meeting the Performance Standards for a successful wetland replication/restoration area at the end of two growing seasons, although additional sowing of a wetland seed mixture may be required at the end of the second growing season.

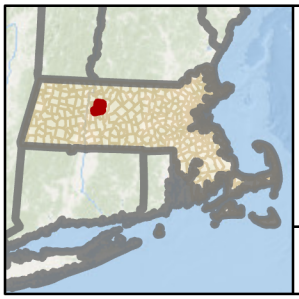
However, I am uncertain as to whether or not all of BVW 2 was actually a wetland prior to the placement of fill. Additional seeding/planting is proposed in this area, and the hydrology will be evaluated in the Spring of 2024 in order to render an opinion on the hydrology during the "wettest" part of the growing season.

Please feel free to contact me if you would like to discuss my findings.

Sincerely,
Wendell Wetland Services

Ward W. Smith, SPWS
Senior Professional Wetland Scientist





Subject Parcel
ANRAD Review Area
Parcel Boundary
BVW Boundary (Delineated)
IVW Boundary (Delineated; Not Jurisdictional)
Wetland Area
100-ft Buffer Zone
No-Contest Buffer Zone
MassDEP Mapped Wetland
Access
Invasive Species Removal Area

Notes:
Wetland Delineation conducted by Fuss & O'Neill on August 5 and 16, November 10 and 28, 2022.
Wetland flag locations located by a Harold L. Eaton & Associates, Inc., Massachusetts PLS #35032.
The No-Contest Buffer Zone extends 100 feet from the subject parcel boundary.

Mitigation Measures
66 Leverett Road
Shutesbury, Massachusetts
December 2023

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Springfield, MA 01103
413.452.0445| www.fando.com

Figure 6

Folder: K:\P2009\1032\A22\MXD\Shutesbury Wetlands Maps\ Project: Shutesbury Wetlands Maps Layout: 2-WetlandDelinOrtho-Feb23 Map: Main Data Frame Map Frame
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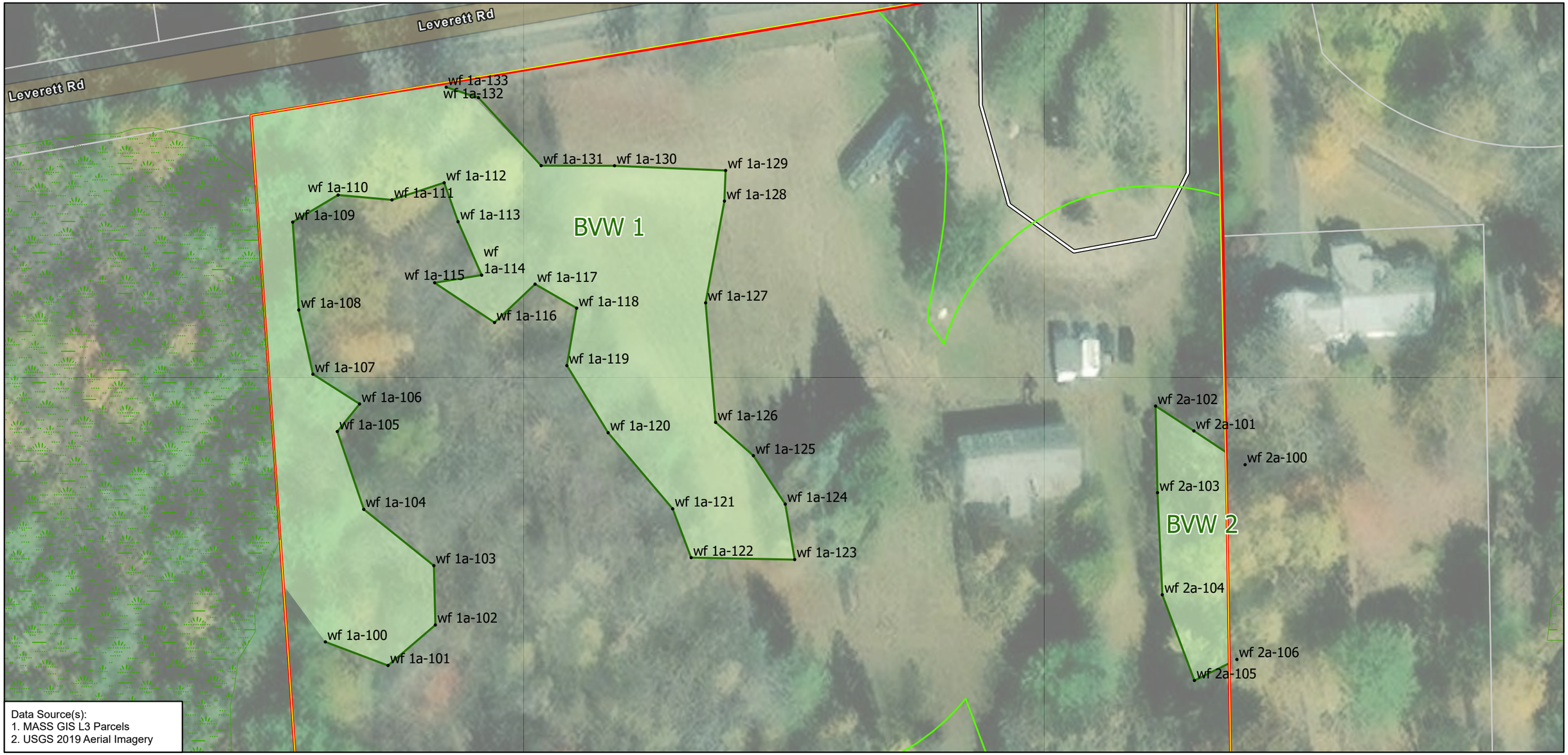

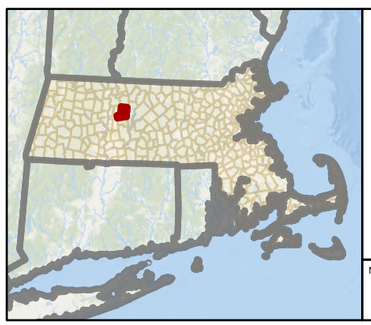

Subject Parcel
ANRAD Review Area
Parcel Boundary
Access
BVW Boundary (Delineated)
IVW Boundary (Delineated; Not Jurisdictional)

Wetland Flag
Wetland Area
100-ft Buffer Zone
No-Contest Buffer Zone
MassDEP Mapped Wetland

N

0 25 50 100 Feet

Notes:
Wetland Delineation conducted by Fuss & O'Neill on August 5 and 16, November 10 and 28, 2022.
Wetland flag locations located by a Harold L. Eaton & Associates, Inc., Massachusetts PLS #35032.
The No-Contest Buffer Zone extends 100 feet from the subject parcel boundary.

Updated Wetland Flag Locations

66 Leverett Road
Shutesbury, Massachusetts

December 2023

FUSS & O'NEILL
1550 Main Street, Suite 400
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413.452.0445| www.fando.com

Figure 7-1

Folder: K:\P2009\1032\A22\MXD\Shutesbury Wetlands Maps\ Project: Shutesbury Wetlands Maps-V3 Layout: 7-1-Wetland11x17-Dec23 Map: Main Data Frame Map Frame
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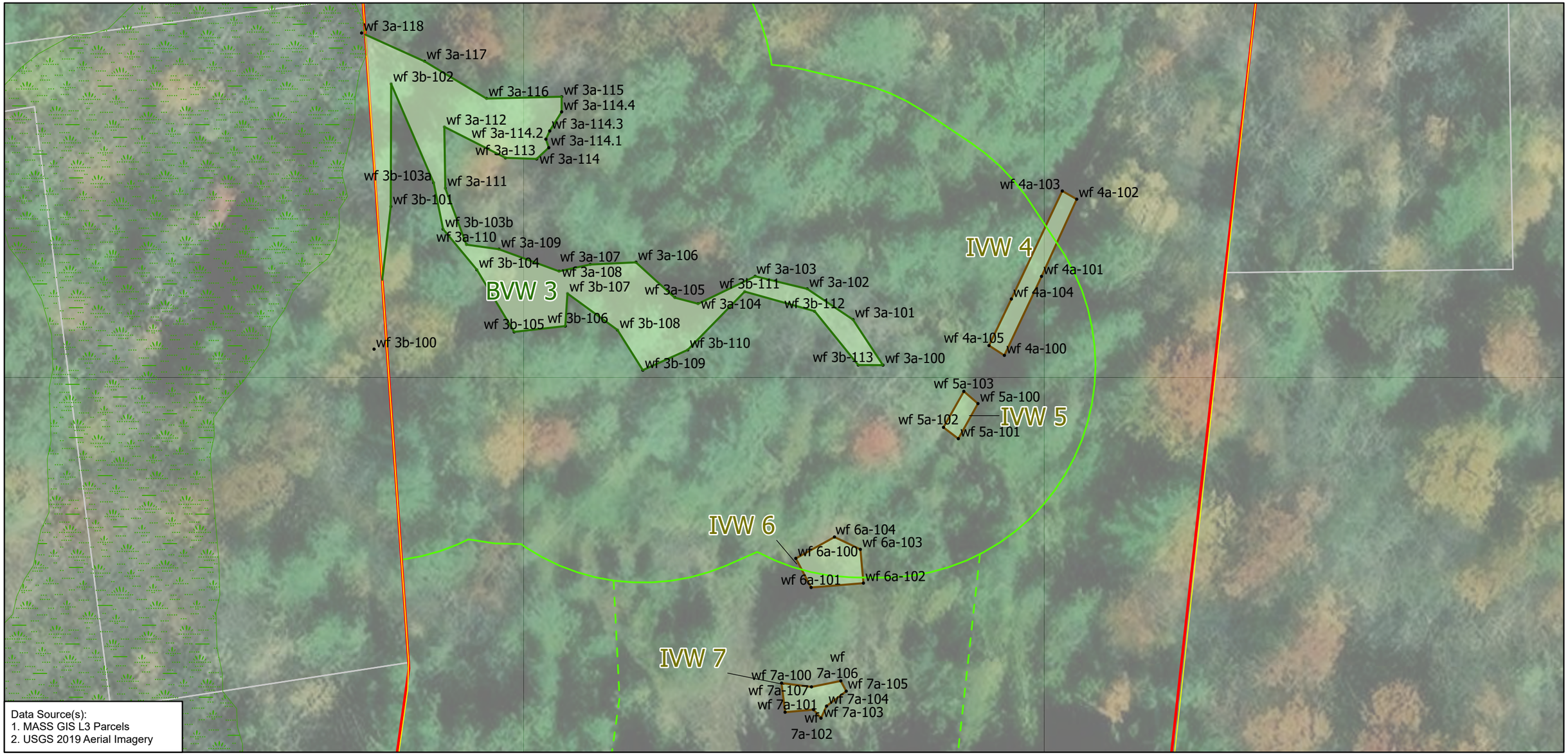

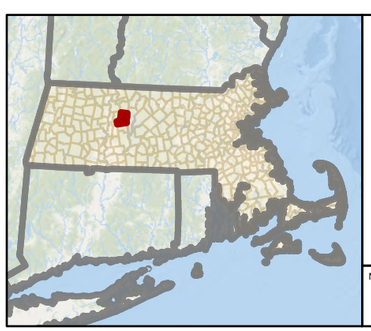

MassDEP Mapped Wetland
ANRAD Review Area
Subject Parcel
Parcel Boundary
Wetland Flag
No-Contest Buffer Zone
BVW Boundary (Delineated)
100-ft Buffer Zone
IVW Boundary (Delineated; Not Jurisdictional)
IVWArea
Radio Tower (demolished)
Access

N

0 25 50 100 Feet

Notes:
Wetland Delineation conducted by Fuss & O'Neill on August 5 and 16, November 10 and 28, 2022.
Wetland flag locations located by a Harold L. Eaton & Associates, Inc., Massachusetts PLS #35032.
The No-Contest Buffer Zone extends 100 feet from the subject parcel boundary.

Updated Wetland Flag Locations

66 Leverett Road
Shutesbury, Massachusetts

December 2023

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Figure 7-2

Folder: K:\P2009\1032\A22\MXD\Shutesbury Wetlands Maps\ Project: Shutesbury Wetlands Maps-V3 Layout: 7-2-Wetland11x17-Dec23 Map: Main Data Frame Map Frame
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