Cory Spaulding and Leslie Yeisley request that the Siting Council reject Petition 1566 for failing to contain the minimum required information as required RSCA Section 16-50j-59 - Information Required.

RSCA Section 16-50j-59 - Information Required.

(NEW) Sec. 16-50j-59. Information Required In addition to conforming to Section 16-50l of the Connecticut General Statutes and Section 16-50l-2 of the Regulations of Connecticut State Agencies, an application for a certificate of environmental compatibility and public need for the construction of a new energy facility, or a modification of an existing energy facility, as defined in Section 16-50i(a)(1) to (4)…

RSCA Section 16-50j-59 identifies the minimum required information needed in certain petitions submitted to the Council. We believe this petition is required to meet these minimum information requirements and does not do so. In Exhibit 9 we performed a detailed review of RSCA Section 16-50j-59 with a sequential review of its sections and why Petition 1566 falls under this minimum required information section of the regulations. A summary of that detailed review is provided below.

Summary,

The required information listed in Section 16-50j-59 applies to petition 1566.

The work described in petition 1566 involves a transmission line and its associated equipment that is over 69 kv and by definition is an existing energy facility. Petition 1566 describes work that is a modification to an existing facility in that the work described in petition 1566 is a general alternation in the general physical characteristics of a facility and is also a significant change. Section 16-50i(a) (4), determined that a "facility" was also other facilities which may have a substantial adverse environmental effect as the council may, by regulation, prescribe. In Section 16-50j-56 – Finding - the Council made a finding (prescribed) that each energy site and its associated equipment may have a substantial adverse environmental impact.

As a result of this finding, the energy sites and work described in petition 1566 constitutes a modification to an existing energy facility (a general alternation in the general physical characteristics of a facility and is also a significant change) and the petition must contain the required information described in Section 16-50j-59. See Exhibit 9 for a more detailed explanation of how RSCA Section 16-50j-59 applies to petition 1566.

The petition does not meet all the information requirement of Section 16-50j-59.

NOTE - See italic yellow highlighted print under each section of 16-50j-59 quoted below for petition 1566 deficiencies in the individual section requirements.

(NEW) Sec. 16-50j-59. Information Required In addition to conforming to Section 16-50l of the Connecticut General Statutes and Section 16-50l-2 of the Regulations of Connecticut State Agencies, an application for a certificate of environmental compatibility and public need for the construction of a new energy facility, or a modification of an existing energy facility, as defined in Section 16-50i(a)(1) to (4), inclusive, of the Connecticut General Statutes shall include, but not be limited to:

(1) A description of the proposed facility and associated equipment, or modification of an existing facility and associated equipment, including, but not limited to, heights of facility components, special design features, and access roads;

The submitted petition fails to identify the OPGW cable size, capacity, change in visual appearance as compared to what presently exists, or where it will be placed on the existing energy facility. The sites in petition 1566 are generally identified as having one pole and one to two electric lines generally centered in the middle of the ROW. This leaves the reader to believe that the existing lines generally have 75 feet of space between the line and ROW boundary. Most sites have 3 poles not one or two as depicted in petition 1566. Site 7785 has 6 poles where two are depicted in petition 1566. All sites have 6 transmission lines evenly spaced over the ROW with approximately 25 feet between the line and ROW limit. Petition 1566 generally details that 75 feet exist between the line and ROW limit.

(2) A statement of the need for the proposed facility and associated equipment, or modification of an existing facility and associated equipment with as much specific information as is practicable to demonstrate the need;

OPGW cables come in many sizes and data capacities. The petition fails to mention what size cable / data capacity is being proposed to be installed in relation to the justification for the need presented in the petition. We believe that since numerous towers have to be changed out to carry the weight of the proposed cable that what is being installed far exceeds the capacity demonstrated as needed. The petition is believed to fail to justify the need for the capacity of the cable being installed. The petition fails to adequately identify the design features of OPGW system being proposed and as such the need detailed cannot be evaluated. The petition lacks the specific information to demonstrate the need.

(3) A statement of the benefits expected from the proposed facility and associated equipment, or modification of an existing facility and associated equipment with as much specific information as is practicable;

The deficiency in the petition for this information requirement is detailed in item 2 above.

(4) (A) The most recent U.S.G.S. topographic quadrangle map (scale 1 inch = 2000 feet) marked to show the approximate site of the facility and associated equipment, or modification of an existing facility and associated equipment and any significant changes within a one mile radius of the site; and (B) a map (scale

1 inch = 200 feet or less) of the lot or tract on which the facility and associated equipment, or modification of an existing facility and associated equipment is proposed to be located showing the acreage and dimensions of such site, the name and location of adjoining public roads or the nearest public road, and the names of abutting owners and the portions of their lands abutting the site;

No USGS topographic quadrangle as described above can be located in the petition.

The petition fails to identify the proposed modification to existing facilities in that much of the work proposed. We will characterized how the petition identifies some proposed modifications - well we might need to do this, or we may need this pad size somewhere, or we will determine later what is needed, we will use existing gravel with no details as to what use means or the proposed changes, we may need to add stone here.

From site 7784 to Chapell road the petition has no detail as to how they are going to install 1300 feet of OPGW cable to the existing structures.

The submitted maps in petition 1566 appear to be 1 to 200 scale however the map note states the information cannot be relied upon for any other purpose. Other quotes from the map note are the words approximate and not from survey. How can the submitted maps meet the 1 to 200 scale requirements when disclaimers as listed above contradict and counteract the purpose of the map scale. Since we know that existing conditions show that the pads at sites 7786 and 7785 presently extend beyond the ROW and are not depicted on the map and we know that a very large pad exists at site 7785 that is also not depicted on the submitted maps then the maps cannot be relied upon for anything due to their numerous errors. Map note = Notes: This mapping product has been created to comply with submittal requirements to obtain certain regulatory approvals and, as such, there is no reliance on the information contained herein for any other purpose. Parcels, ROW boundaries, and structure locations are approximate (NOT from survey). Parcel abutters data provided by Eversource Aug 2022.

(5)(A) Plan and elevation drawings showing the proposed facility and associated equipment, or modification of an existing facility and associated equipment, the components and all structures on the site; and (B) where relevant, a terrain profile showing the proposed facility and associated equipment, or modification of an existing facility and associated equipment;

The elevation drawings and site maps submitted in the petition for site 7785 do not detail the existing conditions as detailed in the survey map provided in Exhibit 10. The discrepancies in this one site are so egregious that the submitted maps cannot be relied upon to accurately represent anything which is generally what the map note states. Eversource failed to disclose in the petition that site 7785 is classified by Eversource as a highly erodible area. A highly erodible soil area site condition requires accurate terrain and elevation maps and are critical to determining the appropriate mitigation for

the proposed work. Since this does not exist in the petition, it fails to meet the requirements of information required in this section.

(6) A description of the site, including the zoning classification of the site and surrounding areas;

(7) A description of the land uses of the site and surrounding areas;

(8) A description of the scenic, natural, historic, and recreational characteristics of the proposed site and surrounding area;

Petition 1566 fails to mention the natural stone walls that traverse our property and the ROW. The Eversource BMP April 2022 edition (Exhibit 19) that is supposed to apply to this petition has an entire section detailing the requirements for dealing with stone walls on property impacted by Eversource work. The submitted maps fail to follow Eversource's own BMP guidance. What is not detailed in the submitted petition is that Eversource has already buried and destroyed stone walls in previous work on this property and proposes to bury more and do more damage to them in the proposed work. The stone walls are not detailed on the submitted maps, the legend does not even contain a stone wall delineator all of which contradict the information requirements of this section and Eversource's own BMS manual.

(9) A statement in narrative form of the environmental effects of the proposed facility and associated equipment, or modification of an existing facility and associated equipment;

See attachments 1 and 1a for a partial list of environmental effects of the proposed facility. Past work is incorporated into the work proposed in petition 1566.

(10) A statement containing justification for the site selected including a description of siting criteria and the narrowing process by which other possible sites were considered and eliminated;

The Old Mill Road provides access sites 7785 and 7784, is known to Eversource, previously used by Eversource, and on April 13, 2023 in a meeting with Eversource contractors it was admitted that the road was in sufficient condition to accommodate Eversource access to these sites. This alternate access, if it had been considered by Eversource would have reduced the previous damage done to our property by Eversource by an estimated 80% and would significantly reduce the environmental impacts to our property from the proposed work in petition 1566. Petition 1566 fails to mention any evaluation of site access via for the Old Mill Road and fails to make any mention of a potential alternate access site.

(11) A statement of the estimated cost for site acquisition and construction of the facility and associated equipment, or modification of an existing facility and associated equipment;

Petition 1566 has no cost data and contains information that indicated that the work cannot be completed within the existing ROW as well as previous work has exceeded the ROW. Intrusions into private property constitute a taking and adverse possession. The petition contains no data as to site acquisition or acquisition of rights to take trees beyond the ROW as stated may occur in petition 1566. Petition 1566 is also to install a telecommunications cable (OPGW) and the present easement is for electric lines only. No information is contained in petition 1566 in reference to acquiring rights to use the property for other than electric lines or bury counterpoise ground wire.

(12) A schedule showing the proposed program of site acquisition, construction, completion, and operation;

Petition 1566 lacks any proposed program or schedule for any site acquisition information despite containing information that the proposed work cannot be confined to the present ROW. No completion schedule or operation schedule is included in the petition.

(13) The names and mail addresses of the owner of the site and all abutting owners;

(14) A listing of any federal, state, regional, district, and municipal agencies with which reviews were conducted concerning the facility or modification of an existing facility, including a copy of any state and municipal agency position or decision with respect to the facility or modification of an existing facility;

Petition 1566 states that municipal officials were briefed on petition 1566. The Lebanon First Selectman Kevin Cwikla personally stated to Cory Spaulding on May 9, 2023 that he had no recollection of ever being briefed by Eversource about the work proposed in petition 1566. Cwikla admitted to receiving the same, "notice that says nothing" that was mailed by Eversource on April 12, 2023. When made aware that the petition called for mowing the entire easement to a height of 6 to 8 inches, he stated he was opposed to that.

(15) Where relevant, a list of all energy facilities and associated equipment within a 5-mile radius of the proposed facility or modification of an existing facility which are owned or operated by a public service company or the state;

(16) A description of technological alternatives and a statement containing justification for the proposed facility;

No information regarding technological alternatives to the proposed facility or OPGW or capacity of the OPGW is contained in petition 1566.

(17) A description of alternate sites, if applicable, for the proposed facility and associated equipment, or modification of an existing facility and associated equipment with the following information: (A) a U.S.G.S. topographic quadrangle map (scale 1 inch = 2000 feet) marked to show the location of alternate sites; (B) a map (scale 1 inch =

200 feet or less) of the lots or tracts of the alternate sites for the proposed facility and associated equipment, or modification of an existing facility and associated equipment showing the acreage and dimensions of such site, the name and location of adjoining public roads or the nearest public road, and the names of abutting owners and the portions of their land abutting the alternate site; and (C) such additional information as would be necessary or useful to compare the costs and environmental impacts of the alternate sites with those of the proposed site;

Petition 1566 is missing the majority of the information required in item 17.

(18) A statement describing hazards to human health, if any, with such supporting data or references to authoritative sources of information as will be helpful to the understanding of all aspects of the issue, including electric and magnetic field levels at the property boundaries of the proposed site and compliance with the Council's Best Management Practices for Electric and Magnetic Fields; and

(19) Additional information as may be requested by the Council.

END OF REVIEW - RSCA Section 16-50j-59.

Based upon the above-listed deficiencies in petition 1566 we request the petition be rejected as not complying with information requirements of RSCA Section 16-50j-59.

Attachments

Exhibit 1 - IN THE MATTER OF THE EVERSOURCE EASEMENT ON THE PROPERTY OF CORY R. SPAULDING AND LESLIE A. YEISLEY, 716 BEAUMONT HIGHWAY, LEBANON, CT 06249 APRIL 19, 2023 – A complaint and demand to Eversource Energy. A partial listing of damage done by Eversource work on the Spaulding Yeisley Property.

Exhibit 1a - COMBINED EXHIBITS RELATING TO EXHIBIT 1

1) Lebanon Assessor Property Record Card
2) Lebanon Assessor Property Record Card
3) Easement granted to Eversource dated March 7, 1934.
4) Eversource Real Estate Survey Map – Right of Way Survey – Dated 3-2018 – Sheet 15 of 18. - A map of the Spaulding / Yeisley easement with ROW boundaries and survey marker locations.
5) Reynolds Engineering site survey depicting land elevation changes due to Eversource work at site 7785
6) Reynolds Engineering site survey depicting land contours and existing conditions at site 7785 dated 4/15/22
7) Reynolds Engineering site survey depicting land contours and existing conditions at site 7785 dated 4/15/22
8) Reynolds Engineering site survey depicting cutting and clearing beyond the ROW at site 7785 dated 4/15/22

9) REMA Environmental – Assessment of Environmental Impacts on land owned by C. Spaulding and L. Yeisley, 716 Beaumont Highway in and adjacent to the Eversource Right of Way by Eversource Maintenance Activities. Dated - 11/27/22 - with attachments.

Exhibit 8 - Tutorial on Optical Ground Wire Ratings Analysis for Protection Engineers

Exhibit 9 - Detailed review of RSCA Section 16-50j-59

Exhibit 10 - Reynolds Engineering site survey depicting land contours and existing conditions at site 7785 dated 4/15/22

Exhibit 19 - April 2022 Construction & Maintenance Environmental Requirements, Best Management Practices Manual for Massachusetts, and Connecticut

Certification

I hereby certify that an electronic copy of the forgoing document was mailed to

The Connecticut Light and Power Company d/b/a Eversource Energy

Deborah Denfeld Team Lead – Transmission Siting Eversource Energy P.O. Box 270 Hartford, CT 06141 Phone: (860) 728-4654 deborah.denfeld@eversource.com

Cory Spaulding Leslie Yeisley

5/22/23

Exhibit 1

BEAUMONT HWY

Location	BEAUMONT HWY	**Mblu**	221/ / 50/ /
Acct#	D0043300	**Owner**	SPAULDING CORY R & YEISLEY LESLIE A
Assessment	$10,900	**PID**	1525
Building Count	1		

Current Value

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$0	$10,900	$10,900

Owner of Record

Owner	SPAULDING CORY R & YEISLEY LESLIE A	**Sale Price**	$97,500
Co-Owner		**Certificate**	
Address	4142 MARINER BLVD #408 SPRING HILL, FL 34609	**Book & Page**	318/862
		Sale Date	08/13/2020
		Instrument	28

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
SPAULDING CORY R & YEISLEY LESLIE A	$97,500		318/862	28	08/13/2020
DAVIS JACKSON W & PATRICIA C	$0		0108/0421	29	01/01/1900

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: $0
Building Percent Good:
Replacement Cost Less Depreciation: $0

Building Attributes	
Field	**Description**
Style	Vacant Land
Model	
Grade:	
Stories:	

Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Xtra Fixtrs:	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Kitchens	
Insulated	
Usrfld 103	
Usrfld 104	
Usrfld 105	
Usrfld 106	
Usrfld 107	
Num Park	
Fireplaces	
Gas Fireplaces	
Usrfld 101	
Usrfld 102	
Usrfld 100	
Usrfld 300	
Usrfld 301	
Usrfld 302	
Usrfld 304	
Fndtn Cndtn	
Basement	
Usrfld 701	
Usrfld 305	
Usrfld 900	
Usrfld 901	
Usrfld 303	

Building Photo

(http://images.vgsi.com/photos/LebanonCTPhotos//default.jpg)

Building Layout

(http://images.vgsi.com/photos/LebanonCTPhotos//Sketches/1525_1525.jp

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	6100
Description	FOREST
Zone	RA
Neighborhood	11
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	64.84
Frontage	0
Depth	0
Assessed Value	$10,900

Outbuildings

Outbuildings	Legend
No Data for Outbuildings	

Valuation History

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2020	$0	$10,900	$10,900
2019	$0	$10,900	$10,900
2018	$0	$10,900	$10,900

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Exhibit 2

716 BEAUMONT HWY

Location	716 BEAUMONT HWY	**Mblu**	221/ / 47/ /
Acct#	L0100000	**Owner**	SPAULDING CORY R &
Assessment	$530,530	**PID**	1522
Building Count	1		

Current Value

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$460,930	$69,600	$530,530

Owner of Record

Owner	SPAULDING CORY R &	**Sale Price**	$650,000
Co-Owner	YEISLEY LESLIE A	**Certificate**	
Address	716 BEAUMONT HWY LEBANON, CT 06249	**Book & Page**	0300/0867
		Sale Date	11/29/2016
		Instrument	30

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
SPAULDING CORY R &	$650,000		0300/0867	30	11/29/2016
LYMAN RONALD E	$0		0296/0627	31	12/15/2015
LYMAN JACQUELINE A & RONALD E TRUSTEES	$0		0272/0556	29	07/08/2011
LYMAN RONALD E	$0		0271/0760	29	05/12/2011
LYMAN JACQUELINE & RONALD E- TRUSTEES	$0		0254/0914	29	03/17/2008

Building Information

Building 1 : Section 1

Year Built:	1999
Living Area:	7,573
Replacement Cost:	$762,525
Building Percent Good:	82
Replacement Cost Less Depreciation:	$625,270

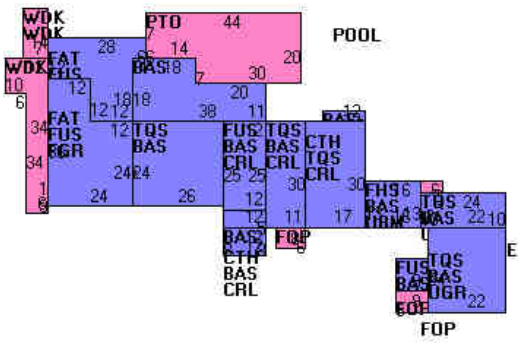
Building Attributes	
Field	**Description**
Style	Cape Cod

Model	Residential
Grade:	Very Good
Stories:	2 Stories
Occupancy	2
Exterior Wall 1	Clapboard
Exterior Wall 2	
Roof Structure:	Gable/Hip
Roof Cover	Asphlt/Architc
Interior Wall 1	Drywall/Sheet
Interior Wall 2	
Interior Flr 1	Hardwood
Interior Flr 2	Carpet
Heat Fuel	Gas
Heat Type:	Forced Air
AC Type:	Central
Total Bedrooms:	8 Bedrooms
Total Bthrms:	6
Total Half Baths:	1
Total Xtra Fixtrs:	2
Total Rooms:	18
Bath Style:	Modern
Kitchen Style:	Above Average
Kitchens	2
Insulated	Yes
Usrfld 103	
Usrfld 104	
Usrfld 105	
Usrfld 106	
Usrfld 107	
Num Park	
Fireplaces	1
Gas Fireplaces	2.00
Usrfld 101	
Usrfld 102	
Usrfld 100	
Usrfld 300	
Usrfld 301	
Usrfld 302	
Usrfld 304	
Fndtn Cndtn	
Basement	
Usrfld 701	
Usrfld 305	
Usrfld 900	No
Usrfld 901	No

Building Photo

(http://images.vgsi.com/photos/LebanonCTPhotos//\00\00\99\04.jpg)

Building Layout



(http://images.vgsi.com/photos/LebanonCTPhotos//Sketches/1522_1522.jp

Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	3,503	3,503
TQS	Three Quarter Story	2,232	1,897
FUS	Finished Upper Story	1,557	1,557
FAT	Finished Attic	1,176	470
FHS	Finished Half Story	208	146
CRL	Crawl Space	1,200	0
CTH	Cathedral Ceiling	570	0
FGR	Garage	720	0
FOP	Open Porch	120	0
PTO	Patio	782	0
UBM	Unfinished Basement	448	0
UGR	Basement Garage	528	0
WDK	Wood Deck	520	0
		13,564	7,573

Usrfld 303	

Extra Features

Extra Features				Legend
Code	**Description**	**Size**	**Value**	**Bldg #**
WST	Wood Stove	1.00 UNITS	$1,640	1

Land

Land Use

Use Code	1011
Description	One Family + Accessory Unit
Zone	RA
Neighborhood	12
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	10.49
Frontage	0
Depth	0
Assessed Value	$69,600

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
LNT	LEAN-TO			640.00 S.F.	$1,920	1
FGR1	GARAGE-AVE			960.00 S.F.	$15,310	1
SPL2	IG POOL-VINYL			648.00 S.F.	$8,910	1
CAN	CANOPY			1008.00 S.F.	$3,020	1
WDK	WOOD DECK			400.00 S.F.	$2,400	1

Valuation History

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2020	$460,930	$69,600	$530,530
2019	$460,930	$82,300	$543,230
2018	$460,930	$82,300	$543,230

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Exhibit 3

0-51.
226A-66

Form 830—2M 11 31

#5192-31

Know all Men by these Presents:

That ~~I~~ we, WILLIAM F. PARKHURST and MARY C. PARKHURST

Lebanon, County of New London, State of Connecticut, of the Town of

of a valuable sum in dollars, received to ~~my~~ our, full satisfaction of The Connecticut Light and Power Company, a corporation chartered by the General Assembly of the State of Connecticut, and having its principal place of business in Hartford, in the State of Connecticut, do give, grant, bargain, sell and confirm unto the said The Connecticut Light and Power Company, a perpetual easement, privilege, and right of way One hundred and Twenty-Five feet wide for electric lines for the transmission of electric currents of any character necessary or convenient from time to time in the conduct of the grantee's business and the right at any and all times and from time to time to erect, inspect, operate, use, patrol and permanently maintain the said electric lines upon, over and across ~~my~~, our lands situate in the Town of Lebanon, County of New London, State of Connecticut.

Said easement, privilege and right of way herein granted, covers any land, or interest therein, owned by ~~me~~, us within thirty feet measured at right angles to and easterly of and, within Ninety-five feet measured at right angles to and westerly of, the following described line of location whether such line of location is, at the point opposite such land, on ~~my~~, our land, on the highway or on land of some other party.

Said line of location Begins at an iron pin in the southerly boundary line of land now or formerly of Rose and Mike Kollar said pin being about 524.8 feet westerly (as measured along said southerly boundary line) from the intersection of the westerly boundary line of land now or formerly of John Griffin and the said southerly boundary line of Rose and Mike Kollar; thence S 11° - 25' W about 1187 feet to an iron pin at an angle; thence S 26° - 50'E about 609 feet to the Old Hayward Pond Road (so called) and land now or formerly of Jane E. and Harry N. Bruce.

Said electric lines may consist of poles, towers, other supporting structures (which may be substituted one for the other at any time), circuits, cables, wires, cross arms, guy wires, anchors, guy stubs and other fixtures and appurtenances, any or all of which constituent parts of said electric lines may be erected, relocated, replaced, repaired or changed in number, size or type from time to time.

Together with the right to trim, cut, take down and remove at any and all times such trees, parts of trees, limbs, branches, underbrush and structures within or projecting into the above described right of way as in the judgment of the grantee may interfere with or endanger any of said electric lines or their operation, whenever they are erected.

Together also with the right to enter upon, pass and transport materials, along and over said right of way to and from adjoining lands of others or highways.

Reserving, however, to ~~myself~~, ourselves, and to ~~my~~, our, heirs and assigns the right to use the land, except for structures, beneath said electric lines and elsewhere within said right of way, but no use of the land whatsoever, shall interfere with or obstruct the rights herein granted or endanger said electric lines or their operation, whenever they are erected.

If any part of the above described land upon or over which said electric lines shall be located is now or shall hereafter become a public street or highway or a part thereof, permission, as provided in the General Statutes of Connecticut relating to adjoining land owners, is hereby given to the grantee to use that part for the purposes and the manner above described.

TO HAVE AND TO HOLD the said granted and bargained easement, privilege and right of way and its appurtenances to said grantee and to its successors and assigns forever, to its and their own proper use and behoof.

And ~~I~~, we, the grantors, do hereby covenant and agree for ~~myself~~, ourselves, and ~~my~~, our, heirs, executors and administrators, with the grantee and its successors and assigns, that, at and until the ensealing of these presents, ~~I~~, we, ~~am~~ are, lawfully seized of the above bargained premises in fee simple, that ~~I~~ we, have full right, title and authority to grant and convey the foregoing rights and privileges, and ~~I~~ we, further, by these presents, bind ~~myself~~, ourselves, and ~~my~~, our, heirs, executors and administrators forever to warrant and defend the same to the said grantee and to its successors and assigns forever against all claims and demands whatsoever.

The said electric lines shall remain the property of the grantee, its successors and assigns.

IN WITNESS WHEREOF, ~~I~~ we, have hereunto set ~~my~~ our, hands and seals at Lebanon, this 7th day of March, 19 34.

In the presence of:

William F. Parkhurst [Seal.]

William B. Mitchell — Mary C. Parkhurst [Seal.]

Fred C. Harber — [Seal.]

State of Connecticut } ss.: March 7th, 19 34

County of New London }

Personally appeared before me WILLIAM F. PARKHURST and MARY C. PARKHURST Signers and sealers of the foregoing instrument and acknowledged the same to be their free act and deed.

William B. Mitchell

Notary Public.

WILLIAM F. PARKHURST
and
MARY C. PARKHURST

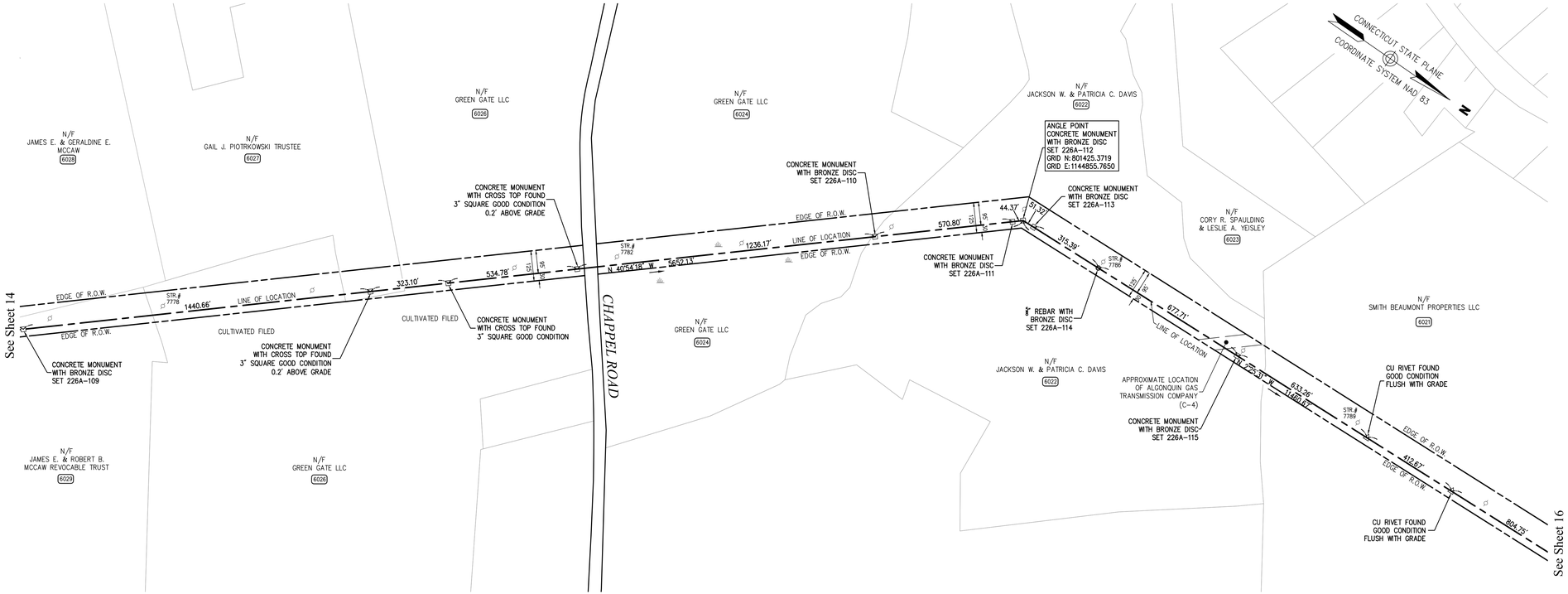
to

THE CONNECTICUT LIGHT & POWER COMPANY.

Rec'd for Record Mar. 9, 1934
at 11 o'clock A. M.
Recorded in Lebanon Land
Records Vol. 60, Page 238-239
Sarah L. Abell
Town Clerk

Contract No. 5192-31
Recorded 3/17/34
Read By
Read By

Exhibit 4



Legend

- EDGE OF C.L.&P. CO. RIGHT OF WAY
- MON. LINE OF LOCATION
- APPROXIMATE STREET/HIGHWAY LINE
- APPROXIMATE EASEMENT LINE
- C.L.&P. CO. PROPERTY LINE
- CU RIVET FOUND
- CONCRETE MONUMENT FOUND – CONCRETE MONUMENT W/BRONZE DISK SET
- BRONZE DISK – DRILL HOLE SET IN LEDGE
- CU PIN FOUND, I.P. FOUND, LPIPE FOUND, REBAR FOUND – 5/8" REBAR W/BRONZE CAP SET
- 6308 LINE LIST NUMBER
- APPROXIMATE STRUCTURE LOCATION
- N/F NOW OR FORMERLY
- STR.# EXISTING STRUCTURE NUMBER
- 226A-1 MONUMENT ID NUMBER
- APPROXIMATE WET AREA

200 0 200 400
SCALE IN FEET

ALL MEASUREMENTS DEPICTED ON THIS PLAN ARE GRID MEASUREMENTS AND ARE REFERENCED TO THE CT NAD 83 GRID COORDINATE SYSTEM USING A COMBINED FACTOR OF 0.999986. DIVIDE PLAN DISTANCE BY COMBINED FACTOR TO CONVERT GRID DISTANCE TO GROUND DISTANCE.

STATE OF CONNECTICUT · REGISTERED LAND SURVEYOR

TO MY KNOWLEDGE AND BELIEF THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON. THIS PLAN IS NOT VALID WITHOUT A LIVE SIGNATURE AND EMBOSSED SEAL.

CHRISTOPHER C. DANFORTH, L.S. #70118 7/2121 DATE

CAD GENERATED DWG

MAKE NO MANUAL CHANGES. CONTACT SURVEY ENGINEERING

- ATTENTION -
NOT TO BE USED AS A BASIS OF LAND TITLES OR MEASUREMENTS

vhb.com

vhb

100 Great Meadow Road, Suite 200
Wethersfield, Connecticut 06109
860.807.4300 • FAX 860.372.4570

Survey Notes

1. RIGHT OF WAY EVIDENCE DEPICTED ON THIS MAP IS BASED UPON AN ACTUAL FIELD SURVEY CONDUCTED BY VHB, INC. BETWEEN AUGUST 2018 AND NOVEMBER 2018. MLOL AS-BUILT DATED 9/2019.
2. ALL OTHER PROPERTY LINES, HIGHWAY LINES, STREET LINES AND ROADS DEPICTED ON THIS MAP WERE COMPILED FROM LOCAL ASSESSOR'S MAPS AND FROM PREVIOUS PLANS AND DEEDS OF RECORD. VHB HAS NOT PERFORMED A FIELD SURVEY TO VERIFY AND ACCURATELY PLOT THE LINES.
3. RIGHT OF WAY SURVEYING WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE COMMITMENT. ACCORDINGLY, ALL ENCUMBRANCES MAY NOT BE SHOWN.
4. HORIZONTAL DATUM IS BASED ON CONNECTICUT STATE PLANE NAD 83 (GRID) COORDINATE SYSTEM AND WAS DETERMINED USING HORIZONTAL CONTROL PREPARED BY VHB. THE DATUM WAS COMPUTED AND MEASURED USING AVERAGED REAL TIME NETWORK (RTN) GPS SOLUTIONS.
5. THE STRUCTURE LOCATIONS DEPICTED HEREON HAVE BEEN SUPPLIED BY EVERSOURCE ENERGY AND ARE APPROXIMATE.
6. THIS SURVEY AND MAP HAS BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THROUGH 20-300b-20 AND THE "STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. AMENDED OCTOBER 26, 2018. THIS IS A RIGHT OF WAY SURVEY, THE MON. LINE OF LOCATION CONFORMS TO A HORIZONTAL ACCURACY A-2 STANDARD.

TOWN OF LEBANON, CONNECTICUT

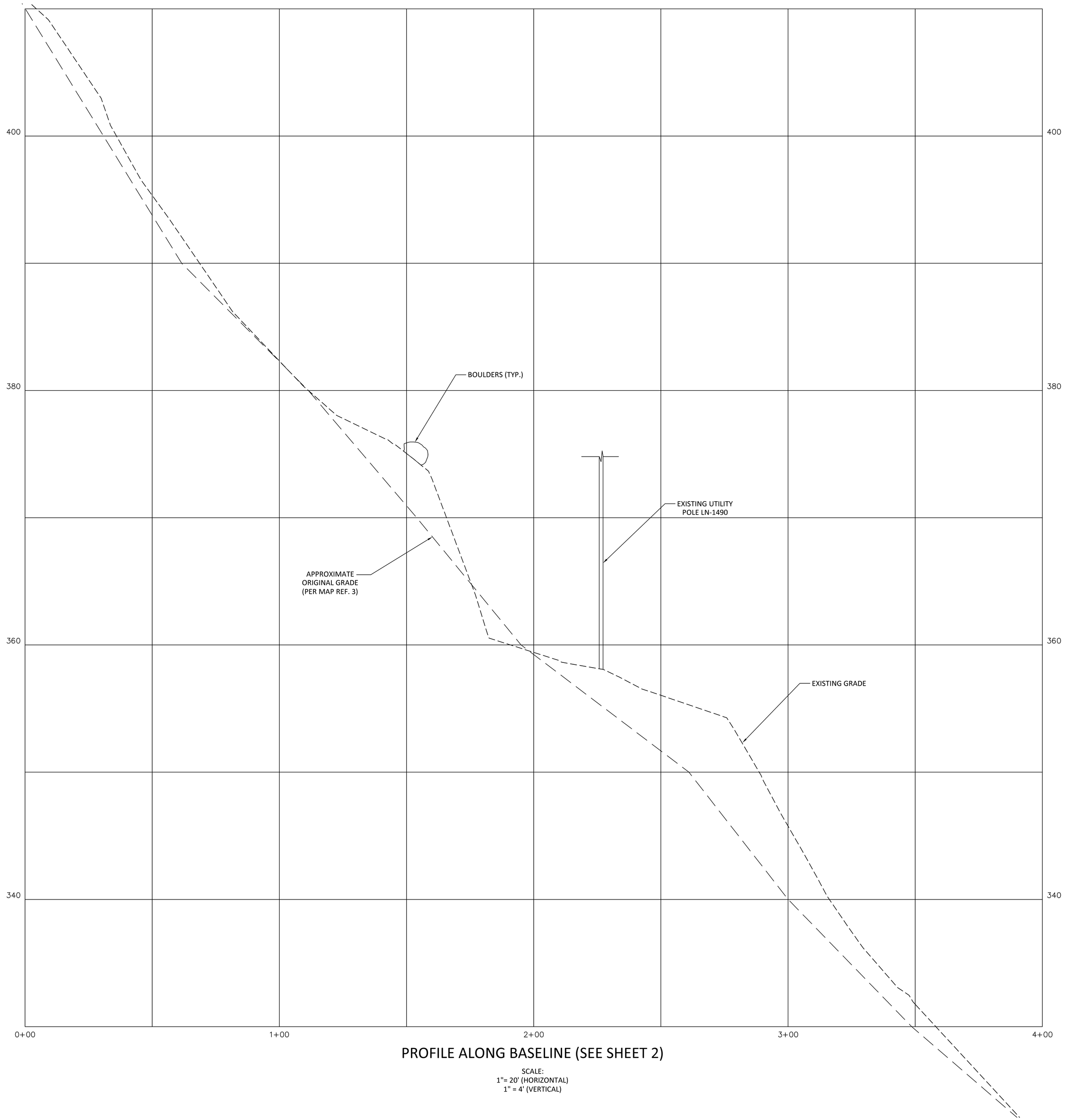
NO.	DATE	REVISIONS	BY	CHKD
2	7-2021	Title Block	JDD	CCD
1	9-2019	MLOL As-Built	JDD	CCD

EVERSOURCE ENERGY

TITLE: REAL ESTATE SURVEY PLAN RECORD MAP
RIGHT OF WAY SURVEY
MONTVILLE-WAWECUS JUNCTION-CARD 55

BY:	JDD	CHKD:	CCD	APP:	APP:
DATE:	1-2018	DATE:	1-2018	DATE:	DATE:
H-SCALE:	1"=200'	SIZE:	17X44	SURVEY JOB #:	S21645
V-SCALE:		V.S.:	2:1-5	R.E. PROJECT #:	000-51.226A
R.E. DRAWING #:			24145	SHEET #:	15 OF 18

Exhibit 5



PROFILE ALONG BASELINE (SEE SHEET 2)

SCALE:
1"= 20' (HORIZONTAL)
1" = 4' (VERTICAL)

PLAN VIEW

0 10 20 40

SCALE: 1"= 20'

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www.hellstromlandsurveying.com

Mailing Address:
P.O. BOX 378
HEBRON, CT. 06248

Designed By: SAM
Drawn By: SAM
Checked By: MAR
CAD File: 22-037_Exist_Cond

Drawing Scale: 1"=20'
Drawing date: 4/15/22

Rev.	Date	Revision	By

Existing Ground Profile

PROJECT TITLE: *Owunneguhset Mountain*
716 Beaumont Hwy.
Lebanon, Ct.

PREPARED FOR: *Cory Spaulding*

CIVIL ENGINEERING CONSULTANTS
63 NORWICH AVENUE
COLCHESTER, CT
(860) 516-0093
RES
Reynolds Engineering Services, LLC

Drawing #: 3 OF 3

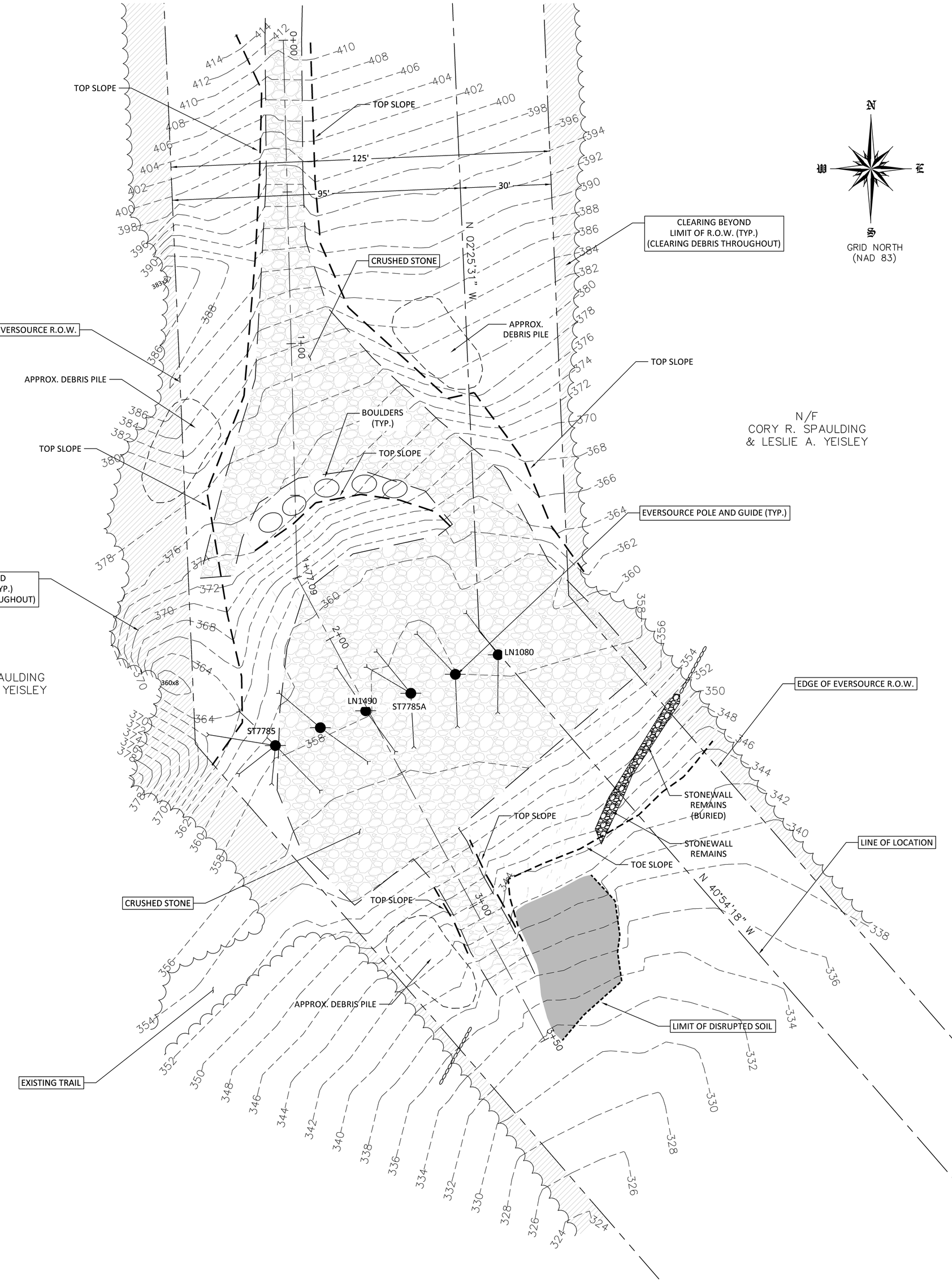
Job #: 22-037

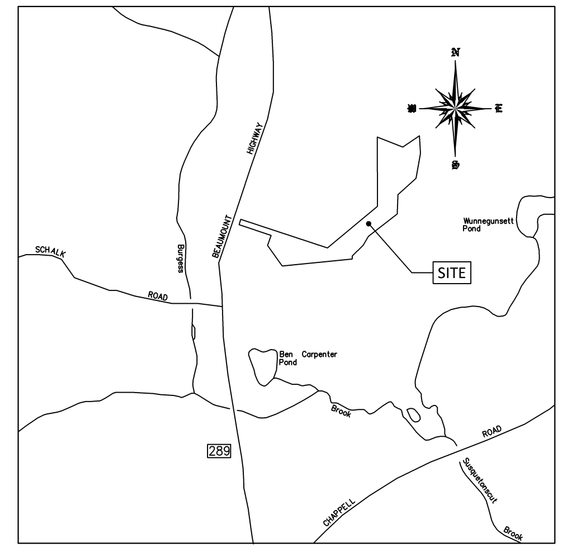
Exhibit 6

LEGEND

THESE STANDARD SYMBOLS WILL BE FOUND IN THE DRAWING.

- EDGE OF EVERSOURCE R.O.W.
- LINE OF LOCATION (BASELINE)
- EXISTING CONTOUR
- LIMIT OF CLEARING
- UTILITY POLE
- CRUSHED STONE





LOCATION MAP
SCALE: 1"= 1000'

PLAN VIEW
0 10 20 40
SCALE: 1"= 20'

MAP REFERENCES:

1. "PROPERTY OF HOWARD W. & ELIZABETH DAVIS LEBANON, CONN." BY MEGSON & HEAGLE CIVIL ENGINEERS & LAND SURVEYORS GLASTONBURY, CONN. DATE: 7-6-81 SCALE: 1"=100' MAP NO.170-80-1
2. "REAL ESTATE SURVEY PLAN RECORD MAP RIGHT OF WAY SURVEY MONTVILLE-WAWECUS JUNCTION-CARD SS" BY EVERSOURCE ENERGY DATE: 3-2018, SCALE: 1"=200' REVISED 7-2021
3. "CARD TO MONTVILLE TO TUNNEL UPGRADE PROJECT LEBANON, CT LINE 1080/1490 - STRUCTURES 7781, 7782, 7783 & 7784" BY EVERSOURCE ENERGY DATE: JULY,2017 MAP SHEET 5 OF 23 SCALE: 1"=200'

MAP STANDARD NOTES:

1. THIS SURVEY AND MAP HAS BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THROUGH 20-300b-20 AND THE "STANDARDS AND SUGGESTED METHODS AND PROCEDURES FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON AUGUST 29, 2019.
2. THE TYPE OF SURVEY IS AN TOPOGRAPHIC SURVEY.
   BOUNDARY DETERMINATION CATEGORY: RESURVEY
   HORIZONTAL ACCURACY CLASS: A-2.
   TOPOGRAPHIC ACCURACY CLASS: T-2 (EXISTING CONTOURS)
   T-D (ORIGINAL GRADE)

TO MY KNOWLEDGE AND BELIEF, THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

THIS DRAWING IS NOT VALID UNLESS IT BEARS AN ORIGINAL INK SIGNATURE AND EMBOSSED SEAL

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P.O. BOX 378
HEBRON, CT. 06248

Designed By: SAM
Drawn By: SAM
Checked By: MAR
CAD File: 22-037_Exist_Cond

Drawing Scale: 1"=20'

Rev.	Date	Revision	By

Drawing date: 4/15/22

Existing Conditions Plan

PROJECT TITLE: *Owunnegunset Mountain*
716 Beaumont Hwy.
Lebanon, Ct.

PREPARED FOR: *Cory Spaulding*

CIVIL ENGINEERING CONSULTANTS
63 NORWICH AVENUE
COLCHESTER, CT
(860) 516-0033
RES
Reynolds Engineering Services, LLC

Drawing #: 1 OF 3

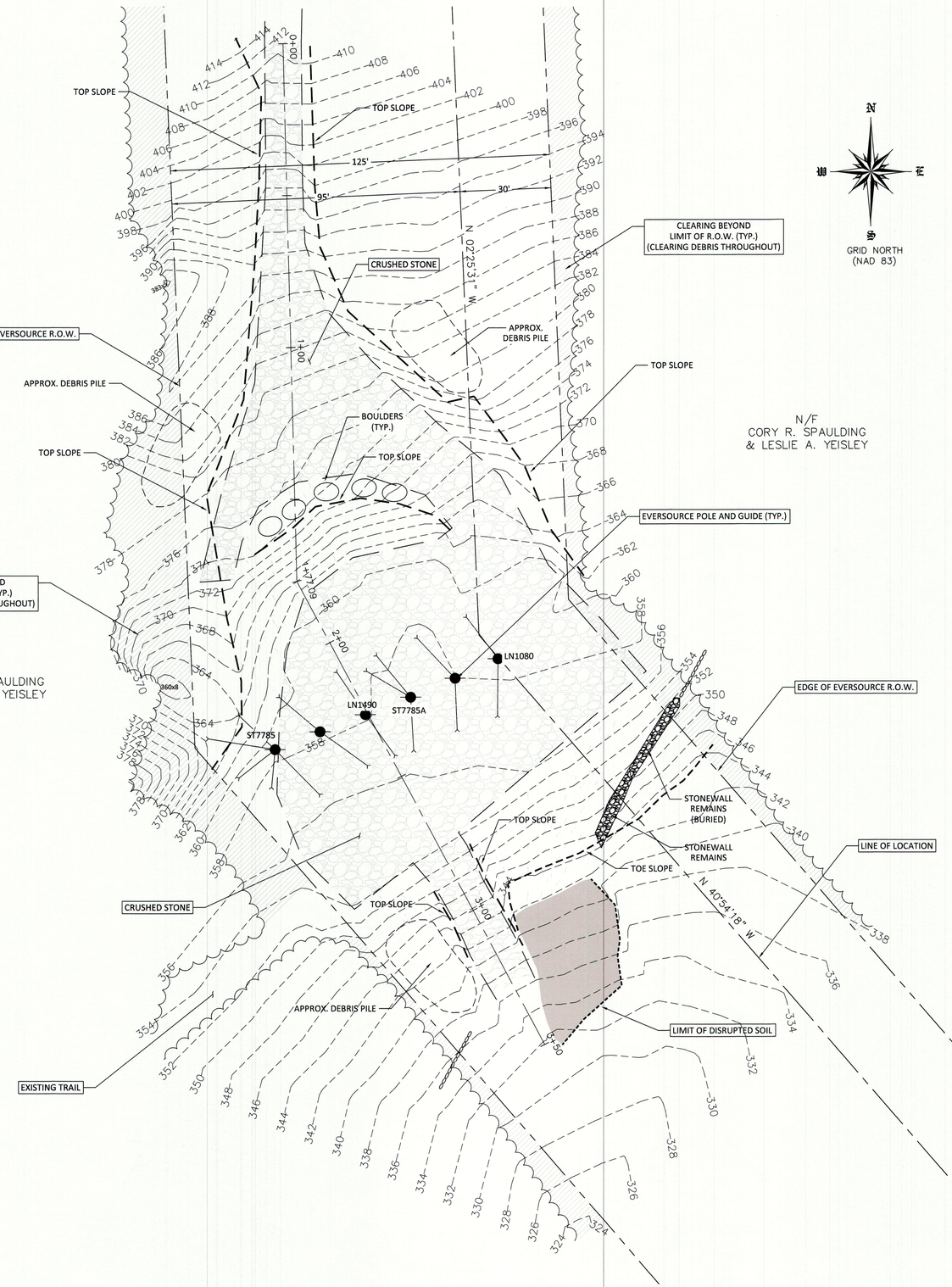
Job #: 22-037

Exhibit 7

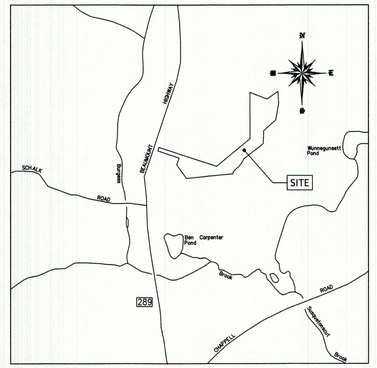
LEGEND

THESE STANDARD SYMBOLS WILL BE FOUND IN THE DRAWING.

- EDGE OF EVERSOURCE R.O.W.
- LINE OF LOCATION (BASELINE)
- 100 EXISTING CONTOUR
- LIMIT OF CLEARING
- UTILITY POLE
- CRUSHED STONE



N
GRID NORTH
(NAD 83)



LOCATION MAP
SCALE: 1"= 1000'

PLAN VIEW
0 10 20 40
SCALE: 1"= 20'

MAP REFERENCES:

1. "PROPERTY OF HOWARD W. & ELIZABETH DAVIS LEBANON, CONN." BY MEGSON & HEAGLE CIVIL ENGINEERS & LAND SURVEYORS GLASTONBURY, CONN. DATE: 7-6-81 SCALE: 1"=100' MAP NO.170-80-1
2. "REAL ESTATE SURVEY PLAN RECORD MAP RIGHT OF WAY SURVEY MONTVILLE-WAWECUS JUNCTION-CARD SS" BY EVERSOURCE ENERGY DATE: 3-2018, SCALE: 1"=200' REVISED 7-2021
3. "CARD TO MONTVILLE TO TUNNEL UPGRADE PROJECT LEBANON, CT LINE 1080/1490 - STRUCTURES 7781, 7782, 7783 & 7784" BY EVERSOURCE ENERGY DATE: JULY,2017 MAP SHEET 5 OF 23 SCALE: 1"=200'

MAP STANDARD NOTES:

1. THIS SURVEY AND MAP HAS BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THROUGH 20-300b-20 AND THE "STANDARDS AND SUGGESTED METHODS AND PROCEDURES FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON AUGUST 29, 2019.
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   BOUNDARY DETERMINATION CATEGORY: RESURVEY
   HORIZONTAL ACCURACY CLASS: A-2.
   TOPOGRAPHIC ACCURACY CLASS: T-2 (EXISTING CONTOURS)
   T-D (ORIGINAL GRADE)

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Designed By: SAM
Drawn By: SAM
Checked By: MAR
CAD File: 22-037_Exist_Cond

Drawing Scale: 1"=20'
Drawing date: 4/15/22

Rev.	Date	Revision	By

Existing Conditions Plan

PROJECT TITLE: *Owunnegunset Mountain*
716 Beaumont Hwy.
Lebanon, Ct.

PREPARED FOR: *Cory Spaulding*

RES
Reynolds Engineering Services, LLC
CIVIL ENGINEERING CONSULTANTS
63 NORWICH AVENUE
COLCHESTER CT
(860) 5160033

Drawing #: 1 OF 3

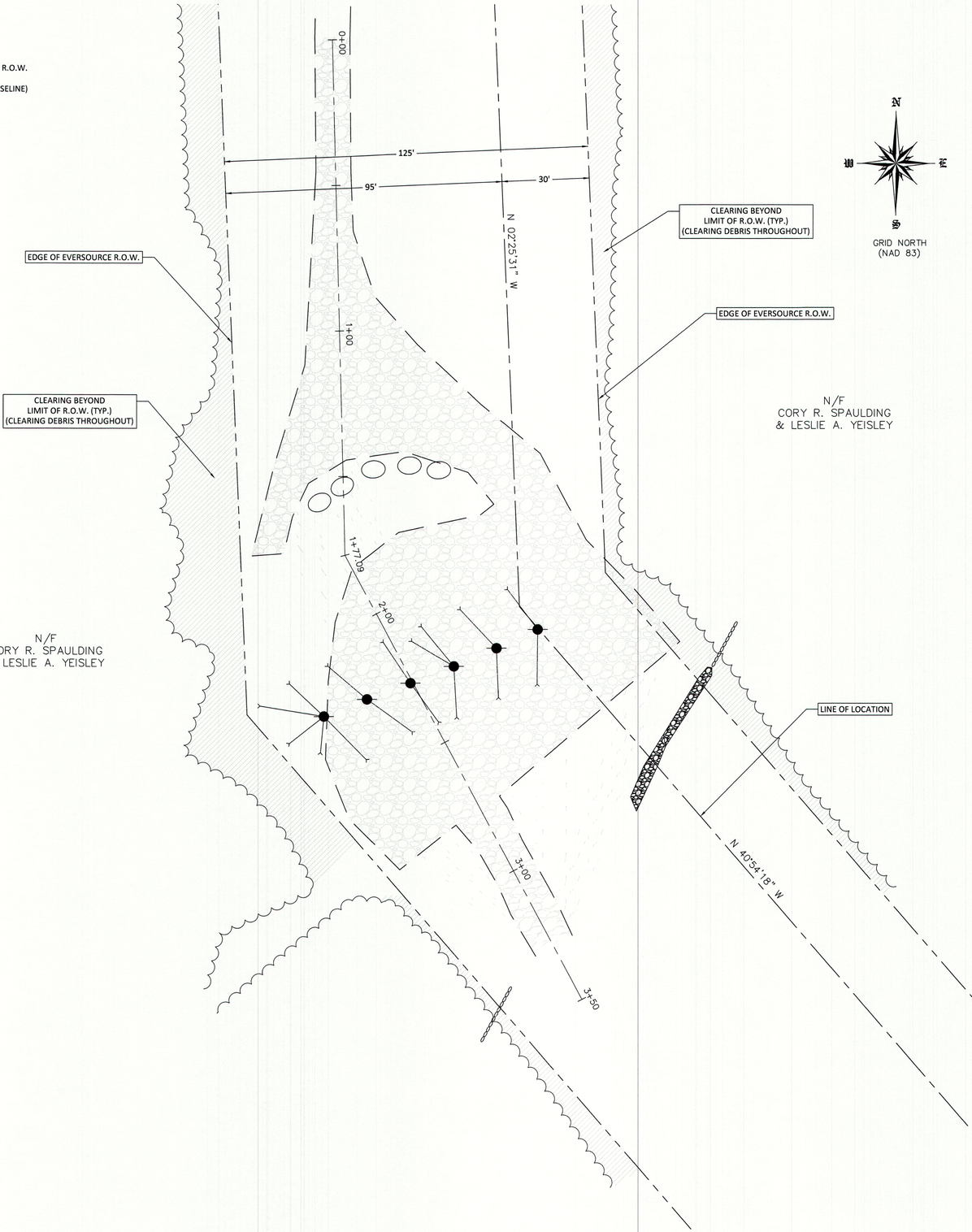
Job #: 22-037

Exhibit 8

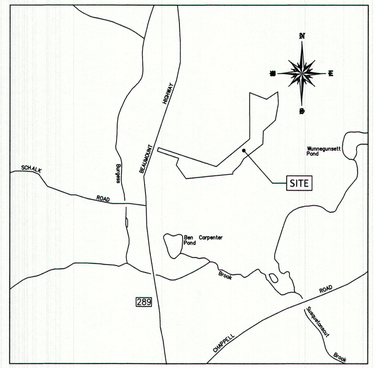
LEGEND

THESE STANDARD SYMBOLS WILL BE FOUND IN THE DRAWING.

- EDGE OF EVERSOURCE R.O.W.
- LINE OF LOCATION (BASELINE)
- 100 EXISTING CONTOUR
- LIMIT OF CLEARING
- UTILITY POLE
- CRUSHED STONE



GRID NORTH
(NAD 83)



LOCATION MAP
SCALE: 1"= 1000'

PLAN VIEW

0 10 20 40

SCALE: 1"= 20'

MAP REFERENCES:

1. "PROPERTY OF HOWARD W. & ELIZABETH DAVIS LEBANON, CONN." BY MEGSON & HEAGLE CIVIL ENGINEERS & LAND SURVEYORS GLASTONBURY, CONN. DATE: 7-6-81 SCALE: 1"=100' MAP NO.170-80-1
2. "REAL ESTATE SURVEY PLAN RECORD MAP RIGHT OF WAY SURVEY MONTVILLE-WAWECUS JUNCTION-CARD SS" BY EVERSOURCE ENERGY DATE: 3-2018, SCALE: 1"=200' REVISED 7-2021

MAP STANDARD NOTES:

1. THIS SURVEY AND MAP HAS BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THROUGH 20-300b-20 AND THE "STANDARDS AND SUGGESTED METHODS AND PROCEDURES FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON AUGUST 29, 2019.
2. THE TYPE OF SURVEY IS AN IMPROVEMENT LOCATION SURVEY. BOUNDARY DETERMINATION CATEGORY: RESURVEY HORIZONTAL ACCURACY CLASS: A-2. TOPOGRAPHIC ACCURACY CLASS: T-2

TO MY KNOWLEDGE AND BELIEF, THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

THIS DRAWING IS NOT VALID UNLESS IT BEARS AN ORIGINAL INK SIGNATURE AND EMBOSSED SEAL

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Designed By: SAM
Drawn By: SAM
Checked By: MAR
CAD File: 22-037_Exist_Cond

Drawing Scale: 1"=20'
Drawing date: 4/15/22

Rev.	Date	Revision	By

Existing Clearing Limits

PROJECT TITLE: *Owunnegubset Mountain*
716 Beaumont Hwy. Lebanon, Ct.

PREPARED FOR: *Cory Spaulding*

CIVIL ENGINEERING CONSULTANTS
RES
63 NORWICH AVENUE
COLCHESTER, CT
(860) 5166033
Reynolds Engineering Services, LLC

Drawing #: 2 OF 3

Job #: 22-037

Exhibit 9

● Ecology
● Soil & Wetland Studies
● Water Quality Monitoring ● GPS
● Environmental Planning & Management
● Ecological Restoration & Habitat Mitigation
● Aquatic, Wildlife and Listed Species Surveys
● Application Reviews ● Permitting & Compliance

November 27, 2022

Mr. Dwight Merriam, Esq.
80 Latimer Lane
Simsbury, CT 06089

RE: ***Assessment of Environmental Impacts on land owned by C. Spaulding & L. Yeisley 716 Beaumont Hwy., Lebanon, CT, in & adjacent to the Eversource Right-of-Way by Eversource's Maintenance Activities***

REMA Job No.: 21-2453-LEB8

Dear Attorney Merriam,

At your request, REMA ECOLOGICAL SERVICES ("REMA") has evaluated the environmental and ecological impacts of maintenance activities by Eversource Energy along an approximately 1,800-foot-long right-of-way (ROW) segment in Lebanon, Connecticut.

1.0 INTRODUCTION

This report has been prepared on behalf of the plaintiffs, Cory Spaulding, and Leslie Yeisley; this Eversource ROW traverses their 10.5-acre subject property at 716 Beaumont Highway. Information sources for the report include the following:

- Annotated map of the Spaulding-owned ROW segment prepared by Landscape Architect Jeff Gebrian, dated 12/09/21. This map shows locations of environmental features extending from the pad at Pole #7784 at the south end of the ROW segment, to the pad at Pole #7788, at the north end.

- REMA's field inspections on November 21st, and December 14th, 2021, and May 24th, 2022 of ecological conditions along this ROW segment, and in adjacent forest owned by Mr. Spaulding and his wife. Attachment 1 is an annotated photo-record of these inspections.
- The ROW maintenance application for this segment, required under Petition 1293.
- On-line natural resource information, such as USDA-NRCS soil survey, and CTECO mapping, including bedrock geology, topography, and CTDEEP aerial photos taken on various dates, in different seasons. See Attachment 2.

Ecological impacts along this ROW segment were assessed by Sigrun Gadwa and George Logan, of REMA. Each has 30 years of experience investigating wetland and upland ecological communities in Connecticut, and in the planning and implementation of habitat restoration and mitigation. Issues related to invasive plants have been a particular focus. Sigrun has an MS in Plant Ecology from the University of Connecticut at Storrs, and a BS in Biology from Brown University. George Logan has a BS and an MS in Natural Resources from URI (University of Rhode Island). George is a certified ecologist, and both are registered soil scientists, and professional wetland scientists.

In summary, the following maintenance activities have caused adverse environmental impacts. Restoration has not taken place following multiple types of vegetation and soil disturbance caused by ROW maintenance activities.

1. ***Tree and shrub cutting*** along forest edges and within the ROW. In addition to the direct losses, ***increased light levels*** after logging to widen the ROW ***are accelerating invasive plant infestation of forest edges,*** on Spaulding land.

2. ***Tree and shrub cutting*** along forest edges and within the ROW;

3. ***Woody debris deposition*****; and *fill deposition*** for access roadway construction, and for construction of pads to support equipment to erect the taller steel poles;

4. ***Soil compaction*** and ***disturbance by heavy equipment*** also damaged existing herbaceous plants and soils along the ROW, and ***fostered colonization by noxious invasive plant species,*** especially common mugwort *(Artemisia vulgaris*).

2.0 BACKGROUND

Eversource Energy Corporation holds an easement allowing maintenance activities along this ROW segment owned by Mr. Cory Spaulding and his wife, Leslie Yeisley. The maintenance activities of concern took place after the CT Siting Council had approved Eversource's 2017 sub-petition application for ROW maintenance activities, submitted, as required under Petition 1293.

In November 2016, when Mr. Spaulding and his wife purchased their hilltop home, the ROW that traversed their property was a densely vegetated shrubland, with hundreds of red cedars, of varying sizes, and a relatively narrow dirt access path. It was typical of thousands of linear miles of ROW, selectively managed as shrubland by CT Light and Power, since the 1960's. The aerial photo record (2006, 20012, and 2016 CTDEEP Spring season photos) shows this ROW segment being managed as shrubland, known to provide excellent habitat for shrubland birds, rare New England cottontail rabbits, and other wildlife (Askins 1994). Though woody growth in 2017 was not tall enough to threaten the electric wires, it provided woody habitat linkage between the forested habitats to the east and west of the right-of-way. This minimized forest fragmentation by the powerline ROW in the larger landscape, allowing higher diversity and densities of area-sensitive wildlife species (Askins 1994).

The extent of cutting and filling in Eversource ROW's increased dramatically, both statewide and along the Spaulding ROW segment, following a major switch in ROW vegetation management methods. This occurred after the CT Siting Council granted Petition 1293 in 2017, agreeing that "no certificate of environmental compatibility and public need" would be required for ROW pole replacement and access improvement work. Petition 1293 also included assurance by Eversource that vegetation and soil disturbance would be followed by appropriate restoration. In their response to Petition 1293, the Siting Council had concluded that the ROW maintenance work "was not expected to have a substantial adverse effect on the environment or the ecology, nor would they damage exiting scenic, historic, or recreational values." However, multiple adverse environmental impacts related to ROW maintenance along the Spaulding/Yeisley ROW segment are evidence that this conclusion is incorrect. The Spaulding/Yeisley property has been harmed, as well as the public trust.

Beginning in 2019 at this site, instead of selective removal of tree saplings, leaving shrubs in place, the entire right-of-way was cut short, using very large mowing equipment. As shown

in the 2019 CTDEEP spring aerial photo, Eversource maintenance also included extensive fill placement over existing vegetation to build a broad, gravel access road, followed by grading and gravel placement to construct three large pads for replacing wooden poles with taller steel poles. The pad at Pole #7784 was constructed in 2018, and the most recently constructed pad is at Pole # 7786. ROW corridors were also significantly widened. Widening extended outside the ROW easement onto Spaulding land, by 7 to 16 feet, just north of the pad at Pole #7786. Wood chips and small woody debris have been strewn over the ROW, most thickly along forest edges where partial shade allows the highest herb diversity. Restoration of damage to soil and vegetation was not carried out.

3. 0 SITE OVERVIEW

3.1 Landscape Setting

The roughly 1,800-foot-long ROW segment under consideration is in a hilly part of eastern Lebanon, adjoining sizable blocks of undeveloped forest. Farmland becomes more important in the landscape, to the south and east of the subject ROW segment, as shown on Figure 1 (see Attachment 2). Nearby is the Algonquin natural gas ROW, with a dense meadow cover type.

As shown on the 2019 CTECO summer aerial photo, the subject ROW segment adjoins substantial core forest habitat, defined as forest more than 300 feet from an edge. The largely forested tract, to the east is a mile long, north to south, and about a half a mile wide. West of this ROW segment is another unfragmented, forested area, with a diameter of about a quarter mile. The surrounding road network is widely spaced, with a low proportion of commercial and residential land uses. Beaumont Highway (Rt. 289) is 0.4 miles, on average, from the ROW. Chappell Road is 0.2 miles to the south, and Bogg Lane is about 0.75 miles to the east.

Prior to the major maintenance policy change, the Eversource ROW contributed to landscape fragmentation only to a limited extent because the dominant cover type along the ROW was shrubland rather than open terrain, as described in the second paragraph of Section 2.0. Nevertheless, ecological integrity is still very good in the larger site vicinity,

Forested areas near the subject ROW include both steep, rocky hillsides; rich, slope-base forest; and forested riparian habitat along Susquetonscut Brook. The ROW passes down the steep southern slope of Owunnegunset Hill, with a nearly 200-foot drop in elevation. Besides

this hill, three other nearby hills also have summits 500 to 600 feet in elevation, and very steep, east- to south-facing slopes, that are largely forested. The topographic variation is associated with the diversity of ecological communities.

Susquetonscut Brook flows westerly across the ROW about 100 feet south of the Spaulding-owned ROW segment, at the base of a long, steep hill, before joining Burgess Brook, another sizable perennial stream. Near the ROW, Susquetonscut Brook is bordered by extensive wetlands. A quarter mile upstream, the brook is impounded as 3.3-acre Hayward Pond. These additional habitat classes, including emergent marsh, increase wildlife support potential for the ROW vicinity. We note that in addition to widespread "backyard" bird species, Eastern towhee and wood thrush were both observed in late May (probably breeding) in forested habitat at the edge-of the ROW. Both are declining neotropical migratory species. Towhee uses both forest edge habitat and shrubland and wood thrush breeds in moderate-sized forest blocks as well as forest interiors.

Significance

A site's ecological integrity affects the significance of the impacts to natural habitats, described below. Natural lands adjacent to this ROW segment are expected to support a diverse assemblage of wildlife and flora and high-quality ecological communities, in contrast to a hypothetical ROW in an urbanized, highly fragmented area.

3.2 ROW Conditions

3.2.1 Topography and Soils

Topography along the ROW is similar to that in adjacent forest. The highest elevation is at the far north end at the intersection with the grassy Algonquin Pipeline ROW, just north of Pole Group #7788. Proceeding southerly, a 125-foot ROW section slopes gently down to the isolated northern wetland. Next, the 200-foot section down to Pole Group #7786, has a gentle south-easterly slope, though the grade is nearly level on the west side. The access road crosses to the west side along this gently sloping stretch, and is not severely eroded.

The next four-hundred-foot-long section has approximately forty percent slopes. Soil Mapping Unit 73E occupies a roughly 1,000-foot-long section along the southern section of this ROW segment, and the forested, Spaulding/Yeisley-owned land, both to the east and to

the west (see Attachment 3). Mapping Unit 73E is the Charlton & Chatfield Complex with "15% to 45% slopes, very rocky." Bedrock is as close as 20 inches from the surface in Chatfield soils.

3.2.2 Upland ROW Vegetation

Upland ROW vegetation cover types and different stages of mugwort infestation are shown in Photos 2-1 through 2-6. At the northern pipeline crossing, the vegetation cover-type is dense, grassy meadow with native species like black-eyed Susan and prickly dewberry, and minimal colonization by mugwort.

All along the access road, mugwort swaths, ten to twenty feet wide, are dense and mature, with five-foot tall dead stems, remaining from the 2021 growing season. Further back from the road, patches of young, spreading mugwort are dominant, interspersed with scattered common herbaceous colonizers, both naturalized and native. Plant cover is typically sparse, usually less than fifty percent cover on May 24th, 2022. Young invasive vines and shrubs also have a significant presence, especially Asiatic bittersweet and multiflora rose, in the southern portion of the ROW.

Low native and naturalized ROW wildflowers include bluets, maiden pink, (*Dianthus deltoides*), white clover, common cinquefoil, plantains, and low spring mustard species. Some of the taller forbs are the goldenrods *(Solidago rugosa, S. altissima, and S. canadensis*), mulleins, common evening primrose, and summer daisy *(Erigeron spp.*). Asters were not identifiable in May but must be common, because pearl crescent butterflies were abundant on May 24th, 2022; asters are their larval host plant. Deer tongue grass is the most important graminoid species. Others include fescues, bent grasses, poverty oat grass, a variety of clump-forming sedges, and rosette-panic grasses. Examples are shown in Photos 1-7 to 1-10 (Attachment 1).

Though widespread and considered 'weedy,' they have aesthetic appeal and do support diverse pollinators and other insects. Several, like the plantains, and the sedges and grasses, are important seed-producers for winter birds, as are the perennial graminoids. Their loss is a significant adverse ROW impact, whether as a result of burial under gravel or woody debris, or compaction by heavy machinery, or competitive exclusion by invasive mugwort or Asiatic bittersweet.

Larger plant species needing fertile, moist growing conditions have become established along the ROW perimeter at the low-elevation south end of the ROW near Susquetonscut Brook, first disturbed over three years ago. Invasive multiflora rose and Asiatic bittersweet are dominant, and are associated with blackberries, black raspberries, pokeweed, and orchard grass.

3.2.3 Isolated Wetland

Joe Pye weed, willow-herb (*Epilobium coloratum*), and sensitive fern were growing in a portion of the isolated wetland, near the crossing, where soils are saturated long enough to exclude mugwort. The woody wetland plants in this small area (≤700 square feet) were a winterberry shrub (*Ilex verticillata*) and a shrub willow, and *Populus* saplings. However, this wetland is much larger (over 5,500 square feet in total per Eversource mapping). The remainder of the wetland is currently dominated by mugwort and other non-hydrophytic invasive shrubs like non-native honeysuckles and autumn olive. After soils have been disturbed, allowing colonization, mugwort can thrive in jurisdictional, seasonally saturated wetlands, provided the high watertable does not extend up into the near-surface root zone.

3.3 *Adjacent Plant Communities*

The forested hillsides bordering the ROW, within the subject property, support several different, high-quality ecological communities.

One well-developed example of the *rocky hillside forest community* is just west of the ROW, near Pole #7785, bordering the steepest ROW section. Diverse and aesthetically pleasing vegetation grows among exposed boulders, a "boulder wall," and talus. Ferns include marginal wood fern, fragile fern, common polypody, and evergreen wood fern. Representative wildflowers are doll's eyes (*Actaea pachypoda*.), Canada mayflower, and false Solomon's seal. Hickories are abundant, some very large. Unfortunately, invasives plants are starting to proliferate here, due to increased light levels from forest-edge clear-cutting several years ago. See Photos 5-2 to 5-8

East of Pole #7786 is another high-quality example of *rocky hillside oak-hickory forest*, depicted in Photos 1-4, 3-5, 5-3, and 5-4. A broad swath of the forest edge was recently clearcut, including a 7 to 16-foot-wide section located outside the ROW, on the subject

property, east of Pole # 7786. Plant species documented there included hop hornbeam, pignut hickory, sugar maple, a triple-trunk red oak, Christmas fern, smooth aralia, Canada mayflower, white wood aster, and Pennsylvania sedge. Invasive species are entirely lacking.

The *moist*, *slope-base forest community* borders the south end of this ROW segment, on the west side. It is fed by mineral-rich hillside seepage. As is characteristic of slope-base forest, sugar maple is dominant, associated with low trees needing mineral-rich soil, like ironwood and hophornbeam. There are many spring wildflowers such as red trillium, wild geranium, enchanter's nightshade (*Circaea canadensis*), and prickly bedstraw (*Galium asprellum*). This part of the Spaulding/Yeisley property is a mature forest community with high aesthetic appeal, readily accessible from the access road off Beaumont Road. Photos 5-5 To 5-8 show invasive colonizers, adjacent to forest herbs after forest edger shearing has increased light levels.

3.4 Former Shrubland ROW Community

As Connecticut plant ecologists, Ms. Gadwa and Mr. Logan are familiar with the typical woody constituents of the diverse shrubland communities on rocky, acidic soils in the Eastern Connecticut Highlands. Sigrun Gadwa, assisted by other members of the Connecticut Botanical Society, has formally inventoried three such shrubland ROW segments. The most typical woody species are in the heath (Ericaceae) family: highbush blueberry, maleberry, sweet pepperbush, mountain and sheep laurel, and swamp azalea; common non-ericaceous shrubs are chokeberry, winterberry, arrowwood and maple-leaf viburnum, blackberry, raspberry, hazelnut, pussy willow, and spicebush. Scrub oak is occasional. Widespread dwarf shrubs are huckleberry, low-bush blueberries, meadowsweet, steeplebush, and sweet fern. Characteristic herbaceous plants also grow in small clearings between shrubs, and along the former, earthen access roadways.

The shrubland vegetation along this ROW segment was not inventoried prior to 2017, when Mr. Spaulding and his wife bought the property traversed by this ROW segment. However, the vegetation was probably similar to that along many other minimally disturbed shrubland ROW communities in the acidic, rocky highlands of Eastern Connecticut. They were also maintained using the prior vegetation management approach, used by Connecticut Light & Power. Evidence includes a remnant undisturbed forest edge at the far north end of this ROW

segment, on the east side. Low-growing vegetation along that edge includes huckleberry, highbush blueberry, maple leaf viburnum, red cedar, and Pennsylvania sedge (See Photo 5-1.)

Provided native soils are minimally disturbed, significant ecological and aesthetic damage is not an unavoidable associated outcome of long-term ROW maintenance, at least in hilly, infertile, rocky terrain. Symbiotic relationships with soil biota allow the native shrubs to thrive in acidic, infertile rocky conditions; they include blueberries, laurels, maleberries, meadowsweet, and sweet fern. In such terrain, intrinsically challenging growing conditions for vegetation limit the speed and vigor of sapling growth, and of rank-growing/invasive understory vegetation, which needs frequent cutting.

4.0 ADVERSE ENVIRONMENTAL IMPACTS

4.1 *Direct Vegetation Losses*

Extensive direct losses of vegetation and wildlife habitat occurred between 2018 and 2020 when brush-hogging/mowing at more frequent intervals (except within wetlands) replaced the long-standing former practice of selective tree sapling removal, while leaving shrubs intact. Most of the native shrubs in our region die when cut close to the ground every 3 years or so.

ROW widening by clearcutting forest edges also removed much vegetation. The recently cut swath on the west side of the ROW, north of Pole #7785 is up to 30 feet wide. ROW widening, and conversion to a low, open cover type has increased fragmentation of the local landscape, such that the other forested land within the subject property has become less valuable for wildlife, in particular for forest-interior species, and for birds that forage along natural forest edges and in shrublands.

Additional extensive direct habitat losses occurred wherever ROW vegetation was buried by the new wider gravel roadways or by gravel pads to support equipment for pole replacement. Mr. Spaulding's consultants have calculated the total area buried by gravel to be 1.5 acres. Pads were constructed several years ago, but remain bare or very sparsely vegetated, as shown in Photos 3-1to 3-3. They were not spread with stockpiled, salvaged local topsoil, as is the customary restoration practice. Nor were the compacted gravel pads spread with imported, pervious topsoil, or removed; these are all mitigation options discussed in the Siting Council's response to Petition 1293. If the pads were seeded, there has been negligible germination.

Assorted clovers were observed on a cut slope adjacent to the nearly bare Pad #7784, likely from a seed mix.

Blooming in spring and/or early to mid- summer, the low woody ROW species listed in Section 3.4 are all important for pollinators, complementing assorted fall perennial wildflowers like goldenrods, *Eupatorium* species, and asters. Many yield juicy fruits, others produce numerous seeds. Shrub cover also provides ample nesting and insect-gleaning habitat. Slow-growing red cedars of all sizes were reported to be abundant in this cover type, before the brush-hogging (also seen on aerial photographs). They provide outstanding winter cover and oil-rich winter fruits.

We do not know exactly which subset of the many shrubland ROW species listed in the second paragraph of Section 3.4 used to grow along this particular section of ROW, or what their proportions were. One could argue that the former ROW shrubland may have consisted primarily of invasive shrubs. However, woody invasives are typically present only to a limited extent in a shrubland, where many years of continuous shrub cover have largely prevented colonization. Without data, we cannot be sure to what extent this was the case in this particular ROW segment. Woody invasive shrubs do provide some cover, nectar, fruit or seeds, and insect gleaning habitat for wildlife.

Researchers such as Dr. Robert Clark at the Great Hollow Nature Preserve & Ecological Research Center, in New Fairfield, Connecticut, and elsewhere are finding that significant foraging for arthropods by birds does take place on various invasive shrubs. However, the extent to which wildlife support by various invasive shrubs is less than that of native shrubs has not yet been well-researched (Seewagen et al 2020). Note that the herbaceous invasive, mugwort, lacks those redeeming qualities for wildlife and pollinators.

Regardless, the prior shrubland community surely had substantially higher wildlife and pollinator value than the current mugwort-dominated vegetation on this ROW segment, and far more value than barren gravel pad and roadway surfaces. ***This has been a major and significant environmental loss.***

Additionally, direct vegetation losses have adversely impacted the aesthetic and recreational value of the Spaulding, Yeisley property. The prior community shrubland also had much higher aesthetic value, and more interest and appeal for the owners. Mr. Spaulding and his

wife appreciate not only plants' beauty, but also their wildlife support function, e.g., shrub cover for cottontails, nectar-rich flowers for pollinators, and seeds and fruit for songbirds. Opportunities for enjoyment and observation of nature are much diminished, for the property owners and their guests, and for nature clubs and scout troops, or student groups that they might choose to host. The new vegetation management methods have eliminated most of the ecological values for fauna along the owners' ROW segment.

4.2 *Woody Debris Deposition*

Tree-cutting to widen the right-of-way, has been accompanied by deposition of woody debris piles over perennial right-of-way plants, as shown in Photos 1-1 to 1-6. After logging for recent ROW-widening, the large logs were trucked off-site; small, and moderate-size woody debris was left behind, in piles or scattered about. In two areas, that is, adjacent to Pole #7785 and #7786, stumps and woody debris were disposed of outside the ROW on Spaulding/Yeisley land. Disposition of the debris from initial brush hogging in 2019 and 2020 is not known.

Woodchip mulch and woody debris has buried many low-growing native plants like rosette panic grasses, multiple sedge species, poverty oat grass, and wildflowers like maiden pink and Canada cinquefoils (See Section 3.2.2). Burial has also prevented germination and/or seedling establishment of other plants. Herbaceous plants other than mugwort, currently present along this ROW, do have wildlife and pollinator value, though less overall, than in the prior shrubland community. Their loss is also a major adverse ecological impact.

Leaving woody debris in the ROW degrades its aesthetic value for the property owners, who enjoy passive recreation along the ROW. Debris piles are unsightly. They cover blooming wildflowers and mar views of scenic boulder outcrops on the ROW perimeter (See Photo 1-5).

As the woody debris and wood chips decompose, they also change the soil; phosphorus levels increase and the soil microbial community is altered. The soil becomes more suitable for various rank weeds, like mugwort, pokeweed (*Phytolacca americana*), and cudweed (*Erechtites hieracifolia*), and less suitable for the more desirable sedges, native grasses, and wildflowers of low-nutrient, rocky, hillside soil. In the highlands of Eastern Connecticut, the native ROW plant species, are adapted to acidic, low nutrient soil. Many species, especially those in the Ericaceae family depend on soil mycorrhizae to extract sufficient nutrients. They

have a competitive advantage in low-nutrient habitats against fast-growing, 'weedy' plants adapted to fertile soils. This advantage is undercut, when decomposing vegetation debris fertilizes soil, or when fertile topsoil is applied.

4.3 *Indirect Vegetation Losses - Competitive exclusion by Mugwort*

The extent of the common Mugwort infestation along the ROW has been described in detail in Section 2.3.3. The high density of the tall mature mugwort infestation along the access road suggests that the road-building and pad-building materials were contaminated with mugwort propagules, both seeds and rhizome fragments. Mugwort readily colonized the disturbed roadsides which were unavoidably damaged by heavy equipment, and placement soil and gravel. Initial colonization by mugwort presumably occurred in 2017 and 2018, when the gravel access road was being built.

Herbs other than mugwort are most diverse and abundant in the areas where mugwort patches are younger and less extensive, such as where tree-cutting or grading took place most recently. This is evidence of competitive exclusion by mugwort. The newer mugwort patches, further away from the access road, lacked standing remains of tall flowering mugwort stalks. However, by the 2023 growing season, the mugwort will be full-height and will set seed in these areas, as well. Low-growing herbs can be quickly eliminated by a tall, dense mugwort patch. The proportion of meadow species other than mugwort will continue to decline. Only a few tall species, like goldenrods (*Solidago rugosa and S. altissima*) will persist for several more years because they are less shaded by mugwort, and also spread by rhizomes as well as seed. Most asters (not identifiable in May) may also be tall. However, whorled loosestrife (*Lysimachia quadrifolia*) is not tall enough to compete in a dense mugwort patch and the biennial summer daisies (*Erigeron* species) are too short-lived to compete successfully. However, hay-scented fern, which is locally abundant near Pole Group #7787, may be able to persist because its dense rhizome mat prevents mugwort establishment.

4.4 *Adverse Impact on Forest Edges*

4.4.1 Direct losses

Impacts from tree-cutting along the Eversource ROW edges begin with direct losses of forest vegetation, including edge-adapted plant species such as sassafras and shadbush and multiple

forest edge forbs that need partial shade. These edge plants are sparse or absent from the forest interior.

Loss of high-quality avian foraging habitat is also important. Fast growing, tender foliage along forest edges supports higher densities of caterpillars and gleaning songbirds and tree frogs, than in forest interiors. A recent quantitative study supports this widely accepted fact. Significantly higher rate of insectivory were recorded in forest edge habitats, than in forest interiors (Luc et al. 2013).

Along the eastern edge of the far north end of the Spaulding segment, where it crosses the Algonquin gas pipeline, is a classic example of a diverse, invasive-free edge, with complex structure. It serves as a "reference" edge habitat at this site (See Photos 5-1 and 5-2).

A grave concern is that tree removal, to widen the ROW, extended outside the legal ROW in several areas, as documented by survey work, which has been entered into the record for this case. The largest such incursion is just east of Pole #7786. The impacted area was a high-quality example of the rocky hillside forest community, as described above.

4.4.2 Indirect Adverse Impacts

ROW widening also results in harmful alteration to habitat located outside the ROW, but still on the Spaulding/Yeisley property. When natural, long-standing forest edges are "sheared off," the new forest edges are "open." This has the unfortunate effect of *accelerating colonization by invasive plant species*, along a swath of forest extending up to fifty feet into the forest. Removal of border shrubs and saplings and the outer trees with many low tree branches, has much increased light levels and soil temperatures along most of the forest edges of this ROW segment. The seed bank in forest soils typically includes many bird-dispersed invasive seeds. The additional light passing through an open forest edge significantly improves rates of germination, seedling survival and seedling growth of invasive species. As field ecologists we routinely observed invasive infestation along new or maintained forest edges.

Along this ROW segment, one can relate the progressive stages of invasive colonization of sheared forest edges to the time elapsed since the cutting occurred (See Photos 5-1 to 5-6). A severe advanced infestation may be seen just east of Pole # 7784 area, where forest edge-

widening occurred in 2018, when that pad was built, coinciding with ash mortality. Intermediate stage infestation occurs just southwest of Pole #7785 up to the southern limit of brush-hogging and road construction. ROW brush-hogging and road construction was delayed along the southernmost segment until after 2020. The early stages of invasive colonization affect the western forest edge, extending 250 feet north of Pole #7784. This is a high-quality forest dominated by sugar maple and pignut hickory. Seedlings of Asiatic bittersweet, Japanese barberry, and winged *Euonymus* were photographed next to forest wildflowers, ferns, and native tree seedlings, most of these desirable native plants will be enveloped and outcompeted by much faster-growing and taller invasives, within a few years.

We suggest a maintenance alternative to creation of "open" forest edges. This alternative would also lessen risks of future tree damage to powerlines. Excessively tall trees can be topped, and low-stature trees and tall shrubs can be planted in front of them, along the forest edge (or allowed to remain if already present). Future tree and sapling removal behind the planted low trees will not significantly increase light levels and the low trees will also serve as a windbreak. Maintaining a zone of tall shrubs and low trees at the edge of the ROW used to be an Eversource policy.

4.5 Increased Erosion

Since the shrubland cover type was brush-hogged, runoff levels and soil erosion have increased, especially in the steep southern portion of this ROW segment. This is due to diminished tree and shrub cover to intercept vegetation, and more exposed soil. Hillside soils are increasingly skeletonized. The increased runoff volumes from the large impervious pads and stone-covered roadways have washed the fine sediment and gravel from between the larger stones as fine particles are washed away. Trails have become difficult for Mr. Spaulding and his wife to use, either on foot or using their small four-wheeled recreational vehicle. Recreational value is diminished along the ROW because the trail down the steep southern portion of his ROW segment.

Rather than remaining in place, germinating, and becoming established, a high proportion of seeds are washed downhill or fail to become established because the bony soil holds insufficient moisture for germination. Invasive seeds are also washed downhill, exported to the off-site Susquetonscut riparian corridor, along with the sediment washed off the steep hillside.

Off-site sediment impacts were not investigated, or the extent of off-site mugwort colonization. These are admittedly not potential impacts on the Spaulding/Yeisley property but rather on the public trust. We do point out that mugwort thrives in floodplain habitat, replacing heavy-seeding annual herbs like sticktight and false-nettle, with great value for birds. Bare sediment deposits are preferred sites for mugwort colonization.

5.0 CONCLUSION

In conclusion, several different maintenance activities have resulted in direct losses of ROW vegetation. Indirect adverse impacts result from the proliferation of invasive plants, fostered by soil disturbance (creating favorable unvegetated seed beds for mugwort), introduction of invasive propagules during construction, and by increased light levels along forest edges. Satisfactory restoration of groundcover, where disturbed, has not taken place. Mr. Spaulding and his wife have substantially reduced enjoyment of their property along their ROW section and in adjacent forests. This is due to reduced aesthetic value and also due to diminished opportunities to observe and appreciate wildlife, wildflowers, and scenic vistas. The new access roads have increased ATV use of the ROW. ATV noise disrupts wildlife, and further diminishes the owners' enjoyment of their property.

The surrounding landscape has a low proportion of residential and commercial landuses, sizable unfragmented forested areas, and multiple habitat classes, such that the quality and biodiversity of wildlife and forest plant communities in the immediate vicinity of this ROW segment, that is, on the Subject Property, is expected to be high. The good ecological integrity and habitat diversity of the surrounding landscape has increased the magnitude of adverse impacts from ROW maintenance activities. It also increases the significance of ROW shrub removal and construction of unvegetated pads because the ROW is now fragmenting the forested landscape to a much greater extent. CTDEEP aerial photography shows that as recently as 2017, this ROW segment was occupied by a dense cover of shrubs, saplings, and high herbs. Losses of trees and shrubs, and herb clumps are accompanied by losses of wildlife habitat (cover & food) and by reduced climate & flooding moderation function.

Based on this analysis, it is our professional opinion, that Eversource's ROW maintenance activities since 2017 have caused long-term adverse impacts on the property owned by Mr. Spaulding and his wife. These activities have harmed the property's environmental and ecological resources, including its plant communities and the wildlife that uses the property.

Some activities also took place outside the Eversource ROW. Others were within the ROW and subject to the ROW easement, but the required restoration activities that should have reduced the extent of adverse impacts were never carried out.
Please feel free to contact our office with any questions on the above.

Respectfully submitted,

REMA ECOLOGICAL SERVICES, LLC

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Registered Soil Scientist
Certified Senior Ecologist (ESA)

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VIA HAND-DELIVERY

Attachments: 1: Annotated Photos
2: Figures
3: USDA-NRCS Web Soil Survey

Attachment 1

Photo record

ATTACHMENT 1: PHOTO RECORD

TABLE OF CONTENTS

Segment 1 - Photos 1-1 to 1-10: **Tree-cutting & brush-hogging has eliminated much valuable habitat. The woody debris buries and damages vegetation. It mars scenic views & natural features like rock outcrops and patches of wild flowers. Nutrients leach from rotting debris, overfertilizing soil. This discourages native plants and fosters invasive, weedy species.**

Segment 2 - Photos 2-1 to 2-10: **Invasive mugwort arrived during construction of gravel roads and pads. It has negligible habitat value, and continues to spread, both by rhizomes and seed. Native herbs can compete with low, young mugwort. A tall, dense, unsightly monoculture now borders the gravel roads in the north part of the ROW (built first).**

Segment 3 - Photos 3-1 to 3-6: **The three large compacted gravel and stone dust pads are bare or sparsely vegetated. They were not restored by adding soil and seeding, as called for in Petition 1093. Nearly impervious, they increase the volume of runoff from the site. Pads built to support the pole replacement operation eliminated a substantial habitat area.**

Segment 4 - Photos 1-1 to - 1-2: **No gravel was laid down where the access road crosses the one isolated wetland at the north end of the site; timber matting was used instead, as called for by the CT Siting Council. Native wetland vegetation borders this crossing. Just to the south, where gravel resumes, adjacent vegetation is again dense mugwort.**

Segment 5 - Photos 5-1 to - 5-12: **Natural, undisturbed forest edge, and high quality forest communities along ROW edges are altered by edge shearing to widen ROW's. Open forest edges let much additional light into forest communities at south end of ROW. This fosters colonization & seedling growth of invasive Asiatic bittersweet, barberry, and burning bush, that will outcompete forest wildflowers, ferns, & tree seedlings**

Photorecord: Environmental Impacts along Eversouce ROW at 716 Beaumont Hwy, Lebanon , CT

Photo 1: Easterly view of debris along W. edge of steep ROW, N. of Pole 7784.

Photo 2:Westerly view. Logging 35 ft. into forest , N. of Pole 7786.

Photo 3: Westerly overview of debris on ROW & Spaulding home, N. of Pole 7786.

Photo 4: E. view of debris on Spaulding land, E. edge of ROW, N. of Pole 7784.

Photorecord: Environmental Impacts along Eversouce ROW at 716 Beaumont Hwy, Lebanon , CT

Photo 1-5: Easterly view. Debris mars scenic roack outdrops, N. of Pole 7785.

Photo 1- 6: Easterly view. Debris & new mugwort on outcrop S. of Pole 7787.

Photo 1- 7: Debris & gravel fill bury perennial sedges and grasses, S. of Pole 7786.

Photo 1- 8: Buried grasses include native *Danthonia spicata* , near Pole 7786.

Photorecord: Environmental Impacts along Eversouce ROW at 716 Beaumont Hwy, Lebanon , CT

Photos 1-9 and 1-10: N. of Pole 7784 wildflowers inclclude maiden Pink, goldenrod, bluets, cinquefoil, & clover: typical current ROW plants impacted by debris.

Photo 2-1: View northerly towards Pole 7787, of mugwort on distrubed roadside

Photo 2-2: Northerly view to Pole7785: former forest edge, W. side of ROW.

Photorecord: Environmental Impacts along Eversouce ROW at 716 Beaumont Hwy, Lebanon , CT

Photo 2-3. Westerly view by Pole 7787. Tall dense mugwort along access road.

Photo 2-4. NW view to Pole 7787. Mugwort sparse on E. side far from road.

Photo 2-5: E. view. Mugwort on rock outcrop; disturbed roadside by Pole 7787

Photo 2-6: Mugwort, with dissected leaves, competing with goldenrods.

Photorecord: Environmental Impacts along Eversouce ROW at 716 Beaumont Hwy, Lebanon , CT

Photo 3-1. SW view dowhill from sparse pad at Pole 7785 towards Pole 7784.

Photo 3-2. N view to Pole 7786. On cut slope clovers sprouted from seed mix

Photo 3-3: W. view of forest edge from large, sparse gravel pad N. of Pole 7786.

Photo 3-4: Westerly view. Sparse compacted ground S. of pad at Pole 7786.

Photorecord: Environmental Impacts along Eversouce ROW at 716 Beaumont Hwy, Lebanon , CT

Photo 3-5. E. view. Cut & stone fill encroaches on Spaulding land, by Pole 7786.

Photo 3-6. E. view. Grassy cover at Pole 7788 at N end of ROW. No pad yet.

Photo 4-1: E. view. Roadway without gravel crosses wetland N. of Pole 7788.

Photo 4-2: Northerly view of E. side of wetland with willow & aspen.

Photorecord: Environmental Impacts along Eversouce ROW at 716 Beaumont Hwy, Lebanon , CT

Photo 5-1. S.view of natural woods edge. Shrubs, low limbs screen light. Pole 7788.

Photo 5-2. W. of S. part of ROW is high-quality "rich, moist slope-base forest."

Photorecord: Environmental Impacts along Eversouce ROW at 716 Beaumont Hwy, Lebanon , CT

Photo 5-5. Bittersweet seedlings threaten wild geraniums in rich slope-base forest

Photo 5-6. Japanese barberry also threatens trillium & other low wildflowers.

Photo 5-7: On W. side of ROW, open logged edge lets light into slope-base woods.

Photo 5-8: Invasion started earlier near Pole 7785, after logging to build pad.

Photorecord: Environmental Impacts along Eversouce ROW at 716 Beaumont Hwy, Lebanon , CT

Photo 5-9. In steep, rocky forest multiflora rose smothers false Solomon's seal.

Photo 5-10. Close-up of the flowers of false Solomon's seal.

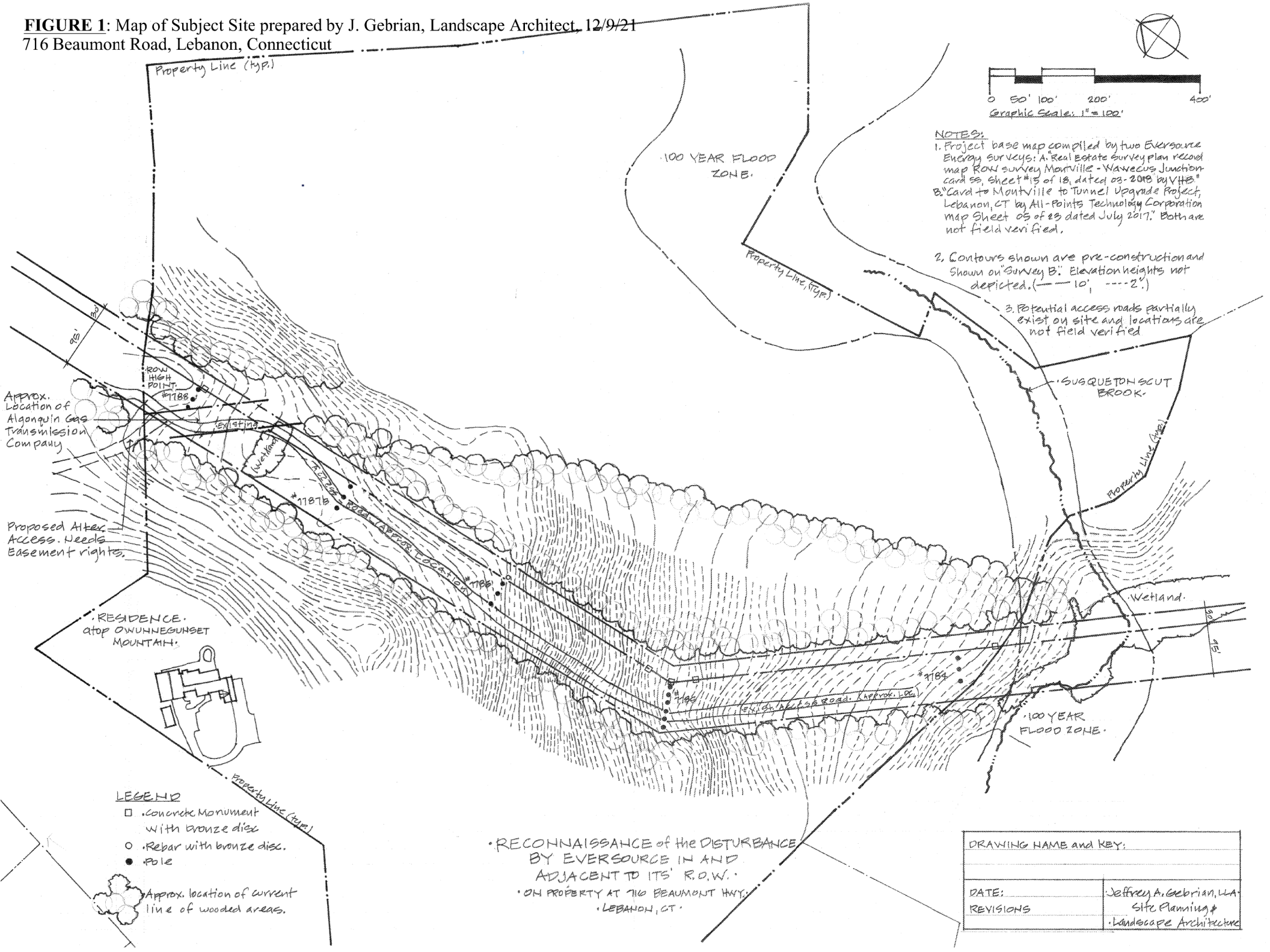
Photo 5-11: Burning bush & Christmas fern on west side of ROW, near Pole 7785,

Photo 5-12: Moist woods E.of 1st pad (7784) has 40' of continuous invasives.

Attachment 2

Figures 1, 2, and 3

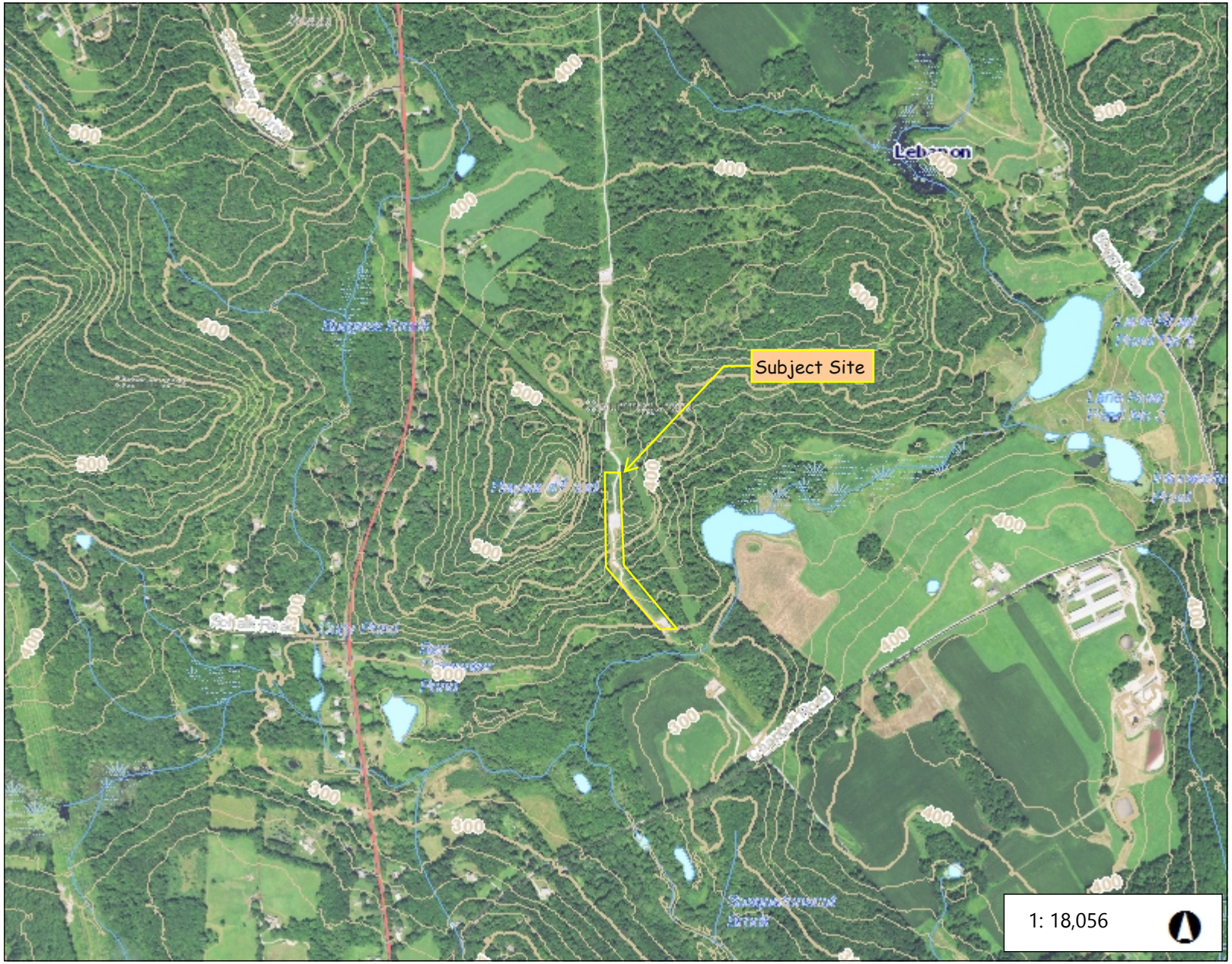
FIGURE 1: Map of Subject Site prepared by J. Gebrian, Landscape Architect, ~~12/9/21~~
716 Beaumont Road, Lebanon, Connecticut



CT Environmental Conditions Online

FIGURE 2: SUBJECT SITE LANDSCAPE SETTING

716 Beaumont Hwy., Lebanon, CT



Legend

- Geographic Names7
- Geographic Place 3
- Airport
  - Airport
  - Heliport
- Railroad
- Streets
  - Interstate Highway
  - US Highway
  - State Highway
  - Primary limited-access
  - Ramp
  - Street
  - Ferry crossing
- County Line
  - State Boundary
  - County Boundary
  - Coastline
- County Name
- Town Line
  - State Boundary
  - Town Boundary
  - Coastline
- CT Town Name
- Waterbody Line 7
  - Water

Notes

0.6 0 0.28 0.6 Miles

© Connecticut Environmental Conditions Online

THIS MAP IS NOT TO BE USED FOR NAVIGATION

This map is intended for general planning, management, education, and research purposes only. Data shown on this map may not be complete or current. The data shown may have been compiled at different times and at different map scales, which may not match the scale at which the data is shown on this map.

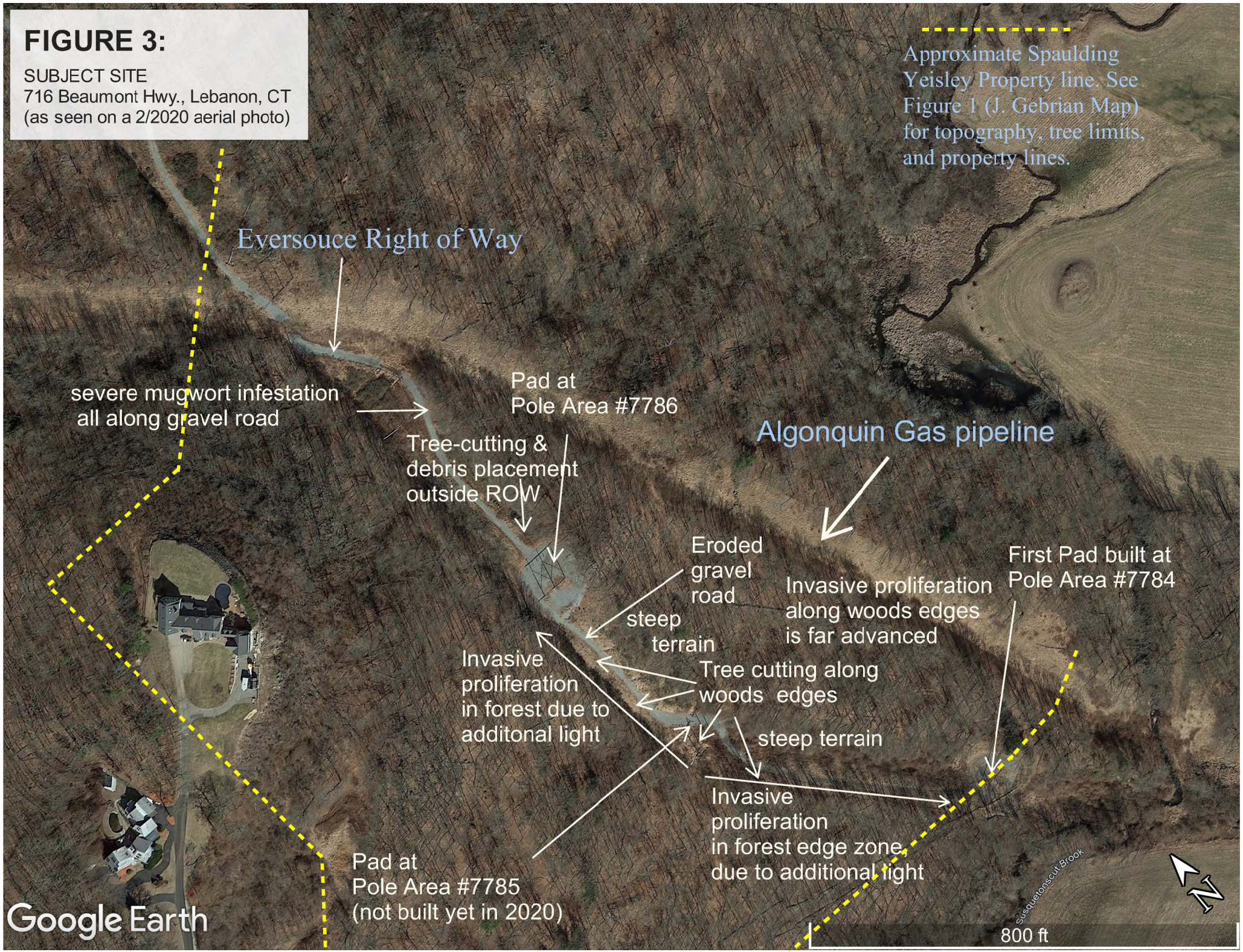
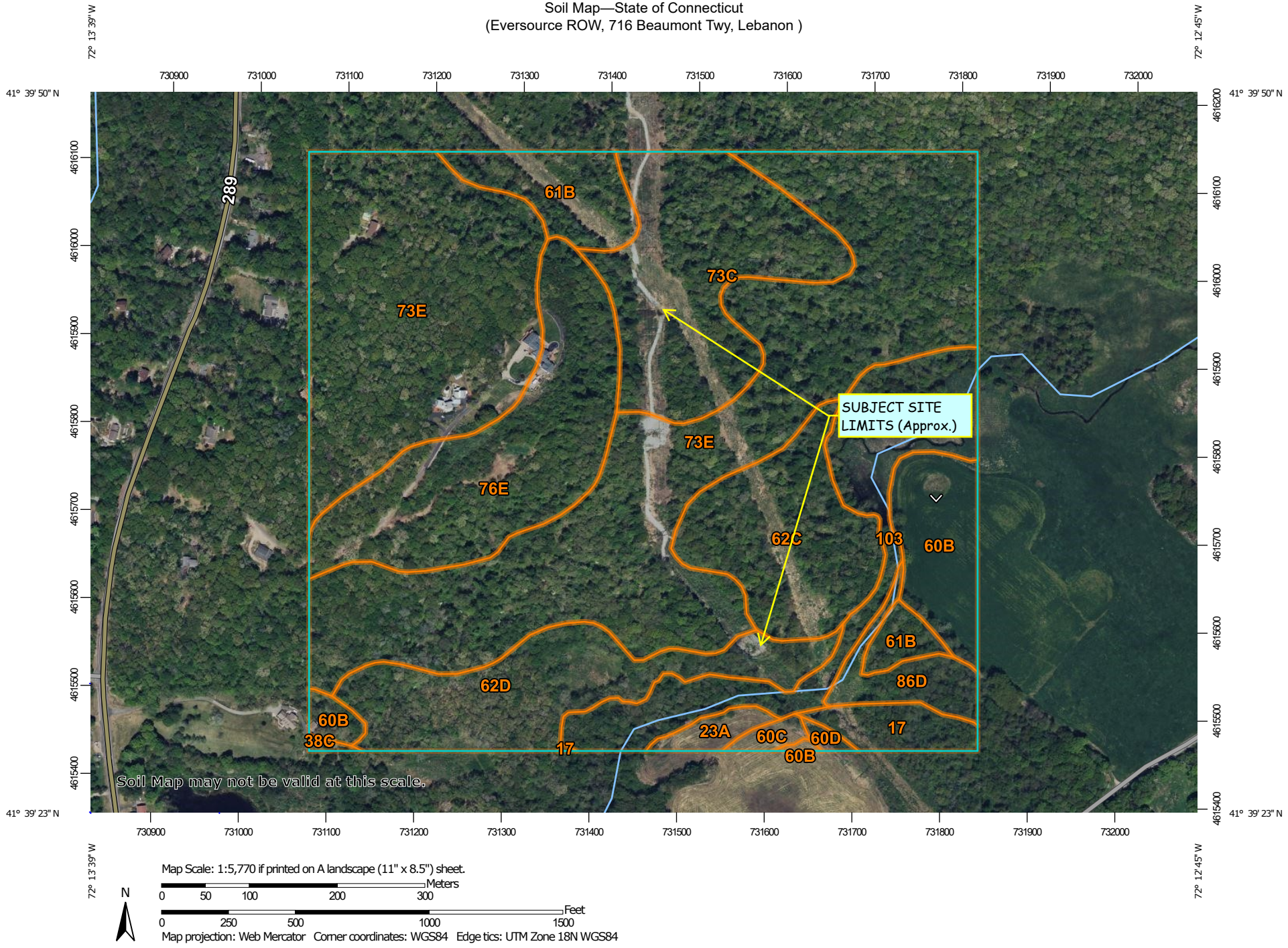


FIGURE 3:
SUBJECT SITE
716 Beaumont Hwy., Lebanon, CT
(as seen on a 2/2020 aerial photo)
Approximate Spaulding Yeisley Property line. See Figure 1 (J. Gebrian Map) for topography, tree limits, and property lines.
Eversouce Right of Way
severe mugwort infestation all along gravel road
Pad at Pole Area #7786
Tree-cutting & debris placement outside ROW
Algonquin Gas pipeline
Eroded gravel road
steep terrain
Invasive proliferation along woods edges is far advanced
First Pad built at Pole Area #7784
Invasive proliferation in forest due to additonal light
Tree cutting along woods edges
steep terrain
Invasive proliferation in forest edge zone due to additional light
Pad at Pole Area #7785 (not built yet in 2020)
Sasequetonscut Brook
N
800 ft
Google Earth

Attachment 3

USDA-NRCS Soils Map

Soil Map—State of Connecticut
(Eversource ROW, 716 Beaumont Twy, Lebanon)



Map Scale: 1:5,770 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021

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

Date(s) aerial images were photographed: Data not available.

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
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	2.1	1.6%
23A	Sudbury sandy loam, 0 to 5 percent slopes	1.0	0.8%
38C	Hinckley loamy sand, 3 to 15 percent slopes	0.2	0.1%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	5.5	4.3%
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	0.6	0.4%
60D	Canton and Charlton soils, 15 to 25 percent slopes	0.3	0.2%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	4.9	3.8%
62C	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony	9.0	7.0%
62D	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	10.3	8.0%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	13.2	10.3%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	55.6	43.2%
76E	Rock outcrop-Hollis complex, 3 to 45 percent slopes	14.0	10.9%
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	2.4	1.9%
103	Rippowam fine sandy loam	9.8	7.6%
Totals for Area of Interest		**128.9**	**100.0%**

IN THE MATTER OF THE EVERSOURCE EASEMENT ON THE PROPERTY OF CORY R. SPAULDING AND LESLIE A. YEISLEY, 716 BEAUMONT HIGHWAY, LEBANON, CT 06249

APRIL 19, 2023

Summary:

Eversource has undertaken improvements within its 1800-foot-long easement that have grossly exceeded the rights granted by that easement and has encroached on areas in which it has no rights outside of the easement.

The illegal work that has been done in the easement and the land adjacent to it includes, but is not limited to, the:

1. unauthorized construction of a road and pads,
2. destruction of regulated inland wetlands,
3. unpermitted creation of a pond,
4. deposition of large amounts of rock and fill material,
5. destruction of an historic stone wall,
6. wholesale removal of indigenous plants,
7. introduction of invasive plant species to the area,
8. grading, excavation, and removal of trees in areas outside of the easement,
9. deposition of tree and construction debris throughout the easement and adjoining land,
10. alteration of the property's natural drainage patterns through extensive changes to the topography,
11. construction of an unpermitted multi-tiered terraced escarpment by excavating fill material from a steep hillside,
12. blocking access and use of the lower section of the easement through the creation of a terraced escarpment, and
13. clear cutting of the easement with mechanical equipment destroying the natural condition of the property and creating ongoing erosion issues.
14. destruction of agricultural land.

This by no means all of it…investigations into additional damages done to the property by Eversource is ongoing.

The actions of Eversource constitute a burdening of the easement, trespass, inverse condemnation, violations of the Connecticut Environmental Protection Act, potential violation of the federal Clean Water Act, violation of Connecticut's statutory public trust, and violation of Connecticut public utilities law in that the activity conducted in the easement and adjacent to it was not authorized as required by state regulatory authorities.

Much of the damage done to the property was completely unnecessary and the result of intentional acts by Eversource and its contractors. Eversource was fully aware of the available existing access to the easement via a route known as "The Old Mill Road". Eversource chose to not utilize this alternate access and instead chose a path causing extensive and unnecessary environmental damage.

Cory R. Spaulding and Leslie A. Yeisley seek to have Eversource:

1. disclose in full its illegal and unpermitted activities in the easement and adjacent to it to the Public Utilities Regulatory Authority, the Connecticut Siting Council, the Connecticut Department of Energy and Environmental Protection, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the Town of Lebanon Inland Wetlands Commission, and all other federal, state, and local regulatory authorities with jurisdiction over the activities of Eversource within the easement and adjacent to it;
2. disclose to the property owners all construction activities undertaken by Eversource on the property and provide them with copies of all documents in the possession of Eversource or its contractors relating to the work including, but not limited to, all pre and post construction site surveys, engineering and work plans, quantities of fill deposited on the property, pre and post elevations of poles replaced, and copies of all pre and post inspection reports performed on the property.
3. provide the property owners a topo map of the entire easement with elevation contours at a minimum of 2-foot intervals of the post construction elevations so that the full extent of ground disturbance and elevation changes can be determined.
4. apply to all appropriate federal, state, and local authorities for whatever approvals were necessary to undertake the restoration and remediation of the damage done by the illegal and unauthorized activities in the easement and adjacent to it;
5. restore the property to its condition prior to Eversource's illegal and unauthorized activity; and
6. compensate the owners with money damages and reimburse them for all reasonable costs they have and will continue to incur, including, but not limited to, surveys, site investigations, and legal fees.

The Property:

Cory R. Spaulding and Leslie A. Yeisley are the owners of the 64.44-acre property in which the Eversource easement is located. Exhibit 1 is the property card. They reside in a single-family detached home on the and abutting parcel of 10.49 acres with a street address of 716 Beaumont Highway. Exhibit 2 is the property card.

The Eversource easement was granted to The Connecticut Light & Power Company on March 7, 1934, by a predecessor in title to the current owners. Exhibit 3 is the deed of easement. Exhibit 4, entitled "REAL ESTATE SURVEY PLAN RECORD MAP RIGHT OF WAY SURVEY MONTVILLE-WAWECUS JUNCTION-CARD SS" dated 7/2121, is a map of the easement.

The easement is 125 feet wide and gives Eversource the right to maintain electric lines for the transmission of electric currents and **"the right at any and all times and from time to time to erect, inspect, operate, use, control, and permanently maintain the said electric lines upon, over and across"** the burdened estate.

The **"electric lines may consist of poles, towers, other supporting structures (which may be substituted one for the other at any time), circuits, cables, wires, cross arms, guy wires, anchors, guy stubs and other fixtures and appurtenances, any or all of which constituent parts of said electric lines may be erected, relocated, replaced, repaired or changed in number, size or type from time to time."**

With this easement. Eversource also has "**the right to trim, cut, take down and remove at any and all times such trees, parts of trees, limbs, branches, underbrush and structures within or projecting into the above described right of way as in the judgment of the grantee may interfere with or endanger any of said electric lines or other operation, whenever they are erected."**

The easement is elegant in its simplicity, much different than the overly complicated documentation of today. The easement describes with clarity exactly what Eversource can do and, where it is silent, Eversource has no rights. The easement clearly defines the bounds of the right of way and does not prescribe, or grant to, Eversource any rights to perform activities outside of the described easement.

Eversource did not acquire the right to:

1. construct a road in the easement,
2. bring in 800 tons of crushed rock and other fill material,
3. undertake regulated activities on the property without a permit.,
4. destroy resources protected by Connecticut's Environmental Protection Act, including the statutory public trust and the inland wetland laws,
5. cut and fill in undertaken the grading that was unnecessary in erecting, relocating, replacing, and repairing its electric lines,
6. infest the area with invasive plant species,
7. change the entire topography and drainage of the easement, and
8. violate numerous potential federal, state, and local violations of law for which Cory R. Spaulding and Leslie A. Yeisley may potentially be held liable.

<u>What Eversource Did</u>:

Eversource, not directly, but apparently through one or more of its private contractors, undertook substantial work along the easement and the land adjacent to it. Ostensibly, the work was in part in furtherance of the Connecticut Siting Council's approval of Eversource's 2017 sub-petition application for ROW maintenance activities, submitted as required under Petition 1293.

While performing the activities authorized under this Siting Council permit, Eversource undertook significant unauthorized work and construction activities in the easement and land

adjacent to it without benefit of a Siting Council permit. In comingling the permitted activity with the even greater unpermitted and unauthorized work, the project ballooned in scope far beyond what the Siting Council was told would be done pursuant to permit 1293 without disclosure to, or authorization of, the Siting Council, constituting essentially an intentional misrepresentation to the agency. The non-permitted work includes, but is not limited to, close cut mowing via mechanical equipment throughout the entire easement, tree removal within and outside the easement, significant expansion of work in areas of pole replacement authorized under permit 1293, and all construction activities performed between site 7786 and 7784, including the significant work performed at site 7785.

Unauthorized Activities:

1. **Importation of fill material and land excavation sites 7786 to sites 7784.**

Based on the best estimates that are available, it is believed that approximately 800 tons of crushed rock and other fill material were trucked in and deposited into the easement area near and adjacent to site 7785 on the Spaulding/Yeisley property. Those estimates are based on a comparison of the easement area today with documentation of its prior condition. Exhibit 5, entitled "Existing Ground Profile", dated 4/15/22 drawing 3 of 3 (22-037_PROFILE_5-11-22) and Exhibit 6, entitled "Existing Conditions Plan", drawing 1 of 3, dated 4/15/22 (22-037_TOPO_5-11-22), document the data and technique used to derive the estimate. Using the estimated differences in elevation in the area over which that filling is occurred, it is possible to derive an approximate figure of the volume of material that was imported and deposited along the easement in this area of construction.

The 100ft x 140ft pad area at site 7785 was apparently constructed with on-site fill material dug out of the hillside along with additional imported fill material. The pad was supposedly required to support a crane for the pole replacement. According to information and belief, a crane was not used for site 7785 because it could not traverse the steep grade to the site. If a crane was not used for 7785, it likely was also not used at site 7784, where another large pad was constructed. Extensive land changes and roads were installed on the pretense of being required to support a large crane for pole replacement when in fact no large crane was ever utilized or needed.

The 100ft x 140ft pad at site 7785 created a manmade terraced escarpment on the steep hillside where none previously existed. This, and other identified issues, are detailed in photographs below labeled "filled area site 7785" and Exhibit 7, a plan entitled "Existing Conditions Plan", drawing 1 of 3 dated 4/15/22 (22-037_Sheet_1_SCAN_5-11-22) which shows the extent of the disturbed soils at site 7785.

It is believed that the material was brought into site 7785 because it was a cheap and easy way to set new poles and the required guy wires, rather than drilling into solid rock ledge, which would have had minimal environmental impact and complied with the terms of the easement. In short, material was brought in, mounded up, the new poles and guy wires were stuck into the fill material rather than drilling into bedrock as was done when the poles were originally installed. Exhibit 8, entitled "Existing Clearing Limits", drawing 2 of 3 dated 4/15/22 (22-

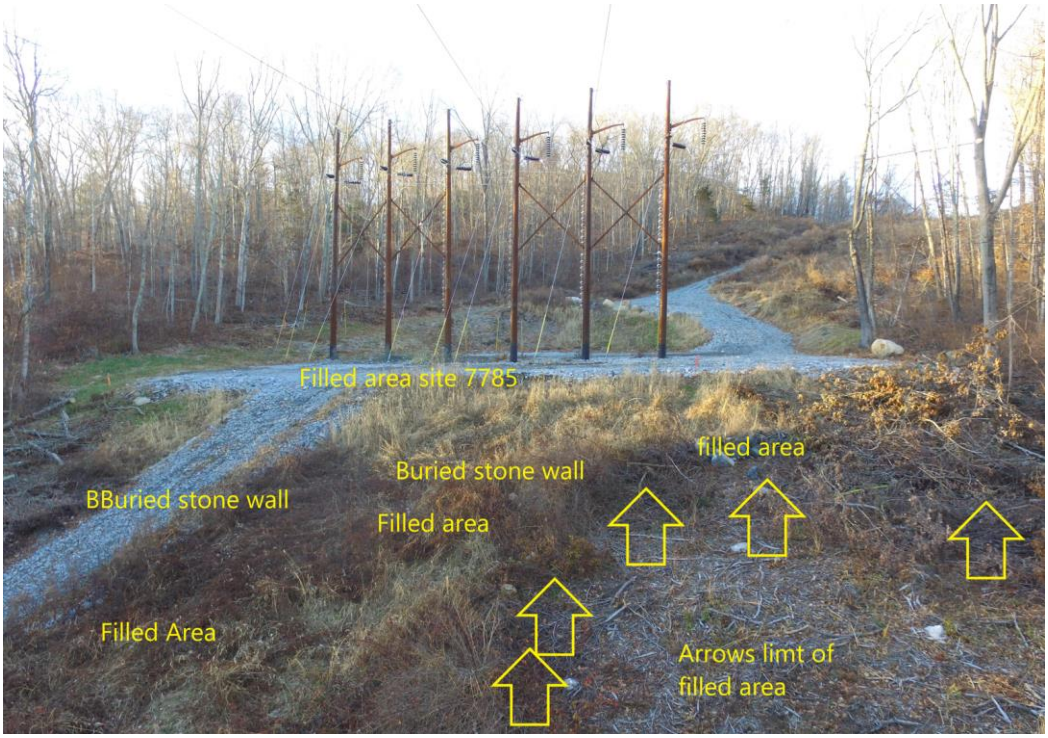
037_Exist_Cond_5-11-22), is a survey of one section of the easement. It shows the area of fill in just one of the sets of pole replacements.

Expediency won out over the environment and, equally troubling was that it was done without Siting Council approval, which presumably would never have been granted.

2. Building an unpermitted road.

Eversource, or its contractors, in constructing a road from site 7786 to site 7784 apparently decided that it would not follow the plan as the state approved in Petition 1293 which required very limited access on a temporary basis solely for the activity of replacing the poles and required the use of timber mats to cross over areas where the soil was soft and environmentally sensitive. Eversource has identified this area as a high erosion area on their own maps yet for reasons that are inexplicable, except one might suspect it was a matter of expediency, the contractors decided to build themselves a road where no road previously existed on land that they knew was a high erosion area.

In reference to the road and pad built at site 7785, to date, no site engineering has been disclosed to show exactly how this grading and filling was performed or that it conforms to any level of acceptable construction or engineering practices Since no permits were obtained for this work, no review as to its legal and engineering suitability or stability was ever performed.



The photo above is a view looking north at site 7785 showing the filled area, the manmade terraced escarpment and depicting the large area that was filled and graded for the unpermitted pole replacement at this location. This is a post pole replacement photo.

This is a photo of site 7785 prior to Eversource construction activities.

This is an image of the hillside and road from 7785 to 7786 which shows extensive erosion, suggesting poor design or construction, or both, creating a serious environmental problem:

And more erosion.

And more erosion.

This image is from 2017 before the work began and depicts what existed between sites 7786 and 7785 pre-construction. Site 7786 is at the bottom of the photo and site 7785 is at the top of the photo. Notice there is no existing road where Eversource illegally constructed one. Where the line turns to the left, there is an existing road on the right that provides alternate access that Eversource chose not to use or to acquire rights to use. It is "The Old Mill Road".

For sites 7784 and 7785, there was clearly a feasible and prudent alternative to building a road through this environmentally sensitive area. "The Old Mill Road" runs directly to both sites.

The Old Mill Road has served Eversource in the past and present for access to its power lines and continues to be the only access to the lower section of the easement that does not damage and destroy the steep slopes and other environmentally sensitive areas along this section of the easement.

The Old Mill Road access point is undeniably suitable. During a recent meeting with Eversource contractors on April 14, 2023, Mr. Giovanni Agliotti of Supreme Construction, acknowledged to those present that The Old Mill Road provided for satisfactory for access to the lower area of the power lines and easement.

Eversource's tree cutting contractors recently used The Old Mill Road for access to the southern easement area because they could not utilize the Eversource built road due to a gas line and wetland breaks in the road at the northern end of the easement.

At site 7784, Eversource, during pole replacement, performed extensive excavation, mounded up soil, changed the contours of the land, and blocked preconstruction drainage patterns. Along The Old Mill Road that abuts site 7784, Eversource pushed one historic stone wall on the north side of the road onto the top of a second historic stone wall on the south side of the road and then buried both with imported stone fill material.

In summary, for sites 7784 and 7785 there was clearly a feasible and prudent alternative to building a road through environmentally sensitive areas. The Old Mill Road goes directly to each site, is suitable access, and has been previously used by Eversource contractors. Eversource had no legal right to build the road and destroy the hillside in constructing it. Eversource built the road in direct violation of the permits granted by the Siting Council.

3. Destruction of wetlands and environmentally sensitive areas sites 7787 to site 7786.

In the northern part of the easement where wetlands have been identified, the Siting Council authorized the use of mats to cross the wetlands. Eversource did use mats in this area but did not

properly install and maintain them. The mats failed to protect the wetlands as they were intended to by spreading the weight of the vehicles over a larger area. Instead of protecting the wetlands, the mats destroyed the wetlands vegetation and compacted the soil.

When the mats were removed, the newly compressed, depressed area of land immediately filled with water creating a mud hole that appears to be a decoy vernal pool that will likely result in the decline of amphibians. See Calhoun, A. J. K. and M. W. Klemens. 2002. BEST DEVELOPMENT PRACTICES: CONSERVING POOL-BREEDING AMPHIBIANS IN RESIDENTIAL AND COMMERCIAL DEVELOPMENTS IN THE NORTHEASTERN UNITED STATES. MCA Technical Paper No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York:

> "If amphibians deposit their eggs in these artificial wetlands, they rarely survive due to the sediment and pollutant loads, as well as fluctuations in water quality, quantity, and temperature." At 22.
>
> "Created wetlands that do not have the appropriate habitat often attract breeding amphibians. Eggs laid in these "decoy" pools often do not survive. Such pools serve to trap breeding amphibians and might result in local population declines." At 25.
>
> https://www.nae.usace.army.mil/Portals/74/docs/regulatory/VernalPools/BestDevelopmentPractices20Oct2014.pdf

The Siting Council permit authorized the work at sites 7786 and 7784, but Eversource went far beyond what was permitted, including unliterally deciding to build an unauthorized road and bring in large amounts of fill to replace the poles and add new poles at site 7785.

The wetlands that were crossed were destroyed in part because what Eversource did greatly exceeded what it described in its permit application and it undertook significant, unpermitted work along with it. The mat wetland crossing method and the installation performed may have been sufficient for the light duty crossing work described in the Siting Council permit application, however, it was clearly not sufficient to handle the long-term heavy crossing work which included repeatedly being traversed by heavy truck traffic hauling vast amounts of unpermitted and unnecessary fill material to sites 7785 and 7784.

The extent of the disturbance, far beyond what was required to replace poles, is evident in this comparative view of the easement in 2016 before the work and in photos that depict the area during and after construction. See below photos.

Photo of site 7786 prior to construction.

Photo of site 7786 after construction.

Between 7786 and 7787 is one of the wetlands damaged and the decoy vernal pool created.

In its Siting Council permit application Eversource claimed that a road existed between sites 7787 and 7786 and as such had the right to improve that existing road as necessary to replace poles at site 7786. The claim is totally unsupported. The before construction photos above show there was no existing road. That there was no existing road is further evidenced by the extensive removal of topsoil by Eversource in constructing this "new" road.

In performing this illegal road building activity, Eversource mounded up vast amounts of topsoil on the westerly side of the road and creating an earthen berm in and adjacent to the identified wetlands and in the upland wetland review area. The Eversource-built berm runs from the gas pipeline crossing to site 7786, approximately 590 feet.

If a road previously existed, why would Eversource find it necessary to excavate vast amounts of topsoil from an existing road?

This mounded topsoil demonstrates that no road previously existed. The 590-foot-long berm now impounds water and has evolved into an Eversource-created pond/wetland/decoy vernal pool area. See photo below. The natural drainage from the steep hillside to the west over this land has now been altered.

Inland wetlands, no matter how new in origin, are protected. The creation of this impounded water area by Eversource cannot be removed without a permit and now severely restricts the use of the property by the owners. Eversource created a new wetland where none previously existed and now subjects the property owner to local inland wetland review of a far greater amount of property than was subject to review prior to the Eversource work.

Photo of Eversource-created pond/wetland/vernal pool area

And to compound the problem, as shown above, the water now being detained by the berm is flowing across the illegally-built road. Also note the mug wort invasive species introduced to the area by Eversource that has taken over both sides of the road.

The construction of the new road and pad at site 7786 included a deep excavation and importation of massive amounts of fill material. This new road and pad are located at the very top of a steep hillside escarpment. Eversource pitched both to drain onto the top of the escarpment. In constructing the pad at site 7786, Eversource mounded up additional topsoil on the western end of the pad and sloped that topsoil to also drain down the escarpment. These grade changes made by Eversource now direct vast amounts of water directly onto the top of the escarpment. To say the least, this Eversource-created water diversion is contrary to best management practices and engineering principles for protecting escarpments and preventing escarpment erosion. Simply put, one should not divert water onto the top of a long steep hill.

As explained previously, this escarpment which encompasses all of site 7785 is now subject to extensive erosion and remains unabated today despite Eversource having been informed numerous times in writing and during its onsite inspections about the need for immediate remediation. The improper, unauthorized work at site 7786 has caused extensive, ongoing, and increasing environmental damage with washouts, erosion, and sedimentation of the escarpment.

This is site 7786 prior to construction.

In summary, the easement grants no rights to Eversource to destroy regulated inland wetlands, to create regulated wetlands, to build new roads, and to do work in the upland review area without regulatory approval, and the easement grants no rights to Eversource to regrade the land and change natural drainage patterns. This illegal activity on the Spaulding/Yeisley property potentially exposes the owners to claims by federal, state, and local governments, which claims they would then deny because Eversource acted independently, intentionally, and unlawfully. Regardless, the threat and the possible need to defend weigh heavily on the owners.

The easement should be restored to its original grade and replanted with what was there before.

4. Introduction of Invasive species.

Eversource contractors have admitted that the fill material utilized on this project introduced the invasive species known as mugwort to easement. The mugwort has now taken over both sides of the Eversource-built road from one end of the easement to the other. Before construction photographs depict land covered with low trees and brush. Eversource close cut

mowed the easement which allowed this invasive species to proliferate and take over the easement as the dominate species. On a neighbor's property where Eversource also laid down stone fill without disturbing the soil, and without close cut mowing, the area shows little to no evidence of this invasive plant.

The vast disturbance of land on the Spaulding/Yeisley property, the clear-cutting of timber, the close to the ground mechanical mowing of the easement, all contributed to the proliferation of this invasive plant. This fact is detailed in the attached REMA report (Exhibit 9) and detailed in part below. REMA is an environmental consultant retained by Cory R. Spaulding and Leslie A. Yeisley. They have studied the easement and surrounding land in detail and noted this fact among the several adverse environmental impacts caused by the illegal and unauthorized work in the easement:

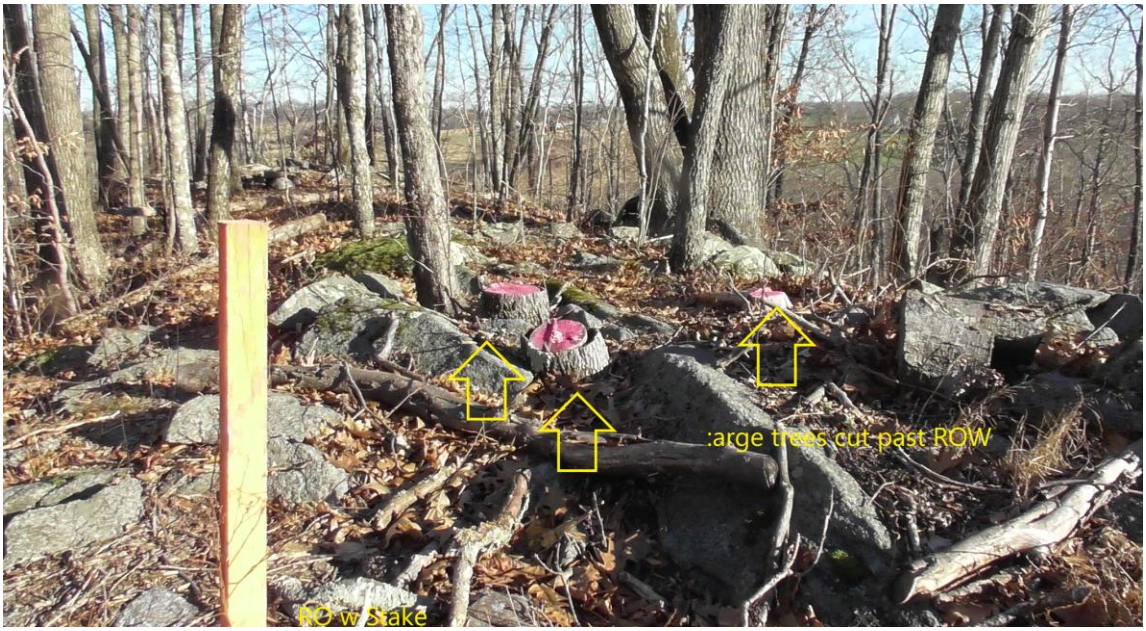
> ***Soil compaction*** and ***disturbance by heavy equipment*** also damaged existing herbaceous plants and soils along the ROW, and ***fostered colonization by noxious invasive plant species***, especially common mug wort *(Artemisia vulgaris*).
>
> After logging to widen the ROW ***increased light levels are accelerating invasive plant infestation of forest edges***, on Spaulding land. Restoration has not taken place following multiple types of vegetation and soil disturbance caused by ROW maintenance activities.

5. **Clear cutting, tree removal, land destruction, and filling outside the easement from sites 7784 to sites 7787.**

Eversource has rights under the easement and that easement has described legal bounds: "**the right to trim, cut, take down and remove at any and all times such trees, parts of trees, limbs, branches, underbrush and structures within or projecting into the above described right of way as in the judgment of the grantee may interfere with or endanger any of said electric lines or other operation, whenever they are erected.**" The evidence in the field is that Eversource clear cut trees and brush approximately 15 feet beyond the easement bounds on each side of the easement. This means that Eversource destroyed by clear cutting approximately 1.23 acres of forest land belonging to the property owners that it had no legal right to trespass upon or alter.

The easement contains the word "remove" and that word is associated with the words trim, cut and take down. The easement in its simplicity implies that both the grantor and grantee shall not interfere with each other's rights under the easement. Eversource failed to remove the trees and brush it cut and instead left the debris scattered throughout the easement. The failure of Eversource to remove what it cut now burdens the owners' rights and use of the property.

This image is from 7785 to 7786:



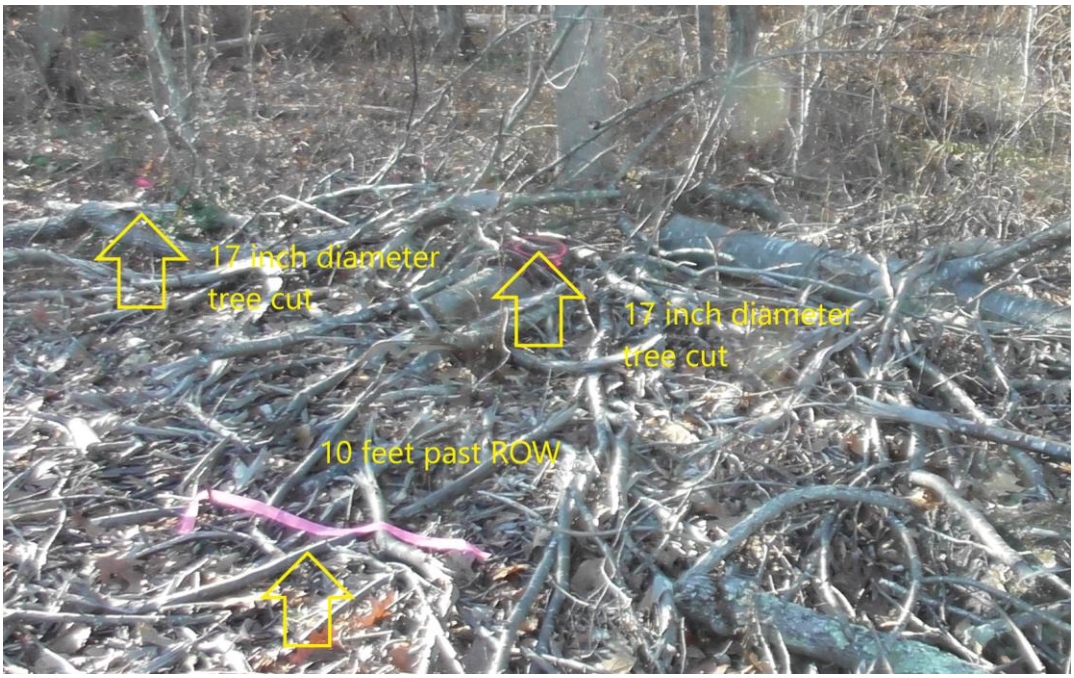
This is a photo from the east side of site 7786 where large trees were removed outside the easement.

This is another example of the clear cutting of trees outside the easement.

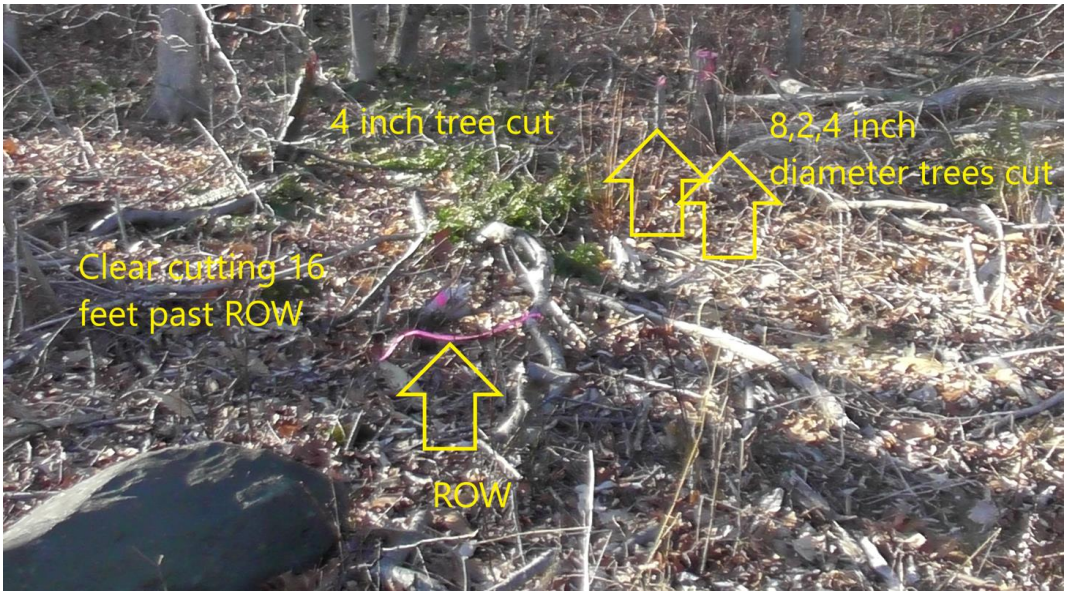
This photo depicts crushed rock fill deposited outside the easement and the debris left near site 7786.

This photo shows the Eversource placed stake that defines the ROW limit at site 7785. Note the extensive filling and grading outside of the easement.

This image from 7786 to 7787 shows a 10-inch diameter tree taken down 11 feet outside the easement.



And this, showing a 17-inch diameter trees cut down 10 feet beyond the easement.



Same area, 11-inch diameter tree cut down 16 feet beyond the easement.

And this, 16 feet outside the easement, and still clear cutting of timber.

And here, 16 feet outside the easement, a 6-inch diameter tree is cut down.

At site 7786 on the west side is this evidence of all the trees cut down outside the easement and the debris left.

Instead of selective removal of trees and leaving shrubs and saplings in place, on this property the entire right-of-way was mechanically close cut mowed by Eversource, using very large mowing equipment. Eversource has the right to cut and remove vegetation within the easement: "**the right to trim, cut, take down and remove at any and all times such trees, parts of trees, limbs, branches, underbrush and structures within or projecting into the above described right of way as in the judgment of the grantee may interfere with or endanger any of said electric lines or other operation, whenever they are erected."**

The operative language regarding the indiscriminate close-cut mowing of virtually the entire easement is **"in the judgment of the grantee may interfere with or endanger any of said electric lines or other operation."** First, reasonableness is fairly implied in Eversource's judgment. Second, the vegetation must be reasonably likely to interfere with or endanger the electric lines or other operations. The small trees should have been left. The bushes, so important to the habitat, should not have been cut. It was unreasonable for Eversource to determine that the saplings, shrubs, and tall grasses endangered their electric lines. Among other things, the clear cutting burdened the easement, violated the Connecticut Environmental Protection Act, and created an erosion hazard in environmentally sensitive areas.

The likely reason for this extensive overcutting has to do with the labor required to selectively limb trees. The workers were out in the woods, out of sight of anyone, and took the quick path to clearing any limbs overhanging the easement area that "**may interfere with or endanger any of said electric lines or other operation"** by taking down whole trees, rather than going up in bucket lifts and trimming back at the easement boundary as they were required to do. One cut from the ground is much easier and cheaper for Eversource versus a half dozen or more cuts in the air from a bucket truck.

The property owners were never notified of any trees inside or outside the easement that presented a danger to the electric line operations and they find it implausible for Eversource to be able to defend that trees of the diameter depicted posed any threat to the electric lines whether located inside or outside the easement.

Eversource, by their own recent staking out of the easement lines, has established the easement boundaries and hence demonstrated that extensive work and tree clear cutting was done outside of the easement bounds, and areas outside of the easement were filled. The easement provides Eversource with no rights outside of the ROW bounds. In exceeding the ROW bounds Eversource has trespassed and damaged the Spaulding/Yeisley property unlawfully.

Eversource and its contractors have failed to resolve the issues with Mr. Spaulding and Ms. Yeisley:

When Mr. Spaulding first discovered the extent of damage done at site 7785 by Eversource, he contacted Eversource and ultimately met with Mr. James A. Rasile. Mr. Rasile's business card which he provided to Mr. Spaulding during this first meeting states he is the construction project manager for Eversource, includes an Eversource email address, and

indicates he works for BHI Energy. During this meeting Mr. Rasile explained that he was the manager for this project and responsible for the work performed. Mr. Rasile made significant verbal promises of remedial action to correct the issues that have been discussed in this document. None of those promised remedial actions were ever performed.

Mr. Spaulding then complained to the Siting Council which directed Eversource in a letter to address the environmental concerns Mr. Spaulding had raised. Later, Eversource provided assurances to the Siting Council that all concerns and environmental issues had been resolved by Eversource in conjunction with Mr. Spaulding**.** That was not true. It could not have been true when stated, because only later, on April 13, 2023, did Eversource submit a remediation plan to Mr. Spaulding and Ms. Yeisley.

In a project closure filing with the Siting Council Eversource also certified that all work was performed as detailed in the permit. That was not true because the work varied from the approved plans, e.g., the construction of the road and failure to properly use wetland mats as mandated.

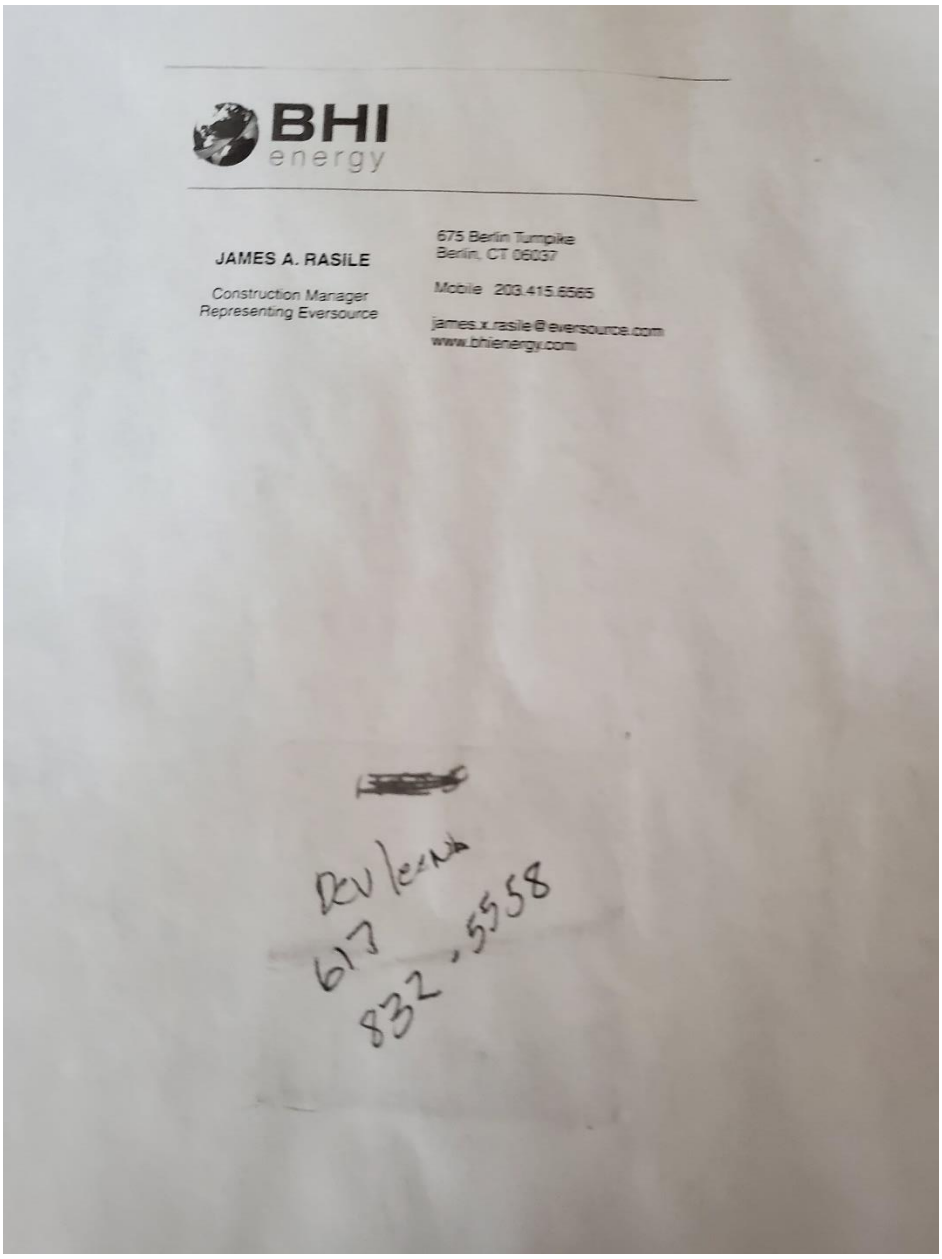
At a later point in time, Mr. James A. Rasile, Eversource Project Manager, falsely accused Mr. Spaulding of stealing Eversource property. Mr. Spaulding believes that theseunfounded accusations were made with the knowledge of Ms. Devleena Gosh-Brower, an Eversource Project Manager.

Mr. Rasile became aware that Eversource contractors had given Mr. Spaulding permission to remove old, discarded power poles from a site on Route 66 in Columbia, Connecticut, and that Mr. Spaulding would be removing those poles on Saturday August 14, 2021**.** On that day Mr. Rasile showed up at the Columbia site, accompanied by an unknown BFI employee, confronted Mr. Spaulding, and accused him of theft of Eversource property. During this confrontation, Mr. Rasile made Mr. Spaulding keenly aware that he knew who Mr. Spaulding was, that he knew Mr. Spaulding resided on Beaumont Highway in Lebanon, and that Mr. Spaulding was the the one who had filed all the complaints regarding damage to his property by Eversource. After making Mr. Spaulding aware of these facts, Mr. Rasile then handed Mr. Spaulding a handwritten note with the word “Devlena” and a phone number of 617-832-5558. See image of the business card and note below. Mr. Rasile then instructed Mr. Spaulding to call “Devlena” and said “maybe we can make this whole problem go away”.

Mr. Spaulding felt that Mr. Rasile was attempting to intimidate him. Mr. Spaulding rejected Mr. Rasile’s request to call Devlena and that he would not be pressured in any way. Mr. Spaulding stated that he had committed no crime, had permission to be on the site, and had obtained prior permission to take old poles. Considering the magnitude of what had just occurred, Mr. Spaulding immediately gathered up his equipment and left the site with no Eversource property, all under the watchful eye of Mr. Rasile.

On or about August 20, 2021, two police officers came to Mr. Spaulding’s Beaumont Highway residence and stated that they were investigating a complaint of theft of Eversource property from Route 66 in Columbia. Mr. Spaulding cooperated with the police, showed them overwhelming evidence that no crime had in fact been committed or contemplated, that in fact

Eversource contractors had given Mr. Spaulding permission to take the poles, and that other Eversource employees and contractors were attempting to intimidate him. Mr. Spaulding was not arrested and presumes the police closed the complaint as unfounded. Mr. Spaulding possesses additional documentation to show that he had the permission of Eversource contractors to be on the site and to take the discarded property.



This photo is a copy of Mr. Rasile's business card and the note handed to Mr. Spaulding by Mr. Rasile.

Eversource proposed new work, new Eversource contractors, and the Eversource Remediation Plan:

Mr. Spaulding and Ms. Yeisley over the last few months have met with Eversource contractors that are planning new work and new pole replacement on the property on behalf of Eversource. During these meetings and inspections, the parties discussed the damage done during prior Eversource work.

On April 13, 2023, at the request of Burns McDonnell, an Eversource contractor, the parties met at the Spaulding/Yeisley residence to "discuss remediation plans". The contractors submitted to Ms. Yeisley and Mr. Spaulding an Eversource version of a remediation plan that touched on a fraction of the issues discussed in the previous months.

The plan was titled "Spaulding Property Restoration" map sheet 1 of 1. The written plan and the verbal explanation presentation provided by the group at the meeting of that written plan did not align. This anomaly was brought to the specific attention of the contractor's project manager, Ms. Heather Hayes. The written plan called for a 100-foot cut in the topsoil berm to drain the wetlands created by Eversource and to "restore preexisting drainage patterns". The verbal explanation was that the 590-foot-long berm that everyone acknowledged exists was going to be removed entirely and deposited at site 7785 to smooth out the greater than 3:1 slope that Eversource created when they excavated out the hillside. The written plan does not detail what will be done with the 100 feet of top soil to be removed and does not detail if or how the entire 590- foot berm will be removed. At site 7785 the plan calls for the adding fill from an unspecified origin to "soften the grade". No details of how much fill or to what grade the slope will be softened is detailed.

The contractor's verbal plan when reflected upon in detail is to take the topsoil which is now fully contaminated with the invasive plant species mugwort that was introduced to the area by Eversource with the road fill material and infest another area of the easement with this invasive plant species to soften the steep slope Eversource created by excavating the hillside. This is again another example of Eversource utilizing material owned by Mr. Spaulding and Ms. Yeisley (the topsoil) to the benefit of Eversource.

The one-page plan left with the property owners has 12 general notes that do not appear to have any correlation to map sheet 1 of 1. General notes 7 and 8 discuss wetland invasive species, wetlands that contain invasive species, and vernal pool best management practices. Both notes reference detail sheet 2, which was never shown to or left with the owners.

The map identifies wetland areas. When asked who delineated them, when they were delineated, and why no wetland delineation flags were on the property, no answer was available. The owners believe that Eversource utilized old maps depicting the wetland that existed previously. Considering that Eversource has full knowledge of the extent that that they impacted the existing wetlands, it is highly irregular, deceptive, and unprofessional for Eversource to utilize old wetland delineations when they possessed knowledge that those wetlands were drastically impacted. Perhaps this is why no Eversource environmental professionals were at the meeting. The owners believe that Eversource did not want to have a new wetlands survey done

because it would show the newly created wetlands and highlight the magnitude of what Eversource did when it built the berm. Eversource chose to use old wetlands data knowing full well that the wetlands delineation may have changed and call the work "restore preexisting drainage" rather than use the more accurate description that they would of drain the created wetlands.

The map details that approximately 10 water bars are to be installed on the steep sloped escarpment of the existing access road that never existed prior to Eversource unlawfully building it. Eight water bars drain to the east and 2 drain to the west. The problem with this is that the access road in this area is 2 to 6 feet below the adjacent land area. This is because when Eversource constructed this new road, they excavated the road area down approximately 2 feet and mounded up the existing topsoil to both sides of the road.

To install the detailed water bars Eversource would be required to excavate this highly erodible escarpment further by excavating holes in the mounded-up topsoil. Water cannot run uphill. The water bars once installed will divert water from the road onto another part of the escarpment which is also a highly erodible area that was close cut mowed by Eversource which destroyed the natural erosion protection vegetation for the area the water is being diverted to. In summary, the Eversource plan concentrates water via water bars from one highly erodible area (the road) and diverts this concentration of water onto another highly erodible area in which Eversource previously destroyed the natural erosion protection by clear cut mowing.

A map note states that the water bars "may need to be graded level to facilitate access during construction" and "reinstall" … following construction, indicating that the water bars will be installed, removed during construction, and then reinstalled after construction. Why a restoration map has notations about the restorations being removed during some unspecified construction work and then being reinstalled after some unspecified construction work remains a mystery.

Map note 12 states that for grade changes on the work pad tie-in on slopes greater than 3:1 a reverse sloping bench is needed for every 15 feet of elevation change per "Connecticut Guidelines for Soil and Sedimentation Control Manual". The map does not show the slope grades by ratio or explain how this note applies to this remediation plan. It is known that Eversource, when working at site 7785 did in fact create slopes greater than 3:1. The map does depict some elevation gradients but for reasons unknown is completely missing the gradient information from steepest part of the slope where this 3 to 1 or greater slope is known to exist. The area is instead identified with a red oval and labeled as "add fill to work pad side slope to soften the grade".

The map shows water bars being installed about every 25 feet along part of the escarpment yet other areas the escarpment which also have an Eversource road, have a similar slope, and have eroded, have no water bars proposed to be installed. The entire area below the level area of the terraced escarpment that Eversource built at site 7785, that has also washed out, has no erosion protection being installed.

Eversource previously installed an unknown amount of water bars on this slope and all have washed out. No details of these previously failed water bars exist on the plans nor is there any explanation as to how the new water bars will be different than the old ones that washed out. Eversource built this road without any permits, so it appears that no engineering or as built drawings exist. No plans or engineering for the work Eversource did in this area has ever been shown to the owners or is available as a matter of public record.

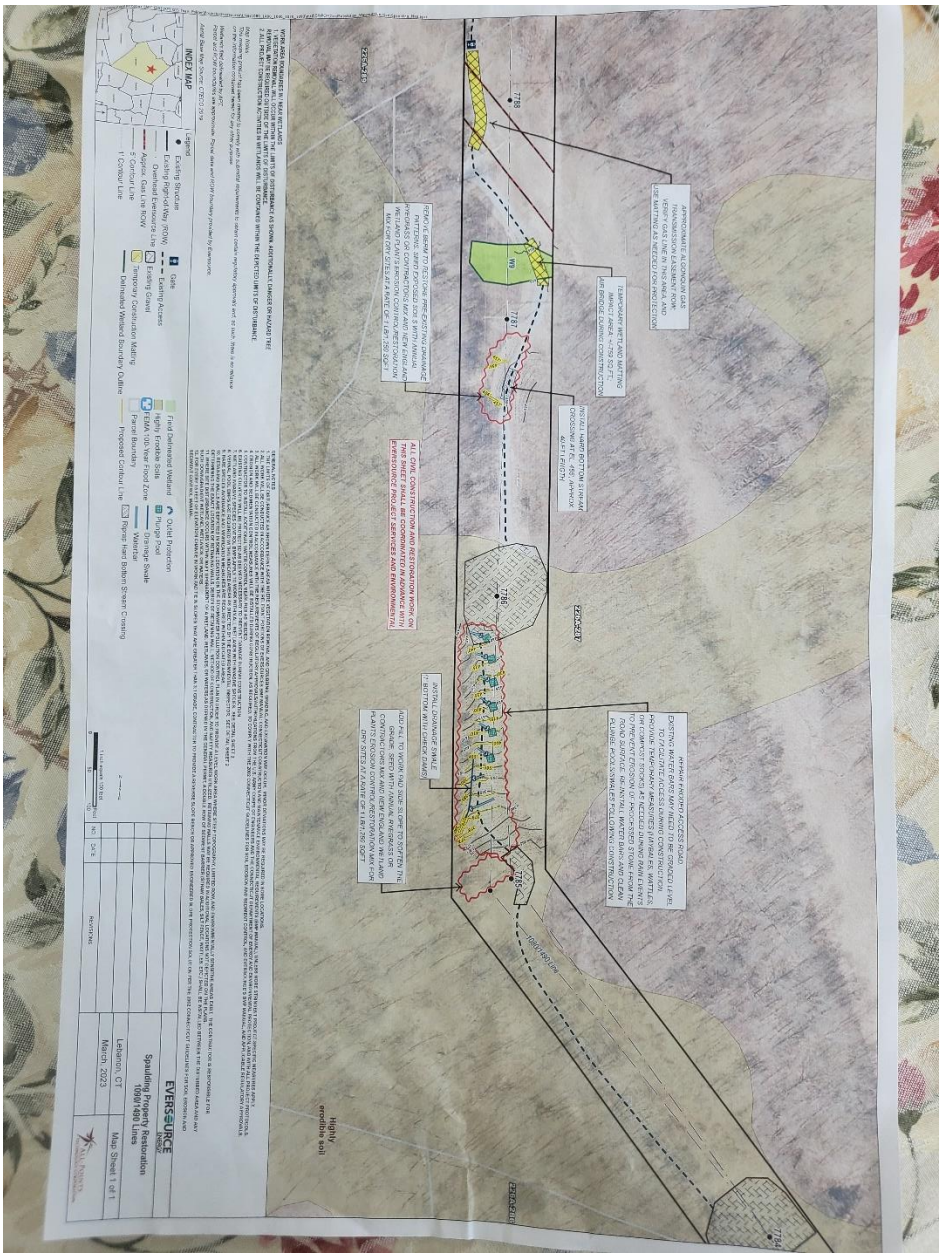
The map detailed installing wetlands mats to cross the wetlands previously destroyed by Eversource. When asked from whom Eversource would seek permits for this wetland crossing the answer was that Eversource is self-reporting to the USACE. When asked if this was going before the Siting Council the answer was no. When shown a Connecticut OLR research report detailing that Connecticut regulated wetlands jurisdiction over public utilities was transferred from local wetlands control to the Siting Council for this KV of a transmission line, the contractor had no comment. When asked again as to who reviews or permits Eversource's work in regulated wetlands for this wetlands work described, the answer was the same, we "self-report to the USACE".

The map identifies the area from site 7786 to site 7784 as "highly erodible soil". This is the same area that Eversource was granted permits from the Siting Council to use wetland mats for access for its pole replacement at site 7784 but chose to build themselves a road. The proposed remediation plan does not address any erosion protection measure for the highly erodible soil between sites 7785 and 7784.

The plan details the gravel pads installed during previous construction at sites 7786 and 7785. The map depicts each pad as being with in the ROW when in fact the ROW stakes put up by Eversource recently confirm that the pads extend well beyond the ROW. When the contractor was asked what was going to be done about this specific filling beyond the ROW intrusion, the verbal reply was we are going to pull them back to within the ROW. The map details that they are within the ROW presently.

This and other map anomalies previously detailed bring into question the accuracy and validity of the entire map presented.

Although the contractors appeared to be sincere in their efforts, it was immediately apparent that they had no authority to deal with the magnitude of the issues involved and had no answers or remediation plans for the remaining 90% of the issues.



Remediation plan provided by Eversource contractors on April 14, 2023

<u>The unauthorized and illegal activity in the end has been for nothing</u>:

Eversource cannot use the roads they installed.

Eversource installed roads and work pads along the entire 1800 feet of this easement where no roads previously existed. This was at great expense to rate payers and at great expense to the environment. The northern end of the easement is completely blocked by two underground high-pressure natural gas pipelines owned by Enbridge and 100 feet past the pipeline, the easement is completely blocked by wetlands.

The permitting process for the crossing of the gas line is a long, time-consuming process. It requires detailed investigation into what equipment will be crossing the pipeline, the weight of the equipment, and the ground pressure exerted by the equipment. This is compared to the depth of the pipe underground where crossing is anticipated, the soils covering the pipe, and the protection measure being installed over the pipe to prevent ground disturbance and equalize the weight distribution of the vehicles that are proposed to cross the pipeline. Special permission from the pipeline owner is required prior to crossing.

Wetlands are regulated in Connecticut and require permits when working in or near identified wetlands. Since the entire easement is blocked by wetlands, permits are required to cross. The acquisition of these permits is another time-consuming process.

The southern end of the easement is blocked by steep grades, wetlands, and a brook. The escarpment located at site 7785 is in the middle of the easement corridor and also has a very steep slope. The road on this steep slope is washed out.

In summary, the only access to the northern part of the easement is blocked by two obstacles and even if those obstacles are overcome, one can only travel to site 7786 where the road traverses down a steep hillside that is washed out. The only access to the southern portion of the easement is via t\The Old Mill Road, which is a private road owned by Mr. Spaulding and Ms. Yeisley.

Eversource wasted vast sums of ratepayer money illegally constructing roads that it cannot use.

How Eversource Violated Its Own Best Management Practices:

Had Eversource followed their own BMPs, as they are lawfully required to do, most of the damage done to the Spaulding/Yeisley property would never have occurred.

The best management practices (BMPs) for activities within its powerline easement that Eversource commissioned is the CONSTRUCTION & MAINTENANCE ENVIRONMENTAL REQUIREMENTS BEST MANAGEMENT PRACTICES MANUAL FOR MASSACHUSETTS AND CONNECTICUT, Prepared For: Eversource Energy Environmental Licensing and Permitting Group 107 Selden Street Berlin, CT September 2016, available at https://portal.ct.gov/-/media/CSC/1_Dockets-medialibrary/Docket_461A/DevelopmentandManagement/VolumeII_Part1_115kvDoubleCircuitUndergroundTransmissionLines/AppendixDEversourceBMPSeptember2016pdf.pdf

The BMPs are mandatory: “Regardless of whether a specific permit is needed for the work, construction and maintenance projects must follow internal environmental performance standards, which is the purpose of these BMPs.” Sec. 1.1 at 1-1.

Without going into detail on the numerous ways in which Eversource has violated its own, self-imposed BMPs for work in powerline easement areas, a few provisions are worthy of highlighting.

Nothing in the guidebook authorizes the construction of 100 foot x 100 foot gravel or stone work pads for any work pads other than timber.

The only work pads allowed are timber and they are intended to be removed upon the completion of the improvements. To see what a typical work area looks like with proper soil erosion and sedimentation controls, profoundly different that the large amount of crushed rock used in this easement, see the image at AI-29 of the BMPs.

Typical view of light mulching atop unstable, seeded soils.

Notice also in this illustration from the BMPs that the existing native vegetation has been retained and is flourishing. In the easement in this case Eversource mowed down all the vegetation, right to the ground, contrary to the preservation requirements of the BMPs, and thereby "opened the door" to invasive species which have now taken over in several areas. As the owner's environmental consultant observed: "All along the access road, mugwort swaths, ten to twenty feet wide, are dense and mature, with five-foot tall dead stems, remaining from the 2021 growing season." At REMA 3.2.2.

The extensive and unnecessary destruction of the existing vegetation has been documented by the owners' environmental consultant:

"Extensive direct losses of vegetation and wildlife habitat occurred between 2018 and 2020 when brush-hogging/mowing at more frequent intervals (except within wetlands) replaced the long-standing former practice of selective tree sapling removal, while leaving shrubs intact. Most of the native shrubs in our region die when cut close to the ground every 3 years or so.

ROW widening by clearcutting forest edges also removed much vegetation. The recently cut swath on the west side of the ROW, north of Pole #7785 is up to 30 feet wide. ROW widening, and conversion to a low, open cover type has increased fragmentation of the local landscape, such that the other forested land within the subject property has become less valuable for wildlife, in particular for forest-interior species, and for birds that forage along natural forest edges and in shrublands." At REMA 4.1.

BMP Section 4.1.5 – Post Construction requires the contractor to monitor for invasive species. As detailed by REMA, the invasive species have taken over the easement. Where was the Eversource invasive species post construction monitoring?

The BMPs expressly provide in Section 5 Rehabilitation and Restoration 5.1 Restoration that "All areas disturbed by construction, repair, and maintenance activities shall be substantially restored to pre-construction conditions."

All the Siting Council permitted work that was performed in this easement was maintenance and was subject to the BMP regarding rehabilitation and restoration. New construction is treated differently since the site is changed with the new construction and cannot be restored 100% to its pre-construction conditions

"Maintenance projects" is a defined term in the BMPs:

"Maintenance Projects: Typically consist of activities limited to the repair and/or replacement of existing and lawfully located utility structures and/or facilities where no substantial change in the original structure or footprint is proposed. Maintenance activities also include vegetation management." At 1-3

Maintenance projects are not "new construction" as defined in the BMPs:

"New Construction: Construction of new transmission or distribution facilities that previously did not exist or construction that substantially modifies existing facilities. All new (and existing) construction projects are required to go through a full permit review by the Eversource Environmental Licensing and Permitting Department." At 1-3.

New access roads were constructed on the property without federal, state, or local permits as required under the BMPs:

"3.4.1 New Access Roads New access roads are generally associated with new or large-scale projects that have separate permitting requirements. Construction of new access roads will be based on plans that are reviewed and approved by applicable federal, state,

and local agencies. If a new access road is needed and not associated with a large project, notify the Environmental Licensing and Permitting Group to make a decision on best access routes and identification of the necessary permits and approvals required to construct the new road. **Permit requirements must be followed**." [emphasis in the original] At 3-3.

In constructing the new, unauthorized access roads, Eversource failed to follow its own requirements for erosion and sedimentation controls, leading to widespread erosion and sedimentation through large areas of the easement:

"Erosion and Sedimentation Controls Construction personnel are reminded to control erosion and flow conditions during access road construction or maintenance by utilizing the following erosion and sedimentation measures which are described and illustrated further in Appendix A…." At 3-5.

The impact of the failure to use the BMP-mandated soil erosion and sedimentation controls has led to significant damage as documented by the owners' environmental consultant:

"Since the shrubland cover type was brush-hogged, runoff levels and soil erosion have increased, especially in the steep southern portion of this ROW segment. This is due to diminished tree and shrub cover to intercept vegetation, and more exposed soil. Hillside soils are increasingly skeletonized. The increased runoff volumes from the large impervious pads and stone-covered roadways have washed the fine sediment and gravel from between the larger stones as fine particles are washed away. Trails have become difficult for Mr. Spaulding and his wife to use, either on foot or using their small four-wheeled recreational vehicle. Recreational value is diminished along the ROW because the trail down the steep southern portion of his ROW segment.

Rather than remaining in place, germinating, and becoming established, a high proportion of seeds are washed downhill or fail to become established because the bony soil holds insufficient moisture for germination. Invasive seeds are also washed downhill, exported to the off-site Susquetonscut riparian corridor, along with the sediment washed off the steep hillside." REMA at 4.5.

Eversource failed to consider alternate access, manual access, limited trips, and aerial access, all of which could have been utilized in the easement area. Access via The Old Mill Road would have eliminated much of the damage done to the Spaulding/Yeisley property. Failure to utilize this viable and previously utilized alternative violates Eversource's own BMPs:

"Alternate Access

- Manual access. Consider accessing work areas on foot through terrestrial areas and/or by boat through open water or ponded areas. Smaller projects (e.g., repairs to individual structures or parts of structures) do not categorically require the use of heavy machinery and should be accessed manually to the extent practicable.

- Limit trips. Multiple trips through a wetland have shown to increase the potential for damage and requirement for matting. Try to limit trips to one in and one out. Use of overhead/aerial access (e.g., helicopters)
- Using overhead or aerial equipment can be expensive and is not always feasible, but it may be appropriate in some situations in order to get vehicles and other equipment to a site that may be otherwise very difficult to access. The use of overhead and/or aerial equipment may be beneficial for work in areas where large water bodies, deep crevices, or mountainous areas hinder ground access." At 3-22, 23

Eversource failed to properly employ mats as mandated by the Siting Council over a steep escarpment, but instead excavated and filled the escarpment with crushed rock to create a new road and constructed a massive manmade terraced escarpment where none previously existed … all in direct contravention of the requirements of the BMPs:

"BMP - General Design: New and Existing Access Roads

Where practicable, construction access roads should conform to the contours of the land, avoiding grades steeper than 10 percent and creating side slopes no steeper than a ratio of 2:1. If the side slopes are steeper than 2:1, then use of engineered slope stabilization methods may be necessary, consider the volume and type of construction traffic as well as the extent that natural ground must be altered to accommodate the traffic. If no grading is required and the construction traffic is very intermittent (i.e., access roads used to maintain utility lines) the measures used may be limited to water bars, or some top dressing with gravel or stone in areas where the vegetation over soft soil is destroyed by traffic. During wet weather, these roadways can generate significant quantities of sediment if not constructed with adequate stormwater management and erosion control measures. During an active construction or maintenance activity, inspection of the construction access road and the associated erosion and sedimentation measures should be conducted by the person(s) designated at the pre-construction meeting, should occur regularly while the activity is occurring, and repairs to controls should be made in a timely matter. Repairs may include regrading and/or top dressing the traveled surface with additional aggregate to eliminate ruts, as well as those repairs required by each erosion and sedimentation measure used**.** When the roadway is no longer needed on a regular basis, the access road should be reviewed to ensure that the road is left in a condition that prevents future erosion and sedimentation (i.e., installation of water bars, gravel, etc.). In some cases, permit conditions may warrant that the access road be removed and that the disturbed area be seeded and mulched as required to match the pre-construction conditions."

Eversource improperly installed wetland mats to cross a wetland area. This protection system failed and ended up destroying the wetland area. The installer failed to elevate the mats in direct contradiction to Eversource BMP's for crossing wetland areas.

"3.4.3.1 Best Management Practices – Construction in Wetlands The following are BMPs that are applicable to new access roads in wetlands and are described at the following tab:

Construction Mats (includes Elevated Construction Mats and AlturnaMATs) – Tab 2A" At 3-23.

"Construction Mats (i.e., timber or swamp mats) Applications: Wetland crossings, rut minimization • Used for access where the ground surface is unstable due to shallow, standing water, saturated soils, or other substrates not suitable for heavy vehicles." At 3-25.

The project planners and contractors failed to follow requirements to avoid and minimize environmental and historical impacts is required by the BMPs:

"3.1 Avoidance and Minimization Avoidance and minimization should always be considered before beginning any construction or maintenance project. Take appropriate measures to avoid construction impacts to wetlands, waterways, rare species habitats, known below and above ground historical/archeological resources, and other environmentally sensitive areas. Use existing ROW access whenever practicable. Keep to approved routes and roads and do not widen or deviate from them. Consult with the Environmental Licensing and Permitting Group, when avoidance is not practicable, to determine measures to minimize the extent of construction impacts. Alternate access routes and/or staging areas that will minimize construction impacts to the natural environment may be considered." At 3-1.

The project planners and contractors failed to consider and control invasive species in their work as required by the BMPs:

"Other Considerations Other regulated factors taken into consideration during the project planning process include the presence of protected (i.e., threatened, rare or endangered) species, non-native invasive plant species and/or historical and archaeological resources. Special requirements may need to be evaluated as part of new construction and/or some maintenance activities." At 2-2.

"4.1.5 Post Construction Post-construction inspections of restored areas will be conducted at regular intervals throughout the growing season, as required by any applicable permits, and/or after major storm events. Sites should be inspected for success or failure of revegetation, invasive species colonization, and erosion and sedimentation. In the event additional measures are required to achieve site restoration and stabilization, corrective actions shall be identified and implemented." At 4-2.

"Disturbed wetland areas shall generally be allowed to revegetate from the natural seed bank. Measures to discourage the establishment or spread of plant species identified as non-native, invasive species by federal or state agencies shall be utilized. Environmental Licensing and Permitting can evaluate whether to let the wetland vegetate naturally." At 5-3.

Eversource failed to follow its own BMPs in that it did not substantially restore the easement to its pre-construction conditions.

> "5.1 Restoration All areas disturbed by construction, repair, and maintenance activities shall be substantially restored to pre-construction conditions. Please refer to Appendix A Section I for photos and typical for loaming, seeding, and mulching. Prompt restoration minimizes the extent and duration of soil exposure and protects disturbed areas from stormwater runoff. Stabilization should be conducted as soon as practicable. Where appropriate, it is preferable to allow wetlands to naturally revegetate." At 4-3.

The result of Eversource's failure to follow its own BMPs and its unauthorized activities outside of the easement are summarized by the owners' environmental consultant:

> "Based on this analysis, it is our professional opinion, that Eversource's ROW maintenance activities since 2017 have caused long-term adverse impacts on the property owned by Mr. Spaulding and his wife. These activities have harmed the property's environmental and ecological resources, including its plant communities and the wildlife that uses the property. Some activities also took place outside the Eversource ROW. Others were within the ROW and subject to the ROW easement, but the required restoration activities that should have reduced the extent of adverse impacts were never carried out." REMA at 5.0.

The easement and the surrounding 64 acres of property are agricultural land as defined by the State of Connecticut. The property is designated as forestry acreage which in Connecticut is agriculture. Eversource failed to follow its BMPs as to agricultural lands.

> "5.3 Work in Agricultural Lands
> Transmission lines often cross agricultural lands. In some instances, this may affect ongoing agricultural activities in and around the ROWs. If a construction or maintenance project occurs on agricultural lands, Eversource will work closely with landowners, licensees and stakeholders to minimize agricultural impacts. Whenever practical, Eversource will make reasonable efforts to coordinate the schedule of construction-related activities around the growing and harvest seasons to minimize the impacts on agricultural operations. When this is not practical, Eversource will pursue reasonable measures to mitigate any impacts. Eversource recognizes that disturbed soils, or soils compacted by heavy construction equipment, may affect the soil's ability to support certain agricultural activities. Eversource will take reasonable steps to avoid or minimize soil compaction and will restore soils that are compacted by construction equipment. Eversource will also work with affected landowners to determine the appropriate method for restoring the soils, and is open to discussing and implementing the landowners' alternative restoration suggestions. After the transmission improvement is complete, Eversource will remove all construction-related equipment and debris from the ROW."

Eversource interrupted the ongoing agricultural activity, destroyed forestry crops, failed to minimize agricultural impacts, failed to mitigate their activities, unnecessarily disturbed and compacted soils, failed to restore soils to pre-construction condition, and upon completion of the work failed to remove all debris from the ROW.

A Tutorial on Optical Ground Wire Ratings Analysis for Protection Engineers

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***Abstract*—Installation of an Optical Ground Wire (OPGW) is an increasingly common upgrade when replacing shield wire(s) on a transmission line, as it provides the added benefit of broadband communications capability. Utilizing such fiber installed inside the shield conductor comes with a substantial risk of damaging the communications circuit from annealing of the shield conductor due to ground fault current flow. The transient current-induced temperature rise on an OPGW is a simple calculation in itself, but sizing of an OPGW for adequate thermal capability requires careful consideration of numerous and often overlooked factors characterizing the total heating energy, many of which fall on the protection engineer to calculate. This paper provides a detailed overview of the principles and process to determine the required thermal withstand capacity of an OPGW and discusses a particularly complex case study with a novel mitigation solution.**

I. INTRODUCTION

An Optical Ground Wire (OPGW), essentially a lightning shield conductor containing one or more fiber optic cables, would seem to present a cost-effective means of adding a broadband communications path to a transmission line that already requires a shield conductor for lightning protection. However, the unique characteristics of OPGW pose additional design constraints over a conventional shield wire. To ensure a reliable installation for critical communication applications such as line teleprotection or Supervisory Control and Data Acquisition (SCADA) systems, an OPGW will likely require additional investments in structural strength and/or the structure grounding systems that offset the cost versus benefit viability of the OPGW, especially in retrofit applications. This paper discusses some of the overall design considerations in applying OPGW to transmission lines. Then, a tutorial is provided for calculating the fault current thermal capacity requirement for an OPGW design application. To ensure a reliable OPGW fiber communications path, the lower specific thermal capacity of OPGW over conventional shield wires needs to be understood and addressed through careful analysis of the protection and grounding design systems.

II. OPGW DESIGN CONSIDERATIONS

OPGW installation design is essentially applying an aerial-supported cable that can satisfy a line's needs for lightning protection and a fiber optic communications path. As with any design, satisfying the needs of the application is a balance of compromises.

As an aerial conductor supported on the line, the OPGW must maintain adequate clearance from phase conductors and objects adjacent to the line. To achieve the needed clearances, the OPGW attachment height can be increased, but doing so increases the length of the lever that the OPGW applies under wind and tension loading. Alternatively, the sag can be reduced by increasing the tension on the OPGW at the dead-end attachment points, but that requires not only stronger dead-end structures, but potentially a larger OPGW for the needed rated breaking strength. Increasing the conductor area also increases the weight and wind burden on the supporting structures.

For the fiber optic application, the number of fiber strands determines the size of the one or more inner fiber bundles within the overall conductor cross-section. As the number of fiber strands increases, either the OPGW overall diameter increases, or the conductor cross-section area decreases relative to that occupied by the fiber.

For lightning protection, the OPGW position at the structure top and the grounding design are key considerations. Increasing the height of the OPGW increases the effectively shielded area for conductors below. However, increasing the height of the OPGW increases the length of the lever and thus the cantilever force it would apply on the supporting structures. Two shield wires may be positioned horizontally to provide the greater shielding area needed for structure configurations with double circuits and/or wide horizontal phase conductor spacing. Two shield wires add burden to the supporting structures, but each shield shares only a portion of the total current flow from a ground fault or residual load current flow due to phase current unbalance. Since the heat generated in the conductor from Ohmic loss is proportional to the square of the current magnitude, splitting the residual current flow among two shield conductors results in a dramatic reduction of losses. The probability of a lightning induced flashover can also be reduced by installing a more extensive structure grounding design or continuous counterpoise system, both of which also reduce the current-carrying duty of the OPGW during a ground fault.

As a grounded conductor, the OPGW is a path for ground fault current and a source of losses from flow of residual current due to phase current unbalance. Reducing the resistance of the conductor portion of the OPGW:

1. reduces the losses from both load unbalance and ground fault current flow;

2. increases overall ground fault current; and
3. increases the portion of total ground fault current that flows back through the OPGW to the source.

Reducing conductor resistance generally requires a larger conductor cross-section or use of more conductive materials. Designing OPGW cross-sections to use higher-conductivity materials like aluminum alloys can offset the reduction of conductor cross-sectional area occupied by the fiber. However, the more conductive materials are generally softer mechanically than the extra-high-strength steel, Alumaweld, or Copperweld materials used for conventional shield wire. As a result, an OPGW compared to a shield wire of equal diameter will typically provide lower specific tension capacity and exhibit greater change in sag as conductor temperature varies. In a retrofit application, it may be necessary to select a larger OPGW than the shield it replaced to provide enough tension capacity to maintain sag within the limits required for electrical clearances.

The OPGW supporting conductor material typically consists of a combination of aluminum and steel alloys to achieve a desired balance in mechanical characteristics. As can be seen in OPGW manufacturers' datasheets, the conductor materials can handle temperatures of 180℃ to 200° C before annealing. Fiber optic strands are typically made of silica glass and can withstand a constant temperature well more than the OPGW's surrounding conductor. Therefore, if the conductor portion of the OPGW assembly is not adequately sized to withstand the ground fault current duty of an application, the conductor may anneal from thermal overload during a fault and mechanically fail the inner fiber optic cable. Also, the concentric placement of the fiber inside the metal supporting conductor does not lend to a practical mid-span splice repair solution, in contrast to a conventional shield wire that can be spliced multiple times in a single span. Repair of a broken OPGW generally requires replacement of an entire span of OPGW to the nearest dead end structures or retrofitting structures into dead ends to support and splice in a new OPGW span at the two dead-end splice points. The consequentially-added two splice points add about 0.6 dB to the fiber communications path losses. This significant disadvantage in repairability emphasizes the importance of accurately calculating the ultimate fault current thermal duty of the OPGW application and satisfying that duty through informed conductor selection, design of supporting structures, and their associated grounding system.

For retrofitting a conventional shield wire with OPGW, a common design approach is to choose an OPGW with the necessary number of fiber strands and an overall assembly with similar sag characteristics, outer diameter, and weight per unit length equal to or less than the existing shield wire. The aim with such an approach is to avoid imposing any greater burden on the supporting structures. Being that the fiber optic material is not an especially effective thermal conductor, an OPGW will generally provide less thermal withstand capacity than a conventional all-metal shield wire of the same diameter. This reduced thermal capacity may not satisfy the fault duty of the application without additional investments in grounding to reduce resistance to ground, segmenting the OPGW into multiple isolated sections, or isolating the OPGW from the substation terminals, all of which make it a less favorable ground source return path and thereby reduce the OPGW fault current duty.

III. OPGW INSTALLATION DESIGN PROCESS

A line construction project generally begins with a transmission planning study identifying the need and specifications for a new or upgraded transmission line, including the required line capacity (in Amperes or Mega-Volt Amperes), number of circuits, and line route. This line upgrade may coincide with the utility's fiber expansion plan, and consequently the project includes scope to add an OPGW with specific fiber count. Then, the transmission line engineering team develops the preliminary physical design of the line, including selection of a candidate OPGW for its fiber count and physical and mechanical characteristics. A utility may have defined standard selections of OPGW to streamline stock materials for repairs and installations.

Prior to completion of the preliminary line design, a protection engineer should calculate the transmission line constants and perform a short circuit study to determine the required thermal rating of the OPGW. To develop an accurate short circuit model of the studied line, a protection engineer needs a complete set of line plan and profile drawings, structure unit drawings, and staking tables. From those references, the phase conductor, OPGW, and shield are identified, as well as the conductor cross-sectional geometry at the structures and at mid-span. Conductor selection and line distance alone satisfy the positive-sequence impedance model. The zero-sequence impedance model, characterized by structure attachment geometry, grounding design, proximity to adjacent lines, and earth resistivity, would have to be modeled approximately; those line design details are generally finalized during the subsequent detailed line design phase. To avoid understating the required thermal capacity of the OPGW, it is important to include a design margin to account for uncertainties in the zero-sequence impedance model. The protection engineer should also select the line protection systems for the application, considering the fault maximum clearing time specified by transmission planning or otherwise follow utility standard design practices. The clearing time of the protection systems will need to be calculated for all fault locations studied, both under normal protection system operation and system contingencies such as a pilot scheme communications channel or relay out of service. Finally, the protection engineer will need to understand the reclosing philosophy established for the line. If the utility has yet to select a preferred terminal for testing the dead line after a fault is cleared, the protection engineer should conservatively assume the end with higher available fault current as the test terminal.

Once an OPGW thermal rating is specified by the protection engineer, an iterative process begins between the transmission line engineer, protection engineer, and possibly grounding and lightning studies engineer to refine the transmission line physical design and satisfy the OPGW thermal rating specification. The solution can be as simple as the transmission line engineer selecting a large enough OPGW to satisfy the entire OPGW thermal rating requirement and augment the supporting structural design to support that OPGW. In cases where an OPGW size is restricted to limit structural impacts, satisfying the thermal rating can involve refining the line

grounding, shielding, insulation, and protection system designs to reduce the fault current carrying burden of the OPGW. Discussed in the following sections are the principles and detailed process for performing OPGW thermal ratings analysis and application of mitigation techniques as demonstrated through a real case study.

IV. OPGW THERMAL RATING CALCULATION METHOD

The standard method for calculating the current-temperature relationship of bare overhead conductors is described in IEEE 738-2012 [1]. During steady state pre-fault operation, the grounded OPGW is subject to heating and cooling effects in the form of solar heating, convective cooling (wind), radiant cooling, and ohmic losses from current flow. Assuming that transmission line phase currents are well balanced and that current induced from phase conductors is minimized through design, the steady state current effects on the OPGW temperature can be considered negligible. For a fault transient heating calculation, the solar heating, convective cooling, and radiant cooling effects can be simply accounted for by an assumed pre-fault conductor temperature. A value of 40°C is typical for the basis of the published fault current rating on an OPGW manufacturer datasheet. During a fault, the current heating effects dominates all other effects. Since the fault duration is very short, solar heating, convective cooling, and radiant cooling effects are ignored, and the OPGW heating effect reduces to:

$$T_{Final} = I_{Fault}^2 \mathrm{t} + T_{Initial} \quad (1)$$

where T is the temperature in Celsius or Kelvin, and t is the fault duration in seconds. On a manufacturer datasheet, the OPGW rated fault current will usually be expressed as a value with units kA^2s, and the assumed initial and final conductor temperatures should be stated.

It is worth noting that lightning transient current flow is not typically considered when determining the design thermal rating of an OPGW. The current magnitude of a lightning strike can approach 250 kA [2], a factor of 625 times the heating energy of a 10-kA fault of identical duration. The duration of a lightning strike, however, is on the order of 0.05 milliseconds [3], whereas a fault detected by instantaneous relay tripping elements and cleared by a three-cycle breaker is expected to clear in 83.33 milliseconds (five cycles), a heating factor 1,666 times that of a lightning strike of equal current magnitude. As a more direct comparison, the heating from a 250-kA lightning strike lasting 0.05 milliseconds is equal to a 6.12-kA fault lasting five-cycles. With typical available transmission line fault currents well above this example figure, OPGW heating from a lightning strike is essentially negligible compared to the heating from a ground fault.

V. OPGW FAULT WITHSTAND ANALYSIS PROCESS

Since the heating of a conductor due to fault current is determined by the fault current magnitude and duration, development of an OPGW thermal rating involves the same tools and techniques used to conduct a system protection study. The OPGW rating analysis simply has a different goal – to determine the worst-case cumulative I^2t heating in a section of OPGW from a fault event, addressing the following considerations, each of which is discussed in more detail:

1. system pre-fault contingencies,
2. the heating contribution of the initial asymmetrical portion of the fault waveform,
3. the actual current flowing through the OPGW,
4. delayed breaker failure clearing,
5. multiple recloses back into the fault, and
6. the time to clear the fault by the protection system.

System Pre-Fault Contingencies – The OPGW fault thermal capacity needs to support faults within the normal system and the system with a single pre-fault contingency. A pre-fault contingency will affect the heating of an OPGW during a fault either by a change in OPGW current flow or fault duration. A pre-fault outage of a line or transformer connected to a remote substation is expected to reduce the remote terminal current contribution (infeed) to a fault on a line, thereby increasing fault current contributed from the local line terminal. Finding the pre-fault outage that increases OPGW current the most usually requires simulating faults and calculating I^2t heating for numerous possible contingencies and fault locations. Documenting the case assumptions, calculation steps, and results in an organized table aids recognition of the controlling cases for the OPGW thermal design specification and for simply demonstrating that analysis was comprehensive. Protection system contingencies such as the loss of a pilot scheme communications system or loss of a protective relay may result in additional fault clearing delay. For a line with redundant pilot schemes, a loss of one pilot scheme or protective relay would pose no impact to fault clearing time. However, if a line has only one pilot scheme among the two protection systems, loss of that pilot scheme would result in delayed clearing of faults beyond the reach of the relay's instantaneous underreaching elements (e.g. Zone 1 ground distance, 50G). The additional heating expected from delayed fault clearing is to some degree offset by the reduced current contribution to a relatively remote fault location, but the delay in fault clearing may prove to be a controlling design case among a comprehensive set of study case calculation results.

Initial Fault Current Asymmetry – The initial asymmetric peak and transient decay of fault current, also referred to as the "DC offset" component of the fault waveform, is one current heating factor that can represent a substantial portion of the total heat energy absorbed by an OPGW during a fault. It is important that the DC offset portion of the fault current is accounted for in the OPGW heating calculations, and yet software tailored for protection coordination studies typically reports only the symmetrical portion of fault currents and no direct measure of the DC offset portion of the current waveform. However, using the symmetrical magnitude of fault current and the X/R ratio reported from the compute model simulation, we can determine the additional heating of the asymmetrical waveform by calculating its RMS value over the fault duration [4]:

$$I_{RMSAsym} = \frac{1}{t_{stop}} \int_0^{t_{stop}} [I_{Pk} \sin(\omega t + \theta - \varphi) - \sin(\theta - \varphi)\, e^{-1\alpha t})]^2 dt \quad (2)$$

where,

t_{stop} is the fault duration in seconds
$\omega = f * 2\pi; f = 60\ Hz$
$\theta = 90° - tan^{-1}\frac{X}{R}$ voltage phase angle at fault onset
$\varphi = tan^{-1}\frac{X}{R}$ difference in angle of fault current with respect to voltage
$a = \frac{\omega}{XR}$ exponential decay time constant
$I_{Pk} = I_{RMSSym}\sqrt{2}$ theoretical maximum peak asymmetrical current

This RMS value can be thought of as a symmetrical equivalent current magnitude accounting for the total heating of the true asymmetrical waveform and should be used as the current magnitude for the OPGW I^2t heating calculations.

OPGW Current Split – For lines with a single OPGW and no other shield wire or continuous counterpoise conductor, the total branch current returning from a fault to a terminal may be a suitably accurate measurement of the current flowing through the OPGW. However, if a line has a second shield or continuous counterpoise system, the fault current will split among the conductor paths according to their impedances [5]. For configurations with unequal OPGW, conventional shield, and/or continuous counterpoise conductor impedances, an accurate measurement of the current split can be obtained by modeling the system and line in a different system analysis program, such as one used for studying electrical system transients, which would allow for more granular component modeling and measurements than typical short circuit modeling software designed specifically for protective relaying studies. One should also consider whether the line constants mathematical model used by the system modeling software accounts for structure grounding either as discrete or distributed components. Each ground is an alternate path for fault current to flow to earth, effectively reducing the total current duty of the OPGW. Not all short circuit simulation programs account for structure grounds, and an engineer performing an OPGW thermal rating study should recognize any such limitations and consider re-modeling the system in another program.

Delayed Breaker Failure Clearing – Delayed clearing of a fault due to a breaker failure is a possible outcome that should be supported by an OPGW thermal rating design. A failed breaker is generally considered in addition to a pre-fault contingency, rather than in lieu of it. A utility should consider whether the OPGW's thermal capacity needs to withstand breaker failure clearing on the last shot of an N-shot reclose sequence, i.e. after N-1 successive faults cleared normally, or whether failed breaker clearing will only be supported on the first and only shot of a fault event. Failed breaker clearing at the end of a multiple-shot reclose sequence may be considered a low enough probability that a utility does not want to size the OPGW to support it. Rather, a utility may choose to support either 1) a sequence of faults cleared normally and unsuccessful reclose attempts to eventual lockout, or 2) only a single fault with delayed breaker failure clearing. Calculation of the total OPGW heating due to a fault cleared by a breaker failure scheme can be considered as two separate fault simulations added together, i.e. the initial fault until the remote end is cleared normally, and then the fault fed only through the local stuck breaker terminal until the time when it is cleared by the breaker failure protection scheme. For a networked system, the OPGW current sourced through the local stuck breaker terminal is generally expected to increase after the remote terminal is cleared via its normal line protection system.

Reclosing Effects – As a practical matter, any cooling of the OPGW during a typical reclose open interval of 15 seconds or less can be ignored due to the limited reduction in temperature expected in such a short time frame. Also, the rate of cooling is only especially sensitive to wind speed, which is highly variable in nature. To demonstrate, an iterative calculation of temperature change due to a current transient was performed for a 795 ACSR "Drake" conductor based on the method defined in section 4.6.3 of IEEE 738-2012. Simulation results are provided in Table 1. The base simulation case is a post-transient ambient temperature of 40°C, no wind, solar exposure at a position latitude of 43°N on August 1st, and enough pre-transient current to result in a steady state current temperature 200°C.

TABLE I. IEEE 738-2012 CALCULATION OF CONDUCTOR TEMPERATURE VERUS TIME AFTER A CURRENT TRANSIENT

Case Description	Temperature After 15 Seconds	Temperature After 10 min.
Base Case	197.1 °C	130.1 °C
Base Case with Wind Speed 22.35 m/s (50 mph)	176.4 °C	42 °C
Base Case with 0 °C Ambient Temp.	196.8 °C	113.7 °C

The calculation results indicate limited cooling potential during a typical reclose open interval. Without wind, the conductor will require on the order of 60 minutes to return to ambient temperature. Therefore, the total heating duty of an OPGW due to fault current flow should be approximately equal to the heating accumulated from one fault event multiplied by the number of reclose attempts that the line terminal is designed to make.

Fault Clearing Time – To optimally specify an OPGW's thermal capacity, a protection engineer should provide accurate fault clearing times as the fault location varies along the line based on the actual protection design and relay set points. Accurate calculation of the clearing time requires careful consideration of the make and model of relay(s) protecting the line, their protection element setpoints, details of any pilot schemes employed, whether any auxiliary tripping relays are employed, the line terminal breaker(s) interrupting speed(s), and details of any breaker failure protection systems.

VI. CASE STUDY

As a demonstration of the technical principles and analysis approach to determining the required thermal capacity of an OPGW application, a real-world case study is presented.

Described herein is an analysis to determine the fault carrying capacity of a proposed OPGW retrofit for a 2.7-mile 115-kV transmission line connecting stations generically named Station A and Station B. The existing towers were configured to carry a single 3#6 Copperweld shield wire. The OPGW proposed by the transmission line engineering team were sized for the required number of fiber strands and for an overall diameter and weight per lineal foot matching as close to the original shield wire as possible to minimize impact to the structural design. The key design factors considered in the study are as follows:

1. **OPGW Thermal Rating –** 109.0 kA^2s (40°C initial temp, 200°C final temp
2. **Line Protection Design -** dual pilot schemes (POTT and DCB); slowest normal clearing is less than five cycles for a solid ground fault anywhere on the line, including the two-cycle breaker interrupting time.
3. **Breaker Failure Fault Clearing Time –** 15 cycles
4. **Reclosing Philosophy -** one shot taken from one terminal on dead 115-kV line
5. **Fault Current Growth Factor** – The utility specified a 10% fault current design margin to address future fault current growth.

The utility's protection group provided their short circuit computer model of the existing system, and with it the subject line constants model was updated according to the revised phase conductors, structure geometry, and initial OPGW selection from the transmission line design. The line constants model's soil resistivity parameter was also verified from measurements at several locations near the line and substations that were taken for related project work.

From the updated short circuit model, initial simulations of ground faults along the line under system normal state and with both end terminals yielded total fault current ranging from 30.7 kA to 41.2 kA. Station A contributed currents from 9.2 kA to 30.0 kA depending on distance to fault, and Station B contributed 5.1 kA to 24.2 kA. Since the line protection design features dual pilot schemes with insignificant difference in clearing time between the two systems, contingency analysis did not need to consider a protection system contingency. Each of the substations is networked with eight to ten other lines, and several of the lines share right-of-way with the subject line. Therefore, the search for controlling design cases under contingency was done by batch simulations of ground faults along the line with both end terminals closed and a single contingency per simulation case of either an infeed line being isolated or a mutually-coupled line being isolated and grounded at both ends. Under contingency, the highest fault current contributed by a terminal was 30.6 kA ∠79° for a close-in fault at Station A with outage of the strongest line infeed connected to the remote end Station B. The short circuit analysis also gathered the highest through currents under contingency for faults at other points on the line. This data was ultimately not a factor defining the basis for the OPGW sizing, since the line was short and the reduction in heating for a fault closer to the middle of the line was not enough for the utility to justify installing multiple sizes of OPGW according to the thermal fault current duty of a particular section of line.

From the highest fault current simulation result of 30.6 kA ∠79°, the X/R ratio was calculated to be $\tan 79° = 5.14$. From (2), the RMS value of asymmetric current with X/R = 5.14 and fault duration of five cycles is 1.078 times symmetrical current, or 33.0 kA. The thermal duty can then be calculated for a worst-case bolted ground fault cleared normally by the line protection:

$$I_{Fault}^2 t = (33.0\text{ kA})^2\left(5/60\ s\right) = 90.8\text{ kA}^2\text{s} \qquad (3)$$

After this initial fault is cleared, the line reclosing scheme would attempt to restore the line from one terminal. One needs to account for the additional heating event after the terminal recloses back into the fault. For these thermal duty calculations, reclosing is assumed to be attempted from the terminal with the stronger source behind it. A simulation of a close-in fault at Station A with the Station B end opened and the same contingency used for the initial fault case yields a fault current through Station A of 30.7 kA ∠79°, a small increase from the initial fault fed from both terminals. Since the fault current angle relative to positive sequence voltage is identical to the initial fault case, we know that the RMS value of the asymmetric current is $1.078(30.7\text{ kA}) = 33.1\text{ kA}$. This fault current cleared again normally in no more than five cycles yields an additional heating duty of $I_{Fault}^2 t = (33.1\text{ kA})^2\left(5/60\ s\right) = 91.3\text{ kA}^2\text{s}$. Since the reclosing scheme for this line is designed to make only one reclosing attempt, the total OPGW fault thermal withstand duty from a permanent fault cleared twice normally by the line protection is $90.8\text{ kA}^2\text{s} + 91.3\text{ kA}^2\text{s} = 182.1\text{ kA}^2\text{s}$.

The thermal rating design also needs to support the heating duty from delayed fault clearing during a breaker failure scenario. Given a fault on the line with a stuck breaker at Station A, the Station B terminal will interrupt its contribution normally within five cycles. Then fault will continue to be fed from Station A for an additional ten cycles, at which point the breaker failure scheme will clear Station A's contribution to the fault. We know from prior fault simulations that the Station A asymmetrical current contribution is 33.0 kA to an initial fault sourced from both terminals. By the time the Station B terminal opens, we consider the DC offset portion of the fault current waveform to have subsided, so Station A continues to contribute a symmetrical AC current of 30.7 kA, which we found earlier. From this two-step breaker failure clearing of the fault, the calculated thermal duty is $(33.0\text{ kA})^2\left(5/60\ s\right) + (30.7\text{ kA})^2\left(10/60\ s\right) = 90.8\text{ kA}^2\text{s} + 157.1\text{ kA}^2\text{s} = 247.9\text{ kA}^2\text{s}$. It is also possible that the initial fault is cleared normally, but after reclosing back into the fault, a breaker fails to interrupt the fault the second time, and the fault has to be cleared on the second shot by the breaker failure scheme. This scenario would add approximately 90 kA^2s to the 247.9 kA^2s of

heating of the single fault cleared by the breaker failure protection.

The thermal duties calculated earlier are far greater than the rating of the OPGW originally proposed by the transmission line engineering team to match the structural demand of the existing shield wire. The utility opted for the OPGW design withstand rating to not support the theoretical worst-case duty cycle of normal clearing of the initial fault followed by delayed breaker clearing of the fault after the final (and only) reclose attempt. The utility's justification was the low probably of the breaker successfully clearing the initial fault normally but shortly after failing to clear the fault after reclosing.

At this point in the study, there is a clear gap to resolve between the proposed OPGW thermal capacity of 109.0 kA^2s and the design thermal duty of 247.9 kA^2s. Also, the rating design still needs to include some margin for future fault current growth, as a current growth factor was not applied to the earlier calculations. Arrival at the final accepted design solution required both refinements to the short circuit study model and incorporating mitigation strategies that avoided substantial structure upgrades. Development of the final solution is discussed in the next section.

VII. MITIGATION DESIGN

After a detailed review of the study, the utility had several questions and further direction to refine the study and ultimately produce a design that satisfies the OPGW thermal duty, is constructible, and does not result in a significant increase in overall project cost. The most consequential of this feedback was a question about the short circuit model: how does the model account for the structure ground connections between the OPGW and earth? The line constants model from the utility's short circuit modeling software utilizes a simplified version of Carson's method, namely considering any grounded wires and earth to be at zero potential, effectively ignoring the grounded path between the OPGW and remote earth through the structure grounding design [6]. Therefore, the current return path for a ground fault is considered by the software to be the OPGW in parallel with earth of specified resistivity. The simplified earth return admittance model is not an uncommon practice for relay coordination short circuit modeling programs. However, the simplification prevents the model from indicating whether the structure grounds provide effective alternate paths to divert current from the OPGW and instead return through earth, thereby reducing the apparent OPGW current duty for a given fault. Answering this question required rebuilding the study model in an alternate system modeling software with the flexibility to model flow of fault current through more complex networks of impedances. For this case study, the Alternative Transients Program (ATP) was used and is referenced herein for convenience; other programs are available that possess the modeling and measurement capabilities needed for the analysis, and no endorsement is made for a specific modeling software.

Converting the model to ATP required reducing the original model to a boundary equivalent model, manually building the boundary equivalent model in ATP, simulating faults in both programs to verify equal simulation results, and then augmenting the ATP model with the structure grounds and other ground paths according to the design. Furthermore, the utility decided that a 10% fault current growth factor should be factored into the rating design, so the boundary equivalent source impedances at each end were reduced by 10% to increase all fault current outputs by 10%. Since the study is only interested in current flow along a single line, the ATP model was reduced to the line being studied, an equivalent source behind each end of the line, and a parallel transfer impedance connecting across the two end terminals. The original short circuit modeling software had a feature to automatically create the initial boundary equivalent system model, making the conversion of the study model to ATP a relatively simple and quick process. A one-line representation of a portion of the model is shown in Figure 1. Most of the work was spent re-modeling the studied line as a PI-equivalent line constants model, each span being modeled as a separate section, and the ends of the section being grounded through a structure footing resistance. The fault connection was modeled between the phase A conductor, OPGW, and structure. To verify accurate conversion of the model, fault simulation results were compared between models prior to adding the additional structure ground details to the ATP model.

The model of the structure grounding consisted of a resistance connected between the OPGW and ground at each structure. The utility's standard design resistance for 115 kV structure grounds is 15 ohms, which provides an important assumption to allow completion of lightning protection design studies prior to finalizing of structural designs. Satisfying the 15-ohm structure ground assumption requires that structure

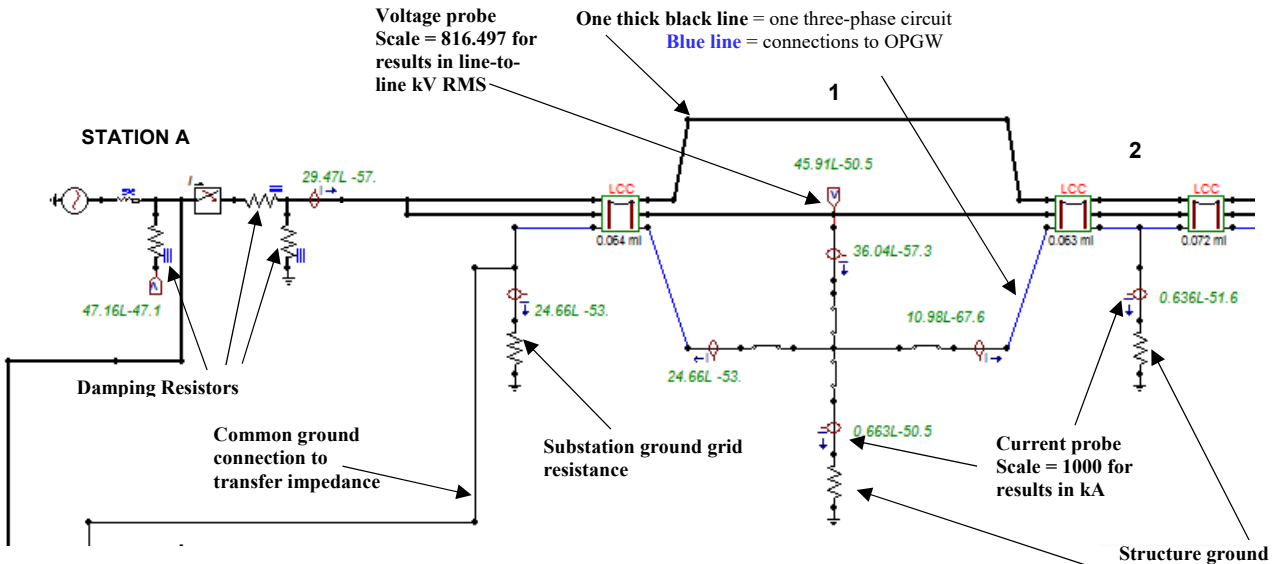

Figure 1. System Model of First Two Line Spans; Line-To-OPGW Fault Simulation.

grounding resistance is tested after the initial grounding design is installed, and further enhancements are made in the field as required to achieve a structure footing resistance of 15 ohms or less. Given prior knowledge of the area subsurface being composed of high-resistivity bedrock and soil, there was concern of a 15-ohm structure grounding system being practical to achieve and therefore assumed for the study. To address this concern, soil resistivity measurements were taken along the line, and the resulting soil was modeled in a program suited for studying electromagnetic effects. To this soil model, the utility's maximum standard grounding design was added, which is a 150-ft. long crow's foot counterpoise arrangement. This system included four ground rods located 10 feet from the structure with four 150-ft. counterpoise conductors spaced approximately 30 ft. from each other in either direction parallel to the line (Figure 2). Using this model, a nominal current was injected into the structure, and the total potential drop from the injection site to ground was recorded and used to calculate the equivalent structure footing resistance. Ultimately, the maximum standard structure grounding design only achieved an equivalent footing resistance of 40 ohms, so that value was entered as the resistance of each structure ground in the ATP model.

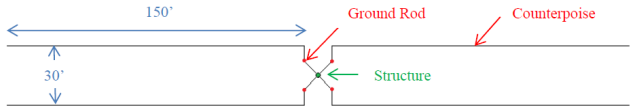

Figure 2. Structure counterpoise grounding arrangement.

Fault simulation results from the more granular study model indicated no significant change to the total current contribution to the fault through the Station A terminal, but the portion of ground current returning through the OPGW back to Station A was reduced to approximately 84% of the total current contributed by the Station A terminal. Each structure ground was off-loading the OPGW by approximately 600 A. The OPGW current duty was reduced to 24.66 kA for a fault on the first span out of Station A with both end terminals closed, and the DC offset multiplication factor was 1.008 given an OPGW current angle of -53° and a five-cycle integration period. With the Station B terminal open, the OPGW current was reduced to 24.13 kA. With these reduced apparent OPGW currents, calculating the thermal duty of a single fault event with failed breaker clearing yields $(1.008 * 24.66\ \text{kA})^2\left({}^{5}/_{60}\ s\right) + (24.13\ \text{kA})^2\left({}^{10}/_{60}\ s\right) = 51.5\ \text{kA}^2\text{s} + 97.0\ \text{kA}^2\text{s} = 148.5\ \text{kA}^2\text{s}$, a reduction in heating duty to $148.5/247.9 = 59.9\%$ of that indicated with the original short circuit model. The total heating duty still exceeded the capability of the proposed OPGW, so additional mitigation design strategies were studied.

Through discussions with the utility, a list of candidate mitigation strategies was approved for further study. From concern about any significant increases to project cost, the utility excluded the possibility of reconfiguring the pole top shielding design to support a second shield wire, which would add a second parallel conductor path for ground return current flow, reducing OPGW current duty by approximately 50% and overall heating by approximately 75%. The transmission line engineering team also confirmed that the currently proposed OPGW with thermal capacity of 109 kA^2s is the largest that the structure tops can physically support. Therefore, the scope of mitigation design study work was narrowed to grounding design enhancements, reducing the breaker failure clearing time, and isolating the OPGW from the Station A and B ground grids.

GROUNDING DESIGN ENHANCEMENTS

The two grounding design enhancement strategies studied included 1) reducing the footing ground resistance to 15 ohms and 2) installing a continuous counterpoise grounding system.

Changing the structure footing resistance to 15 ohms did not appreciably change the available fault current for a close-in fault. The total OPGW return current, however, was reduced to 21.15 kA with both terminals closed and 20.79 kA with the Station B terminal open. The fault angle and DC offset heating factor were 54.7° and 1.012, respectively. With these reduced apparent OPGW currents, calculating the thermal duty of a single fault event with failed breaker clearing yields $(1.012 * 21.15\ \text{kA})^2\left({}^{5}/_{60}\ s\right) + (20.79\ \text{kA})^2\left({}^{10}/_{60}\ s\right) = 38.2\ \text{kA}^2\text{s} + 72.0\ \text{kA}^2\text{s} = 110.2\ \text{kA}^2\text{s}$. The total heating duty is nearly within the capability of the OPGW, but additional grounding design analysis showed that achieving 15-ohm footing resistance at each structure would require significant augmentation of the grounding design, either by deep ground wells or simply installing a continuous counterpoise grounding system. Since the standard lightning design was based on a 15-ohm footing resistance, additional lightning design analysis would need to be performed to ensure satisfactory performance with either 40-ohm footing resistances or a reduced footing resistance that can be achieved cost-effectively.

Installation of a continuous counterpoise system would provide a complete second conductor path for ground fault current and reduce the OPGW current and heating duties to well within its rating. A continuous counterpoise grounding system would also provide an effective path for lightning current, resolving concerns about needing to achieve 15-ohm footing resistances. Unfortunately, the right-of-way for the line intersects major roads in no less than six locations. Installing the continuous counterpoise across the road either as an overhead span or underground would require a major increase in overall project cost and permitting time, the latter of which was not acceptable given the project target in-service date. This enhancement option was therefore not approved for implementation.

REDUCING BREAKER FAILURE CLEARING TIME

Up to this point, the study assumed the breaker failure clearing time to be 15 cycles, matching the performance of the utility's standard breaker failure scheme, which is designed for breakers with three-cycle rated interrupting time. In this project application, the two end stations have 63 kA breakers with two-cycle interrupting capability. The utility had proposed reducing the breaker failure delay timer from the standard eight cycles to six cycles to reduce the breaker failure clearing time to 13 cycles. This change would still maintain a 3.75 cycle margin between a

successful re-trip and a breaker failure trip. The effect on OPGW duty using the currents from the base design ATP model is $(1.008 * 24.66\ \text{kA})^2\left(^5/_{60}\ s\right) + (24.13\ \text{kA})^2(^8/_{60}\ s) = 51.5\ \text{kA}^2\text{s} + 77.6\ \text{kA}^2\text{s} = 129.1\ \text{kA}^2\text{s}$, a relatively safe 15% reduction in heating over the original design, but not enough to satisfy the capacity of the proposed OPGW without combining it with another means of mitigation.

ISOLATING THE OPGW FROM THE STATION GROUND GRIDS

One option proposed by the utility for study was isolating the OPGW from the ground grids at Stations A and B. Hypothetically, this change would increase overall zero sequence impedance of the ground fault and reduce available fault current, thereby also reducing OPGW duty. The OPGW would remain grounded at the remaining structures, and therefore the impact on line lightning protection performance would be negligible. By disconnecting the OPGW from the ground grids in the ATP model, the OPGW current for a fault in the first span from Station A is 21.29 kA ∠-38° with both line terminals closed and 18.29 kA ∠-46° with the Station B terminal open. Assuming the 13-cycle breaker failure design, the heating duty with isolated OPGW would be $(1.000 * 21.29\ \text{kA})^2\left(^5/_{60}\ s\right) + (18.29\ \text{kA})^2(^8/_{60}\ s) = 37.77\ \text{kA}^2\text{s} + 44.6\ \text{kA}^2\text{s} = 82.37\ \text{kA}^2\text{s}$, which is well within the thermal rating of the proposed OPGW. To physically implement such a change would require adding an insulator at the dead-end connection of the OPGW at the substation A-frame structure. The OPGW tail would be then trained down into an OPGW isolator assembly that resembles an underground cable termination and is used to transition the fiber tube out of the OPGW conductor body while maintaining isolation of the conductor body from the grounded substation A-frame. Alternatively, the OPGW tail can be trained down the A-frame using station post insulations to transition the fiber out of the conductor body within a fiber splice case mounted to another station post insulator. The ability of the isolator assembly to withstand a flashover during a ground fault is represented by its 60 Hz frequency wet withstand rating, which was just over 100 kV in this case. A station post insulator solution could implement greater insulation levels needed for applications with greater line voltages. The ATP fault simulation model indicated an OPGW peak potential rise at the fault point of 67.38 kV relative to ground with both terminals closed and 61.45 kV once the Station B end opens. The OPGW isolator was therefore suitable for the application, as would be a 38 kV-class strain insulator for the A-frame dead end termination. Given that the OPGW is a less effective ground path without the connection to the substation ground grids, this amount of OPGW voltage rise during a fault is expected, approaching the line-to-ground voltage as the impedance increases between the OPGW and ground.

The isolated OPGW option appeared initially to be a very effective option for reducing the OPGW current duty while requiring minimal infrastructure investment to implement it. However, some additional tradeoffs had to be addressed. Because the ampere limit to which the substation ground grid will remain IEEE 80 compliant will decrease by having one less alternate ground path connection, the substation grounding studies had to be reviewed for both designs. Fortunately, the substations' initial ground grids were designed to be compliant up to 63 kA, so the loss of one shield path only took out some margin of compliance, and the ground grid design remained compliant for the foreseeable future. The other complication was that the isolated OPGW design needed to be reflected in the line constants model for the utility's overall system short circuit model so that the protective relay settings will accurately discern in-zone versus out-of-zone faults. Representing the isolated ends of the OGPW was a single-span line constants model section at each end of the line that featured a "segmented shield," which effectively isolates the OPGW from the two end substation ground grids. A segmented ground wire is ignored in the software's series impedance calculations but is considered in the shunt-capacitance calculations. The short circuit model software used by the utility also does not account for the structure grounding at all, rather treating the ground fault as connected in parallel with the OPGW and earth defined by its resistivity. The earth resistivity could be used as a tuning parameter to make the short circuit results from the utility short circuit software more closely match that of the ATP model, although this is a preliminary suggestion and requires further investigation to understand the practicality and tradeoffs to this approach. Other available short circuit modeling programs model the structure footing grounds with specified resistance as a distributed parameter and would be expected to more accurately match the results from the ATP model of the isolated OPGW and detailed structure grounding.

CONCLUSION

Addition of an OPGW to a transmission line can require extensive and iterative analyses of fault current duty, the line structural design, and even the structure grounding design to ensure that an OPGW will not anneal and fail due to thermal overload. Especially when the fiber within the OPGW is relied on for critical communications applications like line teleprotection and SCADA, it is important to prevent an OPGW failure because it does not lend to a practical mid-span splice repair option. Introducing fault current duty calculations as soon as possible into the overall design process, even during the scoping and planning phase of a project, would help a utility to develop a line design that can cost-effectively satisfy the thermal duty of the OPGW application. If the OPGW thermal duty is accounted for later in the design process, fewer options are available to augment the line design to satisfy the thermal duty. Mitigation options are available that can help reduce the OPGW thermal duty, and this paper discusses the process and techniques for developing a few different mitigation strategies.

ACKNOWLEDGEMENT

The author would like to thank fellow POWER Engineers colleagues Andrea Wood, Joe Mooney, and Jon Leman for their contributions to this paper and the original case study.

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[2] Dale L. Johnson and William W. Vaughn, "Lightning Characteristics and Lightning Strike Peak Current Probabilities as Related to Aerospace Vehicle Operations," in Proceedings of The Eighth Conference on Aviation, Range, and Aerospace Meterology, Dallas, TX, 1999, p. 3.

[3] C62.11-2012 IEEE Standard for Metal-Oxide Surge Arresters for AC Power Circuits (> 1 kV).

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BIOGRAPHY

Ryan McMaster has been a consulting engineer for electric utilities for the past 11 years, joining POWER Engineers in 2013. He is a member of the SCADA and Analytical Services group, where he performs a variety of electrical system studies for transmission, substation, and generation projects. He has a background in protective relaying and substation protection and control design. Ryan received his B.S. in Electrical Engineering from Washington State University.

Section 16-50j-59 - Information required.

Section **16-50j-59** Requires listed information when applying for a certificate of environmental compatibility or a **modification** of an existing energy facility, as defined in Section 16-50i(a)(**1) to (4),** inclusive

> ***(19)*** *"Modification" means a significant change or alteration in the general physical characteristics of a facility, including, but not limited to, design, capacity, process or operation that the Council deems significant, except where a modification involves a temporary facility as determined by the Council.*

Sec. 16-50i. Definitions. *As used in this chapter:*

(a) "Facility" means: ***(1)*** *An electric transmission line of a design capacity of sixty-nine kilovolts or more, including associated equipment*

(4) *any electric substation or switchyard designed to change or regulate the voltage of electricity at sixty-nine kilovolts or more or to connect two or more electric circuits at such voltage, which substation or switchyard may have a substantial adverse environmental effect, as determined by the council established under section 16-50j, and other facilities which* ***may have a substantial adverse environmental effect as the council may, by regulation, prescribe;***

Section 16-50j-56 - Finding

Pursuant to Section 16-50i(a) (1) to (4), inclusive, of the Connecticut General Statutes, the Council finds that each energy site ***and its associated equipment*** *except as specified in Section 16-50j-57 of the Regulations of Connecticut State Agencies* ***may have a substantial adverse environmental effect and therefore is a facility****, and any modification, as defined in section 16-50j-2 a(m) of the Regulations of Connecticut State Agencies, to an existing energy site, except as specified in Section 16-50j-57 of the Regulations of Connecticut State Agencies may have a substantial adverse environmental effect.*

(a) ***"Facility" means: (****1) An electric transmission line of a design capacity of sixty-nine kilovolts or more,* ***including associated equipment***

Section 16-50j-57

This section deals with Council determinations that certain facilities and work has been pre determined to have no substantial adverse environmental impacts by the Council and do not require a petition. Since a petition has been submitted the described work does not fall into the category of pre determine or exempt work.

Summary,

The required information listed in Section 16-50j-59 applies to petition 1566.

The work described in petition 1566 involves a transmission line and its associated equipment that is over 69 kv and by definition is an existing energy facility. Petition 1566's described work is a modification to an existing facility in that the work described in petition 1566 is a general alternation in the general physical characteristics of a facility and is also a significant change. Section 16-50i(a) (4), determined that a facility was also other facilities which may have a substantial adverse environmental effect as the council may, by regulation, prescribe. In Section 16-50j-56 – Finding - the council made a finding (prescribed) that each energy site and its associated equipment may have a substantial adverse environmental impact.

As a result of this finding, the energy sites and work described in petition 1566 constitutes a modification to an existing energy facility and the petition must contain the required information described in Section 16-50j-59.

Modification" means a significant change or alteration in the general physical characteristics of a facility."

The following information details how the work described in petition 1566 constitutes a modification as defined above.

The petition is for the modification of the power line system to install an OPGW system. The petition details that numerous transmission towers must be replaced in order to handle the stresses and loads caused by the install of the OPGW system. The petition does not describe the size of the OPGW cable however one can assume that it is much larger since tower structures must be replaced to support it. This changes the visual characteristics of the line and is a significant change from what previously existed. The petition states that an unknown amount of counterpose will be required as a result of the install of the OPGW system. The petition states that an ADDS system will be required to be added to the system. As detailed in Exhibit 8 -Tutorial on Optical Ground Wire Ratings Analysis for Protection Engineers, repairs are much more complicated with an OPGW system in that repairs cannot be made mid span and that in the event of a break the fiber optic cable must also be repaired as well as the supporting cable. The entire line is being transformed from a standard electric transmission line to a communications network. As detailed in other articles on OPGW cables this system can be used as a alarm system to detect anyone tampering with a tower. Other articles also describe how other utilities have turned these cables into a for profit enterprise by renting out the cable for the transmission of high-speed data to other companies. Quite simply the installation of this cable entirely transforms the use of this line from electric to electric and telecommunications.

The submitted plan states in many sections that existing gravel at existing sites will be utilized in the OPGW install. Since no details as to what Eversource plans to do with

the existing gravel is contained in the petition how is one to determine if a significant modification to each site will occur? On our property at site 1786 the pad that was installed without a Council permit was a significant change to the physical characteristics of the facility. Petition 1566 calls for an undefined utilization of gravel of a previous significant change which makes the present change significant as well. This work cannot be characterized as temporary in that Eversource has refused to restore the site to its original condition and remove the pad.

The petition calls for mowing of the entire ROW to a height of 6 to 8 inches and includes mowing of wetlands to this height. This is a significant change to the general physical characteristics of all the facilities contained in the ROW. The entire ROW is approximately 189.5 acres.

The petition calls for tree trimming and removal of trees on and outside the ROW. As demonstrated in Exhibits 1 and 1a, illegal removal of trees outside the ROW has previously occurred as well as the present petition calls for more undefined tree removal. This is a significant change of the physical characteristics of all the facilities.

The petition states that pads of 150 by 150 may be needed and on angled sections of the line a minimum pad of 130 by 80 is needed. The petition does not detail how or where these pads will be installed, however the installation of the pads is a significant change to the general physical characteristics of the facility. On our property the angled line is at site 7785 which is a steep hillside. If the 130 by 80 pad is run parallel to the existing lines, then hundreds of truckloads of full material will be needed to construct this pad. If it is run perpendicular to the lines, then you cannot fit 130 feet into a 125 foot wide ROW as well as significantly more fill on top of the 800 tons presently illegally deposited at this site by Eversource will be needed. The petition does not detail how this minimum work pad is to be installed at site 7785. However, in either direction the work constitutes a significant change to the physical characteristic of the facility. It should be noted that this work cannot be characterized as temporary in that Eversource has to date refused to remove any road or pad on this property in direct contradiction to their own Best Management Practices Manual.

The petition calls for the installation of an unknown amount of counterpose. Burying electric ground wire in trenches is a significant change to the physical characteristics of the facility, a violation of the terms of the easement, and alteration of the general physical characteristics of the facility.

The above-listed facts constitute a significant change or alteration in the general physical characteristics of a facility" This transmission line is a facility and has a design load of greater than 69KV. This petition meets the requirements for information required under Section16-50j-59.

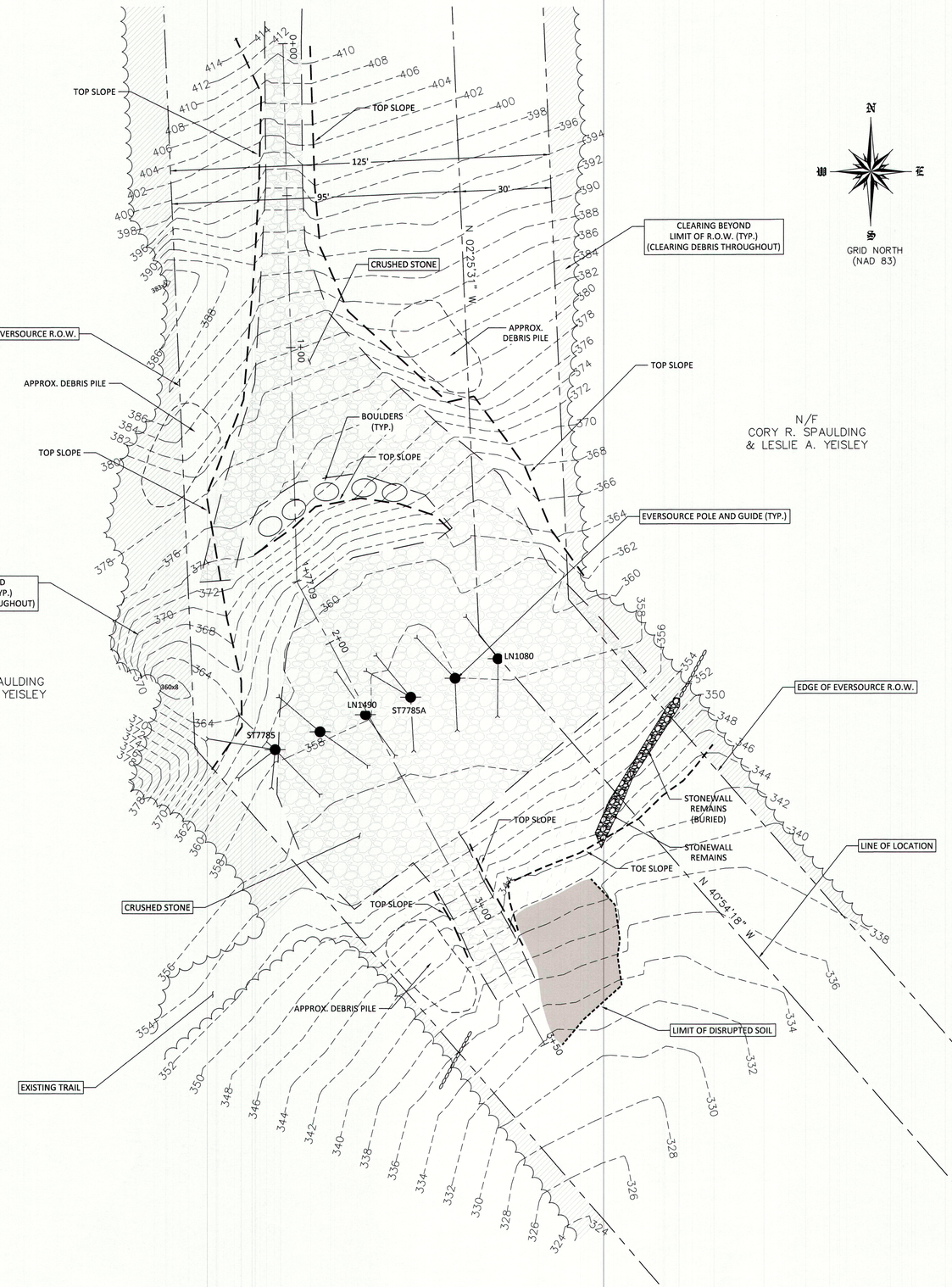
Attachments

Exhibit 8 -Tutorial on Optical Ground Wire Ratings Analysis for Protection Engineers

LEGEND

THESE STANDARD SYMBOLS WILL BE FOUND IN THE DRAWING.

- EDGE OF EVERSOURCE R.O.W.
- LINE OF LOCATION (BASELINE)
- 100 EXISTING CONTOUR
- LIMIT OF CLEARING
- UTILITY POLE
- CRUSHED STONE



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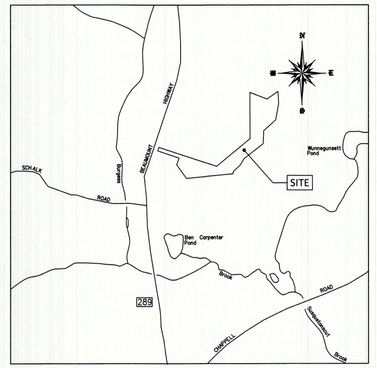
(NAD 83)



LOCATION MAP
SCALE: 1"= 1000'

PLAN VIEW
0 10 20 40
SCALE: 1"= 20'

MAP REFERENCES:

1. "PROPERTY OF HOWARD W. & ELIZABETH DAVIS LEBANON, CONN." BY MEGSON & HEAGLE CIVIL ENGINEERS & LAND SURVEYORS GLASTONBURY, CONN. DATE: 7-6-81 SCALE: 1"=100' MAP NO.170-80-1
2. "REAL ESTATE SURVEY PLAN RECORD MAP RIGHT OF WAY SURVEY MONTVILLE-WAWECUS JUNCTION-CARD SS" BY EVERSOURCE ENERGY DATE: 3-2018, SCALE: 1"=200' REVISED 7-2021
3. "CARD TO MONTVILLE TO TUNNEL UPGRADE PROJECT LEBANON, CT LINE 1080/1490 - STRUCTURES 7781, 7782, 7783 & 7784" BY EVERSOURCE ENERGY DATE: JULY,2017 MAP SHEET 5 OF 23 SCALE: 1"=200'

MAP STANDARD NOTES:

1. THIS SURVEY AND MAP HAS BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THROUGH 20-300b-20 AND THE "STANDARDS AND SUGGESTED METHODS AND PROCEDURES FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON AUGUST 29, 2019.
2. THE TYPE OF SURVEY IS AN TOPOGRAPHIC SURVEY.
   BOUNDARY DETERMINATION CATEGORY: RESURVEY
   HORIZONTAL ACCURACY CLASS: A-2.
   TOPOGRAPHIC ACCURACY CLASS: T-2 (EXISTING CONTOURS)
   T-D (ORIGINAL GRADE)

TO MY KNOWLEDGE AND BELIEF, THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

THIS DRAWING IS NOT VALID UNLESS IT BEARS AN ORIGINAL INK SIGNATURE AND EMBOSSED SEAL

ROBERT W. HELLSTROM, L.S. #13626

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Designed By: SAM
Drawn By: SAM
Checked By: MAR
CAD File: 22-037_Exist_Cond

Drawing Scale: 1"=20'
Drawing date: 4/15/22

Rev.	Date	Revision	By

Existing Conditions Plan

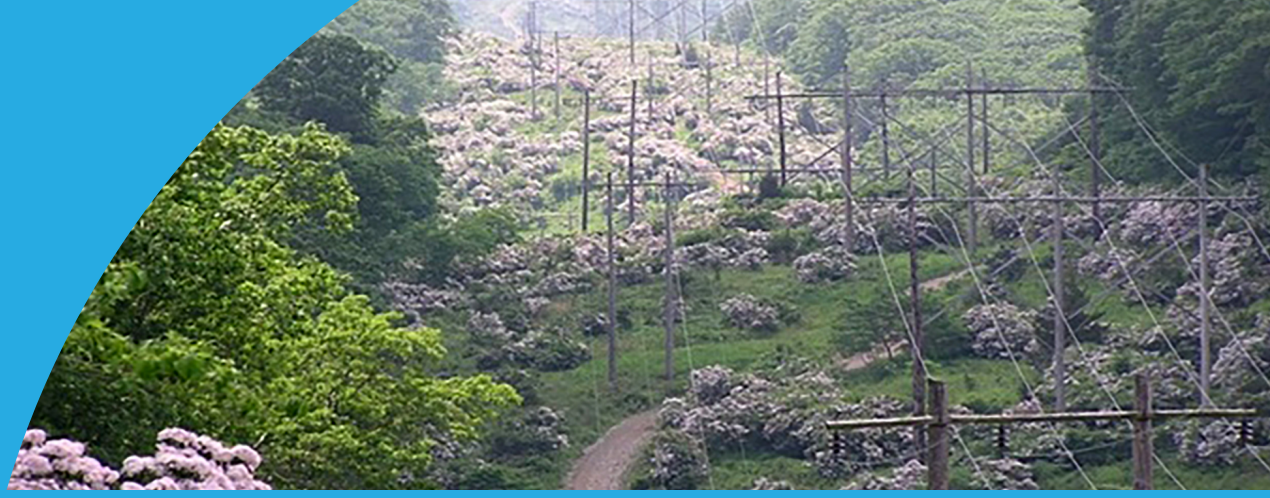
PROJECT TITLE: *Owunnegunset Mountain*
716 Beaumont Hwy.
Lebanon, Ct.

PREPARED FOR: *Cory Spaulding*

RES
Reynolds Engineering Services, LLC
CIVIL ENGINEERING CONSULTANTS
63 NORWICH AVENUE
COLCHESTER CT
(860) 5160033

Drawing #: 1 OF 3

Job #: 22-037



CONSTRUCTION & MAINTENANCE ENVIRONMENTAL REQUIREMENTS

Best Management Practices Manual for Massachusetts and Connecticut

APRIL 2022

Prepared for:
Eversource Energy Environmental Licensing and Permitting Group

EVERSOURCE

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A BMP Typical Details

SECTION 1

Section 1
Introduction

1.1 Purpose

As a matter of Eversource Energy (herein, "Eversource") policy with regard to environmental stewardship and in accordance with local, state, and federal regulations, all construction and maintenance projects shall use environmentally sound best management practices (BMPs) to minimize or eliminate environmental impacts that may result from construction activities. Regardless of whether a specific permit is needed for the work, construction and maintenance projects must follow internal environmental performance standards, which is the purpose of these BMPs.

In many cases, maintenance activities are exempt from regulatory authorization. Permits are usually required for new work. Contractors will be provided with copies of any project-specific permits and will be required to adhere to any and all conditions of the permit(s). Project-specific permit conditions may supersede the BMPs outlined in this manual. However, where certain construction elements are not addressed by permit conditions, or where permitting is not required, or for emergency situations where obtaining a permit before the work occurs may not be feasible, these BMPs shall be considered as Eversource's standards. In some cases, and at the discretion of the Eversource Environmental Licensing and Permitting staff, the BMPs presented herein may be modified to be more appropriate for site-specific conditions.

1.2 Scope and Applicability

These BMPs primarily address the disturbance of soil, water, and vegetation incidental to construction within on- and off-road utility corridors, substations, including the establishment of access roads and work areas, within rights of way (ROWs) and on private property, in and near wetlands, watercourses, or other sensitive natural areas (such as protected species), including storm drain systems (e.g., catch basins). Types of construction include, but are not limited to, installation or maintenance of underground and overhead utilities, access road repair/improvement or construction, and upgrades or maintenance of substations and other facilities. Other common construction issues such as noise, air pollution, oil spill procedures, handling of contaminated soils, and work safety rules are addressed in the Eversource Energy Contractor Work Rules and related appendices.

1.3 Definitions

The following definitions are provided to clarify use of common terms throughout this document.

Best Management Practice (BMP): A means to reduce and minimize impact to natural resources.

Casing: A galvanized steel corrugated pipe that serves as the form for a utility structure foundation.

Emergency Projects: Actions needed to maintain the operational integrity of the system or activities necessary to restore the system and affected facilities in response to a sudden and unexpected loss of electric or gas service or events that affect public health and safety.

Embedded Culvert: A culvert that is installed in such a way that the bottom of the structure is below the stream bed and there is substrate in the culvert.

Environmentally Sensitive Areas: An area containing natural features, cultural resources, or ecological functions of such significance to warrant protection. Some examples are rivers, streams, ponds, lakes, wetlands, rare species habitat, water supply protection areas, archaeological sites, parks, and agricultural land.

Erosion Control: A measure to prevent soil from detachment and transportation by water, wind, or gravity.

Existing Access Roads: Previously permitted or grandfathered access roads that are used to access structures that are clearly visible or can be found by mowing or by the presence of road materials in soil cores.

Grubbing: A site preparation method that is used to clear the ground of roots and stumps.

Intermittent Watercourse: An intermittent watercourse, or stream, is broadly defined as a channel that a flowing body of water follows at irregular intervals and does not have continuous or steady flow. Regulatory definitions for intermittent watercourses are:

- **Connecticut** – Per the Connecticut Inland Wetland and Watercourses Act, intermittent watercourses are delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of recent alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation.
- **Massachusetts** – Under the Massachusetts Wetlands Protection Act (MAWPA), a jurisdictional intermittent watercourse is defined as a body of running water which moves in a definite channel in the ground due to a hydraulic gradient, does not flow throughout the year, and which flows within, into or out of an area subject to protection under the MAWPA. Intermittent watercourses upgradient of any Bordering Vegetated Wetlands or Ponds are not jurisdictional under the MAWPA. A watercourse can be determined to be intermittent if it meets MAWPA criteria with regard to its depiction on the most current USGS topographic map of the area (i.e., shown as intermittent or not shown), and watershed size and predicted flow rates as determined by the USGS StreamStats method or documented observations of no flow at least once per day over the course of four days in any consecutive 12-month period barring drought conditions, withdrawals, or other human-made flow reductions or diversions (subject to conservation commission and/or MassDEP review and approval).

Limit of Work/Disturbance: The boundaries of the approved project within regulated areas. All project related activities in regulated areas must be conducted within the approved limit of work/disturbance. The limit of work/disturbance should be depicted on the approved permit site plans, which may require the limits to be survey located and identified in the field by flagging, construction fencing, and/or perimeter erosion controls.

Low Ground Pressure Vehicle: Vehicles that have a lesser impact on an environmentally sensitive area due to the vehicle being smaller, lighter, or different in another way than a vehicle which would have a greater impact. Low ground pressure is

measured in pounds per square inch (psi) when loaded and as defined by the US Army Corps of Engineers (ACOE).

CT = < 3 psi

MA = < 3 psi

Low impact vehicles could include off-road vehicles (ORVs) or all-terrain vehicles/ utility vehicles (ATVs/UTVs), tracked vehicles with low ground pressure, or vehicles with oversized balloon-type tires.

Maintenance Projects: Typically consist of activities limited to the repair and/or replacement of existing and lawfully located utility structures and/or facilities where no substantial change in the original structure or footprint is proposed. Maintenance activities also include vegetation management.

Minimization: Causing as little disturbance to an area as practicable during construction.

New Construction: Construction of new transmission or distribution facilities that previously did not exist or construction that substantially modifies existing facilities. All new (and existing) construction projects are required to go through a full permit review by Eversource Environmental Licensing and Permitting.

Pre-Construction Notification (PCN): Project activities that do not qualify for Self-Verification (SV) or where otherwise required by the terms of the Massachusetts (MA) and Connecticut (CT) General Permits (GPs) must submit a PCN and obtain written verification before starting work in ACOE jurisdiction. Refer to MA and CT GPs for PCN thresholds. Projects that cannot be completed under a PCN must file for an Individual Permit with the ACOE. In CT, for coastal projects, notification is provided to ACOE by the CT Department of Energy and Environmental Protection (CT DEEP), Office of Long Island Sound Programs (OLISP) or by applicants as necessary. Written approval from ACOE is required.

Protected Species: Species named and protected under the Massachusetts Endangered Species Act (MESA) regulations and/or the Connecticut Endangered Species Act (C.G.S. §§ 26-303 through 26-315).

Rare Species: *See Protected Species.*

Restoration: To return a disturbed area to its former, original or unimpaired condition. A site is considered fully restored when it has returned (as closely as practicable) to its original state. Restoration of disturbed areas should occur as soon as practicable following the completion of activities at that location.

Revegetation: Establishment of plant material for temporary or permanent soil stabilization.

Right of Way (ROW): A pathway, road, or corridor of land where Eversource has legal rights (either fee ownership, lease, or easement) to construct, operate, and maintain an electric power line and/or natural gas pipeline.

Sediment Control: The practice of managing the erosion of soil materials mobilized by water, typically stormwater runoff, on-site for the purpose of protecting nearby wetland and water resources.

Self-Verification (SV): Activities that are eligible for SV are authorized under the MA and CT GPs and may commence without written verification from the ACOE provided the prospective permittee has:

i. Confirmed that the activity will meet the terms and conditions of applicable MA and CT GPs.

ii. Submitted the Self-Verification Notification Form (SVNF) to the ACOE.

In CT, coastal projects do not require filing of a SVNF. ACOE relies on CT DEEP submittals.

Sensitive Environmental Area: For the purposes of this BMP Manual, this term shall be inclusive of all wetlands, streams, waterways, waterbodies, buffer zones, rare species habitat, and historical/cultural resources.

Stabilization: A system of permanent or temporary measures used alone or in combination to minimize erosion from disturbed areas.

Work: For the purposes of this BMP Manual, any form of temporary or permanent draining, dumping, damming, discharging, excavating, filling or grading; the erection, reconstruction, replacement or expansion of any buildings or structures; the driving of piles; the construction or improvement of roads and other ways; the changing of run-off characteristics; the intercepting or diverging of ground or surface water; the installation of storm drain systems (e.g., catch basins); the discharging of pollutants; the destruction of plant life; and any other changing of the physical characteristics of land including, but not limited to: on- and off-road utility corridors and substations. Types of work include but are not limited to the installation or maintenance of underground and overhead utilities, substations and other facilities.

1.4 Acronyms and Abbreviations

The following acronyms and abbreviated are provided to clarify use of common terms throughout this document.

All-terrain Vehicle	ATV
Best Management Practice	BMP
Certified Vernal Pool	CVP
Connecticut	CT
Connecticut Department of Energy & Environmental Protection	CT DEEP
Connecticut Department of Transportation	ConnDOT
Connecticut General Statute	Conn. Gen. Stat.
Cross-Linked Polyethylene	XLPE
Eastern Box Turtle	EBT
Environmental Affairs Department	EAD
Eversource Energy	Eversource
General Permits	GPs
Geographic Information System	GIS
High-Pressure Fluid-Filled	HPFF
Horizontal Directional Drilling	HDD
Kilovolt	kV
Massachusetts	MA
Massachusetts Department of Agriculture	MA DAR
Massachusetts Department of Conservation and Recreation	MA DCR

Massachusetts Department of Environmental Protection	MassDEP
Massachusetts Endangered Species Act	MESA
Massachusetts Wetlands Protection Act	MAWPA
Massachusetts General Law	M.G.L.
Natural Diversity Database	NDDB
Natural Heritage and Endangered Species Program	NHESP
New England Cottontail	NEC
Off-Road Vehicle	ORV
Outstanding Resource Water	ORW
Pounds per Square Inch	psi
Pre-Construction Notification	PCN
Right of Way	ROW
Self-Verification	SV
Self-Verification Notification Form	SVNF
Species	spp.
Time of Year	TOY
United States	U.S.
United States Army Corps of Engineers	ACOE
United States Department of Agriculture	USDA
United States Geologic Survey	USGS
Utility Vehicle	UTV
Vegetation Management Plan	VMP

1.5 BMP References

The following table lists the public guidance documents utilized during the preparation of this BMP manual. Refer to these documents for additional information.

BMP References
General
Best Management Practices (BMPs) Manual for Access Road Crossings of Wetlands and Waterbodies, EPRI, Palo Alto, CA (2002) 1005188.
Gas Research Institute. Horizontal Directional Drilling Best Management Practices Manual (2002) ENSR Corporation, Westford, MA and Trenchless Engineering Corp., Houston, TX.
Connecticut
Connecticut Department of Transportation (ConnDOT). ConnDOT Drainage Manual (October 2000) http://www.ct.gov/dot/cwp/view.asp?a=1385&Q=260116

BMP References

Connecticut Standard Specifications for Roads, Bridges and Incidental Construction, FORM 816 (2004) http://www.ct.gov/dot/cwp/view.asp?a=3609&q=430362

Connecticut Department of Energy & Environmental Protection. Connecticut Guidelines for Erosion and Sediment Control. (2002) http://www.ct.gov/deep/cwp/view.asp?a=2720&q=325660&deepNav_GID=1654%20

Connecticut Department of Energy & Environmental Protection, Bureau of Natural Resources, Division of Forestry. Best Management Practices for Water Quality While Harvesting Forest Products (2012) https://portal.ct.gov/-/media/DEEP/forestry/best_management_practices/BestPracticesManualpdf.pdf

Regulations of Connecticut State Agencies (RCSA). Control of Particulate Matter and Visible Emissions. Section 22a-174-18. https://eregulations.ct.gov/eRegsPortal/Browse/RCSA/Title_22aSubtitle_22a-174Section_22a-174-18/

Massachusetts

Commonwealth of Massachusetts Department of Public Works Standard Specifications for Highways and Bridges (2020) https://www.mass.gov/doc/2020-standard-specifications-for-highways-and-bridges/download

Massachusetts River and Stream Crossing Standards (Revised March 1, 2011) https://www.nae.usace.army.mil/Portals/74/docs/regulatory/StreamRiverContinuity/MA_RiverStreamCrossingStandards.pdf

Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas. Original Print: March 1997. *Reprint: May 2003*. https://www.mass.gov/doc/complete-erosion-and-sedimentation-control-guidelines-a-guide-for-planners-designers-and/download

The Massachusetts Unpaved Roads BMP Manual (Winter 2001) https://www.mass.gov/doc/unpaved-roads-bmp-manual/download

The Massachusetts Anti-Idling Law. M.G.L. Chapter 90, Section 16A and 310 CMR 7.11. https://www.mass.gov/doc/massdep-faq-the-massachusetts-anti-idling-law/download

SECTION 2

Section 2
Project Planning

After undergoing an initial screening review by the department conducting the proposed project, if sensitive environmental areas are identified, the project is required to go through a permit review by Eversource Environmental Licensing and Permitting. The permit review process is supported by Geographic Information Systems (GIS) or a similar program that references the most current spatial data for the project areas in question. Through the GIS review process various geo-processing tools are used to compose maps and provide a spatial reference to environmentally sensitive areas. In consultation with Eversource Environmental Licensing and Permitting, the Project Engineer, permitting specialist, or other project planner should determine regulatory jurisdiction and which (if any) environmental permits or approvals are required before starting any project. Questions regarding which activities may be conducted in regulated areas or within environmentally sensitive areas should be referred to Eversource Environmental Licensing and Permitting. Summaries of potentially applicable laws and regulations are provided in Appendices B and C of this document.

Eversource employs a best practice mitigation hierarchy to 1) avoid environmental impacts wherever possible, followed by 2) minimization of environmental impacts where they cannot be avoided, and 3) mitigating and restoring any environmental impacts where necessary.

2.1 Regulated Areas

2.1.1 Types of Wetlands

Wetland areas common to New England and common to both Connecticut and Massachusetts include, but are not limited to, the following:

Forested Wetlands

Forested wetlands are wetlands that are dominated by trees that are 20 feet or taller. These wetlands are typically drier with standing water typically occurring during periods of high precipitation, seasonally high groundwater, snowmelt, and runoff (e.g., early spring through mid-summer). Tree species typical of this type of wetland include red maple (*Acer rubrum*) and eastern hemlock (*Tsuga canadensis*). "Pit and mound" topography is common in forested wetlands, where mature trees grow on the higher and drier mounds and obligate wetland species are found in the lower pits.

Scrub-Shrub Wetlands

Scrub-shrub wetlands are dominated by woody vegetation less than 20 feet tall and may include peat bogs. Typical bog species include leatherleaf (*Chamaedaphne calyculata*), cotton grasses (*Eriophorum* sp.), cranberry (*Vaccinium macrocarpon, V. oxycoccus*), and black spruce (*Picea mariana*). Other non-bog scrub-shrub wetlands are characterized by buttonbush (*Cephalanthus occidentalis*), alders (*Alnus* spp.), dogwoods (*Swida* spp.), and arrowwoods (*Viburnum* spp.).

Marshes

Marshes are dominated by erect, herbaceous vegetation and appear as grasslands or stands of reedy growth. These wetlands are commonly referred to by a host of terms, including marsh, wet meadow, or fen. These areas are flooded all or most of the year and, in New England, tend to be dominated by cattails (*Typha* spp.).

Wet Meadows

Typical wet meadow species include grasses such as bluejoint (*Calamagrostis canadensis*) and reed canary grass (*Phalaris arundinacea*), sedges (*Carex* spp.) and rushes (*Juncus* spp.), and various other forbs such as Joe-Pye-weeds (*Eutrochium* spp.) and asters (*Aster* spp.).

Floodplains

A floodplain is generally defined as an area of low-lying ground adjacent to a stream or river that is formed mainly of river sediments and is subject to inundation from floodwaters. State-specific regulatory definitions vary and are described as follows:

- In Connecticut, areas that contain alluvial or floodplain soils are regulated as wetlands. These areas may flood so infrequently or be so freely drained that hydrophytic vegetation and hydric soils are not present. Soils in these areas must be examined carefully to determine whether well drained alluvial or floodplain soils are present.
- In Massachusetts, a floodplain is a type of wetland resource area that floods following storms, prolonged rainfall, or snowmelt. There are three types of floodplain areas protected under the MAWPA: coastal areas, areas bordering rivers and streams, and isolated depressions that flood at least once a year.

Streams

A stream is any natural flowing body of water that empties to any ocean, lake, pond or other river. Perennial streams, or rivers, have flows throughout the year. Intermittent streams do not have surface flows throughout the year, though surface water may remain in isolated pockets.

Vernal Pools

Vernal pools are typically contained basin depressions lacking permanent aboveground outlets. These areas fill with water with the rising water table of fall and winter and/or with the meltwater and runoff of winter and spring snow and rain. The pools contain water for a few months in the spring and early summer. Due to periodic drying cycles, vernal pools do not support breeding fish populations and can thus serve as breeding grounds for a variety of organisms, including some rare and/or protected species of frogs and salamanders.

2.1.2 Rare Species

Utility ROWs within Connecticut and Massachusetts overlap with, and in some circumstances create or enhance, habitat of rare/protected species of plants, vertebrate and invertebrate animals. Special requirements may need to be evaluated as part of new construction and/or some maintenance activities.

2.1.3 Historical/Cultural

Other regulated factors taken into consideration during the project planning process include the presence of protected (i.e., threatened or endangered) species, non- native, invasive plant species and/or historical/cultural resources. Special requirements may need to be evaluated as part of new construction and/or some maintenance activities.

2.2 Meetings

A pre-construction meeting is typically held prior to the commencement of all work with the purpose to appoint responsible parties, discuss timing of work, and further consider options to avoid and/or minimize disturbance to sensitive areas. The meeting confirms that there is consensus on work methods and responsibilities and ensures that tasks will be fulfilled with as little disturbance to the environment as practicable. These meetings can occur on or off-site and should include all the applicable stakeholders (i.e., Eversource, contractors, consultants, inspectors and/or monitors, and regulatory agency personnel). A short and less formal briefing should suffice for smaller maintenance projects.

2.3 Site Staging and Parking

During the project planning and permitting process, locations should be identified for designated crew parking areas, material storage, and staging areas. Where possible, these areas should be located outside of buffer zones, watershed protection areas, and other environmentally sensitive areas. Any proposed locations should be evaluated for all sensitive receptors and for new projects requiring permitting, should be incorporated onto permitting and access plans.

2.4 Construction Monitoring

Construction projects require environmental monitoring, which can be conducted either internally or by consultants. Some permitted projects require oversight by designated and pre-approved compliance monitors. Environmental monitoring is a way to keep a chronological record of pre-construction site conditions, progress, and changes that are made, as well as to document issues and authorized solutions.

If work will occur in a sensitive environmental area, permit conditions may dictate that construction be monitored by a qualified and pre-approved wetland or wildlife specialist.

2.5 Signage/Limit of Boundaries

Where appropriate, wetland delineation flagging or signage shall be installed that makes clear where critical boundaries (i.e., the limits of jurisdictional wetland resource areas, rare species habitat, and/or historical/cultural resources) and setbacks occur. Appropriate signage shall also be installed to indicate regulatory authorization by agencies and to prohibit certain uses on ROWs, such as ORV traffic.

Where appropriate, signage shall be installed along sediment and erosion control barriers at appropriate intervals, heights, and sizes to ensure that the presence and location of said barriers is clear to construction personnel during deep snow or other low visibility conditions. Inspection and maintenance of this signage shall be conducted on a regular basis to ensure effectiveness.

Examples of signage at wetlands

SECTION 3

Section 3
Construction Considerations

This section addresses BMPs specific to construction of new access roads, repair of existing access roads, the installation of work pads, structure-related work, and soil stockpile management. Information regarding recommended erosion and sedimentation controls or stormwater controls is also discussed. Please refer to Appendix A for typical details and representative photographs of BMPs used for erosion and sedimentation control and water diversion during construction.

During all project activities (e.g., maintenance, new construction), federal, state, and local regulatory authorities require steps be taken to avoid, minimize, and/or mitigate disturbance to the environment. Sensitive environmental areas should be avoided whenever practicable. However, some projects may require entrance into these areas in order to perform work. This section discusses measures that should be taken to minimize disturbance to if work must occur within sensitive environmental areas.

BMPs were developed to aid in this process and should be carefully selected and implemented based on the proposed activities and the nature of sensitive area(s) encountered at each site. Proper selection of BMPs should take into consideration the project goals, permit requirements, and site-specific information. Once an assessment of the area is made and requirements of the project are established, all BMPs should be considered and implemented as appropriate.

3.1 Avoidance and Minimization

Avoidance and minimization should always be considered before beginning any construction or maintenance project. Eversource and their contractors should utilize appropriate measures to avoid construction impacts to sensitive environmental areas including, but not limited to: wetlands, waterways, rare species habitats, known below and above ground historical/archeological resources, and other environmentally sensitive areas. Use existing ROW access whenever practicable. Keep to approved routes and roads and do not widen or deviate from them. Consult with the Eversource Environmental Licensing and Permitting Group, when avoidance is not practicable, to determine measures to minimize the extent of construction impacts. Alternate access routes and/or staging areas that will minimize construction impacts to the natural environment may be considered.

3.2 Rare Species Habitat

Eversource Environmental Licensing and Permitting coordinates with state and local agencies when work is within areas designated as rare and/or sensitive species habitat.

In order to protect these resources in Connecticut, the following must be reviewed:

- Natural Diversity Database (NDDB) area mapping.
- Critical Habitat mapping.
- Eversource's New England Cottontail (NEC) BMP map.
- Prior NDDB Determinations.

The NDDB mapping is updated approximately every six months and is posted on the State's GIS data download webpage. The Critical Habitat mapping is less frequently updated and also on the State's GIS data download page. Eversource's NEC BMP map and mapping which depicts prior NDDB Determinations shall be provided through Eversource Environmental Licensing and Permitting.

In Massachusetts, Eversource has an annual Operations and Management Plan (OMP) which is updated and renewed at the start of each calendar year with the Natural Heritage Endangered Species Program (NHESP) which designates Priority Habitat (PH) in the State. All work in PH requires review of and compliance with the OMP which may include consultation with NHESP. The OMP establishes guidelines for work within known rare species habitat based on the type of species presence. These guidelines may include time of year (TOY) restrictions or similar measures to avoid impacts to rare species.

Regardless of the State in which construction is taking place, the following shall be employed in all mapped, State-listed species and designated Critical Habitat areas:

- Make every effort to avoid impacts to known populations of State-listed plants and other stationary resources.
- Limit permanent impact through the use of temporary construction matting as opposed to gravel for access road and work pad construction.
- If State-listed resources cannot be avoided, mitigation planning shall be discussed with Environmental Licensing and Permitting.
- Consider time-of-year (TOY) restrictions to avoid impact to sensitive resources during critical life stages including but not limited to nesting season for ground and shrub nesting birds, pup rearing season for bats (if tree removal is necessary), flowering and seeding times for State-listed plants.

Certain species, including the timber rattlesnake (*Crotalus horridus*), are one of the few venomous species in New England which can be a threat to worker safety. Protection measures provided by the respective State agency shall be followed and may require snake sweeps by a qualified herpetologist, contractor education, and field demarcation of hibernacula/known rattlesnake dens.

3.3 Hiking Trails

The following practices shall be implemented in the event project areas intersect or overlap with recreational hiking trails.

- Avoid using hiking trails as access roads or access routes for vehicles and equipment.
- If a hiking trail must be used for vehicle or equipment access coordination with Eversource Vegetation Management Compliance or Oversight staff and/or Eversource Environmental Licensing and Permitting staff is required prior to use.
- Utilize existing access roads to cross hiking trails to the maximum extent practicable.
- If no existing access roads exist and a hiking trail must be crossed, minimize trail crossings by designating one location for use by equipment.
- Signs, barriers, spotters or other means to alert the public to the work shall be

implemented.

- Stockpiling logs and other cut material within 25 feet of hiking trails is not allowed unless approved by Eversource Vegetation Management Compliance or Oversight staff.
- Spreading wood chips on hiking trails is not allowed unless approved by Eversource Vegetation Management Compliance or Oversight staff.
- At the end of each workday all cut material must be removed from hiking trails.
- As soon as possible after work is complete disturbed portions of hiking trails shall be returned as close to pre-construction condition as possible. This may include hand raking, hand cutting of stumps and/or hand removal of cut vegetation.
- If any trees that are marked for trail navigation must be cut, the property manager or trail maintainer must be notified.
- Posts or other markers that are used for trail navigation shall be protected at all times. Replacement in kind shall be completed by the contractor if disturbed or damaged during completion of the work.

3.4 Work on State-owned land in Connecticut

For all work on State of Connecticut-owned land as depicted on the "DEEP Property" data layer available through the State's GIS data download page, matting shall be employed to the greatest extent possible. Gravel access roads and work pads shall only be installed when terrain prohibits the installation of matting. All work must be coordinated through Eversource Environmental Licensing and Permitting for acquisition of necessary authorization prior to the start of construction on State-owned properties.

3.5 Historic/Cultural Resources

Historic and cultural resources are diverse and include, but are not limited to, archaeological sites, historic structures, historic districts, stone walls, and ceremonial stone landscapes. Construction activities near or within significant resources are subject to restrictions outlined in any site or project-specific avoidance/protection plans. The locations of archaeological sites and other sensitive resources such as ceremonial stone landscapes and burials are considered confidential and may only be disclosed on a need-to-know basis.

3.5.1 Stone Walls

Stone walls can be considered significant resources for a number of reasons including unique construction methods, their function as a property boundary, their association with other historic resources such as archaeological sites or farmsteads, and/or their importance to the underlying landowner(s). Non-impact methods of managing work and access near stone walls should always be prioritized and removal, dismantlement, or other alterations to stone walls should be avoided, when possible. Non-impact methods of managing work near stone walls include:

- Avoiding the stone wall altogether - This may involve re-routing an access road or selecting a new access point. Care should be taken not to incur additional impacts to other sensitive environmental areas (e.g., wetlands or rare species habitat).
- Traversing the wall through an existing breach - In this scenario, the breach is

used as-is and the breach is not widened or expanded in any way.

- Traversing the wall using timber matting to temporarily bridge over the wall (e.g., "air bridge") - Although the construction of individual air bridges will vary depending on the surrounding topography, the height of the wall, and the individual operator, the timber mats should not touch the stone wall on any side, and a sufficient air gap between the top of the stone wall and the timber matting directly above should be left to ensure the stone wall is not damaged during the passage of heavy machinery. Before and after photographs of the portion of the stone wall to be crossed should be taken and provided to Eversource Environmental Licensing and Permitting.
- Elevating work pads near stone walls using timber matting - If work pads cannot be reduced in size to avoid stone walls, timber matting may be used to elevate the work pad, or portions thereof, above the stone wall to avoid impacts. None of the timber mats should be in contact with the stone wall and before and after photographs of the stone wall should be taken.

If implementation of the four non-impact measures noted above is not feasible and either temporary or permanent alterations to a stone wall are necessary, Eversource Environmental Licensing and Permitting must be contacted prior to any alterations occurring to secure the appropriate permissions. These permissions may take several weeks to secure and may require input from the cultural resources consultant or Eversource Real Estate and/or Legal Departments.

Prior to alteration, proper documentation of the wall should be obtained and provided to Eversource Environmental Licensing and Permitting. At a minimum, this effort should include recording the following:

- Wall dimensions (total length, width, average height)
- Any existing breaches
- Wall location and general orientation on project maps

Photographs (including a scale, if possible) should also be taken of the entire wall clearly showing all sides, with increased attention on any areas of the wall that will be modified (e.g., expanded breaches) or will need to be rebuilt. The removal of dense vegetation along the stone wall prior to photography is highly recommended.

Once permissions to alter a stone wall and appropriate documentation have been secured, the following BMPs should be followed during alteration and rebuilding:

- While it is preferred that alterations be conducted by hand following traditional dry stone construction methods, construction machinery may be used when appropriate to the level of effort required and taking care not to unreasonably scratch or mar the stones or to begin excavating into soils underneath the wall.
- Any removed stones should be stockpiled nearby, outside any identified sensitive environmental areas such as wetlands or rare species habitat.
- When rebuilding, the wall should be reconstructed in the same location as the original and should match the original wall as closely as possible; if present, it is preferred that weathered/moss-covered surfaces are exposed.
- When alterations/rebuilding is complete, additional photographs from all sides should be taken and provided to Eversource Environmental Licensing and

Permitting.

3.5.2 Unanticipated Discoveries

During construction activities, most notably ground disturbing activities such as excavation, trenching, or grading, it is possible to discover previously unknown archaeological resources. Any specific procedures outlined in project-specific documents such as Post-Review Discoveries or Unanticipated Discoveries Plans should be followed. If such documents do not exist and a contractor encounters an unanticipated discovery, the contractor shall immediately notify the Eversource Construction Representative/Supervisor, secure the site, and not restart work in the area of the discovery until after the Eversource Senior Cultural Resources Program Administrator has granted clearance.

3.6 Human Remains

In the event human remains are encountered, the contractor must immediately stop work and notify the Eversource Construction Representative/Supervisor, secure the site, and ensure that the remains are treated with the utmost dignity and respect. The remains should be covered and left undisturbed along with any associated artifacts. No photography of the remains is allowed and work will not resume in the area of the discovery until after the Eversource Senior Cultural Resources Program Administrator has granted clearance. In addition to these preliminary guidelines, all relevant state laws and guidelines, including, but not limited to, the Massachusetts Unmarked Burial Law (M.G.L. Chapter 38, Section 6) and the Connecticut Human Burials Law (Conn. Gen. State. Sec 10-388) must be adhered to.

3.7 Vernal Pools

Construction within and across wetlands and in proximity to vernal pools should be limited to the extent practicable to avoid working in the periods between April 1st and June 1st. This will allow for obligate vernal pool species to emigrate to the breeding areas, deposit egg masses, and allow for hatching and development of juveniles. Silt fence should be installed at the limits of the construction to prevent individual reptiles and amphibians from entering the workspace, but in a manner that does not impede movement to and from pools from adjacent forested uplands. Consider installing syncopated silt fencing.

Protection Measures

When performing construction activities in proximity to vernal pools, a number of protection measures should be implemented.

Vegetation Removal

- Maintain existing scrub-shrub vegetation (consistent with ROW vegetation management requirements) within 25 feet of vernal pools, except in areas where access roads and work pads must be installed.
- Minimize removal of low growing (scrub-shrub) vegetation surrounding vernal pools by utilizing construction matting where access is needed. If vegetation must be cut adjacent to vernal pools, the cut vegetation (slash) should be left in place to serve as recruitment for leaf litter and coarse woody debris.

Erosion and Sedimentation Control

- Where the potential for sediment intrusion and runoff into a vernal pool exists, sedimentation and erosion controls shall be installed.
- Promptly remove erosion and sedimentation control devices upon final revegetation and stabilization of the ROW.

Access Roads

- Use construction mats, corduroy roads, or clean materials (i.e., clean riprap, gravel, stone or equivalent and rock fords) in locations where existing on-ROW access roads must be improved and are adjacent to vernal pools.
- Man-made depressions along existing on-ROW access roads provide low-quality vernal pool breeding habitat (due to an insufficient hydroperiod). Access roads must be graded and/or improved to accommodate project construction vehicles which may eliminate these depressions and the associated potential for amphibian breeding habitat. Perform improvements to on-ROW access roads outside of the breeding and migration seasons of vernal pool species to avoid direct impacts to amphibians that may breed in the man-made depressions along existing on-ROW access roads.

Scheduling and Site-Specific Considerations

- To the extent practicable (and in consideration of circuit outages and other construction timing constraints), schedule access road and work pad installation in and around vernal pool habitats to minimize interference with amphibian breeding and migration seasons.
- For project activities that must occur adjacent to vernal pools during amphibian migration periods, implement measures on a site-specific basis to facilitate unencumbered amphibian access to and from vernal pools. Consider the site-specific conditions including the type of construction activity that will occur in proximity to a vernal pool, the amphibian species known to occur in the vernal pool, and seasonal conditions. Identify appropriate mitigation measures. Options to be evaluated to allow amphibian access to vernal pools may include, but not be limited to: syncopated silt fencing in the immediate vicinity of vernal pools; elevated construction matting; and aligning erosion and sedimentation controls to avoid bifurcating vernal pool habitat.

3.7.1 Certified Vernal Pools (MA)

Encroachment upon Certified Vernal Pools (CVP) in Massachusetts should be avoided to the maximum extent practicable. CVPs are considered Outstanding Resource Waters (ORWs) in Massachusetts and are regulated under the 401 Water Quality Certification program. Consult with Eversource Environmental Licensing and Permitting.

3.8 Access Roads

Existing construction access roads are unpaved roadways that work crews use to access a site within a ROW. These access roads were generally either permitted previously or

constructed prior to the promulgation of regulations and are previously authorized under past general permits.

3.8.1 New Access Roads

New access roads are generally associated with new or large-scale projects that have separate permitting requirements. Construction of new access roads will be based on plans that are reviewed and approved by applicable federal, state, and local agencies. If a new access road is needed and not associated with a large project, notify Eversource Environmental Licensing and Permitting to make a decision on best access routes and identification of the necessary permits and approvals required to construct the new road. **Permit requirements must be followed**.

3.8.2 Existing Access Roads

The travel surface width of access roads in upland areas is not to exceed 16 feet. This does not include side slopes. Maintenance of existing access roads includes mowing of vegetation, grading, placement/replacement of stone, and the installation/maintenance of erosion control features (e.g., water bars, swales, sedimentation basins).

When access roads are in wetlands, measures should be taken to avoid disturbance to wetlands, waterways, and other sensitive environmental areas. If avoidance is not practicable, then measures should be taken to minimize the extent of disturbance. Alternate access routes should always be considered. Below is a list of methods that should be considered where disturbance is necessary:

- Minimize the width of typical access roads through wetlands. If an existing access road is evident in the wetland based on the presence of previously imported road-building materials (e.g., crushed stone), the existing width of the access road must be maintained. If unable to ascertain the original width of the access, then do not make the road wider than 16 feet (including side slopes).
- To the extent practicable, use low-impact vehicles and/or vehicles with low ground pressure when driving through wetlands.
- Coordinate the timing of work to minimize impacts during the regulatory low-flow period under normal conditions, when water/ground is frozen, after the spring songbird nesting season, and outside of the anticipated amphibian migration window (mid- February to mid-June). The ACOE defines the low-flow periods for streams as follows:
    - Connecticut streams—July 1 through September 30
    - Massachusetts non-tidal streams—July 1 through February 28
    - Massachusetts tidal streams—November 16 to February 15
- Use construction mats in wetlands to minimize soil disturbance and rutting when work needs to occur during non-frozen ground conditions.
- If practicable, conduct work manually if warranted (decision to be made by the Eversource Project Team).

Existing access roads are characterized by a clear dominance of imported fill material to a depth of at least three inches. When determining the presence and extent of an existing access road, soil probes shall be advanced as necessary to establish the boundary between fill and native soil. In some cases, hydrophytic vegetation may have become established or ponding may occur within the limits of imported fill. In these cases, the clear and

consistent presence of fill along a distinguished route is considered a previously authorized fill. Where the existing access road is not evident, Eversource Environmental Licensing and Permitting must be consulted to make a determination whether stone can be placed in the wetland. If stone is not evident, through soil cores, hand digging or other methods, construction mats must be used. If permanent access is warranted through the wetland, the new access road will need to have a permitting review and will likely require permits.

The access road in the wetland should not exceed 16 feet in width (unless there is evidence that the road was originally wider than 16 feet).

Over time, existing access roads require maintenance and repair. Travel by construction equipment and general traffic to reach a particular portion of the ROW must be via the designated access road and route. Changes in the location of the access road or the use of alternate roads must be reviewed and approved by the Eversource Project Team prior to their construction or use. Access road routes were selected to prevent degradation of the utility corridor, and must be constructed, used, and maintained in accordance with this BMP Manual, as well as federal, state, and local requirements, and other project plans.

In some situations, it may be necessary to construct redundant access roads, this practice should be avoided to the extent practicable. Some appropriate reasons for suggesting alternate routes are:

- Poor site conditions along preferred route because of weather or season.
- Property rights constraints, or property owner's preference.
- Equipment requirements.
- Unanticipated off-site access limitations along existing roads.

Unanticipated access opportunities (e.g., ice, snow, other developments) which may avoid environmental disturbance and/or reduce cost.

General Design: New and Existing Access Roads

Construction access roads that require new grading and/or filling or are to be heavily used require the creation of a stable, load-bearing surface resistant to erosion. If the existing soil and subsoil are not well drained, it may be necessary to import an aggregate road base (i.e., gravel borrow) such as that meeting the requirements of aggregate found in the:

- *Commonwealth of Massachusetts Department of Public Works Standard Specifications for Highways and Bridges*, Section 400
- Connecticut *Standard Specifications for Roads, Bridges and Incidental Construction*, Section M1.02

When the construction access road follows the same route as the permanent design road, establishing the grades and subgrade for the permanent roadway early in the construction sequence is recommended.

The travel surface of construction access roads shall typically not exceed 16 feet in width except for passing points, where necessary. Subgrading shall not extend beyond the space required for the finished road and normal side slopes.

Where practicable, construction access roads should conform to the contours of the land,

avoiding grades steeper than 10 percent and creating side slopes no steeper than a ratio of 2:1. If the side slopes are steeper than 2:1, then use of engineered slope stabilization methods may be necessary. Consider the volume and type of construction traffic as well as the extent that natural ground must be altered to accommodate the traffic. If no grading is required and traffic is sporadic (i.e., access roads used to maintain utility lines) the measures used may be limited to water bars, or some top dressing with gravel or stone in areas where the vegetation over soft soil is destroyed by traffic.

During wet weather, these roadways can generate significant quantities of sediment if not constructed with adequate stormwater management and erosion control measures. During active construction or maintenance activities, inspection of the construction access road and associated erosion and sedimentation measures should be conducted by the person(s) designated at the pre-construction meeting, should occur regularly while the activity is occurring, and repairs to controls should be made in a timely matter. Repairs may include re-grading and/or top dressing the traveled surface with additional aggregate to eliminate ruts, as well as those repairs required by each erosion and sedimentation measure used. When the roadway is no longer needed on a regular basis, the access road should be reviewed to ensure that the road is left in a condition that prevents future erosion and sedimentation (e.g., installation of water bars, gravel). In some cases, permit conditions may require that the access road be removed and that the disturbed area be restored (e.g., seeded and mulched) in accordance with applicable permits as required to match the pre-construction conditions.

Erosion and Sedimentation Controls

Construction personnel are reminded to control erosion and flow conditions during access road construction or maintenance activities by utilizing the following erosion and sedimentation measures which are described and illustrated further in Appendix A:

- **Outlet protection**, a **level spreader**, a **trench breaker**, a **sediment trap or basin**, or a **stone check dam** may be used to de-energize concentrated flows from diversions and in temporary channels.
- **Geotextile silt fencing**, **compost filter berms**, **straw wattles** and **straw bale barriers** may be utilized to provide protection at the toe of fill slopes and discharges from water bars.
- Side slopes can be protected by installing **erosion control blankets** and **seeding** the area with a fast-growing native or annual grass mix.
- **Dust control** should be employed when construction access road conditions create airborne dust.
- **Geotextile fabric** shall be used beneath all new fill and construction entrances, where needed.

The use of hay and/or hay products is strictly prohibited.*

The use of nylon and/or plastic netting is strictly prohibited.*

3.8.3 Best Management Practices – New Access Roads

The following are BMPs that are applicable to new access roads in uplands and are described at the following tabs:

Construction Entrance Track Pad (see Figure A01 in Appendix A)

Stormwater Management BMPs (includes Water Bars [Figure A02], Drainage Swales [Figure A03], and Sedimentation Basins [Figures A38-A41] in Appendix A)

Construction Entrance Track Pad

Applications: Erosion and sedimentation control, roadway protection

Limitations:

- Maintenance is required if the pad becomes clogged with soil.
- Muddy conditions may warrant the use of a tire wash station.

Overview:

Where access roads or construction areas connect to paved roads, a stone track pad must be installed at the construction entrance to prevent construction machinery from tracking soil onto paved roadways. Materials appropriate to construction site soil conditions should be employed and/or replenished, as necessary.

Installation:

- Use 3- to 6-inch washed stone to install stone tracking pads at a minimum length of 50 feet and a minimum depth of 12 inches.
- On sites with clayey soils, underlay stone tracking pads with a geotextile liner to prevent the stone from sinking into the soil.

Maintenance:

- Periodically inspect the stone in the entrance track pad. If the pad becomes clogged with soil, remove and refresh and/or clean stone.

Additional Comments:

If muddy conditions warrant the use of a tire wash station, procedures should be established to ensure soils are not tracked off site.

Where appropriate and when safety and environmental conditions are considered, vehicle tires or tracks may be spun quickly ("burn out") on the track pad to further facilitate the removal of soil.

Water Bar

Applications: Erosion and sedimentation control

Limitations:

- Should never be used to direct a watercourse into another waterbody or to divert unfiltered runoff to a wetland.
- Can impede vehicular movement.
- Damage from vehicle traffic and stormwater flow may require water bars to be reinstalled/reworked at the beginning and end of each construction season.

Overview:

Water bars are linear features built diagonally across access roads or ROWs to redirect stormwater runoff away from the road surface at non-erosive intervals. In general, they consist of a trench dug at least 6 inches below grade followed by an earthen mound at least 6 inches above grade. Use water bars to prevent erosion on sloping roadways less than 100 feet wide. Water bars must be designed to be stable throughout their useful life and meet the criteria in the table below. The maximum capacity should be the peak runoff from a 10-year storm.

Installation:

- Set water bar direction to utilize stable outlets and do not allow upslope water bar runoff to converge with down slope water bars. Water bars should be directed into well vegetated upland areas, sediment basins, or other erosion and sedimentation controls (e.g., straw bales, silt fence) as needed.
- Construct the bar immediately after vegetation has been cleared on constant or slightly increasing grades, not exceeding 2%. Avoid reverse grades.
- Mark the location and width of the ridge and disk the entire length.
- Fill ridge to above the design height and compact with wheeled equipment to the design cross section.
- Construct sediment traps or outlet stabilization measures, as needed.
- After the area has been permanently stabilized, remove the ridge and channel to blend with the natural ground level.
- Seed and mulch diversions that are intended for use for more than 30 days.

Minimum Cross Section

Top Width (ft)	Height (ft)	Side Slopes
0	1.5	4:1
4	1.5	2:1

Maximum Recommended Spacing[1]	
Land Slope (%)	**Diversion Spacing (ft)**
< 5	125
5 to 10	100
10 to 20	75
20 to 30	50
> 35	25

[1] Recommendations for ROW widths less than 100 feet as per the Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas (MassDEP, March 1997).

Maintenance:

- Inspect each week and after rain events of 0.25 inches (MA) or 0.50 inches (CT) or greater, or more frequently per permit conditions or Eversource Environmental Licensing and Permitting. Repair damage caused by construction traffic or erosion.
- Remove accumulated sediment and debris from the trench and stabilize outlets.
- If necessary, repair ridge to a positive grade and cross section, and add gravel at crossing areas.
- Use routine inspections to determine if the original spacing is adequate or if additional water bars need to be constructed.

Drainage Swales

Applications: Convey stormwater away from work area and/or improve water quality and reduce peak runoff.

Limitations:

- Vegetated swales need to have adequately established vegetation before flow is diverted to them.
- Need to have adequate bottom stabilization to prevent scouring.

Overview:

Drainage swales usually consist of a ditch that is either vegetated or lined with riprap, erosion control blankets, or other materials. They are natural or constructed waterways/outlets that intercept, redirect, and convey stormwater away from the work area to a stable location and are used in areas where concentrated runoff would otherwise cause erosion/flooding. Swales can be used to reduce erosion in uplands and/or prior to discharge of stormwater flows to natural receiving waters (e.g., wetlands or streams). They also help to reduce surface flow velocity and turbidity.

Grass Lined Channels (Stabilized with vegetation)

- Use where vegetative lining will provide sufficient stability, slopes are less than 5%, and space is available for a wide cross section.

Installation:

- Remove trees, brush, and stumps.

- Excavate and shape channel to dimensions on plans. Overcut 0.2 ft for vegetative growth.
- Install temporary liner or riprap at inflows and stabilize outlets.
- Vegetate immediately after construction and divert water until grass establishes. Install matting if flow cannot be diverted.
- Install sod rather than seeding where slopes approach 5%.
- Spread topsoil to a minimum of 4 inches where soil conditions are unfavorable. Seeded channels should be mulched.

Vegetated Swales (Stabilized with dense vegetation)

- Use for water quality improvement and peak runoff reduction. Applicable for small drainage areas with relatively small amount of impervious cover. The grassed waterway is used to convey runoff at a non-erosive velocity. Dense vegetation can be established and a stable outlet constructed.

Installation:

- General design parameters are as follows: minimum capacity 10-year, 24-hour storm; design slopes to prevent erosion during the 2-year storm event; maximum side slopes 3:1; bottom width 2 to 8 feet.
- Vegetate with a native erosion control seed mix for use at moist sites and divert flow until established.

Riprap Lined Channels (Contains lining of riprap or stone)

- Use on sites where channel flow velocities exceed those acceptable for grass lined swales. Applicable where vegetative establishment is not possible or there are steep grades, wetness, highly erodible soils, seepage or prolonged base flow.

Installation:

- Remove trees, brush, and vegetation from channel area.
- Stabilize inlets and install outlet protection.
- Construct channel and install filter and lining as shown on plan.
- Use the maximum stone size for riprap plus thickness of filter.

Maintenance:

- Swales need to be routinely maintained to prevent brush/sediment buildup. Inspect swale regularly and after every rain event (0.25 inches (MA) or 0.50 inches (CT), or greater). Repair and/or re-seed rill or gully erosion. Remove accumulated sediments and brush before it reaches a depth of 6 inches.

Additional Comments:

- Depth and spacing of swales should be dependent on runoff conditions of the specific site.
- If required, install check dams constructed of riprap or other materials to slow flows along certain reaches of a swale.

- Remove temporary swales once construction is complete or areas are stabilized. If leaving swales in place will provide long-term benefits and be compatible with the ultimate use of the site, then they may remain in place.

Sedimentation Basins

Applications: Erosion and sedimentation control

Limitations:

- Traps and basins need to be adequately sized based on expected rain events and the contributing drainage area.

Overview:

Sediment traps and basins are used to filter and settle out suspended solids in stormwater runoff before water is released into a wetland or other unprotected and/or sensitive environmental area. A sediment trap is a temporary measure installed during construction to detain runoff, while a basin is a more permanent measure. Basins are also used where other erosion control measures are not adequate to prevent off-site sedimentation.

Sediment traps and basins should have three components: a forebay, a check dam, and a basin. Debris and some sediments begin to settle out of the water in the forebay. The stone or straw bale check dam filters more suspended solids as water flows through. The actual basin is a low-velocity pool where suspended solids settle out of the water column before the water is released at the outlet.

Based on the size of the project area, a qualified engineer may be required to calculate the appropriate size of the basin. State-specific guidance for basin sizing can be found in the following locations:

- Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas (Page 140); http://www.mass.gov/eea/docs/dep/water/esfull.pdf
- 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (Section 5-11-1); http://www.ct.gov/dep/cwp/view.asp?A=2720&Q=325660.

Installation:

Drainage area of 5 acres or less:

- Install to direct stormwater runoff to the sedimentation trap or basin. Form basin by excavating a depression similar to a small pond or by placing an earthen embankment across an existing drainage swale or naturally low area.
- The ratio between the basin length and width should be greater than 3:1 (L:W). A ratio of 9:1 is recommended.
- Clear, grub, and strip all vegetation and root material from area of embankment and place embankment fill in lifts (<9”/lift, max). Compact fill and construct side slopes 2:1 or flatter. Excavate rectangular outlet section from compacted embankment.
- Filter fabric may be installed on bottom and sides of basin and covered by riprap.
- Extend outlet apron/spillway below toe of dam on level grade until stable conditions are reached (5 feet minimum). Cover inside face of stone outlet section with a 1-

foot layer of ½- to ¼-inch washed stone.

- Use permanent or temporary seeding to vegetate embankments, spillways, and disturbed areas downgradient of the basin.

Drainage area of 10 acres or less:

- Locate the basin in an easily accessible upland area, not a wetland area.
- Install the basin so that it intercepts the largest possible amount of runoff from the disturbed area.
- Divert sediment-laden water to the upper end of the sediment pool to improve trapping effectiveness.
- Basin should have a minimum volume based on ½-inch of storage for each acre of drainage area.
- Size basin to provide a minimum detention of 12 to 24 hours at the maximum runoff quantity expected for the duration of the basin's use.

Maintenance:

- Monitor the amount of sedimentation in the trap/basin. Install a stake with a marking at half the design depth. Remove sediment when it reaches this mark.
- Inspect after every rain event.
- Clean or replace the spillway gravel and re-seed/plant vegetation, as needed.
- Monitor embankment, spillway, and outlet for erosion. Repair erosion problems immediately.

Additional Comments:

Construction of sediment traps and/or basins should occur before primary construction on a project begins. They are often a critical stormwater management component for larger construction sites and/or those with poorly drained upland soils. If compatible with the post-construction site use, it may be appropriate to leave sediment basins in place indefinitely.

3.8.4 Construction in Wetlands

Access roads that are constructed in or across wetlands require the following considerations in addition to the considerations for access roads in uplands:

- Construction of new access roads in wetlands, whether temporary or permanent, that do not utilize construction mats (e.g., earthen and/or rock fill roads, corduroy roads) requires considerable project specific permitting and design. These types of projects should comply with project specific permits and plans, while only using this BMP manual as a general reference source. Permits often also require wetlands replication when permanent new access roads are constructed in wetlands.
- Avoid putting the construction access road in a wetland whenever practicable. Explore all feasible and prudent alternatives before determining that a wetland crossing is necessary. When avoidance is not practicable, consider crossings that will result in the least amount of disturbance. This may involve locating the construction access road so that it crosses the wetland at its narrowest width or uses areas previously disturbed for access or other purposes.

- Minimize the width of the temporary construction access road through the wetlands (generally no wider than 16 feet when using construction mats). It is preferable to have a passing point created before and after the wetland crossing, but internal passing points may be needed if the crossing is long or critical sight line restrictions exist.
- Construct access roads so that wildlife is able to pass under or go through the road. In areas where the road is only one construction mat thick, allow for passageways or "gaps" between construction mats. In locations where the access road is greater than one mat thick, install elevated construction mat road crossings or "bridges." Gaps and/or bridges are to be placed along the access road at intervals no less than 50 feet.
- Consider the soil conditions. Expect deep organic wetland soils to require geotextiles, construction mats, or other materials during use to keep imported road materials separated from wetland soils. In shallow organic or saturated soils, thick plywood sheets or AlturnaMATS® may be sufficient to support a stable travel surface for small, lightweight vehicles. In addition, in areas which are inundated or have deep organic wetland soils, it may be necessary to use more than one layer of construction mats.
- Prevent obstructions to surface and subsurface flow across and through the construction access road. Provide adequate drainage. This may require the use of crushed stone, a layer of log corduroy, construction mat bridges, or multiple cross culverts, particularly if the wetland does not contain a well-defined watercourse channel and/or the wetland crossing is long. If the wetland soils are susceptible to seasonal high groundwater tables or flooding, then give additional consideration for maintaining flows across and/or over the construction access road without causing erosion or siltation during such times.
- Plan in advance how the construction access road will be removed and the wetland restored. A road stabilization geotextile can facilitate the segregation of imported soils and crushed stone and/or log corduroy from the native wetland soils and make wetland restoration easier. However, after the end of an extensive project and a highly traveled crossing, stone removal from the wetland surface will still usually have to occur, even when placed in conjunction with geotextile.

In some cases, access roads may not need to be constructed in a wetland to gain access into or through a wetland if the work can be designed such that disturbances to the wetland are avoided or negligible. Options to be considered are presented below.

Equipment Selection and Usage:

- **Low ground pressure equipment -** Using equipment that reduces the pressure it exerts on the ground can minimize disturbance to sensitive areas. Employing the use of equipment with wide tires, rubberized tracks, and low ground pressure (<3 psi when loaded) can help minimize soil compaction.
- **Wide tires -** Increasing the width of tires will increase traveling surface area and therefore reduce the amount of ground compaction that the equipment will cause. Ultimately, this will reduce rutting, and allow for easier maneuvering of the vehicle. However, wide tires may be costly and will require a wider travel area.
- **Rubberized tracks -** Equipment with rubberized tracks spreads the weight of the vehicle over a much larger surface, reducing ground pressure and enabling the vehicle to move more freely through wet substrates. Each track can be between

1.5 and 3 feet wide, length depending on the width of the vehicle. This can greatly reduce rutting and allow the vehicle to move with less difficulty through wet substrates.

- **Lightweight equipment -** Disturbance in a wetland area can be lessened by reducing the size of equipment (e.g., ORVs, Gator™) used in sensitive environmental areas. This reduces the amount of pressure to the travel surface as well as the necessary width of access ways.

Timing of Work:

- **Work during frozen conditions**. Activities conducted once wetland areas are frozen can minimize rutting and other disturbance to the surrounding environment. Work during this time also generally reduces disturbance of aquatic and terrestrial wildlife movement by avoiding sensitive breeding and nesting seasons.
- **Work during the "low flow" period**. Conducting work during the low flow period can reduce disturbance to surface water and generally avoids spawning and breeding seasons of aquatic organisms. The ACOE defines the low-flow periods for streams as follows:
    - Connecticut streams—July 1 through September 30
    - Massachusetts non-tidal streams— July 1 through September 30
    - Massachusetts tidal streams—November 16 through February 15

Alternate Access:

- **Manual access** – Consider accessing work areas on foot through terrestrial areas and/or by boat through open water or ponded areas. Smaller projects (e.g., repairs to individual structures or parts of structures) do not categorically require the use of heavy machinery and should be accessed manually to the extent practicable.
- **Limit trips** – Multiple trips through a wetland have shown to increase the potential for damage and requirement for matting. Try to limit trip to one in and one out.

Use of overhead/aerial access (e.g., helicopters):

- Using overhead or aerial equipment can be expensive and is not always feasible, but it may be appropriate in some situations to get vehicles and other equipment to a site that may be otherwise very difficult to access. The use of overhead and/or aerial equipment may be beneficial for work in areas where large water bodies, deep crevices, or mountainous areas hinder ground access.

Erosion and Sedimentation Controls:

Construction personnel are reminded to control erosion and flow conditions during new access road construction by utilizing the following erosion and sedimentation measures which are described and illustrated further in Appendix A:

- **Straw wattles** [Figure A26 in Appendix A]**, geotextile silt fencing** [Figure A22 in Appendix A]**,** and **straw bale barriers** [Figure A21 in Appendix A] may be installed at the edges of earthen roads or construction mat roads to prevent erosion of soil into wetlands from the road fill or tracked soil on construction mats.
- In areas where silt fencing is required for more than one activity season, **syncopated silt fencing** [Figure A23 in Appendix A] may be installed to permit animal crossings.

- Side slopes of earthen roads can be protected by installing **erosion control blankets** [Figure A25 in Appendix A] and **seeding** [Figure A32 in Appendix A] the area with a fast-growing native or annual grass mix.
- **Dust control** should be employed as necessary when construction access road conditions create airborne dust when necessary. Refer to Section 3.16 of this BMP Manual.

Best Management Practices – Construction in Wetlands

The following are BMPs that are applicable to new access roads in wetlands and are described at the following tab:

Construction Mats (includes Elevated Construction Mats and AlturnaMATs®; see Figures A04 – A06 in Appendix A)

Permeable Road (see Figure A08 in Appendix A)

Dewatering (see Figures A39 – A41 in Appendix A)

Construction Mats (i.e., timber or swamp mats)

Applications: Wetland crossings, rut minimization

- Used for access where the ground surface is unstable due to shallow, standing water, saturated soils, or other substrates not suitable for heavy vehicles.

Limitations:

- Only for temporary use. Generally, mats should be removed upon construction completion.
- May float away in high water conditions.
- Need to be installed with heavy machinery.
- AlturnaMATs® limited to smaller vehicles and equipment.
- Equipment operators should remain cautious so as not to drive off or slip off the side of the mats.
- In winter, mats must be plowed and sanded or heated to prevent equipment from sliding off mats. Use of a deicing agent requires approval by Eversource Environmental Licensing and Permitting. Snow removal must be conducted in accordance with the Eversource Snow Removal BMP (refer to Section 3.15).

Installation:

- Place mats along the travel area without any gaps and so that each board is positioned perpendicular to the direction of traffic. Position mats so that they are offset far enough from the resource area so that ruts are not created when equipment enters and exits a sensitive area.
- Remove mats by "backing" out of the site and removing mats one at a time. Regrade soils to pre-existing contours while taking care not to compact soils.
- Clean mats after use to remove any invasive plant species seed stock. Cleaning methods may include, but are not limited to, shaking or dropping mats in a controlled manner with a piece of machinery to knock off attached soil and debris,

spraying with water or air, sweeping, or exposing the mats to high temperatures.

- Clean mats that were used in wetlands dominated by invasive species using brooms, shovels, and compressed air, if needed.

Additional Comments:

Construction mats installed in wetlands categorized as ORWs in Massachusetts must be underlain by non-woven geotextile, which can be placed directly on the ground surface beneath the first layer of matting or atop the first layer of matting if additional layers of mats are to be installed.

Lightweight, easy to maneuver alternatives to traditional mats are available. For example, AlturnaMATS® are half-inch thick polyethylene slip-resistant ground protection mats available in dimensions up to 4 feet by 8 feet and weigh between 21.5 and 86 pounds.

Mat anchoring may be required for matting installed in areas prone to flooding, such as stream crossings, shorelines of lakes and ponds, floodplains where known base flood elevations are 2 feet or greater above the ground surface, and tidal areas, and when mats will be in place in these areas for more than two weeks during hurricane season. The need for, and type of, anchoring should be coordinated with Eversource Environmental Licensing and Permitting. Examples of mat anchoring include:

- Linear ropes anchored using helical screws, manta ray anchors, or posts.
- Cable or report in chain pockets and run linearly.

Construction mat anchoring methods are illustrated in Figure A07 in Appendix A of this BMP Manual. Additional methods may be necessary depending on site and/or weather conditions.

Permeable Road (i.e., rock sandwich, French Mattress, or road with continuous cross-drainage)

Applications: Temporary wetland crossings, rut minimization

Limitations:

- Must be removed entirely at the end of construction unless project-specific permits have been obtained to allow for permanent wetland fill.
- Not appropriate for areas where concentrated, high volume and/or velocity water flow will intersect the road (i.e., stream crossings).
- Need to be installed with heavy machinery.
- Equipment operators should remain cautious so as not to drive or slip off the side of the road.

Overview:

Permeable roads are used for access in situations not suitable for heavy vehicle use often due to unstable ground surfaces with shallow standing water, saturated soils, or other unstable substrate. Installation of a permeable road can also help reduce the potential for frost action and pothole creation by preventing groundwater from wicking up into the road fill material.

Installation:

- Cover existing soil with a geotextile fabric prior to road construction. Excavation of existing soil is generally not recommended in order to minimize impacts to the resource area. Construct road on top of the soil surface, as shown on the typical on the next page. Drainage layer materials include 3- to 6-inch rock (12-inch minimum depth) or log corduroy (2-inch minimum diameter).
- Install the road so that it is offset far enough from the resource area so that ruts are not created when equipment enters and exits a sensitive area.
- Remove road by "backing" out of the site and removing road one section at a time. Regrade soils to pre-existing contours while taking care not to compact soils.

Maintenance:

- Regularly inspect and clean edges of cross-drainage layer along the sides of the road to prevent clogging by debris, leaf litter, sediment, etc.

3.8.5 Watercourse Crossings

There are a number of BMPs that can be used to minimize disturbance to streams. For each application, consider the site and project needs to select a method that is cost effective and will incur the fewest secondary disturbances. Additional erosion and sedimentation controls (e.g., straw bales) may be required in conjunction with the stream crossing BMPs to protect sensitive areas. The stream crossing methodology chosen will depend largely on the equipment required for a particular task, the existing environmental conditions, and the duration of the crossing. In constructing any stream crossing, care should be taken to limit disturbance to the extent practicable within 100 to 200 feet of the stream banks (the riparian area). The riparian area provides habitat to a number of species and provides protection and shading to the stream.

Erosion and Sedimentation Controls

Construction personnel are reminded to control erosion and flow conditions during new watercourse crossings by utilizing the following erosion and sedimentation measures which are described and illustrated further in Appendix A:

- **Straw wattles** [see Figure A26 in Appendix A]**, geotextile silt fencing** [see Figure A22 in Appendix A] and/or **straw bale barriers** [see Figure A21 in Appendix A] may be installed at the edges of earthen roads or construction mat roads to prevent erosion of soil into watercourses from the road fill or tracked soil on construction mats. These controls however should generally not be placed within a watercourse.
- Side slopes of earthen roads can be protected by installing **erosion control blankets** [see Figure A25 in Appendix A] and **seeding** [see Figure A32 in Appendix A] the area with a fast-growing native or annual grass mix.

Best Management Practices – Watercourse Crossings

The following are BMPs that are applicable to new access roads watercourse crossings and are described at the following tabs:

Stream Crossings without Bridges (includes limiting turbidity and stone crossing; see Figures A05, A06, and A12 in Appendix A)

Bridged Crossings (includes construction mat bridges and rail car frame bridges; see Appendix A)

Dewatering (see Figures A39 – A41 in Appendix A)

Stream Crossings Without Bridges: Limiting Turbidity

Applications: Stream crossing, turbidity control

Limitations:

- Limited to areas where stream banks and bottoms will not be significantly damaged by the crossing.

Overview/Use:

- In some situations, such as routine or emergency maintenance with small ORVs, pickup trucks or tracked equipment, it may be acceptable for equipment to simply travel (perpendicularly) through a stream.
- Crossings are generally considered acceptable in situations where there is an existing or historic access road, a stable rock or sand/gravel stream bottom, and/or the crossing is at a relatively narrow reach of the stream and any adjacent wetlands.
- Cross streams slowly to minimize in-stream turbidity.

Stream Crossings Without Bridges: Stone Crossings

Applications: Stream crossing, turbidity control

Limitations:

- Only use in small (less than 2 feet wide or braided) intermittent streams which do not appear on USGS topographic maps and have a downstream section with a gradient greater than 20%.
- Not suitable in areas where there could be a potential for fish passage.
- Stone size should be sufficient to allow for macroinvertebrate passage.
- Not preferred for new access road crossings; generally more suitable for existing access road crossings.
- Project-specific permitting may be required to allow for installation of stone within a stream bed. Consult with Eversource Environmental Licensing and Permitting prior to using this crossing method.

Overview/Use:

- Use to cross small streams with stable stream bottoms.
- Carefully place 6-inch to 8-inch clean angular stone within stream at crossing. Limit width of stone to that needed for widest vehicle/equipment to crossing the stream.
- Drive over stone slowly.
- Leave riprap in intermittent streams for future use. More damage will occur by removing stone.

Bridged Crossings: Construction Mats as Temporary Bridge

Applications: Watercourse crossings

Limitations:

- Installation requires machinery.
- May become unstable under high flows.

Overview/Use:

- Untreated wooden construction mats may be used as a temporary bridge over a stream to allow construction vehicles access to the work site. Construction mat bridging is suitable for crossing intermittent and perennial streams. Before constructing a stream crossing, confirm that the construction mats are capable of supporting the equipment to be used.
- Place small sections of matting on either side of the stream parallel to the flow of water at top of banks to act as supports. Then place mats perpendicular to the stream and resting on top of the initial construction mat supports.
- Install non-woven geotextile between the first and second layers of matting; install erosion control barriers (e.g., straw bales, straw wattles, silt socks) along edges of timber matting to minimize potential for soil to discharge to the stream.
- Use of non-woven geotextile fabric at ORW crossings (MA) is required.

Bridged Crossings: Rail Car Frame as Temporary Bridge

Applications: Watercourse crossings

Limitations:

- Requires heavy equipment for transport and installation.
- Expensive.
- Banks must be stable to support heavy loads.

Overview/Use:

- Used rail car frames can be used for crossing larger and deeply incised streams where construction mats are unsuitable.
- Place the rail car frame perpendicular to the stream flow and between opposing banks. Use timber frame footings, if necessary. Next, place construction matting
- Install non-woven geotextile between the first and second layers of matting; install erosion control barriers (e.g., straw bales, straw wattles, silt socks) along edges of timber matting to minimize potential for soil to discharge to the stream. Use of non-woven geotextile fabric at ORW crossings (MA) is required.

Culvert Installation/Repair/Replacement

Contact Eversource Environmental Licensing and Permitting prior to performing any culvert installations, repairs and/or replacements

Applications: Stream and wetland crossings

Limitations:

- Permitting and design are required for new culvert installation or expansion of existing culverts over streams and wetlands. Significant regulatory requirements must be followed. Permitting restrictions on time of year use.
- Installation may require in-stream work; dewatering and sedimentation concerns.
- Culverts are susceptible to washouts, sedimentation, erosion, and failure during heavy wet-weather events and flooding.
- Culverts require routine and long-term maintenance because they often become clogged with debris or other obstructions.

Overview:

Culverts are installed to maintain wetlands or streams at road crossings. Hydraulic calculations are required at all crossings to determine the area that will drain to the culvert.

General Design Guidelines:

- Size culverts to handle the maximum expected flow of the wetland or watercourse. It is preferable to have one large culvert rather than multiple culverts. Corrugated culverts are favored because they slow the water velocity. HDPE corrugated pipes are preferred to metal.
- Design culverts to withstand and accommodate high flows while maintaining existing low flows and not impeding on the movement of indigenous aquatic life. Culverts must be sized to accommodate flows from at least the 100-year storm and preferably 500-year storm.
- The maximum velocity at the culvert outlet should be consistent with the velocity of the natural channel. To mitigate higher velocities, use outlet protection measures, energy dissipation, and channel stabilization, if necessary.
- Refer to state specific stream crossing guidance documents for additional design requirements:
    - Connecticut: Stream Crossing Guidelines, CT DEEP, Inland Fisheries Division Habitat Conservation and Enhancement Program, February 26, 2008 (www.ct.gov/deep/lib/deep/fishing/restoration/streamcrossingguidelines.pdf)
    - Massachusetts: Massachusetts River and Stream Crossing Standards, River and Stream Continuity Partnership, March 1, 2006, Revised March 1, 2011 (https://www.nae.usace.army.mil/Portals/74/docs/regulatory/StreamRiverContinuity/MA_RiverStreamCrossingStandards.pdf)

Installation:

- Construction mats may be placed over culverts to provide structural protection from heavy loads.

- Backfill culverts with natural substrate matching the upstream and downstream streambed substrate, even when fish passage is not a concern. Other aquatic organisms rely on natural streambed sediment to aid their movement.
- Strive to install culverts with minimal disruption to the watercourse and riparian buffer zone.
- Culvert length should be as short in length as practicable. Cut culverts to size if they are protruding into the natural streambed.

Maintenance:

- Remove debris and sediment from culverts to maintain an open channel for flow. A clogged culvert could result in flooding and washout.

Pole Fords

Applications: Stream Crossings

Limitations:

- Limited to streams with gently sloping adjacent land.

Overview/Use:

- Poled fords are used in remote locations where a stream crossing requires a functional BMP, but it is impractical to bring in larger materials. Sufficiently sized wood poles or saw logs of may be laid in the streambed parallel to the flow.
- Gently slope the road to and from the streambed at a maximum ratio of 1:5 (V:H). To limit disturbance to the riparian area, install engineering fabric and cover with an aggregate bed at the approach and exit.
- Use poles with a minimum length of ten feet.
- Remove poles immediately after use.

3.9 Slope Excavation

Engineering designs may be required for any changes in upland areas that could potentially direct or channel water across the face of slopes, particularly terrace escarpments or other highly erodible soils. No snow or soil piles, construction materials, or equipment should be stored in the immediate vicinity at the top of the terrace escarpment or other highly erodible soils.

3.10 Vegetation Removal and Preservation

Care should be taken to limit disturbance to the extent practicable when removing vegetation. Grubbing is not preferred as it results in considerable ground disturbance that could result in erosion and should be avoided to the extent feasible. Utilize grubbing only when all other methods cannot be used to prepare stable and safe work areas. If grubbing is necessary, the area must be seeded and mulched to protect it prior to the end of the workday. During mowing and trimming, woody debris greater than two (2) inches in diameter should not be placed in wetlands, and no woody debris should be placed in standing water. Permit conditions may mandate all woody debris to be removed from sensitive environmental areas. Mowing must be kept to a minimum, particularly at road crossings.

3.10.1 ROW Vegetation and Eastern Box Turtle (EBT) – MA only

Eastern box turtles (EBT) are often found near small streams and ponds and inhabit old fields, deciduous forests, and logged woodlands. Adults are completely terrestrial, while the young may be semiaquatic. EBTs hibernate on land by digging down in the soil between October and April. They have an extremely small home range and can usually be found in the same area year after year. EBT populations have been negatively impacted by the loss of suitable habitat. Some turtles may be killed directly by construction activities, but many more are lost when important habitat areas for shelter, feeding, hibernation, or nesting are destroyed. As remaining habitat is fragmented into smaller pieces, turtle populations can become small and isolated. Turtles are long-lived and the loss of even a single adult turtle can negatively impact the persistence of a local population. Therefore, vegetation removal in ROWs should be performed in a manner that minimizes impacts to turtle populations.

Cleared and Maintained ROW—EBTs have been found to use existing ROWs for foraging and nesting. Whenever feasible, perform maintenance mowing in identified habitat during inactive periods (November 1st to March 31st). Turtle BMPs are not required for work performed during the inactive period.

If mowing during the active turtle season (April 1st to October 31st) is required, turtle sweeps should be conducted by trained personnel prior to mowing activities; mow vegetation to no lower than seven (7) inches. Use Brontosaurus or Fecon mower heads to minimize the impact to identified habitat areas. Do not used Flail-type mowers during the active season. Additionally:

- **Avoid direct harm to turtles**. Visual inspections ("turtle sweeps") of the work area must be conducted by trained personnel prior to the commencement of work. If turtles are encountered, they should be removed from the work area and reported to NHESP.

Use extra care when using heavy machinery or traveling in vehicles through areas mapped as turtle habitat.

Any silt fencing used in these areas should be removed as soon as site stabilization has occurred; fencing can be a barrier to turtle movements. Alternatively, install silt fencing in accordance with the Syncopated Silt Fence detail (see Appendix A).

If required, excavation should be completed within one (1) day and/or open excavations should be backfilled daily to prevent turtles from becoming trapped.

Uncleared ROW—When project work requires vegetation removal in an uncleared ROW, cut and mow uncleared portions of EBT habitat during the active season (April 1st to November 1st). If clearing must be conducted during hibernation periods, pre-planning will involve conducting a turtle survey and the possible use of telemetry. Consult Eversource Environmental Licensing and Permitting before performing work because this activity may not be covered under the OMP and may require a permit.

3.10.2 ROW Vegetation and Other Protected Turtles

In addition to EBTs, some ROWs overlap with known habitat of other protected species of turtles. In Massachusetts, these species include Blanding's Turtle, Bog Turtle and Northern Red-bellied Cooter. If any work, including but not limited to vegetation

management, is scheduled to occur in the habitats of these turtles at any time of the year, **avoid wetland work**.

If unavoidable, operation and maintenance work in wetlands should be minimized to the greatest extent practicable. If work must occur in wetlands, the following guidelines apply:

- Any work should be reported to NHESP
- Work within wetlands mapped as habitat for the Bog Turtle or Northern Red-bellied Cooter must be reviewed on an individual basis by NHESP.

		Recommended Maintenance Activity if the Existing ROW is:	
Time Period	Turtle Status	Cleared and Maintained	Uncleared
April 1 to November 1	Active	*Perform only if required*—Mow vegetation no lower than seven (7) inches and use recommended mower heads	*Recommended*—Cut and mow uncleared areas
November 1 to April 1	Inactive	*Recommended*—Perform maintenance mowing	*Not recommended*—Requires turtle survey at minimum before removing vegetation

General Construction Recommendations –The following are general construction guidelines for protecting turtles:

- Install silt fencing around the work area prior to construction activity. Consider using syncopated silt fencing (see Figure A23 in Appendix A).
- Turtle training is required for all contractors. Apprise workers of the possible presence of turtles and provided a description of the species. Include a turtle sweep reminder on the Daily Tailboard.
- Conduct a turtle sweep after installing silt fencing and before conducting work.
- Perform daily turtle sweeps in work areas before performing any work.
- Carefully move any turtles that are discovered to an area immediately outside of the fenced area. Position turtle in the same direction that it was walking.
- Perform work with caution during early morning and evening hours. Take special care not to harm basking or foraging individuals.
- Remove silt fencing after work is completed and soils are stable so that reptile and amphibian movement between uplands and wetlands is not restricted.
- Return temporary cross-country access routes to pre-construction grade, seed if adequate root and seed stock are absent, and mulch. Do not seed pre-existing sandy soils that are within mapped rare turtle habitats unless directed by Eversource Environmental Licensing and Permitting in order to avoid altering nesting habitat.

3.10.3 Preservation of Existing Vegetation

Preserve the existing vegetation (i.e., groundcovers, vines, shrubs, trees) when practicable to improve soil stability and decrease the runoff volume and velocity. Identify and protect specified trees for erosion and sediment control benefits and/or aesthetic purposes. Consider saving trees that provide shading or screening benefits, particularly in residential areas. Preserve existing vegetation by reducing the width of a cleared ROW at stream crossings.

3.10.4 Invasive Plant Species

Invasive plant species are non-native species that invade natural communities and develop self-sustaining populations. The start of many infestations is often tied to a disturbance, and once established, the invasive species spread into undisturbed landscapes. They out-compete native species, disrupting ecological processes, and cause a loss of economic value or output. **It is illegal to transport, to introduce, and/or propagate state-listed invasive species**. Cleaning, draining and drying equipment between sites is mandated for aquatic invasives, and recommended for terrestrial equipment. Power washing of equipment and gear between sites is recommended, where feasible. At a minimum, visual inspection and hand removal of any plants, seeds, propagules, insects, mud, etc. is encouraged to maintain compliance with state laws and rules.

The linear nature of utility maintenance activities in vegetated corridors entails that a range of vegetative communities may be encountered by equipment, vehicles and personnel during the course of a single maintenance project or when mobilizing from one project site to another. It is especially important to follow best management practices when mobilizing equipment, vehicles and personnel from an area infested with invasive species to an un-infested area.

3.10.4.1 Project Planning – Invasive Plant Species

Prior to starting utility maintenance work, the project area should be evaluated to determine:

- Do invasive plant species exist in the project area?
- Do project activities have the potential to contact invasive plants or disturb soils in a manner that could potentially spread live plant parts or viable seeds?
- If invasive species are not present, or if it is not possible or not feasible to identify invasive plant species within the project area, follow best management practices to minimize the disturbance and spread of soil and/or plant matter.

3.10.4.2 Species Identification

It is imperative that workers who will be working or operating equipment in areas that may contain invasive plant species be trained in the identification and modes of dispersal of common, highly-prolific aquatic and terrestrial invasive plant species commonly found along road sides and in utility ROWs. See tables below for identification of the common invasive plants in Connecticut and Massachusetts.

Invasive Species in Massachusetts[1]

Botanical Name	Common name
Aegopodium podagraria	Bishop's goutweed; bishop's weed
Acer platanoides	Norway maple
Acer pseudoplatanus	Sycamore maple
Ailanthus altissima	Tree of heaven
Alliaria petiolata	Garlic mustard
Berberis thunbergii	Japanese barberry
Cabomba caroliniana	Carolina fanwort; fanwort
Celastrus orbiculatus	Oriental bittersweet; Asian or Asiatic bittersweet
Cynanchum louiseae	Black swallow-wort; Louise's swallow-wort
Cynanchum nigrum – see Cynanchum louiseae	Black swallow-wort; Louise's swallow-wort
Elaeagnus umbellata	Autumn olive
Euonymus alatus	Winged euonymus; burning bush
Euphorbia esula	Leafy spurge; wolf's milk
Fallopia japonica - see Polygonum cuspidatum	Japanese knotweed; Japanese or Mexican bamboo
Ficaria verna - see Ranunculus ficaria	Lesser celandine; fig buttercup
Frangula alnus	European buckthorn; glossy buckthorn
Glaucium flavum	Sea or horned poppy; yellow hornpoppy
Hesperis matronalis	Dame's rocket
Iris pseudacorus	Yellow iris
Lepidium latifolium	Broad-leaved pepperweed; tall pepperweed
Lonicera japonica	Japanese honeysuckle
Lonicera morrowii	Morrow's honeysuckle
Lonicera x bella [morrowii x tatarica]	Bell's honeysuckle
Lysimachia nummularia	Creeping jenny; moneywort
Lythrum salicaria	Purple loosestrife
Myriophyllum heterophyllum	Variable water-milfoil; two-leaved water-milfoil
Myriophyllum spicatum	Eurasian or European water-milfoil; spike water-milfoil
Nasturtium amphibium - see Rorripa amphibia	Water yellowcress; great yellowcress
Nasturtium officinale - see Rorripa nasturtium-aquaticum	
Phalaris arundinacea	Reed canary-grass
Phragmites australis	Common reed

Invasive Species in Massachusetts[1]

Botanical Name	Common name
Polygonum cuspidatum	Japanese knotweed; Japanese or Mexican bamboo
Polygonum perfoliatum	Mile-a-minute vine or weed; Asiatic tearthumb
Potamogeton crispus	Crisped pondweed; curly pondweed
Ranunculus ficaria	Lesser celandine; fig buttercup
Reynoutria japonica – see Polygonum cuspidatum	Japanese knotweed; Japanese or Mexican bamboo
Rhamnus cathartica	Common buckthorn
Rhamnus frangula – see Frangula alnus	European buckthorn; glossy buckthorn
Robinia pseudoacacia	Black locust
Rorippa amphibia	Water yellowcress; great yellowcress
Rosa multiflora	Multiflora rose
Salix atrocinerea/Salix cinerea	Rusty Willow/Large Gray Willow complex
Sisymbrium amphibium - see Rorripa amphibia	Water yellowcress; great yellowcress
Trapa natans	Water-chestnut
Vincetoxicum nigrum – see Cynanchum nigrum	Black swallow-wort; Louise's swallow-wort

[1] Based on the Massachusetts Invasive Plants Advisory Group (MIPAG); Last Updated 6/2021

Invasive Species in Connecticut[1]

Botanical Name	Common name
Acer platanoides	Norway maple
Aegopodium podagraria	Goutweed/Bishops Weed
Ailanthus altissima	Tree of heaven
Alliaria petiolata	Garlic mustard
Ampelopsis brevipedunculata	Porcelainberry
Artemisia vulgaris	Mugwort
Berberis thunbergii	Japanese barberry
Berberis vulgaris	Common barberry
Cabomba caroliniana	Fanwort
Cardamine impatiens	Narrowleaf bittercress
Celastrus orbiculatus	Asiatic bittersweet
Centaurea stoebe	Spotted knapweed
Cynanchum louiseae	Black swallow-wort

Invasive Species in Connecticut[1]

Botanical Name	Common name
Cynanchum rossicum	Pale swallow-wort
Elaeagnus umbellata	Autumn olive
Euonymus alatus	Winged euonymus
Euphorbia esula	Leafy spurge
Frangula alnus	Glossy Buckthorn
Froelichia gracilis	Slender snake cotton
Hesperis matronalis	Dame's rocket
Hydrilla verticillata	Hydrilla
Iris pseudacorus	Yellow iris
Lepidium latifolium	Perennial pepperweed
Lonicera japonica	Japanese honeysuckle
Lonicera maackii	Amur honeysuckle
Lonicera morrowii	Morrow's honeysuckle
Lonicera x bella	Belle honeysuckle
Lythrum salicaria	Purple loosestrife
Microstegium vimineum	Japanese stiltgrass
Myosotis scorpioides	Forget-me-not
Myriophyllum heterophyllum	Variable-leaf watermilfoil
Myriophyllum spicatum	Eurasian watermilfoil
Phalaris arundinacea	Reed canary grass
Phragmites australis	Common reed
Polygonum caespitosum	Bristled knotweed
Polygonum perfoliatum	Mile-a-minute vine
Potamogeton crispus	Curly-leafed pondweed
Ranunculus ficaria	Fig buttercup
Rhamnus cathartica	Common buckthorn
Robinia pseudoacacia	Black locust
Rosa multiflora	Multiflora rose
Rubus phoenicolasius	Wineberry
Trapa natans	Water chestnut
Tussilago farfara	Coltsfoot

[1] Based on the Connecticut Invasive Plants Council in accordance with Connecticut General Statutes §22a-381a through §22a-381d. The list was most recently re-printed in October 2018.

Avoidance and Minimization

- If possible, avoid or minimize contact with invasive species by physically avoiding locations with invasive plant infestations.
- In locations where invasive infestations exist, design the project to minimize contact with invasive species by choosing access routes and staging areas that are outside areas of infestation.
- Sequence work to the extent possible such that work using clean equipment and materials proceeds in un-infested areas prior to moving into infested areas and not vice versa.
- If it is unknown whether invasive species exist, design the project to limit travel across vegetated areas to the extent possible.
- When possible, time work under conditions that minimize the risk of spread, (frozen ground, snow cover, absence of seeds or propagules).

Vegetation Management

- Control of invasive plants by chemical means should be performed by a licensed applicator in accordance with the requirements of the CT DEEP Pesticide Management Program, the Massachusetts Pesticide Control Act (MPCA; M.G.L. Chapter 132B) and 333 CMR 2.00, ROW Vegetation Management regulations (333 CMR 11.00), and the MAWPA.
- Mechanical mowing of vegetation should adhere to principals of avoidance and minimization. Where possible avoid mowing invasive plants, especially plants that have the ability to sprout from stem and root fragments. For other invasive species, mowing should occur prior to seed set if possible.
- If woody vegetation is removed from a project site, transport it in compliance with invasive pest or disease quarantine zones established by the United States Department of Agriculture (USDA), the Connecticut Agricultural Experiment Station, MA DCR, and MA DAR.
- Any restoration seed mixes used should be free of any species identified as invasive by the Connecticut Invasive Plants Council in accordance with Connecticut General Statutes §22a-381a through §22a-381d (in Connecticut) or the Massachusetts Invasive Plants Advisory Group (in Massachusetts).

Soil Disturbance and Management

- Where possible, avoid soil disturbance as it may increase the chances of colonization by invasive seeds or propagules.
- Stabilize disturbed soils as soon as possible by seeding and/or using mulch, straw or gravel that is free of invasive plant material.
- Where possible, when excavating soils, top layers of soil containing plant material and roots should be segregated from sub soils and left on site.
- Cover soil and other material containing invasive plant material during transport.
- Do not transport fill and material containing invasive plant material onto a project site.
- If fill and materials containing invasive species must be transported off site, do not reuse, stockpile or dispose of these materials in such a manner that could promote

the spread of invasive plants.

Decontamination Procedures

- When utility maintenance activities require work in areas infested with invasive species, implement decontamination procedures per NHDOT's Best Management Practices for Roadside Invasive Plants manual.
- In order to minimize the spread of invasive plant seeds and material:
    - Clean vehicles, equipment, materials, gear, footwear or clothing of all visible soil and plant material on site in the infested area, or as near as practical to the infested area, prior to leaving the project site.
    - Do not decontaminate equipment next to streams or water bodies that could potentially transport seeds or propagules.
    - Decontaminate equipment and materials that may be contaminated by aquatic plant materials adjacent to the surface water they were exposed to prior to use in another surface water body.
    - Do not transport water withdrawn from a surface water body and discharge it to another water body.

Methods of Cleaning

- Use a brush, broom or hand tools to manually clean.
- Clean debris off equipment such as construction matting by shaking or dropping mats in a controlled manner to dislodge attached soil and debris.
- Compressed air.
- Containment must be in compliance with wastewater discharge regulations when using low-or high-pressure wash stations.

3.11 Work Pads

3.11.1 De-Energized and Energized

Applications: Work in wetlands

- Reconnaissance of each work pad area in or adjacent to wetlands should be performed to determine if the construction mat work pad areas could be located outside of wetland resource areas. Wetland disturbances should be avoided or minimized where practicable. Coordinate work pad locations and/or configurations with Eversource Environmental Licensing and Permitting.

Limitations:

- Requires heavy machinery for installation.
- Significant amount of time required for installation and removal.
- Pads for live line work require a considerably larger footprint.
- Several layers of matting may be needed in deep, construction areas.
- Animals may be injured or killed when attempting to cross work pads.

- May not be suitable in deep/open water wetlands.
- Must be underlain with non-woven geotextile if within an ORW (MA only).

How to Use:

- Work at structures may require placement of construction mats to provide safe and stable work pad areas for employees and contractors.
- Live line work, which is work that is done while the line is energized, requires a much larger work pad area. Efforts should be avoid or minimize impacts to wetlands to the extent practicable.
- Sizes of work pads vary based on the type of work being proposed.
- Work pad areas may extend into wetlands where structures that require maintenance either fall within or are in proximity to wetlands. In these cases, untreated wooden construction mats shall be used to limit disturbance.
- Install silt fencing around work pads in identified amphibian and reptile priority habitat and where matting is greater than one mat thick. The exclusionary silt fencing will deter animals from moving across work pads and reduce the likelihood of being crushed by heavy equipment.
- Following construction activities all mats at each work pad and vehicle access locations must be removed.
- Remove mats by "backing" out of the site and removing mats one at a time. Regrade soils to pre-existing contours while taking care not to compact soils, if necessary.
- In areas with invasive species, plant material should be removed from mats following removal from the infested area to prevent the spread of invasive species. Refer to the tables in this section for additional details regarding invasive plant species.

3.11.1.1 Best Management Practices – Work Pads

De-energized work requires smaller work pad areas, while live line work (i.e., work that is done while the line is energized) requires a much larger work pad areas.

De-energized construction mat work pads (see Figure A14 Appendix A)

3.12 Structure-Related Work

3.12.1 Wetland

Structure-related activities that may occur in wetlands include structure replacement/ installation (including casing installation), guy wire anchor installation, counterpoise installation, and pole butt removal. Access to these areas and completion of the activities can cause disturbance to wetland vegetation and soils. Therefore, structure-related activities in wetlands should entail use of adequately sized work pads and proper dewatering methods if/as needed. Inspection of the construction access and associated dewatering measures should occur daily during construction to ensure that controls are in working order and repairs to damaged/deteriorating controls are made in a timely matter. Repairs may include re-grading the traveled surface to eliminate ruts as well as those repairs required by each erosion and sedimentation measure used.

Structure Replacement/Installation

Replacement structures will often be replaced within a few feet of the original structure to maintain the required distances and line sags between other existing structures. Therefore, options for relocating proposed replacement structures are limited. Pole replacement will also require placement of construction mats in wetlands to provide a safe work pad for the required structure replacement activities. Usually, there are no alternatives that allow for this work to be conducted from nearby upland areas or to install the replacement structures in upland areas. Each structure replacement area should be assessed to determine the required footprint needed for construction mat work pads. Typical installation is as follows:

- At each pole location, remove wetland topsoil with an excavator and stockpile. Segregate wetland soils as necessary.
- If a borehole is drilled, collect and dispose of drilling spoils in an upland area.
- A galvanized steel casing is then driven into place at least 12 inches below the ground surface. The new pole is installed within the casing with a crane. The casing is then backfilled with crushed rock and compacted.
- Stockpiled wetland topsoil is placed above the casing to the ground surface. No net fill in wetlands occur, as the original poles are removed.
- Following installation of the new structures, the old structures are removed. Each pole is cut with a chainsaw and allowed to fall to the ground, which in wetland areas is protected by construction mats. If the pole is to be bucked into sections, conduct sawing activities in uplands when feasible. Pole butts will remain in place; if removing the pole butt will cause more damage than if left in place.
- Remove the pole and all appurtenant accessories (e.g., cross-arms, insulators) and properly dispose off-site. Remove each pole butt by pulling with an excavator positioned on a construction mat. If it is apparent that pole removal will compromise the integrity of the new pole installation, or that removal will result in additional disturbance to wetland areas, cut off the old pole at least 12 inches below ground level and backfill to match adjacent grades.

Guy Wire Anchor Installation

Guy wire anchors supporting the structures may also require replacing. There are two types of anchors: 1) helical and 2) plate type. Helical anchors are preferred over plate anchor because the installation of the helical anchor results in less disturbance to the wetland.

- Load test the existing anchor to determine whether it will support the pole structure. Consult with Eversource Engineering to determine load testing requirements. In the event the existing anchor cannot be re-used, remove it and install a new anchor.
- Screw in place a special triple helix ("screw type") anchor with an anchor installation rig operated from the matting area. Add rod sections as needed until proper holding capacity of the anchor is achieved. Consult with Eversource Engineering to determine anchor installation requirements.
    - Helical anchors are turned into the ground with only the rods protruding. Disturbance to the wetland from the helical anchor is minimal.

- Plate anchors are used in wetlands when proper holding cannot be achieved with screw anchors. To install a plate anchor, a pit is excavated to a sufficient depth and if necessary, a concrete footing would be installed several feet below surface grade. Consult with Eversource Engineering to determine plate anchor installation requirements.
    - When excavating to install plate anchors, segregate the top 12 inches of wetland topsoil from the underlying material. When the plate anchor has been set, backfill the excavation with underlying material. Utilize segregated wetland topsoil to restore pre-construction grades.

Counterpoise Installation/Grounding

To install grounding equipment in wetlands, use hand digging or minimally invasive methods to dig around the structure and restore soil to previous grades. In some cases, grounding rods can be driven directly into the ground with hand tools. Where work is occurring in the vicinity of wetland areas, sedimentation and erosion controls will be used to limit disturbance to wetlands.

Underground Facility Repair/Replacement

Underground facilities such as cables and conduits may be present beneath wetland areas. In the event underground facilities require repair, BMPs are required for both access and construction. Construction mats are used for access where warranted, and sedimentation and erosion controls are used to isolate the work area. During excavation activities, excavate wetland topsoil and stockpile separately from subsurface soils. Dewatering is often required during excavation and repair activities.

An alternative to repairing a subsurface line by excavation is to install a new line via trenching or horizontal directional drilling (HDD). The decision to use one of these alternatives is made on a case by case basis. Consult with Eversource Environmental Licensing and Permitting to determine if any permits will be needed.

Pole Butt Removal

When transmission poles are decommissioned or otherwise taken out of service, in most cases the entire pole shall be removed. Treated wood pole butts shall be removed completely from the ground and properly disposed at an off-site location. Locations where the removal of pole butts may cause significant disturbance to wetlands or other sensitive environmental areas will be considered for exception to this practice on a site-by-site basis. The Transmission Line Construction and Maintenance Manager, in consultation with Eversource Environmental Licensing and Permitting, will be responsible for determining if a pole butt can be removed if located in a sensitive environmental area.

All pole butt holes must be backfilled and compacted (every 3 feet) with appropriate fill material. Existing material on-site can be reused if it does not include materials that can rot (e.g., vegetation) and cause settling.

Disposal

Treated and non-treated wood products owned by the Transmission Group shall be stored in an area(s) designated by the Transmission Line Construction/Contract Field Services Supervisor until collected by an approved disposal vendor.

Concrete Wash Outs

Concrete wash outs shall be used for the management of concrete waste. Concrete and concrete wash out water shall not be deposited or discharged directly on the ground, in sensitive environmental areas, or in catch basins or other drainage structures. Where possible, concrete wash outs shall be located away from sensitive environmental areas, including buffer zones. Consult with Eversource Environmental Licensing and Permitting to determine concrete wash out locations prior to their use. Following the completion of concrete pouring operations, the wash outs shall be properly disposed of off-site with other construction debris.

3.13 Underground Cable and Gas Piping-Related Work

Gas piping-related activities will typically occur within roadways or along roadway shoulders. There may be some instances where wetland permitting is required when wetlands are located adjacent to or in the vicinity of roadways. However, when work is performed within the roadway/shoulder, permitting is typically not required. Verify permitting requirements with Eversource Environmental Licensing and Permitting. In all cases, BMPs should be followed to ensure environmental compliance.

Typical examples of underground cable and conduits include:

High-Pressure, Fluid-Filled Pipe-Type Cable: A high-pressure, fluid-filled (**HPFF**) pipe-type of underground transmission line, consists of a steel pipe that contains three high-voltage conductors. The fluid also transfers heat away from the conductors. The fluid is usually static and removes heat by conduction.

XLPE Cable (cross-linked polyethylene): Hydronic tubing that is manufactured from polyethylene plastic with a three-dimensional molecular bond that is created within the structure of the plastic. The cross-linked polyethylene (XLPE) underground transmission line is often called solid dielectic cable. The solid dielectric material replaces the pressurized liquid or gas of the pipe-type cables. XLPE cable has become the national standard for underground electric transmission lines less than 200 kV.

Roadways and Shoulders

When working in roadways, particularly in residential areas, the following activities should be performed in addition to standard construction BMPs:

- Repave disturbed paved areas and return to original elevations on the same day that construction is performed.
- Restore all non-paved areas to pre-existing (or improved) conditions. Replace any sod or other plantings in kind or with an acceptable alternative.
- Employ dust control as necessary to minimize airborne dust.
- Streets should be swept daily or as necessary to remove dirt and debris from resulting from construction from the roadway surface. Dirt and debris swept from the roadway surface should be collected and properly disposed of as construction waste. Under no circumstances should dirt and debris be swept off of the roadway surface to the road shoulder or deposited in any catch basins.
- Discharge trench dewatering volumes to an appropriate dewatering structure setup on adjacent undeveloped, unimproved uplands away from wetlands (refer to Appendix A). Consult with Eversource Environmental Licensing and Permitting staff

to determine appropriate locations for placement of dewatering structures.

- Trench dewatering may also be discharged to areas of open trench to allow for infiltration.
- For minor volumes or short-term duration dewatering needs, trench dewatering may be pumped to frac tanks for transport off-site and discharge to an appropriate dewatering structure located at a contractor yard or similar location.
- Trench dewatering may only be discharged to stormwater catch basins after all necessary federal, state and local permits have been obtained to do so (this typically requires design and implementation of an effective treatment system to remove all potential contaminants, such as suspended solids or other chemical contaminants). Consult with Eversource Environmental Licensing and Permitting if discharge to catch basins is required.

Under certain circumstances, gas piping must be installed beneath existing culverts within roadways. Take care to ensure that any saturated material excavated from the trench be properly stored and disposed as to not cause sedimentation issues. Implement dewatering methodologies, as required.

There may be cases where a drainage ditch or swale must be crossed to gain construction access from paved roads onto ROWs along the roadway shoulder. Install construction mats, mat bridges, or temporary culverts, as necessary, to facilitate access. Culverts should be for temporary use, sized for peak flow, and removed after construction is complete. Consult with Eversource Environmental Licensing and Permitting prior to installation.

Bridges and Culverts

Attachment of gas piping to bridges or culverts is the environmentally preferable method for crossing a wetland or watercourse. Consult with the appropriate people (engineers, the Department of Transportation (DOT), etc.) to determine if attachment to a bridge or culvert is a technically feasible option at the desired crossing location. Eversource Environmental Licensing and Permitting should also evaluate the impacts to FEMA flood storage quantities and potential Coast Guard permitting requirements. Ensure that proper erosion and sedimentation controls are in place on either side of the bridge or culvert throughout construction.

Rivers and Streams

There are two primary approaches for crossing a river or stream with a gas pipeline: direct bury (open trenching) and trenchless methods (e.g., HDD, standard bore/pipe jacking).

Direct bury methods involve erecting a coffer dam to isolate the work area and redirecting water flow using gravity or pumping to move water from one side of the work area to the other. Direct bury methods have larger direct environmental impacts than trenchless methods. Typical coffer dam examples are included in Figures A42 and A43 in Appendix A.

Trenchless methods use specialized equipment to install piping beneath a waterbody (or a major roadway, railroad, etc.). The most common method used for gas piping is HDD which uses remote controlled, steerable drilling equipment to install pipe along a long arc alignment. The drilling process can be divided into three steps: pilot, reaming, and pull-in. The first step is to drill a pilot bore-hole. Next, a larger diameter fly cutter is used to

enlarge the opening. A specialized bentonite slurry drilling fluid is injected into the bore-hole to stabilize the surrounding soil and to lubricate and cool the drill bit. For the final step, a barrel reamer is used to further enlarge the bore-hole and to pull the pipe into place.

A notable environmental concern with HDD is called "frac-out." This occurs when drilling fluid breaks through the soil surface and into the waterbody. Regulatory agencies may require a "frac-out plan" which details preventative controls and response measures should frac-out occur. A typical frac out plan is included in Appendix D; however, HDD contractors should be required to provide a detailed frac-out plan specific to the project and their practices. These plans may be subject to environmental regulatory agency review. Consult with Eversource Environmental Licensing and Permitting for permit requirements.

3.14 Construction Material along the ROW

Once a site is prepared by clearing and/or installing erosion and sediment controls, materials may be stored along the ROW prior to the start of construction. Such materials may include the following: piping, poles, cross-arms, cable, insulators, stone, and other engineered backfill materials. In general, the stockpiling of stone and other unconsolidated material on construction mats should be avoided. If it is determined necessary due to access and work pad constraints, the material should be placed on a geotextile fabric and be properly contained with a sedimentation barrier such as straw wattle or bales. No construction materials should be placed in wetlands or other sensitive resource areas.

3.15 Winter Construction

3.15.1 Snow Management

Snow should not be stockpiled or disposed in any waterbody or near water supply sources. These include wetlands, rivers/streams, the ocean, reservoirs, ponds, stormwater catch basins, wellhead protection area, in high or medium yield aquifer, or within 200 feet of a private well. In addition to water quality impacts and flooding, snow disposed in surface water can cause navigational hazards when it freezes into ice blocks. Maintain a minimum buffer of 25 feet between any snow disposal area and the high water mark of any surface water. A silt fence or equivalent barrier should be installed between the snow storage area and the high water mark of rivers, streams, ponds, or the ocean. Consult with Eversource Environmental Licensing and Permitting regarding any specific state and local snow management requirements.

Avoid disposing of snow on top of storm drain catch basins or in storm water drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system and cause localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water and could also result in fines or a violation.

All debris in a snow storage area should be cleared from the site and properly disposed of no later than May 15 of each year. Care shall be taken not to plow road materials away when removing snow.

3.15.2 De-Icing

Where permitted, calcium chloride is the preferred de-icing agent when applied according to manufacturer's guidelines in upland areas. Sand should be used on construction mats through wetland areas. Consult with Eversource Environmental Licensing and Permitting on de-icing agents when working in a facility or substation near resource areas. Many municipalities have specific de-icing agent requirements for work within 100 feet of wetlands and other sensitive environmental areas.

3.15.3 Snow and Ice Management on Construction Mats

Promptly and properly remove snow from construction mats to avoid ice formation. Remove snow from construction mats before applying sand to avoid forming ice. A round street sweeping brush mounted on the front of a truck may be an effective way to remove snow from construction mats. Propane heaters may also be suitable solutions for snow removal and/or de-icing of construction mats. Sand should be collected from the construction mats and disposed of in an upland area prior to removing construction mats from wetlands. Once construction mats are removed, wetlands shall be inspected for sand buildup that may have fallen through construction mats. Sand deposited in wetlands or other sensitive environmental areas shall be completely removed by the contractor. Consult with Eversource Environmental Licensing and Permitting prior to commencing work in wetlands or other sensitive environmental areas.

3.16 Dust Control

Dust control measures are used to reduce surface and air movement of dust from exposed soil surfaces during land disturbance, demolition, and construction activities. These practices reduce the amount of dust in the air and decrease the potential for accidents, respiratory problems, and airborne sedimentation. Construction activities should be scheduled appropriately to minimize the amount of site surface exposed at one time in order to reduce the amount of areas requiring dust control. Use dust control measures on disturbed soil surfaces and exposed soil surfaces, especially during hot or dry weather periods and in areas with excessively well-drained soils. Repetitive treatments should be used as needed, or required by permits, and until the surface is permanently stabilized.

Type	Description/Use
Vegetative Cover	• Most effective and practical method. • Use in disturbed areas not subject to traffic. • Follow seeding requirements as directed by local guidelines or permit requirements.
Stone	• Cover soil surface with crushed stone/coarse gravel.
Water/Sprinkling	• Sprinkle exposed soils until wet (Water trucks may be used depending on size of the site). • Do not excessively wet the soil as this causes run-off and also wastes water.

Barriers	• Board fences, wind fences, and sediment fences control air currents and blowing soil. • Wind barriers protect soil downgradient for a distance of ten times the barrier height. • Perennial grasses and stands of existing trees also serve as wind barriers, stressing the importance of planning work phasing properly and minimizing the amount of exposed soil.
Plastic Covering	• Cover soil piles with sheets of plastic/tarp to minimize dust.
Calcium Chloride	• Loose, dry granules of calcium chloride may be applied with a mechanical spreader. • Apply at a rate that keeps the surface moist but not high enough to cause water pollution or plant damage. This method should be done under consultation with an expert in order to maintain this balance and to determine if the site is applicable.

3.16.1 Soil Stockpile Management

Some projects may involve excavation and stockpiling of soil. Stockpiles should be located outside sensitive areas to the extent practicable and managed to prevent erosion and sedimentation of adjacent areas. Typical measures include the installation of protective measures (e.g., siltation fence and/or straw bales) around the perimeter of the stockpile. The stockpile must be seeded if left in place for more than 30 days. No snow or soil piles, construction materials, or equipment should be stored in the immediate vicinity at the top of a terrace escarpment slope.

3.16.2 Stockpiles on Construction Mats

When soil (or gravel) stockpiles must be staged on construction mat work pads in wetlands, stockpiles should be placed atop areas of matting underlain with non-woven geotextile (either directly atop the mats or between layers of matting) to minimize the potential for material to filter through gaps in matting and deposit in wetlands. Use of construction mat stringers as physical barriers at the edge of the work pad should also be considered. These barriers are recommended to minimize the potential for stockpiled material to get pushed off the work pad into wetlands. Consult with Eversource Environmental Licensing and Permitting for site-specific guidance.

3.16.3 Regulated Soils Management

When polluted/contaminated soil is encountered, it must be handled in accordance with the appropriate regulatory requirements. In addition to the measures discussed above, contaminated soils should be stockpiled on and covered by polyethylene sheeting. Sheeting used to cover the stockpile should be weighted down to prevent the wind migration of contaminated dust.

For soil stockpiles in substations, contact Eversource Environmental Licensing and Permitting. If soil/water must be stored and/or disposed, comply with existing soil and groundwater management guidelines. Coordinate with the Environmental Affairs Department (EAD) to ensure appropriate procedures are followed.

3.16.4 Best Management Practices – Soil Stockpile Management

The following BMP is applicable to soil stockpile management and is described at:

Soil Stockpile Management (see Figure A19 in Appendix A)

3.17 Anti-Idling Laws

Connecticut and Massachusetts have promulgated anti-idling laws for the purpose of improving air quality by reducing unnecessary air pollution from idling vehicles.

State	Idling Time Limit (in minutes)
Connecticut	3
Massachusetts	5

Details of these laws and the statutory exceptions to the limits noted above are presented in the following sections.

3.17.1 Connecticut

The Regulations of Connecticut State Agencies (RCSA) section 22a-174-18(b)(3) states: a mobile source shall not operate for more than three (3) consecutive minutes when such mobile source is not in motion except if the vehicle is operating for one of the conditions exempted in the regulation.

These exemptions for mobile sources not in motion include:

- When a mobile source is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control.
- When it is necessary to operate defrosting, heating or cooling equipment to ensure the safety or health of the driver or passengers.
- When it is necessary to operate auxiliary equipment that is located in or on the mobile source to accomplish the intended use of the mobile source.
- To bring the mobile source to the manufacturer's recommended operating temperature.
- When the outdoor temperature is below 20 degrees Fahrenheit.
- When the mobile source is undergoing maintenance that requires such mobile source be operated for more than three (3) consecutive minutes.
- When a mobile source is in queue to be inspected by U.S. military personnel prior to gaining access to a U.S. military installation.

3.17.2 Massachusetts

The Massachusetts Anti-Idling Law (M.G.L. Chapter 90, Section 16A and its implementing regulations set forth at 310 CMR 7.11 applies to all vehicles and limits unnecessary engine idling of stopped vehicles to five (5) minutes.

This law shall not apply to:

- Vehicles being serviced, provided that operation of the engine is essential to the proper repair thereof.

- Vehicles engaged in the delivery or acceptance of goods, wares, or merchandise for which engine assisted power is necessary and substitute alternate means cannot be made available.
- Vehicles engaged in an operation for which the engine power is necessary for an associate power need other than movement, and substitute alternate power means cannot be made available provided that such operation does not cause or contribute to a condition of air pollution.

SECTION 4

Section 4
Inspection and Maintenance

A pre-construction meeting will be held to discuss how often and who is responsible for monitoring erosion and sediment controls to document their condition and recommend maintenance or other corrective actions, as necessary. All BMPs will be inspected at least once per week during active construction and until disturbed areas have stabilized following post-construction site restoration. Construction sites will be inspected after major storm events (rainfall events greater than 0.25 inches (MA) or 0.50 inches (CT)), or as directed by Eversource Environmental Licensing and Permitting.

4.1 During Construction

Construction sites, construction access roads, and the associated erosion and sediment controls should be inspected by the person(s) designated at the pre-construction meeting, as required by permit conditions. Any damage observed must be repaired in a timely manner, at least within 48 hours of observation. Repairs may include re-grading and/or top dressing the surface with additional aggregate to eliminate ruts as well as those repairs required by each erosion and sediment measure used.

All inspections will be documented in a written report submitted to Eversource Environmental Licensing and Permitting and saved to the project folder. Copies will be distributed to the relevant contractors if/as directed by Eversource Environmental Licensing and Permitting.

4.1.1 Maintenance of Erosion and Sedimentation Controls

Spare erosion and sedimentation control materials such as straw wattles, straw bales and silt fencing should be kept on site or be readily available so they may be replaced if they become non-functional due to deterioration or damaged during a storm, extreme water or wind, or other unexpected events.

4.1.2 Rapid Wetland Response Restoration

In the event of unintended discharges of sediment into wetlands, Eversource Environmental Licensing and Permitting will direct the contractor(s) to quickly control, contain and remove sediment using non- or marginally invasive methods. Responding quickly to unintended discharges minimizes the difficulty and cost of restoration if the sediment is left in place for an extended period of time. Eversource Environmental Licensing and Permitting will direct sediment removal activities at the time of discharge and will notify the appropriate regulators of the discharge and the recommended corrective actions.

4.1.3 Vehicle Storage and Refueling

All storage and refueling of vehicles and other equipment must occur outside of and as far away as practical from sensitive environmental areas such as wetlands, unless specifically authorized by Eversource Environmental Licensing and Permitting and an alternate protocol is developed and approved internally.

The recommended minimum distance from wetlands for storage of fuel and refueling is 100 feet. Additionally, equipment should be checked regularly for evidence of leaks. Construction material storage should also be located at least 100 feet from wetlands.

Storage of larger, less mobile equipment such as drill rigs or large cranes, may be permitting within wetlands subject to prior approval from Eversource Environmental Licensing and Permitting. Secondary containment shall be in place at each piece of equipment during non-working hours.

Refueling of larger, less mobile equipment such as drill rigs or large cranes, may be allowed within wetlands only with prior approval from Eversource Environmental Licensing and Permitting and if specified precautions and protocols are followed. A proper location for refueling should be identified and designated before site work begins. At a minimum, if refueling must be conducted in wetlands, the contractor shall provide adequate secondary containment during refueling operations and shall maintain a spill kit on-site at all times.

4.1.4 Spills

Spill kits consist of emergency cleanup and spill containment materials that can be used in the event of a fuel or other chemical spill. Spill kits must be kept on site and accessible at all times in case of an emergency spill. Such kits should generally contain multiple absorbent socks and/or pillows and wipes and temporary disposal bags. Follow the applicable Eversource Contractor Work Rules.

4.1.5 Post-Construction

Post-construction inspections of restored areas will be conducted at regular intervals throughout the growing season, as required by any applicable permits, and/or after major storm events. Sites should be inspected for success or failure of revegetation, invasive species colonization, and erosion and sedimentation. In the event additional measures are required to achieve site restoration and stabilization, corrective actions shall be identified and implemented.

All information collected during inspections, regular maintenance, and repair procedures should be documented in project folders. In addition, photographic or diagrammatic logs may be kept to record certain events and for documentation of project progress and any noteworthy observations.

The construction work is not complete until all areas are restored.

SECTION 5

Section 5
Rehabilitation and Restoration

5.1 Restoration

All areas disturbed by construction, repair, and maintenance activities shall be substantially restored to pre-construction conditions. Please refer to Appendix A for photos and typical details for loaming, seeding, and mulching. Prompt restoration minimizes the extent and duration of soil exposure and protects disturbed areas from erosion due to stormwater runoff, ice, wind and gravity. Stabilization should be conducted as soon as practicable. Where appropriate, it is preferable to allow sensitive environmental areas, such as wetlands and rare species habitat to revegetate naturally.

Consult Eversource Environmental Licensing and Permitting for project-specific restoration requirements.

5.1.1 Seed Mixes

Several different seed mixes are available for upland and wetland restoration. State-specific comprehensive summaries of seed mixes for both temporary and permanent seeding of disturbed sites can be found within the following documents:

- Massachusetts: Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, page 157: https://www.mass.gov/doc/complete-erosion-and-sedimentation-control-guidelines-a-guide-for-planners-designers-and/download
- Connecticut: 2002 Connecticut Guidelines for Soil and Erosion Sediment Control, page 5-3-8: https://portal.ct.gov/DEEP/Water/Soil-Erosion-and-Sediment-Control-Guidelines/Guidelines-for-Soil-Erosion-and-Sediment-Control

Upland Seed Mix: If significant grading or upland alteration has occurred, annual rye grass seed shall be placed for temporary stabilization following manufacturer's recommendations after re-grading activities.

Wetland Seed Mix: If significant grading or wetland alteration has occurred, a wetland seed mix shall be placed following manufacture's recommendations after re-grading activities.

5.1.2 Upland

The following restoration techniques apply to restoration projects in upland areas.

- Soil excavated during construction and not used as backfill must be evenly spread across disturbed areas to restore grades. Topsoil shall be stripped and separated to the extent practicable for re-use. Permanent soil protection shall be provided for all areas disturbed by construction activities. All areas will be seeded either by hydroseeding or broadcast seeding. Interim stabilization measures are required if areas cannot be seeded due to the time of year. Interim measures may include the application of mulch.
- Topsoil removed during construction activities will be replaced, seeded, and mulched.
- All areas that are broadcast seeded shall be treated with a layer of mulch, such as

straw, up to one (1) inch thick to enhance moisture retention, dissipate disturbance from precipitation, and detract birds foraging on broadcast seed.

- Rehabilitation of access routes and other areas must be performed as soon as practicable after construction is completed, including reestablishment of water bars or other BMPs to control erosion of the access road, and the removal and restoration of temporary wetland or waterway crossings.
    - Temporary breaks in construction activities may warrant seeding and mulching of disturbed areas as interim erosion control measures. Consult with Eversource Environmental Licensing and Permitting to determine project-specific requirements.
- Erosion control measures shall remain in place until soils are adequately stabilized, as confirmed by Eversource Environmental Licensing and Permitting. Once soils are stable, erosion controls – especially silt fence, which presents an obstacle to movement of small animals, shall be removed and properly disposed off-site. Stakes should be removed from straw bales and spread as mulch to remove barriers to wildlife movement.
- The use of hay and/or hay products is strictly prohibited to prevent the spread of invasive plant species seed stock.
- If a grading operation at a site is suspended for a period of more than twenty-nine (29) consecutive days, the disturbed area shall be stabilized by seeding, mulching, and/or other appropriate means within the first seven (7) days of the suspension of grading.
- Within seven (7) days after a final grade is established in any grading operation, the disturbed area shall be stabilized by seeding, loaming, and/or other appropriate means.

5.1.3 Wetland/Watercourses

Re-grading of Ruts: Upon removal of construction mats, or other BMPs, the wetland/watercourse should be inspected for rutting or disturbance from eroded upland soils. Any rutting should be re-graded to pre-existing contours and upland soils removed from wetland areas while taking care not to compact soils.

The following restoration techniques apply to restoration projects in wetlands:

Maintenance, Repair, and Emergency Projects (When No Permit is Required)

- Remove mats by "backing" out of the site and removing mats one at a time. Re-grade soils to pre-existing contours while taking care not to compact soils.
- Soils excavated from wetland areas shall be segregated and stockpiled separately (i.e., topsoil/muck apart from mineral subsoil) in a dry/upland area at least 100 feet from wetland boundaries unless other provisions have been made to facilitate restoration activities.
- Excavated wetland soils that have been stockpiled during underground utility installations within wetlands shall be replaced in the same order (i.e., mineral subsoil beneath organic topsoil/muck) to the extent practicable and restored to pre-disturbance grades.
    - Grading activities should include the elimination of ruts within the

area to be restored.

- If replacement of soil associated with temporary wetland or watercourse crossings for access roads is necessary, disturbed areas must be restored to pre-disturbance grades, either seeded and mulched, or allowed to revegetate from the natural seed bank.
- Disturbed wetland areas shall generally be allowed to revegetate from the natural seed bank. Measures to discourage the establishment or spread of plant species identified as non-native, invasive species by federal or state agencies shall be utilized. Consult with Eversource Environmental Licensing and Permitting to evaluate means and methods of wetland vegetate re-establishment.
- Any restoration plantings or seed mixes used in restoration shall consist of species native to the project area and, if feasible, from local nursery stock.
- Any stream banks and beds damaged shall be restored through use of 100 percent natural fiber geotextile erosion control blankets and/or coir logs. The use of erosion control products containing plastic and/or nylon is strictly prohibited.
- All seeded areas shall be treated with a layer of mulch (i.e., straw; the use of hay and/or hay products is strictly prohibited) up to one (1) inch thick to enhance moisture retention, dissipate disturbance from precipitation, and detract songbirds foraging on broadcast seed.

5.2 Private Property

5.2.1 Improved Areas

If access is over an off-ROW property, then it is the responsibility of a construction representative to determine if legal access rights are available to cross the property.

Access to and along the ROW over private property must be improved to the extent necessary to ensure suitable passage for construction equipment, provide erosion control, and maintain proper drainage. Upon completion of construction activities, altered yards, lawns, agricultural areas, and other improved areas must be restored to a condition equal to or better than before their use for the construction project.

5.2.2 Overall Work Site

Construction personnel should remove all work-related trailers, buildings, rubbish, waste soil, temporary structures, and unused materials upon satisfactory completion of work. All areas should be left clean, without any litter or equipment (e.g., wire, pole butts, anchors, insulators, cross-arms, cardboard, coffee cups, water bottles) and stabilized to match pre-construction conditions to the maximum extent practicable. Debris and spent equipment should be returned to the operating facility or contractor staging area for disposal or recycling as appropriate.

5.2.3 Material Storage/Staging and Parking Areas

Upon completion of all work, all material storage yards, staging areas, and parking areas shall be completely cleared of all waste and debris. Unless otherwise directed or unless other arrangements have been made with an off-ROW or off-property owner, material storage yards and staging areas shall be returned to the condition that existed prior to the installation of the material storage yard or staging area. Regardless of arrangements

made with a landowner, all areas shall be restored to their pre-construction condition or better. Any temporary structures erected by the contractor, including fences, shall be removed by the contractor and the area restored as near as possible to its original condition, including seeding and mulching as needed.

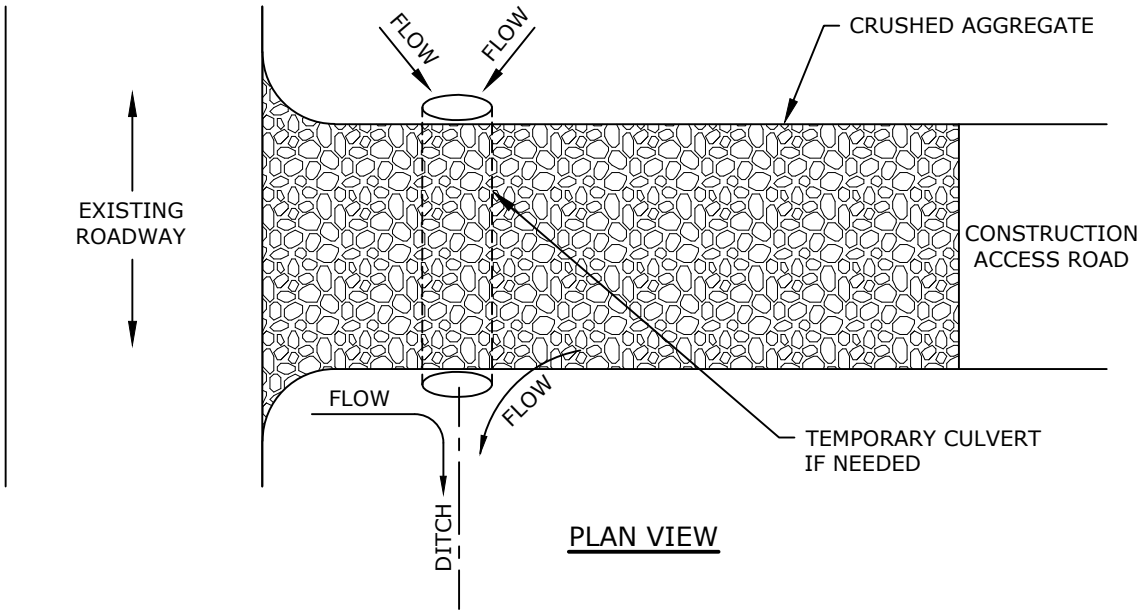
5.3 Work in Agricultural Lands

Transmission lines often cross agricultural lands. In some instances, this may affect ongoing agricultural activities in and around the ROWs. If a construction or maintenance project occurs within agricultural lands, Eversource will work closely with landowners, licensees and stakeholders to minimize agricultural impacts. Whenever practical, Eversource will make reasonable efforts to coordinate the schedule of construction-related activities around the growing and harvest seasons to minimize the impacts on agricultural operations. When this is not practical, Eversource will pursue reasonable measures to mitigate any impacts.

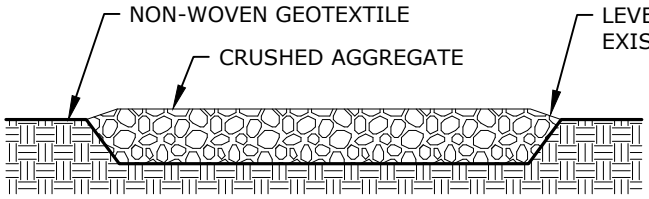
Eversource recognizes that disturbed soils, or soils compacted by heavy construction equipment, may affect the soil's ability to support certain agricultural activities. Eversource will take reasonable steps to avoid or minimize soil compaction and will restore soils that are compacted by construction equipment. Typical measures to avoid or minimize soil compaction include the use of construction mats for access to, and work pads at, structures within the project scope.

Eversource will also work with affected landowners to determine the appropriate method for restoring the soils and is open to discussing and implementing the landowners' alternative restoration suggestions. After the transmission improvement is complete, Eversource will remove all construction-related equipment and debris from the ROW.

APPENDIX A



PLAN VIEW



ELEVATION VIEW

NOTES:

1. CRUSHED AGGREGATE TO CONSIST OF 3-INCH TO 6-INCH STONE.
2. AGGREGATE TO BE UNDERLAIN WITH NON-WOVEN GEOTEXTILE FABRIC.

CONSTRUCTION ENTRANCE TRACK PAD

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A01

EVERSOURCE

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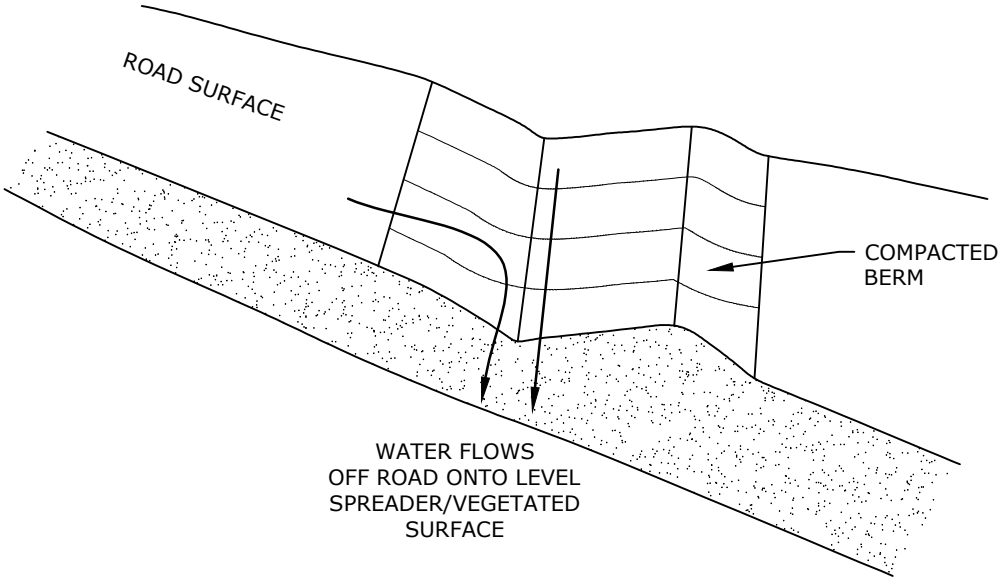
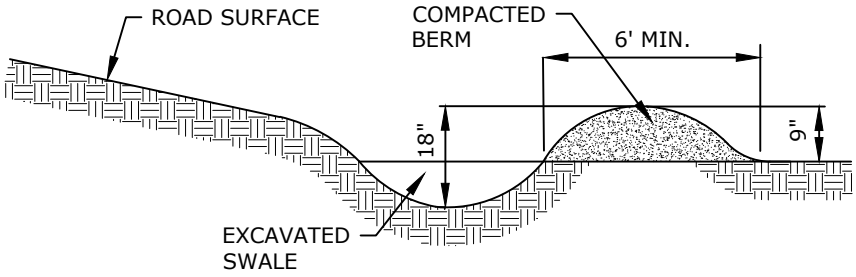
NOTE:
FILL FOR BERMS SHALL BE A COMBINATION OF GRAVEL, SAND AND SILT TO ENSURE WATER TIGHTNESS AND STABILITY.





ELEVATION VIEW

WATER BARS

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A02

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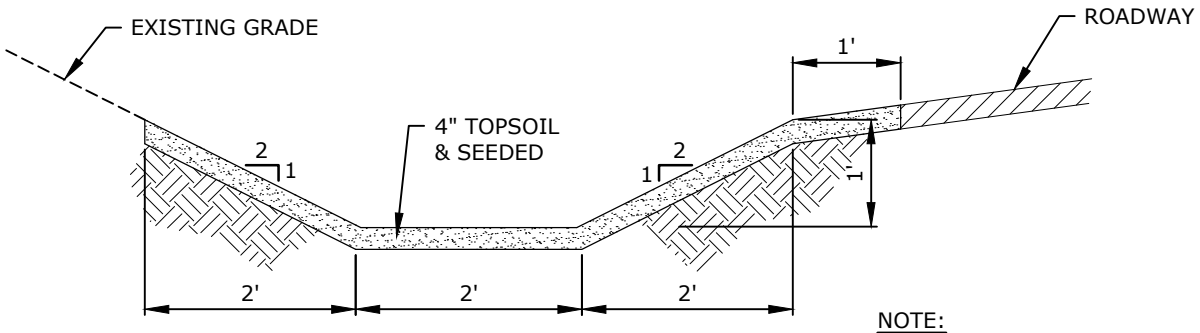
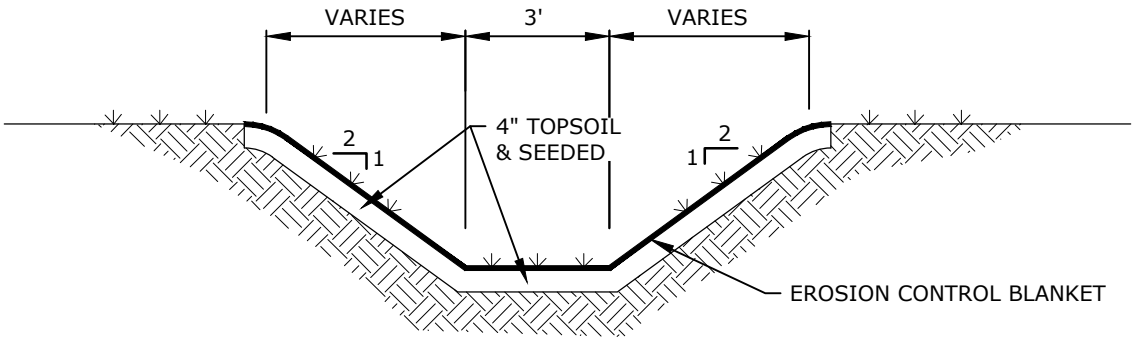


DRAINAGE SWALE AT ROADWAY

NOTE:

1. USE OF PRODUCTS WITH PLASTIC AND/OR NYLON NETTING IS PROHIBITED.



GRASS-LINED CHANNEL

VEGETATED SWALES

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A03

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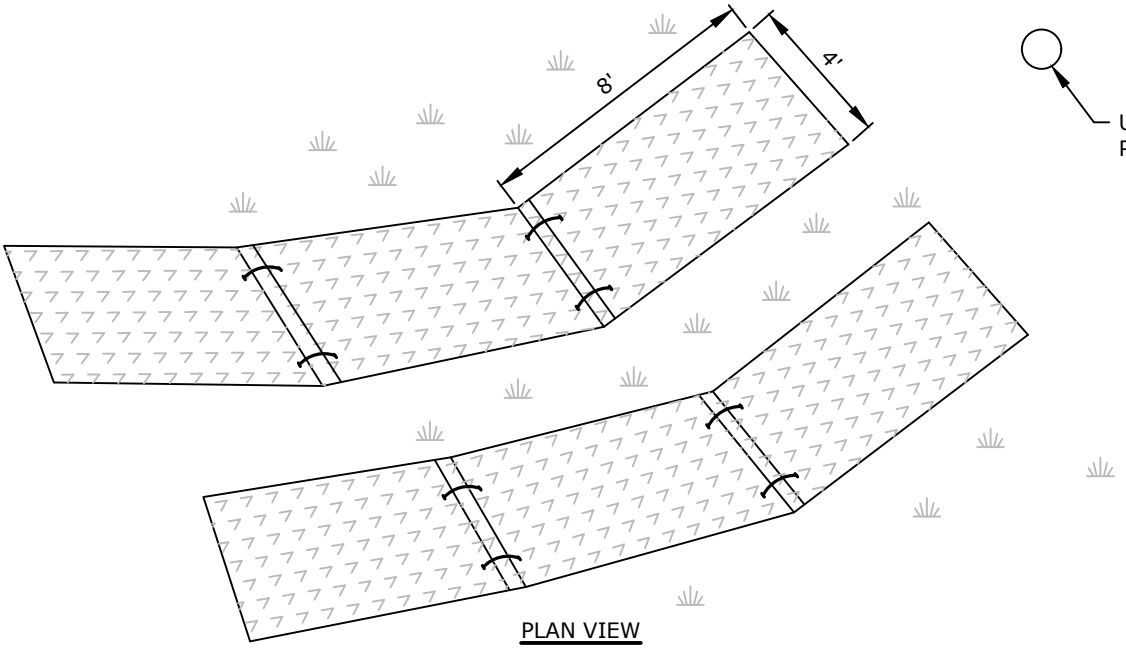
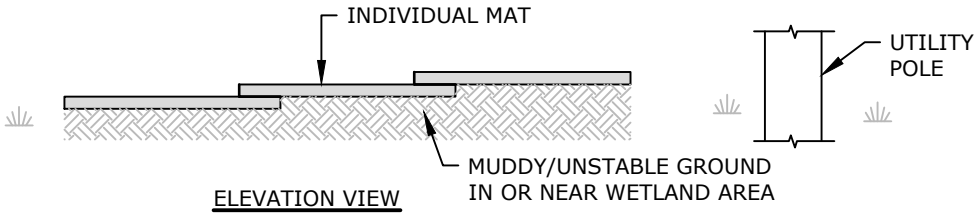


PLAN VIEW



ELEVATION VIEW

ALTURNAMAT®

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A04

EVERSOURCE

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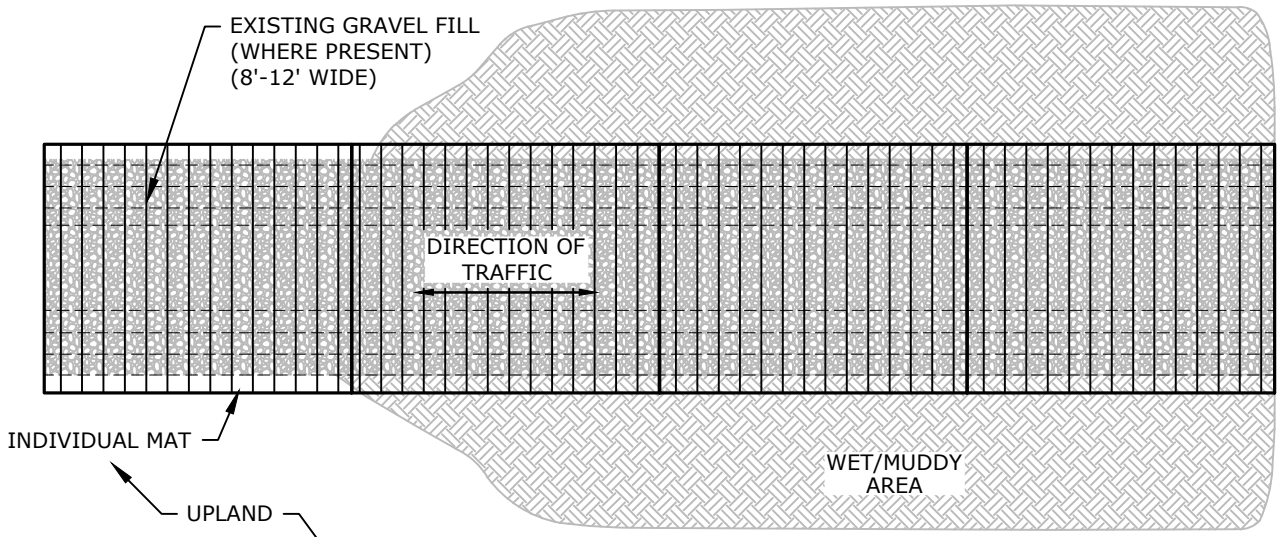
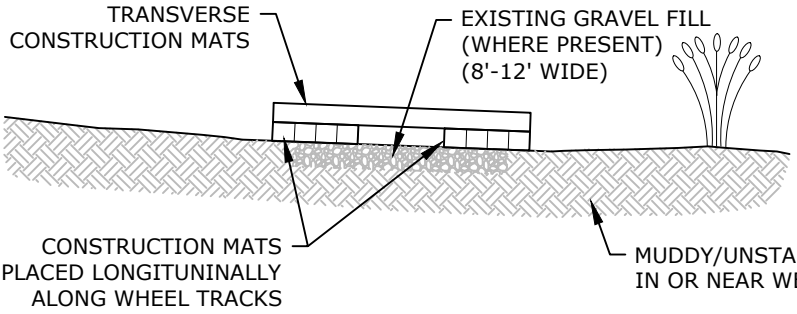


PLAN VIEW



ELEVATION VIEW

NOTES:

1. CONSTRUCTION MAT DIMENSIONS OF 12'x4'x8", 16'x4'x8" OR OTHER TO BE USED.

CONSTRUCTION MAT
(WETLAND CROSSING)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A05

EVERSOURCE

Apr 07, 2022-2:19pm Plotted By: AGordon
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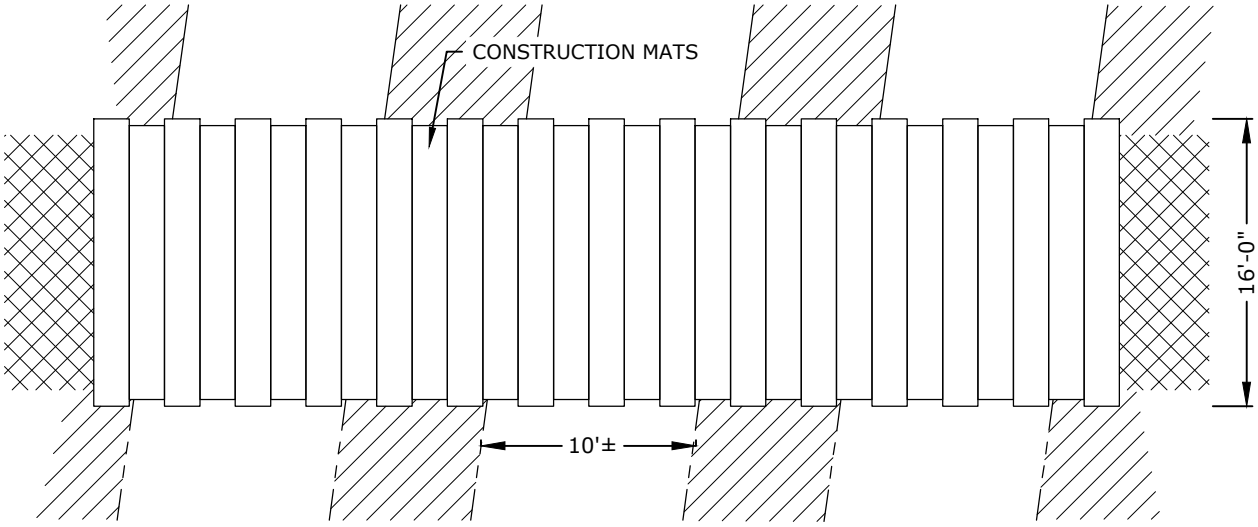
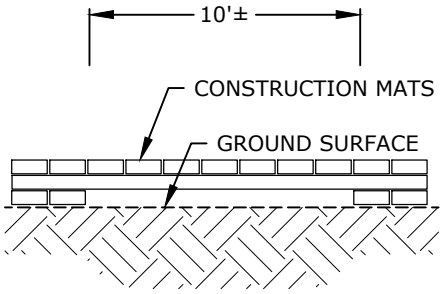


PLAN VIEW



ELEVATION VIEW

NOTES

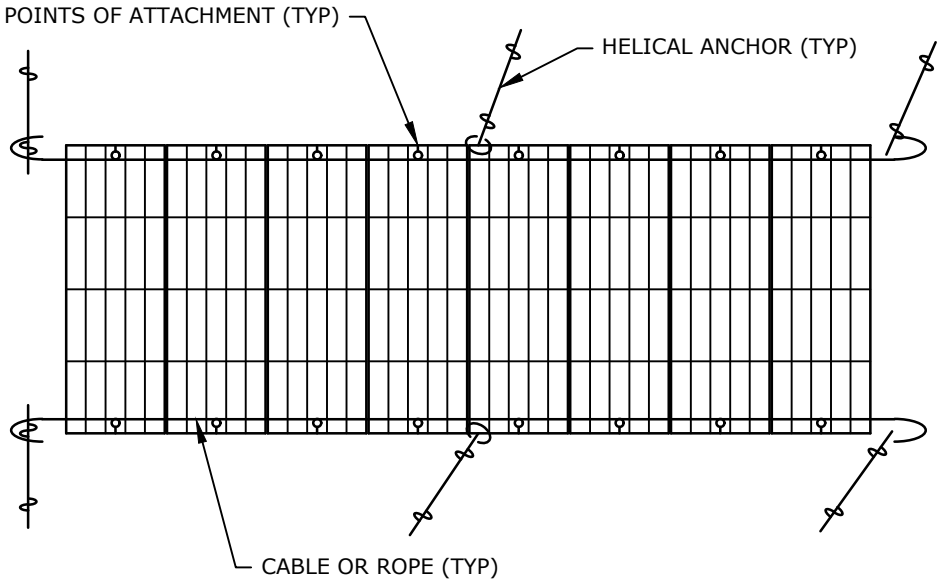
1. CONSTRUCTION MATS SHOULD BE PLACED CLOSELY TOGETHER SO THERE ARE NO GAPS BETWEEN EACH MAT SECTION.
2. CONSTRUCTION MAT DIMENSIONS OF 12'x4'x8", 16'x4'x8" OR OTHER TO BE USED.
3. AIR BRIDGING MAY ALSO BE USED TO AVOID IMPACTS TO UNDERGROUND UTILITIES, STONE WALLS, RARE PLANTS OR OTHER SENSITIVE FEATURES. CONSULT WITH EVERSOURCE ENVIRONMENTAL.
4. ADDITIONAL MEASURES MAY BE REQUIRED.

CONSTRUCTION MAT
(AIR BRIDGE)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A06

EVERSOURCE

Nov 22, 2021-2:28pm Plotted By: TMP
Tighe & Bond, Inc. J:\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Elevated Animal Crossing.dwg



PLAN VIEW

NOTES:

1. TYPICAL HELICAL ANCHOR AND CABLE CONFIGURATION FOR MAT CONTAINMENT IN FLOODPLAINS/LAND SUBJECT TO FLOODING.

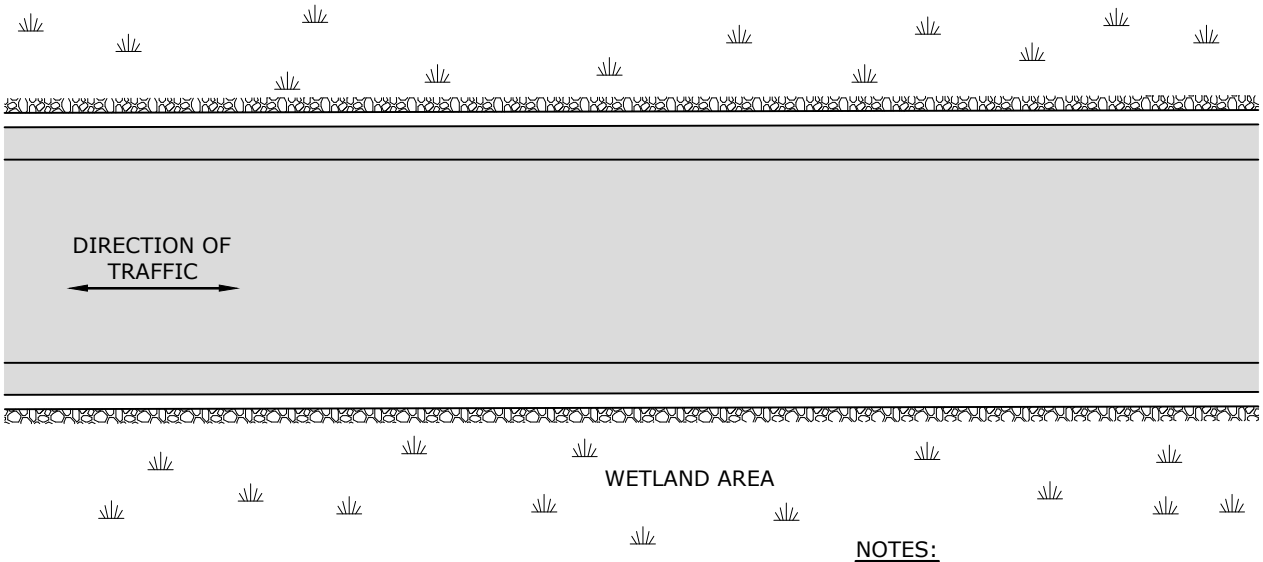
2. TYPICAL POINT OF ATTACHMENT HEAVY STAPLES, EYEBOLTS OR OTHER SUITABLE HARDWARE TO SECURE ATTACHMENT OF MAT TO LINEAR CABLE. IF CHAIN POCKETS ARE PRESENT IN THE MATS CABLE OR ROPE CAN BE LOOPED THROUGH RODS.

CONSTRUCTION MAT ANCHORING

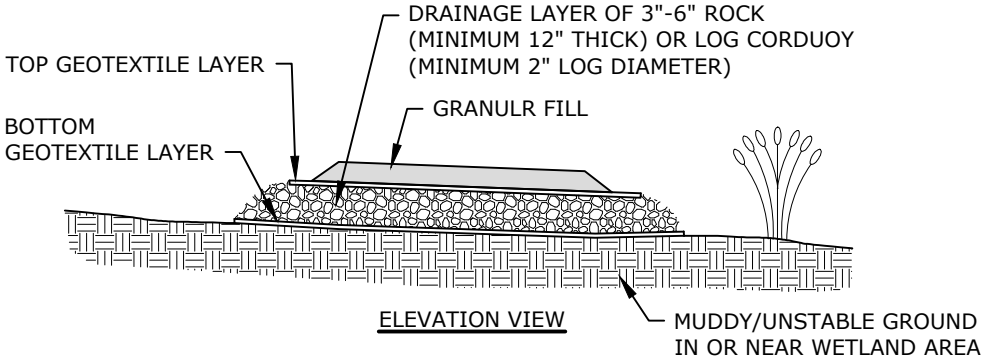
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A07

EVERSOURCE

Feb 04, 2022-10:09am Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Construction Mat Anchor.dwg



PLAN VIEW



ELEVATION VIEW

NOTES:

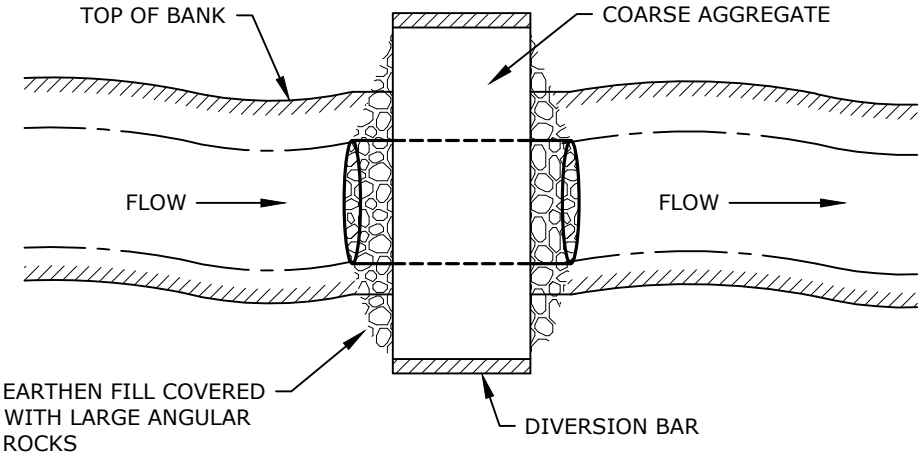
1. DRAINAGE LAYERS MAY BE USED AS AN ALTERNATIVE TO CULVERTS, OR IN COMBINATION WITH CULVERTS, TO PROVIDE ADEQUATE CROSS-DRAINAGE.
2. FILTER FABRIC "JOINTS" SHOULD OVERLAP AT LEAST 18" (WHERE ONE PIECE OF FILTER FABRIC ENDS AND A NEW PIECE OF FABRIC IS ADDED TO CONTINUE THE ROAD).
3. EROSION AND SEDIMENTATION CONTROLS MAY BE INSTALLED ADJACENT TO THE SIDES OF THE ROAD WHEN CONDITIONS WARRANT.

PERMEABLE ROAD

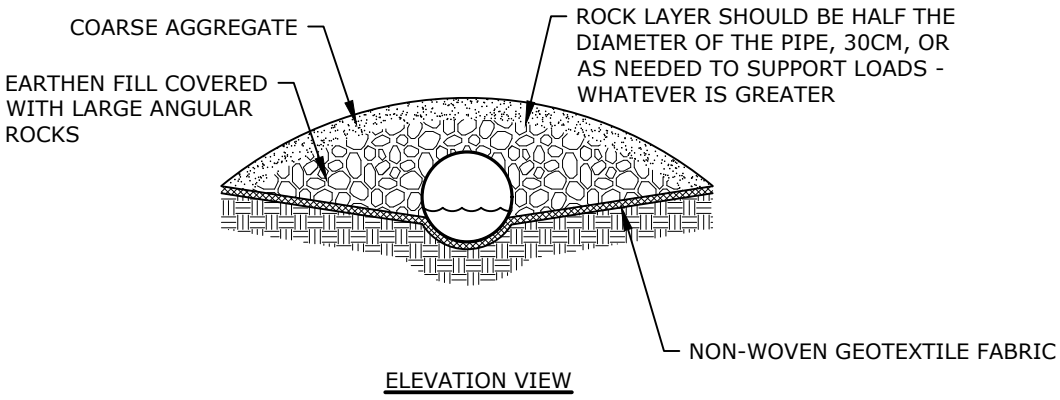
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A08

EVERSOURCE

Dec 15, 2021-3:26pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Permeable Road.dwg



PLAN VIEW



ELEVATION VIEW

NOTES:

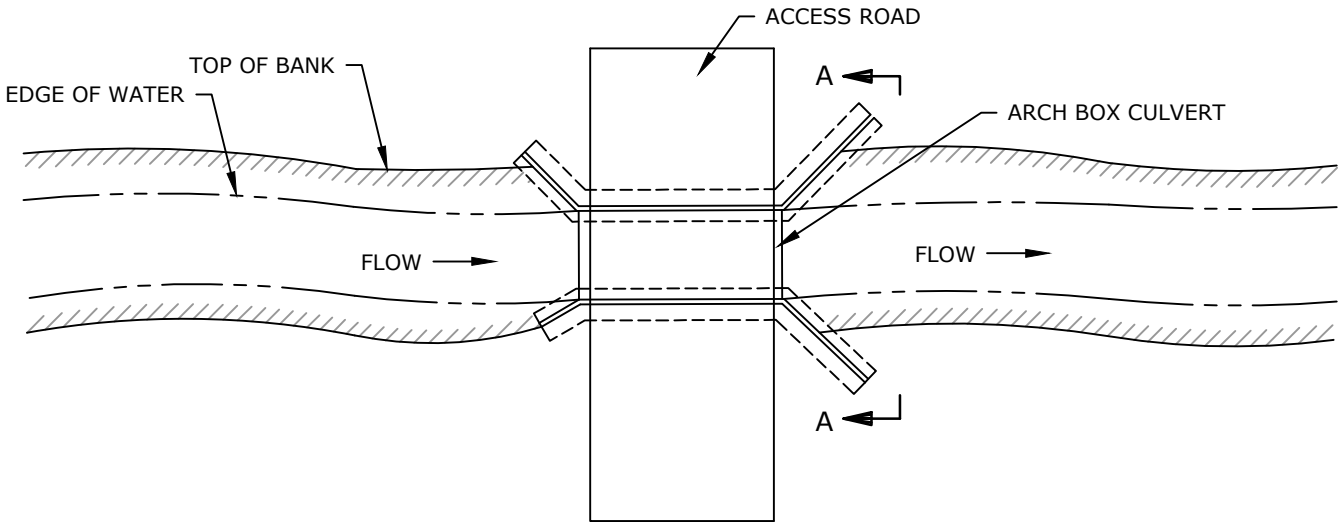
1. CAPACITY OF PIPES COMBINED SHOULD ACCOUNT FOR SIGNIFICANT STORM EVENTS.
2. INSTALLATION OF NEW CULVERTS MAY REQUIRE PERMITS. CONSULT WITH EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING PRIOR TO CONSTRUCTION.

TEMPORARY CONSTRUCTION CULVERT

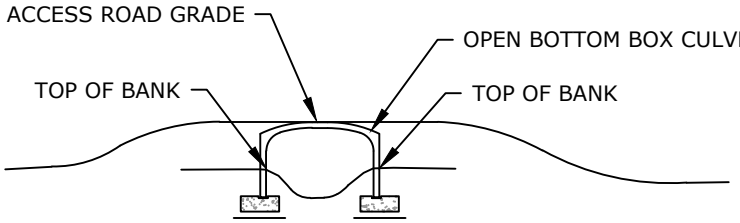
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A09

EVERSOURCE

Dec 15, 2021-3:24pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Culv_Cros_Temp.dwg



PLAN VIEW



SECTION A-A

NOTE:

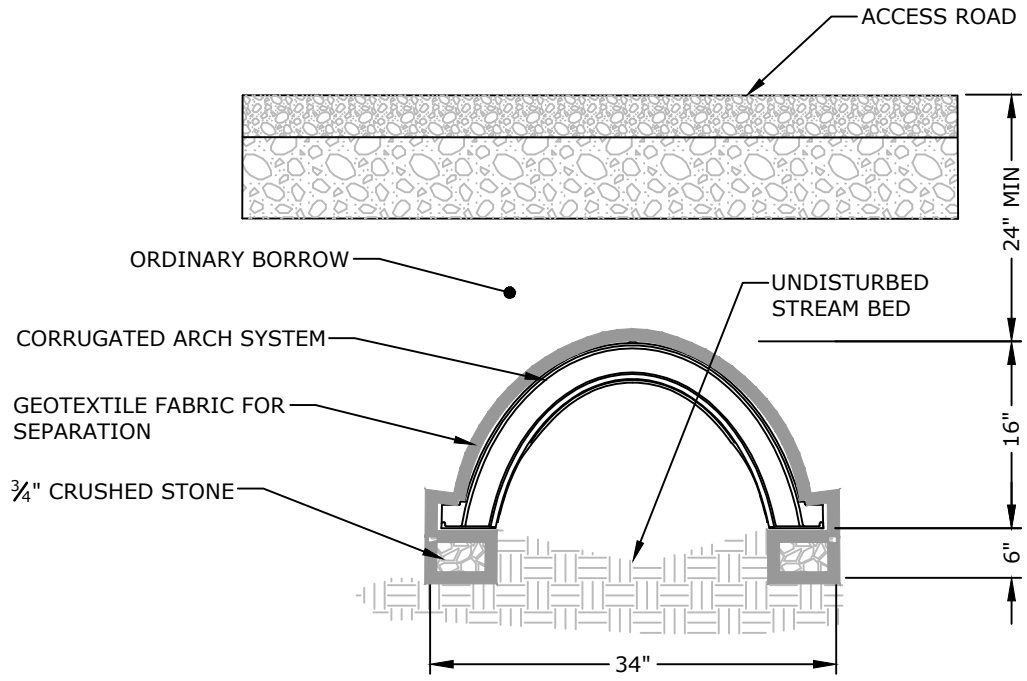
1. INSTALLATION OF NEW OR REPLACEMENT STREAM CROSSINGS, INCLUDING BOX CULVERTS, IS SUBJECT TO ENVIRONMENTAL PERMITTING. CONSULT WITH EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING.

PERMANENT OPEN BOTTOM
BOX CULVERT

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A10

EVERSOURCE

Dec 15, 2021-3:21pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Box Culvert _Permanent.dwg



NOTES:

1. CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS", OR ASTM F2922 "STANDARD SPECIFICATION FOR POLYETHYLENE (PE) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".

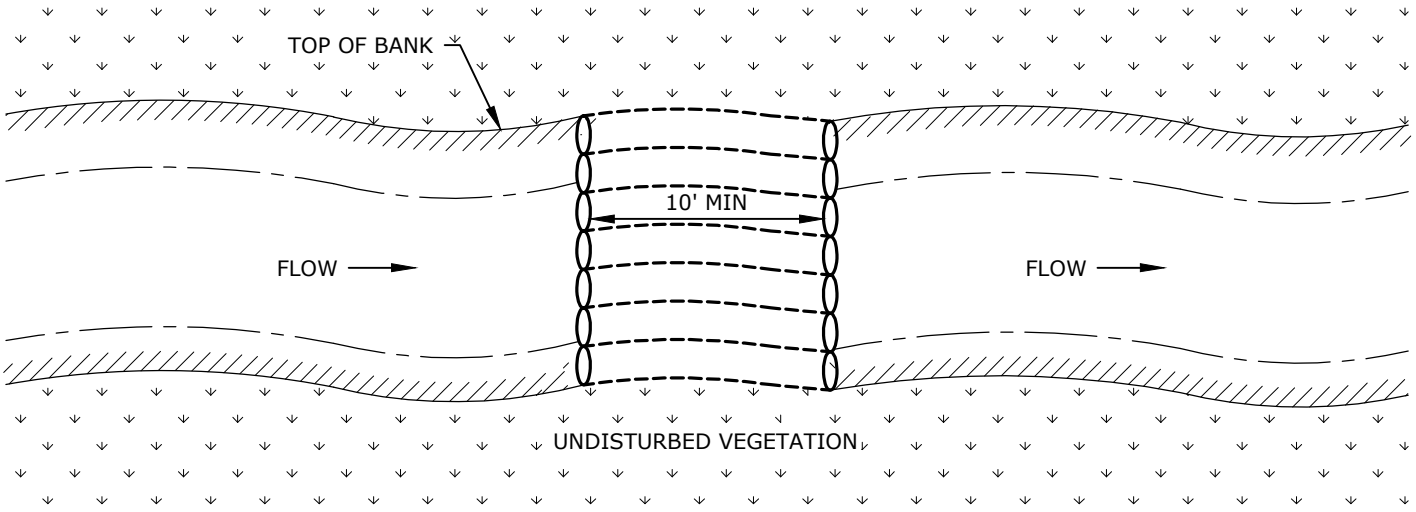
2. CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".

ARCH CULVERT

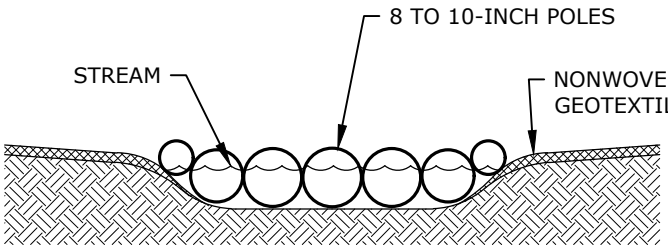
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A11

EVERSOURCE

Dec 15, 2021-3:21pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Arch Culvert.dwg



PLAN VIEW



ELEVATION VIEW

NOTES:

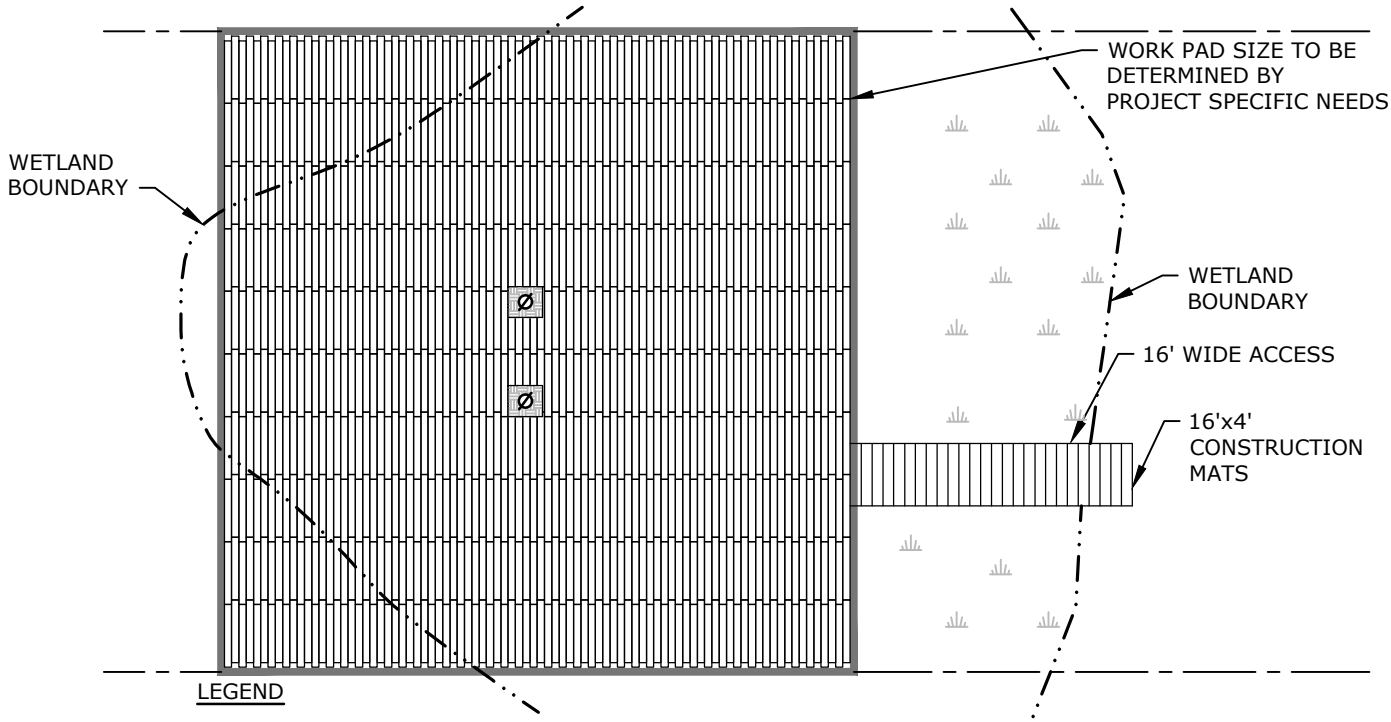
1. POLES AND NONWOVEN GEOTEXTILE MUST BE REMOVED IMMEDIATELY AFTER USE.
2. LENGTH OF POLES SHALL BE AT LEAST 10 FEET.
3. USE OF HARDWOODS PROHIBITED.
4. CONSULT WITH EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING PRIOR TO INSTALLATION OF POLED FORDS.

POLE FORD

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A12

EVERSOURCE

Dec 15, 2021-3:26pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Pole Ford.dwg



LEGEND

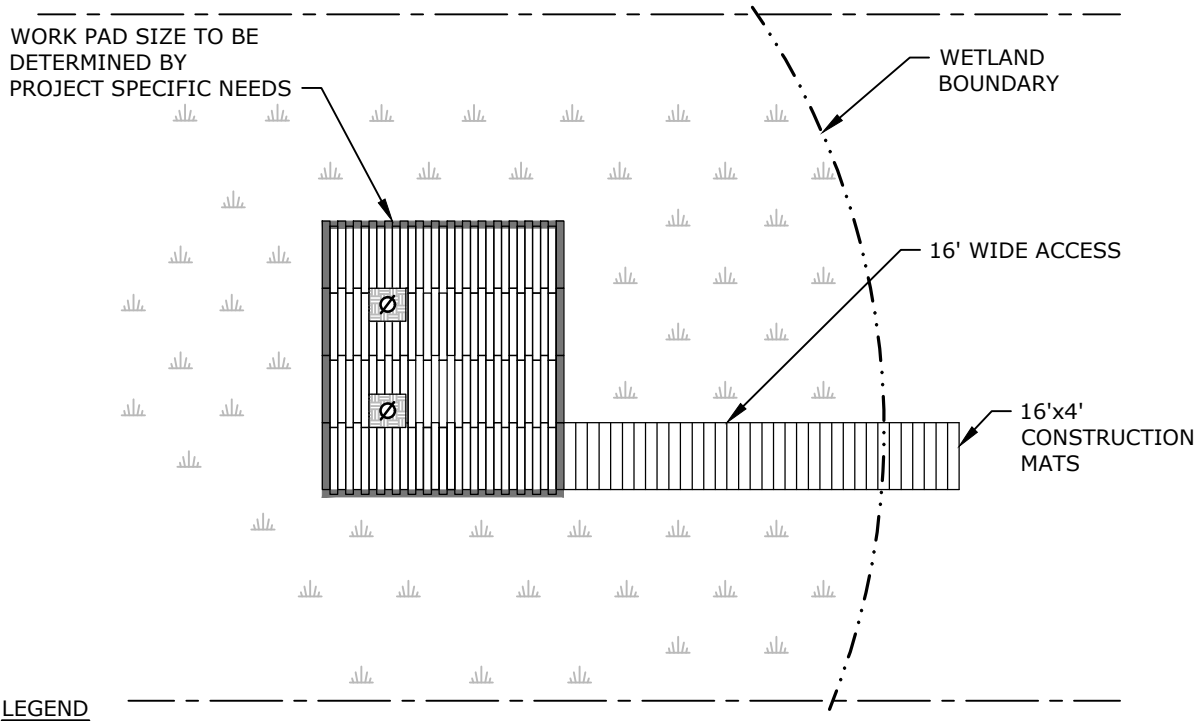
ø	REPLACEMENT POLE LOCATION
▭	CONSTRUCTION MAT - 16'x4'x 8" TYPICAL SIZE. 12'x4'x8" OR OTHER SIZE ACCEPTABLE.
▬	WORK SPACE REQUIREMENTS - LIVE LINE WORK (DETERMINED BASED ON PROJECT SPECIFIC NEEDS)
— – —	LIMIT OF RIGHT-OF-WAY
ılı	WETLAND AREA

CONSTRUCTION MAT LAYOUT
(LIVE LINE WORK)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A13

EVERSOURCE

Dec 15, 2021-3:24pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Construction Mat-Live Line Work.dwg



LEGEND

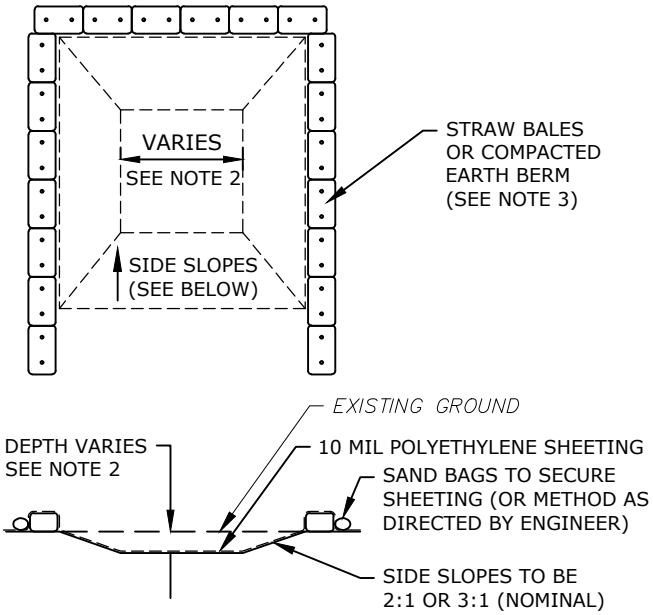
Ø	REPLACEMENT POLE LOCATION
▭	CONSTRUCTION MAT - 16'x4'x 8" TYPICAL SIZE. 12'x4'x8" OR OTHER SIZE ACCEPTABLE.
▬	WORK SPACE REQUIREMENTS - DE-ENERGIZED WORK (DETERMINED BASED ON PROJECT SPECIFIC NEEDS)
— – —	LIMIT OF RIGHT-OF-WAY
ılı	WETLAND AREA

CONSTRUCTION MAT LAYOUT
(DE-ENERGIZED LINE WORK)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A14

EVERSOURCE

Dec 15, 2021-3:28pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Swamp Mat -Deenergized Work.dwg



NOTES:

1. CONCRETE WASHOUT AREA(S) SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE. THE CONCRETE WASHOUT AREA SHALL BE ENTIRELY SELF-CONTAINED.

2. THE CONTRACTOR SHALL SUBMIT THE DESIGN, LOCATION AND SIZING OF THE CONCRETE WASHOUT AREA(S) WITH THE PROJECTS'S EROSION AND SEDIMENTATION CONTROL PLAN.

3. LOCATION: WASHOUT AREA(S) ARE TO BE LOCATED AT LEAST 50 FEET FROM ANY STREAM, WETLAND, STORM DRAINS, OR OTHER SENSITIVE RESOURCE. THE FLOOD CONTINGENCY PLAN MUST ADDRESS THE CONCRETE WASHOUT IF THE WASHOUT IS TO BE LOCATED WITHIN THE FLOODPLAIN.
   SIZE: THE WASHOUT MUST HAVE SUFFICIENT VOLUME TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS INCLUDING, BUT NOT LIMITED TO, OPERATIONS ASSOCIATED WITH GROUT AND MORTAR.

4. SURFACE DISCHARGE IS UNACCEPTABLE. THEREFORE, STRAW BALES OR OTHER CONTROL MEASURES, SHOULD BE USED AROUND THE PERIMETER OF THE CONCRETE WASHOUT AREA FOR CONTAINMENT.

5. SIGNS SHOULD BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CONCRETE AREA(S) AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS. WASHOUT AREA(S) SHOULD BE FLAGGED WITH SAFETY FENCING OR OTHER APPROVED METHOD.

6. WASHOUT AREA(S) ARE TO BE INSPECTED AT LEAST ONCE A WEEK FOR STRUCTURAL INTEGRITY, ADEQUATE HOLDING CAPACITY AND CHECKED FOR LEAKS, TEARS OR OVERFLOWS. (AS REQUIRED BY THE CONSTRUCTION SITE ENVIRONMENTAL INSPECTION REPORT) WASHOUT AREA(S) SHOULD BE CHECKED AFTER HEAVY RAINS.

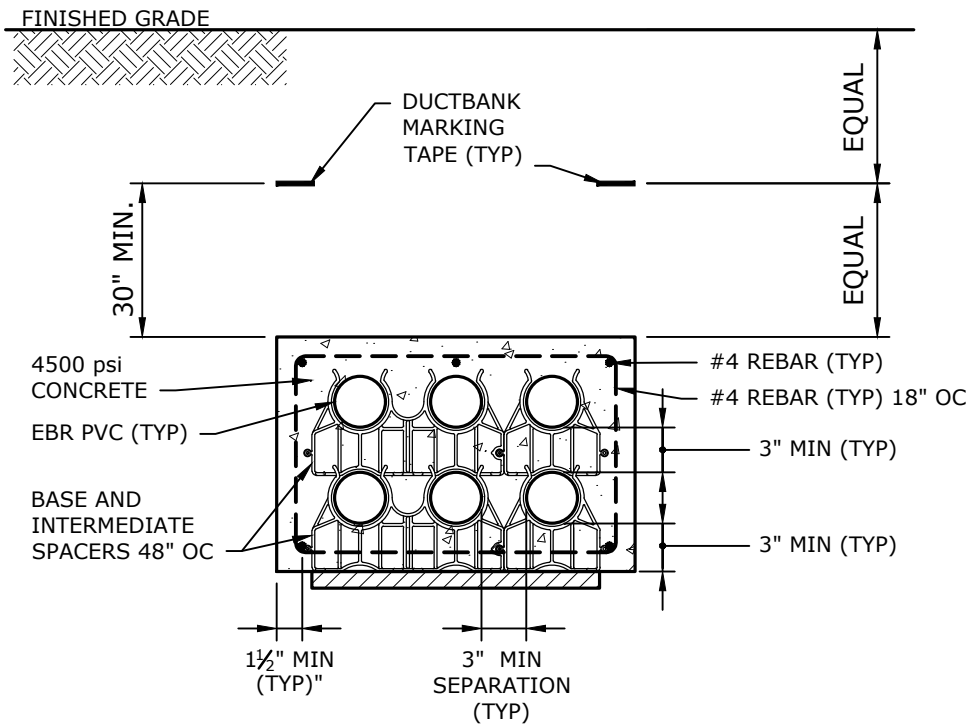
7. HARDENED CONCRETE WASTE SHOULD BE REMOVED AND DISPOSED OF WHEN THE WASTE HAS ACCUMULATED TO HALF OF THE CONCRETE WASHOUT'S HEIGHT. THE WASTE CAN BE STORED AT AN UPLAND LOCATION. ALL CONCRETE WASTE SHALL BE DISPOSED OF IN A MANNER CONSISTENT WITH ALL APPLICABLE LAWS, REGULATIONS, AND GUIDELINES.

CONCRETE WASH OUT

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A15

EVERSOURCE

Dec 15, 2021-3:23pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Concrete Washout.dwg



NOTES:

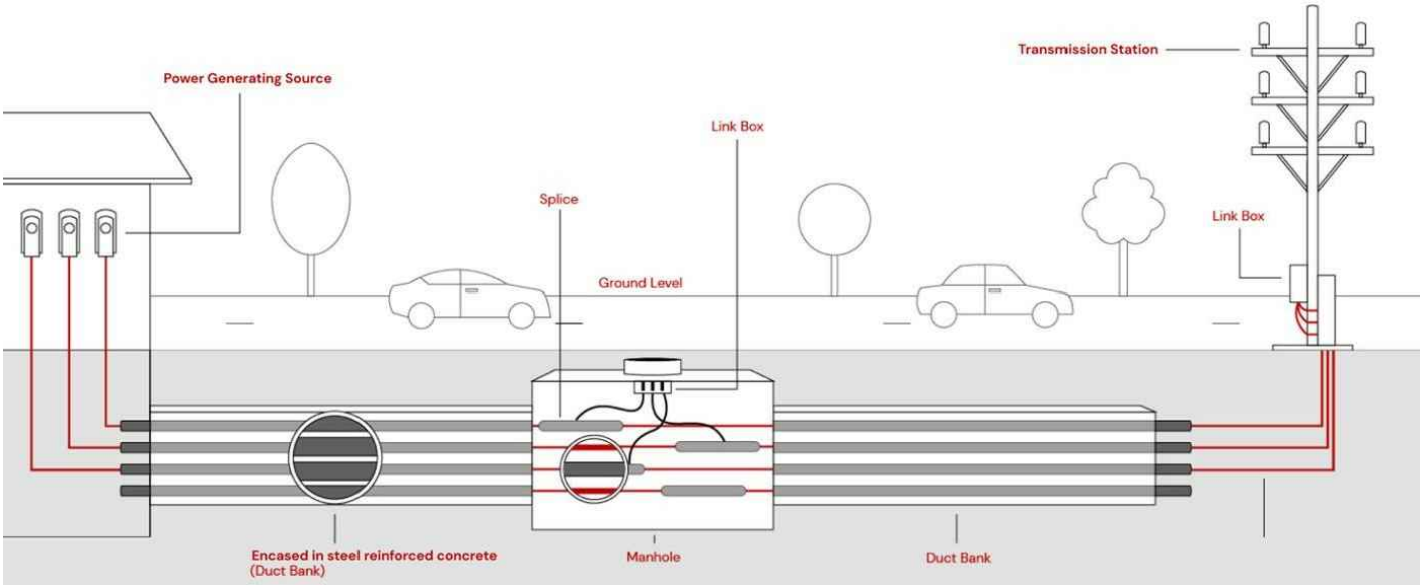
1. GEOTECH TEST, IN ACCORD WITH ASTM D608, THE BOTTOM OF EXCAVATION TO ACHIEVE 85% OF MAXIMUM DRY DENSITY, PRIOR TO CONCRETE PLACEMENT.

ROAD TRENCH
(DUCT BANK)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A16

EVERSOURCE

Dec 15, 2021-3:26pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Road Treanch - 6-Way Ductbank.dwg



ROAD TRENCH
(6-WAY DUCT BANK)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A17

EVERSOURCE

Dec 15, 2021-3:27pm Plotted By: ASapelli
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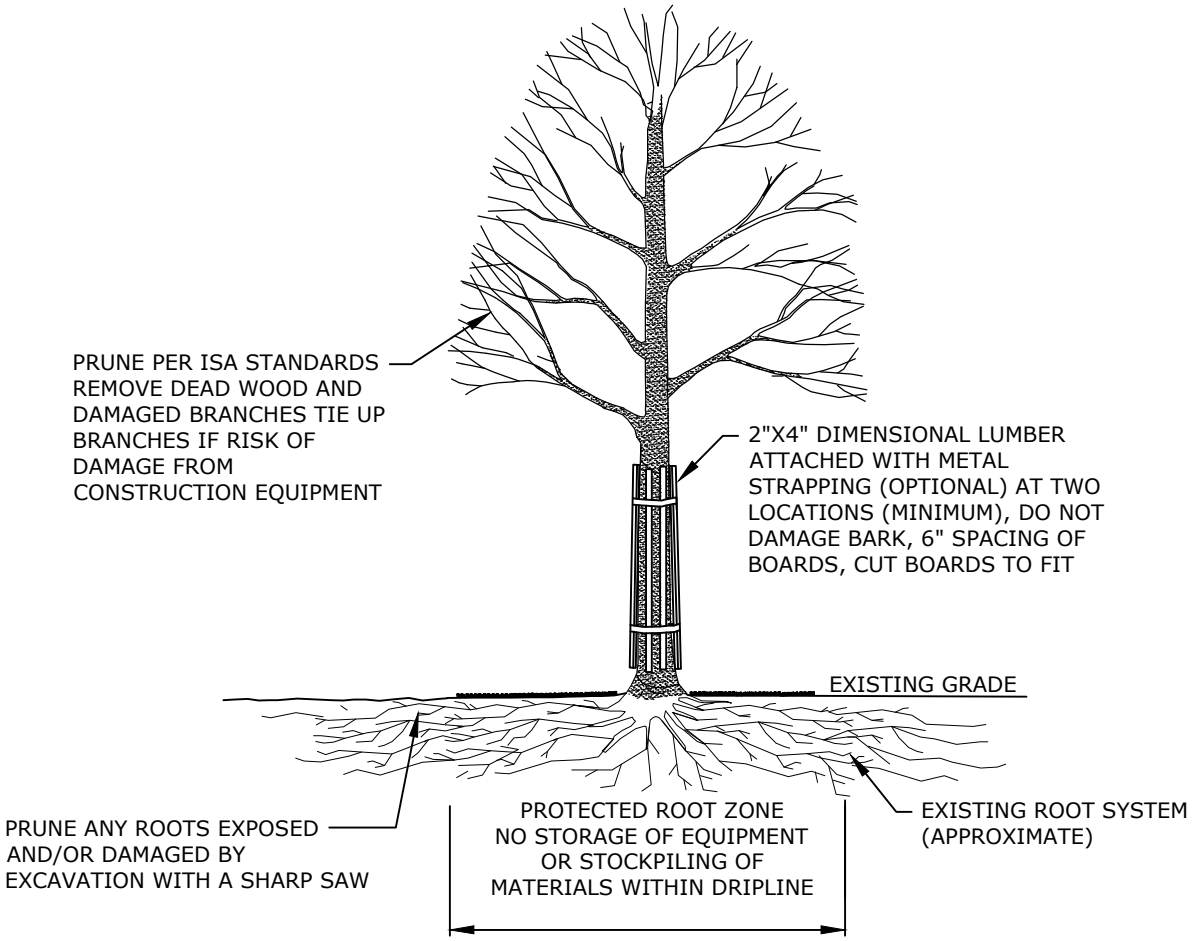

TREE PROTECTION

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A18

EVERSOURCE

Dec 15, 2021-3:29pm Plotted By: ASapelli
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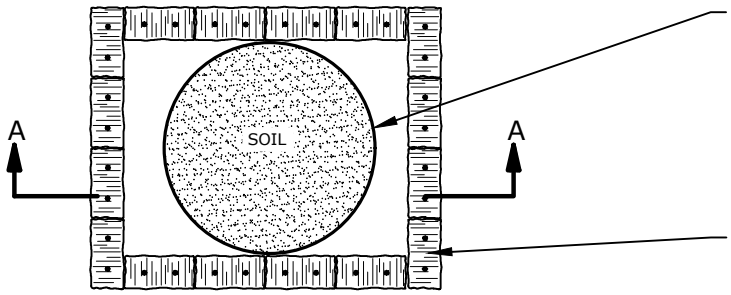
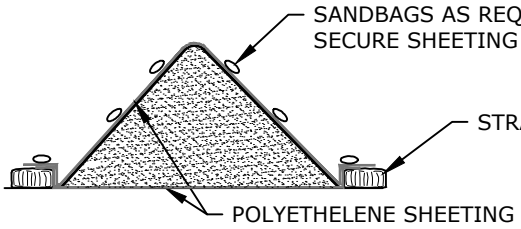


CONTAMINATED SOILS MUST BE ON AND COVERED WITH POLYETHYLENE SHEETING TO LIMIT EROSION. SHEETING NOT REQUIRED FOR NON-CONTAMINATED SOILS IF SEDIMENTATION AND EROSION CONTROLS COMPLETELY ENCLOSE STOCKPILE.

STRAW BALES AND/OR SILT FENCE

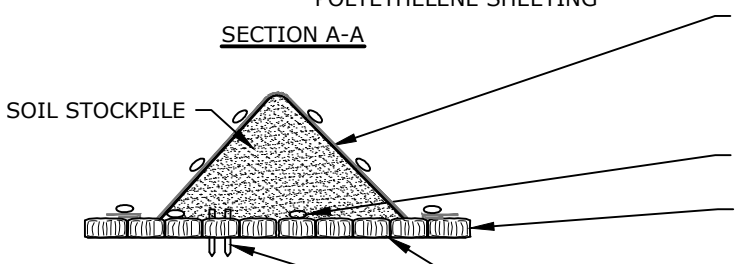
PLAN VIEW



SECTION A-A

NOTE:

1. SANDBAGS (OR SIMILAR) MAY BE USED TO SECURE POLYETHYLENE SHEETING ON TOP OF THE STOCKPILE.
2. STRAW PRODUCTS ONLY; THE USE OF HAY OR HAY PRODUCTS IS STRICTLY PROHIBITED.



ELEVATION VIEW

SOIL STOCKPILE MANAGEMENT

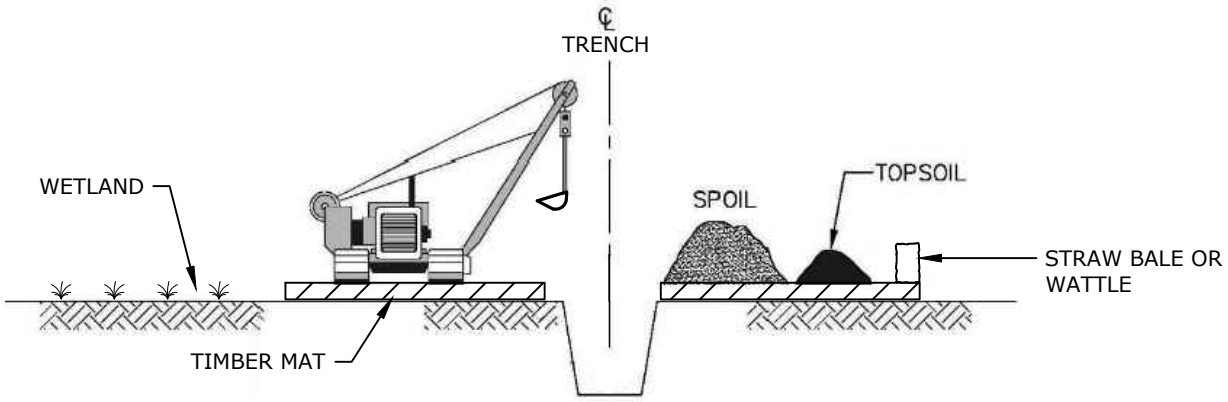
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A19

EVERSOURCE

Dec 15, 2021-3:27pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Soil_Stpl_Mgmt.dwg

NOTES:

1. TOPSOIL SEGREGATION TO BE USED IN WETLANDS AND AGRICULTURAL LAND.
2. IF WORKING WITHIN WETLANDS, MATTING BENEATH STOCKPILES MUST BE LINED OR UNDERLAIN BY GEOTEXTILE FABRIC.
3. STOCKPILES SHOULD BE ENCLOSED BY STRAW BALES OR WATTLES.



TOPSOIL SEGREGATION

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A20

EVERSOURCE

Dec 15, 2021-3:29pm Plotted By: ASapelli
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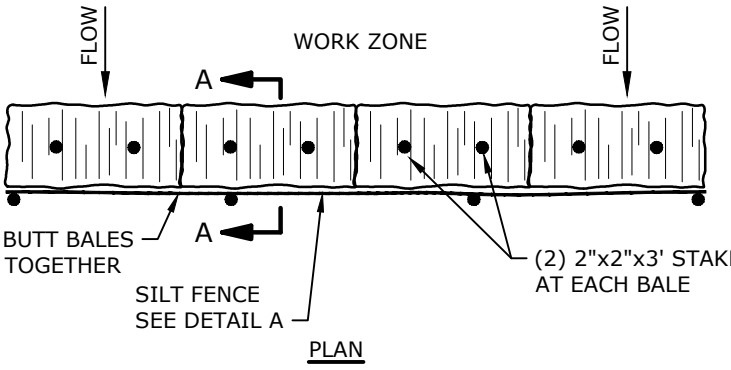
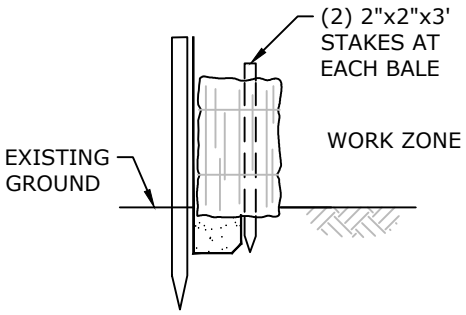
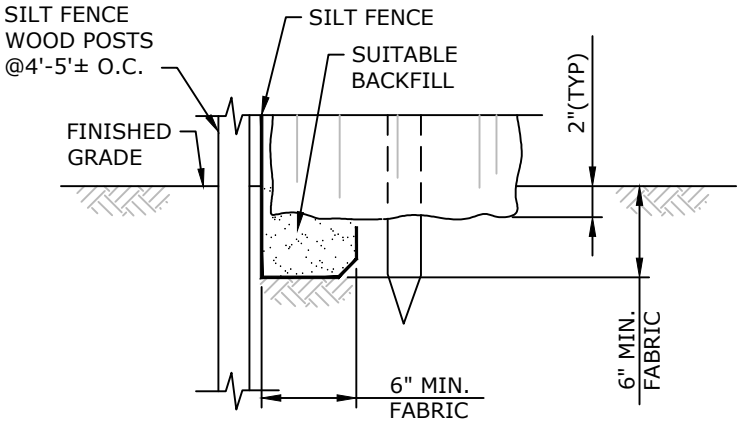


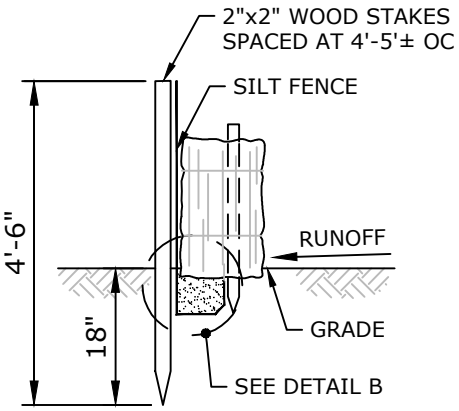
PLAN



SECTION A-A



DETAIL B



DETAIL A

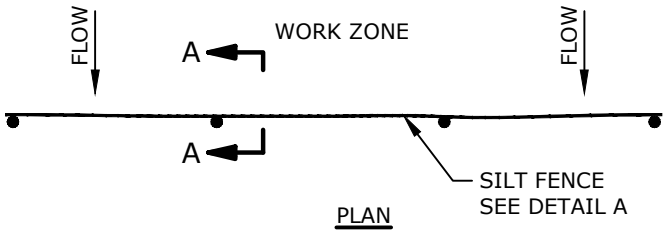
NOTE:
USE OF HAY AND/OR PRODUCTS CONTAINING WEED SEED IS PROHIBITED.

STRAW BALE BARRIER

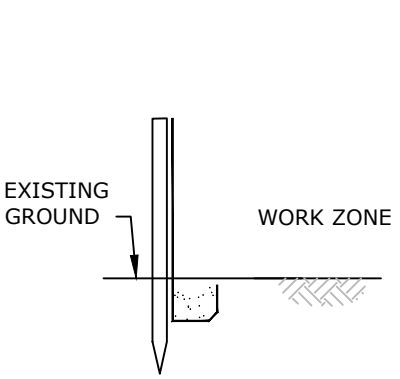
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A21

EVERSOURCE

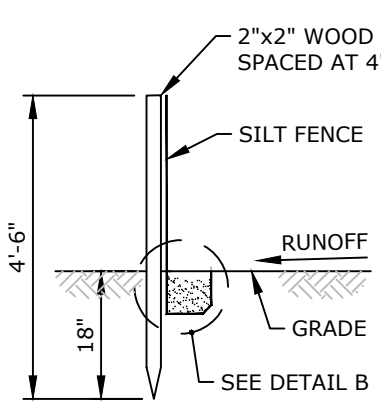
Dec 15, 2021-3:28pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Straw Bales.dwg



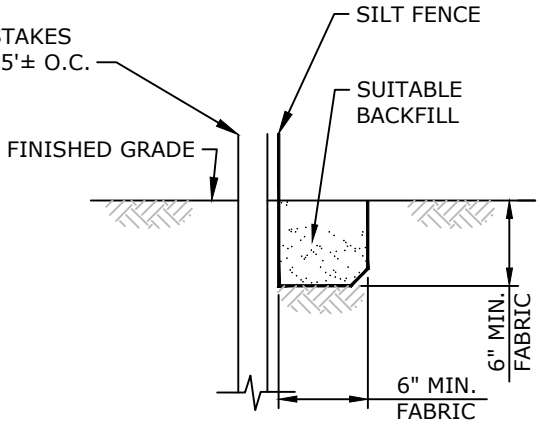
PLAN



SECTION A-A



DETAIL A



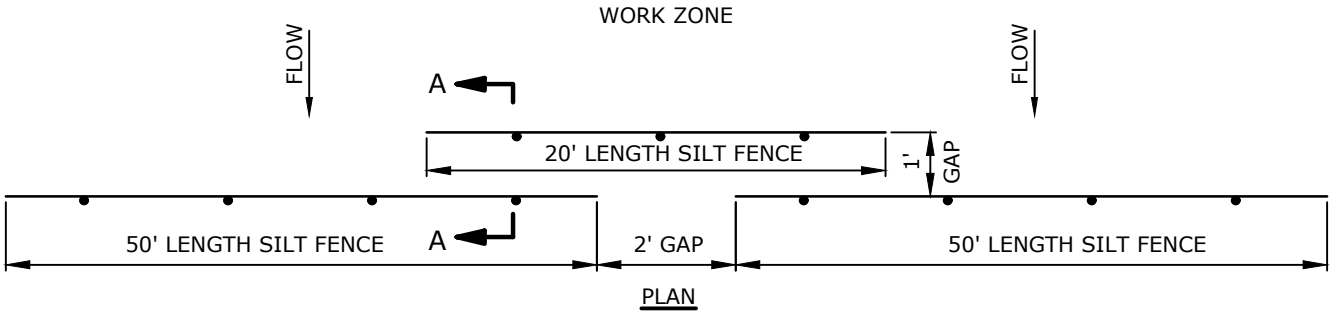
DETAIL B

SILT FENCE

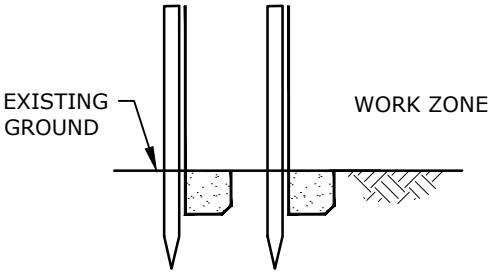
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A22

EVERSOURCE

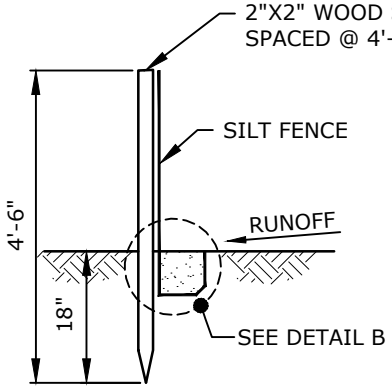
Dec 15, 2021-3:27pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Silt Fence.dwg



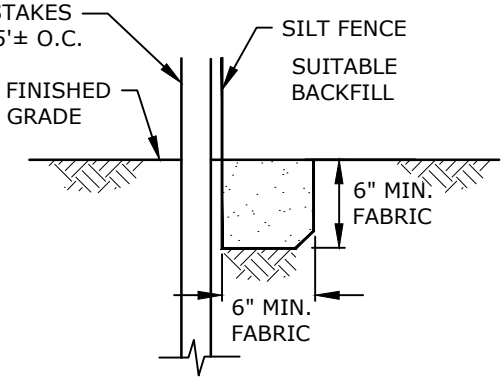
PLAN



SECTION A-A



DETAIL A

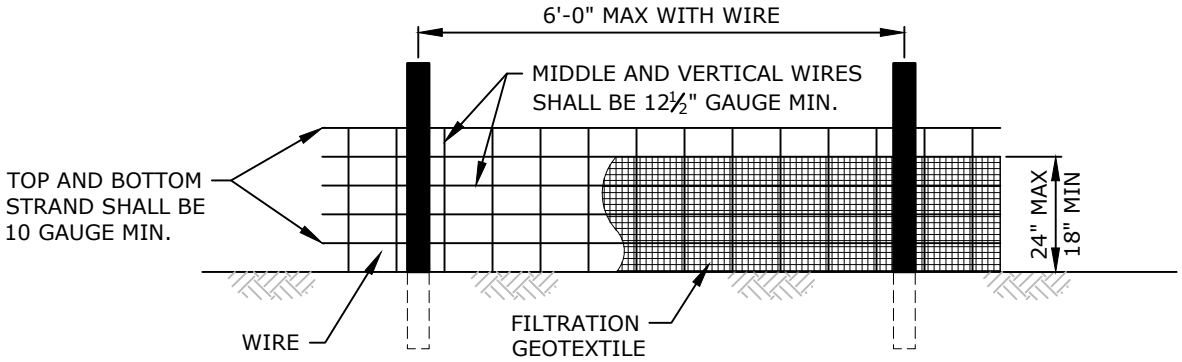


DETAIL B

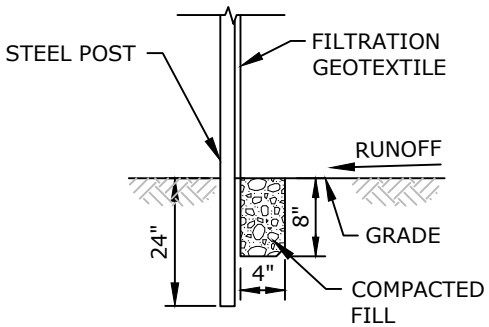
SYNCOPATED SILT FENCE	
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A23

EVERSOURCE

Dec 15, 2021-3:29pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Syncopated Silt Fence.dwg



ELEVATION



SECTION

NOTES:

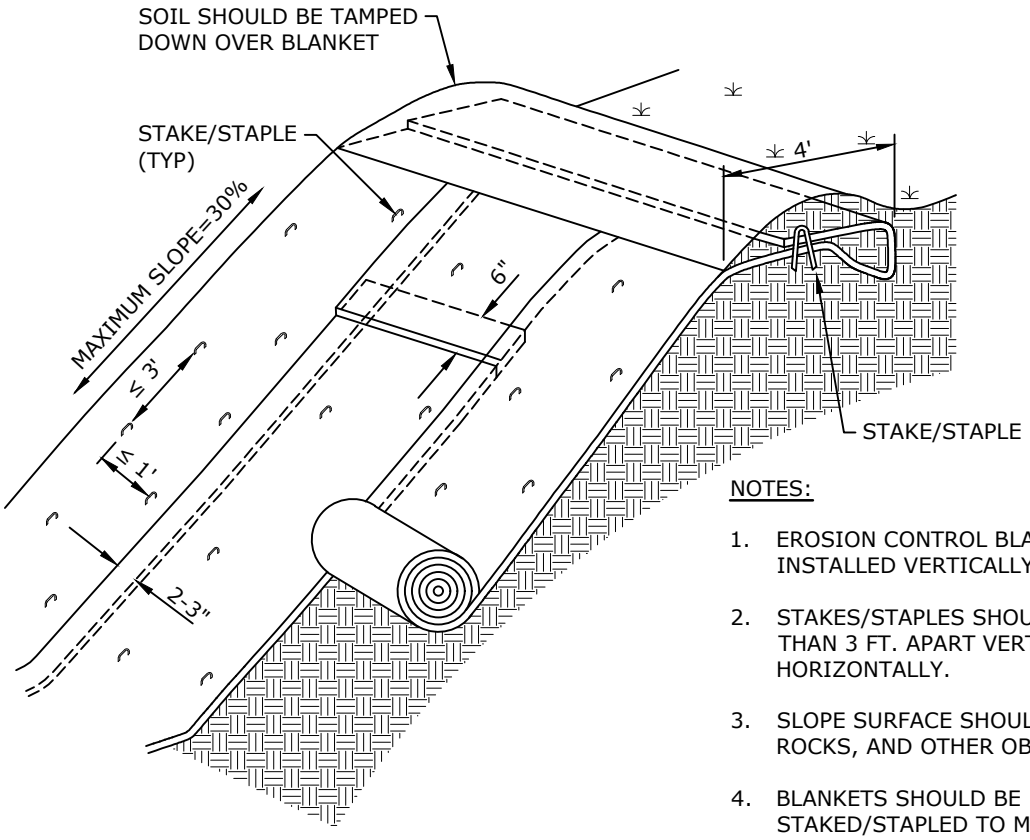
1. USE FILTRATION GEOTEXTILE A MINIMUM OF 36" IN WIDTH AND FASTEN ADEQUATELY TO THE POSTS AND WIRES AS DIRECTED.
2. USE A WIRE A MINIMUM OF 32" IN WIDTH AND WITH A MINIMUM OF 6 LINE WIRES WITH 12" STAY SPACING.
3. PROVIDE 5'-0" STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE.
4. FOR MECHANICAL SLICING METHOD INSTALLATION, GEOTEXTILE SHALL BE A MAXIMUM OF 18" ABOVE GROUND SURFACE.
5. EXTEND GEOTEXTILE AND WIRE INTO TRENCH.

REINFORCED SILT FENCE

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A24

EVERSOURCE

Dec 15, 2021-3:27pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Silt Fence-Wire.dwg



NOTES:

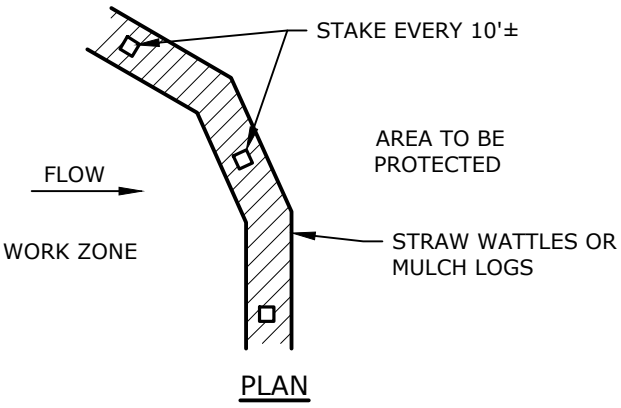
1. EROSION CONTROL BLANKET SHOULD BE INSTALLED VERTICALLY DOWNSLOPE.
2. STAKES/STAPLES SHOULD BE PLACED NO MORE THAN 3 FT. APART VERTICALLY, AND 1 FT. APART HORIZONTALLY.
3. SLOPE SURFACE SHOULD BE FREE OF STICKS, ROCKS, AND OTHER OBSTRUCTIONS.
4. BLANKETS SHOULD BE ROLLED OUT LOOSELY AND STAKED/STAPLED TO MAINTAIN DIRECT SOIL CONTACT. DO NOT STRETCH THE BLANKETS.
5. USE OF PRODUCTS WITH PLASTIC AND/OR NYLON NETTING IS PROHIBITED.

EROSION CONTROL BLANKETS

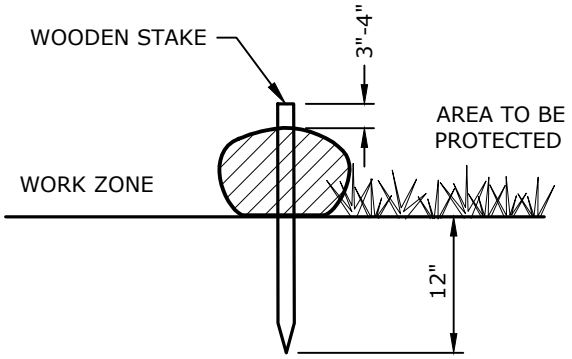
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A25

EVERSOURCE

Dec 15, 2021-3:25pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\E-Blanket.dwg



PLAN



SECTION

NOTE:

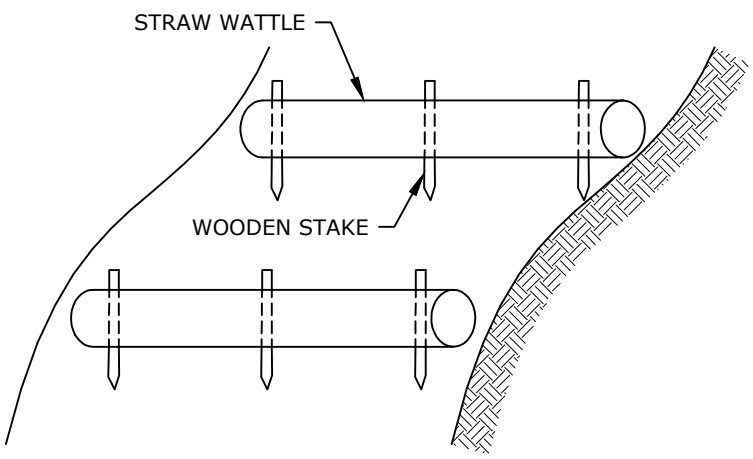
1. USE OF PRODUCTS WITH PLASTIC AND/OR NYLON NETTING IS PROHIBITED.

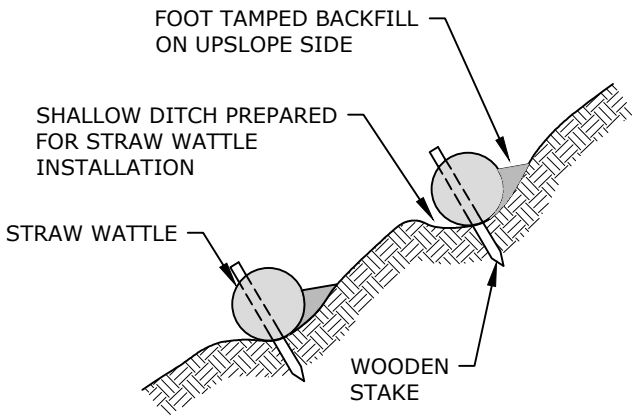
STRAW WATTLE/MULCH LOG

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A26

EVERSOURCE

Dec 15, 2021-3:28pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Straw Wattle2.dwg





ELEVATION VIEW

NOTES:

1. USE OF PRODUCTS WITH PLASTIC AND/OR NYLON NETTING IS PROHIBITED.

2. VERTICAL SPACING FOR SLOPE INSTALLATIONS TO BE DETERMINED BY SITE CONDITIONS: SLOPE GRADIENT AND SOIL TYPE. CONFIRM SPACING PER MANUFACTURER'S SPECIFICATIONS. SEE BELOW FOR TYPICAL REQUIREMENTS. COORDINATE SPACING AND LOCATION WITH EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING.

   - 1:1 SLOPES = 10 FEET APART
   - 2:1 SLOPES = 20 FEET APART
   - 3:1 SLOPES = 30 FEET APART

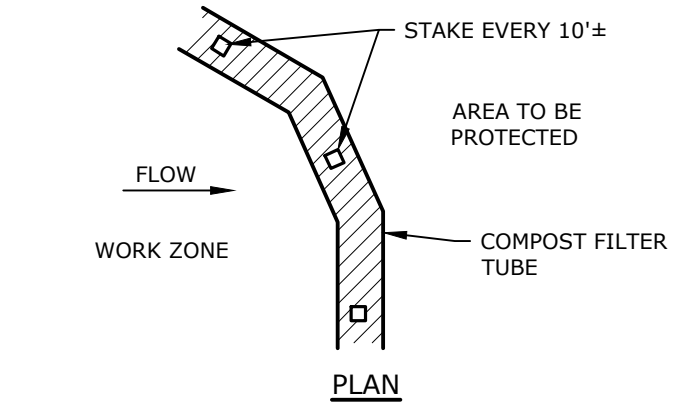
3. MINIMUM 12" DIAMETER WATTLES SHOULD BE USED FOR HIGHLY DISTURBED AREAS (E.G. HEAVILY USED ACCESS ROADS WITH ADJACENT WETLANDS). MINIMUM 8" DIAMETER WATTLES SHOULD BE USED FOR LESS DISTURBED SOILS.

STRAW WATTLE
(ON SLOPE)

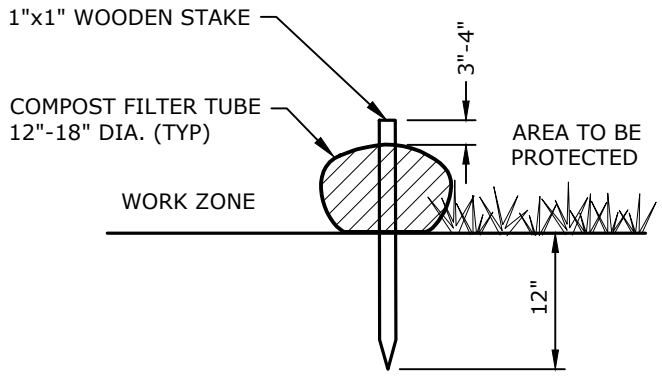
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A27

EVERSOURCE

Dec 15, 2021-3:28pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Straw Wattle.dwg



PLAN



SECTION

NOTES:

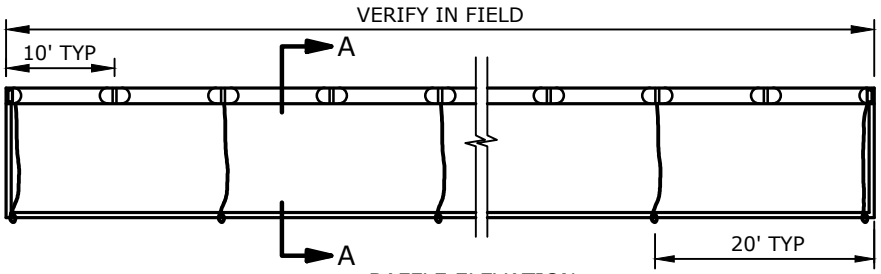
1. TUBES FOR COMPOST FILTERS SHALL BE JUTE MESH OR APPROVED BIODEGRADABLE MATERIAL.
2. TAMP TUBES IN PLACE TO ENSURE GOOD CONTACT WITH SOIL SURFACE.
3. PROVIDE 3' MINIMUM OVERLAP AT ENDS OF TUBES TO JOIN IN A CONTINUOUS BARRIER AND MINIMIZE UNIMPEDED FLOW.
4. COMPOST MATERIAL SHALL BE DISPERSED ON SITE WITHIN LIMITS OF WORK, AS DIRECTED.
5. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
6. DO NOT INSTALL IN PERENNIAL, EPHEMERAL, OR INTERMITTENT STREAMS.
7. CONFIGURE TUBES AROUND EXISTING SITE FEATURES TO MINIMIZE SITE DISTURBANCE AND MAXIMIZE CAPTURE AREA OF STORMWATER RUN-OFF.

COMPOST FILTER TUBE

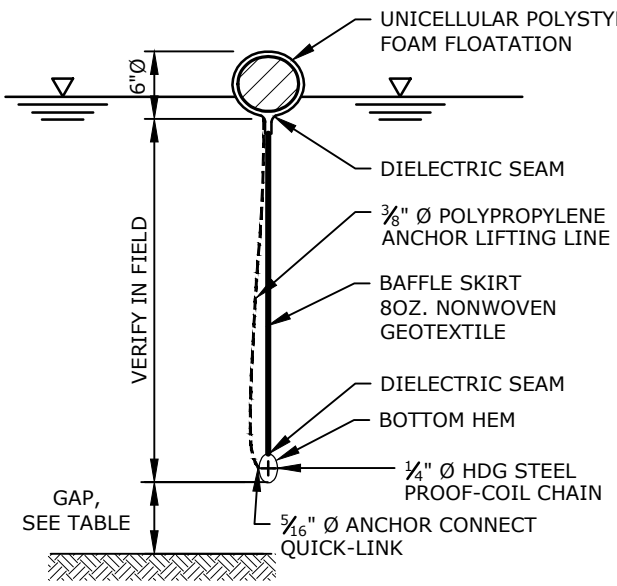
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A28

EVERSOURCE

Dec 15, 2021-3:22pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Compost Filter Tube.dwg



BAFFLE ELEVATION



SECTION A-A

NOTES:

1. TURBIDITY CURTAIN BY ENVIRONETICS, INC. OR APPROVED EQUAL.
2. TURBIDITY CURTAIN SHALL NOT BE EXTENDED ACROSS CHANNEL FLOWS.
3. TURBIDITY CURTAIN MATERIAL SHALL BE ULTRAVIOLET LIGHT RESISTANT.

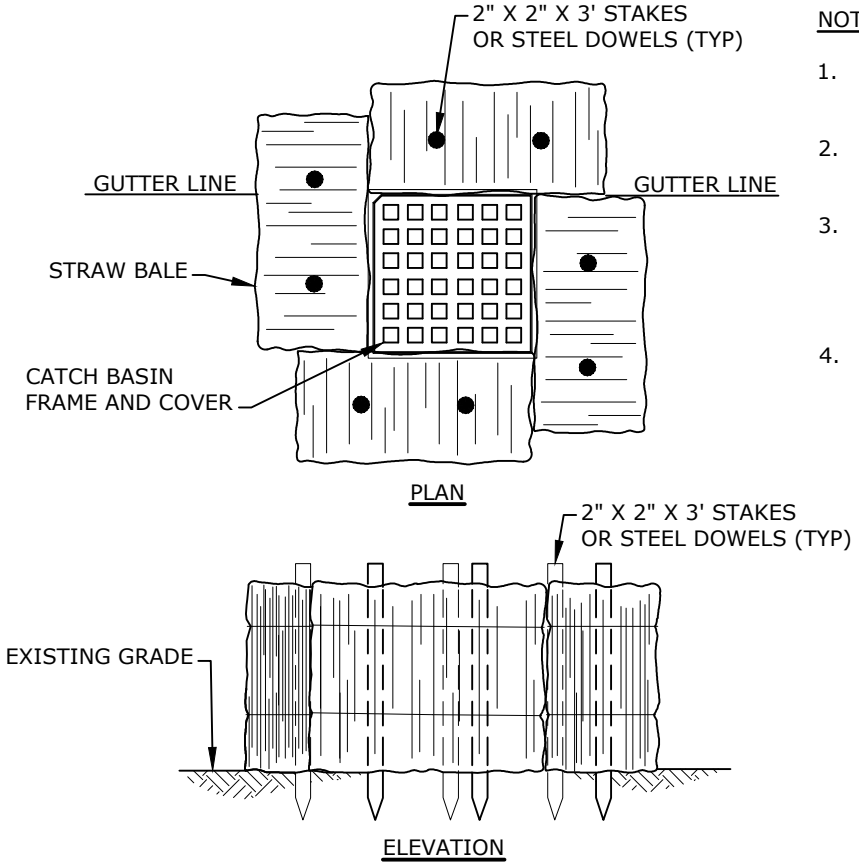
TYPE	DESCRIPTION	CONDITIONS	GAP (IN.)
I	FLATWATER	CALM AND PROTECTED	0
II	LIGHTWEIGHT	SEMI-PROTECTED AREA, CURRENTS UP TO 2 FT/S	12
III	MIDDLEWEIGHT	EXPOSED AREA, CURRENTS UP TO 5 FT/S	12
IV	HEAVYWEIGHT	EXPOSED TO WIND, CURRENT, AND TIDES	0

TURBIDITY CURTAIN

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A29

EVERSOURCE

Dec 15, 2021-3:29pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Turbidity Curtain.dwg



NOTES:

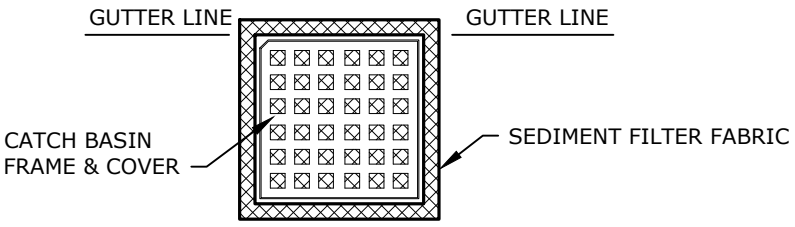
1. A MINIMUM OF TWO WOOD STAKES ARE REQUIRED PER STRAW BALE.
2. STEEL DOWELS MAY BE USED WHERE WOOD STAKES CANNOT BE DRIVEN INTO THE GROUND.
3. "SILT SACKS", "DANDY BAG II" OR OTHER SIMILAR SILT RETENTION DEVICES SHALL BE INSTALLED IN LIEU OF STRAW BALES FOR CATCH BASINS LOCATED IN EXISTING PAVED AREAS.
4. STRAW PRODUCTS ONLY; THE USE OF HAY OR HAY PRODUCTS IS STRICTLY PROHIBITED.

CATCH BASIN INLET PROTECTION
(STRAW BALES)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A30

EVERSOURCE

Dec 15, 2021-3:21pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\CB Inlet Prot.dwg

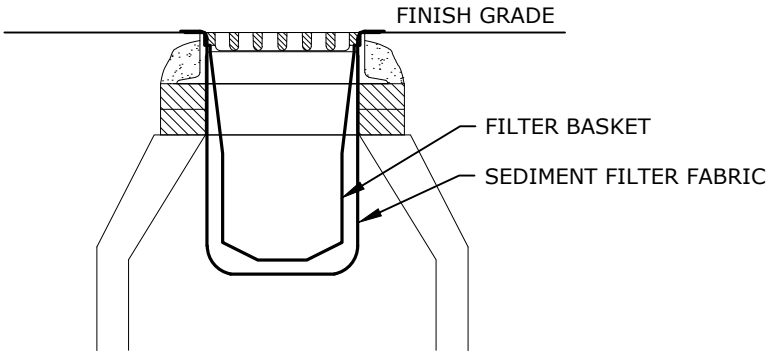


PLAN VIEW

NOTES:

1. FILTER BASKET SHALL BE "SILT SAK" BY JENNIAN, MELROSE, MA; "DANDY BAG" BY DANDY PRODUCTS (1-800-591-2284); DRAIN PAC (91-800-272-2832); OR APPROVED EQUIVALENT SUBJECT TO CONSULTATION WITH EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING.

2. FILTER BASKETS SHOULD BE USED IN COMBINATION WITH ANOTHER INLET PROTECTION MEASURE SUCH AS SEDIMENT FILTER FABRIC IF DRAINAGE AREA IS SMALL WITH SHALLOW FLOWS.



ELEVATION VIEW

CATCH BASIN INLET PROTECTION
(SILT SACK)

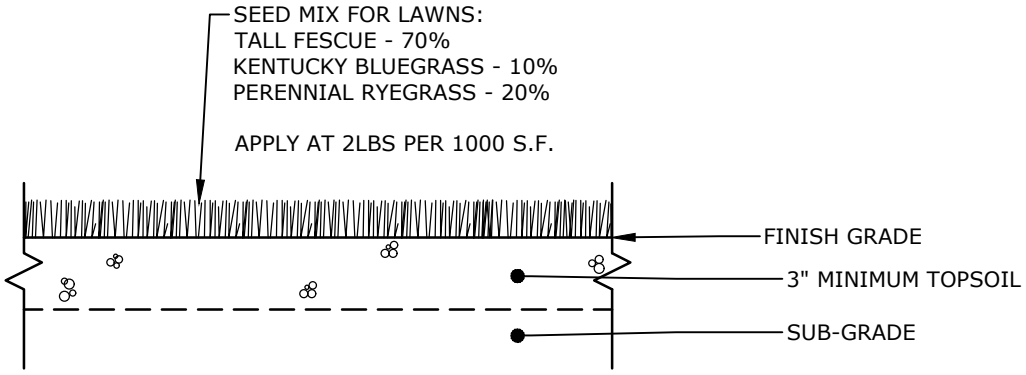
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A31

EVERSOURCE

Dec 15, 2021-3:27pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Silt Sack.dwg

NOTE:

THE SEED MIX UTILIZED SHALL CONSIST OF QUICK GROWING, DROUGHT TOLERANT, NATIVE GRASSES, SUCH AS RYES. THE SEED MIX UTILIZED WITHIN THE BUFFER ZONE TO WETLAND RESOURCE AREAS MAY CONSIST OF QUICK GROWING, DROUGHT TOLERANT, NATIVE GRASSES BUT MUST CONTAIN AT LEAST 50% OF A NATIVE SEED MIX WITH HIGH HABITAT VALUE, SUCH AS ONES WHICH CONTAIN PERENNIAL SHRUBS, WILDFLOWERS. CONSULT WITH EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING FOR PROJECT SPECIFIC REQUIREMENTS.



LOAM AND SEED

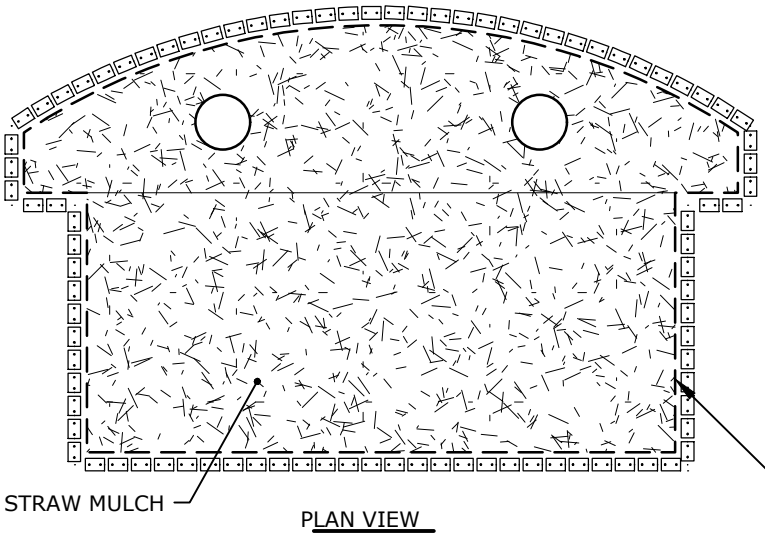
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A32

EVERSOURCE

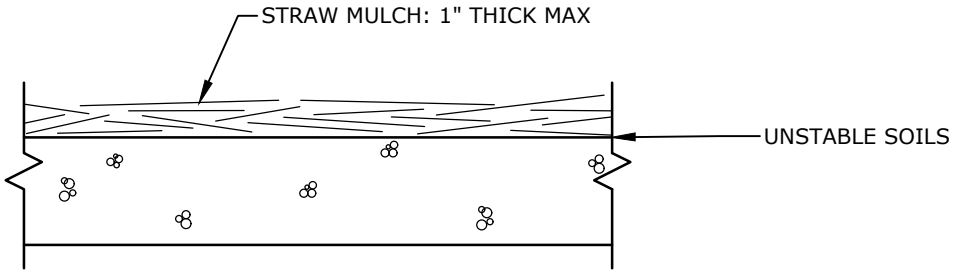
Dec 15, 2021-3:26pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Loam and Seed.dwg

NOTES:

1. STRAW PRODUCTS ONLY; THE USE OF HAY OR HAY PRODUCTS IS STRICTLY PROHIBITED.
2. MULCH APPLICATION SHALL NOT EXCEED 1" IN THICKNESS.
3. WOOD CHIPS MAY BE SUBSTITUTED FOR STRAW MULCH SUBJECT TO EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING APPROVAL.
4. CONSULT WITH EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING FOR PROJECT SPECIFIC REQUIREMENTS.



PLAN VIEW



ELEVATION VIEW

STRAW MULCH

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A33

EVERSOURCE

Dec 15, 2021-3:28pm Plotted By: ASapelli
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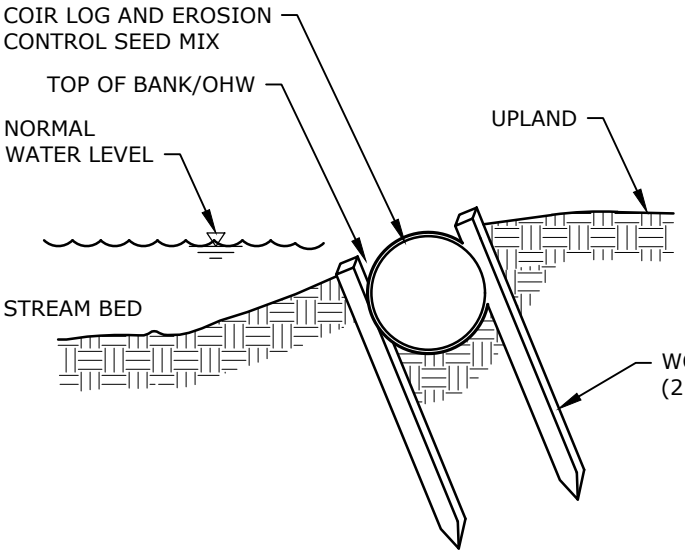
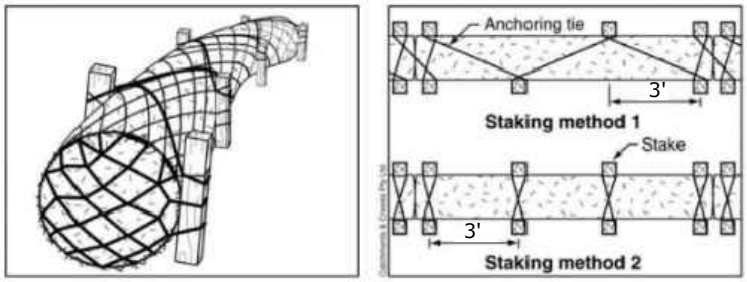


NOTES:

1. USE OF PRODUCTS WITH PLASTIC AND/OR NYLON NETTING IS PROHIBITED.
2. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
3. INSTALLATION MAY INCLUDE SEEDING AND/OR OTHER NATIVE PLANT INSTALLATION. CONSULT EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING.



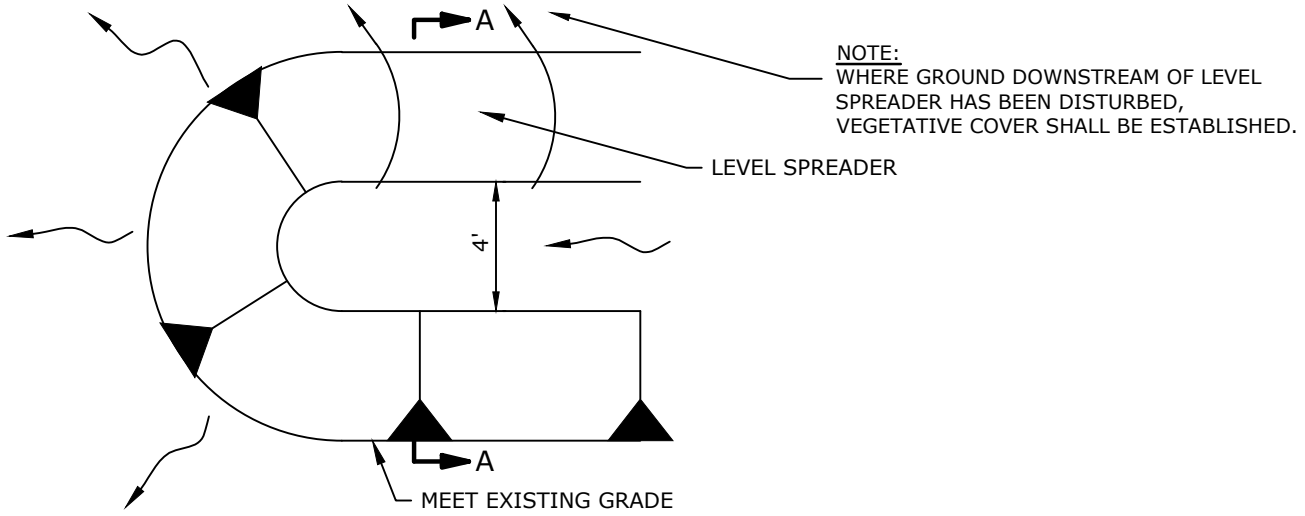
TYPICAL STAKING

COIR LOG

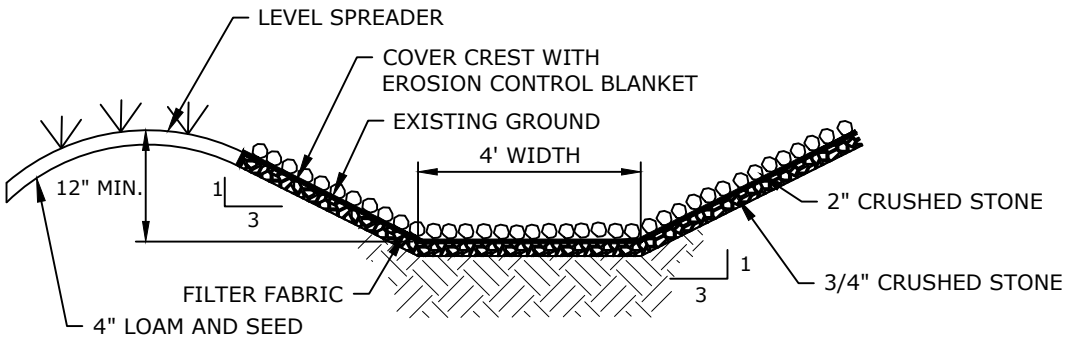
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A34

EVERSOURCE

Dec 15, 2021-3:22pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Coir log.dwg



PLAN VIEW



SECTION A-A

LEVEL SPREADER

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A35

EVERSOURCE

Dec 15, 2021-3:26pm Plotted By: ASapelli
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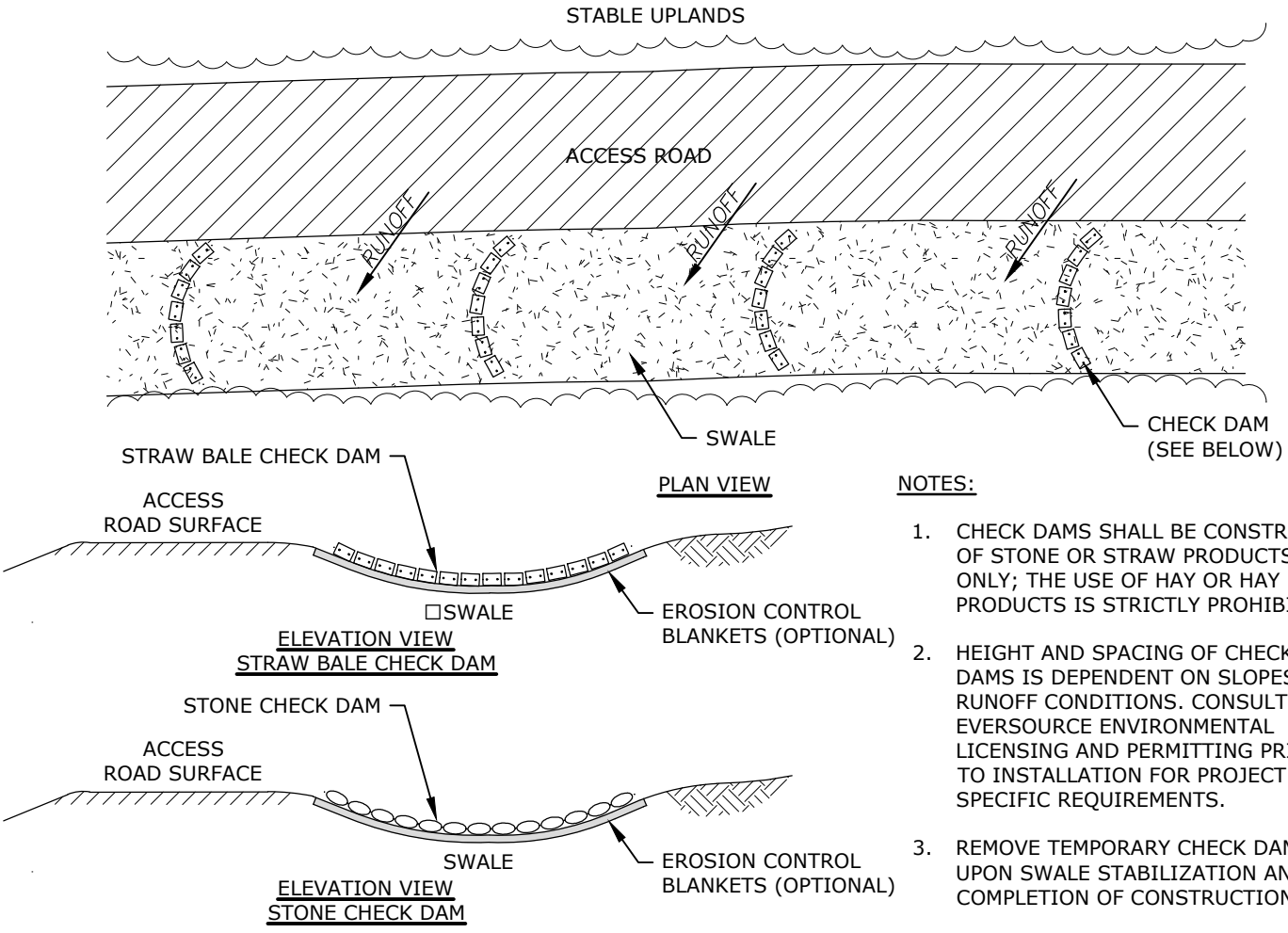


NOTES:

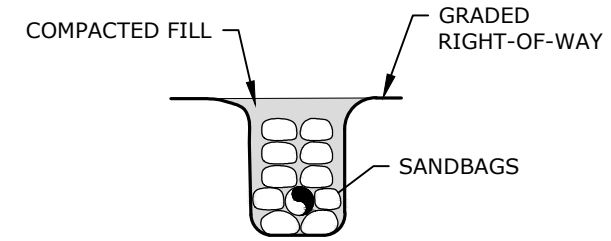
1. CHECK DAMS SHALL BE CONSTRUCTED OF STONE OR STRAW PRODUCTS ONLY; THE USE OF HAY OR HAY PRODUCTS IS STRICTLY PROHIBITED.
2. HEIGHT AND SPACING OF CHECK DAMS IS DEPENDENT ON SLOPES AND RUNOFF CONDITIONS. CONSULT WITH EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING PRIOR TO INSTALLATION FOR PROJECT SPECIFIC REQUIREMENTS.
3. REMOVE TEMPORARY CHECK DAMS UPON SWALE STABILIZATION AND/OR COMPLETION OF CONSTRUCTION.

CHECK DAMS

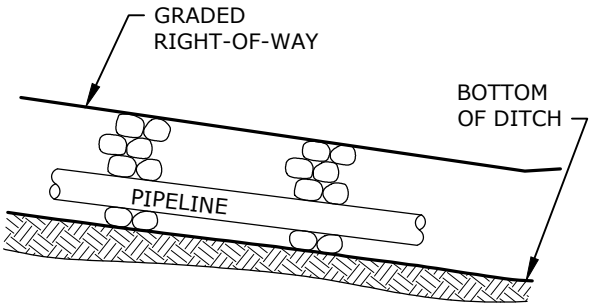
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A36

EVERSOURCE

Dec 15, 2021-3:22pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Check Dams.dwg

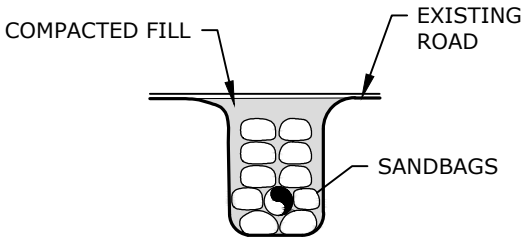


SECTION



ELEVATION

CROSS-COUNTRY BURIED PIPELINE



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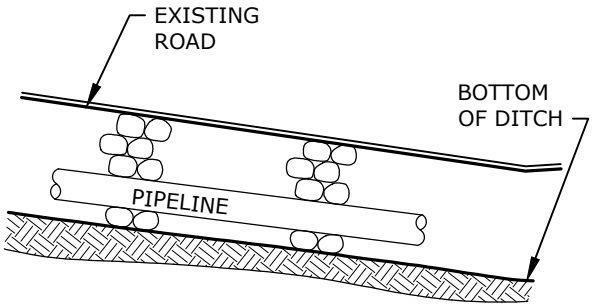


ELEVATION

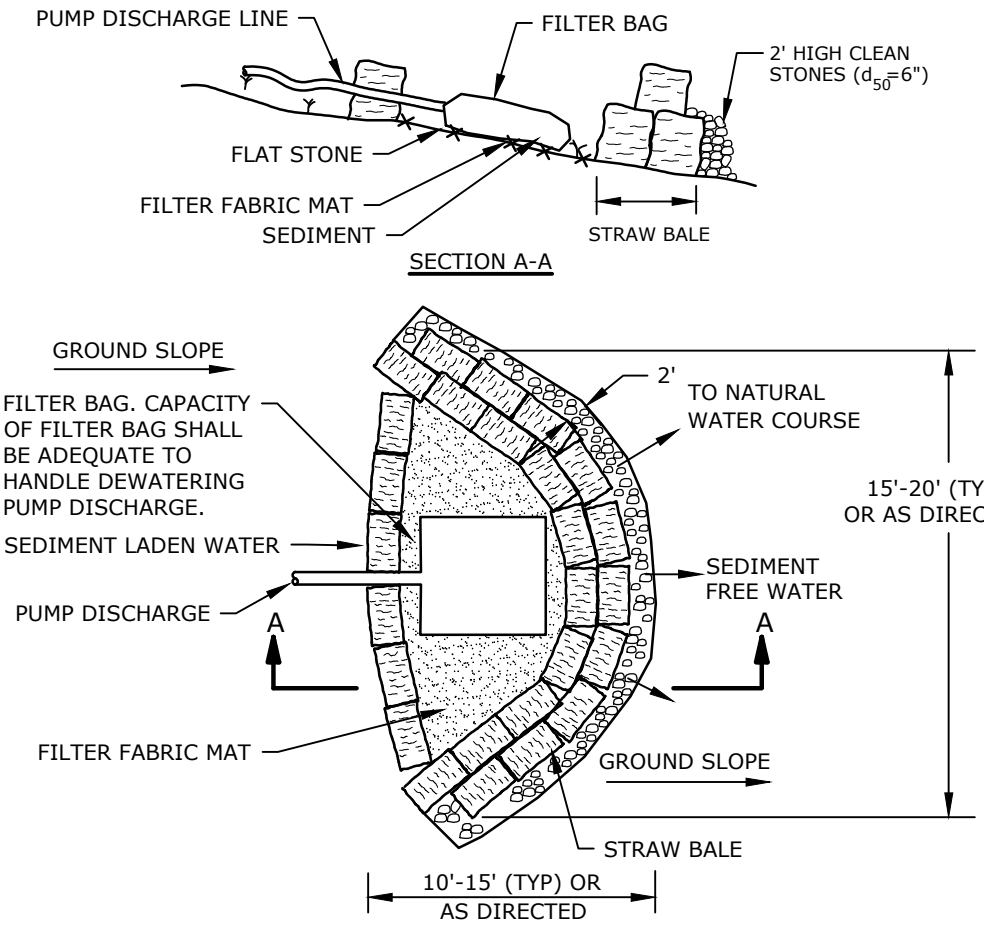
IN-ROAD BURIED PIPELINE

TRENCH BREAKER

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A37

EVERSOURCE

Dec 15, 2021-3:29pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Trench Breaker.dwg



NOTES:

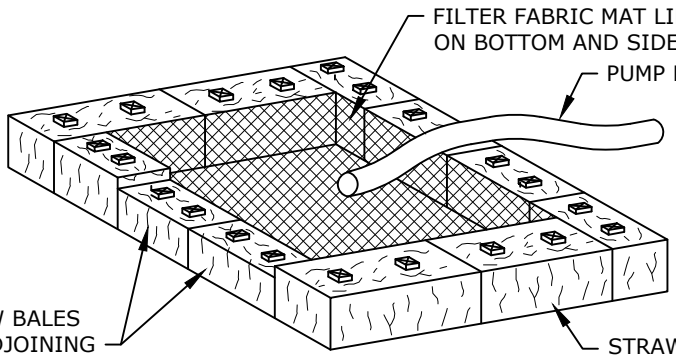
1. LOCATION OF SEDIMENT TRAP SUBJECT TO CONSULTATION WITH EVERSOURCE ENVIRONMENTAL LICENSING AND PERMITTING.
2. SEDIMENT TRAPS OR SETTLING BASINS SHALL BE USED FOR CONSTRUCTION DEWATERING.
3. DISCHARGE AWAY FROM WORK AREA/DEWATERING AREA.

SEDIMENT TRAP

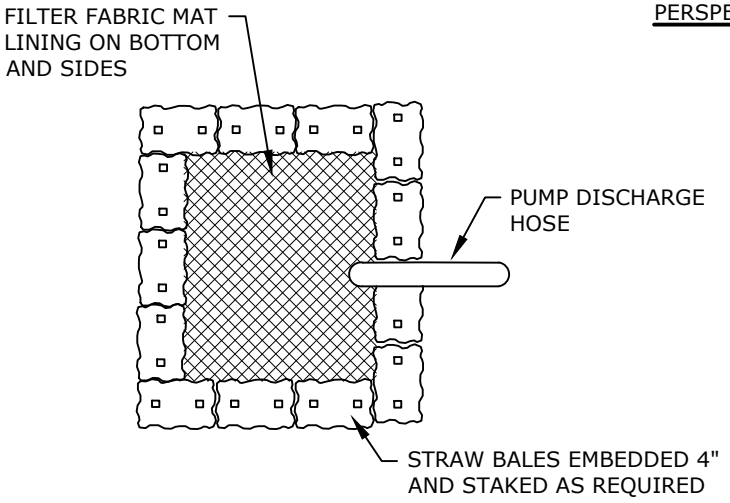
DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A38

EVERSOURCE

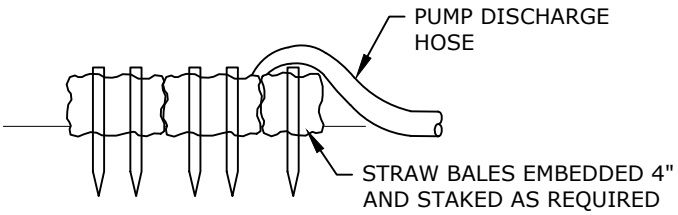
Dec 15, 2021-3:25pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\E-Sediment Trap.dwg



PERSPECTIVE



PLAN VIEW



SECTION

NOTE:
PLACE DEWATERING/PUMPING SETTLING BASINS IN A WELL-VEGETATED AREA, OUTSIDE OF WETLANDS WHENEVER PRACTICABLE.

DEWATERING BASIN

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A39

EVERSOURCE

Dec 15, 2021-3:24pm Plotted By: ASapelli
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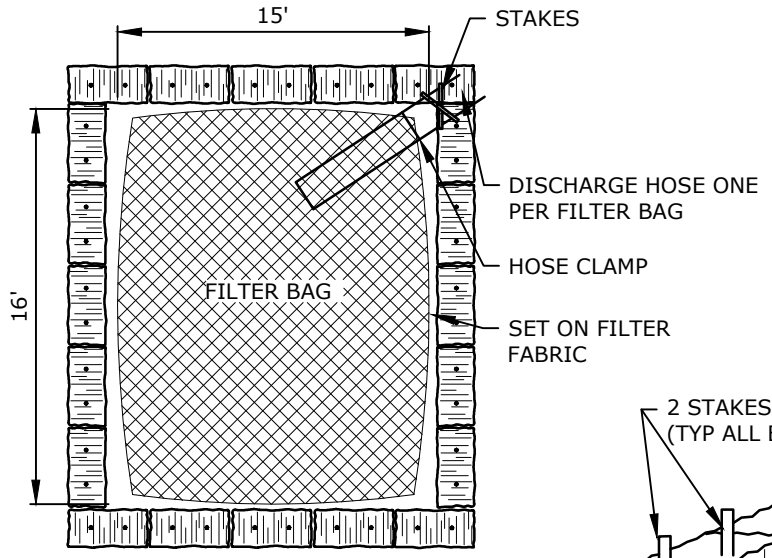
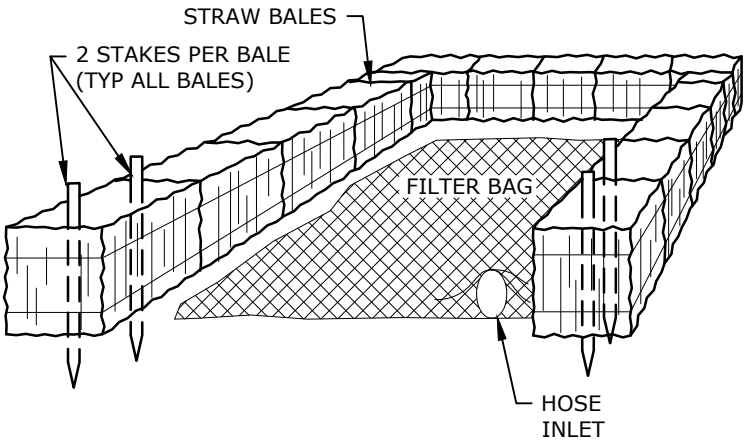


PLAN

SECTION

NOTE:

PLACE FILTER BASINS IN A WELL-VEGETATED AREA, OUTSIDE OF WETLANDS WHENEVER PRACTICABLE.



PERSPECTIVE

DEWATERING BASIN (FILTER BAG)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A40

EVERSOURCE

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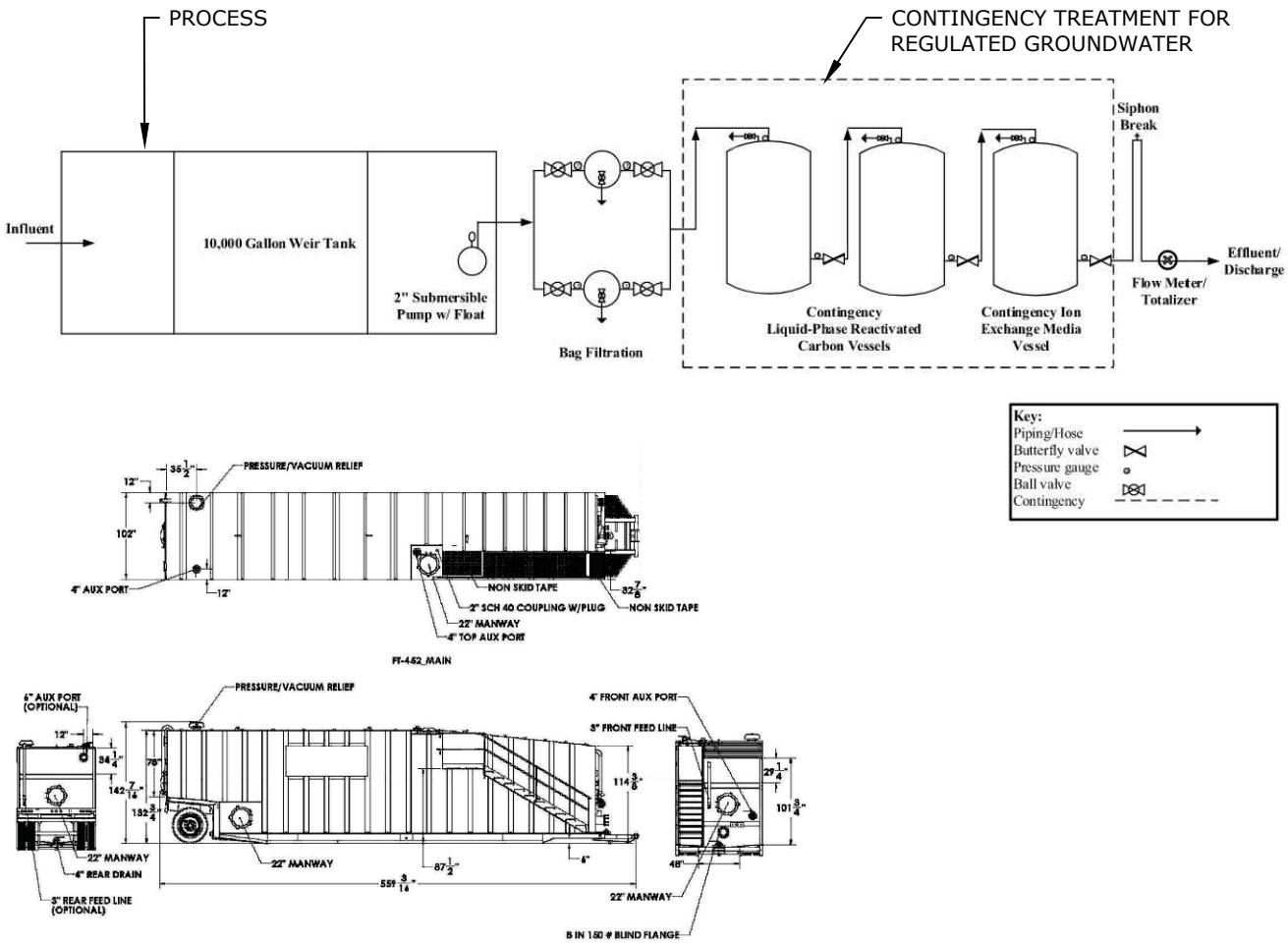

DEWATERING BASIN
(FRAC TANK)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A41

EVERSOURCE

Dec 15, 2021-3:25pm Plotted By: ASapelli
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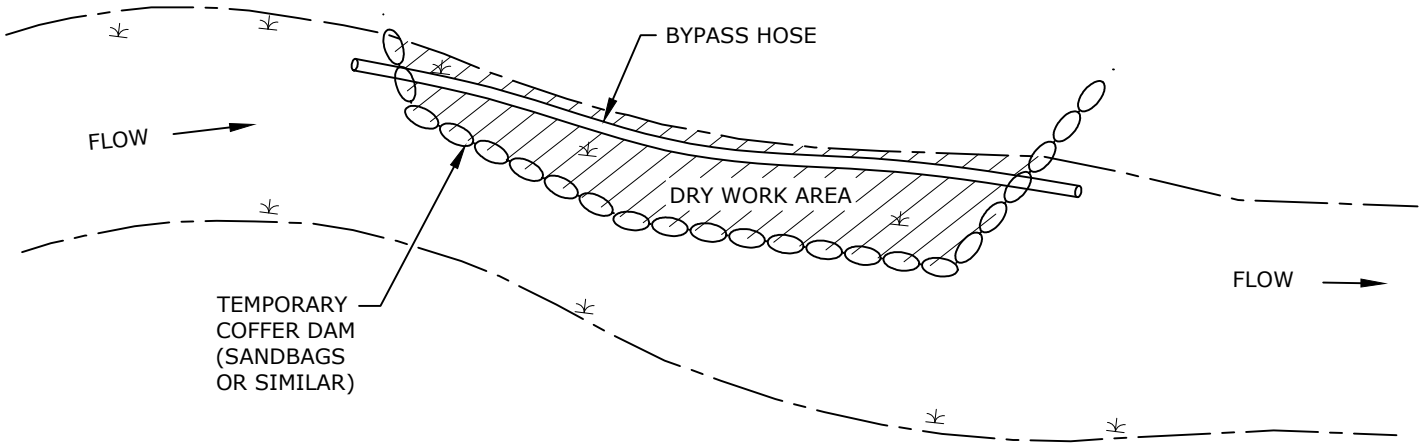


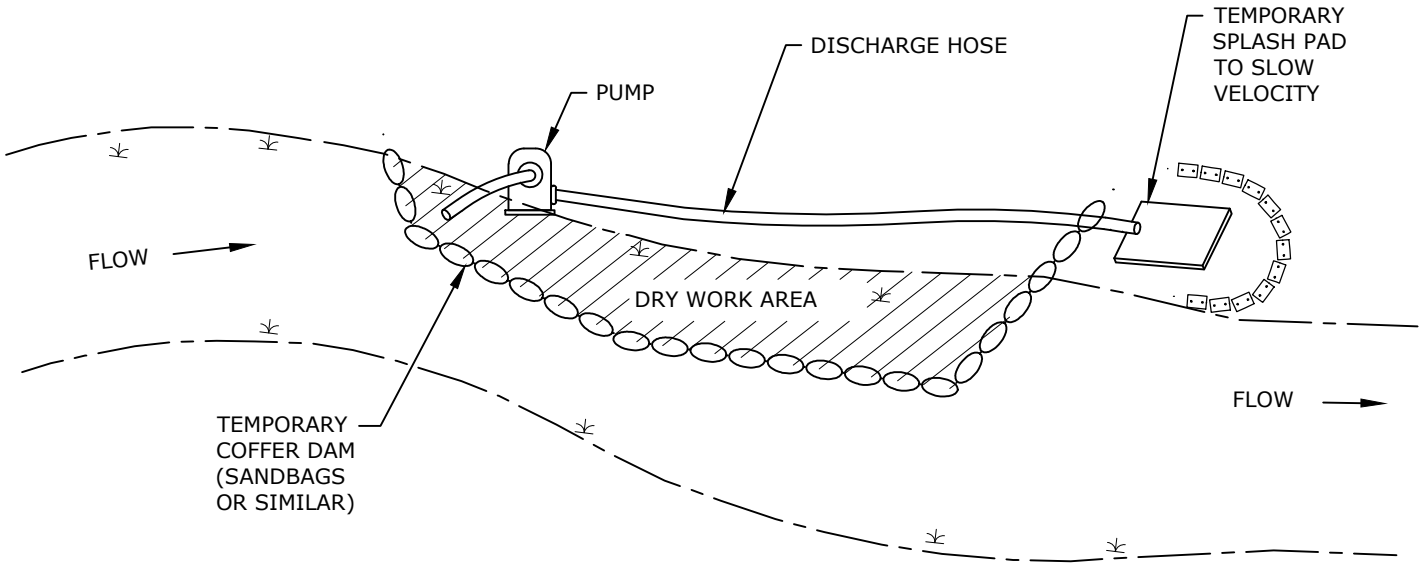
PLAN VIEW - GRAVITY COFFER DAM

COFFER DAM AND STREAM
FLOW BYPASS (GRAVITY)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A42

EVERSOURCE

Dec 15, 2021-3:22pm Plotted By: ASapelli
Tighe & Bond, Inc. F:\Projects\E\E5034 Eversource L&P 2019\088 - CT-MA BMP Manual\Drawings_Figures\AutoCAD\Sheet\Coffer Dam Gravity.dwg



PLAN VIEW - PUMP COFFER DAM

COFFER DAM AND STREAM
FLOW BYPASS (PUMPING)

DATE:	12/2021
SCALE:	NO SCALE
FIGURE:	A43

EVERSOURCE

Dec 15, 2021-3:22pm Plotted By: ASapelli
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APPENDIX B

Appendix B

Appendix B

B.1 Applicable Laws/Regulations

In Connecticut, there are no fewer than eight potentially pertinent regulatory programs associated with activities proposed in environmentally sensitive areas. The following list of laws and regulations are most likely to apply to electrical utility projects in the State.

- Connecticut Inland Wetlands and Watercourses Act (C.G.S. §§ 22a-36 through 22a-45a)
- Municipal inland wetland and zoning regulations
- Connecticut General Permit for Water Resource Construction Activities (C.G.S. §§ 22a-6, 22a-45a and 22a-378a)
- Connecticut Environmental Policy Act (C.G.S. §§ 22a-1a through 22a-1h)
- Connecticut Coastal Management Act (C.G.S. §§ 22a-359 through 22a-363; 22a-28 through 22a-35; 22a-90 through 22a-112; 33 U.S.C. § 1314)
- Connecticut Water Diversion Policy Act (C.G.S. §§ 22a-365 through 22a-379)
- Connecticut Endangered Species Act (C.G.S. §§ 26-303 through 26-315)
- Section 10 of the Rivers and Harbors Act of 1899 (C.G.S. §§ 22a-426; 33 U.S.C. § 403)
- Section 401 of the Clean Water Act (33 U.S.C. § 1251)
- Section 404 of the Clean Water Act (33 U.S.C. § 1344)

B.2 Geographic Areas Subject to Jurisdiction

The following areas are subject to regulatory jurisdiction by at least one of the regulatory programs discussed in this section: It is important to note that more than one jurisdictional resource type may be present at any given location.

- Inland wetlands, watercourses (rivers, streams, lakes, ponds), and floodplains
- Areas subject to municipal wetlands bylaws or ordinances (these vary by town)
- Coastal Resource Areas (beaches, dunes, bluffs, escarpments, coastal hazard areas, coastal waters, nearshore waters, offshore waters, estuarine embayments, developed shorefront, intertidal flats, islands, rocky shorefronts, shellfish concentration areas, shorelands, and tidal wetlands)
- Navigable waters
- Essential Fish Habitat (EFH)
- Rare species habitat as mapped by the Connecticut Natural Diversity Database (NDDB)
- Historic/cultural Resources including archaeological resources and above-ground historic resources

B.3 Applicable Regulatory Agencies

Activities subject to jurisdiction under the above-referenced programs will generally be subject to review by one or more regulatory agencies (refer to list below). Most stream and wetland crossings will require notification or consultation with municipal Inland Wetland and Watercourses Agencies, and may require permitting with the U.S. Army Corps of Engineers (ACOE) and Connecticut Department of Energy & Environmental Protection (CT DEEP) under Sections 404 and 401 of the Clean Water Act. Coordination with CT DEEP may also be required for projects located within areas mapped by the Connecticut Natural Diversity Database.

- Municipal Conservation Commissions
- Connecticut Department of Energy & Environmental Protection (CT DEEP) Land and Water Resources Division (LWRD)
- CT DEEP Wildlife Division
- CT DEEP Office of Environmental Review
- United States Army Corps of Engineers (ACOE) New England District
- CT State Historic Preservation Office (CT SHPO)

The State of Connecticut and the Federal Government define wetlands differently. According to the Inland Wetlands and Watercourses Act, inland wetlands are defined as "land, including submerged land, not regulated pursuant to Sections 22a-28 through 22a-35 of the Connecticut General Statutes, as amended, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soil Survey, as it may be amended from time to time by the United States Department of Agriculture Natural Resource Conservation Service. Such areas may include filled, graded, or excavated sites which possess an aquic (saturated) soil moisture regime as defined by the National Cooperative Soil Survey." State wetland identification is based solely on the presence of these soil types.

"Watercourses" means rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through or border upon this state or any portion thereof. Intermittent watercourses shall be delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of recent alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation.

The Federal Government defines wetlands 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." Federal wetland identification is based on a three-parameter approach, where a prevalence of hydrophytic vegetation, hydric soils, and wetland hydrology is used to make a wetland determination.

B.4 Maintenance, Repair, or Emergency Projects

Most regulatory programs contain provisions that allow normal maintenance of existing structures and/or response to emergency situations that require immediate attention.

Prior to commencement of new construction, all jurisdictional wetland areas within the work corridor should be delineated by a qualified wetland and soil scientist. The specialist shall delineate areas in accordance with the General Statutes of Connecticut (revised January 1, 2007) as set forth at Title 22a Chapter 440 "Inland Wetlands and Watercourses Act", the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual, and any local inland wetland regulations, ordinances or bylaws that may exist. Refer to each set of regulations regarding applicable wetland definitions. Wetland areas shall be clearly demarcated using appropriate flagging tape or similar means. It is important to note that certain jurisdictional wetland areas in Connecticut can actually occur in uplands, such as floodplains. In addition, Upland Review Areas generally apply to work activities and vary in each community. This makes consultation with a wetland specialist particularly important.

B.4.1 Maintain, Repair and/or Replace

Exemptions or considerations for maintenance, repair, and/or replacement of existing electrical utility structures exist in some environmental regulations, but not all. The exemptions are limited to work related to existing and lawfully located structures where no change in the original structure or footprint is proposed. It is not for the selected contractor of a particular project to make a determination as to whether an activity is exempt. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource environmental staff.

These exemptions/considerations are afforded at:

- CT Inland Wetlands & Watercourses Act (RCSA § 22a-39-4)
- CT General Permit (Section 3)
- CT Coastal Management Act (RCSA § 22a-363b)
- CT GP [33 CFR 323.4(a)(2)]
- CT Water Diversion Policy Act (RCSA § 22a-377(b)1)

B.4.2 Emergency Projects

Emergency provisions are generally afforded to activities that need to abate conditions that pose a threat to public health or safety. These provisions generally do not allow work beyond what is necessary to abate the emergency condition and will generally require an after-the-fact permit. It is not for the selected contractor of a particular project to make a determination as to whether an activity is an emergency. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource Environmental Licensing and Permitting.

It is important to note that invocation of an emergency provision does not release the project proponent from reporting requirements.

Emergency provisions are afforded at:

- CEPA (RCSA § 22a-1a-3)
- CT Coastal Management Act (RCSA § 22a-29)
- CT GP [33 CFR Part 323.4(a)(2)]

B.5 Municipal Permitting

Work within wetlands, watercourses and designated Upland Review Areas typically requires notification to municipal staff, (Department of Public Works and/or the Inland Wetland and Watercourse Agency staff). In October 1996 the Connecticut Department of Public Utility Control opened a docket (Docket Number 95-08-34) to conduct a generic investigation on the allocation of siting jurisdiction over utility plant facilities. This included an investigation as to whether local authorities (including local Inland Wetlands and Watercourses Agencies) have jurisdiction over public utility projects.

The investigation resulted in several orders which provide guidance on how public utility companies should coordinate with municipalities on the construction of new facilities, upgrades, significant maintenance activities, and routine maintenance activities.

- For the construction of new facilities, alterations to existing facilities (including upgrades) or significant maintenance involving substantial disturbance of soil, water or vegetation which would regularly fall under the review requirements of certain local authorities (ie. Planning and Zoning Authority; Inland Wetlands Commission; Public Works Department; Historic District Commission), the utility shall at least notify and consult with such local authority, or its designated agent or staff, toward the development of mutually agreeable schedules and procedures for the proposed activity.
- For routine maintenance activities or alterations to existing facilities (including upgrades) involving minor disturbance of soil, water or vegetation which would regularly fall under the review and approval requirements of certain local authorities, the utility shall make local authorities or their designated agent or staff aware of such ongoing activities.

B.6 CT Department of Energy & Environmental Protection

If the project requires formal permitting with the ACOE (Pre-Construction Notification (PCN) or Individual Permit), copies of the application should be forwarded to CT DEEP for review under Section 401 of the Clean Water Act. The CT DEEP requires that a GP Addendum form be completed and submitted along with the ACOE application. If the project qualifies for Self-Verification Notification (SVNF) under the ACOE GP, the project also is granted authorization (Water Quality Certification, WQC) with no formal application under Section 401 of the Clean Water Act, provided the project meets the additional WQC general conditions. The general conditions commonly applicable to utility projects include:

- Prohibiting dumping of any quantity of oil, chemicals, or other deleterious material on the ground;
- Immediately informing the CT DEEP Oil and Chemical Spill Response Division at (860) 424-3338 (24 hours) of any adverse impact or hazard to the environment including any discharge or spillage of oil or chemical liquids or solids;
- Separating staging areas at the site from the regulated areas by silt fences or stray/hay bales at all times;
- Prohibiting storage of any fuel and refueling of equipment within 25 feet from any wetland or watercourse;
- Following the document "Connecticut Guidelines for Soil and Erosion Control," inspecting employed controls at least once per week, after each rainfall, and at least daily during prolonged rainfall, and correcting any deficiencies within 48 hours of being found.

- Prohibiting the storage of any materials at the site which are buoyant, hazardous, flammable, explosive, soluble, expansive, radioactive, or which could in the event of a flood be injurious to human, animal or plant life, below the elevation of the
- 500 year flood. Any other material or equipment stored at the site below this elevation must be firmly anchored, restrained or enclosed to prevent flotation. The quantity of fuel for equipment at the site stored below such elevation shall not exceed the quantity of fuel that is expected to be used by such equipment in one day.
- Immediately informing CT DEEP at (860) 424-3019 and the ACOE at (617) 647-8674 of the occurrence of pollution or other environmental damage in violation of the WQC, and within 48 hours support a written report including information specified in the general conditions.

If the project falls within areas mapped by the Connecticut Natural Diversity Database, or is less than 0.50 miles upstream or downstream of a mapped area, a data request and possible coordination will be required with the Natural Diversity Database.

If a project is located within tidal, coastal or navigable waters of the state or in tidal wetlands, permitting may be required with the CT DEEP LWRD. For the routine maintenance of previously permitted structures or structures that were in place prior to June 24, 1939, no permitting is required. For significant maintenance of previously permitted structures or structures that were in place prior to June 24, 1939, a Certificate of Permission is required. For new projects a Structures, Dredging and Fill Permit and/or a Tidal Wetlands Permit may be required. The CT DEEP LWRD should be consulted prior to preparing permits to conduct a pre-application meeting and determine the appropriate permitting route.

B.7 U.S. Army Corps of Engineers

Work within wetlands and waters of the United States is subject to jurisdiction under Section 404 of the Clean Water Act, which is administered by the ACOE. Work within navigable waters is also administered by the ACOE under Section 10 of the Rivers and Harbors Act of 1899. The ACOE has issued Department of the Army General Permits for the State of Connecticut and Land Located within the Boundaries of an Indian Reservation (CT GPs) which establishes categories for projects based on their nature of impacts. The current permit was issued on December 15, 2021, and expires on December 15, 2026.

Applications are not required for Self-Verification (SV) projects, but submittal of a Self-Verification Notification Form (SVNF) before the work occurs and submittal of a Compliance Certification Form within one month after the work is completed is required. The SVNF and Compliance Certification Form entail self-certification by applicants that their project complies with the terms and conditions of SV under the CT GPs. Pre-Construction Notification (PCN) projects require the submittal of an application to the ACOE, followed by a screening of the application by the ACOE, the U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (US EPA), National Marine Fisheries Service (NMFS) and CT DEEP, and consultation with the Connecticut Commission on Culture and Tourism and Tribal Historic Preservation Officers (THPOs). PCN projects may not proceed until written approval from the ACOE is received. Written approval is generally provided within 45 days of the multi-agency screening. After written approval is received, a Work-Start Notification Form must be submitted before the work occurs, and a Compliance Certification Form must be submitted within one month after the work is completed.

For work proposed within a FEMA floodway or floodplain, the ACOE recommends that the applicant apply for and receive a Flood Management Certification (if required), prior to applying to the ACOE. Additionally, applications for PCN inland projects that propose fill in ACOE jurisdiction must include an Invasive Species Control Plan (ISCP), unless otherwise directed by the ACOE.

An Individual Permit (IP) requires a formal permit application to be submitted to the ACOE. The application is reviewed in detail by both state and federal agencies, and a Public Notice is released for public comment. Projects which trigger an IP generally result in significant impacts to wetlands and/or watercourses.

Stream and wetland crossings are only subject to jurisdiction under the ACOE if there is **a discharge of dredge or fill material into wetlands or waters of the United States**. Equipment access through a stream or wetland with no structural BMP is not regulated by the ACOE if there is no discharge of dredge or fill material (note that equipment rutting as a result of not using an appropriate BMP can be considered a "discharge of dredge material"). Similarly, the use of a timber or rail car bridge that extends from bank to bank with no stream impacts is not regulated by the ACOE. Additionally, the use of timber mats and stone is considered "fill material" by the ACOE, and must be calculated to determine overall impacts. Temporary mats are not counted towards the 1-acre PCN threshold if they are adequately cleaned after previous use, removed immediately after completion of construction and disposed of at an upland site.

Maintenance, including emergency reconstruction of currently serviceable structures, is exempt from ACOE jurisdiction and does not require formal permitting. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs to qualify for this exemption.

Stream and wetland crossings that involve the discharge of dredge and fill material may be conducted under SV if the work complies with the general conditions and SV criteria of the CT GPs. The following are SV criteria that are commonly applicable to stream and wetland crossings in utility rights of way. See Section 1.8 for additional criteria for culvert crossings:

- The work results in less than 5,000 square feet of impacts to wetlands or Waters of the United States. Replacement of utility line projects with impacts solely within wetlands greater than 5,000 square feet may be eligible for SV Authorization after consultation with the ACOE about the specific project;
- Temporary fill, with the exceptions of swamp and timber mats, discharged to wetlands shall be placed on geotextile fabric laid on the pre-construction wetland grade. Unconfined temporary fill discharged into flowing water (rivers and streams) shall consist only of clean stone. All temporary fill shall be removed as soon as it is no longer needed, and disposed of at an appropriate upland site.
- Any unconfined in-stream work, including construction, installation or removal of sheet pile cofferdam structures, is conducted during the low-flow period between July 1 and September 30. However, installation of coffer dams, other than sheet pile cofferdams, is not restricted to the low-flow period and must be installed between July 1 and March 31 and must not encroach > 25% of the stream width measured from OHW during the prohibited work window;
- No work will occur in the main stem or tributary streams of the Connecticut River watershed that are being managed for Atlantic salmon (*Salmo salar*). (Work of this

nature requires screening for potential impacts to designated Essential Fish Habitat.);

- The work does not result in direct or secondary impacts to Special Wetlands, Threatened, Endangered or Special Concern Species, or Significant Natural Communities identified by the Connecticut Natural Diversity Database. Work within 750 feet of vernal pools shall be minimized;
- The project does not require an ACOE permit with associated construction activities within 100 feet of Special Wetlands;
- The project does not result in fill placed within a FEMA established floodway, unless the applicant has a State of Connecticut Flood Management Certification pursuant to Section 25-68d of the Connecticut General Statutes;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- The project does not entail stormwater detention or retention in inland waters or wetlands;
- The project is not located in a segment of a National Wild and Scenic River System (includes rivers officially designated by Congress as active study status rivers for possible inclusion) or within 0.25 miles upstream or downstream of the main stem or tributaries to such a system;
- The project has no potential for an effect on a historic property which is listed or eligible for listing in the National Register of Historic Places;
- The project does not impinge upon the value of any National Wildlife Refuge, National Forest, or any other area administered by the U.S. Fish and Wildlife Service, U.S. Forest Service or National Park Service;
- Section 106 needs to be taken into account for all work that requires federal permitting – including SV;
- The project does not use slip lining, plastic pipes, or High Density Polyethylene Pipes (HDPP).
- Appropriate BMPs are employed in regard to heavy equipment in wetlands (General Condition 16) and sedimentation and erosion controls (General Condition 20).
- Disturbed inland wetland areas are restored in accordance with General Condition 18.

Stream and wetland crossings that involve the discharge of dredge and fill material may be conducted under PCN if the work complies with the general conditions and PCN criteria of the CT GPs. The following are PCN criteria that are commonly applicable to stream and wetland crossings in utility ROWs. See Section 1.8 for additional criteria for culvert crossings:

- The work results in less than one acre of impacts to wetlands or Waters of the United States;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- The project does not entail stormwater detention or retention in inland waters or wetlands.
- Temporary fill, with the exceptions of swamp and timber mats, discharged to

wetlands shall be placed on geotextile fabric laid on the pre-construction wetland grade. Unconfined temporary fill discharged into flowing water (rivers and streams) shall consist only of clean stone. All temporary fill shall be removed as soon as it is no longer needed, and disposed of at an appropriate upland site.

- Appropriate BMPs are employed in regard to heavy equipment in wetlands (General Condition 16) and sedimentation and erosion controls (General Condition 20).
- Disturbed inland wetland areas are restored in accordance with General Condition 18.

Stream and wetland crossings that cannot meet SV or PCN criteria may require review under an IP. The ACOE should be consulted before assuming an IP will be required, as exceptions can be made under certain circumstances.

GP1. Aids to navigation & temporary recreational structures (Coastal only)
GP2. Repair or maintenance of existing currently serviceable, authorized or grandfathered structures/fills and removal of structures *(Coastal and Inland)*
GP3. Moorings *(Coastal only)*
GP4. Pile-supported structures & floats, including boat lifts/hoists & other miscellaneous structures & work *(Coastal only)*
GP5. Boat ramps and marine railways *(Coastal and Inland)*
GP6. Utilities including lines, outfall and intake structures and appurtenant structures *(Coastal and Inland)*
GP7. Dredging, transport & disposal of dredged material, beach nourishment & rock removal and rock relocation *(Coastal only)*
GP8. Discharges of dredged or fill material incidental to the construction of bridges *(Coastal only)*
GP9. New shoreline and bank stabilization projects and Living Shorelines *(Coastal and Inland)*
GP10. Aquatic habitat restoration, establishment and enhancement activities *(Coastal and Inland)*
GP11. Fish and wildlife harvesting activities *(Coastal and Inland)*
GP12. Oil spill and hazardous material response operations *(Coastal and Inland)*
GP13. Cleanup of hazardous and toxic waste and removal of contaminated soil *(Coastal and Inland)*
GP14. Scientific measurement and monitoring devices *(Coastal and Inland)*
GP15. Survey and exploratory survey activities *(Coastal and Inland)*
GP16. Aquaculture & Mariculture Activities *(Coastal only)*
GP17. New and expansion of recreational, residential, institutional, and commercial developments *(Inland only)*
GP18. Wetland crossings for linear transportation projects (Inland only)
GP19. Stream, river and brook crossings (not including wetland crossings) *(Coastal and Inland)*
GP20. Energy generation and renewable energy generation facilities and hydropower projects *(Coastal and Inland)*
GP21. Temporary fill not associated with a regulated General Permit activity *(Inland only)*

GP22. Modification and Improvement of Existing Minor drainage features and Mosquito Control *(Coastal only)*

GP23. Agricultural Activities *(Inland only*)

B.8 Culvert Installation

New culvert installation or existing culvert replacements will require notification or consultation with municipal staffers which might include the Department of Public Works and/or the inland wetlands officer, and may require permitting with the ACOE under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899, and the CT DEEP under Section 401 of the Clean Water Act. Coordination with CT DEEP may also be required for projects located within areas mapped by the Connecticut Natural Diversity Database. For work within tidal, coastal or navigable waters or in tidal wetlands, permitting will be required with the CT DEEP LWRD.

B.8.1 Municipal Permitting

See Section 1.5 for general local permitting guidance.

- For the installation of new culverts and the replacement of culverts that involve substantial disturbance of soil, water or vegetation which would regularly fall under the review and approval requirements of certain local authorities (i.e., Planning and Zoning Authority; Inland Wetlands Commission; Public Works Department; Historic District Commission), the utility shall at least notify and consult with such local authority, or its designated agent or staff, toward the development of mutually agreeable schedules and procedures for the proposed activity.
- For the replacement of culverts involving only minor disturbance of soil, water or vegetation which would regularly fall under the review and approval requirements of certain local authorities, the utility shall make local authorities or their designated agent or staff aware of such ongoing activities.

B.8.2 CT Department of Energy & Environmental Protection

If the project requires formal permitting with the ACOE, copies of the application should be forwarded to CT DEEP for review under Section 401 of the Clean Water Act. CT DEEP requires that a PGP Addendum form be completed and submitted along with the ACOE application.

If a culvert project falls within areas mapped by the Connecticut Natural Diversity Database or falls within 0.50 miles upstream or downstream of a mapped area, a data request and possible coordination will be required with the Natural Diversity Database.

If a culvert project is located within tidal, coastal or navigable waters of the state or in tidal wetlands, permitting will be required with the CT DEEP LWRD. For new projects a Structures, Dredging and Fill Permit and/or a Tidal Wetlands Permit will be required. For replacement structures which were previously permitted, or which were in place prior to June 24, 1939, a Certificate of Permission may only be required, which entails a shorter permitting process.

B.8.3 U.S. Army Corps of Engineers

See Section 1.7 for general ACOE permitting requirements. Open bottom arches, bridge spans or embedded culverts are preferred over traditional culverts and are required for SV projects. However, where site constraints make these approaches impractical, the ACOE should be consulted.

New bridge or open-bottom structure crossings may be conducted under SV or PCN if the following criteria are met in addition to meeting any applicable general criteria listed in section 1.7 of this manual:

- The work spans at least 1.2 times the watercourse bank full width;

- The structure has an openness ratio equal to or greater than 0.25 meters;
- The structure allows for continuous flow of the 50-year frequency storm flows.

New culvert installations may be conducted under SV if the work complies with the general conditions and SV criteria of the CT GPs. The following are SV criteria that are commonly applicable to new culvert installations in utility right of ways:

- Work is conducted in accordance with the design requirements listed in Section 3.1.3 of the BMP Manual; Plastic and High Density Polyethylene Pipes (HDPE) are not used;
- The work results in less than 5,000 square feet of impacts to wetlands or Waters of the United States;
- Any unconfined in-stream work, including construction, installation or removal of sheet pile coffer dam structures, is conducted during the low-flow period between July 1 and September 30, except in instances where a specific written exception has been issued by the Connecticut Department of Energy & Environmental Protection. However, installation of coffer dams, other than sheet pile coffer dams, is not restricted to the low-flow period;
- No open trench excavation is conducted within flowing waters. Work within flowing waters can be avoided by using temporary flume pipes, culverts, coffer dams, etc. to isolate work areas and maintain normal flows;
- The tributary watershed to the culvert does not exceed 1.0 square mile (640 acres);
- The culvert gradient (slope) is not steeper than the streambed gradient immediately upstream or downstream of the culvert;
- For a single box or pipe arch culvert crossing, the inverts are set not less than 12 inches below the streambed elevation;
- For a multiple box or pipe arch culvert crossing, the inverts of one of the boxes or pipe arch culverts are set not less than 12 inches below the elevation of the streambed;
- For a pipe culvert crossing, the inverts are set such that not less than 25% of the pipe diameter or 12 inches, whichever is less, is set below the streambed elevation;
- The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate;
- The structure does not otherwise impede the passage of fish and other aquatic organisms;
- The structure allows for continuous flow of the 50-year frequency storm flows;
- The work does not result in direct or secondary impacts to Special Wetlands, Threatened, Endangered or Special Concern Species, or Significant Natural Communities identified by the Connecticut Natural Diversity Database. Work within 750 feet of vernal pools shall be minimized;
- The project does not require an ACOE permit with associated construction activities within 100 feet of Special Wetlands;
- The project does not result in fill placed within a FEMA established floodway, unless the applicant has a State of Connecticut Flood Management Certification pursuant to section 25-68d of the Connecticut General Statutes;

- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- The project does not entail stormwater detention or retention in inland waters or wetlands;
- The project is not located in a segment of a National Wild and Scenic River System (includes rivers officially designated by Congress as active study status rivers for possible inclusion) or within 0.25 miles upstream or downstream of the main stem or tributaries to such a system;
- The project has no potential for an effect on a historic property which is listed or eligible for listing in the National Register of Historic Places;
- The project does not impinge upon the value of any National Wildlife Refuge, National Forest, or any other area administered by the U.S. Fish and Wildlife Service, U.S. Forest Service or National Park Service.
- Appropriate BMPs are employed with regard to sedimentation and erosion controls (General Condition 20).

New culvert installations may be conducted under PCN if the work complies with the general conditions and PCN criteria of the GP. The following are PCN criteria that are commonly applicable to new culvert installations in utility right of ways:

- Work is conducted in accordance with the design requirements listed in Section 3.1.3 of the BMP Manual;
- The work results in less than one acre of impacts to wetlands or Waters of the United States;
- The project does not result in fill placed within a FEMA established floodplain that would adversely affect the hydraulic characteristics of the floodplain;
- There is no practicable alternative location for the crossing that would have less environmental impacts;
- The use of a bridge or open-bottom structure is determined to be not practicable;
- For a single box or pipe arch culvert crossing, the inverts are set not less than 12 inches below the streambed elevation;
- For a multiple box or pipe arch culvert crossing, the inverts of one of the boxes or pipe arch culverts are set not less than 12 inches below the elevation of the streambed;
- For a pipe culvert crossing, the inverts are set such that not less than the pipe diameter or 12 inches, whichever is less, is set below the streambed elevation;
- The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate;
- The culvert has an openness ratio equal to or greater than 0.25 meters;
- The structure does not result in a change in the normal water surface elevation of the upstream waters or wetlands;
- The structure allows for continuous flow of the 50-year frequency storm flows;
- Appropriate BMPs are employed with regard to sedimentation and erosion controls (General Condition 20).

New culvert installations that cannot meet SV or PCN criteria may require review under an IP. The ACOE should be consulted before assuming an IP will be required, as exceptions can be made under certain circumstances.

In-kind replacement of culverts using the same materials is exempt from Section 404 of the Clean Water Act, and does not require permitting with the ACOE. The ACOE, however, should be consulted before assuming an activity is exempt from their jurisdiction. Consult with Eversource Environmental Licensing and Permitting.

Bridge or open-bottom structure replacements may be conducted under SV if the conditions for a new bridge or open-bottom structure replacement have been met. In addition, bridge or open-bottom structure replacements should not result in a change in the normal surface elevation of the upstream waters or wetland, and the replacement structure should have a riparian bank on one or both sides for wildlife passage. Culvert replacements may be conducted under SV if the conditions for new culvert installation are met.

Bridge or open-bottom structure replacements may be conducted under PCN if the conditions for a new bridge or open-bottom structure replacement have been met. Culvert replacements may be conducted under PCN if the following conditions are met:

- The work results in 5,000 square feet to less than one acre of impacts to wetlands or Waters of the United States;
- The use of a bridge or open-bottom structure is determined to be not practicable;
- For a single box or pipe arch culvert crossing, the inverts are set not less than 12 inches below the streambed elevation;
- For a multiple box or pipe arch culvert crossing, the inverts of one of the boxes or pipe arch culverts are set not less than 12 inches below the elevation of the streambed;
- For a pipe culvert crossing, the inverts are set such that not less than the pipe diameter or 12 inches, whichever is less, is set below the streambed elevation;
- The culvert is backfilled with natural substrate material matching upstream and downstream streambed substrate;
- The culvert has an openness ratio equal to or greater than 0.25 meters;
- The structure does not result in a change in the normal water surface elevation of the upstream waters or wetlands;
- The structure allows for continuous flow of the 50-year frequency storm flows;
- Appropriate BMPs are employed with regard to sedimentation and erosion controls (General Condition 20).

APPENDIX C

Appendix C

Appendix C – Massachusetts Environmental Regulations

C.1 Applicable Laws/Regulations

In Massachusetts, there are no fewer than nine potentially pertinent regulatory programs associated with activities proposed in environmentally sensitive areas. The following list of laws and regulations are most likely to apply to electrical utility projects in the Commonwealth.

- Massachusetts Wetlands Protection Act (M.G.L. 131 § 40) (MA WPA)
- Municipal wetland bylaws/ordinances (varies by municipality)
- Massachusetts Endangered Species Act (M.G.L. 131A) (MESA)
- "Chapter 91" Public Waterfront Act (M.G.L. c. 91 §§ 1 through 63)
- Massachusetts Environmental Policy Act (M.G.L. c. 30 §§ 61 through 62H) (MEPA)
- Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403)
- Section 401 of the Clean Water Act (33 U.S.C. § 1251; 314 CMR 9.00)
    - Administrative Consent Order (ACO)
- Section 404 of the Clean Water Act (33 U.S.C. § 1344)
- Massachusetts Watershed Protection Act (M.G.L. 92A §1/2) (MA WsPA)

C.2 Geographic Areas Subject to Jurisdiction

The following areas are subject to regulatory jurisdiction by at least one of the regulatory programs discussed in this section: It is important to note that more than one jurisdictional resource area type may be present at any given location.

- Massachusetts Wetlands Protection Act Resource Areas:
    - (Coastal) Land Under the Ocean; Designated Port Areas; Coastal Beaches; Coastal Dunes; Barrier Beaches; Coastal Banks; Rocky Intertidal Shores; Salt Marshes; Land Under Salt Ponds; Land Containing Shellfish; Banks of or Land Under the Ocean, Ponds, Streams, Rivers, Lakes or Creeks that Underlie Anadromous/Catadromous ("Fish Run"); Land Subject to Coastal Storm Flowage
    - (Inland). Bank; Bordering Vegetated Wetland; Land Under Water Bodies and Waterways; Land Subject to Flooding; 200-foot Riverfront Area; and the 100-foot Buffer Zone to Bank and BVW
- Areas subject to municipal wetlands bylaws or ordinances (note: varies by community)
- Estimated and/or Priority Habitat of State-listed Rare Species
- Outstanding Resource Waters (ORWs; include Certified Vernal Pools, public surface water drinking supplies, tributaries to drinking water supplies and vegetated wetlands adjacent thereto)
- Essential Fish Habitat (EFH)
- Areas of Critical Environmental Concern (ACECs)
- Great Ponds

- Navigable waterways
- Wild and Scenic Rivers
- Quabbin Reservoir, Ware River and Wachusett Reservoir watersheds

C.2.1 Endangered Species

The Massachusetts Natural Heritage and Endangered Species Program (NHESP), a department of the Massachusetts Division of Fisheries and Wildlife (MassWidlife) maintains the current list of rare and endangered species and species of special concern in Massachusetts. Publicly available data only allows for identification of designated Priority Habitats of Rare Species and Estimated Habitats of Rare Wildlife, not specific species information. Priority and Estimated Habitat locations are available online via the Massachusetts Geographic Information System (MassGIS) viewer.

Species specific information is provided for planned linear transmission maintenance activities which are reviewed by NHESP as part of Eversource's annual Operation and Maintenance (O&M) Plan. Projects/ activities which are not covered in the O&M Plan must file an independent request for information or initiate coordination with NHESP through Eversource Environmental Licensing and Permitting.

Applicable regulations and agency are listed below:

- Massachusetts Endangered Species Act: 321 CMR 10.00 – Division of Fisheries and Wildlife – NHESP

C.2.2 Vernal Pools

NHESP maintains a database of certified and potential vernal pools in Massachusetts. These data are available on the NHESP website and MassGIS. Certified Vernal Pools (CVP) are considered Outstanding Resource Waters (ORWs).

The current version of the Department of the Army General Permits for the Commonwealth of Massachusetts (MA GPs), effective date April 16, 2018 (expiration date: April 5, 2023) includes General Conditions for protection of vernal pools, regardless of whether or not the vernal pool is certified by NHESP, and including the vernal pool depression, the vernal pool envelope (area within 100 feet of the vernal pool depression's edge), and the critical terrestrial habitat (area within 100-750 feet of the vernal pool depression's edge). Temporary impacts associated with construction mats in previously disturbed areas of existing utility projects rights-of-way are exempt from GP requirements regarding work in the vernal pool envelope or critical terrestrial habitat, provided that a Vegetation Management Plan (VMP) exists that avoids, minimizes and mitigates impacts to aquatic resources. Applicable regulations and agencies for Certified Vernal Pools (CVPs) are listed below:

- Wetlands Protection Act: 310 CMR 10.00 – Municipal Conservation Commissions (and MassDEP)
- 401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the U.S. within the Commonwealth: 314 CMR 9.00 – MassDEP
- Department of the Army General Permits for the Commonwealth of Massachusetts – ACOE

C.2.3 Essential Fish Habitat and Wild & Scenic River Designation

Essential Fish Habitat (EFH) is a habitat essential for spawning, breeding, feeding, or growth to maturity of federally managed species. This website provides more information: https://www.fisheries.noaa.gov/region/new-england-mid-atlantic#habitat. Consultation

with the ACO is recommended to confirm the location of Essential Fish Habitat with respect to a proposed project.

Massachusetts has approximately 8,229 miles of river, of which 147.1 miles are designated as wild & scenic, as summarized below:

- Nashua River (Main Stem from the confluence of the North and South Rivers in Lancaster, and extending north to the MA-NH border; some geographic exclusions)
- Squannacook River (from headwaters in Ash Swamp/Townsend, extending downstream to the confluence with the Nashua River in Shirley/Ayer; some geographic exclusions)
- Nissitissit River (from headwaters in Brookline (NH) to confluence with the Nashua River in Pepperell)
- Sudbury River (14.9-mile segment from Danforth Street Bridge/Framingham downstream to the Route 2 Bridge/Concord; 1.7-mile segment
- Assabet River
- Concord River
- Westfield River (Main Stem, East Branch, Middle Branch, West Branch, and named tributaries
- Taunton River (main stem from headwaters at the confluence of the Town and Matfield Rivers (Bridgewater) downstream 40 miles to confluence with the Quequechan River at the Route 195 Bridge (Fall River)

Currently, there are no river segments under study in Massachusetts for National Wild and Scenic designation (https://www.rivers.gov/study.php).

Wild and Scenic designations should be verified via the National Wild and Scenic Rivers System website (https://www.rivers.gov/massachusetts.php) during project planning and permitting. The ACOE reviews projects for impacts to both EFH and National Wild and Scenic Rivers.

- Department of the Army General Permits for the Commonwealth of Massachusetts – ACOE

C.2.4 Cold-water Fishery Resources

The Massachusetts Division of Fisheries and Wildlife (MassWildlife) maintains a list of waters that are known to have cold-water fishery resources (CFRs) which are waters in which the mean of the maximum daily temperature over a seven day period generally does not exceed 68°F (20°C) and, when other ecological factors are favorable (such as habitat), are capable of supporting a year round population of cold-water stenothermal aquatic life. CFRs are not currently regulated in and of themselves in Massachusetts. However, MassDEP is particularly concerned with water quality impacts to CFRs due to erosion and sedimentation as a result of construction projects.

C.2.5 Outstanding Resource Waters

Outstanding Resource Waters (ORWs) include Certified Vernal Pools (CVPs), surface drinking water supplies, tributaries to surface drinking water supplies and vegetated wetlands adjacent thereto.

CVPs are designated by NHESP and locations are available through MassGIS. Locations of surface drinking water supplies and other ORWs, typically identified as Zone A, are also available through MassGIS. The applicable regulations and agency are listed below:

- 401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the U.S. within the Commonwealth: 314 CMR 9.00 – MassDEP

C.2.6 Historic/Cultural Resources

The Massachusetts Historical Commission (MHC) is the State Historical Preservation Office (SHPO) and, along with the Board of Underwater Archaeological Resources (BUAR), are the state agencies responsible for protecting the Commonwealth's historic and cultural resources. Additional stakeholders for cultural resources include the Massachusetts Commission on Indian Affairs, Native American tribes with interests in the state, and local historical commissions.

C.3 Applicable Regulatory Agencies

Activities subject to jurisdiction under the above-referenced programs will generally be subject to review by one or more regulatory agencies (refer to list below). New stream and wetland crossings not related to maintenance will require permitting with municipal Conservation Commissions, and may require permitting with the U.S. Army Corps of Engineers (ACOE) and Massachusetts Department of Environmental Protection (MassDEP) under Sections 404 and 401 of the Clean Water Act. Any non-maintenance work within Land Under Water will require permitting with the MassDEP Division of Wetlands and Waterways. Coordination with NHESP may also be required for projects located within areas mapped as Priority and/or Estimated Habitat for state-listed rare species. For work within navigable waters, consultation may be required with the Massachusetts Office of Coastal Zone Management (MA CZM).

- Municipal Conservation Commissions
- Massachusetts Department of Environmental Protection (MassDEP) Division of Wetlands and Waterways
- Massachusetts Division of Fisheries and Wildlife: Natural Heritage and Endangered Species Program (NHESP)
- Massachusetts Executive Office of Energy and Environmental Affairs (EEA)
- United States Army Corps of Engineers (ACOE) New England District
- Massachusetts Office of Coastal Zone Management (MA CZM)
- Massachusetts Division of Conservation and Recreation (MA DCR)

C.4 Maintenance, Repair, or Emergency Projects

Most regulatory programs contain provisions that allow normal maintenance of existing structures and/or response to emergency situations that require immediate attention.

C.4.1 Maintain, Repair and/or Replace

Exemptions or considerations for maintenance, repair, and/or replacement of existing electrical utility structures exist in some environmental regulations, but not all. The exemptions are limited to work related to existing and lawfully located structures where

no change in the original structure or footprint is proposed. It is not for the selected contractor of a particular project to make a determination as to whether an activity is exempt. This determination will be made prior to the commencement of work by the Eversource project manager in consultation with Eversource Environmental Licensing and Permitting.

These exemptions/considerations are afforded at:

- MAWPA (M.G.L Chapter 131, § 40, paragraph 1)
- MAWPA regulations for Riverfront Area (310 CMR 10.58(6))
- MEPA regulations (301 CMR 11.01(2)(b)(3))
- 33 CFR Part 323.4(a)(2)
- MESA (M.G.L. Chapter 131A, § 3; 321 CMR 10.14(5-7) and (12)
- MAWPA (350 CMR 11.05(11) and (12))
- National Pollutant Discharge Elimination System (NPDES), Construction General Permit (as modified effective February 16, 2012)

Certain operation and maintenance activities that will directly impact Waters of the United States through the discharge of fill (e.g., construction mats) are subject to Sections 401 and 404 of the Clean Water Act.

C.4.2 Emergency Projects

Emergency provisions are generally afforded to activities that need to abate conditions that pose a threat to public health or safety. These provisions generally do not allow work beyond what is necessary to abate the emergency condition and will generally require an after-the-fact permit. It is not for the selected contractor of a particular project to make a determination as to whether an activity is an emergency. This determination will be made prior to work by the Eversource project manager, in consultation with Eversource environmental staff.

It is important to note that invocation of an emergency provision does not release the project proponent from reporting requirements.

Emergency provisions are afforded at:

- MAWPA regulations (310 CMR 10.06)
- MEPA (301 CMR 11.00)
- MA 401 WQC (314 CMR 9.12)
- Chapter 91 (310 CMR 9.20)
- MESA (321 CMR 10.15)

C.5 Municipal Permitting

Work within wetlands, watercourses and Buffer Zones typically requires permitting with municipal Conservation Commissions. Work that entails "maintaining, repairing or replacing, but not substantially changing or enlarging, an existing and lawfully located structure or facility used in the service of the public and used to provide electric service" is exempt under the Massachusetts Wetlands Protection Act (MAWPA) per MGL Chapter 131 Section 40. However, individual municipalities may establish their own wetlands bylaws under Home Rule authority which could require permitting for operation and maintenance activities. The following table lists communities in which Eversource operates and maintains infrastructure and which have a wetland bylaw. Appropriate municipal

permitting or notification should be completed in these towns as required prior to conducting operation and maintenance activities. Bylaws may be revised, or new bylaws enacted, at any time. Consult with Eversource Environmental Licensing and Permitting prior to the commencement of work.

TABLE C-1
Eversource Energy Communities with Municipal Wetland Bylaws[1]

Community	Date of Bylaw	Utility Maintenance Exemption	Notification Required
Acton	7/8/2003	Yes	No
Amherst	2/12/2014	Yes	Yes
Andover	5/11/1999	Yes	Yes
Aquinnah	6/23/2020	Yes	Yes
Arlington	5/15/2000	No	Yes
Ashland	5/6/2009	Yes	Yes
Attleboro	12/12/2007	No	No
Auburn	5/1/2012	Yes	Yes
Avon	5/7/2019	Yes	Yes
Barnstable	11/7/1987/rev. 7/7/2003	Yes	Yes
Bedford	1987/rev. 2016	Yes	Yes
Belchertown	6/7/2020	Yes	Yes
Bellingham	12/2015	No	Yes
Berlin	2/15/2021	Yes	Yes
Bolton	5/7/2012	Yes	No
Boston	12/11/2019	Yes	Yes
Bourne	10/26/2009	No	Yes
Brewster	1/1/2013	Yes	Yes
Bridgewater	11/13/1990	Yes	Yes
Brookline	5/28/2013	Yes	Yes
Burlington	5/2021	Yes	Yes
Canton	5/10/2017	Yes	Yes
Carlisle	2002	Yes	No
Carver	1998	Yes	Yes
Chatham	5/10/2004	Yes	Yes
Chicopee	4/3/2002	Yes	Yes
Chilmark	10/12/1993	No	Yes
Dartmouth	1990/rev. 8/25/2015	Yes	Yes
Dedham	11/182013	Yes	Yes
Deerfield	11/6/1989	Yes	Yes
Dennis	5/5/1989	Yes	Yes
Dover	5/2/1994	Yes	Yes
Duxbury		Yes	No
East Longmeadow	10/1992	Yes	Yes
Eastham	1980/rev. 1999	Yes	Yes
Edgartown	1985/rev. 6/25/1991	No	Yes
Fairhaven	5/10/1988	Yes	No
Falmouth	4/2/1979/rev. 7/16/1993	Yes	Yes

TABLE C-1
Eversource Energy Communities with Municipal Wetland Bylaws[1]

Community	Date of Bylaw	Utility Maintenance Exemption	Notification Required
Framingham	4/26/2005	Yes	Yes
Grafton	5/11/1987	Yes	Yes
Greenfield	11/23/2001	Yes	No
Hadley	5/1/2008	No	Yes
Hampden	8/5/1992	Yes	Yes
Harwich	7/1/2003/rev. 11/25/2020	No	Yes
Holden	2011	Yes	Yes
Holliston	5/2021	Yes	Yes
Hopkinton	5/2/1995/rev. 5/7/2012	Yes	Yes
Holyoke	11/2005	Yes	Yes
Kingston	2004	No	Yes
Leicester	11/2015	Yes	Yes
Lenox[3]	12/18/1985	Yes	No
Lexington	5/3/1982	No	Yes
Lincoln	3/24/2007	No	Yes
Longmeadow	10/2000	Yes	No
Ludlow	5/1/2002	Yes	No
Marshfield	1988/rev. 4/23/2018	Yes	Yes
Mashpee	2/1/1988	Yes	Yes
Maynard	12/3/2005	Yes	Yes
Medfield	1926	Yes	No
Medway	7/2014	Yes	Yes
Milford	5/2010	Yes	No
Millis	5/13/1191	Yes	No
Millville	5/13/2013	Yes	Yes
Natick	4/27/2000	Yes	No
Needham	9/1/1988	Yes	Yes
New Bedford	2017	Yes	Yes
Norfolk	11/9/2010	Yes	Yes
Northampton	8/17/1989	Yes	Yes
Northborough	5/21/1990	Yes	Yes
Northbridge	5/6/2008	Yes	Yes
Oak Bluffs	4/1983	No	Yes
Orleans	5/5/1987	Yes	Yes
Palmer	8/12/2013	Yes	Yes
Pelham	5/2/1987	Yes	Yes
Pembroke	4/22/2008	Yes	No
Plymouth	4/5/1989	Yes	Yes
Plympton	5/16/2012	Yes	Yes
Provincetown	5/2019	Yes	Yes
Richmond	5/2015	Yes	Yes
Rochester	As of 12/2015	Yes	Yes

TABLE C-1
Eversource Energy Communities with Municipal Wetland Bylaws[1]

Community	Date of Bylaw	Utility Maintenance Exemption	Notification Required
Sandwich	5/4/1992	Yes	Yes
Sharon	As of 12/2015	Yes	No
Sherborn	2013	Yes	No
Shutesbury	5/2/1987	Yes	Yes
Southampton	9/21/2021	Yes	Yes
Southborough	4/10/1995	Yes	Yes
South Hadley	12/27/2005	No	Yes
Southwick	6/6/1989	Yes	Yes
Springfield	5/5/1993	Yes	Yes
Stoneham	4/2013	Yes	Yes
Stow	5/21/2003	No	Yes
Sudbury		Yes	Yes
Sunderland	4/27/1990	Yes	Yes
Sutton	5/11/2015	Yes	Yes
Tisbury	1/1/1983	Yes	No
Truro	9/30/2010	No	Yes
Upton	2009	Yes	Yes
Walpole	2002	Yes	Yes
Wareham	4/25/2016	Yes	Yes
Watertown	10/2010	Yes	Yes
Wayland	5/1/2002	Yes	No
Wellfleet	4/20/1986/rev. 10/6/2021	Yes	Yes
Wendell	3/10/1988	Yes	Yes
West Tisbury	6/3/2004	Yes	Yes
Westborough	10/20/2008	Yes	Yes
Westfield	5/20/2003	Yes	Yes
Westport[4]	4/11/1995	No	Yes
Westwood	1989	Yes	Yes
Wilbraham	5/27/1997	Yes	Yes
Winchester		No	Yes
Woburn	6/24/1987	Yes	Yes
Worcester	7/1/2007	Partial	Yes
Yarmouth	12/1/2016	No	Yes

[1] Information based on the Massachusetts Association of Conservation Commissions website as of 2019 and municipal websites.

[2] Refer to municipal bylaws prior to conducting work in the community.

[3] Berkshire Scenic Mountain Act, as adopted by the Town of Lenox and administered by the Lenox Conservation Commission.

[4] Town of Westport Soil Conservation Bylaw, as administered by the Westport Conservation Commission.

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C.6 MA Department of Environmental Protection

Review and approval under the Commonwealth's Water Quality Certification Regulations

is required for "*discharge of dredged or fill materials, dredging, and dredged material disposal activities in waters of the United States within the Commonwealth which require federal licenses or permits and which are subject to state water quality certification under 33 U.S.C. 1251, et seq. The federal agency issuing a permit initially determines the scope of geographic and activity jurisdiction*" (314 CMR 9.01(2)). An individual Water Quality Certification is required from the Massachusetts Department of Environmental Protection (MassDEP) for any activity identified at 314 CMR 9.04. In accordance with 314 9.04 (4) activities which are exempt from MGL Chapter 131 Section 40 but are subject to 33 U.S.C. 1251, *et seq*., and will result in any discharge of dredge or fill material to bordering vegetated wetlands or land under water require an individual 401 Water Quality Certification.

Eversource entered into an Administrative Consent Order (ACO) with MassDEP in 2017. This ACO serves as a general permit under the 401 Water Quality regulations (314 CMR 9.00) and establishes general conditions for routine operation and maintenance activities within existing ROWs.

C.7 U.S. Army Corps of Engineers

Work within wetlands and waters of the United States is subject to jurisdiction under Section 404 of the Clean Water Act, which is administered by the ACOE. The General Permits for the Commonwealth of Massachusetts (MA GPs) establish categories for projects based on their nature of impacts. The MA GPs were most recently issued on April 16, 2018, and expire on April 5, 2023.

Certain minor activities are eligible for Self-Verification (SV), which requires submittal of a Self-Verification Notification Form (SVNF) prior to the commencement of work. Activities eligible for Self-Verification are authorized under the MA GPs and may proceed without written verification from the ACOE as long as the SVNF has been submitted and the activity meets the terms and conditions of the applicable MA GPs.

Activities requiring Pre-Construction Notification (PCN) require the submittal of an application to the ACOE, followed by a screening of the application by the ACOE, the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, National Marine Fisheries Service, MassDEP, and consultation with the Massachusetts Historical Commission, Tribal Historic Preservation Officers (THPOs) and the Massachusetts Board of Underwater Archaeological Resources (BUAR). PCN projects may not proceed until written verification from the ACOE is received.

An Individual Permit (IP) requires a formal permit application to be submitted to the ACOE. The application is reviewed in detail by both state and federal agencies, and a public notice is released for public comment. Projects which trigger an Individual Permit generally result in significant impacts to wetlands and/or watercourses outside the limits of the MA GPs.

Work within, or above, Navigable Waters is also administered by the ACOE under Section 10 of the Rivers and Harbors Act of 1899.

ACOE permitting does not apply to activities that fall under the maintenance exemption set forth at 33 CFR 323.4(a)(2) – Discharges Not Requiring Permits:

"Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs in order to qualify for this exemption."

Maintenance projects that occurred prior to the ACOE jurisdiction over fill activities, or that were properly permitted, can proceed under the maintenance exemption noted above, provided that the same temporary fill areas are used. However, it is recommended that a formal determination be requested from the ACOE to confirm these activities are exempt. The repair, rehabilitation or replacement of a previously authorized, currently serviceable structure or fill (with some minor deviations in the structure's configuration or filled area) are regulated under MA GP1 and subject to SV or PCN.

Also, operation and maintenance related activities that do not meet the above exemption may qualify for SV. In that case, it is recommended that a copy of the SVNF be submitted to MassDEP.

The MA GPs are listed below. MA GPs specifically, and typically, applicable to utility projects are emphasized by bold italic font:

GP1. Repair, Replacement and Maintenance of Authorized Structures and Fills
GP2. Moorings
GP3. Pile-Supported Structures, Floats and Lifts
GP4. Aids to Navigation, and Temporary Recreational Structures
GP5. Dredging, Disposal of Dredged Material, Beach Nourishment, and Rock Removal and Relocation
GP6. Discharges of Dredged or Fill Material Incidental to the Construction of Bridges
GP7. Bank and Shoreline Stabilization
GP8. Residential, Commercial and Institutional Developments, and Recreational Facilities
GP9. Utility Line Activities
GP10. Linear Transportation Projects Including Stream Crossings
GP11. Mining Activities
GP12. Boat Ramps and Marine Railways
GP13. Land and Water-Based Renewable Energy Generation Facilities and Hydropower Projects
GP14. Temporary Construction, Access, and Dewatering
GP15. Reshaping Existing Drainage Ditches, New Ditches, and Mosquito Management
GP16. Response Operations for Oil and Hazardous Substances
GP17. Cleanup of Hazardous and Toxic Waste
GP18. Scientific Measurement Devices
GP19. Survey Activities
GP20. Agricultural Activities
GP21. Fish and Wildlife Harvesting and Attraction Devices and Activities
GP22. Habitat Restoration, Establishment and Enhancement Activities
GP23. Previously Authorized Activities

In general, the following cumulative thresholds apply for determining the level of ACOE permitting required:

Table C-2
MA GPs Permits Limits

Resources	SV Limits (SV Eligible)	PCN Limits (PCN Eligible)	IP Limits (IP Required)
Non-tidal waters of the US	0 to 5,000 sf	5,000 sf to 1 acre	>1 acre
Tidal waters of the US	Not eligible	All discharges ≤1/2 acre	>1/2 acre
SAS in tidal waters of the US excluding vegetated shallows	Not eligible	All discharges ≤1,000 sf	>1,000 sf

SAS in tidal waters of the US consisting of vegetated shallows only	Not eligible	All discharges ≤100 sf (compensatory mitigation is required	>100 sf

*Special Aquatic Sites (SAS) consist of wetlands, mud flats, vegetated shallows, sanctuaries and refuges, coral reefs, and riffle and pool complexes. These are defined at 40 CFR 230 Subpart E.

Stream and wetland crossings are only subject to jurisdiction under the ACOE if there is **a discharge of dredge or fill material into wetlands or waters of the United States**. Equipment access through a stream or wetland with no structural BMP is not regulated by the ACOE if there is no discharge of dredge or fill material (note that equipment rutting as a result of not using an appropriate BMP can be considered a "discharge of dredge material"). Similarly, the use of a timber or rail car bridge that extends from bank to bank with no stream impacts is not regulated by the ACOE. The use of timber mats, stone, and log corduroy is considered "fill material" by the ACOE under the MA GPs, and must be calculated to determine overall impacts.

Maintenance, including emergency reconstruction of currently serviceable structures, is exempt from ACOE jurisdiction and does not require formal permitting. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs to qualify for this exemption.

New culvert installation or existing culvert replacements may require permitting with local Conservation Commissions under the MAWPA, and may also require permitting with the ACOE under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899, and the MassDEP under Section 401 of the Clean Water Act.

Stream and wetland crossings (including culvert installations) that involve the discharge of dredge and fill material may be conducted under SV if the following criteria are met.

- The use of construction mats of any area can be used to conduct activities that were previously authorized, authorized under Self-Verification, or not subject to regulation. Other temporary or permanent fill and associated secondary impacts must meet the SV limits.
- Authorized construction mats must be removed immediately upon work completion, and the wetlands must be restored per the General Conditions.

The project has no potential for an effect on a historic property within the permit area or any known historic property that may occur outside the permit area.

- Any in-water work controls that encroach upon more than 25 percent of the stream width are limited to a Time of Year (TOY) restriction in consideration of spawning, breeding and migration to maintain upstream fish passage. Activities within streams proposed during the TOY restrictions are generally ineligible for SV authorization.
- The work does not result in direct or secondary impacts to Special Aquatic Sites.
- No work occurs in Navigable Waters (waters subject to the ebb and flow of the tide and, in Massachusetts, the non-tidal consist of the Merrimack River, Connecticut River, and Charles River to the Watertown Dam).
- Span streams or size culverts or pipe arches such that they are at least 1.2 times the bankfull width. Spans are strongly preferred as they avoid or minimize disruption to the streambed and avoid entire streambed reconstruction and maintenance inside the culvert or pipe arch, which may be difficult in smaller structures. Footings and abutments for spans and scour protection should be landward of 1.2 times bankfull width.
- Embed culverts or pipe arches below the grade of the streambed. This is not required when ledge/bedrock prevents embedment, in which case spans are required. The following depths are recommended to prevent streambed washout, and ensure compliance and long-term success:
    - ≥ 2 feet for box culverts and pipe arches, or
    - ≥ 2 feet and at least 25% for round pipe culverts.
- Match the culvert gradient (slope) with the stream channel profile.
- Construct crossings with a natural bottom substrate within the structure matching the characteristics of the substrate in the natural stream channel and the banks (mobility, slope, stability, confinement, grain and rock size) at the time of construction and over time as the structure has had the opportunity to pass substantial high flow events.
- Construct crossings with appropriate bed forms and streambed characteristics so that water depths and velocities are comparable to those found in the natural channel at a variety of flows at the time of construction and over time. In order to provide appropriate water depths and velocities at a variety of flows and especially low flows, it is usually necessary to reconstruct the streambed (sometimes including a low flow channel) or replicate or preserve the natural channel within the structure. Otherwise, the width of the structure needed to accommodate higher flows will create conditions that are too shallow at low flows. Flows could go subsurface within the structure if only large material is used without smaller material filling the voids.
- Openness, which is the is the cross-sectional area of a structure opening divided by its crossing length when measured in consistent units, is > 0.82 feet (0.25 meters).

Banks on each side of the stream inside the crossing matching the horizontal profile of the existing stream and banks outside the crossing are recommended. To prevent failure, all constructed banks should have a height to width ratio of no greater than 1:1.5 (vertical:horizontal) unless the stream is naturally incised. Tie these banks into the up and downstream banks and configure them to be stable during expected high flows.

- The project is not located within a vernal pool depression, or vernal pool envelope, and does not individually or cumulatively impact greater than 25% of the vernal pool critical terrestrial habitat. It is feasible for some temporary impacts associated with the use of construction mats in previously disturbed ROWs to occur within the vernal pool envelope or critical terrestrial habitat if a Vegetation Management Plan demonstrates avoidance, minimization and mitigation impacts to aquatic resources.
- Culvert extensions do not qualify for SV.
- Culvert projects using slip lining do not qualify for SV, either as new work or maintenance activities.
- No open trench excavation in flowing waters. No work in riffles and pools.
- The project does not entail stream relocation.
- Work is not conducted within riffles or pools.
- Normal flows within the stream boundary's confines must be maintained, i.e., temporary flume pipes, culverts, cofferdams, etc.
- Water diversions (i.e., bypass pumping or water withdrawals) may be used immediately up and downstream of the work footprint.
- The project is (a) not located in the designated main stem of, or within 0.25 miles up or downstream of the designated main stem of, or in tributaries within 0.25 miles of the designated main stem of a National Wild and Scenic River System; (b) not in "bordering or contiguous wetlands" that are adjacent to the designated main stem of a National Wild and Scenic River; or (c) does not have the potential to alter flows within a river within the National Wild and Scenic River System.
- The project is not located within areas containing USFWS or National Marine Fisheries Service (NMFS)-listed species or critical habitat. The project is not "likely to adversely affect" listed species or habitat per the federal Endangered Species Act (ESA) or result in a "take" of any federally-listed threatened or endangered species of fish or wildlife.
- The project does not impinge upon the value of any National Wildlife Refuge, National Forest, National Marine Sanctuary, or any other area administered by the U.S. Fish and Wildlife Service, U.S. Forest Service or National Park Service.
- The project is not located on ACOE properties and ACOE-controlled easements.
- The project does not propose temporary or permanent modification or use of a federal project beyond minor modifications required for normal operation and maintenance.
- The project minimizes use of heavy construction equipment, and, where required, either has low ground pressure (typically less than 3 psi) or it must be placed on construction mats.
- Construction mats must be placed in the wetland from the upland or from equipment positioned on swamp mats if working within a wetland.
- Temporary fill must be stabilized. Unconfined, authorized temporary fill must consist of clean material that minimizes impacts to water quality. Temporary fill placed during the growing season must be removed before the beginning of the next growing season. If temporary fill is placed during the non-growing season, it may remain throughout the following growing season but must be removed before the beginning of the next growing season.

- Appropriate erosion, sedimentation and turbidity controls are used and maintained during construction.
- Appropriate measures must be taken to minimize flooding to the maximum extent practicable.

Wetland and stream crossings may be authorized under PCN if the following criteria are met:

- The work results in less than one acre of impacts to inland, non-tidal, wetlands or waters of the United States.

Stream and wetland crossings that cannot meet SV or PCN criteria may require review under an IP. The ACOE should be consulted before assuming an IP will be required, as exceptions can be made under certain circumstances.

C.8 Temporary Stream Crossings

C.8.1 U.S. Army Corps of Engineers

See Section C.7 for general ACOE permitting requirements for stream crossings. To qualify for SV, temporary stream crossings (typically culverts) that are not spans must be designed in accordance with below.

1) Installed outside of the TOY restrictions and must be removed before the beginning of the TOY restriction of that same season. Temporary crossings that must remain into the TOY restriction will require PCN review.
2) Impacts to the streambed or banks require restoration to their original condition (see "Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings," for stream simulation restoration methods). Use geotextile fabric or other appropriate bedding for stream beds and approaches where practicable to ensure restoration to the original grade. The requirements in GCs 17, 18 and 19 are particularly relevant.
3) Avoid excavating the stream or embedding crossings.
4) For Culverts:
    a. The water height should be no higher than the top of the culvert's inlet and the culvert is large enough to pass debris.
    b. Install energy dissipating devices downstream if necessary to prevent scour.
    c. The TOY restrictions in GC 18 and the restrictions in GC 17(f) are particularly relevant.
5) Removed upon the completion of work. Impacts to the streambed or banks requires restoration to their original condition using stream simulation methods.

In-kind repair, replacement and maintenance of currently serviceable, authorized fills are eligible for SV. However, the conditions of the original authorization apply, and minor deviations in fill design are allowed. In-kind repair and maintenance of culverts that includes an expansion or change in use requires PCN. Replacement of non-serviceable fills, including an expansion or change in use, also requires PCN. In-kind replacement using the same materials is exempt from Section 404 of the Clean Water Act, and does not require permitting with the ACOE. The ACOE, however, should be consulted before assuming an activity is exempt from their jurisdiction.

APPENDIX D

Horizontal directional drilling (HDD) for subsurface utility installations is considered to be the most effective and least environmentally damaging technique when compared to traditional mechanical dredging and trenching. This method ensures the placement of the pipeline at the target burial depth with no wetland or water body disturbance. HDD installation is the preferred method for crossing sensitive resources–the alternative is open cut trenching.

The HDD procedure uses bentonite slurry, a fine clay material as a drilling lubricant. Directional drilling has the small potential to release bentonite slurry into the surface environment through frac-outs. This term describes the situation caused when the drilling head and its accompanying inert clay lubricant slurry, hits a subterranean fractured substrate. When the pressurized lubricant slurry reaches the fracture it can follow the fracture up or otherwise force itself to the surface or into the water if drilling is occurring under a waterbody. If a "frac-out" occurs under these water features, the potential exists for the inert clay (a non-toxic bentonite-based substance) to be released into the water column. In large quantities, the release of drilling mud into a waterbody could affect fisheries or other aquatic organisms by settling and temporarily inundating the habitats used by these species. Properly monitoring the slurry pressures and amounts significantly decreases risk of significant quantities of drilling fluid being released into the environment.

Frac-out is most likely to occur near the bore entry and exit points where the drill head is shallow. Should a frac-out occur during HDD operations, the following measures will be taken.

- Temporarily suspend forward drilling progress.
- Monitor frac-out for 4 hours to determine if the drilling mud congeals. (Bentonite will usually harden, effectively sealing the frac-out location.)
- If drilling mud congeals, take no other action that would potentially suspend sediments in the water column.
- If drilling mud does not congeal, erect appropriate isolation/containment measures (i.e. turbidity curtains and/or underwater boom and curtain).
- If the fracture becomes excessively large, a spill response team would be called in to contain and clean up excess drilling mud in the water. Phone numbers of spill response teams in the area will be on site.
- Following containment, evaluate the current drilling profile (i.e. drill pressures, pump volume rates, drilling mud consistency) to identify means to prevent further frac-out events.
- If the fracture is mitigated and controlled, forward progress of the drilling may resume.

Certification

I hereby certify that an electronic copy of the forgoing document was mailed to

The Connecticut Light and Power Company d/b/a Eversource Energy

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5/22/23

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