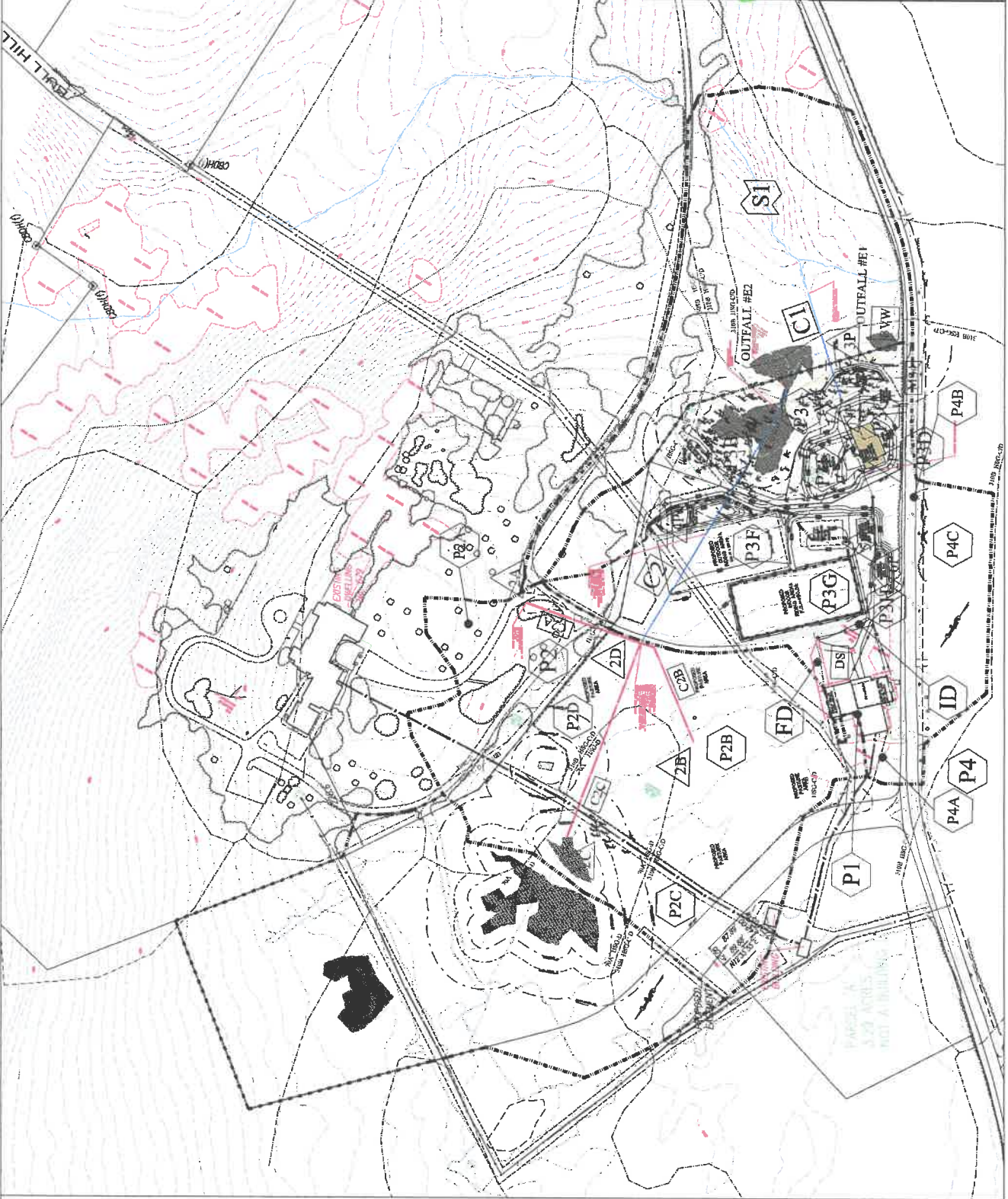


- NOTES:**
1. HARRINGTON ASSOCIATES, INC. HAS CONDUCTED VISUAL INSPECTIONS OF THE PROPOSED STORMWATER MANAGEMENT SYSTEM AND FOUND IT TO BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS.
  2. WETLAND DELINEATION BY H&M ASSOCIATES, INC. ON APRIL 17, 2021.
  3. STUMP AND WETLAND PILE LOCATION BY TURNER POINT ENGINEERING, INC. ON SEPTEMBER 14, 2020.
  4. WETLAND PILE LOCATION BY TURNER POINT ENGINEERING, INC. ON SEPTEMBER 14, 2020.
  5. BASE SURVEY INFORMATION, WETLAND DELINEATION, STUMP AND WETLAND PILE LOCATION, AND OTHER INFORMATION IS PROVIDED FOR YOUR INFORMATION.

REV.	DATE	DESCRIPTION
1	11.23.2021	HYDROLOGIC MODELING

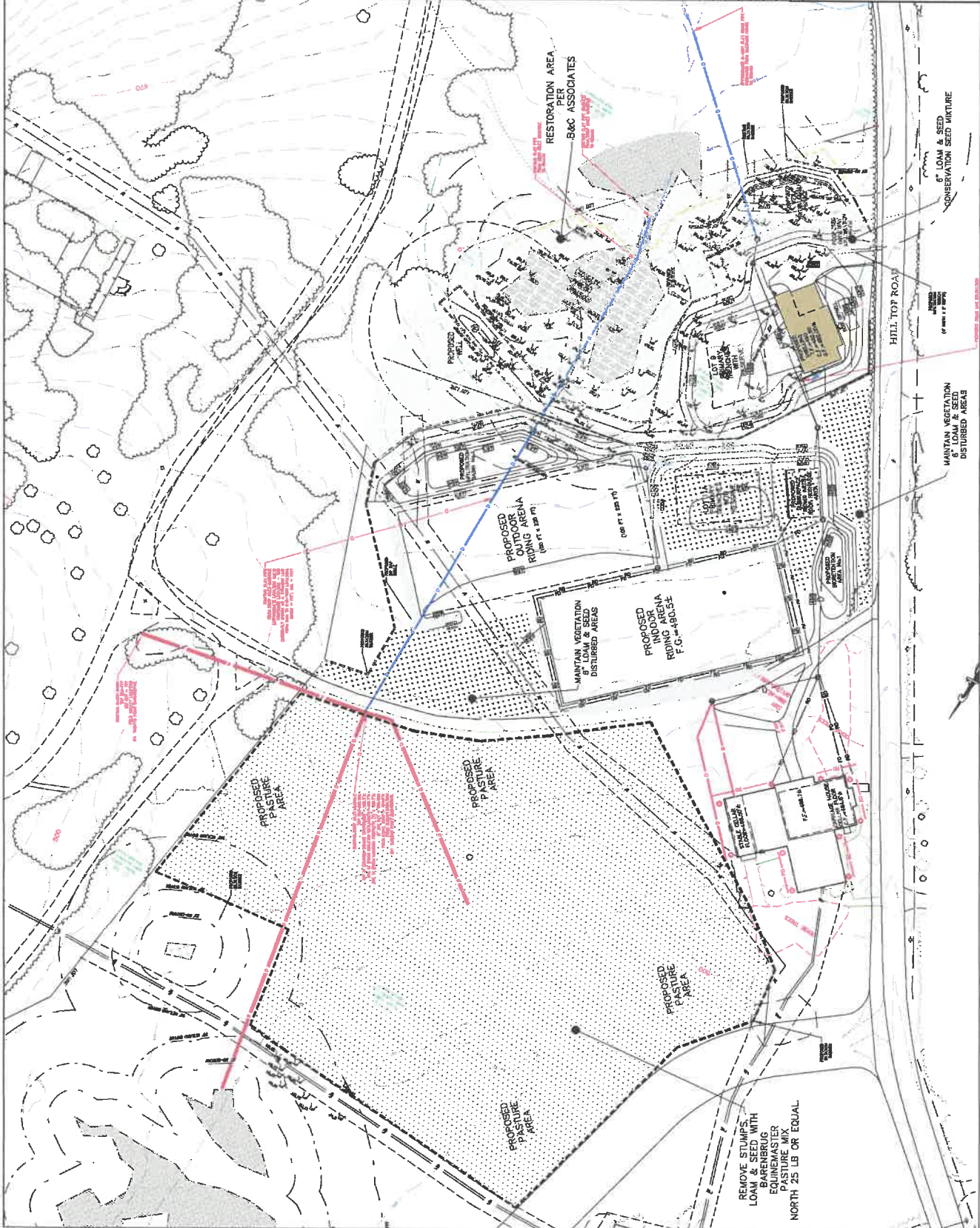
**TITLE**  
**STORMWATER MANAGEMENT PLAN**  
**(1 OF 2)**  
 201 HILL TOP ROAD, LANCASTER, MA  
 PREPARED FOR: LDRING  
 DATE: 11.9.2021 (INTERIM)  
 SCALE: 1" = 60'  
 HARRINGTON ASSOCIATES, LLC  
 201 HILL TOP ROAD, LANCASTER, MA 01906  
 TEL: 978.686.9933  
 EMAIL: pharrington@harrington.com



- NOTES:
1. PROPERTY LINE, TOPOGRAPHY AND EXISTING CONDITIONS.
  2. WETLAND DELINEATION BY BAC ASSOCIATES, P.C. ON JUNE 17, 2012.
  3. STUMP AND WETLAND FILL LOCATION BY TURNING POINT ENGINEERING ON JUNE 17, 2012 & SEPTEMBER 1, 2012. LID DATA FROM TURNING POINT ENGINEERING.
  4. BASE SURVEY INFORMATION, WETLAND DELINEATION, BUFFER ZONES PROVIDED BY TURNING POINT ENGINEERING, SUTTON, MA.

REV.	DATE	DESCRIPTION

TITLE  
**EROSION AND SEDIMENT CONTROL PLAN**  
 201 HILL TOP ROAD, LANCASTER, MA  
 PREPARED FOR: LORING  
 DATE: 11-22-2021  
 SCALE: 1" = 40'  
 HARRINGTON ASSOCIATES, LLC  
 20 MAIN STREET, WEDDERWOOD OFFICES SUITE 3  
 LANCASTER, MA 01901  
 EMAIL: info@harringtonma.com



REMOVE STUMPS,  
 LOAM & SEED WITH  
 EQUIVALENT  
 PASTURE MIX  
 NORTH 25 LB OR EQUAL

MANTAIN VEGETATION  
 & LOAM & SEED  
 DISTURBED AREAS

6\"/>

**LEGEND**

Open Bottom structures 2B & 2D - results in aroundwater drop below outlet during dry weather events.

Within Mansion Driveway Offsite

Six Area Drains Inside the Wall Garden

NW (Structure not found)

Direct to Drop Inlet

Left-side of Carriage House sheet flow across street frontage into gutter

Runoff from within Public Street R.O.W. Above Carriage House Driveways down to end of Lot 9

Abutting 2 acre lots - front yard curb cut sheetflow into Hilltop Road gutter

A.D. = Area Drain

D.I. = Drop Inlet Field Stone Basin

Swale along driveway to Mansion from Hilltop Road past Carriage House

Lot 9 & Portion of Lot 11A from front Carriage House

Dye Test confirmed Outfall #E2 within stream bed

Direct to Stream

E1 - Foundation Drain

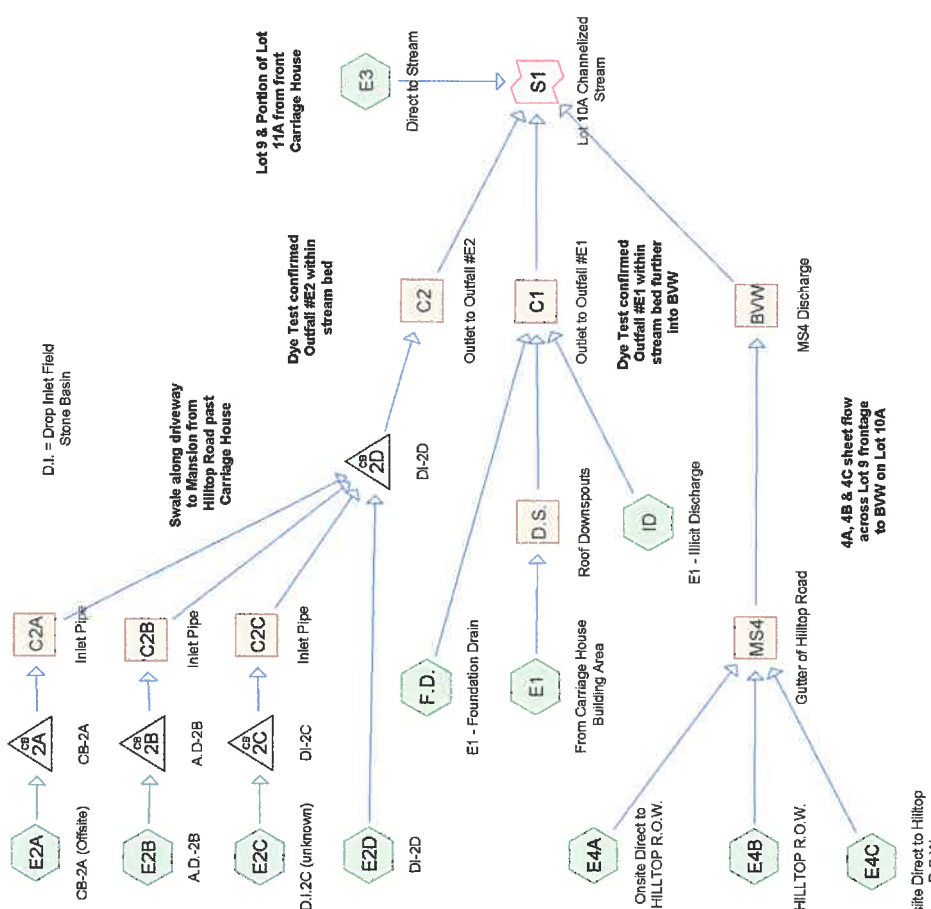
From Carriage House Building Area

E1 - Illicit Discharge

MS4 Discharge

4A, 4B & 4C sheet flow across Lot 9 frontage to BVW on Lot 10A

Offsite Direct to Hilltop R.O.W.

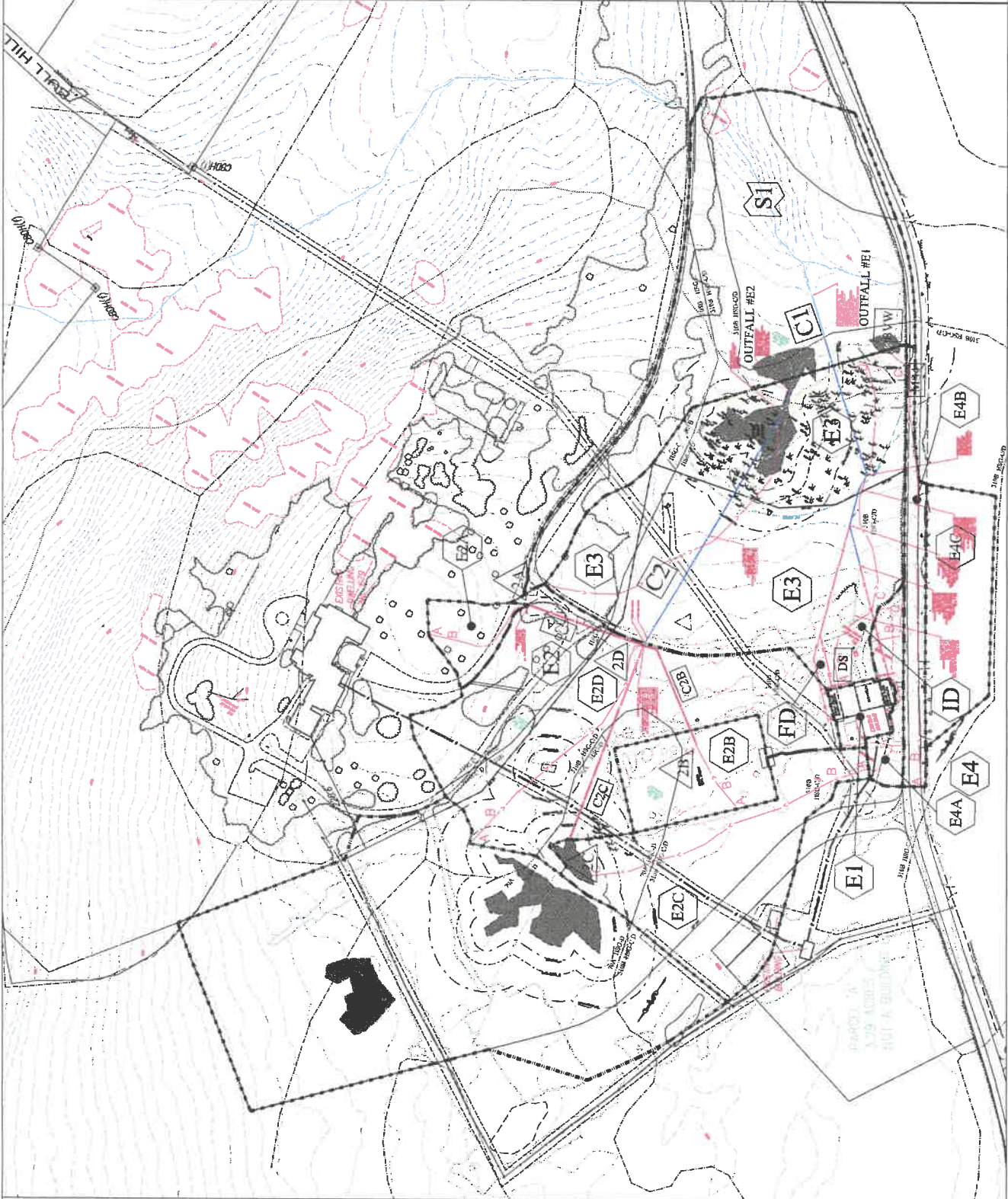


- NOTES:**
1. PROPERTY LINE, TOPOGRAPHY AND EXISTING CONDITIONS DERIVED FROM AERIAL PHOTOGRAPHS AND SURVEY DATA.
  2. METLAND DELINEATION BY EAC ASSOCIATES, INC. ON JUNE 11, 2017.
  3. STUMP AND METLAND PLANT LOCATION BY TURNING POINT ENGINEERING ON JUNE 17, 2017 & SEPTEMBER 1, 2017. L&C PHOTOGRAPHS BY TURNING POINT ENGINEERING ON JUNE 17, 2017.
  4. BASE MAP BY METLAND DELINEATION BY EAC ASSOCIATES, INC. ON JUNE 11, 2017.

REV.	DATE	DESCRIPTION
1.	11.22.2021	HydroCAD Routing

**EXISTING WATERSHED MAP  
(1 OF 2)**

901 HILL TOP ROAD, LANCASTER, MA  
 PREPARED FOR: LORENG  
 DATE: 11.22.2021 (INTERIM)  
 SCALE: 1" = 80'  
 HARRINGTON ASSOCIATES, LLC  
 20 MAIN STREET, WESBURY OFFICES SUITE 202  
 WESBURY, MA 01980  
 EMAIL: harrington@harrington.com



**LEGEND**

Open Bottom structures 2B & 2D - structure drops below outlet during dry weather events.

Upgrade Structure & Inlet with Lot 10A if Feasible or provide easement

Adjust locations of Six Area Drains based upon Fence Post locations within Pasture

Video Ins: Locate structure and provide borehole area for Pasture Mitigation

Divert runoff to borehole areas if feasible, add structure controls.

New Manhole Structure

Left-side of Carriage House sheet flow across street frontage into gutter

Runoff from within Public Street R.O.W. Above Carriage House Driveways down to end of Lot 8

Abutting 2 acre lots - front yard curb cut sheetflow into Hilltop Road gutter

A.D. = Area Drain

D.I. = Drop Inlet Field Stone Basin

Expand capacity of swale

Upgrade pipe materials

DI-2D Outlet to Outfall #P2

Obtain Easement from Lot 10A Owner or Mitigate Outfall within Lot 9 Boundary

Number of Structures dependent upon Video Analysis of Existing lines near building

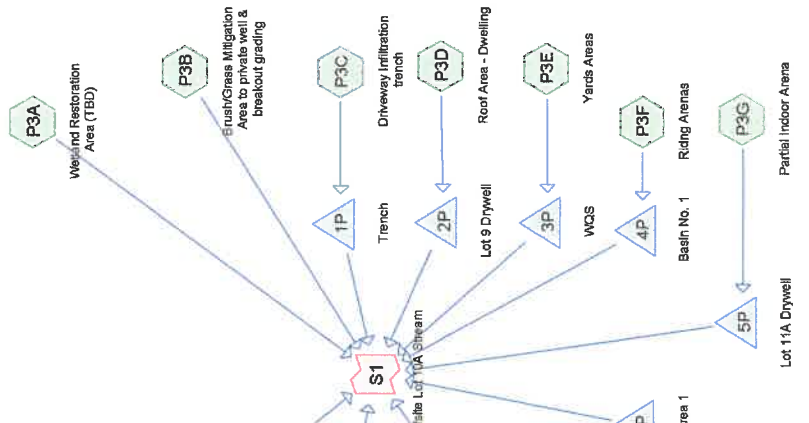
MS4 Discharge onto Lot 9 to remain unchanged

Gutter of Hilltop Road 4A, 4B & 4C sheet flow across Lot 9 frontage to BVW on Lot 10A

Offsite Direct to HILLTOP R.O.W.

Offsite Direct to Hilltop R.O.W.

Proposed Mitigation to Template Subject to additional discussions with Town



Subcat

Reach

Pond

Link

**Routing Diagram for Hilltop-Post**  
 Prepared by Harrington Associates, LLC, Printed 11/22/2021  
 HydroCAD® 10.10-6a s/n M17845 © 2020 HydroCAD Software Solutions LLC

- NOTES:
1. PREPARED FOR THE STORMWATER MANAGEMENT PLAN AND DESIGN CONDITIONS BY HARRINGTON ASSOCIATES, LLC ON JUNE 17, 2017.
  2. METEOROLOGICAL DATA PROVIDED BY HARRINGTON ASSOCIATES, LLC ON JUNE 17, 2017.
  3. STAMP AND METEOROLOGICAL DATA LOCATION BY TURNING POINT ENGINEERING, LLC ON JUNE 17, 2017.
  4. BASE MAPS PROVIDED BY TURNING POINT ENGINEERING, LLC ON JUNE 17, 2017.
  5. BASE MAPS PROVIDED BY TURNING POINT ENGINEERING, LLC ON JUNE 17, 2017.

REV.	DATE	REVISIONS
1	11.22.2017	HYDROCAD ROUTING

**STORMWATER MANAGEMENT PLAN**  
**(1 OF 2)**  
 201 HILL TOP ROAD, LANCASTER, MA

PREPARED FOR: LORING  
 DATE: 11.8.2017 (INTERIM)  
 SCALE: 1" = 80'

HARRINGTON ASSOCIATES, LLC  
 ENGINEERING | PLANNING | DEVELOPMENT  
 200 W. MAIN ST., 2ND FLOOR OFFICE SUITE 7  
 LANCASTER, MA 01906  
 EMAIL: info@harringtonma.com



Table 2-2a Runoff curve numbers for urban areas <sup>1/</sup>

Cover description	Average percent impervious area <sup>2/</sup>	Curve numbers for hydrologic soil group			
		A	B	C	D
<b>Fully developed urban areas (vegetation established)</b>					
<b>Open space (lawns, parks, golf courses, cemeteries, etc.) <sup>3/</sup>:</b>					
Poor condition (grass cover < 50%) .....		68	79	86	89
Fair condition (grass cover 50% to 75%) .....		49	69	79	84
Good condition (grass cover > 75%) .....		39	61	74	80
<b>Impervious areas:</b>					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way) .....		98	98	98	98
<b>Streets and roads:</b>					
Paved; curbs and storm sewers (excluding right-of-way) .....		98	98	98	98
Paved; open ditches (including right-of-way) .....		83	89	92	93
Gravel (including right-of-way) .....		76	85	89	91
Dirt (including right-of-way) .....		72	82	87	89
<b>Western desert urban areas:</b>					
Natural desert landscaping (pervious areas only) <sup>4/</sup> .....		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders) .....		96	96	96	96
<b>Urban districts:</b>					
Commercial and business .....	85	89	92	94	95
Industrial .....	72	81	88	91	93
<b>Residential districts by average lot size:</b>					
1/8 acre or less (town houses) .....	65	77	85	90	92
1/4 acre .....	38	61	75	83	87
1/3 acre .....	30	57	72	81	86
1/2 acre .....	25	54	70	80	85
1 acre .....	20	51	68	79	84
2 acres .....	12	46	65	77	82
<b>Developing urban areas</b>					
<b>Newly graded areas</b>					
(pervious areas only, no vegetation) <sup>5/</sup> .....		77	86	91	94
<b>Idle lands (CN's are determined using cover types similar to those in table 2-2c).</b>					

<sup>1</sup> Average runoff condition, and  $I_a = 0.2S$ .<sup>2</sup> The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.<sup>3</sup> CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.<sup>4</sup> Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.<sup>5</sup> Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

**Table 2-2b** Runoff curve numbers for cultivated agricultural lands <sup>1/</sup>

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment <sup>2/</sup>	Hydrologic condition <sup>3/</sup>	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
C&T+ CR	Poor	65	73	79	81	
	Good	61	70	77	80	
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
C&T+ CR	Poor	60	71	78	81	
	Good	58	69	77	80	
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

<sup>1</sup> Average runoff condition, and  $I_a=0.2S$

<sup>2</sup> Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

<sup>3</sup> Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good  $\geq 20\%$ ), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.



Table 2-2c Runoff curve numbers for other agricultural lands <sup>1/</sup>

Cover type	Cover description	Hydrologic condition	Curve numbers for hydrologic soil group			
			A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. <sup>2/</sup>		Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.		—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. <sup>3/</sup>		Poor	48	67	77	83
		Fair	35	56	70	77
		Good	30 <sup>4/</sup>	48	65	73
Woods—grass combination (orchard or tree farm). <sup>5/</sup>		Poor	57	73	82	86
		Fair	43	65	76	82
		Good	32	58	72	79
Woods. <sup>6/</sup>		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	30 <sup>4/</sup>	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.		—	59	74	82	86

<sup>1</sup> Average runoff condition, and  $I_a = 0.2S$ .

<sup>2</sup> *Poor*: <50% ground cover or heavily grazed with no mulch.

*Fair*: 50 to 75% ground cover and not heavily grazed.

*Good*: > 75% ground cover and lightly or only occasionally grazed.

<sup>3</sup> *Poor*: <50% ground cover.

*Fair*: 50 to 75% ground cover.

*Good*: >75% ground cover.

<sup>4</sup> Actual curve number is less than 30; use CN = 30 for runoff computations.

<sup>5</sup> CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

<sup>6</sup> *Poor*: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.

*Fair*: Woods are grazed but not burned, and some forest litter covers the soil.

*Good*: Woods are protected from grazing, and litter and brush adequately cover the soil.