

Sudbury-Hudson

Project Number: 12970.02
 Determining Isolated Land Subject to Flooding (ILSF)

Determined by: EJT
 Checked by: LC

Sudbury

Workflow Source:
 MassDEP Hydrology Handbook for Conservation Commissioners (March 2002)
[Hydrology-Handbook-For-Conservation-Commissioners.pdf](#)

Town of Sudbury Bylaw:
[ARTICLE-XXII-WETLANDS-ADMINISTRATION.pdf](#)

= determined not to be an ILSF
 = determined to be an ILSF

Isolated Wetland Flag Sequence	Latitude	Longitude	Step 1. Is the area isolated?				Step 2. Can the area confine a volume of water greater than or equal to 1/8 acre-feet and to an average depth of 6 inches?			Step 3. Does the area confine a volume of water, at least once per year, greater than or equal to 1/8 acre-feet and to an average depth of 6 inches?		
			a	b	c	Outcome	a (acre-feet)	b (inches)	Outcome	a (acre-feet)	b (inches)	Outcome
DW51-DW65	42.360175	-71.406965	No inlet	No outlet	No connection to 100-yr floodplain	Yes, continue to Step 2	Volume < 0.125		No, depression is not an ILSF			
DW65-DW72	42.360107	-71.407703	No inlet	No outlet	No connection to 100-yr floodplain	Yes, continue to Step 2	Volume < 0.125		No, depression is not an ILSF			
DW73-DW79	42.359511	-71.411013	No inlet	No outlet	No connection to 100-yr floodplain	Yes, continue to Step 2	Volume < 0.125		No, depression is not an ILSF			
DW214-DW216	42.363742	-71.42316	No inlet	No outlet	No connection to 100-yr floodplain	Yes, continue to Step 2	Volume >= 0.125 and <= 0.25	Average Depth >= 6	Yes, continue to Step 3	Volume <= 0.125		No, depression is not an ILSF
DW151-DW157	42.370602	-71.444498	No inlet	No outlet	No connection to 100-yr floodplain	Yes, continue to Step 2	Volume < 0.125		No, depression is not an ILSF			
DW122-DW128	42.371883	-71.448356	No inlet	No outlet	No connection to 100-yr floodplain	Yes, continue to Step 2	Volume >= 0.125 and >= 0.25	Average Depth >= 6	Yes, continue to Step 3	Volume <= 0.125		No, depression is not an ILSF

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Step 2 - Depression Volume Calculations

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DW51-DW65

Elevation	Area at Elevation (sf)	1 ft increments	Volume (cf)
124.41	0.0	124.11-125	405.7
125	1,375.3	125-126	1,723.0
126	2,070.6	126-126.05	104.6
126.05	2,112.2		

Total 2,233.3 cf
0.0513 ac-ft

Volume < 0.125 ac-ft

DW65-DW72

Elevation	Area at Elevation (sf)	1 ft increments	Volume (cf)
127.59	0.0	127.591-127.883	207.3
127.98	1,063.3		

Total 207.3 cf
0.0048 ac-ft

Volume < 0.125 ac-ft

DW73-DW79

Elevation	Area at Elevation (sf)	1 ft increments	Volume (cf)
123.27	0.0	123.26-124	130.4
124	357.2	124-125	507.5
125	657.7	125-126	869.8
126	1,082.0	126-127	1,589.2
127	2,096.4	127-127.33	799.3
127.33	2,747.8		

Total 3,896.2 cf
0.0894 ac-ft

Volume < 0.125 ac-ft

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DW214-DW216

Elevation	Area at Elevation (sf)	1 ft increments	Volume (cf)
133	86.6	133-134	1,768.1
134	3,449.7	134-135	6,101.2
135	8,752.8		

Total 7,869.3 cf
0.1807 ac-ft

Volume > = 0.125 ac-ft
 and < = 0.25 ac-ft

Average Depth
 0.90 ft
 10.8 in

Average Depth > = 6 in

DW151-DW157

Elevation	Area at Elevation (sf)	1 ft increments	Volume (cf)
148.01	0.0	148.012-149	410.5
149	829.2	149-150	1,262.7
150	1,696.3	150-150.27	489.4
150.27	1,928.6		

Total 2,162.5 cf
0.0496 ac-ft

Volume < 0.125 ac-ft

DW122-DW128

Elevation	Area at Elevation (sf)	1 ft increments	Volume (cf)
154	283.9	154-155	3,567.2
155	6,850.5	155-156	8,251.4
156	9,652.2		

Total 11,818.5 cf
0.2713 ac-ft

Volume > = 0.125 ac-ft
 and > = 0.25 ac-ft

Average Depth
 1.22 ft
 14.7 in

Average Depth > = 6 in

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11/15/2017

Sudbury

Step 3 - Groundwater Calculations

Workflow Source:

MassDEP Hydrology Handbook for Conservation Commissioners (March 2002)

[Hydrology-Handbook-For-Conservation-Commissioners.pdf](#)

Wetland data sheets:

[Partial Sudbury ILSF Data Sheets.zip](#)

DW214-DW216

Assumptions

Water-stained leaves were found in DW214-DW216 depression by VHB on a field visit on 9/29/2017.

Assume depth of standing groundwater = 6".

Depth =	0.5 ft	<i>Depth of groundwater in depression</i>
Elevation =	133.5	
Area =	1,729 sf	<i>From GIS & LIDAR - for calculation of CN (CN for area of groundwater = 100)</i>
Volume =	454 cf	<i>Volume of groundwater in depression</i>

DW122-DW128

Assumptions

Water-stained leaves were found in DW122-DW128 depression by VHB on a field visit on 9/13/2017.

Assume depth of standing groundwater = 6".

Depth =	0.5 ft	<i>Depth of groundwater in depression</i>
Elevation =	154.5	
Area =	2,901 sf	<i>From GIS & LIDAR - for calculation of CN (CN for area of groundwater = 100)</i>
Volume =	796 cf	<i>Volume of groundwater in depression</i>

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Land Use and HSG Table

Sources
 HSG determined from NRCS SSURGO-Certified Soils layer from MassGIS.
 Land use determined from Land Use (2005) - Middlesex County layer from MassGIS.

Land Use and Hydrologic Soil Group (HSG)	Area (ac)	CN
DW122-DW128		
Forest		
A	0.51	30
Groundwater	0.07	100
Non-Forested Wetland		
A	0.05	78
Total	0.63	41
DW214-DW216		
Commercial		
B	0.09	92
Forest		
B	0.57	55
D	0.13	77
Forested Wetland		
B	0.16	66
D	0.05	83
Groundwater	0.04	100
Industrial		
B	0.20	88
Total	1.24	69



\\vhb\proj\Wat-TE\14009.00 Sudbury-Hudson_Eng\GIS\Project\ILSF Appendix Figures\Sudbury\Figure 1 - Watershed.mxd



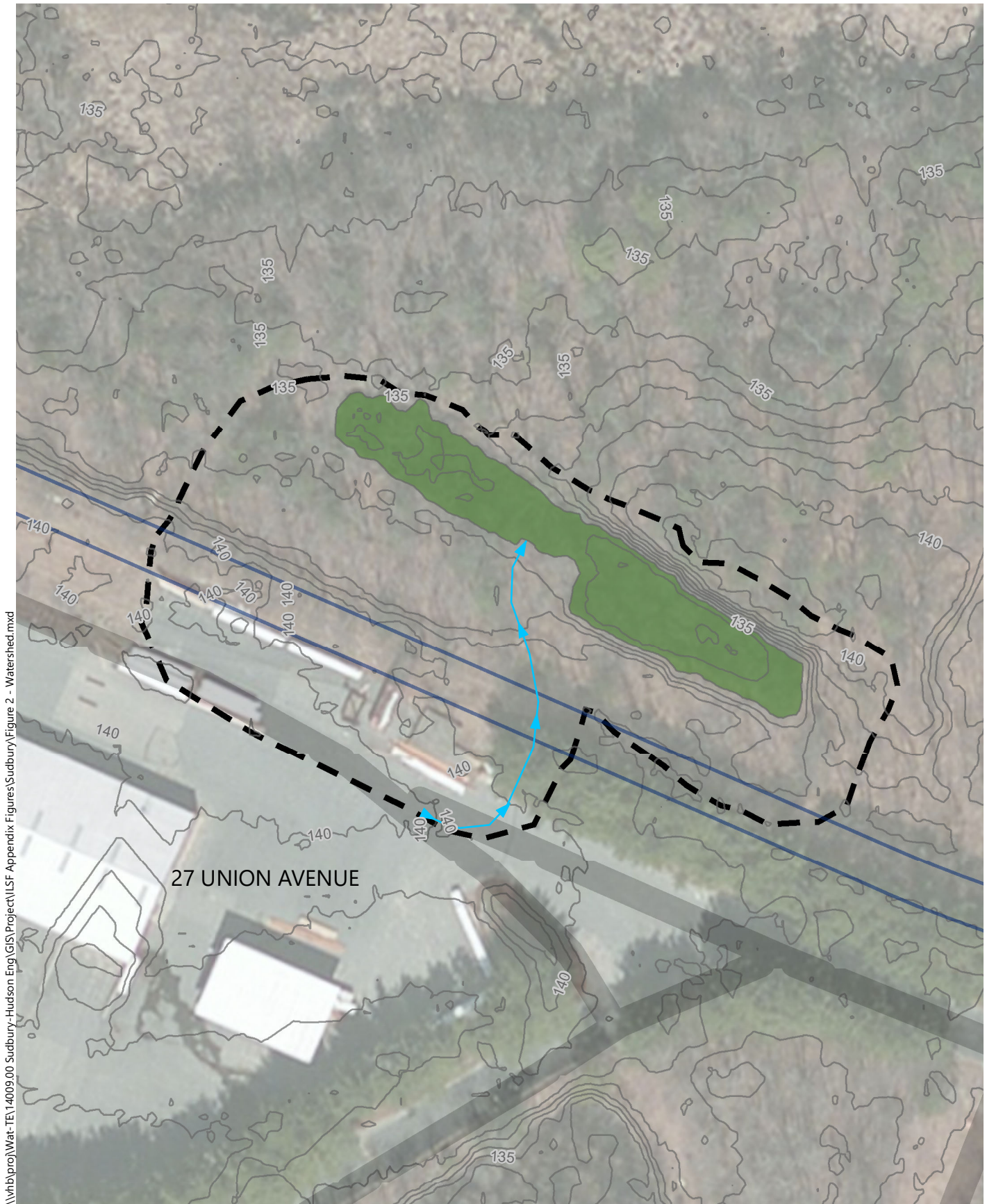
Potential ILSF and Watershed

| Sudbury, MA

- Watershed
- Potential ILSF Extent
- 1 Foot Contours
- TC Path
- Right-of-Way
- Street

**Wetland Flags
DW122-DW128**

Source: MassGIS LIDAR



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Potential ILSF and Watershed

| Sudbury, MA

- Watershed
- Potential ILSF Extents
- 1 Foot Contours
- Right-of-Way
- TC Path
- Street

**Wetland Flags
DW214-DW216**

Source: MassGIS LIDAR

Sudbury-Hudson

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Sudbury

Step 3 - Runoff Volume Calculations

Workflow Source:

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[Hydrology-Handbook-For-Conservation-Commissioners.pdf](#)

Sources

Watershed Area - Delineated from LIDAR Data in CAD

Curve numbers taken from TR-55 (Table 2-2 a, b, c)

DW214-DW216

Inputs

Area = 54,030 sf

CN = 69

Tc = 6 min

Subcatchment 1A

Area contributing to depression (including wetland)

Curve number

Time of concentration

*Run on 1-yr storm

Output

Runoff volume = 0.053 ac-ft

from HydroCAD

Total

Total volume = 0.063 ac-ft

Add standing groundwater volume

Volume < 0.125 ac-ft

DW122-DW128

Inputs

Area = 27,490 sf

CN = 41

Tc = 8.8 min

Subcatchment 1B

Area contributing to depression (including wetland)

Curve number

Time of concentration

*Run on 1-yr storm

Output

Runoff volume = 0 ac-ft

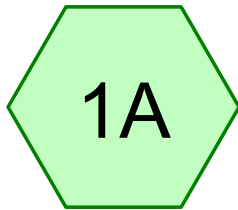
from HydroCAD

Total

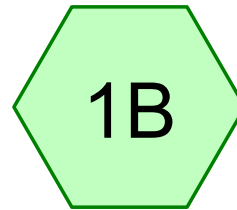
Total volume = 0.018 ac-ft

Add standing groundwater volume

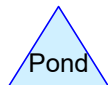
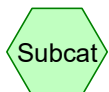
Volume < 0.125 ac-ft



DW214-DW216



DW122-DW128



ILSF Model

Prepared by VHB

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Page 2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.240	69	(1A)
0.631	41	(1B)
1.871	60	TOTAL AREA

ILSF Model

Prepared by VHB

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1yr 1-yr Rainfall=2.69"

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Page 5

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: DW214-DW216

Runoff Area=54,030 sf 0.00% Impervious Runoff Depth=0.51"
Tc=6.0 min CN=69 Runoff=0.66 cfs 0.053 af

Subcatchment 1B: DW122-DW128

Runoff Area=27,490 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=116' Tc=8.8 min CN=41 Runoff=0.00 cfs 0.000 af

Total Runoff Area = 1.871 ac Runoff Volume = 0.053 af Average Runoff Depth = 0.34"
100.00% Pervious = 1.871 ac 0.00% Impervious = 0.000 ac

ILSF Model

Prepared by VHB

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1yr 1-yr Rainfall=2.69"

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Page 6

Summary for Subcatchment 1A: DW214-DW216

Runoff = 0.66 cfs @ 12.20 hrs, Volume= 0.053 af, Depth= 0.51"

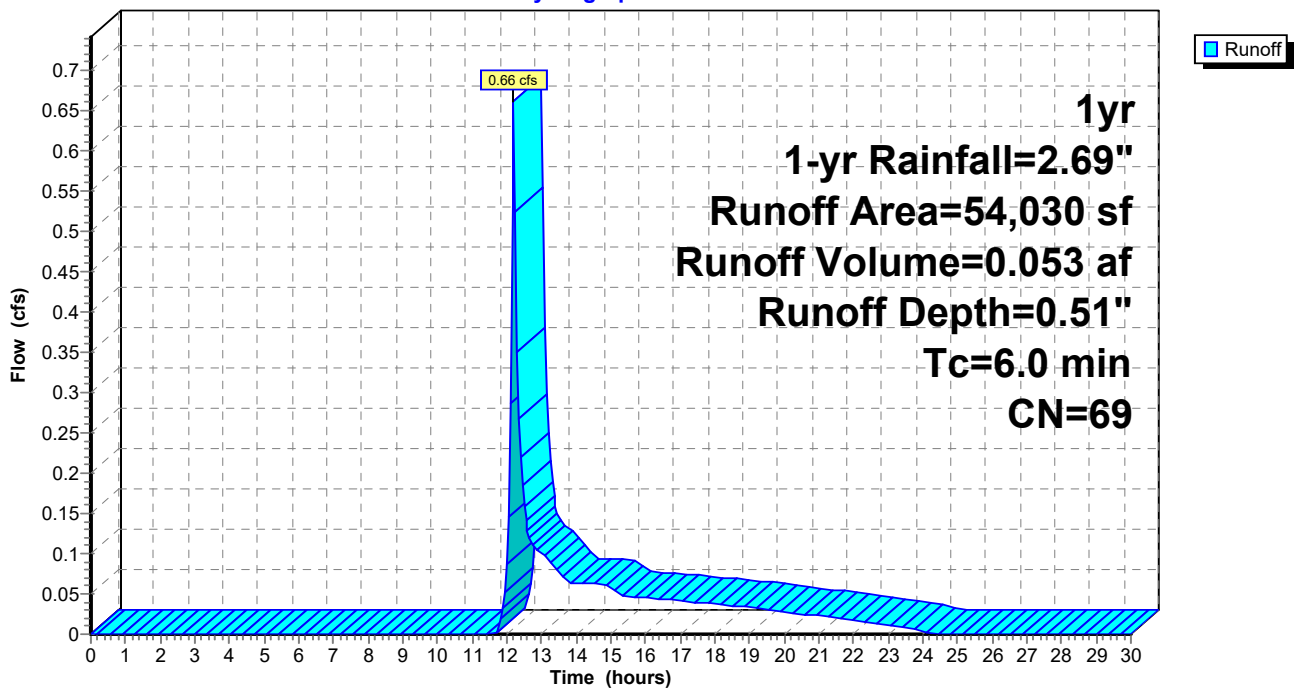
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
1yr 1-yr Rainfall=2.69"

Area (sf)	CN	Description
* 54,030	69	
54,030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, A

Subcatchment 1A: DW214-DW216

Hydrograph



ILSF Model

Prepared by VHB

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1yr 1-yr Rainfall=2.69"

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Page 7

Summary for Subcatchment 1B: DW122-DW128

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
1yr 1-yr Rainfall=2.69"

Area (sf)	CN	Description
* 27,490	41	
27,490		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0480	0.10		Sheet Flow, A
					Woods: Light underbrush n= 0.400 P2= 3.29"
0.2	66	0.0767	4.46		Shallow Concentrated Flow, B
					Unpaved Kv= 16.1 fps
8.8	116	Total			

Subcatchment 1B: DW122-DW128

Hydrograph

