

WIN: 26630.09
 Town: Pembroke
 Route No. US1
 Asset ID: 47373
 Lat: 44.94901 Long: -67.17958

Project Name:
 Stream Name: Willow Stream
 Bridge Name: 47373
 Analysis by: csh
 Date: 3/4/2025

Peak Flow Calculations by USGS Regression Equations (Lombard/Hodgkins, 2021; Hodgkins, 1999 & Lombard/Hodgkins, 2015)

Enter data in blue cells only!

	km ²	mi ²	ac
A	3.63	1.40	896.0
W	0.37	0.1	91.7
P _c	642087	4979591	
County	Washington		

Enter data in [mi²]

Watershed Area *DRNAREA*
 Wetlands area (by NWI)

watershed centroid (E, N; UTM 19N; meters)
 choose county from drop-down menu

ver. 2021 Jan 01

Worksheet prepared by:

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 Augusta, ME 04333-0016
 207-557-1052
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Watershed Characteristics from StreamStats

STORAGE	10.26	
STORNWI	10.23	NWI Wetlands %
SANDGRAV	0.00	sand & gravel aquifer as decimal fraction of watershed A
ELEV	104.1	mean basin elevation (ft)
BSLDEM10M	5.96	mean basin slope (%)
COASTDIST	37.00	distance from the coast (mi)
ELEVMAX	207.5	maximum basin elevation (ft)
LC06WATER	0	percent of drainage basin land cover as open water
PRECIP	44.8	mean annual precipitation
STATSGOA	11	mean basin percentage of hydrological soil group A

References:

Hodgkins, G.A., 1999.
 Estimating the magnitude of peak flows for streams in Maine
 for Selected Recurrence Intervals
WRIR 99-4008, USGS Augusta, ME

Lombard, P.J. & G.A. Hodgkins, 2015.
 Peak flow regression equations for small, ungaged streams:
 in Maine: Comparing Map-Based to Field-Based Variables
SIR 2015-4059, USGS, Augusta, ME

Lombard, P.J. & G.A. Hodgkins, 2020.
 Estimating Flood Magnitude and Frequency on Gaged and
 Ungaged Streams in Maine
SIR 2020-5092, USGS, Augusta, ME.

Ret Pd	I24	Q _T (ft ³ /s)		Q _T (ft ³ /s)
T (yr)		1999 / 2015	2020	Design
1.1			34	35
2	3.16	59	70	70
5	3.87	92	109	110
10	4.46	116	138	140
25	5.27	151	178	180
50	5.89	176	210	210
100	6.52	206	243	245
200	7.20	235	278	280
500	8.19	276	324	325

Calculated Bankfull Width: 12.2 ft

Instructions:

Enter values in blue cells only, watershed data from StreamStats

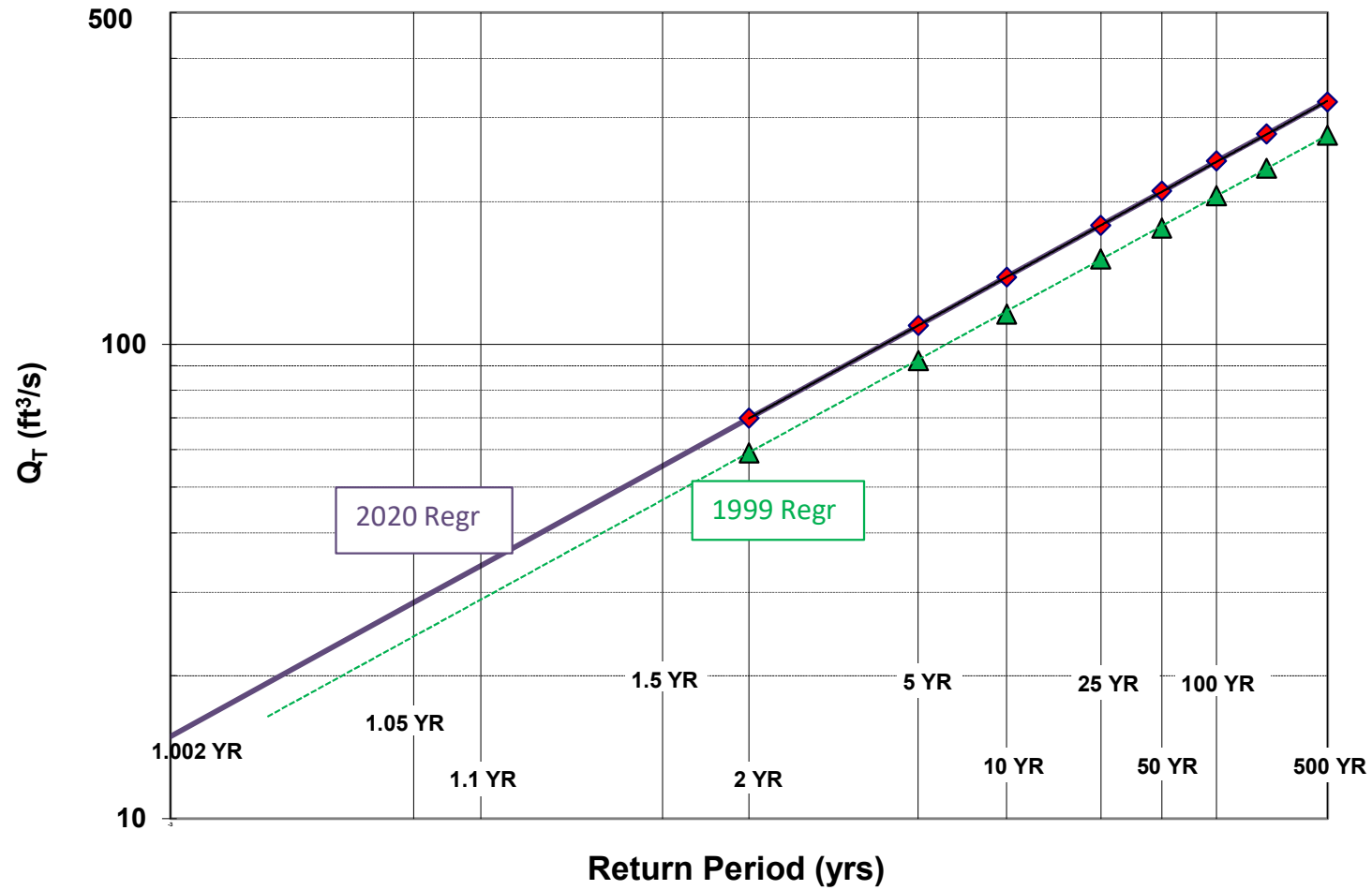
Copy I24 values from Stream Stats

Use results under "Design"

Check against gage data and FEMA studies if available

Questions? Check with ENV / Hydrology Section

Log-Normal Probability Plot



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DO NOT ENTER ANY DATA ON THIS PAGE; EVERYTHING IS CALCULATED

MAINE MONTHLY MEDIAN FLOWS and HYDRAULIC GEOMETRY BY USGS REGRESSION EQUATIONS (2004, 2013, 2015)

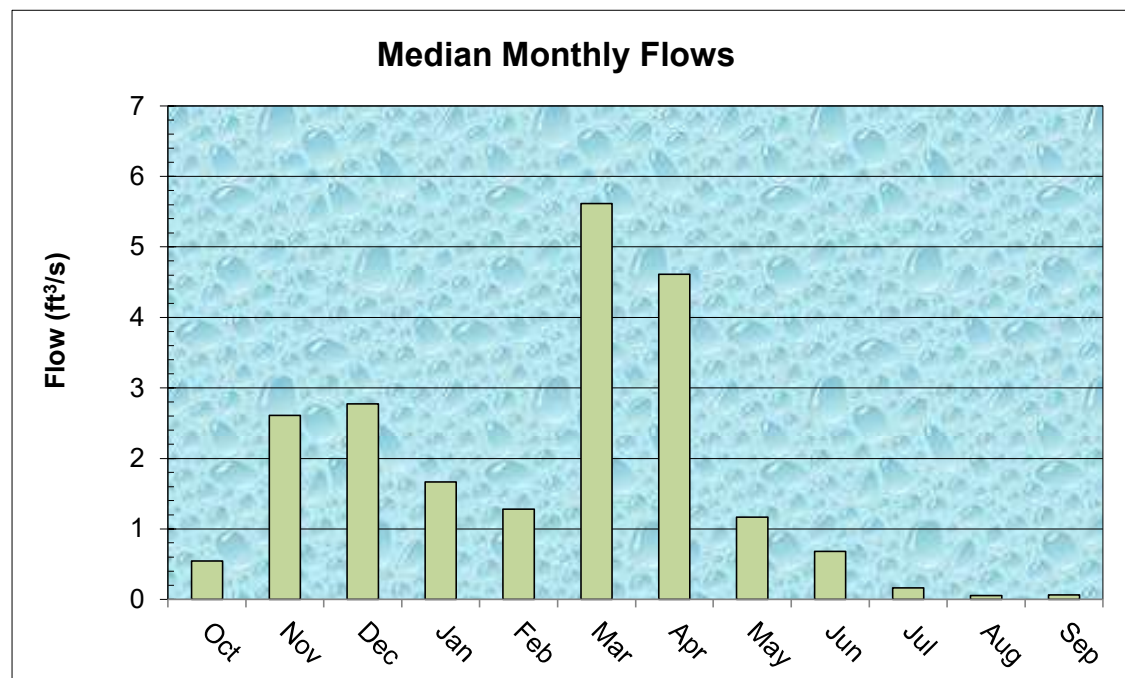
Value	Variable	Explanation
1.40	A	Area (mi ²)
642087	P _c	Watershed centroid (E,N; UTM; Zone 19; meters)
37.00	DIST	Distance from Coastal reference line (mi)
44.8	pptA	Mean Annual Precipitation (inches)
0.00	SG	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	Q _{median} (ft ³ /s)	(m ³ /s)
Jan	1.66	0.0471
Feb	1.28	0.0362
Mar	5.62	0.1591
Apr	4.61	0.1307
May	1.17	0.0331
Jun	0.68	0.0193
Jul	0.16	0.0047
Aug	0.06	0.0016
Sep	0.06	0.0017
Oct	0.54	0.0153
Nov	2.61	0.0739
Dec	2.77	0.0786

Q _{bf}	7.4
ann avg	3.1
ann med	1.2
Q _{1.002}	14.9
Q _{1.01}	20.0
Q _{1.05}	28.5
Q _{1.1}	34.1
Q _{bf}	24.3

assume v = 4ft/s

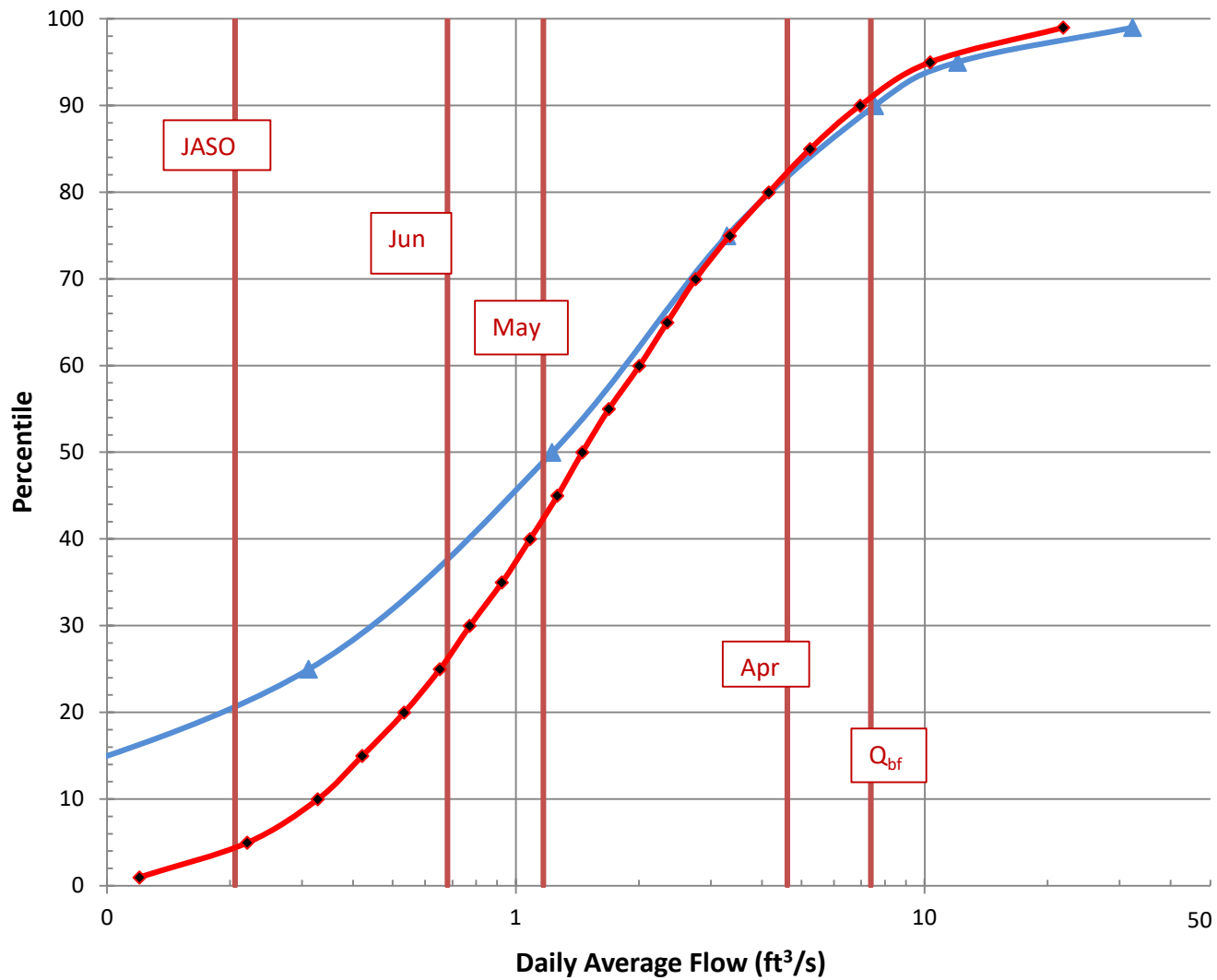
W _{bf}	12.2	estimated bankfull width (ft)
d _{bf}	0.7	estimated bankfull depth (ft)
A _{bf}	6.1	estimated bankfull flow area (ft ²)



References

Dudley, 2013. FY2013 Progress Report - Phase 1 ..., USFWS QRP Project
 Dudley, 2004. Estimating Monthly Streamflows ..., SIR 2004-5026
 Dudley, 2015. Regression Equations for Monthly & Annual Mean..., USGS SIR 2015-5151

Daily Average Flow Distribution



Daily Avg Flow Dist

$A_{ws} = (mi^2)$ 1.4

$Q (ft^3/s)$

Pctl	Median	84 th pctl
1.00E-06	0.00	0.00
1	0.12	0.21
5	0.22	0.35
10	0.33	0.49
15	0.42	0.61
20	0.53	0.75
25	0.65	0.87
30	0.77	0.99
35	0.92	1.14
40	1.08	1.31
45	1.26	1.48
50	1.45	1.75
55	1.69	2.03
60	2.01	2.39
65	2.35	2.78
70	2.75	3.24
75	3.34	3.90
80	4.16	4.65
85	5.25	5.96
90	6.95	8.01
95	10.32	12.46
99	21.83	28.74

Q_{bf} 7.4

$Q_{1.002}$ 14.9

$Q_{1.1}$ 34.1

Q_2 69.8

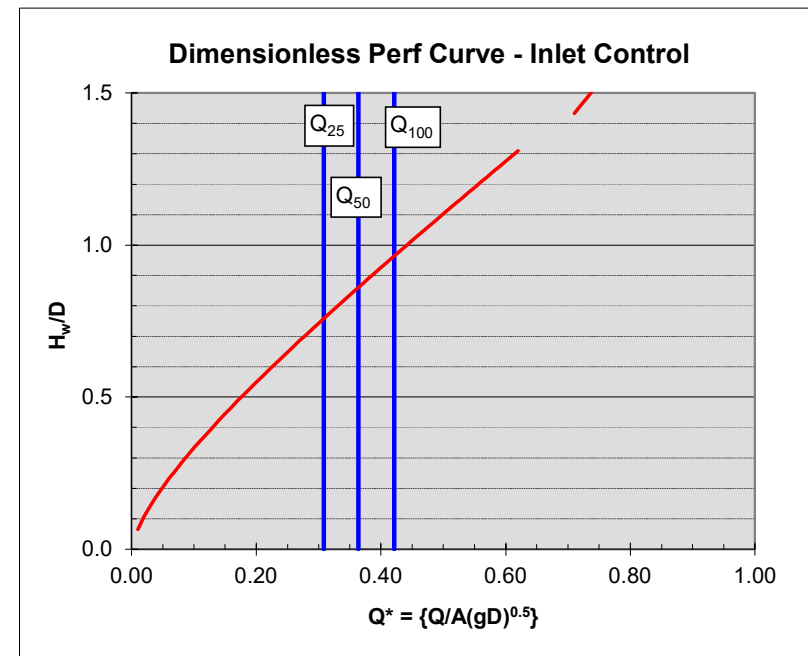
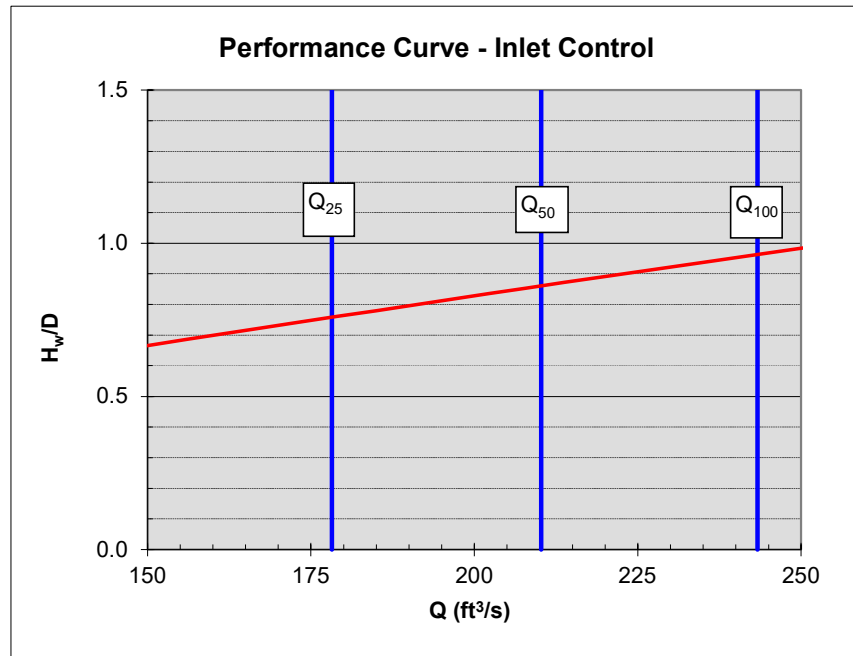
NOTE: This page is for preliminary sizing only.
Final design should be done with HY8 or HDS-5

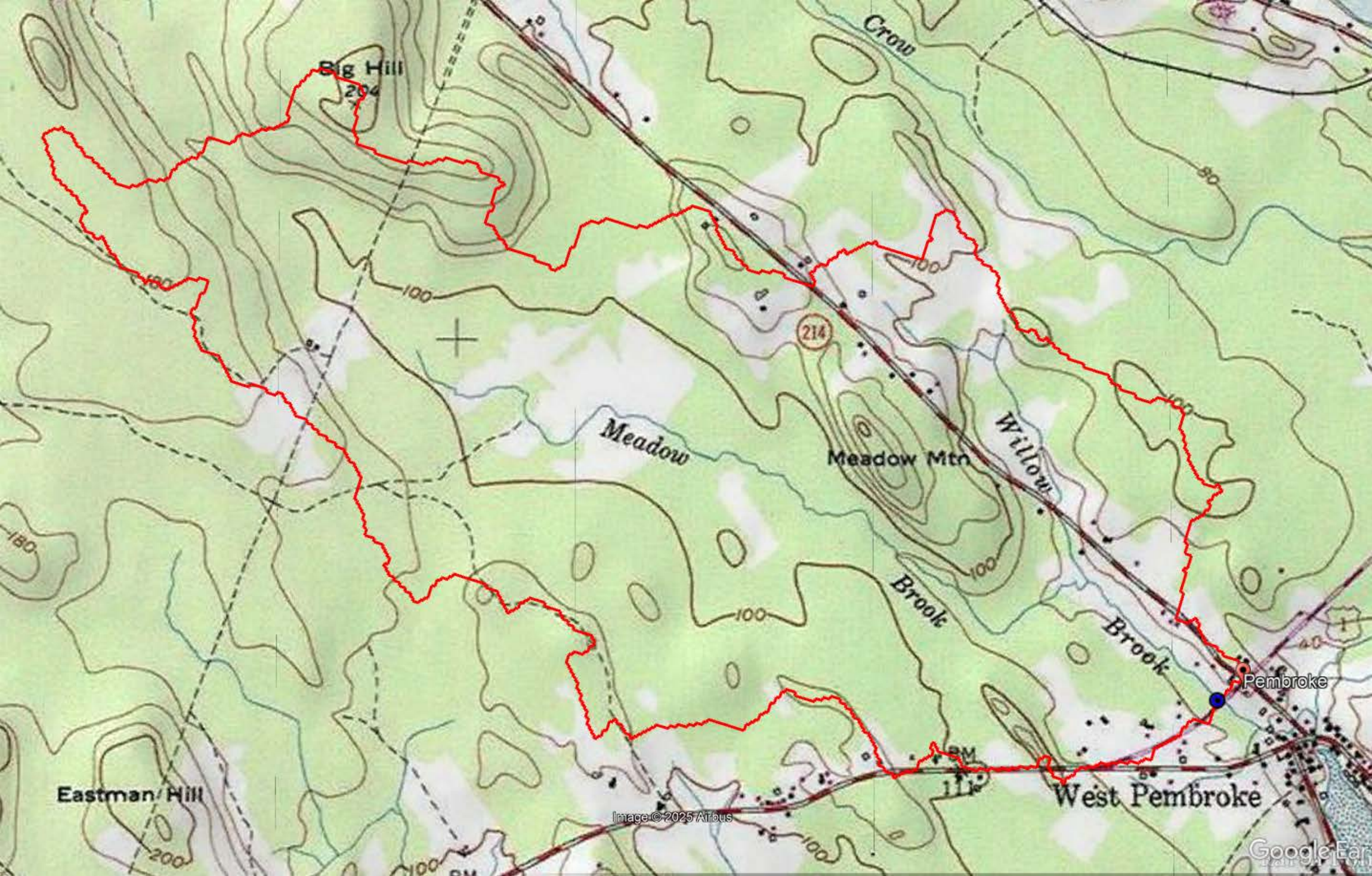
Note:
culvert dimensions are for open flow area; adjust for lost capacity
due to embedding / backfilling (min {2' / 25% rise} embedment)
Finish analysis with HY-8

Preliminary Culvert Sizing - Round & Box Culverts

Shape:	Round			
Inlet Type:	Circ CMP Proj			
D or R (ft)	7	diam / rise	Q_{25} 178.2	trial D / R = 7.1 trial w: BFW = 12.2
w (ft)	24	box span	Q_{50} 210.2	
Slope (ft/ft)	0.01		Q_{100} 243.3	
A (ft ²)	38.48			
g (ft/s ²)	32.2			

Choose shape and inlet type by pull-down menu in green cells





Big Hill
204

Crow

Meadow

Meadow Mtn

Willow

Brook

Brook

Pembroke

West Pembroke

Eastman Hill

214

Image © 2025 Atrius

Google Earth

National Flood Hazard Layer FIRMMette



67°11'6"W 44°57'9"N



1:6,000

67°10'28"W 44°56'44"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/4/2025 at 7:07 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

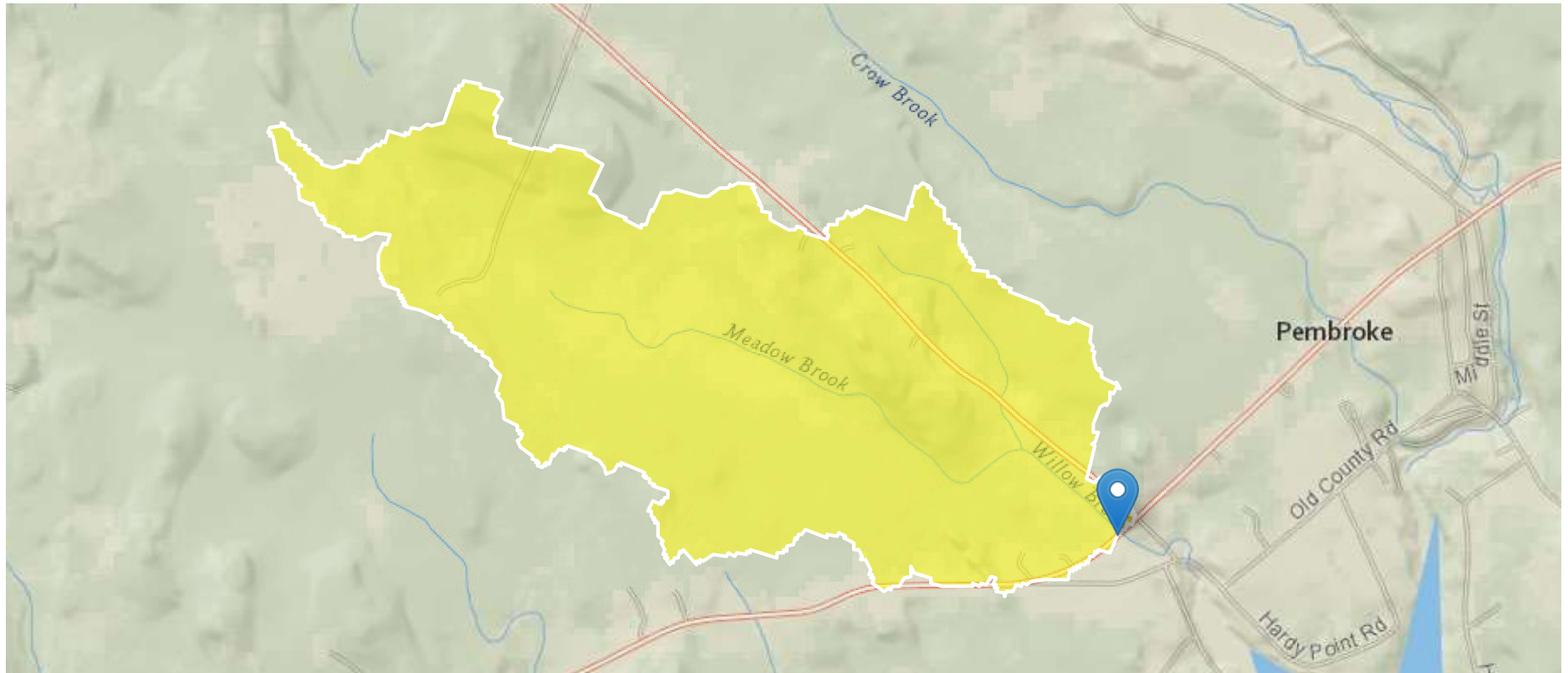
Pembroke 26630.09 LC47373 Willow Brook @ US1

Region ID: ME

Workspace ID: ME20250304133617893000

Clicked Point (Latitude, Longitude): 44.94901, -67.17970

Time: 2025-03-04 08:36:50 -0500



Existing 6D x 100L; Willow Mr aka Meadow Br

[+ Collapse All](#)

➤ Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	5.96	percent
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	642087.36	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	4979591.4	meters
COASTDIST	Shortest distance from the coastline to the basin centroid	37	miles
DRNAREA	Area that drains to a point on a stream	1.4	square miles
ELEV	Mean Basin Elevation	104.1	feet
ELEVMAX	Maximum basin elevation	207.5	feet
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	6.52	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	4.46	inches
I24H200Y	Maximum 24-hour precipitation that occurs on average once in 200 years	7.2	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	5.27	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	3.16	inches
I24H500Y	Maximum 24-hour precipitation that occurs on average once in 500 years	8.19	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	5.89	inches
I24H5Y	Maximum 24-hour precipitation that occurs on average once in 5 years	3.87	inches
JULAVPRE	Mean July Precipitation	3.09	inches
LC06WATER	Percent of open water, class 11, from NLCD 2006	0	percent
PCTSNDGRV	Percentage of land surface underlain by sand and gravel deposits	0	percent

Parameter Code	Parameter Description	Value	Unit
PRDEC FEB90	Basin average mean precipitation for December to February from PRISM 1961-1990	11.8	inches
PRECIP	Mean Annual Precipitation	44.8	inches
SANDGRAVAF	Fraction of land surface underlain by sand and gravel aquifers	0	dimensionless
SANDGRAVAP	Percentage of land surface underlain by sand and gravel aquifers	0	percent
STATSGOA	Percentage of area of Hydrologic Soil Type A from STATSGO	11	percent
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	10.259	percent
STORNWI	Percentage of storage (combined water bodies and wetlands) from the National Wetlands Inventory	10.23	percent

➤ Peak-Flow Statistics

Peak-Flow Statistics Parameters [Statewide multiparameter peakflows SIR 2020 5092]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.4	square miles	0.26	5680
I24H100Y	24 Hour 100 Year Precipitation	6.52	inches	3.99	9.88
I24H10Y	24 Hour 10 Year Precipitation	4.46	inches	2.84	6.38
I24H200Y	24 Hour 200 Year Precipitation	7.2	inches	5.26	11.1
I24H25Y	24 Hour 25 Year Precipitation	5.27	inches	3.3	7.75
I24H2Y	24 Hour 2 Year Precipitation	3.16	inches	1.92	4.17
I24H500Y	24 Hour 500 Year Precipitation	8.19	inches	5.95	13.1

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
I24H50Y	24 Hour 50 Year Precipitation	5.89	inches	3.65	8.79
I24H5Y	24 Hour 5 Year Precipitation	3.87	inches	2.48	5.38
STORAGE	Percent Storage	10.259	percent	0	29.4

Peak-Flow Statistics Flow Report [Statewide multiparameter peakflows SIR 2020 5092]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	PIL	PIU	ASEp
50-percent AEP flood	69.8	ft^3/s	37.3	130	39.1
20-percent AEP flood	109	ft^3/s	59.2	201	38.1
10-percent AEP flood	138	ft^3/s	73.9	258	38.9
4-percent AEP flood	178	ft^3/s	94.1	337	39.9
2-percent AEP flood	210	ft^3/s	109	404	39.7
1-percent AEP flood	243	ft^3/s	127	465	40.7
0.5-percent AEP flood	278	ft^3/s	140	550	42.8
0.2-percent AEP flood	324	ft^3/s	161	650	43.8

Peak-Flow Statistics Citations

Lombard, P.J., and Hodgkins, G.A.,2020, Estimating flood magnitude and frequency on gaged and ungaged streams in Maine: U.S. Geological Survey Scientific Investigations Report 2020–5092, 56 p. (<https://doi.org/10.3133/sir20205092>)

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