

Stormwater Calculations

For

"Kybalion Creek"

St Joseph St 1 ac Tract

Black Lotus Properties, LLC

24-006



Revised 08/28/24 TJS



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Date: 8/22/2024	Design: TJS	Headwaters Engineering of the Cape Fear, PLLC	Sheet: 1
Title: SW Calculations		For: St Joseph St 1 ac Tract	Job #: 24-006

Swale

Q 10 = CiA = 155.5 cfs
 C = 0.4
 i 10 = 7.61 in/hr
 A = 51.10 ac

NOAA Rainfall Data

Average recurrence interval = 10 yrs
 Duration = 24 hr
 i 10 = 7.61 in/hr

Channel Report

Swale

Triangular

Side Slopes (z:1) = 3.00, 3.00
Total Depth (ft) = 3.00

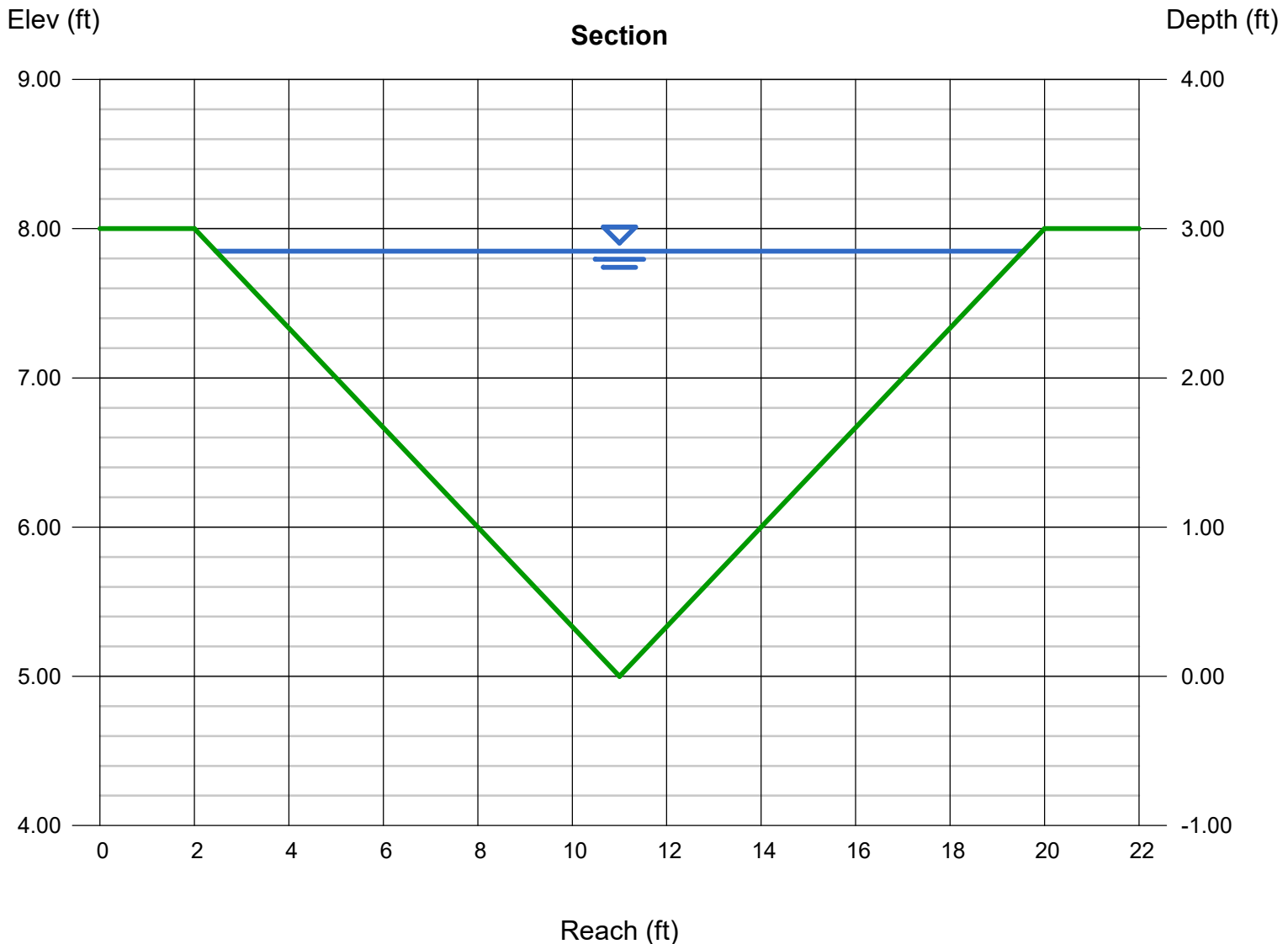
Invert Elev (ft) = 5.00
Slope (%) = 0.50
N-Value = 0.020

Calculations

Compute by: Known Q
Known Q (cfs) = 155.50

Highlighted

Depth (ft) = 2.85
Q (cfs) = 155.50
Area (sqft) = 24.37
Velocity (ft/s) = 6.38
Wetted Perim (ft) = 18.02
Crit Depth, Yc (ft) = 2.79
Top Width (ft) = 17.10
EGL (ft) = 3.48





Measurement

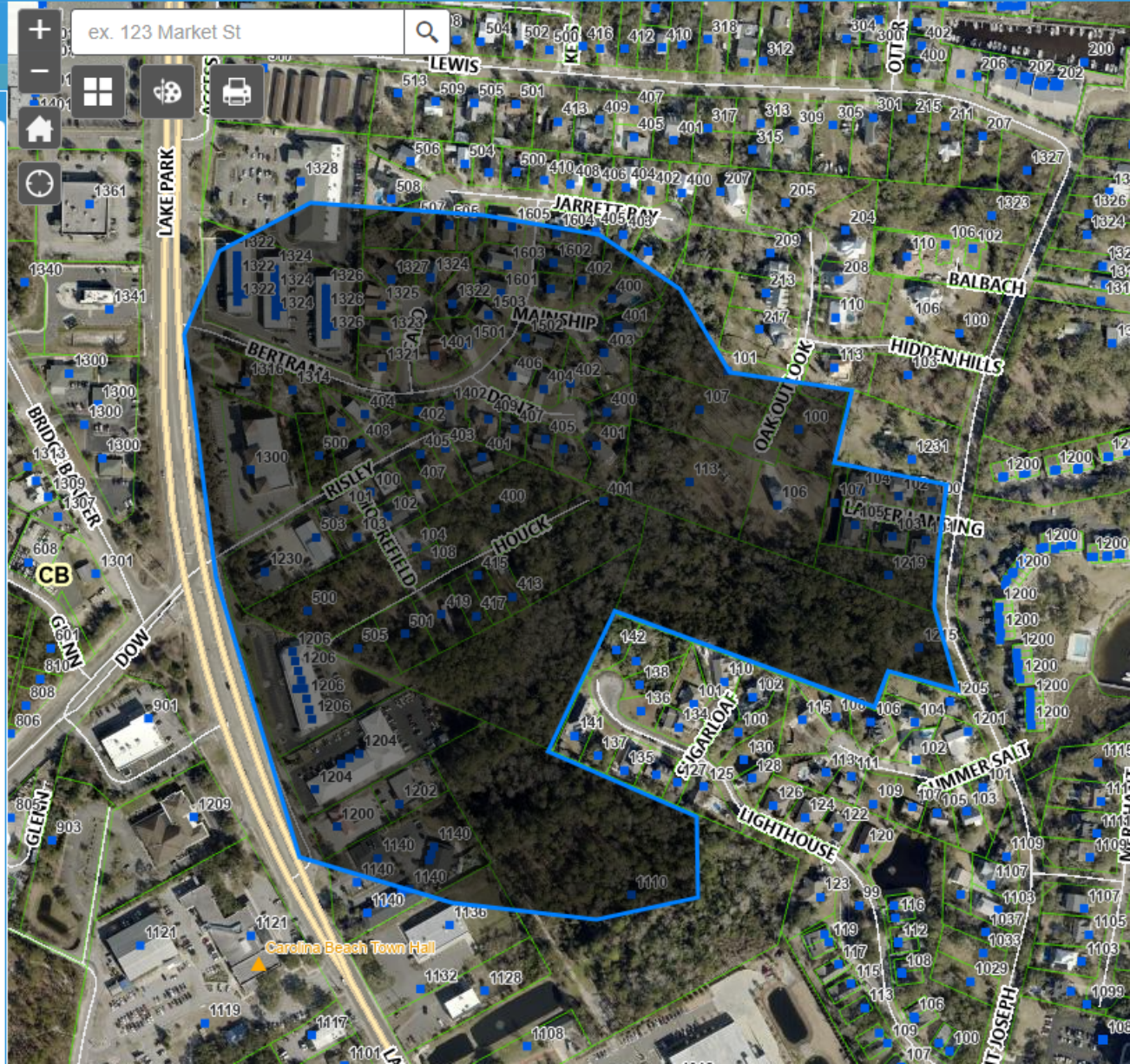
Acres

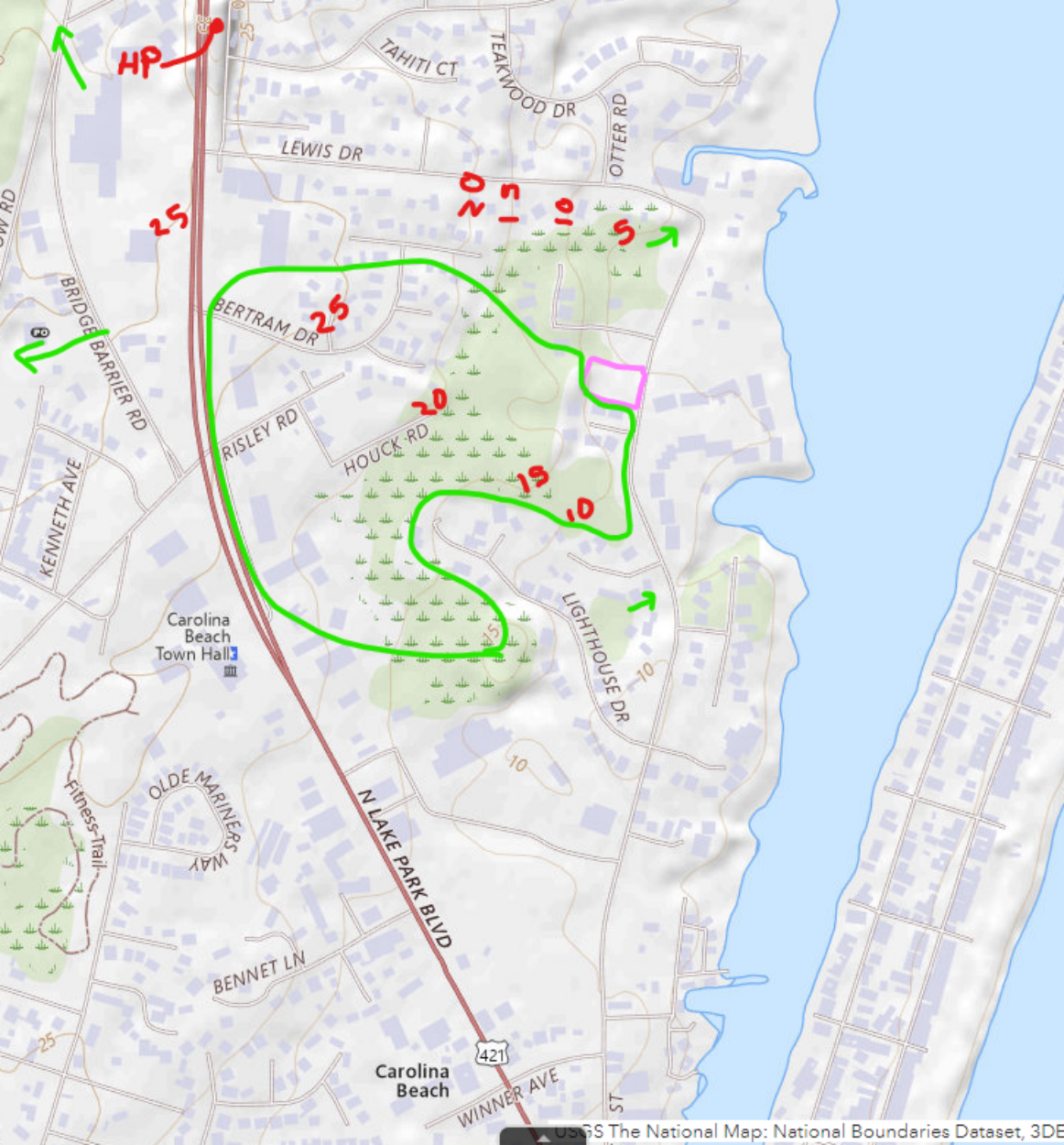
Measurement Result

51.1 Acres

Clear

Press CTRL to enable snapping







NOAA Atlas 14, Volume 2, Version 3
Location name: Carolina Beach, North Carolina, USA*

Latitude: 34.0486°, Longitude: -77.8936°

Elevation: 6 ft**

* source: ESRI Maps

** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

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PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.540 (0.502-0.584)	0.644 (0.598-0.695)	0.751 (0.696-0.810)	0.834 (0.772-0.900)	0.941 (0.866-1.01)	1.02 (0.937-1.10)	1.10 (1.01-1.19)	1.19 (1.07-1.28)	1.30 (1.16-1.40)	1.39 (1.23-1.51)
10-min	0.863 (0.803-0.933)	1.03 (0.956-1.11)	1.20 (1.12-1.30)	1.33 (1.23-1.44)	1.50 (1.38-1.61)	1.63 (1.49-1.75)	1.76 (1.60-1.89)	1.88 (1.70-2.03)	2.05 (1.84-2.22)	2.18 (1.94-2.37)
15-min	1.08 (1.00-1.17)	1.29 (1.20-1.40)	1.52 (1.41-1.64)	1.69 (1.56-1.82)	1.90 (1.75-2.05)	2.06 (1.89-2.22)	2.22 (2.02-2.39)	2.37 (2.15-2.56)	2.58 (2.31-2.79)	2.74 (2.43-2.98)
30-min	1.48 (1.38-1.60)	1.79 (1.66-1.93)	2.16 (2.00-2.33)	2.44 (2.26-2.64)	2.82 (2.59-3.03)	3.10 (2.84-3.34)	3.40 (3.09-3.66)	3.70 (3.34-3.99)	4.11 (3.68-4.45)	4.44 (3.94-4.82)
60-min	1.84 (1.72-1.99)	2.24 (2.08-2.42)	2.77 (2.57-2.99)	3.18 (2.94-3.44)	3.75 (3.45-4.04)	4.20 (3.85-4.53)	4.68 (4.26-5.04)	5.18 (4.69-5.60)	5.89 (5.28-6.38)	6.48 (5.75-7.04)
2-hr	2.19 (2.02-2.39)	2.68 (2.47-2.93)	3.40 (3.13-3.71)	3.99 (3.66-4.36)	4.84 (4.42-5.28)	5.56 (5.05-6.06)	6.34 (5.72-6.92)	7.20 (6.44-7.84)	8.45 (7.48-9.23)	9.54 (8.37-10.4)
3-hr	2.33 (2.14-2.57)	2.85 (2.62-3.14)	3.64 (3.33-4.00)	4.30 (3.93-4.73)	5.29 (4.80-5.81)	6.15 (5.54-6.74)	7.10 (6.34-7.77)	8.14 (7.22-8.91)	9.73 (8.51-10.7)	11.1 (9.62-12.2)
6-hr	2.94 (2.69-3.25)	3.59 (3.29-3.98)	4.59 (4.19-5.08)	5.45 (4.96-6.02)	6.72 (6.07-7.40)	7.82 (7.02-8.62)	9.06 (8.07-9.97)	10.4 (9.20-11.5)	12.6 (10.9-13.8)	14.4 (12.4-15.9)
12-hr	3.44 (3.12-3.84)	4.21 (3.82-4.69)	5.42 (4.91-6.04)	6.47 (5.83-7.20)	8.04 (7.18-8.92)	9.42 (8.36-10.4)	11.0 (9.65-12.2)	12.7 (11.1-14.1)	15.4 (13.2-17.1)	17.9 (15.1-19.8)
24-hr	4.04 (3.70-4.46)	4.90 (4.50-5.41)	6.35 (5.81-7.00)	7.61 (6.95-8.39)	9.56 (8.64-10.5)	11.3 (10.1-12.4)	13.3 (11.7-14.6)	15.5 (13.5-17.2)	19.0 (16.2-21.1)	22.1 (18.5-24.8)
2-day	4.66 (4.29-5.12)	5.64 (5.20-6.20)	7.24 (6.64-7.96)	8.62 (7.87-9.49)	10.7 (9.70-11.8)	12.6 (11.3-13.9)	14.7 (13.0-16.3)	17.1 (14.9-19.0)	20.7 (17.7-23.2)	23.9 (20.1-27.0)
3-day	4.90 (4.52-5.36)	5.92 (5.46-6.48)	7.54 (6.94-8.27)	8.94 (8.19-9.81)	11.0 (10.0-12.1)	12.9 (11.6-14.2)	14.9 (13.3-16.5)	17.2 (15.1-19.1)	20.8 (17.9-23.2)	24.0 (20.2-27.1)
4-day	5.14 (4.75-5.61)	6.20 (5.73-6.77)	7.85 (7.24-8.58)	9.26 (8.50-10.1)	11.4 (10.3-12.4)	13.2 (11.9-14.4)	15.2 (13.6-16.7)	17.4 (15.4-19.2)	20.9 (18.1-23.2)	24.2 (20.3-27.2)
7-day	5.82 (5.42-6.29)	7.01 (6.53-7.58)	8.82 (8.19-9.54)	10.3 (9.55-11.2)	12.5 (11.5-13.6)	14.4 (13.1-15.6)	16.4 (14.8-17.8)	18.6 (16.6-20.3)	21.8 (19.2-24.0)	24.5 (21.2-27.5)
10-day	6.54 (6.10-7.04)	7.83 (7.30-8.43)	9.70 (9.02-10.5)	11.3 (10.4-12.1)	13.5 (12.5-14.6)	15.4 (14.1-16.7)	17.4 (15.9-18.9)	19.7 (17.7-21.4)	22.9 (20.2-25.1)	25.5 (22.3-28.3)
20-day	8.76 (8.22-9.39)	10.4 (9.79-11.2)	12.7 (11.9-13.6)	14.6 (13.6-15.7)	17.3 (16.0-18.5)	19.5 (18.0-20.9)	21.8 (20.0-23.5)	24.3 (22.0-26.3)	27.8 (24.9-30.4)	30.7 (27.1-33.8)
30-day	10.8 (10.2-11.5)	12.9 (12.1-13.7)	15.4 (14.5-16.5)	17.5 (16.5-18.7)	20.4 (19.1-21.8)	22.7 (21.1-24.3)	25.1 (23.2-26.9)	27.6 (25.3-29.7)	31.0 (28.1-33.6)	33.7 (30.3-36.7)
45-day	13.6 (12.9-14.4)	16.1 (15.2-17.1)	19.1 (18.0-20.3)	21.5 (20.2-22.8)	24.8 (23.2-26.4)	27.5 (25.6-29.2)	30.2 (27.9-32.2)	32.9 (30.3-35.3)	36.7 (33.4-39.6)	39.7 (35.9-43.1)
60-day	16.5 (15.6-17.5)	19.4 (18.4-20.6)	22.8 (21.5-24.1)	25.4 (24.0-26.8)	28.9 (27.2-30.6)	31.6 (29.7-33.5)	34.4 (32.1-36.5)	37.1 (34.4-39.5)	40.8 (37.5-43.7)	43.6 (39.8-47.0)

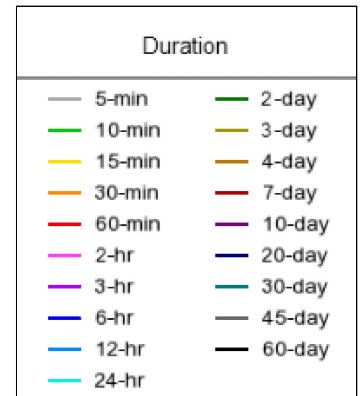
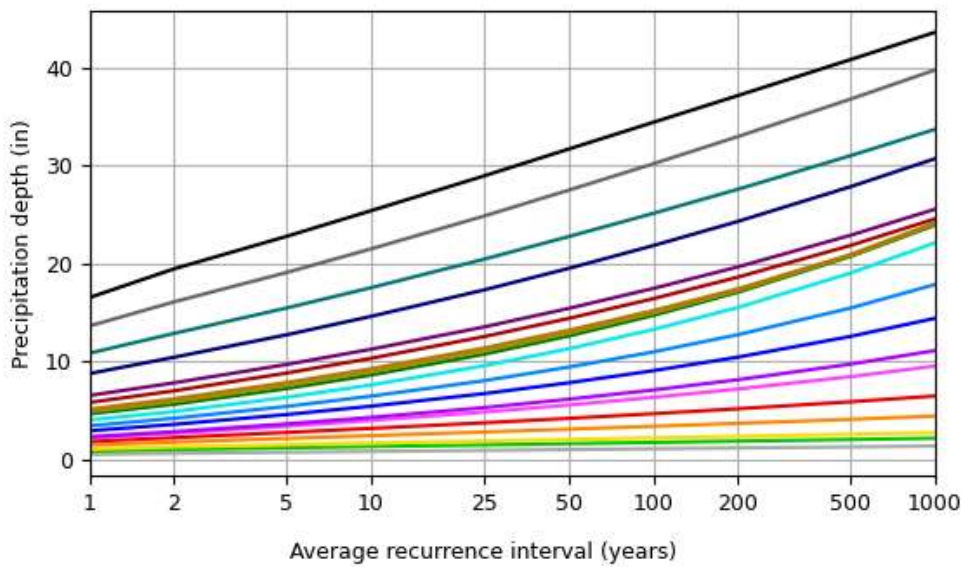
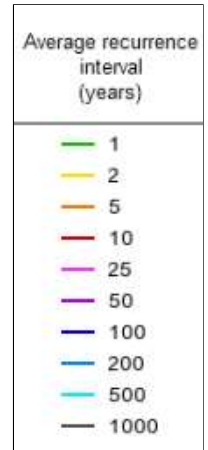
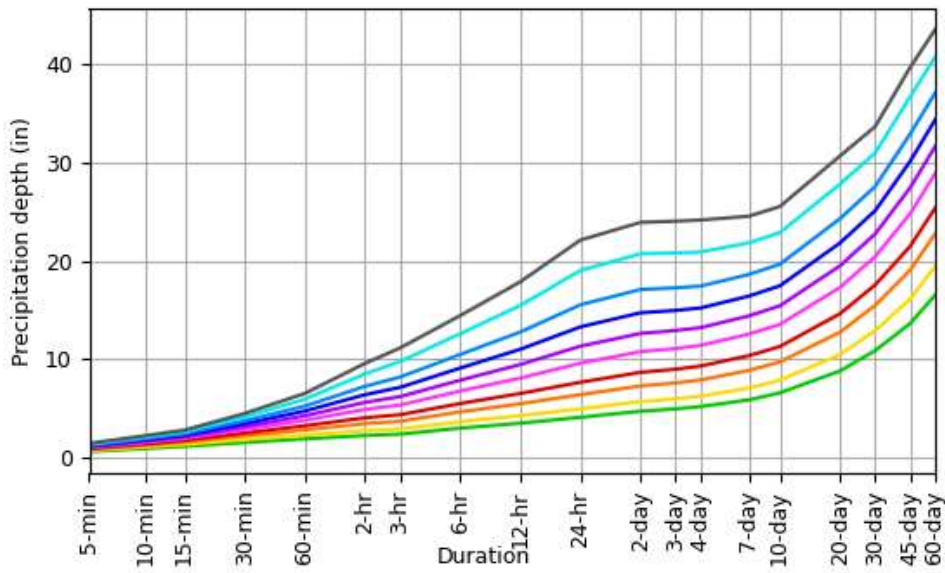
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 34.0486°, Longitude: -77.8936°



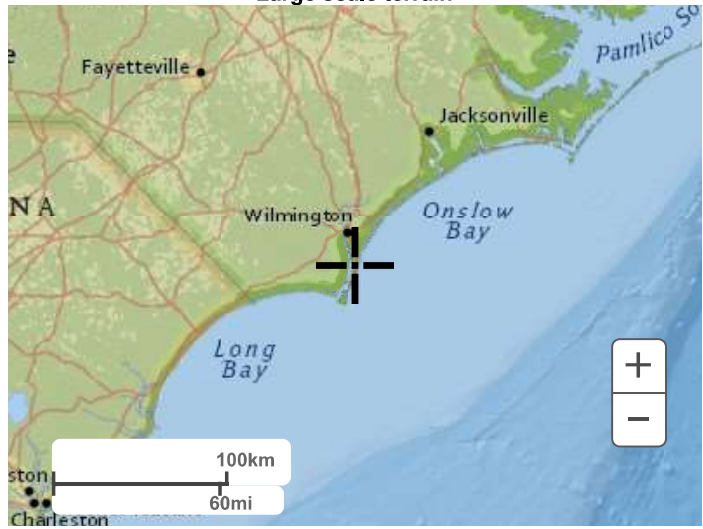
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Maps & aerials

Small scale terrain



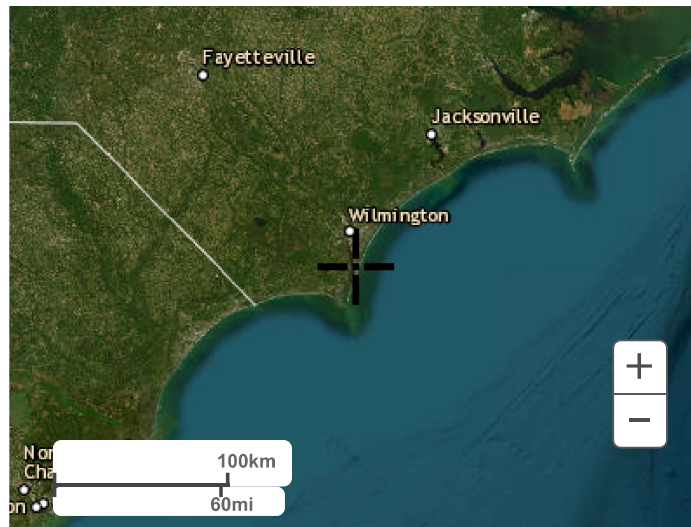
Large scale terrain



Large scale map



Large scale aerial



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