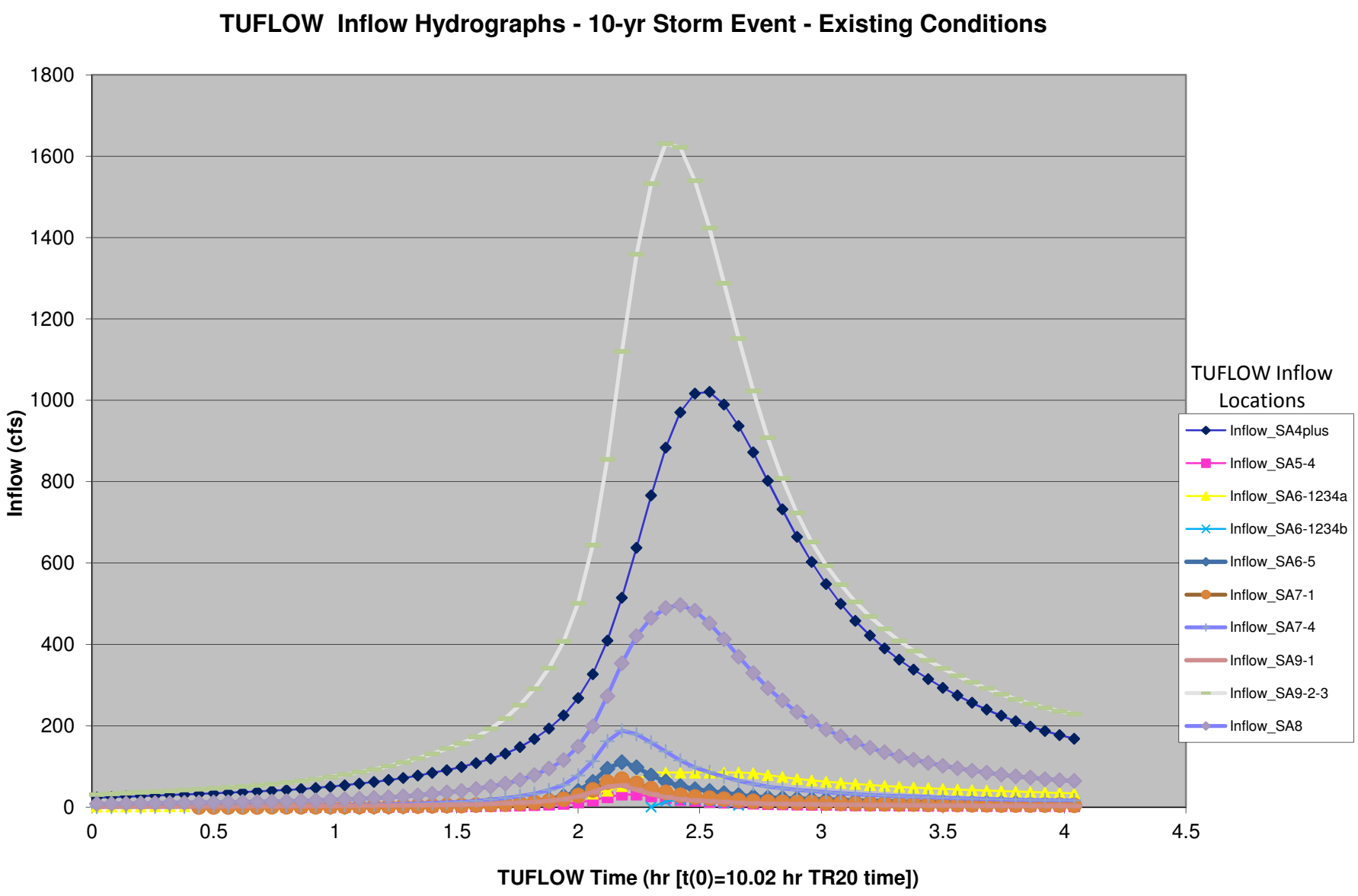
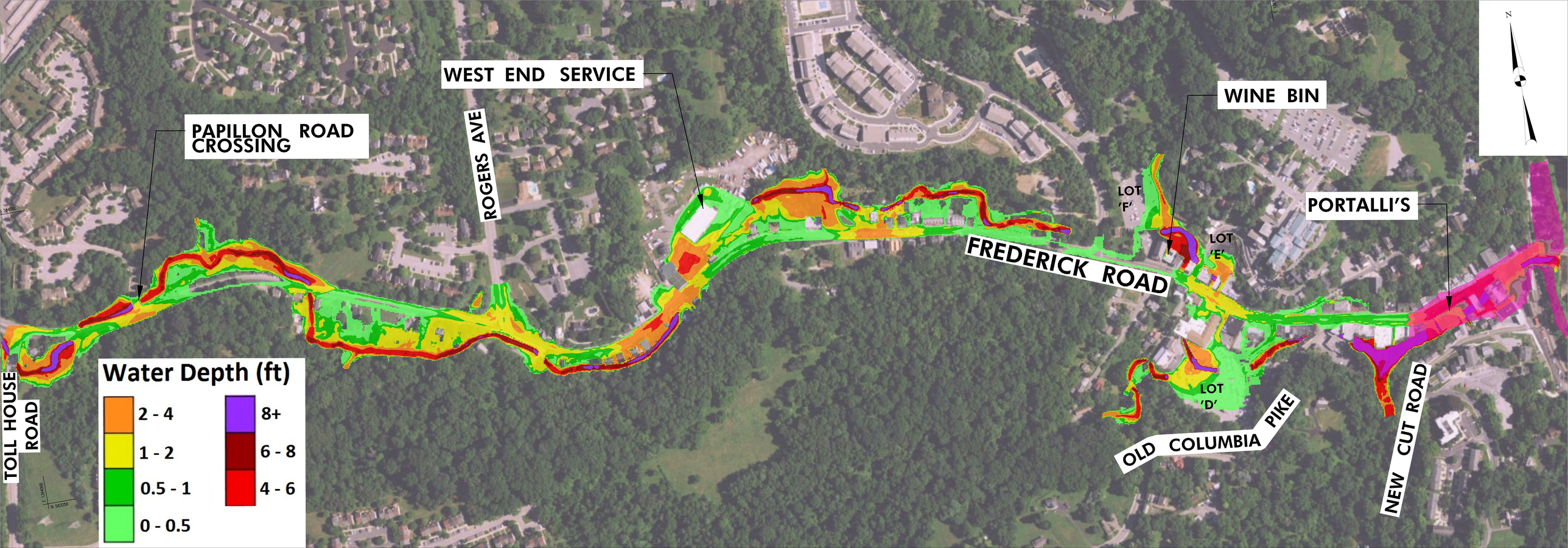
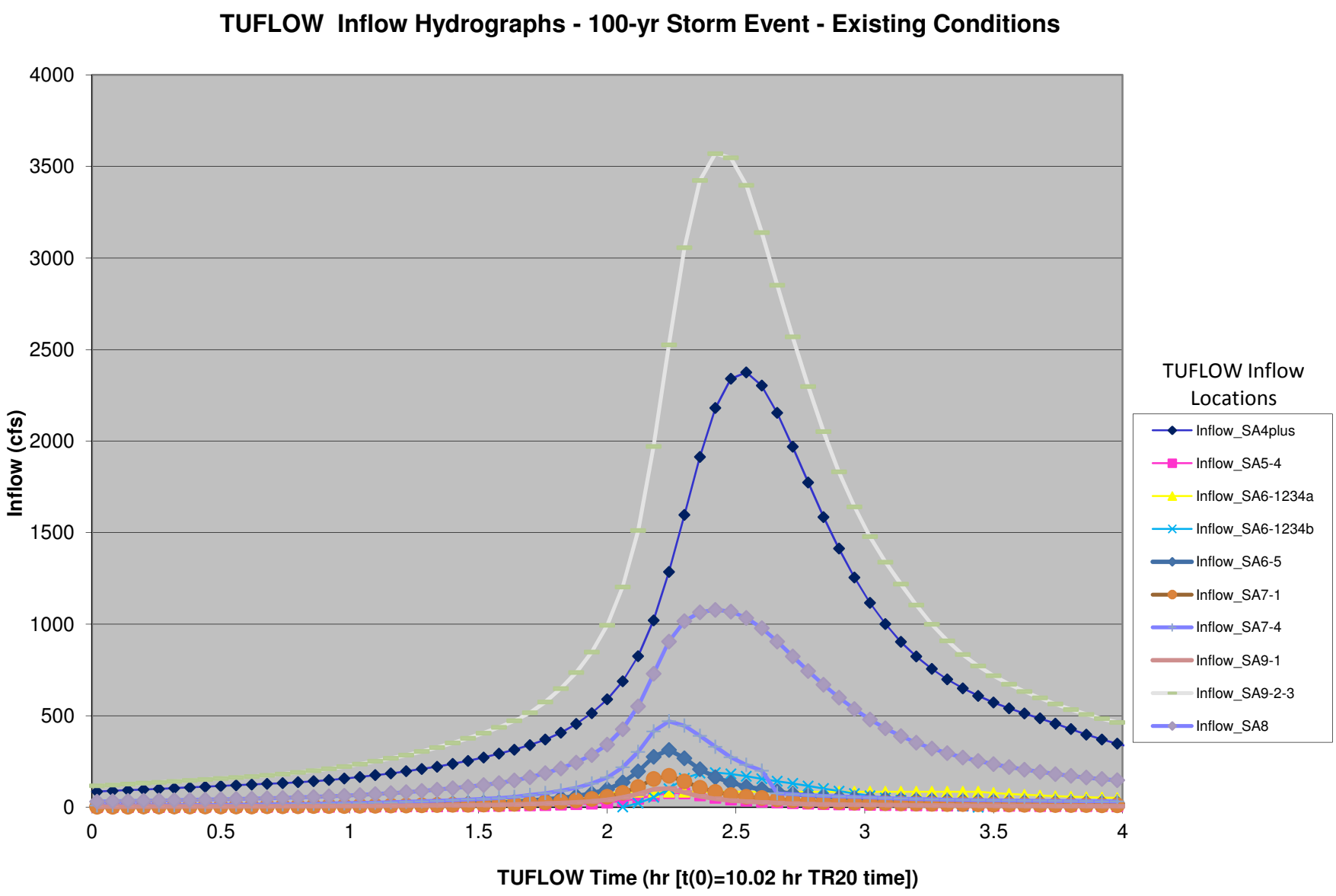
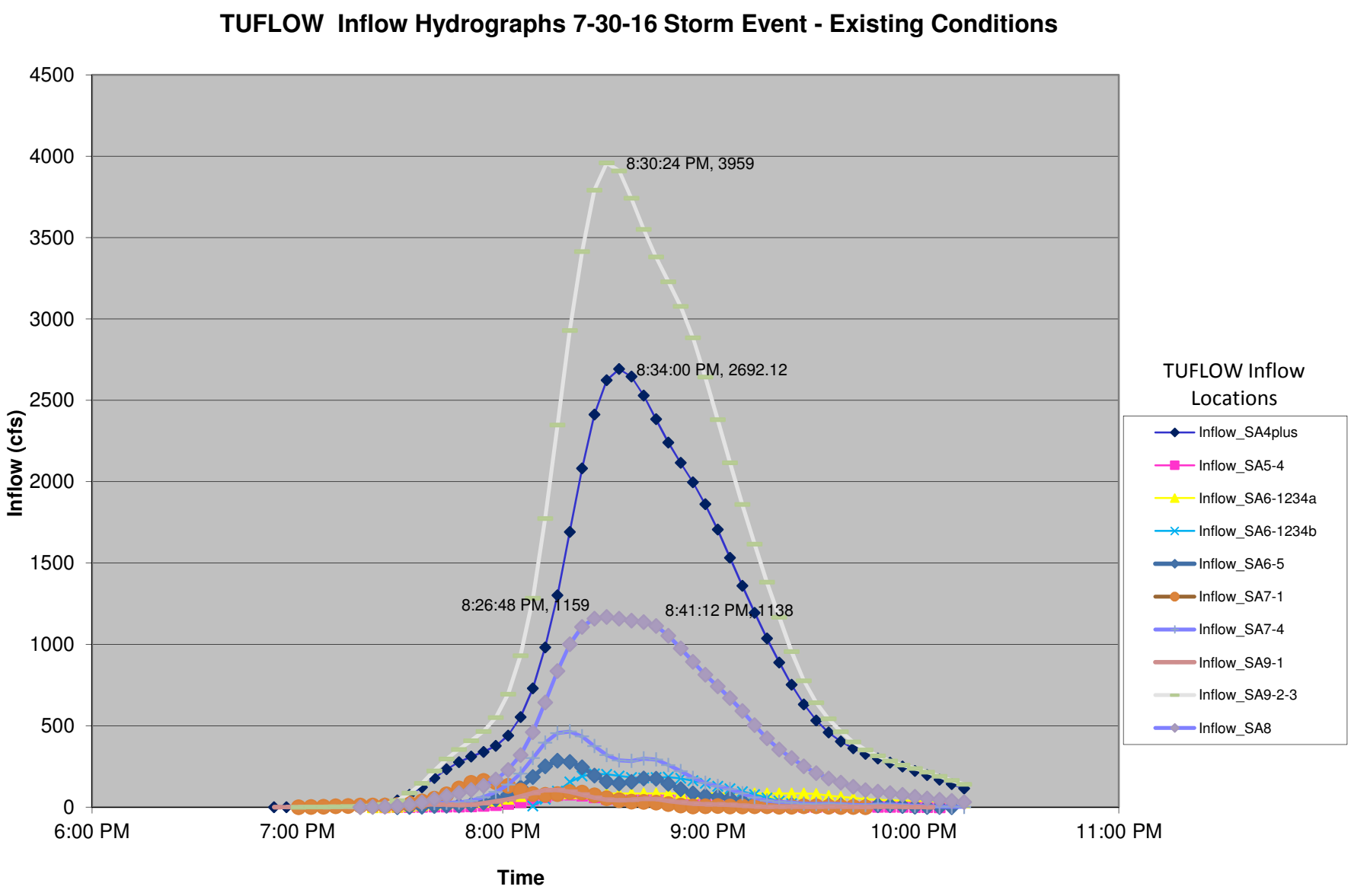
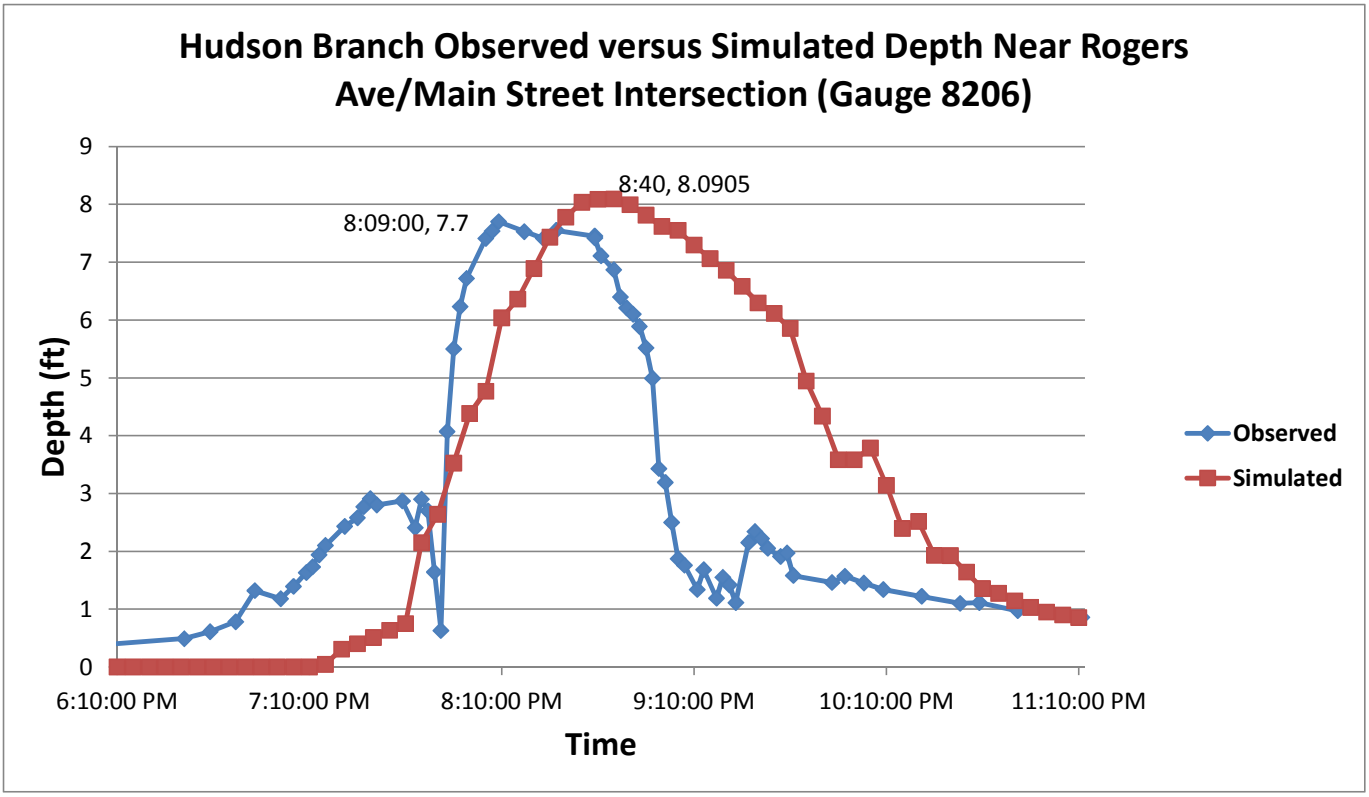

TUFLOW Inflow Hydrographs - 10-yr Storm Event - Existing Conditions
Inflow (cfs)
1800
1600
1400
1200
1000
800
600
400
200
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
TUFLOW Time (hr [t(0)=10.02 hr TR20 time])
TUFLOW Inflow Locations
Inflow_SA4plus
Inflow_SA5-4
Inflow_SA6-1234a
Inflow_SA6-1234b
Inflow_SA6-5
Inflow_SA7-1
Inflow_SA7-4
Inflow_SA9-1
Inflow_SA9-2-3
Inflow_SA8


WEST END SERVICE
PAPILLON ROAD CROSSING
ROGERS AVE
WINE BIN
LOT 'F'
LOT 'E'
PORTALLI'S
FREDERICK ROAD
LOT 'D'
OLD COLUMBIA PIKE
NEW CUT ROAD
TOLL HOUSE ROAD
Water Depth (ft)
2 - 4
1 - 2
0.5 - 1
0 - 0.5
8+
6 - 8
4 - 6


TUFLOW Inflow Hydrographs - 100-yr Storm Event - Existing Conditions
Inflow (cfs)
4000
3500
3000
2500
2000
1500
1000
500
0
0
0.5
1
1.5
2
2.5
3
3.5
4
TUFLOW Time (hr [t(0)=10.02 hr TR20 time])
TUFLOW Inflow Locations
Inflow_SA4plus
Inflow_SA5-4
Inflow_SA6-1234a
Inflow_SA6-1234b
Inflow_SA6-5
Inflow_SA7-1
Inflow_SA7-4
Inflow_SA9-1
Inflow_SA9-2-3
Inflow_SA8


TUFLOW Inflow Hydrographs 7-30-16 Storm Event - Existing Conditions
Inflow (cfs)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
Time
8:30:24 PM, 3959
8:34:00 PM, 2692.12
8:26:48 PM, 1159
8:41:12 PM, 1138
TUFLOW Inflow Locations
Inflow_SA4plus
Inflow_SA5-4
Inflow_SA6-1234a
Inflow_SA6-1234b
Inflow_SA6-5
Inflow_SA7-1
Inflow_SA7-4
Inflow_SA9-1
Inflow_SA9-2-3
Inflow_SA8


Hudson Branch Observed versus Simulated Depth Near Rogers Ave/Main Street Intersection (Gauge 8206)
8:40, 8.0905
8:09:00, 7.7
Depth (ft)
0
1
2
3
4
5
6
7
8
9
6:10:00 PM
7:10:00 PM
8:10:00 PM
9:10:00 PM
10:10:00 PM
11:10:00 PM
Time
Observed
Simulated

HY-8 Culvert Analysis Report

Existing Rogers Avenue SD Inflow To Hudson Branch

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 85 cfs

Maximum Flow: 120 cfs

Table 1 - Summary of Culvert Flows at Crossing: Proposed-10yrsize

Headwater Elevation (ft)	Total Discharge (cfs)	rogers1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
255.00	0.00	0.00	0.00	1
255.87	12.00	12.00	0.00	1
256.29	24.00	24.00	0.00	1
256.66	36.00	36.00	0.00	1
257.01	48.00	48.00	0.00	1
257.37	60.00	60.00	0.00	1
257.76	72.00	72.00	0.00	1
258.21	84.00	84.00	0.00	1
258.25	85.00	85.00	0.00	1
259.31	108.00	108.00	0.00	1
259.97	120.00	120.00	0.00	1
260.00	120.57	120.57	0.00	Overtopping

Rating Curve Plot for Crossing: Proposed-10yrsize

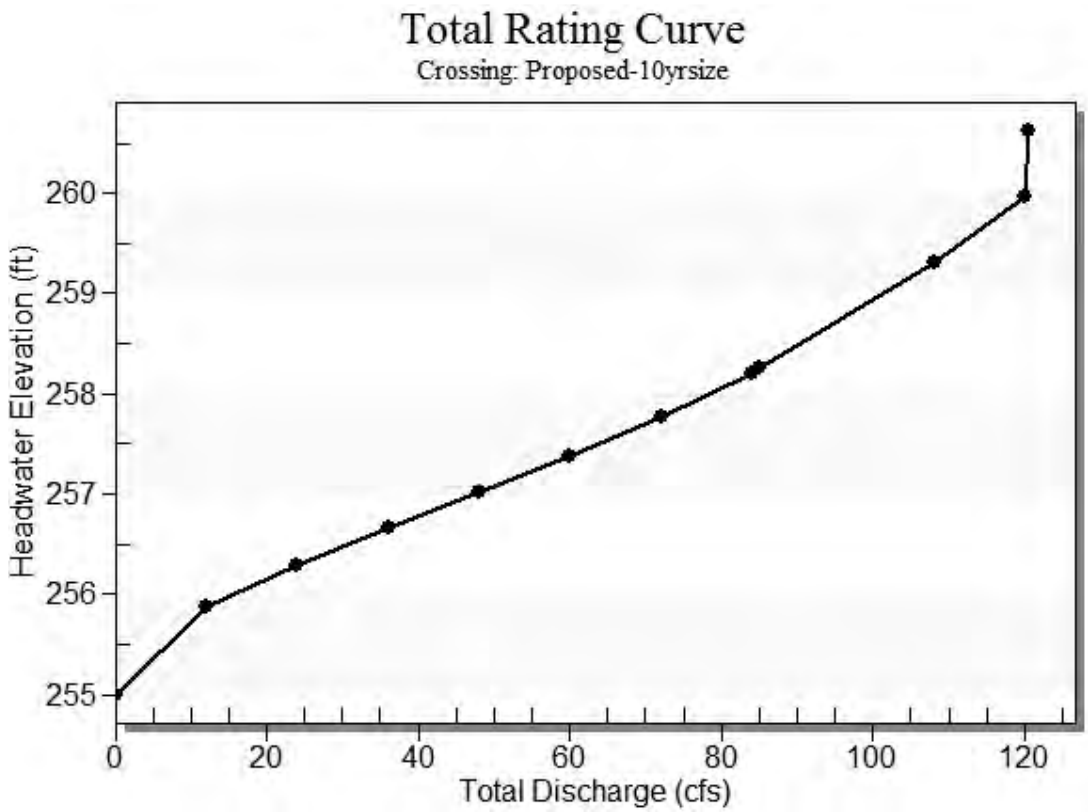


Table 2 - Culvert Summary Table: rogers1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	255.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
12.00	12.00	255.87	0.869	0.0*	1-S2n	0.467	0.639	0.484	0.166	5.571	4.814
24.00	24.00	256.29	1.289	0.285	1-S2n	0.659	0.926	0.692	0.253	6.832	6.326
36.00	36.00	256.66	1.661	0.645	1-S2n	0.814	1.150	0.866	0.324	7.637	7.411
48.00	48.00	257.01	2.010	1.022	1-S2n	0.951	1.337	1.023	0.386	8.232	8.290
60.00	60.00	257.37	2.368	1.437	5-S2n	1.078	1.507	1.159	0.443	8.736	9.038
72.00	72.00	257.76	2.761	1.890	5-S2n	1.189	1.661	1.295	0.495	9.179	9.694
84.00	84.00	258.21	3.208	2.605	5-S2n	1.306	1.795	1.426	0.544	9.573	10.287
85.00	85.00	258.25	3.249	2.642	5-S2n	1.316	1.805	1.437	0.548	9.608	10.333
108.00	108.00	259.31	4.306	3.577	5-S2n	1.544	1.998	1.679	0.636	10.309	11.322
120.00	120.00	259.97	4.967	4.126	5-S2n	1.673	2.063	1.806	0.679	10.656	11.785

* Full Flow Headwater elevation is below inlet invert.

****

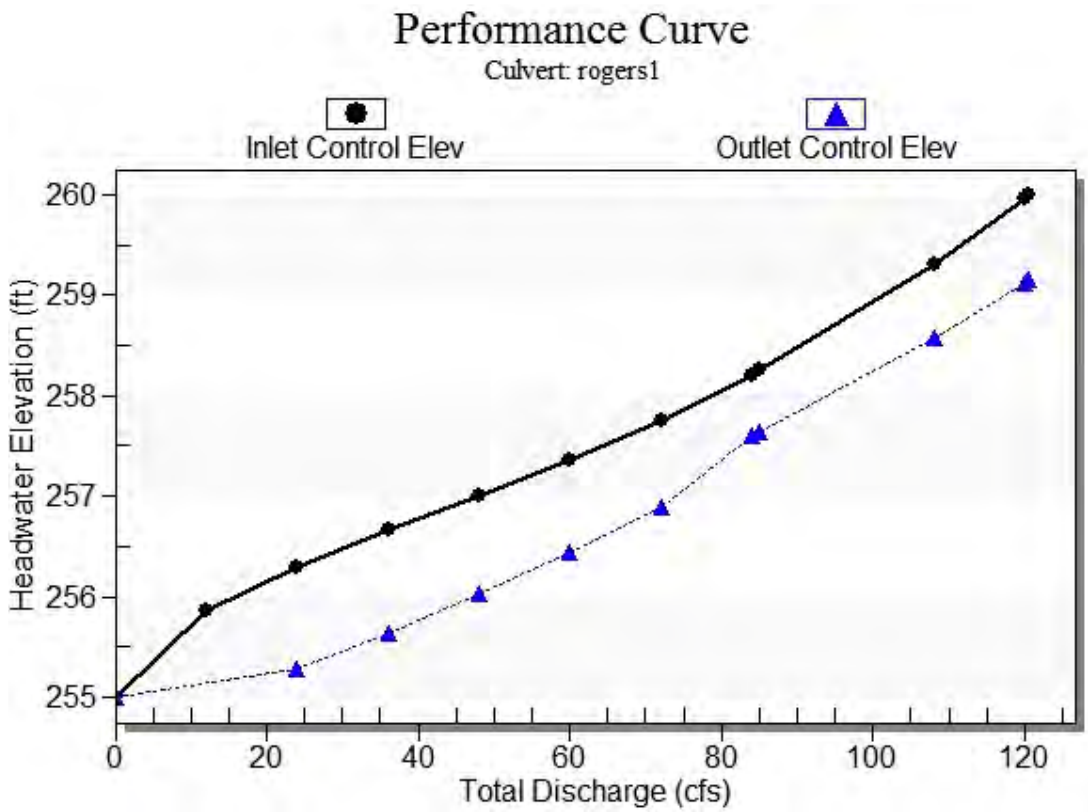
Straight Culvert

Inlet Elevation (invert): 255.00 ft, Outlet Elevation (invert): 254.25 ft

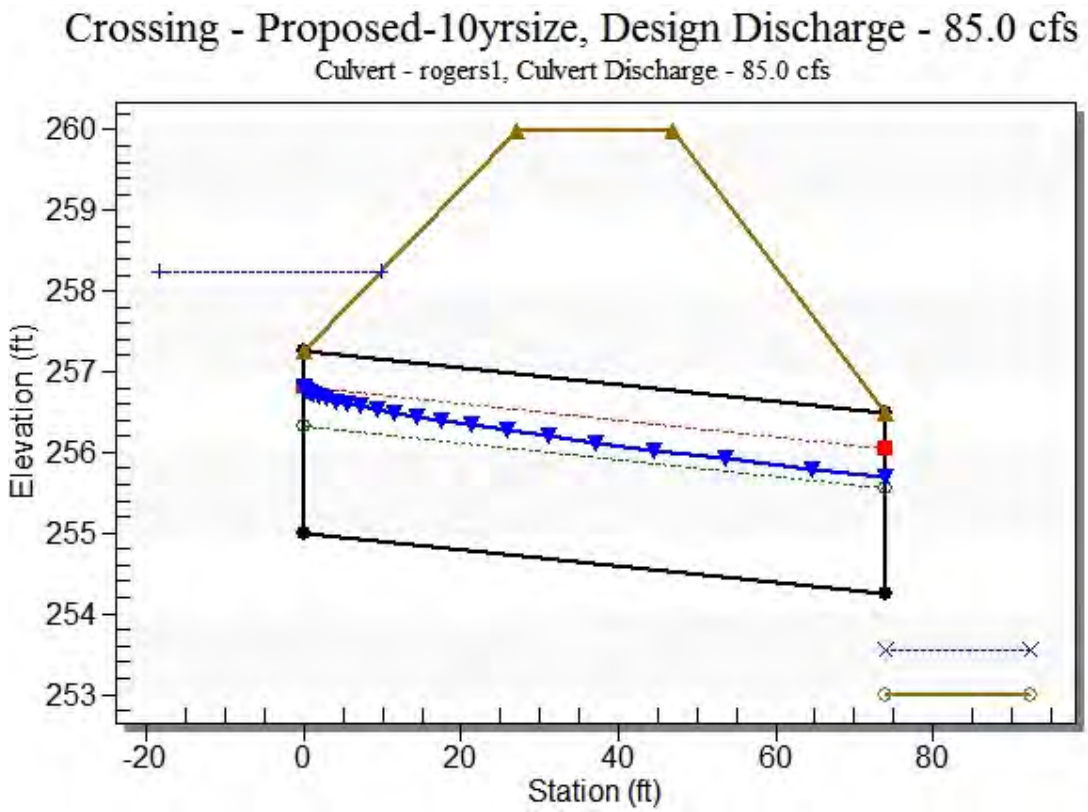
Culvert Length: 74.00 ft, Culvert Slope: 0.0101

****

Culvert Performance Curve Plot: rogers1



Water Surface Profile Plot for Culvert: rogers1



Site Data - rogers1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 255.00 ft

Outlet Station: 74.00 ft

Outlet Elevation: 254.25 ft

Number of Barrels: 2

Culvert Data Summary - rogers1

Barrel Shape: Elliptical

Barrel Span: 42.00 in

Barrel Rise: 27.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Proposed-10yrsize)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	253.00	0.00	0.00	0.00	0.00
12.00	253.17	0.17	4.81	0.21	2.08
24.00	253.25	0.25	6.33	0.32	2.22
36.00	253.32	0.32	7.41	0.40	2.29
48.00	253.39	0.39	8.29	0.48	2.35
60.00	253.44	0.44	9.04	0.55	2.39
72.00	253.50	0.50	9.69	0.62	2.43
84.00	253.54	0.54	10.29	0.68	2.46
85.00	253.55	0.55	10.33	0.68	2.46
108.00	253.64	0.64	11.32	0.79	2.50
120.00	253.68	0.68	11.78	0.85	2.52

Tailwater Channel Data - Proposed-10yrsize

Tailwater Channel Option: Rectangular Channel

Bottom Width: 15.00 ft

Channel Slope: 0.0200

Channel Manning's n: 0.0130

Channel Invert Elevation: 253.00 ft

Roadway Data for Crossing: Proposed-10yrsize

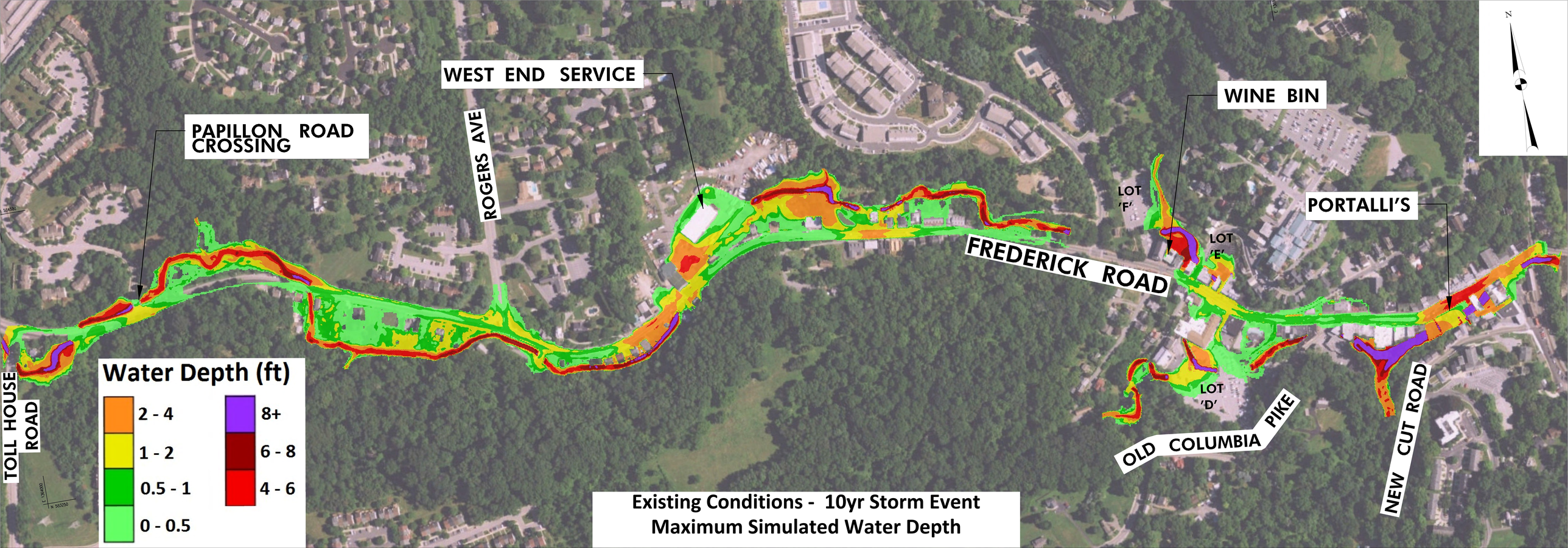
Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

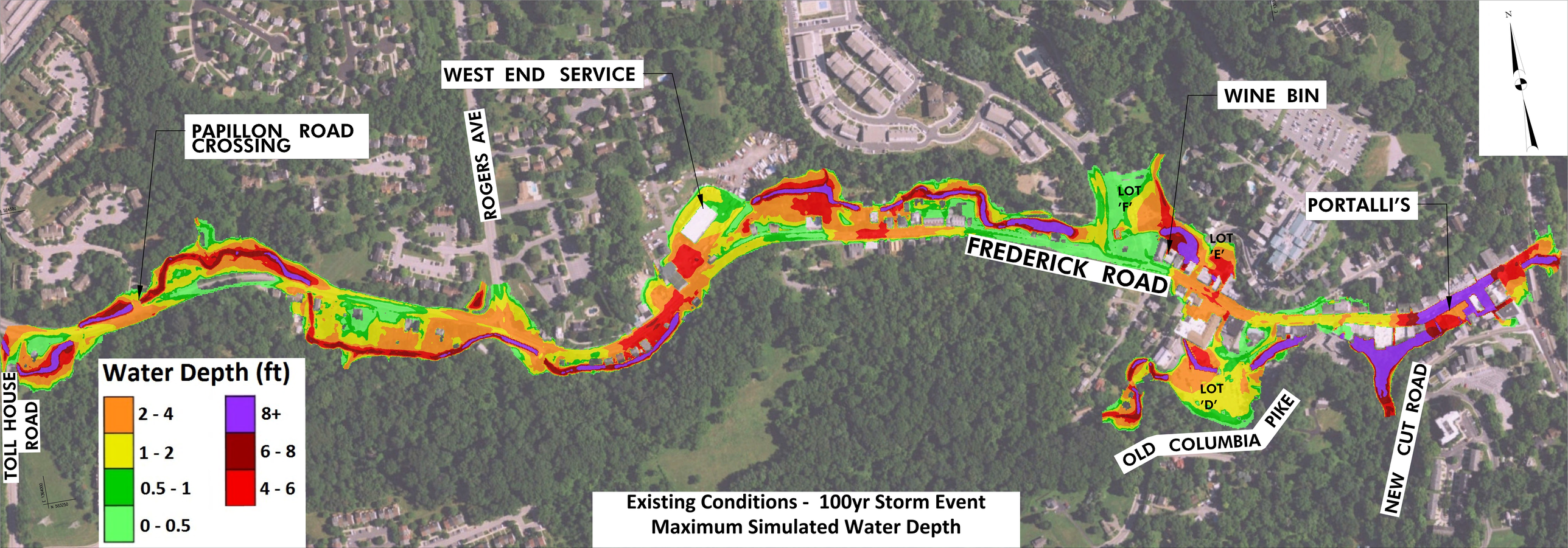
Crest Elevation: 260.00 ft

Roadway Surface: Paved

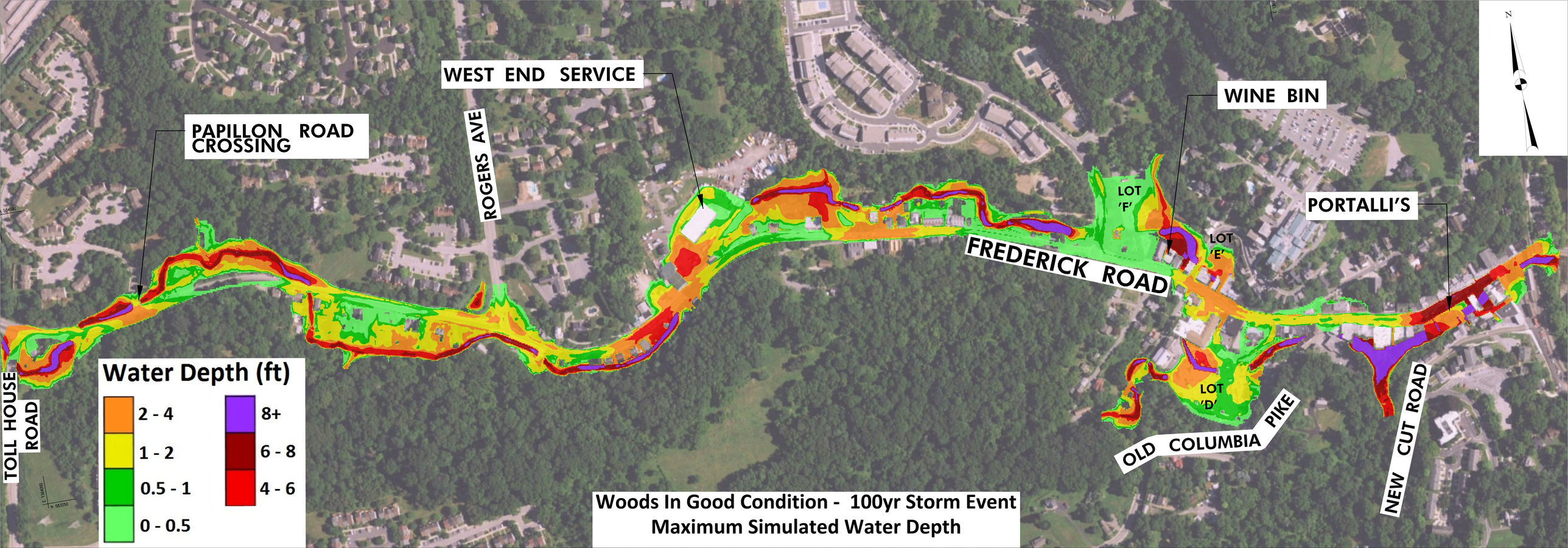
Roadway Top Width: 20.00 ft

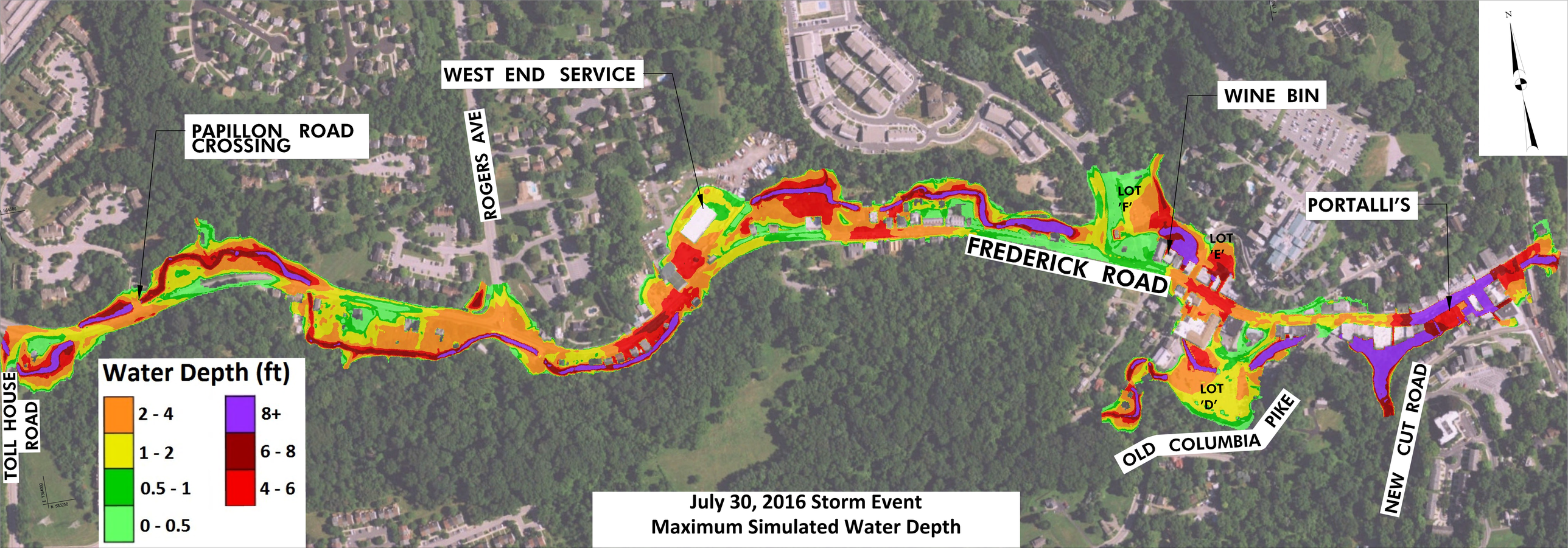


Existing Conditions - 10yr Storm Event
Maximum Simulated Water Depth

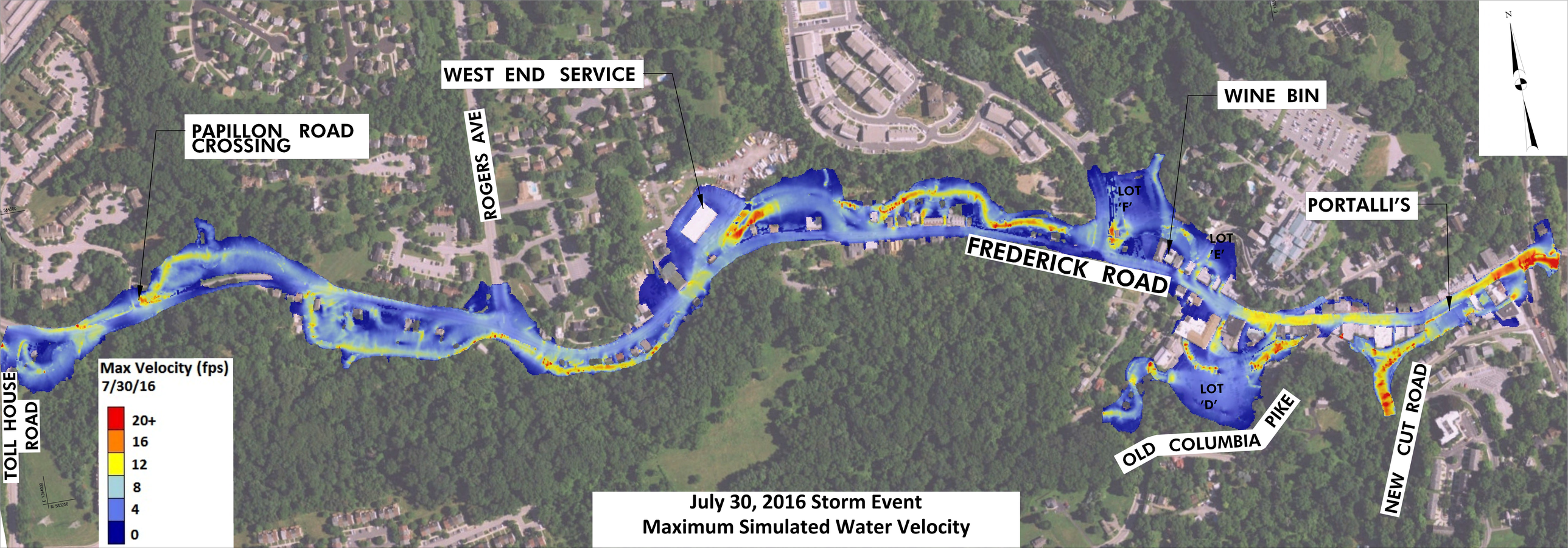


Existing Conditions - 100yr Storm Event
Maximum Simulated Water Depth

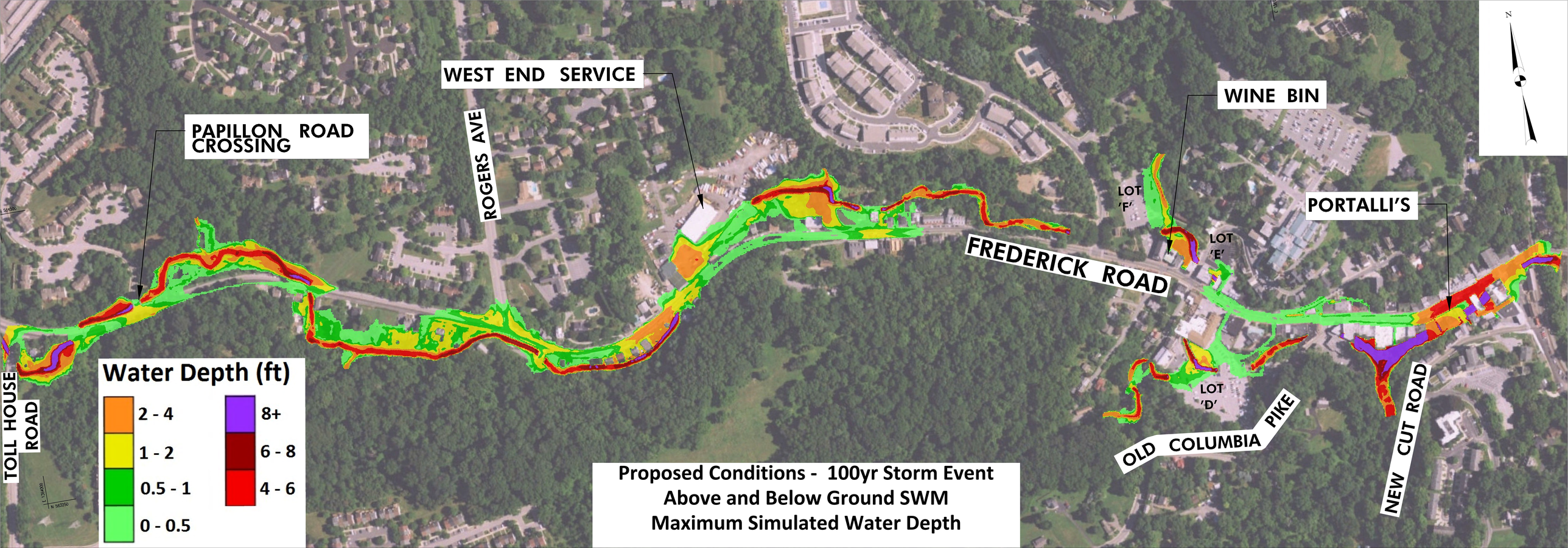

WEST END SERVICE
PAPILLON ROAD CROSSING
ROGERS AVE
WINE BIN
PORTALLI'S
LOT 'F'
LOT 'E'
LOT 'D'
FREDERICK ROAD
OLD COLUMBIA PIKE
NEW CUT ROAD
TOLL HOUSE ROAD
Water Depth (ft)
2 - 4
1 - 2
0.5 - 1
0 - 0.5
8+
6 - 8
4 - 6
Woods In Good Condition - 100yr Storm Event
Maximum Simulated Water Depth

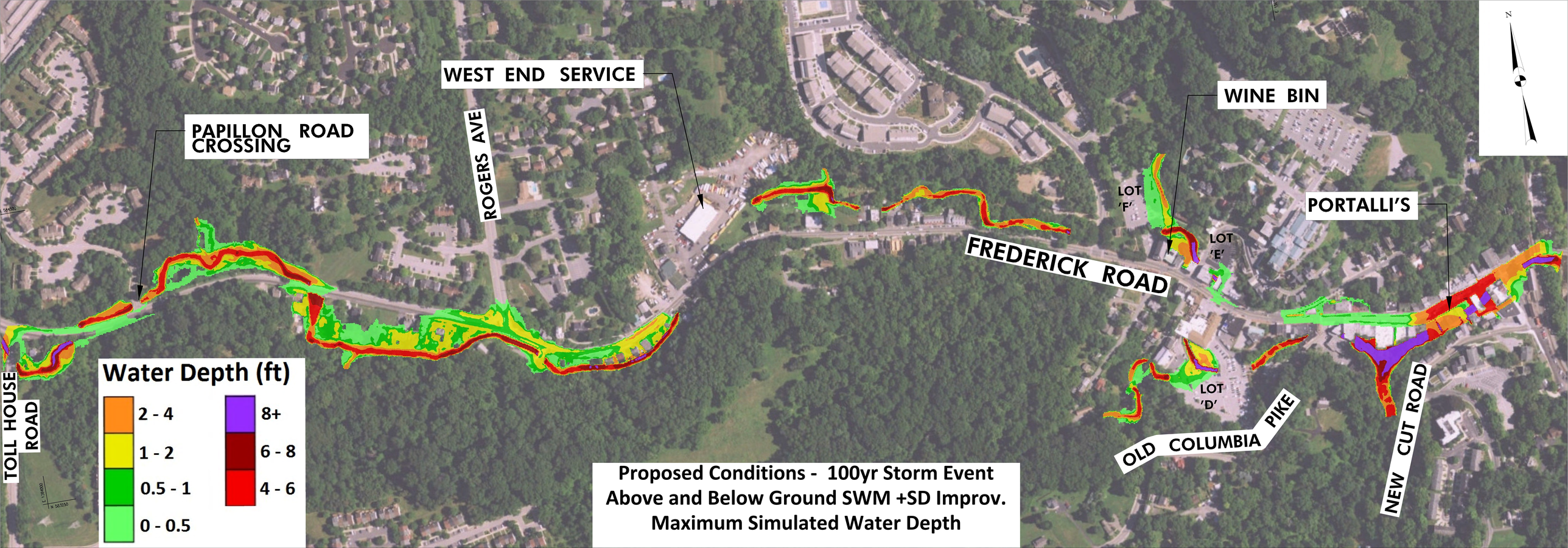


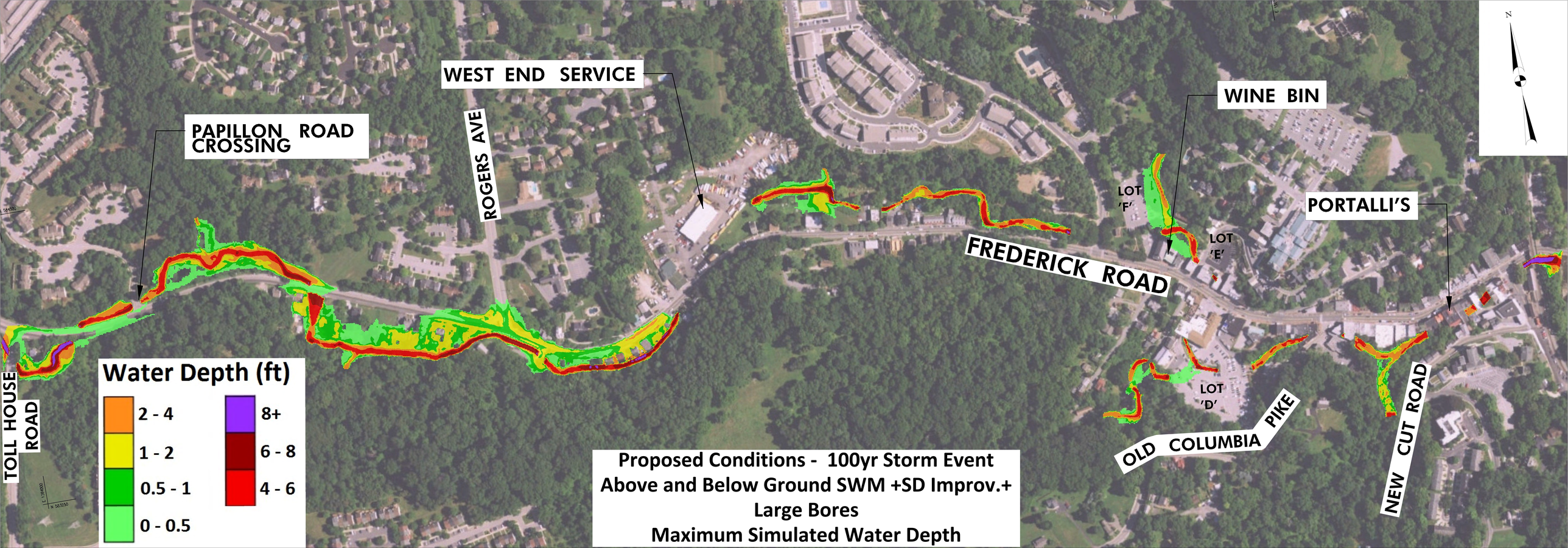
July 30, 2016 Storm Event
Maximum Simulated Water Depth

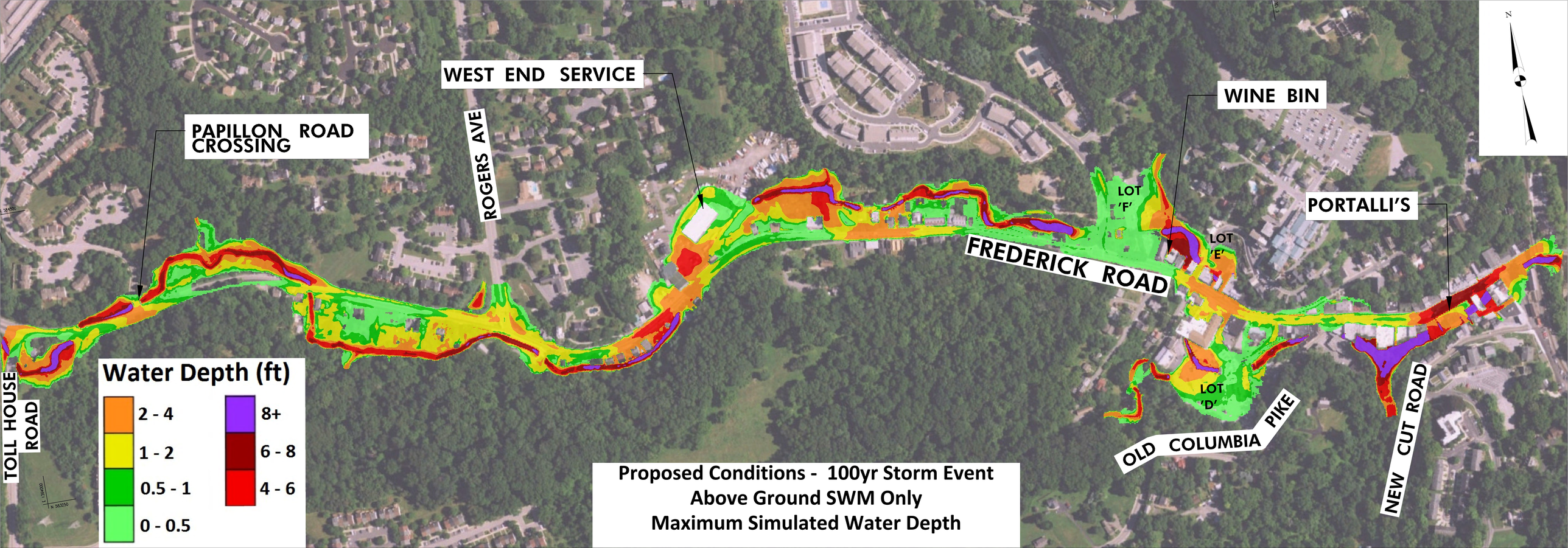


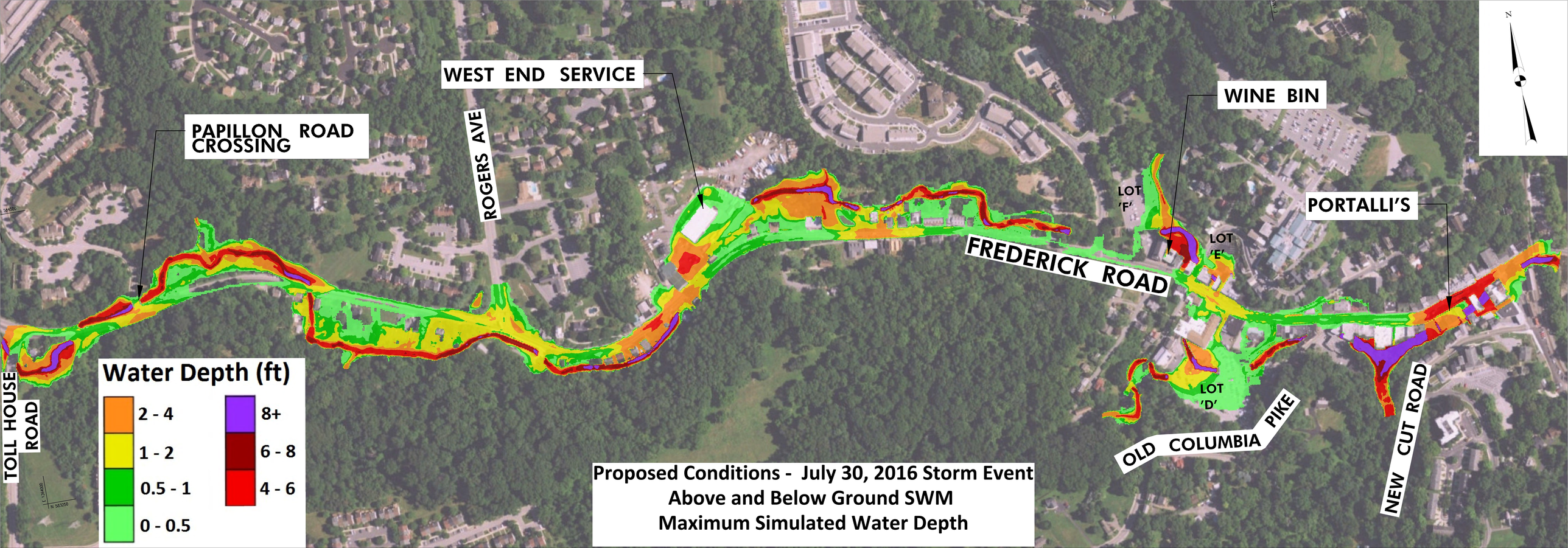
July 30, 2016 Storm Event
Maximum Simulated Water Velocity

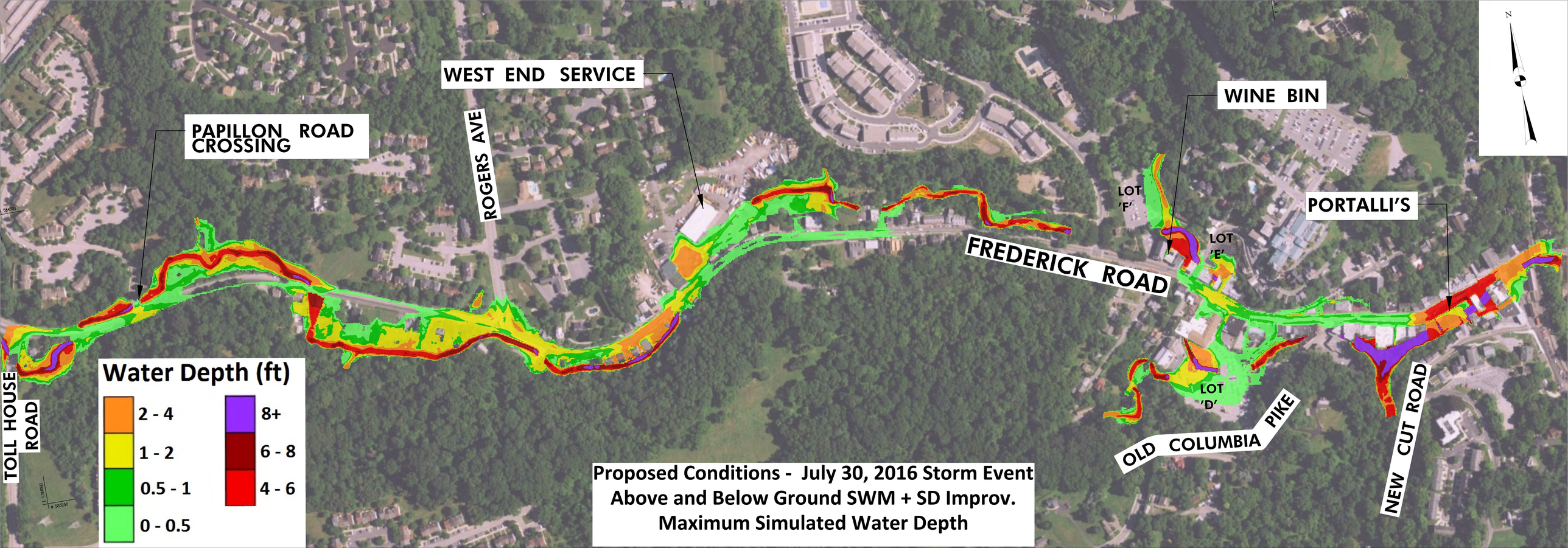

WEST END SERVICE
PAPILLON ROAD CROSSING
ROGERS AVE
WINE BIN
PORTALLI'S
LOT 'F'
LOT 'E'
LOT 'D'
FREDERICK ROAD
OLD COLUMBIA PIKE
NEW CUT ROAD
TOLL HOUSE ROAD
Water Depth (ft)
2 - 4
1 - 2
0.5 - 1
0 - 0.5
8+
6 - 8
4 - 6
Proposed Conditions - 100yr Storm Event
Above and Below Ground SWM
Maximum Simulated Water Depth

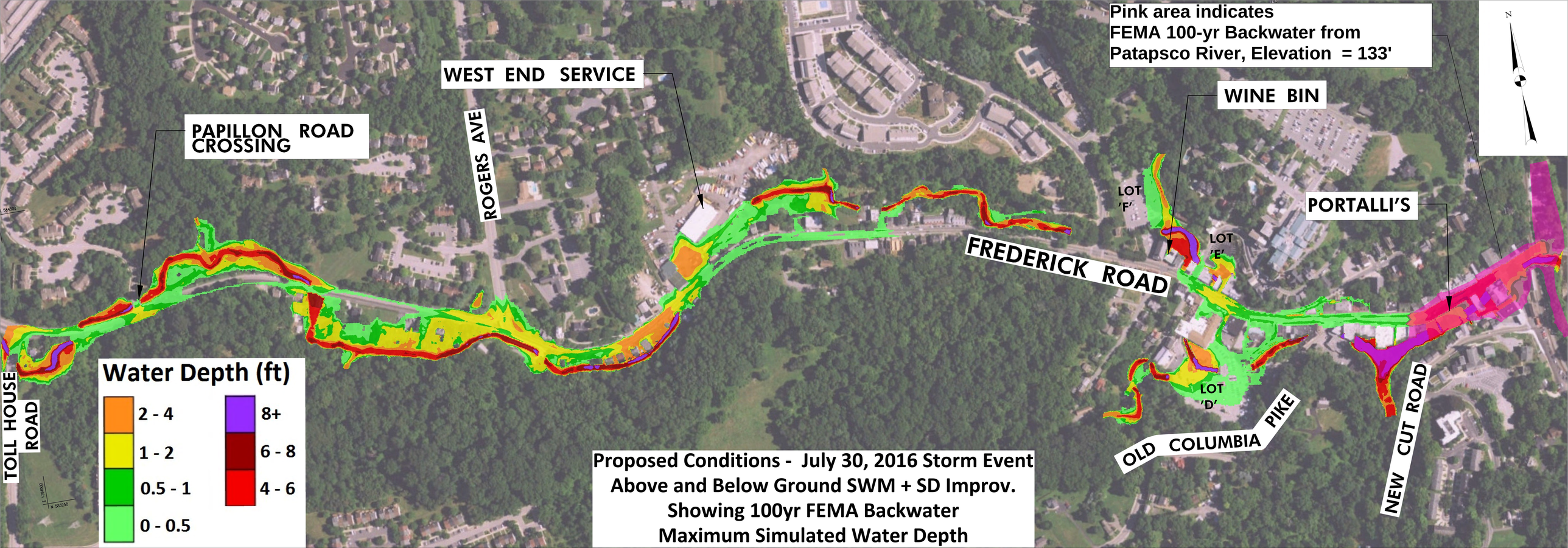

WEST END SERVICE
PAPILLON ROAD CROSSING
ROGERS AVE
WINE BIN
PORTALLI'S
LOT 'F'
LOT 'E'
LOT 'D'
FREDERICK ROAD
OLD COLUMBIA PIKE
NEW CUT ROAD
TOLL HOUSE ROAD
Water Depth (ft)
2 - 4
1 - 2
0.5 - 1
0 - 0.5
8+
6 - 8
4 - 6
Proposed Conditions - 100yr Storm Event
Above and Below Ground SWM +SD Improv.
Maximum Simulated Water Depth


WEST END SERVICE
PAPILLON ROAD CROSSING
ROGERS AVE
WINE BIN
PORTALLI'S
LOT 'F'
LOT 'E'
LOT 'D'
FREDERICK ROAD
OLD COLUMBIA PIKE
NEW CUT ROAD
TOLL HOUSE ROAD
Water Depth (ft)
2 - 4
1 - 2
0.5 - 1
0 - 0.5
8+
6 - 8
4 - 6
Proposed Conditions - 100yr Storm Event
Above and Below Ground SWM +SD Improv.+
Large Bores
Maximum Simulated Water Depth


WEST END SERVICE
PAPILLON ROAD CROSSING
ROGERS AVE
WINE BIN
PORTALLI'S
LOT 'F'
LOT 'E'
LOT 'D'
FREDERICK ROAD
OLD COLUMBIA PIKE
NEW CUT ROAD
TOLL HOUSE ROAD
Water Depth (ft)
2 - 4
1 - 2
0.5 - 1
0 - 0.5
8+
6 - 8
4 - 6
Proposed Conditions - 100yr Storm Event
Above Ground SWM Only
Maximum Simulated Water Depth


WEST END SERVICE
PAPILLON ROAD CROSSING
ROGERS AVE
WINE BIN
PORTALLI'S
LOT 'F'
LOT 'E'
LOT 'D'
FREDERICK ROAD
OLD COLUMBIA PIKE
NEW CUT ROAD
TOLL HOUSE ROAD
Water Depth (ft)
2 - 4
1 - 2
0.5 - 1
0 - 0.5
8+
6 - 8
4 - 6
Proposed Conditions - July 30, 2016 Storm Event
Above and Below Ground SWM
Maximum Simulated Water Depth


WEST END SERVICE
PAPILLON ROAD CROSSING
ROGERS AVE
WINE BIN
PORTALLI'S
LOT 'F'
LOT 'E'
LOT 'D'
FREDERICK ROAD
OLD COLUMBIA PIKE
NEW CUT ROAD
TOLL HOUSE ROAD
Water Depth (ft)
2 - 4
1 - 2
0.5 - 1
0 - 0.5
8+
6 - 8
4 - 6
Proposed Conditions - July 30, 2016 Storm Event
Above and Below Ground SWM + SD Improv.
Maximum Simulated Water Depth


Pink area indicates
FEMA 100-yr Backwater from
Patapsco River, Elevation = 133'
WEST END SERVICE
PAPILLON ROAD CROSSING
ROGERS AVE
WINE BIN
PORTALLI'S
LOT 'F'
LOT 'E'
LOT 'D'
FREDERICK ROAD
OLD COLUMBIA PIKE
NEW CUT ROAD
TOLL HOUSE ROAD
Water Depth (ft)
2 - 4
1 - 2
0.5 - 1
0 - 0.5
8+
6 - 8
4 - 6
Proposed Conditions - July 30, 2016 Storm Event
Above and Below Ground SWM + SD Improv.
Showing 100yr FEMA Backwater
Maximum Simulated Water Depth