

Plan Review and Permitting Services Memo

To: Dan Marinigh
From: Neil MacFarlane
CC: File
Date: September 1, 2021
Subject: ORCA Engineering Review – Floodplain Information for Coral Drive and Television Road, Township of Douro-Dummer

The Otonabee Region Conservation Authority (Otonabee Conservation) technical staff has been given the following items to review with respect to the proposed development project:

- Otonabee Conservation – Planning & Regulations Base Mapping (OC, August 2021)
 - Floodplain and Cross-Section Layers (OC, August 2010)
- Otonabee Conservation – Draft Curtis Creek Floodplain Mapping (OC, July 4, 2019)
 - Floodplain and Cross-Section Layers (OC, July 4, 2019)

ORCA technical staff has reviewed the above noted documents and has the following comments.

1. The watercourse that traverses north of Coral Drive is a tributary and main branch of Curtis Creek.

Figure 1 delineates the hydrology components within the vicinity of Coral Drive.

- Black arrows delineate flow direction,
- Blue lines delineate watercourse,
- Blue polygons delineate wetlands
- The Curtis Creek watershed area upstream of television Road is 720.5 Ha.

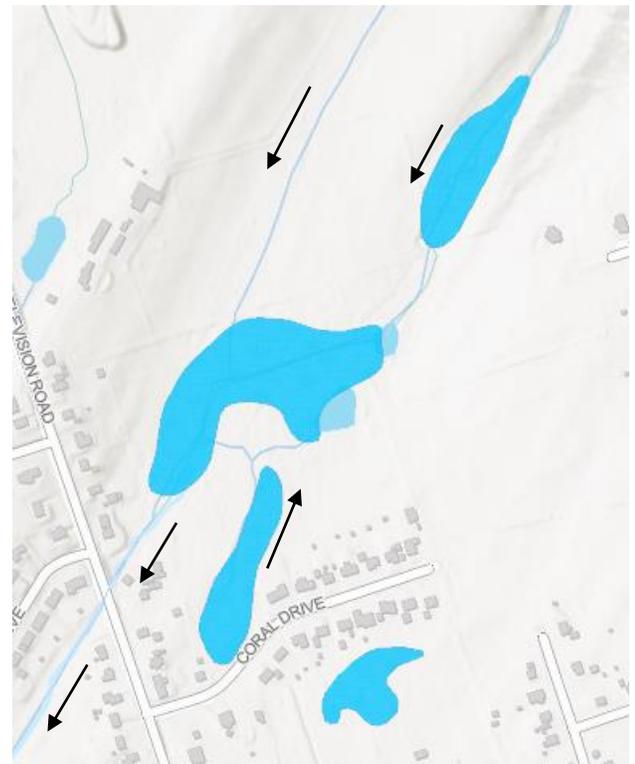


Figure 1 – Delineates Curtis Creek and Wetlands

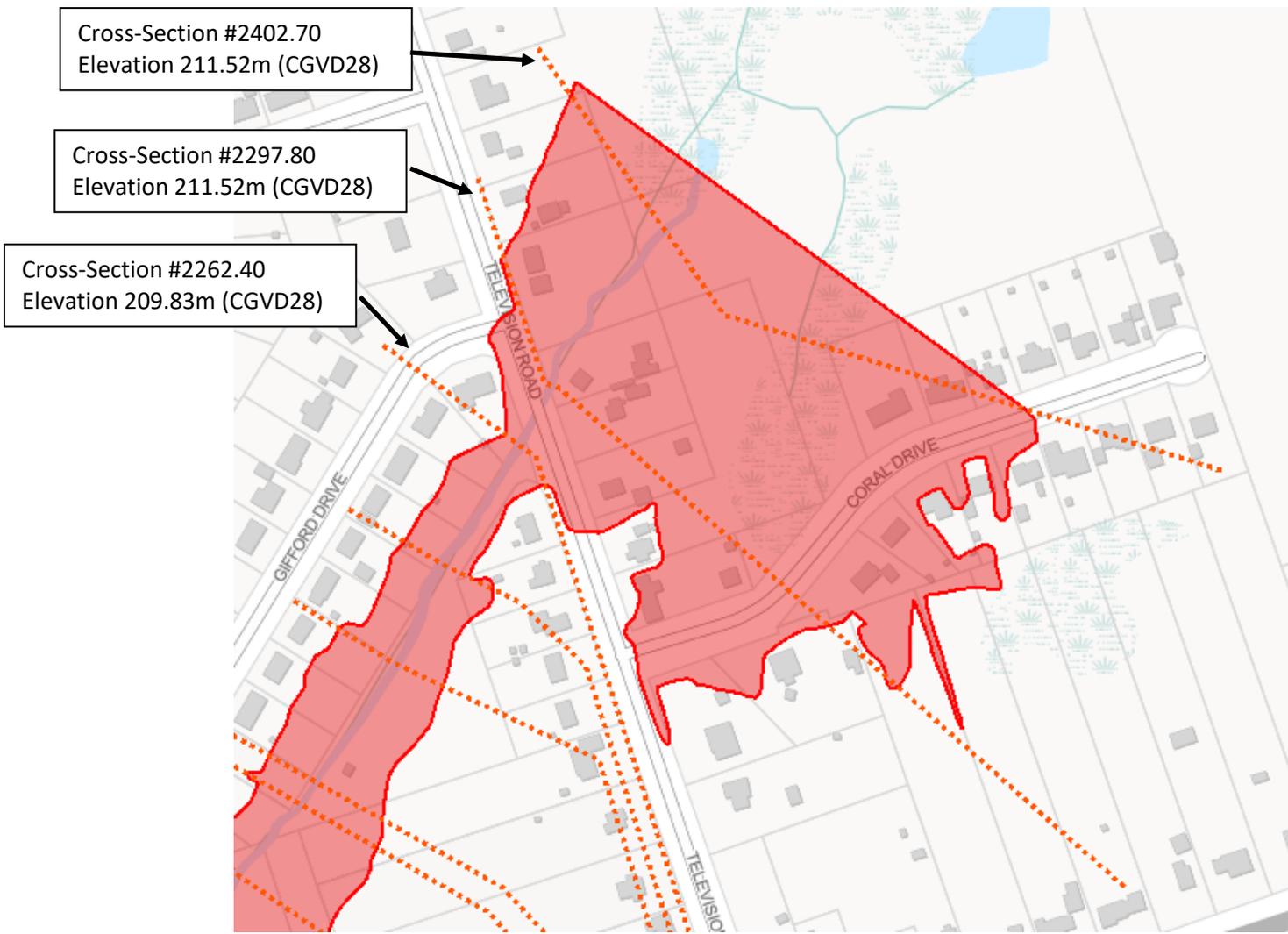


Figure 2 – ORCA Planning & Regulation Mapping 2010 Floodplain Information

2. For comparison purposes, I have included the Curtis Creek floodplain information from 2010. Figure 2 delineates the extent of the Curtis Creek Regulatory floodplain (red shading) and the location of the cross-sections (dashed lines) used in the hydraulic model. The floodplain elevations presented in the note boxes are in vertical datum CGVD28.

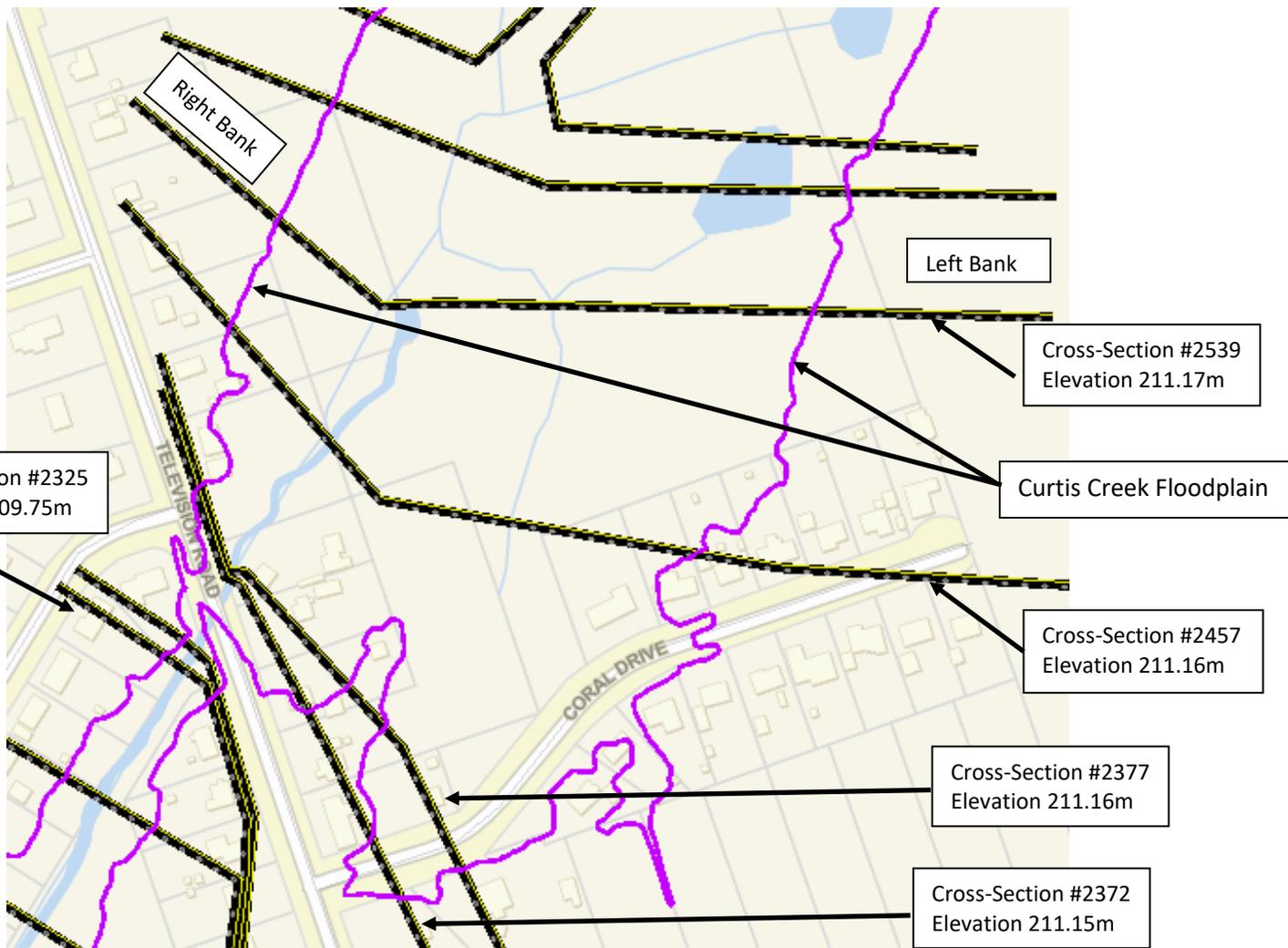


Figure 3 – Draft Curtis Creek Floodplain Mapping prepared by Otonabee Conservation (July 2019)

3. Figure 3 represents the Draft Curtis Creek Floodplain Mapping prepared by Otonabee Conservation (July 2019). The updated mapping provides a visual representation of revised hydrology and hydraulic models that incorporates updated terrain data (LiDAR), surveyed structure data and existing land use planning outlined in OP and ZBA documents.
 - Light blue lines represent the watercourse,
 - Dark lines represent the hydraulic model cross sections,
 - Thick blue line represents the Curtis Creek Regulatory Floodplain
 - Text blocks provide cross-section numbers and associated Regulatory Storm elevations. All elevations are in vertical datum CGVD28.
 - Delineate left and right banks

4. Review of Hydraulic Model and Results:

- Based on the configuration of the floodline at Television Road, the road berm and culvert are creating backwater effects on the upstream side of the road. As shown in Table 1, the culvert and berm does convey the 10-year storm flows without overtopping. The 10-year through 100-year and Timmins Storms all generate backwater effects upstream of Television Road. The 25-year through 100-year and Timmins Storms all overtop Television Road.

Table 1 Television Rd Culvert & Berm Hydraulic Model Output

Reach	River Sta	Profile	W.S. US. (m)	Min El Weir Flow (m)	Q Total (m3/s)	Q Culv Group (m3/s)	Q Weir (m3/s)
8	2354 Television Rd Culvert #1	2YR 6Hr SCS	209.54	210.72	2.60	2.60	
8	2354 Television Rd Culvert #1	5YR 6Hr SCS	210.14	210.72	4.61	4.61	
8	2354 Television Rd Culvert #1	10YR 6Hr SCS	210.73	210.72	6.19	6.19	0.00
8	2354 Television Rd Culvert #1	25YR 6Hr SCS	210.90	210.72	8.39	6.59	1.75
8	2354 Television Rd Culvert #1	50YR 6Hr SCS	210.96	210.72	10.26	6.72	3.54
8	2354 Television Rd Culvert #1	100YR 6Hr SCS	211.00	210.72	12.13	6.79	5.29
8	2354 Television Rd Culvert #1	Timmins	211.15	210.72	22.20	6.84	15.36

- The shape of the floodplain changes between cross-sections 2539 & 2457 and 2377. As outlined in Table 2, the floodplain width in sections 2539 & 2457 is 250 to 260m wide whereas the floodplain width in section 2377 is only 117m wide. The floodplain narrows as it is forced between two high (elevated terrain) points.
- Table 2 does show the effect and extent of the backwater upstream of Television Road. The water surface elevation (W.S. Elev) for approximately 300m of television Road is the same for each storm event.
- Actual difference in floodplain elevations between the 10-Year and Timmins Storms is 0.43m.

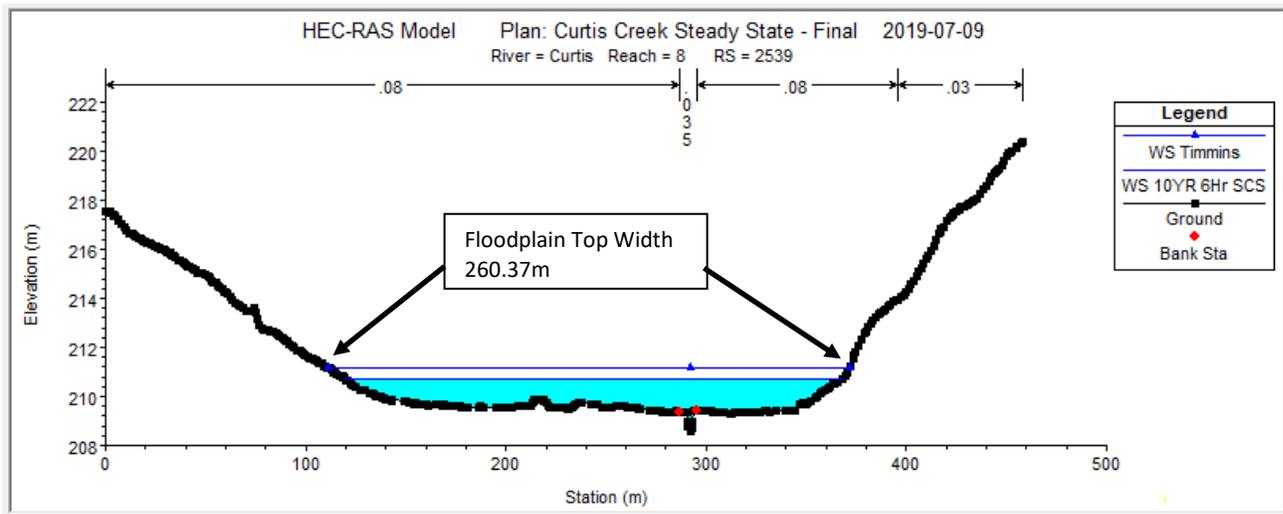


Figure 4 – Cross-Section 2539

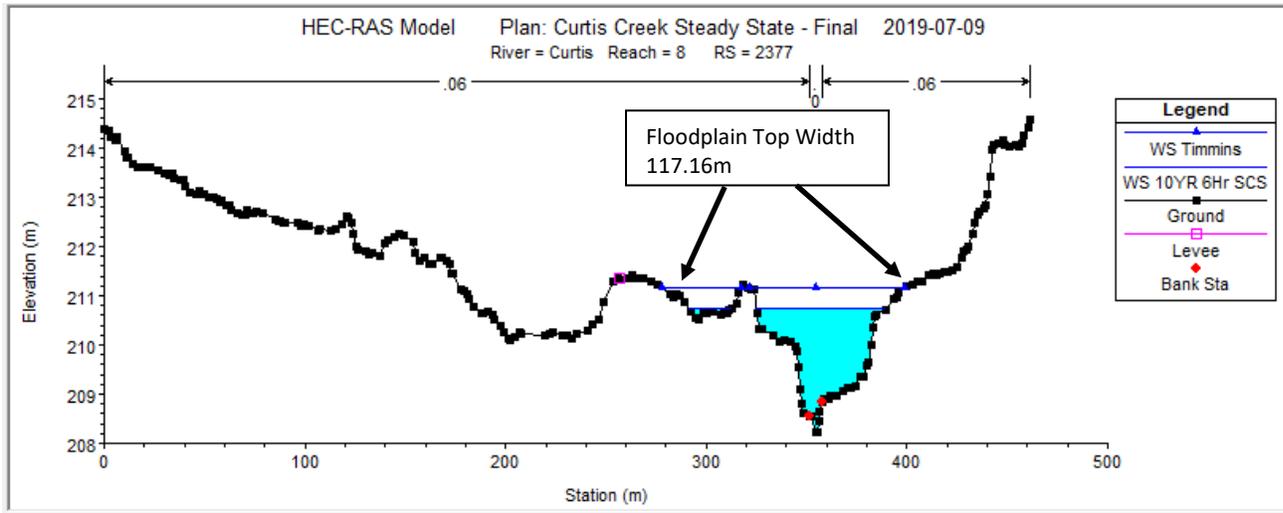


Figure 5 – Cross-Section 2477

Table 2 Hydraulic Model Cross Section Output Summary

Reach	River Sta	Profile	Q Total (m3/s)	W.S. Elev (m)	Flow Area (m2)	Top Width (m)
8	2617	2YR 6Hr SCS	2.60	209.63	14.23	114.23
8	2617	5YR 6Hr SCS	4.61	210.14	110.13	210.92
8	2617	10YR 6Hr SCS	6.19	210.73	238.76	233.29
8	2617	25YR 6Hr SCS	8.39	210.90	279.57	240.51
8	2617	50YR 6Hr SCS	10.26	210.96	293.56	241.19
8	2617	100YR 6Hr SCS	12.13	211.00	303.99	241.68
8	2617	Timmins	22.20	211.17	343.80	244.02
8	2539	2YR 6Hr SCS	2.60	209.56	16.28	113.39
8	2539	5YR 6Hr SCS	4.61	210.14	130.92	225.17
8	2539	10YR 6Hr SCS	6.19	210.73	270.52	248.97
8	2539	25YR 6Hr SCS	8.39	210.90	313.68	254.73
8	2539	50YR 6Hr SCS	10.26	210.96	328.50	255.71
8	2539	100YR 6Hr SCS	12.13	211.00	339.55	256.88
8	2539	Timmins	22.20	211.17	381.79	260.37
8	2457	2YR 6Hr SCS	2.60	209.55	25.95	49.30
8	2457	5YR 6Hr SCS	4.61	210.14	74.14	130.03
8	2457	10YR 6Hr SCS	6.19	210.73	185.31	238.18
8	2457	25YR 6Hr SCS	8.39	210.90	226.61	245.04
8	2457	50YR 6Hr SCS	10.26	210.96	241.02	250.77
8	2457	100YR 6Hr SCS	12.13	211.00	251.81	251.48
8	2457	Timmins	22.20	211.16	292.87	253.84
8	2377	2YR 6Hr SCS	2.60	209.55	21.09	33.64
8	2377	5YR 6Hr SCS	4.61	210.14	43.15	47.81
8	2377	10YR 6Hr SCS	6.19	210.73	78.48	86.01
8	2377	25YR 6Hr SCS	8.39	210.90	94.04	94.94
8	2377	50YR 6Hr SCS	10.26	210.96	99.57	98.19
8	2377	100YR 6Hr SCS	12.13	211.00	103.78	101.30
8	2377	Timmins	22.20	211.16	121.06	117.16

- Figure 6 provides point elevation data along Coral Drive. The information in Figure 6 is taken from the County of Peterborough GIS System. The layers presented are the 2018 air photo and the LiDAR/DEM elevations. The LiDAR/DEM elevations have been converted back to vertical datum CGVD28 (from CGVD2013 by minus 0.35m) to correspond with the floodplain elevation data.
- Comparing the floodplain elevations (W.S. Elev) from Table 2 Hydraulic Model Cross Section Output Summary with the road elevations in Figure 6, flood waters from Curtis Creek will spill over Coral Drive during a 10-year storm event.

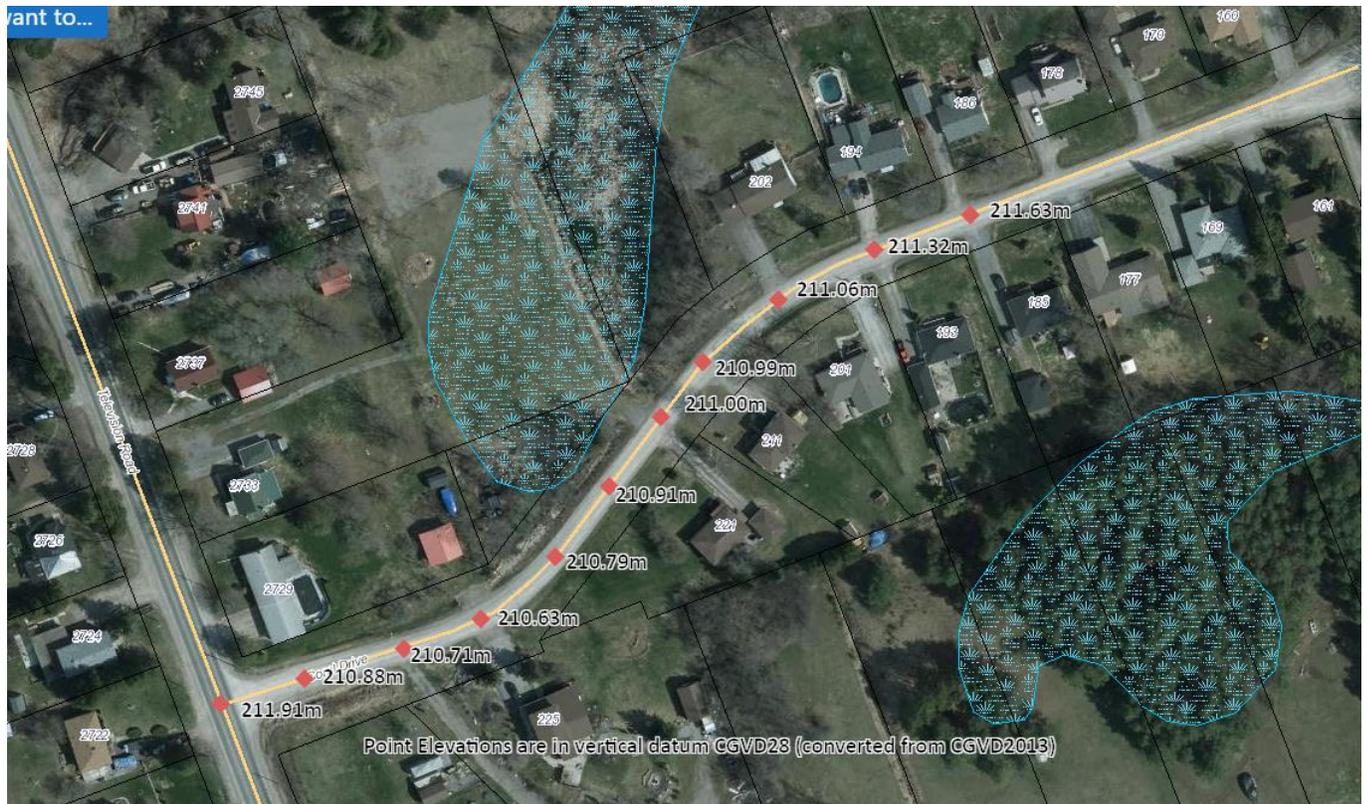


Figure 6 - County of Peterborough GIS System – LiDAR/DEM Elevations

- Figure 7 is a plot of Cross-Section # 2377 from the hydraulic model and represents the terrain (elevation) across the cross-section. Please reference Figure 3 for cross-section location.
- Figure 8 is the same plot of Cross-Section # 2377 but has been zoomed in to the extent of the floodplain. Figure 8 also shows the location of Coral Drive, Curtis Creek and the flood elevations for both the Regulatory (Timmins) storm and the 10-Year storm.
- The floodplain is drawn between cross-sections by following the storm floodplain elevation along the ground elevation using the digital elevation model (DEM) created from the LiDAR point data.

- The DEM data shows that the 10-year storm flood elevation crosses Coral Drive.

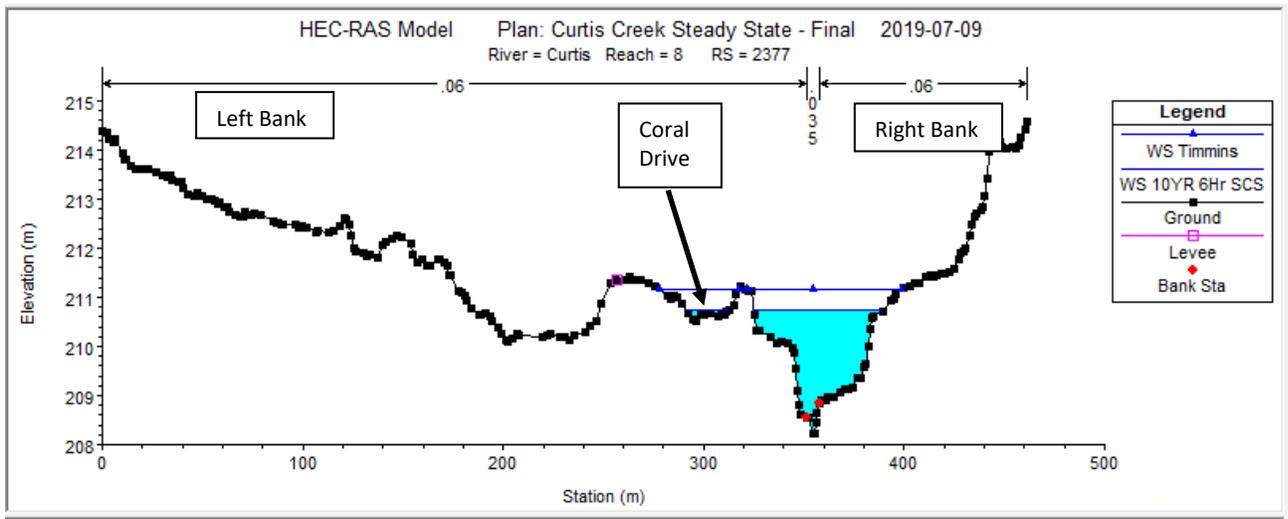


Figure 5 – A Plot of Cross-Section #2377

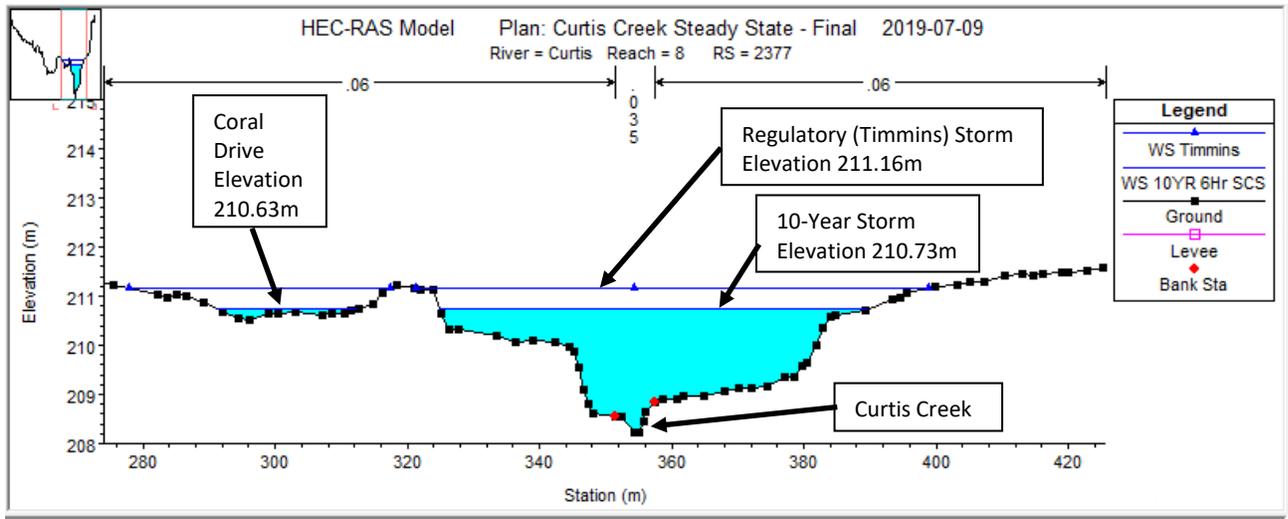


Figure 8 – Cross-Section #2377 Zoomed to Floodplain Extent

If you have any questions related to this correspondence, please contact our office.

Sincerely,

Neil MacFarlane
Engineering Technologist