

Appendix 'I'

Flood Hazard Assessment – Supplemental Information



December 19, 2022

Reference: 21-769
SCRCA Reference No#2020-0846

St. Clair Region Conservation Authority
205 Mill Pond Crescent
Strathroy, Ontario

Attention: Rashida Naznin, P.Eng., Engineering Technician
Reference: Strathroy Development – Buchanan Crossings - Cut/Fill Analysis

Dear Ms. Naznin,

Greck and Associates Limited (Greck) is pleased to provide this letter to detail an updated hydraulic assessment to the Buchanan Crossings subdivision, located within Strathroy, Ontario, referred to as Pt. Lot 19, Concession 4. A previous flood study had been completed and submitted on December 8th, 2021, as to which this letter includes an update of the works utilizing more accurate topographic survey, as well as a review and discussion on proposed cut/fill works. Details of this assessment are provided under a separate cover.

Under the previous assessment, regulatory flood hazard limits were confirmed by developing a hydrologic and hydraulic model of the Cable Drain, which bisects the proposed subdivision. The assessment concluded that regulatory floodplain limits should be defined by the Regional Storm event, referred to as “Hurricane Hazel”.

Hydraulic Modelling Updates

The hydraulic model was updated using topographic survey completed by BM. Ross dated November 16, 2021. Where topographic survey was not available, the previous LiDAR DEM geometry was maintained.

Various cross sections were re-positioned to more appropriately define watercourse geometry where future watercourse crossings are anticipated (i.e. two upstream and downstream bounding cross sections). It should be noted that recommended culvert/bridge geometries have not been provided as part of this submission and will be included during detailed design stages of the subdivision. Updated HEC-RAS hydraulic modeling is provided as an attachment to this letter for review.

Provided below in **Figure 1** and **Figure 2** is an outline of the HEC-RAS modelling schematic overlain on Google Earth Aerial imagery and the extents of the topographic survey Digital Elevation model.

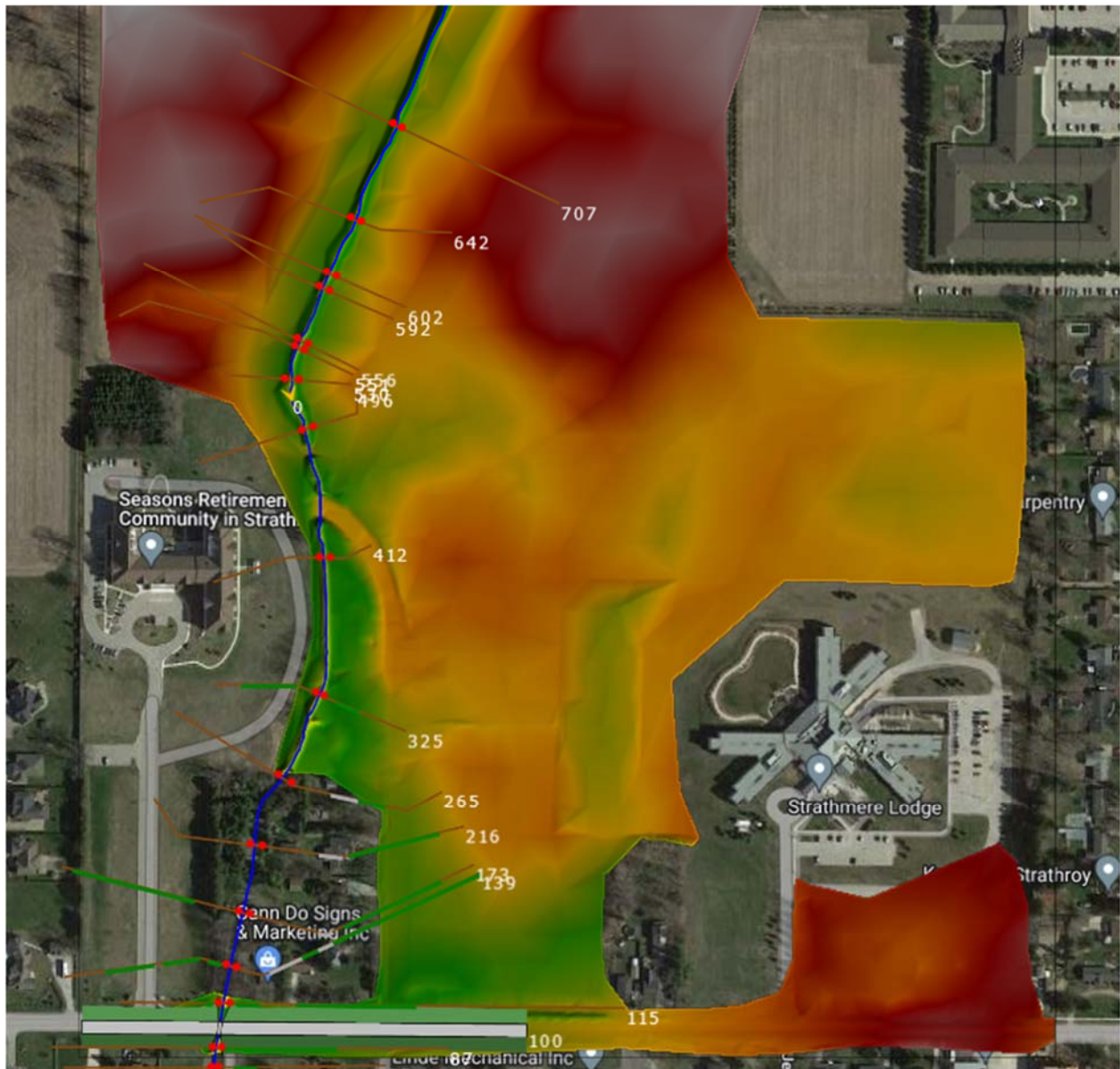


FIGURE 1: HEC-RAS MODELLING SCHEMATIC & TOPOGRAPHIC SURVEY LIMITS (A)

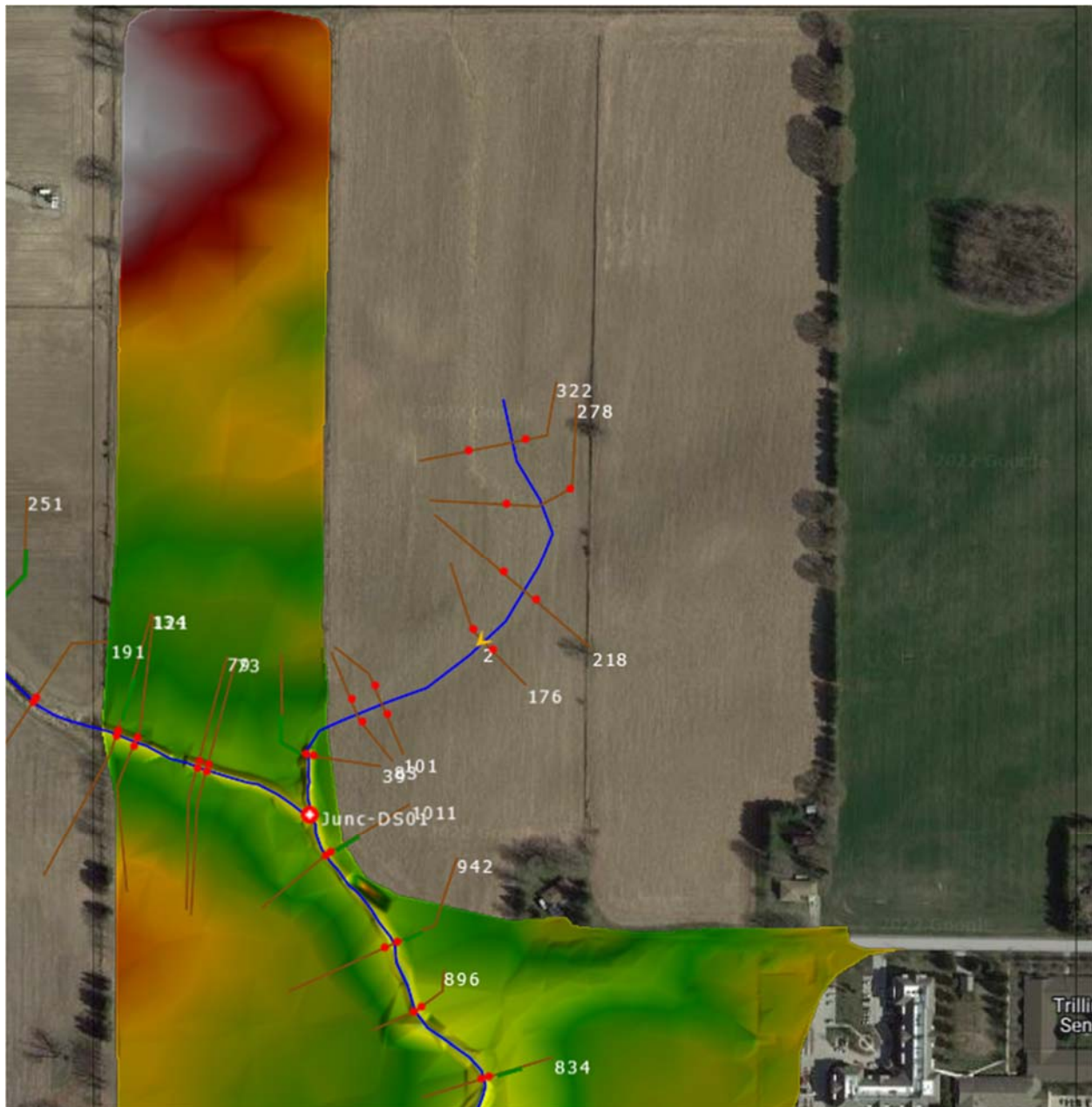


FIGURE 2: HEC-RAS MODELLING SCHEMATIC & TOPOGRAPHIC SURVEY LIMITS (B)

Proposed Cut/Fill Works

Conceptual grading has been proposed by BM. Ross to accommodate development. As such, a proposed hydraulic modelling scenario has been included. This assessment has been completed to determine floodplain impacts (if any) due to any grading measures, as well as determined impacts of proposed cut/fill works.

To service the subdivision, various stormwater management ponds are proposed to provide various quality, quantity and erosion control measures. Due to grading

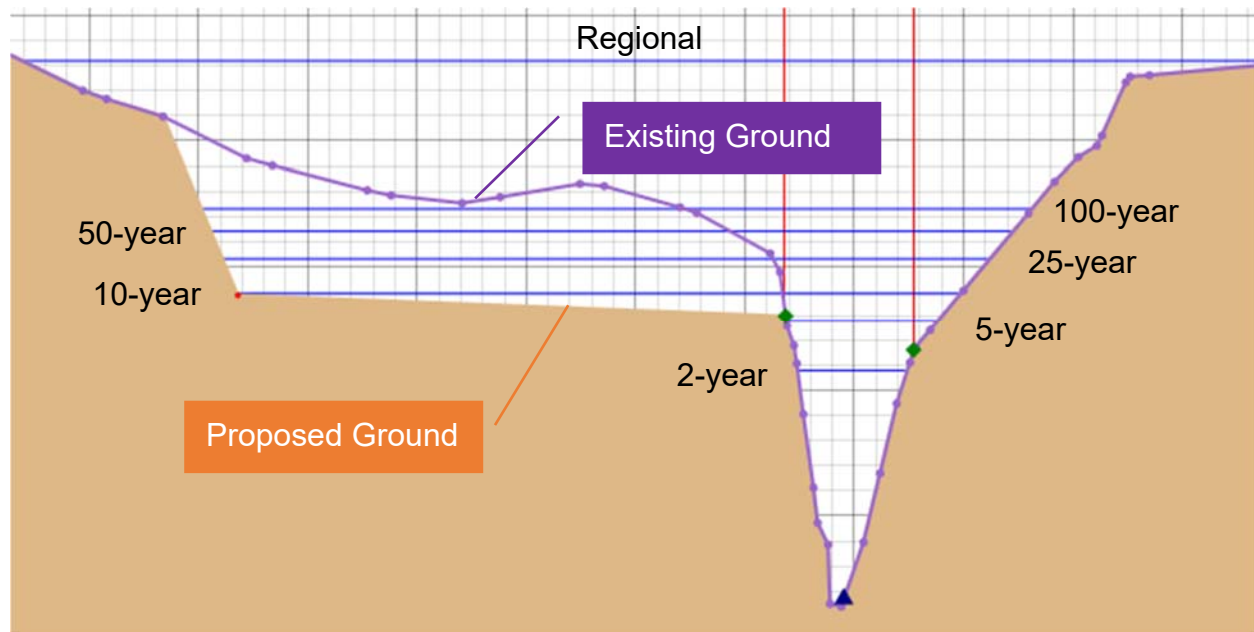


FIGURE 4: CUT-FILL CONCEPT AT SECTION 325

From the above, it is demonstrated that the 2-year (and 5-year) storms are still contained within the banks of the channel, representative of an overly conservative bankfull flow condition (typically, ~1.5-year storm event). This allows for a greater factor of safety, should future channel enlargement occur.

From the above, it can be seen that the existing Cable Drain provides little to no floodplain access (entrenched channel, where floodplain access is only provided for the 50-year storm event and above). This improved floodplain access allows for erosion mitigation, improve channel stability and provide improved riparian habitat features, as it is more representative of natural channel system.

At the location of the pond and adjacent lots, fill is only proposed to accommodate the proposed stormwater management facility (infiltration basin). Only fill is placed within approximately the 100-year flood elevation (227.11m) and Regional (227.71m) and has no impacts on the smaller storm events. The fill placed in this area is only activated during backwater effects, where water would back up through ditch drainage, driveway culverts etc. As such, this filled area can be considered ineffective and would have no impact to flood constraints.

The above is a favorable approach, as the cut works provide improved conveyance area for smaller storm events (i.e., 10-year and above), and fill within higher return period floodplains, backwater areas where conveyance is not provided at all.

Provided below in **Table 1** is a summary of the existing and proposed flood elevations due to the conceptual cut/fill works.

TABLE 1: EXISTING AND PROPOSED CUT-FILL FLOOD IMPACTS (REACH 0)

Section	10 year			25 year			50 year			100 year			Regional		
	Ex.	Pr.	Delta	Ex.	Pr.	Delta	Ex.	Pr.		Ex.	Pr.		Ex.	Pr.	Pr.
38	226.29	226.29	0.00	226.38	226.38	0.00	226.45	226.45	0.00	226.51	226.51	0.00	227.01	227.01	0.00
75	226.40	226.40	0.00	226.48	226.48	0.00	226.54	226.54	0.00	226.59	226.59	0.00	227.01	227.01	0.00
87	226.50	226.50	0.00	226.59	226.59	0.00	226.66	226.66	0.00	226.72	226.72	0.00	227.25	227.25	0.00
100	Napperton Drive														
115	226.71	226.71	0.00	226.87	226.87	0.00	227.00	227.00	0.00	227.11	227.11	0.00	227.72	227.72	0.00
139	226.73	226.73	0.00	226.89	226.89	0.00	227.02	227.02	0.00	227.13	227.13	0.00	227.71	227.71	0.00
173	226.78	226.78	0.00	226.93	226.93	0.00	227.05	227.05	0.00	227.16	227.16	0.00	227.74	227.74	0.00
216	226.82	226.82	0.00	226.96	226.96	0.00	227.08	227.08	0.00	227.18	227.18	0.00	227.77	227.77	0.00
265	226.85	226.85	0.00	227.00	227.00	0.00	227.11	227.11	0.00	227.21	227.21	0.00	227.79	227.79	0.00
325	226.88	226.88	0.00	227.02	227.02	0.00	227.12	227.12	0.00	227.21	227.21	0.00	227.80	227.80	0.00
412	227.04	227.04	0.00	227.17	227.17	0.00	227.26	227.26	0.00	227.34	227.34	0.00	227.89	227.89	0.00
496	227.20	227.20	0.00	227.31	227.31	0.00	227.40	227.40	0.00	227.47	227.47	0.00	228.01	228.01	0.00
530	227.27	227.27	0.00	227.38	227.38	0.00	227.47	227.47	0.00	227.54	227.54	0.00	228.12	228.12	0.00
551	227.28	227.28	0.00	227.38	227.38	0.00	227.47	227.47	0.00	227.53	227.53	0.00	228.11	228.11	0.00
556	227.30	227.30	0.00	227.41	227.41	0.00	227.50	227.50	0.00	227.56	227.56	0.00	228.14	228.14	0.00
592	227.45	227.45	0.00	227.55	227.55	0.00	227.62	227.62	0.00	227.68	227.68	0.00	228.25	228.25	0.00
602	227.47	227.47	0.00	227.57	227.57	0.00	227.64	227.64	0.00	227.70	227.70	0.00	228.27	228.27	0.00
642	227.55	227.55	0.00	227.65	227.65	0.00	227.73	227.73	0.00	227.79	227.79	0.00	228.33	228.33	0.00
707	227.67	227.67	0.00	227.77	227.77	0.00	227.85	227.85	0.00	227.91	227.91	0.00	228.44	228.44	0.00
834	228.01	228.01	0.00	228.11	228.11	0.00	228.19	228.19	0.00	228.25	228.25	0.00	228.71	228.71	0.00
896	228.16	228.16	0.00	228.25	228.25	0.00	228.33	228.33	0.00	228.39	228.39	0.00	228.90	228.90	0.00
942	228.35	228.35	0.00	228.45	228.45	0.00	228.53	228.53	0.00	228.59	228.59	0.00	229.11	229.11	0.00
1011	228.52	228.52	0.00	228.59	228.59	0.00	228.64	228.64	0.00	228.68	228.68	0.00	229.31	229.31	0.00

From the above, it is demonstrated that there are no impacts due to such cut/fill works, and that the proposed grading works by BM. Ross will have no adverse impacts to upstream and downstream landowners.

Conclusions

This letter summarizes the updated hydraulic modelling completed within the Buchanan Crossings development within the town of Strathroy, Ontario. The assessment included an updated the hydraulic modelling using refined topography, as well as anticipation for future development (watercourse crossings etc.) as well as an assessment of cut and fill implications throughout the property.

Fill works were required to accommodate a proposed stormwater management-infiltration basin and adjacent lots, where fill was placed in a low-lying area that becomes inundated by the regulatory floodplain. The fill works are localized in an isolated ineffective flow area which becomes flooded only due to backwater effects through ditch drainage.

Compensatory cuts are proposed upstream within the development limits, where the cuts will provide improved flood conveyance and improved floodplain access, resulting in an overall benefit to flood and erosion conditions associated with the Cable Drain.

As such, it can be concluded that the proposed cut-fill works provide a net improvement throughout the property limits, and will have no adverse effects to watershed wide hydrology and hydraulics of the Cable Drain.

We trust this letter is sufficient to receive approval for the updated floodline, and as such, approval from SCRCA.

If you have questions or require further details, please feel free to contact me at (289) 657-9797 ext. 229 or ssexton@greck.ca.

Sincerely,
GRECK AND ASSOCIATES LIMITED



Scott Sexton, P.Eng.
Water Resources Engineer – Project Manager



APPENDICES

Cut/Fill Report

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Volume Summary							
Name	Type	Cut Factor	Fill Factor	2d Area (sq.m)	Cut (Cu. M.)	Fill (Cu. M.)	Net (Cu. M.)
Block137 Cut	full	1.000	1.000	2094.14	782.60	1.95	780.65<Cut>
Block136 Fill	full	1.000	1.000	2257.18	4.70	676.50	671.80<Fill>

Totals					
		2d Area (sq.m)	Cut (Cu. M.)	Fill (Cu. M.)	Net (Cu. M.)
Total		4351.33	787.30	678.45	108.84<Cut>

* Value adjusted by cut or fill factor other than 1.0