August 26, 2022
WE: 22033

Dr. Archie Sirati, P.Eng.,
Sirati & Partners
12700 Keele St.
King City, Ontario
L7B 1H5

Dear Dr. Sirati:

RE: 159 Huronia Drive, Barrie, Ontario
Hydraulic Analysis and Floodplain Analysis

1. Introduction

We are pleased to provide you with the results of our hydraulic analysis for the above noted project. The intent of this memo is to provide the methodology and results of the hydraulic analysis and the resulting floodlines for the study area. The study area is 159 Huronia Dr., East of the Whiskey Creek within the regulatory floodplain, as shown in **Map 1**.

2. Background and Methodology

The hydraulic analysis was completed using HEC-RAS version 6.2. The existing *Draft* floodplain hydraulic model was provided by Lake Simcoe Regional Conservation Authority (LSRCA) for the reach of the Whiskey Creek East of Huronia Dr. and Little Ave. Cross-sections were interpolated with the LSRCA model (between station 1543 and 1608) to provide finer detail. Then the cross sections were updated based upon the DTM provided by LSRCA (also in station 1237-1383 adjacent to the property). The model geometry was updated based on the proposed site plan provided by Sirati & Partners on July 6, 2022. A combined DTM surface was created in AutoCAD 3D to merge the proposed conditions with the existing terrain. Similar cross-sections were applied to the existing conditions model to facilitate a direct comparison between existing and proposed conditions while minimizing systemic error.

The current model includes the Regional Storm event (Hurricane Hazel) modelled, 100 year storm, and 2 year storm.

The channel roughness was based on the values used on adjacent cross sections in the existing conditions model (0.04 for overland flow and 0.03 for in channel flow). All cross-sections used contraction and expansion coefficients of 0.1 and 0.3, respectively since there was no major expansions or contractions within the study reach.

The floodlines were delineated based on the modelled HEC-RAS water surface elevations.

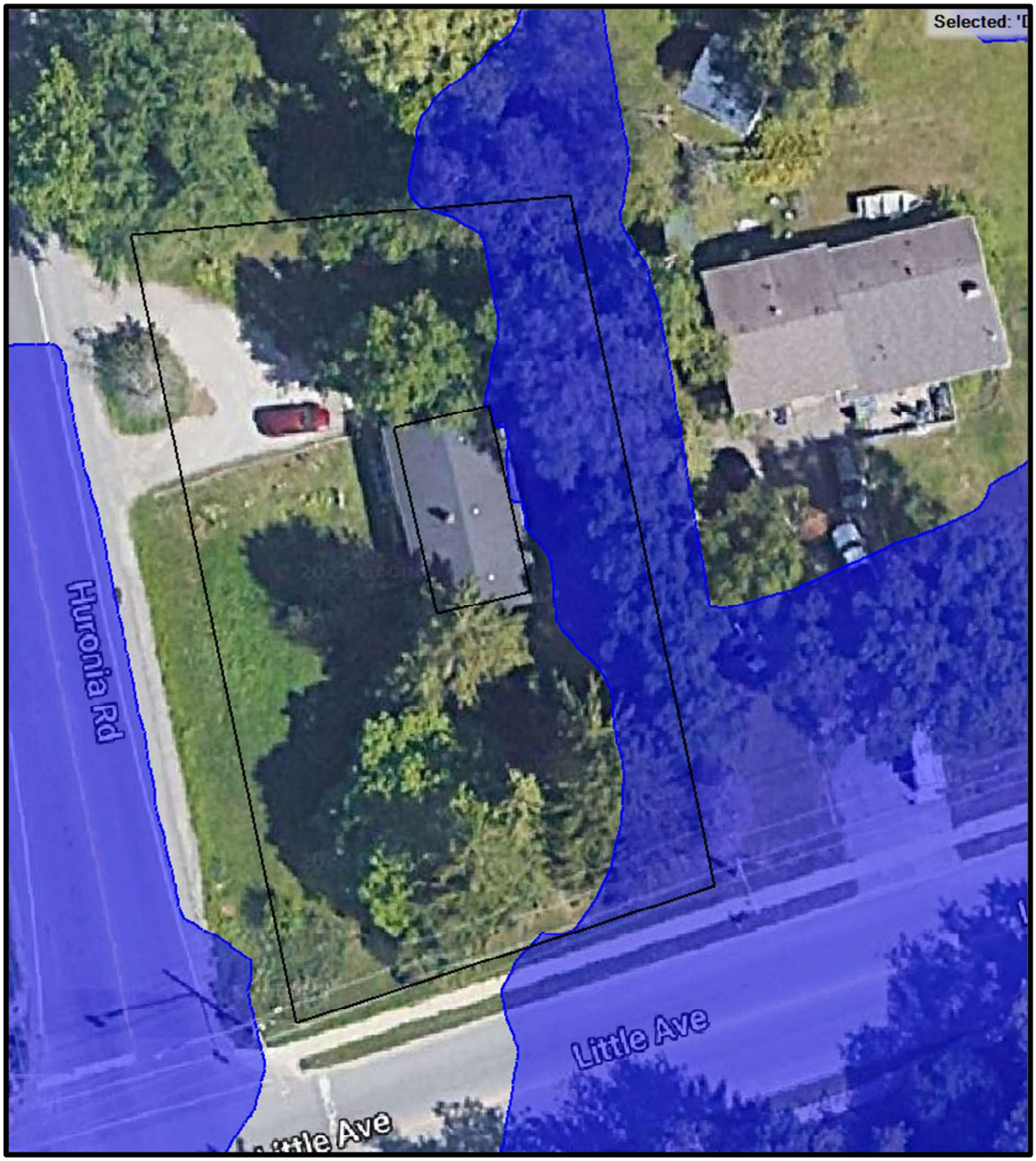


Figure 1 HEC-RAS Inundation Boundary of Hurricane Hazel on 159 Huronia Dr.

3. Results

The modelling results show that the floodplain inundation partially covers the proposed property. See **Table 1** For HEC-RAS outputs. Based on FP analysis, it was identified that the existing elevations within the proposed limit of work would generally have to be raised to ensure the site would remain out of the Regional Storm Floodplain.

4. Summary

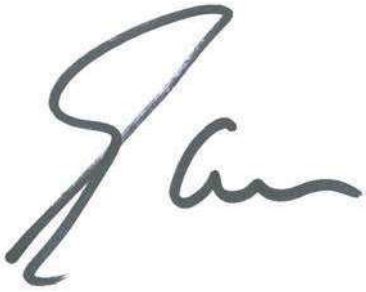
The following results are noted:

1) The provided HEC-RAS model was updated to reflect existing conditions. Model changes other than the proposed works were reflected in both models to facilitate real life conditions.
2) A portion of the proposed development will be located within the Regional Storm Floodplain. It is recommended that a Structural Engineer design the proposed walls in consideration of these depth and velocity values.

The HEC RAS model will be provided as part of the digital submission package.

Should you have any comments or questions please do not hesitate to contact the undersigned.

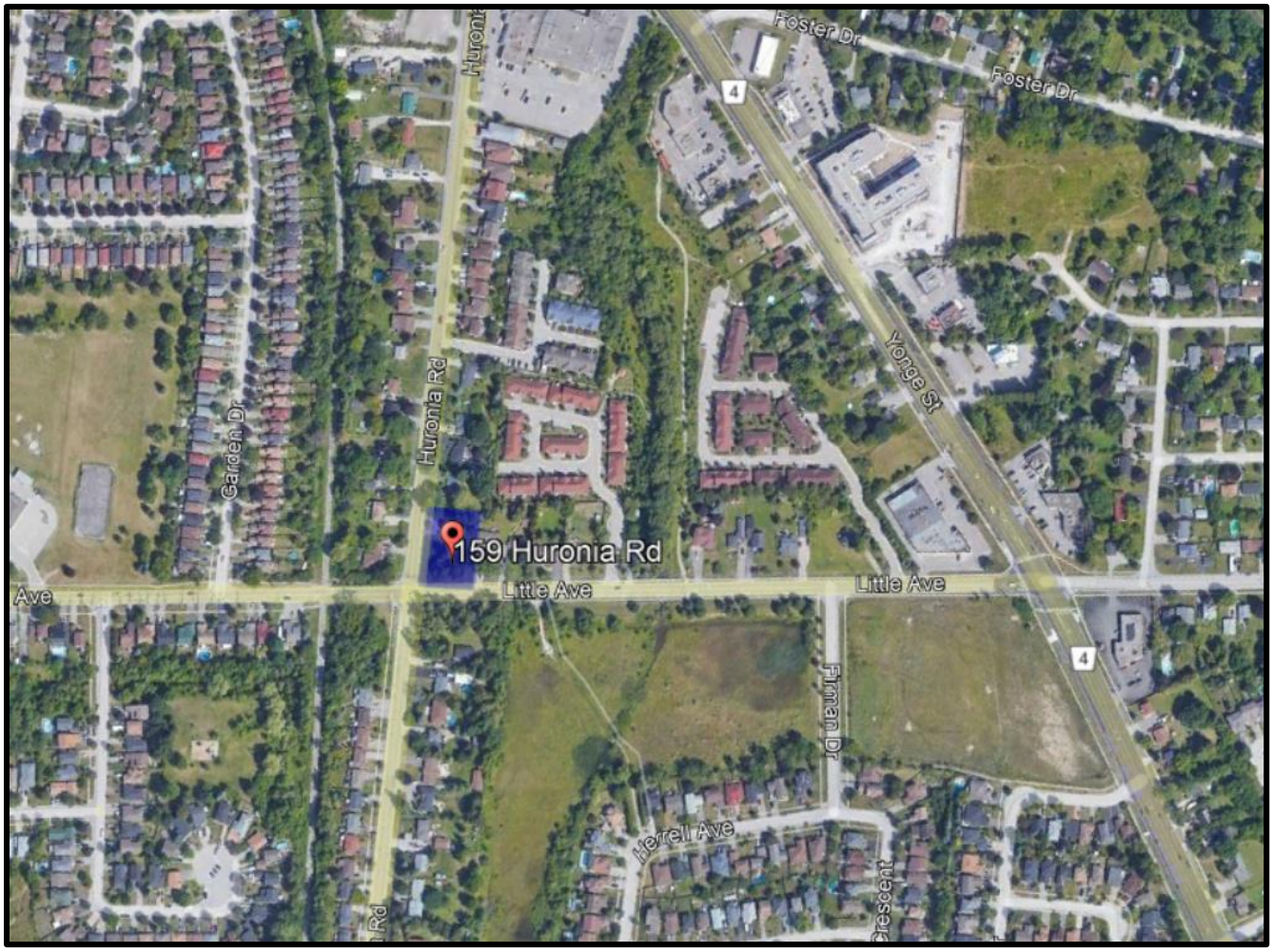
Respectfully submitted,



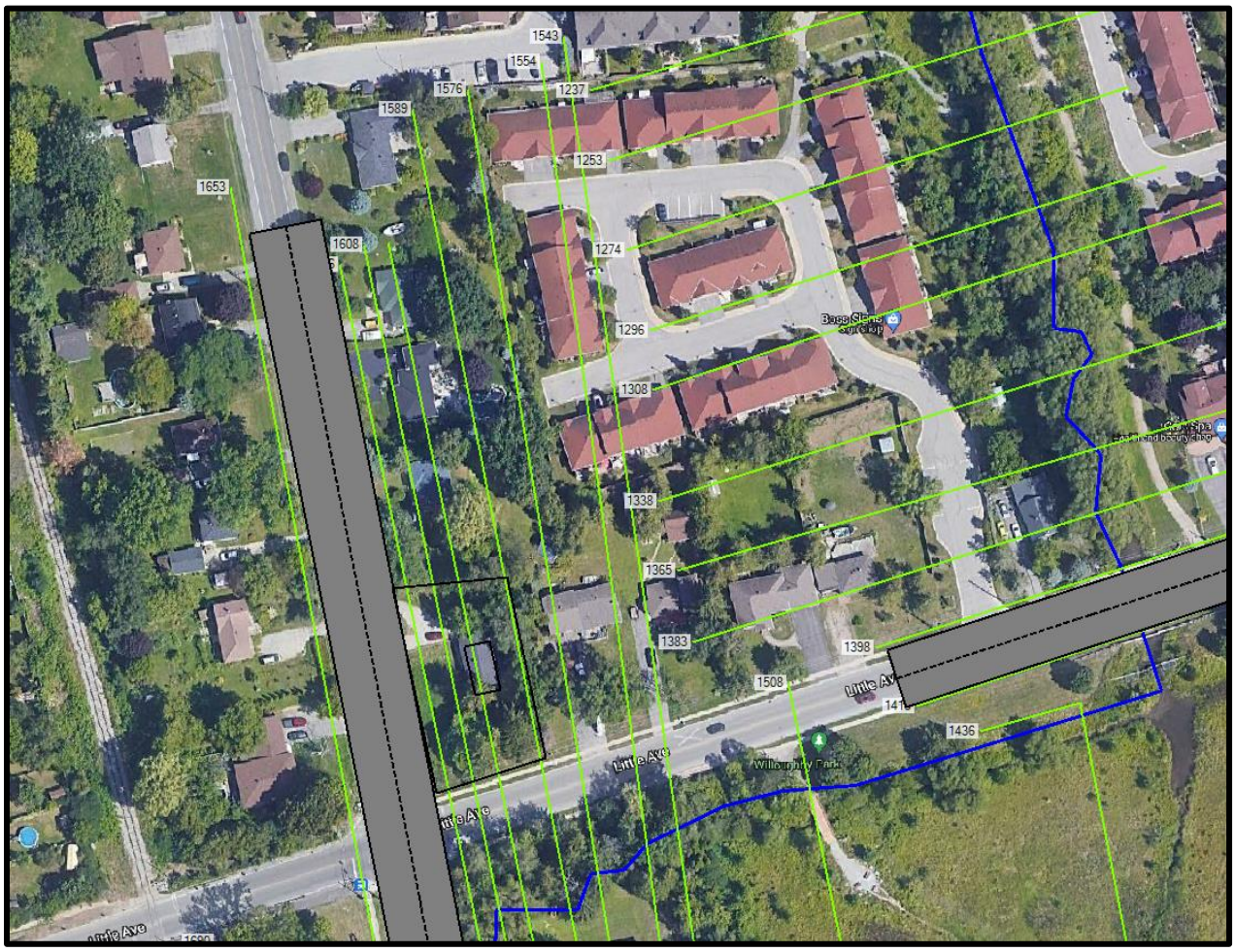
Ed Gazendam, Ph.D., P. Eng.,
President, Sr. Geomorphologist
Water's Edge

Tim Antonio B.A.Sc. EIT
Water Resources Scientist

Att: **Map 1: Proposed Area of Construction**
Map 2: HEC-RAS Model with Extended Cross Sections
Table 1 HEC-RAS- Summary Outputs



Map 1: Map of Construction Area (Google Earth)



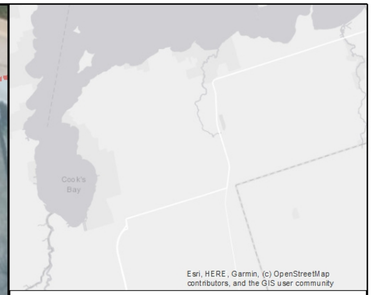
Map 2: HEC-RAS Model with Extended Cross Sections

Table 1 HEC-RAS- Summary Outputs

Reach	River Sta	Profile	Q Total	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width
			(m3/s)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)
Entire Creek	1635		Culvert	**HURONIA ROAD**						
Entire Creek	1626	2 Year Flow	10.17	239.854	239.85	240.05	0.016167	1.958	5.19	13.18
Entire Creek	1626	100 Year Flow	35.12	240.342	240.34	240.64	0.010016	2.547	15.74	43.22
Entire Creek	1626	Hazel Flow	51.19	240.517	240.52	240.89	0.010112	2.9	20.2	65.44
Entire Creek	1608	2 Year Flow	10.17	239.544		239.65	0.008638	1.43	7.16	24
Entire Creek	1608	100 Year Flow	35.12	240.202		240.29	0.001843	1.392	31.43	53.79
Entire Creek	1608	Hazel Flow	51.19	240.208		240.39	0.003823	2.013	31.74	54.2
Entire Creek	1601	2 Year Flow	10.17	239.577		239.61	0.000781	0.919	15.29	29.67

Entire Creek	1601	100 Year Flow	35.12	240.204		240.27	0.001046	1.469	43.07	70.18
Entire Creek	1601	Hazel Flow	51.19	240.215		240.36	0.002147	2.112	43.8	70.87
Entire Creek	1589	2 Year Flow	10.17	239.37	239.37	239.58	0.007554	2.165	6.17	17.47
Entire Creek	1589	100 Year Flow	35.12	239.779	239.78	240.21	0.010363	3.502	16.01	39.29
Entire Creek	1589	Hazel Flow	51.19	240.172	240.17	240.33	0.003553	2.528	52.61	156.59
Entire Creek	1576	2 Year Flow	10.17	239.091	239.09	239.29	0.009827	2.187	5.93	16.05
Entire Creek	1576	100 Year Flow	35.12	239.548	239.55	239.88	0.009074	3.158	18.35	38.77
Entire Creek	1576	Hazel Flow	51.19	239.806	239.81	240.04	0.005706	2.92	33.29	64.6
Entire Creek	1554	2 Year Flow	10.17	239.18		239.2	0.000671	0.558	20.66	58.38
Entire Creek	1554	100 Year Flow	35.12	239.382		239.45	0.00224	1.269	34.13	74.86
Entire Creek	1554	Hazel Flow	51.19	239.446		239.56	0.003363	1.646	39.07	78.23
Entire Creek	1543	2 Year Flow	10.17	239.105	239.11	239.17	0.018389	1.19	9.11	72.78
Entire Creek	1543	100 Year Flow	35.12	239.266	239.27	239.41	0.014123	1.754	23.12	101.92
Entire Creek	1543	Hazel Flow	51.19	239.357	239.36	239.51	0.011191	1.865	32.98	115.28
Entire Creek	1508	2 Year Flow	10.17	237.832	237.77	237.88	0.005485	1.638	13.34	57
Entire Creek	1508	100 Year Flow	35.12	239.11	237.92	239.11	0.000021	0.217	308.95	314.97
Entire Creek	1508	Hazel Flow	51.19	239.222	238.13	239.22	0.000031	0.276	343.96	329.06
Entire Creek	1436	2 Year Flow	10.17	237.835	237.22	237.84	0.000112	0.312	54.95	96.69
Entire Creek	1436	100 Year Flow	35.12	239.108	237.44	239.11	0.000026	0.28	211.28	157.54
Entire Creek	1436	Hazel Flow	51.19	239.218	237.53	239.22	0.000047	0.386	229.03	165.24
Entire Creek	1413	2 Year Flow	9.37	237.677	237.47	237.82	0.003586	1.831	6.12	13.39
Entire Creek	1413	100 Year Flow	47.61	238.937	238.94	239.09	0.002104	2.496	52.25	120
Entire Creek	1413	Hazel Flow	65.88	239.021	239.02	239.2	0.002584	2.838	62.41	120
Entire Creek	**1412**		**Culvert**	**LITTLE AVE**						
Entire Creek	1398	2 Year Flow	9.37	237.628	237.18	237.67	0.001452	1.007	11.31	23.95
Entire Creek	1398	100 Year Flow	47.61	238.37	238	238.46	0.001895	1.712	57.7	143.27
Entire Creek	1398	Hazel Flow	65.88	238.419	238.32	238.55	0.002891	2.155	64.99	156.54
Entire Creek	1383	2 Year Flow	9.37	237.594	237.38	237.65	0.002559	1.024	10.11	26.76

Entire Creek	1383	100 Year Flow	47.61	238.364	237.97	238.42	0.001545	1.318	60.54	181.92
Entire Creek	1383	Hazel Flow	65.88	238.404	238.21	238.5	0.002445	1.688	65.69	184.34
Entire Creek	1365	2 Year Flow	9.37	237.388	237.39	237.56	0.009126	1.991	6.11	21.02
Entire Creek	1365	100 Year Flow	47.61	238.007	237.91	238.34	0.008232	3.211	27.59	118.04
Entire Creek	1365	Hazel Flow	65.88	238.4		238.45	0.001442	1.639	94.5	189.44
Entire Creek	1338	2 Year Flow	9.37	237.2		237.31	0.005718	1.519	7.23	22.07
Entire Creek	1338	100 Year Flow	47.61	238.013	237.71	238.17	0.003564	2.124	41.22	147.88
Entire Creek	1338	Hazel Flow	65.88	238.386		238.42	0.000901	1.249	112.86	206.67
Entire Creek	1308	2 Year Flow	9.37	236.975		237.07	0.008279	1.367	6.87	22.8
Entire Creek	1308	100 Year Flow	47.61	237.996		238.08	0.001133	1.332	41.77	43.83
Entire Creek	1308	Hazel Flow	65.88	238.287		238.38	0.001012	1.441	55.28	49.08
Entire Creek	1296	2 Year Flow	9.37	236.994		237.02	0.000933	0.803	15.45	35.05
Entire Creek	1296	100 Year Flow	47.61	238.008		238.06	0.000616	1.183	55.38	43.87
Entire Creek	1296	Hazel Flow	65.88	238.297		238.36	0.000673	1.371	68.91	50.25
Entire Creek	1274	2 Year Flow	9.37	236.981		237	0.000692	0.777	18.21	37.3
Entire Creek	1274	100 Year Flow	47.61	238.001		238.04	0.000544	1.167	59.26	43.11
Entire Creek	1274	Hazel Flow	65.88	238.29		238.34	0.000595	1.343	72.13	45.99
Entire Creek	1253	2 Year Flow	9.37	236.829	236.77	236.96	0.008712	1.577	6	17.14
Entire Creek	1253	100 Year Flow	47.61	237.956		238.02	0.000968	1.29	45.86	42.75
Entire Creek	1253	Hazel Flow	65.88	238.242		238.32	0.000929	1.429	58.77	47.8
Entire Creek	1237	2 Year Flow	9.37	236.559	236.56	236.77	0.012886	2.047	4.58	11.15
Entire Creek	1237	100 Year Flow	47.61	237.95		238.01	0.00073	1.188	52.04	48.43
Entire Creek	1237	Hazel Flow	65.88	238.239		238.31	0.000727	1.329	67.62	57.42



Legend

- 1m Contours
- Property and Building Lines
- Existing Floodline
- river profile

Scale

0 4 8 16 24 32 Meters

Projection: CRCS UTM Zone 17
Datum: CGVD2013

North Arrow

N

Approved By:

REVISIONS

NO.	DESCRIPTION	BY	DATE
1	Original	NG	Aug. 26, 2022

Consultant

water's edge
ENVIRONMENTAL SOLUTIONS TEAM

159 Huronia Drive Property

Regulatory Floodplain Mapping

Date: Aug. 26, 2022	Drawn By: NG
File No.: WE22033	Map No. 1