

MEMO

DATE September 19th, 2024 **PROJECT NO.** 2621-7000
RE Chipwoods Park – Floodplain Analysis
Town of Melancthon

TO Josh Blokhuis, Project Manager
FROM Trevor Fraser, P.Eng., Matt Bowman
CC Davin Metheral, Planner (NVCA)

1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Sheldon Creek Developments to complete a Floodplain Analysis for the property located at 476420 3rd Line, in the Town of Melancthon. A tributary of the Boyne River flows from the west to the east within the southern portion of the property. The entire property is in the Nottawasaga Valley Conservation Authority (NVCA) Mapping regulated area due to unevaluated wetland, floodplain and erosion hazard areas; therefore, a floodplain analysis is required to support the proposed development. The purpose of this memo is to summarize the results of the floodplain analysis.

2.0 Background

The site encompasses an area of approximately 37 ha with a developable area of approximately 12 ha. The site currently operates as an existing community (Chipwoods Park) with approximately 120 units, a recreational hall, gatehouse, workshop, playground, pool, and at grade parking areas. The site, located in a rural/residential area, is bounded by agricultural lands to the north, south, and west, and 3rd Line to the east.

According to the Development Concept Plan prepared by Glen Schnarr & Associates Inc., dated June 20, 2025, the elements envisioned for this development will include:

- 224 residential houses which will each contain a single car driveway.
- Internal road network and 43 visitor parking spaces.
- Recreational areas, three SWM blocks, and an advanced sewage treatment system block.

The existing units and gravel driveways will be removed to accommodate the proposed development.

3.0 Methodology

The following tasks were completed in preparation of the floodplain analysis for the development:

- Obtained a hydraulic model (HEC-RAS) of the Boyne River from the NVCA and isolated the reach running through the site from the west to the east.
 - Revised the model using detailed topographic survey (VanHarten, September 3rd, 2024) and notes pertaining to culverts, inline structures, and bank conditions to delineate the existing Regional floodplain.
- Delineated the existing and floodplain extents with a 6.0 m buffer on the Overall Constraints Figure.

4.0 Terms of Reference

To date, a terms-of-reference (TOR) has not been established with the NVCA as a formal submission is yet to be submitted and reviewed. Following input from the first submission, a terms-of-reference will be established with the NVCA.

The following summarizes the flood hazard criteria established for this site through discussions with NVCA:

- A 6.0 m setback from the existing conditions Regulatory flood line to the development limits of the site is required.
- Freeboard depth of minimum 0.3 m from the proposed condition Regulatory floodplain elevation to the proposed landform flood protection is required.
- No impacts to floodplain elevations or velocities upstream or downstream of the site.
- Safe access/egress can be provided for the site from 3rd Line.

5.0 Hydraulic Analysis

5.1 Existing Conditions

Crozier created an existing conditions (HEC-RAS) hydraulic model for the section of Boyne River intersecting the site.

The existing conditions HEC-RAS model was obtained from the NVCA and modified by Crozier to reflect the most up to date site conditions in accordance with the detailed topographic survey provided by VanHarten.

The following details were updated from the NVCA existing conditions HEC-RAS model and used in the revised existing conditions HEC-RAS model:

- All reaches were removed from the model apart from “BOY-N1 – 1” which traverses throughout the subject property from the west to the east.
- Culverts and an inline structure were incorporated into the model using information from the detailed topographic survey.
 - A 1.75 m diameter culvert was introduced under 3rd Line and a 0.75 m diameter culvert was introduced under the driveway for 476473 3rd Line.
 - An inline structure was introduced under the Chipwoods internal road at the downstream end of the existing pond. It consists of a structure with a broad crested weir measuring 1 m x 4.14 m and enters a 0.55 m culvert downstream.
- A downstream boundary condition using a normal depth slope of 0.0048 was introduced at the end of reach “BOY-N1 – 1”.
- Using the detailed topographic survey, new cross-sections were added to the model, running from high point to high point (left to right looking downstream).
- Downstream reach lengths, manning's “n” coefficients and bank stations were updated for all the newly added cross-sections.

No modifications were made to the terrain file derived from the detailed topographic survey.

The existing Regional flood limits are delineated with a 6.0 m buffer and illustrated on the Overall Constraints Figure (Figure 1). Figure 1 shows the development limit which sits outside the 6 m buffer applied to the existing Regional flood line. The existing conditions HEC-RAS model flood elevations for the section of the Boyne River under study are summarized in Table 1. The detailed HEC-RAS output is attached to this memo.

Table 1: “BOY-N1 – 1” Existing Regional Water Surface Elevations

River Station	Regional Water Surface Elevation (masl)
1281.4	488.01
1067.89	488.04
969.35	488.04
957.67	488.04
943.68	488.04
937.68	488.04
934	Inline Structure (Chipwoods Internal Road)
930.42	487.12
900	485.92
772.04	483.9
679	482.09
615.19	481.33
384.05	480.23
206.61	479.62
171.07	479.6
161.88	Culvert (3 rd Line)
152.69	479.43
99.44	479.1
95.915	Culvert (476473 3 rd Line)
92.39	478.96
36.19	478.48
0	478.4

The water surface elevations shown in Table 1 are delineated on the Overall Constraints Figure (Figure 1) and were used in conjunction with the environmental buffers to establish the development limit.

6.0 Conclusions

We conclude that the floodplain analysis has been conducted in collaboration with the NVCA and is in conformance with the required NVCA criteria.

Through this analysis, we have established a limit of development for the site. Upon the completion of the Concept Plan and establishing a terms-of-reference (TOR) with the NVCA, the hydraulic model can be further refined and assessed to evaluate impacts of the proposed development, if any.

Should you have any questions, or require further information, please do not hesitate to contact the undersigned.

C.F. CROZIER & ASSOCIATES INC.



Matt Bowman
Engineering Intern, Land Development

AO/tc

Enclosure

Figure 1: Overall Constraints Figure
Detailed HEC-RAS output

C.F. CROZIER & ASSOCIATES INC.



Trevor Fraser, P.Eng.
Project Manager, Land Development



LEGEND

- PROPERTY LINE (AZIMUTH)
- EXISTING WATERCOURSE
- ESTIMATED EXISTING REGIONAL FLOOD LINE (NVCA)
- EXISTING REGIONAL FLOOD LINE 6 m BUFFER (CFCA)
- EXISTING WATER FEATURE (AZIMUTH)
- EXISTING SIGNIFICANT WOODLAND (AZIMUTH)
- EXISTING SIGNIFICANT WOODLAND 30 m BUFFER (NVCA)
- EXISTING LIMIT OF DEVELOPMENT
- 36.19 CROSS-SECTION ID / STATION ID
- 478.48 EXISTING REGIONAL WATER SURFACE ELEVATION

ENVIRONMENTAL CONSTRAINTS LINEWORK PROVIDED BY AZIMUTH ENVIRONMENTAL CONSULTING INC. (FEBRUARY 27TH, 2024)

HYDRAULIC MODEL SOURCE: 476420 3RD LINE MELANCTHON BOYNE RIVER NVCA 56676 (JANUARY 25TH, 2024)



1. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE MODIFICATION AND/OR REPRODUCTION OF ANY PART OF THIS DRAWING IS STRICTLY PROHIBITED WITHOUT WRITTEN AUTHORIZATION FROM THIS OFFICE.
2. THE DIGITAL FILES CONTAIN INTELLECTUAL AND DIGITAL DATA PROPERTY THAT IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO C.F. CROZIER & ASSOCIATES INC. PRIOR TO CONSTRUCTION.
3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
4. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
5. DO NOT SCALE DRAWINGS.

TEMPORARY BENCHMARKS	
ELEVATIONS ARE BASED ON GPS OBSERVATIONS FROM PERMANENT REFERENCE STATIONS IN THE NAD83 (CSRS-2020) COORDINATION SYSTEM WITH HEIGHTS CONVERTED TO OTHOMETRIC ELEVATIONS ON THE CGVD-28 DATUM (1978 ADJUSTMENT) WITH GEOID MODEL HTV2.0, AS SUPPLIED BY NATURAL RESOURCES CANADA.	
SITE TBM 1 - CUT CROSS IN CONCRETE CULVERT - ELEV = 487.88	
SITE TBM 2 - NAIL IN HYDRO POLE - ELEV = 485.10	

No.	ISSUE	DATE: YYYY/MM/DD
A	ISSUED FOR REVIEW	2024/09/19

	<div style="border: 2px solid black; padding: 5px; display: inline-block;"> FOR REVIEW NOT TO BE USED FOR CONSTRUCTION </div>	
--	---	--

**CHIPWOODS PARK
MELANCTHON, ONTARIO**

 OVERALL CONSTRAINTS FIGURE

CROZIER CONSULTING ENGINEERS	Drawn By: A.O. Design By: A.O. Project: 2621-7000 Check By: T.F. Check By: T.F. Drawing: FIG 1
--	---

HEC-RAS Modelling Results

HEC-RAS Plan: rev2 River: Boyne River Reach: Site 1 Profile: PF 1												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Site 1	1281.4	PF 1	2.89	487.69	488.01	488.01	488.08	0.017562	1.16	2.49	18.45	1.01
Site 1	1067.89	PF 1	2.89	487.01	488.04		488.04	0.000009	0.09	39.85	97.05	0.03
Site 1	969.35	PF 1	2.89	485.88	488.04		488.04	0.000001	0.05	57.80	42.77	0.01
Site 1	957.67	PF 1	2.89	485.55	488.04		488.04	0.000001	0.04	70.56	64.80	0.01
Site 1	943.68	PF 1	2.89	485.56	488.04		488.04	0.000001	0.04	66.61	43.57	0.01
Site 1	937.68	PF 1	2.89	486.35	488.04	487.60	488.04	0.000005	0.09	38.28	46.04	0.03
Site 1	934		Inl Struct									
Site 1	930.42	PF 1	2.89	486.40	487.12	487.12	487.14	0.001107	0.62	4.67	10.96	0.30
Site 1	900	PF 1	2.89	485.60	485.92	485.92	486.03	0.014961	1.50	1.93	8.59	1.01
Site 1	772.04	PF 1	2.89	483.56	483.90	483.89	483.98	0.014415	1.25	2.31	13.14	0.95
Site 1	679	PF 1	2.89	481.57	482.09	482.09	482.22	0.014951	1.58	1.83	7.67	1.02
Site 1	615.19	PF 1	2.89	481.00	481.33	481.26	481.33	0.002743	0.38	11.49	129.01	0.38
Site 1	384.05	PF 1	2.89	479.71	480.23	480.23	480.29	0.008565	1.25	3.81	38.00	0.78
Site 1	206.61	PF 1	2.89	478.81	479.62		479.62	0.000006	0.07	95.90	213.46	0.03
Site 1	171.07	PF 1	2.89	477.99	479.60	478.52	479.62	0.000167	0.55	5.21	149.89	0.15
Site 1	161.88		Culvert									
Site 1	152.69	PF 1	2.89	478.49	479.43	479.18	479.51	0.002717	1.25	2.32	176.86	0.49
Site 1	99.44	PF 1	2.89	478.03	479.10	478.89	479.32	0.004249	2.05	1.41	49.60	0.68
Site 1	95.915		Culvert									
Site 1	92.39	PF 1	2.89	478.13	478.96	478.96	478.97	0.000302	0.34	11.08	26.33	0.16
Site 1	36.19	PF 1	2.89	477.78	478.48		478.49	0.001233	0.26	8.39	43.66	0.25
Site 1	0	PF 1	2.89	478.20	478.40	478.36	478.41	0.004806	0.56	7.16	73.52	0.52