APPENDIX K

LITTLE LAKE FLOOD HAZARD

February 10, 2022

Re: Flood Hazard for Little Lake - Discussion

Jeffrey Meyer <jeffrey.meyer@ltc.on.ca>

Wed 2022-01-19 12:03 PM

To: Janet Noyes <janet.noyes@ltc.on.ca>

Cc: Gage Comeau <gage.comeau@ltc.on.ca>

Vertical Control conversions (difference between datum)

Site 21U2288 near Little Lake

CGVD28 minus CGVD2013 = 35.5cm

Latitude	Longitude
44° 1' 4.8"	77° 50' 6.0"

UTM

Zone	Easting (metres)	Northing (metres)	Scale
18	272771.813	4877780.082	1.00024

Vertical Data (levelling)

Vertical Datum	Elevation (m)	Order	Gravity (mGal)	Published	Project ID
CGVD2013 (2010.0)	106.742	1st	980471.41	2013	H13ML1311
CGVD28	107.097	1st	980528.47	1967	VA6
IGLD85	107.147	1st	980619.90	1992	IGLD85AP92

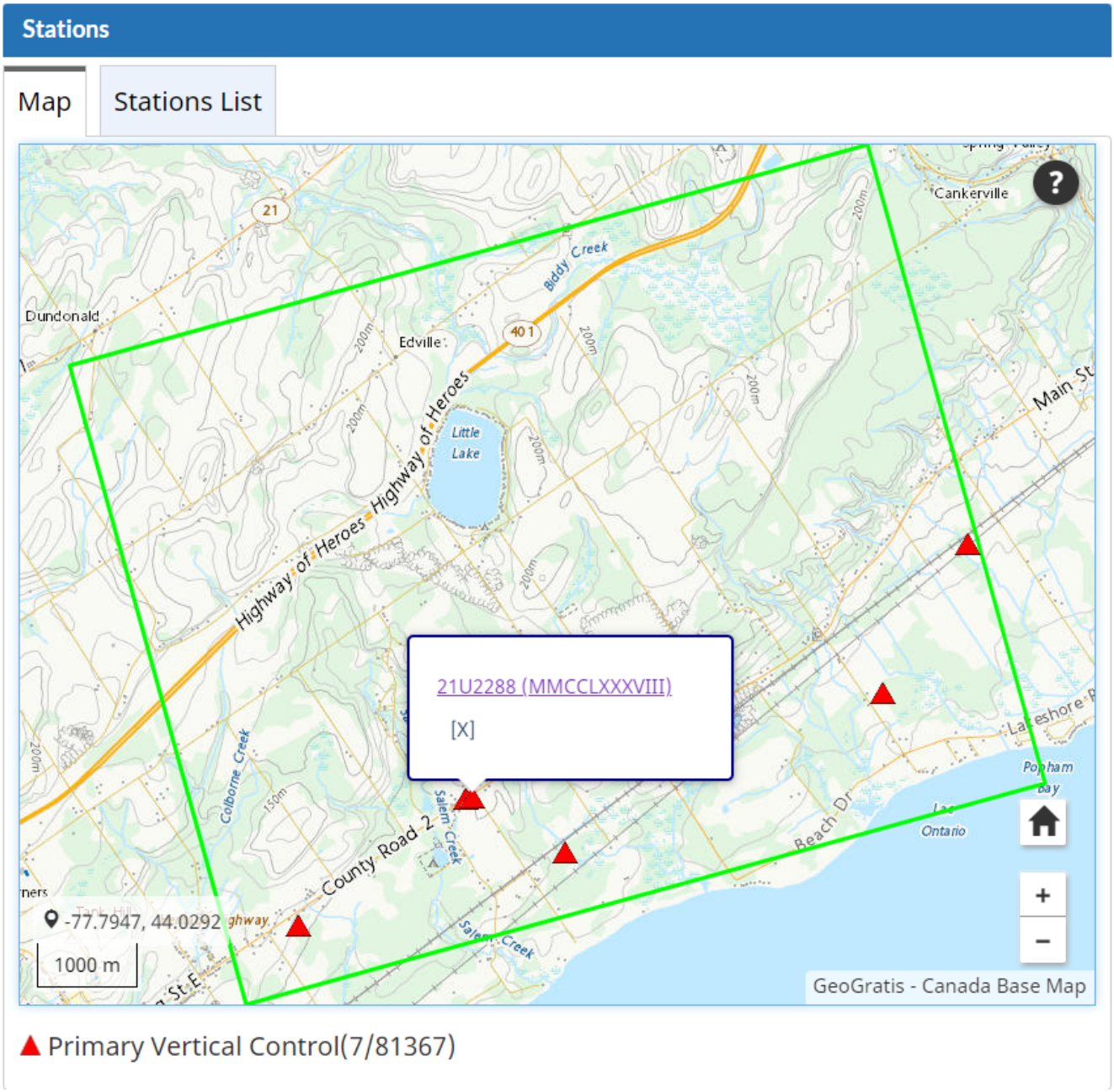
The CGVD2013 height reported in the Vertical Data table is approximate because it is calculated from historical levelling data and not from the combination of GNSS and a geoid model.

Vertical Datum Separation

Datum 1 – Datum 2	Elevation 1 (m)	Elevation 2 (m)	Elevation Difference (m)	Epoch
CGVD28 (lev) – CGVD2013 (lev)	107.097	106.742	0.355	2010.0
IGLD85 (lev) – CGVD2013 (lev)	107.147	106.742	0.405	2010.0
IGLD85 (lev) – CGVD28 (lev)	107.147	107.097	0.050	

https://webapp.geod.nrcan.gc.ca/geod/data-donnees/station/report-rapport.php?id=21U2288

https://webapp.geod.nrcan.gc.ca/geod/data-donnees/passive-passif.php



From: Jeffrey Meyer <jeffrey.meyer@ltc.on.ca>
Sent: January 19, 2022 11:53 AM
To: Janet Noyes <janet.noyes@ltc.on.ca>
Subject: Fw: Flood Hazard for Little Lake - Discussion

From: Jeffrey Meyer <jeffrey.meyer@ltc.on.ca>
Sent: March 24, 2021 4:15 PM
To: Janet Noyes <janet.noyes@ltc.on.ca>; Rhonda Bateman <rhonda.bateman@ltc.on.ca>; Gage Comeau <gage.comeau@ltc.on.ca>
Subject: Re: Flood Hazard for Little Lake - Discussion

Here approximate 100 yr estimated at 171.83m CGVD (beige) in addition to Timmins 171.93 (red) as requested.

Rough sketch:

From: Jeffrey Meyer <jeffrey.meyer@ltc.on.ca>
Sent: March 24, 2021 3:56 PM
To: Janet Noyes <janet.noyes@ltc.on.ca>; Rhonda Bateman <rhonda.bateman@ltc.on.ca>; Gage Comeau <gage.comeau@ltc.on.ca>
Subject: Re: Flood Hazard for Little Lake - Discussion

Thanks Janet.

I have estimated a static water level elevation of 171.43m CGVD2013, giving 171.93m CGVD2013 for 0.5m inundation Timmins event.

Here is the result - flood inundation really only impacts roughly 15 properties on the north end of the lake. During Timmins type event they might also get impacted from behind as the lake joins the spilling wetland, but the road surface seems to stay above for egress. Presumably most of those structures are already elevated.

Rough sketch for discussion:

From: Janet Noyes <janet.noyes@ltc.on.ca>
Sent: March 24, 2021 3:02 PM
To: Rhonda Bateman <rhonda.bateman@ltc.on.ca>; Gage Comeau <gage.comeau@ltc.on.ca>; Jeffrey Meyer <jeffrey.meyer@ltc.on.ca>
Subject: Flood Hazard for Little Lake - Discussion

As you may be aware, the 15-metre "setback" for flood hazards on Oak Lake and Little Lake has always "bothered" me. Both lakes have sides that are quite steep in some areas that would have a very small flood hazard area and other locations are quite low. Applying the 15 metres around the entire lake does not make sense for a flood hazard. This could be defined as some other kind of setback but not a flood hazard. When Mike was issuing permits for around Oak Lake, he would typically tell people to put the main level of the house 1 metre above the ground surface - this basically means the flood hazard is 0.7 metres depth from the ground and the additional 0.3 metres is the floodproofing standard.

I have discussed with Jeff about using a random "2 feet" (0.6 metre) flood line and plotting that to follow Mike's general guideline. Now that we have the 2018 OMAFRA LiDAR we can confidently plot an elevation for a flood hazard. We only have LiDAR for the Little Lake area - not Oak Lake.

In following up with this, I have said that I would actually do some calculations to determine a reasonable depth of flooding on these lakes for Jeff to plot (rather than just pick a random depth like 2 feet).

Watershed Information:

- Drainage Area for Little Lake = 3.57 km2 (from OFAT) - 357 ha
- Little Lake Area = 65.85 ha (measured from LTC GIS)
- Remaining lands draining to Little Lake = 291 ha (357 - 66)

Soils in the watershed area are all mostly sandy loams. Based on MTO Design Chart 1.07, runoff coefficients for open sand loams for rolling (5-10% slope) rural landscape range from 0.3 (cultivated lands) to 0.12 (woodlands). For 100-year flow calculations the runoff coefficients usually have 25% added to them. For a conservative estimate, I started with a runoff coefficient of **0.3.** This is really one of the only parameters to do a sensitivity analysis on.

- 0.3 plus 25% = 0.375, which I rounded up to **0.4**
- for sensitivity I looked at a higher runoff number of 0.4 - 0.4 plus 25% = **0.5**

First stab I looked at 100 year 24-hour rainfall depths. I used the MTO IDF Curve tool and the following rainfall depths were considered (note that the tool can use climate change projected curves):

- 2010: 122.6 mm
- 2070: 132 mm
- 2120: 136.8 mm
- USE **130 mm**

Calculating the depth of flooding on Little Lake I propose to do a simple addition of rainfall depth on the lake (no evaporation or other losses) PLUS runoff contributions from "land" portion of remaining drainage area.

For Runoff Coefficient 0.4:

- Rainfall on Lake + Runoff from Land
- [(0.130 m) x (658500 m2)]/(658,500 m2) + [(0.4) x (0.130 m) x (2,910,000 m2)]/(658,500 m2)
- 0.130 + 0.23
- **0.36 metres**

For Runoff Coefficient 0.5 = **0.42 metres**

Next I looked at the **Timmins** Event, which was **193 mm**

Runoff Coefficient 0.4 - same calculations as shown above

- Depth of Flooding on Little Lake = **0.534 metres**

Runoff Coefficient 0.5 = **0.619 metres**

I would like to suggest a 0.5 metre depth of flooding from the average water level of Little Lake for the flood hazard to delienate using the OMAFRA LiDAR elevation data.

Conversation and discussion is encouraged.

Janet

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