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Hydrogeological Study

For

Proposed Estate Lots

On and Around

Rutherglen Line

Bonfield, Ontario

Prepared For:

Degagne Group of Companies

452 Quae Quae Rd.

Corbeil, Ontario P0H 1K0

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1. INTRODUCTION

1.1. Project Description

This report presents the results of a hydrogeology assessment undertaken for proposed rural estate lot sub-division development located on the north portion of a property consisting of the following lots within the township of Bonfield.

- Part of Lot 32 of Concession 8
- Part of Lot 32 Concession 8

The subject property is located on vacant land east of North Bay just south of Highway 17 west of Rutherglen Line and south of Park Street as shown on Figure 1. A plan showing the property extents is shown on Figure 2. At this time, only the north portion of the subject properties will be developed as shown on Figure 3. Areas for the subject property and proposed development area are summarized in the following Table.

Property	Area (Ha)
Subject Properties	35.44
Development Area	12.67

It is proposed to severe the subject property into rural residential estate lots. Most of the proposed lots will be slightly larger than 0.5 ha in size. The largest lot will be slightly larger than 1 ha (Lot 14). Details for severance of Part of Lot 32, Concession 8 are shown on Figure 4. Details for severances of the remainder of the subject property are currently being considered and will be provided at a later date. This hydrogeology study is being provided to ensure there will be suitable water supply from drilled wells, and that any potential impacts to the surrounding properties from the new development due to water groundwater extraction and on-site sewage disposal will be acceptable.

1.2. Scope of Report

The owner of the property wishes to develop the subject property by sub-dividing into rural estate lots for single family dwelling construction including associated water supply wells and on-site sewage systems. This hydrogeology assessment has been completed to support the zoning application(s) by the property owner. This study has been conducted in general accordance with the following Ministry of Environment (MOE) guidance documents:

- Procedure D-5-5. Technical Guideline for Private Wells: Water Supply Assessment (August 1996).
- Design Guidelines for Drinking-Water Systems, 2008
- Procedure D-5-4 Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment (August 1996).

The objectives of the above noted guidelines are as follows:

1. Characterize the geological and hydrogeological conditions of the general area and subject property being proposed for development.
2. Ensure future residents will be provided with adequate quantity of water of acceptable quality for domestic use.
3. Ensure that the proposed development will not result in groundwater interference conflicts between users in the development and users on the adjoining lands.

This report has been prepared to meet the general objectives outlined above.

1.3 Site Assessment Methodology

The hydrogeology assessment includes:

1. Review of background information to identify site geological history and site conditions.
2. Review of available records of groundwater wells adjacent to the subject property.
3. Completion of Site Reconnaissance to confirm surficial soil and bedrock conditions as well as provide input for the hydrogeology and impact assessment.
4. Provide an assessment of the results to determine if there will be adequate quantity and suitable quality of groundwater for future domestic use and that the impacts from the on-site sewage systems will be acceptable.
5. Provide conclusions and recommendations for the development and comments on if any further work is required.

2. BACKGROUND INFORMATION REVIEW

2.1. General Site Physiography

The subject property is located approximately 2 km south of the Mattawa River and 500 m south of Highway 17 near the hamlet of Rutherglen as shown on Figure 1. Relief of the subject property is quite gentle from a high of elevation 260 masl on the northwest corner of the subject property to less than elevation 240 masl along the central west side where drainage reports to Sharpes Creek. Sharpes Creek flows north to the Lake Talon on the Mattawa River which is at elevation 190 masl. The area south of the highway is quite flat with gentle slopes while it becomes more rugged to the north of the highway with steeper slopes along the Mattawa River.

2.2. General Geological Setting

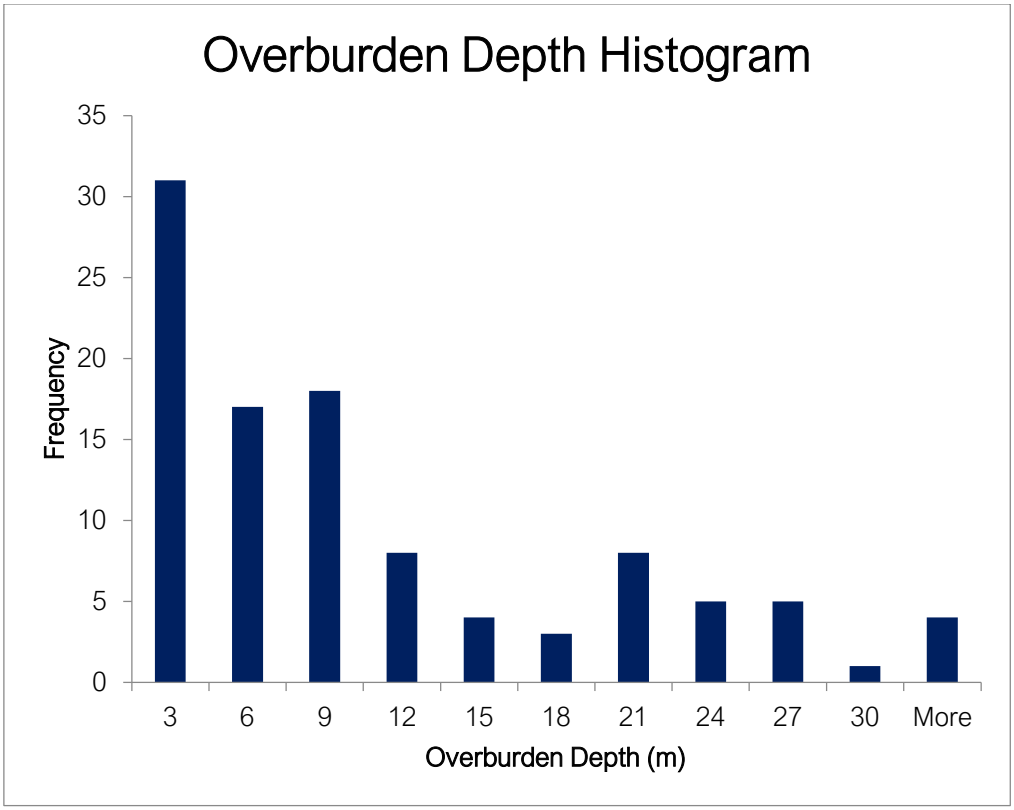
Bedrock within the Rutherglen area consists of Precambrian age and includes strongly foliated gneissic and magmatitic rocks forming part of the Central Gneiss Belt of the Grenville Province.

Based on review of Ontario Geological Survey Mapping for the area, the following types of surficial geological units should be present in vicinity of the subject property:

1. Glaciolacustrine Plain consisting of clay, silts and sands.

2. Bedrock Knob including exposed bedrock and thin glacial till drift deposits

A review of 104 historic test well water well records in the vicinity of the subject property was completed. Information for the wells is summarized on Table 1. Of the 104, 1 of the wells didn't have overburden. Overburden depths ranged from 0.0 to 38.10 m in depth with sand, clay, or gravel being reported at surface. The average depth of overburden was 9.49 m. A histogram of overburden depths for the historic wells is shown on the following chart. Sand, clay, boulders and/or glacial till was reported below the clay and above bedrock.



3. SITE RECONNAISSANCE / INVESTIGATION

3.1. Site Reconnaissance

Reconnaissance of the subject properties was conducted on July 18, 2024. The objective of the reconnaissance was to confirm in more detail the type, and extents of overburden deposits through non-intrusive techniques. This included walking the subject property to document evidence of terrain conditions and soil types using a hand held GPS and digital camera. Figure 5 shows the waypoints where digital photos were taken to document points of interest. Photos corresponding to the waypoint locations, are provided in Appendix A.

As a result of the site reconnaissance, two physiographic areas were defined as follows:

1. Glaciolucustrine Plain – Approximately 85% of the subject property consists of surficial deposits of historic fine grained lakebed sediments from higher lake levels associated with glacial retreat as discussed above. These deposits occur along lower lying areas of the properties. Surface exposures inspected during the site visit consisted of brown clay and silt. It is expected that at depth, the sediments will include varved clays and silts with some sandy layers. As shown on the photos in Appendix A, the cleared fields

used for agriculture tend to be located on the silt and clay deposits. The ground terrain is typically relatively smooth with some undulations. Generally, the glaciolacustrine plain sediments are draped up against higher topography where glacial till and bedrock is exposed. Due to the relatively impervious nature of the clay and silt deposits, standing water can occur in low lying areas.

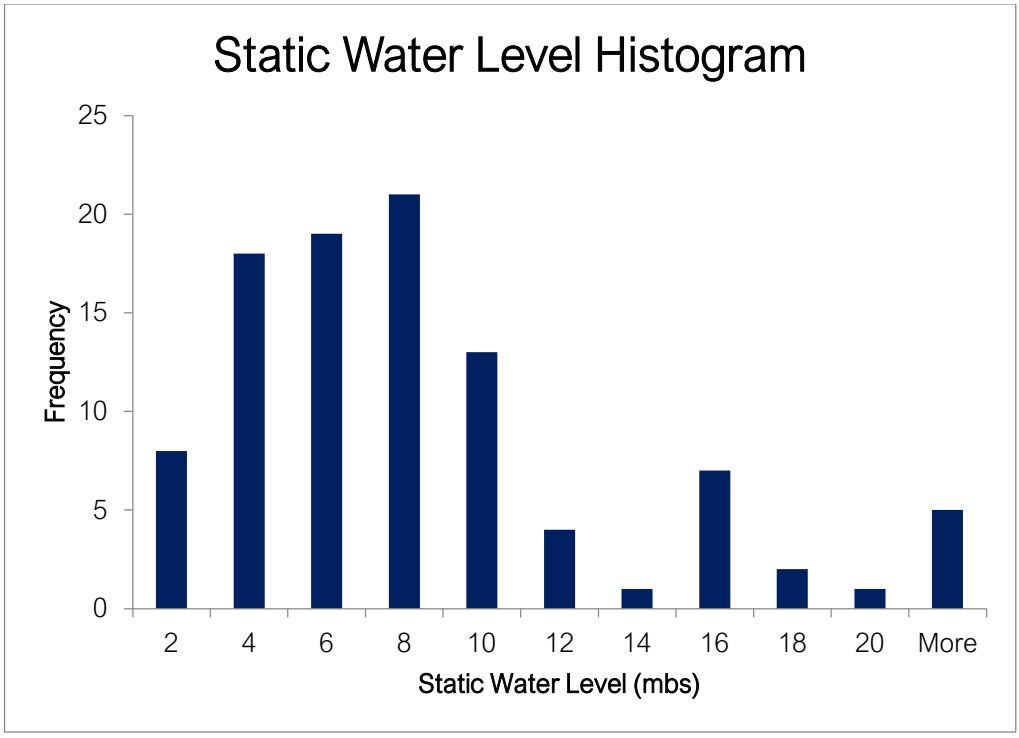
2. Bedrock Knob/Glacial Till – A smaller portion of the subject property (approximately 15%) consists of surficial glacial till or drift deposits and are hummocky to undulating with some infrequent smooth bedrock outcrops occurring mainly at topographical high points. These areas of the property have not been cleared for agricultural use due to the steeper terrain and occurrence of bedrock and boulders at surface. These areas tend to be gently sloping and relatively well drained. Small exposed ridges of glacial till in flatter areas are likely small moraine deposits and may suggest some sorting due to wave action during glaciolacustrine periods following glacial retreat.

4. WATER WELL REVIEW

In order to consider domestic water supply for the proposed subdivision, a review of available drilled well records adjacent to the subject properties was completed. A detailed summary of the well records is provided on Table 1. Data from a total of 104 wells was included in the analysis. Only wells after January 1990 were included as older wells were typically not constructed or tested to current standards. The following general summary provides a basic statistical summary of the data on Table 1.

Well Criteria	Minimum	Maximum	Mean
Overburden Depth	0.00 m	38.10m	9.49m
Total Depth	12.80m	188.98 m	78.59 m
Water Found Depth	3.30 m	185.93 m	63.04m
Static Level Depth	0.30 m	34.14 m	7.66 m
Pump Rates	2.84lpm	378.00 lpm	29.56 lpm
Maximum Drawdown	0.20 m	136.25 m	30.98m
Specific Capacity	0.07 lpm/m	3780.00 lpm/m	194.31 lpm/m
Well Volume	55.13 litres	2407.23 litres	740.81 litres
Pump Volume for 120 min.	340.20 litres	45360.00 litres	3564.36 litres
Total Volume Available	476.01 litres	47301.71 litres	4368.38 litres
Volume minus Drawdown	457.64 litres	9092.40 litres	3626.56 litres

A histogram of the static water table is provided in the following chart.



As shown in the above table the static water table is generally at or near the bottom of overburden or within the bedrock suggesting that the groundwater within the bedrock is

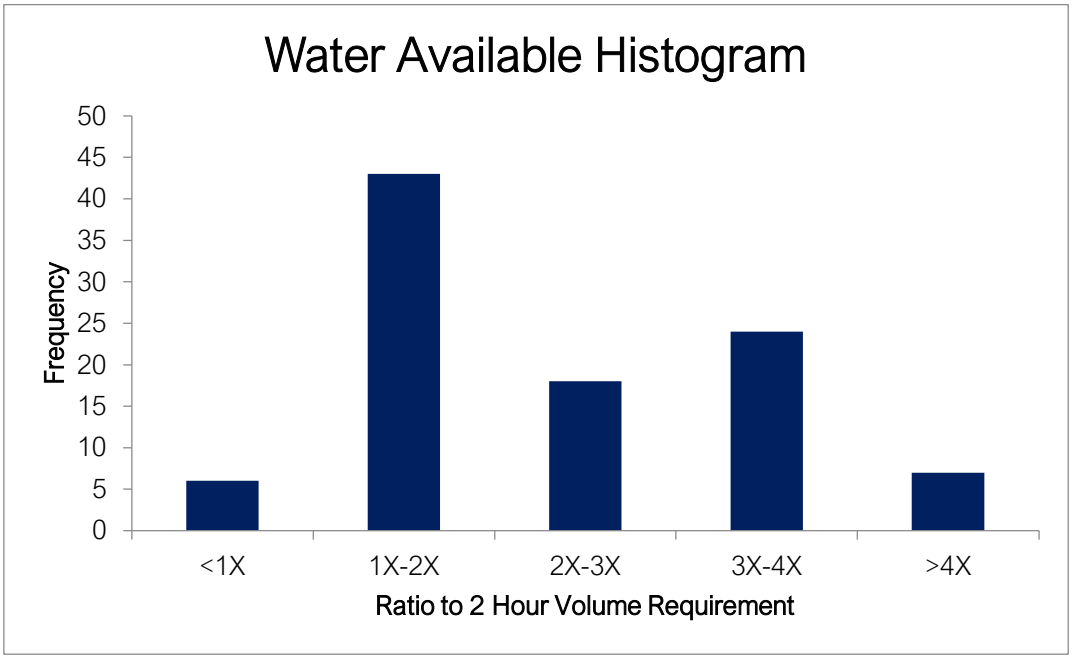
not directly connected to the overburden except through infiltration.

Requirements for new domestic wells as per MOE Guideline D-5-5 are as follows

1. The per person requirement shall be 450 litres per day.
2. Peak Demand will be based on a period of 120 minutes each day based on a demand rate of 3.75 litres per minute per person.
3. A minimum house size of 4 bedrooms is to be used unless otherwise established resulting in a daily water demand of 1,800 litres per day and a peak demand over 120 minutes of 13.7 litres per minute which is equivalent to 1,644 litres.
4. Lower well yields can be accepted where prolonged pumping rates can be used to make up difference in volume-based compensation systems. For example, a well with a pump rate of 11.34 lpm would need an excess volume of 271.20 litres ((1,632 litres - (11.34 lpm x 120 minutes = 1,360.80 litres)). In effect, a well must be able to provide a 2 hour volume of 1,632 litres from pumping and/or storage in the well. For a 150 mm diameter well, the water storage volume is 17 litres per m of depth, so 271.2 litres of storage would be available if the pump was 16 m below the lowest drawdown level after 2 hours of continuous pumping.

Review of the well record data on Table 1 indicates the following:

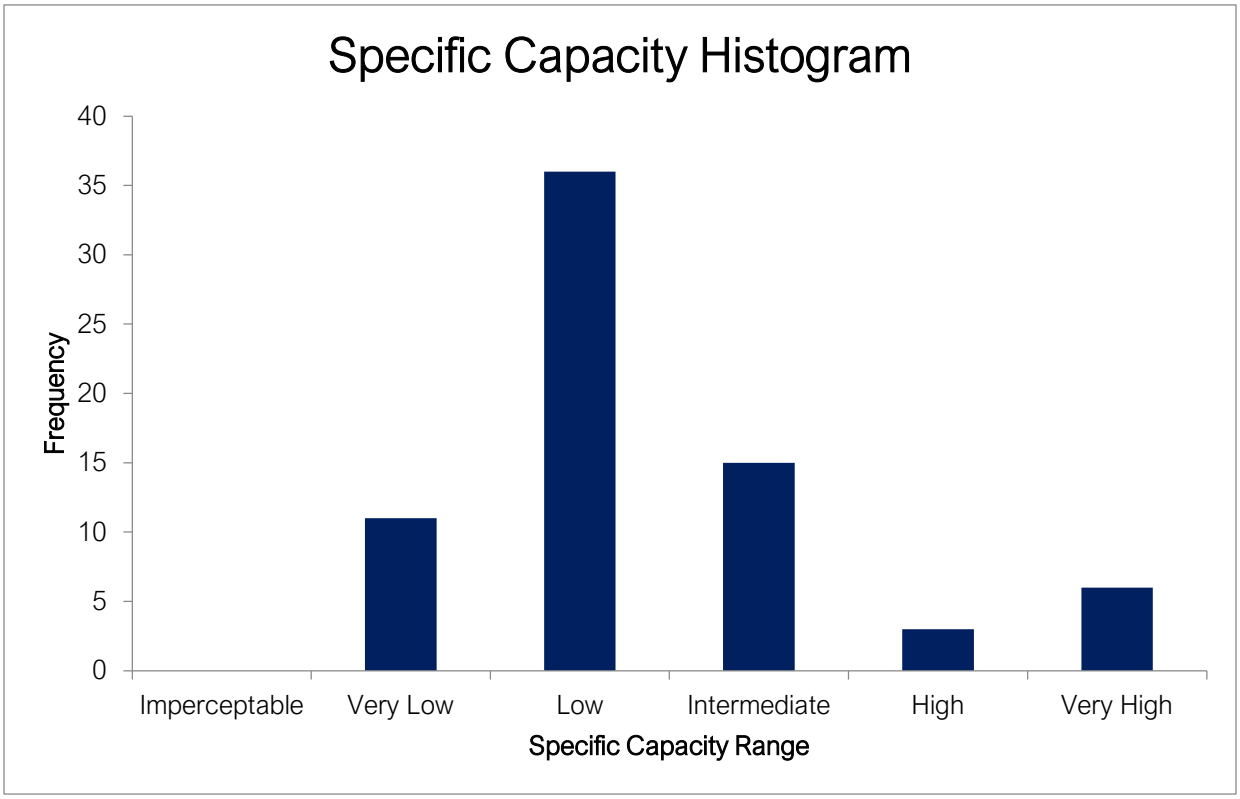
1. Of the 104 wells, 21 wells were tested at pumping rates less than the 13.7 lpm value required for a 4-bedroom home.
2. Taking into consideration available total volumes in the wells prior to drawdown, 4 of the 104 existing wells would not provide more than 1644 litres over 2 hours. As shown on the following chart, the majority of the wells would provide more than 2 times (2X) the required 2-hour volume requirement of 1644 litres.



Transmissivity is an important hydraulic property of aquifers as it provides an estimate of the potential for groundwater abstraction. Krasny (1993) developed a classification of transmissivity magnitude and variation to help provide an objective method for classifying relative aquifer transmissivity values and relating them to an estimate of approximate groundwater yield. The following table provides a summary of the aquifer parameters for various designations as per Krasny (1993).

Transmissivity Range	Designation	Specific Capacity	Supply Potential	Anticipated Well Yield at 5 m Drawdown
0.1 to 1 m2/day	Very Low	.06 to 0.6 lpm/m	Withdrawal for local water supply with limited consumptions	0.3 to 3 lpm
1 to 10 m2/day	Low	0.6 to 6 lpm/m	Withdrawals for local water supply (private consumption etc.)	3 to 30 lpm
10 to 100 m2/day	Intermediate	6 to 60 lpm/m	Withdrawals for local water supply (small communities, plants, etc.)	30 to 300 lpm

A review of the specific gravity values calculated from historic wells was also completed. The following chart provides a histogram of all results.



As shown above, the bulk of the historic wells fit in the Low to Intermediate classification range indicating that there should be adequate water supply for private consumption.

5. DEVELOPMENT IMPACT REVIEW

5.1. Groundwater Supply Quantity

Based on the work completed with respect to supply of groundwater, it is not anticipated that there will be any issue with domestic water supply for the proposed rural lot development on the subject properties for the following reasons.

1. Based on review of 104 well records for the area, it was determined that all of the existing wells except 4 will satisfy the daily water supply requirements in 2 hours for single family dwellings.
2. Review of Specific Capacity values for the existing wells indicates that most values are in the low to intermediate range which is more than satisfactory for single family dwelling water supply.

5.2. On-site Sewage Systems

All new homes will require a class IV on-site sewage system consisting of a septic tank and an adsorption bed. Based on current practice, it is likely that all systems will include filter beds as they minimize area requirements for the top of the bed. For example, a filter bed for a 4 bedroom home with a design flow of 2,000 lpd would need to be 2,000/75 = 26.7 m^2 or about 5 m x 5.5 m.

Based on the site reconnaissance and test pit program expected surface conditions will include:

1. Varved Silt and Clay – Percolation Time (T) estimated > 50.
2. Sandy Glacial Till - T estimated 5 to 15
3. Bedrock – T estimated > 50.

As per Part 8 of the building code for soils with a T > 15, mantle must be imported. In such cases, the bed will generally be fully raised to be on top of the imported mantle. Also, if the water table is at or near surface, beds will need to be fully raised with imported mantle.

Mantle area requirements for a 4-bedroom home will be as follows:

1. T > 20 – Mantle Area = 2,000/8 = 250 m^2 or about 16 x 16 m
2. T > 50 – Mantle Area = 2,000/4 = 500 m^2 or about 22.5 x 22.5 m

Based on the above preliminary calculations for a standard 4 bedroom home, some lots on the subject properties are anticipated to require a fully raised filter bed on imported mantle. The lots range in size from 4,700 m^2 and higher so less than 11 % of each lot will be required for the septic system foot print. Therefore, it is not anticipated that there will

be any space and clearance issues with the siting and construction of the on-site sewage systems.

In terms of the potential impact of on-site septic systems on groundwater, the following points are relevant:

1. Where possible, septic systems should be installed on lower permeability surficial soils as it will provide an effective separation barrier between the septic system effluent and bedrock aquifer.
2. Septic beds should be placed in areas where overburden deposits have a greater thickness over bedrock, and as far away from any drilled wells as possible to provide as much natural separation and attenuation of septic system effluent.
3. Septic beds should be placed so that shallow groundwater and/or effluent flows are directed away from the well locations by taking into account topography and localized surface geological features.

Based on the site conditions determined from site reconnaissance, it is judged that by strategically placing the septic beds as described above, the potential risk to the bedrock aquifer will be very low.

Septic effluent impacts to surface water flows leaving the property are expected to be minimal for the following reasons:

1. Use of proper construction techniques for septic systems by licensed installer as required by the OBC.
2. Studies have shown that finer soils generally provide greater attenuation of BOD, Nitrogen and Phosphorus then coarser grained soils. Therefore placement of the septic beds on the lower permeability overburden with adequate mantle areas for infiltration will be beneficial for mitigating septic be effluent quality.
3. The large size of the lots with respect to the septic bed area requirements will allow beds to be located away from any sensitive areas.

Nitrogen levels in on-site sewage effluent can be estimated from the following sources.

1. USEPA – 11 grams per person per day (https://groundstone.ca/2019/01/nitrogen-in-sewage-systems/)
2. MOEE D-5-4 – 40 grams per single family dwelling per day.
3. Typical Concentration 40 mg/L (https://www.app4water.com/resources/technical-documents/characteristics-of-residential-wastewater/)

Based on this information, the estimated nitrogen loading from a 4 bedroom home can be calculated as follows.

- Based on a flow of 1,800 lpd and a concentration of 40 mg/L, a total daily loading would be 72 grams of nitrogen per day.

The annual average amount of precipitation in North Bay is 975 mm (https://en.climate-data.org/north-america/canada/ontario/north-bay-14610/). Based on gross run-off coefficient post development of 60 %, the annual rain fall infiltration volume for 1 m^2 will be 0.975 m x 0.4 x 1 m^2 = 0.39 m^3 or 390 litres per year. This equates to 1.07 litres per day per m^2. In order to meet the Ontario drinking water standards, nitrogen levels in the groundwater should be kept below 10 mg/L. Based on a total nitrogen load of 72 g per day, to maintain a concentration below 10 mg/L, a total volume of 7,200 litres per day is required including effluent and infiltration. Therefore a total daily volume of infiltration of 7,200 – 1,800 = 5,400 litres is required. Based on an infiltration rate of 1.07 litres per day per m2, an area of 5,400/1.07 = 5047 m^2 or roughly 0.5 hectares is required to provide enough lot area to attenuate nitrogen levels. Therefore, the minimum lot size should be kept at 0.5 hectares or larger.

6. CONCLUSIONS

Rural lot development of the subject properties is being proposed by the client A hydrogeological site assessment was undertaken to characterize the geological and hydrogeological conditions of the subject properties to support the proposed rural lot subdivision.

Based on the review of available background information and site investigations the overburden at the site consists of glaciolacustrine varved silt and clay deposits, glacial till ranging from sand and gravel to silty sand overlain by thin topsoil, and some bedrock at surface. Overburden depths up to greater than 30 m occur based on historic well logs.

Review of 104 well records in the vicinity of the subject properties indicated that supply of enough water to support single family dwellings is highly likely. Based on analyses of the pump test results for historic wells, it is anticipated that there will be more than adequate domestic water supply for the proposed single family dwellings.

A review of on-site septic systems indicate that a minimum lot size of 0.5 hectares should be maintained and that standard filter bed construction with imported mantles where required for soil or groundwater conditions will be satisfactory.

7. CLOSURE

Should you have any questions regarding the information presented herein, please contact the underisgned.

Sincerely yours,

Matthew R Parfitt P.Eng.
Senior Geological Engineer
North Bay

TABLE 1 - WATER WELL RECORD DATA ANALYSES SUMMARY

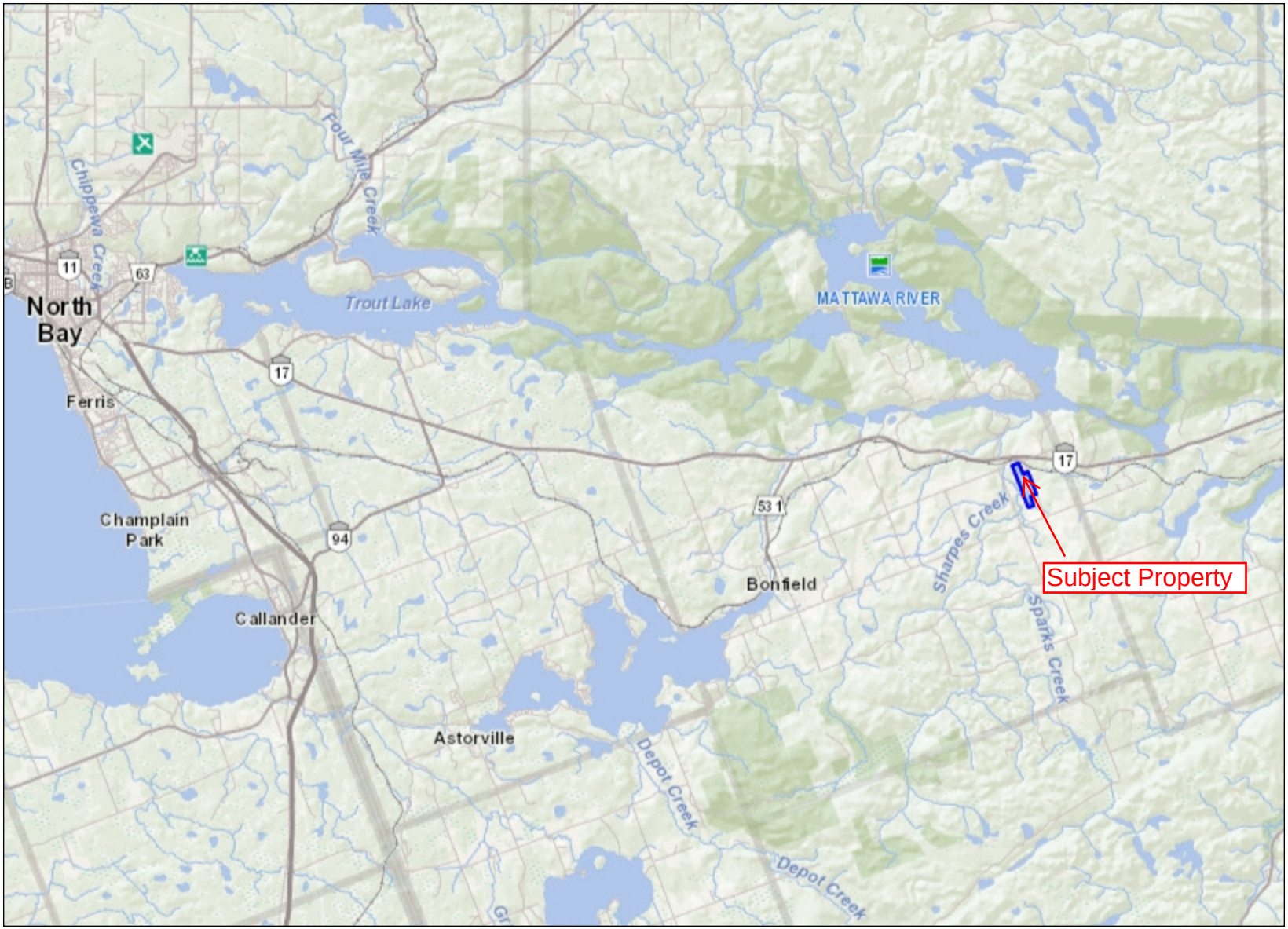
	Well No.	Date Drilled	Overburden Encountered			Total Depth	Water Found	Static Level	Pump Rate	Pump Level	Pumptest Duration	Maximum Drawdown	Total Recovery	Percent Recovery	Specific Capacity	Well Volume	120 min. Pump Vol.	Total Vol. Available	Vol. minus Drawdown	Hydro Frack
	No.		Depth	Type																
	No.		m			m	m	m	lpm	m	hr	m	m		lpm/m	litres	litres	litres	litres	
1	4304927	01-Feb-90	11.28	sand	oken rock &solid ro	86.87	82.91		18.90	N/A	1.0	N/A	N/A	N/A	N/A	N/A	2268.00	N/A	N/A	no
2	4304928	30-Jan-90	0.91	sand gravel	granite	153.92			3.78	N/A	1.0	N/A	N/A	N/A	N/A	N/A	453.60	N/A	N/A	yes
3	4304971	12-May-90	16.76	sand clay grave	edrock & broken ro	18.29	17.98	4.27	45.36	16.76	1.0	6.7056	N/A	N/A	6.76	251.14	5443.20	5694.34	N/A	no
4	4304997	24-Aug-90	19.51	clay stones	granite	56.39	55.17	11.28	30.24	53.34	1.0	42.0624	N/A	N/A	0.72	845.29	3628.80	4474.09	N/A	no
5	4305019	14-Aug-90	10.06	quicksand grav	oken rock & bedro	38.10	26.21	6.40	45.36	N/A	1.0	16.4592	N/A	N/A	2.76	N/A	5443.20	N/A	N/A	no
6	4305061	19-Oct-90	2.74	sand	granite	99.06	94.18	9.14	2.84	30.48	1.0	86.868	N/A	N/A	N/A	428.77	340.20	768.97	N/A	no
7	4305103	07-May-91	3.35		bedrock	153.92		2.13	18.90	91.44	1.3	89.3064	N/A	N/A	N/A	1794.70	2268.00	4062.70	N/A	no
8	4305132	15-Aug-90	19.51	sand clay grave	rock	76.20	71.02	14.33	30.24	60.96	1.0	N/A	N/A	N/A	N/A	937.16	3628.80	4565.96	N/A	no
9	4305169	15-Jul-91	18.90	sand clay	granite	44.20	43.28	0.30	20.79	39.62	1.0	39.3192	N/A	N/A	N/A	790.16	2494.80	3284.96	N/A	no
10	4305170	17-Jul-91	20.42	clay sand	granite	50.29	48.46	0.30	20.79	47.24	1.0	46.9392	N/A	N/A	0.44	943.29	2494.80	3438.09	N/A	no
11	4305189	05-Sep-91	19.81	gravel sand	bedrock, rock	21.95	21.03	3.66	45.36	18.29	1.0	0.6096	N/A	N/A	74.41	294.01	5443.20	5737.21	N/A	no
12	4305214	07-Oct-91	2.44	sand gravel	granite	61.57	surged	8.53	11.34	113.08	1.0	N/A	N/A	N/A	N/A		1360.80	1360.80	N/A	no
13	4305215	03-Oct-91	2.44	sand	granite	107.90	105.16	10.97	378.00	107.59	1.0	N/A	N/A	N/A	N/A	1941.71	45360.00	47301.71	N/A	no
14	4305263	13-Nov-91	38.10	sand	rock	140.21	121.92	24.38	3.78	137.16	1.1	82.296	N/A	N/A	N/A	2266.35	453.60	2719.95	N/A	no
15	4305265	18-Jan-91	12.19	clay hardpan	rock	73.76	121.92	4.57	15.12	76.20	1.1	123.444	N/A	N/A	N/A	1439.44	1814.40	3253.84	N/A	no
16	4305266	02-Oct-91	18.59	sand clay	rock	138.68	137.16	0.91	15.12	131.06	1.1	136.2456	N/A	N/A	N/A				N/A	
17	4305281	01-Oct-91	1.83	sand stones	granite	57.00	surged	5.49	11.34	56.69	1.0	N/A	N/A	N/A	N/A	1029.04	1360.80	2389.84	N/A	no
18	4305353	09-Apr-92	8.53	clay	granite	50.29	48.77	5.79	20.79	47.24	1.0	41.4528	N/A	N/A	N/A	833.04	2494.80	3327.84	N/A	no
19	4305358	27-Apr-92	23.16	clay gravel quic	rock	79.25	72.24	4.57	22.68	30.48	1.0	N/A	N/A	N/A	N/A	520.65	2721.60	3242.25	N/A	no
20	4305405	13-Jun-92	5.18	clay,rocks	granite	80.77	70.10	3.35	37.80	30.48	1.0	N/A	N/A	N/A	N/A	545.15	4536.00	5081.15	N/A	no
21	4305449	02-Aug-92	3.96	clay	granite	76.20	70.71	3.66	56.70	45.72	1.0	N/A	N/A	N/A	N/A	845.29	6804.00	7649.29	N/A	no
22	4305461	05-Aug-92	21.34	sand gravel qu	rock	152.40	143.26	6.71	30.24	91.44	1.0	84.7344	N/A	N/A	N/A	1702.82	3628.80	5331.62	N/A	no
23	4305533	12-Nov-92	9.45	ill clay boulder	granite	69.19	54.50	3.66	3.78	54.86	1.0	N/A	N/A	N/A	N/A	1029.04	453.60	1482.64	N/A	no
24	4305577	01-Jul-93	9.14	sand boulders	granite	125.27		7.62	22.68	60.96	32.0	N/A	N/A	N/A	N/A	1071.92	2721.60	3793.52	N/A	yes
25	4305593	03-Apr-93	3.05	boulders grave	granite	88.39	76.20		11.12	60.96	1.0	N/A	N/A	N/A	N/A	1225.05	1334.40	2559.45	N/A	no
26	4305631	01-Sep-93	0.30	gravel	granite	105.16	82.60	24.08	3.78	102.11	1.0	78.0288	N/A	N/A	N/A	1568.07	453.60	2021.67	N/A	no
27	4305684	10-Oct-93	2.74	sand boulders	granite	125.58	surged	5.18	18.90	124.97	1.0	N/A	N/A	N/A	N/A	2407.23	2268.00	4675.23	N/A	no
28	4305878	26-Feb-94	5.03	sand clay grave	granite	56.39	45.11	4.27	37.80	42.67	1.0	22.2504	N/A	N/A	N/A	771.78	4536.00	5307.78	N/A	no
29	4305903	07-Jul-94	0.00	Granite		82.30	78.03		56.70	54.86	1.0	N/A	N/A	N/A	N/A	1102.55	6804.00	7906.55	N/A	no
30	4306069	18-Oct-95	24.69	sand clay	granite	61.87	16.46	16.46	11.34	60.96	1.0	N/A	N/A	N/A	N/A	894.29	1360.80	2255.09	N/A	no
31	4306219	06-Aug-96	6.10	nd clay boulde	granite	122.22	120.40	6.10	9.45	60.96	1.0	N/A	N/A	N/A	N/A	1102.55	1134.00	2236.55	N/A	no
32	4306246	10-Oct-96	3.66	clay	granite	122.53	unknown	9.14	7.56	112.78	10.0	15.24	N/A	N/A	N/A	2082.59	907.20	2989.79	N/A	no
33	4306468	16-Jun-98	7.01	sand boulders	granite	69.80	68.58	4.57	37.80	87.78	1.0	39.32	N/A	N/A	0.96	1672.20	4536.00	6208.20	N/A	no
34	4306471	20-Mar-98	6.40	sand	granite	141.43	129.54		4.73	91.44	1.0	N/A	N/A	N/A	N/A	1837.58	567.00	2404.58	N/A	no
35	4306588	09-Oct-98	5.79	sand boulders	granite	110.34	103.63	6.10	7.56	76.20	1.0	104.2416	N/A	N/A	N/A	1408.81	907.20	2316.01	N/A	no
36	4306589	12-Oct-98	2.74	d gravel bould	granite	73.76	60.05	6.10	11.34	70.10	1.0	67.6656	N/A	N/A	N/A	1286.30	1360.80	2647.10	N/A	no
37	4306590	08-Oct-98	0.91	sand	granite	73.76	65.53	8.53	11.34	68.58	1.0	65.2272	N/A	N/A	N/A	1206.68	1360.80	2567.48	N/A	no
38	4306649	25-Sep-98	3.66	sand	granite	188.98	185.93	6.10	18.90	106.68	3.0	27.432	N/A	N/A	N/A	2021.34	2268.00	4289.34	N/A	no
39	4306755	12-Aug-99	13.41	sand	granite	74.37	69.49	15.85	75.60	74.07	1.0	58.2168	N/A	N/A	1.30	1169.92	9072.00	10241.92	N/A	no
40	4306763	03-Aug-99	2.44	clay	granite	40.23	30.48	2.13	11.34	25.91	1.0	35.052	N/A	N/A	0.32	477.77	1360.80	1838.57	N/A	no
41	4306765	09-Aug-99	26.21	sand	granite	116.43	108.81	4.57	15.12	N/A	1.0	N/A	N/A	N/A	N/A	N/A	1814.40	N/A	N/A	no
42	4306766	02-Sep-99	17.07	sand clay	granite	31.09	18.29	15.24	37.80	24.38	1.0	15.8496	N/A	N/A	2.38	183.76	4536.00	4719.76	N/A	no
43	4306768	30-Jul-99	1.52	sand boulders	granite	124.97	109.73	9.14	7.56	68.58	1.0	115.824	N/A	N/A	0.07	1194.43	907.20	2101.63	N/A	no
44	4306786	28-Sep-99	1.83	sand	granite	46.33	39.62	6.10	18.90	48.77	1.0	49.3776	N/A	31%	0.38	857.54	2268.00	3125.54	N/A	no
45	4306816	11-Nov-99	1.83	sand	granite	67.67	64.01	0.61	94.50	18.29	1.0	67.056	N/A	N/A	1.41	355.27	11340.00	11695.27	N/A	no
46	4307258	17-Jun-02	28.35	gravel and har	bed rock	29.26	29.26	16.76	37.80	25.91	1.0	9.144	N/A	N/A	4.13	183.76	4536.00	4719.76	N/A	no
47	4307349	08-Apr-03	7.92	nd clay boulde	granite	115.82	N/A	4.27	7.56	N/A	24.0	35.3568	N/A	N/A	0.21	N/A	907.20	N/A	N/A	yes
48	4307350	02-Apr-03	19.81	nd clay boulde	granite	73.76	70.10	15.85	75.60	54.86	1.0	57.912	N/A	N/A	1.31	784.03	9072.00	9856.03	N/A	no
49	4307383	14-Jul-03	6.71	Sand boulders	granite	79.86	60.96	10.67	11.34	70.10	1.0	69.1896	N/A	N/A	0.16	1194.43	1360.80	2555.23	N/A	no
50	4307490	26-Nov-03	8.23	nd clay boulde	granite	31.09	28.04	6.10	45.36	10.67	1.0	1.524	N/A	N/A	29.76	91.88	5443.20	5535.08	N/A	no
51	4307584	02-Sep-04	7.62	sand boulders	granite	55.47	50.29	6.10	18.90	30.48	1.0	6.4008	4.626	72%	2.95	490.02	2268.00	2758.02	2665.06	no
52	4307608	23-Aug-04	25.60	gravel sand	rock	67.10	65.50	15.20	75.60	18.59	1.0	2.37744	2.37744	100%	31.80	68.18	9072.00	9140.18	9092.40	no
53	4307662	13-Nov-04	6.40	nd clay boulde	granite	55.47	50.29	9.14	18.90	30.48	1.0	5.1816	5.1816	100%	3.65	428.77	2268.00	2696.77	2592.64	no
54	4307844	26-Nov-05	1.52	sand boulders	granite	92.05	73.15	2.74	37.80	30.48	1.0	27.7368	22.96	83%	1.36	557.40	4536.00	5093.40	4631.99	no
55	4307990	25-Aug-06	2.44	sand	granite	97.54		7.32	37.80	30.48	1.0	6.401	6.401	100%	5.91	465.52	4536.00	5001.52	4872.89	yes
56	7038940	17-Nov-06	5.49	sand gravel	granite	61.57	59.44	5.49	37.80	30.48	1.0	24.99	24.99	100%	1.51	502.27	4536.00	5038.27	4536.07	no
57	7039494	20-Nov-06	1.52	clay sand	granite	73.76	surged	0.91	37.80	30.48	1.0	29.5656	29.083	98%	1.28	594.15	4536.00	5130.15	4545.70	no
58	7051900	04-Jul-07	6.40	sand	granite	55.47	48.77	9.14	37.80	30.48	1.0	21.336	21.336	100%	1.77	428.77	4536.00	4964.77	4536.00	no
59	7109665	22-Jul-08	15.30	silt gravel	bedrock	21.30	3.30	3.70	20.00	15.20	1.0	2.4	2.4	100%	8.33	231.10	2400.00	2631.10	2582.87	no
60	7116838	05-Sep-08	1.52	gravel	granite	42.67	40.23	6.10	18.90	30.48	1.0	1.8288	1.7526	96%	10.33	490.02	2268.00	2758.02	2722.80	no
61	7116946	07-Oct-08	1.83	clay sand	granite	43.28	40.84	3.05	37.80	15.24	1.0	0.01	0.01	100%	3780.00	245.01	4536.00	4781.01	N/A	no
62	7116947	08-Oct-08	7.01	sand	granite	43.28	40.84	3.35	37.80	30.48	1.0	27.1272	23.1648	85%	1.39	545.15	4536.00	5081.15	4615.63	no
63	7117095	07-Nov-08	0.91	sand	granite	79.25	73.15	13.72	37.80	33.22	1.0	16.764	16.51	98%	2.25	392.02	4536.00	4928.02	4596.23	no
64	7131850	21-May-09	1.22	sand stones	granite	109.73		4.57	37.80	30.48	1.0	25.908	25.222	97%	1.46	520.65	4536.00	5056.65	4549.79	yes
65	7131871	26-May-09	5.18	sand	granite	115.82	103.63	8.84	18.90	30.48	1.0	2.7432	2.7432	100%	6.89	434.89	2268.00	2702.89	2647.77	no
66	7137040	20-Jul-09	19.20	nd clay boulde	granite	97.54	79.25	7.62	37.80	30.48	1.0	13.716	11.78357	86%	2.76	459.39	4536.00	4995.39	4758.59	no
67	7137054	18-Sep-09	21.34	sand clay	granite	31.09	27.43	15.54	37.80	18.29	4.0	0.3048	0.3048	100%	124.02	55.13	4536.00	4591.13	N/A	no
68	7137402	29-Nov-09	12.80	ay sand boulde	granite	37.19	29.26	5.49	18.90	15.24	1.0	1.8288	1.8288	100%	10.33	196.01	2268.00	2464.01	2427.26	no
69	7144256	04-Oct-09	3.00	clay	bedrock	109.70	25.60	2.40	20.00	103.60	1.0	43.6	26	60%	0.46	2033.72	2400.00	4433.72	3911.22	no
70	7149663	16-Jul-10	10.10	sand gravel	bedrock	36.60	33.70	7.60	20.00	30.50	1.0	2.4	2.4	100%	8.33	460.20	2400.00	2860.20	2811.97	no
71	7156562	18-Oct-10	2.13	sand boulders	granite	61.57	55.47	4.88	37.80	30.48	1.0	25.6032	23.36597	100%	1.48	514.52	4536.00	5050.52	4580.96	no
72	7158649	14-Oct-10	11.58	clay sand	granite	60.96		15.24	15.12	60.35	1.0	60.3504	N/A	N/A	0.25	906.54	1814.40	2720.94	N/A	no
73	7172920	04-Aug-11	1.22	sand	granite	12.80	9.14	2.44	18.90	9.14	1.0	0.01	0.01	100%	1890.00	134.76	2268.00	2402.76	N/A	no
74	7173050	12-Aug-11	3.35	boulders	granite	79.86	72.54	5.49	18.90	15.24	1.0	2.7432	2.7432	100%	6.89	196.01	2268.00	2464.01	2408.88	no
75	7182162	08-May-12	2.13	sand	granite	31.09	26.21	3.66	18.90	15.24	1.0	3.048	3.048	100%	6.20	232.76	2268.00	2500.76	2439.51	no
76	7193317	04-Oct-12	6.10	sand gravel	bedrock	91.40	67.10	4.60	20.00	85.30	1.0	43.6	26.8	61%	0.46	1621.75	2400.00	4021.75	3483.17	no
77	7205781	15-May-13	2.44	sand gravel	granite	39.62	36.58	3.66	3.05	9.14	1.0	0.9144	0.9144	100%	3.33	110.25	365.76	476.01	457.64	no
78	7206205	09-May-13	5.50	gravel	bedrock	24.40	12.20	0.60	20.00	18.30	1.0	1.9	1.9	100%	10.53	355.70	2400.00	2755.70	2717.52	no
79	7210214	10-Jul-12	11.30	sand gravel	bedrock	91.40	15.20	3.00	20.00	14.00	1.0	7.9	7.9	100%	2.53	221.06	2400.00	2621.06	2462.30	no
80	7213969	22-Nov-13	8.84	sand	granite	85.34	82.30	9.14	37.80	30.48	1.0	21.336	20.321	95%	1.77	428.77	4536.00	4964.77	4556.40	no
81	7234078	02-Sep-14	0.61	sand	granite	67.06	54.86	9.14	18.90	30.48	1.0	3.3528	3.3528	100%	5.64	428.77	2268.00	2696.77	2629.39	no
82	7246420	09-Jul-15	37.80	vel boulders st	granite	105.16	52.12	34.14	11.34	100.58	1.0	19.2024	14.9352	78%	0.59	1335.31	1360.80	2696.11	2395.97	no
83	7248088	31-Jul-15	2.10	sand boulders	granite	30.50	10.70	7.60	20.00	24.40	1.0	2.4	2.4	100%	8.33	337.61	2400.00	2737.61	2689.38	no
84	7255246	15-Oct-15	7.62	ay sand boulde	granite	85.34	surged	3.05	37.80	30.48	1.0	27.432	18.5928	100%	1.38	551.27	4536.00	5087.27	4713.63	no
85	7255247	16-Oct-15	7.92	nd boulders gra	granite	67.06	64.01	5.49	11.34	15.24	1.0	0.6096	0.6096	100%	18.60	196.01	1360.80	1556.81	1544.56	no
86	7255376	05-May-15	3.05	clay sand	granite	73.76	71.63	3.05	18.90	15.24	1.0	0.01	0.01	100%	1890.00	245.01	2268.00	2513.01	N/A	no
87	7271949	03-Aug-16	3.00	fill	oken bedrock, bedr	117.30	115.80	21.30	20.00	54.90	1.0	23.7744	23.7744	100%	0.84	675.23	2400.00	3075.23	2597.46	no
88	7278118	26-May-16	1.52	gravel	granite	73.76	54.86	5.49	37.80	30.48	1.0	24.9936	22.83461	91%	1.51	502.27	4536.00	5038.27	4579.39	no
89	7278328	25-Aug-16	12.80	& gravel bou	granite	73.15	69.80	9.14	18.90	22.86	1.0	0.01	0.01	100%	1890.00	275.64	2268.00	2543.64	N/A	no
90	7287841	12-May-17	3.00	clay	bedrock	115.80	114.30	6.10	20.00	30.50	1.0	0.2	0.2	100%	100.00	490.34	2400.00	2890.34	2886.32	no
91	7301954	18-Jul-17	0.91	sand	granite	115.82		6.10	37.80	30.48	1.0	24.384	18.288	75%	1.55	490.02	4536.00	5026.02	4658.51	yes
92	7324603	04-Jun-18	21.03	lay sand stone	granite	79.25	73.76	9.14	18.90	15.24	1.0	0.01	0.01	100%	1890.00	122.51	2268.00	2390.51	N/A	no
93	7325460	26-Sep-18	1.83	sand	granite	115.82	surged	6.10	18.90	15.24	1.0	9.144	9.144	100%	2.07	183.76	2268.00	2451.76	2268.00	no
94	7325469	02-Nov-18	6.40	clay	granite	110.34	108.20	6.10	11.34	15.24	1.0	0.6096	0.6096	100%	18.60	183.76	1360.80	1544.56	1532.31	no
95	7325470	01-Nov-18	24.38	sand clay	granite	31.09	28.96	18.90	18.90	30.48	1.0	0.01	0.01	100%	1890.00	232.76	2268.00	2500.76	N/A	no
96	7325475	09-Nov-18	11.58	sand boulders	granite	103.63	70.10	24.99	37.80	30.48	1.0	5.4864	5.4864	100%	6.89	110.25	4536.00	4646.25	4536.00	no
97	7378315	07-Jun-20	21.34	sand boulders	granite	97.54		9.14	37.80	30.48	1.0	21.336	20.3707	95%	1.77	428.77	4536.00	4964.77	4555.40	yes
98	7378316	19-Jun-20	0.61	sand	granite	109.73	surged	7.62	37.80	22.86	1.0	15.24	10.03301	66%	2.48	306.26	4536.00	4842.26	4640.64	no
99	7380881	27-Nov-20	6.10	sand clay	granite	91.44	surged	3.05	37.80	22.86	1.0	19.812	18.288	92%	1.91	398.14	4536.00	4934.14	4566.63	no
100	7422406	16-Jun-22	26.52	gravel boulde	granite	54.86		7.19	18.90	51.82	1.0	19.23288	17.00784	88%	0.98	896.74	2268.00	3164.74	2822.95	no
101	7424464	10-Jul-22	30.48	topsoil clay g	granite	73.15		5.21	18.90	67.06	1.0	52.91328	3.62712	7%	0.36	1242.82	2268.00	3510.82	3437.92	no
102	7426865	22-Jul-22	3.35	d boulders gra	granite	91.44		0.91	45.36	7.62	1.0	36.94176	36.94176	100%	1.23	134.76	5443.20	5577.96	4835.57	no
103	7428737	31-Aug-22	26.82	sand clay grave	granite	28.96	28.65	11.09	18.90	25.91	1.0	8.16864	8.16864	100%	2.31	297.69	2268.00	2565.69	2401.53	no
104	7449628	02-Jun-23	7.92	topsoil clay	granite	92.35	26.52	1.74	45.36	45.72	1.0	29.5	29.5	100%	1.54	883.88	5443.20	6327.08	6327.08	no

Max			38.10			188.98	185.93	34.14	378.00	137.16		136.25	36.94	100.00%	3780.00	2407.23	45360.00	47301.71	9092.40	
Min			0.00			12.80	3.30	0.30	2.84	7.62		0.01	0.01	6.85%	0.07	55.13	340.20	476.01	457.64	
Mean			9.49			78.59	63.04	7.66	29.56	46.00		29.13	10.99	91.79%	194.31	740.81	3564.36	4368.38	3626.56	
Stan. Dev.			8.93			35.19	36.17	5.93	38.21	30.99		31.31	10.44	17.75%	644.62	567.16	4604.06	4770.60	1446.11	

Ontario Ministry of Natural Resources

Make a Topographic Map

FIGURE 1 - SITE LOCATION



Legend

- Building as Symbol
- Building to Scale
- Airport
- Heliport \ Hospital Heliport
- Seaplane Base
- Ferry Route
- Trail
- Bruce Trail
- Greenbelt Route
- Rideau Trail
- Trans Canada Trail
- Voyageur Trail
- Waterfront Trail
- Railway \ Train Station
- Railway with Bridge
- Railway with Tunnel
- Road (Major → Minor)
- Winter Road
- Road with Bridge
- Road with Tunnel
- Primary, Kings or 400 Series Highway
- Secondary Highway
- Tertiary Highway
- District, County, Regional or Municipal Road
- Toll Highway
- One Way Road
- Road with Permanent Blocked Passage
- Road with Address Ranges
- Hydro Line, Communication Line or Unknown Transmission Line
- Natural Gas Pipeline, Water Pipeline or Unknown Pipeline
- Spot Height
- Index Contour
- Contour
- Wooded Area
- Wetland
- Waterbody
- Waterbody Elevation
- Watercourse
- Falls
- Rapids
- Rapids \ Falls
- Rapids
- Rocks
- Lock Gate
- Dam \ Hydro Wall
- Dam \ Hydro Wall
- Provincial \ State Boundary
- International Boundary
- Upper Tier \ District Municipal Boundary
- Lower Tier \ Single Tier Municipal Boundary
- Lot Line
- Indian Reserve
- Provincial Park
- National Park
- Conservation Reserve
- Military Lands

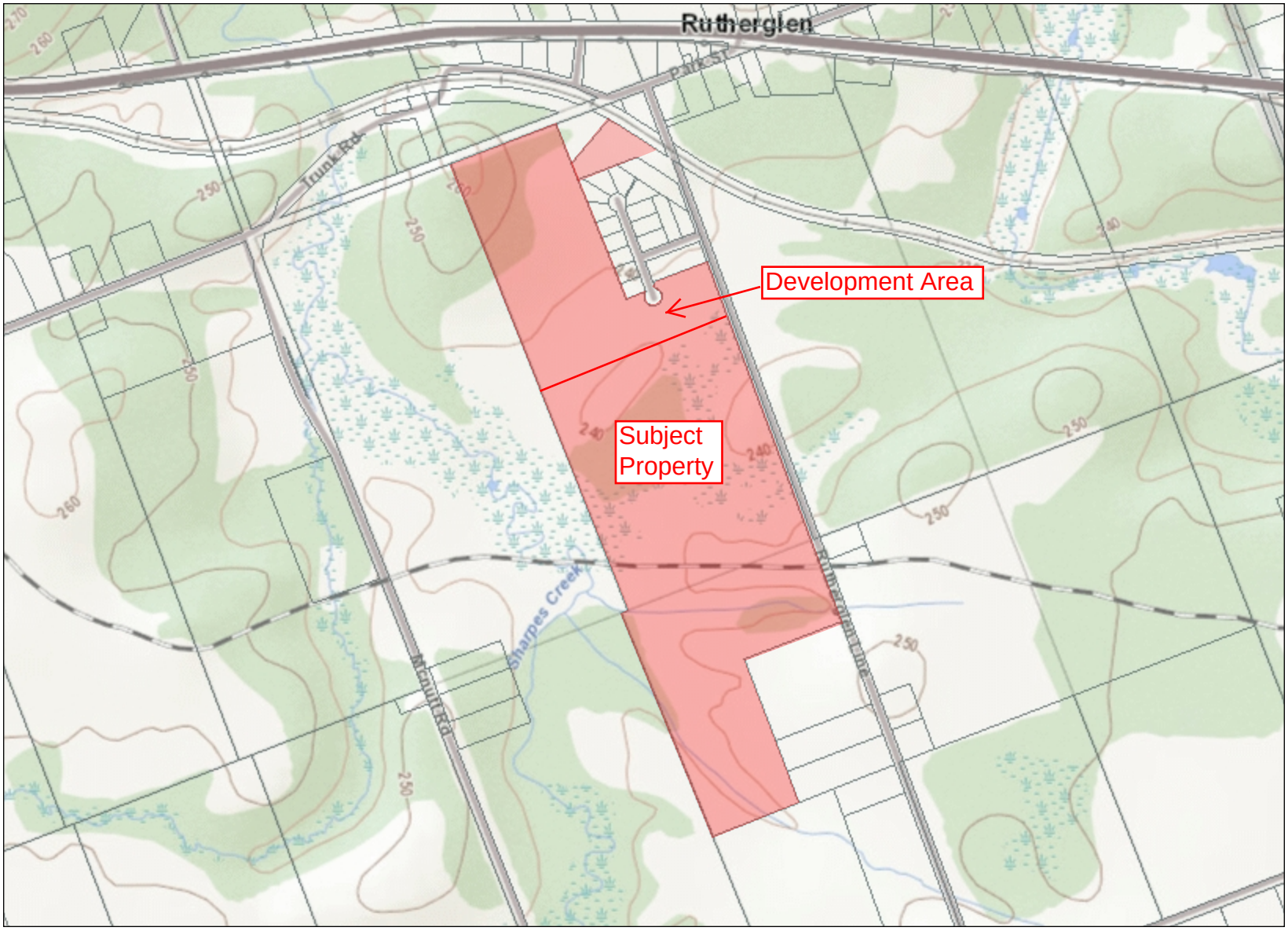
0 10.1 km

Projection: Web Mercator

Ontario Ministry of Natural Resources

Make a Topographic Map

FIGURE 2 - PROPERTY PLAN



Legend

- Building as Symbol
- Building to Scale
- Airport
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- Rideau Trail
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- Road (Major → Minor)
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- Primary, Kings or 400 Series Highway
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- Road with Address Ranges
- Hydro Line, Communication Line or Unknown Transmission Line
- Natural Gas Pipeline, Water Pipeline or Unknown Pipeline
- Spot Height
- Index Contour
- Contour
- Wooded Area
- Wetland
- Waterbody
- Waterbody Elevation
- Watercourse
- Falls
- Rapids
- Rapids \ Falls
- Rapids
- Rocks
- Lock Gate
- Dam \ Hydro Wall
- Dam \ Hydro Wall
- Provincial \ State Boundary
- International Boundary
- Upper Tier \ District Municipal Boundary
- Lower Tier \ Single Tier Municipal Boundary
- Lot Line
- Indian Reserve
- Provincial Park
- National Park
- Conservation Reserve
- Military Lands

0 0.6 km

Projection: Web Mercator

Ontario

Ministry of Natural Resources

Make a Topographic Map

FIGURE 3 - DEVELOPMENT AREA

Legend

- Building as Symbol
- Building to Scale
- Airport
- Heliport \ Hospital Heliport
- Seaplane Base
- Ferry Route
- Trail
- Bruce Trail
- Greenbelt Route
- Rideau Trail
- Trans Canada Trail
- Voyageur Trail
- Waterfront Trail
- Railway \ Train Station
- Railway with Bridge
- Railway with Tunnel
- Road (Major → Minor)
- Winter Road
- Road with Bridge
- Road with Tunnel
- Primary, Kings or 400 Series Highway
- Secondary Highway
- Tertiary Highway
- District, County, Regional or Municipal Road
- Toll Highway
- One Way Road
- Road with Permanent Blocked Passage
- Road with Address Ranges
- Hydro Line, Communication Line or Unknown Transmission Line
- Natural Gas Pipeline, Water Pipeline or Unknown Pipeline
- Spot Height
- Index Contour
- Contour
- Wooded Area
- Wetland
- Waterbody
- Waterbody Elevation
- Watercourse
- Falls
- Rapids
- Rapids \ Falls
- Rapids
- Rocks
- Lock Gate
- Dam \ Hydro Wall
- Dam \ Hydro Wall
- Provincial \ State Boundary
- International Boundary
- Upper Tier \ District Municipal Boundary
- Lower Tier \ Single Tier Municipal Boundary
- Lot Line
- Indian Reserve
- Provincial Park
- National Park
- Conservation Reserve
- Military Lands

0 0.3 km

Projection: Web Mercator

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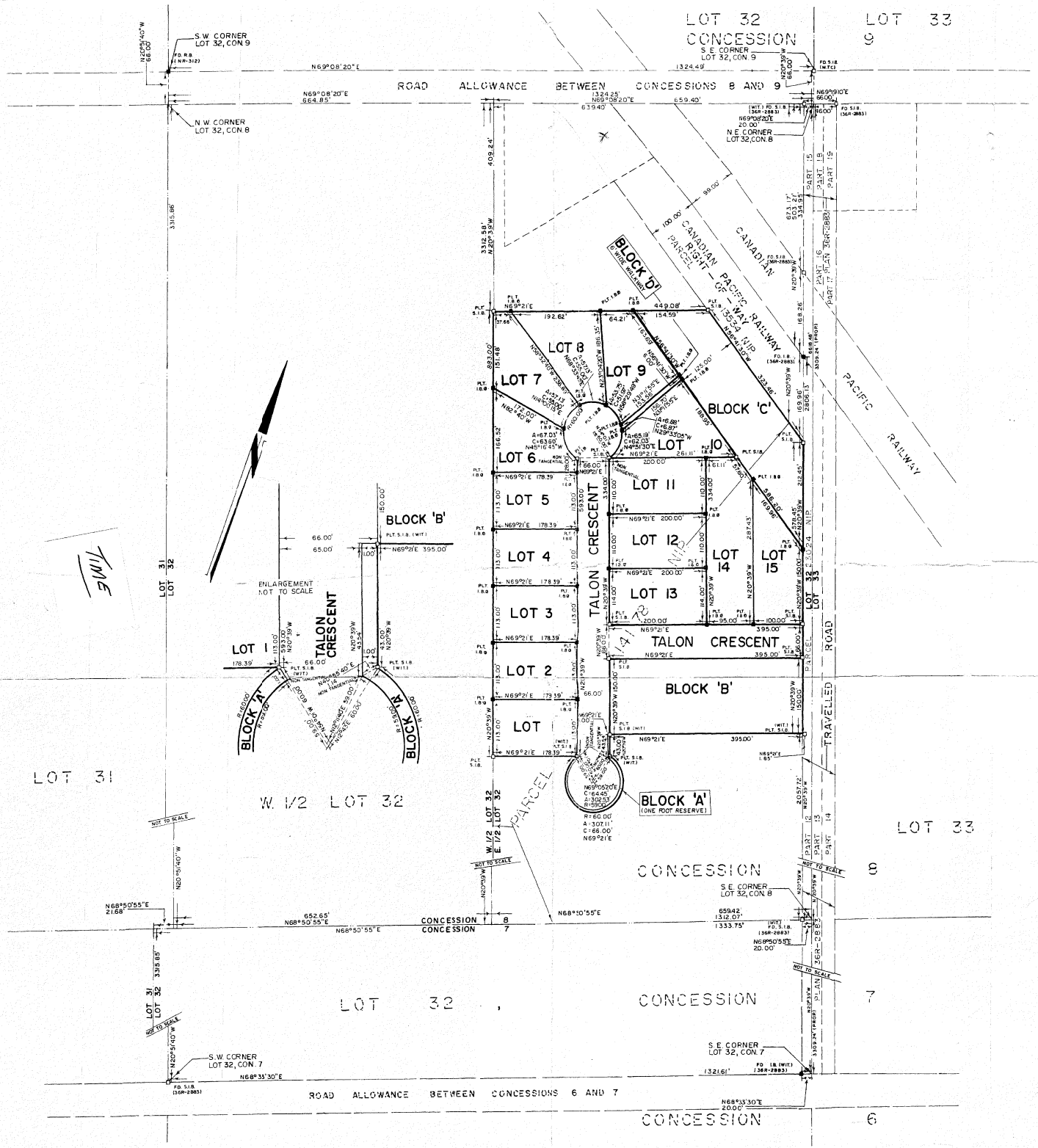
N-5362

FIGURE 4

PLAN M- 512
APPROVED FOR REGISTRATION
S. S. Lucier
EXAMINER OF SURVEYS
PLAN M- 512 REGISTERED Jan 9/79 and ENTERED ON PARCEL 24912 Nip
S. S. Lucier
LAND REGISTRAR
Certificates, Consents and Dedications are filed under No. 198399



PLAN AND FIELD NOTES OF SUBDIVISION OF
PART OF E.1/2 of LOT 32, CONCESSION 8
TOWNSHIP OF BONFIELD
DISTRICT OF NIPISSING
SCALE: 1 INCH = 100 FEET
J. J. NEWLANDS, O.L.S. — 1978

NOTES

ALL HANGING LINES HAVE BEEN VERIFIED.

DISTANCES ARE IN FEET AND DECIMALS THEREOF.

BEARINGS ARE ASSUMED AND ARE DERIVED FROM THE WESTERLY LIMIT OF PART 12, PLAN 36R-2883, HAVING AN ASTRONOMIC BEARING OF N20°39'W, AS SHOWN ON PLAN 36R-2883.

O.S.I.B. — DENOTES STANDARD IRON BAR (1"sq. x 48").
I.B.Ø — DENOTES ROUND IRON BAR (3/4"dia. x 24").
PLT. — DENOTES PLANTED.
FD. — DENOTES FOUND.
(WIT.) — DENOTES WITNESS MONUMENT.
I.B. — DENOTES IRON BAR (5/8"sq. x 24").

OWNER'S CERTIFICATE

LOTS 1 TO 15 (INCLUSIVE); BLOCKS 'A' (ONE FOOT RESERVE), 'B', 'C', and 'D' (SIX FOOT WIDE WALKWAY) AND THE STREET NAMELY TALON CRESCENT; AS DESIGNATED WITH THE AREA OF SURVEY OUTLINED, HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS AND THE STREETS ARE HEREBY DEDICATED AS PUBLIC HIGHWAY.

SEAL

MICHEAL G. BROPHY — PRESIDENT
HIGHWAY 17 DEVELOPMENT LIMITED

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEY'S ACT AND THE LAND TITLE'S ACT AND THE REGULATIONS MADE THEREUNDER.
2. I WAS PRESENT AT AND DID PERSONALLY SUPERVISE THE SURVEY REPRESENTED BY THIS PLAN.
3. THIS PLAN CONTAINS A TRUE COPY OF THE FIELD NOTES OF SURVEY.
4. THE SURVEY WAS COMPLETED ON THE 13th DAY OF FEBRUARY, 1978.

FEBRUARY 16, 1978
NORTH BAY, ONT.

J. J. NEWLANDS
ONTARIO LAND SURVEYOR

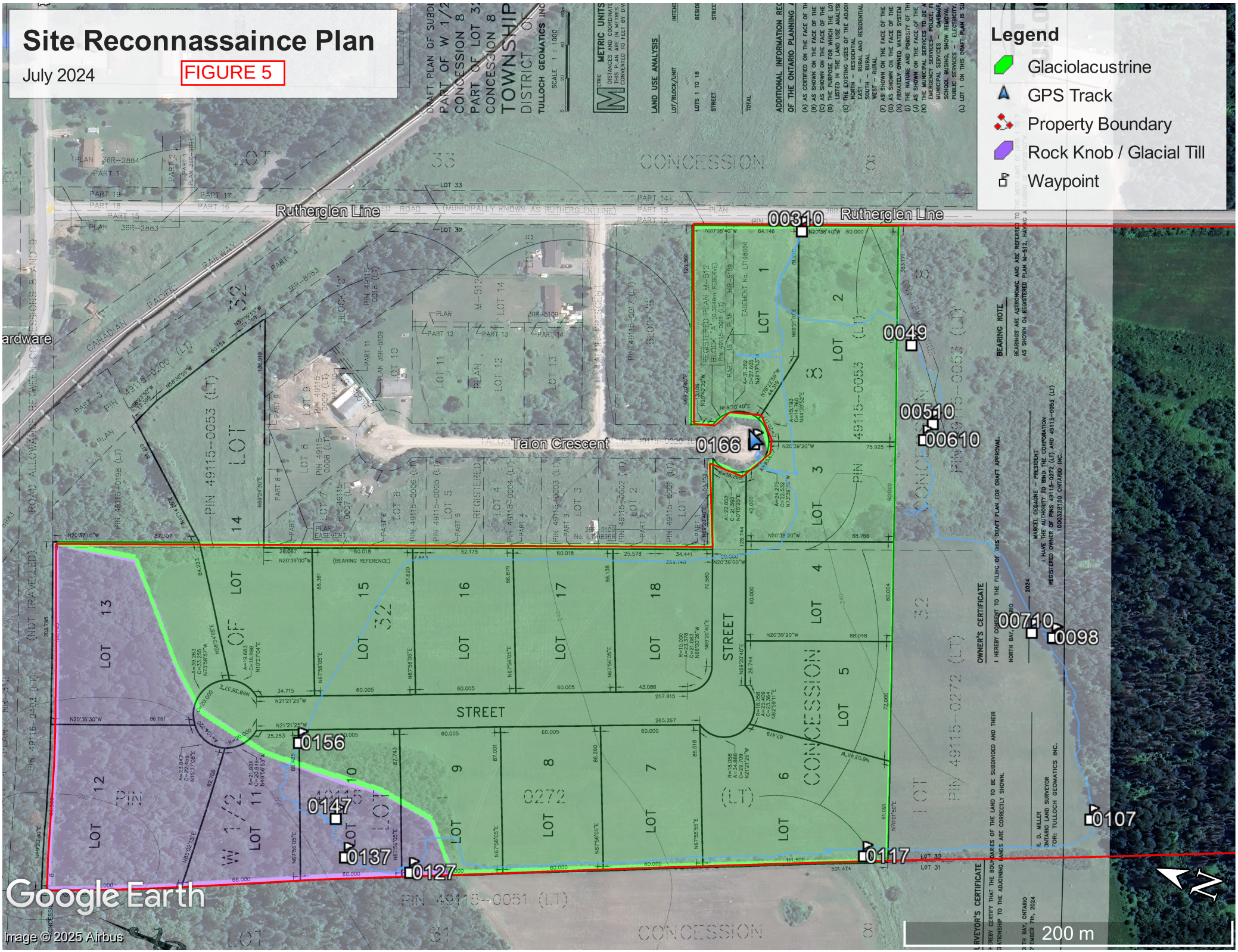
Approved under Section 33 of THE PLANNING ACT.
This 20th day of DEC. 1978

SEAL

Site Reconnassaince Plan

July 2024

FIGURE 5



APPENDIX A

SITE RECONNAISANCE PHOTOS

WPT 0166 – View looking west showing access trail – glaciolacustrine plain.

WPT 00310 – View looking north along Rutherglen Line – glaciolacustrine plain.

WPT 0049 – View looking west along edge of bottom of slope – glaciolacustrine plain.

WPT 00510 – View looking west along gentle slope to south – glaciolacustrine plain.

WPT 00610 – View looking northwest into field area – glaciolacustrine plain.

WPT 00610 – Test hole showing silt and clay soils.

WPT 00710 – View looking east along field edge – glaciolacustrine plain.

WPT 0098 – View looking south downs slope as field edge – glaciolacustrine plain.

WPT 0117 – View looking northeast into field – glaciolacustrine plain.

WPT 0127 – View showing boulders at surface – rock knob / glacial till.

WPT 0137 – Viwe showing exposed bedrock – rock knob/ glacial till.

WPT 0147 – View showing glacial till under tree root – rock knob/glacial till.

WPT 0156 – View looking north along edge of field – glaciolacustrine plain.