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Ontario

Glamorgan Property (Claims: 4212342 and 4212343)
2014 Mapping and Geochemical Program
(Oct/Nov 2014)
Glamorgan Township, Ontario
Southern Ontario Mining Division
National Topographic System 31D16

Prepared for: Crushcor Ltd.
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Toronto, ON
M8X 2K3

Prepared by:
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674 Camelot Dr
Sudbury, ON
P3B 3N1

Dec 2016

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OVERVIEW:

The Glamorgan Property consists of 2 claims, 4212342 and 4212343, totaling 4 units covering approximately 83 hectares on the eastern side of Glarmorgan Township in Mining District of Southern Ontario, near Gooderham.

The property is situated regionally on a variety of Precambrian Carbonate Sediments/Metasediments that strike approximately east to west and dip shallowly to moderately to the south. There are intrusions of pegmatitic granite, syenite gneiss, gabbro and nepheline pegmatite within the carbontares of varying size and alteration.

Locally, the property is primarily composed of a large syenite gneiss-biotite syenite gneiss intrusion, which dominates the southern half of the claims, and contains a large body of nepheline syenite. The northern half of the property contains varying degrees of metasediment made up of crystalline limestone-dolomite-graphite marble with some syenite intrusions. A large mass of gabbro bounds these units to the south just off the claim boundary, with additional bands of metasediment and syenite intrusions continuing to the north off the property until they are bounded by a large pluton of granite.

Two dormant quarries, the Upper and Lower Gill Quarries are located within the nepheline syenite body that were historically mined during the late 1930's. Approximately 3178 tons were extracted during historic production.

In 2014, a property scale geological mapping program was conducted and a geochemical sampling accompanied this program. Multiple traverses over the property were done covering approximately 75% of the claims and yielding 14 geologic grab samples. Samples were submitted to ALS Minerals Ltd for whole rock analysis. Results from the program indicate areas of significant increased aluminum content compared to background values and additional investigate is required in order to properly define the potential ore body. Mechanical overburden stripping to bedrock of the former Lower Gill Quarry is recommended as an initial step in combination with channel sampling to evaluate the mineralogic characteristics of the nepheline pegmatite. Potential follow up stripping and further grid spaced channel grab samples to define the surficial extent of mineralization would be warranted. Furthermore, a definition style drill program, perpendicular to dip, is highly recommended to determine the true thickness of lens. Follow up, or in conjugation with, exploratory step out drilling would be beneficial to determine regional feature and extent of lithological unit.

INTRODUCTION:

A geological mapping and geochemical sampling program took place on the Glamorgan Property, claims 4212342 and 4212343, between Oct and Nov 2014. A crew of two consultants, one geologist and one helper, were used to undertake this program and spent approximately 16 hours on the property. A total of 14 grab samples were taken, recorded, and sent for whole rock analysis to Act Labs Ltds. All work in this report is for assessment credits and to further develop the Glamorgan Property.

PROPERTY LOCATION AND ACCESS:

The Glamorgan Property is located entirely within the Township of Glamorgan, in Municipality of Highland East, Ontario, Canada. Glamorgan property is composed of two claims, 4212342 and 4212343, and comprises 83 hectares through 4 units.

Claim Number	Units	Holder (100%)
4212342	2	Crushcor Ltd
4212343	2	Crushcor Ltd

Table 1- Claim Holders

The property is approximately 3.2km from the hamlet of Gooderham, a five min drive, and approximately 322km from Toronto, a three hour drive. The property is centered at approximately 710151E, 4975761N in UTM Zone 17. The property is located in the Southern Ontario Mining District. Access to the property is along public highway, Hwy 503 (Furance Falls Road), and a 2.5km municipal site access road, McCalls Road. A private, gated road provided the entrance to the property from McCalls Rd and provided direct access to the Gill Quarry. A network of private All-Terrain-Vehicle trails can be found throughout the property and offer access to the entire property. Secondary access can occur by using ATV trails off Tamarack Rd from Hwy 507.
Access to the property is through private landowner holdings who are the Surface Right Owners (SRO) and have residential assets on the property. The Glamorgan Property contains three separate SRO's over the claims with two holding the majority of the property, approximately 88%.
Previous encounters with the SRO for claim 4212343 have established a precedent that 24 hours' notice must be given for property access.

Figure 1-Location Map

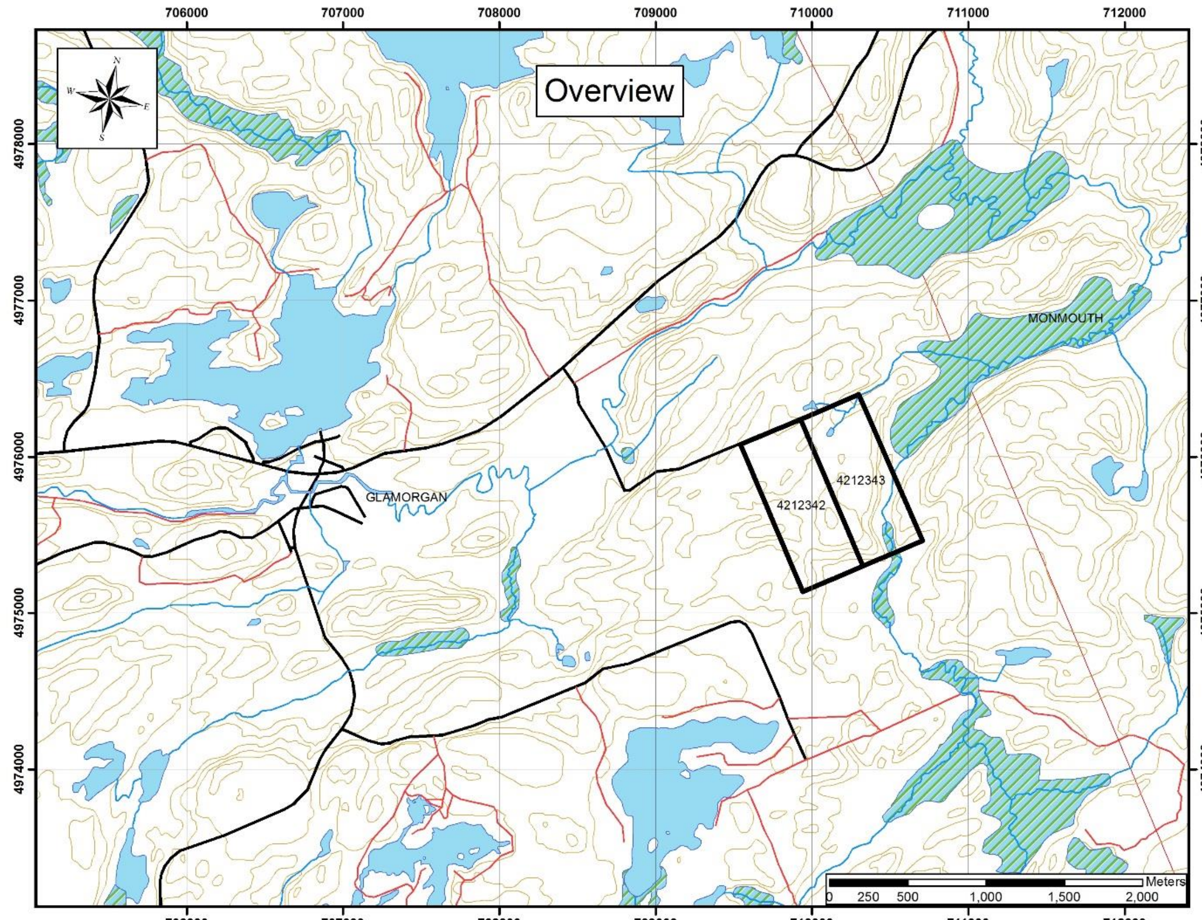


Figure 2- Property Location Overview

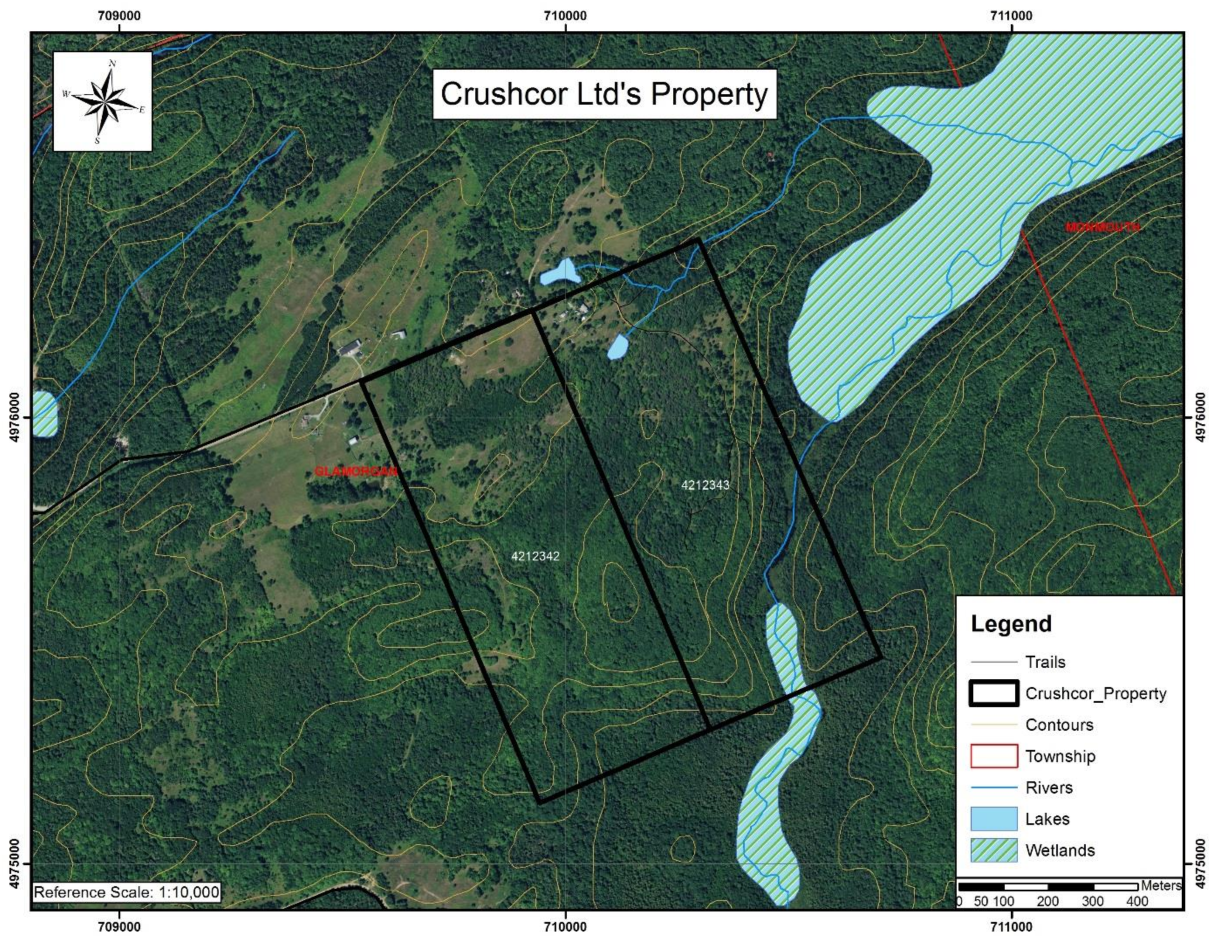


Figure 3- Crushcor Ltd's Glamorgan Property

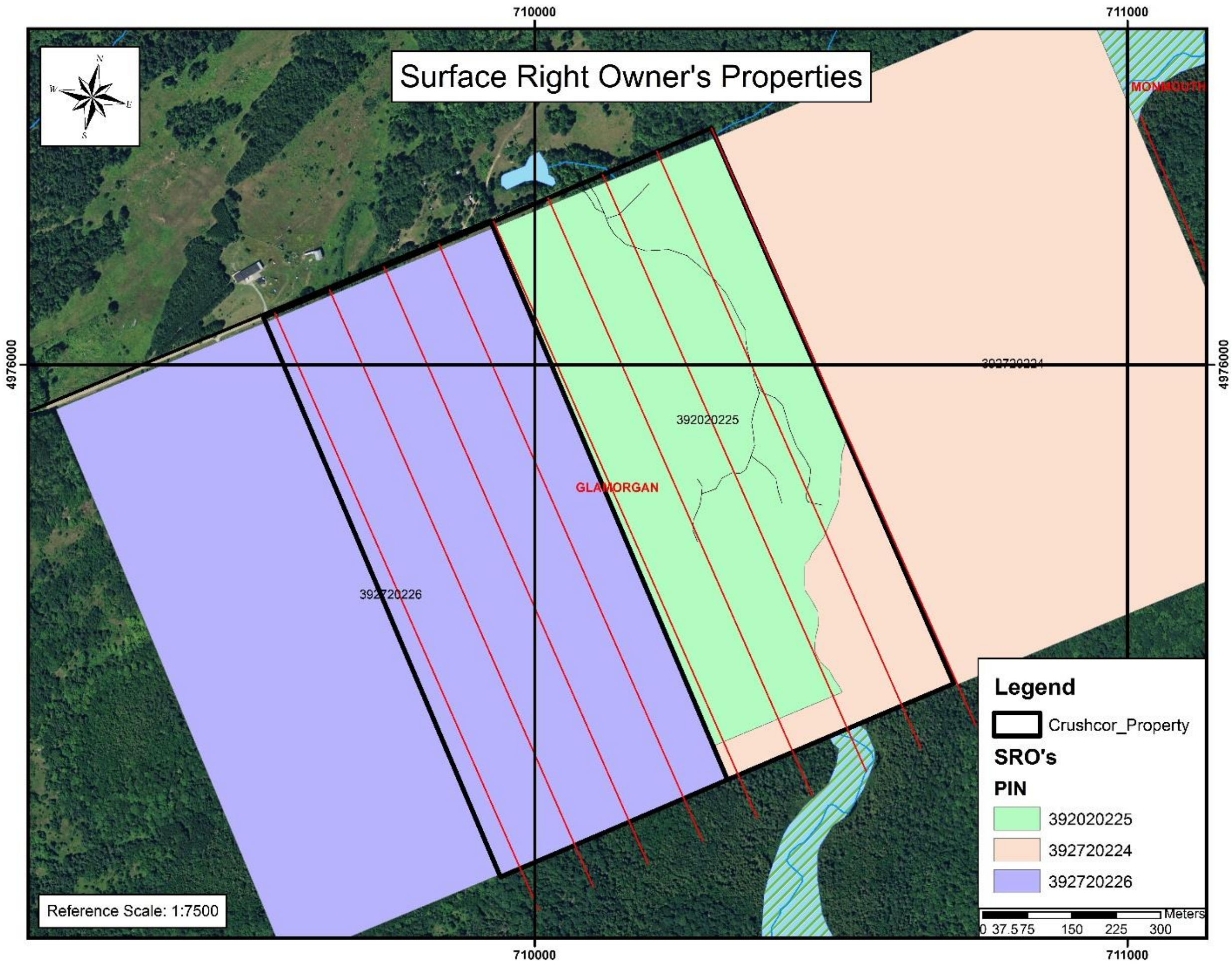


Figure 4- Surface Right Owner's by Property

REGIONAL GEOLOGY:

Crushcor Ltd's Glamorgan Property is situated in the Haliburton Highlands area of the Grenville Province within the Precambrian Canadian Shield. The Haliburton Highlands consist of east-west trending sequence of metamorphosed lithologies ranging from felsic to ultramafic units and contains sedimentary sequences. Rock types can vary from granitic to gabbroic and include siltstone and conglomerates. Multiple intrusive units crosscut the metavolcanics and metasediment sequences. Bedrock is hidden by shallow to thick cover in area by Pleistocene aged glacial till and sediments. Metavolcanic units can include: granitic gneisses, migmatites, feldspar-quartz pegmatites, nepheline syenite, gabbro, diorites, and hornblende gneiss among many others. Metasediments can range vastly and include: marble, quartzite, limestone, calcareous amphibolites and most varieties of carbonate sediments. The area has been metamorphosed to greenschist-amphibolite faceis and is highly deformed in areas. Local deposits of Uranium, and Nepheline occur within the metasediment and metavolcanics.

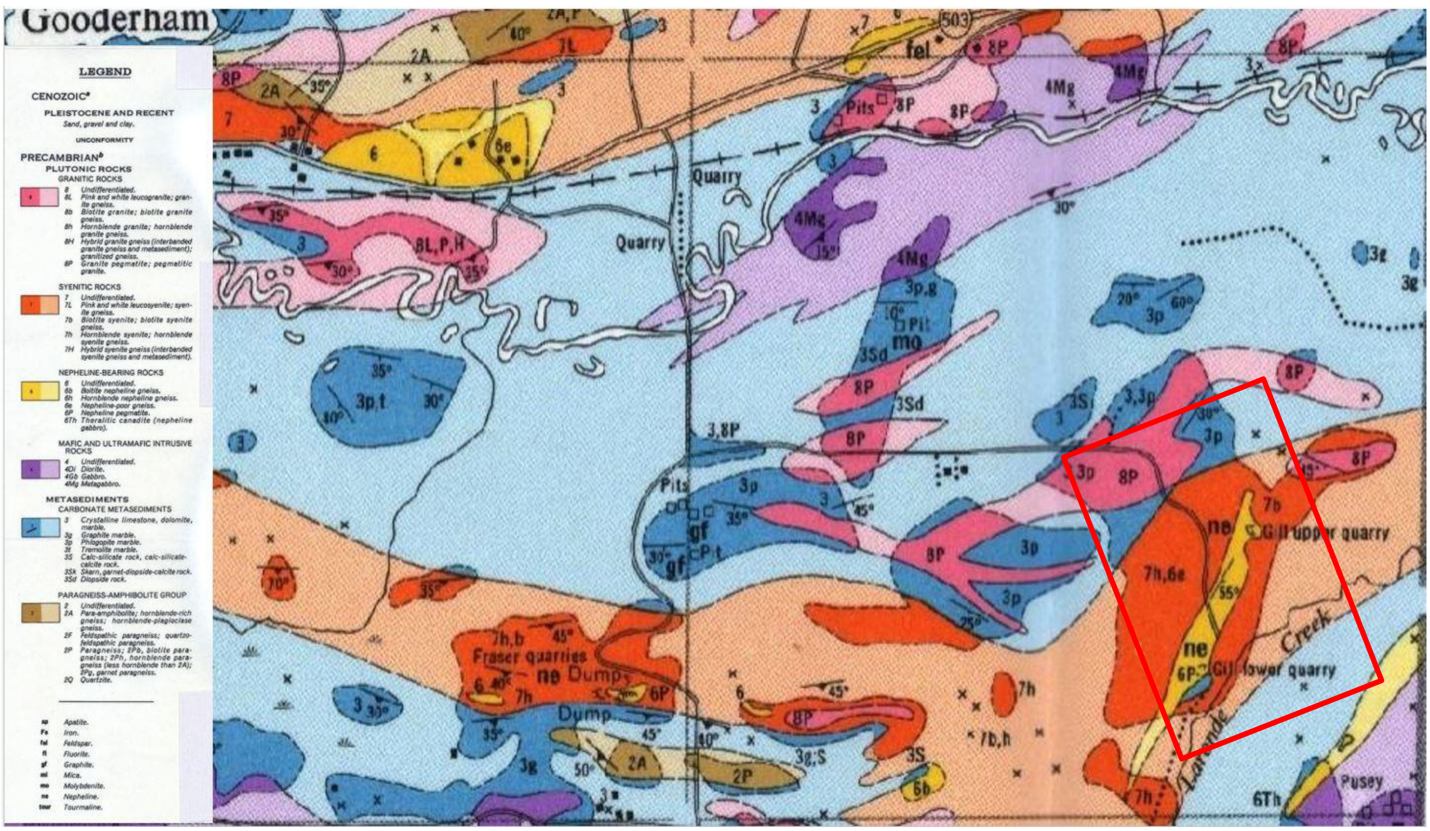


Figure 5. Regional Geology

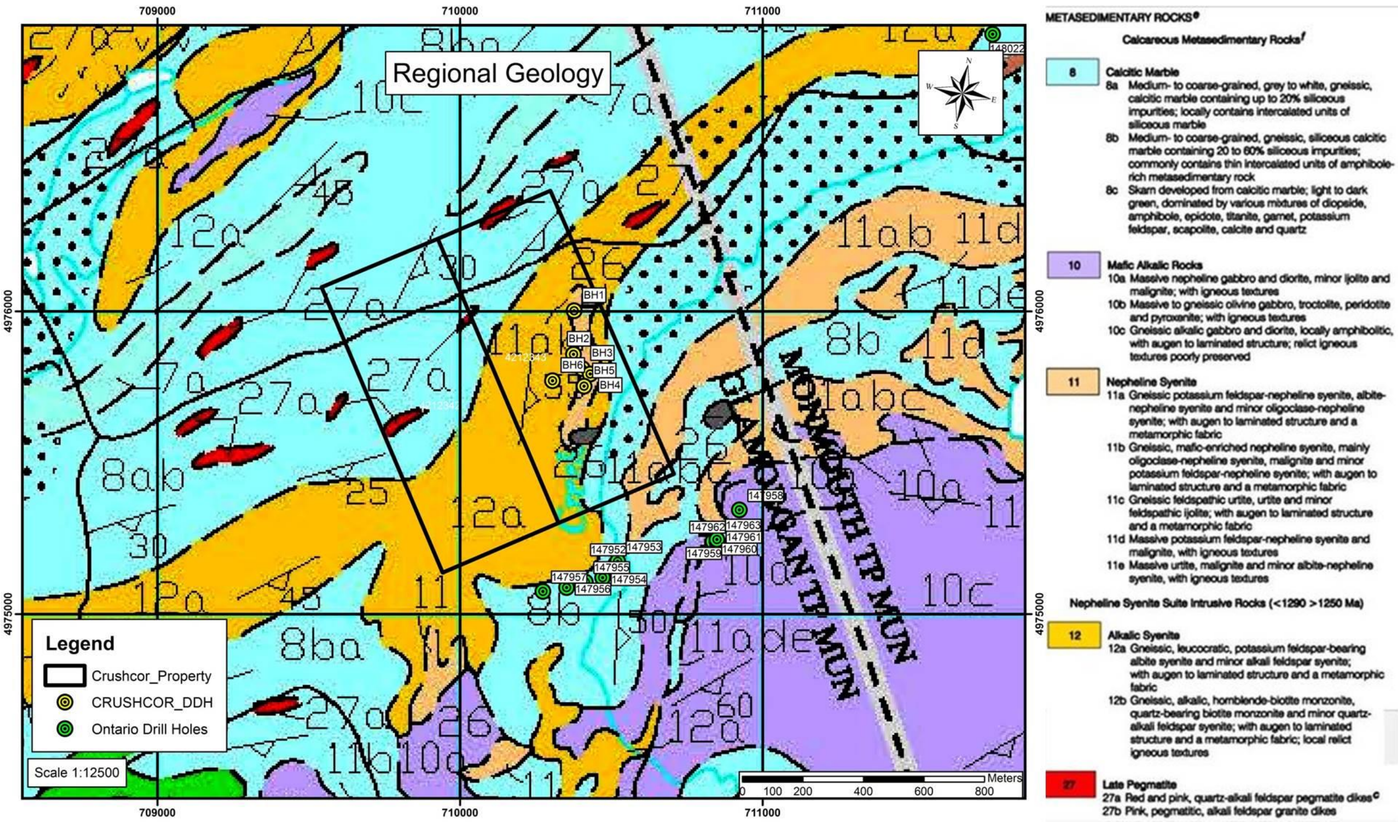


Figure 6-Regional Geology-Property Geology

HISTORICAL WORK:

Work on the Glamorgan Property is sparse and there have been large increments of time when no work occurred. Prospecting in the area can be dated back to the late 1800's when farming settlers would extract mostly feldspar, nepheline and graphite minerals from small pits, trenches or shafts. Historical iron, gold, lead, uranium, graphite, and other industrial mineral workings can be found within the region. Limited production has occurred in the area with those few that produce only lasting 4-5 years with small scale tonnage. The first economic report for the area came out in 1910 in a geology report by Adams and Barlow. Work on the Gill Quarry, with Lower Gill Quarry located on the Glamorgan Property, occurred in 1937 and 1938 and was operated by J.A. Fraser. Approximately 3178 tons of nepheline syenite were removed from a combined 3 pits and trucked for processing

2014 MAPPING AND GEOCHEMICAL PROGRAM AND OBSERVATIONS:

During the fall of 2014, a general mapping and geochemical sampling program took place over the course of two days on Oct 31st and Nov 1st. The general purpose of the program was to collect additional samples from the Lower Gill Quarry to confirm the presence of increased aluminium content within the Nepheline Syenite, and provide an overview of geology on a property wide scale. Additional samples were taken throughout the property to determine the background alumina content and extent of mineralized area. Two separate traverses were executed covering approximately 75% of the property over the course of 12km. Outcrops were sparse, approximately 5% coverage, with heavy cover in most places. Exposed outcrops were recorded and samples taken when deemed important. A total of 14 grab samples were taken.

Sample Number	UTM_N	UTM_E
DAR-14-001	710112	4976264
DAR-14-002	710339	4976176
DAR-14-003	710415	4976026
DAR-14-004	710448	4975808
DAR-14-005	710457	4975815
DAR-14-006	710452	4975789
DAR-14-007	710390	4975664
DAR-14-008	710423	4975446
DAR-14-009	710403	4975385
DAR-14-010	710533	4975568
DAR-14-011	710214	4975377
DAR-14-012	710020	4975339
DAR-14-013	709837	4975648
DAR-14-014	710438	4975935

Table 2: Location of Grab Samples

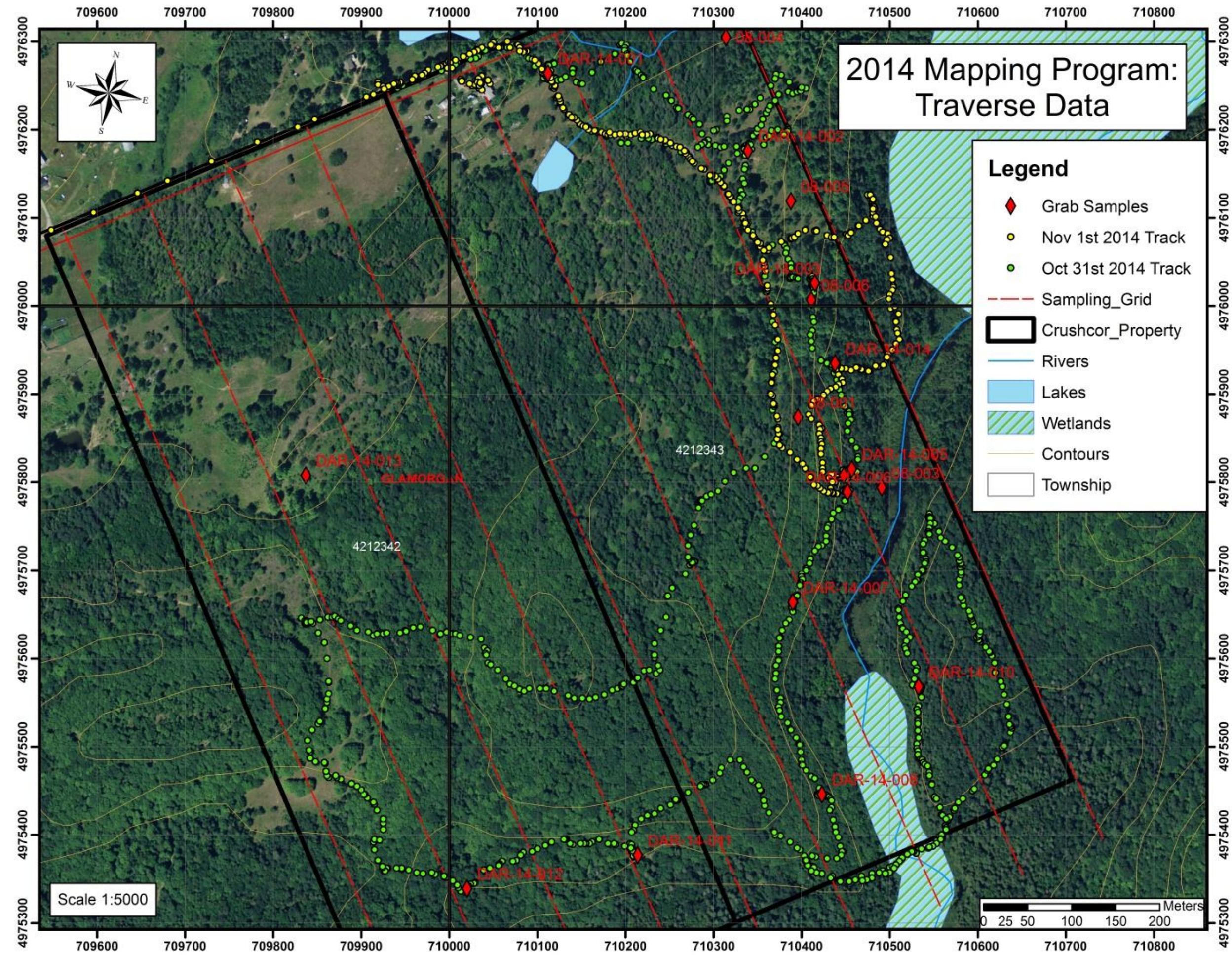


Figure 7- Traverse Data from 2014 Mapping Program

RECOMMENDATIONS/CONCLUSION:

The Glamorgan Property is located in the Glamorgan Township in the Southern Mining District in Ontario and is composed of two claims, 4212342 and 4212343, totaling 4 claim units.

The Property contains the former Gill Quarries, which had small-scale production from two pits in the 1930`s producing approximately 200 tons.

Based on the observation during this field report's site visit, previous site visits, past diamond drilling, geochemical analysis, data compilation and comparative studies; further work on the Glamorgan Property is warranted due to potential for additional economic grade alumina mineralization. This is confirmed by the analytical work on surficial grab samples taken during this study, which describe an alumina rich lens within the local, massive Nepheline Pegmatite dyke.

In order to better understand the geometry of the local lithologies, an initial step of overburden stripping, in the vicinity of the former Gill quarry, is recommended. This will better confirm the extents of any prospective, alumina rich bearing rock in the area, as well as expose additional mircostructures to use as future vectors for exploration. Follow up surface samples in an appropriate grid pattern and/or trenching/channel sampling should be used once overburden stripping reveals suitable targets.

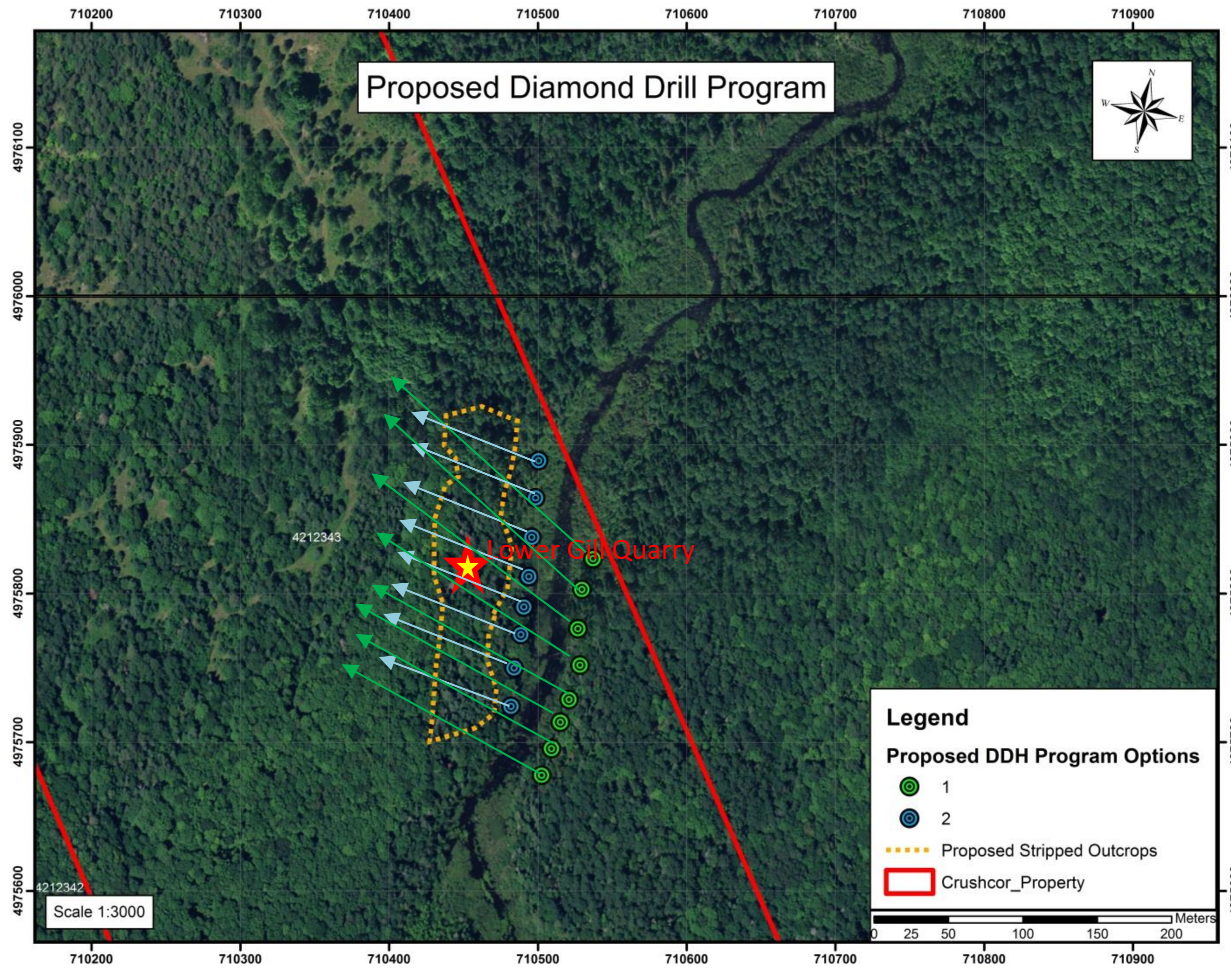
Additionally, in order to better define the potential ore body at depth, follow up diamond drilling is required. Drilling should first concentrate on the immediate area surrounding the previous diamond drill program from 2008 and be tightly spaced in a definition style program, approximately 25 holes during the first phase. Drilling should take place perpendicular to dip, rather than the previous designed vertical holes, and include horizontal drill spacing parallel to strike along a predefined grid. This drilling strategy can potentially create some logistical issues due to the location of the pit on a steep hill and presence of a small creek at the bottom. Holes will likely need to be collared on the east side of the Laronde Creek and drill towards the west and under the creek. Alternatively, drill pads could be constructed from local material and built on the west side of the creek to allow from closer intersection with the Nepheline Pegmatite lens, pending safe set ups. Whole rock lithogeochemistry analysis should be employed on any prospective sections of drill core.

Following, or in conjunction with, the definition program, some larger step out exploration holes are recommended to test the area along strike and at depth for additional zones of high alumina concentrations as the local geology indicates potential zones could be hidden under thin overburden cover or dykes within the regional Biotite Syenite.

Based on the initial mapping, results from the grab samples, and geologic setting; the potential for a large scale area of alumina enrichment is high. A potential of approximately 2,675,000 tons of enriched material is contained within pitable footprint from surface as the orebody appears to continue for approximately 600m long, 50m wide, and 30m thick. However, the true thickness of the orebody is unknown as mineralization remains open at depth. Additionally, the boundaries of the mineralized body are undefined and multiple splays could be present. Based on and initial recovery of 50-60% of the alumina enriched material, approximately 1,350,000 tons of economic material could be recovered. However, additional material processing studies would need to be undertaken in order to understand the recovery process and potential methods for higher recovery rates.

Finally, property consolidation will be needed to continue any additional material testing as Crushcor Ltd only currently holds Mining Rights. The Surface Rights will likely need to be acquired in order to conduct any future development of the property. Similarly, surrounding property may need to be purchased from existing owners before larger scale development begins. Furthermore, various types and levels of permitting should begin so as to not impede any future development as some permit can be excessively time consuming.

Figure 8. Proposed Diamond Drill Program Locations



Persons performing work:

1. David Rock, P. Geo. 674 Camelot Dr, Sudbury ON, P3B 3N1
2. Dave Rock (*Deceased*), Geological Assistant. 34 Joseph St, Apt 2, Brampton ON, L6Y 1X3

STATEMENT OF QUALIFICATIONS:

I, David A. Rock, of the CITY of SUDBURY, in the PROVINCE of ONTARIO, hereby certify:

I am a Professional Geologist and currently a consultant of Crushcor Ltd. holding the position of Consulting Geologist and operating independently out of my Sudbury home.

I graduated from Laurentian University with a Bachelor of Science degree, specializing in Geology, in 2012.

I have practicedas both an exploration and mine geologist since 2007 to present with experience ranging from grassroots exploration to underground production including advanced exploration programs for multiple commodities types and as part of an underground production operation in Canada.

I am currently registered, and in good standing, as a Professional Geologist (Membership # 2579) with the Association of Professional Geoscientists of Ontario (APGO).

This report is based on a field examination of the property in Oct/Nov of 2014, including information collected by myself, and a compilation of all information made available to me, both published and unpublished.

Dated in Sudbury this 13th day of December, 2016.

David A. Rock, P.Geo. 2579

REFERENCES:

Armstrong, H. and Gittens, J. (1952). Geology of Glamorgan and Monmouth townships - Haliburton County. ODM.

Adams, F. D., and Barlow, A. E (1910)-Geology of the Haliburton and Bancroft area, Province of Ontario

Hewitt, D. (1961). Nepheline syenite deposits of Southern Ontario. Toronto: Printed and published by Frank Fogg, printer tot eh Queen's ... Majesty, pp.p. 36,39-40.

Satterly, J. (1943). Mineral Occurrences in the Haliburton Area. Vol 52, ODM, pp.p. 71-73.

Appendix 1

Certificate of Analysis

Quality Analysis ... *Innovative Technologies*

Date Submitted:	16-Jun-15
Invoice No.:	A15-04352 (i)
Invoice Date:	22-Jun-15
Your Reference:	GILL QUARRY

CRUSHCOR LTD.
3 Golf Crest Rd.
Toronto On M9A1K9

ATTN: W.B Harvey

CERTIFICATE OF ANALYSIS

14 Rock samples were submitted for analysis.

The following analytical package was requested: Code 4B (11+) Major Elements Fusion ICP(WRA)
Code Weight Report (kg)-Internal Received Weights

REPORT **A15-04352 (i)**

Notes:

Total includes all elements in % oxide to the left of total.

CERTIFIED BY:

Emmanuel Eseme , Ph.D.
Quality Control

SCC Accredited LAB
LAB Accrédité CCN TM

ACTIVATION LABORATORIES LTD.

41 Bittern Street, Ancaster, Ontario, Canada, L9G 4V5
TELEPHONE +905 648-9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL Ancaster@actlabs.com ACTLABS GROUP WEBSITE www.actlabs.com

Results

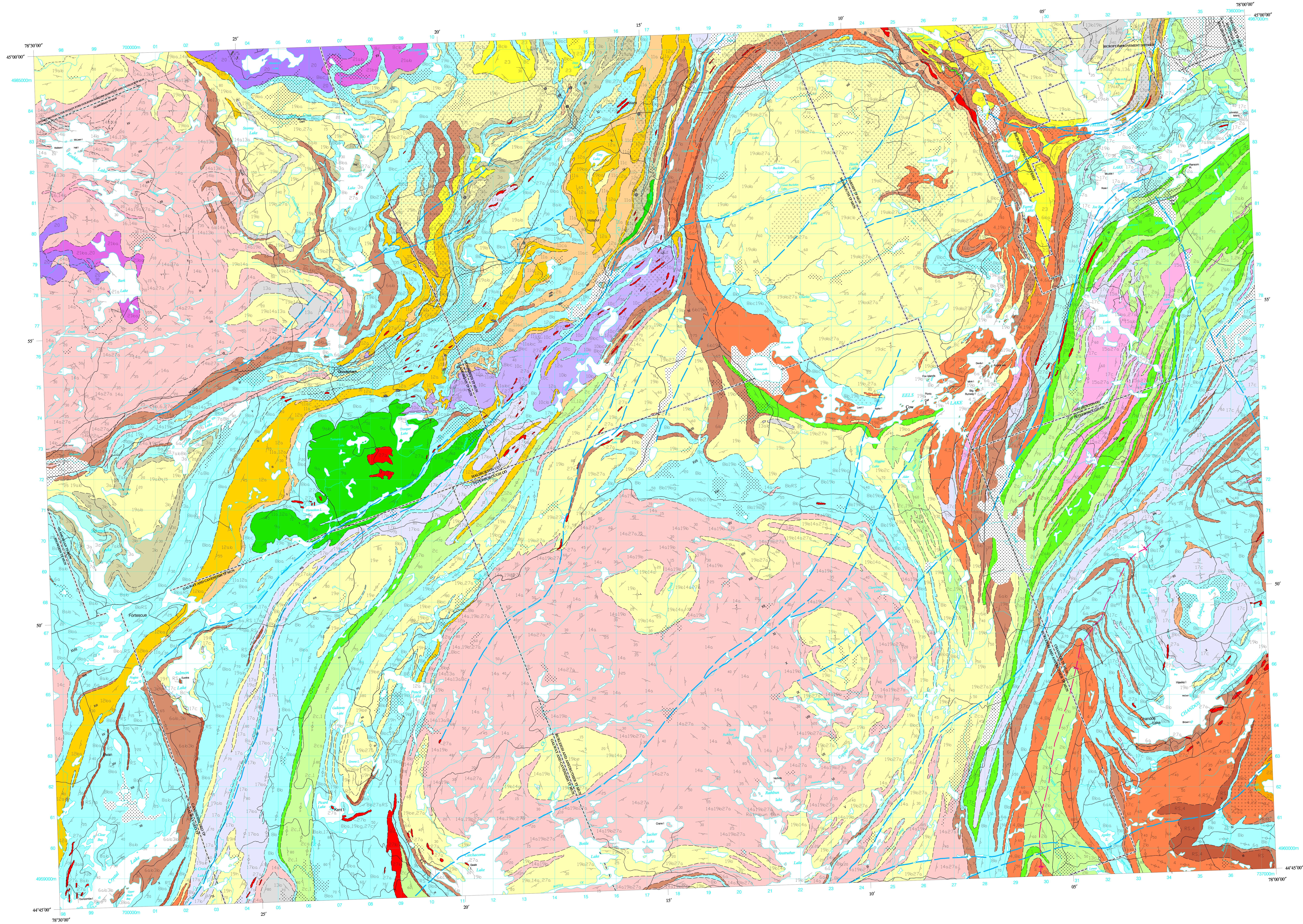
Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Ba	Sr	Y	Sc	Zr	Be	V
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01		0.01	2	2	1	1	2	1	5
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP
DAR-14-001	58.07	12.64	7.85	0.178	1.18	6.86	6.63	3.10	0.160	0.10	2.87	99.63	144	165	13	6	526	4	39
DAR-14-002	66.40	14.91	3.50	0.047	1.26	1.99	2.70	6.95	0.306	0.11	1.51	99.70	2733	421	37	15	83	2	43
DAR-14-003	65.51	16.82	1.61	0.064	0.90	0.74	7.59	4.36	0.085	0.05	1.14	98.86	197	25	10	5	87	3	24
DAR-14-004	56.15	19.63	0.61	0.061	0.08	4.69	9.80	3.38	0.013	0.01	4.59	99.00	195	267	20	< 1	61	1	< 5
DAR-14-005	55.95	20.86	3.25	0.071	0.46	2.54	9.98	2.95	0.164	0.18	2.35	98.77	52	211	10	< 1	70	1	10
DAR-14-006	53.67	15.25	0.31	0.075	0.06	11.14	6.86	3.73	0.005	< 0.01	9.23	100.3	360	477	32	< 1	22	< 1	< 5
DAR-14-007	62.38	13.64	6.35	0.164	0.40	3.02	6.43	4.48	0.072	0.08	1.58	98.61	383	96	56	< 1	922	24	6
DAR-14-008	66.88	17.85	0.40	0.019	0.04	0.22	7.31	5.88	0.008	0.03	0.41	99.05	479	84	10	< 1	192	1	< 5
DAR-14-009	88.21	4.40	1.85	0.022	0.63	0.63	1.17	2.81	0.235	0.03	0.64	100.6	237	35	21	2	127	< 1	22
DAR-14-010	52.02	14.74	15.00	0.341	1.37	5.23	4.67	3.05	0.653	0.35	1.08	98.50	1307	468	35	1	170	3	7
DAR-14-011	67.14	18.05	1.74	0.019	0.28	0.27	7.93	4.64	0.066	0.02	0.65	100.8	297	182	11	< 1	104	3	< 5
DAR-14-012	27.60	7.46	4.81	0.172	3.91	27.42	2.93	2.63	0.374	0.19	22.12	99.63	226	1187	116	4	198	1	44
DAR-14-013	60.60	16.86	6.91	0.064	0.24	1.09	7.41	4.30	0.271	0.06	1.32	99.11	136	137	48	< 1	323	3	10
DAR-14-014	54.55	17.94	9.50	0.185	1.84	1.74	6.75	3.33	0.891	0.57	1.95	99.26	1361	780	27	2	288	2	41

QC

Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Ba	Sr	Y	Sc	Zr	Be	V
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01		0.01	2	2	1	1	2	1	5
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP
NIST 694 Meas	11.44	1.85	0.73	0.010	0.35	43.55	0.88	0.55	0.120	30.23									1650
NIST 694 Cert	11.2	1.80	0.790	0.0116	0.330	43.6	0.860	0.510	0.110	30.2									1740
DNC-1 Meas	47.34	18.25	9.67	0.150	10.03	11.30	1.91	0.22	0.480	0.07			105	140	15	31	34		148
DNC-1 Cert	47.15	18.34	9.97	0.150	10.13	11.49	1.890	0.234	0.480	0.070			118	144.0	18.0	31	38		148
GBW 07113 Meas	72.08	12.66	3.17	0.140	0.17	0.62	2.48	5.40	0.280	0.03			498	40	48	5	398	4	6
GBW 07113 Cert	72.8	13.0	3.21	0.140	0.160	0.590	2.57	5.43	0.300	0.0500			506	43.0	43.0	5.00	403	4.00	5.00
W-2a Meas	52.32	15.13	10.42	0.170	6.28	10.91	2.20	0.61	1.060	0.12			171	192	19	35	85	< 1	261
W-2a Cert	52.4	15.4	10.7	0.163	6.37	10.9	2.14	0.626	1.06	0.130			182	190	24.0	36.0	94.0	1.30	262
SY-4 Meas	50.08	20.88	6.25	0.110	0.51	7.96	6.99	1.66	0.290	0.13			346	1209	121	1	533	3	7
SY-4 Cert	49.9	20.69	6.21	0.108	0.54	8.05	7.10	1.66	0.287	0.131			340	1191	119	1.1	517	2.6	8.0
BIR-1a Meas	47.71	15.95	11.08	0.170	9.58	13.33	1.81	0.02	0.960	0.03			8	106	14	43	15	< 1	319
BIR-1a Cert	47.96	15.50	11.30	0.175	9.700	13.30	1.82	0.030	0.96	0.021			6	110	16	44	18	0.58	310
DAR-14-014 Orig	54.94	17.99	9.51	0.186	1.85	1.75	6.82	3.36	0.894	0.57	1.95	99.83	1374	781	27	2	289	2	42
DAR-14-014 Dup	54.16	17.89	9.48	0.184	1.83	1.73	6.69	3.30	0.888	0.57	1.95	98.68	1348	779	27	2	287	2	41

Appendix 2

Ontario Geological Survey Map P.3405-Gooderham Area



LEGEND

PHANEROZOIC

CENOZOIC[a]

QUATERNARY

PLEISTOCENE AND HOLOCENE

(dotted pattern) Swamp, bog and peat accumulations; marl; fluvial and lacustrine silt, sand, gravel; glaciofluvial sand, gravel, boulders; sandy, bouldery glacial till

UNCONFORMITY

PRECAMBRIAN

PROTEROZOIC

MESOPROTEROZOIC

Fenite-Carbonatite Suite (1070–1040 Ma)[b]

27 **Late Pegmatite**
- 27a Red and pink, quartz-alkali feldspar pegmatite dikes[c]
- 27b Pink, pegmatitic, alkali feldspar granite dikes

26 **Late Pegmatite:**
Nepheline-albite pegmatite dikes

25 **Carbonatite and Calcite Dikes:**
Carbonatite rich in calcite, with various mixtures of alkalic pyroxene, amphibole, alkali feldspar, titanite, allanite, fluorite, apatite, phlogopite, biotite, zircon and U, Th and REE minerals; fenite fragments common. Forms small stocks less than 100 m across and dikes less than 1 m wide.

24 **Fenite:**
Highly fenitized rocks marked by large concentrations of one or more of the following: alkalic pyroxene and amphibole, fluorite, apatite, alkalic pyroxene syenite pegmatite, granite pegmatite and calcite-rich syenite; enriched in Na, K, Ca, Fe, Ti, P, F, Cl, U, Th, REE, Ba and Mo

23 **Fenite:**
Highly syenitized rocks developed mainly in alaskite (unit 19); patches and veinlets of alkalic pyroxene and amphibole are abundant; local patches of highly fenitized rocks (unit 24); original lithology largely replaced by nepheline-normative alkali feldspar syenite

Monzonite-Diorite Suite Intrusive Rocks (1090–1070 Ma)

22 **Granite:**
Massive monzogranite with igneous textures

21 **Syenitic Rocks**
- 21a Massive alkali feldspar syenite with igneous textures
- 21b Massive monzonite with igneous textures

20 **Mafic Rocks:**
Massive diorite and gabbro with igneous textures

REGIONAL METAMORPHISM

Alaskite Suite Intrusive Rocks (1250–1240 Ma)

19 **Felsic Intrusive Rocks**
- 19a Gneissic, metaluminous to marginally peraluminous alaskite with augen structure and relict igneous textures
- 19b Unit 19a with laminated structure and a metamorphic fabric
- 19c Gneissic, peralkalic alaskite with augen structure and relict igneous textures
- 19d Unit 19c with laminated structure and a metamorphic fabric
- 19e Gneissic, leucocratic monzogranite with augen structure and relict igneous textures
- 19f Gneissic, fine- to medium-grained, porphyritic, metaluminous to marginally peraluminous alaskite with augen structure and relict igneous textures
- 19g Gneissic, contaminated, metaluminous to marginally peraluminous alaskite, formed by the assimilation and reaction of marble with alaskite magma. These rocks are mainly gneissic biotite-hornblende monzogranite and quartz syenite.
- 19h Gneissic alkali feldspar syenite and alaskite, minor pyroxene monzonite and fine-grained alaskite dikes; with augen structure and relict igneous textures

Diorite Suite Intrusive Rocks (1270–1240 Ma)

18 **Felsic Intrusive Rocks:**
Gneissic granodiorite, minor trondhjemite, with augen structure and relict igneous textures

17 **Mafic Intrusive Rocks**
- 17a Gneissic to massive gabbro and diorite with relict igneous textures
- 17b Gneissic amphibolite with a metamorphic fabric; locally contains relict phases of unit 17a
- 17c Gneissic gabbro and diorite sills and dikes; with augen structure and relict igneous textures[d]

Late Trondhjemite Suite Intrusive Rocks (1280–1270 Ma)

16 **Granite:**
Gneissic monzogranite with augen to laminated structure and poorly preserved igneous textures

15 **Albite Granite**
- 15a Gneissic, leucocratic, albite granite derived from a fine-grained, aphanitic to porphyritic subvolcanic phase; with augen structure and relict igneous textures
- 15b Unit 15a containing sillimanite nodules

14 **Trondhjemite and Granodiorite**
- 14a Gneissic trondhjemite and minor granodiorite, with laminated structure, a metamorphic fabric and veins of coarse-grained quartzofeldspathic material
- 14b Unit 14a with granodiorite predominant
- 14c Gneissic, quartz-poor trondhjemite (10-20% quartz) that grades into oligoclase monzodiorite; with augen structure; relict igneous textures poorly preserved

13 **Mafic Rocks**
- 13a Gneissic tonalite and minor diorite, with laminated and augen structure and mainly a metamorphic fabric
- 13b Unit 13a with diorite predominant; locally amphibolitic
- 13c Tonalite breccia; possibly a feeder for dacitic volcanic eruptions

Nepheline Syenite Suite Intrusive Rocks (<1290 >1250 Ma)

12 **Alkalic Syenite**
- 12a Gneissic, leucocratic, potassium feldspar-bearing albite syenite and minor alkali feldspar syenite; with augen to laminated structure and a metamorphic fabric
- 12b Gneissic, alkalic, hornblende-biotite monzonite, quartz-bearing biotite monzonite and minor quartz-alkali feldspar syenite; with augen to laminated structure and a metamorphic fabric; local relict igneous textures

11 **Nepheline Syenite**
- 11a Gneissic potassium feldspar-nepheline syenite, albite-nepheline syenite and minor oligoclase-nepheline syenite; with augen to laminated structure and a metamorphic fabric
- 11b Gneissic, mafic-enriched nepheline syenite, mainly oligoclase-nepheline syenite, malignite and minor potassium feldspar-nepheline syenite; with augen to laminated structure and a metamorphic fabric
- 11c Gneissic feldspathic urtite, urtite and minor feldspathic ijolite; with augen to laminated structure and a metamorphic fabric
- 11d Massive potassium feldspar-nepheline syenite and malignite, with igneous textures
- 11e Massive urtite, malignite and minor albite-nepheline syenite, with igneous textures

10 **Mafic Alkalic Rocks**
- 10a Massive nepheline gabbro and diorite, minor ijolite and malignite; with igneous textures
- 10b Massive to gneissic olivine gabbro, troctolite, peridotite and pyroxenite; with igneous textures
- 10c Gneissic alkalic gabbro and diorite, locally amphibolitic, with augen to laminated structure; relict igneous textures poorly preserved

Anorthosite Suite Intrusive Rocks (<1290 >1250 Ma)

9 **Mafic Intrusive Rocks**
- 9a Gneissic, locally massive, gabbroic and dioritic anorthosite, anorthositic gabbro and diorite, and anorthosite; with augen to laminated structure and relict igneous textures
- 9b Gneissic anorthositic diorite with augen structure and relict igneous textures

METASEDIMENTARY ROCKS[e]

Calcareous Metasedimentary Rocks[f]

8 **Calcitic Marble**
- 8a Medium- to coarse-grained, grey to white, gneissic, calcitic marble containing up to 20% siliceous impurities; locally contains intercalated units of siliceous marble
- 8b Medium- to coarse-grained, gneissic, siliceous calcitic marble containing 20 to 60% siliceous impurities; commonly contains thin intercalated units of amphibole-rich metasedimentary rock
- 8c Skarn developed from calcitic marble; light to dark green, dominated by various mixtures of diopside, amphibole, epidote, titanite, garnet, potassium feldspar, scapolite, calcite and quartz

7 **Dolomitic Marble**
- 7a Medium- to coarse-grained, white to greenish, dolomitic marble containing up to 20% siliceous impurities; local intercalations of tremolite-rich dolomitic marble
- 7b Medium- to coarse-grained, cherty dolomitic marble; contains numerous discontinuous layers of coarsely recrystallized chert, possibly in part derived from silicified stromatolites and algal mats
- 7c Fine-grained, dark grey to buff, dolomitic marble with up to 20% siliceous impurities; sedimentary fabric preserved

6 **Amphibole-Rich Metasedimentary Rocks**
- 6a Metamorphosed calcareous mudstone and sandstone (diopside-amphibole-plagioclase gneiss locally containing phases rich in potassium feldspar, quartz, biotite, scapolite, epidote, carbonate, titanite, pyrite and iron-titanium oxide minerals); thin intercalated units of siliceous marble (unit 8b) common
- 6b Unit 6a containing thin units of siliceous clastic metasedimentary rock (unit 4)

5 **Calcareous and Siliceous Shaly Metasedimentary Rocks:**
Intercalated, thinly bedded, siliceous and calcareous mudstone (garnet-feldspar-biotite-quartz gneiss and schist locally containing phases rich in one or more of garnet, sillimanite, muscovite, plagioclase, potassium feldspar, scapolite, diopside, iron-titanium oxide minerals and pyrite), orthoquartzite, arkose, subarkose, amphibole-rich metasedimentary rock and siliceous marble

Siliceous Clastic Metasedimentary Rocks[f]

4 **Micaceous Sandy Metasedimentary Rocks:**
Biotite-quartz-plagioclase gneiss, derived from greywacke-siltstone sequences possibly eroded from volcanic-rich terranes and deposited by turbidity currents; locally contains thin units of amphibole-rich metasedimentary rock; may include thin tuffaceous units

3 **Quartz-Rich and Feldspathic Metasedimentary Rocks**
- 3a Sequences dominated by gneisses derived from orthoquartzite, subarkose and aluminous shaly metasedimentary rock
- 3b Sequences dominated by quartzofeldspathic gneisses derived from arkose, subarkose and minor orthoquartzite; includes abundant muscovite- and biotite-rich gneisses derived from shale and mudstone

METAVOLCANIC ROCKS

Andesite-Dacite Suite (1280–1270 Ma)[g]

2 **Felsic Metavolcanic Rocks**
- 2a Gneissic and schistose, dacitic and rhyodacitic flows and fragment-poor tuff
- 2b Gneissic, locally fragmental rocks, probably derived from dacitic and rhyodacitic agglomerate and fragment-poor tuff
- 2c Quartz-hornblende-biotite-plagioclase gneiss and biotite-hornblende-plagioclase gneiss; locally contains intercalated rocks of unit 4 and calc-silicate rocks. Possibly derived from dacitic pyroclastic rocks containing some intercalated metasedimentary rock and andesitic flows.

1 **Mafic Metavolcanic Rocks:**
Gneissic amphibolite and biotite amphibolite derived from basaltic and andesitic flows; locally contains relict flow features such as pillows and flow-top breccia. Rocks of units 2a and 2b are commonly intercalated with the amphibolite.

RS Rusty-weathering, graphitic, pyrite- and pyrrhotite-bearing schist[h]

[a] Only the thickest and most extensive Cenozoic deposits in which bedrock outcrops are absent or scarce are shown.
[b] Igneous rock suites and their ages are from Lumbers et al. (1990).
[c] Present only in the gneissic Precambrian rocks; only the largest known dikes and areas of marked dike concentrations are shown.
[d] Multiple ages represented. Some sills and dikes may be related to volcanism (units 1 and 2).
[e] Metasedimentary rocks intercalated with metavolcanic rocks south of the nepheline syenite suite intrusions form part of the 1300 to 1240 Ma Hastings Supracrustal Sequence (Lumbers et al. 1990). Metasedimentary rocks containing the quartz-rich and shaly units north and west of the nepheline syenite suite intrusions may belong to the 1350 to 1400 Ma Haliburton Supracrustal Sequence (Lumbers et al. 1990).
[f] Rocks of these groups are subdivided lithologically and the order does not imply age relationships either within or between groups.
[g] Metavolcanic rocks of the andesite-dacite suite are in part contemporaneous with plutonism of the late trondhjemite suite.
[h] Most rusty schists are probably hydrothermal replacement deposits in shear zones, but some may represent tuffaceous iron-sulphide-bearing sediments or black shales.

Ontario

Ontario Geological Survey

MAP P.3405

PRECAMBRIAN GEOLOGY

GOODERHAM AREA

Scale 1:50 000

1000 m 0 1 2 km

NTS Reference: 31 D/16

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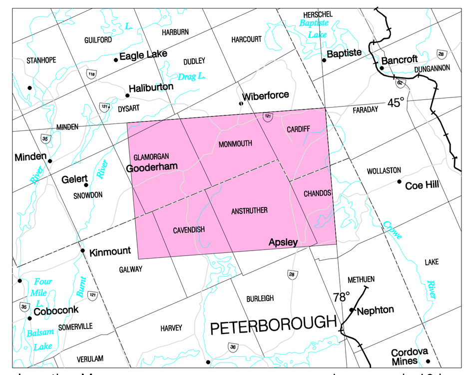

Location Map 1 cm equals 10 km

SYMBOLS

- Geological contact
- Compositional layering and/or parallel tectonic foliation (horizontal)
- Compositional layering and/or parallel tectonic foliation (vertical)
- Compositional layering and/or parallel tectonic foliation (inclined, magnitude of dip uncertain)
- Lineation (with plunge, magnitude of plunge uncertain)
- Fault
- Syncline
- Contact metamorphic aureole
- Slight fenitization marked by patches and veinlets of alkalic pyroxene and amphibole, alkali feldspar, and minor syenitization developed as fracture fillings in host rocks older than 1240 Ma

SOURCES OF INFORMATION

Base map derived from map 31 D/16 of the National Topographic System, scale 1:50 000.

Lumbers, S.B., Heaman, L.M., Vertolli, V.M. and Wu, T.W. 1990. Nature and timing of Middle Proterozoic magmatism in the Central Metasedimentary Belt, Grenville Province, Ontario; in Mid-Proterozoic Laurentia-Baltica, Geological Association of Canada, Special Paper 38, p.243-276.

Published maps and reports of the Geological Survey of Canada and the Ontario Geological Survey.

Unpublished undergraduate and post-graduate theses.

Magnetic declination approximately 12°W in the centre of the Gooderham area in 1999.

Geology not tied to surveyed lines.

CREDITS

Geology by S.B. Lumbers and V.M. Vertolli, 1980-1989.

Geological compilation by S.B. Lumbers and V.M. Vertolli, 1989-1991.

Drafting by P. Londry.

Drafting revisions by E. Amyotte.

Digital conversion under the direction of B. Berdusco.

Geology and legend reviewed by M. Easton and B. Berdusco.

To enable the rapid dissemination of information, this map has not received a technical edit. Discrepancies may occur for which the Ontario Ministry of Northern Development and Mines does not assume liability. Users should verify critical information.

This map covers an area in the vicinity of other previously released maps (e.g., P.3385 Precambrian Geology, Bancroft Area) and upcoming maps. Although the rock codes for the same lithologic unit may not correspond from map to map, an attempt has been made to standardize the colour used on all maps to represent the same rock type.

Issued 2000.

Information from this publication may be quoted if credit is given. It is recommended that reference to this map be made in the following form:

Lumbers, S.B. and Vertolli, V.M. 2000. Precambrian geology, Gooderham area; Ontario Geological Survey, Preliminary Map P.3405, scale 1:50 000.

Persons performing work:

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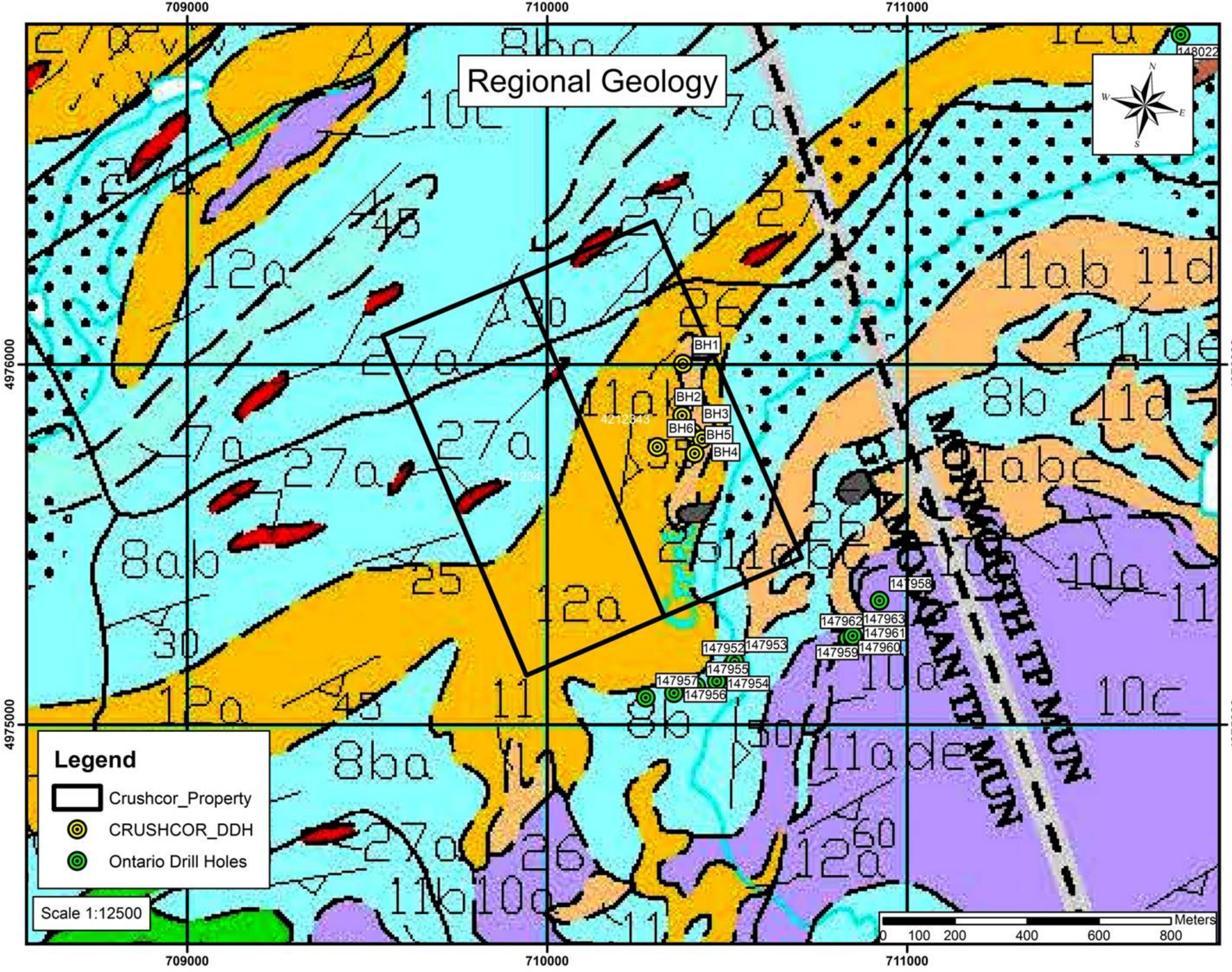
2. **Dave Rock (*Deceased*), Geological Assistant. 34 Joseph St, Apt 2, Brampton ON, L6Y 1X3**



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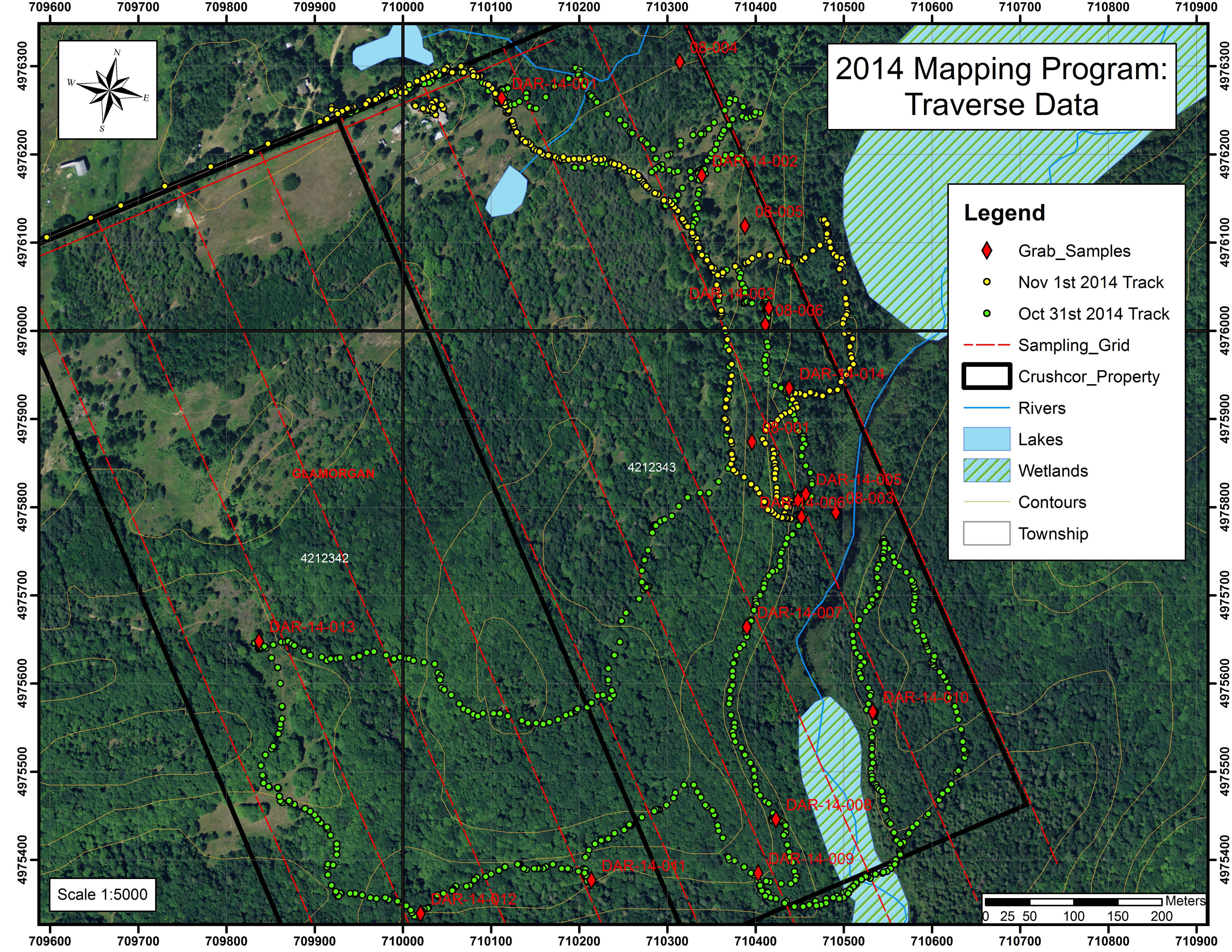
27 Late Pegmatite

- 27a Red and pink, quartz-alkali feldspar pegmatite dikes[c]
- 27b Pink, pegmatitic, alkali feldspar granite dikes



2014 Mapping Program:
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Oct 31st 2014 Track
Sampling_Grid
Crushcor_Property
Rivers
Lakes
Wetlands
Contours
Township
GLAMORGAN
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08-006
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DAR-14-006
08-003
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DAR-14-013
DAR-14-010
DAR-14-008
DAR-14-009
DAR-14-011
DAR-14-012
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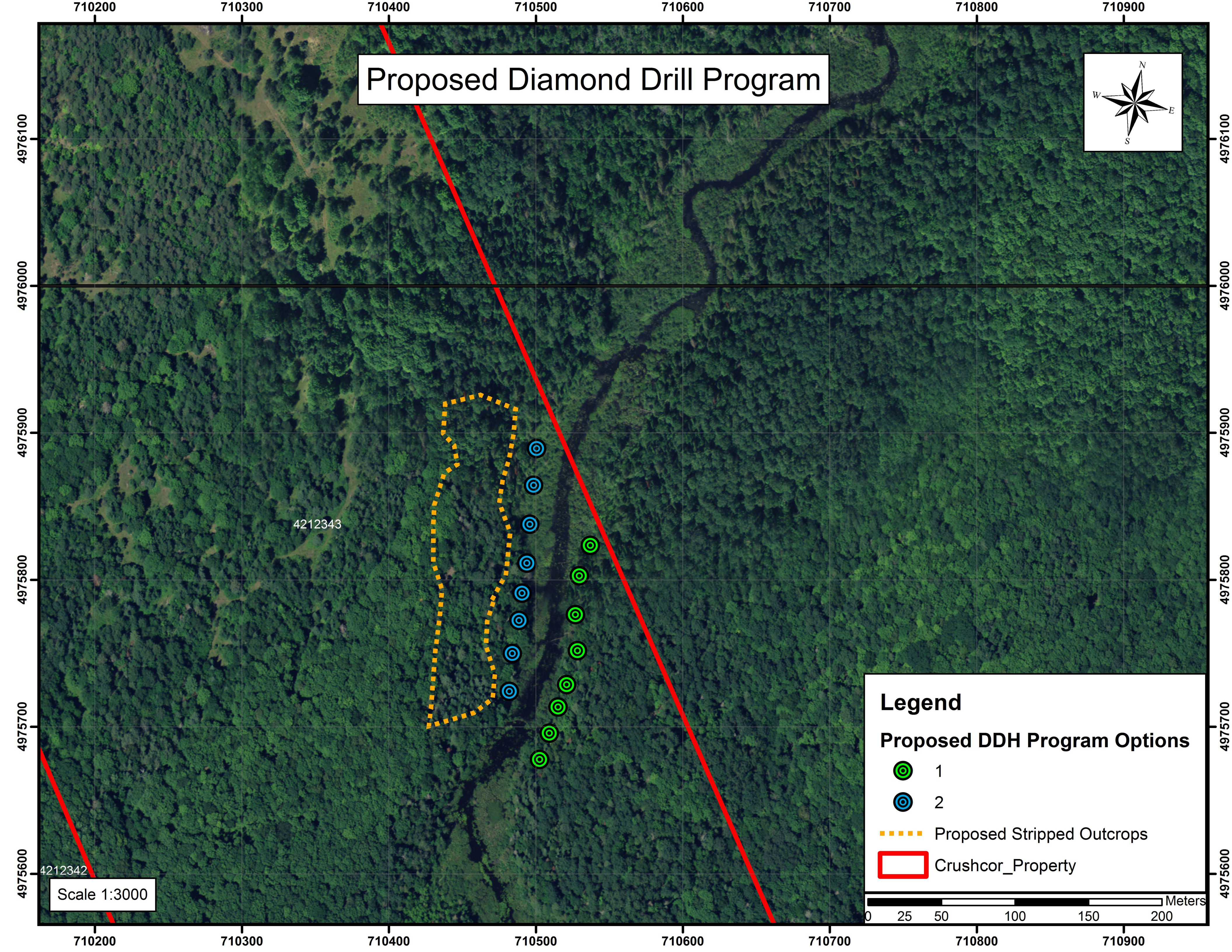

Proposed Diamond Drill Program
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710300
710400
710500
710600
710700
710800
710900
4976100
4976000
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4975800
4975700
4975600
N
E
S
W
4212343
4212342
Scale 1:3000
Legend
Proposed DDH Program Options
1
2
Proposed Stripped Outcrops
Crushcor_Property
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