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2021

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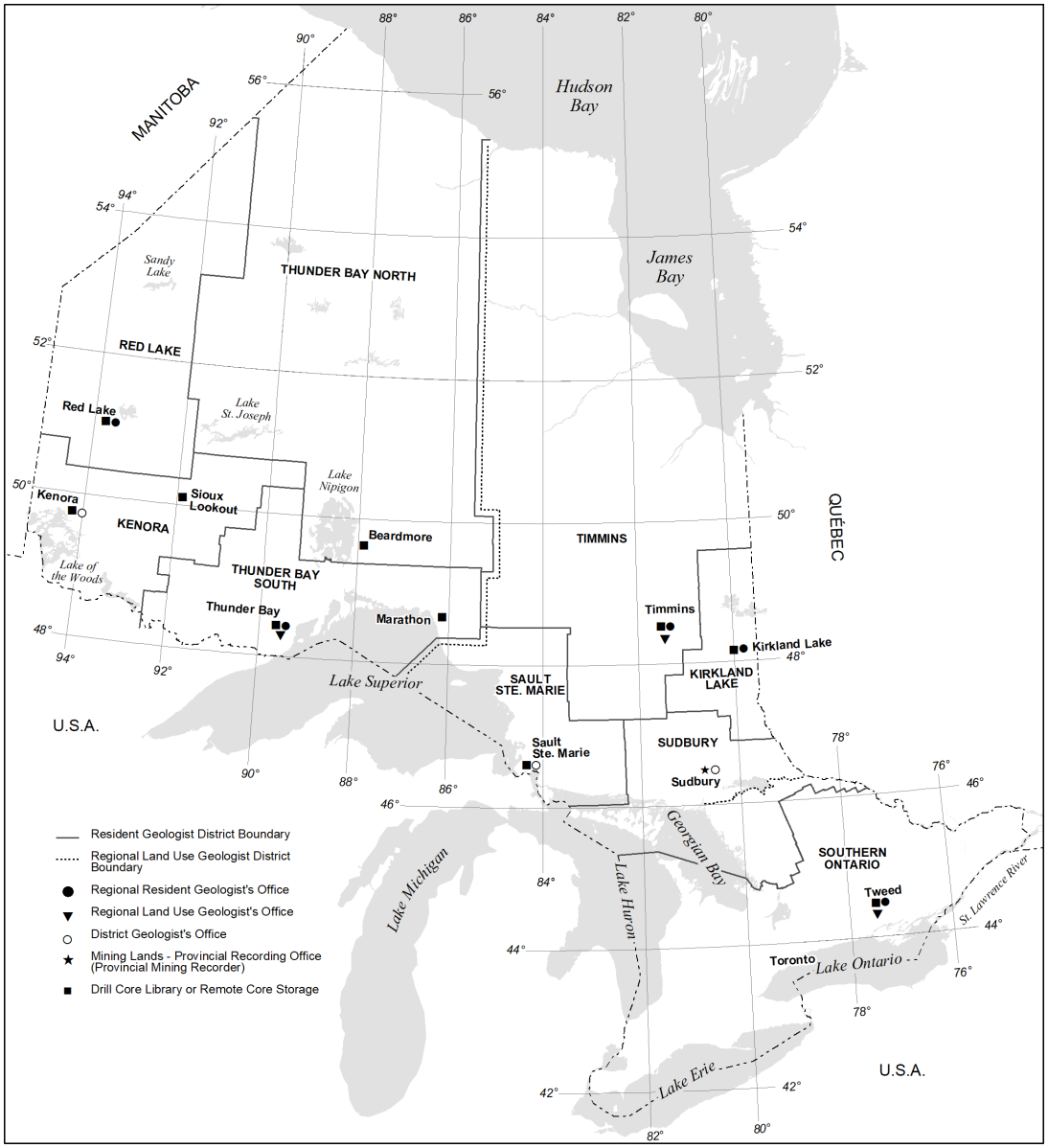

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ONTARIO GEOLOGICAL SURVEY

RESIDENT GEOLOGIST PROGRAM

REPORT OF ACTIVITIES—2020

KIRKLAND LAKE
REGIONAL RESIDENT GEOLOGIST REPORT

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INTRODUCTION

The year 2020 was no ordinary year! Despite starting off as most years do, with the preparation and submission of the *Report of Activities* and participation in the annual Prospectors and Developers Association of Canada (PDAC) convention, things changed significantly in mid-March 2020, as a result of the lockdowns brought about by the COVID-19 pandemic. Essentially all public-facing gatherings were put on hold, which included field work and property visits, and a provincial work-from-home protocol was introduced – which remained in place as of year end.

Client support transitioned from a typical office environment, with direct access to office resources and materials, to a home-based online and telephone type of support. Despite the various technical challenges in adjusting to a new work environment, we strived to provide technical support to our clients as best we could under these circumstances. Certain activities were adversely affected, the absence of a field season being the most notable, whilst certain office projects earmarked for the Drill Core Library, which includes cataloguing of old maps and plans remains to be done, as well as retrieving the mineral and rock display cases and the various rock and mineral collections from their present temporary storage. We optimistically anticipate that much of this will be completed in the forthcoming summer. We thank our valued clients for their understanding and patience during these unusual times.

In the Kirkland Lake Resident Geologist District (Figure 1), exploration activity was relatively quiet for the first half of 2020 and heading into the fall of 2020. This may have been driven, to some extent, by the imposition of COVID-19 related health and safety protocols, including physical distancing and work-from-home policies. However, there was a notable increase in exploration activity as companies adapted to working in the field, whilst respecting pandemic-related health and safety considerations. Precious metal prices surged to an all-year high around August, with gold peaking at US$2050 per ounce (Figure 2) and silver at US$29 per ounce (Figure 3). Gold and silver prices ended the year at US$1893 per ounce and US$26 per ounce, respectively.

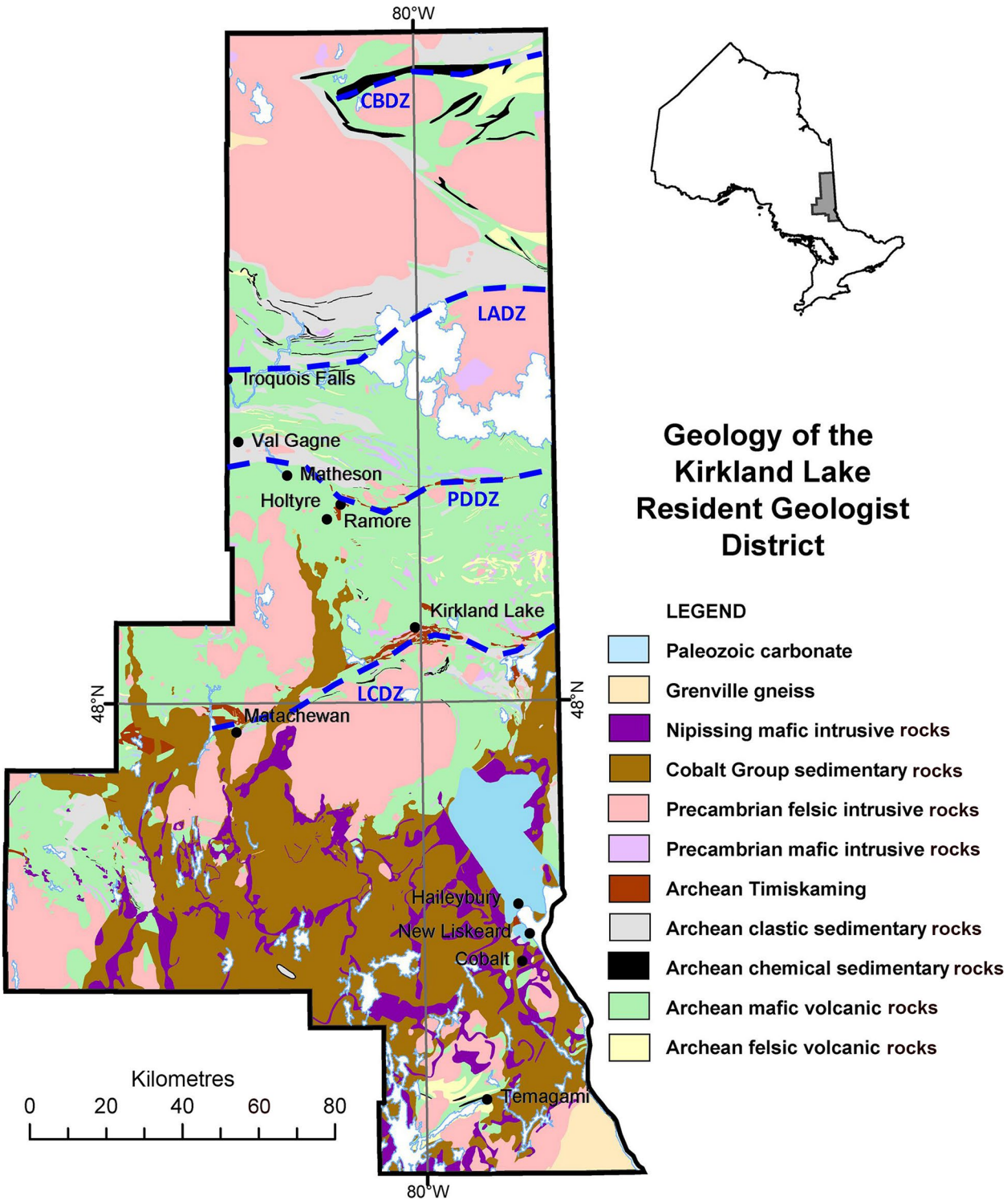

Figure 1. The area of the Kirkland Lake Resident Geologist District with simplified bedrock geology showing major deformation zones (blue dashed lines: CBDZ, Casa Berardi deformation zone; PDDZ, Porcupine–Destor deformation zone; LCDZ, Larder–Cadillac deformation zone; LADZ, Lake Abitibi deformation zone). Geology *from* Ayer and Chartrand (2011).

The price of cobalt has been generally flat throughout 2020 at around US$15 per pound, after a significant peak at over US$40 per pound in the spring of 2018 (Figure 4).

Once again, brownfields exploration dominated the exploration space for gold, and both silver and cobalt to a lesser extent, in areas proximal to current historic production sites, especially to the west of the Kirkland Lake gold camp. It is also worth noting that shortly after the acquisition of the Juby gold project by Caldas Gold Corp. in mid-2020, there has been a surge in exploration activity within the Shining Tree area and the Gowganda gold camp in general.

Diamond- and kimberlite-related exploration activities remained noticeably active in 2020, with RJK Explorations Ltd. leading the way amongst the junior exploration community, whilst the dominant player in this activity, De Beers, remains active in the District, although few details are available.

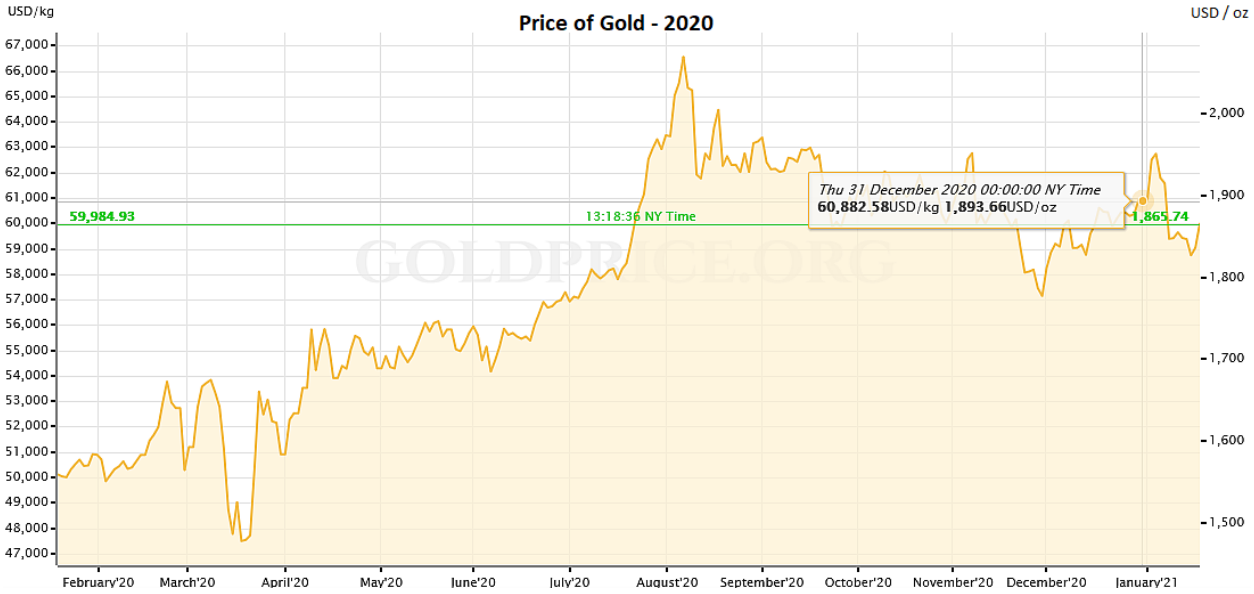

Figure 2. Chart showing the price of gold quoted in US$ per ounce for 2020 (www.goldprice.org).

Figure 3. Chart showing the price of silver quoted in US$ per ounce for 2020 (www.silverprice.org).

Figure 4. Chart showing the price of cobalt quoted in US$ per pound for a 5 year period spanning 2016–2020 (www.dailymetalprice.com).

Cumulative gold production (excluding re-treated tailings) to the end of 2020 in the District, stands at 47 012 291 ounces (Table 1). Within the District, gold was produced from Alamos Gold Inc.'s Young–Davidson Mine, McEwen Mining Inc.'s Black Fox Mine and Kirkland Lake Gold Ltd.'s Macassa Mine and the Holt Complex (comprising the Holt, Holloway and Taylor mines). Driven by economic and priority-driven considerations, production at the Holt Complex ceased at the end of the second quarter of 2020, and the mines were placed on care and maintenance.

The total production of gold in 2020 was 372 928 ounces, a decrease of 35% in 2020 from the same period in 2019. Overall, there were 65 active exploration projects (including 4 advanced projects) in the Kirkland Lake Resident Geologist District, a slight increase from the previous year's 61 projects.

In 2020, 117 assessment files were received into the Kirkland Lake assessment file system. These reports, approved for assessment credits, represent C$17 997 737 in exploration expenditures, compared to C$22 697 895 (for 150 reports filed) reported for the previous year.

One publication was added to the Kirkland Lake Resident Geologist District library in 2020 and entered into the publications database. No diamond-drill core was received for the Drill Core Library during the same reporting period.

MINING ACTIVITY

Gold, once again, dominated mine production in the Kirkland Lake District in 2020 from a total of 6 mines. The locations of these mines are shown on the map in Figure 5. Table 2 sumarizes 2020 production from these 6 mines, their cumulative production figures from startup to the end of 2020 and their most recent publicly disclosed mineral reserve statements (www.alamosgold.com, www.klgold.com, www.mcewenmining.com). It is important to note that production from the Holt Complex, which includes the Holt, Holloway and Taylor mines, ceased during the second quarter of 2020.

Table 1. Cumulative gold production in the Kirkland Lake Resident Geologist District to the end of 2020.

Mine	Township	Tons Milled	Production (ounces gold)	Grade (ounce/ton)	Years of Production
Aljo	Beatty	2333	42	0.018	1940
American Eagle	Munro	60	40	0.667	1911
Argyll	Beatty	12 455	851	0.068	1918
Armistice	McGarry	8282	1035	0.125	1995, 1997 (bulk samples)
Ashley	Bannockburn	157 076	50 123	0.319	1932-36
Barber Larder	McGarry	30 118	3072	0.102	1988
Barry Hollinger	Pacaud	267 741	77 000	0.288	1918, 1925–1936, 1944–1946
Bidgood	Lebel	586 367	160 184	0.273	1934–1951
Black Fox*	**Hislop**	**8 353 357**	**1 010 170**	**0.121**	**1997–2001, 2009–present**
Blue Quartz	Beatty	500	81	0.162	1923, 1926, 1928, 1934
Bourkes	Benoit	1298	277	0.213	1918, 1936–1938
Buffonta	Garrison	117 013	12 139	0.104	1981, 1991–1992
Canadian Arrow	Hislop	303 449	19 140	0.063	1974–1976, 1980–1983
Canamax (Matheson project)	Holloway	38 675	5391	0.139	1988
Cathroy Larder (Mirado)	McElroy	89 719	10 231	0.114	1941–1944, 1947, 1957, 1987
Centre Hill	Munro	327 007	422	0.001	1967–1970
Cheminis	McVittie	179 013	17 530	0.098	1991–1996
Chesterville	McGarry	3 260 439	358 880	0.110	1930–1952
Croesus	Munro	5333	14 859	2.786	1915–1918, 1923, 1931–1936
Eastmaque (tailings)	Teck	1 051 744	28 740	0.027	1988–1991
Ethel Copper	James	17 477	115	0.007	1962–1967
Garrcon	Garrison	81 057	3518	0.046	2014 (bulk sample)
Gateford (Swastika)	Teck	103 684	30 068	0.290	1910–1947***
Golden Summit	Maisonville	737	57	0.077	1936–1937, 1945
Gold Hill	Catharine	4616	660	0.143	1927–1928
Gold Pyramid	Guibord	175	36	0.206	1911
Goldpost	Hislop	9403	2913	0.310	1989
Hislop Mine (Hislop East)	Hislop	2 082 219	128 635	0.062	1990–1991, 1993–1995, 1999–2000, 2007, 2010–2014
Holloway	Holloway	6 720 648	1 027 203	0.153	1993, 1995 (preproduction), 1996–2006, 2011–2016
Holloway–Holt	Holloway	601 778	89 703	0.149	2007–2010
Holt	Holloway	11 640 918	1 727 575	0.148	1988–2004, 2011–2018
Holt Complex* (Holt, Holloway & Taylor)	**Holloway, Taylor**	**1 178 200**	**143 342**	**0.122**	**2019–present**
Hudson–Rand	Teck	6496	483	0.074	1922
Kerr	McGarry	40 336 512	10 457 441	0.259	1911, 1938–1996
Kirkland Lake	Teck	3 140 283	1 172 955	0.374	1916–1960
Kirkland Lake Gold* (Macassa)	**Teck**	**4 775 758**	**2 193 432**	**0.459**	**2002–present**
Kirkland Town site	Teck	4230	1921	0.454	1958–1959
Laguerre	McVittie	40 514	7568	0.187	1937–1939
Lake Shore	Teck	17 208 323	8 602 791	0.500	1918–1965, 1982–1987, 1997–1998
Macassa	Teck	7 877 532	3 525 389	0.448	1933–1999
Macassa (tailings)	Teck	3 240 890	173 659	0.054	1987–1999, 2002
Matachewan Consolidated	Powell	3 631 908	385 503	0.106	1934–1954, 1980–1982
McBean	Gauthier	557 621	45 900	0.082	1984–1986
Miller Independence	Pacaud	31	59	1.903	1918
Moffat–Hall	Lebel	16 388	4780	0.292	1934–1935
Morris Kirkland	Lebel	127 253	16 999	0.134	1936–1938, 1940–1942

Mine	Township	Tons Milled	Production (ounces gold)	Grade (ounce/ton)	Years of Production
New Telluride	Skead	104	62	0.596	1931–1932
Newfield	Garrison	55 000	9680	0.176	1996 (bulk sample)
Omega	McVittie	1 615 081	214 098	0.133	1913, 1926–1928, 1936–1947
Queenston	Gauthier	1054	177	0.168	1941
Ronda	MacMurchy	24 592	2727	0.111	1939
Ross	Hislop	6 714 482	995 832	0.148	1936–1989
Ryan Lake**	Powell	188 790	1352	0.007	1948–1957, 1962–1964
Stairs	Midlothian	15 835	3573	0.226	1965–1966
Sylvanite	Teck	5 049 536	1 674 808	0.332	1927–1961
Taylor	Taylor	1 072 489	175 601	0.164	2007, 2013–2014 (preproduction), 2015–2018
Teck Hughes	Teck	9 565 302	3 709 007	0.388	1917–1968
Toburn	Teck	1 186 316	570 659	0.481	1912–1953***
Tyranite	Tyrrell	223 810	31 352	0.140	1939–1942
Upper Beaver	Gauthier	580 562	140 709	0.242	1913–1972***
Upper Canada	Gauthier	4 648 984	1 398 291	0.301	1938–1971
White–Guyatt	Munro	50	10	0.200	1911
Wright Hargreaves	Teck	9 934 327	4 821 296	0.485	1921–1965
Young Davidson	Powell	6 218 272	585 690	0.094	1934–1957
Young-Davidson*	**Powell**	**24 644 881**	**1 366 854**	**0.055**	**2012–present**
Total including tailings		189 936 097	47 214 690	0.249	
Total excluding tailings		185 643 463	47 012 291	0.253	

***Note:** * Current producer (in **BOLD**), ** Base metal producer, *** Intermittent production.*

Table 2. Mine production and reserves in the Kirkland Lake Resident Geologist District in 2020.

Mine (period in production)	Total Production (for the specific period shown)		Production (2020)		Reserves at End of 2019			
	Tonnage @ Grade	Total Commodity	Tonnage @ Grade	Total Commodity	Tonnage (Short Tons)			Grade (g/t Au)
Alamos Gold – Young–Davidson (2012–present)	24 644 881 tons @ 0.055 oz/t Au	1 366 854 ounces gold	2 405 600 tons @ 0.057 oz/t Au (1.94 g/t Au)	136 200 ounces gold	**Underground:**	Proven	20 936 199	2.67
						Probable	20 521 729	2.53
						Measured	6 014 210	4.23
						Indicated	4 496 328	2.95
						Inferred	1 464 972	2.43
					Surface:	Proven	110 231	1.31
						Measured	546 746	1.13
						Indicated	1 369 071	1.28
						Inferred	34 172	0.99
Kirkland Lake Gold – Macassa (2002–present)	4 775 758 tons @ 0.459 oz/t Au	2 193 432 ounces gold	344 758 tons @ 0.531 oz/t Au (18.20 g/t Au)	183 037 ounces gold	Proven & Probable		3 659 674	22.10
					Measured & Indicated		1 781 335	13.80
					Inferred		1 145 301	16.70
[1]Kirkland Lake Gold – Holt Complex (2019–present)	1 178 200 tons @ 0.122 oz/t Au	143 342 ounces gold	237 347 tons @ 0.124 oz/t Au (4.25 g/t Au)	29 391 ounces gold	Proven & Probable		5 987 755	4.00
					Measured & Indicated		8 545 117	4.20
					Inferred		10 027 726	4.40
McEwen Mining – Black Fox (1997–2001; 2009–present)	8 353 357 tons @ 0.121 oz/t Au	1 010 170 ounces gold	259 043 tons @ 0.094 oz/t Au (3.22 g/t Au)	24 300 ounces gold	**Black Fox:**	Proven	440 925	5.40
						Probable	330 693	5.78
						Measured	220 462	7.83
						Indicated	881 849	7.48
						Inferred	110 231	7.32
					Tamarack:	Indicated	881 849	1.83
					Grey Fox:	Indicated	4 299 014	7.05
						Inferred	881 849	6.58
					Froome (U/G):	Indicated	1 212 542	5.09
						Inferred	55 116	4.13

***Note:** [1]Holt Complex includes production from Holt, Holloway and Taylor mines combined.*
All tonnages reported in this table have been converted to US (short) tons, to preserve continuity with earlier reports.

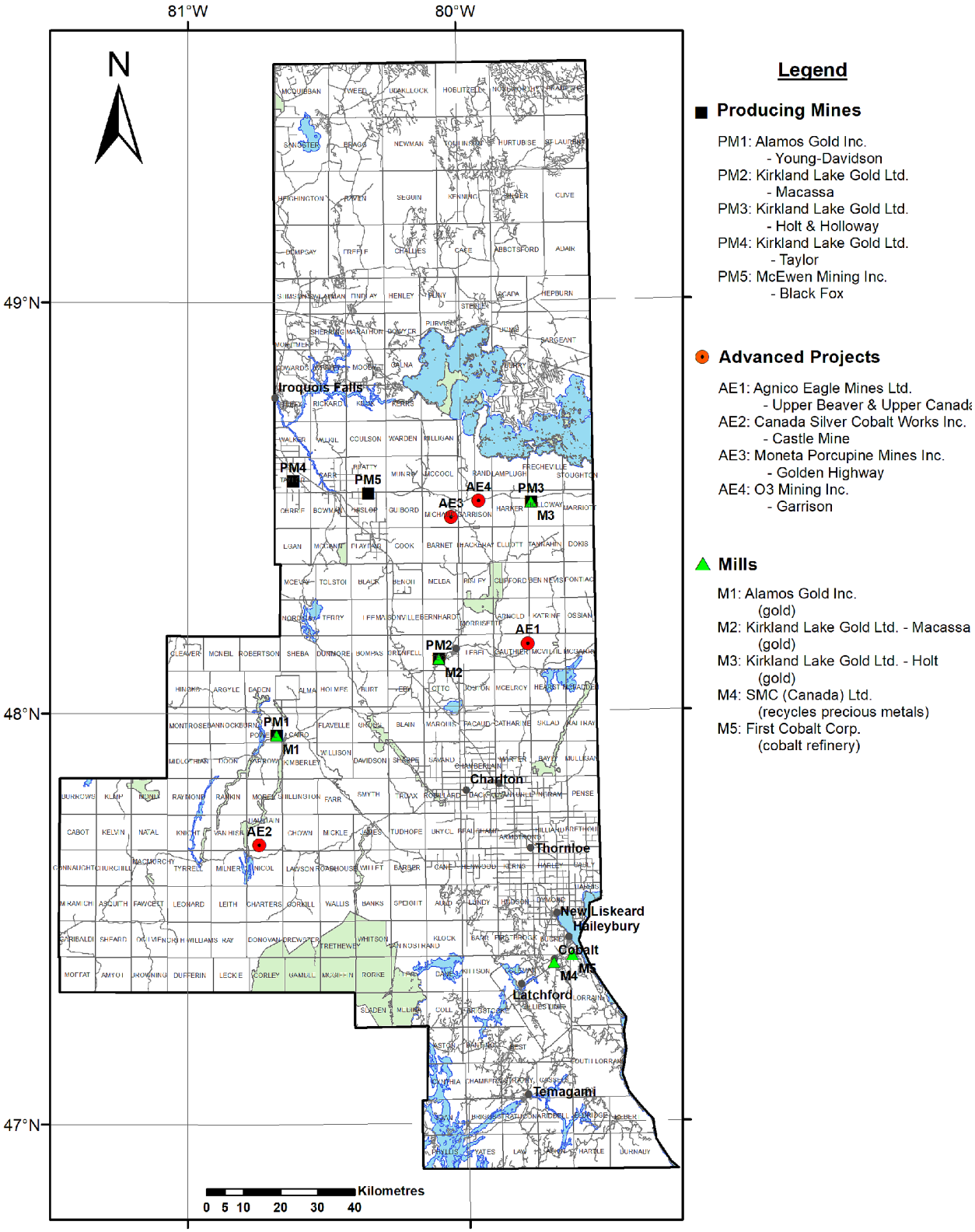

Figure 5. Kirkland Lake Resident Geologist District with locations of producing mines, mills and advanced projects.

Alamos Gold Inc.

Alamos Gold Inc. (Alamos) is a Canadian-based intermediate gold producer, with production from 4 operating mines in North America, including the Young–Davidson (*see* Figure 5) and Island Gold mines in northern Ontario. Other operating mines are the El Chanate and Mulatos mines in Sonora, Mexico.

YOUNG–DAVIDSON MINE

The Young–Davidson Mine is a large, bulk tonnage underground gold mine (*see* Figure 5), located near the town of Matachewan, approximately 60 km west of Kirkland Lake, within the southwestern part of the Abitibi greenstone belt. The property consists of contiguous mineral leases and claims totalling 11 000 acres, and is situated on the site of 2 past-producing mines that produced about 1 million ounces from 1934 to 1957. Production rates for 2020 averaged 5960 tonnes per day (tpd), with a 14 year reserve life based on mineral reserves as of December 31, 2020 (Alamos Gold Inc., www.alamosgold.com/mines-and-projects/reserves-and-resources [accessed March 1, 2021]).

In 2020, the Young–Davidson Mine produced 136 200 ounces of gold compared to 188 000 ounces of gold declared the previous year (Alamos Gold Inc., www.alamosgold.com [accessed March 1, 2021]). A significant milestone for the mine was the transition to lower mine infrastructure (Figure 6), which was completed in July 2020, resulting in a 33% increase in ore production from 6000 to 8000 tpd.

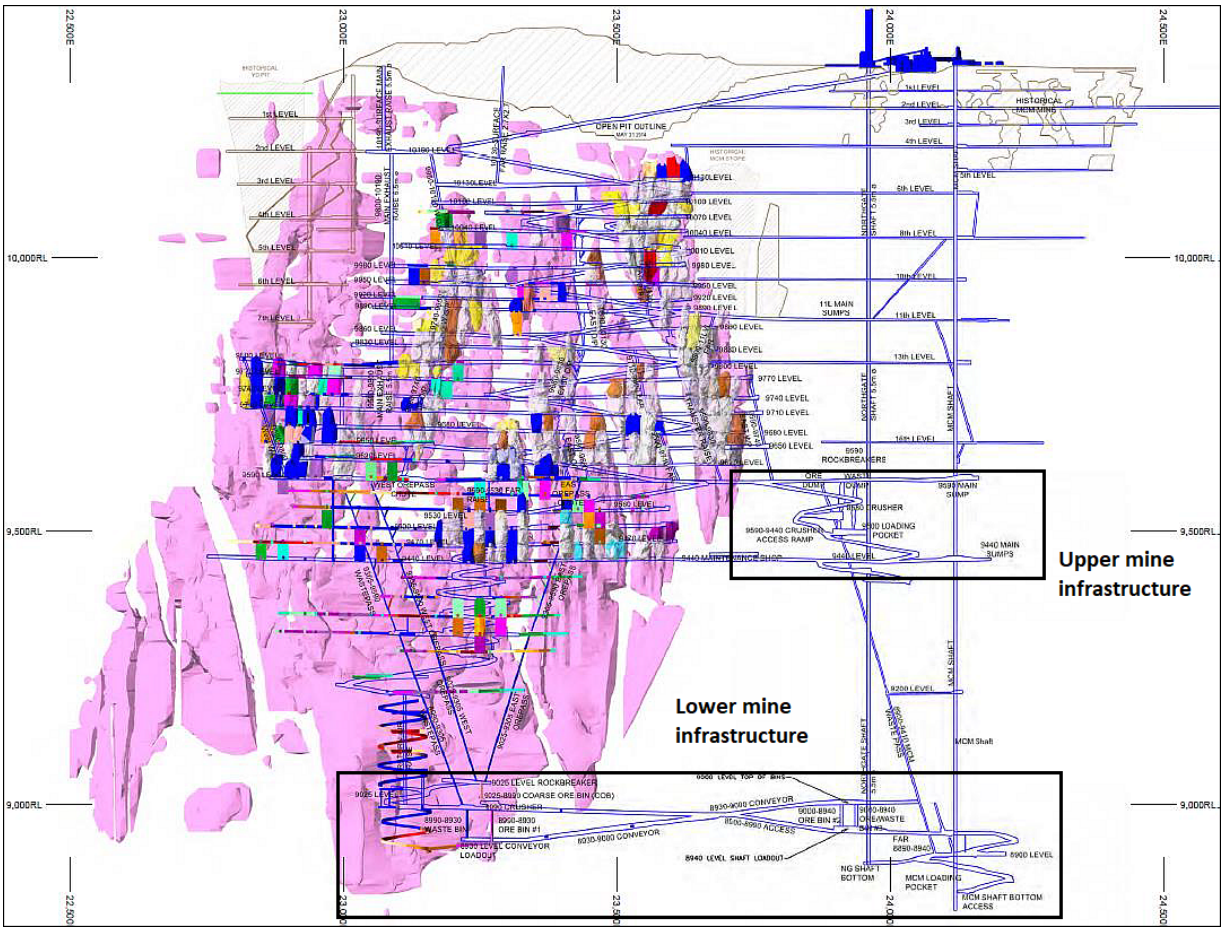

Figure 6. Simplified longitudinal section through the Alamos Gold Inc. Young–Davidson Mine showing the completed lower mine infrastructure (Alamos Gold Inc., www.alamosgold.com/investors/Presentations, Corporate Presentation, December 2020 [accessed January 20, 2021]).

Kirkland Lake Gold Ltd.

Kirkland Lake Gold Ltd. is a mid-tier Canadian-based gold producer, with 4 wholly owned underground gold mines in Canada, including the Macassa, Taylor, Holt and Holloway mines (*see* Figure 5) and the Detour Lake Mine, which is an open-pit mine, in addition to the Fosterville Mine in the state of Victoria, Australia. In January 2019, production reporting for Holt, Holloway and Taylor mines was combined to fall under a single business unit referred to as the "Holt Complex".

HOLT COMPLEX

The Holt Complex, consisting of Holt, Holloway and Taylor mines, was designated as a non-core asset on February 19, 2020, with plans to review options for maximizing value. In mid-March, the Kirkland Lake Gold placed Holloway Mine on care and maintenance, with no plans for future resumption of operations. On April 2, 2020, operations at the Taylor Mine and Holt Mine and Mill were suspended as part of the company's response to the COVID-19 pandemic, whilst continuing the strategic review of the Holt Complex in order to maximize value. On July 16, 2020, the Company announced the suspension of operations at the Holt Complex would be extended until further notice (Kirkland Lake Gold Ltd., www.klgold.com, Management's Discussion and Analysis, Nine Months Ending September 30, 2020 [accessed January 28, 2021]).

The Holt Complex produced a total of 29 391 ounces of gold during 2020, from 215 318 tonnes (237 347 tons) milled, at an average grade of 4.25 g/t Au.

MACASSA MINE

As of the end of the third quarter of 2020, the Kirkland Lake Gold completed in excess of 84 100 m of underground drilling, using up to 8 underground drills on the 5300, 5600 and 5700 levels. Drill targetting focussed on extensions of the South Mine complex to the east, west and at depth, in addition to areas along the Amalgamated Break proximal to the South Mine complex. Exploration drilling was also undertaken to test the Main Break on the former Kirkland Minerals property 300 m below the deepest mine level and proximal to #4 shaft (Kirkland Lake Gold Ltd., www.klgold.com, Management's Discussion and Analysis, Nine Months Ending September 30, 2020 [accessed January 28, 2021]).

In October of 2020, the company reported a significant drill intersection near the contact with the Main Break, while testing the south margin of the South Mine complex, with values up to 253.7 g/t Au over a core length of 14.5 m (Kirkland Lake Gold Ltd., www.klgold.com, news release, October 19, 2020 [accessed January 28, 2021]). This new discovery falls outside the current Mineral Reserves near the contact with the Amalgamated Break.

A cross section (looking eastwards) showing the South Mine complex and its proximity to the Amalgamated Break and the Main/'04 Break, in addition to the on-section projection of the #3 and #4 shafts, is shown in Figure 7. This cross section also illustrates the convergence of the Main/'04 Break, Amalgamated Break and the South Mine complex with depth—an area yet to be explored.

The Macassa Mine complex produced a total of 183 037 ounces of gold during 2020, a significant decrease compared to 241 297 ounces declared in 2019, from 312 759 tonnes (344 758 tons) milled, at an average grade of 18.20 g/t Au. This reduction in production was impacted by reduced workforce productivity and equipment availability, largely related to excessive heat in the mine caused by record temperatures in Kirkland Lake, as well as ongoing health and safety protocols as part of the company's COVID-19 response.

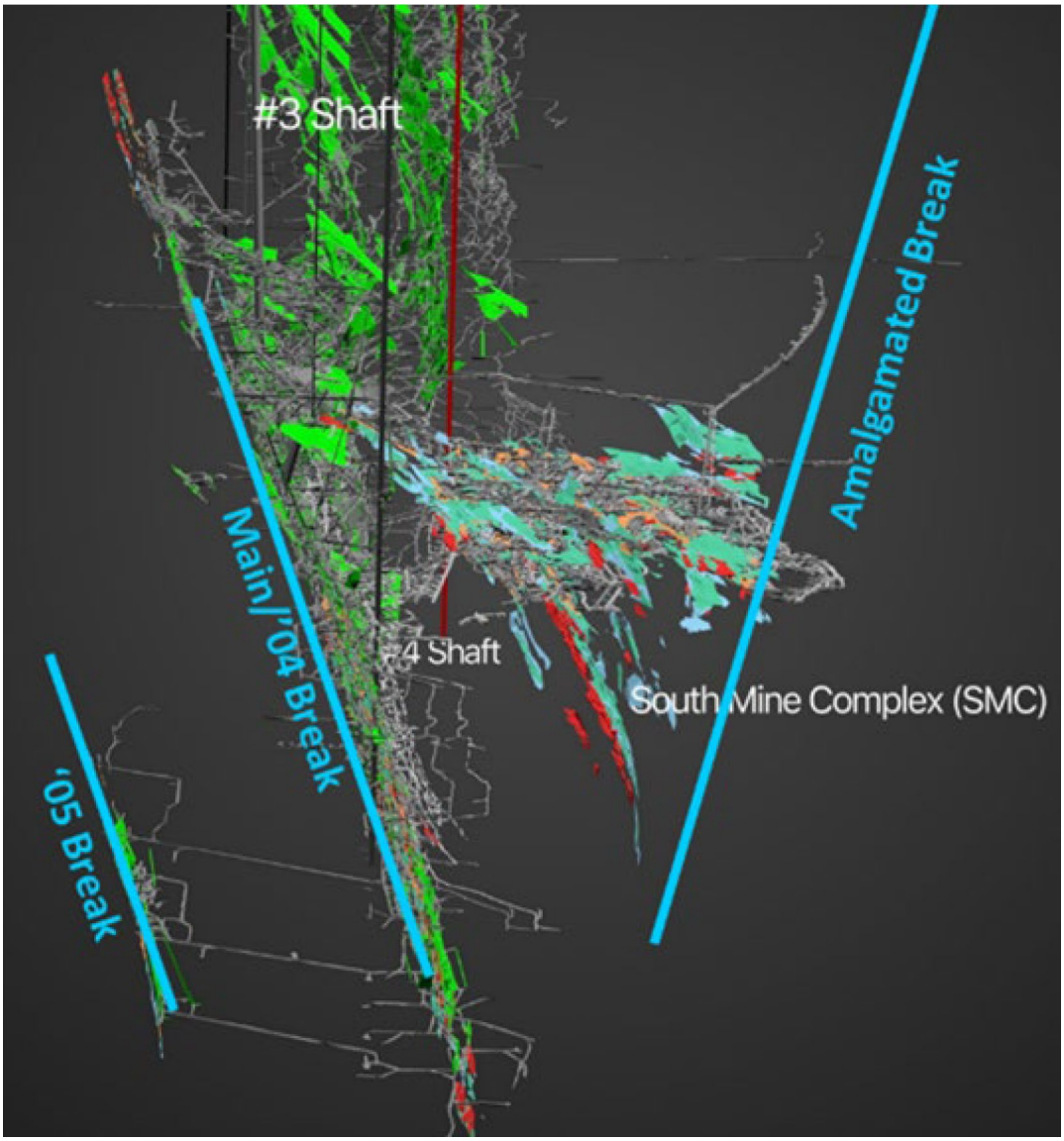

Figure 7. A cross section (looking east) showing the Kirkland Lake Gold Ltd. South Mine complex and its proximity to the Amalgamated Break and the Main/'04 Break (Kirkland Lake Gold Ltd., www.klgold.com, Investor Presentation, January 27, 2021 [accessed January 28, 2021]).

MACASSA #4 SHAFT PROJECT

Sinking of the shaft advanced approximately 3040 feet during 2020, reaching 4240 feet by year end; the project was advancing ahead of schedule and was on track for completion in late 2022, with production at Macassa to grow to 400 000 to 425 000 ounces in 2023 (Kirkland Lake Gold Ltd., www.klgold.com, news release, January 12, 2021 [accessed January 28, 2021]).

McEwen Mining Inc.

McEwen Mining Inc. operates the underground Black Fox Mine (*see* Figure 5), the El Gallo Mine in Sinaloa, Mexico, in addition to the San José Mine in Santa Cruz, Argentina. Ore is crushed at the Black Fox Mine complex and is trucked 30 km west to the Black Fox Mill for further processing.

BLACK FOX MINE

During 2020, exploration remained focussed on extensions of existing gold resources proximal to the mine infrastructure, in addition to the Froome deposit. Development of underground access to the Froome deposit, located 850 m west of the Black Fox, is on track for both the haulage ramp and ventilation ramp being 52% and 60% complete (Figure 8), respectively, as of the end of October 2020. Commercial production from the Froome is scheduled for the fourth quarter of 2021 (McEwen Mining Inc., www.mcewenmining.com, news release, October 16, 2020 [accessed January 29, 2021]).

A Preliminary Economic Assessment (PEA) study to include the Black Fox Mine and Grey Fox deposit, remains ongoing with the aim of expanding the current short mine life producing 30 to 40 000 ounces of gold per year to a ten-year mine life with an annual production targeting 100 to 150 000 ounces of gold per year. Surface exploration activities for 2020 remained focussed within the Grey Fox deposit area, located approximately 4 km to the southwest of the Black Fox Mine, and includes the Whiskey Jack, Gibson, Grey Fox South, 147 and 147NE zones (McEwen Mining Inc., www.mcewenmining.com, Investor Presentation, January, 2021[accessed January 29, 2021]).

In 2020, the Black Fox Mine produced an estimated 24 300 gold equivalent ounces from 235 000 tonnes (259 043 tons) milled, a 32% decrease compared to 2019 production (McEwen Mining Inc., www.mcewenmining.com [accessed January 29, 2021]).

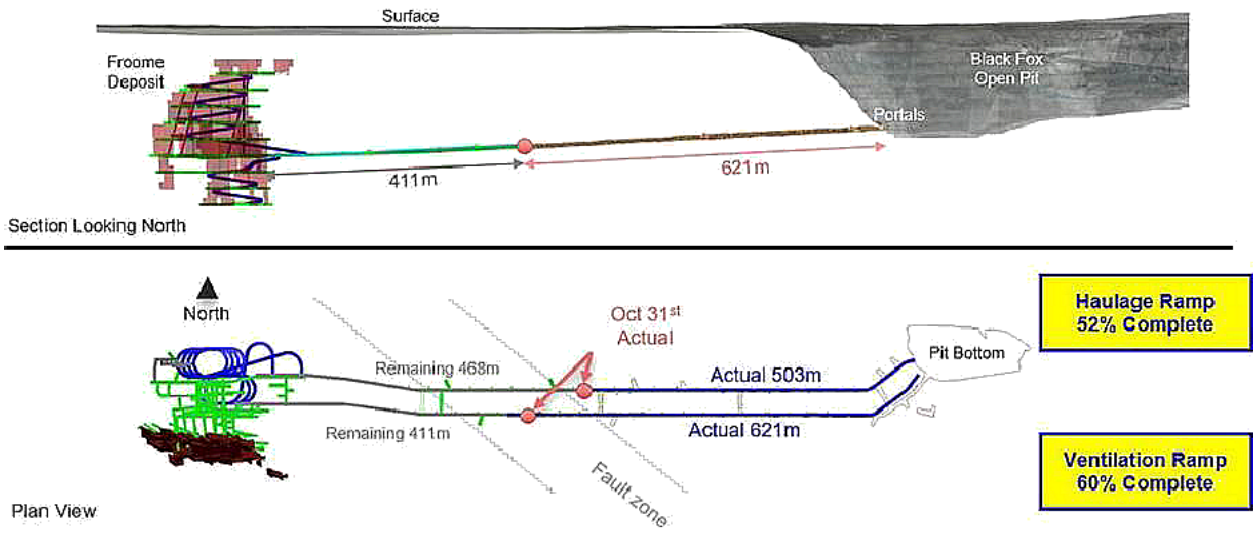

Figure 8. Surface plan and corresponding cross section (looking north) showing the ramp development, linking the bottom of the Black Fox pit with the Froome deposit (McEwen Mining Inc., www.mcewenmining.com, Investor Presentation, January 2021 [accessed January 29, 2021]).

EXPLORATION ACTIVITY

Introduction

The number of active claims and cells, including new registrations in 2020 for the Larder Mining Division (Kirkland Lake District) are given in Table 3. The dollar value of work performed and approved for assessment work credit (C$17 997 737) is also presented. The area covered by active claims in the district at year end 2020 was 957 445 ha, which was higher than the past 2 preceeding years (Table 4).

Ninety-four (94) exploration plans and 270 exploration permits were active in the district during 2020. Of these, 30 plans and 90 permits were issued in 2020. Work proposed in the exploration plans and permits were mechanized drilling, geophysical surveys, line cutting, digging pits, overburden stripping and bedrock trenching (Tables 5 and 6).

Furthermore, in 2020, 117 new assessment reports (Table 7) were received and processed for the Kirkland Lake District and uploaded into the Ontario Mineral Exploration Information System (OMEIS). OMEIS is an intranet-based application launched in 2018 and is used by RGP and Mining Lands staff to maintain and update assessment file and drill-hole data. Exploration activity in the district, based on assessment filings, company reports and news releases, is listed in Table 8.

Table 3. Status of claims, cells and value of assessment work received in the Larder Mining Division, compared to other divisions for the year ending December 31, 2020.

Mining Division	Total Active Claims	Total Active Cells	New Registered Claims	New Registered Cells	Work Performed Approved ($)
Kenora	14 548	17 154	3190	3555	2 646 430
Red Lake	32 699	41 951	5777	7064	7 370 955
Patricia	17 852	23 235	8463	8825	2 409 140
Thunder Bay	65 264	77 238	15 829	18 300	18 755 638
Sault Ste. Marie	12 750	18 540	3500	4069	24 131 571
Porcupine	56 699	65 703	12 810	14 341	43 415 618
Sudbury	14 983	18 119	3281	3677	5 423 547
Larder	**43 727**	**47 014**	**5731**	**7305**	**17 997 737**
S. Ontario	4419	4537	253	253	147 891
Total	**262 941**	**313 491**	**58 834**	**67 389**	**122 298 527**

Note: *Some claims are situated and reported in more than 1 division and claims and assessment work totals are not adjusted to remove double counting.*

Table 4. Total area covered by staked claims in the districts of the Resident Geologist Program (RGP).

RGP District	Total Area (ha) Covered by Claims January 4, 2021	Total Area (ha) Covered by Claims January 6, 2020	Total Area (ha) Covered by Claims January 9, 2019
Kenora	508 798	421 997	485 425
Kirkland Lake	**957 445**	**900 261**	**947 786**
Red Lake	808 419	676 218	516 996
Southern Ontario	97 777	100 455	116 319
Sault Ste. Marie	243 390	222 125	249 176
Sudbury	335 285	305 966	323 328
Thunder Bay North	1 242 431	988 020	964 354
Thunder Bay South	887 605	717 393	739 982
Timmins	1 158 607	938 315	996 853

Note: *Data are from MLAS, compiled by G. Dorland, Northwest GIS Data Specialist, Resident Geologist Program.*

Table 5. Active exploration plans in the Kirkland Lake Resident Geologist District in 2020.

Abbreviations

DRILL ..... Mechanized drilling
GEOPH ..... Geophysical survey
LC ..... Line cutting
PITS ..... Digging pits
PSTRIP ..... Overburden stripping
PTRNCH ..... Bedrock trenching

No.	Plan No.	Claim Holder/Proponent	Project Name	Township	Exploration Activity	Effective
1	PL-18-010877	Detour Gold Corp.	Burntbush East	Hurtubise, Noseworthy	GEOPH, LC, PITS, PTRNCH	2018
2	PL-18-010884	Metalstech Bay Lake Cobalt Inc.	Bay Lake project	Coleman	GEOPH, LC	2018
3	PL-18-010894	C. Ploeger	Gowganda project - Capitol	Nicol, Haultain	GEOPH, LC	2018
4	PL-18-010897	Ashley Gold Mines Ltd.	Wilder project - Thompson	Donovan	GEOPH, LC	2018
5	PL-18-010903	J. Brady	Wilder project - Brady	Donovan	GEOPH, LC	2018
6	PL-18-010909	Ashley Gold Mines Ltd.	Elk Lake project	Mickle	GEOPH, LC	2018
7	Pl-18-010910	Battery Mineral Resources Ltd.	Elk Lake project	Mickle	GEOPH, LC	2018
8	PL-18-010911	Battery Mineral Resources Ltd.	Shining Tree project -Seville	Leonard	GEOPH, LC	2018
9	PL-18-010912	Battery Mineral Resources Ltd.	Shining Tree project -Burda	Leonard	GEOPH, LC	2018
10	PL-18-010913	Battery Mineral Resources Ltd.	Shining Tree project - Nellie Lake	Leonard	GEOPH, LC	2018
11	PL-18-010914	Battery Mineral Resources Ltd.	Shining Tree project -Bobtail	Leonard, Tyrrell	GEOPH, LC	2018
12	PL-18-010915	Battery Mineral Resources Ltd.	Shining Tree project - Powerline	Leonard	GEOPH, LC	2018
13	PL-18-010926	Battery Mineral Resources Ltd.	Gowganda project -Knight	Knight	GEOPH, LC	2018
14	PL-18-010927	Battery Mineral Resources Ltd.	Elk Lake project - James SE	Willet, James	GEOPH, LC	2018
15	PL-18-010928	Battery Mineral Resources Ltd.	Elk Lake project - Willet NE	Willet	GEOPH, LC	2018
16	PL-18-010929	Battery Mineral Resources Ltd.	Elk Lake project - Barber NW	Willet, Barber	GEOPH, LC	2018
17	PL-18-010930	Battery Mineral Resources Ltd.	Elk Lake project - Tudhope SW	Tudhope, Willet, Barber, James	GEOPH, LC	2018
18	PL-18-010935	Battery Mineral Resources Ltd.	Elk Lake project - Silverclaim South	Mickle	GEOPH, LC	2018
19	PL-18-010936	Ashley Gold Mines Ltd.	Elk Lake project -Cotley	Mickle	GEOPH, LC	2018
20	PL-18-010937	Battery Mineral Resources Ltd.	Elk Lake project -Silverstrike	James	GEOPH, LC	2018
21	PL-18-010938	1154077 Ontario Ltd.	SVA - Clifford	Clifford	LC, PSTRIP	2018
22	PL-18-010939	Ashley Gold Mines Ltd.	Elk Lake project -Silverstrike	James	GEOPH, LC	2018
23	PL-18-010942	Battery Mineral Resources Ltd.	Wilder project - Wilder East	Donovan	GEOPH, LC	2018
24	PL-18-010943	Battery Mineral Resources Ltd.	Wilder project - Wilder Bridge	Charters, Donovan	GEOPH, LC	2018
25	PL-18-010944	Battery Mineral Resources Ltd.	Gowganda project - Milner	Milner, Nicol	GEOPH, LC	2018
26	PL-18-010949	Tiger Gold Exploration Corp.	Ghost-41	Harker	GEOPH, LC	2018
27	PL-18-010954	Battery Mineral Resources Ltd.	McAra project - MH12	Dufferin	GEOPH, LC	2018
28	PL-18-010956	Ashley Gold Mines Ltd.	Wilder project - Kell South	Corkill, Brewster	GEOPH, LC	2018
29	PL-18-010957	Battery Mineral Resources Ltd.	McAra project - MH13	Dufferin	GEOPH, LC	2018
30	PL-18-010959	Battery Mineral Resources Ltd.	McAra project -MH7-MH8-MH9	Dufferin, Leckie	GEOPH, LC	2018
31	PL-18-010960	Battery Mineral Resources Ltd.	McAra project -MH6	Dufferin	GEOPH, LC	2019
32	PL-18-010961	Battery Mineral Resources Ltd.	White Lake project - Skog	Browning	GEOPH, LC	2019
33	PL-18-010979	Ashley Gold Mines Ltd.	Wilder project-Kell	Corkill, Charters	GEOPH, LC	2019
34	PL-18-010980	Knightsbridge Exploration Ltd.	North Wind project	Connaught	DRILL, GEOPH, LC, PSTRIP	2019
35	PL-18-010983	Battery Mineral Resources Ltd.	McAra project -South	Dufferin	GEOPH, LC	2019
36	PL-18-10891	Northern Gold Mining Inc.	Boundary Claim property	Harker, Holloway	GEOPH, LC	2018
37	PL-18-10896	Northern Gold Mining Inc.	Garrison-Mharkari property	Garrison	GEOPH, LC	2018
38	PL-18-10900	Northern Gold Mining Inc.	Guibord properties	Guibord	GEOPH, LC	2018
39	PL-18-10904	Northern Gold Mining Inc.	Satellite claims	Harker, Elliott	GEOPH, LC	2018

No.	Plan No.	Claim Holder/Proponent	Project Name	Township	Exploration Activity	Effective
40	PL-19-000001	F. Kiernicki	Camking project	Powell	PSTRIP	2019
41	PL-19-000013	J. Camilleri	Camilleri Clifford Grid 2019 project	Ben Nevis, Clifford, Katrine, Arnold	GEOPH, LC	2019
42	PL-19-000014	J. Camilleri	Camilleri Clifford Grid 2019 project	Clifford, Arnold	GEOPH	2019
43	PL-19-000015	J. Camilleri	Camilleri Clifford Grid 2019 project	Clifford	GEOPH, LC	2019
44	PL-19-000021	Canadian Gold Miner Corp.	Elephant Head project	Connaught	GEOPH, LC	2019
45	PL-19-000037	Canadian Gold Miner Corp.	Jumping Moose project	Burrows	GEOPH, LC	2019
46	PL-19-000050	Northstar Gold Corp.	Miller Gold project	Pacaud, Boston	GEOPH, LC	2019
47	PL-19-000051	M. Sutton	GNR project	Boston	PSTRIP	2019
48	PL-19-000063	The Alberta Gold Exploration Corp.	Iris project	Harker, Elliott	DRILL, GEOPH, LC, PSTRIP	2019
49	PL-19-000064	The Alberta Gold Exploration Corp.	Iris project	Harker	DRILL, GEOPH, LC, PSTRIP	2019
50	PL-19-000065	Tiger Gold Exploration Corp.	Iris project	Tannahill, Harker, Holloway, Elliott	DRILL, GEOPH, LC, PSTRIP	2019
51	PL-19-000066	Red Pine Exploration Inc.	Goalie Stick project	Rand, Harker, Garrison	GEOPH, LC, PITS, PSTRIP, PTRNCH	2019
52	PL-19-000075	Aurelius Minerals Inc.	Mikwam project	Noseworthy	GEOPH, LC	2019
53	PL-19-000084	Skead Holdings Ltd., Ben Nevis Resources Inc.	Interprovincial project	Ben Nevis	DRILL, GEOPH, LC, PSTRIP	2019
54	PL-19-000085	Ben Nevis Resources Inc.	Interprovincial project - NE	Ben Nevis	DRILL, GEOPH, LC, PSTRIP	2019
55	PL-19-000086	Ben Nevis Resources Inc.	Interprovincial project - SW	Ben Nevis	GEOPH, LC, PSTRIP	2019
56	PL-19-000090	P. West	Pense South project	Pense	GEOPH, PSTRIP	2019
57	PL-19-000102	A. Allsopp	Atacama-1 Property project	Eby, Otto	GEOPH, LC	2019
58	PL-19-000108	J. Reed	Atacama-1	Eby, Otto	GEOPH, LC	2019
59	PL-19-000114	Power Metals Corp.	Case Lake property	Steele	PSTRIP	2019
60	PL-19-000115	Mistango River Resources Inc.	Omega project	McVittie	LC	2019
61	PL-19-000131	Cambrian Mining Corporation	Atacama 3 project	Teck, Otto	GEOPH, LC	2019
62	PL-19-000138	Northstar Gold Corp.	Miller Gold project	Pacaud, Catharine, Boston, McElroy	GEOPH, LC	2019
63	PL-19-000140	Transition Metals Corp.	Gowganda project - Big Four	Nicol	GEOPH, LC	2019
64	PL-19-000141	Transition Metals Corp.	Gowganda project - Transition	Nicol, Haultain	GEOPH, LC	2019
65	PL-19-000145	Winterbourne Explorations Ltd.	Clifford project	Ben Nevis, Clifford	DRILL, GEOPH, LC	2020
66	PL-20-000007	LaSalle Exploration Corp.	Blakelock project	Hoblitzell, Blakelock	GEOPH, LC	2020
67	PL-20-000013	Agnico Eagle Mines Ltd.	Skead-MacGregor A project	Gauthier, McElroy	LC	2020
68	PL-20-000026	J. Kleinboeck	Ferrim Lake property	Chambers, Cynthia	LC, PITS, PTRNCH	2020
69	PL-20-000036	Tiger Gold Exploration Corp.	Bradette project	Bradette	GEOPH, LC	2020
70	PL-20-000051	Battery Mineral Resources Ltd.	McAra project - Isaac	Leonard, North Williams	GEOPH, LC	2020
71	PL-20-000052	Battery Mineral Resources Ltd.	Wilder project - Rusty NW	Leith	GEOPH, LC	2020
72	PL-20-000065	Battery Mineral Resources Ltd.	McAra project	Dufferin, North Williams, Browning, Ogilvie	GEOPH, LC	2020

No.	Plan No.	Claim Holder/Proponent	Project Name	Township	Exploration Activity	Effective
73	PL-20-000066	Battery Mineral Resources Ltd.	McAra project - Tracy Lake	North Williams	GEOPH, LC	2020
74	PL-20-000067	Battery Mineral Resources Ltd.	McAra project - MH11	Dufferin	GEOPH, LC	2020
75	PL-20-000068	Battery Mineral Resources Ltd.	McAra project - Southwest	Dufferin	GEOPH, LC	2020
76	PL-20-000069	Battery Mineral Resources Ltd.	McAra project - West	Dufferin	GEOPH, LC	2020
77	PL-20-000074	Tri Origin Exploration Ltd.	North Abitibi	Hoblitzell, Noseworthy	GEOPH, LC	2020
78	PL-20-000087	S. Skjonsby	Elliott Clean Rock	Clifford, Elliott	DRILL, PITS, PSTRIP, PTRNCH	2020
79	PL-20-000094	Agnico Eagle Mines Ltd.	Lebel (Bidgood Area)	Lebel	PSTRIP	2020
80	PL-20-000097	Battery Mineral Resources Ltd.	Gowganda project - Leases	Nicol, Haultain	GEOPH, LC	2020
81	PL-20-000098	Battery Mineral Resources Ltd.	Gowganda project - Capitol	Nicol, Haultain	GEOPH, LC	2020
82	PL-20-000099	Jobina Resources Inc.	Toanga project	Morrisette	GEOPH	2020
83	PL-20-000100	Battery Mineral Resources Ltd.	McAra project - McAra	Dufferin, North Williams	GEOPH, LC	2020
84	PL-20-000102	Battery Mineral Resources Ltd.	Wilder project - Thompson	Donovan	GEOPH, LC	2020
85	PL-20-000103	Battery Mineral Resources Ltd.	Elk Lake project - Mapes	Mickle	GEOPH, LC, PITS, PTRNCH	2020
86	PL-20-000104	J. Brady	Wilder project - Wilder	Donovan	GEOPH, LC	2020
87	PL-20-000105	Battery Mineral Resources Ltd.	Wilder project - Rusty NE	Charters	GEOPH, LC	2020
88	PL-20-000114	M. Marion	Las Pipas project	Thackeray, Elliott	GEOPH, LC	2020
89	PL-20-000118	Battery Mineral Resources Ltd.	Gowganda project - Babs South project	Nicol, Haultain	GEOPH, LC	2020
90	PL-20-000119	Transition Metals Corp.	Gowganda project - Babs South project	Nicol, Haultain	GEOPH, LC	2020
91	PL-20-000122	Canada Silver Cobalt Works Inc.	Castle - Everett Lake project	Haultain	DRILL	2020
92	PL-20-000127	Battery Mineral Resources Ltd.	Gowganda project - Silver Leaf	Lawson	GEOPH, LC	2020
93	PL-20-000128	Skead Holdings Ltd.	Lincoln-Nipissing Lafond	Skead, Hearst	GEOPH, LC	2020
94	PL-20-000129	Agnico Eagle Mines Ltd.	UC East project	Gauthier	GEOPH, LC	2020

Table 6. Active exploration permits in the Kirkland Lake Resident Geologist District in 2020.

Abbreviations

DRILL ..... Mechanized drilling
LC ..... Line cutting
PITS ..... Digging pits
PSTRIP ..... Overburden stripping
PTRNCH ..... Bedrock trenching

No.	Permit No.	Claim Holder/Proponent	Project Name	Township	Exploration Activity	Effective
1	PR-17-11070A1	Alpha Exploration Inc.	Mikwam	Noseworthy	DRILL	2020
2	PR-17-11080	The Claim Group Inc.	Quetico East project area	Tweed, McQuibban	DRILL	2017
3	PR-17-11115	Canadian Gold Miner Corp.	Elephant Head	Connaught, Brunswick	DRILL, LC, PSTRIP	2017
4	PR-17-11118	Ashley Gold Mines Ltd.	Lucky Strike	Ossian, McGarry, McVittie, Katrine	DRILL, PSTRIP	2017
5	PR-17-11126	Lake Shore Gold	Fenn-Gib permit #2	Guibord, Munro	DRILL	2017
6	PR-17-11128	Canadian Malartic Corp.	Lebel project	Gauthier, Lebel	DRILL	2017
7	PR-17-11132	Explor Resources Inc.	Montrose	Midlothian, Montrose, Hutt, Halliday	DRILL	2017
8	PR-17-11139	Cruz Cobalt Corp.	Hector claim group	Coleman, Gillies Limit	DRILL, PITS, PSTRIP, PTRNCH	2017
9	PR-17-11145	International Explorers & Prospectors Inc.	Goose Egg Lake	Maisonville	DRILL	2017

No.	Permit No.	Claim Holder/Proponent	Project Name	Township	Exploration Activity	Effective
10	PR-17-11148	Cleghorn Minerals Ltd.	Meech Lake prospect	Argyle, McNeil, Robertson, Baden	DRILL, PSTRIP	2017
11	PR-17-11160	R. Peever	Wabi	Kerns, Lundy, Henwood, Auld, Hudson, Cane	DRILL	2018
12	PR-17-11168	G. Edwards	Goalie Stick	Rand, Harker, Garrison	DRILL	2017
13	PR-17-11169	St. Andrew Goldfields Ltd.	Airstrip project	Harker, Holloway	DRILL	2017
14	PR-17-11179	J. Camilleri	Melbern South	Melba, Bernhardt	DRILL	2017
15	PR-17-11193	Cobalt Industries of Canada Inc.	Silver Centre - Keeley Frontier	South Lorrain	DRILL, PSTRIP	2017
16	PR-17-11195	International Explorers & Prospectors Inc.	Stoughton/Mistaken islands	Mistaken Islands Area, Stoughton	DRILL	2017
17	PR-17-11197	G. Chitaroni	Trap Rock	Best	DRILL	2017
18	PR-17-11198	Platinex Inc.	Shining Tree	MacMurchy, Asquith, Churchill	DRILL, PITS, PSTRIP, PTRNCH	2018
19	PR-17-11204	T. Obradovich	Starburst	South Lorrain	DRILL	2018
20	PR-17-11205	Cobalt Power Group Inc.	Smith Cobalt-Chrysler Nyle area	Lorrain, Coleman	DRILL, PSTRIP	2018
21	PR-17-11215	G. Clatworthy	Mulligan project	Bayly, Mulligan	DRILL	2018
22	PR-17-11216	South American Resources Corp.	Juby drill #2	Tyrrell	DRILL	2018
23	PR-17-11235	Canadian Gold Miner Corp.	Cobalt Paragon	Tudhope, Barber	DRILL, LC, PSTRIP	2018
24	PR-17-11241	G. Chitaroni	Jessie Lake	Strathcona	DRILL, LC, PSTRIP	2018
25	PR-18-000004	New Found Gold Corp.	Waldman	Coleman, Gillies Limit	DRILL, LC, PSTRIP	2018
26	PR-18-000006	G. Stone	Dokis	Dokis, Pontiac	PSTRIP	2018
27	PR-18-000021	Mid North Engineering	Benner Harris	Harris	DRILL, LC, PSTRIP	2018
28	PR-18-000024	Detour Gold Corp.	Burntbush East	Hurtubise, Noseworthy		2018
29	PR-18-000025	Detour Gold Corp.	Burntbush East	Noseworthy	DRILL, LC, PITS, PTRNCH	2018
30	PR-18-000026	Detour Gold Corp.	Burntbush East	Noseworthy	DRILL, LC, PITS, PTRNCH	2018
31	PR-18-000027	Battery Mineral Resources Ltd.	McAra project	Dufferin, North Williams	DRILL, PITS, PSTRIP, PTRNCH	2018
32	PR-18-000028	Detour Gold Corp.	Burntbush East	Noseworthy	DRILL	2018
33	PR-18-000031	Detour Gold Corp.	Burntbush East	Hurtubise, Noseworthy		2018
34	PR-18-000033	Detour Gold Corp.	Burntbush East	Hurtubise, Noseworthy	DRILL	2018
35	PR-18-000034	Detour Gold Corp.	Burntbush East	Hurtubise, Noseworthy	DRILL	2018
36	PR-18-000035	Detour Gold Corp.	Burntbush East	Bradette, Noseworthy	DRILL	2018
37	PR-18-000036	Detour Gold Corp.	Burntbush East	Bradette, Noseworthy	DRILL	2018
38	PR-18-000037	Detour Gold Corp.	Burntbush East	Bradette	DRILL	2018
39	PR-18-000038	Detour Gold Corp.	Burntbush East	Bradette	DRILL	2018
40	PR-18-000039	Detour Gold Corp.	Burntbush East	Bradette	DRILL	2018
41	PR-18-000040	Detour Gold Corp.	Burntbush East	Bradette	DRILL	2018
42	PR-18-000041	Detour Gold Corp.	Burntbush East	Bradette	DRILL	2018

No.	Permit No.	Claim Holder/Proponent	Project Name	Township	Exploration Activity	Effective
43	PR-18-000042	Detour Gold Corp.	Burntbush East	Bradette, Noseworthy	DRILL	2018
44	PR-18-000043	Detour Gold Corp.	Burntbush East	Noseworthy	DRILL	2018
45	PR-18-000044	Detour Gold Corp.	Burntbush West	Bragg, Tweed	DRILL	2018
46	PR-18-000045	Detour Gold Corp.	Burntbush West	Bragg, Tweed	DRILL	2018
47	PR-18-000046	Detour Gold Corp.	Burntbush West	Newman, Bragg, Tweed, Blakelock	DRILL	2018
48	PR-18-000047	Detour Gold Corp.	Burntbush West	Newman, Blakelock	DRILL	2018
49	PR-18-000048	Detour Gold Corp.	Burntbush West	Newman, Blakelock	DRILL	2018
50	PR-18-000049	Detour Gold Corp.	Burntbush West	Tweed, Blakelock	DRILL	2018
51	PR-18-000050	Detour Gold Corp.	Burntbush West	Tweed	DRILL	2018
52	PR-18-000051	Detour Gold Corp.	Burntbush West	Tweed	DRILL	2018
53	PR-18-000052	Detour Gold Corp.	Burntbush West	Tweed	DRILL	2018
54	PR-18-000053	Detour Gold Corp.	Burntbush West	Tweed	DRILL	2018
55	PR-18-000058	Battery Mineral Resources Ltd.	McAra MH1	North Williams	DRILL, PITS, PSTRIP, PTRNCH	2018
56	PR-18-000059	Battery Mineral Resources Ltd.	McAra-MH2-MH3	Ray, North Williams	DRILL, PITS, PSTRIP, PTRNCH	2018
57	PR-18-000060	Battery Mineral Resources Ltd.	McAra MH4	Ray	DRILL, PITS, PSTRIP, PTRNCH	2018
58	PR-18-000064	Battery Mineral Resources Ltd.	White Reserve project	Van Nostrand, Whitson	PITS, PSTRIP, PTRNCH	2018
59	PR-18-000080	iMetal Resources Inc.	Gowganda West	Leonard	DRILL, PITS, PSTRIP, PTRNCH	2018
60	PR-18-000082	Metalstech Bay Lake Cobalt Inc.	Bay Lake project	Coleman	DRILL, LC	2018
61	PR-18-000100	Sunvest Minerals Corp.	Elk Lake - Roy	Farr	DRILL, PITS, PSTRIP, PTRNCH	2018
62	PR-18-000101	T. O'Connor	Gowganda West	Leonard		2018
63	PR-18-000108	Battery Minerals	Gowganda project - Capitol	Nicol, Haultain	DRILL, PITS, PSTRIP, PTRNCH	2018
64	PR-18-000110	Metalstech Bay Lake Cobalt Inc.	Last Chance/Vanchester drill	Coleman	DRILL	2018
65	PR-18-000111	iCobalt Rusty Lake Cobalt Inc.	Rusty Lake drill	Charters, Leith	DRILL	2018
66	PR-18-000117	Newfound Gold Corp.	Triangle	Auld, Cane	DRILL, PSTRIP	2018
67	PR-18-000118	Battery Mineral Resources	Gowganda project -Leases	Nicol, Haultain	DRILL, PITS, PSTRIP, PTRNCH	2018
68	PR-18-000119	St Andrew Goldfields Ltd.	Winter Road	Garrison	DRILL	2018
69	PR-18-000121	T. O'Connor	Gowganda West	Leonard	DRILL, PITS, PSTRIP, PTRNCH	2018
70	PR-18-000124	Battery Mineral Resources Ltd.	Wilder project -Thompson	Donovan	DRILL, PITS, PSTRIP, PTRNCH	2018
71	PR-18-000125	J. Brady	Wilder-Brady	Donovan	DRILL, PITS, PSTRIP, PTRNCH	2018
72	PR-18-000126	T. O'Connor	Gowganda West	Leonard, Tyrrell	DRILL, LC, PITS, PSTRIP, PTRNCH	2018
73	PR-18-000130	Ashley Gold Mines	Elk Lake project - Mapes	Mickle	DRILL, PITS, PSTRIP, PTRNCH	2018
74	PR-18-000132	Battery Mineral Resources Ltd.	Elk Lake project - Mapes	Mickle	DRILL, PITS, PSTRIP, PTRNCH	2018
75	PR-18-000146	Cobalt Industries of Canada Inc.	North Cobalt	Bucke	DRILL	2018
76	PR-18-000148	Cobalt Industries of Canada Inc.	South Cobalt	South Lorrain	DRILL	2018
77	PR-18-000165	Canadian Cobalt Projects Inc.	Silver Eagle	South Lorrain	DRILL, PSTRIP	2018
78	PR-18-000166	Cobalt Industries of Canada Inc.	Central Cobalt project	Lorrain, Coleman, Gillies Limit	DRILL	2018

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79	PR-18-000168	D. Vallillee, P. Dellelce	Dellelce	Katrine, Arnold	DRILL, PSTRIP	2018
80	PR-18-000170	Boston Creek Mines Limited	Boston Creek	Pacaud	DRILL, PSTRIP	2018
81	PR-18-000171	New Found Gold Corp.	Boston Creek NFGC	Pacaud, Boston	DRILL, PSTRIP	2018
82	PR-18-000173	iMetal Resources Inc.	Gowganda West	Milner, Leonard, Leith, Tyrrell	DRILL, LC, PITS, PSTRIP, PTRNCH	2018
83	PR-18-000181	Cobalt Industries of Canada Inc.	Silver Leaf project	Coleman	DRILL	2018
84	PR-18-000182	Cobalt Industries of Canada Inc.	Schumann project	Lorrain, Coleman, Gillies Limit	DRILL, LC	2018
85	PR-18-000183	Cobalt Industries of Canada Inc.	Glen project	Coleman, Gillies Limit	DRILL	2018
86	PR-18-000201	G. Shalton, Y. Veronneau	Rawhide	Haultain	DRILL	2018
87	PR-18-000204	St Andrew Goldfields Ltd.	Canamax	Holloway	DRILL	2019
88	PR-18-000205	Battery Mineral Resources Ltd.	Shining Tree project - Saville	Leonard	DRILL, PITS, PSTRIP, PTRNCH	2019
89	PR-18-000206	Battery Mineral Resources Ltd.	Shining Tree project - Powerline	Leonard	DRILL, PITS, PSTRIP, PTRNCH	2019
90	PR-18-000207	Battery Mineral Resources Ltd.	Shining Tree project - Burda	Fingal, Leonard	DRILL, PITS, PSTRIP, PTRNCH	2019
91	PR-18-000208	Battery Mineral Resources Ltd.	Shining Tree project - Bobtail	Leonard	DRILL, PITS, PSTRIP, PTRNCH	2019
92	PR-18-000209	Battery Mineral Resources Ltd.	Gowganda project -Knight	Knight	DRILL, PITS, PSTRIP, PTRNCH	2019
93	PR-18-000210	Ashley Gold Mines Ltd.	White Reserve project - White Reserve	Van Nostrand, Whitson	DRILL, PITS, PSTRIP, PTRNCH	2019
94	PR-18-000211	R. Annett	MacDonalds project	MacMurchy	DRILL	2019
95	PR-18-000213	Battery Mineral Resources Ltd.	Wilder project - Bridge	Charters	DRILL, PITS, PSTRIP, PTRNCH	2018
96	PR-18-000214	Battery Mineral Resources Ltd.	White Lake project -Skog	Browning	DRILL, PITS, PSTRIP, PTRNCH	2019
97	PR-18-000228	Canadian Malartic Corp.	Amalgamated Kirkland	Teck	DRILL	2019
98	PR-18-000247	B. Bishop	Bishop property Paradis pond	Lorrain	DRILL	2019
99	PR-18-000249	Transpacific Resources Inc.	Clay project	McGarry, McVittie	DRILL, PSTRIP	2019
100	PR-18-000250	Ashley Gold Mines Ltd.	Wilder project - Kell	Corkill, Charters	DRILL, PITS, PSTRIP, PTRNCH	2019
101	PR-18-000251	Goldstake Explorations Inc., Transpacific Resources Inc.	Rose project	McGarry, McVittie	DRILL, LC, PSTRIP	2019
102	PR-18-000252	Champagne Resources Ltd.	Goodfish Kirana project	Teck, Morrisette, Bernhardt, Lebel	DRILL	2019
103	PR-18-000256	Battery Mineral Resources Ltd.	McAra project - Kite Lake	North Williams	DRILL, PITS, PSTRIP, PTRNCH	2019
104	PR-18-000261	Battery Mineral Resources Ltd.	McAra - MH11-MH12-MH13 project	Dufferin	DRILL, PITS, PSTRIP, PTRNCH	2019
105	PR-18-000262	Battery Mineral Resources Ltd.	McAra project - MH10 project	Dufferin, Leckie	DRILL, PITS, PSTRIP, PTRNCH	2019
106	PR-18-000263	Battery Mineral Resources Ltd.	McAra project - South project	Dufferin	DRILL, PITS, PSTRIP, PTRNCH	2019
107	PR-18-000264	Battery Mineral Resources Ltd.	McAra project - SK4 project	Dufferin, North Williams	DRILL, PITS, PSTRIP, PTRNCH	2019
108	PR-18-000270	Orefinders Resources Inc.	Porphyry Lake project	Tyrrell	DRILL, PITS, PSTRIP, PTRNCH	2019
109	PR-18-000271	Orefinders Resources Inc.	Duggan project	Knight, Tyrrell	DRILL, PITS, PSTRIP, PTRNCH	2019
110	PR-18-000273	PowerOre Inc.	Mann Mine project	Milner	DRILL, PITS, PSTRIP, PTRNCH	2019

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111	PR-18-000274	Orefinders Resources Inc.	Mirado project	Catharine, McElroy	DRILL, PITS, PSTRIP, PTRNCH	2019
112	PR-18-000279	St Andrew Goldfields Ltd.	Canamax project	Holloway	DRILL	2019
113	PR-18-000280	St Andrew Goldfields Ltd	Tousignant South Extension project	Harker, Holloway	DRILL	2019
114	PR-18-000284	St Andrew Goldfields Ltd.	Campbell zone PR-17-11096 project	Garrison	DRILL	2019
115	PR-18-000287	Brandy Brook Mines Ltd.	Tannahill project	Tannahill, Holloway	DRILL, LC, PSTRIP	2018
116	PR-18-000296	St Andrew Goldfields Ltd.	Taylor project	Taylor	DRILL	2019
117	PR-18-11247	Skead Holdings Ltd.	Lincoln-Nipissing Webster	Skead, Hearst	DRILL	2018
118	PR-18-11249	Skead Holdings Ltd.	Lincoln-Nipissing Cook	Skead, Hearst, Catharine, McElroy	DRILL	2018
119	PR-18-11250	Skead Holdings Ltd.	Lincoln-Nipissing Zenith	Catharine, McElroy	DRILL, PSTRIP	2018
120	PR-18-11251	Skead Holdings Ltd.	Lincoln Nipissing Manley	Skead, Hearst	DRILL	2018
121	PR-18-11258	E. Marion	South Break	Eby, Otto	DRILL	2018
122	PR-18-11262	Golden Valley Mines Ltd.	Island 27 prospect	Burt, Gross, Holmes, Flavelle	DRILL	2018
123	PR-18-11263	E. Marion	O'Connell	Teck, Lebel	DRILL, LC, PSTRIP	2018
124	PR-18-11270	Prosper Gold Corp.	Egan project	Egan, Sheraton	DRILL, PITS, PSTRIP, PTRNCH	2018
125	PR-18-11283	Cobalt Industries of Canada Inc.	Greater Cobalt	South Lorrain, Lorrain, Coleman, Gillies Limit	DRILL, LC, PSTRIP	2018
126	PR-18-11287	Power Americas Minerals Corp.	Kittson-Cobalt B	Brigstocke, Kittson, Coleman	DRILL, LC, PSTRIP	2018
127	PR-18-11311	Meteoric Resources Sub Inc.	Burt	Burt, Eby	DRILL, LC	2018
128	PR-18-11312	E. Korba	Currie project	Currie	DRILL	2018
129	PR-19-000026	Golden Harp Resources Inc.	Main Block - Foley Lake area	MacMurchy, Fawcett	DRILL	2019
130	PR-19-000031	T. Young	Block A project	MacMurchy	DRILL	2019
131	PR-19-000042	2681891 Ontario Inc.	St. Laurent	St. Laurent	DRILL, LC	2019
132	PR-19-000063	Canadian Gold Miner Corp.	West Matachewan project	Midlothian, Doon	DRILL, PSTRIP	2019
133	PR-19-000064	Canadian Gold Miner Corp.	Midlothian project	Midlothian	DRILL, PSTRIP	2019
134	PR-19-000065	Skead Holdings Ltd.	Four Corners - Lincoln-Nipissing project	Skead, Hearst, Catharine, McElroy	DRILL, PSTRIP	2019
135	PR-19-000066	Skead Holdings Ltd.	Mondoux Lincoln-Nipissing project	McElroy	DRILL, PSTRIP	2019
136	PR-19-000070	B. Bishop	Bishop property Nicol Lake area project	Lorrain	DRILL	2019
137	PR-19-000071	B. Bishop	Bishop property Peanut Lake Area project	Lorrain	DRILL	2019
138	PR-19-000076	B. Bishop	Bishop property Criostal Lake area project	Lorrain	DRILL	2019
139	PR-19-000077	B. Bishop	Bishop property Longfellow Lake area	Lorrain	DRILL	2019
140	PR-19-000078	B. Bishop	Bishop property Chopin Lake area project	Gillies Limit	DRILL	2019
141	PR-19-000079	B. Bishop	Bishop property Flying Fox, Puni, Mozart lakes area project	Gillies Limit	DRILL	2019

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142	PR-19-000080	B. Bishop	Bishop property Ice Chisel, Darwin lakes area project	Gillies Limit	DRILL	2019
143	PR-19-000086	Gatling Exploration Inc.	Larder project	McVittie	DRILL, PITS, PTRNCH	2019
144	PR-19-000094	Kraken Gold Corp.	Currie East Zone project	Currie	DRILL, LC, PSTRIP	2019
145	PR-19-000097	Northstar Gold Corp.	Miller Gold project	Pacaud, Catharine, Boston, McElroy	DRILL	2019
146	PR-19-000098	Northstar Gold Corp.	Miller Gold project	Pacaud, Catharine	PSTRIP	2019
147	PR-19-000099	Alexandria Minerals Corp.	Matachewan project	Cairo, Kimberley, Flavelle	DRILL, PITS, PSTRIP, PTRNCH	2019
148	PR-19-000115	Precambrian Equipment Ltd.	Cryderman project	MacMurchy	DRILL, PSTRIP	2019
149	PR-19-000120	J. Brassard	Temiskaming project - Smyth-Truax Twp claim block project	Smyth, Truax	DRILL	2019
150	PR-19-000122	J. Brassard	De Beers Temiskaming project - Klock Twp claim project	Klock	DRILL	2019
151	PR-19-000126	J. Brassard	De Beers Temiskaming project - Charters-Nicol Twp project	Charters, Nicol	DRILL	2019
152	PR-19-000127	J. Brassard	De Beers Temiskaming project - Willison Twp	Kimberley, Willison	DRILL	2019
153	PR-19-000130	J. Brassard	De Beers Temiskaming project - McFadden Twp	McFadden	DRILL	2019
154	PR-19-000135	Atacama Resources International Inc.	Atacama-3 project	Otto	DRILL	2019
155	PR-19-000144	A. Allsopp	Atacama-1 property project	Eby, Otto	DRILL	2019
156	PR-19-000156	Aurelius Minerals Inc.	Mikwam project	Noseworthy	DRILL	2019
157	PR-19-000158	Mistango River Resources Inc.	Omega project	McVittie	DRILL	2019
158	PR-19-000160	J. Rapski	Lucky Irish	Gross, Flavelle	DRILL, LC, PSTRIP	2019
159	PR-19-000161	Tri Origin Exploration Ltd.	Nipissing Cobalt project	Klock, Kittson, Coleman, Barr, Firstbrook	DRILL	2019
160	PR-19-000162	Tri Origin Exploration Ltd.	Nipissing Cobalt project	Kittson, Coleman, Firstbrook	DRILL	2019
161	PR-19-000171	Moneta Porcupine Mines Inc., St Andrew Goldfields Ltd.	Golden Highway project	Michaud, Garrison, Barnet	DRILL	2019
162	PR-19-000179	5007223 Ontario Inc.	Grenfell project	Grenfell, Maisonville	DRILL, LC	2019
163	PR-19-000180	F. Sharpley, L. Currah	Browning project	Browning, Amyot	DRILL, LC	2019
164	PR-19-000182	L. Gervais	Potter Doal project	Warden, Munro	DRILL	2019
165	PR-19-000183	T. Link	Link-Catharine RLDZ property project	Catharine	DRILL, LC, PSTRIP	2019
166	PR-19-000194	Gatling Exploration Inc.	Larder project	McVittie	PSTRIP	2019
167	PR-19-000210	Meteoric Resources Sub Inc.	DBC Temiskaming project-Pense Twp claims	Pense	DRILL	2019
168	PR-19-000211	The Claim Group Inc.	Temiskaming project - Barr Lundy twp	Lundy, Barr	DRILL	2019
169	PR-19-000224	Tri Origin Exploration Ltd.	South Abitibi project	Brigstocke, Best, Kittson, Coleman, Gillies Limit	DRILL	2019
170	PR-19-000225	Tri Origin Exploration Ltd.	South Abitibi project	Cassels, Gillies Limit, Best	DRILL	2019
171	PR-19-000242	S. Deveau	De Beers Temiskaming project - Law Strathcona twp	Strathcona, Law	DRILL	2019

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172	PR-19-000252	Canada Cobalt Works Inc.	Castle East project	Nicol, Haultain	DRILL	2019
173	PR-19-000255	Abitibi North Metals Inc.	Sulphur Island project	Chesney Bay Area, Sulphur Island Area, Northeast Bay Area	DRILL, LC	2019
174	PR-19-000256	Progenitor Metals Corp.	De Beers Temiskaming project - Chambers - Strathy Twp	Chambers, Strathy	DRILL	2019
175	PR-19-000262	Grid Metals Corp.	Bannockburn Nickel project	Montrose, Bannockburn	DRILL	2019
176	PR-19-000272	Transition Metals Corp.	Gowganda project - Transition	Nicol, Haultain	DRILL, PSTRIP	2019
177	PR-19-000273	Transition Metals Corp.	Gowganda project - Cobalt Nugget	Nicol, Haultain	DRILL, PSTRIP	2019
178	PR-19-000274	Transition Metals Corp.	Gowganda project - Big Four	Nicol	DRILL, PSTRIP	2019
179	PR-19-000275	Battery Mineral Resources Ltd.	McAra project - SK2	North Williams	DRILL, PSTRIP	2019
180	PR-19-000280	Abitibi North Metals Inc.	Browning Extension project	Browning, Amyot	DRILL, LC	2019
181	PR-19-000290	Battery Mineral Resources Ltd.	McAra project - Kite Lake Ext	North Williams	DRILL, PSTRIP	2020
182	PR-19-000292	A. Kon	Kon Kimberlite property permit area project	Gillies Limit	DRILL	2020
183	PR-19-000327	Alexandria Minerals Corp.	Wydee - RQ8 project	Argyle, Montrose, Bannockburn, Powell, Hincks	DRILL	2020
184	PR-19-000339	Cobalt Power Group Inc.	T2 Power Group projects permit area	Lorrain	DRILL	2020
185	PR-19-000340	Agnico Eagle Mines Ltd.	Anoki -McBean project	Gauthier	DRILL	2020
186	PR-19-000341	Agnico Eagle Mines Ltd.	Munro property project	Gauthier, Lebel	DRILL, LC	2020
187	PR-20-000003	Agnico Eagle Mines Ltd.	Teck A&B project	Teck, Otto, Boston, Lebel	DRILL	2020
188	PR-20-000004	Agnico Eagle Mines Ltd.	Goldbanks project	Teck	DRILL, LC	2020
189	PR-20-000005	R. Salo	Salo Bompas Twp property project	Bompas	DRILL, PITS, PSTRIP, PTRNCH	2020
190	PR-20-000006	B. Beyer	Beyer McNeil Twp property project	McNeil, Fasken	DRILL, PITS, PSTRIP, PTRNCH	2020
191	PR-20-000007	R. Salo	Salo Terry-Dunmore Twp property project	Dunmore, Terry	DRILL, PSTRIP	2020
192	PR-20-000008	Agnico Eagle Mines Ltd.	Rand-Ross Project	Teck, Lebel	DRILL, LC	2020
193	PR-20-000009	B. Beyer	Beyer Egan-McEvay property project	McEvay, Egan	DRILL, PITS, PSTRIP, PTRNCH	2020
194	PR-20-000012	Agnico Eagle Mines Ltd.	Kirkland North 1 project	Teck	DRILL, LC	2020
195	PR-20-000013	Agnico Eagle Mines Ltd.	Kirkland North 2 project	Teck	DRILL, LC	2020
196	PR-20-000014	Agnico Eagle Mines Ltd.	Kirkland North 3 project	Teck, Lebel	DRILL, LC	2020
197	PR-20-000015	E. Korba, Recoskie Contracting Ltd.	Rickard property	Rickard	DRILL	2020
198	PR-20-000018	Cobalt Industries Canada Inc.	Lorrain Twp drill project	Lorrain	DRILL	2020
199	PR-20-000019	Cobalt Industries Canada Inc.	Lorrain Twp drill West project	Lorrain	DRILL	2020
200	PR-20-000024	Ashley Gold Mines Ltd.	Elk Lake project - Cotley	Mickle	DRILL	2020
201	PR-20-000025	Battery Mineral Resources Ltd.	Elk Lake project - Cotley	Mickle	DRILL	2020
202	PR-20-000039	Globex Mining Enterprises Inc.	Laguerre-Knutson property project	McVittie, Hearst	DRILL	2020
203	PR-20-000065	A. Taylor	Abitibi Kidd project	Ossian	DRILL, LC, PITS, PSTRIP, PTRNCH	2020

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204	PR-20-000066	7247915 Canada Inc.	Black Gold Mine project	Teck	DRILL	2020
205	PR-20-000067	Hart Gold Corp., Pelangio Exploration Inc.	Stoughton-Abitibi project	Frecheville, Marriott, Mistaken Islands Area, Stoughton	DRILL, LC	2020
206	PR-20-000073	Orefinders Resources Inc.	Knight project	Tyrrell	DRILL, LC	2020
207	PR-20-000074	A. Taylor	Ospwakan One project	Arnold	DRILL	2020
208	PR-20-000077	D. Vallillee	Cantbee-1 project	Thackeray, Elliott	DRILL	2020
209	PR-20-000080	D. Vallillee	Cantbee-2 project	Arnold	DRILL	2020
210	PR-20-000081	Agnico Eagle Mines Ltd.	Skead-MacGregror B project	Gauthier, McElroy	DRILL	2020
211	PR-20-000082	M. Marion	Las Pipas project	Thackeray, Elliott	DRILL	2020
212	PR-20-000083	Agnico Eagle Mines Ltd.	Skead-MacGregor C project	Gauthier, McVittie, Hearst, McElroy	DRILL	2020
213	PR-20-000088	Agnico Eagle Mines Ltd.	Lebel-Stock Munro	Gauthier, Lebel	DRILL	2020
214	PR-20-000100	Battery Mineral Resources Ltd.	Elk Lake project - Silverstrike	James	DRILL, PSTRIP	2020
215	PR-20-000101	Transition Metals Corp.	Gowganda project – Big Four East project	Nicol	DRILL, PSTRIP	2020
216	PR-20-000104	Battery Mineral Resources Ltd.	Gowganda project - Beadman project	Milner	DRILL, PSTRIP	2020
217	PR-20-000105	Battery Mineral Resources Ltd.	McAra project - Isaac project	Leonard, North Williams	DRILL, PSTRIP	2020
218	PR-20-000106	Battery Mineral Resources Ltd.	Elk Lake project - Big 6 project	James	DRILL, PSTRIP	2020
219	PR-20-000107	Battery Mineral Resources Ltd.	Gowganda project - Leroy project	Nicol, Haultain	DRILL, PSTRIP	2020
220	PR-20-000114	C. Peever, S. Moretti	Moretti-Peever Egan project	McEvay, Egan	DRILL, LC, PSTRIP, PTRNCH	2020
221	PR-20-000117	Tiger Gold Exploration Corp.	Harker Heritage - Ghost project	Elliott	PSTRIP	2020
222	PR-20-000118	Tiger Gold Exploration Corp.	Harker Heritage project - Gravel Pit project	Elliott	PSTRIP	2020
223	PR-20-000119	Tiger Gold Exploration Corp.	Harker Heritage project - Magusi East project	Holloway	PSTRIP	2020
224	PR-20-000120	Tiger Gold Exploration Corp.	Harker Heritage project - Magusi West project	Harker, Holloway	PSTRIP	2020
225	PR-20-000121	The Alberta Gold Exploration Corp.	Harker Heritage project - Iris project	Harker, Elliott	PSTRIP	2020
226	PR-20-000122	Battery Mineral Resources Ltd.	Shining Tree project - Central project	Leonard	DRILL, PSTRIP	2020
227	PR-20-000123	The Alberta Gold Exploration Corp.	Harker Heritage project - Iris	Harker	PSTRIP	2020
228	PR-20-000129	New Found Gold Corp.	Lucky Strike - Walsh/FP area project	Ossian, Katrine	DRILL, LC, PITS, PSTRIP, PTRNCH	2020
229	PR-20-000132	New Found Gold Corp.	Lucky Strike - Kerr North project	Ossian, Katrine	DRILL, LC, PITS, PSTRIP, PTRNCH	2020
230	PR-20-000144	Sparton Resources Inc.	Oakes project	Powell	DRILL, PITS, PTRNCH	2020
231	PR-20-000170	Battery Mineral Resources Ltd.	Wilder project - Rusty NW	Leith	DRILL, PSTRIP	2020
232	PR-20-000171	Tiger Gold Exploration Corp.	Harker Heritage project - Ghost	Harker, Elliott	LC	2020
233	PR-20-000173	Battery Mineral Resources Ltd.	Wilder project - Rusty NE	Charters	DRILL, PSTRIP	2020
234	PR-20-000174	Battery Mineral Resources Ltd.	Wilder project - Hains	Donovan	DRILL, PSTRIP	2020
235	PR-20-000177	Battery Mineral Resources Ltd.	Wilder project - Bridge South	Charters, Donovan	DRILL, PSTRIP	2020

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236	PR-20-000179	Battery Mineral Resources Ltd.	White Reserve project - Speight	Speight	DRILL, PSTRIP	2020
237	PR-20-000180	Battery Mineral Resources Ltd.	White Reserve project	Whitson	DRILL	2020
238	PR-20-000181	Battery Mineral Resources Ltd.	McAra project - MH9	Leckie	DRILL, PSTRIP	2020
239	PR-20-000182	Battery Mineral Resources Ltd.	McAra project - MH10ext	Dufferin, Leckie	DRILL, PSTRIP	2020
240	PR-20-000183	Battery Mineral Resources Ltd.	McAra project - Southwest	Dufferin	DRILL, PSTRIP	2020
241	PR-20-000184	Battery Mineral Resources Ltd.	McAra project - Far West	Dufferin, North Williams, Browning, Ogilvie	DRILL, PSTRIP	2020
242	PR-20-000185	Battery Mineral Resources Ltd.	McAra project - West	Dufferin	DRILL, PSTRIP	2020
243	PR-20-000186	Battery Mineral Resources Ltd.	McAra project - Tracy Lake	North Williams	DRILL, PSTRIP	2020
244	PR-20-000212	Tri Origin Exploration Ltd.	North Abitibi project	Hoblitzell, Noseworthy	DRILL	2020
245	PR-20-000228	7247915 Canada Inc.	BGM	Teck, Lebel	DRILL	2020
246	PR-20-000229	E. Marion	Mount Abernak	Dokis	DRILL	2020
247	PR-20-000230	J. Tinney	XQZ project	Dokis	DRILL	2020
248	PR-20-000231	E. Marion	The “1”	Eby	DRILL	2020
249	PR-20-000234	L. Despres	John Doh	Eby	DRILL, LC	2020
250	PR-20-000239	East Copperfield Metals Inc.	Niemetz-Snowshoe project	Briggs	DRILL, LC, PSTRIP	2020
251	PR-20-000251	J. Camilleri	Camilleri Goodwin Lake property permit area	Lorrain	DRILL, LC	2020
252	PR-20-000252	R. Dillman, J. Renaud	Kenzie	Boston	DRILL, LC, PSTRIP	2020
253	PR-20-000259	Agnico Eagle Mines Ltd.	Bidgood Part 2	Lebel	DRILL, LC	2020
254	PR-20-000260	Agnico Eagle Mines Ltd.	Bidgood Part 3 project	Gauthier, Lebel	DRILL, LC	2020
255	PR-20-000261	Agnico Eagle Mines Ltd.	Bidgood Part 1	Lebel	DRILL, LC	2020
256	PR-20-000262	Agnico Eagle Mines Ltd.	Bidgood Part 4	Gauthier, Lebel	DRILL, LC	2020
257	PR-20-000264	Epica Gold Inc.	Munro-Croesus project	Munro	DRILL, LC, PSTRIP	2020
258	PR-20-000265	Epica Gold Inc.	Munro-Croesus	Munro	DRILL, LC, PSTRIP	2020
259	PR-20-000266	Agnico Eagle Mines Ltd.	Amalgamated Kirkland	Teck	DRILL	2020
260	PR-20-000273	LaSalle Exploration Corp.	Blakelock	Hoblitzell, Blakelock	DRILL	2020
261	PR-20-000275	Battery Mineral Resources Ltd.	Elk Lake project - Cotley	Mickle	PITS, PSTRIP, PTRNCH	2020
262	PR-20-000277	New Found Gold Corp.	Lucky Strike East	Ossian	DRILL, LC, PSTRIP	2020
263	PR-20-000292	B. Bishop	Bishop Gleeson Lake N property, permit area project	Lorrain	DRILL, PITS, PSTRIP, PTRNCH	2020
264	PR-20-000293	RJK Explorations Ltd.	RJK Gleeson Lake NE property, permit area project	Lorrain	DRILL, LC, PITS, PSTRIP, PTRNCH	2020
265	PR-20-000297	B. Bishop	Bishop Paradis Pond property, new permit area project	Lorrain	DRILL, LC, PITS, PSTRIP, PTRNCH	2020
266	PR-20-000299	Plato Gold Corp.	Marriott project	Marriott	DRILL, PSTRIP	2020
267	PR-20-000300	M. Leahy	Kenogami Lake project	Eby, Grenfell	DRILL	2020
268	PR-20-000317	Mistango River Resources Inc.	West Kirkland project	Teck, Grenfell	DRILL	2020
269	PR-20-000330	Battery Mineral Resources Ltd.	Gowganda project - Silver Leaf	Lawson	DRILL, PSTRIP	2020

Table 7. Assessment files received in the Kirkland Lake Resident Geologist District in 2020.

Abbreviations

ACOMP ..... Compilation and interpretation - airborne geophysics
AMAG ..... Airborne magnetometer survey
ARAD ..... Airborne radiometric survey
ASSAY ..... Assays
AVLF ..... Airborne electromagnetic very low frequency survey
BEEP ..... Beep mat
BENEF ..... Beneficiation studies
CHNL ..... Channel sampling
DHRSMP ..... Drill core resampling
EM ..... Electromagnetic survey
EMPB ..... Electron microprobe study
GCHEM ..... Geochemical
GCOMP ..... Compilation and interpretation - ground geophysics
GEOL ..... Geological survey/mapping
GLCOMP ..... Compilation and interpretation - geology
GR ..... Resistivity survey
IP ..... Induced polarization survey
LC ..... Line cutting
LIDAR ..... LiDAR
MAG ..... Magnetic/magnetometer survey
MAGSUS ..... Magnetic susceptibility
MCOMP ..... Miscellaneous compilation and interpretation
MICRO ..... Microscopic studies
OPET ..... Other petrographic work
PDRILL ..... Diamond drilling
PHOTO ..... Air photo and remote imagery interpretations
PITS ..... Digging pits
PMAN ..... Manual labour
PMECH ..... Mechanical labour
PROSP ..... Prospecting
PSTRIP ..... Overburden stripping
PTRNCH ..... Bedrock trenching
RECON ..... Regional or reconnaissance ground exploration
ROCK ..... Rock sampling
SEDMT ..... Lake or stream sediment sampling
SOIL ..... Soil or till sampling
VLF ..... Very low frequency electromagnetic survey

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File ID
20000017883	Dokis	J. Tinney	cell 32D05H006, 07	2019	ASSAY, PROSP	$3,106	45906
20000017941	Currie	Kraken Gold Corp.	Bond-Currie property	2019	GEOL, PHOTO, PSTRIP	$21,114	2276, 45719
20000017933	Grenfell	Golden Valley Mines Ltd.	Cook Lake prospect	2019	RECON, ROCK	$5,500	45395
20000017929	Strathy	E.L. Jordan	Alfreda Creek property, Errol Jordan property	2019	MAG	$1,640	45309
20000017921	Dufferin, North Williams	Battery Mineral Resources Ltd.	McAra project	2017–2018	ASSAY, PDRILL, ROCK	$1,251,220	44960
20000017886	Tannahill, Holloway	Dr. J. Renaud, J.M. Chard, R.J. Dillman	Field of Dreams property	2019	MAG, VLF	$10,401	47102
20000017899	Gillies Limit, Best	Tri Origin Exploration Ltd.	South Abitibi property	2017–2019	IP, LC	$110,199	36137
20000017897	Tyrrell	T. Young	Porphyry Lake property	2019	ASSAY, SOIL	$3,970	49577
20000017895	Dokis	J. Tinney	cell 32D05H002, 22	2019	ASSAY, PROSP	$4,855	49336
20000017888	Holloway	R.J. Dillman	Field of Dreams (FOD)	2019	MAGSUS, VLF	$4,170	47250
20000017920	Pense	J. Gaudreau	Pense property	2017–2018	ASSAY, PROSP, ROCK	$3,486	44857
20000018052	Bucke	Cobalt Industries of Canada Inc.	Peddie property	2019	OPET, ROCK	$3,600	49044
20000018006	Otto, Teck	Cambrian Mining Corp.	Atacama 3 property	2019	MAG, VLF	$35,725	2578, 47854
20000018007	Catharine	J. der Weduwen	Teck tailings project	2019	ASSAY	$2,300	47895
20000018009	North Williams, Browning, Dufferin, Leckie, Leith, Leonard, Ogilvie, Ray	Battery Mineral Resources Ltd.	McAra property	2018	ASSAY, LIDAR, RECON, ROCK	$144,418	47914, 47916, 47918, 47920, 47922, 47923, 47925, 47927, 47930
20000018011	North Williams	Battery Mineral Resources Ltd.	McAra project	2019	ACOMP, GCOMP	$4,983	47947
20000018013	St. Laurent	Pancontinental Resources Corp.	St Laurent property	2019	ASSAY, GEOL, ROCK, SOIL	$19,793	47967
20000018019	South Lorrain	Cobalt Power Group Inc.	MacMahon showing	2018	ASSAY, PROSP, ROCK	$11,203	48281
20000018020	Gauthier, McVittie	Agnico Eagle Mines Ltd.	Upper Beaver property	2018–2019	ASSAY, PDRILL	$6,112,704	48360

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File ID
20000018023	Pense	D. Fudge, G. Chitaroni, M. Gaudreau	Pense property	2019	ASSAY, PROSP, ROCK	$2,499	48508
20000018024	Gauthier	Agnico Eagle Mines Ltd.	Upper Canada project	2018–2019	ASSAY, PDRILL, ROCK	$2,847,597	48531
20000018026	North Williams	Battery Mineral Resources Ltd.	McAra project	2019	ASSAY, PDRILL, ROCK	$195,316	48580
20000018029	Gillies Limit, Coleman	New Found Gold Corp.	The Waldman Claims	2019	BEEP, MAG	$2,467	48691
20000018030	Clifford, Ben Nevis	Winterbourne Explorations Ltd.	Clifford property	2018–2019	IP, MCOMP	$12,692	48728
20000018031	St. Laurent	Pancontinental Resources Corp.	St Laurent property	2019	ASSAY, PDRILL, ROCK	$380,653	48738, 48739, 48740
20000018035	Chown, Corkill, Haultain, Knight, Lawson, Nicol, Raymond, Van Hise	Battery Mineral Resources Ltd.	Gowganda Property	2018	ASSAY, LIDAR, PROSP, ROCK	$107,998	48857, 48858, 48859, 48860, 48862, 48863, 48864, 48868
0000018036	Tyrrell	T. Young	Porphyry Lake property	2019	ASSAY, SOIL	$3,970	49577
20000018037	Leonard, Tyrrell	Battery Mineral Resources Ltd.	Shining Tree property	2019	ASSAY, PROSP, ROCK	$43,164	49585
20000018039	Powell	Skead Holdings Ltd.	Powell property	2019	PROSP, ROCK	$7,100	49814
20000018042	South Lorrain	Canadian Silver Hunter Inc., Cobalt Industries of Canada Inc.	Bellellen property, Greater Cobalt project	2018	ASSAY, PDRILL	$216,856	33330, 33474, 33574
20000018043	Barber, Banks, Speight, Willet	Battery Mineral Resources Ltd.	White Reserve property	2018	AMAG, ARAD	$10,323	45259, 45260, 45261, 45262
20000018046	Donovan, Brewster, Charters, Corkill, Leith, Ray	Battery Mineral Resources Ltd.	Wilder property	2018	ASSAY, LC, LIDAR, PROSP, ROCK	$43,163	47357, 47360, 47362, 47363, 47366, 47367, 47368, 47369
20000018049	Teck	J. der Weduwen, L. Gervais, S. Polson	Teck tailings project	2019	ASSAY, BENEF	$985	48870
20000018050	Holloway, Harker	Tiger Gold Exploration Corp.	Harker Heritage property - Magusi area	2019	RECON, ROCK	$11,450	49015, 49019
20000018002	Donovan, Brewster, Charters, Corkill, Leith, Milner, Ray, Trethewey	Battery Mineral Resources Ltd.	Wilder property	2018–2020	ASSAY, LIDAR, RECON, ROCK	$12,381	47356, 47359
20000018001	Donovan, Brewster, Charters, Corkill, Leith, Milner, Ray, Trethewey	Battery Mineral Resources Ltd.	Wilder property	2018	ASSAY, LIDAR, RECON, ROCK	$8,373	47355, 47358
20000017999	Currie	9640355 Canada Corp.	Currie property	2018–2019	PROSP, ROCK	$14,440	47388
20000017987	Leonard, Tyrrell	Battery Mineral Resources Ltd.	Shining Tree project	2018	ASSAY, LIDAR, RECON, ROCK	$117,585	46807, 46808, 46809
20000017979	Leonard	Battery Mineral Resources Ltd.	Shining Tree project	2019	ACOMP, IP	$12,347	46673

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File ID
20000017971	Harker	St Andrew Goldfields Ltd.	Runway, Runway Property	2017	ASSAY, PDRILL, ROCK	$163,555	2365, 46324
20000017970	Coleman, Gillies Limit	Cobalt Industries of Canada Inc.	Hamilton property	2017–2018	ASSAY, GEOL, MCOMP, RECON, ROCK	$26,941	2364, 46276
20000017964	Elliott, Harker	Tiger Gold Exploration Corp.	Iris property	2019	IP, MAG	$39,984	46140, 46150, 46154
20000017962	Coleman	T. Fielding	Green Lake property	2018	PROSP	$3,426	2348, 46102
20000017949	Brigstocke	Searchlight Resources Inc.	Cameron Cobalt project	2018	ASSAY, PROSP, ROCK	$8,497	2308, 45902
20000017944	Burrows	Canadian Gold Miner Corp., Iamgold Corp.	Jumping Moose project	2018	ASSAY, PDRILL, ROCK	$147,570	2284, 45800
20000018005	Haultain, Nicol	Battery Mineral Resources Ltd.	Gowganda project	2019	ASSAY, PDRILL, ROCK	$215,576	47712
20000018137	Argyle, McNeil	Cleghorn Minerals Ltd.	Meech Lake prospect	2017–2018	ASSAY, PDRILL, PSTRIP, ROCK	$417,817	48351
20000018145	Leonard, Tyrrell	iMetal Resources Inc.	Gowganda West project	2019	IP	$191,505	49946, 49973, 49993
20000018149	Harker, Elliott	Tiger Gold Exploration Corp.	Harker Heritage property - Iris area	2019	RECON, ROCK	$27,350	50030, 50036
20000018152	Marriott	Plato Gold Corp.	Marriott property	2019	ASSAY, RECON, ROCK	$29,016	50520
20000018161	Otto	E. Marion	South Break project	2019–2020	PITS, PSTRIP, PTRNCH	$3,475	51962
20000018162	Powell	Ashley Gold Mines Ltd.	Powell property	2019	RECON, ROCK	$2,900	52186
20000018166	Ben Nevis	Ben Nevis Resources Inc.	Interprovincial project	2019	AVLF, MAG	$12,675	52371
20000018170	Playfair	DH Exploration Inc.	Ramore Gold property	2018–2019	ASSAY, RECON, ROCK	$4,522	47542
20000018177	Haultain, Nicol	Battery Mineral Resources Ltd.	Capitol Mine Kilpatrick prospect, Gowganda project	2018–2019	ASSAY, CHNL, PMAN, ROCK	$39,450	50572
20000018179	Churchill	P.P. Dirks	Shining Tree Base and Precious Metals property	2019	ASSAY, ROCK	$4,255	50725
20000018188	Asquith	T. O'Connor	Jesse James property	2019–2020	ASSAY, ROCK	$2,805	51039
20000018193	St. Laurent	Pancontinental Resources Corp.	St Laurent property	2020	EM	$19,210	51751
20000018194	Farr	Battery Mineral Resources Ltd.	Roy (Sunvest) property	2018–2019	ASSAY, PDRILL, ROCK	$312,170	51894
20000018203	Eby	D. Eves, G. Matheson	Burt-Eby project	2019	ASSAY, GEOL, PROSP, ROCK	$4,271	49384
20000018205	Elliott	Tiger Gold Exploration Corp.	Harker Heritage property - gravel pit	2019	RECON, ROCK	$6,300	49422
20000018207	Gauthier	Agnico Eagle Mines Ltd.	Upper Canada property	2019	ASSAY, PDRILL, ROCK	$488,876	49539
20000018208	Elliott	Tiger Gold Exploration Corp.	Harker Heritage property - Ghost Lake	2019	RECON, ROCK	$20,900	49634
20000018210	Dufferin, North Williams	Battery Mineral Resources Ltd.	McAra project	2019	ASSAY, PDRILL, ROCK	$881,816	49807
20000018146	Guibord	T. O'Connor		2019–2020	ASSAY, PROSP, SOIL	$4,545	49957
20000018273	Lorrain	Cruz Cobalt Corp.	Lorrain Township claims	2019	AMAG	$11,001	49265
20000018272	Noseworthy	Aurelius Minerals Inc.	Mikwam property	2018	ASSAY, PDRILL, ROCK	$1,379,346	49146

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File ID
20000018271	Gillies Limit	G. Bishop	Oro Lake	2018–2019	MICRO, PROSP, SOIL	$5,523	47103
20000018276	Grenfell	M.S. Woolhead	Grenfell Township property	2019–2020	ASSAY, PROSP, ROCK	$5,182	50823
20000018288	Benoit	T. Skjonsby	Benoit property	2019	PROSP, ROCK	$2,650	53191
20000018293	McFadden, Hearst	Skead Holdings Ltd.	Hearst and McFadden property	2019	PROSP, ROCK	$10,973	52919
20000018294	Hearst, Rattray, Skead	Skead Holdings Ltd.	Hearst property	2019	PROSP, ROCK	$13,713	52923
20000018287	Ben Nevis	R.J. Dillman	SZ property	2019	EMPB, SEDMT, SOIL	$11,307	53041
20000018286	Ben Nevis	Dr J. Renaud, J.M. Chard, R. Dillman	SZ property	2019	MAG, VLF	$4,269	53037
20000018285	Connaught	Knightsbridge Exploration Ltd.	Northwind project	2019	PROSP, ROCK	$3,800	52673
20000018284	Connaught	Knightsbridge Exploration Ltd.	Northwind project	2019	EM, VLF	$13,908	52672
20000018299	Ben Nevis	Dr J. Renaud, J.M. Chard, R. Dillman	SZ property	2019–2020	ASSAY, GEOL, ROCK	$5,188	53048
20000018335	Tannahill, Ben Nevis	R.J. Dillman	Felsic property	2018–2020	PROSP, ROCK	$3,505	53242
20000018336	Gillies Limit	A. Kon, RJK Explorations Ltd.	Kon Diamond Exploration claims	2020	AMAG	$21,542	53626
20000018410	Chambers, Strathy	De Beers Group	Progenitor claims	2019–2020	MAG	$13,750	52338
20000018402	Hearst	Skead Holdings Ltd.		2019–2020	ASSAY	$624	54108
20000018420	South Lorrain	First Cobalt Corp.	Keeley-Frontier property	2018	ASSAY, PDRILL, ROCK	$407,293	53757
20000018421	Dufferin	Battery Mineral Resources Ltd.	McAra South property	2020	GCOMP, GR, IP	$3,722	53936
20000018422	Nicol, Haultain	Battery Mineral Resources Ltd.	Big 4 prospect	2020	GCOMP	$102,088	53938, 53939
20000018423	Haultain, Nicol	Battery Mineral Resources Ltd.	Gowganda Transition property	2019–2020	GCOMP	$7,448	53968
20000018424	Haultain, Nicol	Battery Mineral Resources Ltd.	Gowganda project	2018–2020	MCOMP	$38,083	54381
20000018396	James, Barber, Farr, Mickle, Smyth, Truax, Tudhope, Willet	Battery Mineral Resources Ltd.	Elk Lake property	2018–2019	ASSAY, LIDAR, RECON, ROCK	$111,779	52373, 52374, 52375, 52380, 52381, 52382, 53377
20000018395	Morrisette, Teck, Bernhardt, Lebel	Warrior Gold Inc.	Goodfish Kirana property	2018	IP, MAG, VLF	$19,622	52336
20000018414	Holloway	Brandy Brook Mines Ltd.	Tannahill-Holloway property	2018–2020	ASSAY, ROCK	$2,876	54025
20000018446	Nicol	S. Swain	Miller Lake claims	2020	ASSAY, PROSP, ROCK	$2,805	55478
20000018439	Morrisette, Bernhardt, Lebel, Teck	Champagne Resources Ltd., Warrior Gold Inc.	Goodfish Kirana property	2018	AMAG, AVLF		53096, 57539
20000018457	Ben Nevis	Dr J. Renaud, J.M. Chard, R.J. Dillman	SZ property	2019–2020	EMPB, SEDMT	$3,607	54209, 54211
20000018564	Connaught	T. Mathieu	BenoMath property – Esther project	2018–2020	ASSAY, PROSP, ROCK	$11,313	54464
20000018572	Steele	Power Metals Corp.	Case Lake	2017–2018	ASSAY, PDRILL	$241,471	57089

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File ID
20000018575	Cairo	Prosper Gold Corp.	Matachewan project	2019	ASSAY, PDRILL	$360,942	57310
20000018582	Morrisette, Bernhardt, Lebel, Teck	War Eagle	Goodfish Kirana property	2018	GEOL	$17,800	55410
20000018565	Browning, Amyot	Abitibi North Metal Inc.	Browning property	2019–2020	MAG	$64,345	55678
20000018586	McElroy, Hearst, Skead	Canadian Gold Miner Corp.	Lincoln-Nipissing property	2018	ASSAY, CHNL	$14,228	56821
20000018607	Whitson, Van Nostrand	Battery Mineral Resources Ltd.	White Reserve property	2020	GEOL, IP, LC, MCOMP	$111,300	59037
20000018614	Bucke	Fuse Cobalt Inc.	Glencore Bucke property, Teledyne Cobalt property	2018	PDRILL, ROCK	$375,549	58910
20000018615	Bucke	Fuse Cobalt Inc. / LiCo Energy Metals Inc.	Teledyne Cobalt and Glencore Bucke properties	2018	ASSAY, PDRILL	$217,883	58914
20000018603	Skead	Canadian Gold Miner Corp.	Lincoln-Nipissing property	2019–2020	ASSAY, PDRILL, ROCK	$103,835	56871
20000018622	Noseworthy, Hurtubise, Singer	Detour Gold Corp.	Burntbush East property	2019–2020	GLCOMP, MAG	$214,434	55710
20000018621	Mickle	Battery Mineral Resources Ltd.	Elk Lake project	2020	IP, LC	$215,358	59034
20000018623	Coleman, Kittson	Power Americas Minerals Corp.	Kittson-Cobalt property	2018	PDRILL, ROCK	$758,790	56855
20000018641	Lorrain	J.P. Camilleri	Goodwin Southeast property	2020	AMAG	$18,348	59224
20000018638	Pontiac, Dokis	G. Stone	Dokis property	2018–2019	ASSAY, PROSP, PSTRIP, ROCK	$13,710	53850
20000018663	McGarry, Ossian	Gold Candle Ltd.	McGarry property, North Virginiatown property, Salo-Ram property	2020	ASSAY, ROCK, SOIL	$41,254	3681, 60121
20000018678	Lorrain, Coleman	Cobalt Power Group Inc.	Smith Cobalt property	2017	ASSAY, PDRILL, ROCK	$36,114	28291
20000018679	Morrisette	Champagne Resources Ltd.	Goodfish Kirana property	2016–2018	ASSAY, DHRSMP, PDRILL, PROSP, ROCK	$259,143	27126
20000018698	South Lorrain	Cobalt Power Group Inc.	Canadian Cobalt project	2018	AMAG, AVLF	$27,919	30767
20000018703	Boston	F. Kiernicki, M. Sutton	GNR property	2018	ASSAY, PMECH, ROCK	$23,069	31981
20000018705	North Williams	Battery Mineral Resources Ltd.	McAra project - Kite Lake property	2018	IP, LC	$185,814	32334
20000018708	Arnold	M.F. Cloutier	Nelson Lake claims	2019	ASSAY, ROCK, SOIL	$1,374	40478
20000018709	Dufferin, North Williams	Battery Mineral Resources Ltd.	McAra project	2017	GCHEM, SOIL	$10,798	45690
20000018710	South Lorrain, Lorrain	Quantum Cobalt Inc.	Nipissing Lorrain Cobalt property	2017	ASSAY, PROSP, ROCK	$11,560	40692

Advanced Projects

The following criteria have been used to define an advanced project for the purpose of this report:

- Satisfies the requirements for an Advanced Exploration Project as defined in O. Reg. 240/00: Mine Development and Closure Under Part VII of the *Mining Act*.
- Advanced exploration permits are actively being sought.
- Work is at an advanced stage, moving resources to reserves.
- A positive Preliminary Economic Assessment (PEA) or equivalent study (NI 43-101) has been completed.

AGNICO EAGLE MINES LTD. – UPPER BEAVER AND UPPER CANADA DEPOSITS

The Upper Beaver and Upper Canada deposits are part of Agnico Eagle's 25 506 ha Kirkland Lake project. During the year 2020, Agnico Eagle focussed on both deposits, which are located approximately 5 km from each other in Gauthier Township. As of December 31, 2019, mineral reserve and resources at Upper Beaver underground depths have been estimated as follows (https://agnicoeagle.com | Exploration | Mineral Reserves and Mineral Resources | "Download PDF version"):

- Probable Mineral Reserve of 8.0 Mt containing 1.4 million ounces of gold and 19 980 t of copper, grading 5.43 g/t Au and 0.25% Cu
- Measured and Indicated Mineral Resources of 3.6 Mt, containing 0.4 million ounces of gold and 5135 t of copper, grading 3.45 g/t Au and 0.14% Cu
- Inferred Mineral Resources of 8.7 Mt containing 1.4 million ounces of gold and 17 300 t of copper, grading 5.07 g/t Au and 0.20% Cu

Environmental baseline studies continued at Upper Beaver. Agnico Eagle reported that the conversion drilling program at depth at Upper Beaver in the third quarter of 2020 returned highlight intercepts, such as 11.6 g/t Au and 0.48% Cu over 5.6 m at 1227 m depth. Results from the 2020 exploration program are expected to be incorporated into an updated mineral reserve and mineral resource estimate to be announced in 2021 (Agnico Eagle Mines Ltd., news release, October 28, 2020).

At the Upper Canada deposit, there are Indicated Mineral Resources of 9.7 Mt grading 2.23 g/t Au (containing 693 000 ounces of gold) and Inferred Mineral Resources of 17.1 Mt grading 3.22 g/t Au (containing 1.8 million ounces of gold) at underground and open pit depths (www.agnicoeagle.com/English/exploration/exploration-projects/Kirkland-Lake-project).

CANADA SILVER COBALT WORKS INC. – CASTLE SILVER PROPERTY

The past-producing Castle Mine in Haultain Township is 85 km northwest of the historic Cobalt silver mining camp. The mine operated at various times between 1917 and 1989, producing a documented total of 9 410 095 ounces of silver and 376 053 pounds of cobalt from the No. 3 shaft (www.canadacobaltworks.com/projects/castle-cobalt-silver). Canada Cobalt Works Inc. had a name change to Canada Silver Cobalt Works Inc. as of May 14, 2020. The company has 100% ownership of the Castle Mine and the 78 km^2 Castle property with strong exploration upside in the prolific past-producing high-grade Gowganda silver camp. A total of 50 000 m of diamond drilling was planned for 2020 and 2021. In 2020, the company focussed on the Castle East Robinson zone where it had made a major discovery of high-grade silver, including massive native silver in drill core. Highlights of significant drill intercepts include the following (Canada Silver Cobalt Works, news releases, January 10, January 27, September 30, 2020):

- DDH CS-20-22 with 4971 g/t Ag and 0.39% Co over 0.60 m, including 8338 g/t Ag and 0.66% Co over 0.35 m
- DDH CS-20-28 with 3452 g/t Ag over 0.4 m

A maiden NI 43-101 mineral resource estimate for the Robinson zone was released during the second quarter. Particularly, zones 1A and 1B of the Robinson zone were estimated to have a combined Inferred Mineral Resource of 27 400 t of ore containing 7.56 million ounces of silver grading at 8582 g/t Ag, using a cut-off grade of 258 g/t silver equivalent (AgEq) (Canada Silver Cobalt Works, news release, May 28, 2020; MD&A September 30; Rachidi 2020).

MONETA PORCUPINE MINES INC. – GOLDEN HIGHWAY PROJECT

Moneta Porcupine Mines Inc. has a largely contiguous land package of 740 single and boundary mining cell claims or approximately 10 680 ha with an updated NI 43-101 mineral resource estimate (effective December 8, 2020) of 55.3 Mt grading at 1.21 g/t Au containing 2.1 million ounces of gold in the Indicated category, and 49.7 Mt grading at 2.09 g/t Au containing 3.3 million ounces of gold in the Inferred category (Moneta Porcupine Mines Inc., news release, December 10, 2020; Hennessey et al. 2021).

The Golden Highway project (Figure 9) captures 12 km of the Porcupine–Destor deformation zone (PDDZ) corridor with 4 major splays of the regional structure present. The project currently hosts a NI 43-101 resource covering only 4 km of the corridor and found primarily within sedimentary host rocks along one splay of the PDDZ (www.monetaporcupine.com/projects/golden-highway-project).

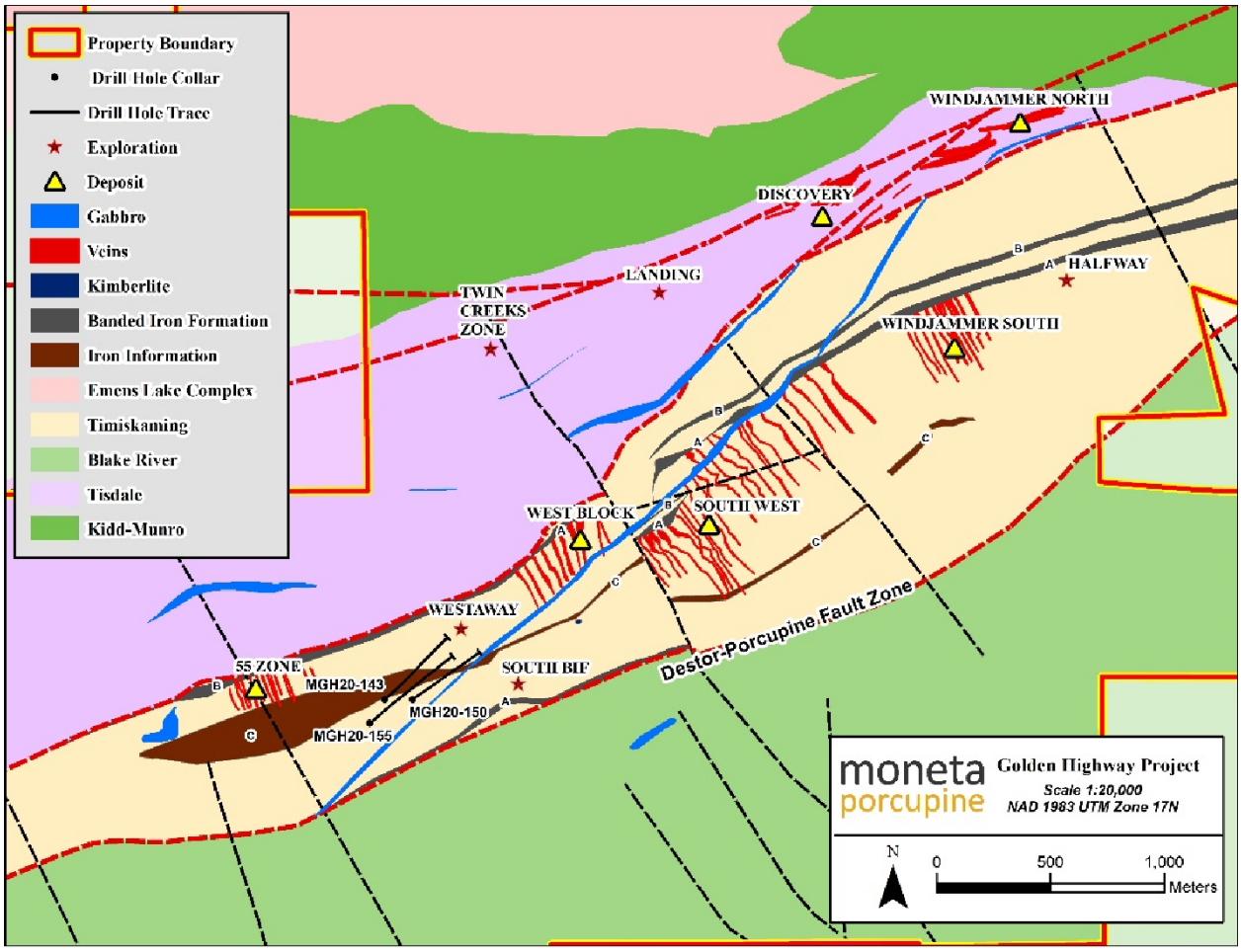


Figure 9. Map of the Moneta Porcupine Mines Inc. Golden Highway project showing key deposits and target areas (Moneta Porcupine Mines Inc., news release, July 16, 2020, link to figure in news release).

Moneta announced positive assay results from its 2019–2020 winter drill program leading to extensions of gold mineralization. Highlights of significant drill intercepts include the following:

- DDH MGH20-136 intersected 2.10 g/t Au over 5.50 m, including 7.05 g/t Au over 0.75 m at Windjammer South deposit (Moneta Porcupine Mines Inc., news release, February 20, 2020)
- DDH MGH20-143 intersected 9.73 g/t Au over 1.90 m, including 18.90 g/t Au over 0.90 m at the new Westaway target (Moneta Porcupine Mines Inc., news release, May 5, 2020)
- DDH MGH20-146 intersected 1.83 g/t Au over 11.48 m, including 4.04 g/t Au over 2.60 m at 55 deposit (Moneta Porcupine Mines Inc., news release, August 6, 2020)
- DDH MGH20-156 intersected 14.98 g/t Au over 1.60 m, including 21.30 g/t Au over 0.90 m from a new mineralized zone south of West block (Moneta Porcupine Mines Inc., news release, July 7, 2020)

During the third quarter of 2020, Moneta commenced an initial 20 000 m diamond-drilling program on the project area, focussed on continuing to expand the current gold resource base and testing new gold targets. Drilling occurred on areas away from the South West deposit. A recent positive preliminary economic assessment (PEA) study on the South West deposit showed the potential for an 11-year mine life to produce up to 85 700 ounces of gold per annum for a total of 719 000 ounces at an attractive cash cost of US$590 per ounce, with low initial capital of C$144 million repaid over 3.4 years (Moneta Porcupine Mines Inc., news releases, September 9, October 15, 2020).

O3 MINING INC. – GARRISON PROJECT

The Garrison project is located along the Porcupine–Destor deformation zone, approximately 40 km north of the town of Kirkland Lake. It contains the Garrcon, Jonpol and 903 deposits.

O3 Mining announced positive results from an independent PEA on its 100% owned Garrison project. The assessment was prepared by Ausenco Engineering Canada Inc., and include the following highlights (O3 Mining Inc., news release, December 14, 2020):

- initial capital (CAPEX) of C$267 million for a 4.0 Mt per year processing plant and infrastructure
- 2.3 years after-tax payback period
- life of mine of 12 years
- average annual gold production of 121 000 oz at a mill head grade of 1.04 g/t Au in years 1 to 8
- Measured and Indicated Mineral Resource of 66.3 Mt at a grade of 0.86 g/t Au

Exploration Projects

A summary of 65 active exploration projects, based on news releases and assessment filings, as reported in the Kirkland Lake Resident Geologist District, is listed in Table 8 and project localities are shown in Figure 10. Following are summary descriptions of some of the active projects in the Kirkland Lake District during 2020.

Table 8. Exploration activity in the Kirkland Lake Resident Geologist District in 2020. Location numbers keyed to Figure 10.

Abbreviations

ACOMP ..... Compilation and interpretation – airborne geophysics
AMAG ..... Airborne magnetometer
ASSAY ..... Assays
BENEF ..... Beneficiation studies
BULK ..... Bulk sampling
CHNL ..... Channel sampling
EM ..... Electromagnetic survey
EMPB ..... Electron microprobe study
GCHEM ..... Geochemical
GCOMP ..... Compilation and interpretation – ground geophysics
GEOL ..... Geological survey/mapping
GLCOMP ..... Compilation and interpretation - geology
GR ..... Resistivity
IP ..... Induced polarization
LC ..... Line cutting
LIDAR ..... LiDAR
MAG ..... Magnetic/magnetometer survey
MCOMP ..... Miscellaneous compilation and interpretation
PDRILL ..... Diamond drilling
PITS ..... Digging pits
PMECH ..... Mechanical labour
PROSP ..... Prospecting
PSTRIP ..... Overburden stripping
PTRNCH ..... Bedrock trenching
RECON ..... Regional or reconnaissance ground exploration
ROCK ..... Rock sampling
SEDMT ..... Lake or stream sediment sampling
SOIL ..... Soil or till sampling

Location Number	Company Name	Property Name	Township	Exploration Activity
1	Abitibi North Metal Inc.	Browning property	Browning, Amyot	MAG
2	Agnico Eagle Mines Ltd.	Upper Beaver project	Gauthier	ASSAY, PDRILL
3	Agnico Eagle Mines Ltd.	Kirkland Lake project	Gauthier, Teck, Lebel	ASSAY, PDRILL
4	Alamos Gold Inc.	Young-Davidson	Powell	BENEF, PMECH
5	Atacama Resources International Inc.	Atacama 3 Block	Teck, Otto	ASSAY, CHNL
6	Battery Mineral Resources Ltd.	Big 4 prospect	Nicol, Haultain	GCOMP
7	Battery Mineral Resources Ltd.	Elk Lake project	Mickle	IP, LC
8	Battery Mineral Resources Ltd.	Gowganda Transition property	Nicol, Haultain	GCOMP
9	Battery Mineral Resources Ltd.	Gowganda project	Nicol, Haultain	MCOMP
10	Battery Mineral Resources Ltd.	McAra South property	Dufferin	GCOMP, GR, IP
11	Battery Mineral Resources Ltd.	White Reserve property	Whitson, Van Nostrand	GEOL, IP, LC, MCOMP
12	Battery Mineral Resources Ltd.	Wilder property	Donovan, Brewster, Charters, Corkill, Leith, Milner, Ray, Trethewey	ASSAY, LIDAR, RECON, ROCK
13	Brandy Brook Mines Ltd.	Tannahill-Holloway property	Holloway	ASSAY, ROCK
14	Brixton Metals Corp.	Langis project	Casey	ASSAY, CHNL, PDRILL, PSTRIP, PTRNCH
15	Caldas Gold Corp.	Juby	Tyrrell	BENEF
16	Canadian Gold Miner Corp.	Lincoln-Nipissing property	Skead	ASSAY, PDRILL, ROCK
17	Canada Silver Cobalt Works Inc.	Castle Mine	Haultain	ASSAY, PDRILL, PMECH
18	Canada Silver Cobalt Works Inc.	Castle East	Haultain	ASSAY, BENEF, PDRILL
19	De Beers Group	Progenitor claims	Chambers, Strathy	MAG
20	Detour Gold Corporation	Burntbush East property	Noseworthy, Hurtubise, Singer	GLCOMP, MAG
21	Dr J. Renaud, J.M. Chard, R. Dillman	SZ property	Ben Nevis	ASSAY, EMPB, GEOL, ROCK, SEDMT
22	E. Marion	South Break project	Otto	PITS, PSTRIP, PTRNCH
23	First Cobalt Corp.	Refinery	Bucke	BENEF
24	Fuse Cobalt Inc.	Teledyne	Bucke, Lorrain	MCOMP
25	Gatling Exploration Inc.	Bear Lake	McVittie	AMAG, ASSAY, LIDAR, PDRILL
26	Gatling Exploration Inc.	Fernland	McVittie	AMAG, ASSAY, LIDAR, PDRILL
27	Gatling Exploration Inc.	Cheminis	McVittie	AMAG, ASSAY, LIDAR, MCOMP, PDRILL
28	Gatling Exploration Inc.	Kir Vit	McVittie	AMAG, ASSAY, CHNL, LIDAR, PDRILL
29	Gold Candle Ltd.	McGarry property, North Virginiatown property, Salo-Ram property	McGarry, Ossian	ASSAY, ROCK, SOIL

Location Number	Company Name	Property Name	Township	Exploration Activity
30	iMetal Resources Inc.	Gowganda West - Zone 1	Tyrell, Leonard, Leith	ASSAY, PDRILL
31	iMetal Resources Inc.	Gowganda West - MacCallum stripping	Tyrell	PROSP, ROCK
32	J.P. Camilleri	Goodwin Southeast property	Lorrain	AMAG
33	Kirkland Lake Gold Inc.	Macassa	Teck	ASSAY, BENEF, PDRILL
34	Kirkland Lake Gold Inc.	Holt Complex	Holloway	BENEF
35	LaSalle Exploration Corp.	Blakelock Gold property	Blakelock	LC, PDRILL
36	LaSalle Exploration Corp.	Egan Gold property	Egan	ASSAY, GEOL, PROSP, ROCK, SOIL
37	McEwen Mining Inc.	Grey Fox	Hislop	ASSAY, BENEF, PDRILL,
38	McEwen Mining Inc.	Black Fox	Hislop	BENEF, PDRILL, PMECH
39	Mistango River Resources Inc.	Eby-Baldwin project	Grenfell, Teck	ACOMP, GEOL, GLCOMP, PDRILL, ROCK
40	Moneta Porcupine Mines Inc.	Golden Highway (Windjammer South deposit)	Michaud	ASSAY, BENEF, PDRILL
41	Moneta Porcupine Mines Inc.	Golden Highway (West Block deposit)	Michaud	ASSAY, BENEF, PDRILL
42	Moneta Porcupine Mines Inc.	Golden Highway (Westaway deposit)	Michaud	ASSAY, PDRILL
43	Moneta Porcupine Mines Inc.	Golden Highway (South BIF deposit)	Michaud	ASSAY, PDRILL
44	Moneta Porcupine Mines Inc.	Golden Highway (55 deposit)	Michaud	ASSAY, BENEF, PDRILL
45	Moneta Porcupine Mines Inc.	Golden Highway (South West deposit)	Michaud	BENEF
46	M.S. Woolhead	Grenfell Township property	Grenfell	ASSAY, PROSP, ROCK
47	Northstar Gold Corp.	Miller	Boston, Pacaud, McElroy, Catharine	ASSAY, GCOMP, GR, IP, PDRILL
48	O3 Mining Inc.	Garrison	Garrison	BENEF
49	Orefinders Resources Inc.	Knight project	Knight, Tyrrell	ASSAY, PDRILL
50	Pancontinental Resources Corp.	St. Laurent	St. Laurent	EM
51	Pelangio Exploration Inc.	Grenfell project	Grenfell	ASSAY, PDRILL
52	Platinex Inc.	Shining Tree Gold	MacMurchy, Churchill, Asquith, Fawcett	ASSAY, CHNL, GEOL, PMECH, PSTRIP, ROCK, SOIL
53	R.J. Dillman	Felsic property	Tannahill, Ben Nevis	PROSP, ROCK
54	RJK Explorations Ltd.	Bishop Nipissing diamond project	Lorrain, Gillies Limit	BULK, GCHEM, IP, SOIL
55	RJK Explorations Ltd., A. Kon	Kon Kimberlite project	Gillies Limit	AMAG, EMPB, PDRILL
56	RJK Explorations Ltd.	Paradis Pond	Lorrain, Gillies Limit	BULK, EMPB, GCHEM, PDRILL
57	RJK Explorations Ltd.	HSM Kimberlite	Lorrain, Gillies Limit	BULK, PDRILL
58	RT Minerals Corp.	Link-Catharine property	Catharine	ASSAY, PDRILL
59	S. Swain	Miller Lake claims	Nicol	ASSAY, PROSP, ROCK
60	Skead Holdings Ltd.		Hearst	ASSAY
61	Sparton Resources Inc.	Matachewan gold property	Powell	AMAG, PDRILL, PMECH, PSTRIP
62	T. O'Connor	Jesse James property	Asquith	ASSAY, ROCK
63	T. O'Connor		Guibord	ASSAY, PROSP, SOIL
64	T. Mathieu	BenoMath property - Esther project	Connaught	ASSAY, PROSP, ROCK
65	Warrior Gold Inc.	Goodfish-Kirana	Teck, Lebel, Morrisette, Bernhardt	ASSAY, GCHEM, GEOL, PDRILL

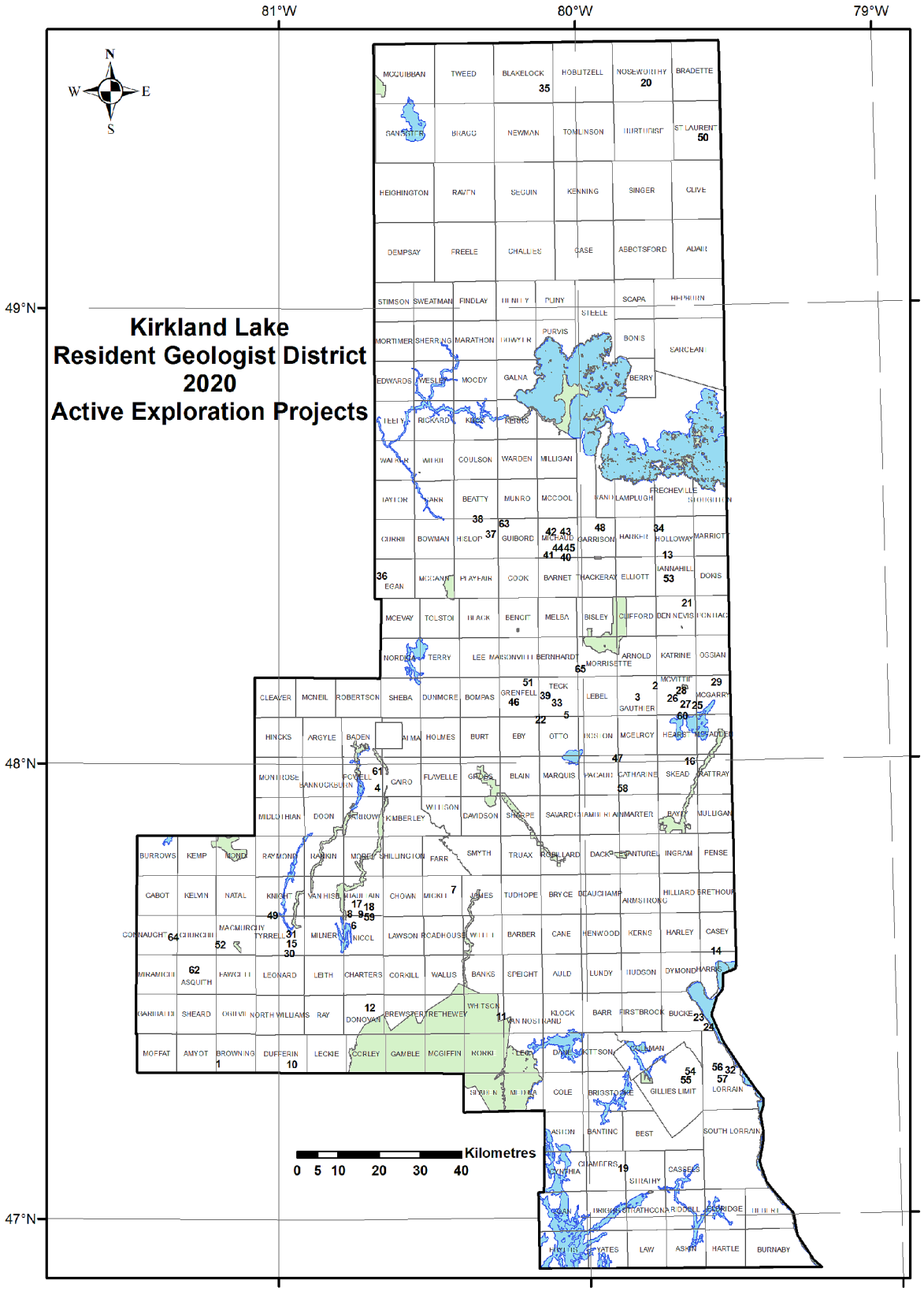


Figure 10. Active exploration projects in the Kirkland Lake Resident Geologist District in 2020; numbers are keyed to Table 8.

ARIS GOLD CORP. (FORMERLY CALDAS GOLD CORP.) – JUBY PROJECT

The Juby project remained inactive throughout 2020. It is located in Tyrell, Leonard and McMurchy townships in the Shining Tree area, approximately 92 km southwest of the town of Kirkland Lake. Gold was first discovered in the Shining Tree area in the 1930s. Caldas completed acquisition of 100% interest in the Juby project and a 25% joint venture interest in a number of claims adjoining the Juby project (Caldas Gold Corp., news release, July 2, 2020). The Juby project currently comprises the Juby Main zone, Golden Lake zone, Hydro Creek–LaCarte zone and Big Dome zone deposits (www.caldasgold.ca/operations-and-projects/Juby). Caldas contracted SGS Geological Services and GeoVector Management Inc. to complete an updated mineral resource estimate on the deposits (effective July 14, 2020) (Aris Gold Corp., www.arisgold.com/operations/juby-project/resource-estimates).

- Juby Main zone and Golden Lake zone deposits contain a pit constrained Indicated Resource of 20.2 Mt at an average grade of 1.12 g/t Au for 728 000 ounces of gold and a pit constrained Inferred Resource of 41.5 Mt at an average grade of 0.99 g/t Au for 1 319 000 ounces of gold
- Hydro Creek–LaCarte zone and Big Dome zone deposits contain a pit constrained Indicated Resource of 1.1 Mt at an average grade of 1.31 g/t Au for 45 000 ounces of gold and a pit constrained Inferred resource of 5.6 Mt at an average grade of 0.93 g/t Au for 169 000 ounces of gold

ATACAMA RESOURCES INTERNATIONAL, INC. – ATACAMA 3 PROPERTY

The Atacama 3 property is located in northern Otto Township approximately 4 km directly south of the new #4 shaft of Kirkland Lake Gold Ltd. The company released geophysical data and sampling results from the property. A total of 18 km of cut lines, induced polarization (IP), magnetic and VLF-EM surveys were carried out over the fall and winter of 2019. The survey identified 3 main IP chargeability horizons comprising iron formation and graphitic sediment interflow units, with zinc mineralization within the upper graphitic horizon. Follow-up channel sampling showed zinc values greater than 1% Zn with a high of 4.04% Zn over 1 m. The results showed anomalous gold, silver, copper, lead, arsenic and cobalt mineralization (Atacama Resources International, Inc., news release, February 6, 2020).

BRIXTON METALS CORP. – LANGIS PROJECT

Brixton's wholly owned Langis Mine project is a past-producing silver mine located approximately 70 km southeast from the town of Kirkland Lake. The silver mineralization occurs as native silver and within steeply to moderately (and in some cases shallow) dipping veins, veinlets and as dissemination rosettes and fracture infill. The mineralization can be associated with calcite, hematite, pyrite, cobaltite, chalcopyrite, niccolite and gold. Mineralization is hosted within any of the 3 main rock types: Archean volcanic and metasedimentary rocks, Coleman Member sedimentary rocks and Nipissing diabase. The Langis Mine produced 10.6 million ounces of silver at a grade of 787 g/t Ag and 3 58 340 pounds of cobalt.

Prior diamond drilling in 2018 and early 2020 returned high-grade native silver over considerable widths near the historical shaft #3. Surface expression of these native silver veins was achieved through overburden removal and trenching in September 2020, returning the following assays (Brixton Metals Corp., news release, October 1, 2020):

- 3140 g/t Ag, 10.15% Co, 0.58% Ni from channel sampling
- 6160 g/t Ag and 16.95% Co, >1% Ni from grab samples of the native silver veins

Close to the end of the period under review, the company announced initial assay results for the first 17 drill holes, totalling 1624 m, from its planned 20 000 m fall–winter diamond-drilling campaign. The company reported that the drilling results continue to support the existence of new, shallow, high-grade

silver-cobalt mineralization around the shaft #3 area (Figure 11). Highlights include the following (Brixton Metals Corp., news release, December 8, 2020):

- DDH LM20-93 with 193 g/t Ag over 6 m
- DDH LM20-96 with 222.9 g/t Ag over 7 m
- DDH LM20-102 with 333 g/t Ag over 4 m, including 904 g/t Ag and 0.2% Co over 1 m

Additional drill intercepts released earlier in the current year include the following (Brixton Metals Corp., news release, January 8, 2021):

- DDH LM-20-111 with 370 g/t Ag over 4 m, 1080 g/t Ag over 1 m
- DDH LM-20-113 with 366 g/t Ag over 4 m, including 1015 g/t Ag and 0.35% Co over 1 m

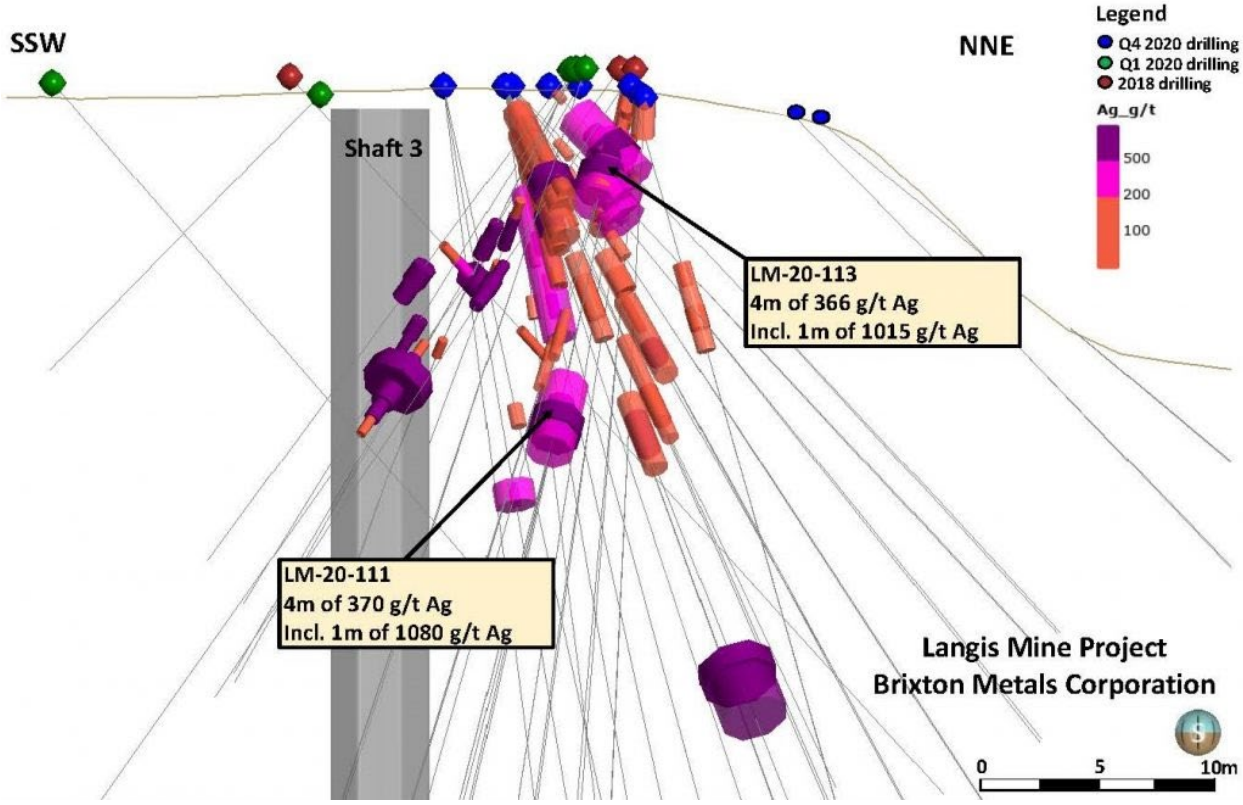


Figure 11. Pseudo cross section showing diamond-drill holes near Brixton Metals Corp. Langis Mine shaft #3 with significant silver results (Brixton Metals Corp., news release, January 8, 2021).

FUSE COBALT INC. – TELEDYNE PROPERTY

Fuse Cobalt Inc. was formerly LiCo Energy Metals Inc. (Fuse Cobalt Inc., press release, February 28, 2020). The Teledyne Cobalt property consists of 5 patented and 8 unpatented mining claims covering an area of approximately 607.1 ha in Bucke and Lorrain townships (https://fusecobalt.com/teledyne-overview). During the third quarter of 2020, Fuse announced that it had completed an Internal Conceptual Study for the de-watering and reclamation of the Teledyne ramp on the property where a high degree of cobalt mineralized material is thought to exist. The study consists of 3 phases (Fuse Cobalt Inc., press releases, May 21, September 15, 2020):

- environmental baseline study and permitting
- surface infrastructure construction
- ramp dewatering/rehabilitation and bulk sampling

GATLING EXPLORATION INC. – LARDER PROJECT

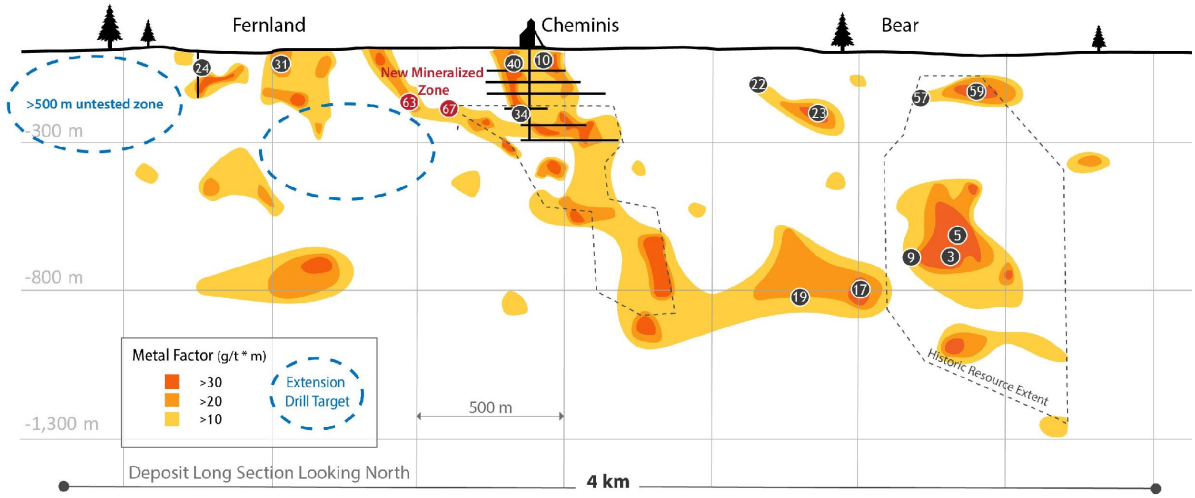
The Larder project hosts 3 high-grade gold deposits (Figure 12) along the Larder–Cadillac deformation zone in McVittie and McGarry townships, 35 km east of Kirkland Lake and 4 km northeast of the town of Larder Lake. The project is 100% controlled by Gatling and comprises patented and unpatented claims, leases and mining licences of occupation. The 3370 ha project area is located 7 km west of the historical Kerr Addison Mine, which produced 11 million ounces of gold. The 3 gold deposits are the Bear, Cheminis and Fernland (www.gatlingexploration.com/larder-project/overview).

Throughout 2020, Gatling was engaged in aggressive diamond-drilling activities at the Larder project leading to the discovery of high-grade, near-surface mineralization and continuity between deposits. Highlights of drill intercepts include the following (Gatling Exploration Inc., news releases, January 16, June 3, September 21, 2020):

- DDH GTR-20-059 with 85.1 g/t Au over 3.0 m
- DDH GTR-20-063 with 4.6 g/t Au over 5.0 m
- DDH GTR-20-067 with 8.7 g/t Au over 2.0 m

Gatling announced that it had engaged artificial intelligence (AI) experts, Windfall Geotek, to use its advanced Computer Aided Resource Detection System (CARDS) to identify probable gold targets at the Larder project (Gatling Exploration Inc., news release, July 30, 2020). A third high-grade gold trend was discovered at Gatling's Kir Vit prospect, which is 6 km north of the Larder–Cadillac deformation zone. LiDAR data, IP anomalies and geochemical data were used in the selection of outcrops to strip, map and sample. Results from channel sampling include the following (Gatling Exploration Inc., news release, November 4, 2020): 16.2 g/t Au over 1.0 m; 8.2 g/t Au over 1.0; and 2.8 g/t Au over 7.0 m.

As a follow up activity, Gatling plans to complete an additional 25 000 m of diamond drilling on the Larder project in 2021 (Gatling Exploration Inc., news release, January 7, 2021).



No.	DDH No.	Significant Intercept
3	GTR-19-003	20.7 g/t Au over 6.1 m
5	GTR-19-005	12.7 g/t Au over 5.0 m
9	GTR-19-009	10.6 g/t Au over 5.0 m
10	GTR-19-010	12.3 g/t Au over 5.0 m
17	GTR-19-017	1.5 g/t Au over 36.8 m
19	GTR-19-019	1.2 g/t Au over 21.8 m

No.	DDH No.	Significant Intercept
22	GTR-19-022	8.3 g/t Au over 2.0 m
23	GTR-19-023	11.2 g/t Au over 5.0 m
24	GTR-19-024	11.9 g/t Au over 4.0 m
31	GTR-19-031	1.6 g/t Au over 15.0 m
34	GTR-19-034	7.7 g/t Au over 2.0 m
40	GTR-19-040	1.7 g/t Au over 21.3 m

No.	DDH No.	Significant Intercept
57	GTR-20-057	8.4 g/t Au over 1.5 m
59	GTR-20-059	85.1 g/t Au over 3.0 m
63	GTR-20-063	**4.6 g/t Au over 5.0 m**
67	GTR-20-067	**8.7 g/t Au over 2.0 m**

Figure 12. Longitudinal section showing Gatling Exploration Inc.'s 3 main gold deposits and some significant drill intercepts of 2019 and early 2020 (Gatling Exploration Inc., www.gatlingexploration.com/larder-project/maps-and-sections).

iMETAL RESOURCES INC. – GOWGANDA WEST PROJECT

iMetal Resources holds a 100% interest in the 145 km^2 contiguous Gowganda West project (www.imetalresources.ca/gowganda-west), located 17 km west-southwest of Gowganda and 90 km southwest of the town of Kirkland Lake. It covers the projected eastward extension of the structural trend that hosts the Juby deposit.

In 2020, sampling and diamond drilling at the Gowganda West project focussed on zone 1 and zone 3. At zone 1, grab sample values included the following (iMetal Resources Inc., news release, January 15, 2021):

- 5.13 g/t Au, with 5 of the 7 samples in the northern extension returning values in excess of 1 g/t Au from a strongly ankerite-altered, brecciated unit

The first drill hole on zone 1 was aimed at testing a near-surface priority chargeability and resistivity induced polarization anomaly. Significant new intercepts in this anomaly included the following (iMetal Resources Inc., news releases, March 18, April 20, 2020):

- DDH IMGW-20-01 with 0.69 g/t Au over 1.5 m, 0.36 g/t Au over 4.25 m and 1.39 g/t Au over 3.35 m

A new key area of interest on the Gowganda West project is the MacCallum stripping, which returned 18.71 g/t Au from a grab sample. Mineralization at the stripping is associated with a sheared ultramafic intrusive rock in contact with Archean metasedimentary rocks and a strongly bleached and silicified quartz porphyry with significant ankerite alteration and disseminated pyrite (iMetal Resources Inc., news release, September 9, 2020).

LASALLE EXPLORATION CORP. – BLAKELOCK GOLD PROPERTY

The 3700 ha Blakelock property covers 15 km of the Casa Berardi deformation zone, 55 km west of the multi-million ounce, high-grade Casa Berardi gold mine operated by Hecla Mining Company. LaSalle acquired the property from Pan American Silver subject to a C$400 000 exploration expenditure by LaSalle and a retained 2% net smelter returns royalty (LaSalle Exploration Corp., news release, March 10, 2020). During the fourth quarter, LaSalle initiated a 5-hole diamond-drill program to confirm and expand historic intersections in the Porphyry Creek zone. Two drill holes were completed by the end of the year. An induced polarization geophysical survey was planned to begin in January 2021 to locate possible additional gold targets (LaSalle Exploration Corp., news release, December 17, 2020).

MISTANGO RIVER RESOURCES INC. – EBY–BALDWIN PROJECT

The Eby–Baldwin project, also known as the Kirkland West project, consists of 2 zones, namely, the Eby zone and Baldwin zone (Figure 13; https://mistango.com/projects/kirkland-west). The Baldwin zone is adjacent to Kirkland Lake Gold's Macassa Mine and includes land holdings in western Teck Township, as well as in Grenfell and Eby townships. The zone shares a similar geological context with the Kirkland Lake mining camp in that it hosts likely extensions of the gold-bearing Main Break fault and subsidiary structures, as well as the regionally important Larder–Cadillac deformation zone. The Eby zone is 3 km to the southwest within Eby Township and is likely to feature a somewhat different although a highly prospective geological setting. Mistango commenced field work on June 1, 2020. The work included compilation of historical data, extensive mapping and collection of approximately 240 grab samples, reprocessing of an aeromagnetic data set and structural interpretation to establish drill targets (Mistango River Resources Inc., news release, September 8, 2020).

In November, a planned 10 000 m diamond-drilling program began at the Baldwin zone to test identified targets on the completed geological and structural interpretation. These included the historical Baldwin Mine and surrounding areas, as well as several complex structural domains, each of which are located on or associated with fault systems similar to those that host much of the gold endowment of the Kirkland Lake mining camp (Mistango River Resources Inc., news release, October 16, 2020). Assay results are pending.

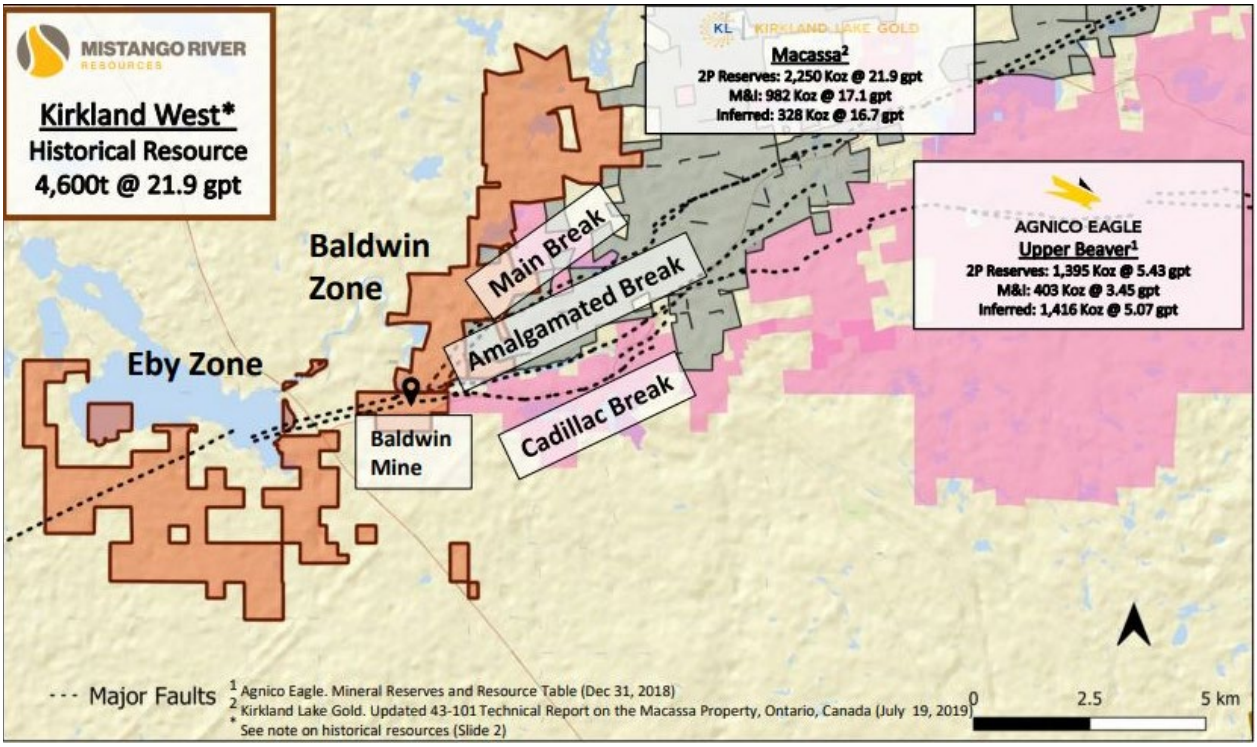


Figure 13. Location map of the Mistango River Resources Inc. Eby–Baldwin project along the regional east-northeast-trending Larder–Cadillac deformation zone. Note the convergence of faults at the Baldwin zone (Mistango River Resources Inc., https://mistango.com/investors/presentations, Corporate Presentation, October 2020 [accessed April 9, 2021]).

OREFINDERS RESOURCES INC. – KNIGHT PROJECT

The Knight project is one of Orefinders' flagship assets, located adjacent to and contiguous with Aris Gold's 2.3 million-ounce Juby project. The land package encompasses approximately 2200 ha and consists of 14 patented leases and 79 mining claims. The company has outlined 3 distinct targets on its Knight project: each target has a distinct geological style and have not been previously drill tested (https://orefinders.ca/projects/knight-project).

In 2020, Orefinders planned 9000 m of diamond drilling on the Tyranite Mine and Porphyry Lake targets. By early November, 2 drill holes had been completed and a third was in progress at the former target. Significant drill intercepts from the first completed drill hole on the Tyranite Mine target included the following (Orefinders Resources Inc., news releases, August 14, November 5, 2020):

- DDH TYR20-001 with 4.18 g/t Au over 14.28 m, and 2.03 g/t Au over 9.0 m

Assay results from the other holes were pending at the time of writing this report.

PELANGIO EXPLORATION INC. – GRENFELL PROJECT

The Grenfell project (Figure 14), located 10 km northwest of the town of Kirkland Lake, comprises 38 mining cells and 8 leased claims covering an area of approximately 6.7 km^2. Pelangio completed 2 phases of diamond drilling on the project during 2020. Highlights of the Phase 1 drill program that ended in the spring of 2020 include the following (Pelangio Exploration Inc., new releases, March 1, September 22, 2020):

- DDH JS2004 with 314 g/t Au over 1.74 m (uncut), including a higher grade section that assayed 1810 g/t Au over 0.3 m
- DDH JS2005 with 2.5 g/t Au over 26 m, including 9.39 g/t Au over 3 m

Phase 2 drill program was designed to further test Phase 1 drill results as well as test additional priority targets. The drill program successfully intercepted gold in both higher grade narrow vein intersections and a series of new gold-bearing intercepts. Highlights of Phase 2 drill program included the following (Pelangio Exploration Inc., new release, January 8, 2021):

- DDH JS2013 intersected a new vein (No.1 HW vein) in the hanging wall of the historic No.1 vein, returning 11.4 g/t Au over 0.6 m, and also 1.16 g/t Au over 7.5 m
- DDH JS2014 returned 2 new significant zones of mineralization. One of the zones yielded 1.45 g/t Au over 9 m and 1.76 g/t Au over 4.5 m, including some higher grade intercepts of 4.02 g/t Au over 1.1 m, and 3.46 g/t Au over 1.5 m

Pelangio plans to input all pertinent historical data and recently acquired drill data into a geological model to help better understand the mineralized zones.

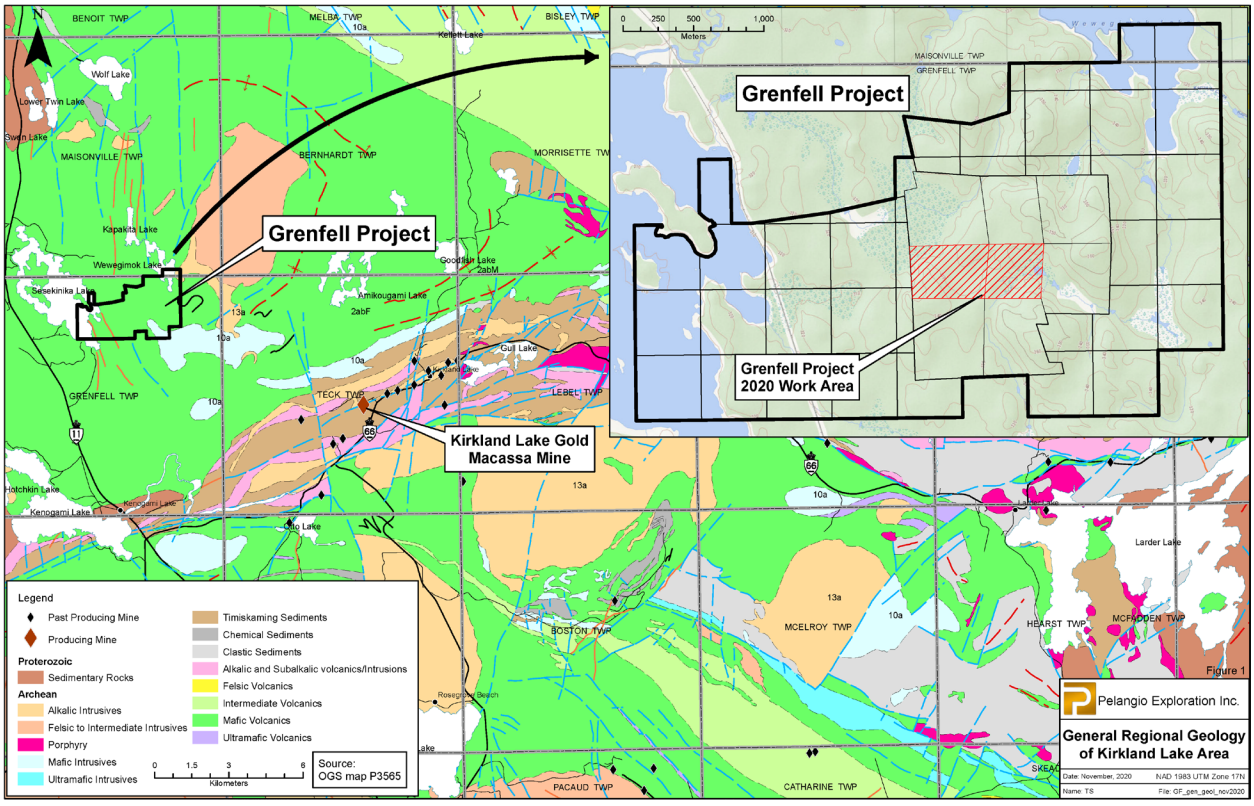


Figure 14. Geology map showing the location of the Pelangio Exploration Inc. Grenfell project area and the 2020 work area (www.pelangio.com/projects/canada/grenfell).

PLATINEX INC. – SHINING TREE GOLD PROPERTY

The Shining Tree Gold property (of which Platinex holds 100% interest) is the largest holding in the Shining Tree gold district at 20 750 ha (51 274 acres) situated along the Ridout–Tyrrell trend between the Juby deposit owned by Aris Gold Corp. to the east and the mine development-stage Côté Gold deposit to the west, owned by IAMGOLD (Platinex Inc., news release, December 7, 2020).

The Caswell prospect, which is 1 of 21 known mineralized areas on the Shining Tree property, was the main focus of Platinex's 2020 exploration. Caswell hosts a 700 m wide east-west corridor of shear zones and quartz veining. A program of mechanical stripping and collecting of 569 channel samples was completed on the prospect, followed by structural mapping during the fall of 2020 to further assess the extent and character of the gold mineralization (Platinex Inc., news releases, October 7, November 25, 2020). Assay results of the channel sampling program are pending.

RJK EXPLORATIONS LTD. – BISHOP NIPISSING DIAMOND PROJECT

On February 5, 2019, RJK Explorations Ltd. entered into a property option agreement with Anthony Bishop for the Bishop Nipissing diamond properties. Additional claim registration increased the land holding from the previous 2090 ha to approximately 7500 ha, because of positive results from a Spatiotemporal Geochemical Hydrocarbon soil sampling program conducted on 3 separate geophysical targets that the company identified as potential kimberlite pipes (RJK Explorations Ltd., news release, January 21, 2020, www.rjkexplorations.com/bishop-nipissing-diamond). A total of 4 kimberlite bodies were discovered through diamond drilling during the course of 2020 (Figure 15). The company reported that the fourth kimberlite (HSM conductance anomaly) is approximately 1400 m long by 350 m wide and is located 1 km southeast of the Robin's Place kimberlite. The new HSM kimberlite, along with the Paradis Pond and Robin's Place kimberlites, are spatially associated with the Cross Lake fault structure, whereas the Gleeson kimberlite appears to be associated with a southwest-northeast fault structure (RJK Explorations Ltd., news releases, November 24, December 3, 2020).

Toward the end of the year, RJK announced diamond and indicator mineral results from analytical work completed at CF Mineral Research Ltd. in Kelowna, British Columbia. CF Mineral Research Ltd. carried out attrition milling, heavy mineral processing, picking and electron microprobe analysis to identify and probe for diamond indicator minerals, and caustic fusion for microdiamond analysis from 3 sample batches, totalling 165 kg, recovered from 4 drill holes on Paradis Pond. From the heavy mineral concentrates, 283 grains were probed and classified into 6 diamond indicator minerals: olivine/forsterite, chromite and high titanium chromite, clinopyroxene, peroditic pyroxene, eclogitic garnet and peroditic garnet. A total of 5 microdiamonds were recovered and all stones were described as natural, white, chip with adamantine lustre, very strong colour emission with no inclusions. One diamond from drill holes PP-20-03/04 was described as an irregular crystal with fractured surface, weakly yellow with adamantine lustre, very strong colour emission with no inclusions (RJK Explorations Ltd., news releases, November 24, December 9, 2020).

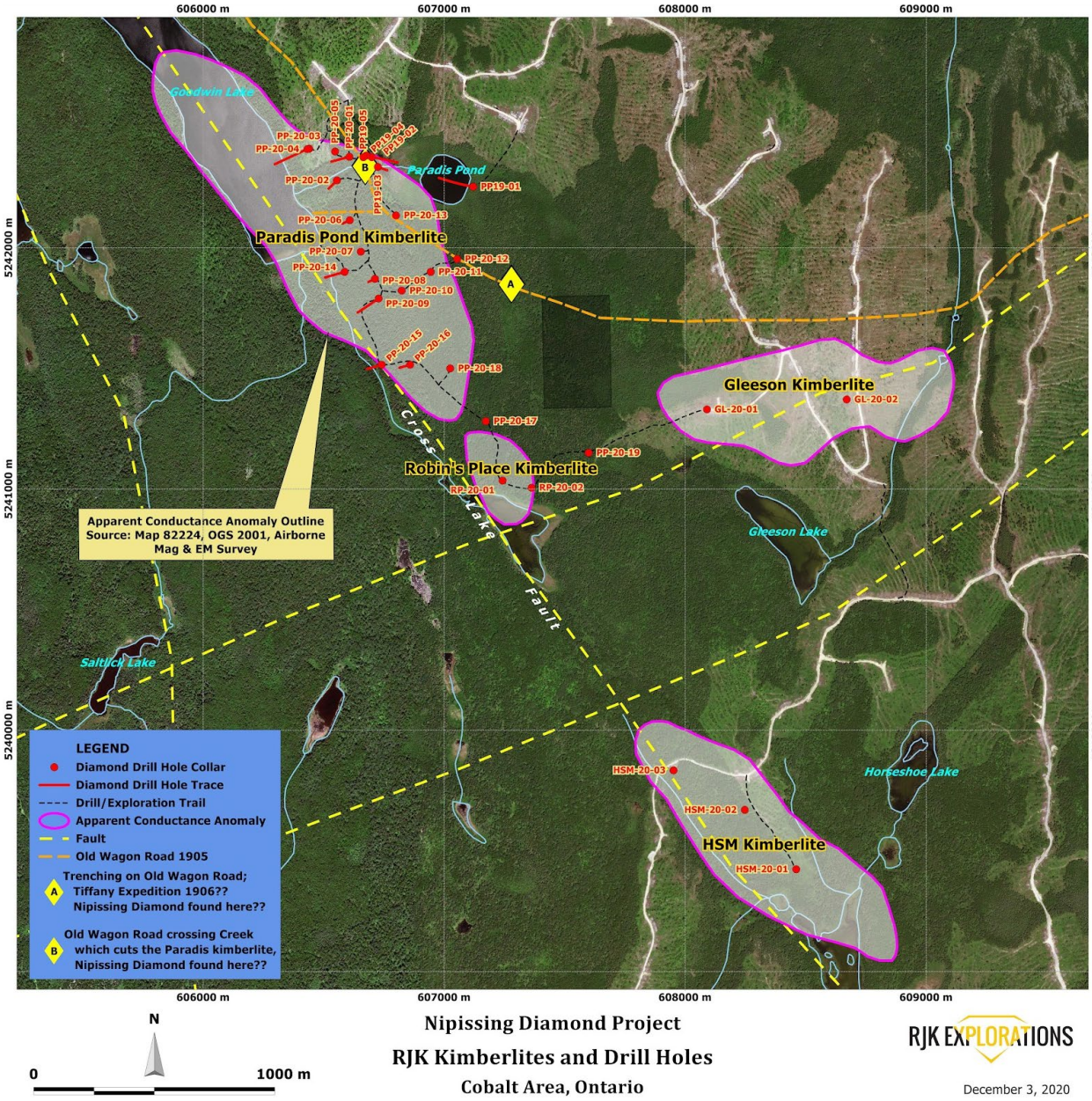


Figure 15. A locality map of the RJK Explorations Ltd. Nipissing diamond project showing interpreted kimberlites (RJK Explorations Ltd., news release, December 3, 2020).

RT MINERALS CORP. – LINK–CATHARINE PROPERTY

The Link–Catharine property represents a 220 ha gold property located in Catharine Township, 25 km south-southeast of Kirkland Lake. RT Minerals Corp. has the option to earn a 100% interest in the property subject to a 2% NSR retained by the vendor (www.rtmcorp.com). Gold mineralization occurs on the property in zones of quartz-veined, iron and green fuchsitic carbonate-altered rocks associated with the north-trending Pacaud fault and associated deformation zone. The north-trending Pacaud deformation zone is approximately 400 m wide and 2.5 km long on the property (RT Minerals Corp., news release, September 29, 2020).

A planned 1000 m diamond-drilling program, consisting of 7 drill holes, commenced on the property during the fourth quarter of 2020. Highlights of reported drill intercepts include the following (RT Minerals Corp., news releases, October 14, November 11, December 1, 2020):

- DDH CA 20-01 with 2.81 g/t Au over 33.1 m, including 3.54 g/t Au over 25.15 m
- DDH CA 20-03 with 1.09 g/t Au over 4.86 m, and 1.93 g/t Au over 1.00 m
- DDH CA 20-05 with 2.25 g/t Au over 6.90 m, and 5.29 g/t Au over 0.65 m
- DDH CA 20-07 with 1.01 g/t Au over 1.58 m, including 1.40 g/t Au over 0.76 m

The company is planning on follow-up diamond drilling, consisting of at least 10 deeper holes of between 250 m and up to 750 m in core length, with downhole geophysics being conducted from each hole prior to drilling the next hole in succession (RT Minerals Corp., news release, December 1, 2020).

SPARTON RESOURCES INC. – MATACHEWAN GOLD PROPERTY

The Matachewan gold property consists of 41 mining claims and 3 mining leases in the Matachewan area. During the fourth quarter of 2020, Sparton Resources Inc. announced the commencement of an initial 2000 m diamond-drilling program consisting of 10 holes on the Sir Harry Oakes project, which is in close proximity to Alamos Gold's producing Young–Davidson Mine. Drilling was designed to occur from 5 locations in order to establish approximately 300 m of strike length of the zones reported from the 1930s historical data (Sparton Resources Inc., news release, October 19, 2020; www.spartonres.ca/financialreports | Q3 Financial Statements with MD & A). Assay results of the diamond drilling are pending.

WARRIOR GOLD INC. – GOODFISH–KIRANA PROPERTY

Warrior Gold's 100% owned Goodfish–Kirana property is situated approximately 5 km north of the Larder–Cadillac deformation zone in Kirkland Lake. It is 11.5 km long by roughly 3.5 km wide, and contains 3 major structural trends: the east-trending Kirana deformation zone, the north-northeast Goodfish trend, and the Victoria Creek deformation zone. In January of 2020, Warrior Gold announced the discovery of a new high-grade gold interval, south of the A zone where a Phase 2 diamond drilling was completed at the end of 2019 (Warrior Gold Inc., news release, January 20, 2020). Follow-up diamond drilling, totalling 2448 m and consisting of 7 drill holes, was completed on the A zone in the third quarter, to test the down dip and strike extension to the east and west. Two additional drill holes, totalling 447 m, were completed on the C zone in an effort to better determine the orientation of the known mineralization and associated structures. Significant drill intercepts include the following results (Warrior Gold Inc., news releases, August 20, September 23, 2020):

- DDH GK20-032 with 3.69 g/t Au over 2.3 m, and DDH GK20-028 with 6.7 g/t Au over 7.4 m with visible gold at A zone
- DDH GK20-033 with 3.41 g/t Au over 2.0 m, and 3.93 g/t Au over 3.0 m at C zone

From the drill results, the A zone was extended laterally over a total strike length of 350 m and to a depth of 325 m. In addition, a new orientation was confirmed for the C zone mineralization (Warrior Gold Inc., news release, September 23, 2020).

DISTRICT STAFF AND ACTIVITIES

Because of public health restrictions that were implemented in response to the COVID-19 pandemic, all Resident Geologist Program (RGP) staff worked remotely during the time period between March 16 and December 31, 2020. The primary impacts of these restrictions on RGP services included the suspension of public access to our offices and the cancellation of the 2020 field season (i.e., no property visits or other field investigations). However, staff were able to continue delivering most of our client services using electronic communication channels (e.g., telephone, email and video calls). Staff were also able to access the offices on an as-needed basis to obtain paper files and other materials that were required to fulfil these services. Client requests for physical documents, exploration equipment loans (e.g., Beep Mats) and diamond-drill core were accommodated outside the office setting in accordance with public health guidelines.

During 2020, the Kirkland Lake Regional Resident Geologist office was staffed by P. Chadwick, *P.Geo.,* Regional Resident Geologist, J. Suma–Momoh, *P.Geo.,* District Geologist, and L. Streit, District Geological Assistant (Acting, January–August). S.L.K. Hinz, Mineral Deposit Compilation Geoscientist and C.M. Daniels, *P.Geo.*, Regional Land Use Geologist, both from the Timmins office, contributed to this report in their respective sections.

During the course of the year, Kirkland Lake Regional Office staff provided 235 individual services to 229 clients, the majority of which occurred through phone/email. Only a total of 28 in-person services were completed. Staff attended limited industry-related events. P.J. Chadwick attended the Northern Prospectors Association (NPA, Kirkland Lake) Annual General Meeting. J. Suma-Momoh attended the Northern Prospectors Association (NPA, Kirkland Lake) Annual General Meeting; staffed a booth in the Trade Section of the Prospectors and Developers Association of Canada Convention (PDAC, Toronto), and gave a half-day Prospector Training Course to residents of the Temagami First Nations at Bear Island, Temagami. L.M. Streit was involved in updating the Ontario Mineral Exploration Information System (OMEIS). Staff continued to plan and implement the relocation of all library materials, including files, reports, map, cabinets and display samples to suitable stations within the office.

A total of 1 publication was received, as listed in Table 9, and entered into the Kirkland Lake District library database. Other publications released by the OGS, related to the Kirkland Lake District, are also listed in Table 9.

In 2020, 33 Mineral Deposit Inventory (MDI) records were updated, 5 records were deleted and no new record was created for the Kirkland Lake District (*see* Table 13 in “Mineral Deposit Compilation Geoscientist – Northeastern Ontario”).

Table 9. Publications received by the Kirkland Lake Resident Geologist office and other publications released by the Ontario Geological Survey relevant to the Kirkland Lake District in 2020.

Title	Author(s)	Type and Year of Publication
Publication Received		
Report of Activities 2019, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake and Sudbury Districts, 2020	P.J. Chadwick, A.S. Péloquin, J. Suma-Momoh, C.M. Daniels, S.L.K. Hinz, C.A. Kennedy, L. Streit and R.M. Todd	Ontario Geological Survey, Open File Report 6367, 143p., 2020
Publications Released		
Recommendations for Exploration 2019–2020	Ontario Geological Survey	Ontario Geological Survey, Recommendations for Exploration, 2020
Geographic Index to Published Reports, Maps and Digital Data, 2011–2019	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Paper (MP) 178 (Supplement 2011–2019), 2020
Index to Published Reports, Maps and Digital Data, 2011–2019	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Paper (MP) 177 (Supplement 2011–2019), 2020
Index to Maps, Bedrock Geology, 1991–2019	Ontario Geological Survey	Ontario Geological Survey, set of 4 maps, scale 1:1 000 000, 2020
Index to Maps, Surficial Geology, 1991–2019	Ontario Geological Survey	Ontario Geological Survey, set of 4 maps, scale 1:1 000 000, 2020
Lake Geochemistry of Ontario	Ontario Geological Survey	Ontario Geological Survey, Lake Geochemistry of Ontario—2019 (LakeGeochemON), online database, 2020
Ontario Airborne Geophysical Surveys, Magnetic Gradiometer Data, Grid and Profile Data (ASCII and Geosoft® Formats) and Vector Data, Sturgeon River Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1088, 2020
Airborne Magnetic Gradiometer Survey, Colour-Filled Contours of the Residual Magnetic Field, Sturgeon River Area	Ontario Geological Survey	Ontario Geological Survey, Maps 83 014 to 83 019, scale 1:50 000, 2020
Airborne Magnetic Gradiometer Survey, Shaded Colour Image of the Second Vertical Derivative of the Residual Magnetic Field and Keating Correlation Coefficients, Sturgeon River Area	Ontario Geological Survey	Ontario Geological Survey, Maps 83 020 to 83 025, scale 1:50 000, 2020
Summary of Field Work and Other Activities, 2020	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6370, 182p., 2020

Drill Core Storage Site

The Kirkland Lake Resident Geologist District office operates an indoor Drill Core Library within the municipality of Kirkland Lake, and a Remote Drill Core Storage Site west of Kirkland Lake in Burt Township. No core was donated in 2020. A total number of 12 clients requested access to examine drill core at the indoor facility, but this service was put on hold in respect of public health restrictions.

PROPERTY EXAMINATIONS

Public health restrictions implemented in response to the COVID-19 pandemic resulted in the cancellation of the 2020 RGP field season.

RECOMMENDATIONS FOR EXPLORATION

Lithium-Cesium-Tantalum Pegmatite Potential in Chambers Township, Temagami Area

Note: The following recommendation is modified from *Suma-Momoh (2021).*

Cynthia–Chambers–Strathy is a block of 3 contiguous townships within the Temagami greenstone belt, which is itself located approximately 40 km north of the Grenville Province in eastern Ontario. For further description of the Temagami greenstone belt, the reader is referred to Moorhouse (1946), Bennett (1978) and Fyon and Cole (1989).

In Chambers Township, Archean mafic to intermediate to felsic and metasedimentary rocks are intruded by the Spawning Lake quartz monzonite stock in the south, and the Chambers–Strathy batholith in the north. Proterozoic Cobalt Group sedimentary rocks unconformably overlie the rocks in the northwest corner of the township. Younger Nipissing diabase dikes and sills intrude all the rocks in the area. Selected mineral occurrences in the area are the R.G. Gilson (copper, zinc, lead, gold) occurrence, the Kokoko (iron) prospect and the Falconbridge DDH CHA-03 (nickel, copper) occurrence in Chambers Township; the Falconbridge DDH CHA-08 (zinc, copper, lead) occurrence, and the B. Westin (gold) occurrence in the adjacent townships of Cynthia and Strathy, respectively (Figure 16).

The Temagami area remains underexplored for lithium-cesium-tantalum (LCT) mineralization despite high demand in the electric vehicle industry. This article highlights some of the significant characteristics of this class of pegmatite, and how these can be harnessed to help guide exploration efforts in Chambers Township.

The LCT pegmatites are granitic rocks that form relatively small igneous bodies and are characterized by large crystals and unique textures, particularly graphic intergrowths (London 2008). The LCT family of pegmatites takes its name from its characteristic enrichment in lithium, cesium and tantalum; thus, in addition to the lithium minerals petalite, lepidolite and spodumene, LCT pegmatites may contain the cesium ore mineral, pollucite; the tantalum ore mineral, columbite-tantalite; the beryllium ore mineral, beryl; and the tin ore mineral, cassiterite. The LCT pegmatites are the products of extreme fractional crystallization of orogenic granites. Most such granites were derived from metasedimentary rocks (S-type granites) rich in muscovite, although certain LCT pegmatites are related to granites derived from igneous rocks (I-type granites) (Martin and De Vito 2005; Bradley et al. 2017).

The following factors and considerations are important regarding mineralization and exploration for LCT pegmatites in Chambers Township:

The most significant change in LCT pegmatites through Earth's history is that, by far, the largest deposits are Archean in age. Thus, the potential for economic deposits seems greatest in orogens of that age (Bradley and McCauley 2013). This factor is satisfied by the geology of Chambers Township and the Temagami greenstone belt in general.

Most LCT pegmatites intruded, and are hosted in, metamorphosed sedimentary rocks, typically at low pressure amphibolite to upper greenschist facies (Černý 1992). Bradley and McCauley (2013) add that the metamorphic grade setting is a guide rather than a requirement. In Chambers Township, metasedimentary and metavolcanic rock units are in contact with, and in close vicinity (approximately 1 km) to, the granitic Spawning Lake stock (*see* Figure 16, black rectangular outlines). The Spawning Lake stock is a large body of porphyritic quartz monzonite. It consists of 2 distinct phases: a central coarse porphyritic phase and a medium-grained grey border phase. Narrow dikes of aplite and pegmatite are locally abundant. The central coarse porphyritic phase makes up, by far, the largest part of the stock (Bennett 1978).

It is relevant to ascertain whether the Spawning Lake stock is “fertile”. Fertile granites are identified by 1) the presence of distinctive minerals, such as muscovite, tourmaline and garnet; 2) anomalously high concentrations of trace elements, such as lithium, cesium, tantalum, rubidium and tin; and 3) low concentrations of major elements calcium, iron, and magnesium (Selway, Breaks and Tindle 2005). Around a fertile granite, the more distal LCT pegmatites are more likely to be enriched in lithium and other compatible elements (Figure 17).

Weathering of LCT pegmatites can result in both soil anomalies and indicator minerals. Smith, Perdrix and Davis (1987) demonstrated that arsenic, beryllium, antimony and tin form a 12 by 20 km halo in lateritic soils around the Greenbushes pegmatite in western Australia, whereas niobium, tantalum and boron form a smaller, 1 by 5 km halo. Cassiterite, tantalite, elbaite and spessartine are sufficiently dense and durable to serve as heavy indicator minerals that can be found by panning unconsolidated sediments (Bradley et al. 2017).

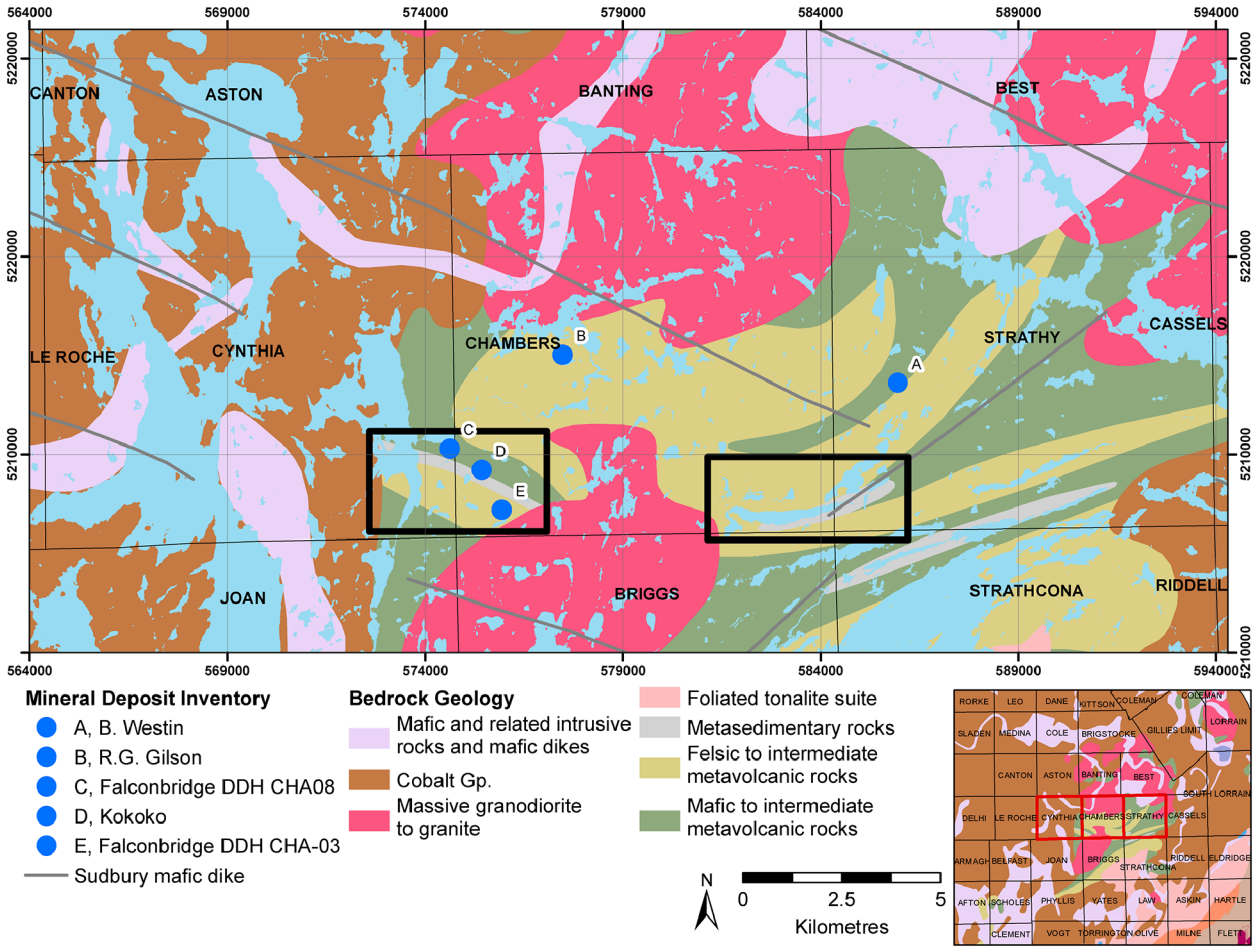


Figure 16. Geology map of Chambers Township and the surrounding townships with the locations of selected occurrences *from* the Mineral Deposit Inventory database (Ontario Geological Survey 2020a). The inset township map shows the entire Temagami greenstone belt. The locations of 2 LCT-prospective areas, adjacent to the Spawning Lake stock, are indicated by thick black rectangular outlines. Geology *from* Ontario Geological Survey (2011). Universal Transverse Mercator (UTM) co-ordinates are provided using North American Datum 1983 (NAD83) in Zone 17.

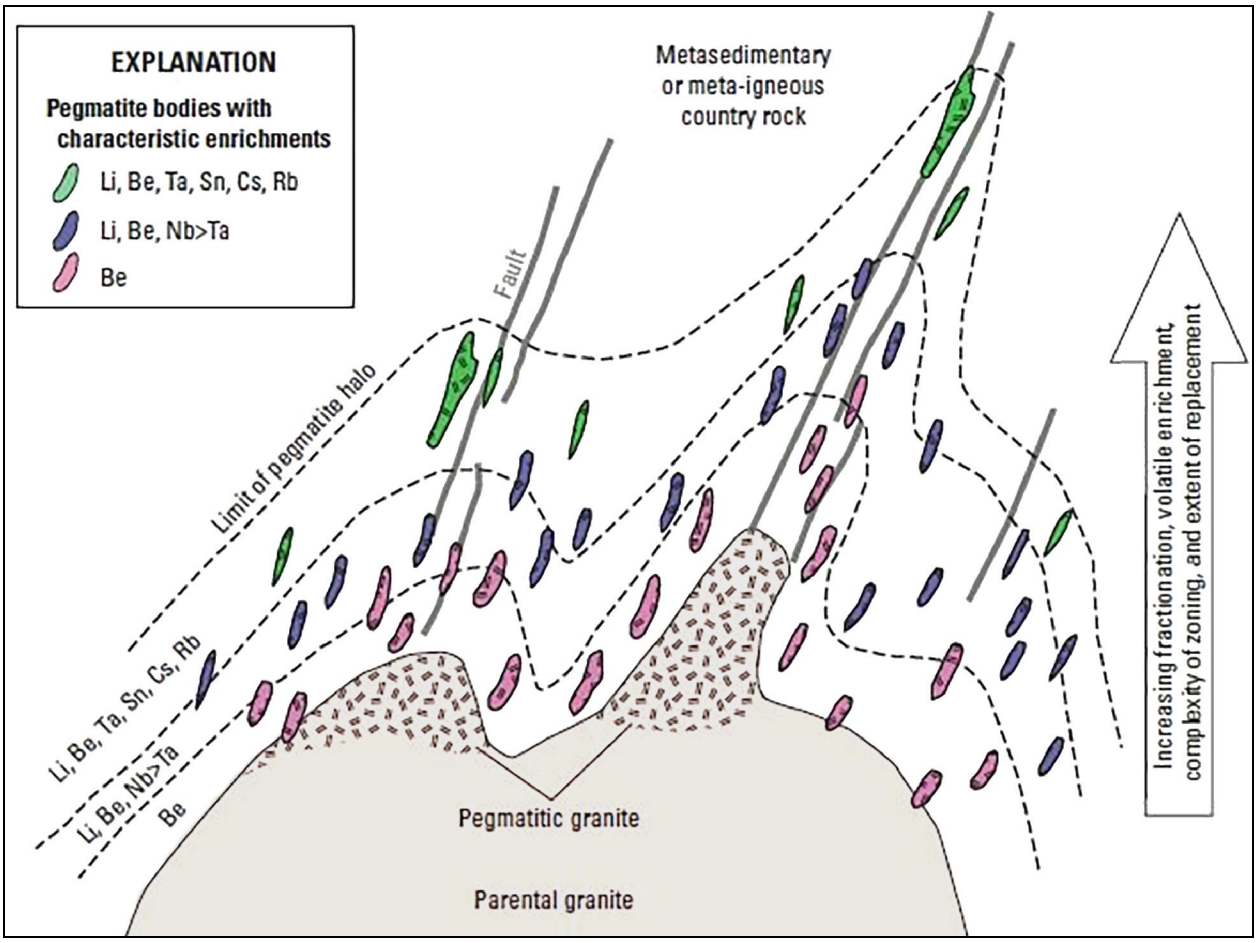


Figure 17. Schematic cross section showing the concentric arrangement of LCT pegmatites (small pink, purple and green bodies) around a parental granite pluton. In this model, common pegmatites form near the parent, whereas pegmatites with enrichments in incompatible elements (indicated by chemical symbols) and corresponding rare minerals form farther away. Abbreviations: Be = beryllium; Cs = cesium; Li = lithium; Nb = niobium; Rb = rubidium; Sn = tin; Ta = tantalum. Diagram *modified from* Bradley et al. (2017).

In summary, historical exploration for LCT pegmatites in the Temagami area is unknown. Chambers Township is located within the Temagami granite–greenstone belt, which has undergone regional greenschist- to low amphibolite-facies metamorphism. Based on these characteristics and the above factors and considerations that are consonant with Superior Province-type rare metal pegmatite deposit model, one might suggest that Chambers Township has the potential to host LCT pegmatites. Against this backdrop, 2 areas (*see* Figure 16, black rectangular outlines) containing lensoidal metasedimentary rock units proximal to a potential fertile granitic Spawning Lake stock are recommended for the exploration of these critical metals. An exploration program consisting of detailed geological mapping and sampling of any existing distal pegmatitic dikes should be implemented as an initial approach, followed by soil geochemical survey and sampling to delineate potential metal anomalies and zones.

Looking for Gold in the Eastern Parts of the Kidd–Munro Assemblage

Note: The following recommendation is modified from *Chadwick (2021).*

The Kidd–Munro assemblage (2720 to 2710 Ma), is perhaps better known as a host to the world-class Kidd Creek Mine near Timmins, a giant volcanogenic massive sulphide (VMS) deposit, primarily rich in copper and zinc, as well as the Potter Mine, a smaller equivalent deposit in Munro Township, in the western part of the Kirkland Lake District (Houlé et al. 2010). The purpose of this brief note is to explore the possibility of potential orogenic lode gold mineralization in the eastern parts of this assemblage, and to draw comparisons in terms of the structural, lithological and age settings with Osisko Mining Inc.'s Windfall Lake project in adjacent Quebec (Murahwi and Torrealba 2020).

A simplified geology map of the easternmost part of the Kidd–Munro assemblage is shown in Figure 18. This assemblage is structurally bound to the north by the northern branch Porcupine–Destor fault zone and the older mafic metavolcanic rocks of the Stoughton–Roquemaure assemblage. To the south, the Kidd–Munro assemblage is separated from the younger mafic metavolcanic rocks of the Blake River assemblage by the Porcupine–Destor fault zone (PDFZ). Known gold-bearing mineral deposits are also shown, in addition to those documented in the Mineral Deposit Inventory (MDI) database and drill-hole collar positions for core, kept in the Kirkland Lake Drill Core Library, which report gold values (Ontario Geological Survey 2020a, 2020b).

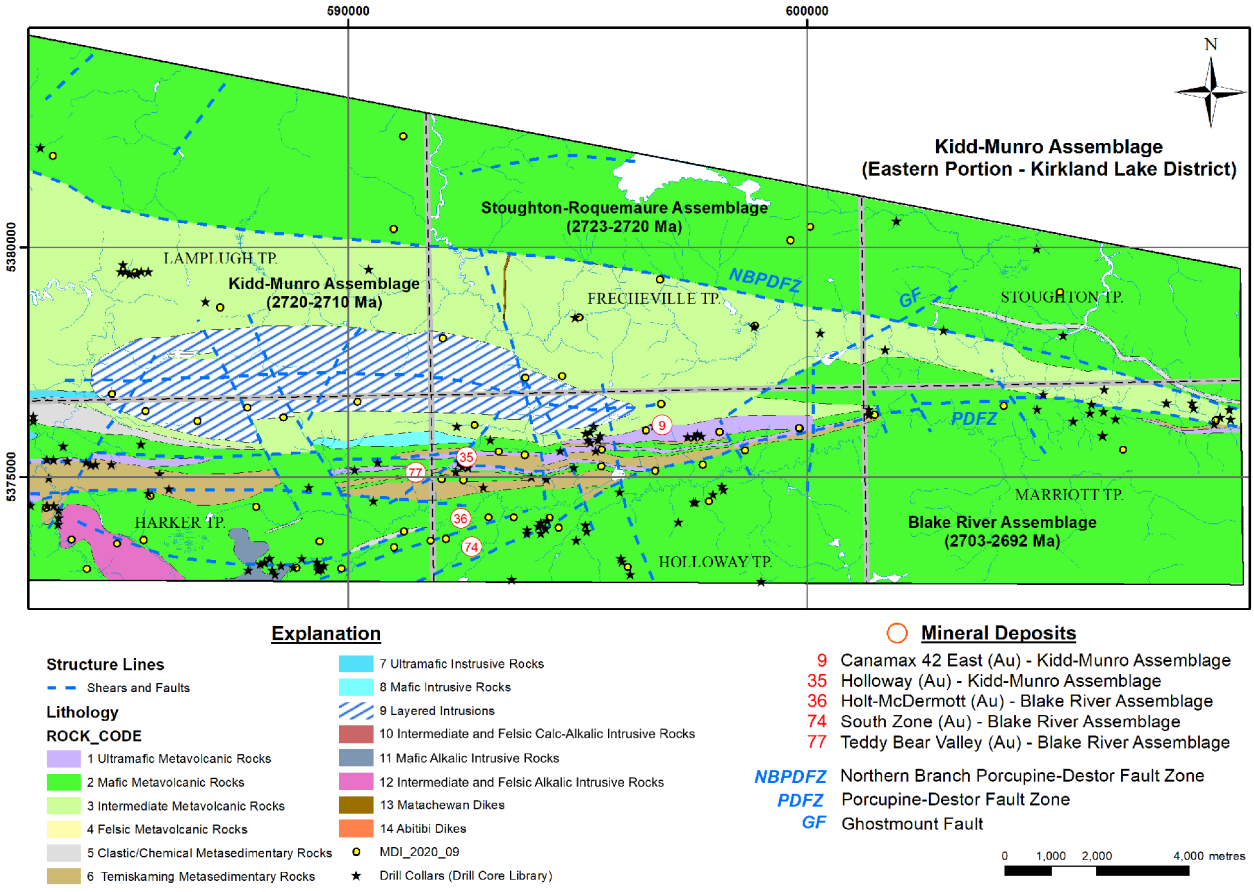


Figure 18. Geological map of the easternmost part of the Kidd–Munro assemblage in the Kirkland Lake District (*modified from* Berger 2010) showing the locations of the gold-related mineral occurrences documented in the Mineral Deposit Inventory (MDI) database (Ontario Geological Survey 2020a) and drill-core collars of core kept at the Kirkland Lake Drill Core Library, the details of which can be found in the Ontario Drill Hole Database (ODHD; Ontario Geological Survey 2020b).

A similar map is presented in Figure 19, highlighting interpreted geological structures (Berger 2010) and locations of specific mineral occurrences (Ontario Geological Survey 2020a) that report gold mineralization both within and immediately adjacent to the Kidd–Munro assemblage. The reader will note the association between structure and reported gold showings.

Table 10. Documented gold-related mineral occurrences (keyed to Figure 19).

ID	MDI Number	Location Description	Comment
5	MDI32D12SE00035	Diamond-drill hole 88-03	No logs
11	MDI32D12SE00143	Pit	0.10 oz/t gold (grab)
12	MDI32D12SE00028	Diamond-drill holes DDH8a, DDH9 & DDH11	Up to 0.2 oz/t gold
13	MDI32D12SE00020	Adit	Trace gold (grab)
14	MDI32D12SE00008	DDH, underground workings	5.83 g/t Au (resource)
15	MDI32D12SW00219	Drill-hole collar on claim 43078	Discretionary occurrence
16	MDI32D12SE00140	Collar of DDH9	Up to 0.02 oz/t gold
17	MDI32D12SE00014	Diamond-drill hole 49-02-07	910 ppb Au
18	MDI32D12SE00047	Sonic drill-hole 88-06	Trace gold in till
19	MDI32D12SW00068	Sonic drill-hole 85-43	Trace gold in till
22	MDI32D12SW00069	Sonic drill-hole 85-42	Trace gold in till
23	MDI32D05NW00070	Backhoe till sample 85-35B	5000 ppb Au
25	MDI32D12SE00007	Group of 20 diamond-drill holes	Developed prospect
26	MDI32D12SE00048	Sonic drill-hole 88-16	Trace gold in till
27	MDI32D12SE00002	Diamond-drill hole	Up to 0.5 oz/t gold
31	MDI32D12SE00013	Diamond-drill hole 49-04-01	Up to 2.43 g/t Au
32	MDI32D12SE00012	Diamond-drill hole 010-47-1	Average 1.270 ppb Au

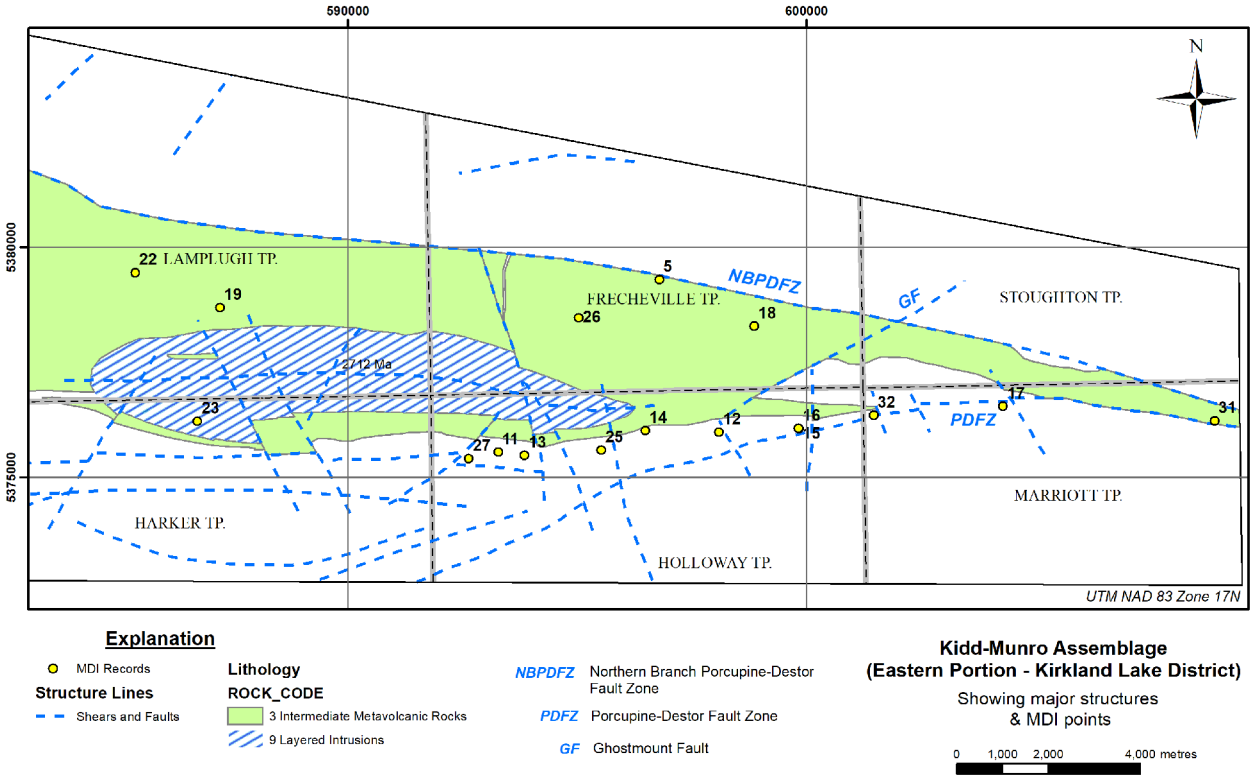


Figure 19. Simplified map of the easternmost part of the Kidd–Munro assemblage in the Kirkland Lake District (*modified from* Berger 2010) highlighting the major geological structures and the locations of documented gold-related mineral occurrences, as keyed to Table 10 (MDI; Ontario Geological Survey 2020a).

KEY ELEMENTS OF THE EASTERN KIDD–MUNRO ASSEMBLAGE

An excellent description of the Kidd–Munro assemblage is provided by Bleeker and van Breemen (2011), who subdivided the 2720 to 2710 Ma assemblage into 4 age groups, each spatially restricted with distinct rock types, volcanic morphologies, geochemical affinities and distinctive base and precious metal prospectivity. These are summarized as follows.

- The 2720 to 2717 Ma group is composed of tholeiitic and transitional mafic, intermediate and rare felsic metavolcanic flows, located mostly in Quebec with minor base metal mineralization.
- The 2717 to 2715 Ma group is a bimodal suite of tholeiitic mafic and high-silica felsic metavolcanic flows and a komatiitic suite (proximal to the Kidd Creek Mine). It is worth noting that the tholeiitic felsic metavolcanic rocks of this age are also host to VMS mineralization, as are the high-silica rhyolite units of this age group.
- The 2715 to 2712 Ma group consists mostly of mafic tholeiitic lava flows. Kambalda-style nickel-copper with minor platinum group elements (PGE) mineralization in thick komatiite sequences can be found in this group in addition to being observed within the preceding 2717 to 2715 Ma age group.
- The 2712 to 2710 Ma group consists mostly of tholeiitic and transitional felsic tuffs and is restricted geographically to only a few areas.

In addition to hosting base metals, rocks of the Kidd–Munro assemblage do host epigenetic gold, and these occurrences appear to be strongly controlled by structure. This is particularly the case for the eastern parts of the assemblage, where notable gold occurrences are known to be associated with the dominant PDFZ and include the Canamax 42 zone and the Lightning zone (Holloway Mine), as shown in Figure 18.

SIMILARITIES WITH OSISKO MINING INC.'S WINDFALL LAKE PROJECT

Osisko Mining Inc. is currently advancing its Windfall Lake property, located in the Eeyou Istchee James Bay Territory of northeastern Quebec, and occurring within the Urban–Barry greenstone belt, located in the northern volcanic zone of the Abitibi geological subprovince. A detailed description of this high-grade and potential multi-million ounce gold deposit is presented by Murahwi and Torrealba (2020). The Urban–Barry greenstone belt contains mafic to felsic volcanic rock units and is crosscut by several east-trending and east-northeast-trending shears that delineate major structural domains.

It is the opinion of the author that similar structural domains are present within the eastern parts of the Kidd–Munro assemblage, and that the Riedel-type structural model presented at Windfall Lake to account for the distribution of gold mineralization (Murahwi and Torrealba 2020), can be applied as an exploration model within the Kidd–Munro assemblage as shown in Figure 20. Similarities include the following.

- The host rock is mostly a felsic to intermediate metavolcanic rock.
- The age of the Kidd–Munro assemblage (2720 to 2710 Ma) falls within the more general age of 2735 to 2705 Ma for the northern volcanic zone of the Abitibi greenstone belt at Windfall Lake.
- Both areas are bound to the north and south by major east-trending fault zones and shear zones. At Windfall Lake, these would be the North and Bank faults, with their equivalent being the northern branch PDFZ and the PDFZ in the eastern part of the Kidd–Munro assemblage.
- Cross faults are observed at Windfall Lake, with the east-northeast deformation zones (Riedel shears), and gold mineralization is strongly associated with these crosscutting structures. Similar cross faults are evident in the Kidd–Munro assemblage as shown in Figure 19.

The Reidel shear model, as a significant control for gold deposition at Windfall Lake, is presented in Figure 20, with an idealized equivalent interpretation proposed for the Kidd–Munro assemblage.

The significance of geological structures within the Kidd–Munro assemblage is described by Bleeker and van Breemen (2011), which notes that the northeast-striking faults are generally more brittle-ductile in character, and of less regional extent than the more northerly and northwest-striking faults, and generally more economically significant. The Ghostmount fault, as shown in Figures 18 and 19, for example, is likely to be a splay off the PDFZ. Similar structures appear as splays off the PDFZ, farther to the west of the Ghostmount fault, proximal to a layered intrusive unit.

To summarize, gold mineralization at Windfall Lake is largely hosted by the following geological settings, all of which are present to some extent in the Kidd–Munro assemblage.

- second-order (D_2) east-northeast deformation zones, concentrated in areas of contrasting rock competencies
- along geometrical boundaries between flat-lying lithological boundaries (layered intrusions) and steep gold-bearing structures
- along strong chemical boundaries between ultramafic (layered intrusions) and felsic rock types

Whilst extensive overburden will pose a challenge in parts of the assemblage area, high-resolution geophysical surveys and the re-assessment of existing publicly accessible geophysical data (Ontario Geological Survey 2003), will be paramount as a desk study, to be supported by overburden–bedrock interface sampling (sonic or rotary air-blast drilling) and subsequent follow-up diamond drilling.

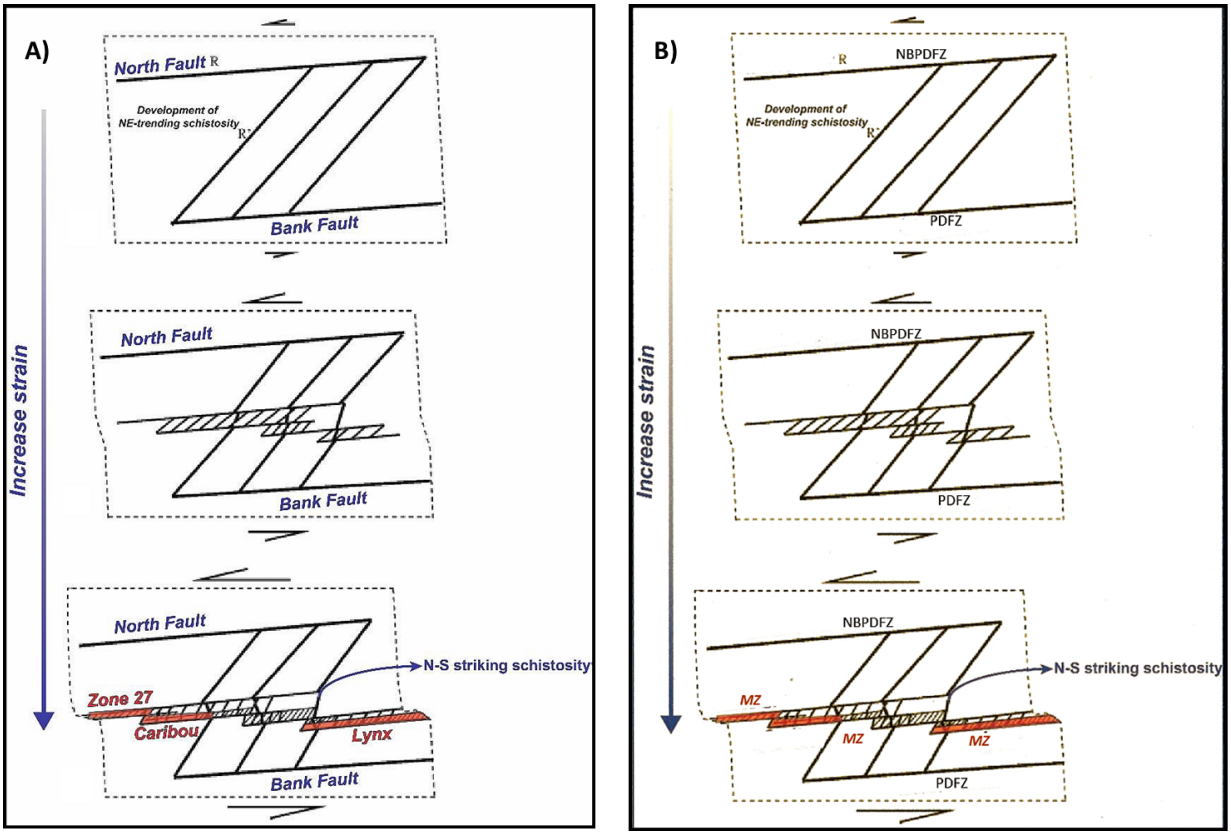


Figure 20. The Riedel-type structural model (R, R′ shears) applied to **A)** the Windfall Lake deposit, Quebec (Murahwi and Torrealba 2020) and **B)** the eastern portion of the Kidd–Munro assemblage. Both figures *modified from* Katz, Weinberger and Aydin (2004). Abbreviations: MZ, mineralized zone; NBPDFZ, northern branch Porcupine–Destor fault zone; PDFZ, Porcupine–Destor fault zone.

OGS ACTIVITIES AND RESEARCH BY OTHERS

Ontario Geological Survey Activities

As reported in the Ontario Geological Survey's *Summary of Field Work and Other Activities 2020* (Beneteau 2020; Hechler et al. 2020; Ontario Geological Survey 2020c), the COVID-19 pandemic created an unusually challenging year for the OGS. Public health restrictions implemented in response to the COVID-19 pandemic resulted in the cancellation of the 2020 field season for the OGS Earth Resources and Geoscience Mapping Section (ERGMS). However, activities that did not require field work continued for several Ontario Geological Survey (OGS) projects conducted in the Kirkland Lake District in 2020.

- P.J. MacDonald (OGS–ERGMS) continued work on an ongoing, multi-year bedrock geology mapping project within the Temagami greenstone belt. The project covers the bedrock geology of Best, Briggs, Chambers, Strathcona and Strathy townships, as well as portions of the surrounding townships where Archean supracrustal bedrock is exposed (MacDonald 2019).
- R.M. Easton (OGS–ERGMS) completed a compilation of geological characteristics for carbonatites across the province and provided the estimated exploration potential for 50 complexes (Easton 2020).
- E.C.G. Hastie (OGS–ERGMS) continued work on a multi-year collaborative project between the Ontario Geological Survey, the Royal Ontario Museum and the Metal Earth research program. The project is developing a method for analyzing major and trace elements associated with gold and working towards a public database for gold geochemistry across Ontario and the world. The project currently makes use of samples from 13 deposits in the Kirkland Lake District (Hastie et al. 2020).
- D.R.B. Rainsford and S. Biswas (OGS–ERGMS) described 2 airborne geophysical surveys were commissioned by the OGS. The Sturgeon River area airborne magnetic gradiometer survey and the Biscotasing area time-domain electromagnetic (TDEM) and magnetometer survey, both located in northeastern Ontario were concluded in February. Plans to fly a helicopter-borne TDEM and magnetometer survey over the Saganash greenstone belt, also located in northeastern Ontario are far advanced (Rainsford, Biswas and Larsen 2020).

University Studies

LAURENTIAN UNIVERSITY

The Mineral Exploration Research Centre (MERC), a collaborative centre for mineral exploration research and education, as part of the Harquail School of Earth Sciences at Laurentian University, initiated the Metal Earth project that focusses on the metal endowment in the Precambrian Shield. The goal of the project is to improve the science of exploration targeting leading to the discovery of new orebodies. Metal Earth conducted a limited field season in the summer 2020 because of COVID-19 restrictions; details on these activities can be found on the Metal Earth Website (at https://merc.laurentian.ca/research/metal-earth [last accessed February 1, 2021]). Metal Earth did not release articles as part of the OGS *Summary of Field Work and Other Activities, 2020* volume.

As reported last year, out of a total of 4 projects within the Kirkland Lake District, 2 projects formed part of the Larder Lake transect and consisted of regional geological mapping of Blake River Group rocks in Katrine Township, and a study of geochemical characterization of alteration processes with the Kerr–Addison orogenic system. The remaining 2 projects include a study of the structure and stratigraphy of the Archean basement near Cobalt and a study to determine the origin of metals in the silver-cobalt deposits of Cobalt.

CARLETON UNIVERSITY

Nabil Shawwa, a PhD candidate at Carleton University, continued his study on the sedimentary record of Paleoproterozoic atmospheric oxygen in the Huronian Supergroup sediments of Ontario and Quebec. Despite a limited field season because of COVID-19 health and safety protocols, there were some roadside outcrop examinations and minor bush work around Temiskaming Shores, the Lorrain Valley, Kenabeek, Elk Lake, Gowganda, Shining Tree and Matachewan. Project collaboration with staff of the Resident Geologist Program, in addition to Battery Mineral Resources Ltd. and Tri Origin Exploration Ltd., succeeded in accessing appropriate drill core related to the development of the Cobalt Basin. The project is co-supervised by R.H. Rainbird (Geological Survey of Canada), M.G. Babechuk (Memorial University of Newfoundland) and J.E. Mungall (Carleton University).

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

Amy Parkinson, a MSc candidate at Memorial University, continued her study on a provenance, depositional and diagenetic redox analysis of the Lorrain Formation, Huronian Supergroup. No field work was undertaken during 2020 and project work focussed on literature research and sample preparation. The project is being supervised by M.G. Babechuk (Memorial University of Newfoundland) in collaboration with R.H. Rainbird (Geological Survey of Canada) and N. Shawwa (PhD candidate, Carleton University).

UNIVERSITY OF WESTERN ONTARIO

Warrior Gold Inc. announced that it initiated a field mapping program on its Goodfish–Kirana project in collaboration with N.R. Banerjee and his students in the Department of Earth Sciences at the University of Western Ontario. The collaborative studies will focus on gaining a better understanding of the mechanisms of gold mineralization to the north of the Timiskaming unconformity. Warrior Gold expects that the research will assist in refining its exploration targeting strategies using new technologies and scientific approaches.

MINERAL DEPOSITS NOT BEING MINED

Table 11 summarizes the mineral deposits that have either historical or NI 43-101 compliant reserves and resources, for a variety of commodities, that are not currently being mined.

Table 11. Mineral deposits not being mined in the Kirkland Lake Resident Geologist District in 2020.

Abbreviations

AF ..... Assessment Files
AR ..... Annual Report
CAMH ..... *Canadian and American Mines Handbook* [since 2004–2005]
CMH ..... *Canadian Mines Handbook* [up to and including 2003–2004]
GR ..... Geological Report
MD&A ..... Management Discussion & Analysis
MDC ..... Mineral Deposit Circular [No.15–]
..... [formerly Mineral Resources Circular, No.1-14]
MDIR ..... Mineral Deposit Inventory record
MLS ..... Mining Lands, Sudbury
MP ..... Miscellaneous Paper
MR ..... Mining Recorder
NM ..... *The Northern Miner*
OFR ..... Open File Report
PC ..... Personal communication
Website ..... Company web site

Deposit Name (Township)	Commodity MDI No.	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
180 East (Lebel)	Au 32D04SW00336	Historical Indicated Resource (2004): 327 000 t @ 4.1 g/t Au	Agnico Eagle Mines Ltd., CAMH 2015–2016, p.27-29	Queenston Mining Inc., Website, Feb 4, 2013	Inactive
903 Zone (Garrison)	Au	Indicated Mineral Resource (2020): 17 786 000 t @ 0.914 g/t Au Inferred Mineral Resource (2020): 7 521 000 t @ 0.756 g/t Au	O3 Mining Inc., Website, Jan 8, 2021	O3 Mining Inc., news release, Dec 14, 2020	Inactive
95-2 (Lundy)	Diamond 31M12SW00017	Inferred Mineral Resource (year unknown): 20.2 Mt @ 11.3 carats/100 t	Ashton Mining of Canada Inc. (20%) and North Arrow Minerals Inc. (80%) (Claim 1202724 Abstract, Dec 17, 2015)	Stornoway Inc., NI 43-101 Technical Report, Nov 28, 2012	Inactive
Adams (Boston, Lebel)	Fe 32D04SW00013	Historical Resource (1990): 19 398 300 t @ about 26% iron	N/A	N/A	Inactive
Amalgamated Kirkland (Teck)	Au 42A01NE00184	Indicated Mineral Resource (2019): 1 268 000 t @ 6.51 g/t Au Inferred Mineral Resource (2019): 2 373 000 t @ 5.32 g/t Au	Agnico Eagle Mines Ltd., Website, Jan 11, 2021	Agnico Eagle Mines Ltd., Website, Jan 8, 2020	Inactive
Barber Larder (McGarry)	Au 32D04SE00043	Historical Resource (year unknown): 60 000 tons of 0.16 oz per ton Au	Orefinders Resources Inc., Website, Jan 31, 2020	CMH 1990–1991, p.416-417	Inactive
Bear Lake (McGarry)	Au 32D04SE00077	Inferred Mineral Resource (2011): 3 750 000 t @ 5.69 g/t Au	Gatling Exploration Inc., CAMH 2020, p.169	CAMH 2015–2016, p.245-246	Active
Bidgood (Lebel)	Au 32D04SW00073	Indicated Mineral Resource (2011): Pit: 1 447 000 t @ 2.47 g/t Au U/G: 43 000 t @ 7.05 g/t Au Inferred Mineral Resource (2011): Pit: 246 000 t @ 2.88 g/t Au U/G: 136 000 t @ 7.52 g/t Au	Agnico Eagle Mines Ltd., CAMH 2020, p.26-28	Queenston Mining Inc., news release, Oct 17, 2011	Inactive
Big Agaunico (Bucke)	Co 31M05NE00018	Historical Indicated Resource (year unknown): 100 000 tons @ 0.5% Co	N/A	CMH 1982–1983, p.320	Inactive
Blue Quartz (Beatty)	Au 42A09SW00130	Historical Resource (1962): 128 000 tons of 0.86 oz per ton Au	McLaren Resources Inc. (50%) / Orla Mining Ltd. (50%), CAMH 2020, p.252	Red Mile Minerals Corp., NI 43-101 Technical Report, Sep 21, 2010 (Rioux 2009)	Inactive

Deposit Name (Township)	Commodity MDI No.	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Buffonta (Garrison)	Au 32D05N00009	Historical Resource (1997): 407 000 tons @ 5.00 g/t Au	Osisko Mining Inc., CAMH 2020, p.303	Osisko Mining Inc., NI 43-101 Technical Report (McGarry et al. 2013)	Inactive
Canamax (Holloway)	Au 32D12SE00008	Measured and Indicated Mineral Resource (2019): 240 000 t @ 5.10 g/t Au Inferred Mineral Resource (2019): 170 000 t @ 4.30 g/t Au	Kirkland Lake Gold Ltd., Website, Jan 8, 2021	Kirkland Lake Gold Ltd., Website, Jan 8, 2021	Inactive
Cheminis (McVittie)	Au 32D04SE00019	Indicated Mineral Resource (2011): 335 000 t @ 4.07 g/t Au Inferred Mineral Resource (2011): 1 391 000 t @ 5.22 g/t Au	Gatling Exploration Inc., CAMH 2020, p.169	CAMH 2015–2016, p.245-246	Active
Clenor (Strathy)	Au, Ag 31M04SW00088	Historical Resource (year unknown): 24 000 tons of 0.21 oz per ton Au, 1.8 oz per ton Ag	Gwen Resources Ltd., CMH 1997–1998, p.220	GR 163 (Bennett 1978)	Inactive
Commodore (Lebel)	Au 32D04SW00039	Historical Resource (year unknown): 738 000 tons of 0.07 oz per ton Au inferred with a higher grade zone of 307 000 tons of 0.11 oz Au per ton inferred	Agnico Eagle Mines Ltd., CAMH 2020, p.26-29	AF KL-4447	Inactive
Creek Zone (Hislop)	Au 42A08NW00142	Indicated Resource (2004): 483 500 t @ 6.61 g/t Au Inferred Resource (2004): 367 700 t @ 5.90 g/t Au	Hislop Gold Company Ltd. (Stroud Resources), news release, Oct 14, 2017	CAMH 2015–2016, p.412	Inactive
Diadem (Strathcona)	Cu, Ni 31M04SW00077	Historical Resource (year unknown): 500 000 tons of 0.5% Cu, 0.1% Ni to 400 feet	Northstar Gold Corp., Website, Jan 8, 2020	MDC 12 (Shklanka 1969)	Inactive
Duggan zone (Knight)	Au 41P11NE000023	Historical Resource (year unknown): 1.01 Mt @ 2.40 g/t Au	Orefinders Resources Inc., Website, Jan 23, 2020	MDIR 41P11NE00023	Active
Eastmaque (Teck)	Au 42A01NE00043	Historical Resource (year unknown): 2 132 500 tons of tailings of 0.035 oz per ton Au	NA	CMH 1991–1992, p.142	Inactive
Fenn–Gib (Guibord)	Au 42A08SE00121	Indicated Mineral Resource (2018): 40.8 Mt @ 0.99 g/t Au Inferred Mineral Resource (2018): 24.5 Mt @ 0.95 g/t Au	Pan American Silver Corp., CAMH 2020, p.308-310	Pan American Silver Corp., CAMH 2020, p.308-310	Inactive
Fort Knox (Fawcett)	Cu, Ni 41P11SE00074	Indicated Resource (year unknown): 1 020 000 t @ 0.71% Ni, 0.36% Cu, 0.02% Co Inferred Resource (year unknown): 1 490 000 t @ 0.67% Ni, 0.36% Cu, 0.03% Co	Wellgreen Platinum Ltd., CAMH 2012–2013, p.458	CAMH 2012–2013, p.458	Inactive
Garrcon (Garrison)	Au 32D12SW00004	Indicated Mineral Resource (2020): 20 923 000 t @ 0.821 g/t Au Inferred Mineral Resource (2020): 7 056 000 t @ 0.866 g/t Au	O3 Mining Inc., Website, Jan 8, 2021	O3 Mining Inc., news release, Dec 14, 2020	Inactive
Grey Fox (Hislop)	Au 42A09SW01430	Indicated Mineral Resource (2019): 2 485 000 t @ 7.1 g/t Au Inferred Mineral Resource (2019): 678 000 t @ 6.19 g/t Au	McEwen Mining Inc., CAMH 2020, p.251-252	McEwen Mining Inc., CAMH 2020, p.251-252	Active
Gold Pike (Hislop)	Au 42A09SW00033	Historical Resource (1988): 200 000 tons @ 0.09 oz per ton Au	Osisko Mining Inc., CAMH 2020, p.303	Alban Exploration, news release, Apr 27, 1988	Inactive
Golden Harker (Harker, Holloway)	Au 32D05NW00159	Historical Resource (1988): 241 436 tons of 0.178 oz per ton Au	Jubilee Gold Exploration Ltd., CAMH 2020, p.221	CAMH 2010–2011, p.329	Inactive

Deposit Name (Township)	Commodity MDI No.	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Golden Highway (Michaud)	Au 42A08NE00030 42A08NE00038 42A08NE00158 42A08NE00175 42A08NE00036	South West Indicated Mineral Resource (2020): 3 239 000 t @ 4.53 g/t Au Inferred Mineral Resource (2020): 7 601 000 t @ 4.32 g/t Au Windjammer (WJ) South Indicated Mineral Resource (2020): 364 000 t @ 4.19 g/t Au Inferred Mineral Resource (2020): 173 000 t @ 4.59 g/t Au "55" Zone Indicated Mineral Resource (2020): 216 000 t @ 5,11 g/t Au Inferred Mineral Resource (2020): 327 000 t @ 4.31 g/t Au Windjammer (WJ) North Inferred Mineral Resource (2020): 265 000 t @ 3.80 g/t Au Discovery Inferred Mineral Resource (2020): 108 000 t @ 4.12 g/t Au	Moneta Porcupine Mines Inc., Website, Jan 12, 2021	Moneta Porcupine Mines Inc., news release, Dec 10, 2020	Active
Gowganda Silver (Haultain)	Ag 41P10NE00009	Indicated Mineral Resource (2011): Tailings: 1 937 520 t @ 47.5 g/t Ag	Brixton Metals Corp., news release, Dec 19, 2016	Brixton Metals Corp., news release, Dec 19, 2016	Inactive
Hare Lake (Tyrrell)	Au 41P11NE00024	Historical Resource (year unknown): 600 000 t @ 6 g/t Au	Pan American Silver Corp., CAMH 2020, p.308-310	Goldeye Explorations Ltd., news release, Nov 5, 2002	Inactive
Hislop (Hislop)	Au 42A08NW00154	Proven and Probable Mineral Reserve (2019): 176 000 t @ 5.8 g/t Au Measured and Indicated Mineral Resource (2019): 1 150 000 t @ 3.6 g/t Au Inferred Mineral Resource (2019): 800 000 t @ 3.7 g/t Au	Kirkland Lake Gold Ltd., CAMH 2020, p.228	Kirkland Lake Gold Ltd., news release, Feb 20, 2018	Inactive
Hydro Creek / Big Dome (Tyrrell)	Au 41P11NE00024	Indicated Mineral Resource (2014): 1 290 000 t @ 1.28 g/t Au Inferred Mineral Resource (2014): 22 010 000 t @ 1.04 g/t Au	Pan American Silver Corp., CAMH 2020, p.308-310	Temex Resources Corp., news release, Jan 15, 2014	Inactive
Iris (Harker)	Au, W 32D05NW00021	Historical Resource: 769 756 tons of 0.07 oz per ton Au	N/A	AF KL-3170	Inactive
Jonpol (Garrison)	Au 32D12SW00044	Indicated Mineral Resource (2020): 17 786 000 t @ 0.914 g/t Au Inferred Mineral Resource (2020): 7 521 000 t @ 0.756 g/t Au	O3 Mining Inc., Website, Jan 8, 2021	O3 Mining Inc., news release, Dec 14, 2020	Inactive
Juby (Tyrrell)	Au 41P10SW00013	Juby Main & Golden Lake zones Indicated Mineral Resource (2020): 20 200 000 t @ 1.12 g/t Au Inferred Mineral Resource (2020): 41 500 000 t @ 0.99 g/t Au Hydro Creek & Big Dome zones Indicated Mineral Resource (2020): 1 100 000 t @ 1.31 g/t Au Inferred Mineral Resource (2020): 5 600 000 t @ 0.93 g/t Au	Caldas Gold Corp., Website, Jan 11, 2021	Caldas Gold Corp., news release, Oct 5, 2020	Inactive
Kanichee (Strathy)	Cu, Ni, Au, Ag, PGE 31M04SW00022	Historical Drill Proven and Indicated Resource (year unknown): 2 062 505 tons of 0.412% Cu, 0.257% Ni	Progenitor Metals Corp., Website, Feb 1, 2020	Northern Platinum Ltd., CMH 1989–1990, p.346	Inactive

Deposit Name (Township)	Commodity MDI No.	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Kerr–Addison (McGarry)	Au 32D04SE00011	Proven and Probable Reserves (2010): 771 000 tons @ 0.110 oz per ton Au (84 500 oz Au) Possible Reserves (2010): 1 299 000 tons @ 0.124 oz per ton Au (161 800 oz Au) Additional Mineral Inventory (2010): 3 051 000 tons @ 0.150 oz per ton Au (457 600 oz Au)	Gold Candle Ltd., PC	Armistice Resources Corp., Dec 23, 2010	Inactive
Kerrs (Kerrs)	Au MDI000000001443	Inferred Mineral Resource (2011): 7 041 460 t @ 1.71 g/t Au	Canoe Mining Ventures Corp., CAMH 2020, p.97-98	Canoe Mining Ventures Corp., CAMH 2020, p.97-98	Inactive
Kokoko (Chambers, Cynthia)	Fe 31M04SW00096	Historical Unclassified (year unknown): 93 700 000 tons @ 25% Fe	J.M. Kleinboeck & D.D. Laronde, CLAIMaps III, Jan 6, 2016	AF CO-0866	Inactive
Leckie (Strathy)	Au 31M04SW00090	Historical Probable Resource (year unknown): 348 240 tons @ 0.20 oz per ton Au Historical Possible Resource: (year unknown): 57 237 tons @ 0.17 oz per ton Au	Progenitor Metals Corp., Website, Feb 1, 2020	CAMH 2000–2001, p.372	Inactive
Ludgate (Michaud, Guibord, Garrison)	Au 42A08NE00159	Measured and Indicated Mineral Resource (2018): 522 000 t @ 4.10 g/t Au Inferred Mineral Resource (2018): 1 396 000 t @ 3.60 g/t Au	Kirkland Lake Gold Ltd., Website, Jan 8, 2021	Kirkland Lake Gold Ltd., news release, Feb 20, 2018	Inactive
Martin–Bird (Hearst)	Au 32D04SE00143	Historical Resource (year unknown): 558 000 tons of 0.114 oz per ton Au	Barrick Gold Corp., CAMH 2007–2008, p.87-91	AF KL-3752	Inactive
Matona (Tyrrell)	Au 41P11NE00014	Historical Resource (year unknown): 27 000 t @ 13.2 g/t Au	N/A	MDIR 41P11NE00014	Inactive
McBean–Anoki (Gauthier)	Au 32D04SW00060 32D04SW00069	Indicated Mineral Resource (2019): 1 868 000 t @ 5.33 g/t Au Inferred Mineral Resource (2019): 2 526 000 t @ 4.70 g/t Au	Agnico Eagle Mines Ltd., Website, Jan 11, 2021	Agnico Eagle Mines Ltd., Website, Jan 8, 2020	Active
McGarry (McGarry)	Au 32D04SE00013	Indicated Mineral Resource (2011): 492 000 tons @ 0.23 oz per ton Au Inferred Mineral Resources (2011): 172 000 tons @ 0.17 oz per ton Au	Orefinders Resources Inc., Website, Jan 23, 2020	Armistice Resources Corp., NI 43-101 Technical Report, Sep 2011	Active
Mikwam (Noseworthy)	Au 32E05NE00004	Inferred Mineral Resource (2016): 1 810 000 t @ 2.34 g/t Au	Aurelius Minerals Inc., Website, Jan 23, 2020	Aurelius Minerals Inc., NI 43-101 Technical Report (Jobin-Bevans, Harnois and Baker 2016)	Inactive
Minto (Tyrrell)	Au 41P10NW00006	Historical Resource (year unknown): 225 000 t @ 6.9 g/t Au	Orefinders Resources Inc., Website, Jan 23, 2020	MDIR 41P10NW00006	Active
Mirado (Catharine)	Au 32D04SW00004	Inferred Mineral Resource (2013): Pit: 9 927 000 t at 1.18 g/t Au UG: 669 000 t @ 2.90 g/t Au N. Pile: 23 000 t @ 4.71 g/t Au Cen. Pile: 4000 t @ 5.38 g/t Au S. Pile: 5000 t @ 2.74 g/t Au	Orefinders Resources Inc., Website, Jan 13, 2021	Orefinders Resources Inc., news release, Dec 9, 2013	Inactive
Omega (McVittie)	Au 32D04SE00017	Indicated Mineral Resource (2013): 4 920 000 t @ 1.39 g/t Au (<130 masl) Indicated Mineral Resource (2013): 3 000 t @ 3.19 g/t Au (>130 masl) Inferred Mineral Resource (2013): 3 350 000 t @ 1.80 g/t Au (<130 masl) Inferred Mineral Resources (2013): 1 340 000 t @ 4.00 g/t Au (>130 masl)	Mistango River Resources Inc., Website, Jan 13, 2021	Mistango River Resources Inc., news release, Jul 10, 2013	Active

Deposit Name (Township)	Commodity MDI No.	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Potter (Munro)	Cu, Zn, Ag, Au, Co 42A09SE00015	Indicated Mineral Resource (2011): 3 028 767 t @ 1.45% Cu, 1.19% Zn, 389.7 ppm Co, 11.1 ppm Ag, 127.5 ppb Au Inferred Mineral Resources (2011): 2 071 101 t @ 1.08% Cu, 1.05% Zn, 301.4 ppm Co, 8.7 ppm Ag, 81.7 ppb Au	Millstream Mines Ltd., Website, Jan 23, 2020	CAMH 2018–2019, p.271	Inactive
Ramp / Maude Lake property (Beatty, Carr, Coulson, Wilkie)	Au 42A09SW00133	Historical Resource (1994): 793 474 tons of 0.235 oz per ton Au	Globex Mining Enterprises Inc., CAMH 2020, p.177-178	Globex Mining Enterprises Inc., Website, Jan 15, 2019	Inactive
Ross (Hislop)	Au 42A08NW00005	Historical Resource (year unknown): 1 055 000 tons of 0.125 oz per ton Au	Eastway International Inc.	CMH 1989–1990, p.188	Inactive
Ryan Lake (Powell)	Cu, Mo 41P15NE00015	Indicated Mineral Resource (2008): 5 969 917 t @ 0.34% Cu, 0.039% Mo, 0.09 g/t Au, 5.0 g/t Ag	Pacific Comox Resources Ltd., CAMH 2015–2016, p.330	CAMH 2012–2013, p.505	Inactive
Sherman Mine (Chambers, Strathcona, Strathy)	Fe 31M04SW00025	Historical Reserves (1995): 5 Mt @ 18% Fe	N/A	*The Nugget*, Jul 23, 1995	Inactive
Stairs (Midlothian)	Au 41P14NE00011	Historical Proven Reserve (1965): 45 200 tons @ 0.88 oz per ton Au Historical Probable Reserve (1965): 95 700 tons @ 0.25 oz per ton Au	Teck Resources Ltd., CLAIMaps III, Feb 1, 2016	MDC 18, (Gordon et al. 1979, p.158-159)	Inactive
Teck Hughes (Teck)	Au 42A01NE00020	Measured and Indicated Resource (2003): 3 347 000 tons @ 0.32 oz per ton Au Inferred Resources (2003): 58 900 tons @ 0.35 oz per ton Au	Kirkland Lake Gold Ltd., CAMH 2020, p.228	CMH 2003–2004, p.270	Inactive
Temagami Copper (Phyllis)	Cu, Ni 41I16NE00004	Historical Resource (year unknown): 2 540 117 t @ 1.00% Cu, 0.6% Ni, 0.1% Co	N/A	MDC 12, (Shklanka 1969, p.201)	Inactive
Tillex (Currie, Bownman)	Cu 42A10SE00055	Historical Resources (1990): 1 338 000 t @ 1.56% Cu	Metals Creek Resources Corp., Website, Jan 23, 2020	Metals Creek Resources Corp., Website, Jan 23, 2020	Inactive
Tyranite (Tyrrell, Knight)	Au 41P11NE00013	Historical Resource (year unknown): 520 000 t @ 6.9 g/t Au	Orefinders Resources Inc., Website, Jan 23, 2020	MDIR 41P11NE00013	Active
Upper Beaver (Gauthier)	Au, Cu 32D04SW00068	Probable Mineral Reserve (2019): U/G: 7 992 000 t @ 0.25% Cu, 5.43 g/t Au Indicated Mineral Resource (2019): U/G: 3 636 000 t @ 0.14% Cu, 3.45 g/t Au Inferred Mineral Resource (2019): U/G: 8 688 000 t @ 0.20% Cu, 5.07 g/t Au	Agnico Eagle Mines Ltd., Website, Jan 8, 2021	Agnico Eagle Mines Ltd., Website, Jan 23, 2020	Active
Upper Canada (Gauthier)	Au 32D04SW00057	Indicated Mineral Resource (2019): Pit: 1 842 000 t @ 1.72 g/t Au U/G: 7 808 000 t @ 2.36 g/t Au Inferred Mineral Resource (2019): Pit: 1 034 000 t @ 1.38 g/t Au U/G: 16 037 000 t @ 3.34 g/t Au	Agnico Eagle Mines Ltd., Website, Jan 11, 2021	Agnico Eagle Mines Ltd., Website, Jan 23, 2020	Active
Victoria Creek (Gauthier)	Au 32D04NW00043	Historical Mineral Resource (year unknown): 1 342 000 t @ 5.12 g/t Au	Agnico Eagle Mines Ltd., CAMH 2020, p.26-29	Queenston Mining Inc., Website, Jan 27, 2012	Inactive
Vimy (Hislop)	Au 42A08NW00105	Historical Mineral Resource (year unknown): 18 144 t @ 7.2 g/t Au	N/A	MDIR 42A08NW00105	Inactive

Note: *This table contains tonnage and grade estimates referred to as Resource (indicated, possible, probable), which were determined at various times by methods largely unreported. Except where noted, none of these estimates are known to conform to the standards required for National Instrument 43-101 and should be considered inferred mineral resources not reserves.*

Unit abbreviations used*: g/t = grams per tonne; Mt = million tonnes; oz = ounce(s); ppm = parts per million; t = tonnes.*

REGIONAL LAND USE GEOLOGIST ACTIVITIES—NORTHEAST REGION

Land Use Planning Activities

The northeast Regional Land Use Geologist, based in Timmins, co-ordinates input into land-use planning activities in the Sault Ste. Marie, Timmins and Kirkland Lake Resident Geologist districts and the part of the Sudbury district that is north of the French River. In 2020, the northeast Regional Land Use Geologist position was staffed from January through July by Catherine Daniels, *P.Geo*. For the remainder of the year, the duties were carried out by Catherine Daniels, *P.Geo.*, in her new position as the Land Use Planning and Policy Coordinator, the northwest Regional Land Use Geologist, Sarah Ferguson, *P.Geo.*, and the acting southern Regional Land Use Geologist, Peter LeBaron, *P.Eng.*

The boundaries of the Regional Land Use Geologists' regions are indicated on Figure 21.

Figure 21. Extent of the Regional Land Use Geologists' ("RLUG") areas of responsibility (red lines indicate the regional boundaries; grey lines indicate the municipal boundaries).

The objective of the position is to ensure that geoscience information is considered in policy and land-use planning decisions. The geoscience information relates to

- mineral-related values and economic opportunities
- natural geological and mining-related hazards
- renewable and non-renewable energy sources
- groundwater resources

Program activities that support this objective include helping develop, deliver and administer provincial policies, practices and procedures; and providing advice and guidance to municipalities, agencies and others involved in or affected by land use planning regarding geoscience-related matters.

In 2020, the northeast Regional Land Use Geologist dealt with a variety of land-use planning issues throughout the northeast region. The following sections summarize the work that was done.

CROWN LANDS

The Ministry of Energy, Northern Development and Mines (ENDM) engages with the Ministry of Natural Resources and Forestry (MNRF) when Crown land use planning activities have the potential to impact provincial mineral interests, or to expose those using Crown lands to natural geological or mining-related hazards. These activities relate to forest management planning; energy and other major infrastructure projects; Far North land use planning; proposals to modify existing parks or create new ones; and various other initiatives related to Crown land use.

Crown Land Disposition

In 2020, the northeast Regional Land Use Geologist provided support to multiple ministries in the evaluation of potential lands for 2 agriculture dispositions in the Hearst District in northeastern Ontario. Geoscience information was prepared and provided for this initiative.

Forest Management Planning

The forest management planning process involves consideration of a wide range of values, including mineral values, in the context of forestry activities, and the relevance of legislation other than the *Crown Forest Sustainability Act*, such as the *Mining Act*. The northeast Regional Land Use Geologist was not called upon to provide input into the development of Forest Management Plans in 2020.

The northeast Regional Land Use Geologist provided information pertaining to road construction plans for the Nagagami Forest Management Unit to the local District Geologist, so they could inform any applicable stakeholders.

Approved forest management plans, with detailed information about annual operations, including plans for creating new access routes or decommissioning existing routes, and maps showing forest access roads are posted on the MNRF Web site (https://nrip.mnr.gov.on.ca).

Far North Land Use Planning

The Far North Land Use Planning Initiative is about working with First Nations to identify where development may occur and where land will be designated for protection in the Far North of Ontario. The Far North encompasses 42% of Ontario's land mass in an area generally north of the areas where forest management planning is done (for the planning area boundary, *see* www.ontario.ca/rural-and-north/far-north-ontario). For detailed information about Far North Land Use Planning and the *Far North Act*, *see* www.ontario.ca/page/far-north-land-use-planning-initiative.

All but a few First Nation communities in the Far North are working on a range of land-use planning activities, although they are not all at the same stage in the planning process. In northeastern Ontario, ENDM has provided geoscience information to Constance Lake and Kashechewan First Nations, as they work on gathering information for their planning areas and learning about the land use planning process. Both communities have completed Terms of Reference.

In 2020, the northeast Regional Land Use Geologist provided information and support to the MNRF Far North Branch with regard to the mineral sector and geoscience information to be applied to the Constance Lake First Nation Community-Based Land Use Plan.

In 2020, MNRF undertook a review of the *Far North Act*, during which time the northeast Regional Land Use Geologist provided support and input as needed. The proposed amendments were posted on the Environmental Registry of Ontario on November 30, 2020: a decision is expected for 2021.

Withdrawal Orders

Other work related to Crown land use in the northeast region may include reviews of applications for withdrawal of lands from staking under Section 35 of the *Mining Act*. Applications may be for mining rights only, surface rights only and for both mining and surface rights. Reviews by the northeast Regional Land Use Geologist ensure that mineral potential, mineral sector activity and mining-related hazards are identified and considered before decisions are made. In 2020, one withdrawal order was received from the Ministry of Energy, Northern Development and Mines (ENDM) for an area in Hearst Township, District of Temiskaming.

Aggregates

The northeast Regional Land Use Geologist ensured that mineral potential, mineral sector activity and mining-related hazards were identified and considered before decisions are made regarding aggregate permit applications. No aggregate applications were received for comments in 2020.

MUNICIPAL AND PRIVATE LANDS

The Ministry of Energy, Northern Development and Mines supports municipal and private land use planning through the One Window Planning Service, led by the Ministry of Municipal Affairs and Housing (MMAH), and through the Municipal Plan Review process where a municipality has approval authority. When requested, the northeast Regional Land Use Geologist provides input into, and reviews, draft Official Plans, Official Plan Amendments, draft plans of subdivision and consent (severance) applications to ensure that provincial mineral interests, natural geological hazards and mining-related hazards are appropriately considered in the planning process.

Municipal Planning

The Provincial Policy Statement (PPS), which guides municipal planning in Ontario, is issued under the provisions of the *Planning Act*. The PPS helps to ensure that municipal Official Plans recognize mining operations and areas with significant mineral potential, so that they can be protected from incompatible land uses. The PPS was last modified in 2020. There were no revisions in 2020 directly applicable to the review process of the Regional Land Use Geologist.

As a participant in MMAH's One Window Planning Service for Official Plans and their amendments, the Regional Land Use Geologist provides comments, mineral values mapping and other input as required for Official Plans and Official Plan Amendments. Where a municipality has approval authority, ENDM

participates in the Municipal Plan review directly with the municipality for Official Plan amendments and related planning initiatives.

In addition, reviews are completed, and information provided for pre-consultation for consent applications and formal consent applications, and plan of subdivision/condominium applications. Although such decisions are normally made by municipal governments, most of the area of the northeast region is outside of towns and cities. In the absence of a municipal government to manage planning decisions related to private land in those areas, decisions are made by the MMAH, with the support of partner ministries, including ENDM.

In 2020, the northeast Regional Land Use Geologist provided maps, comments and other input as required for municipal planning activities that included

- 16 consent (severance) and plan of subdivision/condominium applications in 4 single-tier municipalities and 8 unorganized geographic townships or areas
- 7 Official Plans and related planning initiatives (such as Offical Plan amendments, zoning by-laws, and minor variances) in 5 communities
- 4 new draft Official Plans or Official Plan updates

The municipalities involved in these planning initiatives are listed below in Table 12.

Table 12. Municipal planning initiatives with ENDM input, northeastern Ontario, 2020.

Consent (Severance) and Subdivision/Condominium Applications
Consent, Town of Blind River
Consent, Municipality of French River
Consent (early consultation), City of Greater Sudbury
Consent (early consultation), Township of Sables–Spanish River
Consent, Finan Township, District of Algoma
Consent, Guibord Township, District of Cochrane (3)
Consent, Lebel Township, District of Temiskaming
Consent, Munro Township, District of Cochrane (2)
Consent, Robillard Township, District of Temiskaming
Consent, Riggs Township, District of Algoma (2)
Consent, Cascaden Township, District of Sudbury
Plan of subdivision, Tudhope Township, District of Temiskaming
Official Plans and Related Initiatives
Early consultation, Town of Blind River
Official Plan amendment, City of Greater Sudbury
Early consultation, Township of Sables–Spanish River
Zoning By-law amendment, Municipality of French River
Zoning By-law amendment, City of Timmins
Site plan amendment, City of Timmins
Minor variance, City of Timmins
Draft Official Plans and Official Plan Updates
Bruce Mines, Town of
Temagami, Municipality of
Plummer Additional, Township of
Desbarats–Echo Bay Planning Area

Exemptions from Mining Tax

Section 189 (1) of the *Mining Act* allows owners of patented land to apply for exemption from paying mining tax. Key factors that are considered when applications are reviewed include whether or not the lands are being used for mining-related purposes, and whether or not there would be third-party interest in using the lands for mining-related purposes (e.g., the surrounding lands are being explored or the sites in question have provincially significant mineral potential).

During 2020, 3 such applications covering a total of 6 mining patents were reviewed for the northeast region, in Grenfell, Ben Nevis and Clifford townships. Comments were provided to ENDM's Mining Lands Section to be consolidated with other information for the Ministry's consideration and decision.

FIRST NATIONS

In addition to doing work related to Far North land-use planning, the northeast Regional Land Use Geologist provided information on mineral occurrence sites, past or present mining and exploration activity, geology and mineral potential for 1 Treaty Land Entitlement Claim site in northeastern Ontario and for the Constance Lake First Nation traditional land use area in the District of Cochrane.

Information about the mineral potential evaluation process undertaken by the Regional Land Use Geologists using the Metallic Mineral Potential Estimation Tool (MMPET) was also provided to the Strategic Support Unit (ENDM). This information is being utilized to inform the Aboriginal Participation Fund Values Mapping program.

Other Activities

The northeast Regional Land Use Geologist also undertook a number of additional activities in 2020, as outlined below.

MINISTER'S ORDERS

In 2020, the northeast Regional Land Use Geologist commented on a proposed amendment to a Minister's Zoning Order in the Wawa–Dubreuilville area.

CLASS ENVIRONMENTAL ASSESSMENTS

Class Environmental Assessments ("Class EAs") are documents that set out a standard environmental assessment process to evaluate the potential environmental effects of a project. There are currently 11 Class EAs in effect in Ontario (www.ontario.ca/page/class-environmental-assessments-approved-class-ea-information), relating to the development of new infrastructure, such as dams, transmission lines, pipelines, highway corridors, commuter rail stations and bus terminals, and sewer and water facilities; the establishment of new parks and conservation reserves; forest management plans; and Crown land dispositions.

The northeast Regional Land Use Geologist worked with staff from MNRF and other ministries to ensure that relevant geoscience information and provincial mineral interests were identified and accommodated early in the planning process of projects subject to Class EAs. In 2020, feedback was provided for reviews of 2 Class EA projects within northeastern Ontario:

- a Crown Land purchase for agricultural use in the Kapuskasing area, Hearst District
- a minor Crown Land Use Amendment to allow for agriculture to occur as a permitted use on areas designated for aggregate resource extraction in the Kapuskasing area, Hearst District

In 2020, the Ministry of the Environment, Conservation and Parks (MECP) undertook a review of the Class Environmental Assessment process. The proposed amendments to Class EAs and regulatory exemptions were reviewed by the northeast Regional Land Use Geologist. Input was provided to the Environmental Assessment Coordinator (ENDM), who co-ordinated ENDM's response to MECP.

POLICY AND GUIDANCE

The northeast Regional Land Use Geologist assisted staff from the Resident Geologist Program offices in Timmins, Kirkland Lake, Sudbury and Sault Ste Marie with inquiries that included a land-use component. Land use–related inquiries from the general public, such as abandoned mines information, mineral potential and mining land status, were also addressed.

CONFERENCES AND OUTREACH ACTIVITIES

Because of public health restrictions that were implemented in response to the COVID-19 pandemic, all Resident Geologist Program (RGP) staff worked remotely during the time period between March 16 and December 31, 2020. No conferences or outreach events were attended by the northeast Regional Land Use Geologist in 2020.

MINERAL DEPOSIT COMPILATION GEOSCIENTIST ACTIVITIES—NORTHEASTERN ONTARIO

The Mineral Deposit Compilation Geoscientists (MDCG) investigate and document mineral deposits and occurrences across the province. Through field visits, comprehensive literature research and personal research, they work with regional and district Resident Geologist Program staff to ensure that the Mineral Deposit Inventory (MDI) database is regularly updated. Regular updates are required to ensure that the Ministry of Energy, Northern Development and Mines is using the most up-to-date information in making land-use planning and policy decisions and that mineral industry clients have access to comprehensive and up-to-date records. Records for certain areas are reviewed and updated in support of bedrock mapping and other field work conducted by the Earth Resources and Geoscience Mapping Section (ERGMS) of the Ontario Geological Survey (OGS). As of November 2020, Sheree Hinz became the permanent northeastern Ontario MDCG.

The MDI database is a dynamic compilation of over 19 200 records describing most of the known mineral occurrences in Ontario. It is an important reference tool for explorationists interested in exploring and acquiring mining properties in Ontario. When used in conjunction with other spatial databases generated by the Ontario Geological Survey, it provides additional tools for making mineral discoveries in Ontario.

As described below, MDI record information was provided during 2020.

- Timmins District:
  - complete updates were compiled and entered for Cunningham, Dore, Swayze, Denton, and Carscallen townships
  - 6 new MDI points were added based on assessment work (4) and RGP field visits (2)
  - MDI records were compiled for land-use planning decisions in the Timmins District
- Sault Ste. Marie District:
  - a systemic issue was fixed in many Sault Ste. Marie MDI points
  - updates were done for some past producing mines and elsewhere in the district
  - MDI records were compiled for land-use planning decisions in the Sault Ste. Marie District

- Kirkland Lake District:
  - updates were completed in the Cobalt area, including Coleman, Bucke and Lorrain townships
  - various updates were completed around the district
  - MDI records were compiled for land-use planning decisions in the Kirkland Lake District
- Sudbury District:
  - complete updates were compiled and entered for Trill and Hyman townships
  - 1 new MDI point was added based on assessment work
  - various updates were completed around the district
  - MDI records were compiled for land-use planning decisions in the Sudbury District
- Southern Ontario Region (Southeastern Ontario and Southwestern Ontario districts):
  - complete updates were compiled and entered for Cavendish, Methuen and Tudor townships
  - 10 new MDI points were added based on assessment work (6), data compilation (3) and field work done prior to summer 2020 (1)
  - MDI records were compiled for land-use planning decisions in the Southern Ontario Region

Total contributions to the MDI database completed by the northeastern Ontario MDCG in 2020 included 321 updated records, 13 deleted records and 17 new records. A breakdown, by district, of the MDI records revised by the northwestern Ontario Mineral Deposit Compilation Geoscientist is provided in Table 13.

Table 13. Mineral Deposit Inventory records revision in northeastern Ontario in 2020.

District	Updates	Deletions	New
Kirkland Lake	33	5	0
Sault Ste. Marie	120	0	0
Southern Ontario	50	5	10
Sudbury	26	2	1
Timmins	92	1	6
Total	**321**	**13**	**17**

The publicly available version of the MDI database is updated monthly and is available from the OGS online data warehouse, GeologyOntario (www.ontario.ca/geology). The Mineral Deposit Inventory can also be viewed geographically using the OGSEarth application (www.ontario.ca/ogsearth), which helps users discover data through the Google Earth™ mapping service. The activity reports on mineral exploration, available using the OGSEarth application, includes monthly and year-to-date listings of the MDI records that have been updated.

GEOGRAPHIC INFORMATION SYSTEM DATA SPECIALISTS ACTIVITIES—NORTHWESTERN AND NORTHEASTERN ONTARIO

The Geographic Information System (GIS) Data Specialists, based out of Thunder Bay and Timmins, design and construct electronically derived maps, graphs, tables and other graphics for land-use planning purposes, geoscience compilations, reports, posters, displays and presentations. The northwestern Ontario GIS Data Specialist position was staffed by Genevieve Dorland and northeastern Ontario position staffed by Curtis Patterson for 2020. They provide ongoing support and maintenance for the Resident Geologist Program by co-ordinating the design and implementation of geoscience data standards for all program offices.

Existing Data Products

ONTARIO ASSESSMENT FILE DATABASE AND ONTARIO DRILL HOLE DATABASE

The Ontario Assessment File Database (OAFD) and Ontario Drill Hole Database (ODHD) are updated on a continual basis by RGP staff using the Ontario Mineral Exploration Information System (OMEIS). An intranet-based application launched in 2018, OMEIS is used by RGP and Mining Lands staff to maintain and update assessment file and drill-hole data. New assessment files and related drill-hole information are added to the database as soon as the files are received from Mining Lands. Updates to existing data are made on an ongoing basis. These updates can include corrections to address errors reported by clients or other ENDM staff, or improvements, such as the addition of details that had not been captured for older files. Updated information and new files are accessible through the GeologyOntario search tool within 24 hours. Most of the data entry is carried out by the District Geological Assistants. The GIS Data Specialists are responsible for the administration of OMEIS, the creation of GIS data for the new files and for drill holes, as well as corrections to existing assessment file polygons.

The GIS Data Specialists extract the tabular and spatial data at the beginning of each month and compile updates for OAFD and ODHD for release each as 1) a graphical interface or data layer (keyhole mark-up language (*.kml*) files) through OGSEarth (www.ontario.ca/ogsearth), which can be viewed using user-friendly geographic information programs, such as Google Earth™ mapping service; and 2) a compressed (*.zip*) downloadable file on GeologyOntario (www.ontario.ca/geology). A summary of new items added and existing items updated in 2020 is provided in Table 14.

Table 14. Ontario Mineral Exploration Information System (OMEIS) statistics for 2020.

File Type	New Files Added	Existing Files Updated	New Drill Holes Added	Existing Drill Holes Updated
Approved Assessment	444	2665	4782	1462
Non-Assessment Exploration Work	512	17	400	0
Total	**956**	**2682**	**5182**	**1462**

New Data Products

OGSFocus

The GIS Data Specialists were involved in the development of OGSFocus: a new series of data sets that quantify data from the Ontario Assessment File Database (OAFD), the Ontario Drill Hole Database (ODHD) and the Mineral Deposit Inventory (MDI). A score based on the quantity of data available is assigned to each cell in the Mining Lands Administration System (MLAS) provincial grid along with a relative data rating. The resulting “Data Rating Grids” provide a visual representation of the quantity of data available. OGSFocus layers can be used to draw attention to areas that are available for claim acquisition, and where considerable historical exploration has occurred. The “Data Hot Spots” layer highlights significant contiguous areas with robust data that are available for acquisition. Each “Data Hot Spot” and “Data Rating Grid” cell is linked to a summary of data available in that area. OGSFocus is available as a data layer (*.kml* file) through OGSEarth (www.ontario.ca/ogsearth), which can be viewed using Google Earth™ mapping service; and in GIS format as a compressed (*.zip*) downloadable file. OGSFocus is updated bi-weekly.

PROPERTY EXAMINATIONS GEODATABASE

Starting in the 1960s, the RGP has included "Property Examinations" as an integral part of its annual *Reports of Activities*. The articles are based on field visits by RGP geologists and capture exploration history, significant assay results and geological summaries for specific properties and/or mineral occurrences. They provide third-party geological interpretations from the field visit and often provide recommendations to guide further exploration work. The GIS Data Specialists assisted in the creation of a geodatabase containing locations and attributes for 872 property examination articles encompassed by the Thunder Bay North, Thunder Bay South, Kenora and Red Lake districts. Work is currently underway to compile and eventually add property examinations from the other RGP districts to the geodatabase. Data include location information, Web links to each property examination article, a listing of associated MDI points, OGS geoscience report and Assessment File references, and information about the availability of assay data. The Property Examination Articles geodatabase is available as a compressed data layer (*.kmz* file) through OGSEarth (www.ontario.ca/ogsearth).

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Ontario

Ontario Geological Survey
Resident Geologist Program

Kirkland Lake Regional Resident Geologist (Sudbury District)—2020

by

A.S. Péloquin and R.M. Todd

2021

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Kirkland Lake Regional Resident Geologist (Sudbury District)—2020

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INTRODUCTION

The Sudbury District Geologist Office administers to the judicial districts of Sudbury, Manitoulin, Parry Sound, Muskoka, parts of Nipissing District and the County of Renfrew (Figure 1). The District encompasses approximately 48 000 km^2 and more than 380 geographical townships. The Sudbury District Geologist Office is located on the campus of Laurentian University in the Willet Green Miller Centre, 3rd Floor, 933 Ramsey Lake Road, Sudbury P3E 6B5.

In general, the District is underlain, from north to south, by a diverse assemblage of granitic, volcanic, mafic intrusive and gneissic rocks of the Archean Superior Province; mafic intrusive, volcanic and sedimentary rocks of the Paleoproterozoic Huronian Supergroup of the Southern Province; the Paleoproterozoic Sudbury Igneous Complex and related mafic intrusive rocks, and supracrustal crater fill of the Whitewater Group; various lithologies within the Central Gneiss Complex of the Grenville Province; and Paleozoic sedimentary rocks of the Michigan Basin (*see* Figure 1).

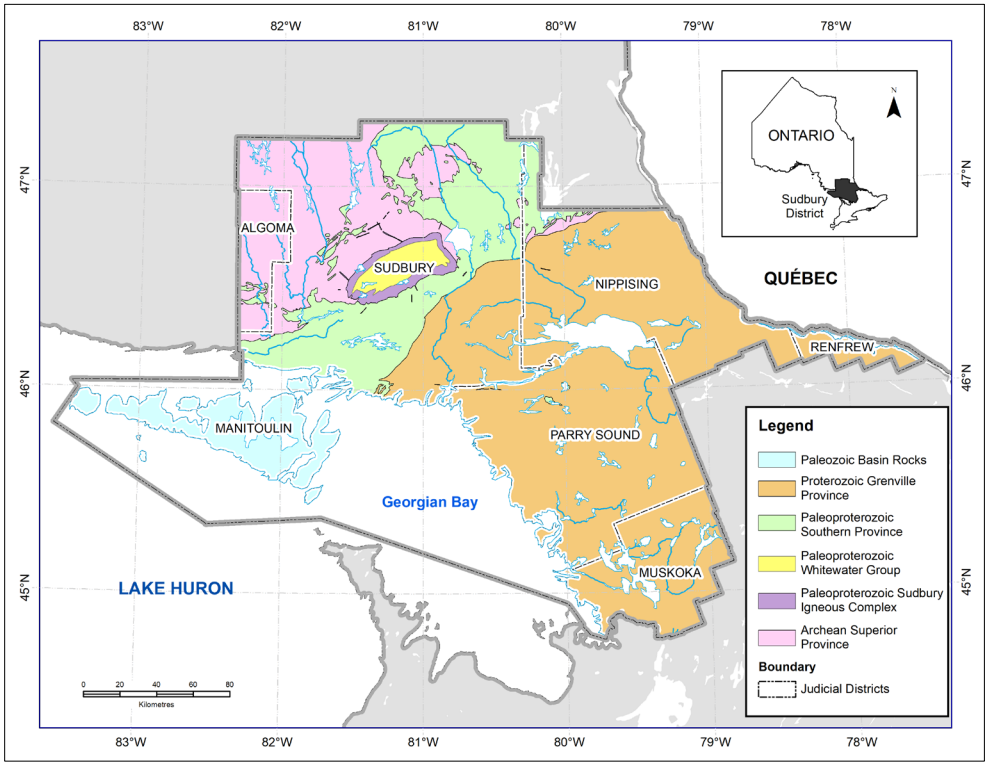

Figure 1. Extent of the Sudbury District, showing the judicial districts covered, and the bedrock geology. Geology *modified after* Ontario Geological Survey (2011).

The Sudbury mining camp is one of the oldest and most active in the world, with nickel-copper mining operations related to the Sudbury Igneous Complex (SIC) providing the basis of economic activity in the Sudbury region (Figure 2). From 1883 to 2019, Sudbury's deposits have yielded approximately 25.2 billion pounds (11.4 billion kilograms) of nickel, 26.9 billion pounds (12.2 billion kilograms) of copper, 5 million ounces (157 million grams) of gold, and 31 million ounces (961 million grams) of platinum group metals (PGM) (Ministry of Energy, Northern Development and Mines (ENDM) estimates).

Dollar values in this report are given in Canadian currency (C$), unless otherwise stated. Ore reserve statistics mentioned in this report may not be National Instrument (NI) 43-101–compliant; compliance or noncompliance/historical will be indicated. Activities and financial statements reported for quarterly periods may be abbreviated as Q in this report (Q1 for first quarter, etc.). Where metal values are given in imperial measures, ounces (oz) are troy ounces, and tons are short tons. Other measurement abbreviations found in this document conform with the International System of Units (SI): tonne (t), kilogram (kg), gram (g), metre (m), kilometre (km), hectare (ha), square kilometre (km^2), kilo (k).

MINING AND QUARRYING ACTIVITY

Metals

In 2020, 8 nickel-copper mines operated by 3 companies—Vale Canada Ltd., Glencore Canada Corp. and KGHM International Ltd.—were producing within the Sudbury Basin (Figure 3, Table 1).

Table 1. Actively producing mines in Sudbury in 2020.

Company	Mine	Township
Vale	Copper Cliff North	McKim
	Creighton	Snider
	Garson	Garson
	Coleman[1]	Levack
	Totten	Drury
Glencore	Fraser[2]	Levack
	Nickel Rim South	Maclennan
KGHM	McCreedy West	Levack

[1]*Also referred to as Coleman–McCreedy East; Lower Coleman*
[2]*Also referred to as Fraser–Strathcona*

VALE CANADA LIMITED

Vale is a global diversified mining company, and the largest nickel producer in the world. Vale Canada's Sudbury Operations have been operating in the Sudbury District for over 100 years. Its activities include mining (Copper Cliff North, Creighton, Garson, Coleman and Totten mines), milling (Clarabelle Mill), and smelting and refining operations (Copper Cliff Smelter and Refinery). Vale's Sudbury Operations employ nearly 4000 people (http://www.vale.com/canada/EN/ | about Vale | communities | sudbury, accessed February 12, 2021).

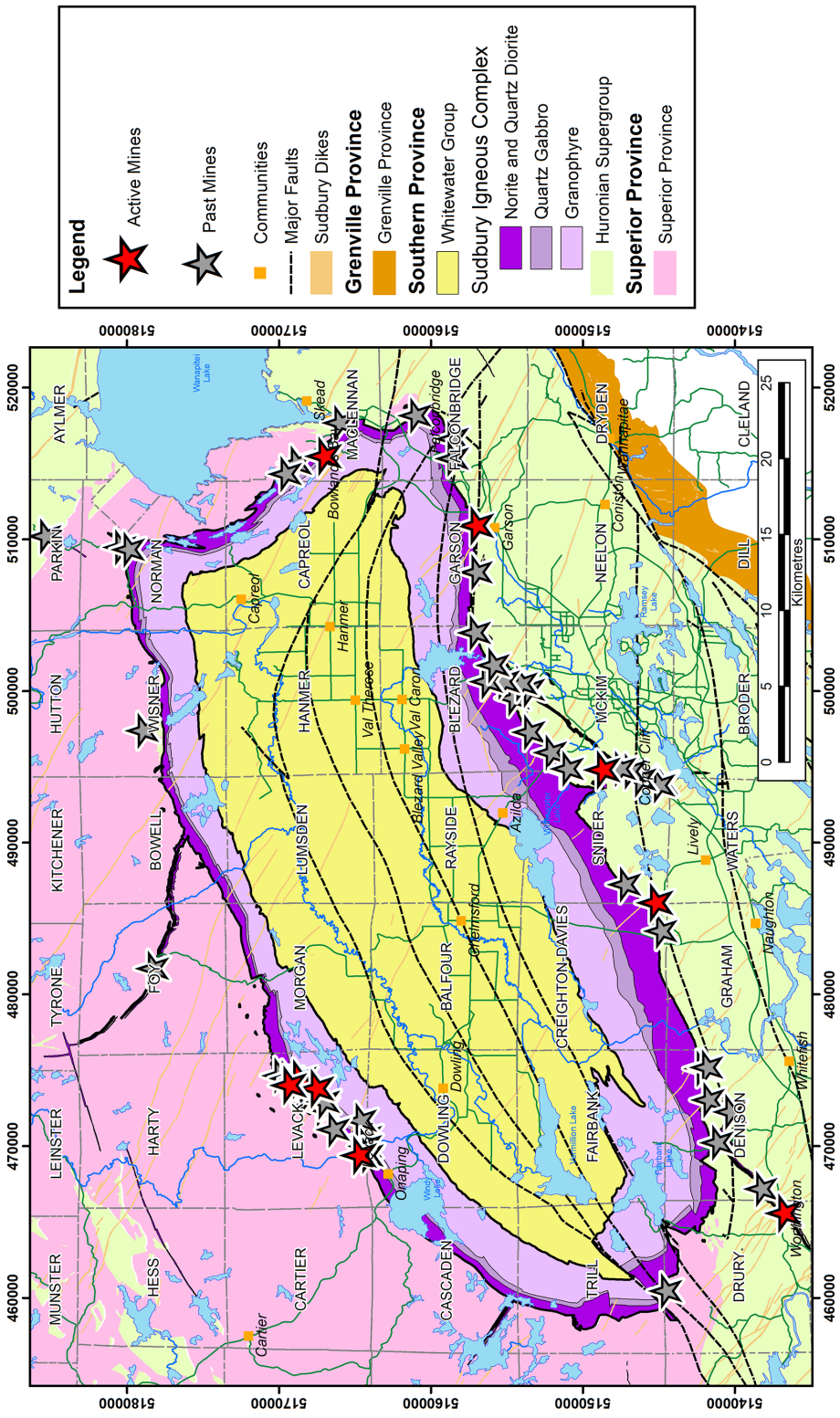

Figure 2. Past and actively producing nickel-copper-cobalt mines related to the SIC (Ontario Geological Survey 2020a); geology *modified after* Ames et al. (2005); Universal Transverse Mercator (UTM) North American Datum 1983 (NAD83) zone 17.

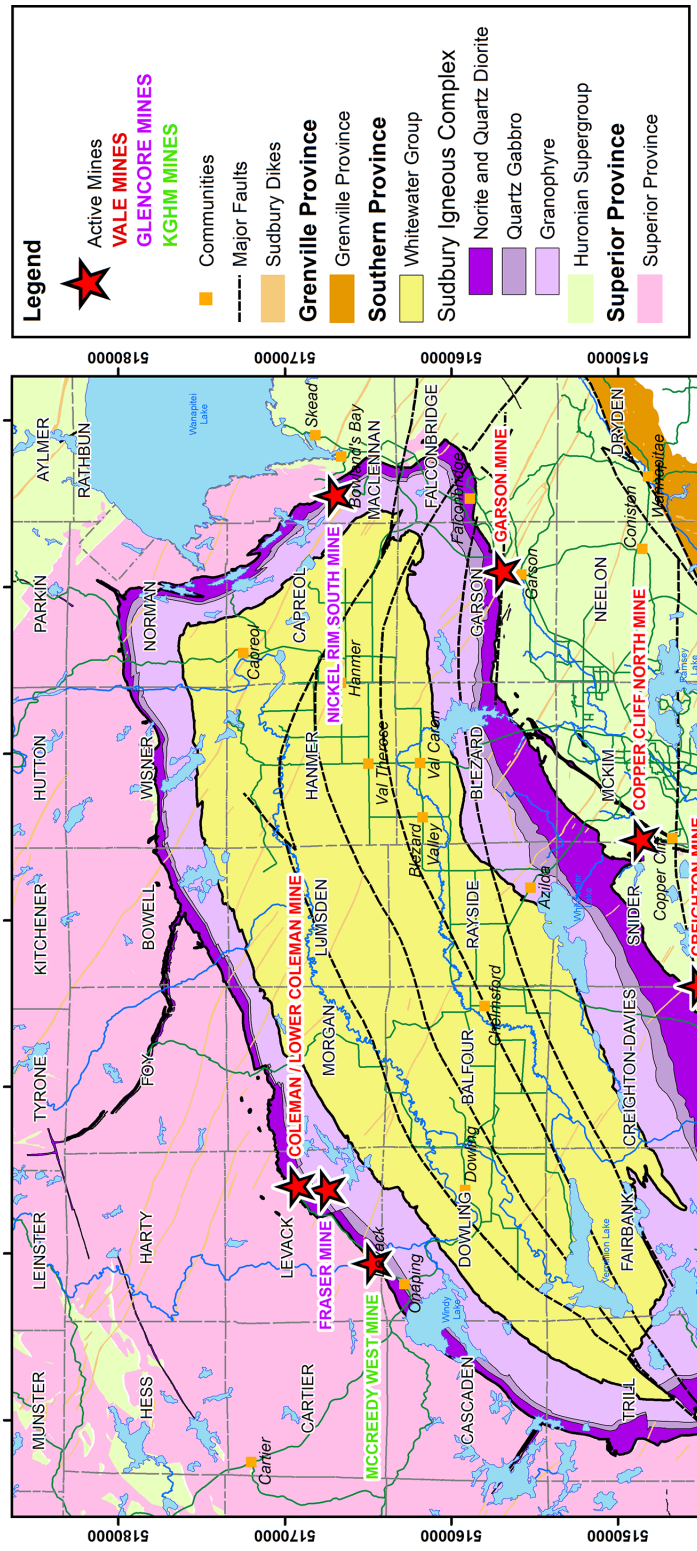

Figure 3. Actively producing mines in the Sudbury District; geology *modified after* Ames et al. (2005); UTM NAD83 zone 17.

Vale's Copper Cliff Smelter can produce up to 150 000 t of nickel and copper matte products (http://www.vale.com/canada/EN/ | about Vale | communities | sudbury | Vale_NiSSS_SmelterOperations_August2020.pdf, accessed February 12, 2021). Vale's Copper Cliff Refinery reports an annual nominal production capacity of 66 000 tonnes of refined nickel, and additionally, produce nickel oxide feed for the refinery in Wales (Vale 2020a).

In 2020, Vale had 5 operating mines in the Sudbury District: Copper Cliff North, Creighton, Garson, Coleman/Lower Coleman and Totten mines (*see* Figure 3), and is working on developing the Copper Cliff Deep mine project (*see* "Mine Expansion and Development"). The total proven and probable reserves in Vale's Sudbury mines, as given in their 2019 20-F report filed April 2020 (Vale 2020a), are shown in Table 2. Vale's mineral reserves in Sudbury decreased in 2019 from 61.7 Mt to 58.1 Mt. The decrease was due to depletion. The projected exhaustion date for the reserves is 2043 (Vale 2020a).

Table 2. Vale Sudbury ore reserves as of December 2019 (*from* Vale 2020a).

Commodity	[1]Total Proven and Probable Reserves (Mt)	Grade (%)	Grade (g/t)	Recovery (%)
	58.1			
Nickel		1.38		75 – 85
Copper		1.75		90 – 95
Cobalt		0.04		20 – 40
Gold			0.47	80 – 90
Platinum			1.26	80 – 90
Palladium			1.52	80 – 90

[1]Defined by Vale (2020a) as "…mineral reserve estimates are of in-place material after adjustments for depletion and mining losses and recoveries, with no adjustments made for metal losses due to processing".

Vale Sudbury Metal Production

In 2020, Vale reported the nickel and copper production from their individual mines in Sudbury as of December 31, 2019 (Vale 2020a; Table 3).

Table 3. Vale Sudbury nickel-copper production for individual mines as of December 2019 (*from* Vale 2020a).

Mine	Production (kt)	Nickel Grade (%)	Copper Grade (%)
Copper Cliff North	644	1.38	1.72
Creighton	613	2.68	2.67
Garson	641	1.77	1.32
Coleman	1102	1.47	3.80
Totten	669	1.33	2.08
Total Ontario operations	3669	1.68	2.50

kt = kilotonne

Vale's 2020 annual production numbers for Sudbury operations were reported in February 2021 (Vale 2021), and are given in Tables 4 and 5. Scheduled mine and plant maintenance was carried out in Q3-2020, with production returning to normal rates in Q4-2020 (Vale 2021).

Table 4. Nickel-copper-cobalt annual production comparison for Vale Sudbury operations 2019–2020 (Vale 2021).

Commodity	2020	2019	Change %
Ni metal (kt)	43.2	50.8	-14.8
Cu metal (kt)	76.5	92.8	-17.6
Co metal (t)	454	495	-8.3

kt = kilotonne; t = tonne

Table 5. Nickel and copper by-product annual production comparisons for Vale world-wide 2019–2020 (Vale 2021).

[1]Commodity	2020	2019	Change %
Platinum (koz)	140	148	-5.4
Palladium (koz)	186	182	2.2
Gold (koz)	469	480	-2.3

[1]Production from all Ni-Cu sources (includes Sudbury)
k, kilo; koz, kilo-ounce troy

GLENCORE CANADA CORPORATION

Glencore Canada Corporation (Glencore) is one of the world's largest diversified natural resource companies. Its Sudbury Integrated Nickel Operations (Sudbury INO) has been operating in the Sudbury District since 1929. Its activities encompass exploration, mineral production (Fraser and Nickel Rim South mines), deep mine projects (Onaping Depth and Nickel Rim Depth), milling (Strathcona Mill) and smelting (Sudbury Smelter). Sudbury INO currently has more than 1300 permanent employees and supports another 1200 contractors.

The Strathcona mill processes ore from Glencore's Sudbury mines, and custom-feed ores from third parties. Two forms of concentrate are produced: nickel-copper, and copper. The maximum processing capacity of the mill is about 2.75 million tonnes of ore per year. The Sudbury smelter smelts nickel-copper concentrate from Glencore's Sudbury, Raglan and XNA (Australia) operations; it also processes custom-feed materials. The smelter is capable of annually producing up to 95 000 tonnes of nickel, copper and cobalt in matte. The matte is sent to Nikkelverk, Norway, for refining. The copper concentrate from the mill is sent to Glencore Copper for smelting (Horne Smelter, Rouyn–Noranda) and refining (Canadian Copper Refinery (CCR), Montreal) (www.sudburyino.ca; www.glencore.ca/en/What-we-do/Metals-and-minerals/Copper [accessed April 07, 2021]).

Glencore operates 2 underground nickel-copper mines in Sudbury: Nickel Rim South and Fraser (*see* Figure 3), and has been working on developing the Onaping Depth and Nickel Rim Depth mine projects (*see* "Mine Expansion and Development").

In 2020, Glencore reported their resources and reserves report as of 31 December 2020 (Glencore 2021a). The totals for Measured and Indicated Resources, and Proven and Probable Reserves in Glencore's Sudbury mines are given in Table 6. Total ore reserves in Sudbury decreased in 2020 due to ore depletion. The current Life-Of-Mine is expected to be 15 years.

Table 6. Glencore Sudbury ore resources and reserves as of December 2020 (Glencore 2021a).

[1]Total Resources and Reserves						
Commodity	**Total Measured and Indicated Resources (Mt)**	**Grade (%)**	**Grade (g/t)**	**Total Proven and Probable Reserves (Mt)**	**Grade (%)**	**Grade (g/t)**
	26.3			17.94		
Ni		2.09			1.93	
Cu		2.33			0.94	
Co		0.05			0.05	
Platinum			0.85			0.39
Palladium			1.04			0.42

[1]Defined by Glencore (2021a) as "cut-off grades are calculated for each individual mine site or resource based on a metal equivalent or net smelter return value taking into account all recoverable metals".

Mt = million tonnes

Glencore Sudbury Metal Production

Glencore reported production from its Sudbury Integrated Nickel Operations (Sudbury INO) as part of its 'Integrated Nickel Operations' (INO), which include Sudbury, Raglan (Quebec) and Nikkelverk (Norway).

Reported in February 2021 (Table 7; Glencore 2021b), Sudbury INO produced 56 900 tonnes of nickel as metal and in concentrate from its own sources in 2020, a 3400 t (6%) decrease from 2019. Copper production as metal and in concentrate was 28 000 tonnes in 2020, a 15 600 tonne (35%) decrease from 2019. The decreases in metal production are a reflection of a decline in head grades.

Table 7. Integrated Nickel Operations (INO) annual production comparison 2019–20 (Glencore 2021b).

Commodity	**2020**	**2019**	**Change %**
Ni metal (kt)	56.5	59.8	-6
Ni in concentrates (kt)	0.4	0.5	-20
Cu metal (kt)	13.5	15.8	-15
Cu in concentrates (kt)	15.1	28.4	-47
Co metal (kt)	0.6	0.7	-14
Gold (koz)	21	29	-28
Silver (koz)	339	507	-33
Platinum (koz)	40	51	-22
Palladium (koz)	101	112	-10
Rhodium (koz)	4	4	0

koz =kilo-ounce troy; kt = kilotonnes

KGHM INTERNATIONAL LIMITED

KGHM is a global diversified mining company, owning a number of mining and mineral properties in the Sudbury District. Mine production (nickel-copper) first occurred on KGHM properties in the early 1900s.

In 2020, KGHM International Ltd. (KGHM) operated the McCreedy West Mine (*see* Figure 3). The ore from the mine is processed at Vale's Clarabelle plant in Sudbury, https://kghm.com/en/our-business/mining-and-enrichment/sudbury [accessed April 07, 2021]. KGHM predicts a 7 year Life-Of-Mine for its current operation (KGHM 2020).

KGHM Sudbury Metal Production

KGHM's 2020 annual Sudbury metal production compared to 2019 is given in Table 8 (KGHM 2021). Only the McCreedy West Mine was producing in 2020. Suspension of mining of the Morrison deposit in 2019 and the lower metals content of the McCreedy deposit account for the decrease in 2020 production numbers in Table 8 (KGHM 2021).

Table 8. KGHM Sudbury Operations annual production comparison 2019–2020 (KGHM 2021).

Commodity	2020	2019	Change %
Ni (kt)	0.4	0.7	-42.9
Cu (kt)	2.1	4.2	-50.0
TPM (koz)	29.9	37.7	-19.8

koz = kilo-ounce; TPM =total precious metals (gold, platinum, palladium)

Industrial Minerals

Commodities produced in the Sudbury District in 2020 included dolostone, silica, flagstone, organic soil conditioner, and several varieties of coloured landscape stone and aggregate (Table 9 and Figure 4). Several companies and individuals extracted sand and gravel for various purposes. The information in this section, regarding active industrial mineral producers, was compiled by staff from the Sudbury District Geologist Office of the Resident Geologist Program (RGP) from information provided by the offices of the Southern Ontario Resident Geologist District and the Ministry of Natural Resources and Forestry (MNRF), and from public domain news sources.

BOREAL AGROMINERALS INC.

Spanish River Carbonatite

Boreal Agrominerals Inc. continues quarrying and selling material extracted from the Spanish River carbonatite as an organic fertilizer. The material is excavated, trucked, screened and packaged for sale as "Volcanic Mineral Plus®". The property consists of active claims and patented mining leases (approximately 445 ha [1100 acres]) in Venturi and Tofflemire townships (*see* Figure 4 [#5]). In 2000, Agricultural Mineral Prospectors estimated the Spanish River Carbonate to have an historical resource of 2 833 740 tonnes (depth of 7.5 m) at 27.4 to 40.11% CaO, 2.64 to 4.55% P_2O_5 and 0.65 to 1.15% K_2O (Smith 2013). The Boreal Agrominerals website lists an updated historical resource, increasing the deposit depth to 25 m at the same grade (45 million tonnes; https://borealagrominerals.ca/operations.html#mine [accessed January 07, 2021]).

Table 9. Industrial mineral and dimension stone producers in the Sudbury District in 2020 (keyed to Figure 4).

No.	Company/Individual	Township/Area	Commodity
1	Meldrum Bay Quarry	Dawson	Dolostone; crushed, metallurgical, chemical stone, aggregate
2	Canadian Colour Rock Inc.	Gordon, Robinson, Aylmer	Dolostone; flagstone, building stone, landscaping stone
3	Colonial Brick & Stone Inc.	Robinson	Limestone; veneer, landscaping stone, flagstone, building stone
4	Odawa Stone Ltd. Partnership (2294669 Ontario Ltd.)	Robinson	Amabel, dolostone; cladding, paving, landscape, armour, countertops
5	Boreal Agrominerals Inc.– Spanish River Carbonatite	Venturi, Tofflemire	Vermiculite, carbonatite
6	Taillefer Quarry	Aylmer	Quartz, sandstone conglomerate; building stone, landscaping stone, monuments
7	Allstone Quarry Products Inc.	Bigwood	Granite; building stone, landscaping stone, flagstone, cut stone
8	Upper Canada Stone Company Ltd. – River Valley Quarry	Gibbons	Marble, limestone; landscaping stone, building stone, ledgerock, specialty aggregates, terrazzo
9	Fowler Construction Company Limited	McDougall	Flagstone, landscaping stone, wall stone, aggregates
10	Mill Lake Stone Quarry Limited	McDougall	Granitic gneiss; flagstone, building stone, landscaping stone, thin stone, veneer
11	Brent Quarries	Medora, Humphrey, Watt	Granite, granitic gneiss; flagstone, landscaping stone, wall stone, armour stone
12	Kafka Granite Glitter Limited	McAulsan	Granitic; crushed, dimension stone, landscape stone
13	Callander Industries Ltd. (Gary M. Mote)	McAuslan, Jocko, Garrow	Quartz-muscovite gneiss; veneer stone, flagstone, landscaping stone
14	Silicorp Developments Inc.	Wyse	Quartz; landscape stone, veneer, polished stone
15	The Rock Centre	Poitras	Granite, limestone, slate, sandstone; flagstone, landscaping stone, aggregate
16	Ted Boyes & Sons Construction Ltd.	Ryerson	Gneiss
17	Brown's Quarry Inc.	Joly	Granite/gneiss armour stone, building stone, flagstone landscaping stone
18	Cushman Stone & Gravel Inc.	Perry	Granitic gneiss
19	Birkendale Natural Stone	Franklin	Granite, gneiss; flagstone, building stone, landscaping stone, armour stone
20	Keystone Granite	Franklin	Flagstone, stairs, landscaping stone
21	McFayden's Stone Quarry	Franklin	Granitic gneiss; flagstone, building stone, landscaping stone
22	Muskoka Rock Company	Franklin	Granitic; landscaping stone, building stone, flagstone, ledgerock

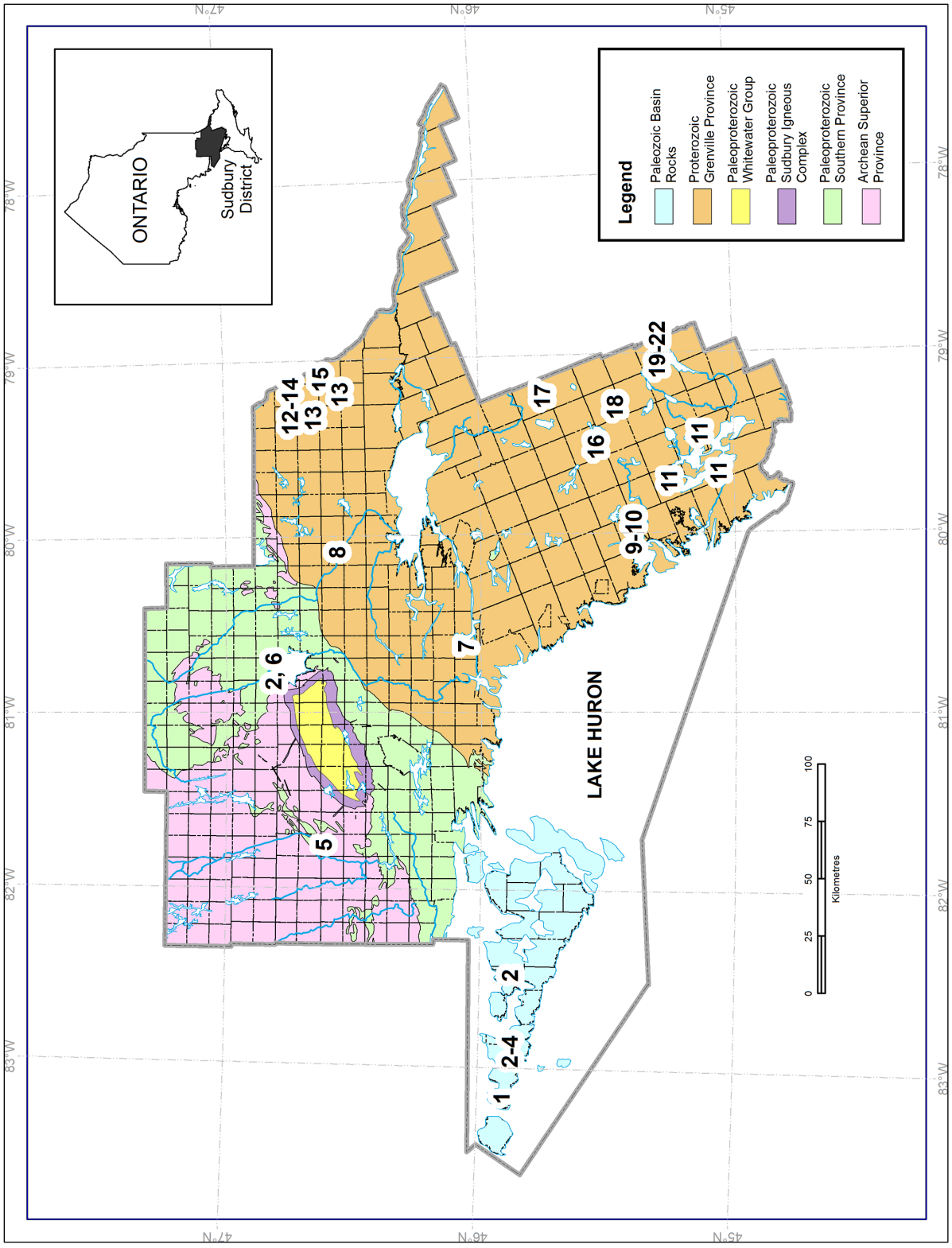

Figure 4. Industrial mineral and dimension stone producers in the Sudbury District in 2020 (keyed to Table 9; note that some companies have multiple extraction sites); geology *modified from* Ontario Geological Survey (2011).

Mine Expansion and Development

There are currently 3 deep mine development projects in the Sudbury District: Glencore's Onaping Depth and Nickel Rim Depth projects, and Vale's Copper Cliff Deep project (Figure 5). In all cases the ore deposits are related to the SIC and are being accessed from pre-existing mine infrastructure.

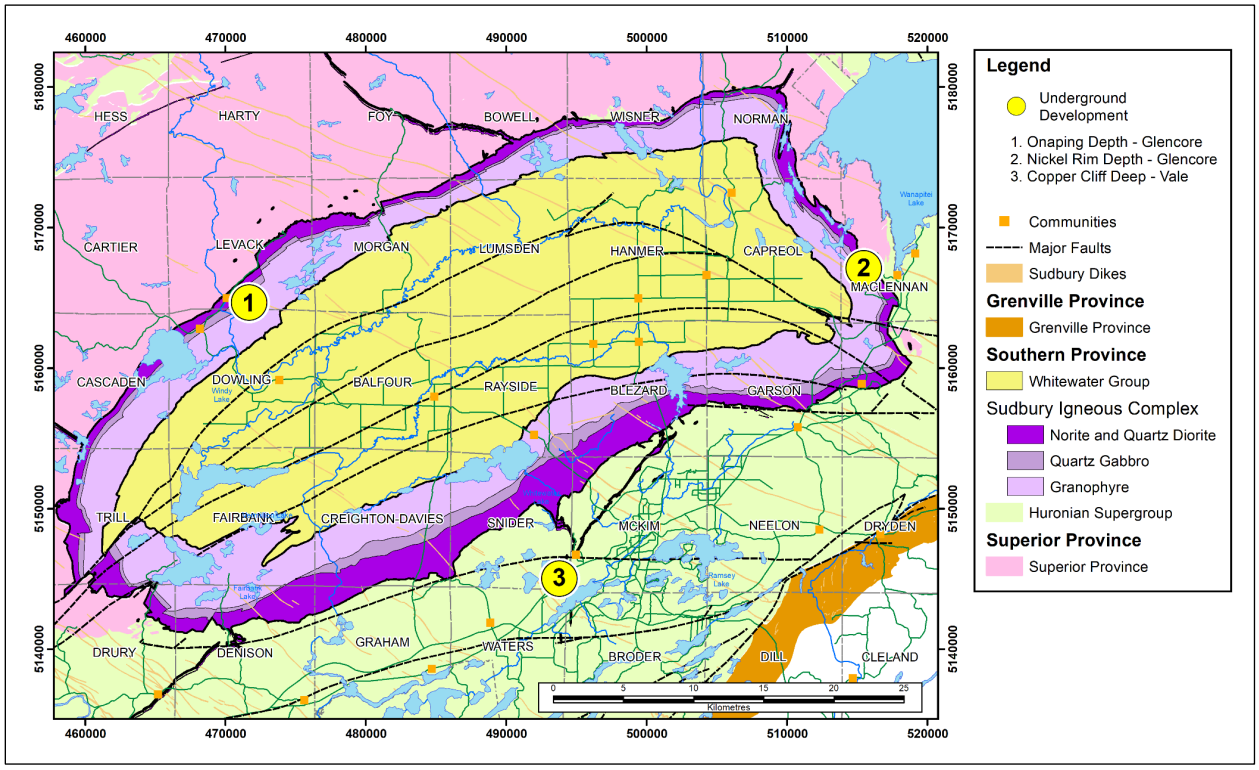

Figure 5. Deep mine development projects in the Sudbury District; geology *modified after* Ames et al. (2005); UTM NAD83, zone 17.

GLENCORE CANADA CORPORATION

Onaping Depth – Underground Development

Glencore continues to advance the development of the Onaping Depth project (https://www.glencore.ca/en/Media-and-insights/Insights/building-the-mine-of-the-future; [accessed April 07, 2021]), located below its Craig and Onaping mines in the North Range of the Sudbury Igneous Complex (www.glencore.ca/en/Media-and-insights/Insights/taking-a-closer-look-at-the-onaping-depth-project; [accessed April 07, 2021]; *see* Figure 5 [#1]). The ore zone was discovered in 1994; a drilling program was completed in the area in 2014 (*Sudbury Mining Solutions Journal,* February 21, 2018). In 2016, Glencore completed a feasibility study of the project and decided on using battery-electric equipment (*Canadian Mining Journal*, February 1, 2019). Full approval for the 700 million USD project was obtained in 2017. Development is from the Craig Mine shaft, which extends to approximately 1.5 km depth (Figure 6). The lateral development from the Craig shaft to above the Onaping deposit extends one kilometre. Excavation of the customized underground headframe was completed in 2019, and work continues on the underground infrastructure. Work on the 1430 m internal shaft to the deposit, running from the 1200 m level to the 2630 m level, has commenced. Initial production is planned for 2023 with full production expected in 2025 (Ontario Prospectors Association 2020; *Canadian Mining Journal*, February 1, 2019; *Sudbury Mining Solutions*

Journal, February 21, 2018). Production figures, and reserve and resource estimates from the Glencore's Investor Update (Glencore 2017) are presented in Table 10. The Onaping Depth deposit is expected to be in production until 2035.

Table 10. Onaping Depth project production, and reserve and resource estimates (Glencore 2017).

Project	Description	Commodity	Reserves and Resources (Mt)	Grade (%)	Production (ktpa)
Onaping Depth	Sulphide project in Sudbury basin using existing infrastructure		14		
		Ni		2.24	20
		Cu		1.01	9

ktpa = kilotonnes per annum

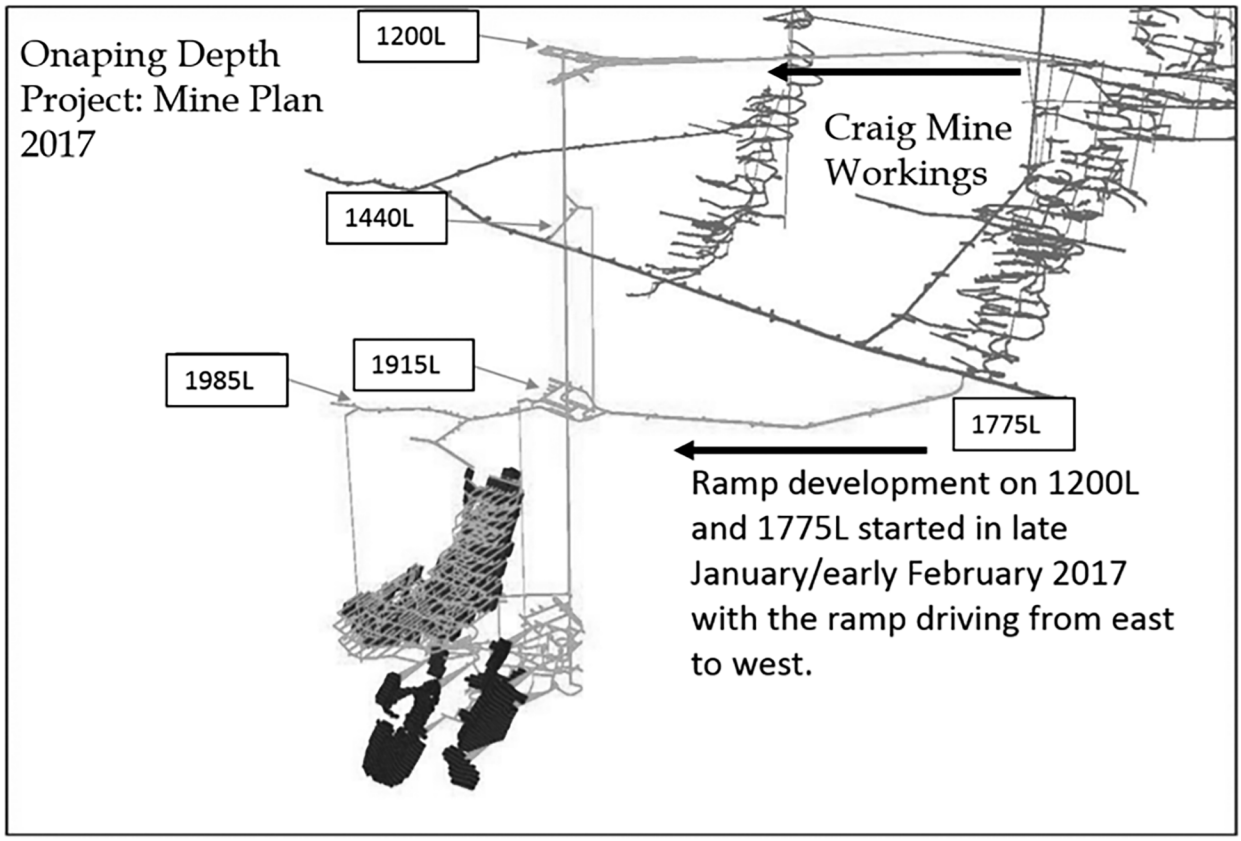

Figure 6. Schema of Onaping Depth project mine plan from 2017 (not to scale); figure *from* Butler and Simser (2017).

Nickel Rim Depth – Underground Development

The Nickel Rim Depth deposit is located approximately 2.3 km west of Glencore's currently operating Nickel Rim South Mine (*see* Figure 5 [#2]), and 2500 to 2700 m below surface (Butler and Simser 2017; Figure 7). It is accessed by underground ramp from the Nickel Rim South Mine.

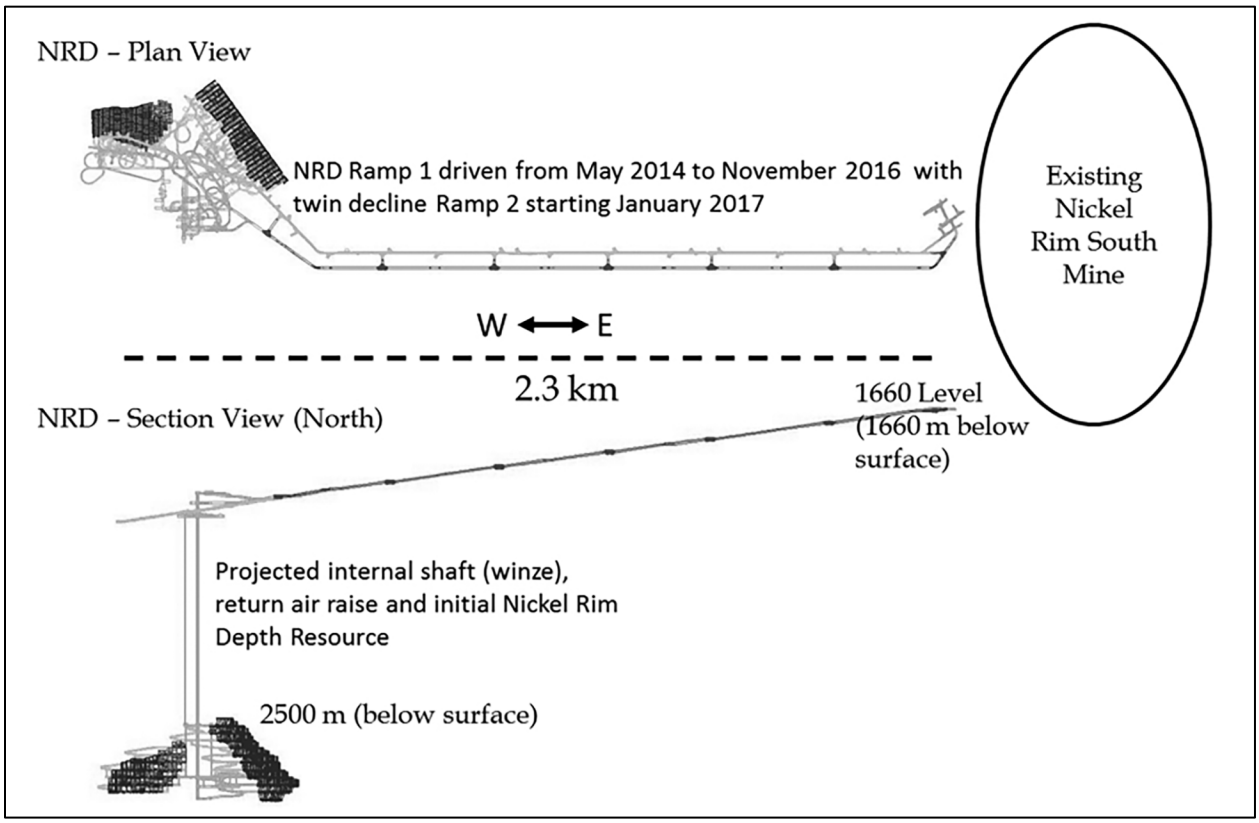

Figure 7. Schema of the Nickel Rim Depth (NRD) project mine plan from 2017 (not to scale); figure *from* Butler and Simser (2017).

VALE CANADA LIMITED

Copper Cliff Deep – Underground Development

Vale (www.vale.com) announced in 2018 that it is proceeding with development of its Copper Cliff Deep project in the South Range of the Sudbury Igneous Complex along the Copper Cliff Offset dike (*Northern Ontario Business*, March 2, 2018; *see* Figure 5 [#3]). Work on the Copper Cliff Deep project started in 2006–2007 and was divided into 3 phases in 2008. Economic considerations placed the project in hiatus. In 2015, prefeasibility and feasibility studies were completed for a smaller phase one. In 2017, Vale established its project team for Copper Cliff Deep. The targeted orebodies are close to the Copper Cliff South shaft, which shut down in 2008 (*Northern Ontario Business*, March 2, 2018). The rehabilitation and refurbishment of the South Shaft, and the associated ventilation work was undertaken in 2019, with full production expected in 2021 (Ontario Prospectors Association 2020; *Canadian Broadcasting Corporation*, November 19, 2019; *Northern Ontario Business*, November 26, 2019). Production is forecast to be 2700 tonnes per day, but the shaft will have a 6000 tonne per day capacity (*Northern Ontario Business*, March 2, 2018).

Historical Mineral Production

PAST PRODUCING MINES

Most of the mining activity in the Sudbury District has occurred in the Sudbury Mining Camp. There are 50 past-producing nickel-copper mines related to the SIC listed in the Ontario Mineral Deposit Inventory (MDI) (Table 11; Figure 8; Ontario Geological Survey 2020a). They are associated with the basal contact and the quartz-diorite offset dikes of the SIC (*see* Figure 8).

Table 11. Past-producing mines related to the SIC (nickel-copper-cobalt-PGM). MDI, Mineral Deposit Inventory *see* Ontario Geological Survey 2020a.

Township	Mine Name	Commodity	Status	MDI #	Alternate Names
Blezard	Frood-Stobie	Ni Cu	Reserves	MDI41I11SE00005	Frood, Stobie
	Little Stobie	Ni Cu	Reserves	MDI41I11SE00004	
	Stobie Mine	Ni Cu	Reserves	MDI41I10SW00020	
	Thayer-Lindsley Mine	Ni Cu PGE	Reserves	MDI41I10SW00039	Lindsley Mine
	Blezard	Ni Cu	No Reserves	MDI41I10SW00010	
	Mount Nickel	Ni Cu	No Reserves	MDI41I10SW00011	
	Sheppard	Ni Cu	No Reserves	MDI41I10SW00009	Shepherd, Davis, Beatrice
Creighton-Davies	Gertrude Mine	Cu Ni	No Reserves	MDI41I06NE00013	
Denison	AER Kidd Property	Ni Cu	Reserves	MDI41I06NW00047	AER Mine, Gersdorffite Mine, Howland Pit, Robinson Zone, Kidd Copper, Worthington Offset
	Lockerby Mine	Ni Cu Co	Reserves	MDI41I06NW00013	
	Victoria Project	Ni Cu	Reserves	MDI41I06NW00014	Victoria Mine, Mond Mine
	Crean Hill Mine	Cu Ni PGE	No Reserves	MDI41I06NW00016	Crean Hill No. 1
	Ellen Open Pit	Ni Cu	No Reserves	MDI41I06NW00015	Crean Hill No. 2
	Vermilion Mine	Cu Ni	No Reserves	MDI41I06NW00017	
Dowling	Boundary Mine	Ni Cu	Reserves	MDI41I11NW00008	
	Hardy Mine	Ni Cu	No Reserves	MDI41I11NW00009	
Drury	Worthington Mine	Ni Cu PGE	Reserves	MDI41I06NW00005	F.C. Crean, Mond Nickel Company
	Sultana Nickel Mine	Cu Ni	No Reserves	MDI41I05NE00015	Miller Claims
Falconbridge	East Falconbridge	Ni Cu	Reserves	MDI41I10SW00003	
	Falconbridge	Ni Cu	Reserves	MDI41I10SW00004	
	Norduna	Ni Cu	No Reserves	MDI41I10SW00005	
Foy	Nickel Offsets Mine	Ni Cu PGE Au	Reserves	MDI41I14SE00004	Mining Location WD250, Ross Mine, Mining Location WR 5 Nickel-Copper-Sulphide
Franklin	Franklin Gold Prospect #1	Ag Ni Au Cu	No Reserves	MDI31E06SE00025	
Garson	Kirkwood Mine -1892, Segway Deposit - 2005	Ni Cu	Reserves	MDI41I10SW00007	
Levack	Craig Mine	Ni Cu	Reserves	MDI41I11NW00049	
	Fecunis Lake Mine	Ni Cu	Reserves	MDI41I11NW00010	
	Levack Mine	Ni Cu	Reserves	MDI41I11NW00006	
	North Mine	Ni Cu	Reserves	MDI41I11NW00015	
	Onaping Mine	Ni Cu	Reserves	MDI41I11NW00012	
	Longvack Mine	Ni Cu	No Reserves	MDI41I11NW00003	

Township	Mine Name	Commodity	Status	MDI #	Alternate Names
	Longvack South Mine	Ni Cu	No Reserves	MDI41I11NW00011	
	McCreedy East	Ni Cu	No Reserves	MDI41I11NW00060	
	Strathcona Mine	Ni Cu	No Reserves	MDI41I11NW00013	
Maclennan	Nickel Rim	Ni Cu	Reserves	MDI41I10NW00003	
	Maclennan	Ni Cu	No Reserves	MDI41I10NW00004	
	Victor	Ni Cu	No Reserves	MDI41I10NW00005	
McKim	Murray	Ni Cu	Reserves	MDI41I11SE00006	
	Copper Cliff	Ni Cu	No Reserves	MDI41I06NE00010	
	Copper Cliff No. 2	Ni Cu	No Reserves	MDI41I06NE00011	McArthur No. 2, Canadian Copper No. 2
	Elsie	Ni Cu	No Reserves	MDI41I11SE00008	
	McKim	Ni Cu	No Reserves	MDI41I11SE00007	
	McKim Mine Area Pits	Ni Cu	No Reserves	MDI41I11SE00019	
Norman	Podolsky Mine	Cu	No Reserves	MDI000000000774	Podolsky 2000 Deposit, Norman North Property
	Whistle Mine	Ni Cu	No Reserves	MDI41I15SW00013	Whistle and Belfeuille Property
Parkin	Milnet Mine	Ni Cu	No Reserves	MDI41I15SW00005	Wallbridge Parkin Offset Property, Jonsmith Mines Ltd, BP Resources V-73 property, Jonsmith Gold Mines Limited
Snider	Copper Cliff No. 1	Ni Cu	No Reserves	MDI41I06NE00003	Canadian Copper No. 1
	Copper Cliff South	Ni Cu	No Reserves	MDI41I06NE00004	Evans Mine
	Evans	Ni Cu	No Reserves	MDI41I06NE00006	
	North Star	Ni Cu	No Reserves	MDI41I06NE00007	McCharles
Wisner	Broken Hammer Mine	PGE Au Cu	No Reserves	MDI000000000780	Broken Hammer Deposit

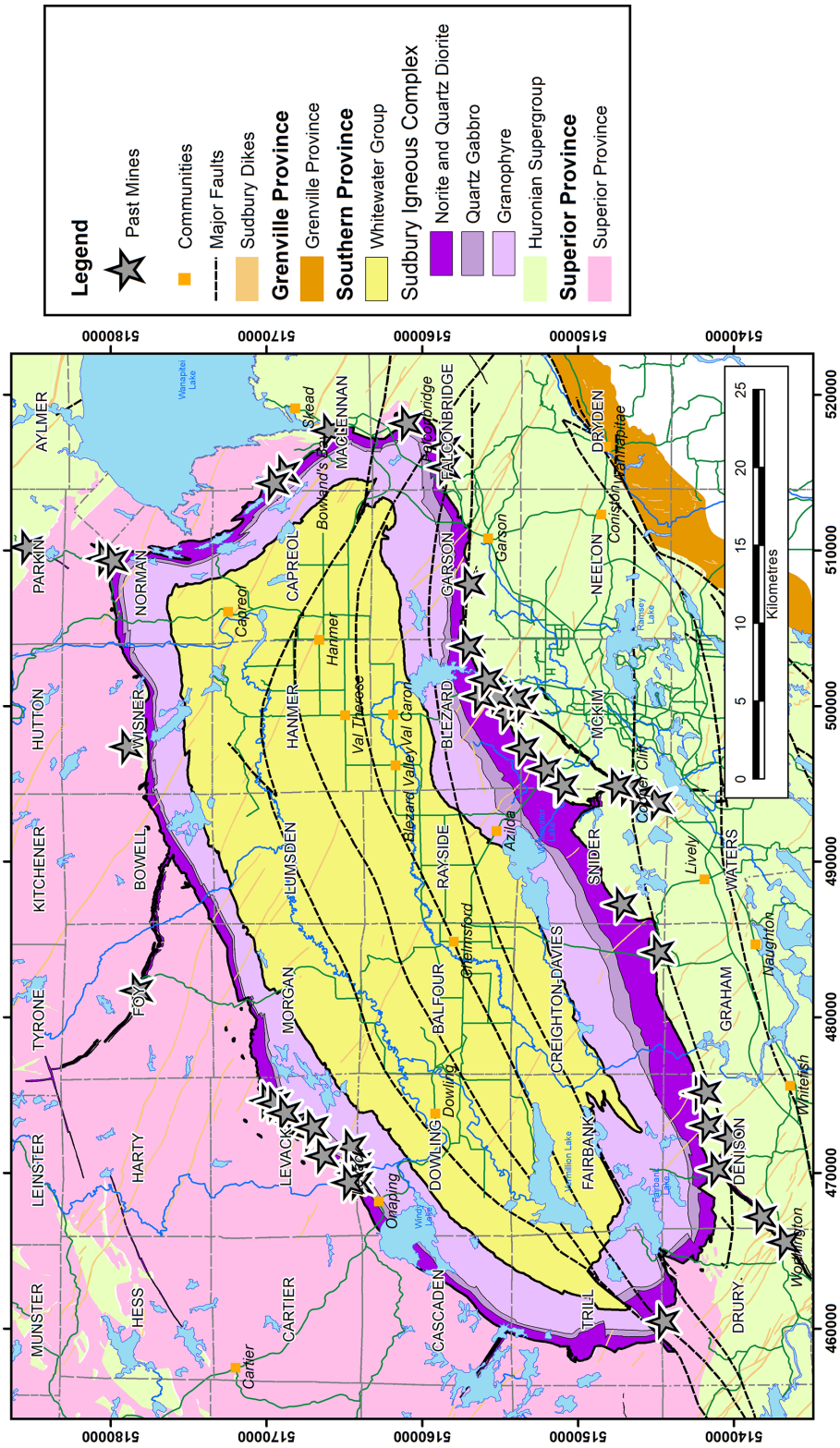

Figure 8. Past-producing nickel-copper-cobalt mines related to the SIC (Ontario Geological Survey 2020a); geology *modified after* Ames et al. (2005); Universal Transverse Mercator (UTM) North American Datum 1983 (NAD83), zone 17.

Although the nickel-copper mines of the SIC are the best known, mineral deposits not hosted by the SIC have also been mined in the Sudbury District. Metal commodities mined (Table 12; Figure 9) include copper, gold, uranium, thorium, lead, silver, zinc and iron. Non-metal commodities mined or quarried (Table 13; Figure 10) include anorthosite, gabbro, gneiss, granite, limestone, dolomite/dolostone, quartzite, feldspar, mica, silica/Quartz, kyanite, clay, diatomite, oil shale, peat, gravel, silica sand, miscellaneous stone.

Table 12. Past-producing metal mines not related to the SIC (Keyed to Figure 9). MDI, Mineral Deposit Inventory *see* Ontario Geological Survey 2020a.

No.	Mine	Township	Status	Commodity	MDI #	Alternate Names
1	Hermenia Mine No.3 Shaft	Salter	No Reserves	Cu	MDI41J01NE00022	
2	Hermenia	Salter	Reserves	Cu	MDI41J01NE00007	
3	Massey Mine No.4 Shaft	Salter	No Reserves	Cu	MDI41J01NE00023	
4	Sable River Copper Company	Salter	No Reserves	Cu	MDI41J01NE00008	Massey
5	McMillan	Mongowin	No Reserves	Au	MDI41I04NW00002	House Lake
6	Bousquet	Curtin	No Reserves	Au	MDI41I04NE00004	
7	Agnew Lake Mine	Hyman	Reserves	U Th	MDI41I05NE00009	Canadian Thorium Corporation Limited Property
8	Vermilion	Fairbank	Reserves	Cu Pb Ag Zn	MDI41I11SW00006	Consolidated Sudbury Basin, Vermilion Lake
9	Errington	Balfour	Reserves	Pb Cu Zn Ag	MDI41I11SW00005	
10	Errington Mine No. 3	Creighton - Davies	Reserves	Zn Pb Cu	MDI41I11SW00030	
11	Moose Mountain Mine No 3 Pit	Hutton	No Reserves	Fe	MDI41I14SE00015	
12	Milnet Mine	Parkin	No Reserves	Cu Ni	MDI41I15SW00005	Wallbridge Parkin Offset Property, Jonsmith Mines Ltd, BP Resources V-73 property, Jonsmith Gold Mines Limited
13	New Golden Rose Mine	Afton	No Reserves	Au	MDI41I16NW00015	Abex Mines Ltd., Afton Mines, Limited, Consolidated Mining and Smelting Company

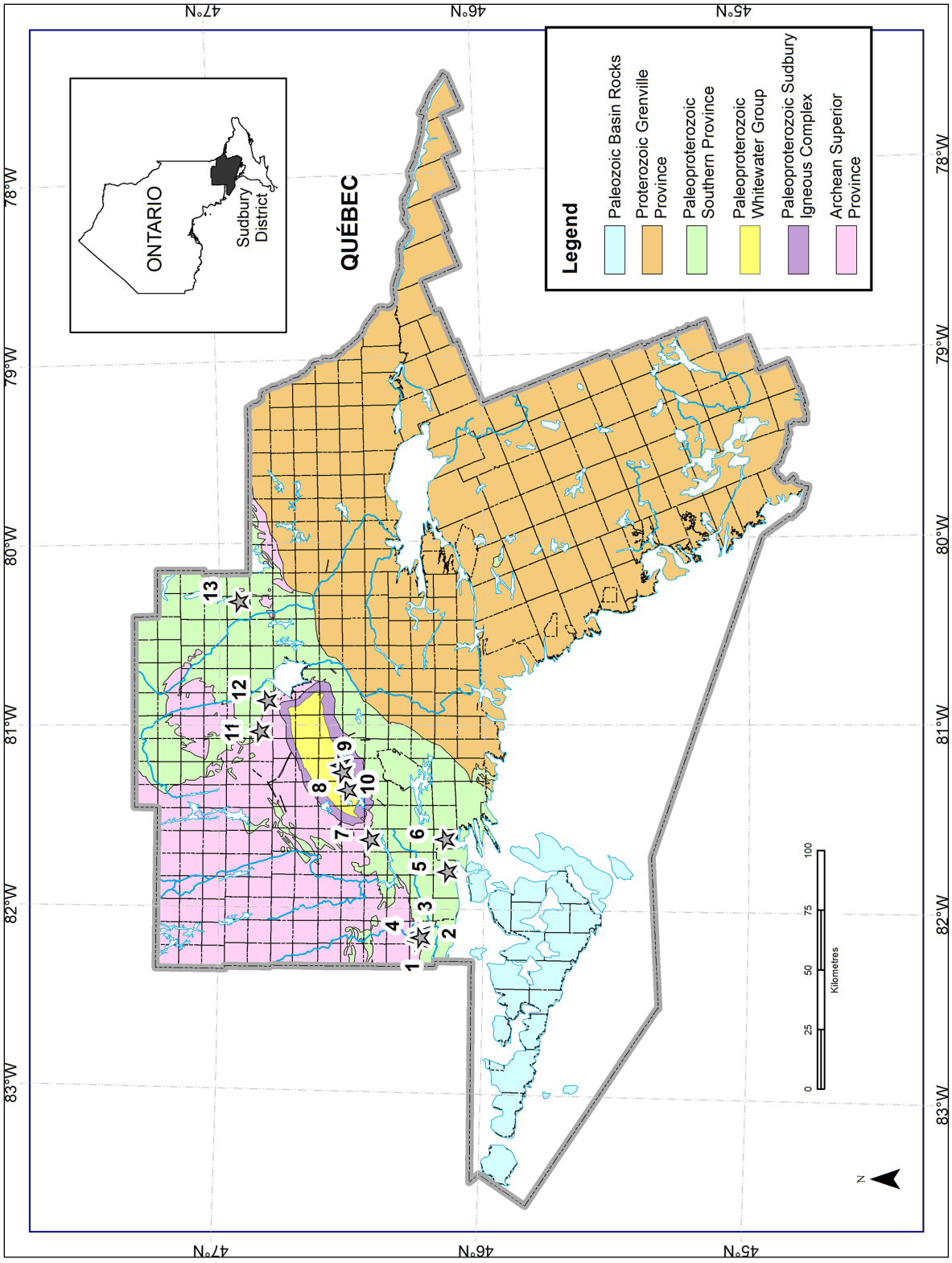

Figure 9. Past-producing metal mines not related to the SIC. Keyed to Table 12. (Ontario Geological Survey 2020a); geology *modified after* Ontario Geological Survey (2011).

Table 13. Past-producing non-metal mines and quarries (Keyed to Figure 10). MDI, Mineral Deposit Inventory *see* Ontario Geological Survey 2020a.

Map #	Township/Area	Mine/Quarry	Status	Commodity	MDI #	Alternate Names
1	Cockburn Island	Cockburn Island	No Reserves	Dolomite/Dolostone	MDI41G14NW00002	
2	Dawson	Meldrum Bay	No Reserves	Dolomite/Dolostone	MDI41G14NE00003	Wicketts Farm
	Dawson	Quarry Point	No Reserves	Dolomite/Dolostone	MDI41G14SE00002	Ryan & Haney Quarry
3	Gordon	Foxey Quarry	Reserves	Limestone	MDI41G15NE00003	
	Gordon	Gore Bay	No Reserves	Dolomite/Dolostone	MDI41G16NW00002	Porter's Quarry
	Gordon	Gore Bay #2	No Reserves	Oil Shale	MDI41G16NW00013	
	Gordon	Gore Bay Airport Quarry	No Reserves	Dolomite/Dolostone	MDI41G15NE00002	
	Gordon	Gore Bay Hole 3	No Reserves	Oil Shale	MDI41G16NW00012	
	Gordon	Jas. Purvis & Sons Ltd Hole 1	No Reserves	Oil Shale	MDI41G16NW00011	
4	Allan	East Gore Bay Quarry	No Reserves	Dolomite/Dolostone	MDI41G16NW00006	
	Allan	Kagawong Quarry	No Reserves	Dolomite/Dolostone	MDI41G16NW00004	
	Allan	Kagawong West Quarry	No Reserves	Dolomite/Dolostone	MDI41G16NW00005	
5	Bidwell	Cup and Saucer Quarry	Reserves	Limestone	MDI41G16NE00006	
6	Tehkummah	Leason Quarry	No Reserves	Dolomite/Dolostone	MDI41H12SW00005	
7	Howland	Sheguiandah	Reserves	Silica Sand	MDI41H13NW00002	
8	Wikwemikong Unceded 26	Great Northern Oil & Gas 1904-06	No Reserves	Oil Shale	MDI41H13SE00006	
9	Frechette Island Area	Croker Island Quarry	No Reserves	Granite	MDI41J01SE00003	
10	Harrow	Lot 4 Con 4 Quartz Quarry	No Reserves	Silica Sand	MDI41I04NW00018	
11	Wells Island Area	Birch Island	No Reserves	Quartzite	MDI41I04SW00003	
12	Whitefish Falls Area	Lawson	Reserves	Silica/Quartz	MDI41I04SE00014	
13	Killarney Ridge Area	Badgeley Island Silica	Reserves	Silica/Quartz	MDI41H13NE00003	Unimin Silica Quarry
	Killarney Ridge Area	Killarney Quarry	Reserves	Silica/Quartz	MDI41H13NE00002	Willmott and Company Quarry
14	Rutherford	Little La Cloche Island Quarry	Reserves	Limestone	MDI41H13NW00004	
15	Truman	Carman Construction Quarry	Reserves	Silica Sand	MDI41I03NW00010	Fielding Quartz Quarry
16	Goschen	Fielding, C.	No Reserves	Silica/Quartz	MDI41I03NW00002	Panache Lake Quartz Quarry
17	Denison	Mond Quartz Quarry	No Reserves	Silica/Quartz	MDI41I06NW00044	
	Denison	Mond Quartzite Quarry	No Reserves	Silica/Quartz	MDI41I06NW00038	
18	Waters	Naughton Quarry	No Reserves	Silica/Quartz	MDI41I06NE00015	
19	McKim	Kelly Lake Quartz Quarry	No Reserves	Silica Sand	MDI41I06NE00018	
20	Dill	Dill Quartz	No Reserves	Silica/Quartz	MDI41I07SW00002	
	Dill	Elizabeth Feldspar	No Reserves	Feldspar	MDI41I07NW00006	

Map #	Township/Area	Mine/Quarry	Status	Commodity	MDI #	Alternate Names
	Dill	Northern Feldspar	No Reserves	Feldspar	MDI41I07NW00008	Weisman Hill Feldspar Mine
	Dill	Vaillancourt Feldspar Quarry	No Reserves	Feldspar	MDI41I07NW00020	
	Dill	Wanup Feldspar	No Reserves	Feldspar Mica	MDI41I07NW00007	Cubar Uranium Mines
21	Cleland	Pelto, Oscar	No Reserves	Feldspar	MDI41I07NW00012	Elbow Creek, Wanapitei River Junction Deposit
	Cleland	Weisman Feldspar	No Reserves	Feldspar	MDI41I07NW00011	
22	Neelon	Mond Nickel Co.	No Reserves	Silica Sand	MDI41I07NW00030	
23	Dryden	Kyanite D	No Reserves	Kyanite	MDI41I10SE00010	Northern Kyanite Mines
	Dryden	McPhee	No Reserves	Feldspar	MDI41I07NW00003	McMaster, McPhee Feldspar Quarry
24	Street	Mohawk Garnet Deposit	No Reserves	Garnet	MDI000000001564	Ecosource Garnet Inc.
25	Delamere	Alexander Centre Industries Quarry	Reserves	Silica/Quartz	MDI41I02SE00018	Alban Quarry, Cosby Delamere Orthoquartzite
26	Davis	Finlan Mines	No Reserves	Feldspar	MDI41I09NW00012	Ess Creek
	Davis	Kabikotwia River E. Feldspar Occurrence	No Reserves	Feldspar	MDI41I09NW00031	Clark and Letson, Wanup Feldspar Mines, Davis & JA
27	Hugel	Carmichael, H.	No Reserves	Feldspar	MDI41I08NW00002	
	Hugel	Larcher Feldspar	No Reserves	Feldspar	MDI41I08NW00003	
28	Crerar	Deer Creek Pegmatite	No Reserves	Feldspar	MDI41I09SE00012	
	Crerar	Erana	No Reserves	Anorthosite	MDI41I09SE00003	Stoncrest, Stonefields, Nipissing Black Granite
	Crerar	Geroux Feldspar	No Reserves	Silica Sand, Feldspar	MDI41I09SE00005	
	Crerar	Old Quarry Black Granite Occurrence	No Reserves	Anorthosite	MDI41I09SE00011	
29	McWilliams	NE Crerar Black Granite	Reserves	Anorthosite	MDI41I09SE00004	
	McWilliams	River Valley Stone Manufacturing Pit	No Reserves	Gabbro	MDI41I09NE00006	
30	Dana	Industrial Garnet	No Reserves	Garnet	MDI41I09SW00002	
	Dana	River Valley Garnet	Reserves	Garnet	MDI41I09NE00002	Dana Township Occurrence, Industrial Garnet Company Ltd.
31	MacPherson	Lavigne Quarry	Reserves	Gravel	MDI41I08SE00005	
32	Gibbons	Nipissing Black Granite	No Reserves	Anorthosite	MDI41I09SW00003	
33	Shawanaga	Gardiner Quarry	No Reserves	Gneiss	MDI41H09SW00006	Dibblee Quarry
34	Carling	MTC Pit Number 39	No Reserves	Gneiss	MDI41H08NE00015	
35	Gibson	Gibson Township Quarry	No Reserves	Gneiss	MDI31D13NW00003	
36	Wood	Torrance	No Reserves	Peat	MDI31D13NE00002	

Map #	Township/Area	Mine/Quarry	Status	Commodity	MDI #	Alternate Names
37	Morrison	Muskoka Diatomite Ltd	No Reserves	Diatomite	MDI31D14NW00002	
38	Draper	Home Brick Limited	No Reserves	Clay	MDI31E03SW00003	Watson and Hutchison Property
39	Franklin	A.E. Allison	No Reserves	Gneiss	MDI31E07SW00003	
	Franklin	Bartell	Reserves	Gneiss	MDI31E06SE00032	
	Franklin	Harold Babcock	No Reserves	Gneiss	MDI31E07SW00002	
	Franklin	Unknown	No Reserves	Miscellaneous Stone	MDI31E06SE00028	
40	Sinclair	Lehman Quarry	No Reserves	Gneiss	MDI31E06SE00003	Fred Boothby
	Sinclair	Read, J.	No Reserves	Gneiss	MDI31E06SE00002	
41	Brunel	Huntsville Brick Works	No Reserves	Clay	MDI31E06SE00005	Stevens Brothers Plant, L. Ware Property
42	Perry	Austin	No Reserves	Diatomite	MDI31E06NW00004	
43	Chapman	S. Mills	No Reserves	Mica	MDI31E12NE00012	C. Herald
44	Croft	Croft Mining Co.	No Reserves	Mica	MDI31E12NE00013	
45	Himsworth	Gomoll Brick and Tile Works	Reserves	Clay	MDI31L03SW00003	D. Clark
46	Widdifield	Gravell Brick Works	No Reserves	Clay	MDI31L06SW00003	Wallace and Son Brick Works
47	Mattawan	Purdy Mine	No Reserves	Mica	MDI31L07SW00014	
48	Head	Carey (Mackey) Mine	No Reserves	Silica Sand, Feldspar	MDI31K04NW00003	

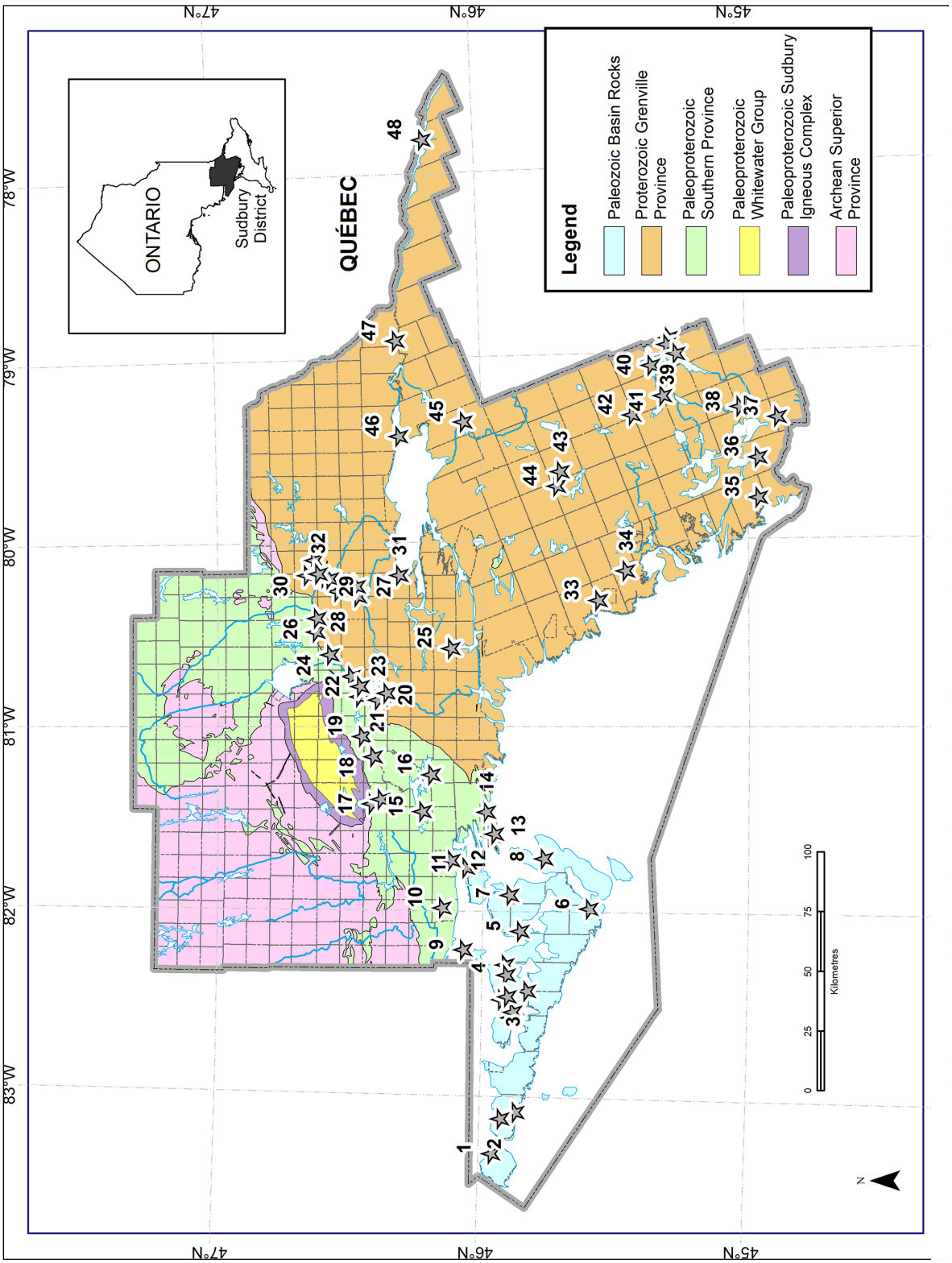

Figure 10. Past-producing non-metal mines and quarries. Keyed to Table 13. (Ontario Geological Survey 2020a); geology *modified after* Ontario Geological Survey (2011).

EXPLORATION ACTIVITY

Introduction

The number of active claims in 2020 for the Sudbury Mining District, which is notably different from the Sudbury Resident Geologist Program District (Figure 11), is given in Table 14 with the number of claims and cells from 2018 and 2019 for comparison. The registered claims and cells, and performed work are also given for 2020 and 2019 (data not available for 2018). It should, however, be noted that Mining Land Administration System (MLAS) cells may overlap mining districts such that some assessment work may be included in multiple mining districts.

The area covered by active claims in the Sudbury RGP District at year-end 2020 is given in Table 15, with comparison to the areas from year-end 2019 and 2018.

In 2020, 53 new assessment reports, with an assessment credit value of $5 114 927, were processed and uploaded to the Ministry's Ontario Assessment File Database (OAFD; Ontario Geological Survey 2020b) and OGSEarth application through the Sudbury District Geologist Office (Table 16; Figure 12).

Table 14. Summary of active claims in the Sudbury Mining Division, for 2020.

Year	# Claims	# Cells	Registered Claims	Registered Cells	Work Performed
2020	**14 983**	**18 119**	**3281**	**3677**	**$5 423 547**
2019	14 886	17 668	2600	3069	$2 539 330
2018	17 834	18 707	—	—	—

Table 15. Area of active claims in the Sudbury RGP Division, for 2020.

Date	Total area (ha) covered by claims
January 4, 2021	**335 285**
January 6, 2020	305 966
January 9, 2019	323 328

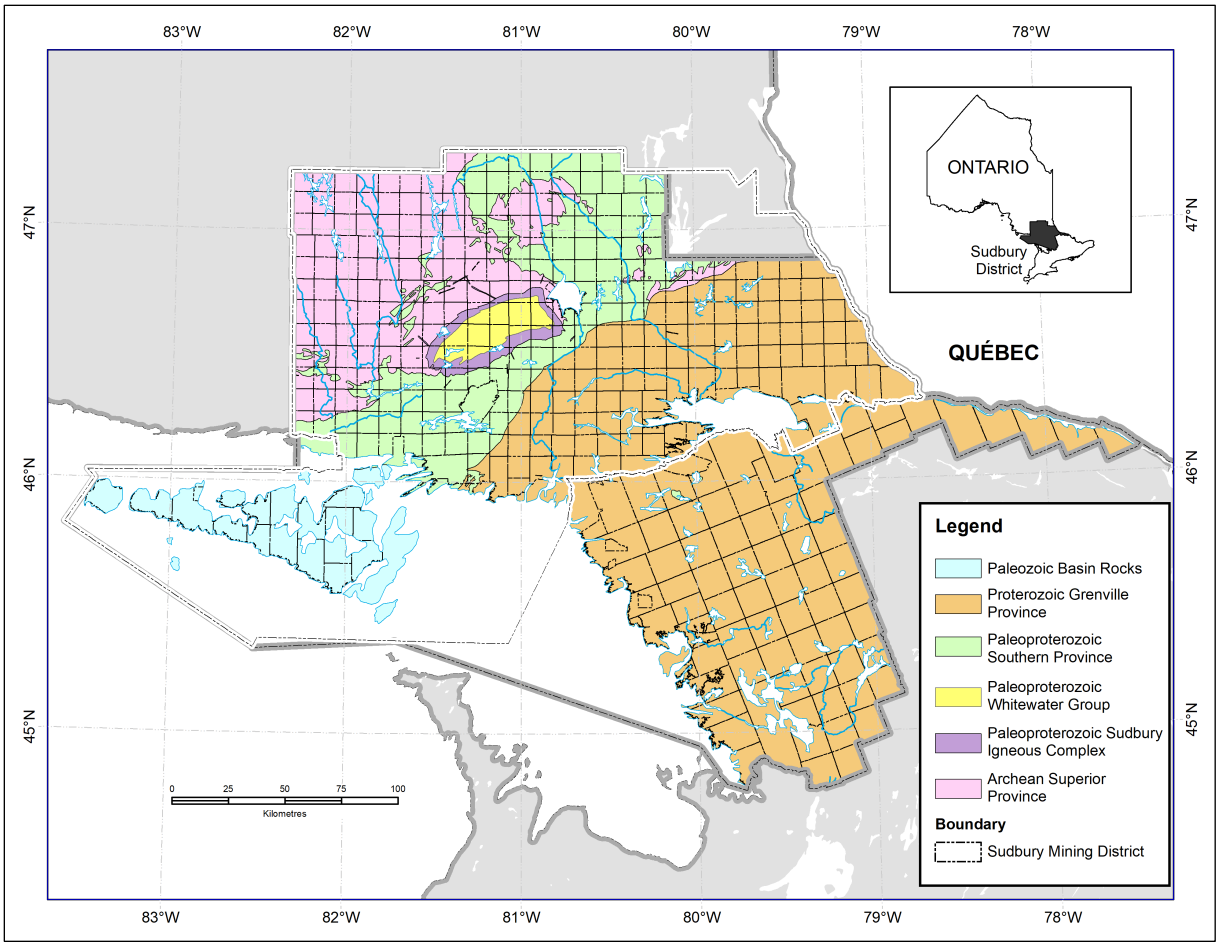

Figure 11. Map showing location of Sudbury Mining District (referred to in Table 14) and Sudbury RGP District outline underlain by geology (geology *modified from* Ontario Geological Survey 2011).

Table 16. Assessment files received in the Sudbury District in 2020 (keyed to Figure 12).

Abbreviations

ASSAY ..... Assaying and Analyses
BULK ..... Bulk Sampling
CHNL ..... Channel Sampling
DHCSUB ..... Drill Core Submission
DHRLG ..... Drill Core Relogging
DHRSMP ..... Drill Core Resampling
EM ..... Electromagnetic
EMPB ..... Electron Microprobe Study
GCOMP ..... Compilation and Interpretation - Ground Geophysics
GEOL ..... Geological Survey / Mapping
GLCOMP ..... Compilation and Interpretation - Geology
GRAV ..... Gravity
LC ..... Linecutting
LIDAR ..... LiDAR
MAG ..... Magnetic / Magnetometer Survey
MAGTEL ..... Magnetotelluric
MICRO ..... Microscopic study
PDRILL ..... Diamond Drilling
PITS ..... Digging Pits
PMAN ..... Manual Labour
PROSP ..... Prospecting By Licence Holder
PSTRIP ..... Overburden stripping
RECON ..... Regional or Reconnaissance Ground Exploration
ROCK ..... Rock Sampling
VLF ..... Electromagnetic Very Low Frequency

No.	Township/Area	Company Filing Report	Year	Work Performed	File ID	Credits Applied
1	Unwin, Browning, Dufferin, Leask, Stull	Battery Mineral Resources Ltd.	2018	ASSAY, LIDAR, PROSP	20000017887	$32,018
2	Creelman	Michel Lavoie	2020	PROSP	20000018144	$1,686
	Creelman	Guy Richard	2018	GEOL	20000018274	$13,356

No.	Township/Area	Company Filing Report	Year	Work Performed	File ID	Credits Applied
3	Aylmer	Thomas Sheppard	2018	ASSAY, ROCK	20000017930	$6,046
	Aylmer	Thomas Sheppard	2019	ASSAY	20000017928	$276
	Aylmer	Thomas Sheppard	2019	ASSAY, PROSP	20000017957	$798
	Aylmer	Thomas Sheppard	2019 - 2020	ASSAY, PMAN	20000018038	$750
	Aylmer	Transition Metals Corp.	2019 - 2021	ASSAY, ROCK	20000018571	$3,988
	Aylmer	Fredric Donald Delabbio, Thomas Sheppard	2019 - 2022	PROSP, ROCK	20000018570	$1,932
4	Mackelcan, McCarthy, Rathbun	Flag Resources (1985) Ltd., Inventus Mining Corp.	2019	ASSAY, CHNL, GEOL, GLCOMP, PROSP, PSTRIP, ROCK	20000018008	$144,848
5	Telfer, Aylmer	Thomas Sheppard	2018 - 2019	PROSP	20000017942	$1,054
	Telfer, Aylmer	Thomas Sheppard	2019	PMAN, PROSP	20000017951	$885
	Telfer, Aylmer	Thomas Sheppard	2018 - 2019	PROSP	20000017945	$852
6	Afton	12 Exploration Inc.	2019	GCOMP, GRAV, MAG	20000018044	$24,415
7	MacBeth, Clement	Brian Wright	2019	GEOL, PROSP	20000018388	$52,965
8	Pardo, Clement	Inventus Mining Corp., Mount Logan Resources Ltd.	2017	BULK	20000017902	$277,651
	Pardo, Clement	Mount Logan Resources Ltd.	2018	ASSAY, PDRILL	20000018211	$69,948
9	Davis	9640355 Canada Corp.	2018 - 2019	ASSAY, PROSP, ROCK	20000018180	$9,071
	Davis	Steven Anderson	2019	ASSAY, PROSP, ROCK	20000018172	$2,283
10	Street	Leonard Cook	2020	PROSP	20000018279	$1,611
11	Moncrieff	Greener North Inc.	2017 - 2019	PROSP, RECON, ROCK	20000017912	$8,087
	Moncrieff, Craig, Ermatinger, Hart, Tofflemire, Ulster	Battery Mineral Resources Ltd.	2018	LIDAR, PROSP	20000018045	$21,686
12	Hart	Battery Mineral Resources Ltd.	2017		20000017940	$21,117
	Hart, Ermatinger	Battery Mineral Resources Ltd., Wallbridge Mining Company Ltd.	2018	LIDAR	20000017994	$6,446
	Hart, Craig, Ermatinger, Hart, Moncrieff, Tofflemire, Ulster	Battery Mineral Resources Ltd., John Brady	2016 - 2018	ASSAY, DHRSMP, LC, LIDAR, MAG, PMAN, PROSP	20000017993	$1,316,678
	Hart	Battery Mineral Resources Ltd.	2019	GCOMP	20000018209	$1,500
13	Venturi, Tofflemire	Boreal Agrominerals Inc.	2019	MAG	20000017980	$10,180
	Venturi, Tofflemire	Boreal Agrominerals Inc.	2016 - 2018	ROCK	20000018560	$18,140
	Venturi, Tofflemire	Boreal Agrominerals Inc.	2018 - 2020	ASSAY, DHCSUB, EMPB, PMAN, ROCK	20000018562	$14,847
14	Totten, Chester, Yeo	Iamgold Corp.	2018	PMAN	20000018561	$1,040
15	Trill	Glencore Canada Corp.	2019	GCOMP, PDRILL	20000018613	$2,336,111
16	Hyman	Frank Racicot	2019	PROSP	20000017894	$3,175
17	Drury, Hyman	Phillip Martel	2019	MAG	20000017910	$11,420
18	McMahon, Lorne, McMahon, Nairn	Steve Anderson	2019	PROSP	20000017972	$3,715
19	Porter, Dunlop	Mitchell Turcott	2020	MAG	20000018413	$4,400
20	Shakespeare	Ursa Major Minerals Inc.	2018	ASSAY, PROSP	20000017998	$6,635

No.	Township/Area	Company Filing Report	Year	Work Performed	File ID	Credits Applied
21	Shibananing, Gough	Dan Brunne	2019	ASSAY, PROSP, PSTRIP, ROCK	20000018342	$9,269
22	Boon	Grid Metals Corp.	2019	ASSAY, ROCK	20000018187	$16,014
	Boon, Gerow, Mandamin, Shibananing	Grid Metals Corp.	2020	MAGTEL	20000018289	$322,270
23	Waters	Marietta Kosovsky	2016 - 2017	ASSAY, MICRO, ROCK	20000017908	$1,277
	Waters	Todd Fielding	2019	ASSAY, PROSP	20000018275	$13,428
	Waters	Marietta Kosovsky	2020	VLF	20000018412	$1,600
24	Eden	Rumble Resources	2018-2019	ASSAY, EM, ROCK	20000018639	$41,572
25	Louise	Ben Haavisto	2018	PROSP, ROCK	20000018295	$2,470
26	Foster	Kenneth Naples	2017	ASSAY, PROSP, ROCK	20000017974	$2,018
27	Merritt, Foster	Jean Paul Vienneau	2019 - 2020	ASSAY, PROSP, ROCK	20000018186	$1,453
28	Mongowin	9649355 Canada Corp.	2020	PROSP, ROCK	20000018394	$12,474
29	Garrow, McAuslan	Gary Mote	2019	PSTRIP	20000018331	$9,641
30	Clarkson	Precambrian Ventures Ltd.	2019	ASSAY, PROSP, ROCK	20000018157	$13, 161
31	Butler, Antoine	Kyanite Mining Corp.	2020	DHRLG	20000018407	$218,462
32	Himsworth	Jeffry James Staples	2018 - 2019	PITS	20000017916	$2,911
32	Himsworth	Jeffrey James Staples	2018	GEOL	20000017911	$8,820
33	Baxter	CJP Exploration Inc.	2019	PROSP, ROCK	20000017934	$6,477

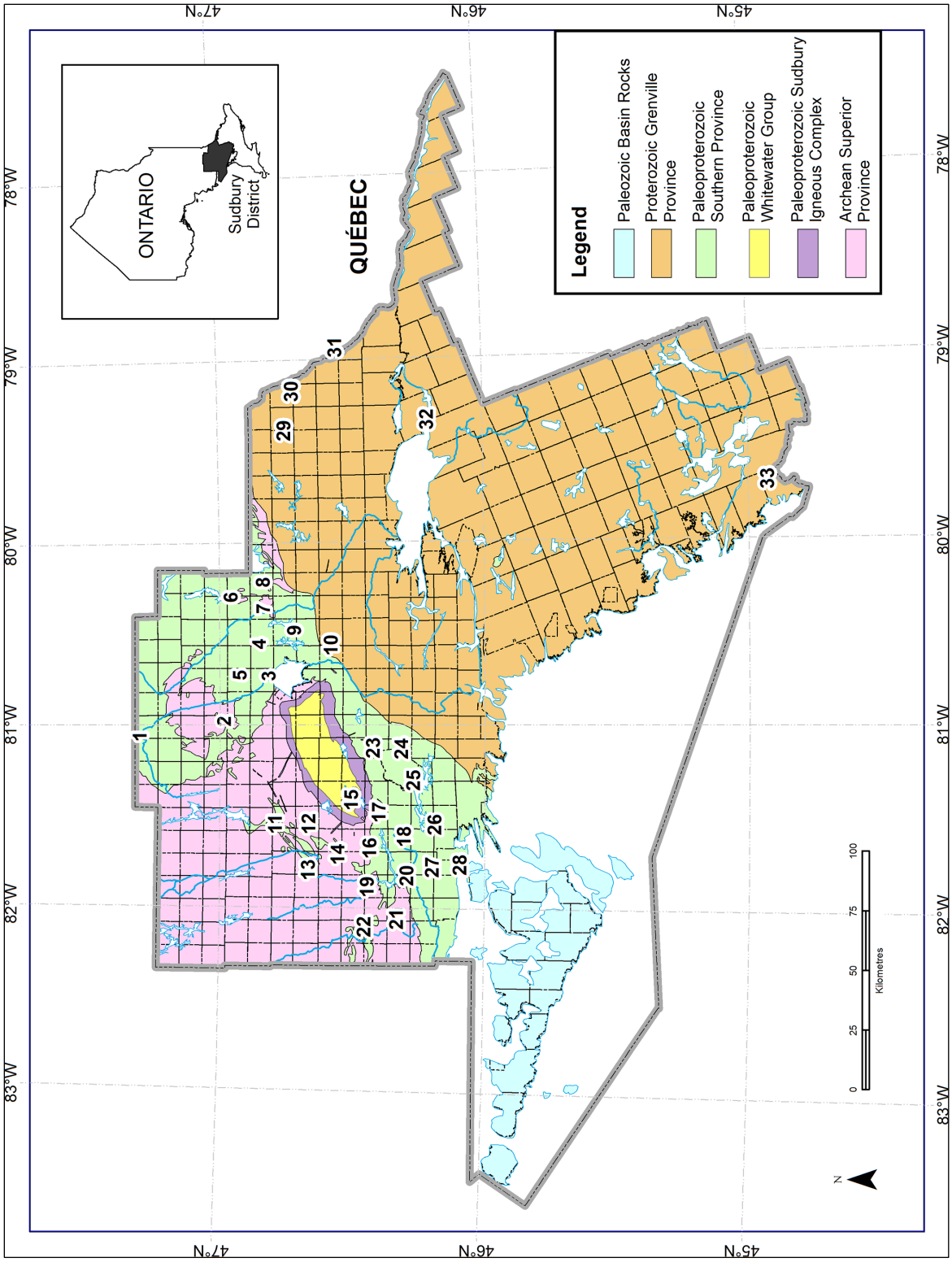

Figure 12. Assessment files received in the Sudbury District in 2020 (keyed to Table 16).

Exploration activity in the Sudbury RGP District in 2020, based on assessment filings, company reports, press releases and news reports, is listed in Table 17 and shown on Figure 13.

In 2020, 236 exploration plans and exploration permits were active in the Sudbury District on active mining claims (Tables 18 and 19; Figures 14 and 15): 140 plans and 96 permits. Of these, 105 (69 plans and 36 permits) were issued in 2020. Work proposed in the exploration plans included line cutting, geophysical surveys, mechanical stripping, pitting and trenching, and mechanized drilling (*see* Table 18). Permitted work included mechanized drilling, mechanical stripping, pitting and trenching, and line cutting (*see* Table 19).

Table 17. Exploration activity in the Sudbury District in 2020 (keyed to Figure 13).

Abbreviations

AMAGTEL ..... Airborne Magnetotelluric	IP ..... Induced Polarisation
ARCH ..... Archeological Studies	MAG ..... Magnetic / Magnetometer Survey
ASSAY ..... Assay and Analyses	MAGTEL ..... Magnetotelluric
CHNL ..... Channel Sampling	METAL ..... Metallurgical Testing
DHCSUB ..... Drill Core Submission	MODEL ..... Modelling
DHRLG ..... Drill Core Relogging	PDRILL ..... Diamond Drilling
EMPB ..... Electron Microprobe Study	PROSP ..... Prospecting By Licence Holder
ENVIRO ..... Environmental Studies	REPORT ..... Reports (Company & News)
GEOL ..... Geological Survey/Mapping	ROCK ..... Rock Sampling
GLCOMP ..... Compilation and Interpretation - Geology	RRCALC ..... Resource Calculation
GROGEO ..... Ground Geophysics	VLF ..... Electromagnetic Very Low Frequency

No.	Company Name/Proponent	Property/Project	Commodity	Township(s)	Type of Work
1	Canadian Palladium Resources Inc.	East Bull PGM Project	PGM	Boon	PDRILL ASSAY MAGTEL
1	Grid Metals Corp.	East Bull Lake PGM	PGM	Boon, Gerow, Mandamin, Shibananing	GEOL ROCK ASSAY PDRILL MAGTEL
2	Mitchell Turcott	Reticulate Lake Au/PGM Property	Au, PGM	Porter, Dunlop	MAG
3	Graycliff Exploration Ltd.	Shakespeare Gold Property	Au	Shakespeare	REPORT GLCOMP PDRILL
3	Magna Mining Corp.	Shakespeare Nickel Property	Cu, Ni, PGM	Shakespeare	CHNL ROCK ASSAY RRCALC
4	9649355 Canada Corp.	McMillan East Property	Au	Mongowin	PROSP ROCK
4	Transition Metals Corp.	Espanola Property	Au	Mongowin	ROCK GEOL
5	Jean Paul Vienneau	Claim 555456	Au	Merritt, Foster	ASSAY PROSP ROCK
5	Transition Metals Corp.	Fostung Property	W	Foster	METAL
6	SPC Nickel Corp.1	Aer-Kidd Property	Ni, PGM	Denison	PDRILL ASSAY GLCOMP MODEL
7	Marietta Kosovsky	Makada Lake Property	Cu, PGM, Ni	Waters	VLF
8	Boreal Agrominerals Inc.	Boreal Property	Apatite, Vermiculite, Phosphate	Venturi, Tofflemire	ASSAY DHCSUB EMPB PMAN ROCK
9	Michel Lavoie	Creelman Project	Au, Co, V, Ni, Cu	Creelman	PROSP
10	Transition Metals Corp.	Doherty Lake	Au, Ag	Demorest	GLCOMP
11	Conquest Resources Ltd.	Golden Rose Gold Mine	Au	Afton	PDRILL
12	Inventus Mining Corp.	Sudbury 2.0	Ni, Cu, Co	Mackelcan, McConnell, Sheppard, McCarthy	IP PDRILL ROCK ASSAY DHRLG GEOL
13	Thomas Sheppard	Sheppard Claim Group	Cu, Au	Aylmer	ASSAY PMAN
13	Transition Metals Corp.	Aylmer IOCG	Cu, Au	Aylmer	GEOL ROCK ASSAY AMAGTEL

No.	Company Name/Proponent	Property/Project	Commodity	Township(s)	Type of Work
13	Fredric Donald Delabbio, Thomas Sheppard	Sheppard Aylmer Township Property - Discovery Pit / Main Showing	Cu, Au	Aylmer	PROSP ROCK
14	North American Nickel Inc.	Post Creek/Halcyon	Ni, Cu, PGM	Norman; Parkin; Aylmer; Rathburn	ROCK ASSAY GLCOMP
15	Glencore Canada Corp.	Norman West	Ni, Cu, PGM	Norman	PDRILL REPORT
16	Vale Canada Ltd. (with Glencore Canada Corp.)	Victor Deposit	Ni, Cu, PGM	Maclennan	REPORT
17	Leonard Cook	Kukugami Project	Garnet (Non-metals)	Street	PROSP
18	MacDonald Mines Exploration Ltd.	Scadding-Powerline-Jovan Project	Au	Davis, Street, Scadding	PDRILL ASSAY IP GLCOMP
18	Joshua Gold Resources Inc.	King Solomon Mines	Au	Davis	ROCK ASSAY
19	SPC Nickel Corp.1	Janes Property	PGM, Cu, Ni	Janes	ROCK GROGEO ASSAY
20	New Age Metals Inc.	River Valley Property	PGM	Dana, Pardo	PDRILL ASSAY ENVIRO ARCH
21	Kyanite Mining Corp.	Crocan Lake Property	Kyanite	Butler, Antoine	DHRLG
22	Northern Graphite Corp.	Bisset Creek Property	Graphite	Maria	METAL

[1] *Formerly Sudbury Platinum Corp.*

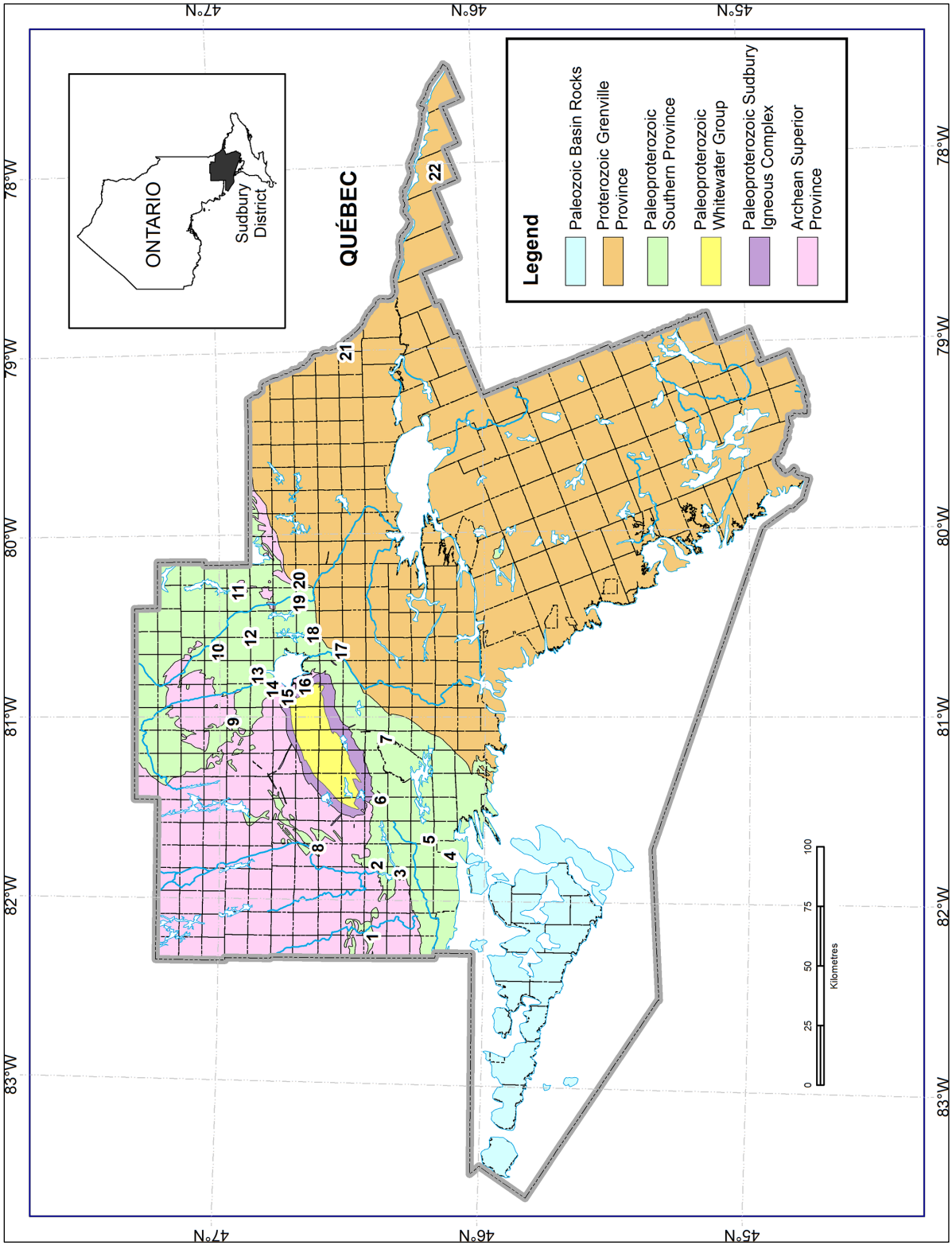

Figure 13. Exploration activity in the Sudbury District in 2020, from assessment reports and press releases (keyed to Table 17); geology *modified from* Ontario Geological Survey (2011).

Table 18. Exploration plans in the Sudbury District in 2020 on active mining claims (No. keyed to location on Figure 14).

Abbreviations

GEOPH ..... Geophysical survey
LQ ..... Line cutting
N/D ..... No data
PDRILL ..... Mechanized drilling
PSTRIP ..... Mechanical stripping
PTRENCH ..... Pitting and trenching

No.	Plan No.	Claim Holder and/or Proponent	Project Name	Township	Exploration Activities	Effective
1	PL-17-10806	Thomas Sheppard	IOCG Project	Aylmer	LQ GEOPH	2017
1	PL-19-000058	Pavey Ark Minerals Inc.	East Bull Project	Gerow	LQ GEOPH	2019
2	PL-18-010986	2254022 Ontario Ltd.	Harrow Project - Long Lake	Harrow	LQ GEOPH	2019
2	PL-18-010990	Battery Mineral Resources Ltd.	Harrow Project - Long Lake	Harrow	LQ GEOPH	2019
2	PL-18-010991	Battery Mineral Resources Ltd.	Harrow Project - Massey	Harrow	LQ GEOPH	2019
3	PL-19-000144	Glencore Canada Corp. - Ursa Major Minerals Inc.	Shakespeare Project	Baldwin, Shakespeare	LQ GEOPH	2020
4	PL-18-010876	J Salo	Foster	Foster	PSTRIP PTRENCH GEOPH	2018
5	PL-19-000124	Wallbridge Mining Company Ltd.	Trill Project	Trill, Drury	LQ GEOPH	2019
5	PL-19-000156	Claude Lamarche	Totten Project	Lorne, Louise, Drury, Denison	GEOPH	2020
6	PL-18-010901	Vale Canada Ltd.	Chicago Project	Drury	GEOPH	2018
6	PL-18-010902	Vale Canada Ltd.	Chicago Project	Drury	GEOPH	2018
6	PL-19-000154	Claude Lamarche	Totten Project	Drury	GEOPH	2020
6	PL-19-000155	Claude Lamarche	Totten Project	Drury	GEOPH	2020
6	PL-20-000125	Glencore Canada Corp.	Chicago Project	Drury	GEOPH	2020
6	PL-20-000126	Vale Canada Ltd.	Chicago Project	Drury	GEOPH	2020
7	PL-19-000103	Vale Canada Ltd.	Victoria Project	Graham, Denison	LQ GEOPH	2019
7	PL-19-000104	Vale Canada Ltd.	Victoria Project	Denison	LQ GEOPH	2019
8	PL-18-010941	Vale Canada Ltd.	Graham Project	Graham, Creighton-Davies	GEOPH	2018
9	PL-18-10885	Vale Canada Ltd.	Ministic Project	Fairbank, Ermatinger, Trill, Cascaden, Dowling	GEOPH	2018
9	PL-19-000099	Glencore Canada Corp.	Trill Project	Trill	LQ GEOPH	2019
9	PL-19-000100	Vale Canada Ltd.	Trill Project	Fairbank, Trill, Cascaden, Dowling	LQ GEOPH	2019
9	PL-19-000122	Wallbridge Mining Company Ltd.	Trill Project	Trill, Drury, Totten	LQ GEOPH	2019
9	PL-20-000054	Wallbridge Mining Company Ltd.	Ministic	Trill, Cascaden	GEOPH	2020
9	PL-20-000055	Glencore Canada Corp.	Ministic	Trill	GEOPH	2020
9	PL-20-000056	Glencore Canada Corp.	Ministic	Trill	GEOPH	2020
9	PL-20-000057	Vale Canada Ltd.	Ministic	Fairbank, Trill, Cascaden, Dowling	GEOPH	2020

No.	Plan No.	Claim Holder and/or Proponent	Project Name	Township	Exploration Activities	Effective
9	PL-20-000064	Vale Canada Ltd.	Ministic	Trill, Cascaden	GEOPH	2020
10	PL-20-000053	Wallbridge Mining Company Ltd.	Ministic	Cascaden	GEOPH	2020
10	PL-20-000058	Vale Canada Ltd.	Ministic	Cascaden	GEOPH	2020
10	PL-20-000059	Vale Canada Ltd.	Ministic	Cascaden	GEOPH	2020
10	PL-20-000060	Vale Canada Ltd.	Ministic	Trill, Cascaden	GEOPH	2020
10	PL-20-000061	Vale Canada Ltd.	Ministic	Cascaden	GEOPH	2020
10	PL-20-000062	Vale Canada Ltd.	Ministic	Cascaden	GEOPH	2020
10	PL-20-000063	Vale Canada Ltd.	Ministic	Cascaden	GEOPH	2020
11	PL-18-10880	Meteoric Resources Sub Inc.	Iron Mask	Hart	GEOPH	2018
12	PL-20-000008	Karen Kettles	Hardy Project	Levack	GEOPH	2020
13	PL-19-000005	Vale Canada Ltd.	Morgan -Lumsden Project	Foy, Bowell, Morgan	LQ GEOPH	2019
13	PL-20-000040	Glencore Canada Corp – Vale Canada Ltd.	Morgan West	Morgan	LQ GEOPH	2020
13	PL-20-000041	Vale Canada Ltd.	Morgan West	Foy, Morgan	LQ GEOPH	2020
13	PL-20-000042	Vale Canada Ltd.	Morgan West	Morgan	LQ GEOPH	2020
13	PL-20-000043	Vale Canada Ltd.	Morgan West	Morgan	LQ GEOPH	2020
13	PL-20-000044	Wallbridge Mining Company Ltd.	Morgan West	Morgan	LQ GEOPH	2020
13	PL-20-000045	Glencore Canada Corp.	Morgan West	Morgan	LQ GEOPH	2020
13	PL-20-000046	Glencore Canada Corp.	Morgan West	Morgan, Levack	LQ GEOPH	2020
13	PL-20-000047	Glencore Canada Corp.	Morgan West	Morgan	LQ GEOPH	2020
13	PL-20-000048	Glencore Canada Corp.	Morgan West	Morgan	LQ GEOPH	2020
14	PL-19-000003	Wallbridge Mining Company Ltd.	Morgan -Lumsden Project	Foy, Bowell, Morgan	LQ GEOPH	2019
14	PL-19-000004	Glencore Canada Corp.	Morgan -Lumsden Project	Foy, Morgan	LQ GEOPH	2019
14	PL-19-000006	Glencore Canada Corp. – Vale Canada Ltd.	Morgan -Lumsden Project	Foy, Morgan	LQ GEOPH	2019
14	PL-19-000007	Glencore Canada Corp. – Vale Canada Ltd.	Morgan -Lumsden Project	Foy	LQ GEOPH	2019
14	PL-19-000009	Glencore Canada Corp. – Vale Canada Ltd.	Sandcherry Project	Harty, Foy	LQ GEOPH	2019
14	PL-19-000147	Nick Moylan	Foy Group Project	Foy, Bowell	LQ PSTRIP GEOPH	2020
14	PL-19-000149	Nick Moylan	Foy Group Project	Harty, Foy, Tyrone	LQ PSTRIP GEOPH	2020
14	PL-19-000151	Nick Moylan	Foy Group Project	Foy	LQ PSTRIP GEOPH	2020
14	PL-19-000152	Nick Moylan	Foy Group Project	Foy	LQ PSTRIP GEOPH	2020

No.	Plan No.	Claim Holder and/or Proponent	Project Name	Township	Exploration Activities	Effective
14	PL-19-000153	Nick Moylan	Foy Group Project	Foy	LQ PSTRIP GEOPH	2020
14	PL-20-000076	Vale Canada Ltd.	Bowell	Foy	LQ GEOPH	2020
14	PL-20-000077	Glencore Canada Corp.	Bowell	Foy	LQ GEOPH	2020
14	PL-20-000078	Wallbridge Mining Company Ltd.	Bowell	Foy, Bowell	LQ GEOPH	2020
15	PL-19-000150	Nick Moylan	Foy Group Project	Harty, Foy, Tyrone	LQ PSTRIP GEOPH	2020
16	PL-18-010861	Claude Lamarche	Bowell Project	Foy, Bowell	GEOPH	2018
16	PL-18-010862	C Lamarche	Bowell Project	Bowell	GEOPH	2018
16	PL-19-000148	Nick Moylan	Foy Group Project	Foy, Bowell	LQ PSTRIP GEOPH	2020
16	PL-20-000001	Claude Lamarche	Nelson Lake	Bowell	GEOPH	2020
16	PL-20-000075	Vale Canada Ltd.	Bowell	Foy, Bowell	LQ GEOPH	2020
16	PL-20-000079	Glencore Canada Corp.	Bowell	Bowell	LQ GEOPH	2020
16	PL-20-000080	FNX Mining Company Inc.	Bowell	Bowell	LQ GEOPH	2020
16	PL-20-000081	FNX Mining Company Inc.	Bowell	Foy, Bowell	LQ GEOPH	2020
16	PL-20-000085	Vale Canada Ltd.	Wisner	Wisner, Bowell	GEOPH	2020
17	PL-18-010866	C Lamarche	Wisner	Wisner, Bowell	GEOPH	2018
17	PL-20-000082	Vale Canada Ltd.	Wisner	Wisner	GEOPH	2020
17	PL-20-000083	Vale Canada Ltd.	Wisner	Wisner	GEOPH	2020
17	PL-20-000084	Vale Canada Ltd.	Wisner	Wisner	GEOPH	2020
17	PL-20-000086	Vale Canada Ltd.	Wisner	Wisner	GEOPH	2020
17	PL-20-000088	FNX Mining Company Inc.	Wisner	Wisner	GEOPH	2020
17	PL-20-000089	Wallbridge Mining Company Ltd.	Wisner	Wisner	GEOPH	2020
17	PL-20-000090	Glencore Canada Corp.	Wisner	Wisner	GEOPH	2020
18	PL-19-000079	John Brady	Golden Pine Project	Parkin	PSTRIP	2019
18	PL-19-000080	John Brady	Golden Pine Project	Parkin	PSTRIP	2019
18	PL-20-000022	John Brady	Norman 3 - North	Norman, Parkin	GEOPH	2020
18	PL-20-000024	Glencore Canada Corp. - Wallbridge Mining Company Ltd.	Norman 3 - North	Norman, Parkin	GEOPH	2020
19	Pl-18-010891	Vale Canada Ltd.	Podolsky Project	Norman, Parkin	GEOPH	2018
19	PL-18-010893	North American Nickel Inc.	Podolsky Project	Norman	GEOPH	2018

No.	Plan No.	Claim Holder and/or Proponent	Project Name	Township	Exploration Activities	Effective
19	PL-18-010899	Vale Canada Ltd.	Podolsky Project	Norman	GEOPH	2018
19	PL-18-010953	Glencore Canada Corp.	Norman West Project	Wisner, Capreol, Norman	GEOPH	2018
19	PL-18-10872	Vale Canada Ltd.	Norman 2 Project	Wisner, Capreol, Norman, Parkin	GEOPH	2018
19	PL-19-000030	Wallbridge Mining Company Ltd.	Norman	Norman	GEOPH	2019
19	PL-19-000031	Vale Canada Ltd.	Norman Project	Norman	GEOPH	2019
19	PL-19-000032	Vale Canada Ltd.	Norman Project	Capreol, Norman	GEOPH	2019
19	PL-19-000033	Vale Canada Ltd.	Norman Project	Capreol, Norman	GEOPH	2019
19	PL-19-000034	Vale Canada Ltd.	Norman Project	Capreol, Norman	GEOPH	2019
19	PL-19-000067	Glencore Canada Corp.	Norman Project	Wisner, Capreol, Norman	GEOPH	2019
19	PL-19-000070	Glencore Canada Corp.	Norman Project	Norman	GEOPH	2019
19	PL-19-000071	Glencore Canada Corp.	Norman Project	Capreol, Norman	GEOPH	2019
19	PL-19-000128	Vale Canada Ltd.	Norman West	Wisner, Norman	GEOPH	2019
19	PL-19-000130	North American Nickel Inc.	Post Creek BHEM	Norman, Parkin	GEOPH	2019
19	PL-20-000021	North American Nickel Inc.	Norman 3 - North	Norman	GEOPH	2020
19	PL-20-000023	Glencore Canada Corp. - Wallbridge Mining Company Ltd.	Norman 3 - North	Norman, Parkin	GEOPH	2020
19	PL-20-000032	Glencore Canada Corp.	Norman 3 - South	Wisner, Capreol, Norman	GEOPH	2020
19	PL-20-000033	Vale Canada Ltd.	Norman 3 - South	Capreol, Norman	GEOPH	2020
19	PL-20-000034	Vale Canada Ltd.	Norman 3 - South	Wisner, Norman	GEOPH	2020
19	PL-20-000096	Karen Kettles	Norman West	Wisner, Capreol, Norman	GEOPH	2020
20	PL-19-000042	Vale Canada Ltd.	Victor Project	Capreol	GEOPH	2019
20	PL-19-000043	Vale Canada Ltd.	Victor Project	Capreol, Maclennan	GEOPH	2019
20	PL-19-000044	Vale Canada Ltd.	Victor Project	Capreol, Maclennan	GEOPH	2019
20	PL-19-000045	Glencore Canada Corp.	Victor Project	Capreol, Maclennan	GEOPH	2019
20	PL-19-000046	Glencore Canada Corp.	Victor Project	Capreol, Maclennan	GEOPH	2019
20	PL-19-000047	Glencore Canada Corp.	Victor Project	Capreol, Maclennan	GEOPH	2019
20	PL-19-000068	Glencore Canada Corp.	Norman Project	Capreol	GEOPH	2019
20	PL-19-000069	Glencore Canada Corp.	Norman Project	Capreol, Norman	GEOPH	2019
20	PL-19-000072	Glencore Canada Corp.	Victor Project	Capreol, Norman	GEOPH	2019

No.	Plan No.	Claim Holder and/or Proponent	Project Name	Township	Exploration Activities	Effective
20	PL-19-000073	Glencore Canada Corp.	Victor Project	Capreol, Maclennan	GEOPH	2019
20	PL-19-000076	Glencore Canada Corp.	Victor Project	Capreol, Maclennan	GEOPH	2019
20	PL-19-000082	Wallbridge Mining Company Ltd.	Victor	Capreol	GEOPH	2019
21	PL-19-000041	Glencore Canada Corp.	Victor Project	Maclennan	GEOPH	2019
21	PL-19-000083	Wallbridge Mining Company Ltd.	Victor	Capreol, Maclennan	GEOPH	2019
21	PL-20-000030	Stephen Skjonsby	Bonanza Lake North	Maclennan	LQ PDRILL PSTRIP PTRENCH	2020
22	PL-20-000091	MacDonald Mines Exploration Ltd.	Scadding East	Scadding, Loughrin, Street, Davis	GEOPH	2020
23	PL-18-10868	Christopher Patrie	McGill Property	Scadding, Davis	GEOPH	2018
25	PL-19-000018	Inventus Mining Corp.	Sudbury 2.0	Mackelcan	LQ PSTRIP PTRENCH GEOPH	2019
25	PL-19-000125	Inventus Mining Corp.	Sudbury 2.0 Project	Mackelcan	PSTRIP	2019
26	PL-19-000019	Inventus Mining Corp.	Sudbury 2.0 Project	McConnell	LQ PSTRIP PTRENCH GEOPH	2019
27	PL-18-010908	Battery Mineral Resources Ltd.	White Lake Project	Unwin	LQ GEOPH	2018
27	PL-18-010946	Battery Mineral Resources Ltd.	White Lake Project - White Lake SE Project	Stull, Unwin	LQ GEOPH	2018
27	PL-18-010948	Battery Mineral Resources Ltd.	White Reserve Project - Chicault Project	Unwin	LQ GEOPH	2018
27	PL-20-000071	Battery Mineral Resources Ltd.	White Lake - T3	Unwin	LQ GEOPH	2020
28	PL-20-000070	Battery Mineral Resources Ltd.	White Lake - T4	Leask, Unwin	LQ GEOPH	2020
29	PL-20-000092	Daniel Deschatelets	Deschatelets prospecting	Clement	LQ	2020
30	PL-19-000017	Brian Wright - Randy Stewart	Clement Property Project	Clement, MacBeth	LQ	2019
30	PL-19-000049	Steven Anderson	Cucumber Lake Project	MacBeth	LQ GEOPH	2019
31	PL-18-010905	Brian Wright	Janes Property South Grid	Davis, Janes	LQ	2018
31	PL-18-010906	Randy Stewart	Janes Central Grid	Janes	LQ	2018
31	PL-18-010950	Brian Wright	Janes Main Grid Project	Janes	LQ PSTRIP GEOPH	2018
31	PL-18-010951	Randy Stewart	Janes Main Grid Project	Davis, Janes	LQ	2018
31	PL-18-010952	Randy Stewart	Janes Main Grid Project	Janes	LQ	2018
31	PL-20-000115	Randy Stewart	Janes	Janes	N/D	2020
31	PL-20-000116	Randy Stewart	Janes	Janes	N/D	2020
31	PL-20-000117	Brian Wright	Janes	Janes	N/D	2020
32	PL-20-000072	Richard Zemoroz	River Valley PGM Project	Pardo, Dana, Janes	GEOPH	2020
33	PL-19-000024	Gary Mote	Garrow Quarry Project	Garrow, McAuslan	PSTRIP	2019

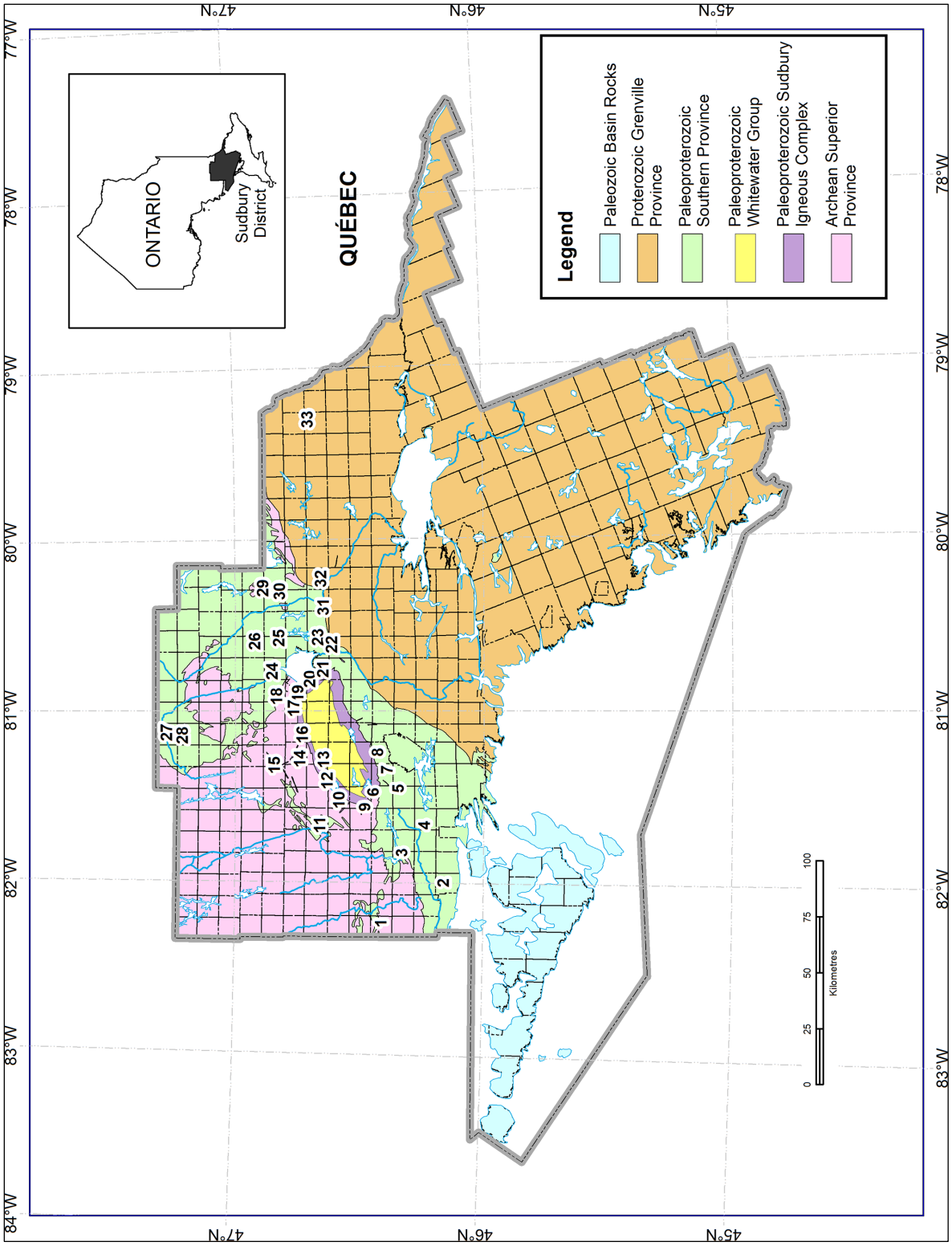

Figure 14. Exploration plans in the Sudbury District in 2020 on active mining claims (keyed to Table 18); geology *modified from* Ontario Geological Survey (2011).

Table 19. Exploration permits in the Sudbury District in 2020 on active mining claims (Keyed to location on Figure 15).

Abbreviations

LQ ..... Line cutting
N/D ..... No data
PDRILL ..... Mechanized drilling
PSTRIP ..... Mechanical stripping
PTRENCH ..... Pitting and trenching

No.	Plan/Permit No.	Claim Holder and/or Proponent	Project Name	Township	Exploration Activities	Effective
1	PR-17-11153	Richard Sutcliffe	East Bull Project	Gerow	PDRILL PSTRIP PTRENCH LQ	2017
1	PR-19-000241	Grid Metals Corp.	East Bull Lake - Moon Lake Claims Project	Gerow	PDRILL	2019
1	PR-19-000261	Grid Metals Corp.	East Bull Lake PGM Project	Gerow	PDRILL	2019
1	PR-20-000092	Pavey Ark Minerals Inc.	East Bull	Gerow	PDRILL PSTRIP PTRENCH LQ	2020
1	PR-20-000149	Robin Dunbar	East Bull Lake - Moon Lake Extension	Boon, Gerow	PDRILL	2020
2	PR-19-000239	Grid Metals Corp.	East Bull Lake - Central Zone Claims Project	Boon	PDRILL PSTRIP	2019
2	PR-19-000240	Grid Metals Corp.	East Bull Lake - Parisien Lake Claims Project	Boon	PDRILL PSTRIP	2019
2	PR-20-000136	Robin Dunbar	East Bull Lake North Margin	Lockeyer, Boon, Gerow, Munro	PDRILL	2020
2	PR-20-000150	Robin Dunbar	East Bull Lake - PDLZ Extension	Boon	PDRILL	2020
2	PR-20-000220	Robin Dunbar	East Bull Lake - PLDZ Northern Extension	Boon	PDRILL	2020
2	PR-20-000221	Robin Dunbar	East Bull Lake - East Lobe Southern Extension	Boon	PDRILL	2020
3	PR-19-000234	Dan and David Brunne	McLander's Creek B Zone Project	Shibananing, Gough	PSTRIP PTRENCH	2019
3	PR-20-000216	Dan Brunne	Kitts Lake	Shibananing	PSTRIP	2020
4	PR-19-000147	Dan and David Brunne	McLanders Creek Project	Dunlop	PSTRIP	2019
4	PR-19-000207	Dan and David Brunne	McLanders Creek C-Zone	Shibananing, Dunlop	PSTRIP PTRENCH	2019
4	PR-19-000304	Dan and David Brunne	McLanders Creek D1-Zone Project	Dunlop	PSTRIP PTRENCH	2020
4	PR-20-000215	Dan Brunne	McLander Creek C-Zone	Shibananing, Dunlop	PSTRIP	2020
5	PR-17-11187	Steven Anderson	Shakespeare	Baldwin, Hallam, Shakespeare	PSTRIP	2017
5	PR-20-000283	Steven Anderson	Shakespeare East	Baldwin, Shakespeare	PDRILL PSTRIP LQ	2020
6	PR-20-000037	Ursa Major Minerals Inc.	P-4 Exploration - Shakespeare	Baldwin, Porter	PDRILL LQ	2020
6	PR-20-000038	Ursa Major Minerals Inc.	Hanover Project - Shakespeare	Porter	PDRILL PSTRIP LQ	2020
7	PR-19-000164	Boreal Agrominerals Inc.	Boreal Agrominerals 2019 Exploration	Ermatinger, Hart, Tofflemire, Venturi	PDRILL PSTRIP PTRENCH	2019
8	PR-18-000109	John Brady	Cobra Project	Hart	PDRILL PSTRIP PTRENCH	2018
8	PR-18-000149	J Ploeger	Cobra Project	Ermatinger, Hart	PDRILL PSTRIP PTRENCH	2018

No.	Plan/Permit No.	Claim Holder and/or Proponent	Project Name	Township	Exploration Activities	Effective
8	PR-18-000150	J Ploeger	Cobra Project	Hart	PDRILL PSTRIP PTRENCH	2018
8	PR-18-11246	John Brady	Iron Mask	Hart	PDRILL PSTRIP PTRENCH	2018
8	PR-18-11248	David LaRocque	Iron Mask	Hart	PDRILL PSTRIP	2018
8	PR-18-11302	Meteoric Resources Sub Inc.	Iron Mask	Hart	PDRILL PSTRIP LQ	2018
9	PR-18-11255	Battery Mineral Resources Ltd.	Iron Mask	Hart, Moncrieff	PDRILL PSTRIP PTRENCH	2018
9	PR-19-000251	Greener North Inc.	Moncrieff Project	Moncrieff	PDRILL PSTRIP	2019
9	PR-20-000062	Greener North Inc.	Moncreiff	Moncrieff	PDRILL PSTRIP	2020
10	PR-14-10592R	Marz Kord	Windy Lake	Cascaden, Dowling	PDRILL	2018
11	PR-14-10563R	Wallbridge Mining Company Ltd.	Rudy's Lake	Morgan	PDRILL PSTRIP	2017
12	PR-20-000286	Benjamin Williams	Fostung	Foster	N/D	2020
13	PR-18-000054	Gordon Salo	Sudbury Prospecting	Truman	PDRILL PSTRIP PTRENCH LQ	2018
13	PR-18-000056	Gordon Salo	Sudbury Prospecting	Dieppe, Truman	PDRILL PSTRIP PTRENCH LQ	2018
14	PR-18-000057	Gordon Salo	Sudbury Prospecting 2	Dieppe, Hansen	PDRILL PSTRIP PTRENCH LQ	2018
14	PR-18-000077	Gordon Salo	Sudbury Prospecting Project	Dieppe, Hansen	PDRILL PSTRIP PTRENCH LQ	2018
15	PR-17-11172	Don Fudge	Eden Township Silica Quarry	Eden	PDRILL PSTRIP PTRENCH LQ	2017
15	PR-18-000055	Gordon Salo	Sudbury Prospecting 3	Eden	PDRILL PSTRIP PTRENCH LQ	2018
16	PR-18-000137	Rod Fielding	DEVA PROJECT	Waters	PSTRIP PTRENCH	2018
17	PR-18-000127	Battery Mineral Resources Ltd.	WHITE LAKE PROJECT	Unwin	PDRILL PSTRIP PTRENCH	2018
17	PR-18-000212	Battery Mineral Resources Ltd.	White Lake Project - Chicault	Unwin	PDRILL PSTRIP PTRENCH	2018
17	PR-18-000215	Battery Mineral Resources Ltd.	White Lake Project - White Lake NE Project	Stull, Unwin	PDRILL PSTRIP PTRENCH	2018
18	PR-17-11175	Ryan Mcilvenna - Michael Lavoie	Creelman	Creelman	PSTRIP PTRENCH LQ	2017
19	PR-17-11129	Wallbridge Mining Company Ltd.	Parkin-Milnet	Norman, Parkin	PSTRIP	2017
19	PR-19-000159	Glencore Canada Corp – Wallbridge Mining Company Ltd.	Parkin/Milnet Project	Norman, Parkin	PDRILL PSTRIP	2019
19	PR-20-000063	John Brady	Black Creek	Parkin	PSTRIP	2020
19	PR-20-000113	John Brady	Black Creek-C	Parkin	PDRILL PSTRIP	2020
20	PR-18-11319	Glencore Canada Corp.	Ella Waddell Project	Wisner, Capreol, Norman	PDRILL	2018
20	PR-19-000040	Vale Canada Ltd.	Norman Project	Wisner, Norman	PSTRIP	2019
20	PR-19-000140	North American Nickel Inc.	Post Creek/Halcyon	Aylmer, Rathbun, Norman, Parkin	PDRILL PSTRIP	2019

No.	Plan/Permit No.	Claim Holder and/or Proponent	Project Name	Township	Exploration Activities	Effective
20	PR-19-000245	Glencore Canada Corp.	Norman West Project	Wisner, Capreol, Norman	PDRILL	2019
21	PR-17-11191	Thomas Sheppard	IOCG Project	Aylmer	PDRILL PSTRIP PTRENCH LQ	2018
21	PR-20-000344E	Thomas Sheppard	IOCG Project	Aylmer	PDRILL PSTRIP PTRENCH LQ	2021
22	PR-17-11151	Claude Gobeil	Wahnapitei	Maclennan	PDRILL	2017
22	PR-20-000238	Todd Fielding	Mactrack	Maclennan	PSTRIP	2020
22	PR-20-000254	Claude Seguin	Bonanza Lake North	Maclennan	PDRILL PSTRIP PTRENCH	2020
23	PR-18-000225	MacDonald Mines Exploration Ltd.	Jovan-Powerline MacDonald Block Project	Scadding, Loughrin, Street, Falconbridge, Davis, Maclennan	PDRILL PSTRIP PTRENCH LQ	2019
24	PR-18-000226	MacDonald Mines Exploration Ltd.	Jovan-Powerline (Powerline Block) Project	Scadding, Street	PDRILL PSTRIP PTRENCH LQ	2019
24	PR-19-000206	Currie Rose Inc.	Scadding	Scadding	PDRILL PSTRIP PTRENCH	2019
24	PR-20-000240	MacDonald Mines Exploration Ltd.	Scadding East	Scadding, Loughrin, Street, Davis	PDRILL PSTRIP PTRENCH LQ	2020
24	PR-20-000305	Tania Poehlman	SPJ Property - Alwyn Block	Scadding, Rathbun	PDRILL PSTRIP PTRENCH LQ	2020
25	PR-19-000003	Flag Resources (1985) Ltd.	Rathbun Lake Project	Rathbun	PDRILL PSTRIP PTRENCH LQ	2019
25	PR-19-000331	Inventus Mining Corp.	Sudbury 2.0	Rathbun	PDRILL PSTRIP PTRENCH LQ	2020
25	PR-20-000016	Mark Hall	Bassfin	Scadding, Rathbun	PDRILL PSTRIP PTRENCH LQ	2020
25	PR-20-000017	Bryan Dorland	Last Chance	Rathbun	PDRILL PSTRIP	2020
25	PR-20-000137	Inventus Mining Corp.	Sudbury 2.0	Rathbun	PDRILL PSTRIP PTRENCH LQ	2020
26	PR-18-11269	Inventus Mining Corp.	Sudbury 2.0	Sheppard, Lorrain, Coleman, McCarthy, Mackelcan, McConnell	PDRILL PSTRIP PTRENCH LQ	2018
26	PR-19-000237	Flag Resources (1985) Ltd.	Sudbury 2.0 Project	Mackelcan	PDRILL	2019
26	PR-19-000329	Inventus Mining Corp.	Sudbury 2.0	McCarthy, Mackelcan	PDRILL PSTRIP PTRENCH LQ	2020
26	PR-20-000244	Mark Hall	Cobalt Hill	Mackelcan	PDRILL PSTRIP PTRENCH	2020
27	PR-19-000072	Inventus Mining Corp.	Sudbury 2.0	Sheppard	PDRILL	2019
27	PR-19-000073	Inventus Mining Corp.	Sudbury 2.0	Sheppard	PDRILL	2019
28	PR-17-11135	Canadian Continental Exploration Corp.	TeckMag1	Scholes, Afton	PDRILL	2017
28	PR-18-000174	P Smith	Golden Rose Property	Scholes, Afton	PDRILL PTRENCH LQ	2018
28	PR-19-000167	Northern Nickel Mining Inc	Golden Rose Gold Project	Scholes, Afton	PDRILL PSTRIP	2019
28	PR-20-000145	Canadian Continental Exploration Corp.	TeckMag1	Afton	PDRILL LQ	2020
29	PR-19-000150	Andre Dauphinais	Belfast Drilling 2019 Project	Belfast	PDRILL	2019

No.	Plan/Permit No.	Claim Holder and/or Proponent	Project Name	Township	Exploration Activities	Effective
30	PR-19-000333	Wesley Whymark	Moses Lake	MacBeth	PDRILL PSTRIP LQ	2020
30	PR-20-000172	Joerg Kleinboeck	Eaglerock Lake	Scholes	PDRILL	2020
30	PR-20-000278	Joerg Kleinboeck	Eaglerock Lake	Scholes	N/D	2020
31	PR-20-000272	Winston Whymark	Pardo	Pardo, Clement	PDRILL PSTRIP PTRENCH LQ	2020
32	PR-17-11143	New Age Metals Inc.	River Valley Project	Pardo, Dana, McWilliams, Janes	PDRILL	2017
32	PR-18-000022	New Age Metals Inc	River Valley	Pardo, Dana, Janes	PDRILL	2018
32	PR-18-000142	H Barr	River Valley PGM Project	Pardo, Dana, Janes	PSTRIP	2018
33	PR-16-10917A1	Inventus Mining Corp.	Janes Project	Janes	PDRILL PSTRIP PTRENCH LQ	2017
33	PR-19-000289	Brian Wright	Janes Property Project	Janes	PDRILL	2019
34	PR-18-000227	John and Marie Brady	Jovan-Powerline (Jovan Block) Project	Davis	PDRILL PSTRIP PTRENCH LQ	2019
35	PR-14-10520	Gary M. Mote	East Block McAuslan Twp.	McAuslan	PSTRIP PTRENCH	2018
35	PR-20-000058	Don Fudge	McAuslan Drilling	McAuslan	PDRILL PTRENCH LQ	2020
35	PR-20-000072	Gary Mote	McAuslan Bulk Sample	McAuslan	PDRILL PSTRIP PTRENCH	2020
35	PR-20-000125	Stephen Skjonsby	Three Tails	McAuslan	PDRILL PSTRIP PTRENCH	2020
36	PR-17-11177	Greg Marsh	Silicorp Property Exploration	McAuslan, Wyse	PSTRIP	2017
37	PR-18-11272	Mike Morris	Crocan Lake	Antoine, Butler	PDRILL	2018
38	PR-18-000164	Jeffrey Staples	North Himsworth Quarry Project	Himsworth	PDRILL PSTRIP PTRENCH	2018

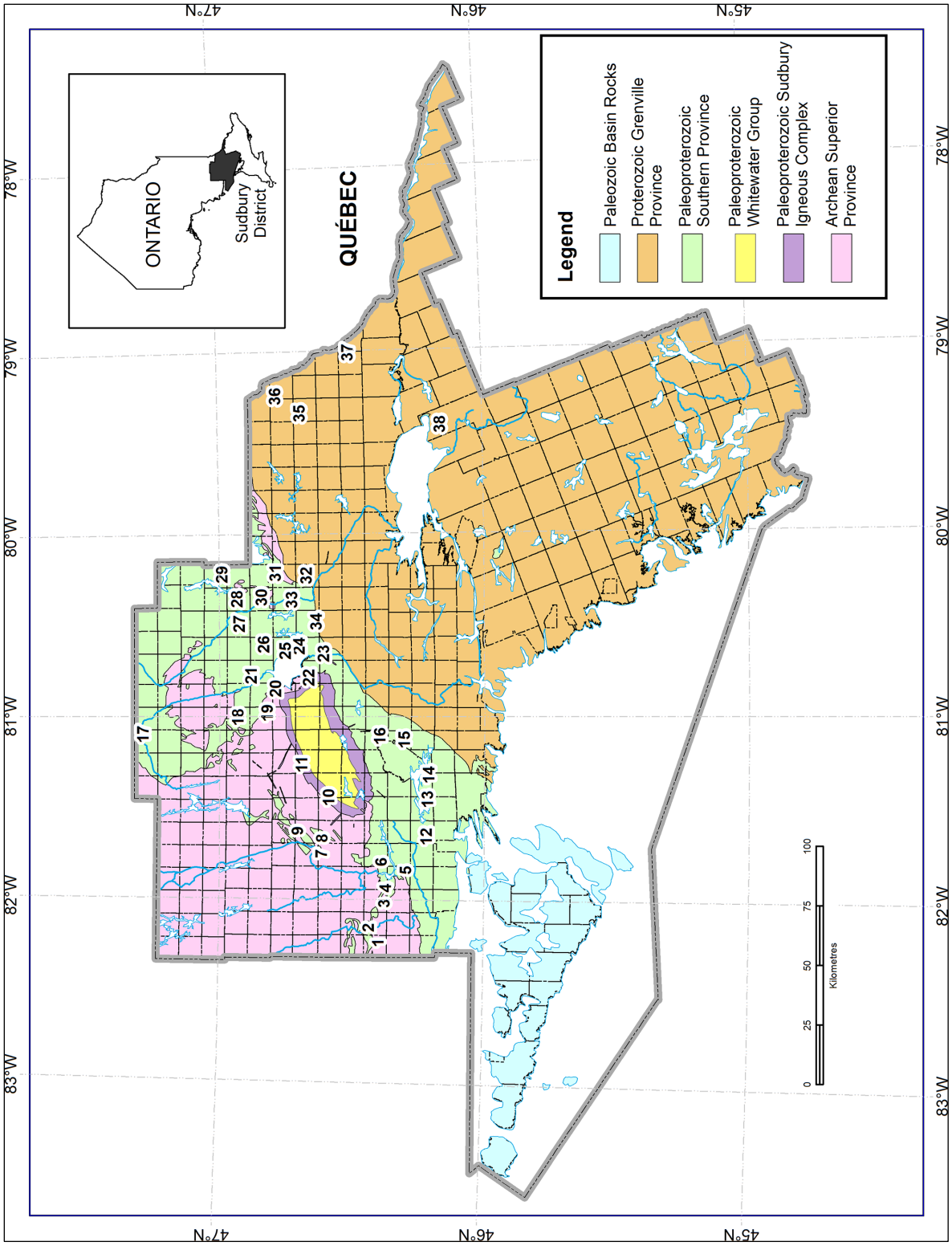

Figure 15. Exploration permits in the Sudbury District in 2020 on active mining claims (keyed to Table 19); geology *modified from* Ontario Geological Survey (2011).

Advanced Projects

There are 3 advanced projects in the Sudbury District (Table 20; Figure 16).

Table 20. Advanced projects in the Sudbury District 2020.

Project	Commodity	Company	Township	Status
Victoria Project	Ni Cu PGM	KGHM Canada	Denison	Pre-mine development
River Valley PGM Project	PGM	New Age Metals	Dana Pardo Janes	Preliminary Economic Assessment
Bissett Creek Project	Graphite	Northern Graphite	Maria	Preliminary Economic Assessment

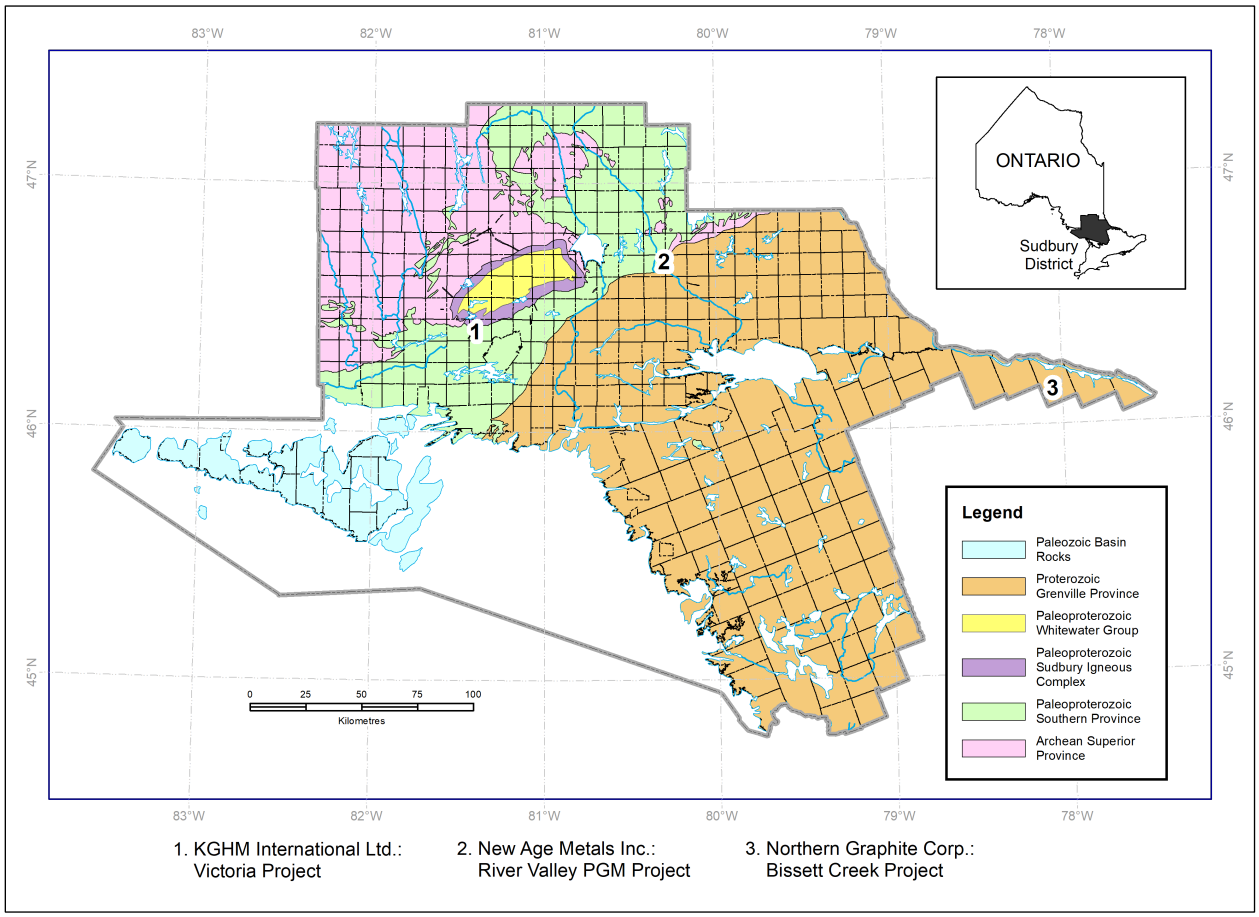

Figure 16. Location of advanced projects in the Sudbury District in 2020; geology *modified from* Ontario Geological Survey (2011).

KGHM INTERNATIONAL LIMITED

Victoria Project – Preproduction Stage

The Victoria property, situated at the junction of the Sudbury Igneous Complex (SIC) and the Worthington Offset dike, is located in the South Range of the Sudbury Structure in Denison Township (*see* Figure 16 [1]).

The Victoria property has a long history of exploration and mining. Operations at the Victoria Mine originally began in 1899 under the Mond Nickel Company and continued through 1923, producing 888 000 tons of ore grading 2.99% Cu and 2.12% Ni (*Sudbury Mining Solutions Journal,* December 1, 2013, v.10, p.15). The mine was reopened by Inco Ltd. in 1970 and operated until 1978. In 2002 FNX Mining Ltd. acquired the rights to the Victoria property from Inco. Exploration on the property was reinitiated in 2008 and resulted in the 2010 Zone 4 discovery. KGHM acquired the Victoria Project through the purchase of Quadra FNX Mining Ltd. The Victoria mineral resources as reported by KGHM (2015) are given in Table 21. KGHM predicts a Life-Of-Mine of 14 years with an annual production of 16 kilotonnes nickel and 18 kilotonnes copper (KGHM 2021).

In 2020, KGHM continued work on exploratory work to increase knowledge of the deposit (KGHM 2021). Cash expenditures on the Victoria project for the 2020 were US$7 million (KGHM 2021).

Table 21. KGHM Victoria Mine ore resources as of December 2014 (KGHM 2015).

Commodity	Indicated Resources (Mt)	Grade (%)	Grade (g/t)	Inferred Resources (Mt)	Grade (%)	Grade (g/t)
Resources	0.48			13.08		
Ni (%)		1.23			2.76	
Cu (%)		1.41			2.64	
Co (%)		0.03			0.06	
Au (g/t)			0.22			0.97
Pt (g/t)			0.47			3.08
Pd (g/t)			1.35			4.45
TPM (g/t)			2.04			8.50

TPM = total precious metals (gold, platinum, palladium)

NEW AGE METALS INC.

River Valley Platinum Group Metals (PGM) Project

The River Valley PGM and River Valley Extension projects of New Age Metals Inc. are located in Dana, Pardo, Janes and McWilliams townships, approximately 60 km east of Sudbury (*see* Figure 16 [2]). The 100% New Age Metals-owned precious metals deposit is hosted in a gabbro breccia unit on or near the contact of the Paleoproterozoic River Valley intrusion with footwall rocks of the Grenville Province (Main and Footwall Zones). The deposit has been traced for 16 km along strike, containing 12 mineralized zones separated by faults with offsets of up to 1 km (Figure 17).

An Updated Mineral Resource Estimate and Preliminary Economic Assessment for the River Valley PGM project is available (Puritch et al. 2019). The Resource Estimate is provided in Table 22. The Preliminary Economic Assessment used a nominal throughput rate of 6 000 000 tonnes/year for the process plant and estimated the Life-Of-Mine to be 14 years (Puritch, et al. 2019).

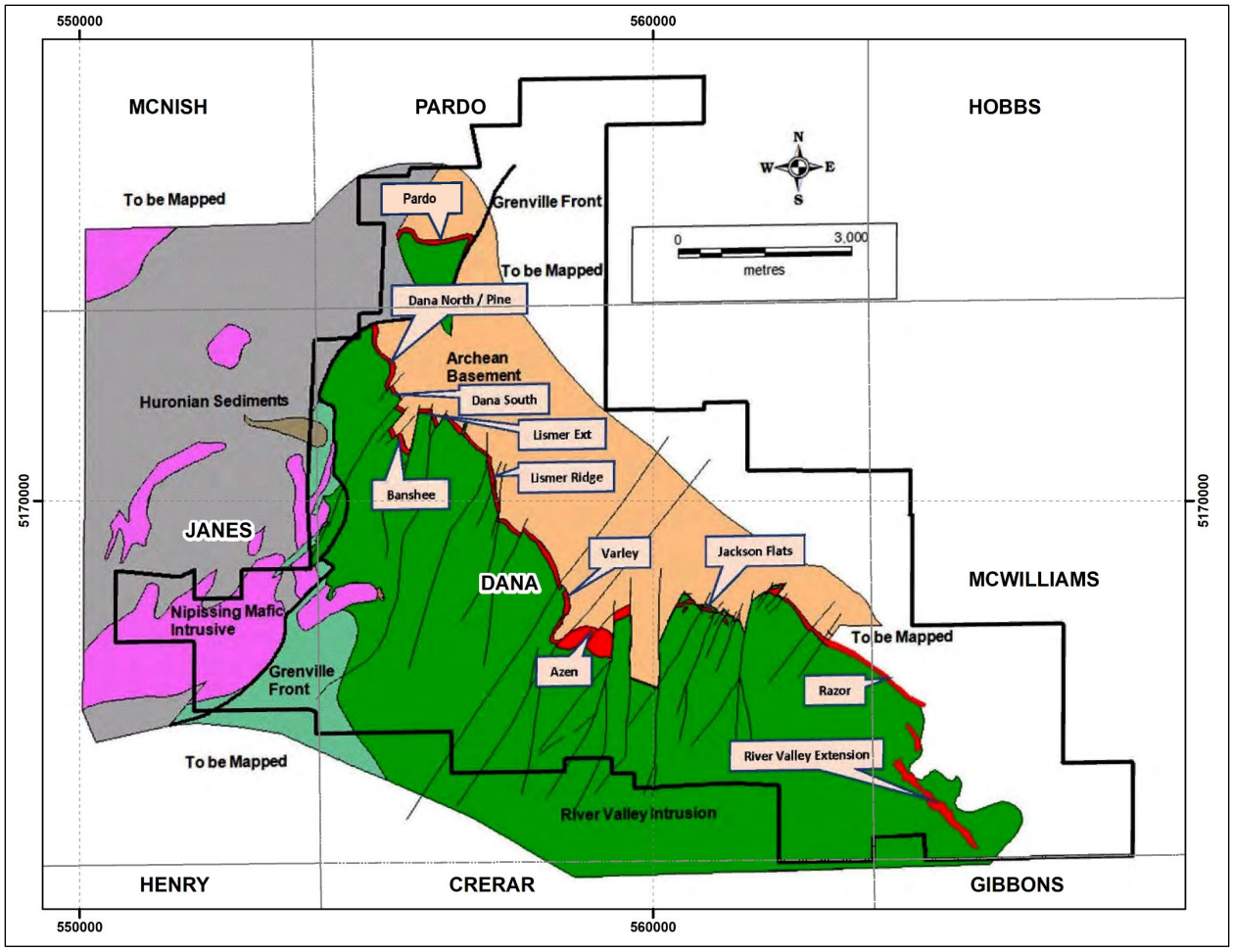

Figure 17. New Age Metal property positions for the River Valley and River Valley Extension projects, with mineralized zones indicated in red (published with permission from New Age Metals; figure *modified from* Puritch et al. 2019).

Table 22. New Age Metals River Valley Mineral Resource summary, using cut-off grades of 0.35 g/t PdEq for open pit mining and 2.00 g/t PdEq for underground mining (*from* Puritch et al. 2019).

	Total Measured and Indicated Resources		Inferred Resources
Commodity	**Pit constrained**	**Underground**	**Pit constrained**
[1]PdEq Cutoff (g/t)	0.35	2.00	0.35
Resources (kt)	99 179	77	52 306
Pd (g/t)	0.52	2.32	0.31
Pt (g/t)	0.2	0.74	0.15
Rh (g/t)	0.009	0.034	0.012
Au (g/t)	0.03	0.09	0.04
Cu (%)	0.06	0.11	0.04
Ni (%)	0.02	0.02	0.02
Co (%)	0.006	0.002	0.001
[1]PdEq (g/t)	0.9	3.37	0.63

[1]PdEq g/t = (Ni % x 2.55) + (Cu % x 1.34) + (Au g/t x 1.20) + (Pt g/t x 0.89) + (Rh g/t x 1.41) + (Co % x 9.01) + Pd g/t

In 2020, New Age Metals' River Valley exploration program focussed on drilling the Pine Zone and geophysical targets in the north part of the project, as well as prospecting and surface sampling, adding rhodium to their data, and environmental and archeological studies. Phase 1 drilling consisted of 8 holes (1685 m) targeting expanding the Pine Zone mineralization, the possible connection at depth between the Pine and Dana North zones (T3), and testing the palladium continuity within the 2019 Block Model (New Age Metals Inc. press release June 2, 2020). Phase 2 consisted of 3 drill holes (792 m) testing the Pine and T3 zones (New Age Metals Inc. press release September 24, 2020). Highlights of the drilling are given in Table 23.

New Age Metals prospected and sampled in the Dana South and Pardo zones (*see* Figure 17) to confirm the presence of the mineralized River Valley breccia unit (New Age Metals Inc. press release September 24, 2020). Highlights of the sample results are given in Table 24. Additionally, 300 core samples from prioritized zones were submitted for rhodium, palladium, platinum, ruthenium and iridium analyses (New Age Metals Inc. press release November 5, 2020).

The results and report on the environmental baseline study undertaken by Story Environmental in 2020 is expected in early 2021 (New Age Metals Inc. press release November 5, 2020).

Table 23. Highlights of 2020 Phase 1 drilling, New Age Metals, River Valley project (New Age Metals Inc. press release June 2 and September 24, 2020).

Zone	Hole ID	Length (m)	[1]TPM (g/t)	[2]PdEq (g/t)
Pine	PZ-20-01	3	1.287	1.477
	PZ-20-02	4	0.447	0.597
	PZ-20-04	12	1.101	1.25
	including	8	1.36	1.542
	PZ-20-05	3	0.603	0.857
T3	T3-20-01	17	0.559	0.744
	T3-20-02	17	0.488	0.622
	T3-20-04	1	0.643	0.866

[1]TPM = Total Precious Metals (Au+Pd+Pt)
[2]PdEq g/t = Pd g/t + (Pt g/t x 0.89) + (Au g/t x 1.20) + (Cu% x 1.34) + (Ni% x 2.55) + (Co% x 9.01)

Table 24. Highlights of 2020 surface sampling, New Age Metals, River Valley project (New Age Metals Inc. press release September 24, 2020).

Zone	Sample	[1]TPM (g/t)
Dana South	RZ-001DS	0.596
	RZ-002DS	1.458
	RZ-003DS	1.088
	RZ-005DS	8.289
	RZ-006DS	1.910
Pardo	RZ2020-01	1.458

[1]TPM = Total Precious Metals (Au+Pd+Pt)

NORTHERN GRAPHITE CORPORATION

Bissett Creek Project

Northern Graphite Corporation holds 100% interest in the Bissett Creek graphitic gneiss deposit near Mattawa, in Maria Township (*see* Figure 16 [3]). The property consists of 2 mining leases, covering 2503 ha, and 5 legacy claims which converted to 52 cell claims covering approximately 1159 ha (Northern Graphite Corporation 2020).

Proposed development of the deposit will occur in 2 phases. Phase 1 will consist of an open pit mine and a processing plant with conventional crushing, grinding and flotation circuits followed by concentrate drying and screening. After 3 years production, phase 2 will involve doubling the production. Extra-large flake and battery grade graphite concentrates will account for 90% of the production.

The resource estimates for Bissett Creek, as reported in Northern Graphite Corporation (2020), are given in Table 25. However, the company reports that the resource estimates may be expanded, as the ore extent has not been closed off by drilling.

A Feasibility Study of the Bissett Creek project was completed in 2012 (G Mining Services Inc. 2012) and subsequently updated in 2013 without material change (Northern Graphite Corporation, press release, May 7, 2013). A Preliminary Economic Assessment (PEA) was completed in 2013 (Leduc 2013) and subsequently updated in 2014 without material change (Northern Graphite Corporation, press release, June 24, 2014). A sensitivity analysis on the Project was performed by G Mining Services Inc. using a 5% increase in capital costs and a 20% increase in operating costs (Northern Graphite Corporation 2020).

In 2020, Northern Graphite completed metallurgical testing at SGS Lakefield to validate the simplified flow sheet (Northern Graphite Corp. press release July 23 2020). Results indicate that the average concentrate purity would increase from 94.5% to 97.2% with the new flow sheet. Small declines in recoveries (from 94.7% to 92.4%) and in large flake yields would be expected.

Table 25. Bissett Creek Resource Estimate 2013 (*from* Northern Graphite Corporation 2020).

	Measured and Indicated Resources			Inferred Resources		
Cutoff Grade (% Cg)	**Tonnage (Mt)**	**Cg (%)**	**In-Situ Graphite (Mt)**	**Tonnage (Mt)**	**Cg (%)**	**In-Situ Graphite (Mt)**
1.02	69.8	1.74	1.2	24.0	1.65	0.4

Mt=Million tonnes; Cg= graphitic carbon

Exploration Projects

GLENCORE CANADA CORPORATION

Glencore Canada Corporation continues its exploration programs throughout its large property holdings in the Sudbury Basin, some of which appear in Tables 17, 18 and 19, and on Figures 13, 14 and 15.

Norman West Project

(Glencore – Sudbury Integrated Nickel Operations (Sudbury INO): Sudbury Geological Discussion Group presentation by B. Lazich, January 27, 2021)

Glencore's Norman West deposit, discovered in 1996, has been actively explored since 2014. The deposit is located in Norman Township, 35–40 km northeast of Sudbury (*see* Figure 13 [#15]). The Norman West Cu-Ni-PGE deposit is hosted over a 2 km strike length within a series of contact and footwall lenses that begin at 1600 m below surface and plunge down to 2800 m. Contact mineralization occurs at the base of the Late Granite Breccia (LGBX) and footwall mineralization occurs vertically below in Sudbury Breccia (SDBX) or metabreccia.

A long-section, looking southeast, is shown in Figure 18. Glencore's exploration at Norman West has been a multi-disciplinary approach, including MultiGrid EM (McMonnies, Hughes and Lamontagne 2020; Lamontagne Geophysics Ltd. 2020) and borehole Radio Imaging Method (RIM).

The total 2020 Inferred Resource for the Norman West deposit (both contact and footwall ore zones) provided by Glencore – Sudbury INO (*pers.comm.*) is given in Table 26.

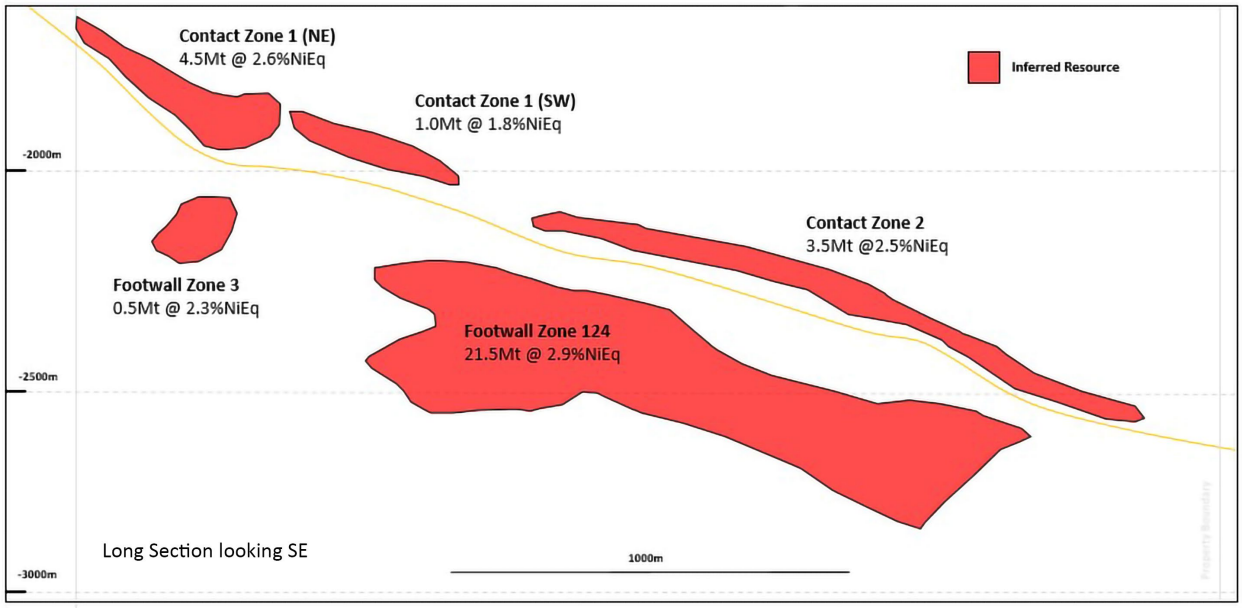

Figure 18. Long section, looking southeast, of Glencore's Norman West deposit; figure *provided by* Glencore – Sudbury Integrated Nickel Operations, published with permission.

Table 26. Norman West Inferred Resource 2020 (*from* Glencore).

Tonnage (Mt)	Ni (%)	Cu (%)	Co (%)	Au (g/t)	Ag (g/t)	Pt (g/t)	Pd (g/t)
31	0.7	2.4	0.02	0.4	18.3	0.9	1.1

VALE CANADA LIMITED

Sudbury Basin

Vale Canada Ltd. continues to explore its extensive Sudbury Basin properties, some of which appear in Tables 17, 18 and 19, and Figures 13, 14 and 15. Among the projects under study is the Kelly Lake property, which makes up phase 2 of the Copper Cliff Deep project, and would be accessed by expansion of that mine. A feasibility study to determine the viability of phase 2 has been commenced (Ontario Prospectors Association 2020; *Northern Ontario Business*, November 26, 2019).

VALE CANADA LIMITED (WITH GLENCORE CANADA CORPORATION)

Victor Property

Vale Canada Ltd. and Glencore Canada Corporation continue working together on Vale's Victor property (*see* Figure 13 [#16]). Vale (2020b) indicate a 2025+ start-up for Victor, and expect +30 kilotonnes per year capacity.

CANADIAN PALLADIUM RESOURCES INC.

(formerly 21C Metals Inc.)

East Bull Palladium Project

Canadian Palladium Resources Inc. entered into an option agreement with Pavey Ark Minerals Inc. for the East Bull Palladium project in 2019. The project is located in Gerow Township, approximately 97 km west of the city of Greater Sudbury (137 km by road; *see* Figure 13 [#1]). The property comprises 4 contiguous claims covering 62 unpatented claim units for a total area of 922 ha (Puritch, Yassa and Barry 2019; Figure 19).

The East Bull Lake intrusion is part of the East Bull Lake Intrusive Suite (ca. 2.48 Ga; Easton, James and Jobin–Bevans 2010). It is a layered lopolith (Easton et al. 2011), and the PGM and base metal mineralization occurs in an inclusion bearing zone above the footwall contact (within a few tens of metres; Puritch, Yassa and Barry 2019).

An updated NI 43-101 technical report and initial mineral resource estimate was submitted to SEDAR in 2019 (Table 27; Puritch, Yassa and Barry 2019).

In 2020, Canadian Palladium Resources completed and reported assay results from 42 diamond-drill holes. Assay results grading better than 1 g/t total precious metals (TPM = Pd + Pt + Au) are given in Table 28. A magnetotelluric survey was undertaken over the project and identified new drill targets (Canadian Palladium Resources Inc., press release, July 23, 2020).

Table 27. East Bull Pallladium deposit pit-constrained mineral resource estimate (Puritch, Yassa and Barry 2019).

Inferred Resource (Mt)	Au (g/t)	Pt (g/t)	Pd (g/t)	Rh (g/t)	Cu (%)	Ni (%)	Co (%)	3PGM+Au (g/t)	PdEq[1] (g/t)
11.1	0.05	0.26	0.58	0.04	0.14	0.05	0.01	9.54	1.46

[1]*PdEq g/t = (Ni % x 1.36) + (Cu % x 2.18) + (Au g/t x 1.43) + (Pt g/t x 1.24) + (Rh g/t x 1.27) + (Co % x 7.38) + Pd g/t)*

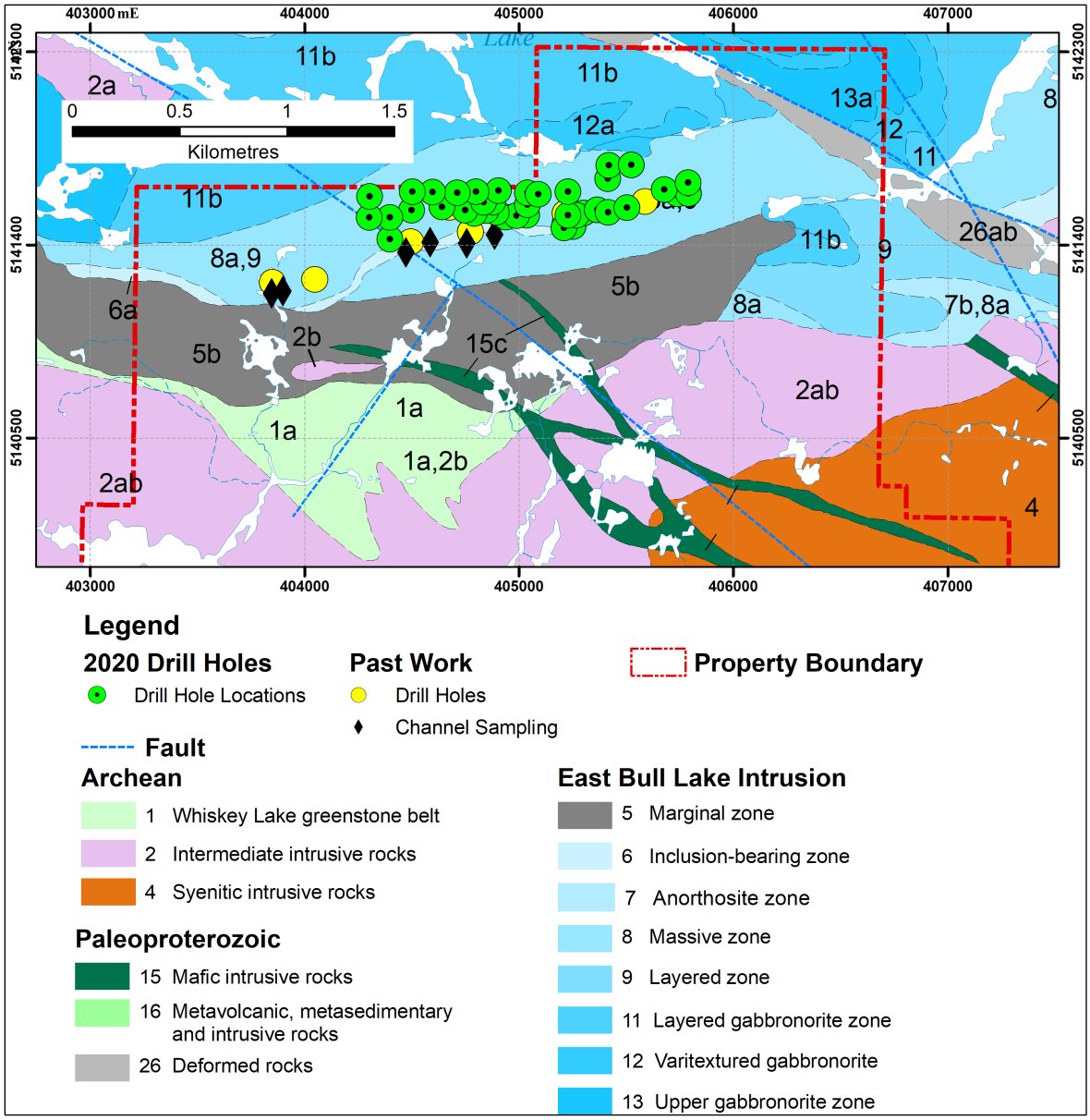

Figure 19. Canadian Palladium Resources' East Bull Palladium property, showing 2020 drill hole locations (Canadian Palladium Resources Inc., press releases, October 21, 28, November 23 and December 4, 2020. Geology *modified from* Easton et al. 2011).

Table 28. Highlights of East Bull Palladium project drill assay results (Canadian Palladium Resources Inc., press releases, October 21, 28, November 23 and December 4, 2020).

Hole ID	Core Length (m)	Pd (g/t)	Pt (g/t)	Au (g/t)	TPM[1] (g/t)
EB-20-01	11	2.156	1.039	0.098	4.088
Includes	6	3.108	1.614	0.121	6.299
EB-20-02	5	1.136	0.385	0.051	1.573
EB-20-03	15	1.118	0.472	0.076	1.869
Includes	3	2.397	1.307	0.134	4.854
EB-20-06	4	0.784	0.22	0.041	1.056
EB-20-07	9	2.141	0.823	0.142	3.106
Includes	3	4.224	1.6	0.231	6.055
EB-20-09	4	0.87	0.46	0.042	1.463
EB-20-12	22	1.239	0.428	0.049	1.716
Includes	2	3.425	1.38	0.093	4.898
AND	2	0.869	0.326	0.055	1.286
EB-20-13	2	0.832	0.216	0.048	1.095
EB-20-17	11	1.003	0.367	0.091	1.461
EB-20-19	7	1.078	0.386	0.041	1.505
AND	3	2.26	0.677	0.079	3.016
EB-20-24	11	0.983	0.272	0.063	1.318
EB-20-25	6	0.832	0.466	0.036	1.333
EB-20-28	2	1.534	0.55	0.09	2.174
EB-20-29	3	0.787	0.306	0.053	1.146
EB-20-34	1	2.17	0.514	0.101	2.79
EB-20-37	12	1.798	0.499	0.092	2.389
Includes	5	2.36	0.611	0.09	4.723
incl.	1	6.4	1.566	0.35	8.32
EB-20-40	28	0.967	0.347	0.088	1.402
Includes	5	2.846	0.965	0.197	4.009
EB-20-42	7	0.712	0.25	0.065	1.027

[1]*TPM = Total Precious Metals (Pd + Pt +Au)*

CONQUEST RESOURCES LTD

Golden Rose Gold Project

Conquest Resources Ltd.'s Golden Rose property is located 65 km northeast of Sudbury in Afton and Scholes townships (*see* Figure 13 [#11]). Consisting of patent and staked claims, it covers 770 ha. The past-producing Golden Rose gold mine is on the property, and 2 prospective iron formations occur (Figure 20). The mineralization at the mine is associated with sulphide facies iron formation, quartz-carbonate veins and albite porphyry intrusion (https://www.conquestresources.com | projects | flagship - golden rose project; accessed January 22, 2021).

In 2020, Conquest Resources initiated a 5000 m drill program. Results from the first 2 drill holes were reported in January 2021 (Conquest Resources Ltd. press release January 11, 2021). Highlights are given in Table 29. The first hole (GRW20-01) targeted the down-fault extension of the gold-hosting iron formation, approximately 1 km west of the Golden Rose Mine. The second hole (GR20-01) targeted the area below the Golden Rose Mine workings. The remaining holes target 1) below the mine workings and 2) magnetic anomalies associated with Mobile Metal Ion (MMI) and B-horizon gold-in-soil anomalies (Conquest Resources Ltd. press releases, November 2, 2020 and January 11, 2021).

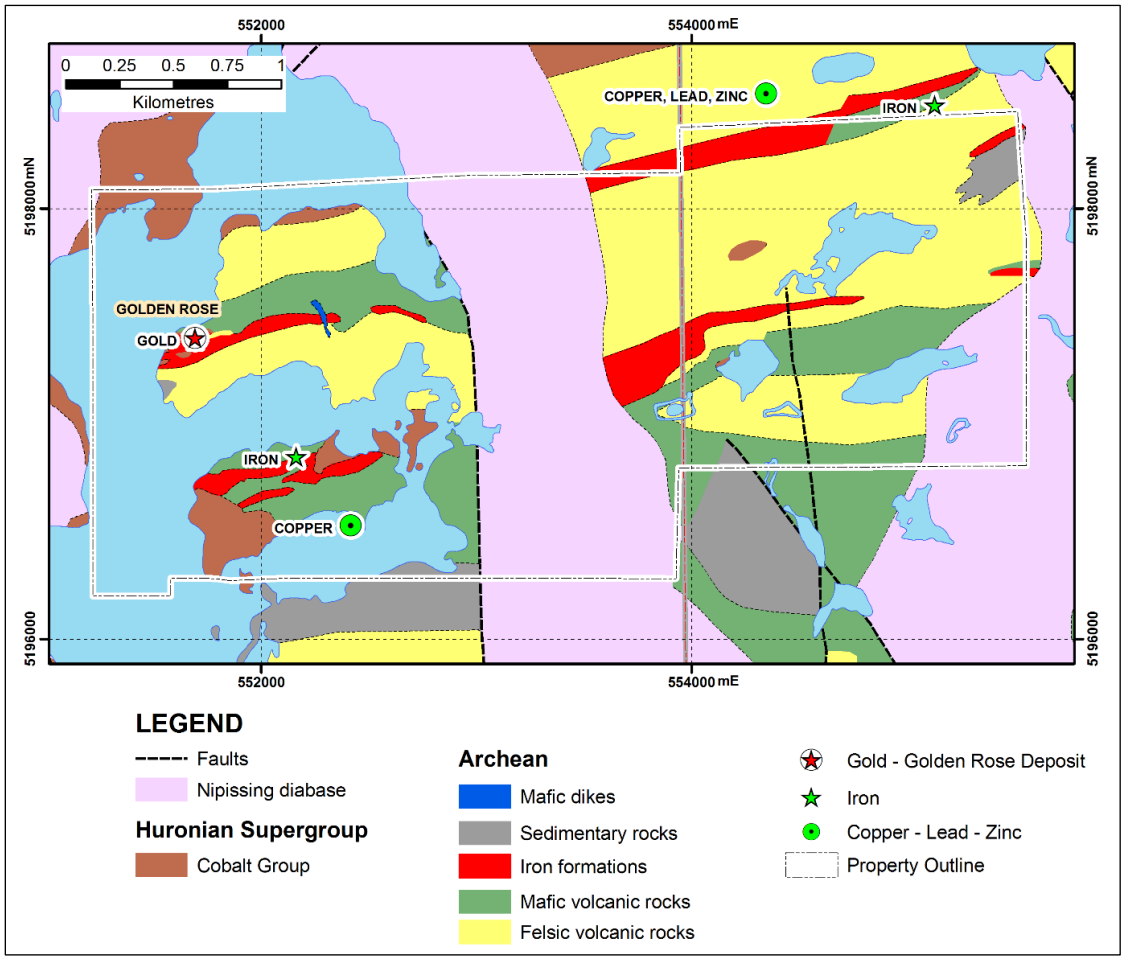

Figure 20. Geology of the Golden Rose property, showing location of the Golden Rose Mine and the 2 parallel iron formations; geology *modified from* Meyn (1977). UTM co-ordinates provided using NAD83, zone 17.

Table 29. Highlights of Conquest Resources 2020 Golden Rose project drill program **(**Conquest Resources Ltd. press release January 11, 2021).

Hole ID	Core Length (m)	Au (g/t)
GRW20-01	0.80	2.90
GR20-01	11.00	2.15
including	1.00	11.20
including	1.00	3.53
including	1.10	4.44
AND	0.40	6.33
AND	2.82	2.03
including	0.90	4.99

Other Properties

In addition to the Golden Rose property, Conquest Resources also holds options on claim cells in MacBeth and Clement townships (Conquest Resources Ltd. press release May 29, 2019). In 2020, Conquest increased its land holdings with the acquisition of Canadian Continental Exploration Corp. (Conquest Resources Ltd. press release October 14, 2020) and with claim cells in Belfast Township, obtained by staking and purchase (Conquest Resources Ltd. press release November 2, 2019). These acquisitions give Conquest Resources a land package greater than 220 km^2 (22 000 ha) in the Temagami mining camp, including Canadian Continental Exploration Corp's Deepwater and Eaglerock Lake projects.

In 2020, Conquest Resources undertook an airborne Geotech VTEM Max survey over the Belfast project. The survey will cover parts of the Eaglerock Lake and Golden Rose properties (Conquest Resources Ltd. press release November 2, 2019). By January 2021, 1251 line-kilometers had been flown, and preliminary data evaluation had identified potential exploration targets (Conquest Resources Ltd. press release January 11, 2021).

GRAYCLIFF EXPLORATION LTD.

(formerly 1093683 B.C. LTD)

Shakespeare Gold Property

Graycliff Exploration entered into an option agreement to acquire the Shakespeare Gold Property in August 2019 (Graycliff 2020), and increased its property position in 2020 (Graycliff Exploration Ltd. press release, October 14, 2020). The property is located 88 km west of Sudbury (*see* Figure 13 [#3]) and consists of 39 mining claims (847 ha).

The property hosts the past-producing Shakespeare gold mine which was in production intermittently between 1905 and 1948. The geology is dominated by Middle to Upper Matinenda Formation metasedimentary rocks of the Huronian Supergroup that are interlayered locally with mafic volcanic rocks. Felsic and mafic intrusions also occur on the property and a regional structure, the Murray fault, crosscuts the property. The mineralization at the past-producing Shakespeare gold mine is considered to be epigenetic, with the mineralization occurring in strongly sheared quartzite and quartz-sericite schist (Jackson and Lewis 2020; Ronacher and McKenzie 2017).

In 2020, Graycliff undertook compilation and analysis of historical data, and field verifications, which lead to the identification of a prospective gold horizon (Graycliff Exploration Ltd. press release,

October 21, 2020). A 2000 m drill program was initiated targeting the area around the past-producing Shakespeare gold mine shaft and over 6 km along the strike of the prospective gold horizon (Graycliff Exploration Ltd. press release, October 28, 2020).

GRID METALS CORP.

East Bull Lake Palladium Project

Grid Metals Corp. has a large property position over the East Bull Lake intrusion (EBLI) in the townships of Gerow, Boon, Shibananing, Lockeyer and Mandamin, approximately 80 km west of Sudbury (*see* Figure 13 [#1]; Figure 21). The property comprises 465 single cell and boundary cell claims, covering approximately 7800 ha (Davis 2020).

Three types of magmatic sulphide mineralization occur in the EBLI: contact-type, structurally-controlled and disseminated (Davis 2020). Based on a re-assessment of the property, Grid Metals concludes that much of the known palladium mineralization is structurally controlled (https://gridmetalscorp.com | properties | east-bull-lake-palladium-project).

In 2020 Grid Metals completed magnetotelluric (MT) surveys over 2 target areas (Parisien Lake and East Lobe) and along 2 survey lines (Davis 2020; https://gridmetalscorp.com | properties | east-bull-lake-palladium-project [accessed April 7, 2021). 2D and 3D modeling of the data yielded reduced resistivity anomalies, generating exploration targets. Grid Metals conducted a drill program, and a 4 week field program in 2020. The field program consisted of mapping, prospecting, and field checking geophysical anomalies. There were 75 grab samples, taken from the Parisien Lake (West Lobe) and Southwest margin (East Lobe). Nine samples returned values above 1g/t TPM (Grid Metals Corp., press release, October 7, 2020). The drill program consisted of 15 drill holes, assays are still pending for the final 2 holes of the program (Figure 21; Grid Metals Corp., press release, December 3, 2020). Assay results grading better than 1 g/t TPM are given in Table 30.

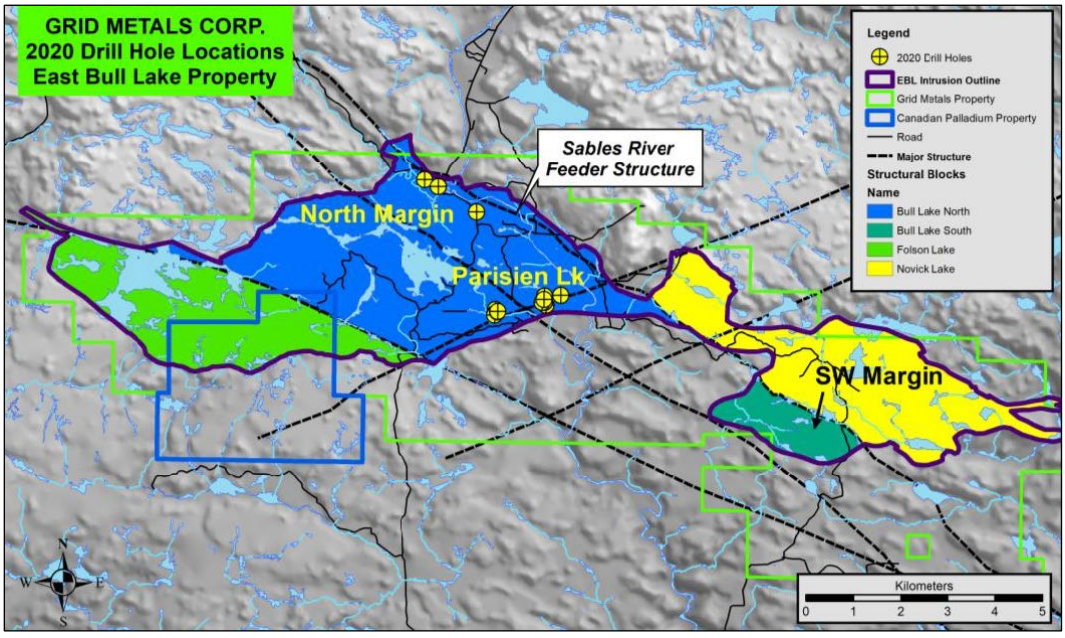

Figure 21. Location map of Grid Metals' East Bull Lake Palladium property, showing location of the 2020 drill hole locations; figure *from* Grid Metals Corp. (2020), published with permission.

Table 30. Highlights of East Bull Lake Palladium project drill assay results (Grid Metal Corp., press releases, August 6, September 9, October 21 and December 3, 2020).

Hole ID	Core Length (m)	Pd (g/t)	Pt (g/t)	Au (g/t)	TPM[1] (g/t)
EBL20-01A	1.24	0.8	0.17	0.05	1.02
AND	1	1.13	0.41	0.11	1.64
EBL20-02	0.96	0.99	0.35	0.1	1.45
AND	11	0.86	0.25	0.03	1.14
including	1	1.77	0.62	0.03	2.41
including	0.6	2.9	0.62	0.11	3.62
AND	3	1.08	0.34	0.05	1.47
EBL20-03	3	0.83	0.21	0.1	1.13
EBL20-05	3	1.06	0.31	0.04	1.4
including	1	2.44	0.68	0.09	3.21
AND	1	1.59	0.49	0.11	2.18
AND	1	1.86	0.93	0.14	2.43
AND	5	0.8	0.27	0.05	1.12
AND	1	0.82	0.19	0.04	1.05
EBL20-06	3	0.72	0.23	0.09	1.04
EBL20-07	7	0.78	0.17	0.04	1.01
including	2	1.65	0.37	0.11	2.14
EBL20-08	10	1.04	0.22	0.04	1.29
including	5	1.66	0.34	0.06	2.05
EBL20-12	6	1.02	0.37	0.08	1.46
including	3	1.43	0.54	0.08	2.05
AND	2.27	0.79	0.19	0.04	1.02
EBL20-10	3.63	0.99	0.27	0.03	1.28
EBL20-13	119.17	0.76	0.21	0.04	1.01
including	2	2.63	0.85	0.12	3.6
including	75	0.89	0.22	0.04	1.15
incl.	48	1.23	0.31	0.06	1.6
with	14	2.04	0.45	0.09	2.58
with	3.68	3.18	0.6	0.15	3.93

[1]*TPM = Total Precious Metals (Pd + Pt +Au)*

INVENTUS MINING CORP

Pardo Paleoplacer Property

The Pardo property, 65 km northeast of Sudbury (*see* Figure 12 [#8]), is road accessible and covers a sequence of Paleoproterozoic rocks, which include the Matinenda and Mississagi formations (basal conglomerate units of the Huronian Supergroup). The numerous gold occurrences on the property (Figure 22) are spatially associated with pyritic, quartz-pebble–bearing portions of both the Matinenda and Mississagi conglomerates (http://www.inventusmining.com/ | Pardo Project [accessed January 21, 2021]; Kuntz, Wymark and Long 2018).

A 1000 tonne bulk sample was taken in 2017 from the Trench 1 area (*see* Figure 22; Kuntz, Wymark and Long 2018). From the 985 dry tonnes of mill feed, 3.72 kg (119.5 troy ounces) of gold were recovered, and the tailings were estimated to contain 0.44 kg (14.2 troy ounces) of gold. This gives a recovery rate of 89%, a total gold content of 4.16 kg (133.8 troy ounces) and an equivalent head grade of 4.20 g/t gold.

Metallurgical test work on the 007 Zone in 2019 (Figure 23) gave the following results (Inventus Mining Corporation, press release July 9, 2019, accessed January 21, 2021).

- Test sample head grade: 6.4 g/t gold.
- Gravity and flotation combination: 95.2% gold recovery at 5% mass pull and tail assay of 0.3 g/t gold.
- Gravity concentration alone: 42.8% gold recovery at 0.08% mass pull; concentrate grade of 3087 g/t gold.
- Environmental test work on the gravity plus flotation tails: <0.05% sulfur; indicating residues not likely to be acid generating.

Sudbury 2.0

Inventus Mining's Sudbury 2.0 Project covers 240 km^2, 45 km northeast of Sudbury, and is located in the Temagami Magnetic Anomaly in Sheppard, McConnell, Mackelcan and McCarthy townships (*see* Figure 13 [#12]). Additionally in 2020, Inventus acquired the Wolf Lake and Cobalt Hill properties, as well as the Rathbun Lake property from Flag Resources (1985) Ltd. (Inventus Mining Corp. press releases July 2 and November 24, 2020).

The Sudbury 2.0 area is underlain by upper Huronian Supergroup sediments. Nipissing and olivine diabase dikes occur, as do small mafic dikes of unknown association. Areas of Sudbury breccia and of extensive hydrothermal brecciation is observed on the property. A deep drill hole (AT-14-01; 2.2 km) drilled in 2014 by Canadian Continental Exploration (currently Conquest Resources Ltd.) intersected a mafic intrusion with characteristics similar to Sudbury Igneous Complex offset dikes (Kawohl and Frimmel 2018).

Inventus considers the Sudbury 2.0 property to have potential for the following mineralization styles:

1. Intrusion-related hydrothermal polymetallic gold mineralization.
2. Sudbury-type magmatic Ni-Cu-PGE-Co-Au mineralization hosted within offset dikes and Sudbury breccia radiating from the Sudbury Igneous Complex.

   (*quoted from* http://www.inventusmining.com | Sudbury 2.0 [accessed January 18, 2021])

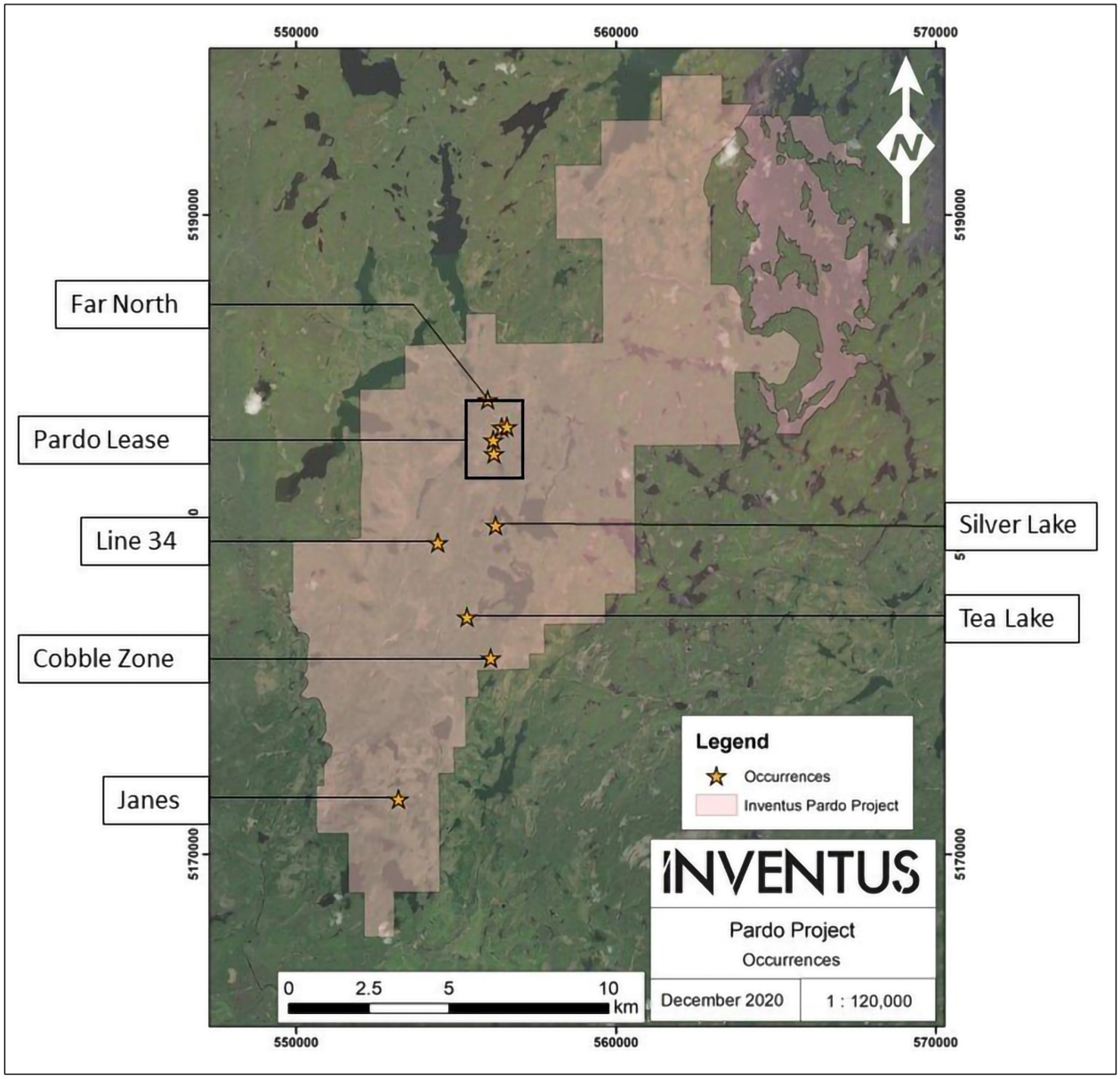

Figure 22. Mineral occurrences on Inventus Pardo Project (Pardo Lease occurrences shown on Figure 23); figure *from* Inventus Mining Corporation, published with permission, http://www.inventusmining.com/ | Pardo Project [accessed January 21, 2021].

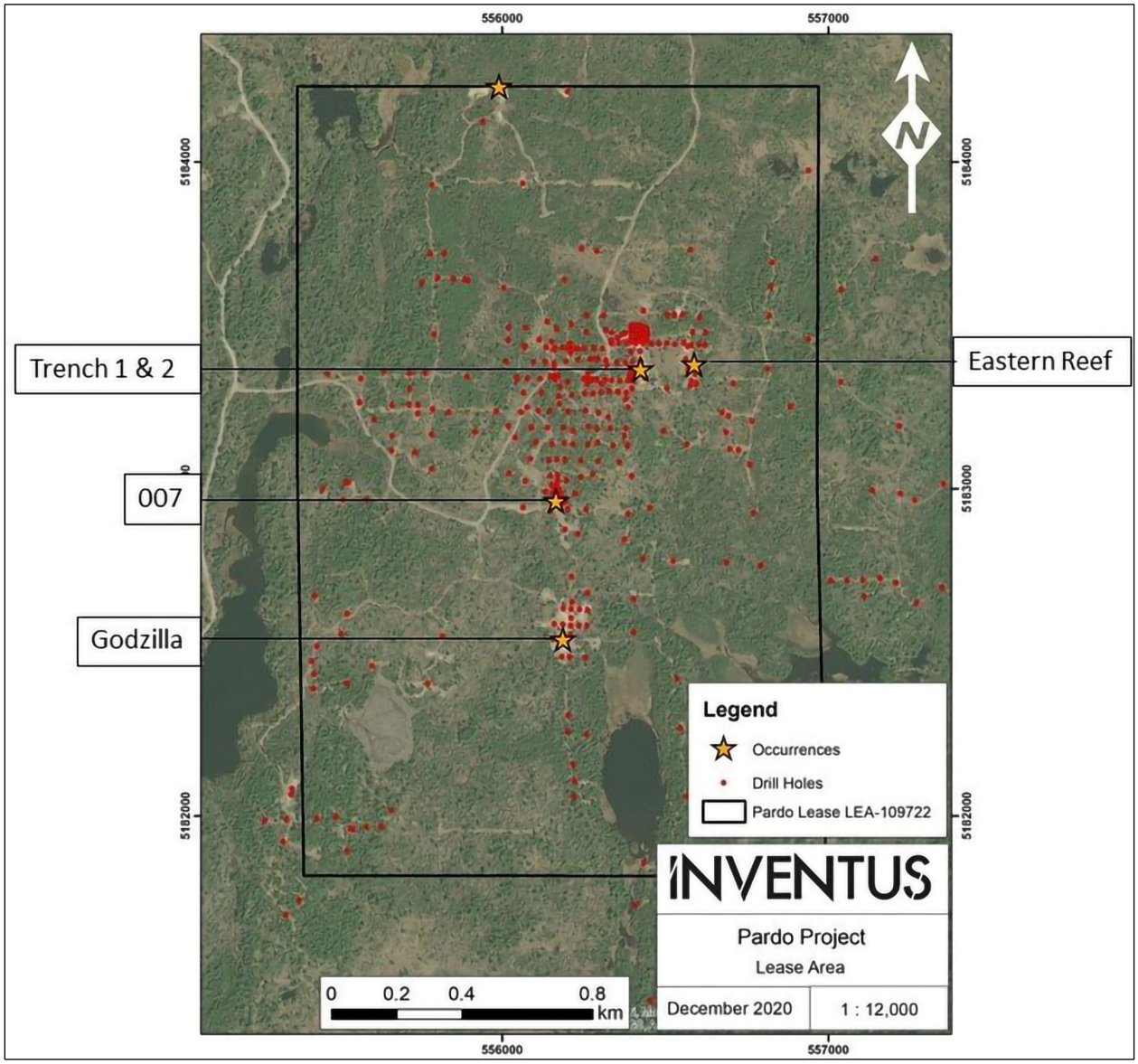

Figure 23. Mineral occurrences on the Pardo Lease, Inventus Pardo Project; figure *from* Inventus Mining Corporation, published with permission, http://www.inventusmining.com/ | Pardo Project [accessed January 21, 2021].

In 2020, Inventus undertook IP surveys targeting 2 areas: Laura Creek Offset Dyke, Big Valley Lake and Doon Lake (Figure 24; Inventus Mining Corp. press release February 3, 2020). Exploration targets were delineated in the areas. In the Laura Creek Offset Dyke area, a 5 drill hole program targeting the IP anomalies and the offset dike was completed. Prospecting over the Big Valley Lake, Wolf Lake and Cobalt Hill properties included sampling. Highlights of the results are in Table 31 (Inventus Mining Corp. press releases, July 2, 2020). Mapping and prospecting also led to the discovery of a visible gold-bearing quartz-carbonate vein at Nick's Lake and of a new Sudbury offset dike at Bassfin Lake (Inventus Mining Corp., press release July 2, 2020).

Table 31. Highlights of 2020 grabs samples from Inventus Mining's Sudbury 2.0 properties (Inventus Mining Corp., press releases July 2 and August 6, 2020).

Property	Au (g/t)	Cu %
Nick's Lake	15.6	
Big Valley Lake	2.9	2.5
Wolf Lake	5.0	1.3
Wolf Lake	4.6	0.1
Wolf Lake	6.3	0.7
Wolf Lake	17.2	0.4

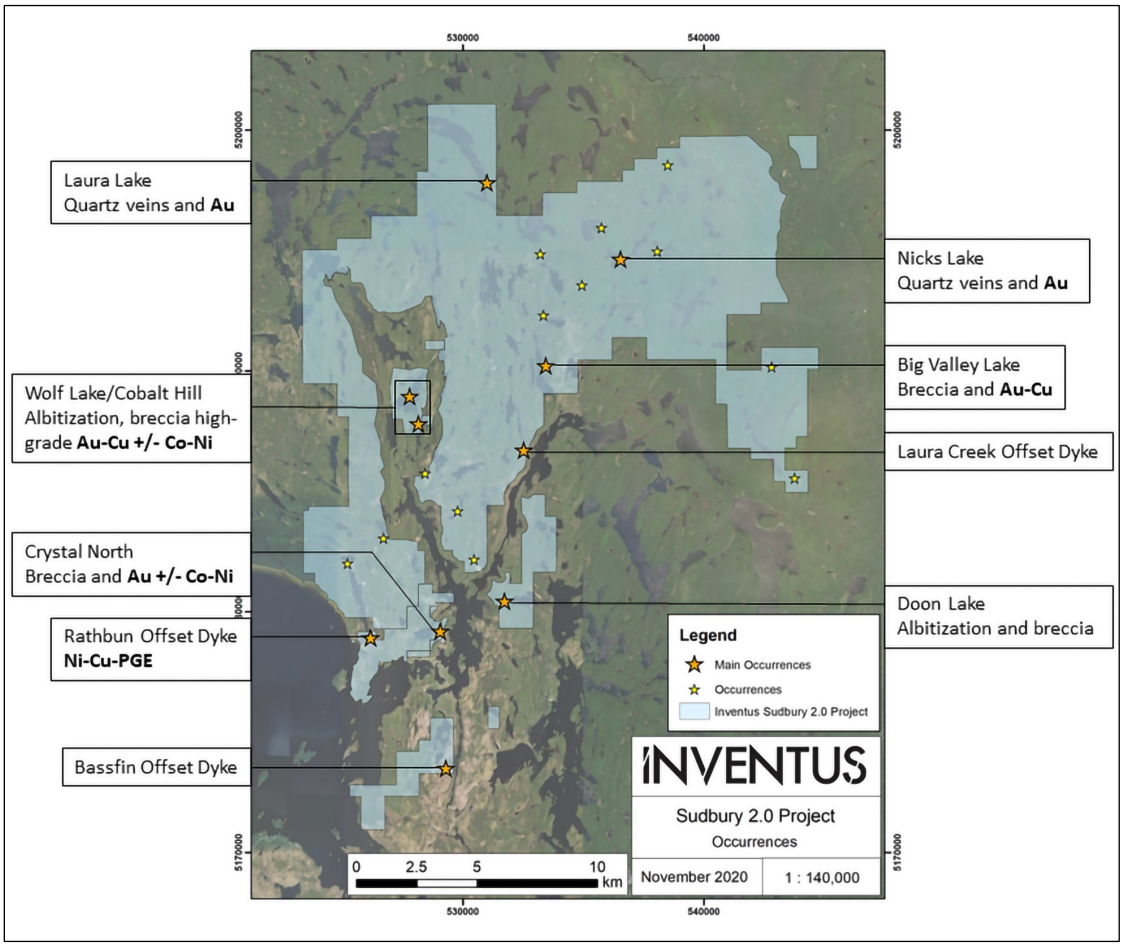

Figure 24. Map of the Inventus Sudbury 2.0 project with locations of main mineralization occurrences indicated; figure *from* Inventus website (http://www.inventusmining.com | Sudbury 2.0 [accessed January 18, 2021], published with permission.

JOSHUA GOLD RESOURCES INC.

King Solomon's Mine Gold Property

In 2020, Joshua Gold Resources Inc. acquired 100% of the King Solomon Mine gold property (Joshua Gold Resources Inc. press release January 13, 2020). The property is located in Davis Township (*see* Figure 13 [#18]) approximately 72 km northeast of Sudbury, and consists of 4 claims with an area of abour 73 ha (180 acres). The area is underlain by the Huronian Supergroup and Nipissing mafic intrusions. The mineralization occurs as auriferous quartz-carbonate and breccia veins.

In 2020, Joshua Gold reported results from grab samples taken in August and November 2019 (Table 32; Joshua Gold Resources Inc. press release January 13 and February 12, 2020).

Table 32. Highlights of grab samples taken in 2019 on Joshua Gold's King Solomon Mine property (Joshua Gold Resources Inc. press release January 13 and February 12, 2020).

Sample	Au (g/t)	Sample Program
Q203003	1.30	August
Q203004	1.78	August
Q203005	209	August
Q203006	3.48	August
Q203007	5.73	August
A37844	140	November
A378446	8.27	November
A376447	2.22	November
A378448	4.59	November

MACDONALD MINES EXPLORATION LTD

Scadding–Powerline–Jovan (SPJ) Iron-Oxide-Copper-Gold Project

MacDonald Mines Exploration Ltd.'s Scadding–Powerline–Jovan (SPJ) iron-oxide-copper-gold project is located approximately 40 km northeast of Sudbury in Davis, Street, Scadding, MacLennan, Falconbridge, Rathbun and Loughrin townships (*see* Figure 13 [#18]), and covers 18 340 ha. The area is underlain by the Huronian Supergroup and Nipissing mafic intrusions, and is characterized by sodic metasomatism, considered a possible indicator for iron oxide-copper-gold deposits (Schandl, Gorton and Davis 1994; Schandl and Gorton 2007), an interpretation that MacDonald Mines embraces (Yarie and Wray 2019). Numerous mineralized showings and prospects occur on the SPJ property (Figure 25). The current hypothesis is that the gold mineralization is controlled by a series of folds distributed across an approximately 500 m east–west corridor (https://macdonaldmines.com/ | projects | SPJ Iron-Oxide-Copper-Gold Project, accessed January 27, 2021).

An historical resource (NI 43-101–noncompliant) was calculated in 1983 for the Scadding gold mine (Table 33; Yarie and Wray 2019).

Table 33. Historical mineral resource estimate for the Scadding gold mine (converted to metric system[1]; Yarie and Wray 2019).

Category	Tonnes	Gold Grade (g/t)
Historical	138 704	12.89

[1]*Original resource reported in short tons and troy ounces/short ton (152 895 tons @ 0.376 t-oz/ton)*

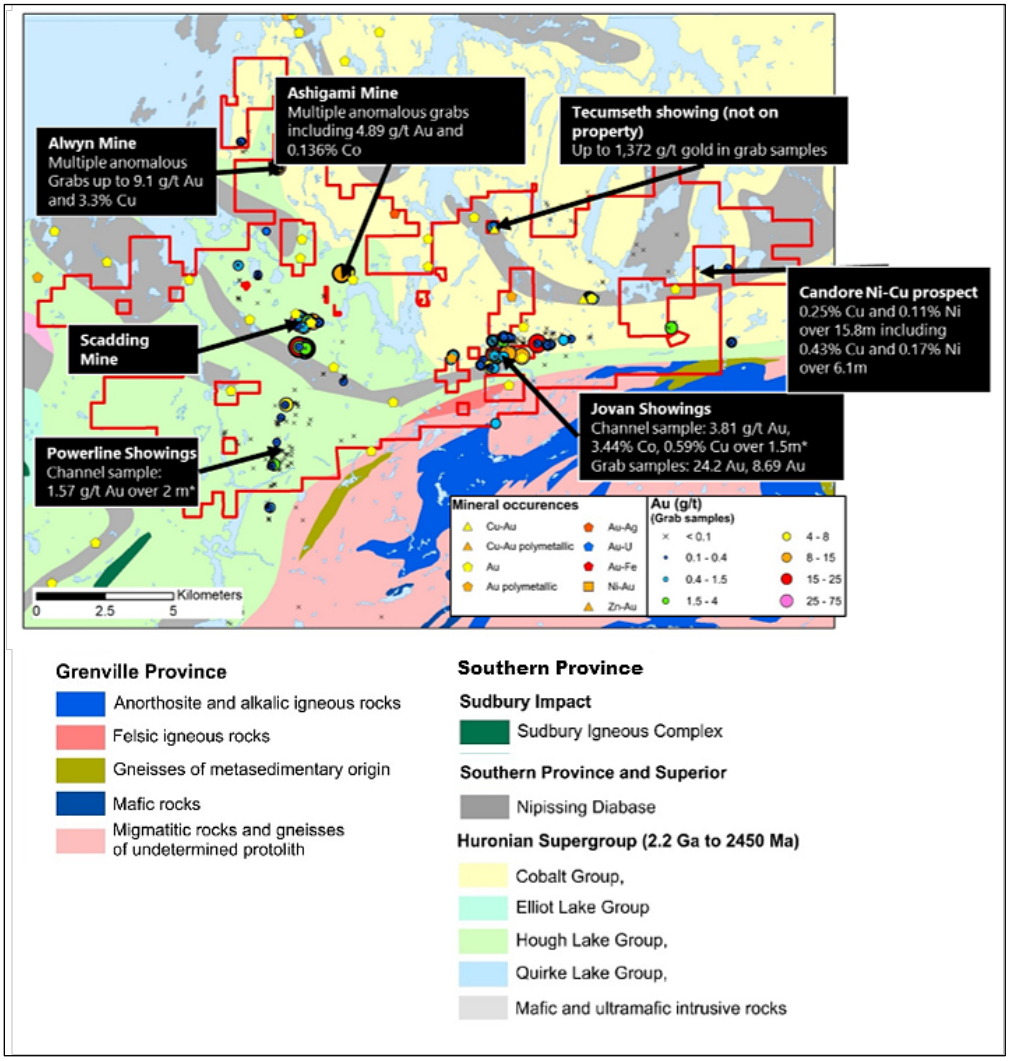

Figure 25. Geology of the SPJ project, showing location of the Scadding gold mine and mineral occurrences in the area; figure *from* MacDonald Mines (2020a; published with permission). Geology *modified after* Ontario Geological Survey (2011).

In 2020, MacDonald Mines continued the drill program started in the summer of 2019 (MacDonald Mines Exploration Ltd. 2020b). The program targeted verification and expansion of the high-grade gold mineralization at the Scadding deposit. Drill collar locations for the 2020 drill program are shown on Figure 26, and highlights of the assay results are given in Table 34. The company also completed 5 ground Induced Polarization (IP) geophysical surveys: 1 in the Scadding deposit area, 3 in the Jovan area and 1 in the Powerline area (MacDonald Mines Exploration Ltd. 2020b). Results from some of the IP surveys were pending at the end of 2020.

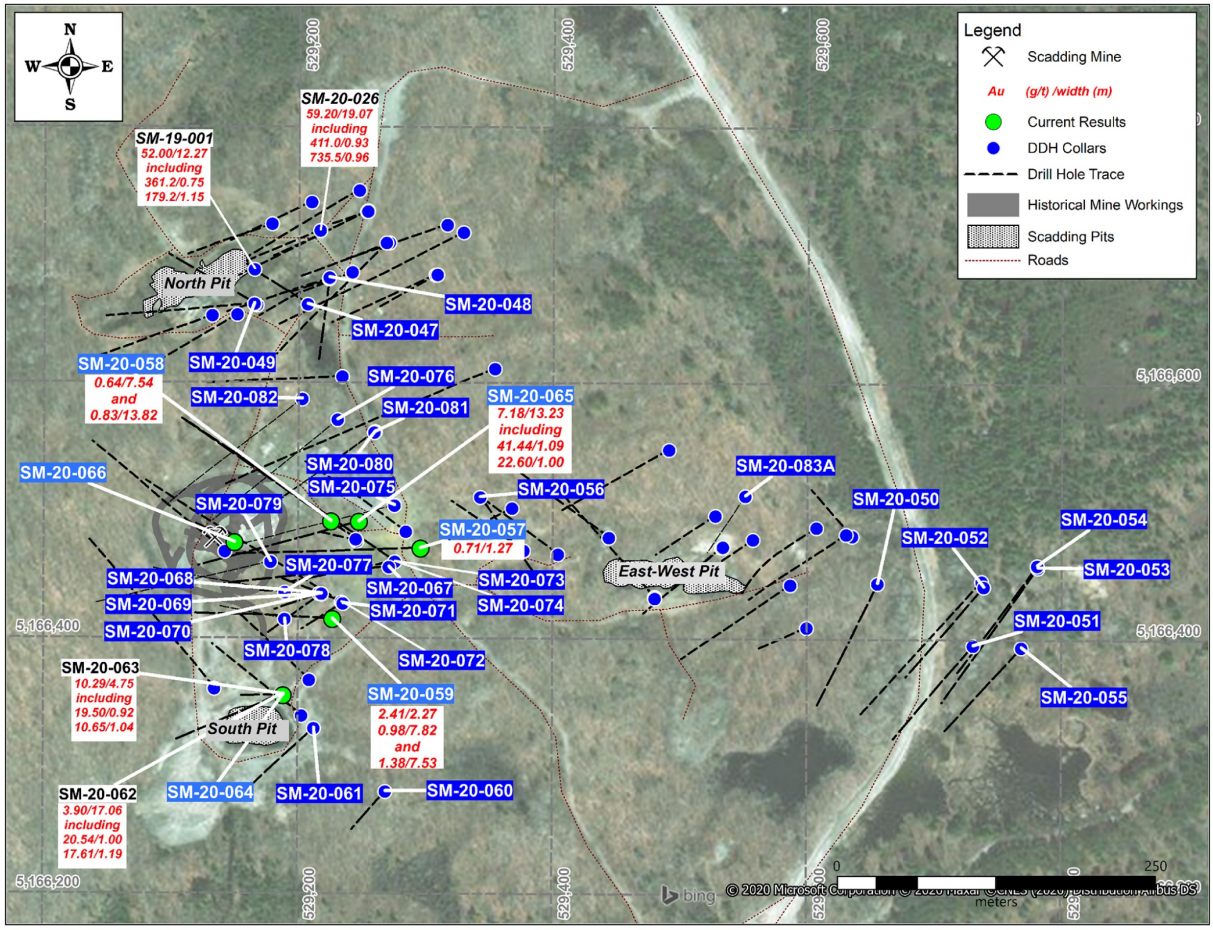

Figure 26. Scadding gold mine area of the SPJ project, the 2019 and 2020 drill hole collar with selected assay results; figure *from* MacDonald Mines, press release November 19, 2020 [accessed January 27, 2021]; published with permission).

Table 34. Highlights of assay results from SPJ project 2020 drill program (MacDonald Mines Exploration Ltd. 2020; accessed January 27, 2021).

Hole ID	Length[1] (m)	Visible gold	Gold (g/t)
SM-20-026	19.07	VG	59.2
including	1.07		25.1
including	0.93		411
including	0.96	VG	735.5
SM-20-028A	1.25		4.21
SM-20-031	1.00		5.9
AND	1.47	VG	1.96
including	0.70		2.68
including	0.77	VG	1.3
AND	0.70		1.57
AND	0.80	VG	1.14
AND	1.35	VG	4.2
including	0.67		1.99
including	0.68	VG	6.38
SM-20-032	1.81	VG	16.1
including	0.50	VG	40.7
SM-20-033	1.40	VG	3.69
including	0.74		6.4
SM-20-034	4.13	VG	3.7
including	1.10	VG	10.21
SM-20-035	4.80	VG	4.37
including	0.68	VG	14.65
SM-20-036	0.86		1.77
AND	0.99		3.44
SM-20-041	5.13	VG	27.2
including	0.97	VG	23.6
including	0.84	VG	34.4
including	1.03	VG	79.3
SM-20-043	6.04		2.3
including	0.87		9.2
AND	2.05		3
SM-20-046	1.50		4.83
SM-20-047	1.91	VG	1.2
SM-20-048	3.63	VG	1.54
including	0.99	VG	4.36
SM-20-049	2.59	VG	1.35
including	0.77	VG	2.79
SM-20-059	2.27		2.41
AND	7.53		1.47

Hole ID	Length[1] (m)	Visible gold	Gold (g/t)
SM-20-062	17.06	VG	3.9
including	1.31	VG	7.38
including	1.00		20.54
including	1.19		17.61
SM-20-063	4.75	VG	10.29
including	1.00	VG	7.24
including	0.92		19.5
including	1.04		10.65
including	0.85		9.82
SM-20-065	13.23	VG	7.18
including	1.09	VG	41.44
including	1.00		22.6

[1]*Length - Assay results are core length, not true width*

MAGNA MINING CORP.

Shakespeare Nickel Property

In 2017, Magna Mining Corp. acquired 100% interest in URSA Major Minerals Inc., including an extensive land package west-southwest of Sudbury (Armitage 2018, 2019; *see* Figure 13 [#3]; Figure 27). The Shakespeare nickel mine property was part of the acquisition and is located approximately 70 km west-southwest of Sudbury in Shakespeare, Baldwin and Dunlop townships. It consists of 21 patented claims and 3 mining leases covering an area of 1967 ha (Armitage 2019).

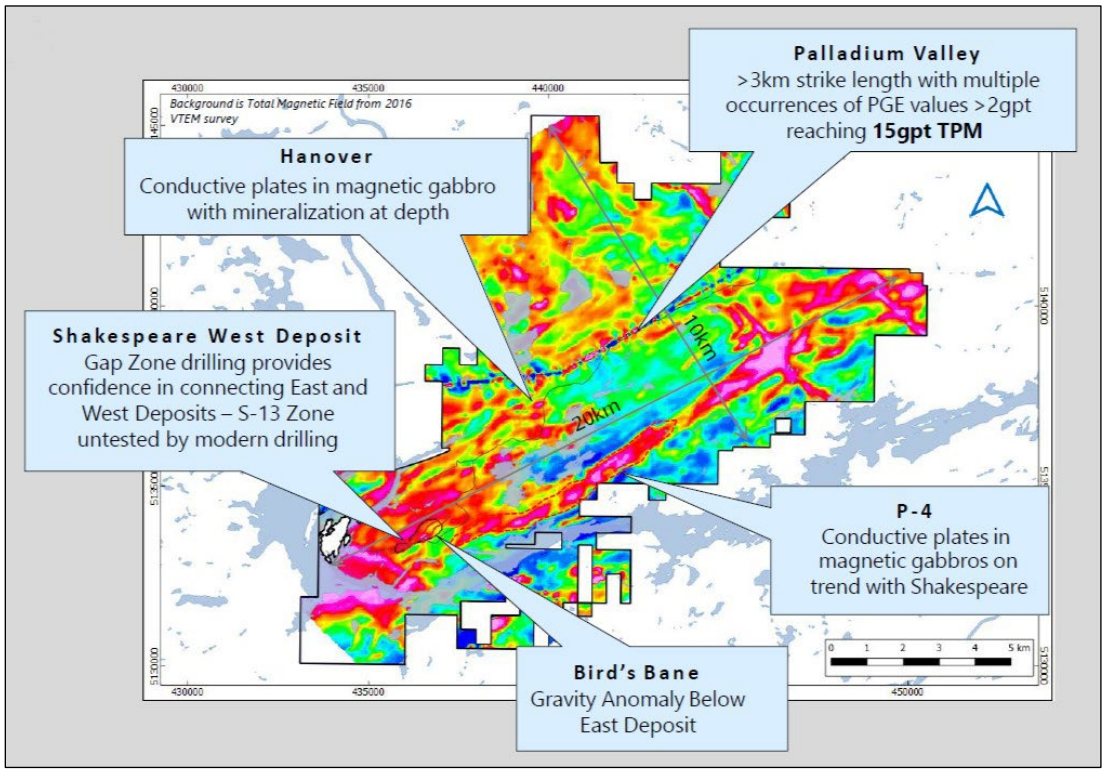

Figure 27. Map showing the total magnetic field image and exploration targets on Magna Mining's Shakespeare nickel property (*from* Magna Mining Corp. 2020; published with permission).

The Shakespeare intrusion is a differentiated sill interpreted to be part of the Nipissing intrusive suite (Shakespeare age: ca. 2217 Ma; Davey et al. 2019). It has 2 magmatic packages: the lower package being unmineralized pyroxenite and gabbro; and the upper package being mineralized melagabbro, quartz gabbro and biotite quartz gabbro (Sproule et al. 2007).

In 2019, Magna submitted an updated mineral resources estimate (Table 35; Armitage 2019). In 2020, Magna Mining's exploration program included surface sampling, trenching and channel sampling (Table 36; Magna Mining Corp. press releases January 28 and February 4, 2020). Magna also re-analyzed prospective samples from the BT trenches for rhodium, returning values of 0.25 and 0.17 g/t Rh (Magna Mining Corp. press release March 6, 2020).

Table 35. Updated mineral resource estimate for the Shakespeare Ni-Cu-PGE deposit (Armitage 2019).

Category	Cutoff Grade (NiEq wt %)[1]	Resource (Mt)	Ni (wt%)	Cu (wt%)	Co (wt%)	Pt (g/t)	Pd (g/t)	Au (g/t)	NiEq (wt%)
Open Pit									
Indicated	0.2	14.436	0.34	0.37	0.02	0.34	0.37	0.19	0.63
Inferred	0.2	1.682	0.29	0.31	0.02	0.27	0.30	0.17	0.54
Underground									
Indicated	0.5	2.489	0.33	0.38	0.02	0.31	0.35	0.19	0.62
Inferred	0.5	2.905	0.34	0.39	0.02	0.34	0.37	0.21	0.64

[1] NiEq Cutoff grades are based on metal prices of $6.25/lb Ni, $2.80/lb Cu, $31/lb Co, $950/oz Pt, $900/oz Pd and $1,250/oz Au, and metal recoveries of 76.4% for Ni, 95.9% for copper, 71% for Co, 74.8% for Pt, 42.4% for Pd and 38.4% for Au.

Table 36. Highlights of grab and channel samples reported in 2020 (Magna Mining Corp. press releases, January 28, and February 4, 2020).

Location	Sample Type	Pd (g/t)	Pt (g/t)	Au (g/t)	TPM[1] (g/t)	Cu %
Palladium Valley - BT Trenches	Grab	9.59	1.24	0.35	11.18	0.45
Bird's Bane	Grab	1.24	0.62	0.35	2.21	0.32
Bird's Bane	Composite Channel (1.22 m)	1.07	0.50	0.37	1.94	0.85

[1]TPM = Total Precious Metals (Pd + Pt +Au)

NORTH AMERICAN NICKEL INC

Post Creek and Halcyon

North American Nickel Inc.'s Post Creek and Halycon projects are located 35 km northeast of Sudbury (*see* Figure 13 [#14]). The properties are contiguous and cover 912 and 864 ha, respectively. The geology of the area consists of Archean metavolcanic and granitic rocks, Proterozoic metasedimentary rocks, and crosscutting Proterozoic diabase dikes. Sudbury Igneous Complex related quartz diorite (CJ QD) and Sudbury Breccia occur on the properties. A zone of Sudbury Breccia occurs along strike to the Whistle radial offset dike; and the CJ QD is located between the Parkin radial offset dike and the along strike extension of the Whistle Offset. The trend of the CJ QD is parallel to those offset dikes (Figure 28) (https://www.northamericannickel.com | projects | Ontario | Post Creek/Halcyon [accessed January 20, 2021]).

In 2020, North American Nickel undertook sampling and data compilation on the Post Creek property (North America Nickel Inc., press release, September 9, 2020). The compilation identified copper-gold mineralization in the Sudbury Breccia zone along the north-northeast–trending strike of the Whistle Offset quart diorite (*see* Figure 28). Highlights of the samples taken from the copper-gold showing are given in Table 37.

Table 37. Highlights of grab samples from copper-gold showing in Sudbury Breccia along Whistle Offset quartz diorite trend (North American Nickel Inc. press releases, September 9, 2020).

Cu (%)	Au (ppm)
1.870	0.873
1.975	0.597

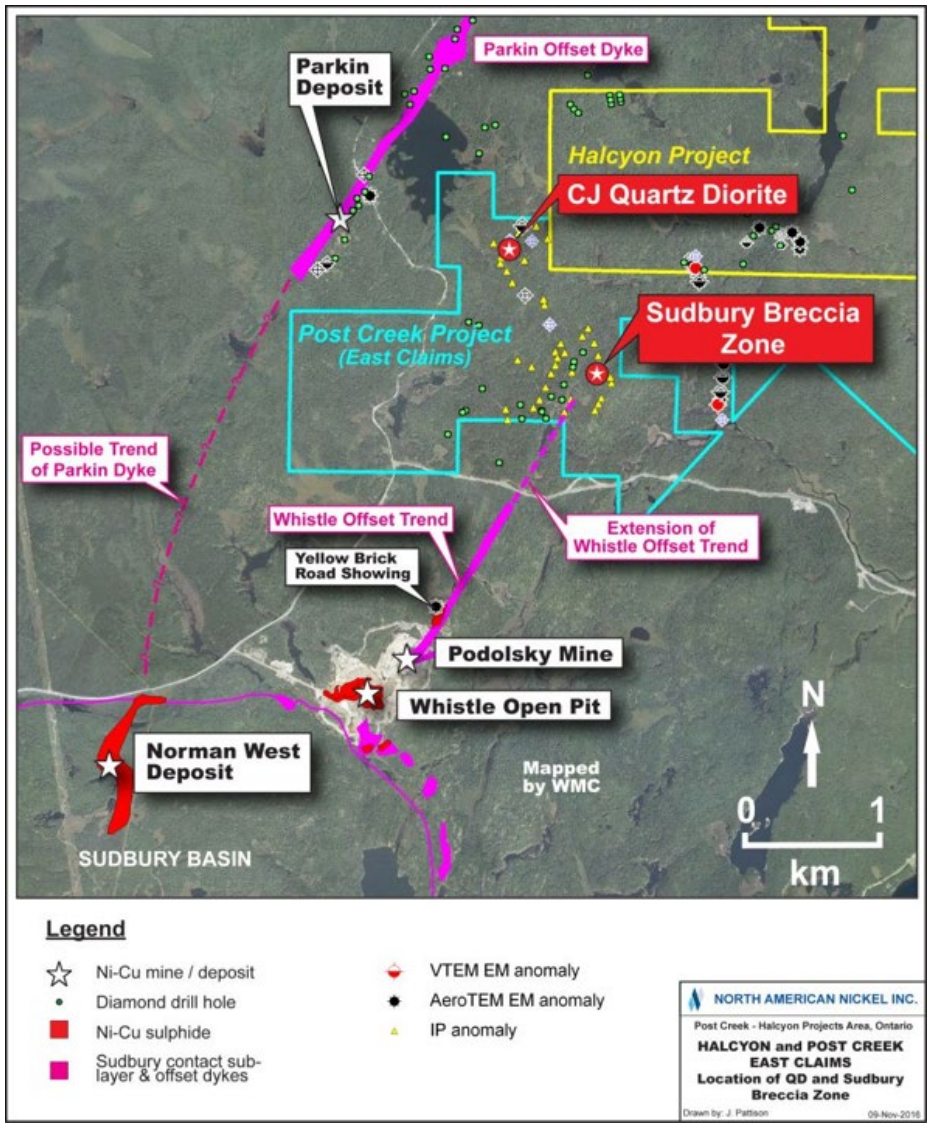

Figure 28. Location of the Halcyon and Post Creek East properties, showing geophysical anomalies, the CJ quartz diorite, and the Sudbury Breccia zone that hosts the copper-gold mineralization (figure *from* North American Nickel, press release September 9, 2020, reproduced with permission.).

SPC NICKEL CORP.

Sudbury Platinum Corporation changed its name to SPC Nickel Corp. on November 23, 2020 (SPC Nickel Corp., press release December 15, 2020 [accessed February 17, 2021]).

Aer–Kidd Project

The Aer–Kidd property is located on the Worthington offset dike (*see* Figure 13 [#6] and Figure 29). The property covers a 1.3 km section of the dike, including the historical past-producing Howland Pit, and Robinson and Rosen mines. SPC Nickel Corp. reported a historical resource of 786 000 t at 0.57% Ni and 0.76% Cu for Aer–Kidd (Zurowski 1957).

In 2020, SPC Nickel Corp. reported results from its fall 2019 drill program in the Rosen Mine area (SPC Nickel Corp., press release, October 19, 2020). Eight drill holes (4670 m) were completed. Drill intersection highlights are given in Table 38 and shown on a long section in Figure 30.

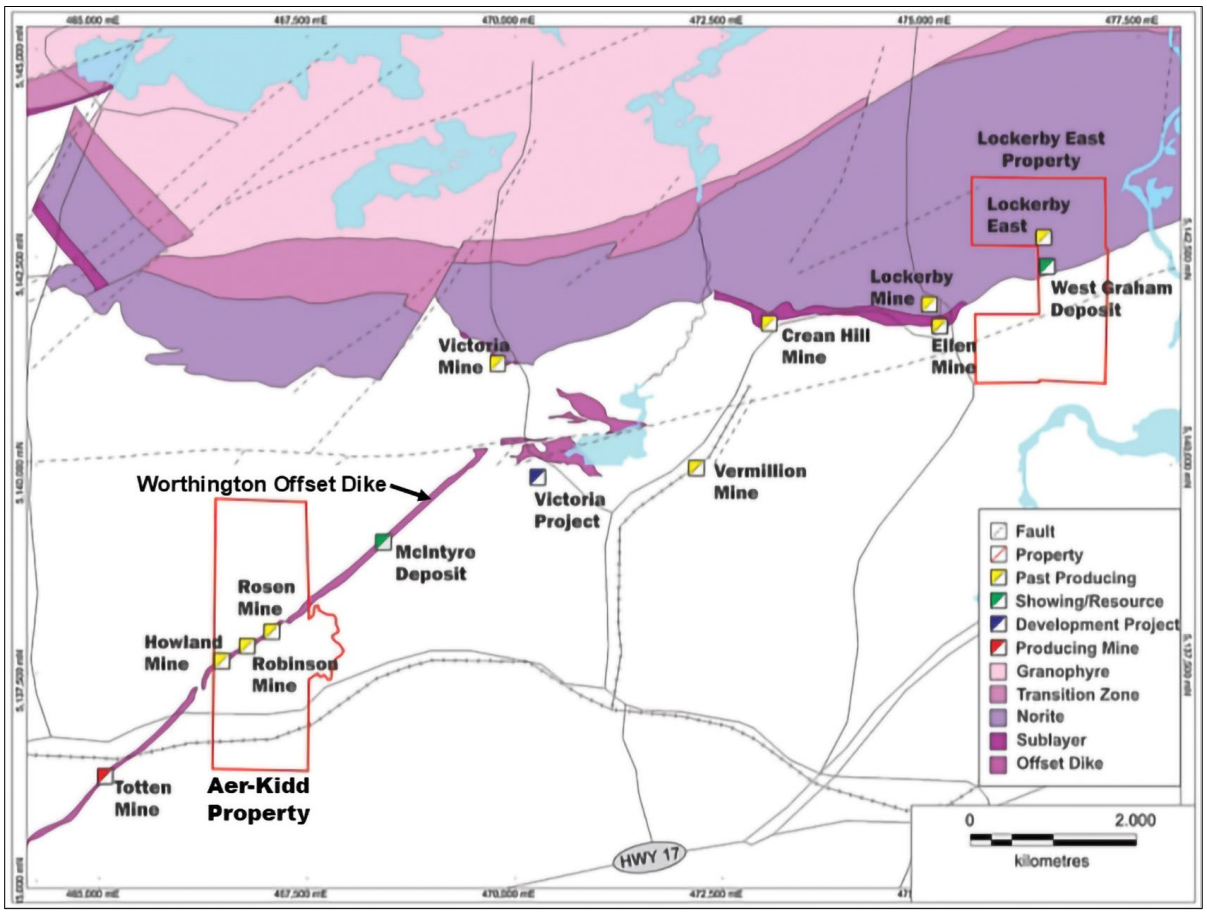

Figure 29. Location of the Aer–Kidd property along the Worthington offset dike. Figure *modified from* SPC Nickel Corp. website (http://www.sudburyplatinumcorp.com/ | Projects | Aer-Kidd | Map Gallery [accessed January 20 2021] Reproduced with permission.).

Table 38. Drill intersection highlights for the Aer–Kidd fall 2019 drill program (SPC Nickel Corp., press release, October 19, 2020).

Hole	[1]Length (m)	Ni wt%	Cu wt%	Pt g/t	Pd g/t	Au g/t	Ag g/t
AK-19-032	4.65	1.07	1.09	0.6	0.23	0.16	9.45
including	1.6	2.7	2.17	0.96	0.1	0.11	18.35
AK-19-033	0.95	0.28	1.81	0.42	1.4	0.65	16
and	1.4	0.28	1.26	0.29	0.14	0.08	12.1
and	0.7	1.02	0.96	3.55	0.56	0.3	7
AK-19-034	12.95	0.32	1.17	0.39	0.47	0.28	10.26
including	2.4	0.17	0.91	0.97	0.48	0.19	7.62
including	3.55	0.61	2.77	0.29	0.98	0.73	25.2
AK-19-035	22.45	0.54	0.41	0.97	0.79	2.08	3.73
including	18.9	0.61	0.37	1.12	0.92	2.46	3.39
incl.	0.5	2.07	2.02	18.1	2.97	3.66	19.3
incl.	0.8	5.03	0.52	0.54	0.15	0.12	5.9
including	4.6	0.61	0.37	2.05	3.03	2.46	3.39
incl.	0.2	6.3	0.33	2.25	41	4.71	8.8
incl.	0.65	3.2	0.97	9.64	7.34	60.7	10

[1] *All intercepts reported are down-hole lengths, not true thicknesses. Insufficient drilling has been completed to date to define the orientation of the mineralized zone in space.*

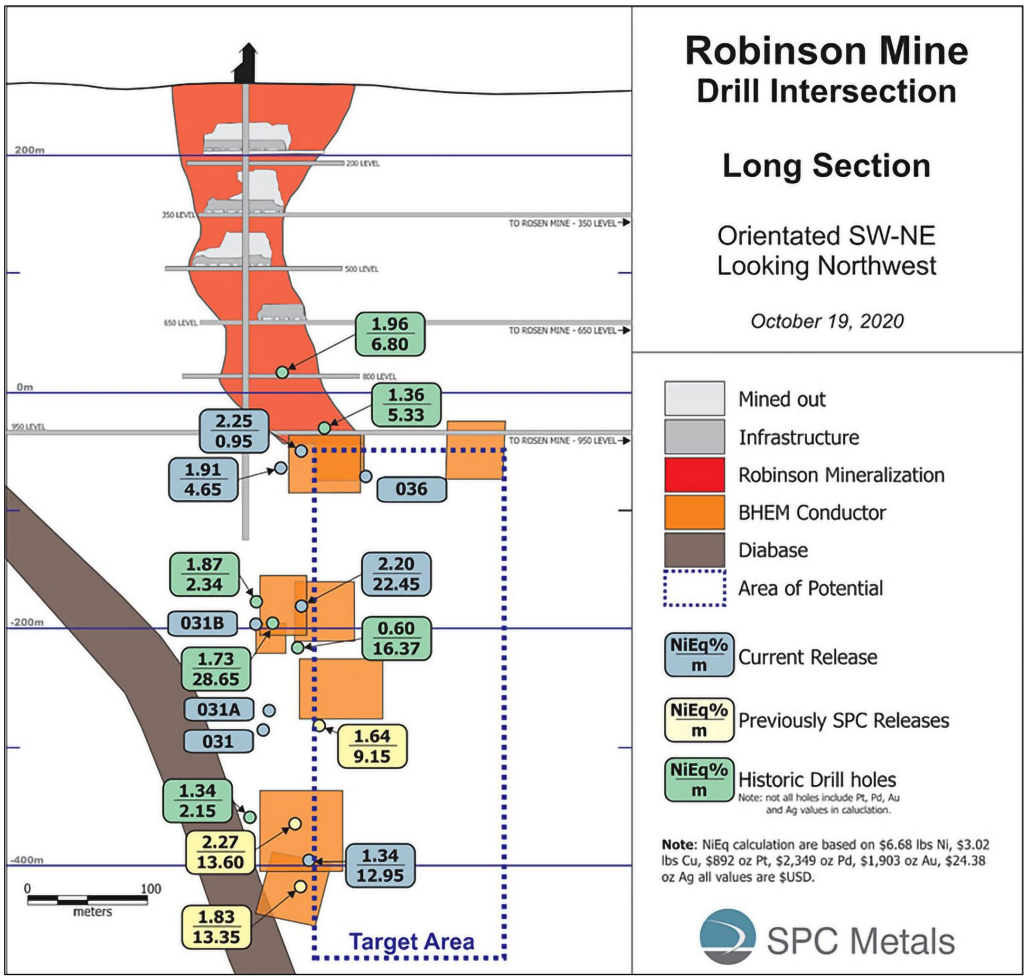

Figure 30. Long section of the Robinson Mine area, showing the pierce points for the 2019 drill holes and earlier holes, the mine (mineralization, infrastructure and mined out areas), and BHEM conductors. Figure *from* SPC Nickel Corp., press release, October 19, 2020. Reproduced with permission.

Jane PGM-Cu-Ni Property

In 2020, SPC Nickel Corp. entered into an option agreement to acquire the Janes property (*see* Figure 13 [#19]; SPC Nickel Corp., press release, September 14, 2020). The property is located 50 km northeast of Sudbury in Janes Township, and covers approximately 2900 ha. The mineralization is disseminated and massive magmatic sulphides associated with a Nipissing diabase sill (SPC Nickel Corp. website; http://www.sudburyplatinumcorp.com/ | Projects | Janes Property | Overview [accessed January 20 2021]).

Highlights of the results from initial sampling at 2 trenches on the property are given in Table 39 (SPC Nickel Corp., press release, September 14, 2020).

Table 39. Highlights of the 2020 sampling of known showings on the Janes property (SPC Nickel Corp., press release, September 14, 2020).

Location	Ni wt%	Cu wt%	Pt g/t	Pd g/t	Au g/t	Rh g/t	Ag g/t
Trench 1	0.59	1.62	4.56	0.645	0.505	0.021	5.4
	0.40	1.73	2.08	0.431	0.475	0.013	4.9
	0.7	1.46	4.22	0.641	0.627	0.022	4.7
	0.78	1.56	2.77	0.46	0.383	0.01	5
	0.51	1.21	2.45	0.461	0.447	0.01	3.6
	0.53	1.46	4.76	1	0.628	0.023	4.4
Trench 4	0.23	1.13	4	0.745	0.277	0.012	2.5
	2.38	1.06	3.92	0.581	0.274	0.22	2.6
	1.07	3.01	5.66	0.441	0.657	0.037	8.7
	0.97	1.97	4.44	0.78	0.574	0.031	4.1
	0.2	0.53	675	89.9	35.9	0.013	7.9

TRANSITION METALS CORP.

In 2020, Transition Metals Corp. added the Aylmer (Cu-Au; *see* Figure 13 [#13]), Espanola (Au; *see* Figure 13 [#4]) and Sawmill (Au-Cu) projects to their Sudbury District properties portfolio (Transition Metals Corp., press release May 11, September 1 and October 15 2020, respectively; Figure 31). Transition Metals also holds the Doherty Lake (Au-Cu; *see* Figure 13 [#10]) and Fostung (W-Cu-Au; *see* Figure 13 [#5]) properties (*see* Figure 31).

Transition Metals Corp. entered into an Option and Joint Venture agreement with 1930153 ON Ltd. for the Fostung Tungsten Property (Transition Metals Corp., press release August 10, 2020). The property is located in Foster Township (*see* Figure 13 [#5], approximately 70 km southwest of Sudbury, and comprises 50 mining claims (1114 ha). A mineral resource estimate was reported on the property in 2007 (Stryhas and More 2007; Table 40).

In 2020, Transition Metals undertook surface sampling and mapping on their Aylmer, Espanola and Sawmill properties, as well as a deep penetrating airborne magnetotelluric (MT) survey over a 35 km^2 area of the Aylmer property (Transition Metals Corp. press release, November 02, 2020).

Table 40. 2007 Mineral resource estimate for the Fostung Tungsten Skarn property (Stryhas and More 2007).

Category	Cutoff grade (WO_3 wt%)	Tonnes (Mt)	WO_3 Grade (wt%)
Inferred	0.125	12.4	0.213

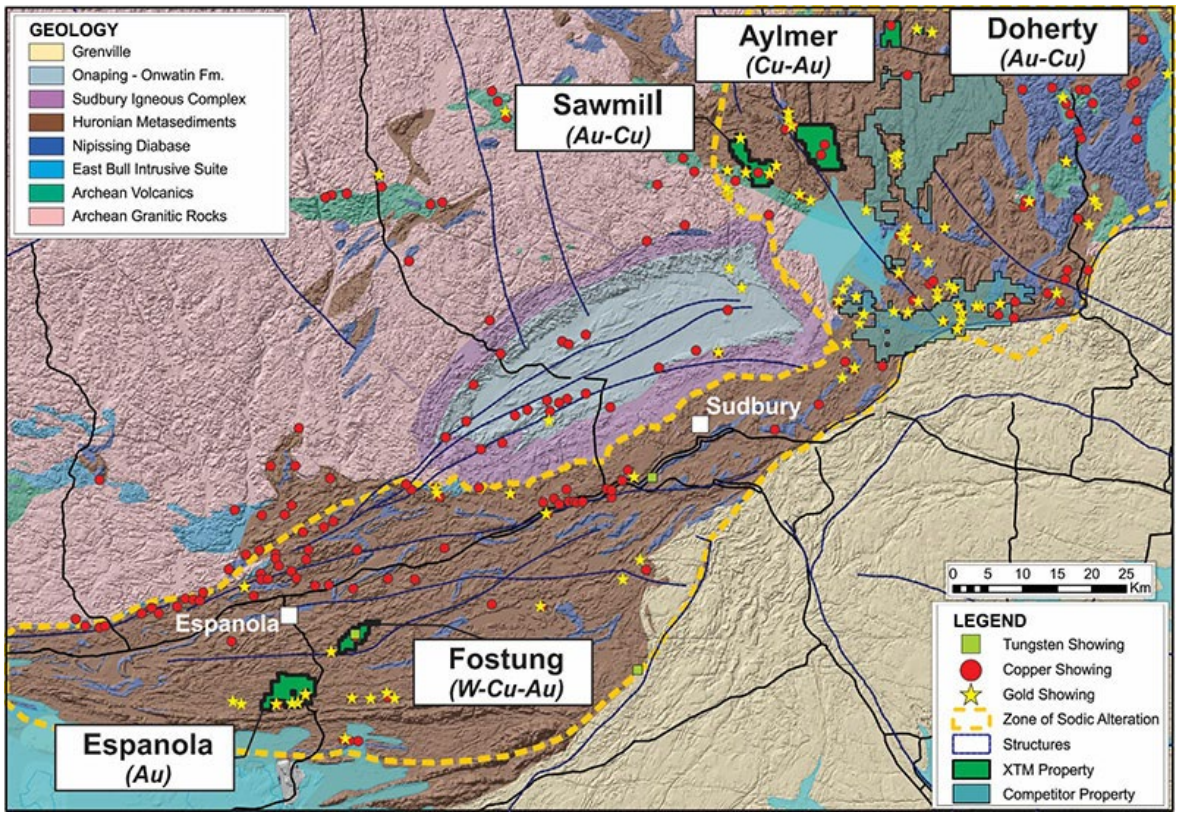

Figure 31. Transition Metals Corp. exploration properties in the Sudbury District; figure *from* Transition Metals Corp. press release, November 02, 2020; accessed January 27, 2021; published with permission).

DISTRICT GEOLOGIST STAFF AND ACTIVITIES

In 2020, the Sudbury District Geologist Office was staffed by S. Péloquin, *P.Geo.*, District Geologist, and R. Todd, District Geological Assistant. A summary of activities of the Sudbury District Geologist Office in 2020 is provided in Table 41.

Table 41. Summary of activities of the Sudbury District Geologist office in 2020.

Activity	Number
Office visits by clients	15
Telephone/Email inquiries	589
Remote consultations/inquiries	0
Indigenous meetings/career fairs	1
Property visits[1]	0
Field trips attended[1]	0
Field trips given[1]	0
Symposia/trade shows attended	0
Assessment files and donations processed	53

[1] *Public health restrictions implemented in response to the COVID-19 pandemic resulted in the cancellation of the 2020 RGP field season.*

Due to public health restrictions that were implemented in response to the COVID-19 pandemic, all Resident Geologist Program (RGP) staff worked remotely during the time period between March 16 and December 31, 2020. The primary impacts of these restrictions on RGP services included the suspension of public access to our offices and the cancellation of the 2020 field season (i.e., no property visits or other field investigations). However, staff were able to continue delivering most of our client services using electronic communication channels (e.g., telephone, email and video calls). Staff were also able to access the offices on an as-needed basis to obtain paper files and other materials that were required to fulfill these services. Client requests for physical documents, and exploration equipment loans (e.g., Beep Mats) were accommodated outside the office setting in accordance with public health guidelines.

Prior to COVID-19 (January to March), 7 in-person client requests, and 163 email, phone or remote requests, were handled by Sudbury District Geologist Office staff. From March 11 to the end of year, Sudbury staff responded to 426 email, phone or remote requests. In addition, staff attended the Willet Green Miller Centre on 8 occasions to meet clients for equipment loans, or to access physical files to accommodate client requests. Requests included advisory and research assistance. Prospectors, mining company personnel and members of the general public were served.

The Mineral Deposit Inventory (MDI) database is maintained by both the Sudbury District Geologist Office and the Northeast Regional Mineral Deposit Compilation Geoscientist. No MDI records were updated in the Sudbury office in 2020; *see* "Mineral Deposit Compilation Geoscientist" in the Kirkland Lake District Report of Activities in this volume for more information on the MDI.

The Ontario Mineral Exploration Information System (OMEIS) is an intranet-based application used by RGP and Mining Lands staff to maintain and update assessment file and drill hole data. Robert Todd entered and updated OMEIS for the Sudbury office.

The Sudbury District Geologist Office delivers month-end reports on mining and exploration news and activity in the District. The reports are published as "Activity Reports–Mineral Exploration" on the Ministry's *OGSEarth* application webpage (https://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth). The data provided by OGSEarth are available in Keyhole Markup Language (KML) format and can be viewed using such geographic information applications as the Google Earth™ mapping service. The month-end reports can also be viewed in table format on the Resident Geologists Program Activity Reports–Mineral Exploration webpage (http://www.geologyontario.mndm.gov.on.ca/mines/ogs/rgp/MER_listing_e.html).

Office staff attended training sessions in Standard First Aid and CPR, and Shirley Péloquin attended an Indigenous Cultural Awareness course and an Anti-Racism course.

S. Péloquin gave a presentation on information available from the OGS-RGP (Recommendations for Exploration, Annual Report of Activities, Mineral Deposit Inventory) to the Values Mapping working group of the ENDM Aboriginal Participation Fund, and attended a meeting of the Association of Municipalities of Ontario.

As part of continuing professional development, staff attended virtual talks and presentations from various local organizations such as, the Sudbury Prospectors and Developers Association, the Sudbury Geological Discussion Group, Laurentian University Harquail School of Earth Sciences, Lakehead University, Université de Québec à Chicoutimi, ALS Global geochemistry webinar, S&P Global and Ore Deposit Hub talks.

The Sudbury District Geologist Office provides free, short-term loans of a Beep Mat, metal detector, ultraviolet (UV) lamp, a very-low-frequency (VLF) instrument and a proton procession magnetometer to qualified explorationists. Binocular and polarizing microscopes are available for in-office use.

The office is located within the John B. Gammon Geoscience ("Mines") Library, 3rd Floor, Willet Green Miller Centre, 933 Ramsey Lake Road, Sudbury, ON, P3E 6B5. The Sudbury District Geologist can be reached at 705-280-6042, and the Sudbury District Geological Assistant at 705-670-5733.

PROPERTY EXAMINATIONS AND FIELD STUDIES

Public health restrictions implemented in response to the COVID-19 pandemic resulted in the cancellation of the 2020 RGP field season.

RECOMMENDATIONS FOR EXPLORATION

Vanadium (FeTiV) Potential Grenville Province, Sudbury District

Vanadium is classed as a Strategic Mineral Resource (Goldberg et al. 1992) and as a Critical Mineral Resource (CMR) in both Canada (Natural Resources Canada 2019) and the United States (Kelley et al. 2017). The dominant use for vanadium remains in steelmaking, but it is also used in catalysts, ceramics, electronics and vanadium chemicals (Kelley et al. 2017). A recent development that will increase demand for vanadium is the use of vanadium redox batteries (VRB) in green technology.

Vanadiferous titanomagnetite deposits (VTM) are the principal global source of vanadium (Kelley et al. 2017). Titanomagnetite and ilmenite are mined for iron, titanium and vanadium (FeTiV). These mineral deposits occur as layers or lenses in mafic to ultramafic intrusions or metamorphic rocks. The magmatic accumulations of magnetite and ilmenite within intrusions may remain *in situ* or be remobilized during metamorphism. Houlé (2019) presented a good overview of magmatic Fe-Ti-V ore systems in the "Geology, genesis, and exploration for magmatic and magmatic-hydrothermal ore deposits" short course at the 2019 Prospectors and Developers of Canada Convention.

The potential for FeTiV deposits has been recognized throughout Ontario (Rose 1973; Cundari and White 2015; LeBaron 2015; Puumala and Campbell 2019, 2020; Bousquet 2020). The area examined here is the Grenville Province in the Sudbury Resident Geologist (RGP) District, which is, for the most part, in the Southern Ontario Mining District. Approximately 13 500 km^2, representing 45% of the Grenville in the Sudbury RGP District, is not affected by surface right holdings or land withdrawals.

Historically, iron occurrences may not have been analyzed for vanadium, or titanium. Of the 20 occurrences listed as being magmatic, metasomatic, metamorphic or hydrothermal (possibly remobilized) in the Ontario Mineral Deposit Inventory (MDI; Ontario Geological Survey 2020a), 5 report iron only as their commodity (Table 42). Fourteen of the documented occurrences rank above "Discretionary Occurrences"; 2 are "Developed Prospects with Reserves": the Titan Property in Angus Township (MDI31L14SW00014) and the Brazeau Property in Papineau Township (MDI31L02NE00010). Resource estimates for the Brazeau (Papineau) Property are not compliant to National Instrument (NI) 43-101 standards (Whiting 2004). Resource estimates for the Titan Property are NI 43-101–compliant (Prenn and Pettigrew 2017). On both properties, the FeTiV mineralization occurs as discrete layers or lenses in mafic intrusions, which in turn are hosted by Grenville gneisses. However, intrusions similar to those hosting the deposits occur elsewhere in the Grenville Province. In Lount Township, there are 7 documented iron occurrences that report titanium as a primary or secondary commodity, but vanadium was not analyzed. These occurrences are classified as metamorphic or hydrothermal, and are hosted in amphibolite considered to be intrusive in origin (Satterly 1956).

Of the 20 documented FeTiV occurrences in the MDI (Ontario Geological Survey 2020a), 6 "Occurrences" and 4 "Discretionary Occurrences" are on open ground (Mining Lands Administration System (MLAS) data, accessed October 14, 2020; *see* Figure 32; Table 42).

Lake sediment geochemistry surveys have been undertaken over the Grenville in the Sudbury RGP District, by the Ontario Geological Survey (OGS; Ontario Geological Survey 2020d) and the Geological Survey of Canada (GSC; Hornbrook, Lund and Lynch 1984; Hornbrook and Fiske 1988, 1989). The data sets are available for download online. Figure 32 shows the vanadium results of the surveys. The OGS data used was analyzed by ICP–OES (induced coupled plasma optical emission spectroscopy), and the GSC Data, by AAS (atomic absorption spectroscopy). The data was filtered to include results only for vanadium values greater than 50 ppm; and the 2 data sets are made distinct in Figure 32. The largest concentration of anomalous vanadium values are southeast of the Titan Prospect. A second concentration of anomalous data is near the southernmost border of the Sudbury RGP District.

RECOMMENDATIONS

1. Examine, sample and analyze known iron occurrences to determine whether vanadium and/or titanium are associated with them.
2. Examine mafic intrusions and their environs for magmatic FeTiV occurrences and possible metamorphic or hydrothermally remobilized mineralization.
3. Examine potential sources for the anomalous vanadium results in the lake sediment surveys.

Table 42. FeTiV occurrences in the Grenville Province, Sudbury Resident Geologist Program District. Data *from* Ontario Geological Survey (2020a). (Map # refers to numbers appearing on Figure 32).

Map #	Property Name (township)	MDI Number	Occurrence Status	Commodity (secondary)	Deposit Type	Land Tenure
1	Titan Property (Angus)	MDI31L14SW00014	Developed Prospect With Reserves	iron, titanium (vanadium)	Hydrothermal	Mining Tenure
2	A-Group (Flett)	MDI000000001459	Occurrence	iron (titanium)	Magmatic	Open
3	B-Group (Flett)	MDI000000001460	Occurrence	iron (titanium)	Magmatic	Open
4	C-Group (Flett)	MDI31L13SE00007	Occurrence	iron (titanium)	Magmatic	Open
5	Nichol Occurrence (Flett)	MDI31L13SE00006	Discretionary Occurrence	iron	Hydrothermal	Open
6	Brazeau Prospect (Papineau)	MDI31L02NE00010	Developed Prospect With Reserves	iron, titanium, vanadium	Magmatic	Active Claim
7	Peerless Canadian (Calvin)	MDI31L02NW00006	Discretionary Occurrence	iron (titanium)	Magmatic	Surface Rights
8	Magnetawan Mine (Lount)	MDI31E13SE00006	Developed Prospect Without Reserves	iron (titanium)	Hydrothermal	Surface Rights
9	Lot 17 Con 1 trench (Lount)	MDI31E13SE00021	Occurrence	iron, titanium	Magmatic Metasomatic	Surface Rights
10	J.W. Edwards Lot 145 Con B (Lount)	MDI31E13SE00040	Occurrence	titanium, iron	Magmatic Metasomatic	Open
11	J. W. Edwards Showing (Lount)	MDI31E13SE00039	Occurrence	titanium, iron	Metamorphic	Open
12	Lot 136 Concession A pit (Lount)	MDI31E13SE00032	Occurrence	titanium, iron	Metamorphic	Surface Rights
13	Spring Lake Deposit (Lount)	MDI31E13SE00029	Occurrence	iron, titanium	Metamorphic	Surface Rights
14	Lot 129 Con B pit (Lount)	MDI000000000715	Discretionary Occurrence	iron	Metamorphic	Open
15	Ferrie Iron (Ferrie)	MDI31E12NE00024	Discretionary Occurrence	iron	Magmatic	Surface Rights

Map #	Property Name (township)	MDI Number	Occurrence Status	Commodity (secondary)	Deposit Type	Land Tenure
16	Lot 29 Concession 8 Iron (Foley)	MDI41H08SE00056	Occurrence	iron (titanium)	Magmatic	Open
17	Tiffany (Bethune)	MDI31E11SE00007	Occurrence	titanium (vanadium)	Magmatic	Surface Rights
18	South Group (Nipissing)	MDI31L04SE00016	Prospect	iron	Hydrothermal	Surface Rights
19	North Group (Nipissing)	MDI31L04SE00017	Discretionary Occurrence	iron	Hydrothermal	Open
20	Dryden Magnetite (Dryden)	MDI41I07NE00005	Discretionary Occurrence	titanium, iron	Magmatic	Open

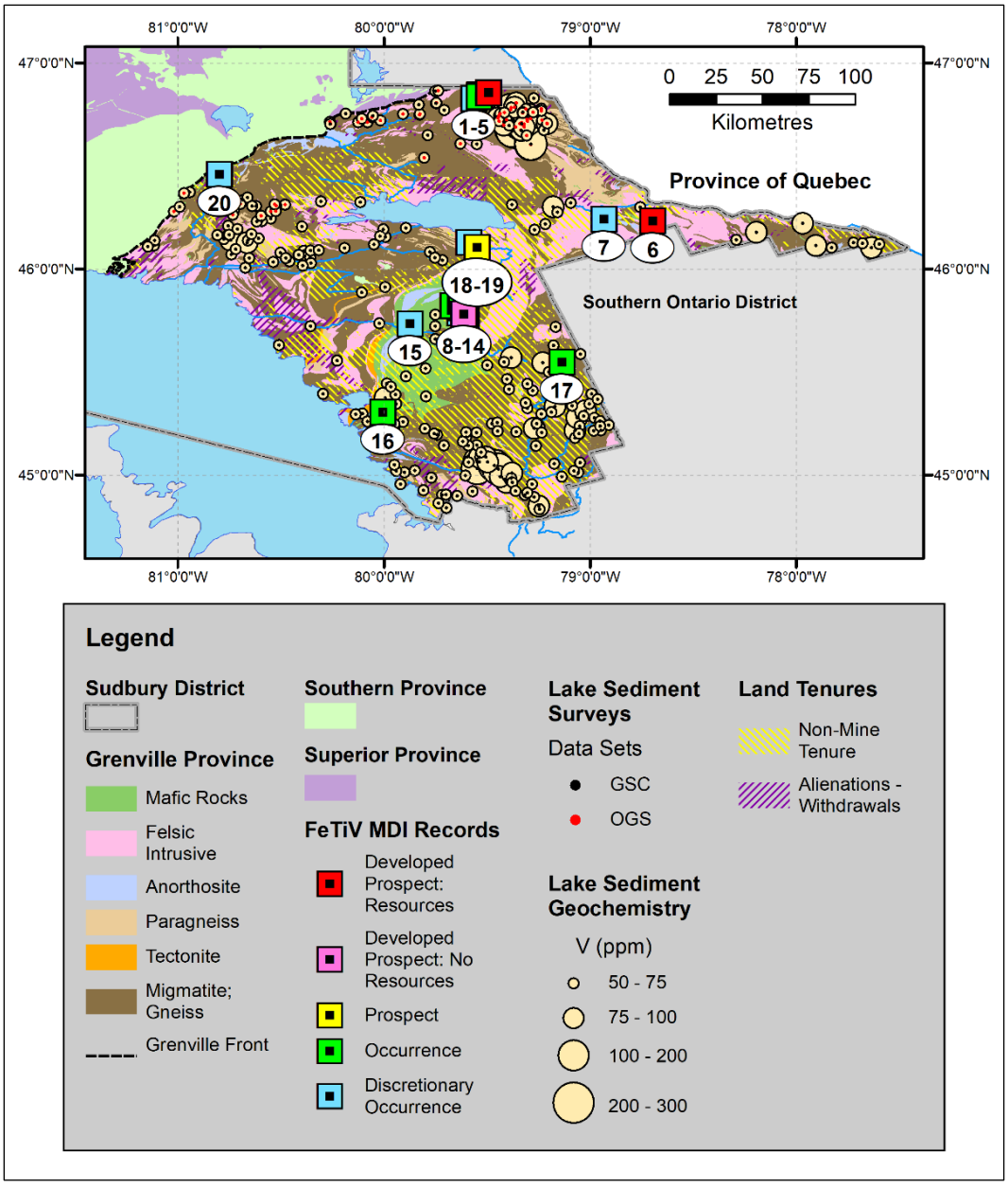

Figure 32. Map of the Grenville Province in the Sudbury Resident Geologist Program District showing the locations of documented FeTiV occurrences (*see* Table 42; data *from* Mineral Deposit Inventory *in* Ontario Geological Survey 2020a; region straddles UTM zones 17 and 18; geology *from* Ontario Geological Survey 2011).

OGS ACTIVITIES AND RESEARCH BY OTHERS

Ontario Geological Survey

Public health restrictions implemented in response to the COVID-19 pandemic resulted in the cancellation of the 2020 field season for the OGS Earth Resources and Geoscience Mapping Section (ERGMS). However, activities that did not require field work continued, and are reported in the *Summary of Field Work and Other Activities* (Ontario Geological Survey 2020c).

In 2020, the Ontario Geological Survey (OGS) released the following publications that covered or included the Sudbury RGP District.

- Lake Geochemistry of Ontario—2019 (Ontario Geological Survey 2020d)
- Aggregate Resources of Ontario—2019; Ontario Geological Survey, Aggregate Resources of Ontario—2019 (Ontario Geological Survey 2020e)
- Ontario Airborne Geophysical Surveys, Magnetic Gradiometer Data, Grid and Profile Data (ASCII and Geosoft® Formats) and Vector Data, Sturgeon River Area (Ontario Geological Survey 2020f)
- Airborne Magnetic Gradiometer Survey, Colour-Filled Contours of the Residual Magnetic Field, Sturgeon River Area map set (Ontario Geological Survey 2020g)
- Airborne Magnetic Gradiometer Survey, Shaded Colour Image of the Second Vertical Derivative of the Residual Magnetic Field and Keating Correlation Coefficients, Sturgeon River Area map set (Ontario Geological Survey 2020h)
- Geochemical and Geochronological Data from the Elliot Lake Group and Hough Lake Group of the Huronian Supergroup, Southern Province, Northeastern Ontario (Ménard 2020)
- Summary of Field Work and Other Activities, 2020 (Ontario Geological Survey 2020c)

Three on-going projects by the Ontario Geological Survey, Earth Resources and Geoscience Mapping Section (OGS–ERGMS) continued in the Sudbury District (Ontario Geological Survey 2020c). Ambient Groundwater Geochemistry - Investigating the Controls on Groundwater Chemistry (Dell 2020); Geological Compilation - Ramsey–Algoma area, Superior and Southern Provinces (Préfontaine 2020); Geophysical Survey – Interpretation of the Sturgeon River Airborne Magnetics Survey (Easton, Rainsford and Préfontaine 2020).

AMBIENT GROUNDWATER GEOCHEMISTRY PROJECT – DELL (2020)

The ambient groundwater geochemistry project in northeastern Ontario was initiated in 2016. Part of its goal was to determine whether methods used in southern Ontario to study controls on groundwater chemistry would work for Precambrian (crystalline silicate) lithologies. The study area extended from Blind River, in the east, to Mattawa, in the west, and included Manitoulin Island. Groundwater sampling was completed in 2018 with 437 samples collected. The study concludes that groundwater geochemical trends are controlled by factors such as glacial drift thickness, salinity sources and pH. The study also found that, although the lithological effect on groundwater geochemistry is subtle, there are cases of correlation between geochemical response and geology.

RAMSEY–ALGOMA GEOLOGICAL COMPILATION – PRÉFONTAINE (2020)

The Ramsey–Algoma geological compilation project is a multi-year project initiated in 2019. The area is covered by the 2018 Ramsey–Algoma airborne high-resolution gamma-ray spectrometer and magnetic gradiometer surveys (Ontario Geological Survey 2019a, 2019b). The northern part of the project is dominated by the Archean Ramsey–Algoma granitoid complex, with greenstone belts, and slivers thereof, also present. The southern part of the project is dominated by the Proterozoic Huronian Supergroup and Nipissing intrusions, with intrusions from the East Bull Lake Intrusive Suite and from multiple dike swarms also present.

The major objectives of the project are

- to use isotopic ages and lithogeochemistry to create a standardized regional tectonic framework for the greenstone belts in the area
- to gain a better understanding of the intrusive rocks surrounding the greenstone belts

Field work in the area was conducted in the spring and fall of 2019. There were 100 samples submitted for lithogeochemistry and 19 for geochronology. On-going compilation work for this multi-year project will entail reviewing thousands of assessment files (including drill hole data), hundreds of Ontario Geological Survey maps, and available geological data sets (geochemical, mineralogical, geochronological). Field work will be an integral part of this project (targeted mapping, and geochemistry and geochronology sampling).

STURGEON RIVER AIRBORNE MAGNETICS SURVEY – EASTON, RAINSFORD & PRÉFONTAINE (2020)

A high-resolution fixed-wing magnetic gradiometer survey was flown over the Sturgeon River area between December 2019 and February 2020 (Ontario Geological Survey 2020f, 2020g, 2020h). The area covered is to the east of, and contiguous with, the Ramsey–Algoma survey (Ontario Geological Survey 2019a, 2019b), and comprises 51 101 line-kilometres at 200 m flight-line intervals.

Objectives of the survey are, as *quoted from* Easton, Rainsford and Préfontaine (2020):

- to address a geoscience gap where existing aeromagnetic coverage was coarse (800 m line spacing)
- to trace Archean basement geology below the overlying veneer of Huronian Supergroup rocks
- to provide high-resolution data to assist with future geological mapping projects in the area

Interpretation of known and interpreted geological features in the area of the survey is presented in Easton, Rainsford and Préfontaine (2020).

Academic Research

LAURENTIAN UNIVERSITY

Harquail School of Earth Sciences and MERC (Mineral Exploration Research Centre)

CURRENT RESEARCH

Lesher, C.M., Genesis and Localization of Ni-Cu-PGE Mineralization in the Sudbury Igneous Complex (Peters/Baurier/Seibel/Lesher), NSERC–Vale CRD, 05/2018-present

Lesher, C.M., Geochemistry, mineralogy, and petrogenesis of ultramafic inclusions in Sublayer norite, Sudbury Igneous Complex (Wang/Lesher/Lightfoot), China Scholarship Council and NSERC Discovery, 09/2014 to present

Lesher, C.M., Mathematical and computer modeling of erosional processes by lava flows (Cataldo/Williams/Lesher), NSF and NSERC Discovery, 09/2013 to present

Lesher, C.M., Geology, mineralogy, geochemistry, and petrogenesis of the South Range Melanorite and implications for the crystallization history of the Sudbury Igneous Complex (Strongman/Walker/Baird/Lesher/Lightfoot/Golightly/Pattison), NSERC Discovery

McDonald, A.M., The mineralogy of sulphide ores from the North Range, Sudbury Basin (Keays/Gauld/Cochrane/Thompson/Vale)

Spiers, G.A., Anthropogenic metal emissions on soils, rivers and lakes, as well as vegetation within the Sudbury Smelter Footprint

PhD CANDIDATES

Baurier Aymat, Sandra: Genesis and Localization of Ni-Cu-PGE Mineralization in the South Range of the Sudbury Structure (Supervisor: Dr. C.M. Lesher)

Généreux, C.-A.: Structural and metamorphic evolution of the South Range in the Drury and Denison townships, Sudbury, with emphasis on the controls on low-sulphide PGE mineralization. (Supervisors: Dr. B. Lafrance, Dr. D. Tinkham)

Peters, D.: Genesis and localization of Ni-Cu-PGE mineralization in the North Range of the Sudbury structure (Supervisor: Dr. C.M. Lesher)

Seibel, H.: Genesis and Localization of Ni-Cu-PGE Mineralization in the offset dikes of the Sudbury Structure (Supervisor: Dr. C.M. Lesher)

MSc CANDIDATES

Duric, M.: Mapping and collection of Precambrian pegmatites from the Grenville Front, east of Sudbury, ON

Gore, T.: A study of the relationship between the crystal-chemistry and morphology of millerite from magmatic ore deposits. (Supervisor: A. McDonald)

MacInnis, L.: Characterization of sharp-wall type footwall Cu-Ni-PGE mineralization at the Podolsky deposit, Sudbury, Ontario. (Supervisor: Dr. D. Kontak)

Nethavhani, P.: Geostatistical Analysis and Integration of Soil Chemistry Data with Remote Sensing Information in the Greater Sudbury Area

Ntabana, C.: Clay mineralogy and carbon sequestration in Sudbury soils. (Supervisor: Dr. G.A. Spiers)

Silva, R.: Fractionation of Sulfide Melts in the Copper Cliff Offset, Sudbury (Supervisor: Dr. C.M. Lesher)

Other Publications

Anders, D., Osinski, G.R., Grieve, R.A.F., Pilles, E.A., Pentek, A. and Smith. D. 2020. Origin and formation of Metabreccia in the Parkin Offset Dike, Sudbury impact structure, Canada. Canadian Journal of Earth Sciences. 57(11): 1324-1336 (https://doi.org/10.1139/cjes-2019-0075).

Barnes, S.J., Taranovic, V., Schoneveld, L. E., Mansur, E. T., Le Vaillant, M., Dare, S., Staude, S., Evans, N.J. and Blanks, D. 2020. The Occurrence and Origin of Pentlandite-Chalcopyrite-Pyrrhotite Loop Textures in Magmatic Ni-Cu Sulfide Ores. Economic Geology v. 115, p.1777–1798 (https://doi.org/10.5382/econgeo.4757).

Beswick, A.E. 2020. Component element ratio analysis of the McCreedy West Fe–Ni–Cu sulfide deposit, North Range of the Sudbury Igneous Complex. Springer Nature Applied Sciences, 2, 1010 (https://doi.org/10.1007/s42452-020-2798-9).

Grieve, R.A.F. and Osinski, G.R. 2020. The Upper Contact Unit of the Sudbury Igneous Complex in the Garson region: Constraints on the depth of origin of a peak ring at the Sudbury impact structure. Meteoritics & Planetary Science, v.55. p.1734-1748.

Gurov, Y.P., French, B.M. and Permiakov, V.V. 2020. Carbon-rich microfossils preserved in the Proterozoic crater-filling breccias of the Sudbury impact structure, Canada. Meteoritics & Planetary Science, 55: 2727-2740 (https://doi.org/10.1111/maps.13601).

Hall, M.F., Lafrance, B. and Gibson, H.L. 2020. Emplacement of sharp-walled sulfide veins during the formation and reactivation of impact-related structures at the Broken Hammer Mine, Sudbury, Ontario. Canadian Journal of Earth Sciences, v.57 (https://doi.org/10.1139/cjes-2019-0229).

Huber, M.S., Kovaleva, E. and Riller, U. 2020. Modeling the geochemical evolution of impact melts in terrestrial impact basins: Vredefort granophyre dikes and Sudbury offset dikes. Meteoritics & Planetary Science, 55: 2320-2337 (https://doi.org/10.1111/maps.13582).

Kamber, B.S., Schoenberg, R. 2020. Evaporative loss of moderately volatile metals from the superheated 1849 Ma Sudbury impact melt sheet inferred from stable Zn isotopes. Earth and Planetary Science Letters, v.544 (https://doi.org/10.1016/j.epsl.2020.116356).

Kawohl, A., Whymark, W.E., Bite, A and Frimmel, H.E. 2020. High-Grade Magmatic Platinum Group Element-Cu(-Ni) Sulfide Mineralization Associated with the Rathbun Offset Dike of the Sudbury Igneous Complex (Ontario, Canada). Economic Geology, v.115, p.505-525 (https://doi.org/10.5382/econgeo.4717).

Keays, R.R. and Lightfoot, P.C. 2020. Mafic intrusions in the footwall of the Sudbury Igneous Complex: Origin of the Sudbury impact melt sheet and its associated ore deposits. Ore Geology Reviews. v.120 (https://doi.org/10.1016/j.oregeorev.2020.103435).

Mosaad Ali, Shulin Sun, Wei Qian, Abdou Dodo Bohari, Dusabemariya Claire, Ajibola Richard Faruwa, Yan Zhang 2020. Borehole resistivity and induced polarization tomography at the Canadian Shield for Mineral Exploration in north-western Sudbury. E3S Web Conf. v.168 (https://doi.org/10.1051/e3sconf/202016800002).

Wang, Y., Lesher, C.M., Lightfoot, P.C., Edward F Pattison, R.F. and Golightly, J.P. 2020. Geochemistry and Petrogenesis of Mafic and Ultramafic Inclusions in Sublayer and Offset Dikes, Sudbury Igneous Complex, Canada. Journal of Petrology, v.61, egaa059 (https://doi.org/10.1093/petrology/egaa059).

Recent OGS Publications

Publications received in the Sudbury District Geologist office during 2020 are listed in Table 43.

Table 43. Publications received by the Sudbury District Geologist Office in 2020.

Title	Author	Type and Year of Publication
Recommendations for Exploration 2019–2020	Resident Geologist Program	Ontario Geological Survey 2020

MINERAL DEPOSITS NOT BEING MINED

Mineral Deposits Not Being Mined in the Sudbury District are a compilation of deposits with recorded resource estimates: historical and NI 43-101–compliant. They are taken from the Ontario Mineral Deposit Inventory database (MDI; Ontario Geological Survey 2020a) and from Resource Estimate NI 43-101 Technical Reports submitted to SEDAR®. Past-producing mines may have residual resources. However, if resource estimates are not publicly available, they are not included in Table 44 and Figure 33.

Table 44. Mineral deposits not being mined in the Sudbury District in 2020 **(**keyed to Figure 33).

No.	Deposit Name and MDI	Commodity	Reserve References	Tonnage-Grade Estimates and/or Dimensions	Status
1	East Bull PGM Property	PGM	Puritch, Yassa and Barry (2019)	11.1 Mt @ 1.46 g/t PdEq Inferred	Occurrence
2	Shakespeare Ni-Cu-PGM Mine, East Zone MDI41I05SW00076	Ni Cu PGM	Armitage (2019)	Pit: Indicated – 14 436 kt @ 0.63% NiEq; Inferred – 1682 kt @ 0.54% NiEq Underground: Indicated – 22489 kt @ 0.62% NiEq; Inferred - 2905 kt @ 0.64% NiEq	Developed mine with reserves
3	Stralak Prospect / Stralak River East Zone MDI41I13SE00044	Zn Ag Cu	*Cooper (1965)	363 680 tons @ 3.18% Zn, 0.68 oz/t Ag, 0.32% Cu over a width of 8.6 to an average depth of 157 ft	Active prospect
4	Fostung property MDI41I04NE00036	W	Stryhas and More (2007)	12.4 M tonnes @ 0.213% WO_3	Developed prospect with reserves
5	Canadian Thorium Corporation Limited property / Agnew Lake Mine MDI41I05NE00009	U	*Robertson and Gould (1983)	5 803 000 tons @ 1.0 lbs/ton U_3O_8	Past-producing mine with reserves
6	Geneva Lake Mine MDI41I13SE00002	Zn Pb	*Constable (1989)	114 000 tons @ 10% Zn, 3% Pb across 5.3 ft width; 24 000 tons @ 8% Pb-Zn content across 4; 32 000 tons @ 6% Pb-Zn content across 3.0 ft	Past-producing mine with reserves
7	Aer-Kidd property MDI41I06NW00047	Ni Cu PGE	*Zurowski. (1957)	786 000 tons @ 0.573% Ni, 0.755% Cu	Past-producing mine with reserves

No.	Deposit Name and MDI	Commodity	Reserve References	Tonnage-Grade Estimates and/or Dimensions	Status
8	Victoria Mine MDI41I06NW00014	Ni Cu PGE	KGHM (2015)	0.48 Mt @ 1.23% Ni, 1.41% Cu, 0.003% Co, 0.22g/t Au, 0.47g/t Pt, 1.35g/t Pd	Past-producing mine with reserves
9	Onaping Mine / Onaping Depth MDI41I11NW00012	Ni Cu	Glencore (2017)	14 Mt @ 2.24% Ni, 1.01% Cu	Developed mine with reserves
10	Vermilion MDI41I11SW00006	Cu Pb Zn PGE	Glencore (2021a)	3.2 Mt @ 4.4% Zn, 1.2% Pb, 1.3% Cu, 1.2% Ni, 53 g/t Ag, 0.9 g/t Au	Past-producing mine with reserves
11	Lockerby Mine / Lockerby Depth MDI41I06NW00013	Ni Cu PGE	Darling, Fuchs and Moore (2012)	Indicated: 1.16 Mt @ 3.3% NiEq Inferred: 0.53 Mt @ 2.2% NiEq Probable: 1.37 Mt @ 2.21% Ni, 1.39% Cu, 0.08% Co	Past-producing mine with reserves
12	Lockerby East Project	Ni Cu PGE	Darling, Fuchs and Moore (2012)	Indicated: 0.18 Mt @ 2.32% Ni, 0.78% Cu, 0.048% Co Inferred: 0.04 Mt @ 2.9% Ni, 0.8% Cu, 0.069% Co	Past-producing mine with reserves
13	West Graham / McVittie Graham MDI41I06NW00072	Ni Cu PGE	Darling, Fuchs and Moore (2012)	Indicated: 8.55 Mt @ 0.45% Ni, 0.31% Cu, 0.01% Co Inferred: 2.0 Mt @ 0.38% Ni, 0.30% Cu, 0.01% Co	Past-producing mine with reserves
14	Errington MDI41I11SW00005 MDI41I11SW00030	Cu Pb Zn PGE	Glencore (2021a)	9 Mt @ 4% Zn, 1.1% Cu, 1.2% Pb, 53g/t Ag, 0.8g/t Au	Past-producing mine with reserves
15	Nickel Offsets Mine / Mining Location WD250 MDI41I14SE00004	Ni Cu	*Card and Meyn (1969)	1900 tons @ 0.73% Cu, 1.09% Ni	Past-producing mine with reserves
16	Nickel Lake Zone/Foy Offset MDI41I11NE00018	Cu Ni	Farrow, Everest and Frayne (2009)	Measured & Indicated: 800 000 tons @ 1.17% Ni, 0.57% Cu; Inferred: 1 560 000 tons @ 0.94% Ni, 0.46% Cu	Developed Mineral Prospect With Reserves
17	W.D. 16 property MDI000000000783	Ni Cu	*Hall (2001)	205 000 tons @ 2.22% Ni+Cu	Developed prospect with reserves
18	New Dominion Nickel Mines Property MDI41I15SW00067	Ni Cu	*Thomson et al. (1957)	45 000 tons @ 0.9% Ni, 0.75% Cu	Past-producing mine with reserves
19	Parkin Township Calcite MDI41I15SW00093	Calcite	*Gates (1991)	25 720 tons calcite, 121 700 tons mixed calcite and dolomite	Active prospect
20	Wallbridge Glencore Parkin property MDI41I15SW00079	Ni Cu PGE	Smith (2017)	264 000 tonnes @ 0.7% Cu, 0.65% Ni, 0.62 g/t Pt, 0.80 g/t Pd, 0.27 g/t Au, 0.03% Co, 6.30 g/t Ag	Developed prospect with reserves
21	Podolsky North Deposit MDI000000000773	Cu Ni PGM	Farrow, Frayne and Ramnath (2008)	Indicated: 130 000 tons @ 6.56% Cu, 0.66% Ni, 0.20 oz/ton TPM	Developed Mineral Prospect With Reserves
22	Rutter Nepheline / Nephco Nepheline Syenite Property MDI41I02SE00005		*Farrow et al. (2012)	50 000 000 tonnes	Developed prospect with reserves
23	Ecosource Garnet Inc. / Mohawk Garnet MDI000000001564	Garnet	*Easton and Murphy (2002)	100 000 tonnes	Past-producing mine with reserves
24	River Valley PGM Project MDI000000001421	PGM	Puritch et al. (2019)	Indicated: 99 179 kt @ 0.9 g/t PdEq (Open Pit) and 77 kt @ 3.37 g/t PdEq (Underground) Inferred: 52 306 kt @ 0.63 g/t PdEq	Developed prospect with reserves
25	Scadding Gold Mine MDI41I10NE00023	Au	*Yarie and Wray 2019	138 704 t @ 12.89 g/t Au	Past-producing mine with reserves
26	Lavergne prospect MDI31L05NW00002	REE	Daigle (2012)	4.167 Mt @ 1.14% Total Rare Earth Oxides	Developed prospect with reserves

No.	Deposit Name and MDI	Commodity	Reserve References	Tonnage-Grade Estimates and/or Dimensions	Status
27	Burcal Mines Ltd. property / Rock Brook Resources property MDI31E12SE00004	Carbonate	*Marmont, C. (1988)	593 333 tons @77.939% total carbonates	Developed prospect with reserves
28	Newman Deposit MDI31L05SE00009	U Th	*Ferguson (1971)	5 163 500 tons @ 0.05% U_2O_8, 0.80% Nb_2O_5	Developed Mineral Prospect With Reserves
29	Titan property MDI31L14SW00014	Fe Ti V	Prenn and Pettigrew (2017)	46 Mt @ 48.32% Fe_2O_3, 14.88% TiO_2, 0.24% V	Developed prospect with reserves
30	Hodge Farm MDI31E06SW00008	Clay	*Martin (1983)	629 000 tons of ceramispar identified in 1945	Active prospect
31	Butler Vermiculite MDI31L11SE00003t	Vermiculite	*Brown (2000)	Main zone: 83 762 tons @ 53.2% 33E zone: 20 025 tons @ 34.7%	Active prospect
32	Brazeau property MDI31L02NE00010	V	*Whiting (2004)	1 360 000 tonnes @ 0.58% V_2O_3	Active prospect
33	Bissett Creek Graphite Project MDI31L01SE00002	C	Northern Graphite Corporation (2020)	69.8 Mt @ 1.74% Cg (graphitic carbon)	Developed prospect with reserves

**These resource estimates are historical and do not follow the required disclosure for reserves and resources as outlined in National Instrument 43-101.*

REGIONAL LAND USE GEOLOGIST ACTIVITIES—NORTHEAST REGION

The activities of the Regional Land Use Geologist are described *in* "Regional Land Use Geologist Activities—northeast Region" in the Kirkland Lake District report of this volume.

MINERAL DEPOSIT COMPILATION GEOSCIENTIST ACTIVITIES—NORTHEASTERN ONTARIO

The activities of the Mineral Deposit Compilation Geologist are described *in* "Mineral Deposit Compilation Geoscientist — Northeastern Ontario" the Kirkland Lake District report of this volume.

GEOGRAPHIC INFORMATION SYSTEM DATA SPECIALISTS ACTIVITIES—NORTHWESTERN AND NORTHEASTERN ONTARIO

The activities of the Geographic Information System Data Specialists are described in "Geographic Information System Data Specialists Activities—Northwestern and Northeastern Ontario" in the Kirkland Lake District report of this volume.

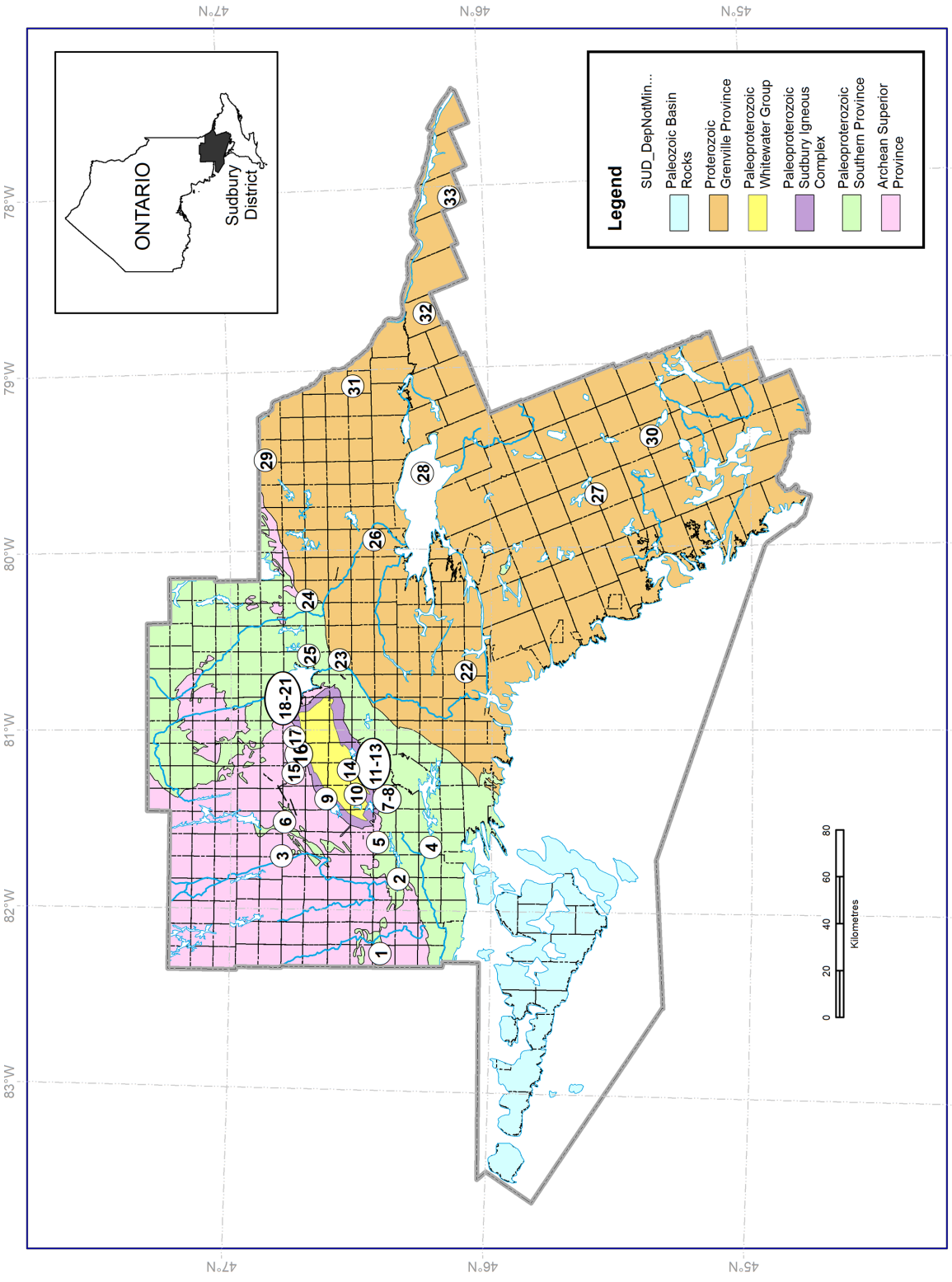

Figure 33. Mineral deposits not being mined in the Sudbury District in 2020 (keyed to Table 44; geology *modified from* Ontario Geological Survey (2011).

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Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
		LENGTH			
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
		AREA			
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
		VOLUME			
1 cm^3	0.061 023	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m^3
		CAPACITY			
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
		MASS			
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton(short)	**907.184 74**	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 9**	t
		CONCENTRATION			
1 g/t	0.029 166 6	ounce (troy) / ton (short)	1 ounce (troy) / ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights / ton (short)	1 pennyweight / ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

*Note: Conversion factors in **bold** type are exact. The conversion factors have been taken from or have been derived from factors given in the* Metric Practice Guide for the Canadian Mining and Metallurgical Industries*, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.*

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