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Resident Geologist Program

Kirkland Lake Regional Resident Geologist Report:
Kirkland Lake and Sudbury Districts

by

J. Suma-Momoh, A.S. Péloquin, P. Bousquet, P.S. LeBaron, S.L.K. Hinz,
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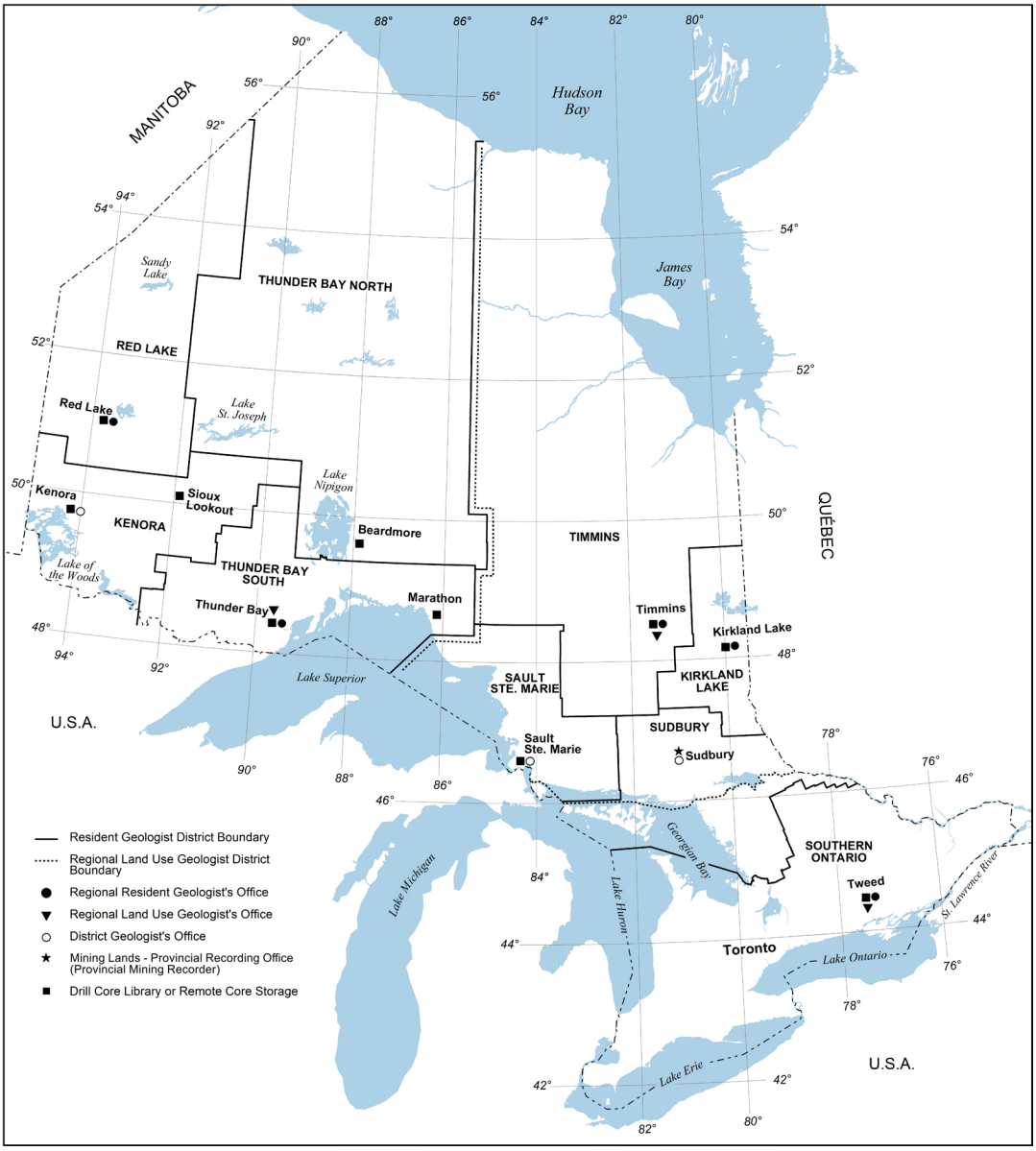

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ONTARIO GEOLOGICAL SURVEY

RESIDENT GEOLOGIST PROGRAM

REPORT OF ACTIVITIES—2024

KIRKLAND LAKE
REGIONAL RESIDENT GEOLOGIST REPORT

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INTRODUCTION

The Kirkland Lake Resident Geologist District (Figure 1) is bordered to the east by the province of Quebec and to the west and south by the Timmins and Sudbury districts, respectively. In general, much of the area in the District is underlain by Archean mafic volcanic rocks that are intruded by Precambrian felsic rocks. In the southern area of the District, unconformably overlying Huronian Cobalt Group sedimentary rocks are intruded by younger Nipissing diabase dikes and sills. The Kirkland Lake District has a long history of mining. This southern area is renowned for its historic cobalt-silver mines that produced approximately 600 million ounces of silver and 45 million pounds of cobalt. In the Kirkland Lake District, gold mineralization is associated with 4 major deformation zones, namely, the Casa Berardi, Lake Abitibi, Porcupine–Destor, and Larder Lake–Cadillac deformation zones. Gold is the main metal commodity currently being produced in the District and is gradually approaching the 50 millionth ounce since mining operations commenced in the early 1900s.

At the start of 2024, the price of gold traded at US$2061.86 per ounce, peaking its highest value at US$2784.03 per ounce on October 31, 2024, and reaching its lowest value when it traded at US$1992.03 per ounce on February 15, 2024. The price of gold closed the year trading at US$2607.28 per ounce (Figure 2), achieving a 21% increase for the year, up 5% compared to 2023.

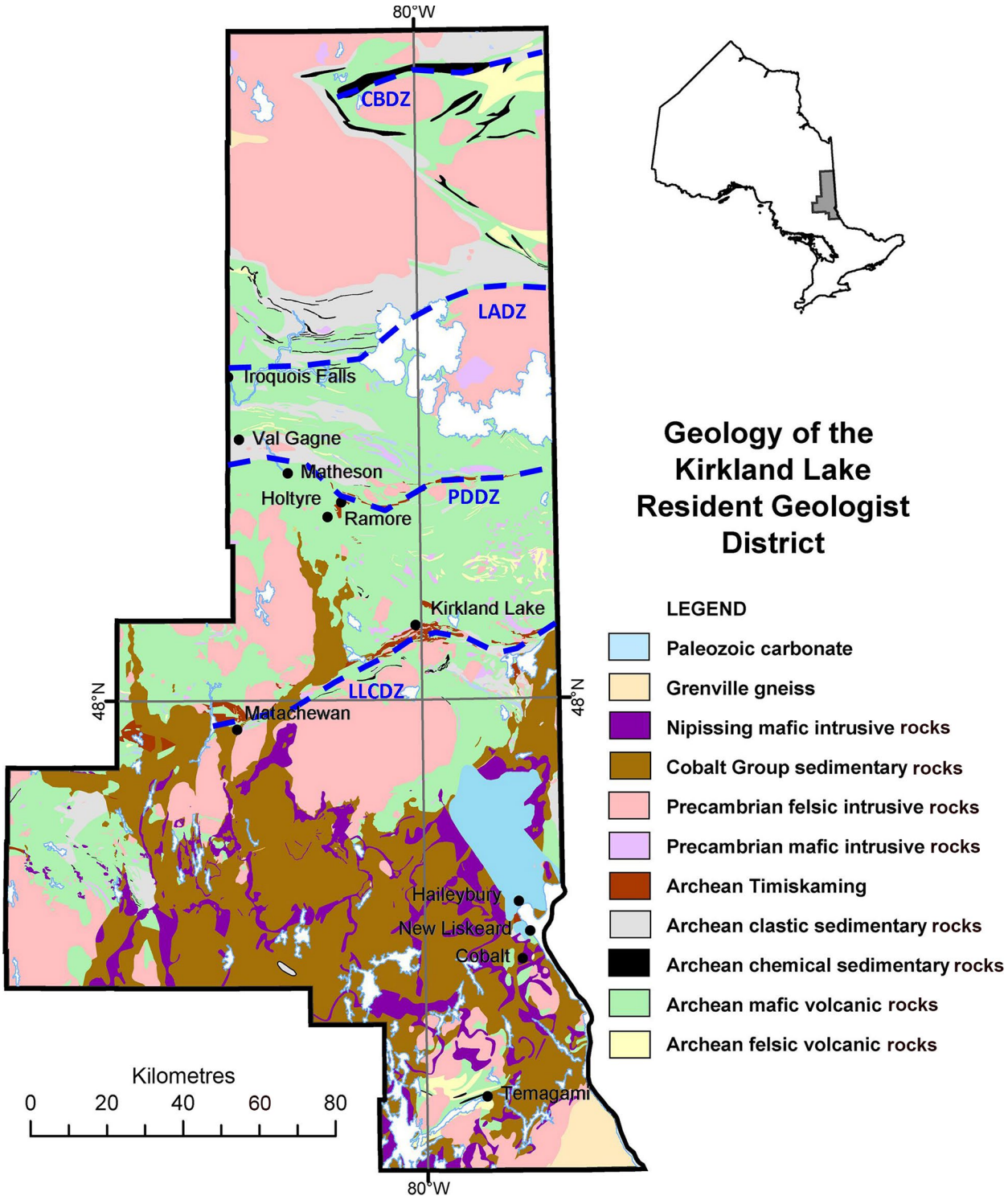

Figure 1. The area of the Kirkland Lake Resident Geologist District with simplified bedrock geology showing major deformation zones (blue dashed lines: CBDZ, Casa Berardi deformation zone; PDDZ, Porcupine–Destor (or Destor–Porcupine) deformation zone; LCDZ, Larder–Cadillac deformation zone; LADZ, Lake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

Figure 2. Gold price chart in US$ per ounce for 2024 (https://www.goldrate24.com/ [accessed January 26, 2025]).

The total gold production in 2024 was 485 535 ounces, an increase of 5.25% (25 400 ounces) compared to the same period in 2023. Cumulative gold production in the District (excluding retreated tailings) at the end of 2024 stands at 48 818 253 ounces (Table 1). Within the District, gold was produced from Alamos Gold Inc.'s Young–Davidson Mine, McEwen Mining Inc.'s Froome Mine and Agnico Eagle Mines Ltd.'s Macassa Mine.

Overall, there were 80 active exploration projects (including 3 advanced projects) in the Kirkland Lake Resident Geologist District during 2024, up 14 projects from the previous year.

In 2024, 118 assessment files were received into the Kirkland Lake assessment file system. These reports, approved for assessment credits, represent C$23 199 349 in exploration expenditures, a slight decrease compared to C$24 752 388 (for 174 files) reported for the previous year. Two hardcopy publications were added to the Kirkland Lake Resident Geologist District library in 2024, and no diamond-drill core were donated to the drill core library during the same reporting period.

Table 1. Cumulative gold production in the Kirkland Lake Resident Geologist District to the end of 2024.

Mine	Township	Total Milled (Tons)	Total Milled (Tonnes)	Production (oz Au)	Grade (oz/ton)	Years of Production
Aljo	Beatty	2 333	2 116	42	0.018	1940
American Eagle	Munro	60	54	40	0.667	1911
Argyll	Beatty	12 455	11 299	851	0.068	1918
Armistice	McGarry	8 282	7 513	1 035	0.125	1995, 1997 (bulk samples)
Ashley	Bannockburn	157 076	142 497	50 123	0.319	1932-36
Barber Larder	McGarry	30 118	27 323	3 072	0.102	1988

Mine	Township	Total Milled (Tons)	Total Milled (Tonnes)	Production (oz Au)	Grade (oz/ton)	Years of Production
Barry Hollinger	Pacaud	267 741	242 891	77 000	0.288	1918, 1925-36, 1944-46
Bidgood	Lebel	586 367	531 943	160 184	0.273	1934-51
Black Fox/Froome*	**Hislop**	**9 572 720**	**8 684 226**	**1 151 533**	**0.120**	**1997-2001, 2009-present**
Blue Quartz	Beatty	500	454	81	0.162	1923, 1926, 1928, 1934
Bourkes	Benoit	1 298	1 178	277	0.213	1918, 1936-38
Buffonta	Garrison	117 013	106 152	12 139	0.104	1981, 1991-92
Canadian Arrow	Hislop	303 449	275 284	19 140	0.063	1974-76, 1980-83
Canamax (Matheson Project)	Holloway	38 675	35 085	5 391	0.139	1988
Cathroy Larder (Mirado)	McElroy	89 719	81 392	10 231	0.114	1941-44, 1947, 1957, 1987
Centre Hill	Munro	327 007	296 656	422	0.001	1967-70
Cheminis	McVittie	179 013	162 398	17 530	0.098	1991-96
Chesterville	McGarry	3 260 439	2 957 821	358 880	0.110	1930-52
Croesus	Munro	5 333	4 838	14 859	2.786	1915-18, 1923, 1931-36
Eastmaque (tailings)	Teck	1 051 744	954 126	28 740	0.027	1988-91
Ethel Copper	James	17 477	15 855	115	0.007	1962-67
Garrcon	Garrison	81 057	73 534	3 518	0.043	2014 (bulk sample)
Gateford (Swastika)	Teck	103 684	94 061	30 068	0.290	1910-47***
Golden Summit	Maisonville	737	669	57	0.077	1936-37, 1945
Gold Hill	Catharine	4 616	4 188	660	0.143	1927-28
Gold Pyramid	Guibord	175	159	36	0.206	1911
Goldpost	Hislop	9 403	8 530	2 913	0.310	1989
Hislop Mine (Hislop East)	Hislop	2 082 219	1 888 957	128 635	0.062	1990-91, 1993-95, 1999-2000, 2007, 2010-14
Holloway Mine	Holloway	6 720 648	6 096 869	1 027 203	0.153	1993, 1995 (preproduction), 1996-06, 2011-16
Holloway-Holt	Holloway	601 778	545 924	89 703	0.149	2007-2010
Holt	Holloway	11 640 918	10 560 463	1 727 575	0.148	1988-2004, 2011-2018
Holt Complex	Holloway, Taylor	1 178 200	1 068 845	143 342	0.122	2019-2020
Hudson-Rand	Teck	6 496	5 893	483	0.074	1922
Kerr	McGarry	40 336 512	36 592 668	10 457 441	0.259	1911, 1938-96
Kirkland Lake	Teck	3 140 283	2 848 817	1 172 955	0.374	1916-60
Kirkland Town site	Teck	4 230	3 837	1 921	0.454	1958-59
Laguerre	McVittie	40 514	36 754	7 568	0.187	1937-39
Lake Shore	Teck	17 208 323	15 611 128	8 602 791	0.500	1918-65, 1982-87, 1997-98
Macassa	Teck	7 877 532	7 146 377	3 525 389	0.448	1933-99
Macassa (Agnico Eagle)*	**Teck**	**6 600 236**	**5 987633**	**3 111 831**	**0.471**	**2002-present**
Macassa (Tailings)	Teck	3 240 890	2 940 086	173 659	0.054	1987-99, 2002
Matachewan Consolidated	Powell	3 631 908	3 294 812	385 503	0.106	1934-54, 1980-82
McBean	Gauthier	557 621	505 865	45 900	0.082	1984-86
Miller Independence	Pacaud	31	28	59	1.903	1918
Moffat-Hall	Lebel	16 388	14 867	4 780	0.292	1934-35
Morris Kirkland	Lebel	127 253	115 442	16 999	0.134	1936-38, 1940-42
New Telluride	Skead	104	94	62	0.596	1931-32

Mine	Township	Total Milled (Tons)	Total Milled (Tonnes)	Production (oz Au)	Grade (oz/ton)	Years of Production
Newfield	Garrison	55 000	49 895	9 680	0.176	1996 (bulk sample)
Omega	McVittie	1 615 081	1 465 177	214 098	0.133	1913, 1926-28, 1936-47
Queenston	Gauthier	1 054	956	177	0.168	1941
Ronda	MacMurchy	24 592	22 309	2 727	0.111	1939
Ross	Hislop	6 714 482	6 091 276	995 832	0.148	1936-89
Ryan Lake**	Powell	188 790	171 267	1 352	0.007	1948-57, 1962-64
Stairs	Midlothian	15 835	14 365	3 573	0.226	1965-66
Sylvanite	Teck	5 049 536	4 580 862	1 674 808	0.332	1927-61
Taylor	Taylor	1 072 489	972 946	175 601	0.164	2007, 2013-14 (preproduction), 2015-2018
Teck Hughes	Teck	9 565 302	8 677 496	3 709 007	0.388	1917-68
Toburn	Teck	1 186 316	1 076 208	570 659	0.481	1912-53***
Tyranite	Tyrrell	223 810	203 037	31 352	0.140	1939-42
Upper Beaver	Gauthier	580 562	526 677	140 709	0.242	1913-72***
Upper Canada	Gauthier	4 648 984	4 217 487	1 398 291	0.301	1938-71
White-Guyatt	Munro	50	45	10	0.200	1911
Wright Hargreaves	Teck	9 934 327	9 012 270	4 821 296	0.485	1921-65
Young Davidson	Powell	6 218 272	5 641 121	585 690	0.094	1934-57
Young-Davidson	**Powell**	**37 120 481**	**33 675 134**	**2 113 054**	**0.057**	**2012-present**
Total (including tailings)		205 455 538	186 386 129	49 020 652	0.239	
Total (tailings only)		4 292 634	3 894 212	202 399	0.047	
Total (excluding tailings)		201 162 904	182 491 917	48 818 253	0.243	

Note: ** Current producer (in **Bold**), ** Base metal producer, *** Intermittent production*
Up to year 2023 tons/tonnes milled shown for Black Fox/Froome; 2024 data not available
All imperial tons milled have been converted to metric tonnes using a conversion factor of 0.90718474

MINING ACTIVITY

There were 3 gold producing mines in the Kirkland Lake District during 2024. The locations of these mines are shown on the map in Figure 3. Table 2 sumarizes 2024 production from these 3 mines, and their most recent publicly disclosed mineral reserves/resources statements (https://www.agnicoeagle.com/English/home/default.aspx, https://alamosgold.com/, https://mcewenmining.com/ [accessed January 25, 2025]).

Table 2. Mine production and current mineral resource estimates in the Kirkland Lake Resident Geologist District in 2024.

Company	Mine	Production in 2024		Mineral Reserve/Resource Estimate	
		Tonnage at Grade	**Total Commodity**	**Tonnage at Grade**	**Contained Commodity**
Agnico Eagle Mines Ltd.	Macassa	574 000 t @ 15.55 g/t Au	279 384 oz Au	Prv & Prb Reserves* 5 067 000 t at 13.11 g/t Au	2 136 000 oz Au
Alamos Gold Inc.	Young–Davidson	2 806 192 t @ 2.08 g/t Au	174 000 oz Au	Prv & Prb Reserves* 43 911 000 t at 2.31 g/t Au	3 261 000 oz Au
McEwen Mining Inc.	Fox Complex/ Froome	N/A	30 151 GEO	**Froome**** Mea & Ind Resources 1 432 000 t at 4.22 g/t Au	194 000 oz Au
				Inf Resources 276 000 t at 3.32 g/t Au	29 000 oz Au
				Black Fox*** Mea & Ind Resources 381 000 t at 5.48 g/t Au	67 000 oz Au
				Grey Fox**** Mea & Ind Resources 13 135 000 t at 3.64 g/t Au	1 538 000 oz Au
				Inf Resources 4 319 000 t at 3.30 g/t Au	458 000 oz Au
				Tamarack***** Ind Resources 1 055 000 t at 1.63 g/t Au	55 000 oz Au

Abbreviations: *Prv (proven), Prb (probable), Mea (measured), Ind (indicated), Inf (inferred)*
Note: *Mineral estimate effective date: * December 31, 2023; ** July 16, 2021; ***May 1, 2021; **** December 31, 2024; ***** April 30, 2021*
GEO = Gold Equivalent Ounces
N/A = Data not available

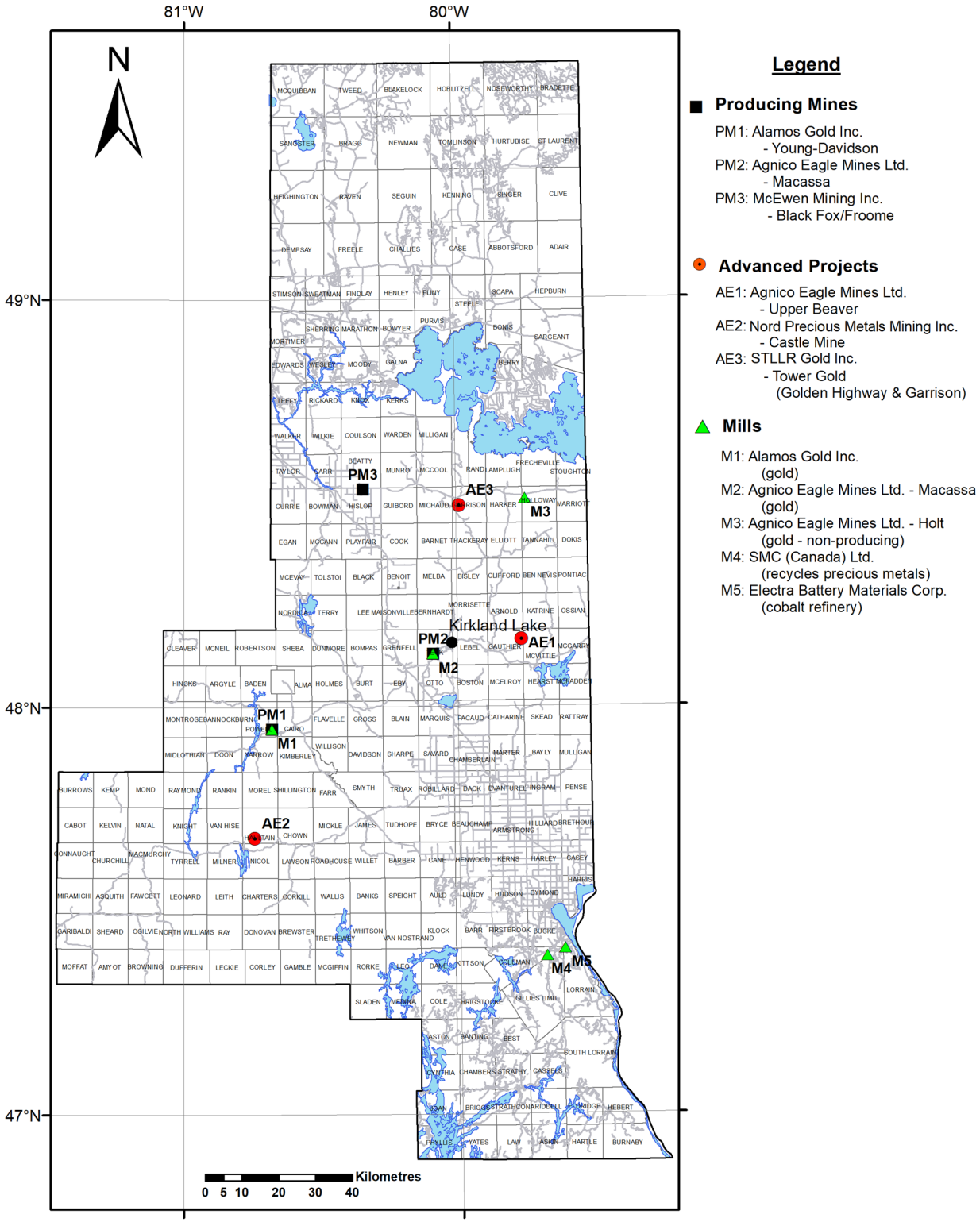

Figure 3. Kirkland Lake Resident Geologist District showing locations of producing mines, mills and advanced projects.

Agnico Eagle Mines Ltd.

Agnico Eagle Mines Ltd. is a senior Canadian gold mining company, producing precious metals from operations in Canada, Australia, Finland and Mexico. The Ontario production assets include the Macassa Mine, an underground operation (*see* Figure 3) and Detour Lake Mine (Timmins District) which is an open pit mine.

MACASSA MINE COMPLEX

At Macassa, construction of the new paste plant achieved 70% completion at the end of the third quarter, and is on schedule for commissioning in the first half of the current year. As of December 31, 2023, Macassa Mine Complex has total Proven and Probable Mineral Reserves of 5.1 Mt of ore grading at 13.11 g/t gold and containing 2.1 Moz of gold (Figure 4, and Agnico Eagle Mines Ltd., news release, February 15, 2024).

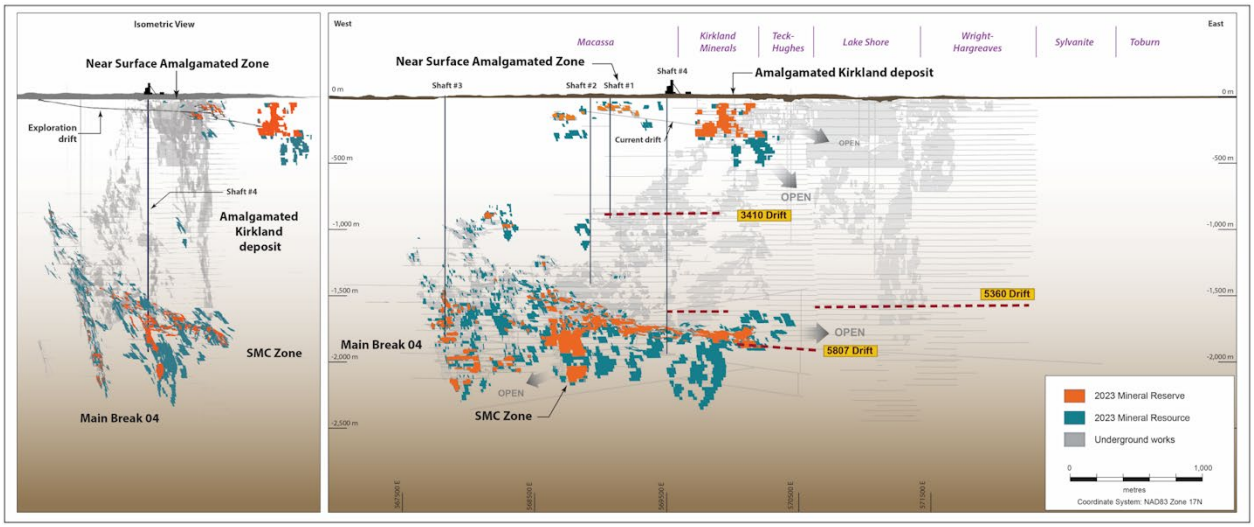

Figure 4. Composite longitudinal section (looking north) of Macassa Mine Complex showing underground mineral resource and reserve outlines (*modified from* Agnico Eagle Mines Ltd., https://www.agnicoeagle.com/English/operations-and-projects/global-operations-and-development-projects/macassa/default.aspx [accessed May 21, 2025]).

Exploration drilling at the mine complex during the first 9 months of 2024 totalled 137 900 m targeting multiple underground zones. Highlights of intercepts at depth include (Agnico Eagle Mines Ltd., news release, October 30, 2024):

- DDH 57-1556, with 12.5 g/t gold over 2.0 m at 1713 m depth in the South Mine Complex (SMC) West zone
- DDH 58-1142, with 18.0 g/t gold over 1.9 m at 1855 m depth in the central area of the Main Break; and DDH 58-1290, with 19.5 g/t gold over 3.2 m at 1986 m depth in the eastern extension of the Main Break

Step-out drilling into the shallow eastern extension of the Amalgamated Kirkland (AK) deposit returned the following highlights:

- DDH KLAK-321, with 7.7 g/t gold over 5.7 m at 245 m depth

- DDH KLAK-339, with 11.8 g/t gold over 1.9 m at 251 m depth, confirming the potential for mineral resource addition down-plunge of current mineral resources (Agnico Eagle Mines Ltd., news release, October 30, 2024)

For the full year 2024, underground operations at the Macassa Mine Complex produced a total of 279 384 ounces of gold from 574 000 tonnes of ore milled at an average grade of 15.55 g/t Au, compared to 228 535 ounces produced in 2023.

Alamos Gold Inc.

Alamos Gold Inc. (Alamos) is a Canadian-based intermediate gold producer, with production from 3 operating mines in North America, namely, the Young–Davidson mine (*see* Figure 3), Island Gold and Magino mines (Sault Ste. Marie District) in northern Ontario. The third operating mine is the Mulatos Mine in Sonora, Mexico.

YOUNG–DAVIDSON MINE

The Young–Davidson Mine is a large, bulk tonnage underground gold mine, located near the town of Matachewan, approximately 60 km west of Kirkland Lake (*see* Figure 3), within the southwestern part of the Abitibi greenstone belt. Production rates for 2024 averaged 7667 tonnes per day (tpd), and the mine produced a total of 174 000 ounces of gold from 2 806 192 tonnes of ore grading at 2.08 g/t gold, representing a 6% decrease in gold production when compared to 185 100 ounces produced in 2023. As of December 31, 2023, Young–Davidson Mine has total Proven and Probable Mineral Reserves of 44 Mt of ore grading at 2.31 g/t gold and containing 3.3 Moz of gold supporting a 15-year mine life (Alamos Gold Inc., Corporate Presentation dated January 2025; news release, January 13, 2024; https://s24.q4cdn.com/779615370/files/doc_downloads/2024/02/Alamos-2023-Reserve-Resource_FINAL.pdf [accessed January 22, 2025).

A total of $12M was budgeted for exploration at Young–Davidson in 2024, up from $8 million spent in 2023. Most of the underground exploration drilling program focused on extending mineralization within the Young–Davidson syenite, which hosts the bulk of mineral reserves and resources. Drilling also tested the hanging wall and footwall of the deposit where higher grades have been intersected. Underground exploration drilling from the mid-mine intersected a new style of higher grade gold mineralization in zones within the hanging wall of the Young–Davidson deposit. These zones are located between 10 m and up to 200 m south of existing infrastructure and mineral reserves and resources, with grades intersecting well above the current mineral reserve grade of 2.31 g/t gold. Highlights of drill intercepts include (Alamos Gold Inc., Corporate Presentation, January 2025; news releases, November 6 and May 14, 2024):

- DDH YMEX24-9620-137, with 9.07 g/t gold over 5.00 m
- DDH YMEX24-9620-141, with 4.13 g/t gold over 8.31 m
- DDH YMEX24-9620-147, with 21.86 g/t gold over 4.00 m

Additional high-grade gold mineralization intercepts are shown in Figure 5. At the end of the third quarter, 19 919 m of underground exploration drilling was completed in 46 drill holes, and 3454 m of surface regional exploration drilling was completed in 11 drill holes (Alamos Gold Inc., news releases, November 6 and July 31, 2024). This year, the company is planning on completing 25 600 m of underground exploration drilling focused on expanding resources, and completing 6000 of surface exploration drilling on regional targets (Alamos Gold Inc., Corporate Presentation dated January 2025).

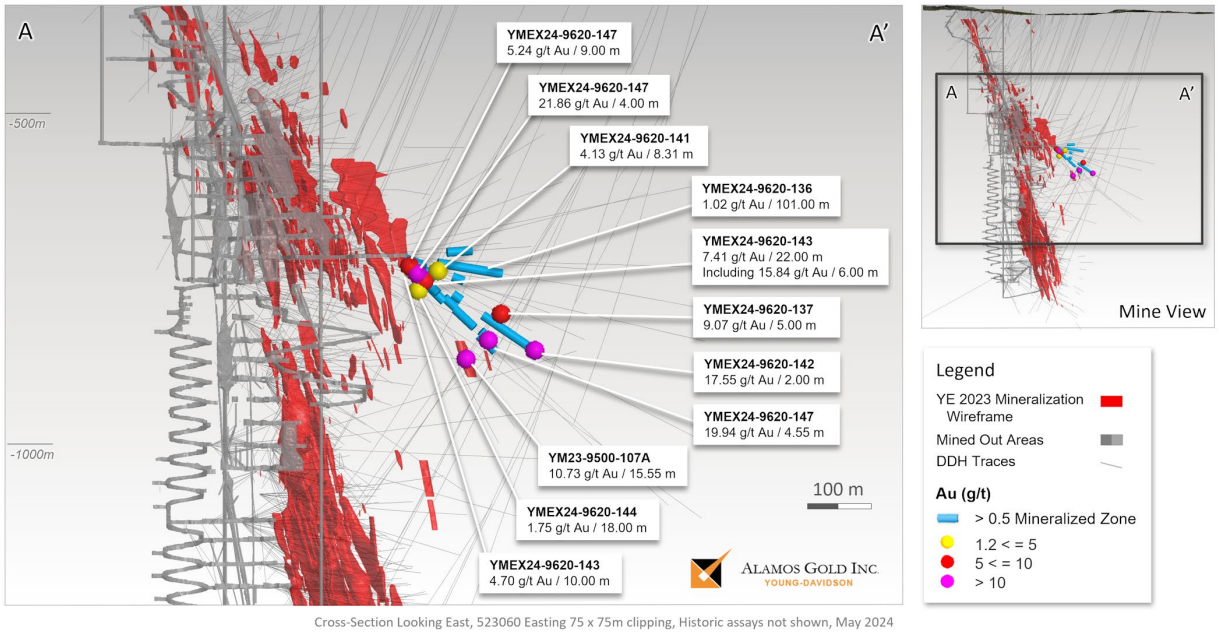

Figure 5. Young–Davidson Mine cross section looking east (523060 East) at 9620- and 9500-level exploration areas, showing high-grade drill hole intercepts and significant composites (Alamos Gold Inc., corporate presentation, January 2025).

McEwen Mining Inc.

McEwen Mining Inc. operates a single underground production site in Canada, the Froome Mine, which is accessed from the dormant Black Fox Mine. Other mining operations include the Gold Bar Mine in Nevada, USA, the El Gallo Mine in Sinaloa, Mexico, in addition to the San José Mine in Santa Cruz, Argentina.

FROOME MINE

McEwen's Fox Complex comprises of the Black Fox property (Figure 6), and the Stock and Lexam properties (Timmins District). The Black Fox property includes the gold producing Froome Mine, the Black Fox Mine (currently under care and maintenance) and the Tamarack and Grey Fox deposits. During 2021, as production wound down at the Black Fox Mine, it ramped up at the Froome underground mine, located 850 metres west of the Black Fox open pit. Froome achieved commercial production in September 2021. The ore is trucked from each sublevel to surface and is hauled 28 km by road trucks to the Stock mill site for processing (https://www.mcewenmining.com/operations/black-fox-complex/default.aspx [accessed January 22, 2025]).

In 2024, the Froome Mine produced 30 150 gold equivalent ounces. This is a significant decrease compared to the 44 500 gold equivalent ounces produced in 2023. Mine production was affected by a shortfall in development metres during the second quarter of 2024 due to a stope failure, limiting stope availability and negatively impacting planned mined and milled gold grades. Additional development was later completed to accelerate stope availability and increased production in the fourth quarter (McEwen Mining Inc., news release, November 5, 2024). Effective December 2024, Fox Complex had total Measured and Indicated Resources of 13.9 Mt of ore grading at 4.2 g/t gold and containing 1.9 Moz of gold; and Inferred Resources of 4.7 Mt of ore grading at 3.61 g/t gold and containing 551 000 ounces of gold. The company announced that an updated mineral resource estimate will be released during the first quarter of 2025 (McEwen Mining Inc., news release, December 2, 2024).

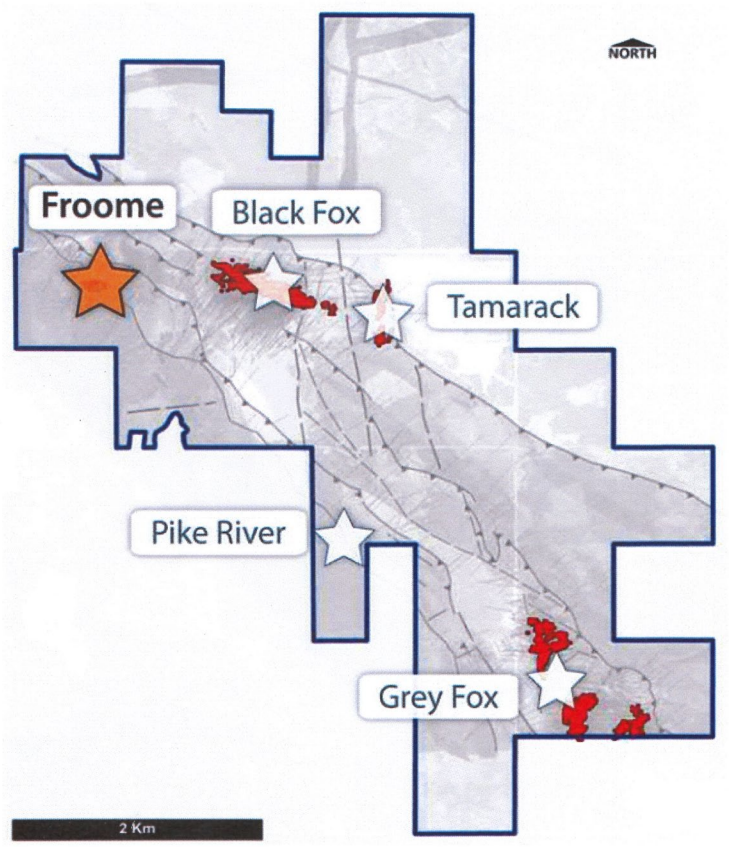

Figure 6. Plan view location map of the Black Fox property showing the current producing Froome Mine in relation to other deposits and targets (https://www.mcewenmining.com/operations/black-fox-complex/default.aspx [accessed January 22, 2025]).

EXPLORATION ACTIVITY

Introduction

The area covered by active claims in the Kirkland Lake District at year-end 2024 was 1 071 406 ha, larger by 28 211 ha from the start of the year (Table 3), and the status of claims in the District for 2024 is illustrated in Figure 7. During the year under review, 21 exploration plans and 124 exploration permits were active in the District (Tables 4 and 5) and of these, 6 plans and 23 permits were newly issued.

The dollar value of work approved for assessment work credit was C$23 199 349, slightly down from C$24 752 388 reported for 2023. This dollar value of work represents 118 new assessment reports (Table 6) that were received and processed for the Kirkland Lake District and uploaded into the Ontario Mineral Exploration Information System (OMEIS). The Resident Geologists Program and Mining Lands staff use OMEIS, an intranet-based application launched in 2018, to maintain and update assessment file and drill-hole data. Exploration activity in the District during 2024, based on assessment work filings, company reports and news releases, is listed in Table 7.

Table 3. Total area covered by registered claims in the 9 districts of the Resident Geologist Program (RGP).

RGP District	Total Area (ha) Covered by Claims December 31, 2024	Total Area (ha) Covered by Claims January 5, 2024	Difference in Total Area (ha) Covered by Claims from January 5, 2024 to December 31, 2024
Kenora	1 249 561	1 288 204	-38 643
Kirkland Lake	**1 071 406**	**1 043 195**	**28 211**
Red Lake	1 219 716	1 379 909	-160 194
Sault Ste. Marie	374 473	340 880	33 593
Southern Ontario	103 098	104 114	-1 016
Sudbury	395 446	382 723	12 723
Thunder Bay North	2 435 225	2 471 792	-36 567
Thunder Bay South	1 570 584	1 672 313	-101 729
Timmins	1 604 545	1 669 803	-65 258

Note: *Data are from MLAS (Mining Lands Administration System), compiled by N. Sabiri, GIS Data Specialist–Northeastern Ontario, Resident Geologist Program.*

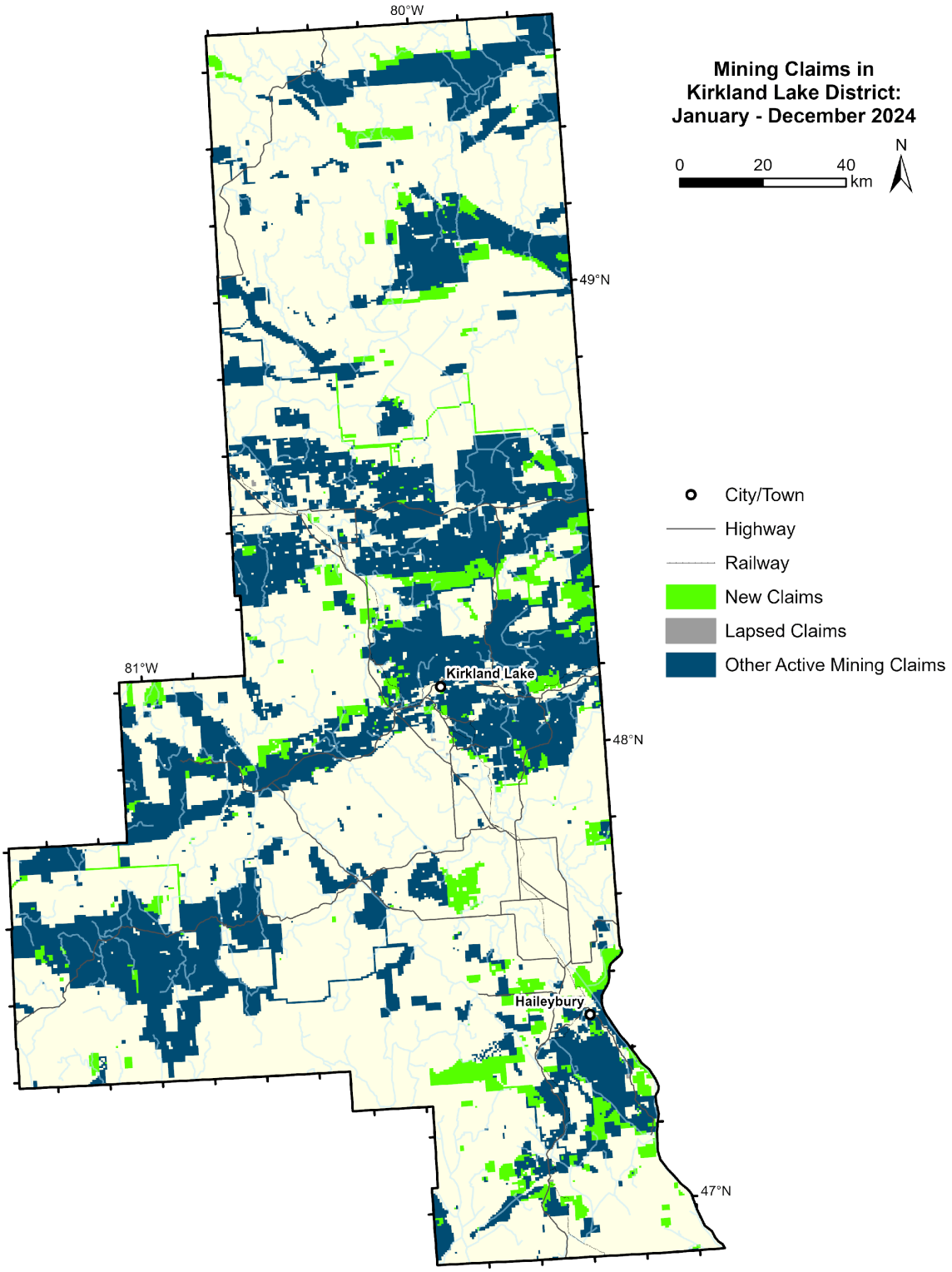

Figure 7. Status of mining claim activity in the Kirkland Lake District from January to the end of December 2024.

Table 4. Active exploration plans in the Kirkland Lake Resident Geologist District in 2024.

No.	Plan No.	Claim Holder or Proponent	Project Name	Township	Effective
1	PL-22-000134	Renegade Gold Inc.	Larder Lake	Ossian, Pontiac	2022
2	PL-23-000005	Gatling Exploration Inc.	Swansea MT-IP Project	Hearst, McVittie	2023
3	PL-23-000020	Jobina Resources Inc.	Toanga Project	Morrisette	2023
4	PL-23-000024	Skead Holdings Ltd.	Larder Main Break MT-IP	Hearst, McVittie	2023
5	PL-23-000027	Lost Hope Mine Ltd.	Kirkland West Gold Project	Eby	2023
6	PL-23-000047	Gatling Exploration Inc.	Larder Main Break MT-IP	McVittie	2023
7	PL-23-000048	2065342 Ontario Inc.	South Abitibi	Best, Brigstocke, Cassels, Coleman, Gillies limit	2023
8	PL-23-000050	NewOrigin Gold Corp.	Nipissing Cobalt	Barr, Coleman, Firstbrook, Kittson, Klock	2023
9	PL-23-000060	South Timmins Mining Inc.	Shining Tree Gold	Churchill, MacMurchy	2023
10	PL-23-000061	South Timmins Mining Inc.	Shining Tree Gold	MacMurchy	2023
11	PL-23-000068	Alamos Gold Inc.	Wydee	Bannockburn, Powell	2023
12	PL-23-000070	Ursa Major Minerals Inc.	Fawcett July 2023	Fawcett	2023
13	PL-23-000079	Jobina resources Inc.	Toanga Project	Morrisette	2023
14	PL-23-000099	Gatling Exploration Inc.	Larder East MT-IP	McVittie	2023
15	PL-23-000105	Gatling Exploration Inc.	Larder West MT-IP	McVittie	2023
16	PL-24-000008	Northstar Gold Corp.	Miller Gold Project	Pacaud	2024
17	PL-24-000033	Jobina Resources Inc.	Toanga Project	Morrisette	2024
18	PL-24-000037	Canada Nickel Company Inc.	Bannockburn Drone	Bannockburn, Montrose	2024
19	PL-24-000047	Michael Leahy	Black-Leahy	Black	2024
20	PL-24-000054	Perry English	Strathy Project	Strathy	2024
21	PL-24-000076	Lost Hope Mine Ltd.	Silversides	Lundy	2024

Table 5. Active exploration permits in the Kirkland Lake Resident Geologist District in 2024.

No.	Permit No.	Claim Holder or Proponent	Project Name	Township	Effective
1	PR-21-000244	Eric Marion	South Break	Eby, Otto	2021
2	PR-21-000288	Gatling Exploration Inc.	Swansea	Hearst, McVittie	2021
3	PR-21-000343	RJK Explorations Ltd.	RJK Hound Chute Lake Area	Gillies Limit	2021
4	PR-21-000346	Voltage Metals Inc.	St. Laurent Nickel	St. Laurent	2021
5	PR-21-000368	2681891 Ontario Inc.	Patten River West	St. Laurent	2021
6	PR-21-000371	2681891 Ontario Inc.	Jerry Lake	Tweed	2021
7	PR-21-000377	Epica Gold Inc.	Munro-Croesus (Southwest)	Guibord, Hislop	2021
8	PR-21-000378	Epica Gold Inc.	Munro-Croesus (Central)	Guibord, Munro	2021
9	PR-21-000379	Epica Gold Inc.	Munro-Croesus (East)	Guibord, Munro	2021
10	PR-21-000380	Epica Gold Inc.	Munro-Croesus (West)	Beatty, Munro	2021
11	PR-22-000001	Mistango River Resources Inc.	Omega Project	McVittie	2022
12	PR-22-000002	Mistango River Resources Inc.	Omega Project	McVittie	2022

No.	Permit No.	Claim Holder or Proponent	Project Name	Township	Effective
13	PR-22-000035	Power Metals Corp.	Case Lake Property	Steele	2022
14	PR-22-000046	Betty Robinson	Reed-Robinson (Robinson-B)	Eby	2022
15	PR-22-000052	Douglas Robinson	Reed-Robinson (Robinson-D)	Eby	2022
16	PR-22-000053	Emmy Reed	Reed-Robinson (Reed-central)	Eby, Otto	2022
17	PR-22-000061	Brixton Metals Corp.	Hudbay-Coleman	Bucke, Coleman	2022
18	PR-22-000062	Agnico Eagle Mines Ltd.	Amalgamated Kirkland	Teck	2022
19	PR-22-000078	James Reed	Reed-Robinson (Reed-West)	Eby	2022
20	PR-22-000079	James Reed	Reed-Robinson (Reed-East)	Eby, Otto	2022
21	PR-22-000080	James Reed	Reed-Robinson (Reed-South)	Eby, Otto	2022
22	PR-22-000081	James Reed	Reed-Robinson (Reed-SE)	Eby	2022
23	PR-22-000082	James Reed	Reed-Robinson (Reed-SW)	Eby	2022
24	PR-22-000087	FNX Mining Company Inc.	Buried Treasure	Doon, Yarrow	2022
25	PR-22-000093	RJK Explorations Ltd.	RJK Chown Lake Area	Lorrain	2022
26	PR-22-000095	Patrick Culhane	Melba Mine	Benoit, Melba	2022
27	PR-22-000107	Don Fudge	Bryce Property	Bryce	2022
28	PR-22-000115	Don Fudge	Pense Property	Pense	2022
29	PR-22-000118	Canadian Gold Miner Corp.	Lincoln-Nipissing Four Corners North	Boston, Catharine, Hearst, McElroy, Skead	2022
30	PR-22-000119	iMetal Resources, Inc	Gowganda West	Leonard, Tyrrell	2022
31	PR-22-000125	Knightsbridge Exploration Ltd.	North Wind	Connaught	2022
32	PR-22-000134	Mistango River Resources Inc.	Omega Project	McVittie	2022
33	PR-22-000145	Arnold Allsopp	Allsopp Option	Eby, Otto	2022
34	PR-22-000149	Alamos Gold Inc.	Young Davidson	Cairo, Kimberley, Powell, Yarrow	2022
35	PR-22-000157	Orefinders Resources Inc.	Knight	Knight, Tyrrell	2022
36	PR-22-000191	STLLR Gold Inc.	Golden Highway Project	Barnet, Garrison, Guibord, McCool, Michaud	2022
37	PR-22-000200	RJK Explorations Ltd.	RJK Criostal Lake Area	Lorrain	2022
38	PR-22-000201	RJK Explorations Ltd.	RJK Flying Fox, Puni, Mozart Lakes Area	Gillies Limit	2022
39	PR-22-000202	RJK Explorations Ltd.	RJK Longfellow Lake Area	Lorrain	2022
40	PR-22-000203	RJK Explorations Ltd.	RJK Chopin Lake Area	Gillies Limit	2022
41	PR-22-000214	Bear Creek Gold Ltd.	Clifford BCG	Ben Nevis, Clifford	2022
42	PR-22-000219	Cobaltech Mining Inc.	Kerr	Coleman	2022
43	PR-22-000226	Cobaltech Mining Inc.	Oxbow	South Lorrain	2022
44	PR-22-000238	Gravel Ridge Resources Ltd.	Kerrs Property	Chesney Bay Area, Kerrs, Rayner Lake Area	2022
45	PR-22-000254	Canadian Gold Miner Corp.	Lincoln-Nipissing Manor Leases	Hearst, Skead	2022
46	PR-22-000264	Agnico Eagle Mines Ltd.	Avalard Permit Area 1	Gauthier, McVittie	2022
47	PR-22-000266	RJK Explorations Ltd.	RJK Ice Chisel Darwin Lakes Area	Gillies Limit	2022
48	PR-22-000288	Sparton Resources Inc.	Oakes	Powell	2022
49	PR-22-000292	RJK Explorations Ltd.	Banting Target a	Banting	2022
50	PR-22-000296	RJK Explorations Ltd.	Peddie Pipe Area	Bucke	2022
51	PR-22-000298	GFG Resources Inc.	Montclerg/Goldern Arm	Beatty, Coulson	2022

No.	Permit No.	Claim Holder or Proponent	Project Name	Township	Effective
52	PR-22-000300	International Explorers & Prospectors Inc.	Montclerg/Goldern Arm	Carr	2022
53	PR-22-000301	International Explorers & Prospectors Inc.	Montclerg/Goldern Arm	Walker, Wilkie	2022
54	PR-22-000309	STLLR Gold Inc.	Buffonta and Plato Project	Elliott, Garrison, Harker, Thackeray	2022
55	PR-22-000316	Northstar Gold Corp.	Miller Gold Project	Boston, Catharine, McElroy, Pacaud	2022
56	PR-22-000320	iMetal Resources, Inc	GW_ZONE 1	Leonard, Tyrrell	2022
57	PR-22-000321	iMetal Resources, Inc	GW_ZONE 3	Leonard	2022
58	PR-22-000324	Canadian Gold Miner Corp.	Midlothian	Midlothian	2022
59	PR-22-000328	Cambrian Mining Corp.	Atacama - 3	Otto	2022
60	PR-22-000348	Alamos Gold Inc.	Matachewan East	Cairo, Flavelle	2022
61	PR-22-000349	Alamos Gold Inc.	Matachewan West	Cairo	2022
62	PR-22-000350	Alamos Gold Inc.	Wydee East	Bannockburn, Powell	2022
63	PR-22-000351	Alamos Gold Inc.	Wydee West	Argyle, Hincks	2022
64	PR-23-000013	Canada Silver Cobalt Works Inc.	Castle Property	Haultain, Nicol	2023
65	PR-23-000026	Agnico Eagle Mines Ltd.	Munro Area 1	Gauthier, Lebel	2023
66	PR-23-000027	Agnico Eagle Mines Ltd.	Munro Area 2	Gauthier, Lebel	2023
67	PR-23-000028	Agnico Eagle Mines Ltd.	Munro Area 3	Gauthier	2023
68	PR-23-000029	Agnico Eagle Mines Ltd.	Federal Kirkland	Lebel, Teck	2023
69	PR-23-000040	Canada Nickel Company Inc.	Bannockburn	Bannockburn, Montrose	2023
70	PR-23-000042	Agnico Eagle Mines Ltd.	Rand-Ross Area 1	Lebel, Teck	2023
71	PR-23-000043	Agnico Eagle Mines Ltd.	Rand-Ross Area 2	Lebel, Teck	2023
72	PR-23-000044	Agnico Eagle Mines Ltd.	Rand-Ross Area 3	Lebel	2023
73	PR-23-000045	Agnico Eagle Mines Ltd.	Rand-Ross Area 4	Lebel, Teck	2023
74	PR-23-000056	FNX Mining Company Inc.	Buried Treasure	Doon, Yarrow	2023
75	PR-23-000059	Edward Shynkorenko	Tannahill Project	Elliott, Tannahill	2023
76	PR-23-000078	B Laurin	Little Abitibi One	Sangster	2023
77	PR-23-000085	B Laurin	Little Abitibi Two	Bragg	2023
78	PR-23-000087	Agnico Eagle Mines Ltd.	Teck A-B	Lebel, Teck	2023
79	PR-23-000088	Gatling Exploration Inc.	Larder Gold Regional Stripping and Trenching	McVittie	2023
80	PR-23-000090	Agnico Eagle Mines Ltd.	Avalard	Gauthier	2023
81	PR-23-000097	Canada Nickel Company Inc.	Powell	Powell	2023
82	PR-23-000098	McLaren Resources Inc.	McCool	McCool	2023
83	PR-23-000115	Kirkland Lake Discoveries Corp.	Goodfish-Kirana	Bernhardt, Lebel, Morrisette, Teck	2023
84	PR-23-000119	Cobaltech Mining Inc.	Campbell-Crawford	Coleman	2023
85	PR-23-000124	Mayfair Gold Corp.	Fenn-Gib North Block 2023	Guibord, Munro	2023
86	PR-23-000174	RT Minerals Corp.	Galna Project	Galna, Moody	2023
87	PR-23-000179	RT Minerals Corp.	Moody Project	Knox, Moody	2023
88	PR-23-000182	Terry Link	Link-Catharine Project	Catharine	2023
89	PR-23-000197	RJK Explorations Ltd.	RJK Lundy Lake Area	Lundy	2023
90	PR-23-000203	NewOrigin Gold Corp.	North Abitibi	Hoblitzell, Noseworthy	2023

No.	Permit No.	Claim Holder or Proponent	Project Name	Township	Effective
91	PR-23-000217	Tiger Gold Exploration Corp.	Harker Heritage - Sulphide Hill Project	Clifford	2023
92	PR-23-000221	Alamos Gold Inc.	Matachewan	Cairo	2023
93	PR-23-000234	Todd Mathieu	BenoMath Property - Esther Project	Churchill, Connaught	2023
94	PR-23-000235	South Timmins Mining Inc.	Shining Tree Gold	Churchill, MacMurchy	2023
95	PR-23-000256	RT Minerals Corp.	Sheba North Project	Sheba	2023
96	PR-23-000257	RT Minerals Corp.	Nordica Project	Nordica	2023
97	PR-23-000258	RT Minerals Corp.	Sheba-East Project	Sheba	2023
98	PR-23-000260	NewOrigin Gold Corp.	South Abitibi	Best, Brigstocke, Cassels, Gillies Limit	2023
99	PR-23-000278	East Copperfield Metals Inc.	Temagami Project - Niemetz/Snowshoe	Briggs	2023
100	PR-23-000290	Epica Gold Inc.	Munro-Croesus	Beatty, Munro	2023
101	PR-24-000010	Perry Wuest	Pense Prospect	Pense	2024
102	PR-24-000011	Fred Kiernicki	Heighington Project	Heighington	2024
103	PR-24-000062	Canadian Gold Miner Corp.	Catherine Project	Catharine	2024
104	PR-24-000066	South Timmins Mining Inc.	Shining Tree Gold	Churchill, MacMurchy	2024
105	PR-24-000083	Transpacific Resources Inc.	FOD B	Holloway, Tannahill	2024
106	PR-24-000108	Transpacific Resources Inc.	FOD C Project	Holloway, Marriott	2024
107	PR-21-000030-R	Sherry Swain	Nicol Twp.	Nicol	2021
108	PR-24-000124	Gatling Exploration Inc.	Kir Vit Southeast Extension	McGarry, McVittie	2024
109	PR-24-000125	Transition Metals Corp.	Gowganda	Haultain, Nicol	2024
110	PR-24-000131	Gatling Exploration Inc.	Larder Gold GS Regional Stripping Project	McGarry, McVittie	2024
111	PR-24-000139	Shining Tree Resources Corp.	Gosselin-McBride	Asquith, Churchill	2024
112	PR-24-000140	Brandy Brook Mines Ltd.	Tannahill	Holloway, Tannahill	2024
113	PR-24-000141	Canadian Gold Miner Corp.	Midlothian	Midlothian	2024
114	PR-24-000155	Agnico Eagle Mines Ltd.	Lac McVittie	McVittie	2024
115	PR-24-000159	Epica Gold Inc.	Munro-Croesus (Lalonde)	Beatty, Munro	2024
116	PR-24-000164	Norman Sicard	Natal Barite Project	Natal	2024
117	PR-24-000165	Tiger Gold Exploration Corp.	Harker Heritage Project	Harker	2024
118	PR-24-000181	Barrick Gold Inc.	Norris	Flavelle	2024
119	PR-24-000182	Barrick Gold Inc.	Norris	Alma, Cairo, Flavelle, Holmes	2024
120	PR-24-000183	John Rapski	Norris	Flavelle, Holmes	2024
121	PR-24-000184	John Rapski	Norris	Burt, Eby	2024
122	PR-24-000185	John Rapski	Norris	Cairo, Flavelle, Gross	2024
123	PR-24-000190	Brian Beyer	Cleaver Project	Cleaver	2024
124	PR-24-000217	Perry English	Strathy Gold Project	Strathy	2024

Table 6. Assessment files received in the Kirkland Lake Resident Geologist District in 2024.

Abbreviations

ACOMP .Compilation and Interpretation – Airborne Geophysics
AEM ..... Airborne Electromagnetic
AGRAD ..... Airborne Gradiometer
AMAG ..... Airborne Magnetometer
ARAD .....Airborne Radiometric
ASSAY ..... Assays
AVLF ..... Airborne Electromagnetic
CHNL..... Channel Sampling
DHRLG .....Drill Core Relogging
DHRSMP ..... Drill Core Resampling
GCBIO ..... Geobotanical and Biogeochemical Survey
GCOMP ... Compilation and Interpretation – Ground Geophysics
GEOL ..... Geological Survey/Mapping
GLCOMP..... Compilation and Interpretation – Geology
GR ..... Resistivity
IP.....Induced Polarisation
LC ..... Line cutting
LIDAR ..... LiDAR
MAG..... Magnetic/Magnetometer Survey
MAGSUS .....Magnetic Susceptibility
MAGTEL..... Magnetotelluric
MCOMP .....Miscellaneous Compilation and Interpretation
MICRO .....Microscopic Studies
OPHYSI .....Other Physical
PCOMP ..... Compilation and Interpretation - Diamond Drilling
PDRILL .....Diamond Drilling
PHOTO ..... Air Photo and Remote Imagery Interpretations
PITS……Digging Pits
PMAN.....Manual Labour
PROSP .....Prospecting by Licence Holder
PSTRIP .....Overburden Stripping
PTRNCH.....Bedrock Trenching
ROCK .....Rock Sampling
SEM .....Scanning Electron Microscopy
SOIL .....Soil/Till Sampling
VLF..... Electromagnetic Very Low Frequency

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File Identifier
20000021576	Hislop, Playfair	Lamella Gold Corp	Hislop Property	2023	LIDAR	$24,950	108914, 6348
20000021580	Morel, Rankin	Sherry Swain	Rankin Property	2023	ASSAY, PROSP, ROCK	$2,207	109303, 6371
20000021589	Arnold	James Tinney	Pipe Dream Treasure	2023	PROSP	$3,708	109609, 6411
20000021597	Doon, Yarrow	FNX Mining Company Inc.	Buried Treasure Project	2022	ASSAY, PCOMP, PDRILL	$1,091,135	110155, 6434
20000021577	Burt, Eby	Lost Hope Mine Ltd.	Lost Hope Mine Project	2023	ASSAY, PROSP, ROCK	$2,471	108989, 6352
20000021590	Pense	Don Fudge	Pense Property	2023	LIDAR	$23,010	109774, 6412
20000021627	Catharine	Terry Link	Link-Catharine Project	2021	IP, LC	$56,420	110167, 6435
20000021619	Flavelle	John Peter Rapski	Flavelle North Grid, Lucky Irish Property	2023	ASSAY, SOIL	$6,875	108731, 6341
20000021626	Asquith, Churchill, Kelvin, MacMurchy	South Timmins Mining Inc.	Shining Tree Gold Property	2021	ASSAY, SOIL	$19,401	109867, 6417
20000021654	Cleaver	Victor Warford	Warford Property	2022 - 2023	ASSAY, PROSP, ROCK	$18,846	107265, 6298
20000021662	Mortimer, Sherring, Stimson,	Canada Nickel Company Inc.	Stimson-Mortimer Project	2023	AEM	$48,373	110591, 6468
20000021661	Marathon, Moody, Sherring, Wesley	Canada Nickel Company Inc.	Moody-Sherring-Marathon Project	2023	AEM	$85,976	110574, 6467
20000021660	Ben Nevis	Ben Nevis Resources Inc.	Interprovincial Property	2023	PROSP, ROCK	$19,508	110347, 6453
20000021656	Powell, Yarrow	Alamos Gold Inc.	Young-Davidson Property	2021 - 2022	ASSAY, PDRILL	$4,479,048	108980, 6351
20000021708	Tyrrell	Fred Swain		2023	PROSP	$2,712	111287, 6508

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File Identifier
20000021701	Holloway, Tannahill	Brandy Brook Mines Ltd.	Tannahill Property	2022 - 2023	ASSAY, MICRO, PROSP, ROCK, SEM	$38,904	110985, 6492
20000021699	Eby	Mistango River Resources Inc.	Eby Property	2023	ASSAY, PROSP, ROCK	$42,825	110942, 6485
20000021696	Elliott	Eric Marion	Elliot Property	2023	GEOL, OPHYSI, PSTRIP, PTRNCH, ROCK	$1,982	110923, 6482
20000021694	Bryce	Northstar Gold Corp.	Bryce Gold Property	2021 - 2022	ASSAY, GEOL, ROCK	$120,291	106991, 6271
20000021710	Dokis	Eric Marion	Dokis Property	2023	MAG	$3,410	112911, 6612
20000021718	Clifford	1154077 Ontario Ltd	Clifford "C-14" Claims	2022	ASSAY, PITS, PMAN, ROCK, SOIL	$6,367	111360, 6516
20000021715	Galna, Moody	Canada Nickel Company Inc.	Galna Project	2022	ACOMP, AEM, AMAG	$38,572	107097, 6273
20000021737	Nordica	RT Minerals Corp.	Nordica Property	2023	ASSAY, PROSP, ROCK	$7,799	111571, 6532
20000021732	Holloway, Marriott	Tiger Gold Exploration Corp.	Harker Heritage Property - PG101 Area	2023	PROSP, ROCK	$6,500	111319, 6512
20000021726	Eby, Grenfell, Teck	Mistango River Resources Inc.	Kirkland West Property	2021 - 2023	ASSAY, PDRILL	$958,761	108953, 6349
20000021742	Hearst, McElroy, McFadden, Skead	Canadian Gold Miner Corp.	South Kirkland Project	2022 - 2023	ASSAY, IP, PTRNCH, ROCK, SOIL	$478,976	5902, 99827
20000021754	Eby, Otto	James Reed	Reed Robinson Property	2021 - 2023	AMAG, CHNL, GEOL, MAGSUS, PSTRIP	$42,484	103446, 103448, 6142, 6144
20000021765	Clifford	Tiger Gold Exploration Corp.	Rat Lake Property	2023	ASSAY, PROSP, ROCK	$7,454	111857, 6566
20000021767	Gauthier	Agnico Eagle Mines Ltd.	Upper Canada Property	2021	PDRILL	$467,043	111991, 6573
20000021764	Argyle, Baden	Val D'Or Mining Corp.	Baden Project	2023	ASSAY, SOIL	$83,100	111720, 6562
20000021761	Beatty, Clergue, Coulson, Stock, Wilkie	GFG Resources Inc.	Goldarm Project	2022	ASSAY, PROSP, ROCK	$167,420	109505, 109541, 6387, 6397
20000021771	Gauthier	Agnico Eagle Mines Ltd.	Upper Canada Property	2023	PDRILL	$469,711	112060, 6583
20000021768	McGarry	Val D'Or Mining Corp.	Recession Larder Property	2023	ASSAY, PROSP, ROCK	$4,271	111625, 6555
20000021794	Cairo	Skead Holdings Ltd.	Cairo Property	2020 - 2023	ASSAY, ROCK	$3,190	103535, 6150
20000021796	Eby	Lost Hope Mine Ltd.	Kirkland West Gold Project	2023	ASSAY, EM, LC, ROCK, SOIL	$17,687	112030, 6579

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File Identifier
20000021801	Currie	2628860 Ontario Ltd.	Currie Property	2023	ACOMP, PHOTO	$7,404	112783, 6607
20000021804	Burrows	Sherry Swain	Claims 700853 and 702784	2023	ASSAY, PROSP, ROCK	$1,812	119952, 6613
20000021797	Maisonville	International Explorers & Prospectors Inc.	Goose Egg Lake Property	2023	ASSAY, PROSP, ROCK	$6,551	112198, 6589
20000021811	Harker	Alberta Gold Exploration Corp.	Tiger Gold Iris Property	2023 - 2024	ASSAY, DHRLG, DHRSMP	$34,848	113565, 6642
20000021824	Tyrrell	iMetal Resources Inc.	Pear Lake Property	2023	AMAG, LIDAR	$10,296	111861, 6568
20000021830	Harker	Alberta Gold Exploration Corp.	Tiger Gold Iris Property	2023	GEOL, PHOTO	$5,025	112353, 6595
20000021837	Currie	2628860 Ontario Ltd.	Currie Property	2023 - 2024	MCOMP, PHOTO	$6,963	113713, 6672
20000021838	Gauthier	Agnico Eagle Mines Ltd.	Upper Canada Property	2023	PDRILL	$164,071	113742, 6678
20000021875	Boston	Northstar Gold Corp.	Rosegrove Property	2023	ACOMP, GCOMP, LIDAR	$42,086	111955, 6572
20000021876	Knight	iMetal Resources Inc	Pigeon Lake Property	2023	ACOMP, AMAG, LIDAR	$26,669	112355, 6596
20000021877	Fawcett, MacMurchy, Tyrrell	Michael Opara	HWY 560 Claim Group	2023	ACOMP, GR	$58,700	112848, 6608
20000021883	Powell	9640355 Canada Corp	Powell Property	2023	ASSAY, PROSP, ROCK	$62,190	114171, 6717
20000021889	Harker	Alberta Gold Exploration Corp.	Tiger Gold Iris Property	2023 - 2024	ASSAY, CHNL, PROSP	$9,801	114394, 6727
20000021894	Burt	Insight Exploration Inc.	Burt Gold Property	2022 - 2023	ACOMP, PDRILL	$193,024	114777, 6749
20000021918	Tannahill	CJP Exploration Inc.	Tannahill Gold Property	2023	ASSAY, DHRLG, DHRSMP, PROSP	$26,051	114716, 6735
20000021931	Skead	Martyn Harrington	Harrington Property	2023	ASSAY, GLCOMP, PROSP, ROCK	$6,966	115442, 6797
20000021924	Currie, Egan, McEvay, Sheraton	Harfang Exploration Inc.	Egan Property	2022	ASSAY, GEOL, PROSP, ROCK, SOIL	$123,374	115037, 6770
20000021956	Challies	Abitibi North Metals Inc.	Challies East Property	2023	ASSAY, PROSP, ROCK	$17,540	114509, 6731
20000021958	Bernhardt, Morrisette	Val D'Or Mining Corp.	Victoria Creek Property	2022	ASSAY, SOIL	$100,045	115417, 6796
20000021963	Frecheville	Frank Ploeger	Hwy 101 Gold Property	2024	GCOMP, MAG, VLF	$7,831	115817, 6824
20000021970	Cabot	Val D'Or Mining Corp.	Claw Lake Property	2022 - 2023	ASSAY, SOIL	$136,810	116598, 6864
20000021972	Grenfell, Teck	Val D'Or Mining Corp.	Cook Lake Property	2022 - 2023	ASSAY, SOIL	$151,207	116635, 6870

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File Identifier
20000021978	Elliott, Harker, Harker	Alberta Gold Exploration Corp.	Harker Heritage Property - Newmont-16	2024	GCOMP, MAG, VLF	$8,181	116931, 6894
20000021977	Harker, Holloway	Tiger Gold Exploration Corp.	Harker Heritage Property - Newmont-16	2024	MAG, VLF	$9,984	116930, 6893
20000022004	Bannockburn	Canada Nickel Company Inc.	Bannockburn Property	2023	ASSAY, PDRILL	$591,689	116448, 6855
20000021998	Chesney Bay Area, Kerrs, Rayner Lake Area	iMetal Resources Inc.	Kerrs Gold Project	2022 - 2023	LIDAR, PHOTO, PROSP	$26,137	111563, 111564, 6530, 6531
20000022009	Powell	Canada Nickel Company Inc.	Powell Property	2023	AEM, AMAG	$17,680	116835, 6890
20000022020	Milligan	Robert Vien	Abitibi dike	2022 - 2023	PROSP	$3,300	115690, 6809
20000022027	Ben Nevis, Pontiac	Goldenfire Minerals Inc.	SZ Property	2021 - 2024	PROSP	$18,774	117307, 6920
20000022069	Arnold, Lebel, Morrisette	Val D'Or Mining Corp.	Murdoch Creek Property	2022 - 2023	ASSAY, SOIL	$140,501	118069, 6972
20000022065	Bannockburn, Powell	Alexandria Minerals Corp	Wydee Property	2024	IP, LC	$159,890	117712, 6959
20000022059	Aurora, Edwards	Global GenX Resources Ltd.	Abitibi East Property	2023	IP	$114,862	110814, 6475
20000022119	Boston, Pacaud	Goldenfire Minerals Inc.	Kenzie Property	2022 - 2024	ASSAY, PROSP, ROCK	$30,706	117992, 6970
20000022111	Gillies Limit	Alan Kon	Kon Property	2022 - 2024	PDRILL	$13,274	116456, 6856
20000022154	Cairo	Val D'Or Mining Corp.	Plumber Property	2023	ASSAY, PROSP, ROCK	$20,229	119596, 7034
20000022156	Bradette, Kingroy Lake Area	Tiger Gold Exploration Corp.	Bradette Property	2024	ACOMP, AMAG, AVLF	$60,955	119255, 7023
20000022163	Coleman	Cobaltech Mining Inc, Kuya Silver Corp.	Kerr Project, Silver Kings Project	2023	ASSAY, PDRILL, ROCK	$493,811	117306, 6919
20000022180	Hislop, Playfair	STTLR Gold Inc.	Gold Pike Island South Property	2024	PROSP	$2,036	117662, 6949
20000022181	Hislop	STLLR Gold Inc.	Gold Pike Island North Property	2024	PROSP	$4,072	117656, 6947
20000022176	Hearst, McVittie	Skead Holdings Ltd.	Gold Dollar property	2023 - 2024	IP, LC, MAGTEL	$67,582	119703, 7038
20000022175	Hearst	Skead Holdings Ltd.	Hearst Property	2024	PROSP, ROCK	$2,920	119713, 123455, 7041, 7244
20000022174	Dokis	James Tinney	Dokis Property	2024	MAG, VLF	$3,952	119830, 7048
20000022177	Black	Axies Canada Inc.	Black Township Property	2024	ASSAY, PROSP, ROCK	$24,518	119691, 7037
20000022216	Nicol	Sherry Swain	Nicol Township Property	2024	PROSP, ROCK	$1,772	120169, 7067
20000022215	Coleman	Alan Kon	Claim 782811	2024	PROSP	$936	120580, 7107
20000022235	Mistaken Islands Area	International Explorers & Prospectors Inc.	Abitibi Lake Property	2024	ACOMP, AMAG	$45,800	118725, 118730, 7002, 7004

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File Identifier
20000022236	Cleaver	Edward Shynkorenko	Claim 847760, subject property	2024	PROSP, ROCK	$3,155	120047, 7060
20000022268	Arnold, Gauthier, Katrine, McVittie, Ossian	Kirkland Lake Discoveries Corp.	Lucky Strike Property	2023	ARAD, AVLF	$233,536	120928, 120929, 120930, 120931, 7131, 7132, 7133, 7134
20000022267	Burt, Flavelle, Gross, Holmes	Val D'Or Mining Corporation	Island 27 Property	2023	AGRAD	$98,219	120861, 120883, 120884, 120885, 7125, 7127, 7128, 7129
20000022264	Cleaver	Edward Shynkorenko	Claim 847760	2024	PROSP, ROCK	$3,155	120047, 7060
20000022261	Mistaken Islands Area	International Explorers & Prospectors Inc.	Abitibi Lake Property	2024	ACOMP, AMAG	$23,487	118725, 118730, 7002, 7004
20000022269	Best	Edward Shynkorenko	Claim 852744	2024	PROSP, ROCK	$3,445	120975, 7135
20000022302	Benoit	Joshua Gold Resources Inc.	Boundary Claim 150877	2024	ASSAY, PROSP, ROCK	$3,136	121186, 7155
20000022303	Cairo	Val-d'Or Mining Corporation	Matachewan Property	2023	ASSAY, PROSP, ROCK	$19,034	121512, 7163
20000022304	Holmes	Val-d'Or Mining Corporation	Island 27 Property	2023	ASSAY, PROSP, ROCK	$9,997	121520, 7164
20000022305	Coleman	Alan Kon	Portage Bay Claims 71202 782811	2024	PROSP	$2,354	121705, 7171
20000022317	Warden	Steven Anderson	Coulson Project	2024	PROSP, ROCK	$3,553	120137, 7065
20000022318	Riddell, Strathcona	Steven Anderson	Strathcona Project	2024	PROSP, ROCK	$3,275	120215, 7070
20000022335	Hepburn	Jadeite Capital Corp.	La Sarre Area Project	2023 - 2024	MCOMP, SOIL	$212,434	117385, 6923
20000022363	Powell	Ashley Gold Mines Ltd.	Powell Property	2024	MAG, VLF	$9,035	124006, 7260
20000022378	Elliott	E Marion	Cell 32D05F194	2024	PSTRIP, ROCK	$5,521	123417, 7242
20000022381	Robillard	CJP Exploration Ltd.	Long Lake Project	2024	ASSAY, PHOTO, PROSP, ROCK	$4,271	123934, 7255
20000022388	Best, Strathy	Edward Shynkorenko	claim 866812	2024	ASSAY, PROSP, ROCK, SOIL	$3,400	124805, 7298
20000022384	Abbotsford, Challies, Challies, Steele	Power Metals Corp.	Case Lake Property	2019 - 2022	ASSAY, GCBIO, GEOL, PDRILL, ROCK	$1,001,656	120799, 7115
20000022398	Clifford, Thackeray	Tiger Gold Exploration Corp.	Harker Heritage Property	2024	PHOTO, PROSP	$9,550	124678, 7296
20000022442	Bernhardt	Val-d'Or Mining Corporation	Blue Mountain Property	2023	ASSAY, PROSP, ROCK	$13,420	126102, 7334
20000022439	Heighington	Fred Kiernicki	Heighington Project	2023	MAG, VLF	$19,650	119962, 7059

File ID	Township/Area	Performed For	Property	Year	Work Type	Work Approved	Other File Identifier
20000022443	Cabot	Val-d'Or Mining Corporation	Jonsmith Property	2023	ASSAY, PROSP, ROCK	$15,548	126118, 7337
20000022459	Haultain	Falcon Mining Inc.	Bloom Lake Property	2024	ASSAY, PROSP, ROCK	$43,786	125787, 7326
20000022450	McGarry	Gatling Exploration Inc.	Larder Project	2022 - 2023	ASSAY, PDRILL	$7,590,251	121689, 7170
20000022460	Cane	Edward Shynkorenko	Claim 742978	2024	ASSAY, PROSP, ROCK	$3,433	126043, 7333
20000022477	Doon, Yarrow	FNX Mining Company Inc.	Buried Treasure Project	2023	AMAG, ASSAY, PDRILL	$1,340,411	120997, 7137
20000022482	Guibord, Michaud	Goldcorp Canada Ltd.	Guibord/Michaud Townships Property	2023	AMAG	$56,986	122373, 7187
20000022484	Churchill, Kelvin, Leonard, MacMurchy, Natal	South Timmins Mining Inc.	Shining Tree Gold Property	2024	ASSAY, SOIL	$208,780	122638, 122642, 122644, 7199, 7200, 7201
20000022474	Eby, Blain	Barrick Gold Inc.	Norris Project	2023	ASSAY, ROCK	$33,348	120825, 7119
20000022473	Morrisette, Morrisette	James Tinney	AM-47 Property	2024	MAG, VLF	$3,625	120357, 7091
20000022470	Nicol	Sherry Swain	Miller Lake East Claim 122435	2023 - 2024	PROSP	$3,042	120275, 7084
20000022471	Gillies Limit	Alan Kon	Claim 730977	2024	PROSP	$953	120354, 7085
20000022498	Shillington	Patrick A Rosko	Rosko Property - Shillington Township	2024	SOIL	$9,461	124689, 7297
20000022503	Dokis	James Tinney	Dokis Property	2024	MAG, VLF	$3,860	126268, 7347
20000022504	Chesney Bay Area, Rayner Lake Area	Gravel Ridge Resources Ltd., Perry English	Kerrs Property	2024	AMAG	$48,649	126441, 126444, 7349, 7350
20000022506	Munro	McFarlane Lake Mining Inc.	Munro Property	2024	ASSAY, PROSP, ROCK	$20,817	126709, 7356
20000022511	Asquith, Churchill, MacMurchy	South Timmins Mining Inc.	Shining Tree Gold Property	2023	ASSAY, ROCK, SOIL	$216,904	126881, 126882, 126883, 7363, 7364, 7365

Advanced Projects

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

- Advanced exploration permits are being sought or already in hand.
- Work is at an advanced stage, moving Resources to Reserves.
- A positive Preliminary Economic Assessment (PEA) or equivalent study has been completed.
- Project is actively being worked within the current year.

AGNICO EAGLE MINES LTD. – UPPER BEAVER PROJECT

Upper Beaver is owned 100% by Agnico Eagle Mines Ltd. (Agnico Eagle). The deposit is located in Gauthier Township, approximately 20 km east of the town of Kirkland Lake (*see* Figure 3, AE1). Upper Beaver is a gold-copper deposit that is mainly hosted in the Upper Beaver alkalic intrusive complex and the surrounding basalts it intruded, and is associated with disseminated pyrite and chalcopyrite, and magnetite-sulphide veining associated with strong magmatic-hydrothermal alteration. The mineralization occurs as elongated tabular bodies that strike northeast, dip steeply northwest and plunge 65° to the northeast (https://www.agnicoeagle.com/English/exploration/exploration-projects/Upper-Beaver/default.aspx [accessed January 14, 2025]). The main deposit remains open at depth, as demonstrated by historical hole KLUB19-452W1 which intersected 7.6 g/t gold and 0.36% copper over 3.4 metres at 1983 m depth, and 1.2 g/t gold and 1.39% copper over 7.1 metres at 2041 m depth, approximately 300 metres down plunge from the nearest mineral resource block (Figure 8).

Agnico Eagle reported that as of June 30, 2024, Upper Beaver had the following updated open pit and underground mineral resource estimate (Agnico Eagle Mines Ltd., news release, July 31, 2024):

- Total Indicated Mineral Resources of 30.88 Mt grading 3.47 g/t gold and 0.23% copper, and containing 3.44 Moz of gold and 71 000 t of copper
- Total Inferred Mineral Resources of 2.96 Mt grading 4.13 g/t gold and 0.36% copper, and containing 393 000 oz of gold and 11 000 t of copper

In June 2024, Agnico Eagle completed an internal evaluation for a standalone mine and mill scenario, based on a 5000 tonne per day production rate. Based on the positive evaluation, Upper Beaver has the potential to produce an annual average of approximately 210 000 ounces of gold and 3600 tonnes of copper, with initial production possible as early as 2030. Over an expected 13 year mine life, total payable gold and copper production is expected to be approximately 2.8 Moz and 46 300 t, respectively.

Agnico Eagle approved a $200 million investment over approximately 3 years to further de-risk the project. With this investment, Agnico Eagle intends to develop an exploration ramp and an exploration shaft to depths of 160 metres and 760 metres, respectively, to establish underground drilling platforms and to collect bulk samples from the 2 most representative geological zones of the deposit. Of the $200 million, approximately $35 million was forecast to be spent in the second half 2024, related primarily to the upgrade of the access road to the site, site surface preparation, construction of site facilities and excavation of the shaft collar. Preparatory site work commenced in early 2024 and approximately $15 million was spent in the first half of 2024. Excavation of the ramp and shaft sinking are expected to start in the second half of 2025 (Agnico Eagle Mines Ltd., news release, July 31, 2024).

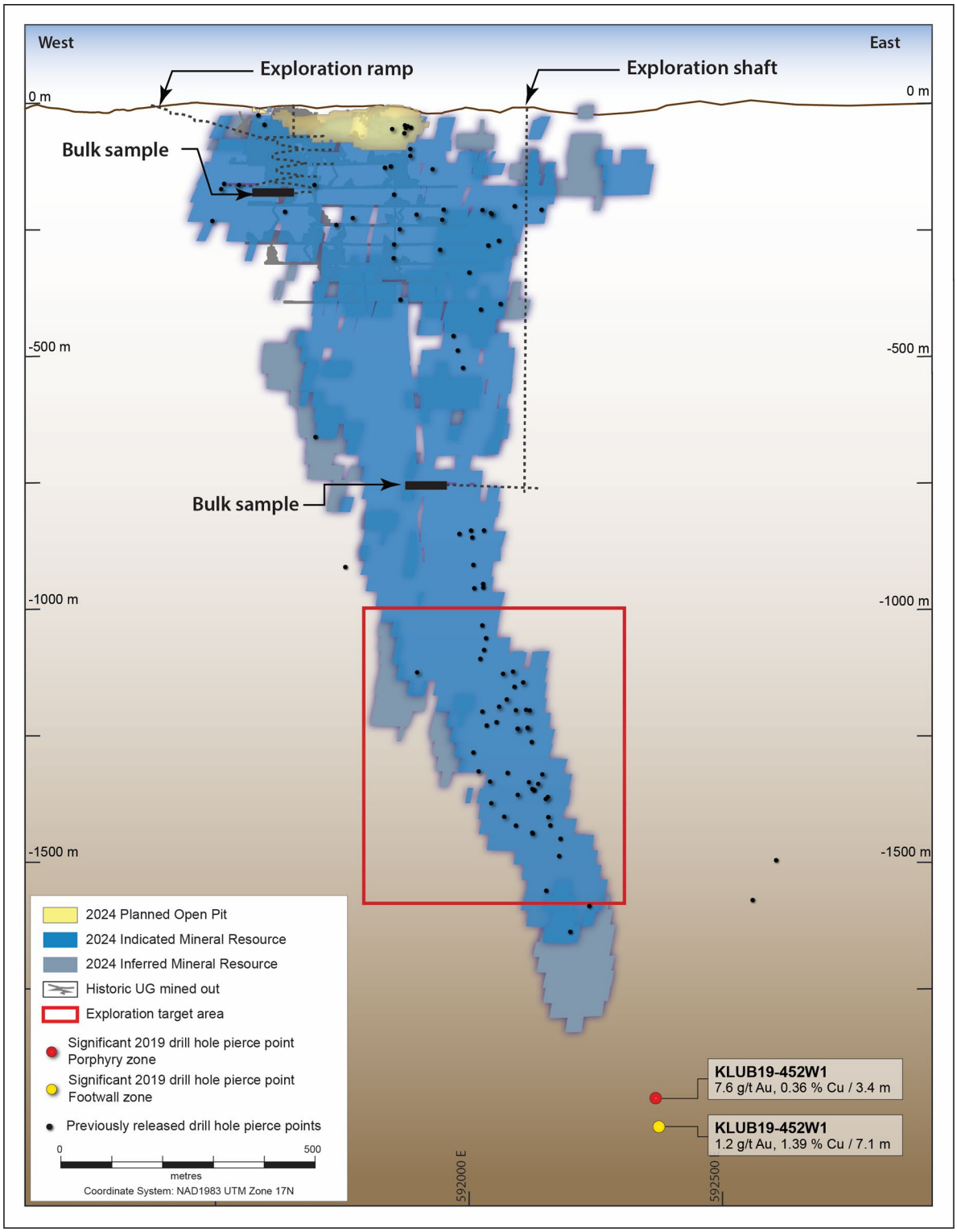

Figure 8. Composite longitudinal section of the Upper Beaver mineral resource outline. Shown also are potential depth extensions of the deposit (drill hole KLUB19-452W1), and locations for the planned underground bulk sampling and exploration ramp and shaft (Agnico Eagle Mines Ltd., news releases, July 31, 2024, and April 25, 2019).

NORD PRECIOUS METALS MINING INC. – CASTLE SILVER PROPERTY

Nord Precious Metals Mining Inc. (Nord, formerly Canada Silver Cobalt Works Inc.) owns the Castle Silver property in the Gowganda area. The property comprises the past-producing Castle Mine and the Castle East project. The 78 km^2 past-producing Castle Mine in Haultain Township is 85 km northwest of the historic Cobalt silver mining camp (*see* Figure 3, AE2). The Castle Mine operated at various times between 1917 and 1989, producing a total of 9 410 095 ounces of silver and 376 053 pounds of cobalt from the #3 Shaft (Nord Precious Metals Mining Inc., news releases, January 8 and 19, 2024; https://www.nordpreciousmetals.com/projects/castle-mine [accessed January 16, 2025]).

During the first quarter of 2024, Nord announced the resumption of bulk sampling permitting process for Castle Mine, marking a crucial step towards the potential of future mining in the region. Nord aims at processing tailings from previous operations at the mine with waste material put underground instead of left at the surface, and utilizing backfilling techniques underground to improve the stability of the historic crown pillar (Nord Precious Metals Mining Inc., news releases, January 29 and August 6, 2024).

Nord disclosed the discovery of a new silver zone (All Stars) located about 500 m from the high-grade Robinson Zone at the Castle East project area. Diamond-drill core assay results released during the second quarter highlighted 2 separate vein structures intercepted (Nord Precious Metals Mining Inc., news releases, May 21 and March 5, 2024):

- DDH CS-23-123 intercepted 5441.4 g/t silver over 0.37 m at 446.55 m – 446.92 m, and 3730 g/t silver over 0.75 m at 461.25 – 462 m depth
- DDH CS-23-123 also returned encouraging gold results up to 3.05 g/t over 0.58 m at 255.45 m – 256.03 m depth (Sample DH0013123)

As a result of the All Stars discovery, Nord is planning on a 30 000 m infill diamond-drilling campaign to connect the All-Stars Zone and the Robinson Zone, as well as assessing potential mineralization between Castle Mine and the Robinson Zone. The drill program is planned to commence following an extensive data recompilation phase (Nord Precious Metals Mining Inc., news releases, June 25 and May 21, 2024).

STLLR GOLD INC. – TOWER GOLD PROJECT

STLLR Gold Inc. (STLLR, formerly Moneta Gold Inc., *see* STLLR Gold Inc. news release dated February 6, 2024) owns 100% the Tower Gold project which contains the combined Garrison property and the Golden Highway property (Figure 9). The project area covers 17 km of the Destor–Porcupine Fault Zone in the contiguous townships of Guibord, McCool, Michaud, Barnet and Garrison, 40 km north of the town of Kirkland Lake (*see* Figure 3, AE3). Tower Gold project hosts 9 gold deposits along a 9 km long mineralized corridor. Mineral resource estimate for Tower Gold, effective September 7, 2022, is as follows (NI 43-101 Technical Report dated November 29, 2022):

- Total Indicated Mineral Resource of 150.57 Mt grading 0.92 g/t gold and containing 4.46 Moz of gold
- Total Inferred Mineral Resource of 235.63 Mt grading 1.09 g/t gold and containing 8.29 Moz of gold

Infill and exploration diamond drilling were the principal activities on the project during the first 9 months of 2024. Diamond-drilling results were announced for the following deposits, confirming continuity and extensions of gold mineralization: Jonpol, Windjammer North, Windjammer South, Southwest, Westaway, and 55 Zone. At Jonpol, the remaining drilling results from the 2023 infill drilling were announced. STLLR reported that the results improve its confidence in the resource block model, and

that the higher grade intercepts suggest the potential to expand the known mineralization of the deposit. Highlights of drill intercepts include (STLLR Gold Inc., news release, March 28, 2024):

- DDH MGA23-193, with 1.58 g/t gold over 14.0 m, including 8.45 g/t gold over 2.0 m
- DDH MGA23-194, with 3.15 g/t gold over 3.3 m, including 4.98 g/t gold over 2.0 m

Halfway through the year under review, STLLR announced that Windjammer South and Southwest mineralization are primarily associated with Timiskaming-age, clastic sediment-hosted stacked quartz veins. Highlights of drill intercepts include (STLLR Gold Inc., news release, June 13, 2024):

- DDH MGH24-508, with 0.91 g/t gold over 3.0 m; DDH MGH24-509, with 6.52 g/t gold over 2.1 m at Windjammer South
- DDH MGH24-510, with 1.57 g/t gold over 5.95 m; DDH MGH24-514, with 2.52 g/t gold over 2.00 m at Southwest

Exploration drilling of prospective targets near the 55 Zone and Westaway deposits at the Golden Highway area of the Tower Gold project returned encouraging results. Gold mineralization was intersected west of the 55 Zone deposit and south of the Westaway deposit, outside of the known mineral resources. Highlights of drill intercepts include (STLLR Gold Inc., news release, May 21, 2024):

- DDH MGH24-517, with 0.73 g/t gold over 57.0 m; DDH MGH24-520, with 2.79 g/t gold over 4.0 m at the 55 Zone West
- DDH MGH24-519, with 0.84 g/t gold over 21.0 m; DDH MGH24-521, with 1.82 g/t gold over 6.0 m at the Westaway Southlimb

A new gold discovery (named Last Chance) was made at the western end of the Tower Gold project. STLLR reported intersecting significant mineralization indicating the potential to expand known mineral resources both westward and at depth. The following are highlights of drill hole intercepts (STLLR Gold Inc., news release, September 5, 2024):

- DDH MGA24-535 intersected 1.10 g/t gold over 74.0 m, including 2.06 g/t gold over 29.6 m
- DDH MGH24-536 intersected 0.67 g/t gold over 18.5 m, and 1.27 g/t gold over 22.6 m

STLLR is planning on conducting follow-up diamond drilling at Last Chance.

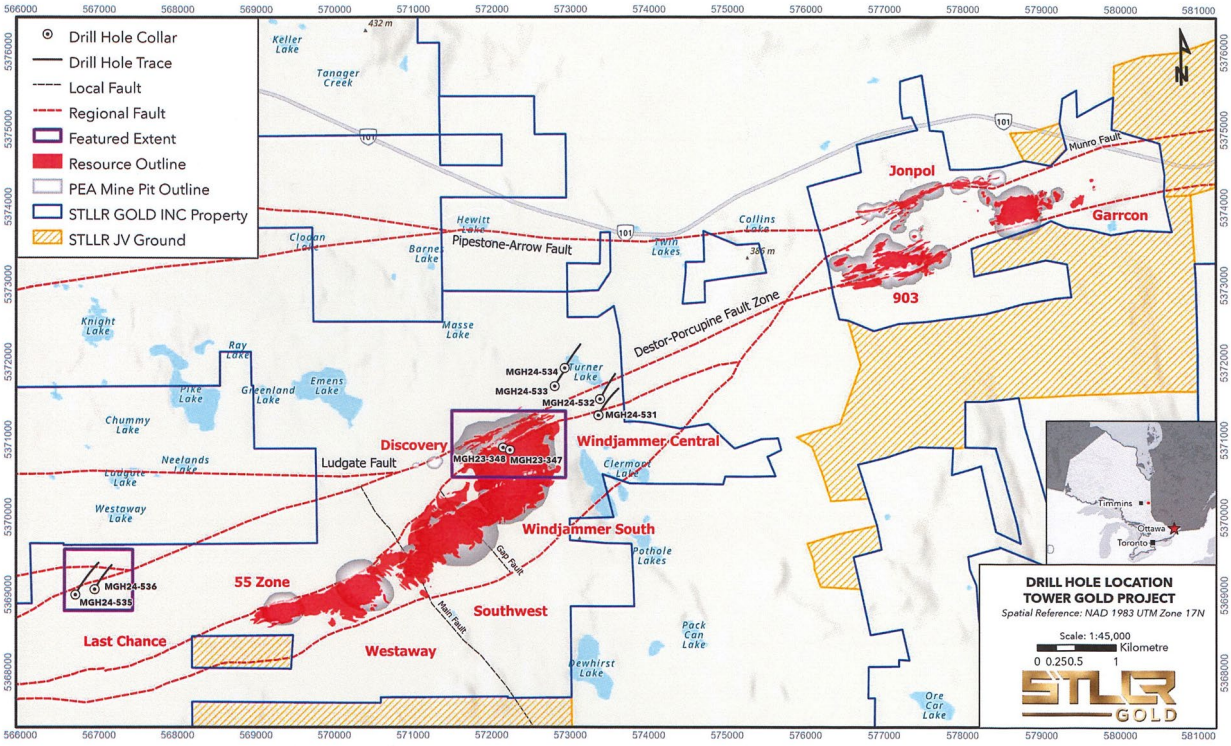

Figure 9. General location map of the Tower Gold project showing the 9 gold deposits. The Garrison property is in the northeast and the Golden Highway property in the southwest. The newly discovered Last Chance zone is also shown (STLLR Gold Inc., news release, September 5, 2024). All location information provided as UTM co-ordinates using NAD83 in Zone 17.

Exploration Projects

A summary of 80 active exploration projects, based on company news releases, assessment work filings to the Ministry of Mines, and prospector-staff property visits, as reported in the Kirkland Lake Resident Geologist District, is listed in Table 7 and project localities are shown in Figure 10. Following are summary descriptions of some of the many active mineral exploration projects in the Kirkland Lake District during 2024.

Table 7. Exploration activity in the Kirkland Lake Resident Geologist District in 2024. Map numbers keyed to Figure 10.

Abbreviations

ACOMP . Compilation and Interpretation – Airborne Geophysics
AMAG ..... Airborne Magnetometer
ASSAY ..... Assays
AVLF ..... Airborne Electromagnetic
BENEF ..... Benefication Studies
BULK ..... Bulk Sampling
CHNL ..... Channel Sampling
DRLRES ..... Drilling Results
DHRLG ..... Drill Core Relogging
DHRSMP ..... Drill Core Resampling
ENVIRO ..... Environmental Studies
EXPLUD ..... Exploration Update
GCOMP ... Compilation and Interpretation – Ground Geophysics
GLCOMP .....Compilation and Interpretation – Geology
IP ..... Induced Polarisation
LC ..... Line cutting
LIDAR ..... LiDAR
MAG ..... Magnetic/Magnetometer Survey
MAGTEL ..... Magnetotelluric
MCOMP ..... Miscellaneous Compilation and Interpretation
METAL ..... Metallurgical Testing
OPET ..... Other Petrographic Work
PDRILL ..... Diamond Drilling
PHOTO ..... Air Photo and Remote Imagery Interpretations
PMECH ..... Mechanical
PROPTR ..... Property Transaction
PROSP ..... Prospecting by Licence Holder
PSTRIP ..... Overburden Stripping
PTRNCH ..... Bedrock Trenching
ROCK ..... Rock Sampling
RRCALC ..... Reserve/Resource Calculations
SOIL ..... Soil/Till Sampling
VLF ..... Electromagnetic Very Low Frequency

Number on Map	Company Name	Property Name	Township	Exploration Activity
1	2628860 Ontario Ltd.	Currie Property	Currie	MCOMP, PHOTO
2	Agnico Eagle Mines Ltd.	AK Deposit	Teck	DRLRES, RRCALC
3	Agnico Eagle Mines Ltd.	Macassa	Teck	DRLRES, RRCALC
4	Agnico Eagle Mines Ltd.	Upper Beaver Project	Gauthier	RRCALC
5	Alamos Gold Inc.	Young-Davidson	Powell	PDRILL, RRCALC
6	Alan Kon	Claim 730977	Gillies Limit	PROSP
7	Alan Kon	Portage Bay Claims 71202, 782811	Coleman	PROSP
8	Alan Kon	Claim 782811	Coleman	PROSP
9	Alan Kon	Kon Property	Gillies Limit	PDRILL
10	Alberta Gold Exploration Corp.	Harker Heritage-Newmont-16	Harker, Elliott	GCOMP, MAG, VLF
11	Alberta Gold Exploration Corp.	Tiger Gold Iris Property	Harker	ASSAY, CHNL, DHRLG, DHRSMP, PROSP
12	Alexandria Minerals Corp.	Wydee Property	Bannockburn, Powell	IP, LC
13	Ashley Gold Mines Ltd.	Powell Property	Powell	MAG, VLF
14	Atacama Resources International Inc.	Tannahill Gold	Tannahill	IP, MAG
15	Axies Canada Inc.	Black Township	Black	ASSAY, PROSP, ROCK
16	Canada Silver Cobalt Works Inc.	Castle Mine	Haultain	ASSAY, BULK, METAL
17	Canadian Nickel Company Inc.	Bannockburn Nickel	Bannockburn	DRLRES, PDRILL
18	CJP Exploration Ltd.	Long Lake Project	Robillard	ASSAY, PHOTO, PROSP, ROCK
19	Cleghorn Minerals Ltd.	Meech Lake	McNeil, Robertson	ASSAY

Number on Map	Company Name	Property Name	Township	Exploration Activity
20	E Marion	CELL 32D05F194	Elliott	PSTRIP, ROCK
21	Edward Shynkorenko	Claim 866812	Best, Strathy	ASSAY, PROSP, ROCK, SOIL
22	Edward Shynkorenko	Claim 742978	Cane	ASSAY, PROSP, ROCK
23	Edward Shynkorenko	Claim 847760	Cleaver	PROSP, ROCK
24	Edward Shynkorenko	Claim 852744	Best	PROSP, ROCK
25	Falcon Mining Inc.	Bloom Lake	Haultain	ASSAY, PROSP, ROCK
26	First Class Metals PLC	Kerrs Gold	Kerrs	PROPTR, MAG
27	Frank Ploeger	Hwy 101 Gold	Frecheville	GCOMP, MAG, VLF
28	Fulcrum Metals Ltd.	Sylvanite Gold Tailings	Teck	ASSAYS, BULK, METAL, OPET, SOIL
29	Fulcrum Metals Ltd.	Tech-Hughes Gold Tailings	Teck	ASSAY, BULK, METAL, OPET, SOIL
30	GFG Resources Inc.	Aljo Mine	Beatty	DRLRES, PDRILL
31	GFG Resources Inc.	Montclerg	Clergue, Stock, Walker	DRLRES, GLCOMP
32	Goldenfire Minerals Inc.	SZ Property	Ben Nevis, Pontiac	PROSP
33	Goldenfire Minerals Inc.	Kenzie	Boston, Pacaud	ASSAY, PROSP, ROCK
34	Gravel Ridge Resources Ltd., Perry English	Kerrs	Chesney Bay Area, Rayner Lake Area	AMAG
35	Harfang Exploration Inc.	Blakelock Gold	Blakelock	PROPTR
36	Harfang Exploration Inc.	Egan Gold	Egan	PROPTR
37	Harfang Exploration Inc.	North Abitibi	Hoblitzell	PROPTR
38	International Explorers & Prospectors Inc.	Abitibi Lake	Mistaken Islands Area	ACOMP, AMAG
39	Jadeite Capital Corp.	La Sarre Area Project	Hepburn	MCOMP, SOIL
40	James Tinney	AM-47 Property	Morrisette	MAG, VLF
41	James Tinney	Dokis Property	Dokis	MAG, VLF
42	Joshua Gold Resources Inc.	Boundary Claim 150877	Benoit	ASSAY, PROSP, ROCK
43	Kirkland Lake Discoveries Corp.	KL West	Bernhardt, Lebel, Morrisette, Teck	PDRILL, SOIL
44	Kirkland Lake Discoveries Corp.	Lucky Strike	Ossian, Teck	DRLRES, PDRILL
45	Kuya Silver Corp.	Kerr Lake	Coleman	EXPLUD
46	Kuya Silver Corp.	Silver Kings	Coleman, Gillies Limit, Lorrain, South Lorrain	DRLRES
47	Mag Silver Corp.	Bear	McVittie	PDRILL
48	Mag Silver Corp.	Cheminis	McVittie	PDRILL
49	Mayfair Gold Corp.	Fenn-Gib	Guibord, Munro	BENEF, BULK, DRLRES, ENVIRO, METAL
50	McEwen Mining Inc.	Grey Fox	Hislop	DRLRES
51	McFarlane Lake Mining Inc.	Munro	Munro	ASSAY, PROSP, ROCK
52	Metals Creek Resources Corp.	Tillex	Currie	DRLRES, PDRILL
53	Mistango River Resources Inc.	Omega Project	McVittie	DRLRES, PDRILL
54	New Break Resources	Moray Gold Project	Hincks, Zavitz	IP
55	Nord Precious Metals Mining Inc.	Beaver Mine	Coleman	ASSAY, BULK, METAL
56	Nord Precious Metals Mining Inc.	Castle East	Haultain	DRLRES
57	Nord Precious Metals Mining Inc.	Castle Mine	Haultain	BENEF, PMECH

Number on Map	Company Name	Property Name	Township	Exploration Activity
58	Nord Precious Metals Mining Inc	St. Denis	Bowyer, Findlay, Henley, Marathon, Pliny, Sherring, Stimson, Sweatman	PROPTR
59	Northstar Gold Corp.	Cam Copper Mine	Pacaud	ASSAY, BULK, METAL, PROPTR, VLF
60	Northstar Gold Corp.	Miller Gold	Boston, Catharine, McElroy, Pacaud	PDRILL
61	Northstar Gold Corp.	Rosegrove	Boston	EXPLUD
62	Onyx Gold Corp.	Munro-Croesus	Beatty, Guibord, Hislop, Munro	DRLRES, LIDAR, PDRILL, PROPTR
63	Patrick A Rosko.	Rosko	Shillington	SOIL
64	Philippe Paquet.	Paquet Claim 898137	McFadden	PROSP
65	Plato Gold Corp.	Marriott	Marriott	DRLRES
66	Power Metals Corp	Case Lake	Steele	AMAG, BULK, DRLRES, ENVIRO, METAL, PDRILL
67	PTX Metals Inc.	Shining Tree Gold	Asquith, Churchill, Fawcett, MacMurchy	ASSAY, CHNL, PSTRIP
68	Sherry Swain.	Miller Lake East Claim 122435	Nicol	PROSP
69	Sherry Swain.	Nicol Township	Nicol	PROSP, ROCK
70	Skead Holdings Ltd.	Hearst	Hearst	PROSP, ROCK
71	Skead Holdings Ltd.	Gold Dollar	McVittie, Hearst	IP, LC, MAGTEL
72	South Timmins Mining Inc.	Shining Tree Gold	MacMurchy, Churchill, Kelvin, Leonard, Natal	ASSAY, SOIL
73	Sparton Resources Inc.	Pense Project	Pense	DRLRES, LC
74	Steven Anderson	Coulson Project	Warden	PROSP, ROCK
75	Steven Anderson	Strathcona Project	Strathcona, Riddell	PROSP, ROCK
76	STLLR Gold Inc.	Gold Pike Island North	Hislop	PROSP
77	STLLR Gold Inc.	Tower Gold	Garrison, Michaud	DRLRES, PROPTR
78	STTLR Gold Inc.	Gold Pike Island South	Hislop, Playfair	PROSP
79	Tiger Gold Exploration Corp.	Harker Heritage	Clifford, Thackeray	PHOTO, PROSP
80	Tiger Gold Exploration Corp.	Bradette Property	Bradette, Kingroy Lake Area	ACOMP, AMAG, AVLF

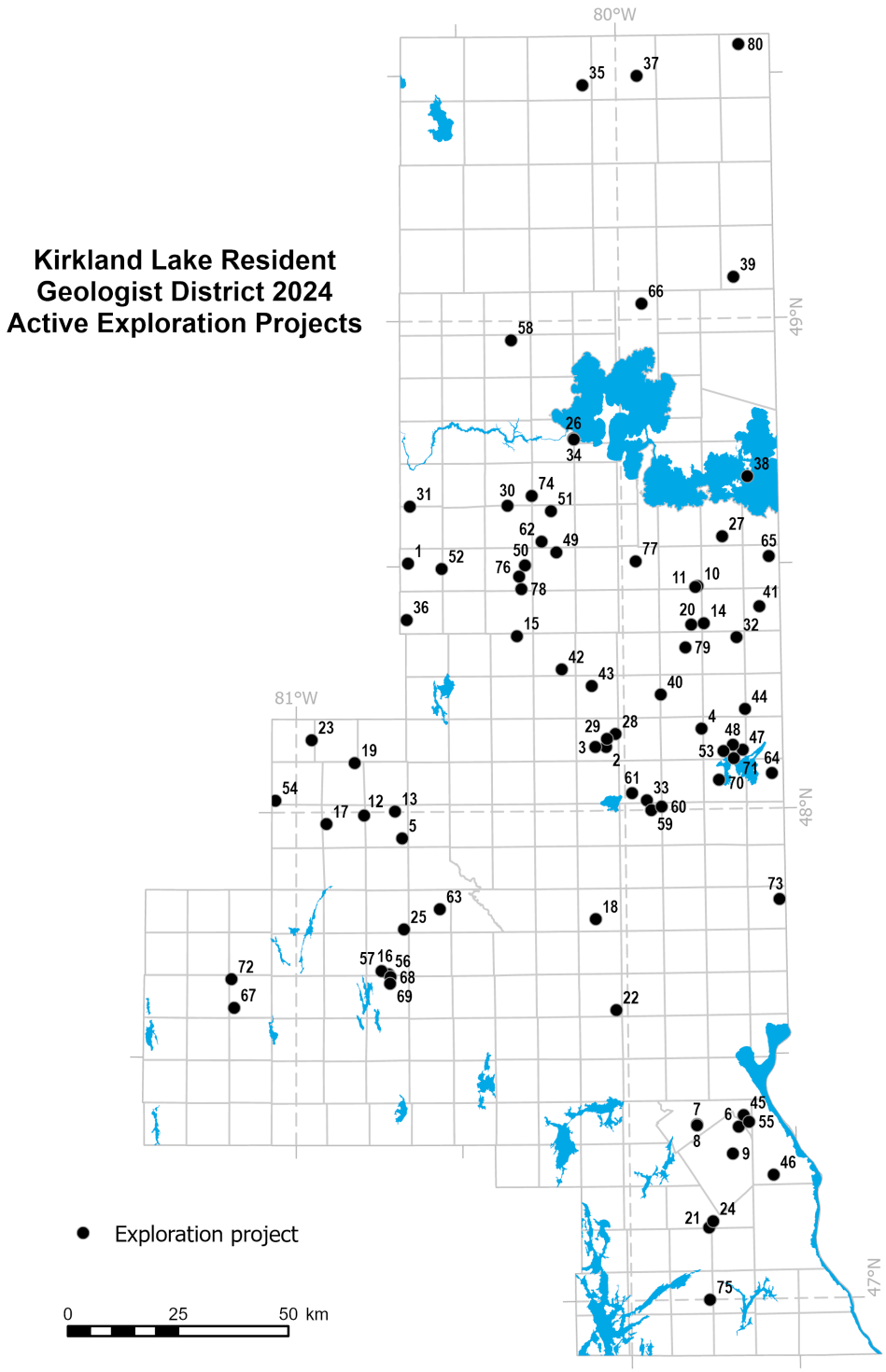

Figure 10. Active exploration projects in the Kirkland Lake Resident Geologist District in 2024, numbers are keyed to Table 7.

CANADA NICKEL COMPANY INC. – BANNOCKBURN PROJECT

Canada Nickel Company Inc. (Canada Nickel) owns 100% the Bannockburn nickel project which is located in Bannockburn Township, approximately 67 km southwest of the town of Kirkland Lake. The project area consists of 151 contiguous unpatented mining claims totaling 3250 ha. During the first quarter of 2024, Canada Nickel announced completion of initial infill diamond drilling at the B-Zone target which consisted of 6 diamond-drill holes totalling 2189 m. All 6 drill holes intersected sections of moderately to strongly serpentinized dunite/peridotite. The first 5 holes drilled into the B-Zone intersected multi-hundred metre intervals of 0.27 to 0.29% nickel and contained higher grade intervals of 0.3% nickel or better. Highlights of higher grade intervals included (Canada Nickel Company Inc., news release, February 20, 2024):

- DDH BAN23-04, with 0.54% nickel, 0.013% cobalt, 0.106 g/t platinum+palladium over 16.5 m
- DDH BAN23-05, with 0.34% nickel, 0.010% cobalt, 0.031 g/t platinum+palladium over 10.5 m

Diamond drilling during the summer of 2024 consisted of 10 diamond-drill holes totalling 3433 m at the B-Zone, and a single hole at the F-Zone totalling 441 m. B-Zone initial resource estimate is expected to be completed by the second quarter of 2025. At the F-Zone, diamond-drill hole BAN24-18 which collared into mafic volcanic rocks, intersected net-textured and massive sulphide-bearing peridotite at depth (Canada Nickel Company Inc., news releases, November 11 and 5, 2024):

- DDH BAN24-18 intersected 0.85% nickel, 0.08% copper, 0.04% cobalt, 0.23 g/t platinum + palladium over 25.3 m at 238.7 – 264.0 m depth, including 3.95% nickel, 0.40% copper, 0.15% cobalt, 1.08 g/t platinum + palladium over 4.0 m at 260.0 – 264.0 m depth

Diamond-drill hole BAN24-20 followed-up on drill hole BAN24-18 displaying a similar mineralization style. Assay results for core from DDH BAN24-20 are pending. Canada Nickel anticipates conducting borehole electromagnetic survey to test the continuation and extent of the high-grade horizons intersected in drill holes BAN24-18 and BAN24-20 (Canada Nickel Company Inc., news releases, December 5 and November 27, 2024).

GFG RESOURCES INC. – ALJO MINE PROJECT

The Aljo Mine project is located in Beatty Township approximately 58 km northwest of Kirkland Lake. It is part of the larger Goldarm property that contains the Montclerg and Carr targets. In the first quarter of 2024, GFG Resources Inc. (GFG) reported that it had completed its 2023 Phase II drill program of 3613 m in 15 drill holes (7 at Montclerg and 8 at Aljo). The program focused on step-out and in-fill drilling at Montclerg and tested a spectrum of targets at Aljo (GFG Resources Inc., news release, January 17, 2024). Drill intercepts at Aljo included multiple veins with anomalous and high-grade gold, and the discovery of a new footwall zone (GFG Resources Inc., news release, February 15, 2024):

- DDH ALJ-23-004, with 3.65 g/t gold over 6.3 m, including 13.35 g/t gold over 3.6 m below the Aljo mine workings
- DDH ALJ-23-011, a 200 m step-out from the Aljo Mine, returned multiple intervals of bulk tonnage gold mineralization in mafic volcanics with visible gold including 1.39 g/t gold over 19.0 m, and 1.86 g/t gold over 17.5 m

In June of 2024, GFG completed 2024 Phase 1 drill program consisting of 1700 m in 5 holes focussing on testing the downdip and lateral extensions of the historic Aljo Mine, and completed step-out holes related to the 2023 drill program. It was announced that drilling was successful in expanding known mineralized zones and identified new zones of gold mineralization which host significant visible gold and tellurides. The best intercept was from DDH ALJ-24-012 returning 23.08 g/t gold over 7.6 m with significant visible

gold and tellurides (GFG Resources Inc., news releases, August 19 and September 5, 2024). Figure 11 displays additional drill intercepts. As a follow up from these high-grade drill intercepts, GFG resumed drilling during the second half of 2024 with a budgeted program of 2500 m in 11 drill holes. The program focussed on testing both depth and strike extensions at Aljo. Drilling was planned to be completed before end of year 2024, and results were expected to be announced during the first quarter of 2025 (GFG Resources Inc., news release, November 28, 2024).

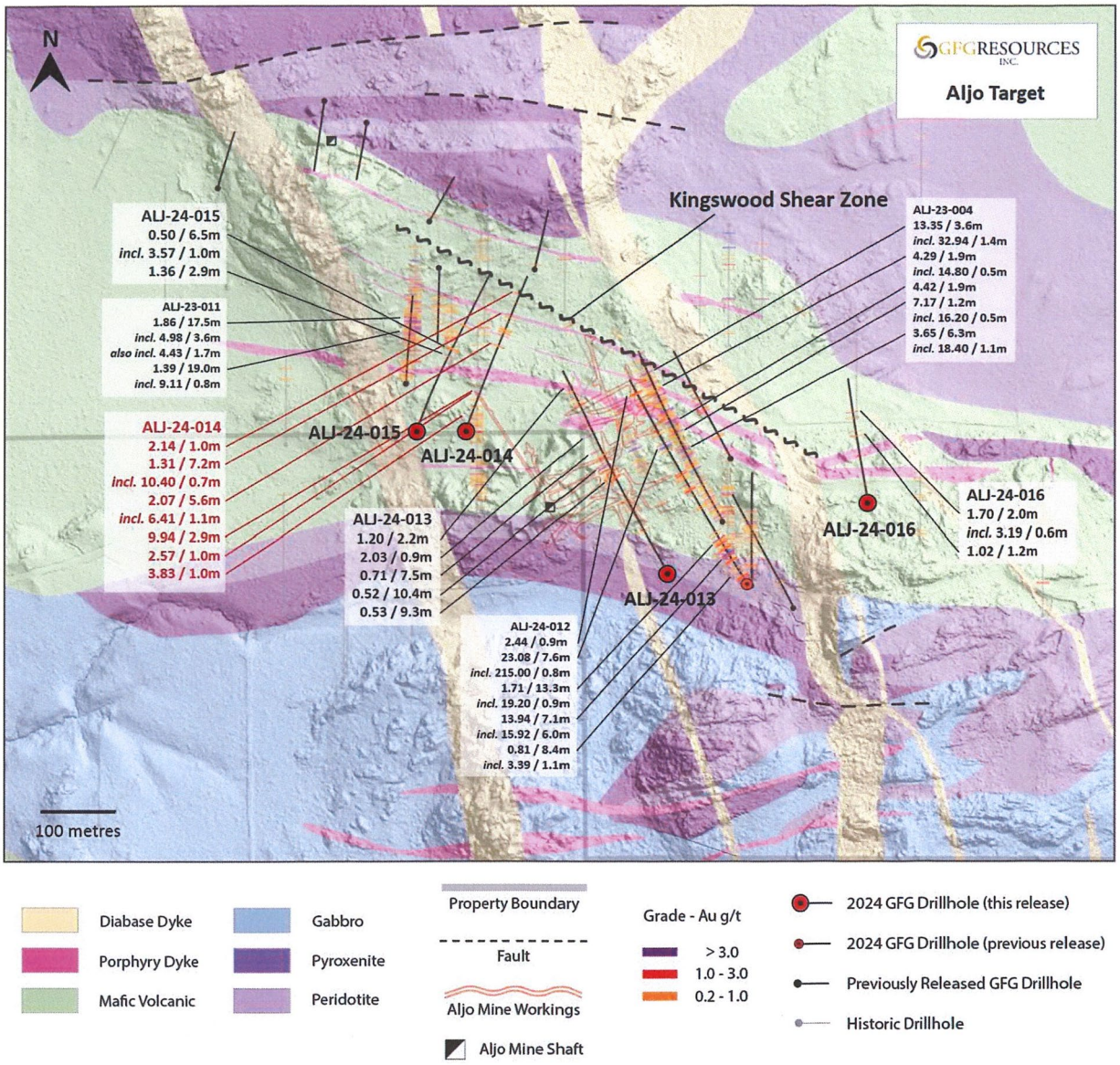

Figure 11. Geology and plan view map of the Aljo target. Some drill intercepts from 2024 are exemplified (GFG Resources Inc., news release, November 28, 2024).

KIRKLAND LAKE DISCOVERIES CORP. – LUCKY STRIKE PROPERTY

The Lucky Strike property consists of 653 unpatented mining claims covering approximately 114 km^2 and is located on the company's KL East project area, approximately 2.5 km north of Agnico Eagle's Upper Beaver deposit (Kirkland Lake Discoveries Corp. (KLDC), news release, February 22, 2023). During 2024, KLDC completed 13 diamond-drill holes totaling 3376 m at 6 targets to follow up on surface showings, mapping, prospecting and a ground induced polarization survey at the 7 km long by 3 km wide Hurricane Intrusive Zone (HIZ; Figure 12). KLDC announced that it successfully intercepted wide zones of alteration (sericite, calcite, epidote in mafic volcanics and gabbro; potassium hematite in syenitic rocks), and quartz veining with/without sulphide mineralization. The best gold assay returned from diamond-drill hole KLD24-22, with 1.11 g/t gold over 1.86 m, including 2.91 g/t gold over 0.63 m (KLDC, news releases, May 23 and April 2, 2024). From the geophysical signature, geology, mineralization, and alteration, the HIZ bears similarities to the intrusion-related gold-copper system that hosts Agnico Eagle Mines Limited Upper Beaver deposit which is located 6 km southeast of the HIZ (https://www.kirklandlakediscoveries.com/kl-east-side [accessed January 9, 2025]). Following the drill results, a program of soil geochemical sampling was initiated on the HIZ and across the Lucky Strike property to narrow down targets with the highest potential for mineralization (KLDC, news release, May 29, 2024).

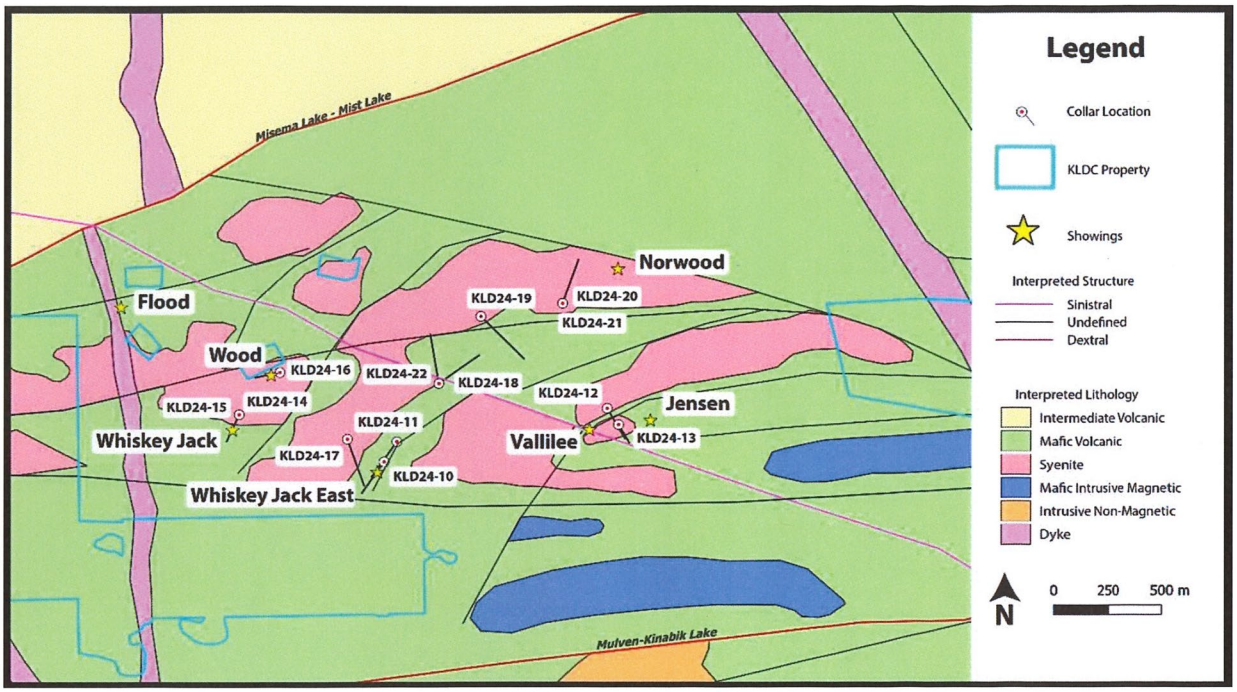

Figure 12. Geology map of the Hurricane Intrusive Zone displaying 2024 drill collar locations and gold-copper mineral showings (Kirkland Lake Discoveries Corp., news release, April 2, 2024).

MAYFAIR GOLD CORP. – FENN-GIB PROJECT

The Fenn–Gib project is located in Guibord and Munro townships, approximately 44 km northwest of Kirkland Lake (*see* Figure 10, no. 49). It comprises approximately 4800 ha of land area. Of the several styles of gold mineralization in the property area, the most common consists of quartz-carbonate veins, stringers and breccias hosted within intensely altered metavolcanic rocks and granitoid intrusions (https://mayfairgold.ca/fenn-gib/ [accessed January 10, 2025]). Effective September 3, 2024, the Fenn-Gib deposit has an open-pit constrained Indicated Mineral Resource of 181 302 000 t grading at 0.74 g/t gold and containing 4 313 000 ounces of gold, and an Inferred Mineral Resource of 8 921 000 t grading at 0.49 g/t gold and containing 141 000 ounces of gold at a cut-off grade of 0.3 g/t gold. (Mayfair Gold Corp. (Mayfair), news release, September 10, 2024). Mayfair announced it was extending metallurgical test work for Fenn-Gib with results expected in the first quarter of 2025. Diamond drilling at the project continued to extend and confirm the higher grade Footwall Zone which is located approximately 100 m to the northwest of the Fenn-Gib deposit. So far, the Footwall Zone has been extended along strike northeasterly to more than 1 km, and it remains open to both the northeast and southwest. Mineralization continuity has been confirmed to a depth of more than 600 m. Highlights of diamond-drill intersects include the following (Mayfair Gold Corp., news releases, April 16 and May 8, 2024):

- DDH FG24-385, with 1.40 g/t gold over 28.3 m, including 19.81 g/t over 1.8 m
- DDH FG24-387, with 0.80 g/t gold over 194.5 m, including 3.02 g/t gold over 3.0 m
- DDH FG24-390, with 6.12 g/t gold over 14.0 m, including 68.13 g/t gold over 0.9 m

Groundwater hydrogeology studies (including the drilling of 12 monitoring wells, logging of overburden, hydraulic testing) and pre-feasibility studies on Fenn-Gib commenced at the end of the 2024 first quarter. At the end of the year, an announcement was made on the successful completion of geotechnical and hydrogeology studies in support of pre-feasibility–level open-pit design for the Fenn-Gib project (Mayfair, news releases, May 8 and March 28, 2024).

ONYX GOLD CORP. – MUNRO-CROESUS PROJECT

Munro-Croesus gold project is 100% owned by Onyx Gold Corp. (Onyx Gold) and located in Munro Township, approximately 47 km northwest of Kirkland Lake. The project area includes the past-producing Croesus Mine (Figure 13) which yielded some of the highest grade gold ever mined in Ontario. The highly prospective geology is proximal to the Porcupine–Destor Deformation Fault zone and Pipestone Fault (https://onyxgold.com/projects/munro-croesus-gold/ [accessed January 10, 2025]).

During the first 9 months ending September 30 of the year under review, Onyx Gold completed 3 acquisitions of properties contiguous or proximal with the project and which are host to multiple high-grade and bulk-tonnage gold occurrences. This portfolio of properties increased the project land area to 10 588 ha (Onyx Gold, news releases, September 9 and 25, April 18, and January 30, 2024).

In 2024, fieldwork in the project area included overburden stripping, grab sampling, prospecting, and lidar survey and diamond drilling. In the spring of 2024, Onyx Gold completed a diamond-drill program consisting of a total of 3311 m in 25 drill holes. This effort led to the expansion of the Argus and GM Vein zones, and the discovery of the Argus North zone (Onyx Gold, news release, December 19, 2024). Drilling results returned the following highlights (Onyx Gold, news releases, September 10, June 17, and May 1, 2024):

- DDH MC24-166, with 0.99 g/t gold over 63.3 m, including 2.18 g/t gold over 17.4 m, and 0.83 g/t gold over 29.0 m at a 50-m stepout on the Argus Zone

- DDH MC24-163, with 1.87 g/t gold over 48.1 m, including 7.14 g/t gold over 4.5 m, and 4.05 g/t gold over 10.0 m. This is the discovery hole at Argus North Zone located immediately north of the main Argus Zone trend
- DDH MC24-154, with 26.52 g/t gold over 1.0 m, including 52.06 g/t gold over 0.5 m at the GM Vein

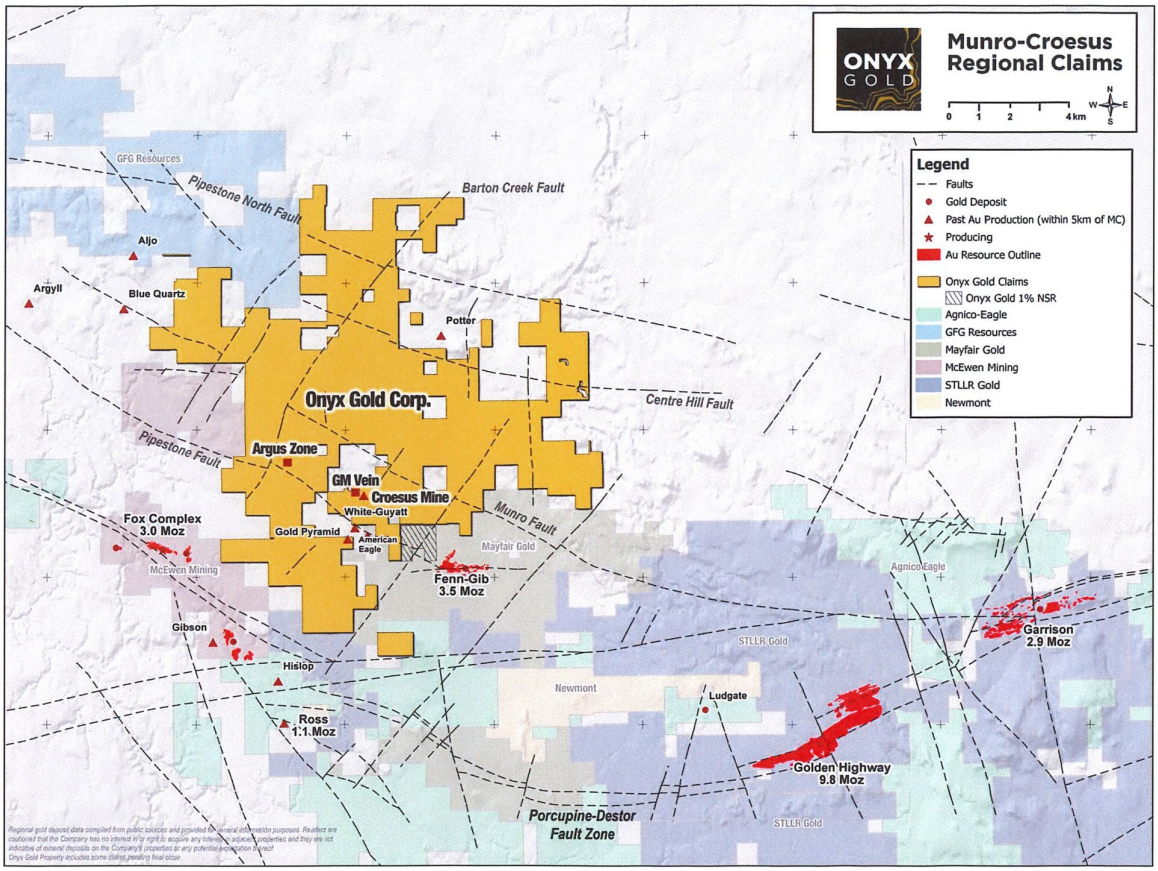

Figure 13. Property map showing location of Onyx Gold Corp.'s Munro-Croesus claims and exploration target areas (https://onyxgold.com/projects/munro-croesus-gold/ [accessed January 11, 2025]).

POWER METALS CORP. – CASE LAKE PROJECT

The Case Lake pegmatite dike swarm project is 100% owned by Power Metals Corp. (Power Metals). It is located in Steele, Case, Scapa, Pliny, Abbotsford, and Challies townships, 80 km east of Cochrane and 100 km north of Kirkland Lake. The 10 km by 9.5 km property consists of 585 cell claims with a total of 14 identified granitic domes. The property consists of 6 spodumene (lithium ore mineral) dikes: North, Main, South, East, Northeast, and West Joe, collectively forming mineralization trend that extends for approximately 10 km. Power Metals has completed several exploration campaigns that have led to the discovery and expansion of new and historic spodumene-bearing lithium-cesium-tantalum (LCT) pegmatites at Case Lake. During the 4th quarter of 2024, a total of 16 drill holes for 971 m of the planned 2000 m Phase III drill program had been completed at West Joe. The objective of the 2024 Phase III program was to target and extend the known cesium zones at West Joe and Main Zone. The company expected assay results to be released in late January and through February 2025 (Power Metals, news releases, December 10 and November 6, 2024). Initial Phase I and II diamond drilling completed earlier

in 2024 consisted of a total of 6500 m. Highlights of drill intercepts with significant cesium concentrations include (Power Metals, news releases, October 31, June 18, and May 22, 2024):

- DDH PMW-24-171, with 1.27% Li_2O, 1.3% Cs_2O and 149 ppm Ta over 9.8 m
- DDH PMW-24-177, with 1.43% Li_2O, 5.95% Cs_2O and 311 ppm Ta over 6.4 m, and
- DDH PMW-24-211, with 1.50% Li_2O, 4.05% Cs_2O, and 423 ppm Ta over 7.9 m, including 0.59% Li_2O, 12.72% Cs_2O and 521 ppm Ta over 1.0 m at West Joe dike
- DDH PMW-24-167, with 1.84% Li_2O and 139 ppm Ta over 13.3 m
- DDH PMW-24-169, with 0.99% Li_2O, and 186 ppm Ta over 4.0 m, including 1.10% Li_2O, 1.03% Cs_2O, and 213 ppm Ta, and
- DDH PMW-24-170, with 1.17% Li_2O, and 97 ppm Ta over 1.6 m at Main dike

During 2024, Power Metals also conducted structural and lithological modelling, high-resolution magnetic drone survey, metallurgical test work, archeological studies, soil, and surface water sampling programs at the Case Lake project (Power Metals, news releases, December 18, 10 and 3, July 9, and May 29, 2024).

PTX METALS INC. – SHINING TREE GOLD PROPERTY

The Shining Tree gold property is approximately 106 km southeast of Kirkland Lake (*see* Figure 10, no. 67). It is part of the South Timmins Mining joint venture with Fancamp Exploration (75% PTX, 25% Fancamp). Platinex Inc. announced the name change to PTX Metals Inc. (PTX), trading under the new name effective February 28, 2024 (Platinex Inc., news release, February 26, 2024). The Shining Tree property is situated along the Ridout–Tyrrell trend between the Juby deposit owned by Aris Gold Corp. to the east and the Côté Gold deposit owned by IAMGOLD Corp. to the west (Timmins District). Platinex continued its 2023 Phase 1 mechanized overburden stripping and channel sampling until early July 2024. Overburden stripping targeted anomalous grab and geochemical (B-horizon) samples, as well as exposed bedrock in 5 target areas (Figure 14) covering 2971 km^2. Assay results for a total of 117 channel samples ranged from 0.01 g/t gold to 5.18 g/t gold. The program allowed the company a better understanding of the geological controls on mineralization at surface at the Ronda Mine target, and led to the discovery of new gold-bearing structures in the surrounding area (PTX, news release, August 7, 2024). Recorded production at the Ronda Mine occurred only in 1939 and amounted to 2727 ounces of gold and 4830 ounces of silver from 24 592 tons for an average recovered grade of 0.11 ounces gold per ton. The mine was closed due to the beginning of World War 1 and the resulting shortage of labour and had never reopened (https://ptxmetals.com/projects/shining-tree/ [accessed January 10, 2025]).

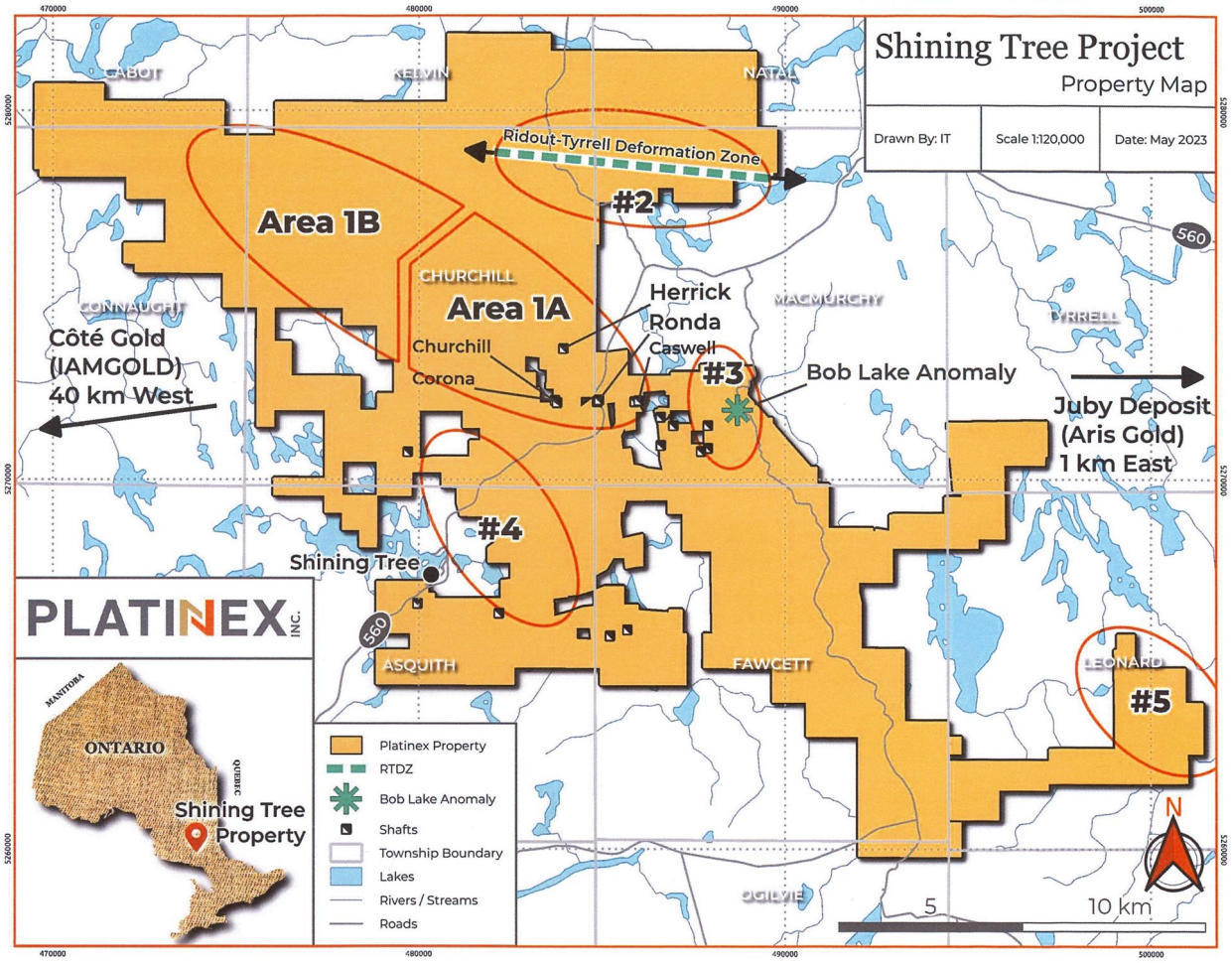

Figure 14. Shining Tree gold property map showing areas of geochemical sampling (https://wp-platinex-2024.s3.ca-central-1.amazonaws.com/media/2023/05/16170117/2_Shining-Tree_Property-Map-scaled.jpg [accessed January 10, 2025]).

SPARTON RESOURCES INC. – PENSE POLYMETALLIC PROJECT

Pense project is located in Pense Township about 52 km southeast of Kirkland Lake. It consists of 90 mining claim units covering 3775 ha. During the first quarter of 2024, Sparton Resources Inc. (Sparton) conducted 400 line-km airborne magnetic and electromagnetic geophysical surveys with 75 m nominal line spacing over the project area. According to the company's preliminary results, 9 areas with distinctive conductive responses were outlined. Line cutting of detailed survey grids ended the first quarter (Sparton, news releases, April 5, February 28, and January 29, 2024). Initial diamond drilling commenced and completed during the fourth quarter to test selected geophysical anomalies. The drilling program consisted of 4 drill holes totaling 822 m and confirmed the presence of critical metals and gold. Highlights of drill results include (Sparton, news releases, December 17, October 24, September 27, and July 18, 2024):

- DDH P24-01, 1.73% zinc over 19.7 m, including 3.1% zinc over 2.8 m; and 0.81 g/t gold over 8.2 m, including 1.5 g/t gold over 1.5 m; and 0.14% copper over 27.7 m
- DDH P24-02 returned values of 0.15% nickel over 12.1 m
- DDH P24-03 returned 0.13% nickel over 4.4 m, and 0.1% nickel over 5.7 m
- DDH P24-04 tested the same anomaly as P24-03 and returned 0.13% nickel over 7.5 m

Sparton reported that these drill holes were located east and north of the holes drilled in 1993 and 1997 that returned encouraging values of critical metals, copper, nickel, zinc and minor cobalt (Sparton, news releases, December 17, 2024).

DISTRICT STAFF AND ACTIVITIES

In 2024, the Kirkland Lake Resident Geologist District office was staffed by P. Chadwick, *P.Geo.,* Regional Resident Geologist (January to October); J. Suma-Momoh, *P. Geo.,* District Geologist (January to September), Acting Regional Resident Geologist (October to December); and H. Jyothikumar, District Geological Assistant (August to December). M. Laforge was the Summer Experience Opportunity (SEO) program student (May to early August). S.L.K. Hinz, *P.Geo.*, the Mineral Inventory Geoscientist (January to November); C. Daniels, *P.Geo.*, Land Use Planning and Policy Coordinator (January to October); P. LeBaron, *P.Eng*., Land Use Planning and Policy Coordinator (November to December); P. Bousquet, *P.Geo.*, Regional Land Use Geologist and N. Sabiri, the Northeastern GIS Data Specialist, contributed to this report in their respective sections. While the position of District Geological Assistant was vacant (2023 to August 2024), significant assistance was provided by B. McKinnon, the District Geological Assistant for the Sudbury District.

During the year under review, the Kirkland Lake Regional Office staff provided 306 individual services to clients, predominantly through cell phone and email. A total of 65 in-person services were completed at the Kirkland Lake office located at 1451 Highway 66, Swastika.

P. Chadwick attended the Canadian Mining Expo and the Northeastern Ontario Mines and Minerals Symposium (NEOMMS) in Timmins; a pegmatite short course in Thunder Bay on February 2 and 3. He attended an informal in-house geology field trip of the Sudbury District on July 4 and 5. In addition, he reviewed several Ontario Junior Exploration Program (OJEP) applications; continued scanning of Howard Lovell's property visits reports and co-ordinated the population of the office rock and mineral displays with the SEO program student.

J. Suma-Momoh, was invited to visit the community of Temagami First Nations on Bear Island to answer some geology-related questions. During the visit, he spoke about the geology including why their traditional land (N'Daki Menan) has a high economic mineral potential, highlighting some of the existing exploration projects and activities on N'Daki Menan. He reviewed OJEP applications and he conducted property visits during the summer. Public sessions attended and delivered include the "Exploration and Mining Activity Update for the Kirkland Lake District" at the NEOMMS. The presentation was also delivered to the OGS Virtual Showcase 2024, with the additional content of the Sudbury District exploration and mining activity update. He assisted the Timmins District by teaching 3 two-hour sessions of "Minerals in our daily lives" to Indigenous children at Camp Chikepak, and helped introduce the subject of geology to kids of the Matachewan First Nation in Alma Township.

M. Laforge assisted with property visits, and digital cataloguing of rock and mineral samples, and ultimately displaying them in opaque and transparent cabinets. In May 2024, the Kirkland Lake District staff participated in the 3-day RGP health and safety training program held at the County Inn & Suites in Belleville. The program ended with geological field tours of the Belleville, Tweed and Bancroft areas.

During the last quarter of 2024, Kirkland Lake District office commenced the assembling of donated hardcopy assessment files for a scanning initiative in compliance with the Accessibility for Ontarians with Disabilities Act (AODA). The goal is to make assessment files available online at the Geology Ontario platform.

As in 2023, 2 publication hardcopies were received for the Kirkland Lake District library during 2024. In addition, other publications released by the OGS and related to the Kirkland Lake District are listed in Table 8.

In 2024, 123 Ontario Mineral Inventory (OMI) records were updated (Ontario Geological Survey 2024), 4 records were deleted and 12 new records were created for the Kirkland Lake District (*see* Table 18 in "Mineral Inventory Geoscientist Activities—Northeastern and Southern Ontario").

Table 8. Publications received by the Ontario Geological Survey relevant to the Kirkland Lake District in 2024.

Title	Author(s)	Type and Year of Publication
Publications Released		
Recommendations for Exploration 2023–2024*	Ontario Geological Survey	Ontario Geological Survey, Resident Geologist Program, Recommendations for Exploration (2024)
Report of Activities 2023, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake and Sudbury Districts, 2023	P.J. Chadwick, A.S. Péloquin, J. Suma-Momoh, B.B. McKinnon, P. Bousquet, P.S. LeBaron, C.M. Daniels, S.L.K. Hinz, G. Meyer and N. Sabiri	Ontario Geological Survey, Open File Report 6411 (2024)
Summary of Field Work and Other Activities, 2024*	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6413, 2024

Note: ** Hardcopy available*

Drill Core Storage Site

The Kirkland Lake Resident Geologist District office operates an indoor Drill Core Library (DCL) within the municipality of Kirkland Lake, and a Remote Drill Core Storage Site (RDCSS) west of Kirkland Lake in Burt Township. No core was donated in 2024. A total of 13 client requests were received for information about drill hole cores kept at these storage facilities.

PROPERTY EXAMINATIONS

During 2024, a total of 8 properties were visited by Kirkland Lake District Office staff as listed in Table 9, and the locations are keyed to Figure 15.

Table 9. Property visits conducted by the Kirkland Lake District staff in 2024 (keyed to Figure 15).

Number	Property Name	MDI Number	Location (Township)
1	Amyot area	Sampled, not OMI eligible	Amyot
2	Biederman	Sampled, not OMI eligible	Bompas
3	Bulldog Zone East	Sampled, not OMI eligible	South Lorrain
4	Case Batholith	Not Sampled	Steeles
5	Cleaver area	Sampled, not OMI eligible	Cleaver
6	McChesney	Sampled, not OMI eligible	Flavelle
7	Montrose Zone	Sampled, not OMI eligible	South Lorrain
8	Paquet Claim # 898137	No outcrops available	McFadden

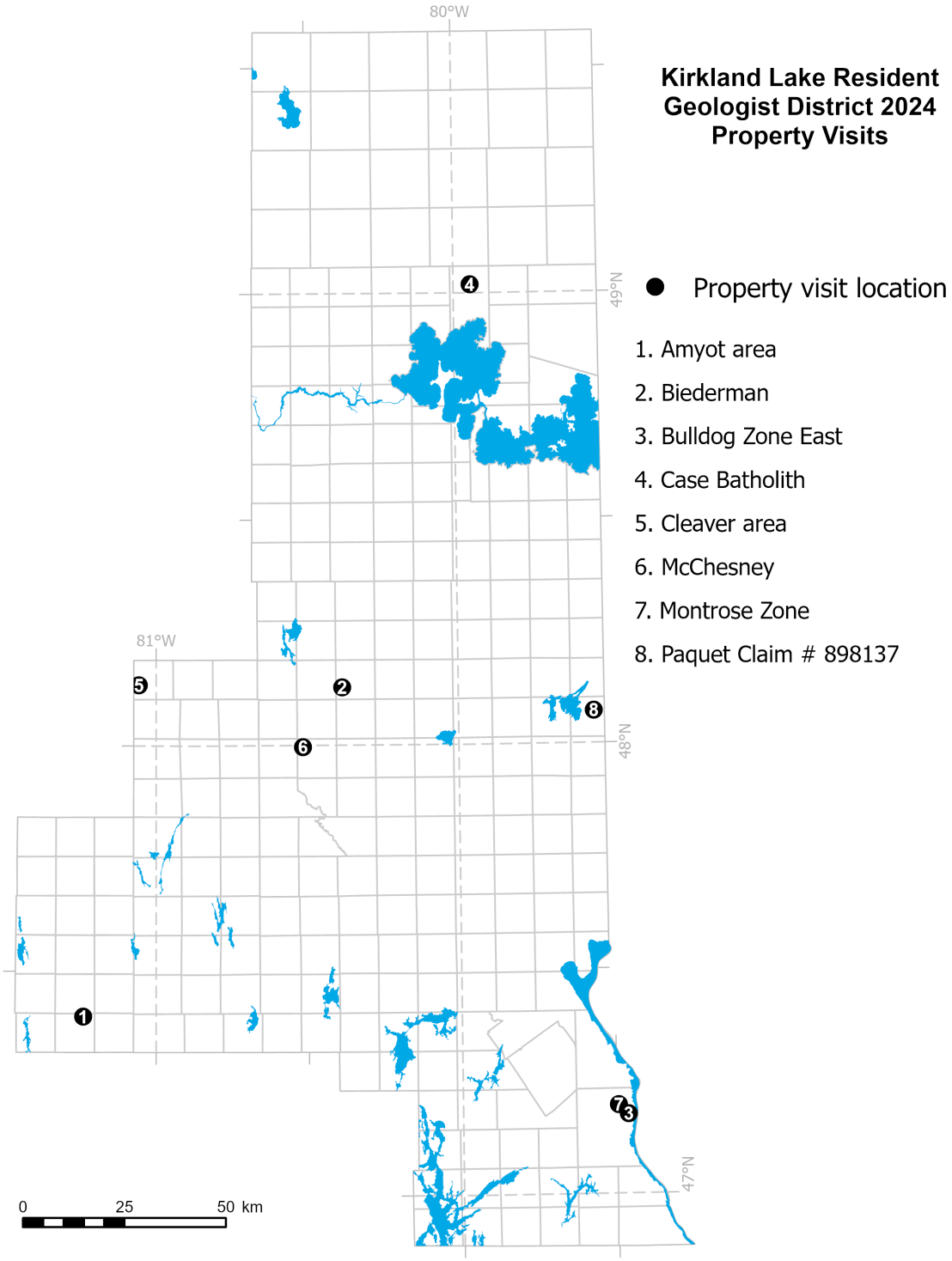

Figure 15. Property visits made by Kirkland Lake District staff in 2024 (keyed to Table 9).

Fertile Parent Granitoid Project

INTRODUCTION

Lithium is a critical component in batteries including those produced for the electric vehicle industry. This report is part of the Resident Geologist Program (RGP) Fertile Parent Granitoid Project that was initiated due to the growing interest in lithium-cesium-tantalum (LCT)–pegmatites and their potential to host economic quantities of lithium. The Project aims at identifying fertile granites parental to LCT-pegmatites. Recently, Price and others (2024) summarized the initial results from analyses of selected samples collected from various RGP districts in 2022. This report presents and discusses analytical data for 15 samples collected from the Case batholith (or Case pegmatite) in the southeastern extension of the Opatica Subprovince in northwestern Kirkland Lake District. The Case batholith was the subject of a previous *Recommendations for Exploration* article on cesium and associated rare element mineralization (Chadwick 2022). Major and trace elements were analyzed by X-ray fluorescence (XRF) and are presented in Table 10 and Table 11, respectively. Trace elements were also determined by inductively coupled plasma mass spectrometry (ICP–MS) and are presented in Table 12.

GEOLOGY AND MINERALIZATION

The Case pegmatite system is hosted in the southeastern part of the Case batholith, an extensive 50 km by 85 km, ovoid granitic complex (Jackson and Fyon 1991), consisting of foliated to massive tonalitic to granodioritic rock suites. Lithium-cesium-tantalum–pegmatites are the products of extreme fractional crystallization of orogenic granites. Most such peraluminous granites (S-type granites) were derived from metamorphosed sedimentary rocks, typically at low pressure amphibolite to upper greenschist facies (Černý 1992). Fertile granites are identified by the presence of distinctive minerals, such as muscovite, tourmaline and garnet; by anomalously high concentrations of such trace elements as lithium, cesium, tantalum, rubidium and tin; and by low concentrations of major elements calcium, iron and magnesium (Selway, Breaks and Tindle 2005). Figure 16 displays the sample locations and Table 13 provides the co-ordinates and brief field descriptions of the 15 samples collected from Case batholith.

DISCUSSION OF ANALYTICAL RESULTS

Fertile granites are peraluminous parental granite to an LCT-pegmatite. The degree to which a granite is peraluminous, can be calculated from the molecular ratio A/CNK [Al_2O_3/(CaO + Na_2O + K_2O)] of bulk whole rock samples. When A/CNK = 1.0 to 1.1, the granite is considered mildly peraluminous, but if A/CNK > 1.2, then the granite is strongly peraluminous. Fertile granites will have a moderate A/CNK ratio (Breaks, Selway and Tindle 2003). In this report, the molecular ratio A/CNK has been calculated according to the following equation by Breaks, Selway and Tindle (2003):

$$A/CNK = \frac{(wt\ \%\ Al_2O_3\ in\ sample/101.96128)}{(wt\ \%\ CaO\ in\ sample/56.08)\ +\ (wt\ \%\ Na_2O\ in\ sample/61.979)\ +\ (wt\ \%\ K_2O\ in\ sample/94.197)}$$

Table 14 results indicate that all 15 granitic samples are mildly peraluminous, suggesting that the granitic intrusions in Heighington, Case, Challies and Seguin townships are generally mildly peraluminous.

Table 10. Results of major element analyses of granitic samples (using X-ray fluorescence (XRF), reported as oxides in weight percent (wt. %).

Sample No. Units	Al_2O_3 (wt. %)	BaO (wt.%)	CaO (wt. %)	Cr_2O_3 (wt. %)	Fe_2O_3 (wt. %)	FeO (wt. %)	K_2O (wt. %)	MgO (wt. %)
Detection Limit:	*0.02*	*0.004*	*0.006*	*0.002*	*0.01*	*0.13*	*0.01*	*0.01*
22-PC-05	15.53	0.071	0.118	0.003	0.11	0.07	9.80	0.02
22-PC-06	14.45	0.024	1.568	0.004	0.20	0.15	3.23	0.03
22-PC-07	14.75	0.048	1.216	0.002	0.61	0.39	4.97	0.13
22-PC-08	15.78	0.134	1.513	0.003	2.10	1.35	5.02	0.55
22-PC-09	14.98	0.063	0.735	0.002	1.15	0.56	5.90	0.17
22-PC-10	14.75	0.002	0.914	0.004	0.16	0.07	2.50	0.01
22-PC-11	13.52	0.013	1.162	0.003	0.50	0.31	3.09	0.13
22-PC-17	13.93	0.047	0.920	0.002	0.58	0.26	5.02	0.10
22-PC-18	14.69	0.032	1.339	0.004	0.57	0.29	3.34	0.12
22-PC-19	9.12	0.040	0.210	0.004	0.32	0.20	5.03	0.03
22-PC-20	13.48	0.010	1.476	0.005	1.00	0.44	1.66	0.12
22-PC-34	16.82	0.027	3.547	0.006	2.44	1.82	1.48	1.31
22-PC-35	14.27	0.010	3.046	0.004	0.47	0.34	0.75	0.23
22-PC-36	12.34	0.034	0.805	0.003	0.46	0.26	4.47	0.05
22-PC-37	12.77	0.056	1.024	0.004	1.20	0.74	4.73	0.37

Sample No. Units	MnO (wt. %)	Na_2O (wt. %)	Nitrogen LOI (wt. %)	P_2O_5 (wt. %)	SiO_2 (wt. %)	TiO_2 (wt. %)	Total (wt. %)	LOI (wt. %)
Detection Limit:	*0.002*	*0.02*	*0.02*	*0.002*	*0.04*	*0.01*		*0.05*
22-PC-05	0.001	2.22	0.15	0.015	71.64	0.03	99.88	0.33
22-PC-06	0.001	4.37	0.12	0.016	75.57	0.03	99.88	0.38
22-PC-07	0.008	3.70	0.16	0.016	73.67	0.06	99.58	0.40
22-PC-08	0.033	3.86	0.18	0.106	69.85	0.33	99.79	0.50
22-PC-09	0.016	3.01	0.19	0.025	73.01	0.13	99.80	0.62
22-PC-10	0.001	5.74	0.12	0.01	75.92	0.01	100.35	0.36
22-PC-11	0.009	4.23	0.18	0.011	76.23	0.05	99.50	0.53
22-PC-17	0.003	3.50	0.14	0.009	74.87	0.03	99.41	0.39
22-PC-18	0.006	4.40	0.20	0.009	74.96	0.05	100.03	0.53
22-PC-19	0.003	1.63	0.05	0.007	82.96	0.01	99.56	0.19
22-PC-20	0.009	4.53	0.17	0.012	77.25	0.09	100.06	0.42
22-PC-34	0.039	5.08	0.16	0.059	67.53	0.20	99.32	0.77
22-PC-35	0.007	4.71	0.01	0.007	74.88	0.02	99.01	0.60
22-PC-36	0.001	3.33	0.08	0.019	77.61	0.03	99.42	0.27
22-PC-37	0.012	3.16	0.09	0.048	74.93	0.08	98.79	0.40

Table 11. Results of trace element analyses of granitic samples (using X-ray fluorescence (XRF), reported in parts per million (ppm)).

Sample No. Units	As (ppm)	Ba (ppm)	Br (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Ga (ppm)
Detection Limit:	*4*	*12*	*0.8*	*18*	*1.8*	*7*	*8*	*2*	*1.2*
22-PC-05	5	580	0.4	9	2.6	15	4	1	14.1
22-PC-06	6	191	0.4	9	0.9	26	4	1	16.8
22-PC-07	6	384	0.8	9	2.4	16	4	1	17.1
22-PC-08	8	1104	0.9	158	6.5	17	4	1	18.8
22-PC-09	6	504	1.5	110	0.9	13	4	1	15.2
22-PC-10	5	6	0.4	9	0.9	19	4	1	22.9
22-PC-11	6	106	0.4	9	0.9	22	4	1	15.4
22-PC-17	5	369	0.4	9	0.9	17	4	1	16.5
22-PC-18	6	265	0.4	9	2.2	21	4	1	18.2
22-PC-19	6	348	0.4	9	2.2	18	4	1	9.6
22-PC-20	5	85	0.4	9	2.4	28	4	1	17.5
22-PC-34	5	221	0.4	9	5.7	38	4	1	19.2
22-PC-35	5	89	2.2	9	0.9	25	4	2	15.8
22-PC-36	4	254	0.4	9	0.9	13	4	1	14.5
22-PC-37	6	457	0.4	9	0.9	18	4	1	14.6

Sample No. Units	La (ppm)	Mn (ppm)	Mo (ppm)	Nb (ppm)	Ni (ppm)	Pb (ppm)	Rb (ppm)	Sc (ppm)	Sr (ppm)
Detection Limit:	*9*	*7*	*0.9*	*0.8*	*1.6*	*2*	*0.6*	*4*	*1*
22-PC-05	4.5	3.5	0.45	0.4	0.8	39.2	273.8	2	200.3
22-PC-06	4.5	22	1	0.4	0.8	24.6	86.8	2	161.7
22-PC-07	12	78	0.45	1.9	2	30.5	147.2	2	177.6
22-PC-08	114	244	0.45	6.3	5.1	31.8	171.9	2	281
22-PC-09	50	121	0.45	2.5	0.8	39.2	169.4	2	150.5
22-PC-10	4.5	15	0.45	24.5	0.8	44	204.3	2	6.8
22-PC-11	12	74	0.45	1.8	0.8	26.7	88.6	2	101.2
22-PC-17	4.5	55	0.45	2.7	0.8	23.4	161.6	2	187.5
22-PC-18	4.5	68	0.45	3.3	0.8	20	106.8	2	195.5
22-PC-19	4.5	28	0.45	27.9	0.8	26.7	190.9	2	92.8
22-PC-20	4.5	90	0.9	4.1	0.8	25.7	59.9	2	158.9
22-PC-34	4.5	325	1.4	1.9	14.3	6.1	68.7	4	382.4
22-PC-35	4.5	49	1	0.4	2.2	9.5	17.4	2	315.5
22-PC-36	4.5	36	0.45	0.4	0.8	23	146.3	2	101.3
22-PC-37	4.5	122	0.9	3.3	2.7	19	146.8	2	178.6

Table 11, *continued.*

Sample No. Units	Th (ppm)	Ti (ppm)	U (ppm)	V (ppm)	Y (ppm)	Zn (ppm)	Zr (ppm)
Detection Limit:	*1.9*	*9*	*1.3*	*2*	*0.9*	*1.1*	*1.6*
22-PC-05	3.2	60	0.65	1	3.6	6	4.7
22-PC-06	13	111	1.4	1	3.9	6.9	58.4
22-PC-07	10.9	404	1.5	3	5.3	15.5	46.4
22-PC-08	28	1965	1.7	18	9.2	53	262.3
22-PC-09	50.2	622	2.1	5	9.1	25.5	137.6
22-PC-10	8.9	24	4	1	4.7	10	13.9
22-PC-11	26.6	216	2.7	2	7.7	13.1	40.6
22-PC-17	4.9	235	3.8	3	3.1	14	17.8
22-PC-18	8	227	3.4	3	3	15.9	14.1
22-PC-19	4.2	135	8.7	2	24.1	7.6	2.1
22-PC-20	26.1	449	2.3	6	5.3	19.5	25.5
22-PC-34	0.95	1292	0.65	25	4.8	51.1	56.5
22-PC-35	0.95	268	0.65	3	0.45	12.2	137.5
22-PC-36	2.8	116	0.65	3	2.9	9.4	15.5
22-PC-37	3.4	732	0.65	4	3.8	26.8	172.5

Table 12. Results of trace element analyses of granitic samples (using inductively coupled plasma mass spectrometry (ICP–MS), reported in parts per million (ppm)).

Sample No. Units	Ba (ppm)	Be (ppm)	Bi (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy (ppm)	Er (ppm)
Detection Limit:	*1.3*	*0.024*	*0.11*	*0.018*	*0.17*	*0.09*	*2.9*	*0.018*	*0.9*	*0.04*	*0.04*
22-PC-05	663.6	0.263	0.055	0.009	1.04	0.11	26	3.355	0.45	0.56	0.4
22-PC-06	227.9	1.93	0.055	0.023	7.67	0.19	34	1.489	0.45	0.63	0.41
22-PC-07	438.4	1.346	0.055	0.019	18.75	0.69	21.1	3.11	0.45	0.98	0.6
22-PC-08	1217	1.37	0.055	0.032	149.16	3.06	25.3	2.577	0.45	2.05	0.84
22-PC-09	579.4	0.952	0.055	0.023	123.1	0.87	22.5	3.187	0.45	2.68	0.94
22-PC-10	2.3	2.118	0.055	0.02	21.22	0.09	32.9	4.776	0.45	1.56	0.41
22-PC-11	126.1	1.197	0.055	0.009	29.34	0.47	25.4	0.915	0.45	1.64	0.76
22-PC-17	425	1.604	0.055	0.009	1.71	0.37	24.8	2.932	0.45	0.52	0.35
22-PC-18	311.2	2.325	0.055	0.009	3.42	0.4	28.6	2.24	0.45	0.59	0.4
22-PC-19	397.8	0.629	0.055	0.009	1.5	0.2	28.3	2.466	0.45	5.15	3.79
22-PC-20	97.7	1.779	0.055	0.02	12.48	0.62	34	1.491	1.1	0.93	0.55
22-PC-34	243.8	0.944	0.055	0.029	10.37	6.45	49.6	2.996	1.3	0.74	0.45
22-PC-35	102.9	1.477	0.055	0.009	5.65	0.84	34.6	0.334	1.7	0.09	0.07
22-PC-36	299.7	0.6	0.055	0.009	12.06	0.28	16.3	1.396	0.45	0.74	0.39
22-PC-37	526.7	0.946	0.055	0.009	5.81	1.47	29.9	0.895	0.45	0.73	0.44

Table 12, *continued*

Sample No. Units	Eu (ppm)	Ga (ppm)	Gd (ppm)	Hf (ppm)	Ho (ppm)	In (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mo (ppm)	Nb (ppm)
Detection Limit:	*0.008*	*0.04*	*0.04*	*0.09*	*0.006*	*0.0017*	*0.09*	*0.24*	*0.005*	*0.08*	*0.05*
22-PC-05	0.472	14.78	0.33	0.36	0.132	0.0059	0.69	1.66	0.066	1.29	0.58
22-PC-06	0.388	17.13	0.61	2.32	0.135	0.0024	2.52	3.28	0.076	1.89	1.31
22-PC-07	0.467	17.57	1.04	1.88	0.206	0.0068	7.61	8.04	0.094	1.17	2.58
22-PC-08	0.811	19.31	3.95	7.07	0.342	0.022	96.96	23.05	0.084	0.97	6.96
22-PC-09	0.698	15.52	5.91	5.04	0.387	0.0125	47.14	11.69	0.128	1.19	2.89
22-PC-10	0.09	23.06	3.97	1	0.194	0.0052	7.16	2.74	0.039	1.54	23.5
22-PC-11	0.358	16.01	2.82	2.18	0.293	0.005	13.03	5.59	0.116	1.23	2.39
22-PC-17	0.341	17.31	0.34	1.09	0.116	0.004	0.79	8.2	0.076	1.28	3.15
22-PC-18	0.372	18.8	0.46	0.89	0.123	0.0039	1.55	9.98	0.085	1.49	3.65
22-PC-19	0.178	10.28	2.77	0.32	1.144	0.0032	1.35	5.52	0.718	1.48	30.41
22-PC-20	0.337	18.4	1.02	1.15	0.188	0.0128	6	7.09	0.09	1.78	4.42
22-PC-34	0.343	20.31	0.85	1.66	0.149	0.0163	4.92	34.01	0.073	1.93	2.43
22-PC-35	0.309	16.31	0.19	4.5	0.02	0.0039	3.12	9.26	0.023	1.69	0.86
22-PC-36	0.292	15.53	0.94	1.02	0.14	0.0045	6.01	9.31	0.051	0.82	1.12
22-PC-37	0.455	15.43	0.89	6	0.148	0.0128	3.3	16.6	0.082	1.47	3.67

Sample No. Units	Nd (ppm)	Ni (ppm)	Pb (ppm)	Pr (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Sm (ppm)	Sn (ppm)	Sr (ppm)	Ta (ppm)
Detection Limit:	*0.11*	*0.6*	*0.29*	*0.019*	*0.15*	*0.025*	*0.17*	*0.05*	*0.17*	*1.3*	*0.015*
22-PC-05	0.41	0.7	37.26	0.107	272.62	0.013	0.24	0.18	0.21	199.2	0.084
22-PC-06	1.61	0.3	21.82	0.451	88.45	0.013	0.54	0.49	0.19	159.4	0.292
22-PC-07	6.32	1.4	27.92	1.854	147.27	0.013	1.6	1.38	0.58	174.5	0.263
22-PC-08	51.97	4.6	29.16	17.222	180.53	0.013	3.97	6.69	1.08	287.9	0.366
22-PC-09	49.02	0.8	37.16	14.205	166.95	0.013	2.4	10.14	0.62	150.8	0.231
22-PC-10	14.65	1.3	41.06	3.341	212.66	0.013	0.63	5.4	0.82	4.8	2.171
22-PC-11	13.87	0.6	24.49	3.7	88.13	0.013	1.29	3.35	0.42	97.9	0.199
22-PC-17	0.82	1.1	21.39	0.206	156.39	0.013	0.76	0.25	0.41	182.3	0.589
22-PC-18	1.52	0.3	17.57	0.417	105.23	0.013	0.85	0.45	0.47	193.9	0.744
22-PC-19	1.04	0.7	25.35	0.221	195.88	0.013	0.45	1.17	0.3	91.6	8.264
22-PC-20	5.12	1.4	23.56	1.453	57.3	0.013	1.31	1.14	0.7	158.2	0.484
22-PC-34	4.94	16	4.59	1.276	68.75	0.013	3.65	0.97	0.57	384.3	0.659
22-PC-35	2.29	1.8	7.49	0.675	16.94	0.013	0.7	0.37	0.35	314.6	0.148
22-PC-36	4.88	0.3	22.44	1.372	146.03	0.013	0.44	1.12	0.34	100.6	0.269
22-PC-37	2.81	2.5	17.49	0.715	147.77	0.013	2.13	0.82	1.09	177.1	0.273

Table 12, *continued*.

Sample No. Units	Tb (ppm)	Th (ppm)	Ti (ppm)	Tl (ppm)	Tm (ppm)	U (ppm)	V (ppm)	W (ppm)	Y (ppm)	Yb (ppm)	Zn (ppm)	Zr (ppm)
Detection Limit:	*0.009*	*0.027*	*8*	*0.004*	*0.005*	*0.01*	*0.4*	*0.05*	*4*	*0.008*	*4*	*4*
22-PC-05	0.075	3.638	62	1.536	0.066	0.62	0.7	0.08	3.81	0.406	7	6
22-PC-06	0.108	13.023	114	0.48	0.064	1.37	0.8	0.05	4.09	0.466	8	65
22-PC-07	0.164	11.423	386	0.851	0.092	1.8	2.8	0.03	5.67	0.616	16	49
22-PC-08	0.45	26.464	1925	1.001	0.103	1.82	18.5	0.05	10.06	0.6	54	307
22-PC-09	0.666	48.447	650	0.97	0.128	2.38	4.7	0.05	9.13	0.823	26	141
22-PC-10	0.431	9.604	37	1.153	0.052	4.51	0.5	0.16	4.86	0.295	9	15
22-PC-11	0.352	29.083	235	0.493	0.108	2.85	2.4	0.06	7.64	0.712	12	45
22-PC-17	0.075	5.963	241	0.903	0.066	3.89	2.3	0.09	3.18	0.478	13	21
22-PC-18	0.088	8.809	235	0.588	0.07	4.32	2.4	0.08	3.14	0.525	16	17
22-PC-19	0.69	5.357	140	1.071	0.669	12.1	1.7	0.13	29.13	4.753	7	4
22-PC-20	0.16	26.73	455	0.329	0.083	3.3	7.2	0.1	5.28	0.564	20	27
22-PC-34	0.123	0.488	1244	0.397	0.066	0.37	26.8	0.03	4.78	0.484	52	58
22-PC-35	0.02	0.914	266	0.09	0.012	0.44	3.4	0.03	0.56	0.125	12	164
22-PC-36	0.142	5.693	118	0.813	0.057	0.85	1.8	0.03	4.19	0.369	8	17
22-PC-37	0.129	3.332	666	0.851	0.067	0.82	4.6	0.06	4.2	0.504	26	187

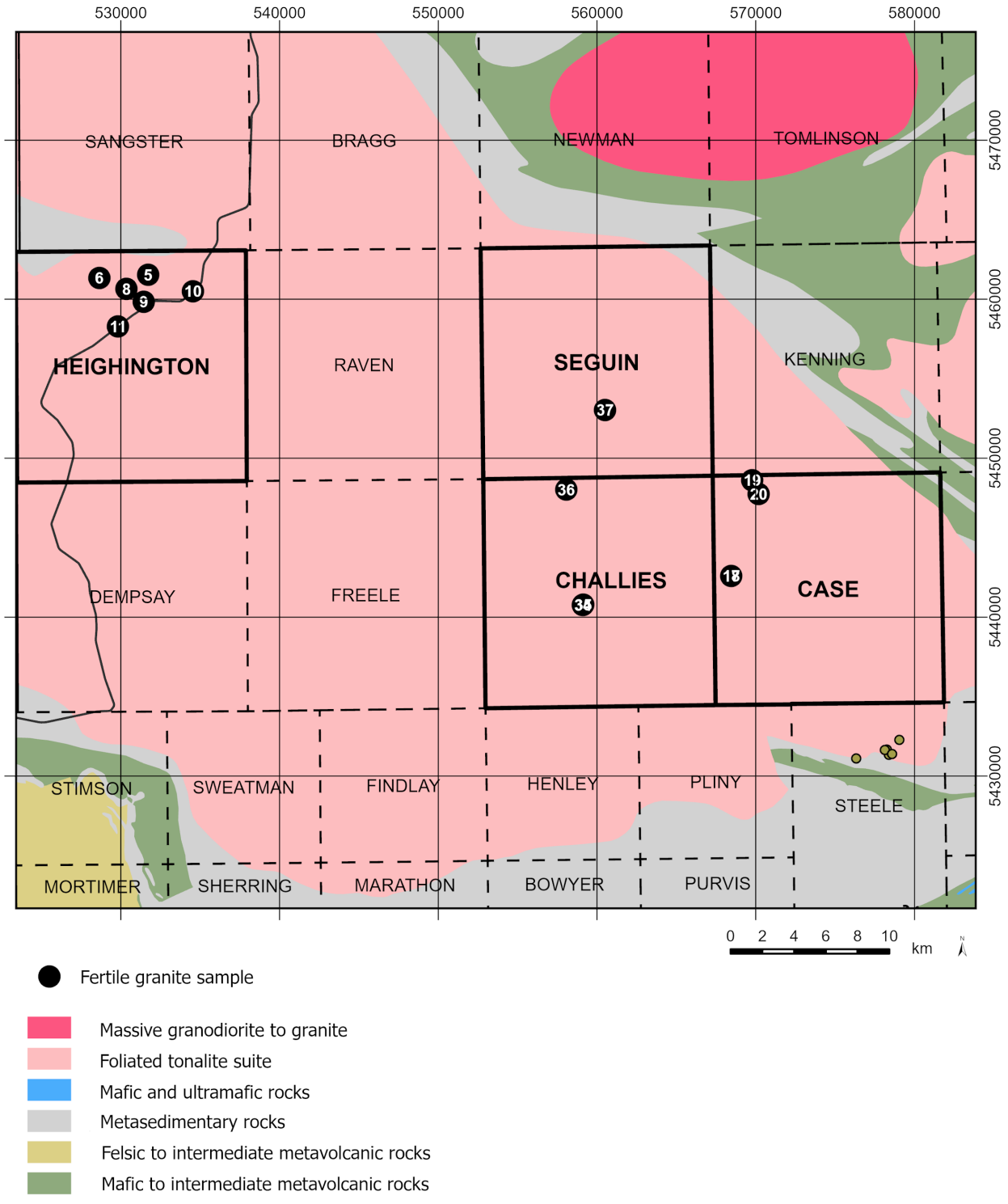

Figure 16. Map of the Case batholith showing geology (*from* Ontario Geological Survey 2011) and sample locations in the Kirkland Lake Resident Geologist District for the 2022 Fertile Parent Granitoid project. Note that some of the sample points overlap. The green circles in northern Steele Township are lithium occurrences (*from* Ontario Geological Survey 2024). Coordinates are in UTM NAD83, Zone 17.

Table 13. Granitic samples collected in 2022. The UTM co-ordinates are provided using North American Datum 1983 (NAD83), Zone 17.

Sample Number	Township	Easting	Northing	Field Description
22-PC-05	Heighington	531086	5460148	very coarse grained; white/pink granite
22-PC-06	Heighington	531045	5460110	very coarse grained; white/pink granite
22-PC-07	Heighington	531045	5460110	very coarse grained; white/pink granite
22-PC-08	Heighington	531076	5460089	very coarse grained; white/pink granite
22-PC-09	Heighington	531108	5460036	medium-grained biotite granite
22-PC-10	Heighington	534545	5460508	roadside outcrop; very coarse-grained granite
22-PC-11	Heighington	529832	5458285	roadside outcrop; coarse-grained biotite granite
22-PC-17	Case	568456	5442594	coarse-grained granite
22-PC-18	Case	568456	5442594	coarse-grained granite
22-PC-19	Case	569784	5448618	very coarse-grained granite
22-PC-20	Case	570186	5447744	poorly developed pegmatite outcrop
22-PC-34	Challies	559111	5440757	coarse crystalline biotite granite
22-PC-35	Challies	559128	5440777	medium crystalline, sugary textured quartz-biotite granite
22-PC-36	Challies	558059	5448018	coarse crystalline granite
22-PC-37	Seguin	560503	5453032	medium crystalline biotite granite

Table 14. Granitic samples collected from the Case batholith in 2022. Calculated major and trace elemental ratios are presented. Values highlighted in bold support high degree of fractionation.

Sample Number	Township	Easting	Northing	A/CNK	Mg/Li	K/Rb	K/Cs	Nb/Ta
22-PC-05	Heighington	531086	5460148	1.07	72.66	297.12	20338.06	**6.90**
22-PC-06	Heighington	531045	5460110	1.07	55.16	308.91	**6703.26**	**4.49**
22-PC-07	Heighington	531045	5460110	1.08	97.52	280.28	**10314.30**	9.81
22-PC-08	Heighington	531076	5460089	1.09	143.91	**242.42**	**10418.07**	19.02
22-PC-09	Heighington	531108	5460036	1.18	87.70	289.12	**12244.34**	12.51
22-PC-10	Heighington	534545	5460508	1.07	**22.01**	**101.58**	**5188.28**	10.82
22-PC-11	Heighington	529832	5458285	1.09	140.26	289.51	**6412.72**	12.01
22-PC-17	Case	568456	5442594	1.08	73.55	**257.87**	**10418.07**	**5.35**
22-PC-18	Case	568456	5442594	1.11	72.52	**259.61**	**6931.54**	**4.91**
22-PC-19	Case	569784	5448618	1.07	**32.78**	**218.73**	**10438.82**	**3.68**
22-PC-20	Case	570186	5447744	1.13	102.08	**230.05**	**3445.02**	9.13
22-PC-34	Challies	559111	5440757	1.03	232.30	**178.83**	**3071.46**	**3.69**
22-PC-35	Challies	559128	5440777	1.01	149.80	357.81	**1556.48**	**5.81**
22-PC-36	Challies	558059	5448018	1.05	**32.39**	**253.63**	**9276.65**	**4.16**
22-PC-37	Seguin	560503	5453032	1.05	134.43	**267.47**	**9816.23**	13.44

The degree of fractionation/evolution of a granite is another important factor to assess the economic potential of bulk samples. In a fertile granite, the degree of fractionation typically increases toward its outer edges. Elemental ratios including Mg/Li, K/Rb, K/Cs and Nb/Ta are excellent fractionation indicators. Ratio values of Mg/Li = 1.7 to 50, K/Rb = 42 to 270, K/Cs = 1600 to 15 400, and Nb/Ta less than 30, are typical for fertile granites. Mg/Li ratios less than 30 indicate a high degree of fractionation whilst primitive fertile granites have moderate Mg/Li ratios of approximately 100 (Černý 1989). Most fractionated samples have Nb/Ta ratios of less than 10. Generally, the lower the elemental ratio value, the higher the degree of fractionation in the granite (Breaks, Selway and Tindle 2003). Table 14 shows that only 2 samples (PC-22-19 and PC-22-36) are in total agreement with the various elemental ratio range of values. Four samples (PC-22-10, PC-22-17, PC-22-18, and PC-22-34) are within the ranges of 3 elemental ratios. The Nb/Ta ratio of < 8.5 has been used as the cut-off to compare the current data with

the fertile Separation Rapids pluton in northwestern Ontario—it has an average Nb/Ta ratio of 4.3 with a range from 0.8 to 8.4 (Breaks and Tindle 1997).

The degree of fractionation of a granite can also be determined from the following rare elements: beryllium, cesium, gallium, lithium, niobium, rubidium, tin, and tantalum. Highly fractionated samples will have high values of some or all of these elements (Breaks, Selway and Tindle 2003). Table 15 compares values returned from the 15 samples to those of the average upper continental crust (Be (3 ppm), Cs (3.7 ppm), Ga (17 ppm), Li (20 ppm), Nb (25 ppm), Rb (112 ppm), Sn (5.5 ppm)) as determined by Taylor and McLennan (1985). The results indicate that samples PC-22-08, PC-22-10 and PC-22-19 contain more elevated rare elements, and therefore, are moderately to strongly fractionated, agreeing with (except for sample PC-22-08) the elemental ratio value results in the above paragraph.

Table 15. Selected indicator element concentrations for determining degree of fractionation in Case batholith samples. Average upper continental crust values from Taylor and McLennan (1985). Sample indicator element values surpassing the average upper continental crust are highlighted in bold.

Sample Number	Township	Easting	Northing	Cs (ppm)	Ga (ppm)	Li (ppm)	Nb (ppm)	Rb (ppm)	Ta (ppm)
Detection Limit				*0.018*	*0.04*	*0.24*	*0.05*	*0.15*	*0.015*
Average upper continental crust values				**3.7**	**17**	**20**	**25**	**112**	2.2
22-PC-05	Heighington	531086	5460148	3.355	14.1	1.66	0.58	**272.62**	0.084
22-PC-06	Heighington	531045	5460110	1.489	16.8	3.28	1.31	88.45	0.292
22-PC-07	Heighington	531045	5460110	3.11	**17.1**	8.04	2.58	**147.27**	0.263
22-PC-08	Heighington	531076	5460089	2.577	**18.8**	**23.05**	6.96	**180.53**	0.366
22-PC-09	Heighington	531108	5460036	3.187	15.2	11.69	2.89	**166.95**	0.231
22-PC-10	Heighington	534545	5460508	**4.776**	**22.9**	2.74	23.5	**212.66**	2.171
22-PC-11	Heighington	529832	5458285	0.915	15.4	5.59	2.39	88.13	0.199
22-PC-17	Case	568456	5442594	2.932	16.5	8.2	3.15	**156.39**	0.589
22-PC-18	Case	568456	5442594	2.24	**18.2**	9.98	3.65	105.23	0.744
22-PC-19	Case	569784	5448618	2.466	9.6	5.52	**30.41**	**195.88**	**8.264**
22-PC-20	Case	570186	5447744	1.491	**17.5**	7.09	4.42	57.3	0.484
22-PC-34	Challies	559111	5440757	2.996	**19.2**	**34.01**	2.43	68.75	0.659
22-PC-35	Challies	559128	5440777	0.334	15.8	9.26	0.86	16.94	0.148
22-PC-36	Challies	558059	5448018	1.396	14.5	9.31	1.12	**146.03**	0.269
22-PC-37	Seguin	560503	5453032	0.895	14.6	16.60	3.67	**147.77**	0.273

CONCLUSION

The 15 rock samples collected from Heighington, Case, Challies and Seguin townships are moderate peraluminous (S-type) granites having the molecular ratio A/CNK ranging from 1.01 to 1.18. The samples show low to high Mg/Li ratios (22.01 to 232.30), and generally low to moderate Nb/Ta ratios (3.68 to 19.02), indicating high to moderate to low degrees of granitic fractionation. The analytical data, although not currently conclusive due to insufficient sampled area; however, demonstrates that the Case batholith contains areas of prospective fertile granites that are worth exploring for economic LCT-pegmatites and their associated rare metals.

RECOMMENDATIONS FOR EXPLORATION

Gold and Copper in Felsic Intrusions of Northern and Central Kirkland Lake District

Note: The following recommendation was originally published as Suma-Momoh (2025).

The gold deposits in the Kirkland Lake and Timmins districts have long been spatially associated with major deformation zones or their subsidiary faults. Most of the gold deposits in these districts are distributed along 2 distinctive but roughly parallel east–west linear trends: the Destor–Porcupine and the Larder Lake–Cadillac deformation zones (Knight 1924, Figure 17). Several researchers have studied the genesis of the gold mineralization along these deformation zones. Among others, Hattori (1993) suggested that the gold deposits in the Kirkland Lake camp are structurally controlled and are spatially associated with an alkalic complex. The deposits display early quartz-carbonate auriferous veins and evidence for a later event that introduced native gold and telluride. Ispolatov et al. (2005) have interpreted the Kirkland Lake camp as an intrusion-related gold system and compared it to epithermal systems even though Robert and Poulsen (1997) argued that the mineralizing event postdates the alkalic complex, and that gold may have been introduced late in the evolution of the Abitibi greenstone belt. Mathieu (2021) suggests that the Kirkland Lake camp may correspond to an orogenic gold system dominated by metamorphic and magmatic fluids derived from deep-seated alkaline magmas.

Moreover, in the Kirkland Lake District, 2 significant gold deposits are located within felsic intrusions: the Kirkland Lake syenitic intrusive complex located in Teck Township (Cooke and Moorhouse 1969, *see* Figure 17), and the Young–Davidson syenite in Powell Township (Sinclair 1982, *see* Figure 17). Despite this, felsic intrusions in the Kirkland Lake District have not gained any serious exploration attention. Regardless of the source of gold in the Kirkland Lake camp (structural, hydrothermal, magmatic or metamorphic), this article seeks to bring attention to key characteristics of intrusions that are associated with gold deposits and are in proximity to major deformation zones which may be relevant to the mineral explorer in the District.

EXAMPLE OF GOLD-BEARING FELSIC TO INTERMEDIATE INTRUSIONS NEAR DEFORMATION ZONES

Both the Kirkland Lake syenitic intrusive complex and the Young–Davidson syenite are located in proximity to the Larder Lake–Cadillac deformation zone. The Kirkland Lake syenitic intrusive complex consists of a three-phase alkalic intrusion, which includes mafic (augite) syenite, syenite, and syenite porphyry (Ispolatov et al. 2008). Whereas the Young–Davidson syenite is a multiphase intrusion that includes different textures: fine to coarse grained, porphyritic, trachytic, massive, and mafic to felsic in composition. All intrusive rocks within the Young–Davidson stock can be classified as alkali-feldspar syenite, syenite or quartz-syenite depending on the relative proportions of quartz to potassium and sodium feldspar (Martin 2012).

In addition to the above intrusions, few other gold occurrences are located within felsic intrusions, such as the Agnico Eagle Mining Limited Upper Beaver gold-copper deposit which is hosted in the Upper Beaver alkalic intrusive complex in proximity to the Victoria Creek deformation zone, a subsidiary to the Larder Lake–Cadillac deformation zone; and Kirkland Lake Discoveries' recently discovered Hurricane Intrusive Zone located between the Misema-Mist Lake fault and the Mulven-Kinabik Lake fault both of which are speculated to be the continuation of the Kirkland Lake Main Break that hosted 7 gold mines in the Kirkland Lake gold camp (*see* Figure 17). The Hurricane has returned up to 4.25 g/t gold and 0.95% copper in grab samples, (https://www.kirklandlakediscoveries.com/kl-east-side [accessed November 21, 2024].

The Upper Beaver deposit is described as below (https://www.agnicoeagle.com/English/exploration/exploration-projects/Upper-Beaver/default.aspx [accessed November 21, 2024]).

> Upper Beaver is a gold-copper deposit that is mainly hosted in the Upper Beaver alkalic intrusive complex and the surrounding basalts it intruded, and is associated with disseminated pyrite and chalcopyrite, and magnetite-sulphide veining associated with strong magmatic-hydrothermal alteration. The mineralization occurs as elongated tabular bodies that strike northeast, dip steeply northwest.

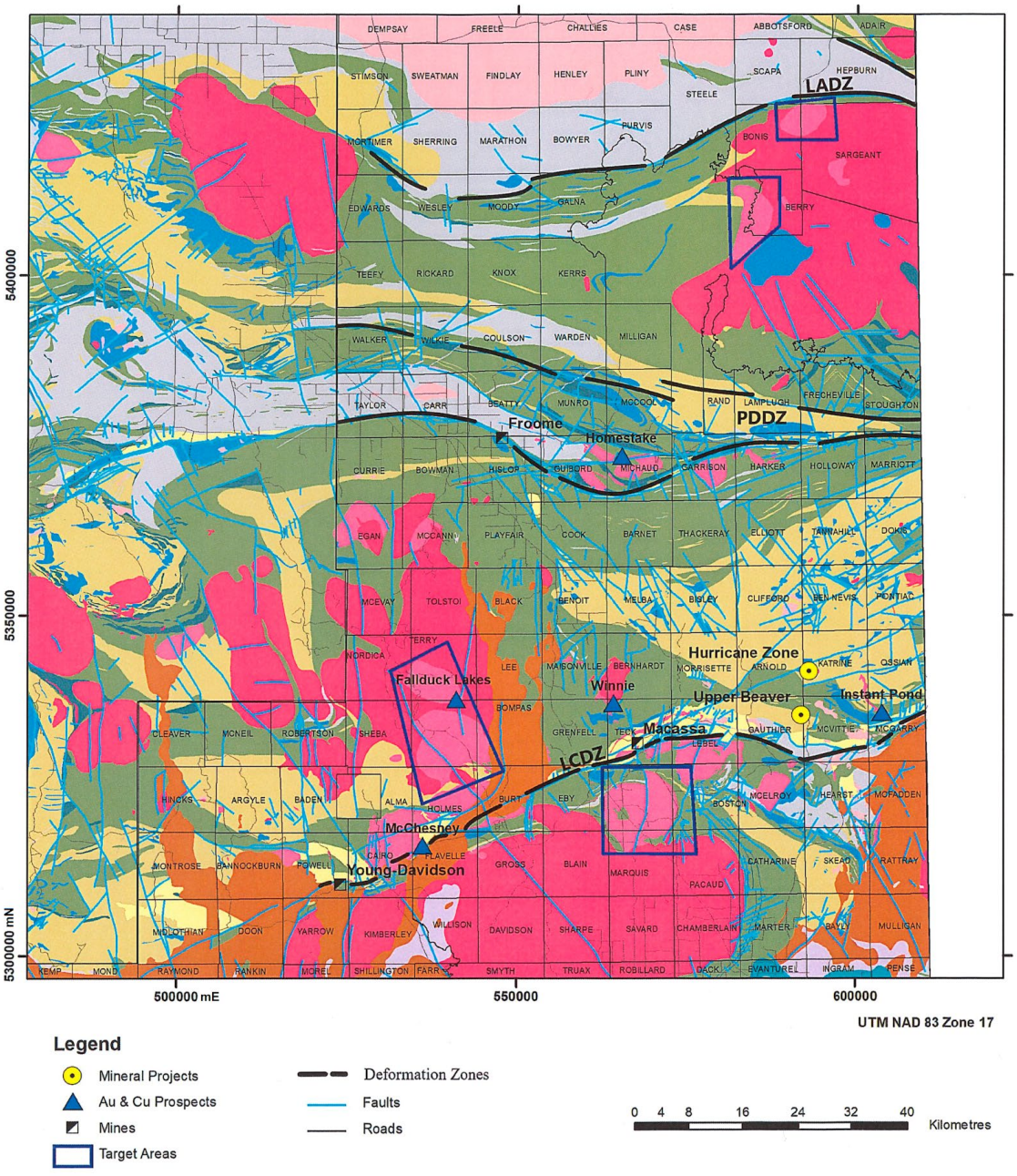

Figure 17. Geology map of central and northern Kirkland Lake District showing recommended exploration targets enclosed by dark blue polygons. Selected gold-copper projects and mineral prospects are also displayed (*from* Ontario Geological Survey 2024). LADZ = Lake Abitibi (Chicobi) deformation zone, PDDZ = Porcupine–Destor deformation zone, LCDZ = Larder Lake–Cadillac deformation zone. *Modified from* Ontario Geological Survey 2011.

Outside the District, gold in felsic to intermediate intrusions have been discovered in the Marmion granitoid batholith at the Hammond Reef project affected by the Hammond Reef shear zone (owned by Agnico Eagle Mines Limited; Thunder Bay South District), and at the Côté Gold deposit near the Rideout deformation zone (currently operated by IAMGOLD Corporation; Timmins District) and its adjacent Gosselin gold zone within the Chester intrusive complex in the Swayze area of the Abitibi greenstone belt. These significant gold occurrences and findings should arouse mineral explorers to consider felsic to intermediate intrusions as possible hosts to gold ores. Côté Gold deposit geology is described as follows (https://www.cotegold.ca/en/geology [accessed November 21, 2024]).

> The Côté Gold deposit is an Archean-aged, low-grade, bulk-tonnage gold (± copper) discovery. It is described as a synvolcanic intrusion-related, stockwork to disseminated gold deposit. Deposits of this type are commonly spatially associated with and/or hosted in intrusive rocks. They include porphyry Cu–Au, syenite-associated disseminated gold, and reduced Au–Bi–Te–W intrusion-related deposits.

SELECTED CHARACTERISTICS TO CONSIDER FOR THE KIRKLAND LAKE DISTRICT

Selected significant geological characteristics for mineralized felsic to intermediate intrusions of the Kirkland Lake District are presented below and may serve as useful guides to target similar intrusions as potential gold-copper hosts in the area.

- The Kirkland Lake alkalic intrusive complex is composed of augite syenite, (felsic) syenite, feldspar porphyry, and quartz-feldspar porphyry. Feldspar porphyry and quartz-feldspar porphyry are the latest of the intrusive phases and host over two-thirds of the gold in the Kirkland Lake camp. Detailed petrography and geochemistry of the feldspar porphyry indicate that it is predominantly a quartz-monzonite (Hicks 1990).
- Disseminated and stringer chalcopyrite and pyrite in altered and sheared syenite have been associated with low-grade gold mineralization in the Kirkland Lake District as exemplified by several trenches and stripped areas north of Highway 66 in Cairo and Flavelle townships. Widely spaced diamond-drill holes and surface sampling returned 0.7 g/t gold and 0.2% copper over intervals up to 99 m from syenite in contact with sheared basalt (Berger 2006; assessment file 2.18159 *see* Larouche 1997).
- Petrography and whole rock lithogeochemistry indicate that moderate to strong sericitic, hematitic, chloritic, potassic, silicification and iron-carbonate alteration in the groundmass, fractures, and/or veinlets is an important marker to gold-copper deposits in the Kirkland Lake District and in other districts in the Abitibi greenstone belt (Berger 2006, Mathieu 2021, Dubé et al. 2024).
- The Kirkland Lake camp deposits have a distinct metal signature in gold-bearing veins (Te > Au, Mo, Pb, Ag, high Au:Ag, low As) and contains several structurally controlled deposits, demonstrating the importance of magmatic fluids in parts of the Abitibi greenstone belt (Ispolatov et al. 2005).
- The normalized multielement spider diagrams for syenite porphyry samples collected from the 144 GAP deposit of the Timmins West complex (2679±1.6 Ma; Timmins District), the Macassa Mine (2676±1.1 Ma), and the Upper Beaver deposit (2678±0.7 Ma) are similar (Figure 18), showing high ratios of light rare earth elements (LREE) relative to heavy rare earth elements (HREE), strong negative Nb, Ta, and Ti anomalies, and the absence of an Eu anomaly, which are characteristic of syn-Timiskaming alkalic/shoshonitic to subalkalic intrusions (Dubé et al. 2024).

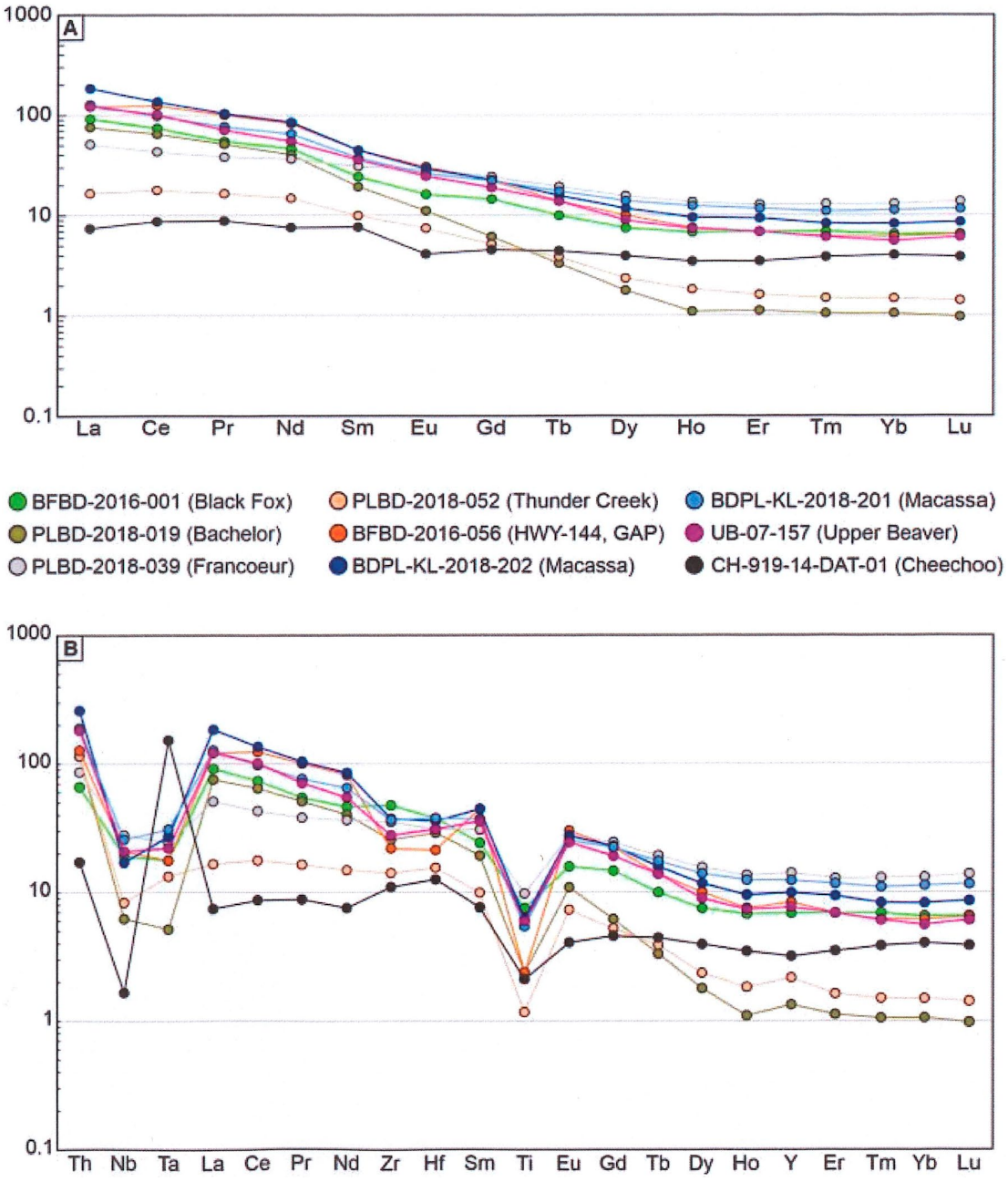

Figure 18. A) Rare earth element diagram, and **B)** multielement (high field strength elements and rare earth elements) diagram. Normalized to C1 chondrite values from McDonough and Sun (1995). Figure *from* Dubé et al. 2024.

RECOMMENDATION

Based on the above characteristics, 4 geographic locations available for registration have been outlined for consideration (dark blue polygons on Figure 17). These areas contain felsic intrusions in the vicinity of the deep-seated deformation zones: Larder Lake–Cadillac and the lesser explored east-trending Lake Abitibi (Chicobi) deformation zones (*see* Figure 17). The above-listed geologic characteristics and geochemical signatures of mineralized felsic intrusions may not only help guide the mineral explorer to prospective targets but also help reduce exploration costs, for example, by reducing the need for unnecessary diamond drilling.

OGS ACTIVITIES AND RESEARCH BY OTHERS

Ontario Geological Survey Activities

There was an extensive amount of field work in progress covering the Kirkland Lake District during 2024 as reported in the Ontario Geological Survey's *Summary of Field Work and Other Activities, 2024* (Ontario Geological Survey 2024). Following are brief descriptions of the projects.

The multiyear bedrock geology mapping project within the Temagami greenstone belt was initiated in 2019 by the ERGMS and described by MacDonald (2019), and updated by MacDonald and Kamo (2021), and MacDonald 2023. The objectives of the project are four-fold as described by MacDonald (2024): to update township-scale bedrock geology maps; to investigate the geological architecture; to seek correlation with Abitibi greenstone belt chronostratigraphic episodes; and to perhaps document geological controls on mineralization.

The multiyear reconnaissance bedrock geological mapping project in Van Hise, Haultain, and Nicol townships was initiated in 2023 by the Earth Resources and Geoscience Mapping Section (ERGMS) and described by Walker (2023). The project was initiated in response to a rise of interest in critical minerals, such as cobalt, in addition to the ongoing discoveries of gold in the Gowganda area. The main goal is to produce a unified 1:20 000 scale bedrock map. The project also aims to identify previous unmapped lithologies; gather information on the Proterozoic silver mineralization, identify alteration and deformation zones potentially associated with gold mineralization, and to examine the geological relationships between the Shining Tree area and the project area (personal communication with J. Walker).

Hastie and MacDonald (2024) have initiated a 5 year Timmins–Kirkland Lake compilation mapping project. The goal is to produce camp-scale bedrock maps (1:50 000 scale) covering the Timmins and Kirkland Lake area that include all the significant gold-producing mines and developed prospects which have never been published publicly. The project has 3 main components: compile historical maps, data and maps produced by companies, and confirm these compilations with bedrock mapping and field work; collect and analyse samples for major and trace element geochemistry and petrography from surface, underground workings and drill core; and collect and analyze key samples for geochronology from surface, underground workings and drill core. The Kirkland Lake compilation area will cover approximately 18 townships. During the 2024 field season, preliminary reconnaissance was performed on townships bordering the Timmins compilation area and throughout the Kirkland Lake compilation area. The second half of the project will focus on the Kirkland Lake compilation area, as described by Hastie and MacDonald (2024).

Academic Research

LAURENTIAN UNIVERSITY, LAVAL UNIVERSITY AND AGNICO EAGLE MINES RESEARCH INITIATIVE

The Upper Beaver research initiative is a Natural Sciences and Engineering Research Council (NSERC) grant led by Laurentian University, University of Laval and Agnico Eagle Mines Ltd. A total of 3 PhD research projects are currently ongoing as part of the Upper Beaver research project in the Kirkland Lake–Larder Lake mining camp. Chadwick et al. (2024) gives a description of the research projects. In addition are 2 BSc projects focussing on the multi-element analysis of copper showings through biogeochemistry (by B. Carragher, Queens University); and the geochemistry and petrography of regional intrusions around Upper Beaver deposit (Laval University). Other research projects within the camp include

- alteration chemistry at the Amalgamated Kirkland (AK) deposit (BSc. project, Laurentian University)
- geology of the Bidgood deposit (MSc. project Laurentian University)
- structural geology of the Amalgamated Break and Larder Lake Break
- studies on the Macassa deposit and the nature of the Timiskaming basin (2 post-doctoral projects)

These projects are funded by NSERC industry grants undertaken by Laval University, Laurentian University and Agnico Eagle Mines Ltd (personal communication with J. Sutton, January 2025).

UNIVERSITY OF TORONTO

Jennifer Cann completed a BSc Honours thesis project on the Main Dyke which is part of the Case pegmatite property in Steele Township owned by Power Metals Corp. The research focussed on the analysis of whole rock and mineral separate geochemistry to interpret the evolution of the Main Dyke pegmatite. Case pegmatite property is located in Steele Township, Kirkland Lake District.

MINERAL DEPOSITS NOT BEING MINED

Table 16 Presents a summary of mineral deposits for a variety of commodities that are not currently being mined. These deposits have either historical or NI 43-101–compliant reserves and resources.

Table 16. Mineral deposits not being mined in the Kirkland Lake Resident Geologist District in 2024.

Abbreviations

AF ..... Assessment Files
CMH ..... Canadian Mines Handbook
GR ..... Geological Report
MDC ..... Mineral Deposit Circular [No.15–]
[formerly Mineral Resources Circular, No.1-14]
MDIR..... Mineral Deposit Inventory record
PC ..... Personal communication
PR ..... Press Release
U/G ..... Underground
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 MDI32D04SW00336	Historical Indicated Resource (2004): 327 000 t @ 4.1 g/t Au	Agnico Eagle Mines Ltd., CMH 2015-2016, p.27-29	Queenston Mining Inc., Website, Feb. 4, 2013	Inactive
95-2 (Lundy)	Diamond MDI31M12SW00017	Inferred Mineral Resource (year unknown): 20.2 million t @ 11.3 carats/100 t	Ashton Mining of Canada Inc. (20%) and North Arrow Minerals Inc. (80%) (Claim 1202724 Abstract, Dec. 17, 2015)	NI 43-101 report for Stornoway Inc., Nov. 28, 2012	Inactive
Adams (Boston, Lebel)	Fe MDI32D04SW00013	Historical Resource (1990): 19 398 300 t @ about 26% iron	Unknown	Unknown	Inactive
Amalgamated Kirkland (AK) (Teck)	Au MDI42A01NE00184	Probable Mineral Reserve (2023) 742 000 t @ 6.69 g/t Au Indicated Mineral Resource (2023): 163 000 t @ 6.95 g/t Au Inferred Mineral Resource (2023): 282 000 t @ 5.69 g/t Au	Agnico Eagle Mines Ltd., Website, Dec. 25, 2025	Agnico Eagle Mines Ltd., Website, Feb. 3, 2025	Active
Barber Larder (McGarry)	Au MDI32D04SE00043	Historical Resource (year unknown): 60 000 tons of 0.16 oz per ton Au	OreCap Investment Corp., Website, Dec. 29, 2023	CMH 1990–1991, p.416-417	Inactive
Bidgood (Lebel)	Au MDI32D04SW00073	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., CMH 2020, p.26-28	Queenston Mining Inc., PR, Oct. 17, 2011	Inactive
Big Agaunico (Bucke)	Co MDI31M05NE00018	Historical Indicated Resource (year unknown): 100 000 tons @ 0.5% Co	Unknown	CMH 1982–1983, p.320	Inactive
Blue Quartz (Beatty)	Au MDI42A09SW00130	Historical Resource (1962): 128 000 tons of 0.86 oz per ton Au	McLaren Resources Inc. (50%), Orla Mining Ltd. (50%), CMH 2020, p.252	Red Mile Minerals Corp., NI 43-101, Sept. 21, 2010	Inactive
Buffonta (Garrison)	Au MDI32D05N00009	Historical Resource (1997): 407 000 tons @ 5.00 g/t Au	Moneta Gold Inc. Inc., DigiGeoData, Website, Dec. 29, 2023	Osisko Mining Inc., NI 43-101, Mar. 3, 2014 submitted to Northern Gold Mining Inc.	Inactive
Canamax (Holloway)	Au MDI32D12SE00008	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	Agnico Eagle Mines Ltd., (part of Holt Complex) PR, Sep. 28, 2021	Agnico Eagle Mines Ltd., Website, Dec. 29, 2023	Inactive
Clenor (Strathy)	Au, Ag MDI31M04SW00088	Historical Resource (year unknown): 24 000 tons of 0.21 oz per ton Au, 1.8 oz per ton Ag	Gwen Resources Ltd., CMH 1997-98, p.220	GR 163	Inactive

Deposit Name (Township)	Commodity MDI No.	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Commodore (Lebel)	Au MDI32D04SW00039	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., CMH 2020, p.26-29	AF KL-4447	Inactive
Creek Zone (Hislop)	Au MDI42A08NW00142	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), PR, Oct. 14, 2017	CMH 2015–2016, p.412	Inactive
Diadem – part of Milestone (Strathcona)	Cu, Ni MDI31M04SW00077	Historical Resource (year unknown): 500 000 tons of 0.5% Cu, 0.1% Ni to 400 feet	Northstar Gold Corp., Website, Dec. 29, 2023	MDC No.12	Active
Duggan Zone (Knight)	Au MDI41P11NE000023	Historical Resource (year unknown): 1.01 million tonnes @ 2.40 g/t Au	OreCap Investment Corp., Website, Dec. 29, 2023	MDIR 41P11NE00023	Inactive
Eastmaque (Teck)	Au MDI42A01NE00043	Historical Resource (year unknown): 2 132 500 tons of tailings of 0.035 oz per ton Au	Unknown	CMH 1991–1992, p.142	Inactive
Fenn-Gib (Guibord)	Au MDI42A08SE00121	Indicated Mineral Resource (2023): 113 687 000 t @ 0.93 g/t Au Inferred Mineral Resource (2022): 5 724 000 t @ 0.85 g/t Au	Mayfair Gold Corp., Website, Dec. 29, 2023	Mayfair Gold Corp., Website, Dec. 29, 2023	Active
Fort Knox (Fawcett)	Cu, Ni MDI41P11SE00074	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., CMH 2012–2013, p.458	CMH 2012–2013, p.458	Inactive
Grey Fox (Hislop)	Au MDI42A09SW01430	Indicated Mineral Resource (2024): 13 135 000 t @ 3.64 g/t Au Inferred Mineral Resource (2024): 4 319 000 t @ 3.30 g/t Au	McEwen Mining Inc., Website, Feb. 3, 2025	McEwen Mining Inc., PR, Feb. 4, 2025	Active
Gold Pike (Hislop)	Au MDI42A09SW00033	Historical Resource (1988): 200 000 tons @ 0.09 oz per ton Au	Unknown	Alban Exploration, PR, Apr. 27, 1988	Inactive
Golden Harker (Harker, Holloway)	Au MDI32D05NW00159	Historical Resource (1988): 241 436 tons of 0.178 oz per ton Au	Unknown	CMH 2010–2011, p.329	Inactive
Golden Tower – Golden Highway (Michaud)	Au MDI42A08NE00030 MDI42A08NE00038 MDI42A08NE00158 MDI42A08NE00175 MDI42A08NE00036	South West (SW)–UG Indicated Mineral Resource (2022): 211 000 t @ 4.53 g/t Au Inferred Mineral Resource (2022): 6 725 000 t @ 4.26 g/t Au South West (SW)–Pit Indicated Mineral Resource (2022): 16 676 000 t @ 0.90 g/t Au Inferred Mineral Resource (2022): 45 470 000 t @ 1.01 g/t Au Windjammer South (WJS)–Pit Indicated Mineral Resource (2022): 42 049 000 t @ 0.78 g/t Au Inferred Mineral Resource (2022): 29 101 000 t @ 0.96 g/t Au Windjammer South (WJS)–UG Inferred Mineral Resource (2022): 704 000 t @ 4.16 g/t Au Westaway (WA)–Pit Indicated Mineral Resource (2022): 750 000 t @ 2.20 g/t Au Inferred Mineral Resource (2022): 22 106 000 t @ 1.95 g/t Au Westaway (WA)–U/G Inferred Mineral Resource (2022): 2 349 000 t @ 4.23 g/t Au Windjammer Central–Pit	STLLR Gold Inc., Website, Feb. 3, 2025	STLLR Gold Inc., NI 43-101 RPT Nov. 29, 2022	Active

Deposit Name (Township)	Commodity MDI No.	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
		Indicated Mineral Resource (2022): 28 498 000 t @ 0.63 g/t Au Inferred Mineral Resource (2022): 77 834 000 t @ 0.64 g/t Au "55" Zone–Pit Indicated Mineral Resource (2022): 4 780 000 t @ 1.30 g/t Au Inferred Mineral Resource (2022): 4 266 000 t @ 1.01 g/t Au "55" Zone–UG Inferred Mineral Resource (2022): 150 000 t @ 3.95 g/t Au Discover (Disc)–Pit Indicated Mineral Resource (2022): 3 244 000 t @ 1.20 g/t Au Inferred Mineral Resource (2022): 5 767 000 t @ 0.85 g/t Au Discover (Disc)–U/G Inferred Mineral Resource (2022): 326 000 t @ 3.97 g/t Au			
Golden Tower, Garrison (Garrison)	Au MDI32D12SW00004 MDI32D12SW00044	903 Zone–Pit Indicated Mineral Resource (2022): 18 090 000 t @ 1.01 g/t Au Inferred Mineral Resource (2022): 24 127 000 t @ 0.75 g/t Au Garrcon–Pit Indicated Mineral Resource (2022): 26 787 000 t @ 1.01 g/t Au Inferred Mineral Resource (2022): 971 000 t @ 0.83 g/t Au Garrcon – U/G Indicated Mineral Resource (2022): 590 000 t @ 4.82 g/t Au Inferred Mineral Resource (2022): 1 466 000 t @ 5.22 g/t Au Jonpol – Pit Indicated Mineral Resource (2022): 8 898 000 t @ 1.34 g/t Au Inferred Mineral Resource (2022): 4 962 000 t @ 0.94 g/t Au	STLLR Gold Inc., Website, Feb. 3, 2025	STLLR Gold Inc., NI 43-101 RPT Nov. 29, 2022	Active
Gowganda Silver (Haultain)	Ag MDI41P10NE00009	Indicated Mineral Resource (2011):Tailings: 1 937 520 t @ 47.5 g/t Ag	Unknown	Brixton Metals Corp., PR, Dec. 19, 2016	Inactive
Hare Lake (Tyrrell)	Au MDI41P11NE00024	Historical Resource (year unknown): 600 000 t @ 6 g/t Au	Unknown	Goldeye Explorations Ltd., PR, Nov. 5, 2002	Inactive
Hislop (Hislop)	Au MDI42A08NW00154	Proven and Probable Mineral Reserve (2019): 176 000 t @ 5.8 g/t Au Measured and Indicated Mineral Resource (2020): 1 337 000 t @ 4.0 g/t Au Inferred Mineral Resource (2020): 804 000 t @ 3.8 g/t Au	Agnico Eagle Mines Ltd., Website, Dec. 29, 2023	Kirkland Lake Gold Ltd., Website, Jan. 11, 2022	Inactive
Holt Complex (Holt, Taylor & Holloway mines)	Au MDI32D12SE00005 MDI32D12SE00002 MDI42A10SE00066	Proven and Probable Mineral Reserve (2019): 5 432 000 t @ 4.0 g/t Au Measured and Indicated Mineral Resource (2023): 11 690 000 t @ 4.52 g/t Au Inferred Mineral Resource (2023): 9 097 000 t @ 4.48 g/t Au	Agnico Eagle Mines Ltd., Website, Jan. 25, 2025	Kirkland Lake Gold Ltd., Website, Jan. 10, 2023	Inactive
Iris (Harker)	Au, W MDI32D05NW00021	Historical Resource: 769 756 tons of 0.07 oz per ton Au	Unknown	AF KL-3170	Inactive
Juby Gold (Tyrrell)	Au MDI41P10SW00013 MDI41P11NE00024	Juby Main & Golden Lake Zones Indicated Mineral Resource (2020): 20 238 000 t @ 1.12 g/t Au	Aris Gold Corp., Website, Jan. 2, 2024	Aris Gold Corp., NI 43-101, Oct. 5, 2020	Inactive

Deposit Name (Township)	Commodity MDI No.	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
		Inferred Mineral Resource (2020): 41 515 000 t @ 0.99 g/t Au Hydro Creek-LaCarte Zone Indicated Mineral Resource (2020): 1 072 000 t @ 1.31 g/t Au Hydro Creek-LaCarte and Big Dome Zones Inferred Mineral Resource (2020): 5 631 000 t @ 0.93 g/t Au		submitted to Caldas Gold Corp.	
Kanichee (Strathy)	Cu, Ni, Au, Ag, PGE MDI31M04SW00022	Historical Drill Proven and Indicated Resource (year unknown): 2 062 505 tons of 0.412% Cu, 0.257% Ni	Progenitor Metals Corp., PC	Northern Platinum Ltd., CMH 1989-1990, p.346	Inactive
Kerr–Addison (McGarry)	Au MDI32D04SE00011	Indicated Mineral Resource (2023): 32 500 000 t @ 1.70 g/t Au Inferred Mineral Resource (2023): 79 100 000 t @ 1.32 g/t Au	Gold Candle Ltd., PC	Gold Candle Ltd., NI 43-101, Apr. 30, 2023	Active
Kerrs (Kerrs)	Au MDI000000001443	Inferred Mineral Resource (2011): 7 041 460 t @ 1.71 g/t Au	First Class Metals PLC. Feb 3, 2025	Sheltered Oak Resources Inc., NI 43-101, Jun. 10, 2011	Inactive
Kokoko (Chambers, Cynthia)	Fe MDI31M04SW00096	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
Larder Project (McGarry, McVittie, Gauthier)	Au MDI32D04SE00077 MDI32D04SE00019	Bear (SW) – UG Indicated Mineral Resource (2021): 487 000 t @ 6.90 g/t Au Inferred Mineral Resource (2021): 3 148 000 t @ 5.21 g/t Au Cheminis – Pit Indicated Mineral Resource (2021): 1 616 000 t @ 1.64 g/t Au Inferred Mineral Resource (2021): 340 000 t @ 0.82 g/t Au Cheminis – U/G Indicated Mineral Resource (2021): 741 000 t @ 3.63 g/t Au Inferred Mineral Resource (2021): 1 704 000 t @ 1.10 g/t Au Fernland–Pit Indicated Mineral Resource (2021): 2 211 000 t @ 1.46 g/t Au Inferred Mineral Resource (2021): 431 000 t @ 1.23 g/t Au Fernland – U/G Indicated Mineral Resource (2021): 78 000 t @ 4.25 g/t Au Inferred Mineral Resource (2021): 1 267 000 t @ 3.41 g/t Au	MAG Silver Corp., Website, Jan. 03, 2024	Gatling Exploration Inc., NI 43-101, Sept. 2, 2021	Inactive
Leckie (Strathy)	Au MDI31M04SW00090	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., PC	CMH 2000-2001, p.372	Inactive
Ludgate (Michaud, Guibord, Garrison)	Au MDI42A08NE00159	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	Unknown	Kirkland Lake Gold Ltd., PR, Feb. 20, 2018	Inactive
Martin-Bird (Hearst)	Au MDI32D04SE00143	Historical Resource (year unknown): 558 000 tons of 0.114 oz per ton Au	Unknown	AF KL-3752	Inactive
Matona (Tyrrell)	Au MDI41P11NE00014	Historical Resource (year unknown): 27 000 t @ 13.2 g/t Au	Unknown	MDIR 41P11NE00014	Inactive

Deposit Name (Township)	Commodity MDI No.	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
McBean–Anoki (Gauthier)	Au MDI32D04SW00060 MDI32D04SW00069	Indicated Mineral Resource (2023): 3 919 000 t @ 2.77 g/t Au Inferred Mineral Resource (2023): 867 000 t @ 3.84 g/t Au	Agnico Eagle Mines Ltd., Website, Jan. 25, 2025	Agnico Eagle Mines Ltd., Website, Jan 03, 2024	Active
McGarry (McGarry)	Au MDI32D04SE00013	Indicated Mineral Resource (2011): 447 000 t @ 8.57 g/t Au (uncut) Inferred Mineral Resources (2011): 157 000 t @ 5.83 g/t Au (uncut)	OreCap Investment Corp., Website, Jan. 03, 2024	Armistice Resources Corp., NI 43-101, Sept. 2011	Inactive
Mikwam (Noseworthy)	Au MDI32E05NE00004	Inferred Mineral Resource (2016): 1 810 000 t @ 2.34 g/t Au	Aurelius Minerals Inc., Website, Jan. 03, 2024	Aurelius Minerals Inc., NI 43-101, Dec. 8, 2016 submitted to Galena International Resources Ltd.	Inactive
Minto (Tyrrell)	Au MDI41P10NW00006	Historical Resource (1984): 225 000 t 6.9 g/t Au	OreCap Investment Corp., Website, Jan. 03, 2024	MDIR 41P10NW00006	Inactive
Mirado (Catharine)	Au MDI32D04SW00004	Indicated Mineral Resource (2018): Pit : 559 000 t @ 2.61 g/t Au Inferred Mineral Resource (2018): Pit: 382 000 t @ 2.66 g/t Au	OreCap Investment Corp., Website, Jan. 03, 2024	OreCap Investment Corp., Website, Jan. 03, 2024	Inactive
Omega (McVittie)	Au MDI32D04SE00017	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. 03, 2024	Mistango River Resources Inc., PR, Jan. 24, 2023	Inactive
Potter (Munro)	Cu, Zn, Ag, Au, Co MDI42A09SE00015	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., SEDAR+ Home Page, Jan. 10, 2023	CMH 2018–2019, p.271	Inactive
Ramp/Maude Lake Property (Beatty, Carr, Coulson & Wilkie)	Au MDI42A09SW00133	Historical Resource (1994): 813 tons of 0.235 oz per ton Au	Transition Metals Corp., Website, Jan. 03, 2024	CMH 1997-1998, p.291	Inactive
Ross (Hislop)	Au MDI42A08NW00005	Historical Resource (1989): 1 055 000 tons of 0.125 oz per ton Au	Unknown	CMH 1989–1990, p.188	Inactive
Ryan Lake (Powell)	Cu, Mo MDI41P15NE00015	Indicated Mineral Resource (2008): 5 969 917 t @ 0.34% Cu, 0.039% Mo, 0.09 g/t Au, 5.0 g/t Ag	Unknown	CMH 2012–2013, p.505	Inactive
Sherman Mine (Chambers, Strathcona, Strathy)	Fe MDI31M04SW00025	Historical Reserves (1995): 5 million tonnes @ 18% Fe	Progenitor Metals Corp., PC	The Nugget, Jul. 23, 1995	Inactive
Stairs (Midlothian)	Au MDI41P14NE00011	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	Unknown	MDC No. 18, p.158-159	Inactive

Deposit Name (Township)	Commodity MDI No.	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Teck Hughes (Teck)	Au MDI42A01NE00020	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	Agnico Eagle Mines Ltd. DigiGeoData, Website, Jan. 03, 2023	CMH 2003–2004, p.270	Inactive
Temagami Copper (Phyllis)	Cu, Ni MDI41I16NE00004	Historical Resource (year unknown): 2 540 117 t @ 1.00% Cu, 0.6% Ni, 01.% Co	Unknown	MDC No. 12, p.201	Inactive
Tillex (Currie, Bownman)	Cu MDI42A10SE00055	Historical Resources (1990): 1 338 000 t @ 1.56% Cu	Metals Creek Resources Corp., Website, Jan. 03, 2024	Metals Creek Resources Corp., Website, Jan. 03, 2024	Inactive
Tyranite (Tyrrell, Knight)	Au MDI41P11NE00013	Historical Resource (year unknown): 520 000 t @ 6.9 g/t Au	OreCap Investment Corp., Website, Jan. 03, 2024	MDIR 41P11NE00013	Inactive
Upper Beaver (Gauthier)	Au, Cu MDI32D04SW00068	Probable & Probable Mineral Reserve (2024): U/G: 7 992 000 t @ 0.25% Cu, 5.43 g/t Au Indicated Mineral Resource (2024): U/G: 27 550 000 t @ 0.24% Cu, 3.66 g/t Au Inferred Mineral Resource (2024): U/G: 2 959 000 t @ 0.36% Cu, 4.13 g/t Au	Agnico Eagle Mines Ltd., Website, Jan. 23, 2025	Agnico Eagle Mines Ltd., PR. July 31, 2024	Active
Upper Canada (Gauthier)	Au MDI32D04SW00057	Indicated Mineral Resource (2023): Pit: 2 006 000 t @ 1.62 g/t Au U/G: 8 433 000 t @ 2.28 g/t Au Inferred Mineral Resource (2020): Pit: 1 020 000 t @ 1.44 g/t Au U/G: 17 588 000 t @ 3.21 g/t Au	Agnico Eagle Mines Ltd., Website, Jan. 23, 2025	Agnico Eagle Mines Ltd., Website, Dec. 31, 2023	Active
Victoria Creek (Gauthier)	Au MDI32D04NW00043	Historical Mineral Resource (year unknown): 1 342 000 t @ 5.12 g/t Au	Agnico Eagle Mines Ltd., CMH 2020, p.26-29	Queenston Mining Inc. Website, Jan. 27, 2012	Inactive
Vimy (Hislop)	Au MDI42A08NW00105	Historical Mineral Resource (year unknown): 18 144 t @ 7.2 g/t Au	Unknown	MDIR 42A08NW00105	Inactive

REGIONAL LAND USE GEOLOGIST ACTIVITIES—NORTHEAST REGION

Land Use Planning Activities

The northeast Regional Land Use Geologist (RLUG), 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 2024, the northeast Regional Land Use Geologist position was staffed from January through December by Pierre Bousquet, *P.Geo*. The Land Use Planning and Policy Co-ordinator is the province-wide lead of the land use geology program. That position was held in 2024 by Catherine Daniels, *P.Geo.*, from January until October 27, and Peter LeBaron, *P.Eng*., from October 28 until the end of year.

The boundaries of the Regional Land Use Geologists' regions are indicated on Figure 19.

Figure 19. 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 2024, the 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 Mines (MINES) is responsible for all geoscience mapping within the province and administers mineral exploration and development under the *Mining Act*. The Ministry of Natural Resources (MNR) is responsible for mineral aggregate extraction under the *Aggregate Resources Act*, in addition to being responsible for mapping and regulating many other natural resource features and activities.

The Ministry of Mines, through the Regional Land Use Geologist, engages with the other Ministries 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.

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*.

In 2024, 1 minor amendment concerning Sudbury Forest 2020–2030 Management Plan was reviewed.

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 MNR Natural Resources Information Portal (https://nrip.mnr.gov.on.ca/s/fmp-online).

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.

Across the Far North, many First Nation communities are engaged with Ontario in community-based land-use planning. Together, the planning teams composed of First Nations and Ontario representatives 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, in 2024, MINES provided information to support the Community Based Land Use Planning Teams for Constance Lake and Moose Cree First Nations.

Withdrawal Orders

Other work related to Crown land use in the northeast region may include reviews of applications for withdrawal of lands from claim registration 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 2024, 3 applications to withdraw Crown mining rights in the northeast region were received and reviewed.

Approved withdrawals are posted on the MINES Web site (Land Notices, Withdrawals and Reopenings (gov.on.ca)).

MUNICIPAL AND PRIVATE LANDS

The Ministry of 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 modified and changes came into effect October 20, 2024. There were no revisions in 2024 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, the Regional Land Use Geologist 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 and/or 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 MINES.

In 2024, the northeast Regional Land Use Geologist provided maps, comments and other input as required for municipal planning activities that included

- 22 consent (severance) and plan of subdivision and/or condominium applications in 3 single-tier municipalities and 7 unorganized geographic townships or areas
- 6 Official Plans and related planning initiatives (such as Official Plan amendments, zoning by-laws, and minor variances) in 1 community
- 8 new draft Official Plans or Official Plan updates

The municipalities involved in these planning initiatives are listed in Table 17.

Table 17. Municipal planning initiatives with MINES input, northeastern Ontario, 2024.

Consent (Severance) and Subdivision Applications
Consent, Mattawan Twp, East Nipissing Planning Board (2)
Consent, Maisonville, Unincorporated Township (2)
Consent, Lebel, Unincorporated Township
Consent, Knicely, Unincorporated Township
Consent, Tarbutt Additional, Desbarats to Echo Bay Planning Board
Consent, Tarbutt, Desbarats to Echo Bay Planning Board
Consent, Harris, Unincorporated Township
Consent, Otto, Unincorporated Township (2)
Consent, Eby, Unincorporated Township
Consent, Grenfell, Unincorporated Township (2)
Consent, Robb, City of Timmins (3)
Consent, Tisdale, City of Timmins
Consent, Godfrey, City of Timmins
Consent, Mountjoy, City of Timmins
Consent, Matheson, City of Timmins
Subdivision, Tisdale, City of Timmins

Completed/Draft/Reviewed Official Plans
Draft Official Plan, Municipality of Huron Shores
Official Plan review, Town of Blind River
Official Plan, Town of Cobalt
Official Plan review, Town of Moonbeam
Official Plan review, Sault Ste. Marie North Planning Area
Official Plan review, West Nipissing
Official Plan review, Township of Coleman
Official Plan review, Town of Mattawa

Official Plan–Related Initiatives
Zoning by-law amendment, City of Timmins (6)

Additional Municipality Related Activities Undertaken in 2024
Information, Bucke, Temiskaming Shores
General guidance, Tisdale, City of Timmins
Site Plan Control, Whitney, City of Timmins

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 2024, no applications were received.

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 2 Aboriginal Title Claim areas.

Other Activities

The northeast Regional Land Use Geologist accompanied other RGP staff on 2 general interest field trips in 2024, as well as undertaking additional activities as outlined in the following sections.

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.

In 2024, 3 Class EAs were received for comment.

ENVIRONMENTAL REGISTRY

The Environmental Registry of Ontario (ERO) is an online resource that contains public notices about environmental matters being proposed by all Ontario government ministries covered by the Environmental Bill of Rights. The public notices contain information about proposals including new acts, regulations, policies and programs; plans to change or eliminate existing ones; and plans to issue permits for a wide range of activities across Ontario.

The northeast Regional Land Use Geologist sifts through the Environmental Registry and creates a spreadsheet for other workers of the ministry and other ministries for any items that would regard land-use planning under the geology lens on a monthly basis.

In 2024, most of the ERO postings relevant to northeastern Ontario were related to aggregate licences issued under the *Aggregate Resources Act*, notices of approval or amendments to Municipal Official Plans, Minister's Zoning Orders, and Provincial Park management, not requiring comments by the Regional Land Use Geologist.

Other province-wide items included postings regarding modernizing Ontario's environmental assessment program, regulatory amendments for increased soil reuse, support for building homes and transit faster,

review of proposed policies for a new provincial planning policy instrument, cutting red tape to build more homes, changes to the *Aggregate Resources Act*, expanding protected areas in Ontario, regulation of commercial-scale geologic carbon storage projects, and reducing gridlock.

POLICY AND GUIDANCE

In July 2024, the Regional Land Use Geologists provided comments to the Land Use Planning and Policy Co-ordinator on proposed amendments to the Provincial Planning Statement with respect to possible impact on MINES land use planning interests. The new Provincial Policy Statement came into effect on October 20, 2024.

CONFERENCES AND OUTREACH ACTIVITIES

In 2024, the northeast Regional Land Use Geologist attended or participated in the following events.

In person:

- 2024 Resident Geologist Program Health and Safety and Field Training Week in Belleville and Tweed, including an introduction to Tweed and Madoc area geology.
- Northeast Ontario Mines and Minerals Symposium – conference in Timmins.
- Organization for Economic Co-operation and Development – Mining Regions Conference in Sudbury with field trip.

Virtual meetings and conferences:

- Ontario Geological Survey Virtual Showcase 2024 – a series of technical presentations over 3 days featuring results of geoscience projects in progress by the Ontario Geological Survey, summaries of activities in all districts of the Resident Geologist Program, and updates on OGS data sets and online applications. A presentation titled “Natural Geological Hazards and Land Use Planning” was created and presented by the Regional Land Use Geologists. The northeast Regional Land Use Geologist participated in the organization of Showcase.
- Kawartha Region Earth Sciences, Engineering and Metallurgy Network (KREEM) – monthly presentations and discussions on various aspects of geoscience, environment and engineering.

MINERAL INVENTORY GEOSCIENTIST ACTIVITIES—NORTHEASTERN AND SOUTHERN ONTARIO

The Ontario Mineral Inventory (OMI) database is a dynamic compilation of over 18 900 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 (OGS), it provides additional tools for making mineral discoveries in Ontario.

The Mineral Inventory Geoscientists (MIG) 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 OMI database is regularly updated. Regular updates are required to ensure that the Ministry of 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).

Several targeted OMI data improvement projects were in progress throughout the year, including a review of Producing and Past-Producing Mine OMI records in southern Ontario. This project was undertaken to review the records with a Producing Mine status and to determine if they are currently producing, or if their status should be changed. The OMI records with a Past-Producing Mine status are being reviewed to determine if there was sufficient historical production for each OMI record to be classified as a past-producing mine, or if they should be downgraded to a different status to better reflect the history, production and information available.

In the spring of 2023, a group of ministry staff came together to review and update the OMI category definitions and associated "threshold grades" (or cut-off values) because these were last reviewed and revised by Wilson et al. (2008). Critical commodities, without a previously set occurrence grade, were added during this process: antimony, barite, beryllium, bismuth, cesium, gallium, germanium, indium, lithium, niobium, rubidium, scandium, selenium, tantalum, tellurium, yttrium and zirconium. With the implementation of the new and updated grades, more than 2000 OMI records were identified and will be examined to determine if they still meet the requirements as an OMI "Occurrence". This examination process is ongoing. In 2024, examinations were completed for OMI "Occurrence" records with the following critical commodities: antimony, beryllium, cesium, gallium, germanium, indium, lithium, niobium, rare earth elements, rubidium, scandium, tantalum, thorium and yttrium. The OMI category definitions document ("OMI Definitions and cut-off values.pdf") is part of the Ontario Mineral Inventory GIS data that can be downloaded from the GeologyOntario Hub (https://geology-ontario-en-mndm.hub.arcgis.com).

For 2024, Sheree Hinz was the northeastern and southern Ontario MIG.

Total contributions to the OMI database for northeastern and southern Ontario in 2024 included 1118 updated records, 270 records deleted and 23 new records. A breakdown of the northeastern and southern Ontario records revised by district is provided in Table 18.

Table 18. Ontario Mineral Inventory records revision in northeastern and southern Ontario in 2024.

Resident or District Office	Updates	Deletions	New
Kirkland Lake	123	4	12
Sault Ste Marie	41	1	3
Southern Ontario	795	261	2
Sudbury	99	4	2
Timmins	60	0	4
Total	**1118**	**270**	**23**

GEOGRAPHIC INFORMATION SYSTEM DATA SPECIALISTS ACTIVITIES—NORTHWESTERN AND NORTHEASTERN ONTARIO

The Resident Geologist Program's (RGP) Geographic Information System (GIS) Data Specialist positions are based in the Thunder Bay and Tweed offices and serve the northwest RGP region and northeast and southern RGP regions, respectively. In 2024, Genevieve Meyer held the Thunder Bay position until July 10, after which she took on an acting role as Initiatives Coordinator, Strategic Support Unit (Mines and Minerals Division). During her acting role, Genevieve continued to extract, compile and release data monthly for the RGP. Angela McEachern filled the Thunder Bay position beginning in November 2024. The Tweed position is staffed by Nazha Sabiri; this position was vacant from February to August 2024

while Nazha acted as the Northwestern Ontario Mineral Inventory Geoscientist. The GIS Data Specialists create maps and graphics, manage geospatial data and conduct data analysis for land-use planning, geoscience compilations, reports, posters and presentations. They provide ongoing GIS support to the RGP and assist clients with accessing geoscience data.

Ontario Assessment File Database, Ontario Drill Hole Database and Ontario Mineral Inventory

The Ontario Assessment File Database (OAFD), Ontario Drill Hole Database (ODHD) and Ontario Mineral Inventory (OMI) database are updated continuously by RGP staff using the Ontario Mineral Exploration Information System (OMEIS). An intranet-based application, OMEIS was launched in 2018 and is used by RGP and Mining Lands staff to maintain, update and correct assessment file and drill-hole data.

Updated information and new files are accessible through the GeologyOntario search tool almost immediately following data entry. Data entry is carried out mainly by the District Geological Assistants. The GIS Data Specialists are responsible for the administration of OMEIS, the creation of GIS data for the assessment files and drill holes, as well as corrections to the geospatial data of existing assessment files.

The GIS Data Specialists extract the tabular and spatial data at the beginning of each month and compile it for release in 2 different formats:

1. a graphical interface or data layer (keyhole mark-up language (*.kml*) file) through OGSEarth (www.ontario.ca/ogsearth), which can be viewed using geographic information applications, such as Google Earth™ mapping service
2. a compressed (*.zip*) downloadable file on GeologyOntario (www.hub.geologyontario.mines.gov.on.ca)

A summary of data added to or updated in OMEIS in 2024 is provided in Table 19.

Table 19. Ontario Mineral Exploration Information System (OMEIS) data entry statistics for assessment files and diamond-drill hole data for 2024.

File Type	New Files Added	Existing Files Updated	New Drill Holes Added	Existing Drill Holes Updated
Approved Assessment	617	2096	3114	430
Non-Assessment Exploration Work	0	67	0	11
Total	**617**	**2163**	**3114**	**441**

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Ontario

Ontario Geological Survey
Resident Geologist Program

Kirkland Lake Regional Resident Geologist Report (Sudbury District)—2024

by

A.S. Péloquin, B.B. McKinnon and P.S. LeBaron

2025

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Kirkland Lake Regional Resident Geologist (Sudbury District)—2024

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INTRODUCTION

The Sudbury District Resident Geologist Program (RGP) 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 RGP office is located on the campus of Laurentian University in the Willet Green Miller Centre, second 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 (SIC) and related mafic intrusive rocks, and supracrustal crater fill of the Whitewater Group; various rock types of the Central Gneiss Belt of the Grenville Province; and Paleozoic sedimentary rocks of the Michigan Basin (*see* Figure 1).

The Sudbury mining camp is one of the oldest and most active in the world, with nickel-copper mining operations related to the SIC providing the basis of economic activity in the Sudbury region (Figure 2). From 1883 to 2024, Sudbury's deposits have yielded approximately 25.8 billion pounds (11.7 billion kilograms) of nickel, 28.4 billion pounds (12.8 billion kilograms) of copper, 5.3 million ounces (164 million grams) of gold, and 32.1 million ounces (998 million grams) of platinum group metals (PGM) (Ministry of Mines (MINES) 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 and half-year periods may be abbreviated in this report as Q and H, respectively (Q1 for first quarter, etc.; H1 for the first half-year). Where metal values are given in imperial measures, ounces (oz or t-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), million (M). Universal Transverse Mercator (UTM) co-ordinates are provided using the North American Datum of 1983 (NAD83) in Zone 17, unless otherwise indicated. However, District maps are in longitude and latitude as the Sudbury District includes both UTM zones 17 and 18.

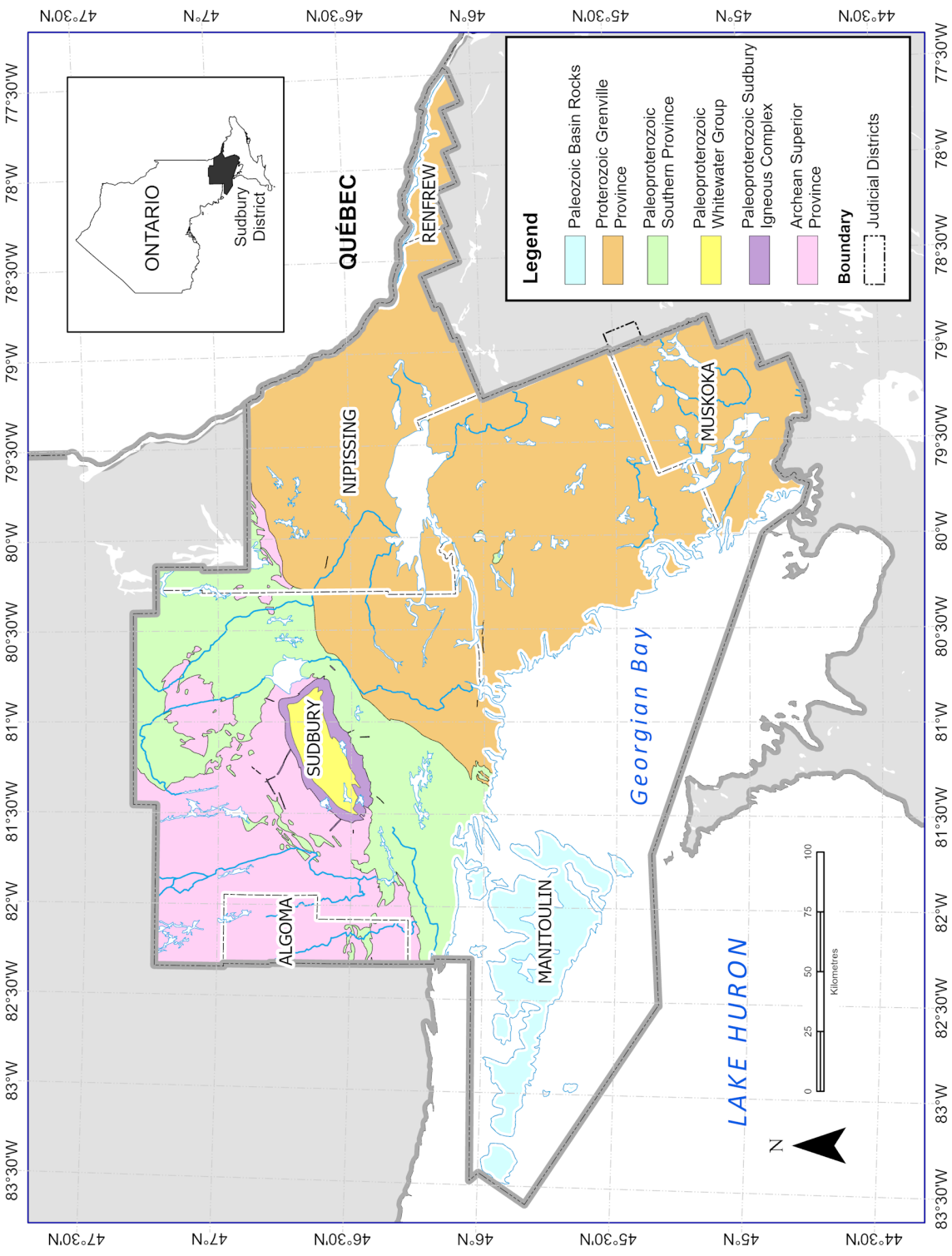

Figure 1. Extent of the Sudbury RGP District overlain on simplified bedrock geology and showing the judicial districts. Geology *modified from* Ontario Geological Survey (2011).

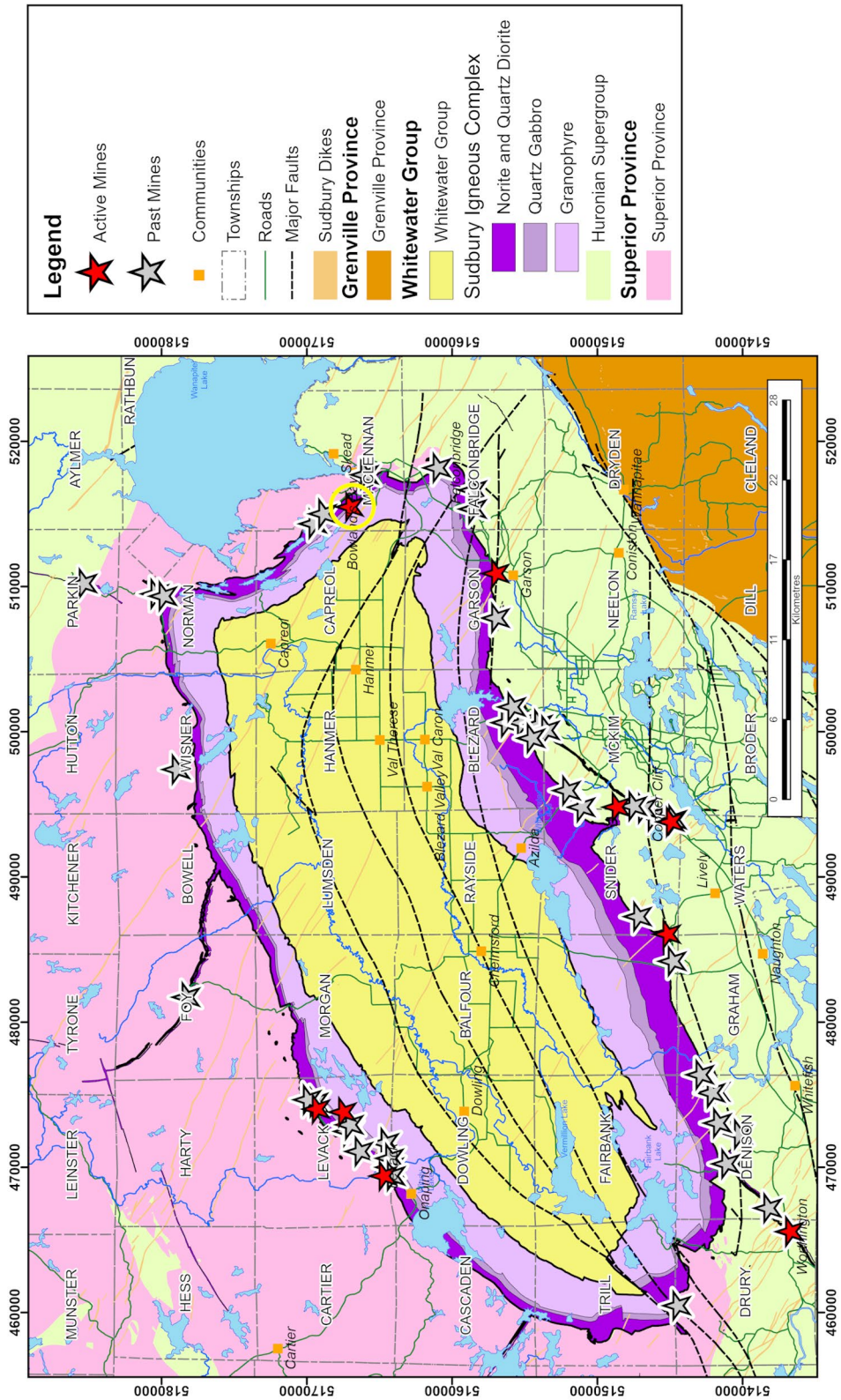

Figure 2. Past and actively producing nickel-copper-cobalt mines related to the SIC (Ontario Geological Survey 2025a); geology *modified from* Ames et al. (2005). Nickel Rim South, circled in yellow, went into care-and-maintenance in 2024.

MINING AND QUARRYING ACTIVITY

Metals

There were 9 producing nickel-copper-cobalt mines in the Sudbury Igneous Complex during 2024. One mine (Nickel Rim South) was put on care-and-maintenance in July (*Northern Ontario Business*, September 5, 2024), and development ore was extracted from Onaping Depth at Craig Mine (www.glencore.ca/en/sudburyino/who-we-are/at-a-glance [accessed January 30, 2025]). At the end of 2024, Vale had 6 active mines; Glencore had 1 active mine with a second coming on-line, and KGHM had 1 active mine (the property is being acquired by Magna Mining Inc.; Magna Mining Inc., press release, September12, 2024) (Figure 3; Table 1). The annual production of nickel and copper (metal and concentrate) in the Sudbury District in 2024 were 80.0 kt and 74.2 kt, respectively. Cobalt and precious metals (gold, platinum and palladium) are not reported solely for Sudbury operations by all the companies (*see* production tables for individual companies below**).**

Table 1. Producing mines in Sudbury in 2024.

Company	Mine	Township
Vale	Copper Cliff Complex North Mine	McKim
	Copper Cliff Complex South Mine	McKim
	Creighton Mine	Snider
	Garson Mine	Garson
	Coleman Mine [1]	Levack
	Totten Mine	Drury
Glencore	Fraser Mine [2]	Levack
	Nickel Rim South [3]	Maclennan
	Craig Mine [4]	Levack
KGHM	McCreedy West Mine [5]	Levack

[1] *Also referred to as Coleman–McCreedy East; Lower Coleman*
[2] *Also referred to as Fraser–Strathcona*
[3] *Placed on care-and-maintenance in 2024*
[4] *Onaping Depth deposit mined through Craig Mine infrastructure*
[5] *In process of being purchased by Magna Mining Inc.*

VALE BASE METALS

Vale Base Metals (VBM) is headquartered in Toronto and is part of Vale S.A., one of the largest integrated mining companies in the world. Vale Base Metals' Sudbury Operations produce nickel, copper, cobalt, platinum group metals, gold and silver. Operating in the Sudbury District for over 100 years, its activities include exploration, mineral production (Copper Cliff Complex North and South mines, Creighton, Garson, Coleman and Totten mines), milling (Clarabelle Mill), and smelting and refining operations (Copper Cliff Smelter and Nickel Refinery). Vale's Sudbury Operations employ nearly 4000 people (www.vale.com/sudbury [accessed January 20, 2025]).

Vale's Copper Cliff Smelter can produce up to 150 000 t of nickel and copper matte products (Vale's Copper Cliff Smelter Operations, August 27, 2020, available at the Sudbury RGP Office). Vale's Copper Cliff Refinery reports an annual nominal production capacity of 66 000 tonnes of refined nickel, and additionally, produces nickel oxide feed for the refinery in Wales.

Vale Base Metals has 6 operating mines in the Sudbury District: Copper Cliff Complex North and South, Creighton, Garson, Coleman and Totten mines (*see* Figure 3). The Mineral Resource estimates and total Proven and Probable Reserves in the Sudbury mines for 2023, as given in their 20-F-2023 report filed April 2024 (Vale 2024a), are shown in Table 2. The reserves include material from Coleman, Copper Cliff, Creighton, Garson, Totten mines and Copper Cliff and Stobie pit projects, and the resources include material from selected zones within the Coleman, Copper Cliff, Creighton, Stobie, Garson, Totten and Victor deposits. Vale's Mineral Reserves in Sudbury increased from 72.4 Mt in 2022 to 75.1 Mt in 2023. An increase of 6.9 Mt of Reserves was due to the conversion of resources to reserves following mine design evaluations, mainly at the Stobie Pit, and the Totten and Copper Cliff mines. The 6.9 Mt were partially offset by 2.3 Mt of mining deletion. Vale's Measured and Indicated Mineral Resources in Sudbury decreased from 43.7 Mt in 2022 to 39.7 Mt in 2023, due to conversion to mineral reserves at the Stobie Pit, and the Totten and Copper Cliff mines. However, some new resources were added as exploration targets were upgraded to mineral resources. The projected exhaustion date for Vale's Sudbury Operations is 2045 (Vale 2024a).

Table 2. Vale Sudbury Mineral Resources and Reserves as of December 2023 (*from* Vale 2024a).

Commodity	Resources				Reserves		
	Total Measured and Indicated [1]	Grade	Inferred [1]	Grade	Total Proven and Probable [1]	Grade	Recovery
Tonnage (Mt)	**39.7**		**8.6**		**75.1**		
Nickel (%)		1.37		1.9		1.42	65–90
Copper (%)		2.41		1.2		1.37	80–90
Cobalt (%)		0.04		0.04		0.04	20–35
Gold (g/t)		0.49		0.4		0.32	50-75
Platinum (g/t)		1.16		1.2		0.84	65-75
Palladium (g/t)		1.47		1.3		1.01	75-90

[1] *The Resources and Reserves are reported at varying cut-off values, which are based primarily on the mining method that will be used.*

Vale Sudbury Metal Production

In 2024, Vale reported the nickel and copper production from their individual mines in Sudbury as of December 31, 2023 (Vale 2024a; Table 3). Note that in the table Copper Cliff includes both North and South mines. Precious metal production for all Sudbury operations in 2023 is given in Table 4. Vale's 2024 annual nickel and copper production numbers for their combined Sudbury operations were reported in January 2025 (Vale 2025) and are given in Table 5. Comparing 2024 production to that of 2023, Nickel showed a 4.2% decrease in production, and copper production slightly increased (1.2%) (*see* Table 5). Vale reports cobalt, platinum, palladium and gold as by-products of their global base metal operations (Table 6).

Table 3. Vale Sudbury nickel-copper production for individual mines as of December 2023 (*from* Vale 2024a).

Mine	Production (kt)	Nickel Grade (%)	Copper Grade (%)
Copper Cliff [1]	985	1.1	1.3
Creighton	406	2.9	2.2
Garson	650	1.0	1.0
Coleman	836	1.4	2.5
Totten	518	1.3	1.9
Total Ontario operations	3422	1.4	1.8

kt = kilotonnes
[1] *North and South mines*

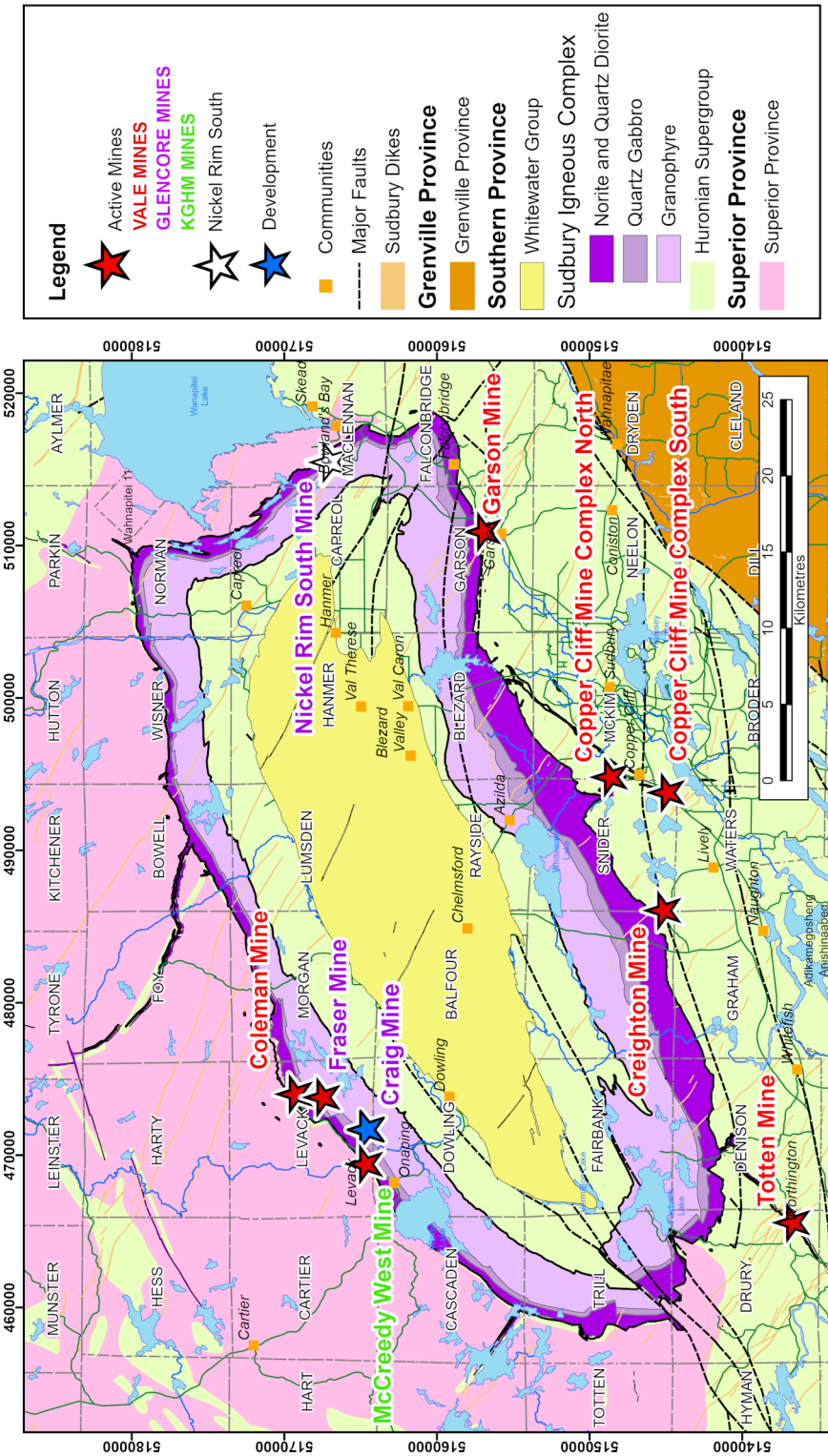

Figure 3. Actively producing mines in the Sudbury District; geology *modified from* Ames et al. (2005). Note: Nickel Rim South Mine went into care-and-maintenance in 2024. Onaping Depth development ore is being extracted through Craig Mine.

Table 4. Vale's cobalt and precious metal production from Sudbury operations in 2023 (Vale 2024a).

Commodity [1]	2023
Cobalt (t)	365
Platinum (koz)	125
Palladium (koz)	149
Gold (koz)	45

t = tonnes; koz = kilo-ounce troy

Table 5. Nickel-copper annual production comparison for Vale Sudbury operations 2023–2024 (Vale 2025).

Commodity	2024	2023	Change %
Ni metal (kt)	36.6	38.2	-4.2
Cu metal (kt)	58.6	57.9	1.2

kt = kilotonnes

Table 6. Vale's annual by-product production from their global base metal operations, comparing 2024 and 2023 (Vale 2025).

Commodity [1]	2024	2023	Change %
Cobalt (t)	2079	1959	6.1
Platinum (koz)	107	125	-14.4
Palladium (koz)	120	149	-19.5
Gold (koz)	445	410	8.5

[1] *Production from all base-metal operations (includes Sudbury).*
t = tonnes; koz = kilo-ounce troy

GLENCORE CANADA CORPORATION

Glencore Canada Corp. (Glencore) is one of the world's largest diversified natural resource companies. Its Sudbury Integrated Nickel Operations (Sudbury INO) have been operating in the Sudbury District since 1928, primarily producing nickel and copper, with cobalt, gold, silver, platinum and palladium as by-products. Its activities encompass exploration, mineral production (Fraser Mine; Nickel Rim South placed on care-and-maintenance in 2024 (*Northern Ontario Business*, September 5, 2024)), a deep mine project (Onaping Depth; development ore extracted through Craig Mine infrastructure in 2024), milling (Strathcona Mill) and smelting (Sudbury Smelter)). Sudbury INO currently has approximately 2400 permanent employees and contractors (www.glencore.ca/en/sudburyino/who-we-are/at-a-glance [accessed January 30, 2025]).

The Strathcona Mill processes ore from Glencore's Sudbury mines, and custom-feed ores from third parties (www.glencore.ca/en/sudburyino/who-we-are/at-a-glance [accessed January 30, 2025]). The mill produces 2 forms of concentrate: nickel-copper, and copper. In 2023, 1 025 997 tonnes of ore were milled, producing 7530 tonnes of nickel in concentrate and 7154 tonnes of copper in concentrate. The Sudbury Smelter processes the nickel-copper concentrate from Sudbury INO operations, as well as custom-feed materials. In 2024, the smelter produced 62 251 tonnes of nickel in matte and 13 720 tonnes of copper in matte. The matte is sent to their Nikkelverk Operation in Norway for refining (www.glencore.ca/en/sudburyino/who-we-are/at-a-glance [accessed January 30, 2025]). The copper concentrate from the mill is sent to Glencore Copper for smelting (Horne Smelter, Rouyn–Noranda) and refining (Canadian Copper Refinery (CCR), Montreal).

For the first half of 2024, Glencore operated 2 underground nickel-copper mines in Sudbury: Fraser Mine, and Nickel Rim South, the latter was placed on care-and-maintenance in July (*Northern Ontario Business*, September 5, 2024) (*see* Figure 3). Glencore continued to work on the development of the Onaping Depth Project with development ore extracted in 2024 (www.glencore.ca/en/sudburyino/what-we-do/mining-and-milling [accessed January 20, 2025]; www.glencore.ca/en/sudburyino/who-we-are/at-a-glance [accessed January 30, 2025]).

In 2025, Glencore reported their resources and reserves as of December 31, 2024 (Glencore Canada Corp. 2025a). The totals for Measured and Indicated Resources and Proven and Probable Reserves in Glencore's Sudbury mines are given in Table 7. Total Mineral Reserves in Sudbury decreased in 2024, mainly due to depletion. The current Life-of-Mine is expected to be 16 years (to 2040).

Table 7. Glencore Sudbury Mineral Resources and Reserves as of December 2024 (Glencore Canada Corp. 2025a).

Commodity	Total Resources and Reserves [1]					
	Total Measured and Indicated Resources (Mt)	Grade (%)	Grade (g/t)	Total Proven and Probable Reserves (Mt)	Grade (%)	Grade (g/t)
Tonnage	**21.4**			**16.0**		
Nickel		2.02			1.77	
Copper		2.69			0.91	
Cobalt		0.04			0.04	
Platinum			0.96			0.37
Palladium			1.1			0.41

[1] *Glencore Canada Corp. (2025a): "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 reports the annual production from its Sudbury Integrated Nickel Operations (Sudbury INO) as part of its "Integrated Nickel Operations" (INO), which includes Sudbury, Raglan (Quebec) and Nikkelverk (Norway) (Glencore Canada Corp. 2025b, 2025c, 2025d). Tonnes of ore mined in 2024 for the Nickel Rim South and Fraser and Nickel Rim South mines, and the Craig (Onaping Depth deposit) Mine are given in Table 8 (www.glencore.ca/en/sudburyino/who-we-are/at-a-glance [accessed January 30, 2025]).

Table 8. Tonnes of ore mined from Glencore's Sudbury operations in 2024 (www.glencore.ca/en/sudburyino/who-we-are/at-a-glance [accessed January 30, 2025]).

Mine	Tonnes of Ore Mined	Status
Fraser Mine	553 033	Active
Nickel Rim South Mine [1]	320 160	Care-and-maintenance
Craig Mine [2]	72 182	Development

[1] *Placed on care-and-maintenance in 2024*
[2] *Onaping Depth deposit accessed through Craig Mine infrastructure*

In 2024, Sudbury INO produced 42 900 tonnes of nickel as metal and in concentrate from its own sources, a 370 t (9.4%) increase from 2023. Total copper production in 2024, including both metal and concentrate, was 13 600 tonnes, a 100 tonne (<1%) decrease from 2023 (Table 9; Glencore Canada Corp. 2025b, 2025c, 2025d).

Table 9. Integrated Nickel Operations (INO*) annual production comparison 2023–2024 (Glencore Canada Corp. 2025b, 2025c, 2025d).

Commodity	2024	2023	Change %
Nickel metal (kt)	42.9	39.1	10
Nickel in concentrates (kt)	0.1	0.2	-50
Copper metal (kt)	10.2	8.9	15
Copper in concentrates (kt)	3.4	4.8	-29
Cobalt metal (kt)	0.6	0.4	50
Gold (koz)	10	11	-9
Silver (koz)	175	223	-22
Platinum (koz)	25	24	4
Palladium (koz)	70	65	8
Rhodium (koz)	3	3	-

koz =kilo-ounce troy; kt = kilotonnes
** INO includes Sudbury, Raglan (Quebec) and Nikkelverk (Norway)*

KGHM INTERNATIONAL LIMITED

In September of 2024, Magna Mining Inc. initiated the acquisition of the majority of the KGHM International Ltd. (KGHM) Sudbury properties (Figure 4), including the McCreedy West Mine (*see* Figure 3):

> The Management Board of the Parent Entity undertook corporate decisions enabling the sale of international mining assets within the KGHM INTERNATIONAL LTD. Group – part of the assets of the Sudbury Basin, i.e., the mines McCreedy West, Levack/Morrison and Podolsky, as well as mining concessions: Kirkwood, Falconbridge, NW Foy, Rand and North Range. Based on the conducted due diligence process, two binding offers were received for the acquisition of these assets, as a result of which the Management Board of the Parent Entity accepted the terms of the offer from Magna Mining Inc. Based on the agreed commercial terms and the structure of the transaction carried out, the subject of the sale is the acquisition by Magna Mining Inc. of 100% of the shares in the target company Project Nikolas Company Inc., to which, at the moment of the transaction, the assets and liabilities related to the assets being sold will be transferred. – from KGHM International Ltd. (2024b)

> On 11 September 2024 a Share Purchase Agreement was entered into between FNX Mining Company Inc. (the owner of the target company), KGHM INTERNATIONAL LTD. (guarantor), Project Nikolas Company Inc. (target company) and Magna Mining Inc. (buyer), which assumes the sale by FNX Mining Company Inc. of 100% of the shares of the target company Project Nikolas Company Inc. to Magna Mining Inc. The agreed purchase price comprises the cash contribution in the amount of CAD 5 million at the moment of closure of the transaction, CAD 2 million deferred to 31 December 2026 as an unconditional cash payment, the acquisition by FNX Mining Company Inc. of shares in the company Magna Mining Inc. in the amount of CAD 2 million and conditional payments in the total maximum amount of CAD 24 million. The closure of the transaction is expected by the end of the first quarter of 2025. – from KGHM International Ltd. (2024b)

The target closure date for the transaction was scheduled for the end of February 2025 (Magna Mining Inc., news release, January 30,2025); then rescheduled to May 2025 (Magna Mining Inc., news release, April 14, 2025).

Mineralization at the McCreedy West Mine (formerly the Levack West property) was discovered in the late 1800s, with the Main Zone discovered in 1939 by INCO (currently Vale Base Metals). Production began in 1974 and continued until 1998. In 2002 FNX signed an option agreement with INCO (currently Vale Base Metals) that included McCreedy West. The mine went back into production in 2003. In 2010, FNX was acquired by Quadra Mining Ltd. and in 2011 KGHM acquired Quadra FNX. In 2015 the mine

was placed on care-and-maintenance. The McCreedy West Mine's sister mine, the Morrison Mine (formerly the Footwall Deposit of the Levack Mine) was placed on care-and-maintenance in 2019, and the production resumed at McCreedy West at that time.

Following the purchase agreement of McCreedy West Mine, Magna Mining Inc. released a mineral resource estimate with an effective date of December 31, 2023 (Table 10; Armitage and van Breugel 2024). The report also included production tonnes and grade for McCreedy West over a 10 year period (2003–2023; Table 11).

Table 10. Mineral Resource estimate for the McCreedy West Mine as of December 31, 2023 (Armitage and van Breugel 2024).

Category	Cut-off Grade [1] (NiEq wt %)	Resource (kt)	Ni (wt %)	Cu (wt %)	Co (wt %)	Pt (g/t)	Pd (g/t)	Au (g/t)	Ag (g/t)	NiEq [1] (wt %)
Indicated	1.1	9345	0.89	1.3	0.024	0.96	1.1	0.45	5.28	2.02
Inferred	1.1	123	1.6	0.75	0.047	0.21	0.23	0.05	0.55	2.12

[1] *The underground base case cut-off grade of 1.10% NiEq considers metal prices of $8.50/lb Ni, $3.75/lb Cu, $17.00/lb Co, $950/oz Pt, $1100/oz Pd and $1950/oz Au, metal recoveries of 78% for Ni, 95.5% for Cu, 56% for Co, 69.2% for Pt, 68% for Pd and 67.7% for Au (Ag is not considered), a mining cost of US$80.00/t rock and processing, treatment and refining, transportation and G&A cost of US$42.50/t mineralized material (*from *Armitage and van Breugel 2024)*

Table 11. Production numbers for the McCreedy West Mine, for 2023 and historical (Armitage and van Breugel 2024).

Year	Tonnes	Ni (wt %)	Cu (wt %)	Co (wt %)	Pt (g/t)	Pd (g/t)	Au (g/t)	Ag (g/t)
2023	317 660	0.23	1.59	0.01	1.03	1.34	0.41	14.05
2003–2023	6 302 072	0.78	0.89	0.03	0.83	1.1	0.32	-

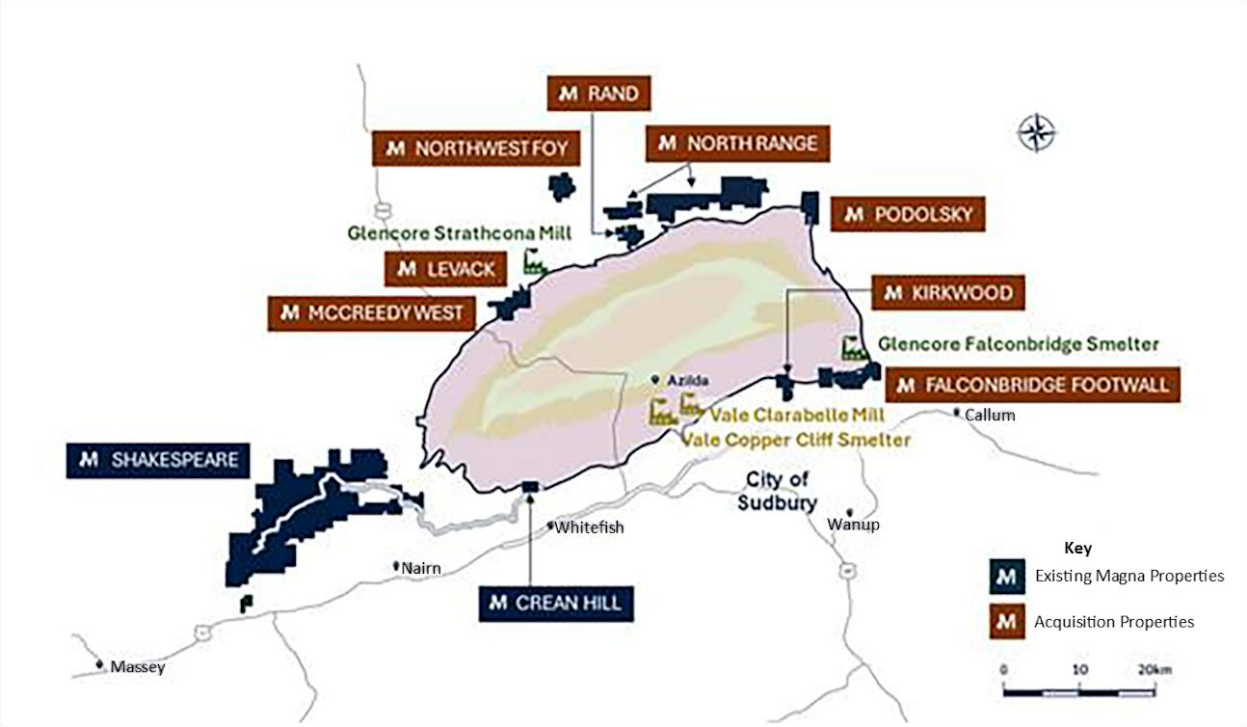

Figure 4. Location of KGHM properties purchased by Magna Mining Inc.; *from* Magna Mining Inc. (2024).

KGHM Sudbury Metal Production

KGHM operated the McCreedy West Mine (*see* Figure 3) in 2024. Metal production in Sudbury reported for 2024 compared to 2023 is given in Table 12 (KGHM International Ltd. 2025). Copper and total precious metals (TPM) both showed a decrease in production in 2024 compared to 2023: 56% for copper and 39% for TPM.

Table 12. KGHM Sudbury Operations production for the first 9 months of 2024 compared to the same period in 2023 (KGHM International Ltd. 2025).

Commodity	2024 (first 9 months)	2023 (first 9 months)	Change %
Nickel (kt)	0.4	0.4	-
Copper (kt)	2.0	4.5	-56
TPM (koz)	11.5	19.0	-39

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

Industrial Minerals

Commodities produced in the Sudbury District in 2024 included dolostone, flagstone, organic soil conditioner, building stone, and several varieties of coloured landscape stone and aggregate. Industrial mineral and dimension stone producers in the Sudbury District are listed in Table 13 and their location in the District is shown in Figure 5. 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 of the Sudbury RGP office, and from public domain news sources (Ontario Mining Association, Directory and Resource Guide 2024 https://www.mediaedgemagazines.com/the-ontario-prospectors-association/ot24d/ [accessed May 1, 2025]).

BOREAL AGROMINERALS INC.

Spanish River Carbonatite

Boreal Agrominerals Inc. has been quarrying and selling material extracted from the Spanish River carbonatite as an organic fertilizer since *circa* 2000 (Cosec, Stewart and Meyer 2002). The biotite–vermiculite–apatite residuum is excavated, trucked, screened and packaged for sale as "Volcanic Mineral Plus®". The deposit occurs in Venturi and Tofflemire townships (*see* Figure 5 [#5]). Boreal Agrominerals' land holdings consist of a mining lease and 64 surrounding active mining claims (approximately 1420 ha [3500 acres]), which extend into Hart and Ermatinger townships. In 2000, Agricultural Mineral Prospectors estimated the Spanish River carbonatite 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). In 2005, a 40 tonne bulk sample returned values of 25.92% CaO, 2.81% P_2O_5 and 1.05% K_2O (Smith 2013). The Boreal Agrominerals listed an updated historical resource, increasing the deposit depth to 25 m at the same grade (45 million tonnes; Operations – Boreal Agrominerals document available at Sudbury RGP Office). The quarry is listed as Active on the Ontario Ministry of Natural Resources "Pits and Quarries Online" (Pits and Quarries Online [accessed January 22, 2025]).

Table 13. Industrial mineral and dimension stone producers in the Sudbury District in 2024 (keyed to location on Figure 5).

No.	Company/Individual	Township or Area	Commodity	Commodity Use
1	Lafarge Canada Inc. – 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 and carbonatite	Soil amendment
6	Taillefer Quarry	Aylmer	Quartz and 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 and 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	McAuslan	Granitic gneiss	Crushed, dimension stone, landscape stone, veneer stone
13	Callander Industries Ltd. (G.M. Mote)	McAuslan, Jocko, Garrow	Quartz–muscovite gneiss	Veneer stone, flagstone, landscaping stone
14	The Rock Centre	Poitras	Granite, limestone, slate and sandstone	Flagstone, landscaping stone, aggregate
15	Brown's Quarry Inc.	Joly	Granite and gneiss	Armour stone, building stone, flagstone, landscaping stone, aggregate)
16	Cushman Stone and Gravel Inc.	Perry	Granitic gneiss	
17	Keystone Granite	Franklin	Flagstone, stairs, landscaping stone	
18	McFayden's Stone Quarry	Franklin	Granitic gneiss	Flagstone, building stone, landscaping stone
19	Muskoka Rock Company	Franklin	Granitic gneiss	Landscaping stone, building stone, flagstone, ledgerock
20	B.O.R. Aggregate Company	Franklin	Granite, round stone, gravel, sand products	

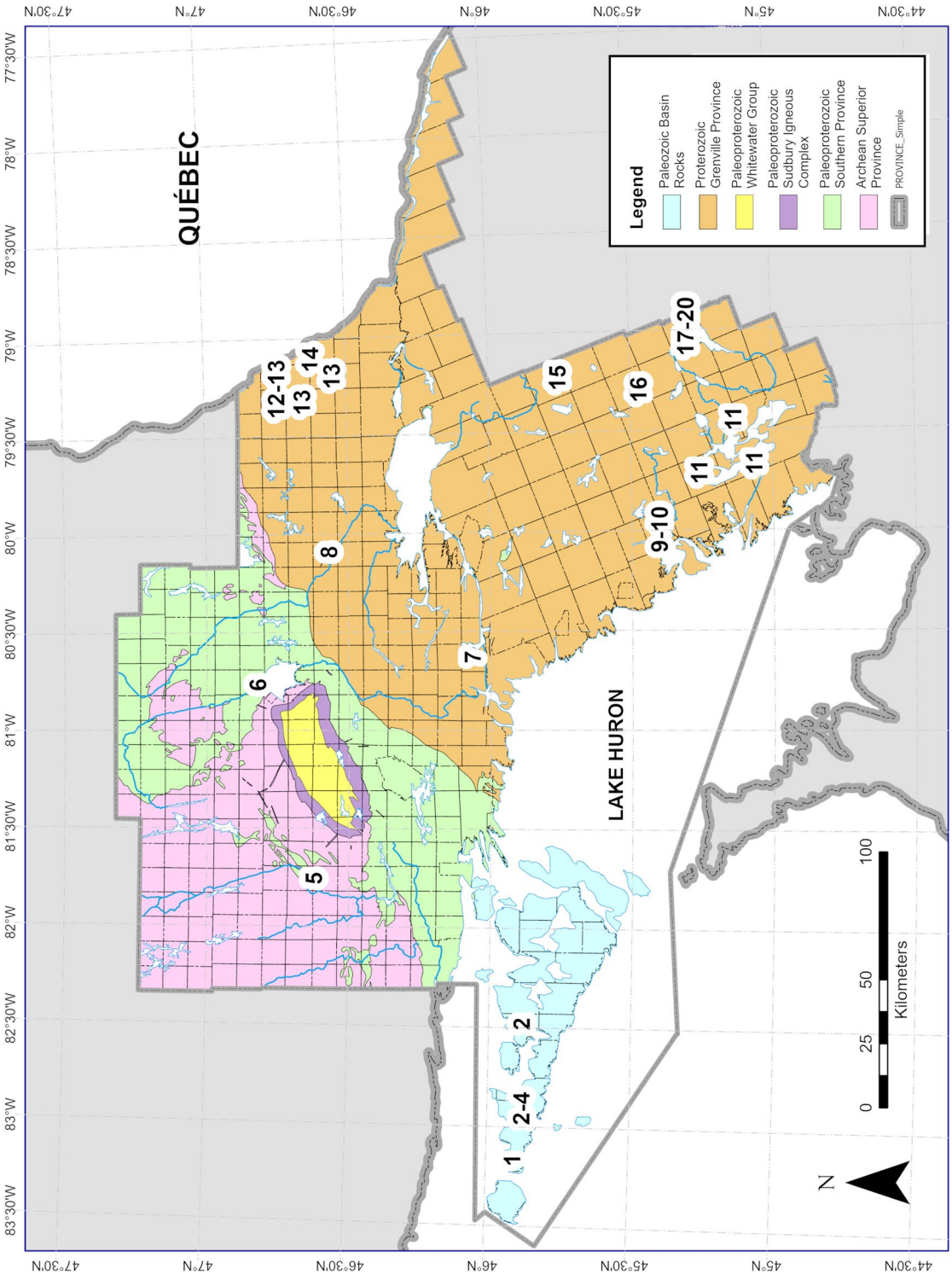

Figure 5. Industrial mineral and dimension stone producers in the Sudbury District in 2024 (numbers shown on map keyed to Table 13; note that some companies have multiple extraction sites); geology *modified from* Ontario Geological Survey (2011) with overlain township fabric.

Mine Expansion and Development

Both Glencore Canada Corp. and Vale Base Metals have mine expansion and development plans in both the short and long term. These projects and their locations are given in Table 14 and shown on Figure 6.

Table 14. Planned mine expansion and development in Sudbury (keyed to location on Figure 6).

No.	Timeline	Company	Mine	Township
1	Planned 2025	Glencore	Onaping Depth [1]	Levack
2	Long term	Glencore/Vale	Nickel Rim South Extension	Maclennan
3	Long term	Vale	Copper Cliff Phase 3	McKim
4	Long term	Vale	Copper Cliff Phase 4	McKim
5	Long term	Vale	Creighton Mine Phase 5	Snider
6	Short term	Vale	Copper Cliff Pit	McKim
7	Short term	Vale	Stobie Pit	Blezard

[1] *Development ore extracted through Craig Mine infrastructure in 2024 (www.glencore.ca/en/sudburyino/who-we-are/at-a-glance [accessed January 30, 2025])*

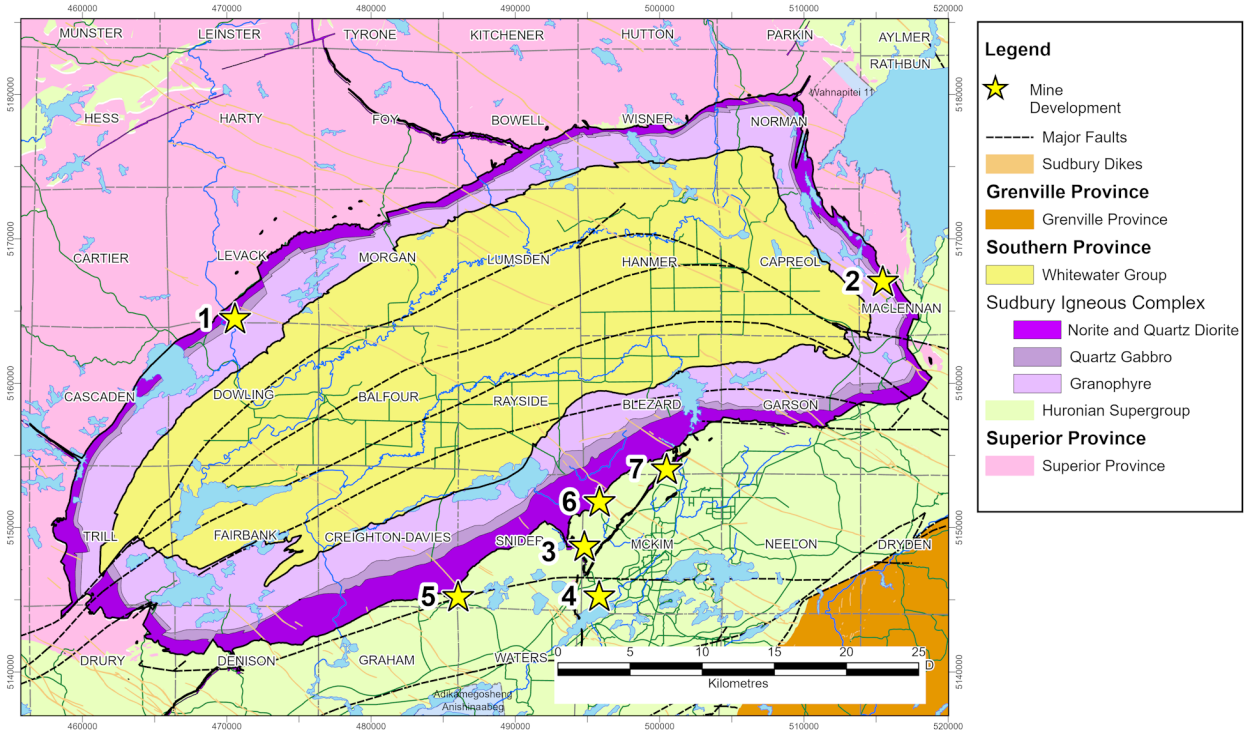

Figure 6. Location of mine expansion and development projects in the Sudbury RGP District; geology *modified from* Ames et al. (2005), *see* Table 14 for project details.

GLENCORE CANADA CORP.

Onaping Depth – Underground Development

Glencore continues to advance the development of the Onaping Depth Project (*Sudbury Star*, December 1, 2023; Glencore 2025d), located below its Craig and Onaping mines in the North Range of the SIC (*see* Figure 6). Glencore reported production coming from the Craig Mine, which is the surface shaft being used to access the Onaping Depth deposit (www.glencore.ca/en/sudburyino/who-we-are/at-a-glance [accessed January 30, 2025]). The ore zone was discovered in 1994, and 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 project was obtained in 2017. Development is from the Craig Mine shaft, which extends to approximately 1.5 km depth (Figure 7). The lateral development from the Craig Mine shaft to above the Onaping deposit extends 1 km. Excavation of the customized underground headframe was completed in 2019, and work continued on the underground infrastructure, including the 1430 m internal shaft to the deposit, running from the 1200 m level to the 2630 m level. Initial production was planned for 2024 with full production expected in 2025 (Ontario Prospectors Association 2024*; CTV News – Northern Ontario*, June 24, 2022; *CBC – Sudbury*, January 2, 2023; *Canadian Mining Journal*, February 1, 2019; *Sudbury Mining Solutions Journal,* February 21, 2018). In their 2023 Annual Report (Glencore Canada Corp. 2024a), Glencore indicated that the main ore production would be delayed. However, development ore was extracted through the Craig Mine infrastructure (www.glencore.ca/en/sudburyino/who-we-are/at-a-glance [accessed January 30, 2025]). Production figures, and reserve and resource estimates from the Glencore's Investor Update (Glencore Canada Corp. 2017) are presented in Table 15. The Onaping Depth deposit is expected to be in production beyond 2040 (*CBC – Sudbury*, January 2, 2023, Glencore Canada Corp. 2024b).

Table 15. Onaping Depth Project production, and Reserve and Resource estimates (Glencore Canada Corp. 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

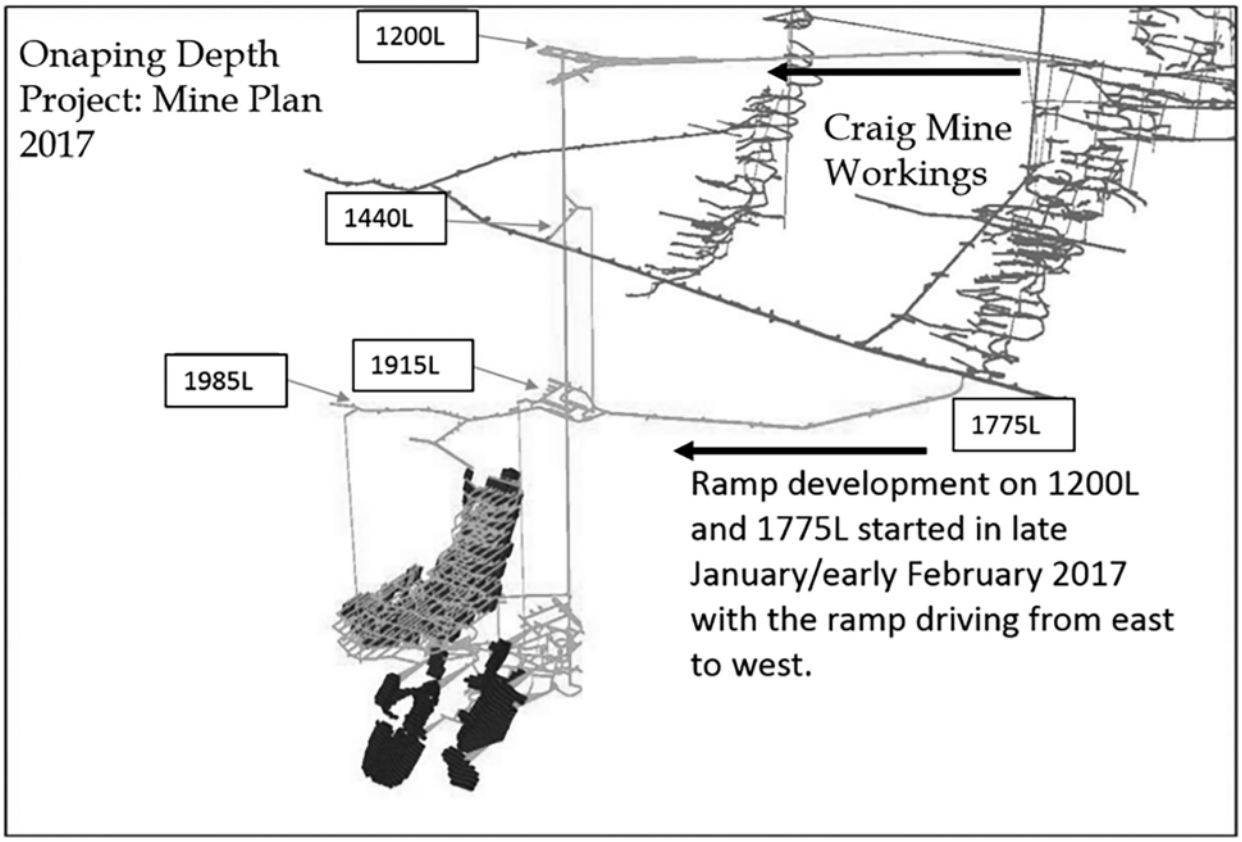

Figure 7. Schema of the Glencore Canada Corp. Onaping Depth Project mine plan from 2017 (not to scale); figure *from* Butler and Simser (2017).

VALE BASE METALS

Mine Site Extension Projects

Vale (2024b) listed a number of mine site extension mining projects that they are studying (Figure 8; Table 16; *see* Figure 6 [#3-7]).

Table 16. Vale's mine site extension projects, Sudbury (Vale 2024b; Figure 8; *see* Figure 6 [#3-7]).

Project	Term	Timeline	Details	Estimated Life of Mine
Copper Cliff Pit	Short-term	Estimated start 2026	Conducting pre-feasibility study; open pit operation; pit dewatering begun, will continue over 2 years	8 years
Stobie Pit	Short-term	Estimated start 2025, with potential to accelerate to 2024	Conducting pre-feasibility study; open pit operation	3 years; possible expansion
Copper Cliff Phase 3 Phase 4	Long-term	 Production 2029 [1] Production 2032 [1]	Completed Phase 1 of Copper Cliff Mine South Project in the fall 2022; Phase 2 on hold and under evaluation; Phase 3 & 4 currently in study phase.	20 years
Creighton Mine Phase 5	Long-term	Construction to have begun 2023	Currently in feasibility study phase	To 2038

[1] *from Vale (2022)*

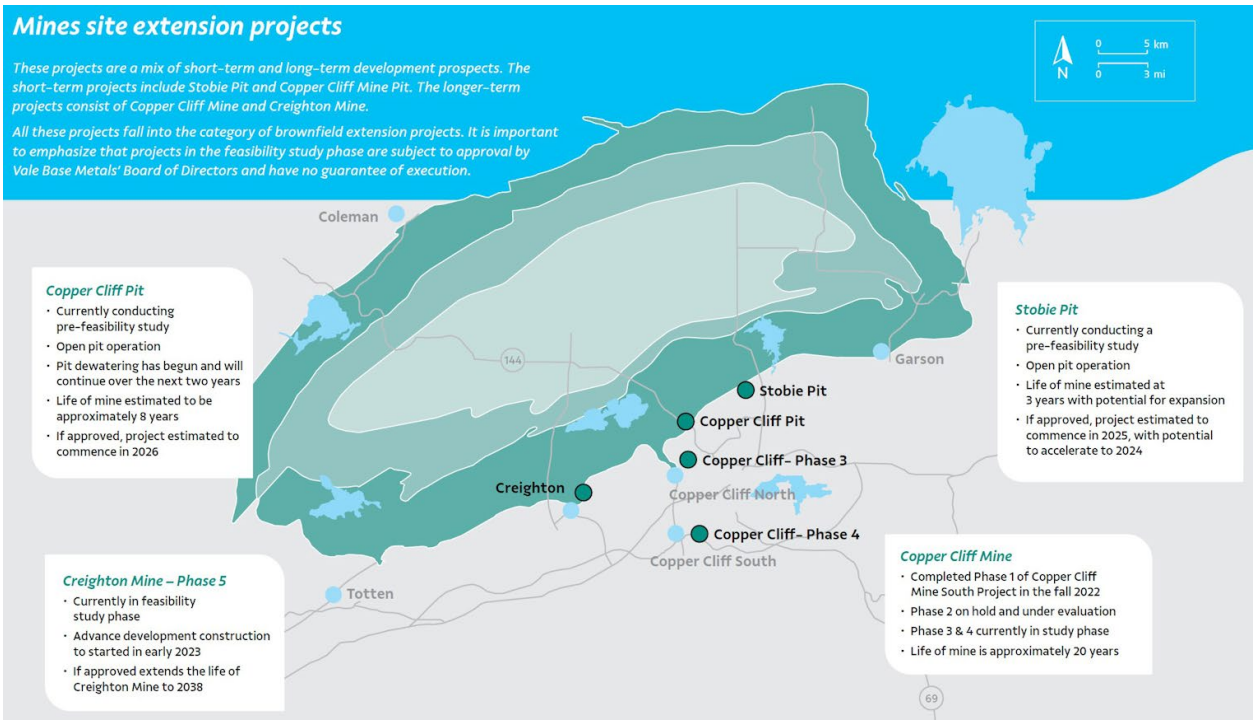

Figure 8. Locations and details of Vale's mine site extension projects (Vale 2024b; figure *from* Vale 2024b).

GLENCORE CANADA CORP AND VALE BASE METALS

Nickel Rim South Extension Project

Glencore Sudbury INO and Vale Base Metals are in discussion on a possible joint venture that would see development of an ore deposit that straddles Glencore and Vale Base Metals properties near the Nickel Rim South Mine (*see* Figure 6 [#2]; *Sudbury Star*, October 26, 2023; Vale 2024b). The 2 companies are jointly funding a Feasibility Study. The Nickel Rim South infrastructure would be used to mine the ore, and the Life of Mine is expected to be to 2052.

Historical Mineral Production

PAST-PRODUCING MINES

Most of the mining activity in the Sudbury District has occurred in the Sudbury Mining Camp. There are 47 past-producing nickel-copper mines related to the SIC according to the Ontario Mineral Inventory (OMI; Table 17; Figure 9; Ontario Geological Survey 2025a). They are associated with or near the basal contact and the quartz–diorite offset dikes of the SIC (*see* Figure 9).

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 18; Figure 10) include nickel, copper, gold, platinum group metals, uranium, thorium, lead, silver, zinc and iron. Nonmetal commodities mined or quarried (Table 19; Figure 11) include anorthosite, gabbro, gneiss, granite, limestone, dolomite (dolostone), quartzite, feldspar, mica, silica/quartz, kyanite, garnet, clay, diatomite, oil shale, peat, gravel, silica sand and miscellaneous stone.

Table 17. Past-producing mines related to the SIC (nickel, copper, cobalt, gold, PGE) (*see also* Figure 9). The OMI number refers to record numbers in the Ontario Mineral Inventory database (Ontario Geological Survey 2025a).

Township	Mine Name	Commodity	Status	OMI Number	Alternate Names
Blezard	Little Stobie	Ni Cu	Resources	MDI41I11SE00004	
	Stobie Mine	Ni Cu	No Resources	MDI41I10SW00020	
	Thayer–Lindsley Mine	Ni Cu PGE	Resources	MDI41I10SW00039	Lindsley Mine, Lindsley Property
	Blezard	Ni Cu	No Resources	MDI41I10SW00010	
	Mount Nickel	Ni Cu	No Resources	MDI41I10SW00011	
Creighton–Davies	Gertrude Mine	Cu Ni	No Resources	MDI41I06NE00013	
Denison	AER Kidd Property	Ni Cu	No Resources	MDI41I06NW00047	AER Mine, Gersdorffite Mine, Howland Pit, Robinson Zone, Kidd Copper, Worthington Offset
	Lockerby Mine	Ni Cu Co	Resources	MDI41I06NW00013	Falconbridge Nickel Mines
	Lockerby East	Ni Cu	Resources	MDI000000003212	
	Victoria Project	Ni Cu	Resources	MDI41I06NW00014	Victoria Mine, Mond Mine
	Crean Hill Mine	Cu Ni PGE	No Resources	MDI41I06NW00016	Crean Hill No.1
	Ellen Open Pit	Ni Cu	No Resources	MDI41I06NW00015	Crean Hill No.2
	Vermilion Mine	Cu Ni	No Resources	MDI41I06NW00017	
Drury	Worthington Mine	Ni Cu PGE	Resources	MDI41I06NW00005	F.C. Crean, Mond Nickel Company
	Sultana Nickel Mine	Cu Ni	No Resources	MDI41I05NE00015	Miller Claims
Falconbridge	East Falconbridge	Ni Cu	Resources	MDI41I10SW00003	
	Falconbridge	Ni Cu	Resources	MDI41I10SW00004	
	Norduna	Ni Cu	No Resources	MDI41I10SW00005	
Foy	Nickel Offsets Mine	Ni Cu PGE Au	Resources	MDI41I14SE00004	Mining Location WD250, Ross Mine, Mining Location WR 5 Nickel-Copper-Sulphide
Garson	Kirkwood Mine	Ni Cu	Resources	MDI41I10SW00007	Segway Deposit
Levack	Craig Mine	Ni Cu	Resources	MDI41I11NW00049	
	Fecunis Lake Mine	Ni Cu	Resources	MDI41I11NW00010	
	Levack Mine	Ni Cu	Resources	MDI41I11NW00006	Morrison Deposit, Rob's Deposit
	North Mine	Ni Cu	Resources	MDI41I11NW00015	
	Onaping Mine	Ni Cu	Resources	MDI41I11NW00012	
	Longvack Mine	Ni Cu	No Resources	MDI41I11NW00003	
	Longvack South Mine	Ni Cu	No Resources	MDI41I11NW00011	
	Boundary Mine	Ni Cu	Resources	MDI41I11NW00008	
	Hardy Mine	Ni Cu	No Resources	MDI41I11NW00009	
MacLennan	Nickel Rim	Ni Cu	Resources	MDI41I10NW00003	
	MacLennan	Ni Cu	No Resources	MDI41I10NW00004	
	Victor	Ni Cu	No Resources	MDI41I10NW00005	
McKim	Murray	Ni Cu	Resources	MDI41I11SE00006	
	Copper Cliff	Ni Cu	No Resources	MDI41I06NE00010	
	Copper Cliff No.2	Ni Cu	No Resources	MDI41I06NE00011	McArthur No.2, Canadian Copper No.2
	Copper Cliff South Mine*	Ni Cu	Resources	MDI000000001815	
	Elsie	Ni Cu	No Resources	MDI41I11SE00008	
	McKim	Ni Cu	No Resources	MDI41I11SE00007	
	Frood–Stobie	Ni Cu	Resources	MDI41I11SE00005	Frood, Stobie
Norman	Podolsky Mine	Cu	No Resources	MDI000000000774	Podolsky 2000 Deposit, Norman North Property
	Whistle Mine	Ni Cu	No Resources	MDI41I15SW00013	Whistle and Belfeuille Property

Township	Mine Name	Commodity	Status	OMI Number	Alternate Names
Parkin	Milnet Mine	Ni Cu	No Resources	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 Resources	MDI41I06NE00003	Canadian Copper No.1
	Copper Cliff South	Ni Cu	No Resources	MDI41I06NE00004	Evans Mine
	Evans	Ni Cu	No Resources	MDI41I06NE00006	
	North Star	Ni Cu	No Resources	MDI41I06NE00007	McCharles
Wisner	Broken Hammer Mine	PGE Au Cu	No Resources	MDI000000000780	Broken Hammer Deposit

**Placed into care-and-maintenance in 2024*

Table 18. Past-producing metal mines not related to the SIC (keyed to Figure 10). The OMI number refers to record number in the Ontario Mineral Inventory database (Ontario Geological Survey 2025a).

No.	Mine	Township	Status	Commodity	OMI Number	Alternate Names
1	Hermenia Mine	Salter	No Resources	Cu	MDI41J01NE00022	No.3 Shaft
1	Hermina	Salter	Resources	Cu	MDI41J01NE00007	
1	Massey Mine No.4 Shaft	Salter	No Resources	Cu	MDI41J01NE00023	
1	Sable River Copper Company	Salter	No Resources	Cu	MDI41J01NE00008	Massey
2	Shakespeare	Shakespeare	Resources	Cu Ni Pd Pt	MDI41I05SW00076	Falconbridge
3	Agnew Lake Mine	Hyman	Resources	U Th	MDI41I05NE00009	Canadian Thorium Corporation Limited Property
4	Bousquet	Curtin	No Resources	Au	MDI41I04NE00004	
5	Long Lake Mine	Eden	No Resources	Au, Ag	MDI41I06SE00002	
6	Vermilion	Fairbank	Resources	Cu Pb Ag Zn	MDI41I11SW00006	Consolidated Sudbury Basin, Vermilion Lake
7	Errington	Creighton–Davies	Resources	Pb Cu Zn Ag	MDI41I11SW00005	
8	Errington Mine No.3	Balfour	Resources	Zn Pb Cu	MDI41I11SW00030	
9	Moose Mountain Mine No.3 Pit	Hutton	No Resources	Fe	MDI41I14SE00015	
10	New Golden Rose Mine	Afton	No Resources	Au	MDI41I16NW00015	Abex Mines Ltd., Afton Mines, Limited, Consolidated Mining and Smelting Company

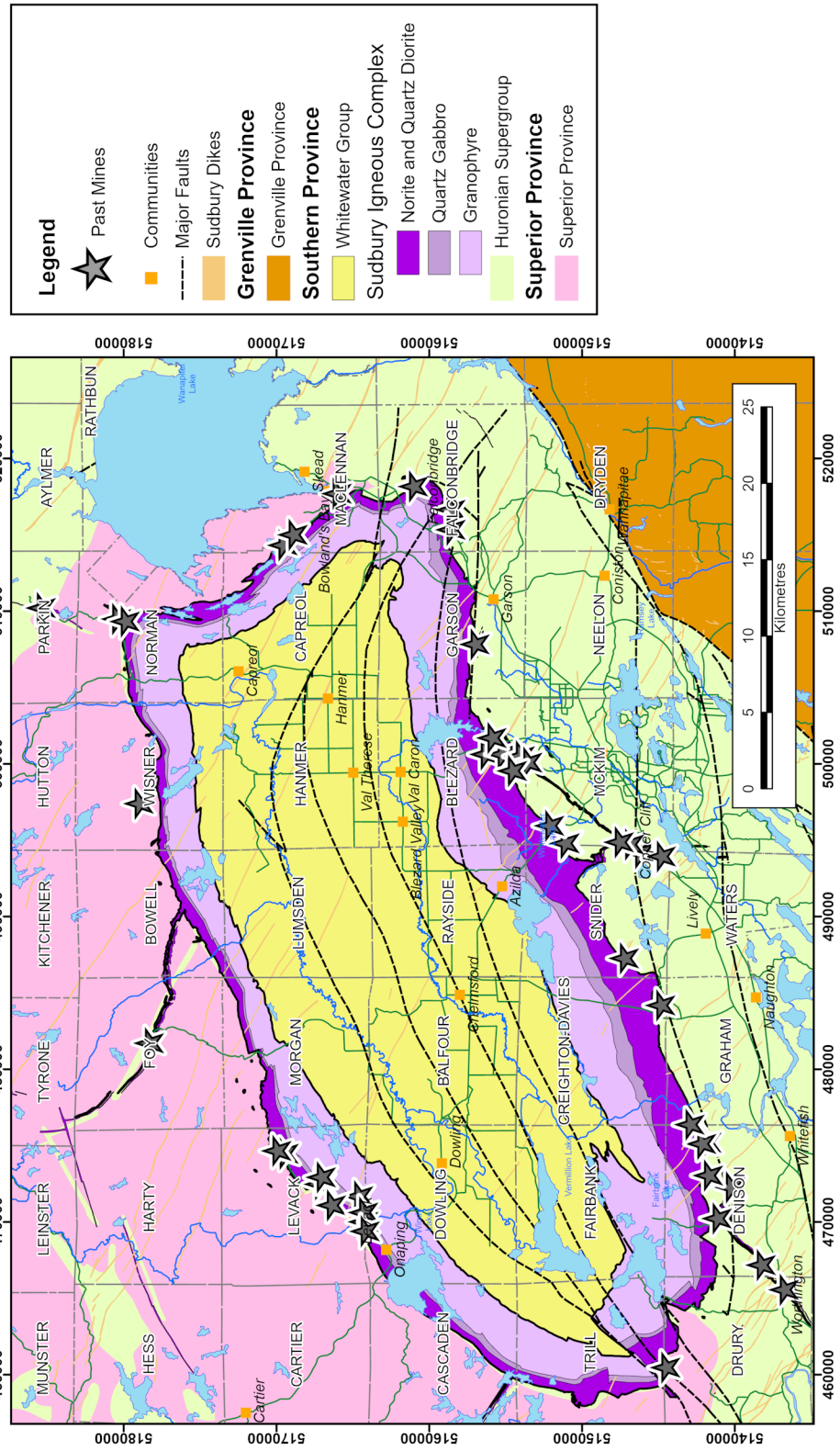

Figure 9. Past-producing nickel-copper-cobalt mines related to the SIC (*see also* Table 17) (Ontario Geological Survey 2025a); geology *modified from* Ames et al. (2005).

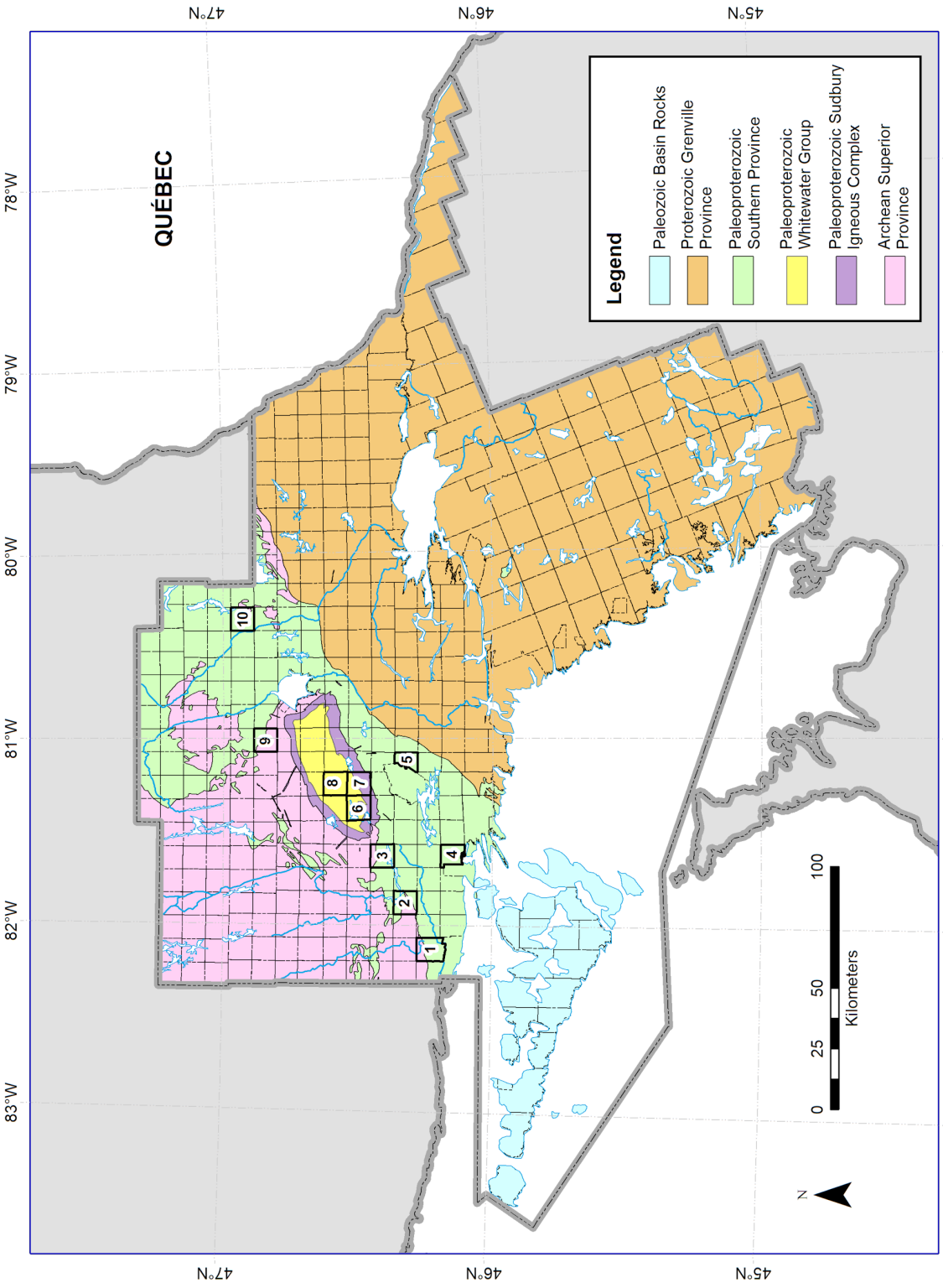

Figure 10. Past-producing metal mines not related to the SIC. Numbers shown on map keyed to Table 18 (Ontario Geological Survey 2024a); geology *modified from* Ontario Geological Survey (2011) overlain by township fabric.

Table 19. Past-producing nonmetal mines and quarries (keyed to Figure 11). The OMI number refers to record number in the Ontario Mineral Inventory database (Ontario Geological Survey 2025a).

No.	Township or Area	Mine or Quarry	Status	Commodity	OMI Number	Alternate Names
1	Cockburn Island	Cockburn Island	No Resources	Dolomite (Dolostone)	MDI41G14NW00002	
2	Dawson	Meldrum Bay	No Resources	Dolomite (Dolostone)	MDI41G14NE00003	Wicketts Farm
		Quarry Point	No Resources	Dolomite (Dolostone)	MDI41G14SE00002	Ryan & Haney Quarry
3	Gordon	Gore Bay	No Resources	Dolomite (Dolostone)	MDI41G16NW00002	Porter's Quarry
		Gore Bay #2	No Resources	Oil Shale	MDI41G16NW00013	
		Gore Bay Airport Quarry	No Resources	Dolomite (Dolostone)	MDI41G15NE00002	
		Gore Bay Hole 3	No Resources	Oil Shale	MDI41G16NW00012	
		Jas. Purvis & Sons Ltd. Hole 1	No Resources	Oil Shale	MDI41G16NW00011	
4	Allan	East Gore Bay Quarry	No Resources	Dolomite (Dolostone)	MDI41G16NW00006	
		Kagawong Quarry	No Resources	Dolomite (Dolostone)	MDI41G16NW00004	
		Kagawong West Quarry	No Resources	Dolomite (Dolostone)	MDI41G16NW00005	
5	Bidwell	Cup and Saucer Quarry	Resources	Limestone	MDI41G16NE00006	
6	Howland	Sheguiandah	Resources	Silica Sand	MDI41H13NW00002	
7	Tehkummah	Leason Quarry	No Resources	Dolomite (Dolostone)	MDI41H12SW00005	
8	Wikwemikong Unceded 26	Great Northern Oil & Gas 1904-06	No Resources	Oil Shale	MDI41H13SE00006	
9	Frechette Island Area	Croker Island Quarry	No Resources	Granite	MDI41J01SE00003	
10	Harrow	Lot 4 Con 4 Quartz Quarry	No Resources	Silica Sand	MDI41I04NW00018	
11	Wells Island Area	Birch Island	No Resources	Quartzite	MDI41I04SW00003	
12	Whitefish Falls Area	Lawson	Resources	Silica/Quartzite	MDI41I04SE00014	
13	Killarney Ridge Area	Badgeley Island Silica	Resources	Silica	MDI41H13NE00003	Unimin Silica Quarry
		Killarney Quarry	Resources	Silica	MDI41H13NE00002	Willmott and Company Quarry
14	Rutherford	Little La Cloche Island Quarry	Resources	Limestone	MDI41H13NW00004	
15	Truman	Carman Construction Quarry	Resources	Silica Sand	MDI41I03NW00010	Fielding Quartz Quarry
16	Denison	Mond Quartz Quarry	No Resources	Silica	MDI41I06NW00044	
		Mond Quartzite Quarry	No Resources	Silica	MDI41I06NW00038	
17	Goschen	Fielding, C.	No Resources	Silica/Quartz	MDI41I03NW00002	Panache Lake Quartz Quarry
18	Waters	Naughton Quarry	No Resources	Silica/Quartz	MDI41I06NE00015	
19	McKim	Kelly Lake Quartz Quarry	No Resources	Silica Sand	MDI41I06NE00018	
20	Dill	Dill Quartz	No Resources	Silica	MDI41I07SW00002	
		Elizabeth Feldspar	No Resources	Feldspar	MDI41I07NW00006	
		Northern Feldspar	No Resources	Feldspar	MDI41I07NW00008	Weisman Hill
		Vaillancourt Feldspar Quarry	No Resources	Feldspar	MDI41I07NW00020	
		Wanup Feldspar	No Resources	Feldspar Mica	MDI41I07NW00007	Cubar Uranium Mines
21	Neelon	Mond Nickel Co.	No Resources	Silica Sand	MDI41I07NW00030	
22	Cleland	Pelto, Oscar	No Resources	Feldspar	MDI41I07NW00012	Elbow Creek, Wanapitei River Junction Deposit
		Weisman Feldspar	No Resources	Feldspar	MDI41I07NW00011	

No.	Township or Area	Mine or Quarry	Status	Commodity	OMI Number	Alternate Names
23	Dryden	Kyanite D	No Resources	Kyanite	MDI41I10SE00010	Northern Kyanite Mines
		McPhee	No Resources	Feldspar	MDI41I07NW00003	McMaster, McPhee Feldspar Quarry
24	Street	Mohawk Garnet Deposit	No Resources	Garnet	MDI000000001564	Ecosource Garnet Inc.
25	Davis	Finlan Mines	No Resources	Feldspar	MDI41I09NW00012	Ess Creek
26	Janes	Kabikotwia River E. Feldspar Occurrence	No Resources	Feldspar	MDI41I09NW00031	Clark and Letson, Wanup Feldspar Mines Davis & Janes
27	Gibbons	Nipissing Black Granite	No Resources	Anorthosite	MDI41I09SW00003	
		Erana	No Resources	Anorthosite	MDI41I09SE00003	Stoncrest, Stonefields, Nipissing Black Granite
28	Dana	Industrial Garnet	No Resources	Garnet	MDI41I09SW00002	
		River Valley Garnet	No Resources	Garnet	MDI41I09NE00002	Dana Township Occurrence, Industrial Garnet Company Ltd.
29	McWilliams	River Valley Stone Manufacturing Pit	No Resources	Gabbro	MDI41I09NE00006	
30	Hugel	Carmichael, H.	No Resources	Feldspar	MDI41I08NW00002	
		Larcher Feldspar	No Resources	Feldspar	MDI41I08NW00003	
31	Crerar	Deer Creek Pegmatite	No Resources	Feldspar	MDI41I09SE00012	
		NE Crerar Black Granite	Resources	Anorthosite	MDI41I09SE00004	
		Geroux Feldspar	No Resources	Silica Sand, Feldspar	MDI41I09SE00005	
		Old Quarry Black Granite Occurrence	No Resources	Anorthosite	MDI41I09SE00011	
32	Delamere	Alexander Centre Industries Quarry	Resources	Silica/Quartz	MDI41I02SE00018	Alban Quarry, Cosby Delamere Orthoquartzite
33	MacPherson	Lavigne Quarry	Resources	Gravel	MDI41I08SE00005	
34	Widdifield	Gravell Brick Works	No Resources	Clay	MDI31L06SW00003	Wallace and Son Brick Works
35	Himsworth	Gomoll Brick and Tile Works	Resources	Clay	MDI31L03SW00003	D. Clark
36	Mattawan	Purdy Mine	No Resources	Mica	MDI31L07SW00014	
37	Shawanaga	Gardiner Quarry	No Resources	Gneiss	MDI41H09SW00006	Dibblee Quarry
38	Carling	MTC Pit Number 39	No Resources	Gneiss	MDI41H08NE00015	
39	Croft	Croft Mining Co.	No Resources	Mica	MDI31E12NE00013	
40	Chapman	S. Mills	No Resources	Mica	MDI31E12NE00012	C. Herald
41	Perry	Austin	No Resources	Diatomite	MDI31E06NW00004	
42	Chaffey	Huntsville Brick Works	No Resources	Clay	MDI31E06SE00005	Stevens Brothers Plant, L. Ware Property
43	Franklin	A.E. Allison	No Resources	Gneiss	MDI31E07SW00003	
		Bartell	Resources	Gneiss	MDI31E06SE00032	
		Harold Babcock	No Resources	Gneiss	MDI31E07SW00002	
44	Gibson	Gibson Township Quarry	No Resources	Gneiss	MDI31D13NW00003	
45	Draper	Home Brick Limited	No Resources	Clay	MDI31E03SW00003	Watson and Hutchison Property
46	Wood	Torrance	No Resources	Peat	MDI31D13NE00002	
47	Morrison	Muskoka Diatomite Ltd.	No Resources	Diatomite	MDI31D14NW00002	

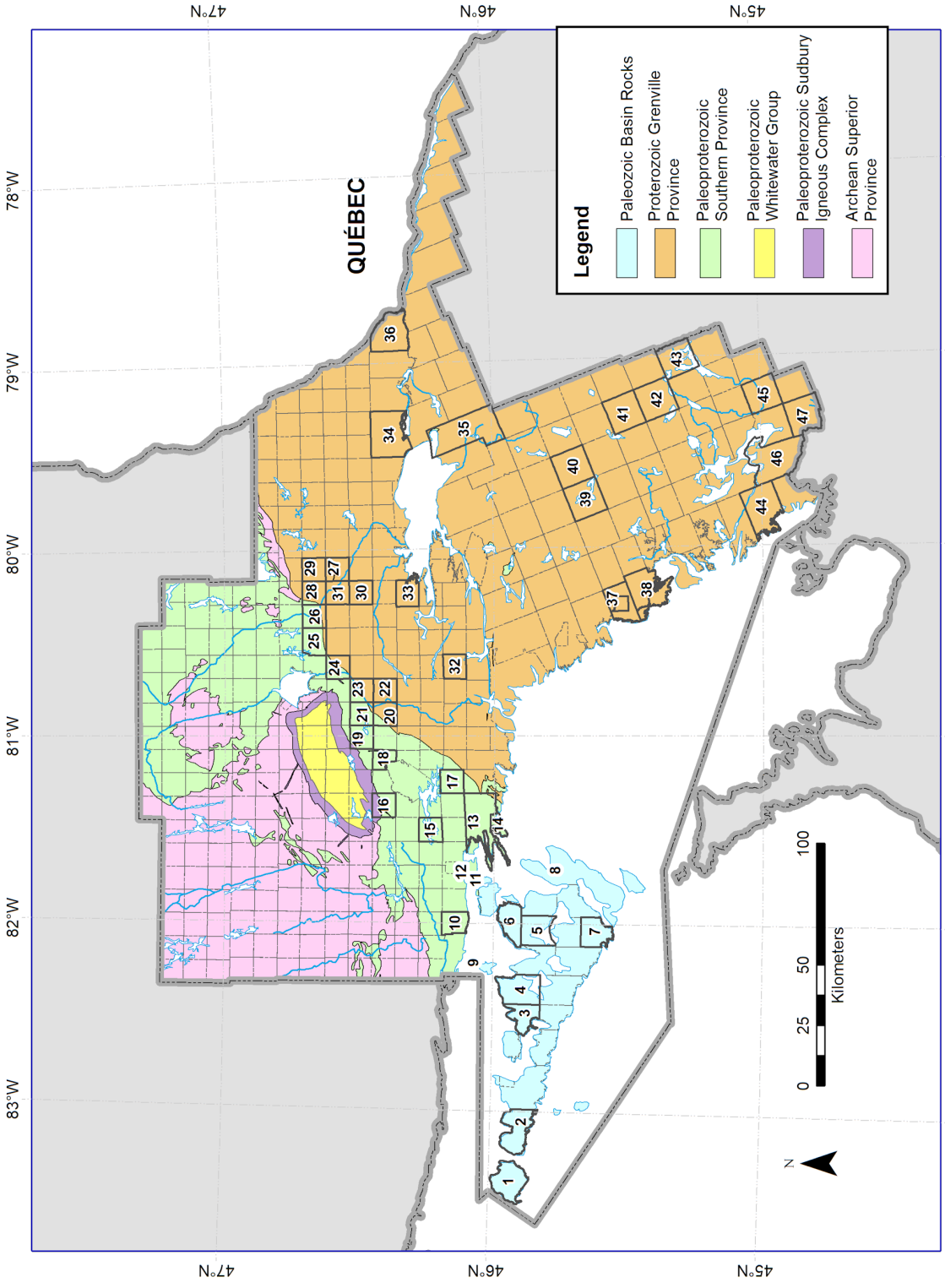

Figure 11. Past-producing nonmetal mines and quarries. Numbers shown on map keyed to Table 19 (Ontario Geological Survey 2025a); geology *modified from* Ontario Geological Survey (2011) overlain by township fabric.

EXPLORATION ACTIVITY

Introduction

The area covered by active claims in the Sudbury RGP District at year-end 2024 is given in Table 20, also shown for comparison are those from year-end 2024, 2023, 2022 and 2021. The total area (ha) covered by claims between January 1, 2024, and December 31, 2024, for the Sudbury RGP District increased by 11 591 ha, (+3%), as shown in Figure 12.

In 2024, 50 new assessment reports, with an assessment credit value of $6 961 736, were processed and uploaded to the Ministry's Ontario Assessment File Database (OAFD; Ontario Geological Survey 2025b), an *OGSEarth* application, through the Sudbury District RGP office (Table 21; Figure 13). Note that physical assessment files are no longer being generated. The existing paper files are being maintained, but no new files are being added; all assessment files are available online.

Exploration activity in the Sudbury RGP District in 2024, based on assessment filings, company reports, company news releases, and news reports, is listed in Table 22 and shown on Figure 14.

Table 20. Area of active claims in the Sudbury RGP District for 2024.

Date	Total area (ha) covered by claims
January 3, 2025	**394 314**
January 5, 2024	382 723
January 4, 2023	392 777
January 25, 2022	361 492
January 4, 2021	335 285

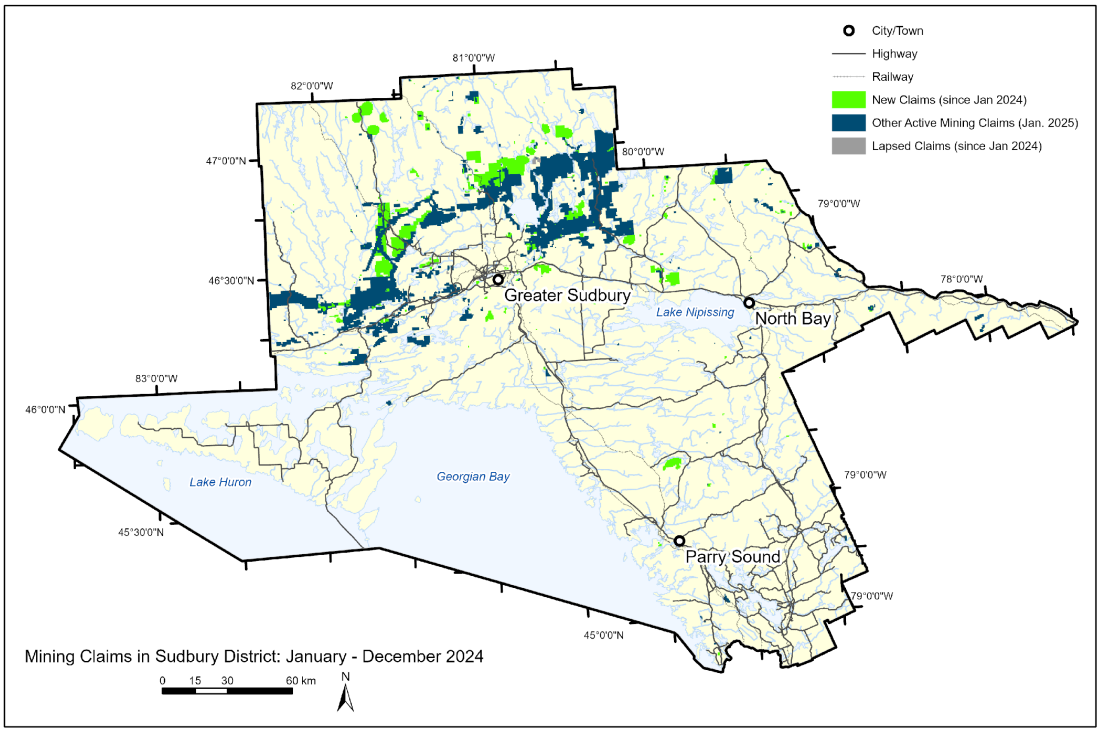

Figure 12. Total area of mining claims in the Sudbury District, at year-end 2024.

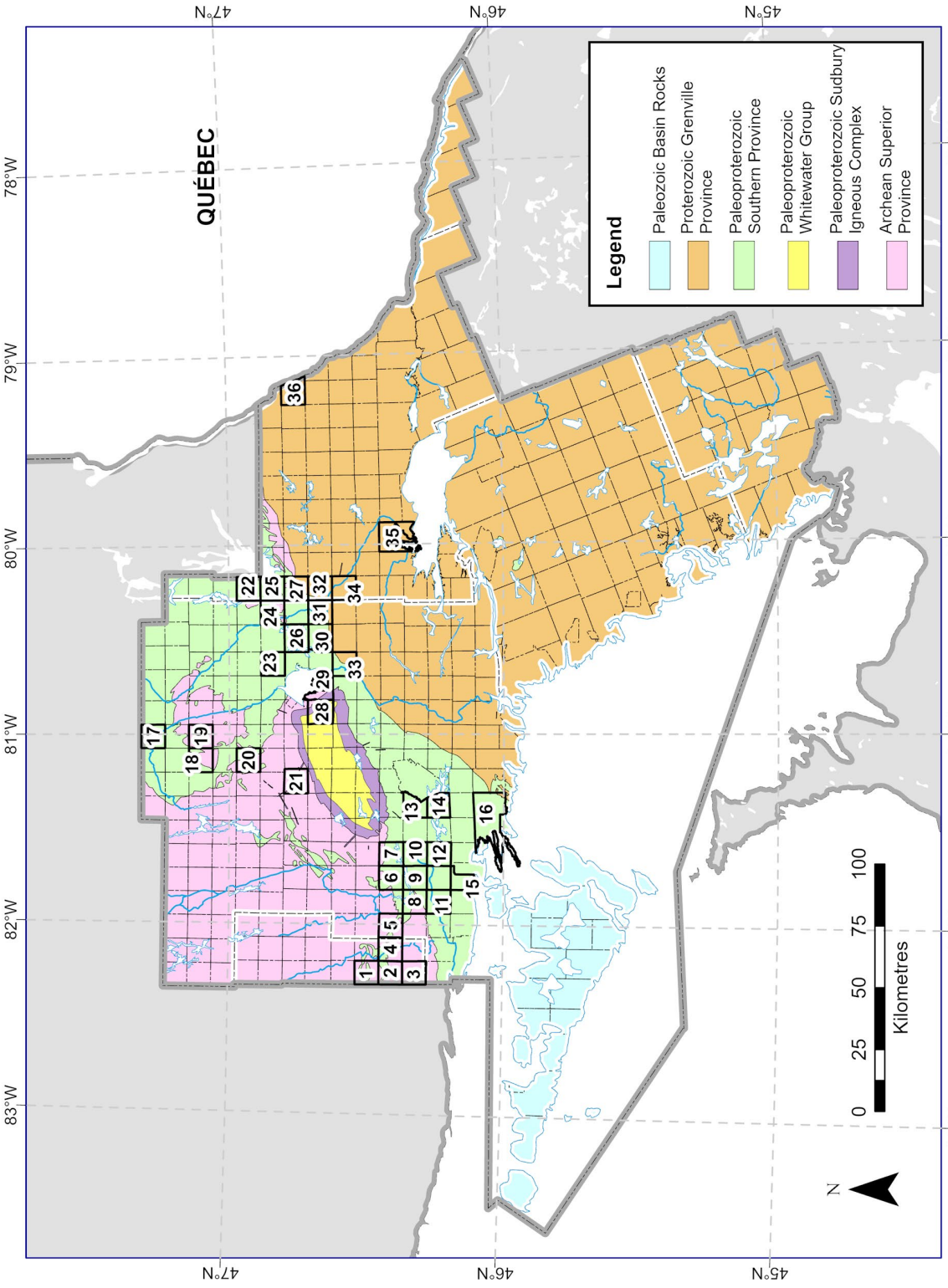

Figure 13. Assessment files received in the Sudbury District in 2024 (numbers shown on map keyed to Table 21). Geology *modified from* Ontario Geological Survey (2011) with overlain township fabric.

Table 21. Assessment files received in the Sudbury District in 2024 (keyed to location on Figure 13).

Abbreviations

ACOMP ..... Compilation and interpretation - airborne geophysics
AEM ..... Airborne electromagnetic survey
AMAG ..... Airborne magnetometer survey
ASSAY ..... Assaying and analyses
BULK ..... Bulk sampling
DHGEO ..... Downhole Geophysics
DHRSMP ..... Drill Core Resampling
GCBIO ..... Geobotanical and Biogeochemical Survey
GCOMP ..... Compilation and interpretation - ground geophysics
GEOL ..... Geological survey / mapping
IP ..... Induced polarization
LC ..... Linecutting
LIDAR ..... Light detection and ranging survey
MAG ..... Magnetic / magnetometer survey
OPHYSI ..... Other Physical
PDRILL ..... Diamond drilling
PHOTO ..... Air photo and remote imagery interpretations
PROSP ..... Prospecting by licence holder
PSTRIP ..... Overburden stripping
PTRNCH ..... Bedrock trenching
ROCK ..... Rock sampling
SOIL ..... Soil/till sampling
VLF ..... Electromagnetic very low frequency survey

Number	Tech ID	Township/Area	Company Name	Property	Year	Work Type	Work Approved	File Identifier
1	20000022468	Lockeyer	Bear Creek Gold Ltd		2023	MAG	$3997	118768, 7006
2	20000021622	Gerow, Deagle, Gaiashk	Marvel Discovery Corp	East Bull Property	2023	AEM, AMAG	$88 588	109435, 6379
3	20000022431	Cadeau	Dan Patrie Exploration Ltd		2023 - 2023	ASSAY, PROSP, ROCK	$3330	124010, 7261
4	20000021895	Boon	Timothy Martel	Boon Property	2023 - 2023	ASSAY, PROSP, ROCK	$2504	114797, 6754
5	20000022142	Shibananing	Precambrian Ventures Ltd	Agnew Offsets Property	2023 - 2024	PROSP, ROCK	$22 051	117901, 6966
6	20000022070	Porter	Skead Holdings Ltd	Agnew Lake Property	2023 - 2024	ASSAY, SOIL	$7740	118150, 6973
6	20000022121	Porter	Skead Holdings Ltd	Agnew Lake Property	2020 - 2024	ASSAY	$3140	118293, 6979
7	20000021864	Hyman	Graycliff Exploration Ltd	Lunge Property	2023 - 2023	ASSAY, GEOL, PROSP, ROCK	$21 091	113914, 6690
7	20000021996	Hyman	Skead Holdings Ltd	Agnew Lake North Property	2019 - 2023	ASSAY, DHRSMP	$11243	110286, 6447
7	20000022137	Hyman	Skead Holdings Ltd	Agnew Lake Mine Property	2023 - 2024	ACOMP, PROSP, ROCK	$24 478	115882, 6826
7	20000022323	Hyman	Skead Holdings Ltd	Hyman Property	2024 - 2024	ASSAY, LIDAR, PROSP, ROCK	$10813	123124, 7219
7	20000022355	Hyman	Skead Holdings Ltd	Agnew Mine Property	2024 - 2024	MAG, VLF	$27 880	123102, 7218
8	20000021854	Shakespeare	Ursa Major Minerals Inc	Shakespeare Property	2022 - 2023	ASSAY, PROSP, ROCK	$5898	109518, 6391
9	20000021967	Baldwin	Graycliff Exploration Ltd	Baldwin NE Property	2023 - 2023	ASSAY, PHOTO, PROSP, ROCK	$10 285	116355, 6850
9	20000022096	Baldwin	Magna Mining Inc	Baldwin Property, P4 Property, Shakespeare Mine, Spanish River Mine Property	2022 - 2023	ASSAY, PDRILL, ROCK	$1 912 654	111427, 6522

Number	Tech ID	Township/Area	Company Name	Property	Year	Work Type	Work Approved	File Identifier
9	20000022134	Baldwin	Ursa Major Minerals Inc	Baldwin Property, P4 Property, Shakespeare Property, Spanish River Property	2022 - 2023	ASSAY, PDRILL	$1 912 654	111427, 6522
10	20000021886	Nairn	DBC Aggregates Ltd	Nairn Property	2023 - 2024	ACOMP, ASSAY, GEOL, PHOTO, ROCK	$52 195	114302, 6722
10	20000022000	Nairn	Steven Anderson	Nairn Ni Project	2023 - 2023	PROSP, ROCK	$5610	112980, 6614
10	20000022112	Nairn	Steven Anderson	Claim 214048	2024 - 2024	PROSP, ROCK	$2900	116563, 6861
11	20000022433	Hallam	Ursa Major Minerals Inc	Shakespeare Property	2024 - 2024	PROSP, ROCK	$4139	124288, 7283
12	20000022036	Foster	Kenneth Naples		2023 - 2023	ASSAY, PROSP, ROCK	$1900	117658, 6948
12	20000022297	Foster	Steve Anderson	Foster Adit Project	2024 - 2024	PROSP, ROCK	$3335	118856, 7013
13	20000021938	Louise	Ben Haavisto	West Lake Mining Claims	2023 - 2023	ROCK	$4200	115747, 6817
13	20000022395	Louise	Ben Haavisto	West Lake Mining Claims	2024 - 2024	PROSP, ROCK	$2100	123661, 7250
13	20000022397	Louise	Ben Haavisto	West Lake Mining Claims	2024 - 2024	PROSP, ROCK	$4200	124140, 7271
14	20000022348	Dieppe	Steven Anderson	Dieppe Project	2024 - 2024	PROSP, ROCK	$3227	120688, 7112
15	20000022481	Mongowin	McFarlane Lake Mining Inc	McMillan Property	2023 - 2024	IP, LC	$66 363	122272, 7184
16	20000021760	Killarney	Badgeley Island Aggregates Inc	Badgeley Point	2023 - 2023	ASSAY, ROCK	$21 900	109219, 6368
17	20000022456	Stull	FNX Mining Company Inc	Warrior Copper Project	2023 - 2024	ASSAY, GEOL, PTRNCH, ROCK	$35 509	124166, 7274
18	20000021575	McNamara	FNX Mining Company Inc	Warrior Copper Project	2023 - 2023	GEOL, ROCK	$5233	108831, 6343
18	20000022499	McNamara	FNX Mining Company Inc	Warrior Copper Project	2024	ASSAY, GEOL	$13 274	126126, 7339
19	20000021964	Cotton	Jonathan Camilleri		2023 - 2023	GCOMP, MAG	$38 848	115623, 6825
20	20000022345	Roberts	CJP Exploration Inc	Nordic Property	2023 - 2023	ASSAY, PROSP, ROCK	$15 566	120230, 7078
21	20000022377	Foy	Todd Fielding	Foy Property	2022	PROSP, ROCK	$3820	120632, 7108
22	20000021798	Scholes	Trefstone Corp	Scholes Township Property	2023 - 2023	MAG	$6318	112388, 6597
23	20000021756	Mackelcan	Inventus Mining Corp	Sudbury 2.0 Property	2021 - 2022	PDRILL	$1 002 712	104978, 111719, 115984, 6235, 6561, 6836
24	20000022418	MacBeth	Randy Stewart	Clement Property	2023 - 2023	GEOL	$25 004	121011, 7138
25	20000022101	Clement	Steven Anderson	Fisher Project	2024 - 2024	PROSP, ROCK	$2800	113956, 6691
26	20000022466	Kelly	Bryan Dorland	Maskinonge PGM Project	2022 - 2024	PROSP, ROCK	$9978	117932, 6969
27	20000021878	Pardo	Mount Logan Resources Ltd	Pardo Project	2021 - 2022	BULK	$1 264 128	113303, 6633

Number	Tech ID	Township/Area	Company Name	Property	Year	Work Type	Work Approved	File Identifier
28	20000022066	Capreol	407043 Ontario Ltd	Radar Road Property	2023 - 2024	ASSAY, GEOL, PROSP, ROCK	$11 630	117751, 6961
29	20000021810	Maclennan	Mark Hall	Bonanza Project	2022 - 2024	ASSAY, PROSP, ROCK, SOIL	$11 352	113285, 6631
30	20000022102	Davies	Steven Anderson	Davis Project	2023 - 2023	PROSP, ROCK	$2800	113978, 6693
31	20000022488	Janes	Brian Wright	Janes Property	2023 - 2024	DHGEO, IP	$18 728	123068, 7217
32	20000021896	Dana	2065342 Ontario Inc	Dana Property	2023 - 2023	ASSAY, PROSP, ROCK	$4146	114891, 6759
33	20000021716	Street	Leonard Cook	Stripping-Street Township Property	2021 - 2022	OPHYSI, PSTRIP	$19 668	107956, 6307
34	20000021809	Crerar	Legendary Ore Mining Corporation	River Valley Property	2023 - 2023	ASSAY, GCBIO, ROCK, SOIL	$176 750	113212, 6629
35	20000021588	Springer	Steven Anderson	Burnt Creek REM Project	2023 - 2023	PROSP, ROCK	$3912	109596, 6410
36	20000022342	Wyse	Globex Mining Enterprises Inc	Wyse Silica Property	2023 - 2023	ASSAY, GEOL, ROCK	$35 320	118836, 7011
36	20000022444	Wyse	Silicorp Developments Inc	Wyse Township Project	2009	GEOL, ROCK	$13 825	2.41861, W0970.01595

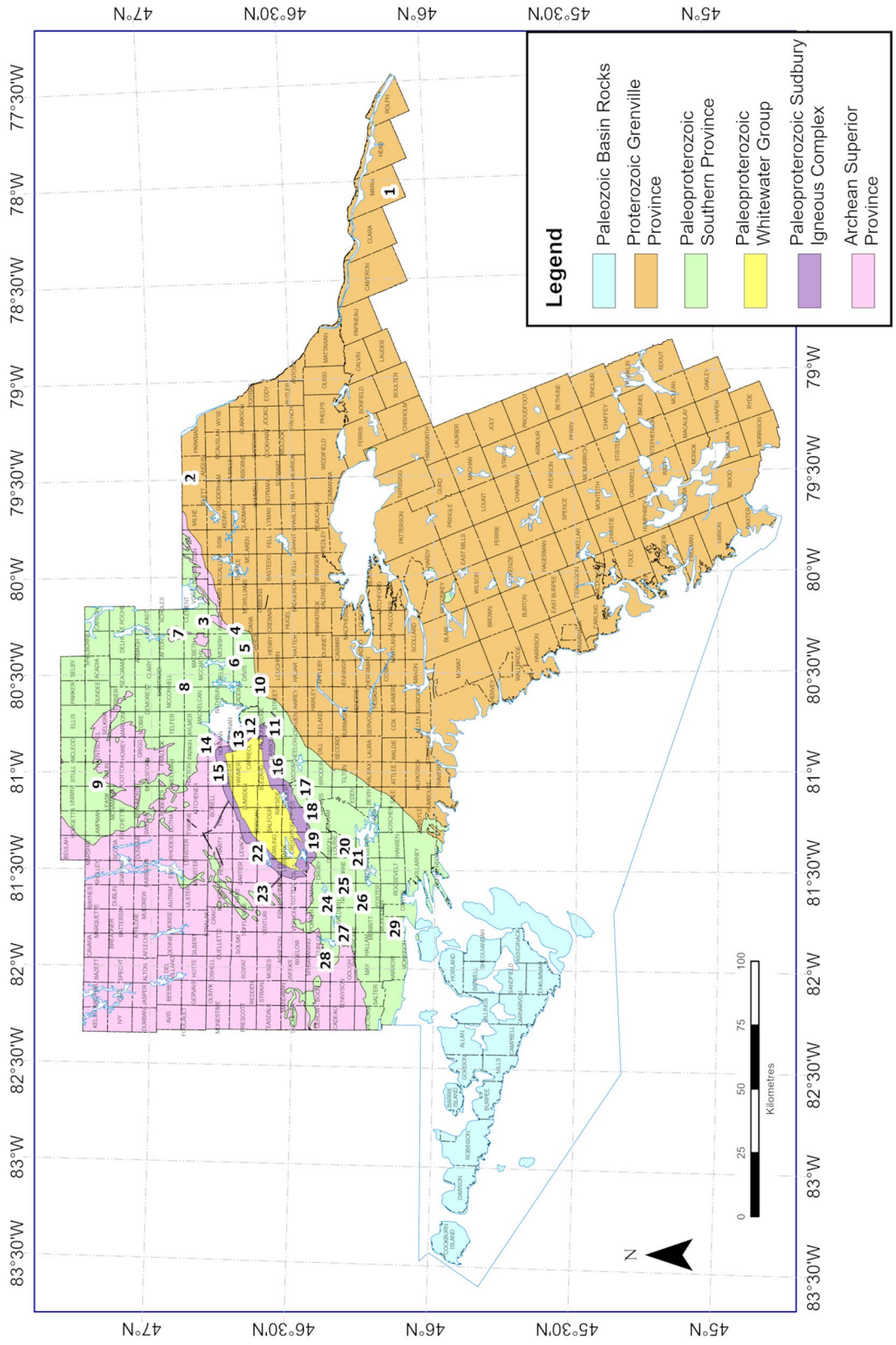

Figure 14. Exploration activity in the Sudbury District in 2024, from assessment reports and news releases (numbers shown on map keyed to Table 22); geology *modified from* Ontario Geological Survey (2011), with overlain township fabric.

Table 22. Exploration activity in the Sudbury RGP District in 2024, keyed to Figure 14.

Abbreviations

ACOMP ..... Compilation and interpretation - airborne geophysics
AGMNT ..... Agreement
ASSAY ..... Assaying and analyses
ASSAYR ..... Assay results
BULK ..... Bulk sampling
CHNL ..... Channel sampling
CORPUP ..... Corporate update
DHGEO ..... Downhole geophysics
DRLRES ..... Drilling results
ENVIRO ..... Environmental studies
EXPLUD ..... Exploration update
FINANC ..... Financing
GEOL ..... Geological survey / mapping
IP ..... Induced polarization survey
LC ..... Linecutting
LIDAR ..... Light detection and ranging survey
MAG ..... Magnetic / magnetometer survey
METAL ..... Metallurgical testing and bulk sampling
PDEWAT ..... Dewatering of underground workings
PDRILL ..... Diamond drilling
PEA ..... Preliminary economic assessment
PHOTO ..... Air photo and remote imagery interpretations
PMECH ..... Mechanical
PRDUD ..... Production update
PROPTR ..... Property transaction
PROSP ..... Prospecting by licence holder
PSHAFT ..... Shaft sinking
PSTRIP ..... Overburden stripping
PTRNCH ..... Bedrock trenching
QANRPT ..... Quarterly / annual report
RECON ..... Regional or reconnaissance ground exploration
ROCK ..... Rock sampling
RRCALC ..... Reserve/resource calculations
SOIL ..... Soil/till sampling
TRPT ..... Technical report
VLF ..... Electromagnetic very low frequency survey

No.	Company/Individual (Stock Symbol) Property Name	Township/Area (Commodity)	Exploration Activity
1	Northern Graphite Corp Bisset Creek Property	Maria (Graphite)	CORPUP
2	Osprey Advanced Materials Corp Titan Titanium Vanadium	Angus (Titanium, Vanadium)	AGMNT
3	Inventus Mining Corp Pardo Paleoplacer Gold Property	Pardo (Gold)	CORPUP, PDRILL
4	New Age Metals River Valley Property	Dana (Platinum Metals)	CORPUP, ENVIRO, METAL
5	Brian Wright Janes Property	Janes	DHGEO, IP
6	Bryan Dorland Maskinonge PGM Project	Kelly	PROSP, ROCK
7	Conquest Resources Ltd Belfast - Teck Mag Property	Belfast (Copper, Gold, Nickel, Platinum Metals)	AGMNT, EXPLUD
7	VerAI US LLC Belfast - Teck Mag Property	Belfast (Copper, Gold, Nickel, Platinum Metals)	AGMNT, EXPLUD
7	Steven Anderson Fisher Project	Clement	PROSP, ROCK
8	Inventus Mining Corp Sudbury 2.0	Mackelcan (Cobalt, Copper, Nickel)	CORPUP
9	FNX Mining Company Inc Warrior Copper Project	Stull, McNamara	ASSAY, GEOL, PTRNCH, ROCK
10	MacDonald Mines Exploration Ltd Scadding-Powerline-Jovan Project	Davis (Copper, Gold)	ASSAYR, CORPUP, PROPTR
10	Canuc Resources Corp Scadding-Powerline-Jovan Project	Davis (Copper, Gold)	PROPTR
11	Glencore Canada Falconbridge Office	Falconbridge (Cobalt, Copper, Nickel)	PRDUD, RRCALC, QANRPT
11	CBLT Inc Falcon Gold Property	Falconbridge (Cobalt, Gold)	CORPUP, PROPTR,ASSAYR, EXPLUD, PMECH, PSTRIP
12	Glencore Canada Nickel Rim South	Maclennan (Cobalt, Copper, Nickel)	CORPUP
12	Mark Hall Bonanza Project	Maclennan	ASSAY, PROSP, ROCK, SOIL

No.	Company/Individual (Stock Symbol) Property Name	Township/Area (Commodity)	Exploration Activity
13	NorthX Nickel Corp (Archer Exploration Corp.) Frost Lake Property	Capreol (Copper, Nickel, Platinum Metals)	CORPUP, PROPTR
13	Magna Mining Inc Frost Lake Property	Capreol (Copper, Nickel, Platinum Metals)	PROPTR
13	407043 Ontario Ltd Radar Road Property	Capreol	ASSAY, GEOL, PROSP, ROCK
14	Premium Resources Ltd (Premium Nickel Resources Corp) Post Creek/Halcyon	Norman (Copper, Nickel, Platinum Metals)	CORPUP
14	Magna Mining Inc Parkin Property	Parkin (Copper, Nickel, Platinum Metals)	PROPTR
14	NorthX Nickel Corp (Archer Exploration Corp.) Parkin Property	Parkin (Copper, Gold, Nickel, Platinum Metals)	CORPUP, PROPTR
15	Magna Mining Inc Wisner Property	Wisner (Copper, Nickel, Platinum Metals)	PROPTR
16	Magna Mining Inc Blezard Property	Blezard (Copper, Nickel, Platinum Metals)	PROPTR
17	Vale Canada Ltd Sudbury Office	Snider (Nickel)	PRDUD, QANRPT, RRCALC, CORPUP
18	Magna Mining Inc Creighton South	Graham (Copper, Nickel, Platinum Metals)	PROPTR
19	KGHM International Ltd Victoria	Denison (Copper, Nickel, Platinum Metals)	QANRPT, CORPUP, PSHAFT
19	SPC Nickel Corp Lockerby Graham Property	Graham (Copper, Nickel, Platinum Metals)	RRCALC, CORPUP, METAL, CHNL, PDRILL, DRLRES, CORPUP
19	SPC Nickel Corp Lockerby East Property	Graham (Copper, Nickel, Platinum Metals)	RRCALC, CORPUP
19	Magna Mining Inc Crean Hill Property	Denison (Copper, Nickel, Platinum Metals)	EXPLUD, DRLRES, AGMNT, CORPUP, PDEWAT, PDRILL, DRLRES, BULK, PEA, PROPTR, FINANC
20	Ben Haavisto West Lake Mining Claims	Louise	PROSP, ROCK
21	Steven Anderson Dieppe Project	Dieppe	PROSP, ROCK
22	KGHM International Ltd McCreedy West Mine	Levack (Copper, Nickel)	QANRPT, PROPTR, PRDUD
22	Magna Mining Inc McCreedy West Mine	Levack (Copper, Nickel, Platinum Metals)	PROPTR, RRCALC, TRPT
22	NorthX Nickel Corp (Archer Exploration Corp.) Windy Lake	Cascaden (Copper, Nickel, Platinum Metals)	CORPUP, PROPTR
22	Magna Mining Inc Windy Lake	Cascaden (Copper, Nickel, Platinum Metals)	PROPTR
23	NorthX Nickel Corp (Archer Exploration Corp.) Trill Property	Trill (Copper, Nickel, Platinum Metals)	CORPUP, PROPTR
23	Magna Mining Inc Trill Property	Trill (Copper, Nickel, Platinum Metals)	PROPTR
24	Skead Holdings Ltd Agnew Lake Mine Property	Hyman	ACOMP, PROSP, ROCK, MAG, VLF
24	Skead Holdings Ltd Hyman Property	Hyman	ASSAY, LIDAR, PROSP, ROCK
24	Skead Holdings Ltd Agnew Lake Property	Porter	ASSAY, SOIL
24	Graycliff Exploration Ltd Lunge Property	Hyman (Copper, Gold, Nickel, Platinum Metals)	PROPTR

No.	Company/Individual (Stock Symbol) Property Name	Township/Area (Commodity)	Exploration Activity
24	EV Minerals Corp Lunge Property	Hyman (Copper, Gold, Nickel, Platinum Metals)	ASSAYR, PROPTR, CORPUP
25	Steven Anderson Claim 214048	Nairn	PROSP, ROCK
25	DBC Aggregates Ltd Nairn Property	Nairn	ACOMP, ASSAY, GEOL, PHOTO, ROCK
26	Steve Anderson Foster Adit Project	Foster	PROSP, ROCK
27	Magna Mining Inc Shakespeare Nickel Property	Shakespeare (Copper, Nickel, Platinum Metals)	EXPLUD, PDRILL, FINANC, ASSAYR
27	Graycliff Exploration Ltd Baldwin Project	Shakespeare (Gold)	PROPTR
27	EV Minerals Corp Baldwin Project	Shakespeare (Gold)	EXPLUD, PROPTR, RECON, CORPUP
27	Ursa Major Minerals Inc	Hallam	PROSP, ROCK
28	Precambrian Ventures Ltd Agnew Offsets Property	Shibananing	PROSP, ROCK
29	McFarlane Lake Mining Inc McMillan/Mongowin Property	Mongowin (Copper, Gold, Platinum Metals, Silver)	CORPUP, IP, EXPLUD, ASSAYR, PDRILL, DHGEO, LC

In 2024, 44 exploration plans and 63 exploration permits were active in the Sudbury District on active mining claims (Tables 23 and 24; Figures 15 and 16). Of these, 31 (14 plans and 17 permits) were issued in 2024.

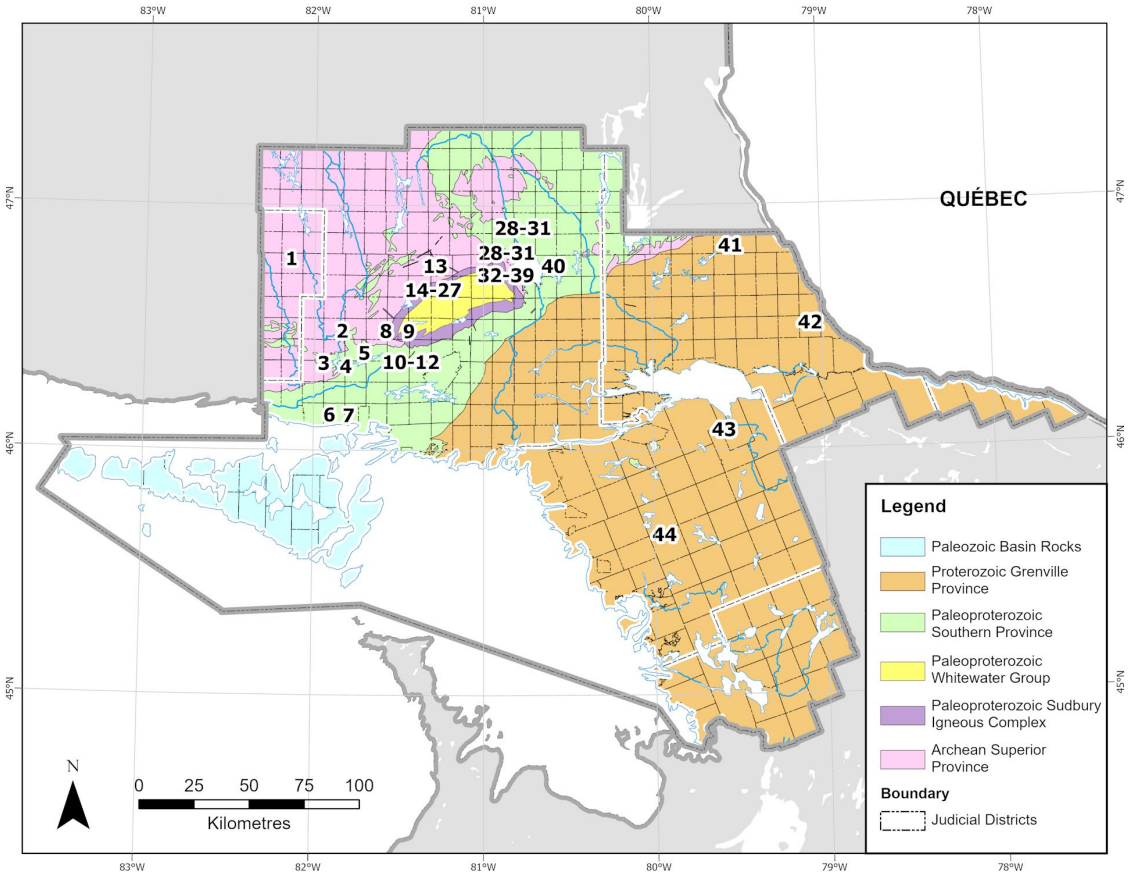

Figure 15. Exploration plans on active mining claims in the Sudbury District in 2024 (numbers shown on map keyed to Table 23); geology *modified from* Ontario Geological Survey (2011) with overlain township fabric.

Table 23. Exploration plans in the Sudbury District in 2024 on active mining claims (keyed to location on Figure 15).

No.	Township	Plan No.	Claim Holder and/or Proponent	Project Name	Effective
1	Olinyk	PL-24-000032	Tyler Neill	TBL	2024
2	Dunlop, Porter	PL-24-000026	Ursa Major Minerals Incorporated	Crowpat Geophysics	2024
3	Shakespeare	PL-23-000092	Glencore Canada Corporation	Shakespeare West 2023	2023
4	Baldwin, Shakespeare	PL-24-000003	Ursa Major Minerals Incorporated	Shakespeare SE	2024
5	Hyman, Porter	PL-23-000089	Ursa Major Minerals Incorporated	Shakespeare East 2023	2023
6	Mckinnon	PL-23-000015	Petrolympic Ltd.	Mckinnon Twp Project	2023
7	Mongowin	PL-23-000093	Mcfarlane Lake Mining Incorporated	McMillan	2023
8	Drury	PL-22-000132	Glencore Canada Corporation	Chicago Project	2022
9	Drury	PL-22-000133	Vale Canada Limited Vale Canada Limitee	Chicago Project	2022
10	Drury	PL-23-000063	Archer Exploration Corp.	Totten Project	2023
11	Denison, Drury, Lorne, Louise	PL-23-000064	Vale Canada Limited Vale Canada Limitee	Totten Project	2023
12	Louise	PL-23-000062	Joerg Kleinboeck	Totten Project	2023
13	Foy, Harty	PL-23-000039	Glencore Canada Corporation	Sandcherry Project	2023
14	Levack, Morgan	PL-24-000019	Glencore Canada Corporation	Morgan West Project	2024
15	Morgan	PL-24-000021	Glencore Canada Corporation	Morgan West Project	2024
16	Morgan	PL-24-000020	Glencore Canada Corporation	Morgan West Project	2024
17	Morgan	PL-24-000016	Vale Canada Limited Vale Canada Limitee	Morgan West Project	2024
18	Morgan	PL-24-000018	Glencore Canada Corporation	Morgan West Project	2024
19	Morgan	PL-24-000013	Glencore Canada Corporation	Morgan West Project	2024
20	Morgan	PL-24-000017	Archer Exploration Corp.	Morgan West Project	2024
21	Foy, Morgan	PL-23-000041	Glencore Canada Corporation	Morgan-Lumsden Project	2023
22	Foy, Morgan	PL-23-000044	Glencore Canada Corporation	Morgan-Lumsden Project	2023
23	Foy, Morgan	PL-23-000042	Glencore Canada Corporation	Morgan-Lumsden Project	2023
24	Foy, Morgan	PL-24-000014	Vale Canada Limited Vale Canada Limitee	Morgan West Project	2024
25	Bowell, Foy, Morgan	PL-23-000045	Vale Canada Limited Vale Canada Limitee	Morgan-Lumsden Project	2023
26	Bowell, Foy, Morgan	PL-23-000040	Archer Exploration Corp.	Morgan-Lumsden Project	2023
27	Foy	PL-23-000043	Glencore Canada Corporation	Morgan-Lumsden Project	2023
28	Norman, Parkin	PL-23-000096	John Brady	Parkin-Brady	2023
29	Parkin	PL-23-000097	1311870 Ontario Inc.	Parkin-1311870	2023
30	Parkin	PL-23-000016	Archer Exploration Corp.	PARKIN PROJECT E	2023
31	Norman, Parkin	PL-23-000098	Premium Nickel Resources Ltd.	Parkin-PN	2023
32	Capreol, Norman	PL-23-000032	Vale Canada Limited Vale Canada Limitee	SN-Ella Project	2023
33	Capreol, Norman	PL-23-000033	Vale Canada Limited Vale Canada Limitee	SN-Ella Project	2023
34	Capreol, Norman	PL-23-000035	Vale Canada Limited Vale Canada Limitee	SN-Ella Project	2023
35	Capreol, Norman, Wisner	PL-23-000036	Glencore Canada Corporation	SN-Ella Project	2023
36	Capreol, Norman	PL-23-000034	Vale Canada Limited Vale Canada Limitee	SN-Ella Project	2023
37	Capreol	PL-23-000037	Glencore Canada Corporation	SN-Ella Project	2023
38	Norman	PL-23-000028	Archer Exploration Corp.	SN-Ella Project	2023
39	Capreol, Norman	PL-23-000038	Glencore Canada Corporation	SN-Ella Project	2023
40	Rathbun	PL-23-000022	Inventus Mining Corp	Boot Lake	2023
41	Flett	PL-23-000074	Osprey Advanced Materials Corp.	Flett Twp Exploration Property	2023
42	Butler	PL-24-000012	Gary Mote	Butler	2024
43	Nipissing	PL-24-000041	Michael Harrison	Nordic Sons Exploration North	2024
44	Hagerman, Mckenzie	PL-24-000034	5051318 Ontario Corp.	Whitestone	2024

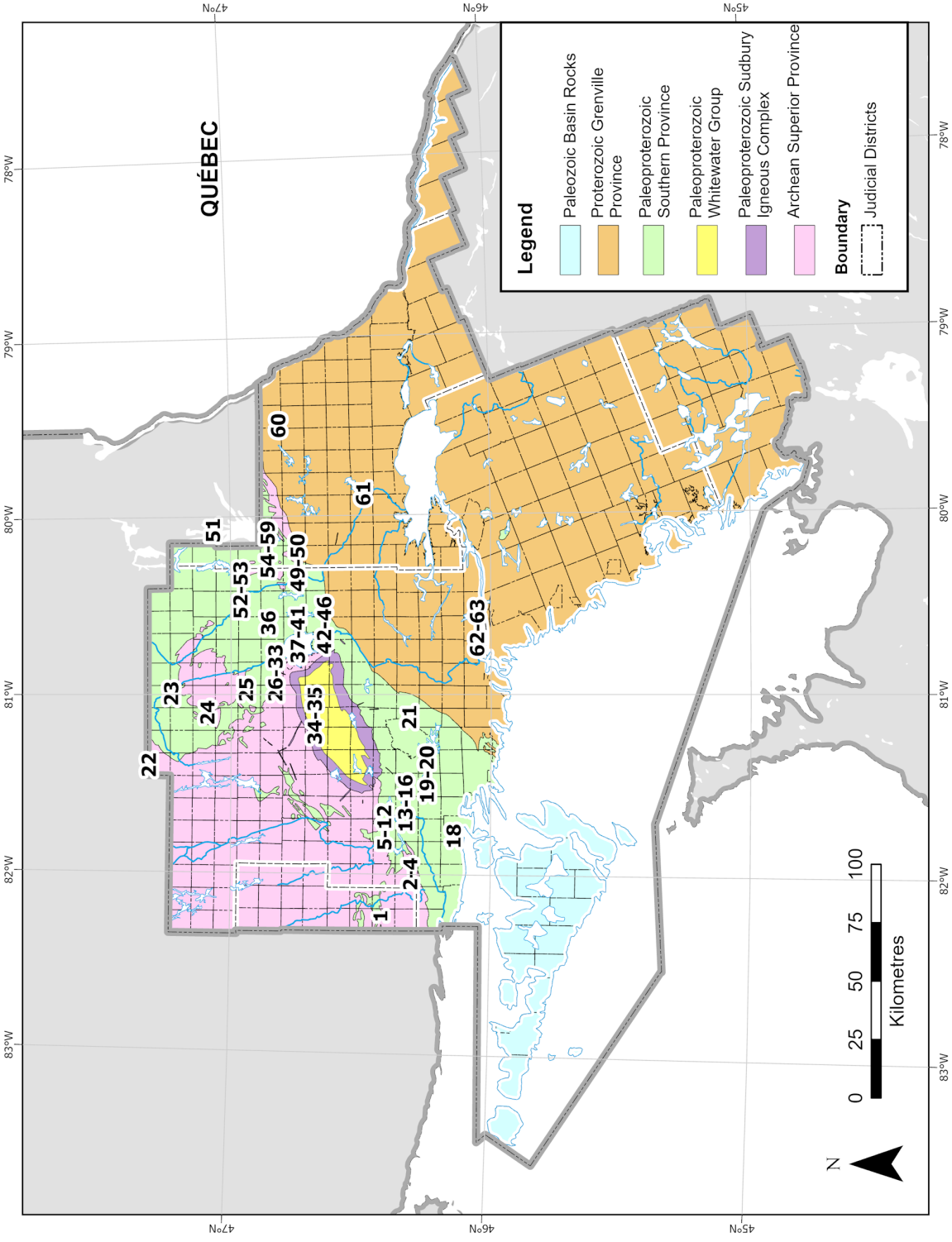

Figure 16. Exploration permits on active mining claims in the Sudbury District in 2024 (numbers shown on map keyed to Table 24); geology *modified from* Ontario Geological Survey (2011) with overlain township fabric.

Table 24. Exploration permits in the Sudbury District in 2024 on active mining claims (keyed to location on Figure 16).

No.	Township	Permit No.	Claim Holder and/or Proponent	Project Name	Effective
1	Gerow	PR-23-000254	Ursa Major Minerals Incorporated	East Bull	2023
2	Shakespeare	PR-21-000381	Brian Wright	Shakespeare Island permit	2021
3	Baldwin, Shakespeare	PR-24-000014	Randy Stewart	Shakespeare	2024
4	Shakespeare	PR-24-000137	Ursa Major Minerals Incorporated	SW	2024
5	Dunlop, Porter	PR-24-000071	Inventus Mining Corp	Crowpat Drilling & Stripping	2024
6	Porter	PR-23-000335	John Brady	Hanover	2023
7	Porter	PR-24-000007	Conquest Resources Limited	Palladium Valley Extension	2024
8	Porter	PR-23-000339	Allstone Quarry Products Inc.	Palladium Valley	2023
9	Baldwin, Porter	PR-22-000218	Jim Melo	Spanish Ext	2022
10	Baldwin, Porter	PR-24-000136	Macdonald Mines Exploration Ltd	P4 & Spanish River	2024
11	Baldwin, Porter	PR-21-000344	Macdonald Mines Exploration Ltd	P-4 Ext	2021
12	Hyman, Porter	PR-24-000013	Macdonald Mines Exploration Ltd	Mag-Grav	2024
13	Hyman, Nairn	PR-23-000031		Jiggy Creek Nickel	2023
14	Nairn	PR-23-000225	Gordon Salo	Nairn NW	2023
15	Baldwin, Foster, Merritt, Nairn	PR-23-000227	Gordon Salo	Nairn Main Project West	2023
16	Foster, Lorne, Nairn, Truman	PR-23-000228	Macdonald Mines Exploration Ltd	Nairn Main Project East	2023
17	Lorne	PR-23-000226	Ursa Major Minerals Incorporated	Niarn Project NE	2023
18	Mongowin	PR-24-000138	Gordon Salo	McMillan Mine Exploration Drilling	2024
19	Truman	PR-22-000228	Macdonald Mines Exploration Ltd	Sudbury Prospecting	2022
20	Dieppe, Hansen, Truman	PR-22-000153	Glencore Canada Corporation	Sudbury Prospecting Project	2022
21	Eden	PR-22-000154	Inventus Mining Corp	Sudbury Prospecting Project	2022
22	Beulah, Moffat	PR-22-000131	Inventus Mining Corp	Meteor Project - North	2022
23	Stull, Valin	PR-23-000095	Ev Minerals Corporation	Warrior	2023
24	Mcnamara	PR-23-000096	Archer Exploration Corp.	Warrior	2023
25	Hutton, Kitchener	PR-24-000069	Champion Bear Resources Ltd.	Leases Hutton Twp	2024
26	Fraleck, Parkin	PR-22-000017	Archer Exploration Corp.	North River	2022
27	Hutton, Parkin	PR-23-000076	Champion Bear Resources Ltd.	Black Creek-Golden Pine 2023	2023
28	Parkin	PR-23-000035	Steven Anderson	Parkin Project D	2023
29	Parkin	PR-23-000075	1311870 Ontario Inc.	Golden Pine	2023
30	Norman, Parkin	PR-23-000032	John Brady	Parkin Project A	2023
31	Parkin	PR-23-000298	Environmental Tailings Corporation	Marble Mountain-Golden Pine	2023
32	Parkin	PR-23-000033	Fnx Mining Company Inc.	Parkin Project B	2023
33	Parkin	PR-23-000034	Fnx Mining Company Inc.	Parkin Project C	2023
34	Capreol, Norman, Wisner	PR-23-000345	Inventus Mining Corp	Norman West	2023
35	Capreol, Norman, Wisner	PR-22-000318	Steven Anderson	Norman West	2022
36	Mackelcan	PR-23-000247	Steven Anderson	Cobalt Hill	2023
37	Aylmer, Mackelcan, Rathbun	PR-23-000214	Steven Anderson	Sudbury 2.0	2023
38	Rathbun	PR-22-000013	Steven Anderson	Rathbun Lake	2022
39	Rathbun, Scadding	PR-22-000089	Macdonald Mines Exploration Ltd	Rathbun	2022
40	Rathbun	PR-23-000016	Macdonald Mines Exploration Ltd	Sudbury 2.0	2023
41	Rathbun	PR-23-000017	Inventus Mining Corp	Sudbury 2.0	2023
42	Rathbun, Scadding	PR-23-000243	Pavey Ark Minerals Inc.	Alwyn	2023
43	Scadding	PR-22-000308	John Brady	Scadding	2022
44	Scadding, Street	PR-22-000090	Ursa Major Minerals Incorporated	Powerline	2022
45	Scadding	PR-23-000092	Ursa Major Minerals Incorporated	Glade	2023
46	Scadding	PR-23-000238	Glencore Canada Corporation	Scadding East Renewal	2023
47	Davis	PR-22-000091	Osprey Advanced Materials Corp.	Jovan-Limestone	2022
48	Davis, Janes	PR-22-000211	Ursa Major Minerals Incorporated	Candore	2022

No.	Township	Permit No.	Claim Holder and/or Proponent	Project Name	Effective
49	Janes	PR-21-000350	Ursa Major Minerals Incorporated	Janes Property	2021
50	Janes	PR-21-000349	Ursa Major Minerals Incorporated	Janes Property	2021
51	Belfast, Joan	PR-24-000122	1039421 Ontario Inc.	Belfast-TeckMag	2024
52	Afton	PR-22-000019	Ursa Major Minerals Incorporated	Belfast-TeckMag	2022
53	Afton	PR-24-000114	Conquest Resources Limited	Belfast-TeckMag	2024
54	Afton	PR-24-000115	Conquest Resources Limited	Belfast-TeckMag	2024
55	Afton, Scholes	PR-24-000144	Conquest Resources Limited	Belfast TeckMag	2024
56	Afton, Scholes	PR-24-000193	Conquest Resources Limited	Belfast TeckMag	2024
57	Scholes	PR-24-000116		Belfast-TeckMag	2024
58	Clement, Scholes	PR-24-000117		Belfast-TeckMag	2024
59	Phyllis, Scholes	PR-24-000120	Ursa Major Minerals Incorporated	Belfast-TeckMag	2024
60	Angus, Flett	PR-24-000004	Ursa Major Minerals Incorporated	Titan Project	2024
61	Field, Grant	PR-23-000039	Mcfarlane Lake Mining Incorporated	Chebogan Lake	2023
62	Bigwood	PR-22-000076	Conquest Resources Limited	Allstone Quarry	2022
63	Bigwood	PR-22-000023	Conquest Resources Limited	Allstone Lease Quarry	2022

Advanced Projects

Advanced Projects are defined here as having one of a Preliminary Economic Assessment, a Pre-Feasibility or Feasibility Study, or an Advanced Exploration Permit. Projects with NI 43-101–compliant Mineral Resource estimates are deemed Significant Projects and are discussed under “Exploration Projects”. There are 6 advanced projects in the Sudbury District (Table 25; Figure 17).

Table 25. Advanced projects in the Sudbury District 2024 (keyed to location on Figure 17).

No.	Project	Commodity	Company	Township	Status
1	Shakespeare Nickel Project	Ni Cu PGM	Magna Mining	Shakespeare	Feasibility Study
2	Crean Hill Project	Ni Cu PGM	Magna Mining	Denison	Preliminary Economic Assessment
3	Victoria Project	Ni Cu PGM	KGHM Canada	Denison	Pre-mine development
4	River Valley Palladium Project	PGM	New Age Metals	Dana Pardo Janes	Preliminary Economic Assessment
5	Pardo Paleoplacer Project	Au	Inventus	Pardo	Bulk Sample
6	Bissett Creek Project	Graphite	Northern Graphite	Maria	Preliminary Economic Assessment

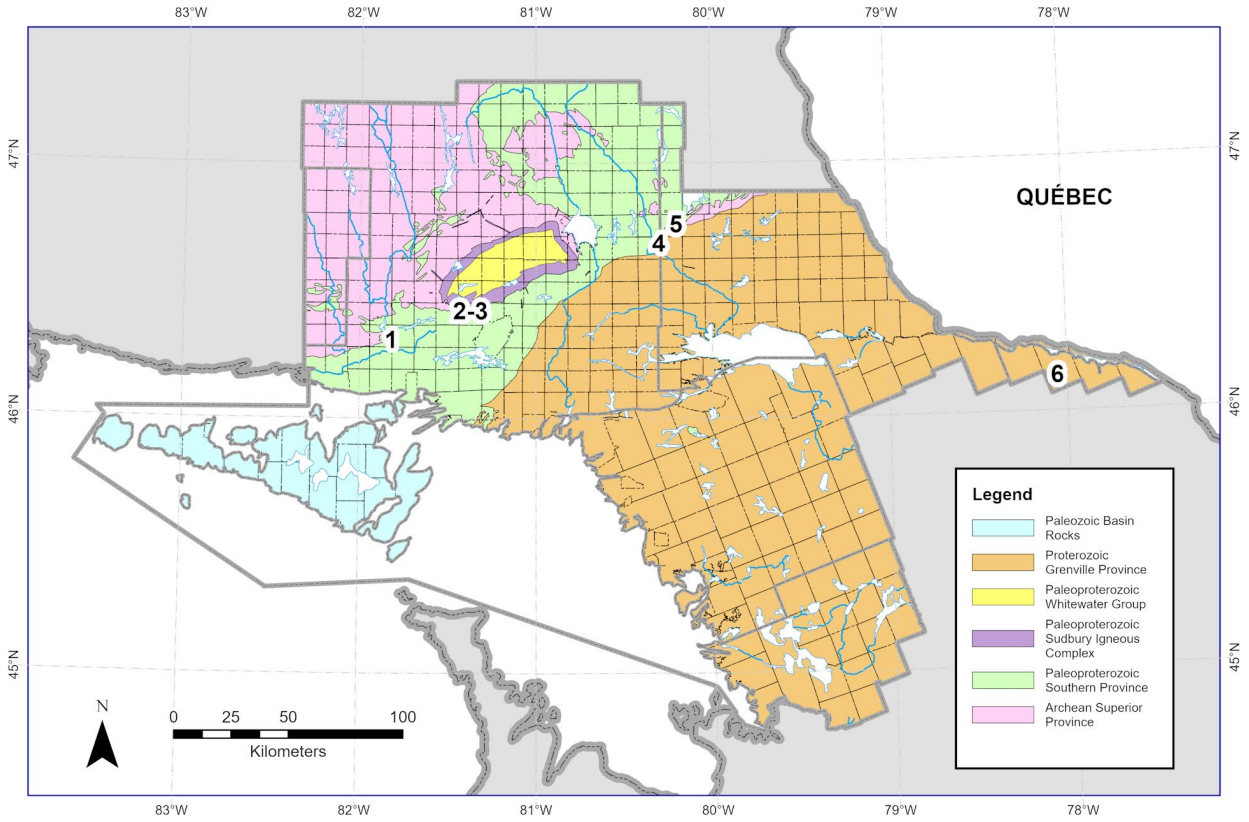

Figure 17. Location of advanced projects in the Sudbury District in 2024 (indicated by numbers on the map and keyed to Table 25); geology *modified from* Ontario Geological Survey (2011) with overlain township fabric.

MAGNA MINING INC.

Shakespeare Nickel Project

In 2017, Magna Mining Inc. acquired 100% interest in URSA Major Minerals Inc., including an extensive land package west-southwest of Sudbury (Armitage et al. 2022; *see* Figure 17 [#1]; Figure 18). The Shakespeare Nickel Mine property was part of the acquisition. The Shakespeare Nickel project is located approximately 70 km west-southwest of Sudbury in Shakespeare, Baldwin, Dunlop, Porter and Baldwin townships, and consisted of 29 patented claims, 3 mining leases and 787 active mining claims (18 178 ha; Armitage et al. 2022).

The Shakespeare intrusion is a differentiated sill interpreted to be part of the Nipissing intrusive suite (Shakespeare age, *circa* 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 2022, Magna Mining Inc. completed a feasibility study on the Shakespeare Nickel project, including an updated Mineral Resource estimate and a new mineral reserve estimate (Armitage et al. 2022; Tables 26 and 27, respectively). The Life-of-Mine is estimated to be 7 years plus 1 year of pre-stripping, with an annual mill feed of 1.62 million tonnes.

In 2024, Magna Mining undertook a regional drill program on their Shakespeare Nickel property. The program consists of approximately 2000 m of drilling. The first target zone was the Palladium Valley

area, about 8.5 km northeast of the Shakespeare Nickel Mine (Magna Mining Inc., news release, January 22, 2024; Figure 19). Selected assay results for the 5 cores drilled at Palladium Valley are given in Table 28. The drill was moved from Palladium Valley to the area of the Stumpy Bay/SW Copper structural trend, about 1 to 2 km southwest of the Shakespeare Nickel Mine (Magna Mining Inc., news release, April 3, 2024; Figure 20). The first hole at the Stumpy Bay/SW Copper area hit a significant copper intersection (*see* Table 28).

In October 2024, Magna Mining Inc. was notified that it received conditional approval for funding from the Natural Resources Canada (NRCAN), Critical Minerals Infrastructure Fund (CMIF). The projects at Shakespeare Nickel are (from Magna Mining Inc., news release, October 9, 2024):

- Pre-construction milestones to advance a 6 km transmission line to connect the Shakespeare Mine to the Ontario grid.
- Pre-construction milestones to advance the upgrade of an existing 30 km forest access road to the Shakespeare Mine.

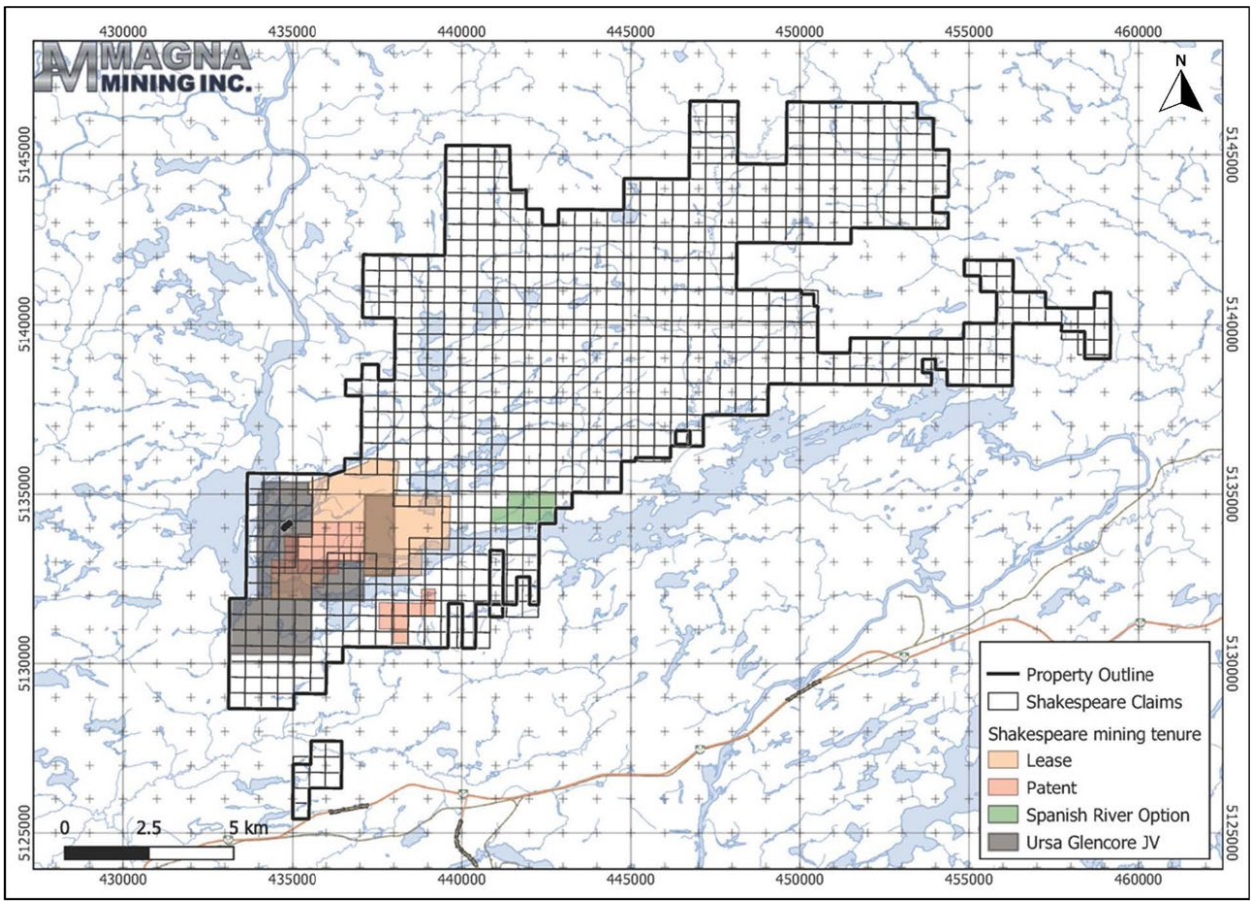

Figure 18. Location and land tenure map of Magna Mining's Shakespeare Nickel property (*from* Armitage et al. 2022).

Table 26. Updated Mineral Resource estimate for the Shakespeare nickel-copper-platinum group element (PGE) deposit as of June 1, 2021 (Armitage et al. 2022).

Category	Cut-off Grade [1,2] (NiEq wt %)	Resource (kt)	Ni (wt %)	Cu (wt %)	Co (wt %)	Pt (g/t)	Pd (g/t)	Au (g/t)	NiEq [1] (wt %)
Open Pit									
Indicated	0.2	16 508	0.34	0.36	0.02	0.33	0.36	0.19	0.56
Underground									
Indicated	0.4	3 832	0.31	0.36	0.02	0.30	0.32	0.19	0.53
Inferred	0.4	2 355	0.33	0.40	0.02	0.34	0.37	0.20	0.20

[1] NiEq wt % (nickel equivalent wt %) = ((Ni% × 2204 × Ni Price $/lb) + (Cu% × 96% Recovery × 2204×x Cu Price $/lb) + (Co% × 56% Recovery × 2204 × Co Price $/lb) + (Pt g/t × 69% Recovery / 31.1035 × Pt $/oz) + (Pd g/t × 68% Recovery / 31.1035 × Pd $/oz) + (Au g/t × 68% Recovery / 31.1035 × Au $/oz))/2204 × Ni $/lb).
[2] NiEq (nickel equivalent) cut-off grades are based on metal prices of $7.50/lb Ni, $3.25/lb Cu, $21.00/lb Co, $1000/oz Pt, $2000/oz Pd and $1600/oz Au, and metal recoveries of 75% for Ni, 96% for Cu, 56% for Co, 73% for Pt, 39% for Pd and 36% for Au.

Table 27. Mineral Reserve estimate for the Shakespeare nickel-copper-PGE deposit as of January 28, 2022 (Armitage et al. 2022).

Category	Cut-off Grade (Ni %)	Reserve (kt)	Ni (wt %)	Cu (wt %)	Co (wt %)	Pt (g/t)	Pd (g/t)	Au (g/t)
Open Pit								
Probable	0.23	11 870	0.33	0.35	0.02	0.32	0.36	0.18

Table 28. Selected drilling-program assays for the Shakespeare Nickel project reported in 2024 (Magna Mining Inc., news release, April 3 and November 4, 2024).

Exploration Area	HOLE ID	Length [1] (m)	Ni (%)	Cu (%)	Co (%)	Pt (g/t)	Pd (g/t)	Au (g/t)	Au (g/t)
Palladium Valley	**MPV-24-03**	0.26	0.01	2.48	0.01	0.00	0.00	1.59	
	AND	3.69	0.00	0.23	0.01	0.00	0.00	0.41	
	AND	0.43	0.00	0.04	0.02	0.00	0.00	01.83	
Stumpy Bay / SW Copper	**MSW-24-01**	32.35	-	1.41	0.09	-	-	-	3.09
	Including	13.90	-	2.29	0.13	-	-	-	4.60

[1] Drill hole intersection lengths are downhole length.

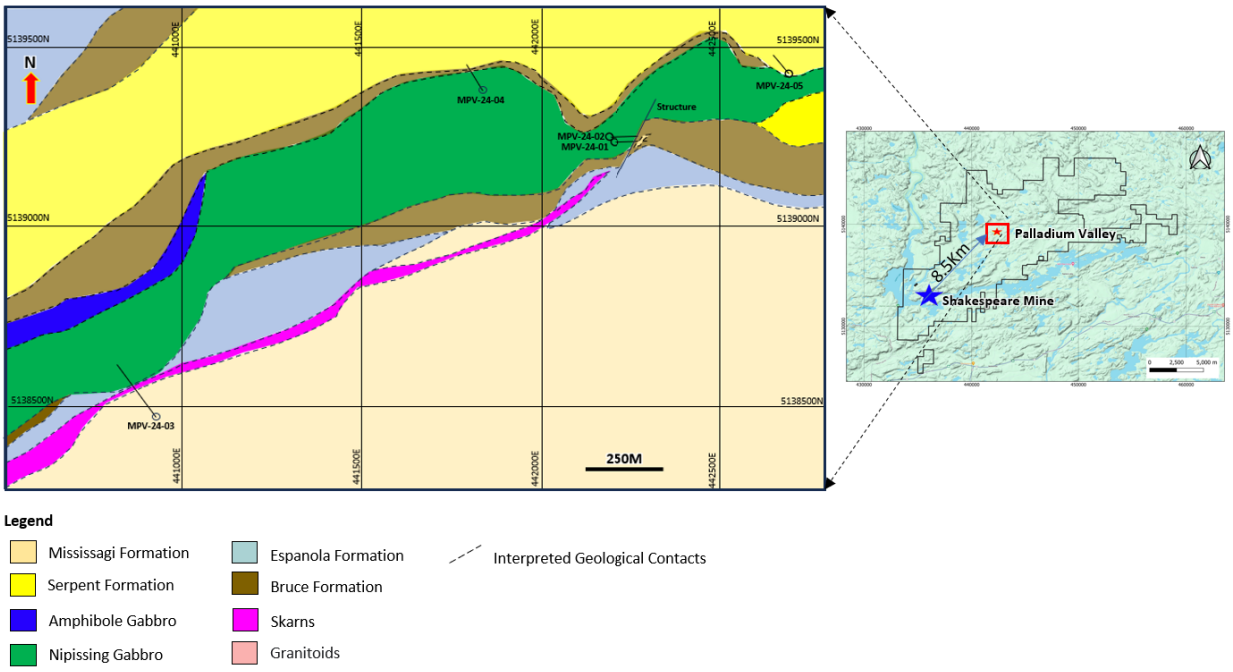

Figure 19. Geology map showing location of 2024 drilling at Palladium Valley, Magna Mining Inc,, Shakespeare Nickel project (*from* Magna Mining Inc., news release, April 3, 2024).

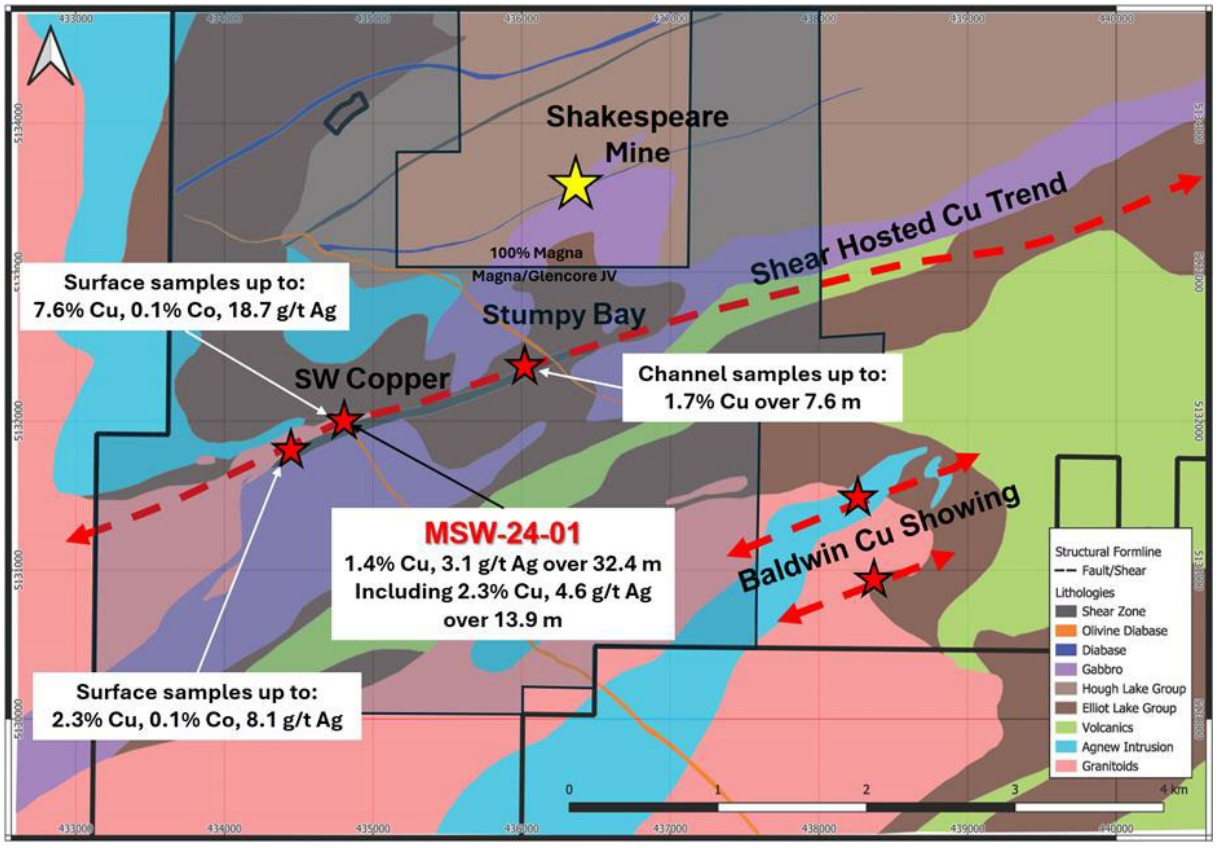

Figure 20. Geology map showing location of the Stumpy Bay area, Magna Mining Inc., Shakespeare Nickel project (*from* Magna Mining Inc., news release, November 4, 2024).

Crean Hill Project

In 2022, Magna Mining Inc. acquired Lonmin Canada Inc., which owned the Denison Project that includes the past-producing Crean Hill nickel-copper-PGE mine (Magna Mining Inc., news release, November 7, 2022; *see* Figure 17 [#2]; Figure 21). The final payment in connection to the property was made to NorthX Nickel Corp. (formerly Archer Exploration Corp.) in 2023 (Archer Exploration., news release, November 15, 2023).

The Denison Project is located in Denison Township approximately 30 km southwest of Sudbury. It covers an area of approximately 255.9 ha over patented mining tenures. The Crean Hill Mine was intermittently in production from 1906 to 2002, first by Canadian Copper Company, then by Inco Ltd. The ore bodies mined were "contact-style mineralization", occurring in embayments at the Sudbury Igneous Complex (SIC) basal contact. Lonmin PLC entered into a joint venture with Inco Ltd. (now Vale Base Metals) in 2003. Lonmin PLC (renamed Lonmin Canada or Loncan) operated the joint venture from 2014, and focused exploration on low sulphide, high PGE mineral potential in the SIC footwall (Armitage 2022). In 2018, Lonmin PLC estimated a noncompliant resource for the Denison 109 FW zone (Lonmin PLC 2018), which has a very low sulphide content amid abundant visible gersdorffite (Gibson, Lightfoot and Evans 2010). In 2022, Magna Mining Inc. produced an NI 43-101–compliant Mineral Resource estimate for the Denison project (Armitage 2022). In 2023 they submitted a Preliminary Economic Assessment (Murphy et al. 2023), which was updated with a new Mineral Resource estimate in 2024 (Armitage et al. 2024; Table 29).

In 2024, Magna Mining Inc. amended the Crean Hill Closure Plan (Magna Mining Inc., news release, March 4, 2024), and were granted a Permit to Take Water, enabling them to dewater the existing mine workings (Magna Mining Inc., news release, April 23, 2024). Magna Mining Inc. signed a Definitive Off-Take Agreement with Vale Base Metals for shipping ore from the Main, Intermediate, 9400, 9400 Footwall and 101 Footwall zones to the Clarabelle Mill (the 109 Footwall zone is excluded from this agreement; Magna Mining Inc., news release, March 27, 2024). A toll milling agreement was signed with Glencore to ship the 109 Footwall zone bulk sample to the Strathcona Mill (Magna Mining Inc., news release, June 4, 2024).

Magna Mining's Advanced Exploration in 2024, included taking a 20 000 tonne bulk sample from the 109 FW zone (Phase 1) and dewatering the underground working to allow a surface portal and underground ramp to be built (Phase 2). The Advanced Exploration contract was awarded to Aki-eh Dibinwewzinwin Limited Partnership (a partnership between Atikameksheng Anishnabek, Wahnapitae First Nation, and Technica Mining) (Magna Mining Inc., news release, June 11, 2024). The bulk sample was delivered to Strathcona Mill in August 2024 (Magna Mining Inc., news release, September 5, 2024). The feed grade results for the sample are given in Table 30 (Magna Mining Inc., news release, October 7, 2024).

Table 29. Underground Mineral Resource estimate for the Magna Mining Inc. Crean Hill project (Armitage et al. 2024).

Category	Cut-off Grade [1] (NiEq wt %)	Resource (kt)	Ni (wt %)	Cu (wt %)	Co (wt %)	Pt (g/t)	Pd (g/t)	Au (g/t)	NiEq [1] (wt %)
Indicated	1.1	118 444	1.01	0.87	0.035	0.98	1.12	0.37	1.96
Inferred	1.1	989	0.70	0.53	0.026	0.98	1.66	0.29	1.56

[1] *The underground base case cut-off grade of 1.10% NiEq considers metal prices of $8.50/lb Ni, $3.75/lb Cu, $17.00/lb Co, $950/oz Pt, $1100/oz Pd and $1950/oz Au, metal recoveries of 78% for Ni, 95.5% for Cu, 56% for Co, 69.2% for Pt, 68% for Pd and 67.7% for Au, a mining cost of US$80.00/t rock and processing, treatment and refining, transportation and G&A cost of US$42.50/t mineralized material (*from *Armitage et al. 2024).*

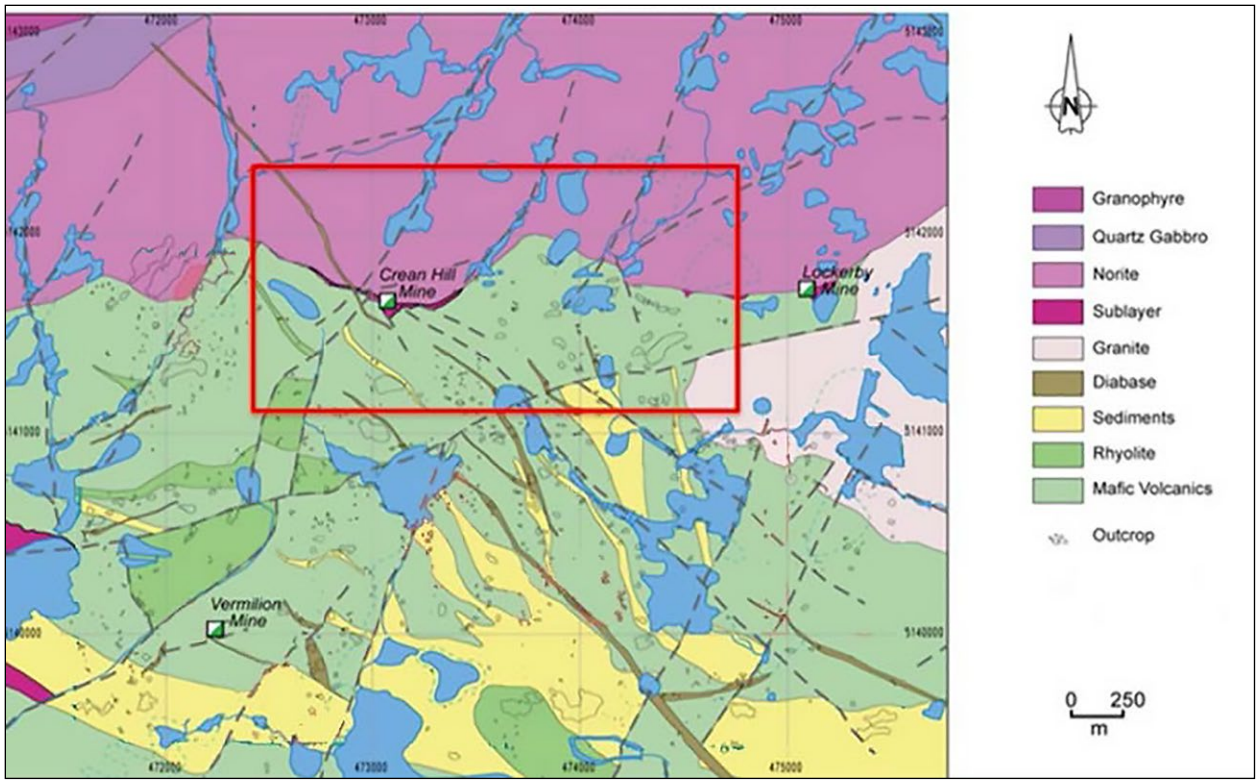

Figure 21. Location and geology of the Crean Hill property (outlined in red). Figure *from* Armitage et al. (2024).

Table 30. Feed grade results from the Magna Mining Inc. Crean Hill surface bulk sample (Magna Mining Inc., news release, October 24, 2024).

	Dry tonnes	Ni (%)	Cu (%)	Co (%)	Pt (g/t)	Pd (g/t)	Au (g/t)
Plant Feed	20 524	0.33	0.52	0.01	2.03	1.46	0.97

In 2024, Magna Mining planned a 20 000 m drill program at Crean Hill for 2024. Two drills were mobilized. One testing deep footwall targets; the other, the upper part of the 109 FW zone (Magna Mining Inc., news release, January 22, 2024). Highlights of drill results for the deep footwall targets are given in Table 31 and shown on Figure 22, and highlights for the surface bulk sample drilling are given in Table 32 (results reported in numerous company new release, dates given in table).

Table 31. Highlights of the drilling results from the Magna Mining Inc. Crean Hill 2024 drilling program (Magna Mining Inc., news releases, 2024 news release dates for these results are included in the table).

Hole ID	Zone	Length [1] (m)	Ni (%)	Cu (%)	Co (%)	Pt (g/t)	Pd (g/t)	Au (g/t)	TPM [2] (g/t)	NiEq [3,4] (%)	Date
MCR-24-060	109 FW	3.0	1.11	8.33	0.03	3.38	5.96	4.58	13.93	7.38	February 20
MCR-24-061	109 FW	2.9	1.62	3.45	0.03	5.38	4.39	2.77	12.54	5.34	February 20
AND		1.0	2.23	1.15	0.05	15.04	4.25	9.44	28.73	7.48	
MCR-24-063	109 FW	0.9	0.52	3.22	0.1	3.47	5.46	5.21	14.15	4.64	February 20
AND		10.2	0.83	1.22	0.02	2.11	3.52	7.07	12.69	3.88	
Including		4.5	1.24	1.86	0.02	2.05	4.21	14.33	20.60	6.20	
MCR-24-064	109 FW	1.4	0.23	1.54	0.01	4.93	6.33	4.03	15.29	3.77	February 20
MCR-24-065	109 FW	10.2	0.23	1.06	0.01	5.50	3.53	2.39	11.42	2.65	February 20
Including		0.7	1.52	10.74	0.03	3.60	11.51	0.88	15.99	9.39	
MCR-24-066	109 FW	4.0	0.23	0.40	0.00	5.72	3.12	2.14	10.98	2.25	February 20
MCR-24-068	109 FW	9.1	1.84	6.32	0.03	12.58	2.76	2.20	17.54	7.13	April 3
Including		4.4	3.22	11.33	0.05	7.60	2.40	0.61	10.61	9.64	
MCR-24-069	109 FW	7.80	0.90	0.25	0.02	16.26	6.23	2.77	25.26	4.98	April 3
MCR-24-070	109 FW	17.1	1.63	5.19	0.04	4.70	4.08	1.22	10.00	5.63	April 3
Including		6.8	2.54	9.60	0.06	8.35	7.61	1.47	17.44	9.74	
Including		3.6	1.83	5.78	0.04	2.17	2.64	0.92	5.73	5.38	
MCR-24-071	109 FW	9.0	0.07	0.18	0.00	1.89	1.18	0.71	3.78	0.79	April 3
AND		3.0	0.05	0.16	0.00	2.39	2.43	1.69	6.50	1.32	
MCR-24-072	109 FW	1.0	0.27	0.27	0.01	16.43	7.52	4.70	28.65	5.06	April 3
AND		2.4	0.02	0.06	0.00	3.19	0.81	0.56	4.56	0.73	
MCR-24-075	109 FW	13.0	0.15	0.18	0.00	9.28	4.87	2.84	16.99	3.05	May 8
AND		3.0	0.35	0.21	0.01	18.15	9.32	5.47	32.94	5.89	
MCR-24-077	109 FW	33.0	0.11	0.16	0.00	6.56	2.53	1.50	10.59	1.85	June 25
Including		15.0	0.15	0.20	0.00	11.75	4.01	2.39	18.16	3.06	
MCR-24-080	109 FW	15.14	0.20	0.57	0.20	11.73	5.46	3.01	20.20	3.73	July 8
MCR-24-082	109 FW	6.39	0.67	2.57	0.02	2.50	6.66	4.05	13.21	4.46	July 8
MCR-24-087	109 FW	15.23	0.69	5.00	0.03	4.65	5.70	2.47	12.82	5.22	July 8
Including		5.70	0.75	1.25	0.03	7.92	9.27	4.89	22.09	5.41	
Including		5.20	1.00	11.74	0.04	0.59	3.90	1.33	5.81	7.25	

[1] *Length is downhole length not true thickness.*
[2] *TPM = Pd g/t + Pt g/t + Au g/t.*
[3] *NiEq % = (Ni% × 2204 × Ni Price $/lb) + (Cu% × Cu Recovery % × 2204 × Cu Price $/lb) + (Co% × Co Recovery % × 2204 × Co Price $/lb) + (Pt g/t × Pt Recovery % / 31.1035 × Pt $/oz) + (Pd g/t × Pd Recovery % / 31.1035 × Pd $/oz) + (Au g/t × Au Recovery % / 31.1035 × Au $/oz)/2204 × Ni $/lb)*
[4] *Metal prices in US$: $8.50/lb Ni, $3.75/lb Cu, $22.00/lb Co, $1000/oz Pt, $2000/oz Pd and $1750/oz Au*

In October 2024, Magna Mining Inc. was notified that it received conditional approval for funding from the Natural Resources Canada (NRCAN), Critical Minerals Infrastructure Fund (CMIF). The project covered at Crean Hill is (*from* Magna Mining Inc., news release, October 9, 2024):

- Studies, engagement activities, regulatory approvals and permit applications for the connection of the Crean Hill project to the Ontario power grid.

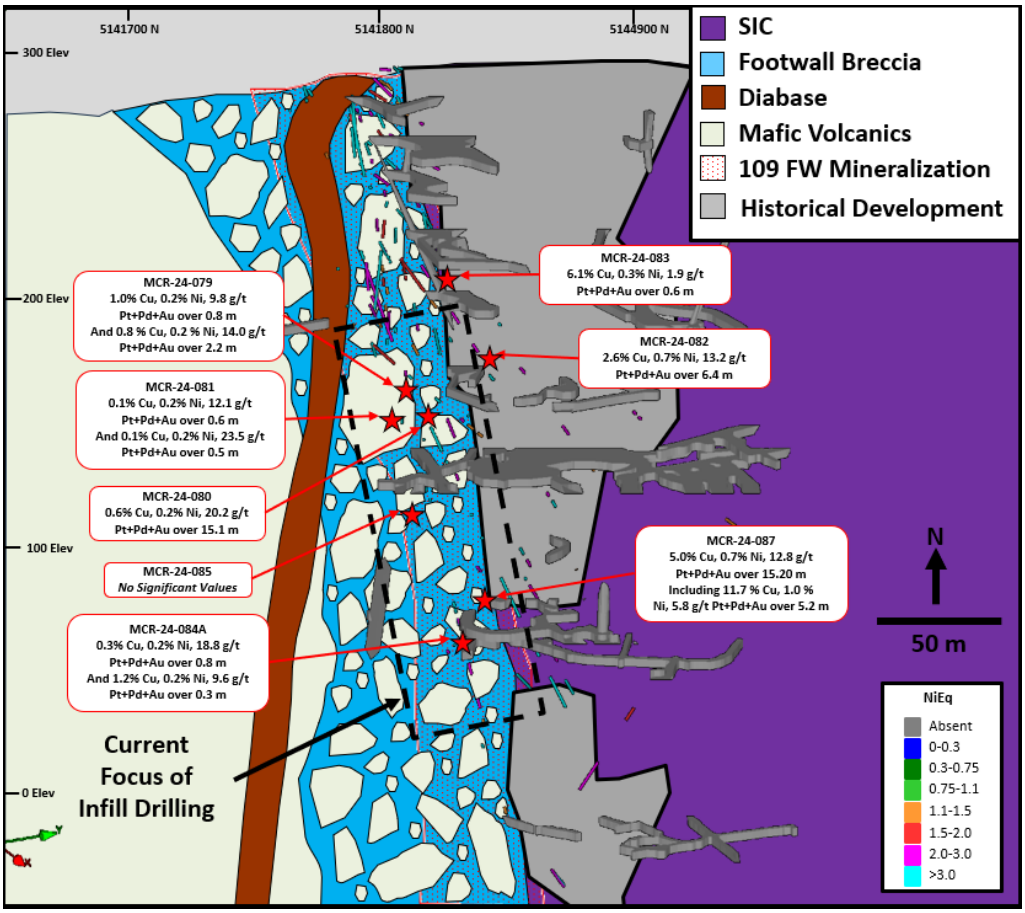

Figure 22. Oblique longitudinal section of the Crean Hill 109 FW zone looking northwest, showing some of the 2024 drill results. Figure *from* Magna Mining Inc., news release, July 8, 2024.

Table 32. Highlights of the surface bulk sample drilling results for the Magna Mining Inc. Crean Hill project (Magna Mining Inc., news releases, 2024 news release dates for these results are included in the table).

Hole ID	Zone	Length [1] (m)	Ni (%)	Cu (%)	Co (%)	Pt (g/t)	Pd (g/t)	Au (g/t)	TPM [2] (g/t)	NiEq [3,4] (%)	Date
MCB-24-029	109 FW	6.33	0.93	2.89	0.02	3.88	4.16	1.43	9.47	3.90	May 8
MCB-24-030	109 FW	0.91	1.95	0.71	0.03	9.15	9.49	1.02	19.66	5.80	May 8
MCB-24-031	109 FW	2.12	1.91	2.34	0.04	1.65	8.46	0.83	10.93	5.30	May 8
MCB-24-033	109 FW	4.52	0.17	2.01	0.01	5.30	4.29	1.69	11.28	3.00	May 8
MCB-24-037	109 FW	4.05	0.36	0.48	0.00	10.70	14.52	9.03	34.26	7.07	June 25
MCB-24-042	109 FW	2.47	0.16	0.11	0.00	2.33	7.39	4.11	13.82	3.05	June 25
MCB-24-052	109 FW	3.10	0.77	2.92	0.02	4.21	1.06	0.62	5.89	2.91	June 25
MCB-24-053	109 FW	6.75	0.10	0.17	0.00	4.05	2.74	1.55	8.34	1.62	June 25

[1] *Length is downhole length not true thickness.*
[2] *TPM = Pd g/t + Pt g/t + Au g/t.*
[3] *NiEq % = (Ni% × 2204 × Ni Price $/lb) + (Cu% × Cu Recovery % × 2204 × Cu Price $/lb) + (Co% × Co Recovery % × 2204 × Co Price $/lb) + (Pt g/t × Pt Recovery % / 31.1035 × Pt $/oz) + (Pd g/t × Pd Recovery % / 31.1035 × Pd $/oz) + (Au g/t × Au Recovery % / 31.1035 × Au $/oz)/2204 × Ni $/lb).*
[4] *Metal prices in US$: $8.50/lb Ni, $3.75/lb Cu, $22.00/lb Co, $1000/oz Pt, $2000/oz Pd and $1750/oz Au*

KGHM INTERNATIONAL LIMITED

Victoria Project – Preproduction Stage

The Victoria property, situated at the junction of the SIC and the Worthington Offset dike, is located in the South Range of the Sudbury Structure in Denison Township, approximately 35 km west of Sudbury (*see* Figure 17 [#3]).

The Victoria property has a long history of exploration and mining. Operations at the Victoria Mine originally began in 1900 under the Mond Nickel Company and continued through 1923, producing 888 000 t of ore grading 2.99% Cu and 2.12% Ni (*Sudbury Mining Solutions Journal,* November 25, 2013) The mine was reopened by Inco Ltd. in 1973 and operated until 1978, producing an additional 649 000 t of ore grading 1.26% Cu, 0.083% Ni and 2.08 g/t (0.067 t-oz/tonne) total precious metals. 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 project Mineral Resources reported by KGHM (2015) are given in Table 33. KGHM predicts a Life-of-Mine of 15 years with an annual production of 15 kilotonnes nickel and 18 kilotonnes copper (KGHM International Ltd. 2025). In 2021, KGHM's exploratory work resulted in the reclassification of 6 million tonnes of Inferred Resources (from the 13.08 million tonnes in Table 33) to Indicated (KGHM International Ltd. 2022).

In 2022, the Victoria Mine headframe and water treatment plant were constructed (*CBC Sudbury*, January 3, 2023). Sinking of the exploration shaft began in 2023 (KGHM International Ltd. 2024a) and continued in 2024 (KGHM International Ltd. 2025). The shaft was excavated to approximately 760 metres below the headframe; underground stations were constructed (levels: 300L and 600L). Surface work was continued in 2024: construction of the mine site drainage system, the mine water reservoir, the waste drainage system, the workshop and the warehouse, and preparation for the second waste rock dump. A second shaft for production is planned in the second stage of the project (KGHM International Ltd. 2025).

Cash expenditures on the Victoria project in 2024 were US$104 million, up from US$70 million in 2023 (KGHM International Ltd. 2025).

Table 33. KGHM Victoria Mine Mineral Resources as of December 2014 (KGHM International Ltd. 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 Palladium Project

The River Valley palladium project of New Age Metals Inc. is located in Dana, Pardo, Janes and McWilliams townships, approximately 60 km east of Sudbury (*see* Figure 17 [#4]). The precious metals deposit, 100% owned by New Age Metals, 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). Ten zones of mineralized breccia occur along a 16 km strike of the River Valley intrusion (Bradfield et al. 2023; Figure 23).

A Preliminary Economic Assessment (PEA) on the River Valley palladium project was completed in 2023 (Bradfield et al. 2023). The Resource estimate is provided in Table 34, for a $15/t net smelter return (NSR) cut-off value (pit-constrained) and a $50/t NSR cut-off value (out-of-pit). A nominal throughput rate of 6850 t per day for the process plant and estimated Life-of-Mine was 16 years in 2023.

In 2023, New Age Metals also initiated a proof-of-concept PLATSOL™ testwork at the River Valley palladium project (New Age Metals Inc., news release, September 26, 2023):

> PLATSOL™ is a high-temperature and pressure acid leaching hydrometallurgical process developed at SGS Canada Inc. for recovery of PGM, gold and base metals from low-grade, bulk-tonnage polymetallic deposits.

The study is being undertaken at SGS Lakefield and managed by D.E.N.M. Engineering Ltd. The sample material came from 2021 drill core of the Dana and Lismer zones stored at SGS Lakefield, Ontario (SGS), and was composited using the method used to make the rougher Cu-PGM sulphide concentrates for the 2023 PEA. Initial results were reported in 2024 (New Age Metals Inc., news release, February 29, 2024). The best results from the initial Platsol™ process test on the Dana and Lismer zones rougher flotation gave final extractions of 93% palladium, 88% platinum, 98% gold, 99% copper and 98% nickel for Dana, and 93% palladium, 85% platinum, 98% gold, 100% copper and 98% nickel for Lismer. The PGM precipitation testing gave recover rates in low-weight final precipitates of >99% palladium, 94% platinum and >99% gold, and >99% palladium, 77% platinum and >99% gold for Dana and Lismer, respectively. These precipitates gave grades of 2908 g/t Pd, 882 g/t Pt and 56.6 g/t Au (Dana) and 1832 g/t Pd, 607 g/t Pt and 8.32 g/t Au (Lismer).

New Age Metals also continued its environmental baseline study, with 2024 being the fifth consecutive year for the program (New Age Metals Inc., news release, February 6, 2024).

Table 34. New Age Metals River Valley updated Measured and Indicated Mineral Resource, using cut-off values of $15/t NSR for pit-constrained Resources and $50/t NSR for out-of-pit Resources (*from* Bradfield et al. 2023).

	Total Measured and Indicated Resources	
Commodity **Cut off**	**Pit constrained** **$15/t (CDN$)**	**Out-of-pit** **$50/t (CDN$)**
Resources (kt)	88 998	642.1
Pd (g/t)	0.54	1.08
Pt (g/t)	0.21	0.35
Rh (g/t)	0.02	0.032
Au (g/t)	0.04	0.06
Cu (%)	0.06	0.08
Ni (%)	0.01	0.02
Co (%)	0.002	0.003
Ag (g/t)	0.26	0.23

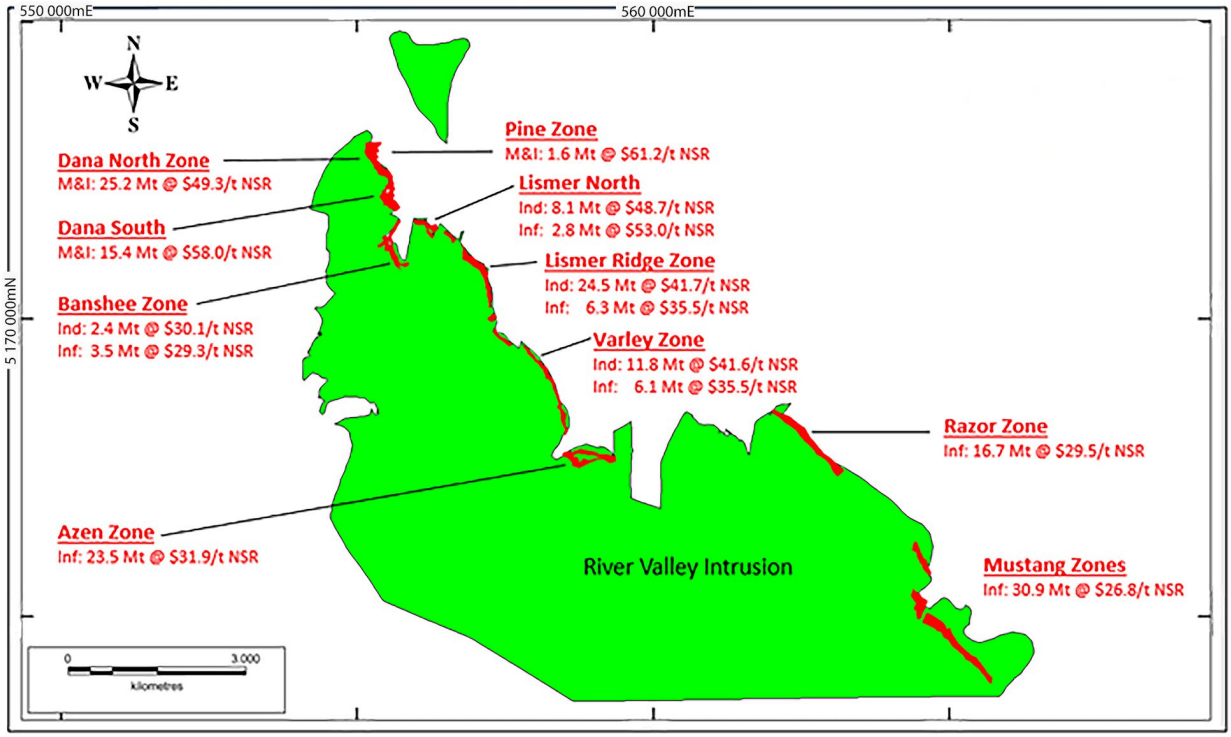

Figure 23. Mineralized zones of the River Valley palladium project with Resource estimates (figure *from* New Age Metals, River Valley palladium project webpage: https://newagemetals.com/river-valley-palladium-project [accessed January 23, 2025]).

INVENTUS MINING CORP.

Pardo Paleoplacer Property

The Pardo Property, 65 km northeast of Sudbury (*see* Figure 17 [#5]), 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 24) are spatially associated with pyritic, quartz-pebble–bearing portions of both the Matinenda and Mississagi conglomerates (https://www.inventusmining.com/pardo [accessed January 24, 2025]; Kuntz, Wymark and Long 2018).

The 2018 NI 43-101 technical report (Kuntz, Wymark and Long 2018) defined 3 exploration target ranges for the gold-bearing Mississagi boulder conglomerate. The targets are defined as pessimistic, moderate and optimistic case scenarios. The assumptions made for each case were described by Kuntz, Wymark and Long (2018):

> The pessimistic case (P10) assumes that the mineralization is only confined to the zones that were bulk sampled and/or have extensive channel sampling and drilling at the Trench 1, Trench 2, 007, Godzilla and Eastern Reef occurrences.
>
> The moderate case (P50) assumes that approximately 50% of the mineralization defined is continuous within the boundaries of the A_M [Mississagi Boulder Conglomerate] mineralized unit.
>
> The optimistic case (P90) assumes that the mineralization between these zones is continuous and extends to the currently known boundaries of the A_M mineralized unit.

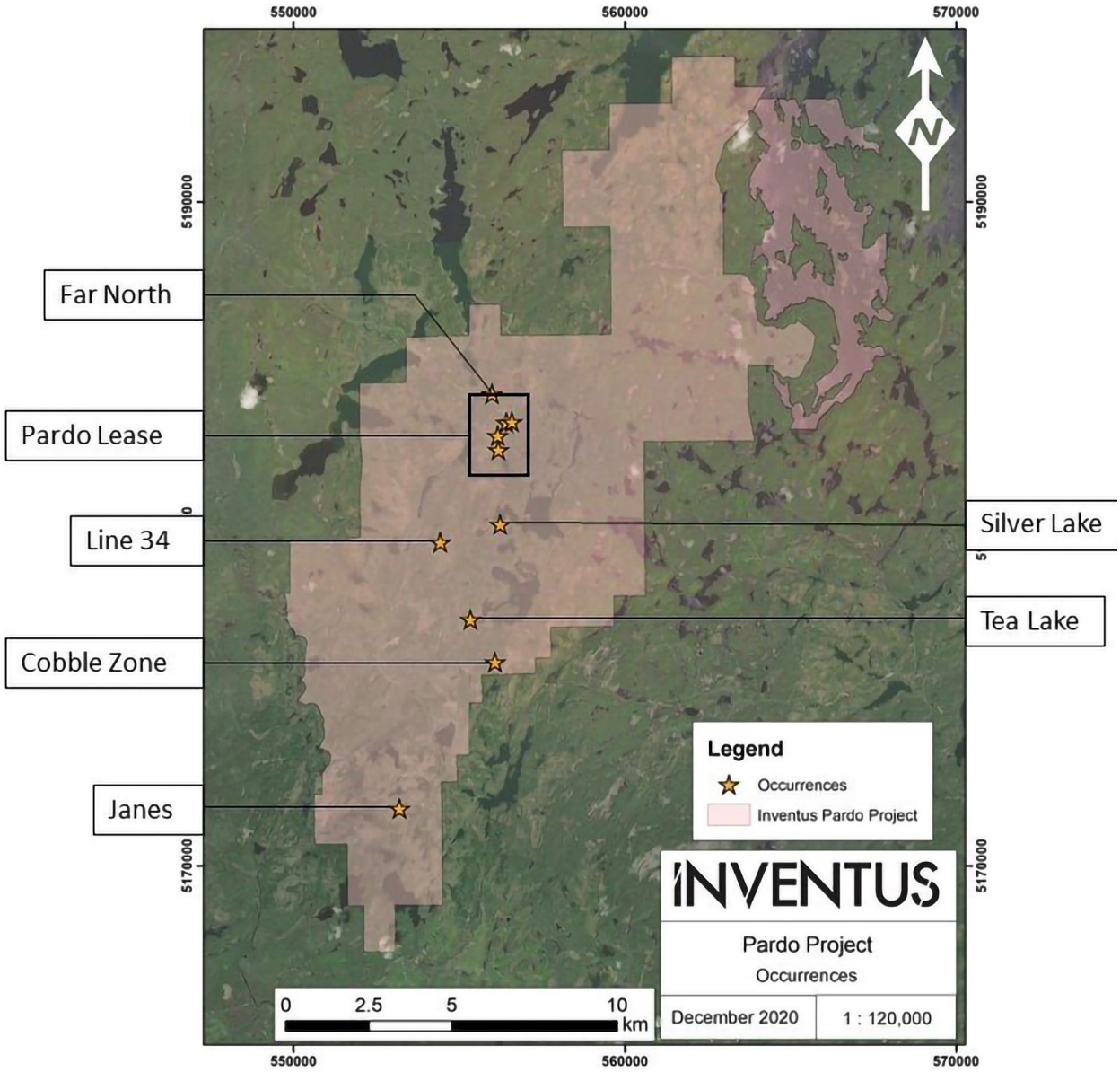

Figure 24. Mineral occurrences on Inventus Pardo project (Pardo lease occurrences shown on Figure 25); figure *from* Inventus Mining Corp., Pardo Project, www.inventusmining.com [accessed January 24, 2025].

The locations of zones used in the case scenarios are shown on Figure 25. The tonnage, grade and gold content of the exploration targets are given in Table 35.

In 2021, Inventus Mining Corp. received approval for a 50 000 t bulk sample and filed its attendant Advanced Exploration Closure Plan (Inventus Mining Corp., news release, March 23, 2021). Six mini-bulk samples (approximately 3.4 t each) were taken from the 007 Zone (*see* Figure 25) and sent to SGS Laboratories to test paleoplacer gold bulk sampling procedures. Results were reported in September 2021 (Inventus Mining Corp., news release, September 20, 2021).

In 2022, a bulk sample of approximately 6000 t of the material from the 007 Zone was sent to the Sun Mining Corporation Redstone Mill in Timmins for processing, with results reported in September 2022

(Inventus Mining Corp., news release, March 10 and September 27, 2022; Table 36). Details on the bulk sample extraction and processing are given in the September 27, 2022, news release.

In 2023, Inventus Mining Corp. engaged Snowden Optiro to conduct a geostatistical study of the recent drilling and bulk sampling data from Pardo (Inventus Mining Corp., news release, April 3, 2023). The goal was to optimize resource drilling to support a resource estimate. The study was completed in July 2023 (Snowden Optiro 2023) and is available on the Inventus Mining Corp. Website (Pardo Project, www.inventusmining.com [accessed January 24, 2025]).

In 2024, Inventus Mining Corp. initiated their Phase 1 drill program (Inventus Mining Corp., news release, November 12 and 25, 2024). The program consists of drilling 80 holes to approximately 12 m depth on a systematic grid over an area of known gold mineralization. Large diameter core (PQ: 8.5 cm; 3-3/8 inch diameter) will be drilled and photon assay technology[1] used. The program parameters are supported by Inventus' experience with the deposit and the study completed by Snowden Optiro (2023).

[1] "Hitting samples with high-energy X-rays, PhotonAssay™ causes excitation of atomic nuclei allowing enhanced analysis of gold, silver, copper and other elements in as little as 2 minutes." – from PhotonAssay.com (https://photonassay.com/ [accessed January 24, 2025].

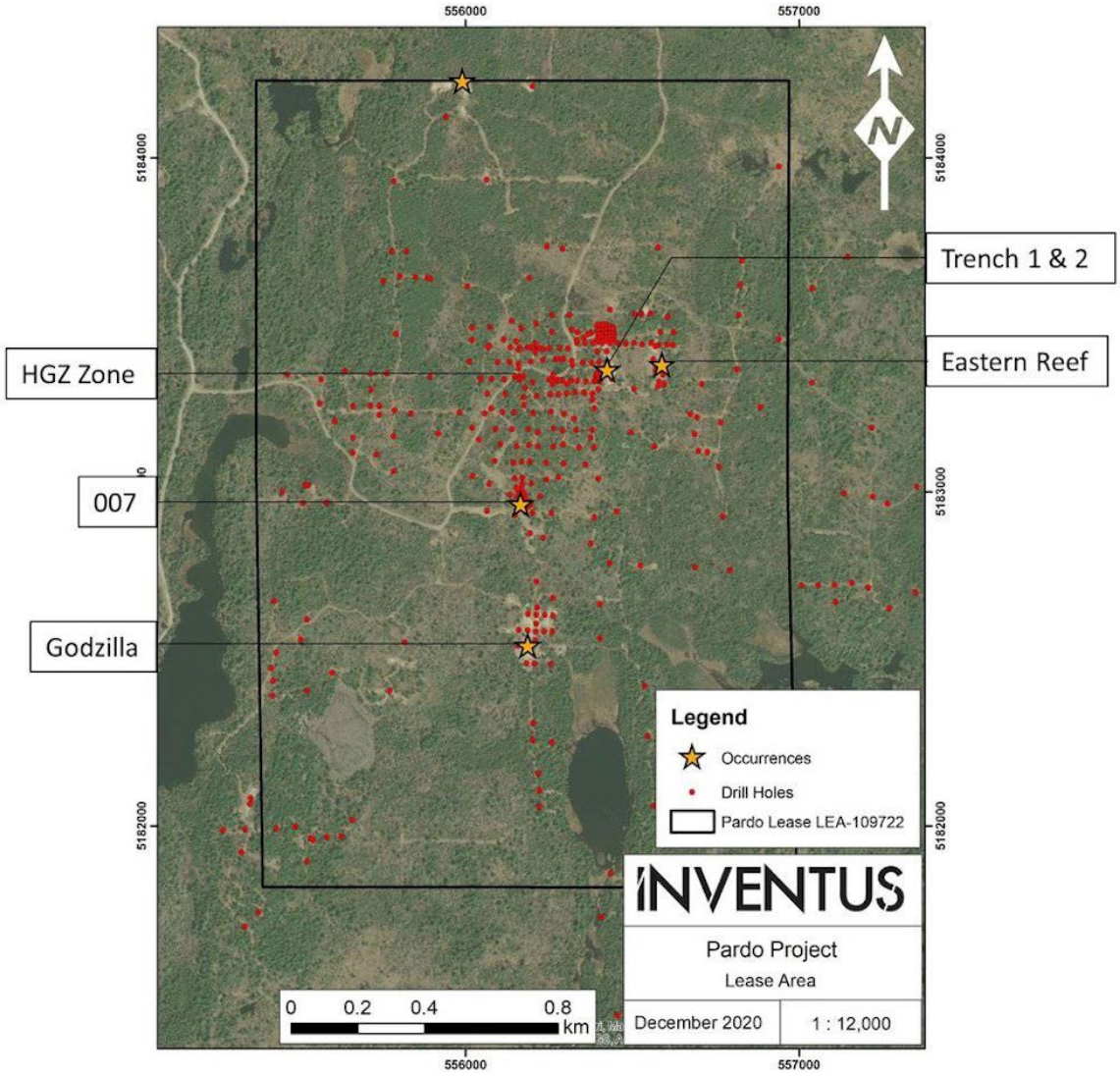

Figure 25. Location of the mineralized areas on the Pardo lease of the Inventus Mining Pardo project (Pardo lease location shown on Figure 34); figure *from* Inventus Mining Corp., Pardo Project, www.inventusmining.com [accessed January 24, 2025].

Table 35. Tonnage, grade and gold content estimated in the gold-bearing Mississagi boulder conglomerate for each of the exploration target ranges defined for Inventus' Pardo paleoplacer gold project (*from* Kuntz, Wymark and Long 2018).

Parameter	P10	P50	P90
Tonnage (t)	450 000	8 600 000	12 500 000
Gold grade (g/t)	4.2	3.5	3.5
Gold content (oz)	60 000	950 000	1 400 000

Table 36. Results from the bulk samples taken at the 007 Zone (Inventus Mining Corp., news release, September 27, 2022).

Bulk Sample (tonnes dry)	Head Grade Au (g/t)	Calculated Contained Au (troy ounces)	Gravity Concentrate		Flotation Concentrate		Total Recovered Au (troy ounces)	Tails Au		Estimated Au Remaining In-Circuit [1] (troy ounces)
			(tonnes dry)	(troy ounces)	(tonnes dry)	(troy ounces)		(g/t)	(troy ounces)	
4979	3.38	541	8.3	299.3	102.4	138.3	437.6	0.17	27.3	± 76.1

[1] *The estimated Au remaining in-circuit is the assumed amount of gold that was not recovered in the milling circuit.*

NORTHERN GRAPHITE CORPORATION

Bissett Creek Project

Northern Graphite Corp. holds 100% interest in the gneiss-hosted Bissett Creek graphite deposit near Mattawa, in Maria Township (*see* Figure 17, [#6]). It is located approximately 116 km east of North Bay (55 km from Mattawa), 15 km south of Highway 17 on Bissett Creek Road, then 3 km east on Graphite Mine Road (Figure 26). The property consists of 2 mining leases, covering 2503 ha, and 52 cell claims covering approximately 1159 ha (Northern Graphite Corp. 2024).

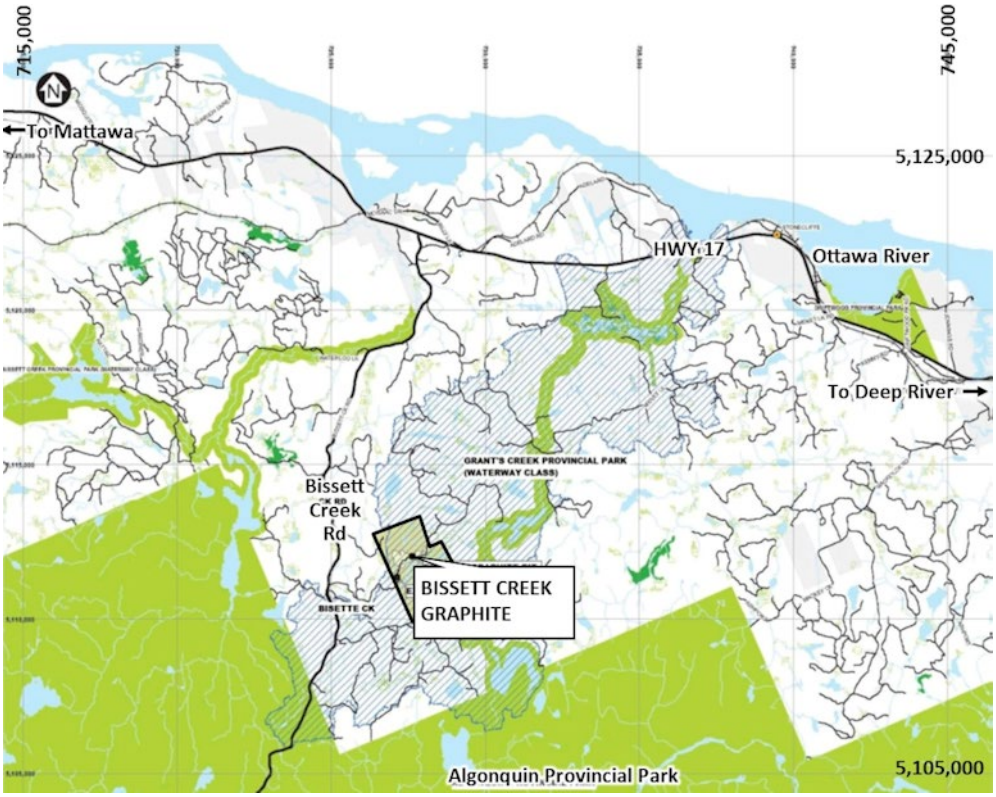

Figure 26. Location of the Bissett Creek project; figure *from* Leduc (2013).

The deposit is hosted in graphitic gneisses, characterized by disseminated flake graphite in paragneisses (gneisses of sedimentary origin). The geology and extent of the host gneiss is shown on Figure 27.

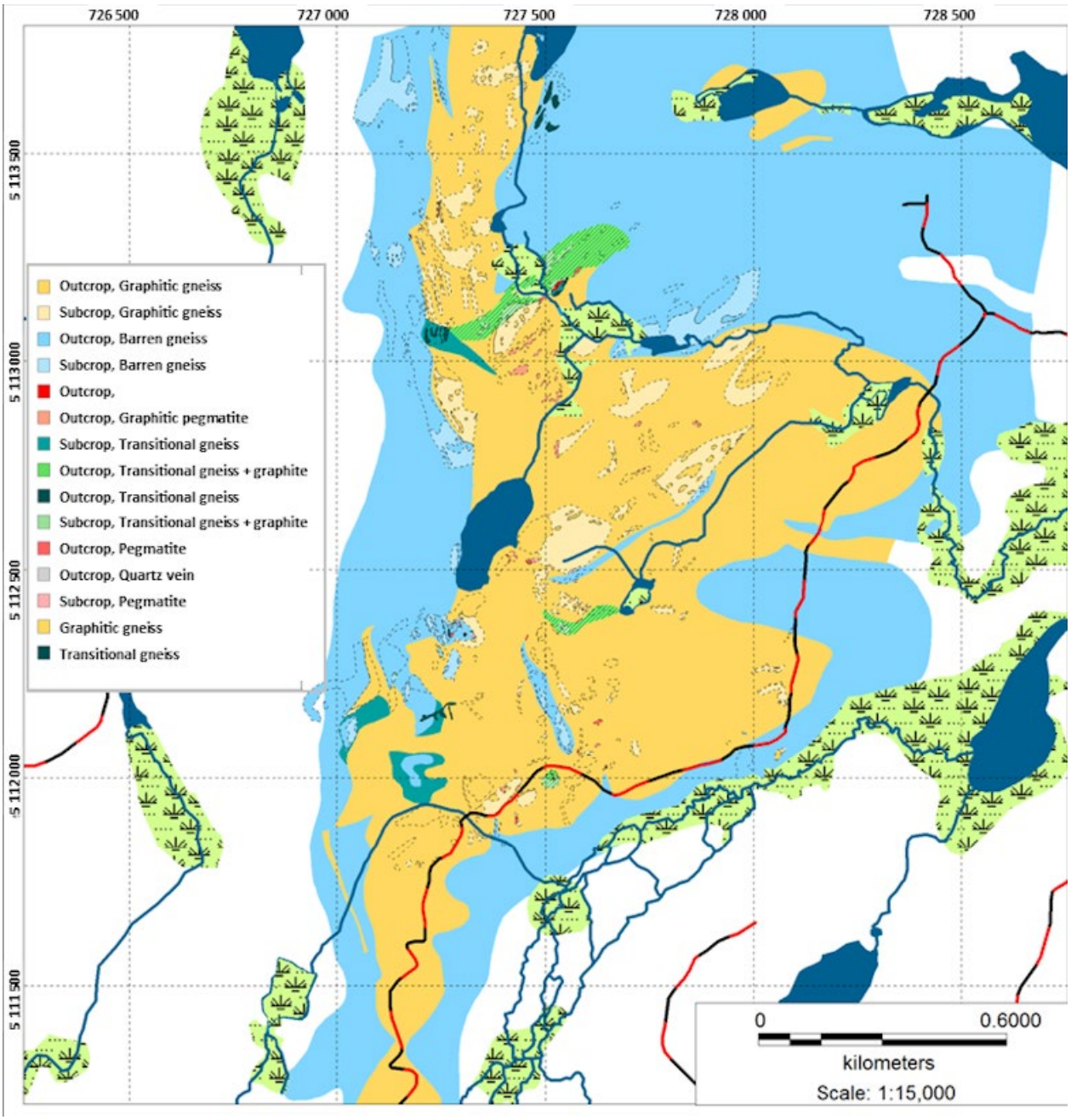

Figure 27. Geology of the Bissett Creek property; figure *from* Leduc (2023).

A Feasibility Study of the Bissett Creek project was completed in 2012 by G Mining Services Inc. (Gignac et al. 2012) and subsequently updated in 2013 without material change (Northern Graphite Corp., news 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 Corp., news 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 Corp. 2023).

The Northern Graphite PEA (Leduc 2013) proposed development of the deposit in 2 phases. Phase 1 will consist of an open pit mine and a 3000 tonnes per day processing plant with conventional crushing, grinding and flotation circuits followed by concentrate drying and screening. Phase 2 involves expansion of the operations with production expected to have doubled after 3 years. The concentrate produced from the Bissett Creek deposit is expected to be dominated by large flake graphite or better. The Mineral Resource and Reserve estimates for Bissett Creek reported by Leduc (2013), are given in Table 37. The expected Life-of-Mine from that study is approximately 21 years. In their 3rd Quarter Management Discussion and Analysis, Northern Graphite sets a goal of initial production from Bissett Creek in 2026 (Northern Graphite Corp. 2024).

Table 37. Bissett Creek Mineral Resource and Reserve estimates *from* Leduc (2013).

	Resources						**Reserves**	
Cut-off Grade (% Cg)	**Measured and Indicated**			**Inferred**			**Probable**	
	Tonnage (Mt)	**Cg (%)**	***In-Situ* Graphite (Mt)**	**Tonnage (Mt)**	**Cg (%)**	***In-Situ* Graphite (Mt)**	**Tonnage (Mt)**	**Cg (%)**
1.02	69.8	1.74	1.2	24.0	1.65	0.4	28.3	2.06

Mt = Million tonnes; Cg = graphitic carbon

Exploration Projects

GLENCORE CANADA CORP.

Glencore Canada Corp. continues to explore its large landholdings in the Sudbury District; some of the projects are listed in Tables 22 and 23 and shown on Figures 15 and 16.

Norman West Project

Glencore's Norman West deposit was discovered in 1996, has been actively explored since 2014 and work on the project continues (Glencore 2021, 2024b). The deposit is located in Norman Township, 35 to 40 km northeast of Sudbury. The Norman West copper-nickel-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 of Glencore's Norman West deposit, looking southeast, is shown in Figure 28. Glencore's exploration at Norman West has followed a multidisciplinary approach, including MultiGrid EM (MGEM; McMonnies, Hughes and Lamontagne 2020; Lamontagne Geophysics Ltd. 2020) and borehole radio imaging (RIM) methods.

The total Inferred Resource for the Norman West deposit (both contact and footwall ore zones) provided in 2021 by Glencore–Sudbury Integrated Nickel Operations (Sudbury INO) (Glencore, written communication, 2022) is given in Table 38.

Table 38. Norman West deposit Inferred Resource 2021 (Glencore, written communication, 2022).

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

Mt = Million tonnes

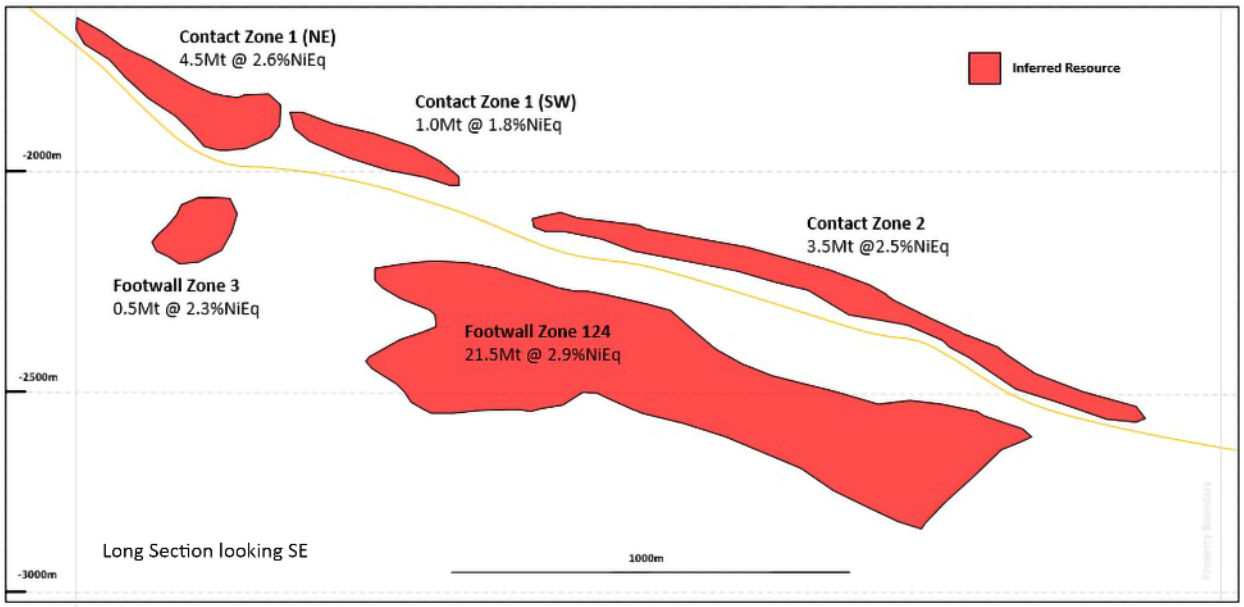

Figure 28. Long section, looking southeast, of Glencore's Norman West deposit; figure *provided by* Glencore, Sudbury INO in 2021.

VALE BASE METALS

Sudbury Basin

Vale Base Metals continues to explore its extensive Sudbury Basin properties; some of the projects appear in Table 22 and are shown on Figure 15.

NORTHX NICKEL CORP. / ARCHER EXPLORATION CORP./ MAGNA MINING INC.

On May 1, Archer Exploration Corp. officially changed its name change to NorthX Nickel Corp. (NorthX Nickel Corp., news release, May 1, 2024). In December, Magna Mining Inc. acquired NorthX Nickel's Sudbury basin property portfolio (NorthX Nickel Corp. and Magna Mining Inc. news releases, December 18, 2024). The properties include (Figure 29):

- Parkin
- Wisner
- Frost Lake
- Creighton South
- Trill
- Windy Lake

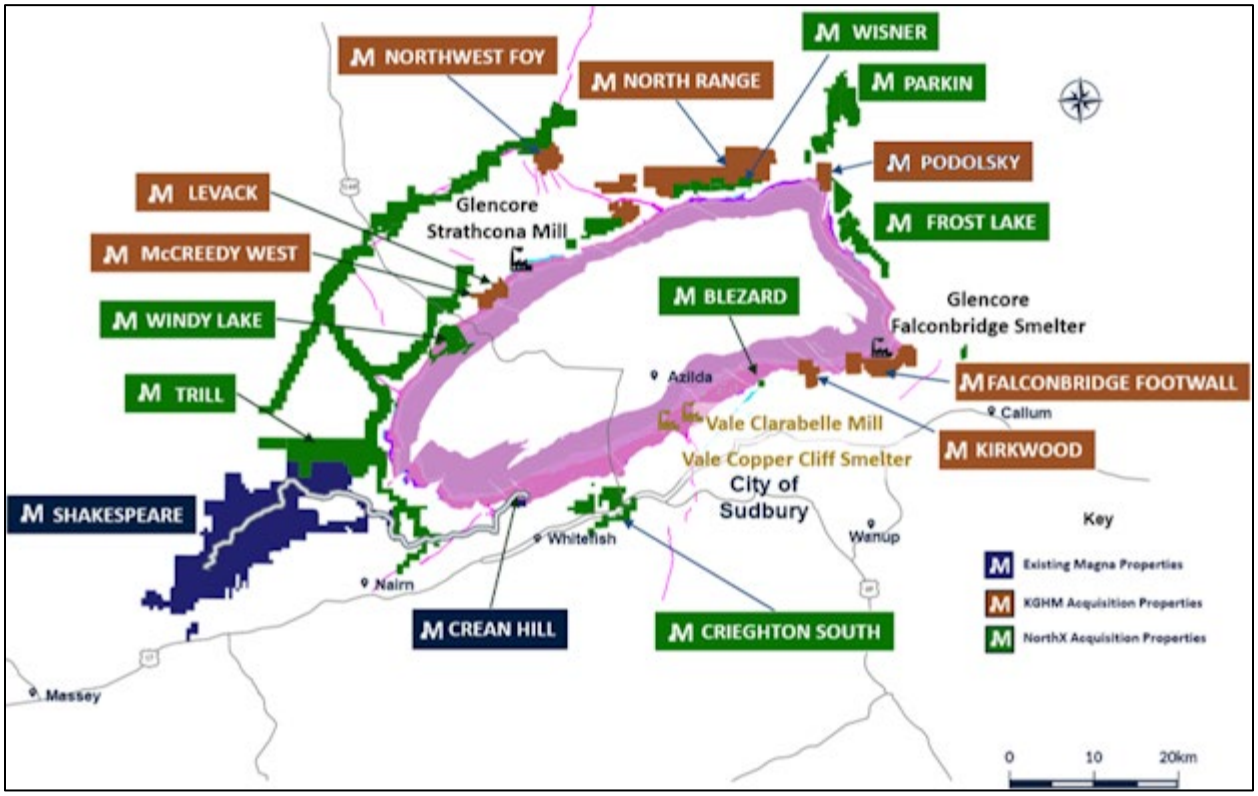

Figure 29. Map showing Magna Mining's 2024 property acquisitions, both KGHM and NorthX Nickel.; figure *from* Magna Mining Inc. news release, December 18, 2024.

MAGNA MINING INC.

In addition to the properties acquired from NorthX Nickel Corp., exploration properties are also part of the acquisition agreement between Magna Mining Inc. and KGHM International Ltd, which would see Magna Mining Inc. acquiring the McCreedy West Mine. The KGHM exploration properties included in the transaction are (Magna Mining Inc., news releases, September 12, 2024; *see* Figure 29):

- past producing mine properties:
  - Levack
  - Podolsky
  - Kirkwood
- exploration properties:
  - Northwest Foy
  - North Range
  - Falconbridge Footwall

The transaction was originally scheduled to close at the end of February, 2025 (Magna Mining Inc., news release, January 30, 2025); then rescheduled to May 2025 (Magna Mining Inc., news release, April 14, 2025).

CBLT INC.

CBLT Inc. currently has 3 exploration properties in the Sudbury RGP District: Geneva Lake, Copper Prince and Falcon Gold (https://cblt.info | Projects).

Falcon Gold Property

(OMI: MDII41I10SE00003; AMIS 05294)
(*also discussed in "*Property Visits*")*

CBLT Inc. acquired the Falcon Gold property from Kinross Gold Corp in June 2024 (press release June 5, 2024). The property is located in Falconbridge Township, within the limits of the City of Greater Sudbury, approximately 21 km northeast of the city centre (*see* Figure 14 [#11]). It comprises 3 contiguous patent claims, covering an area of 96 ha and is adjacent to CBLT's Copper Prince property (Figure 30).

The Falcon Gold property is underlain by Huronian sediments of the Mississagi Formation of the Hough Lake Group, the Bruce and Espanola formations of the Quirke Lake Group, and Nipissing gabbroic intrusions. The historical workings (trenches and shaft) are in the Bruce Formation. The property lies within the zone of sodic metasomatism also known as the "Huronian Gold Belt" (*see* "Recommendations for Exploration"), and along the eastward projection of the Garson Fault.

In the of summer 2024, CBLT undertook a reconnaissance prospecting program, collecting 23 grab samples from outcrop and excavation waste piles. Seven of the 23 samples graded above 2 g/t gold (Table 39: CBLT Inc., press release, July 31, 2024 on Newsfile: https://www.newsfilecorp.com/release/218348/CBLT-Samples-up-to-25.7-gt-Au-at-Past-Producer-Falcon-Gold-Sudbury-Ontario). In the fall, a second phase of exploration was launched. The area where the grab samples from the first exploration phase was mechanically stripped (press release, July 31, 2024 on Newsfile: https://www.newsfilecorp.com/release/226807/CBLT-Commences-Phase-2-at-Past-Producer-Falcon-Gold).

Table 39. Selected grab sample results from 2024 exploration program (CBLT Inc., press release, July 31, 2024 on Newsfile:. https://www.newsfilecorp.com/release/218348/CBLT-Samples-up-to-25.7-gt-Au-at-Past-Producer-Falcon-Gold-Sudbury-Ontario).

Sample	Easting	Northing	Au (g/t)
864865	519937	5157078	25.7
864876	519945	5157083	8.96
864867	519934	5157076	4.8
864873	519929	5157077	4.38
864866	519936	5157081	4.06
864877	519933	5157074	3.81
864872	519926	5157077	2.42
864878	519924	5157081	1.63

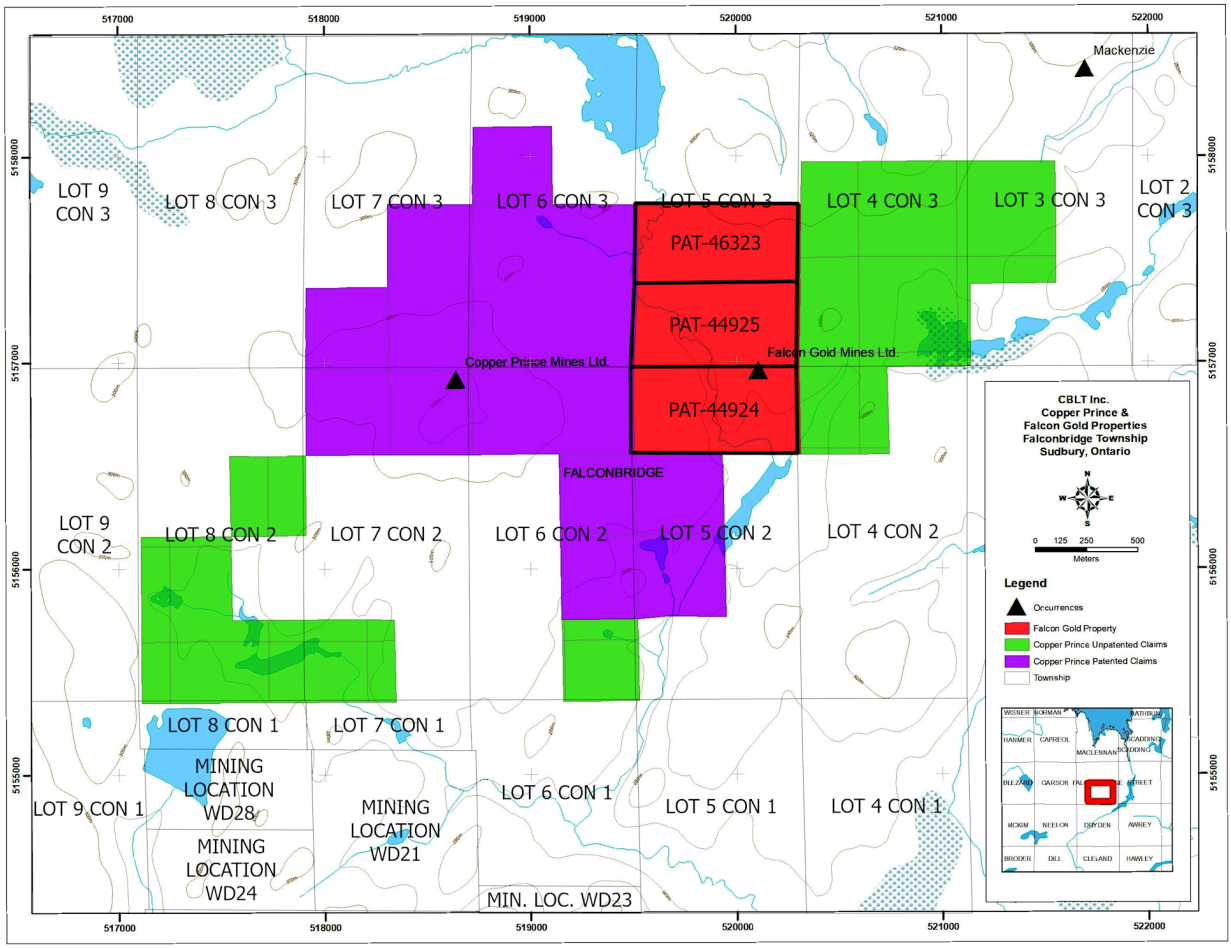

Figure 30. Map of CBLT's property position, including the Falcon Gold property (*modified from* CBLT Inc. press release, June 5, 2024 on Junior Mining Network: CBLT Acquires Falcon Gold Mine with Historical Resource Estimate - Junior Mining Network).

CONQUEST RESOURCES LTD. / VDI RESOURCES

Belfast–TeckMag Project

Conquest Resources Ltd.'s Belfast–TeckMag property is located approximately 75 km northeast of Sudbury in Afton, Scholes, Belfast, MacBeth, Clement and Sheppard townships in the Sudbury District, and Phyllis and Joan townships in the Kirkland Lake District (*see* Figure 14 [#7]; Figure 31). The property is underlain by a large Nipissing mafic intrusion, rocks of the Huronian Supergroup (Cobalt Group) and outliers of Archean felsic to intermediate rocks.

In 2024, Conquest Resources Ltd. entered into a Royalty Purchase and Sales Agreement with VDI Resources (a subsidiary of VerAI Discovery Inc.) (Conquest Resources, news release, April 16, 2024). In September, Conquest Resources announced that it would be starting a 3000 m drill program focussing on high priority targets generated using VerAI's proprietary AI technology (Conquest Resources, news release, September 17, 2024).

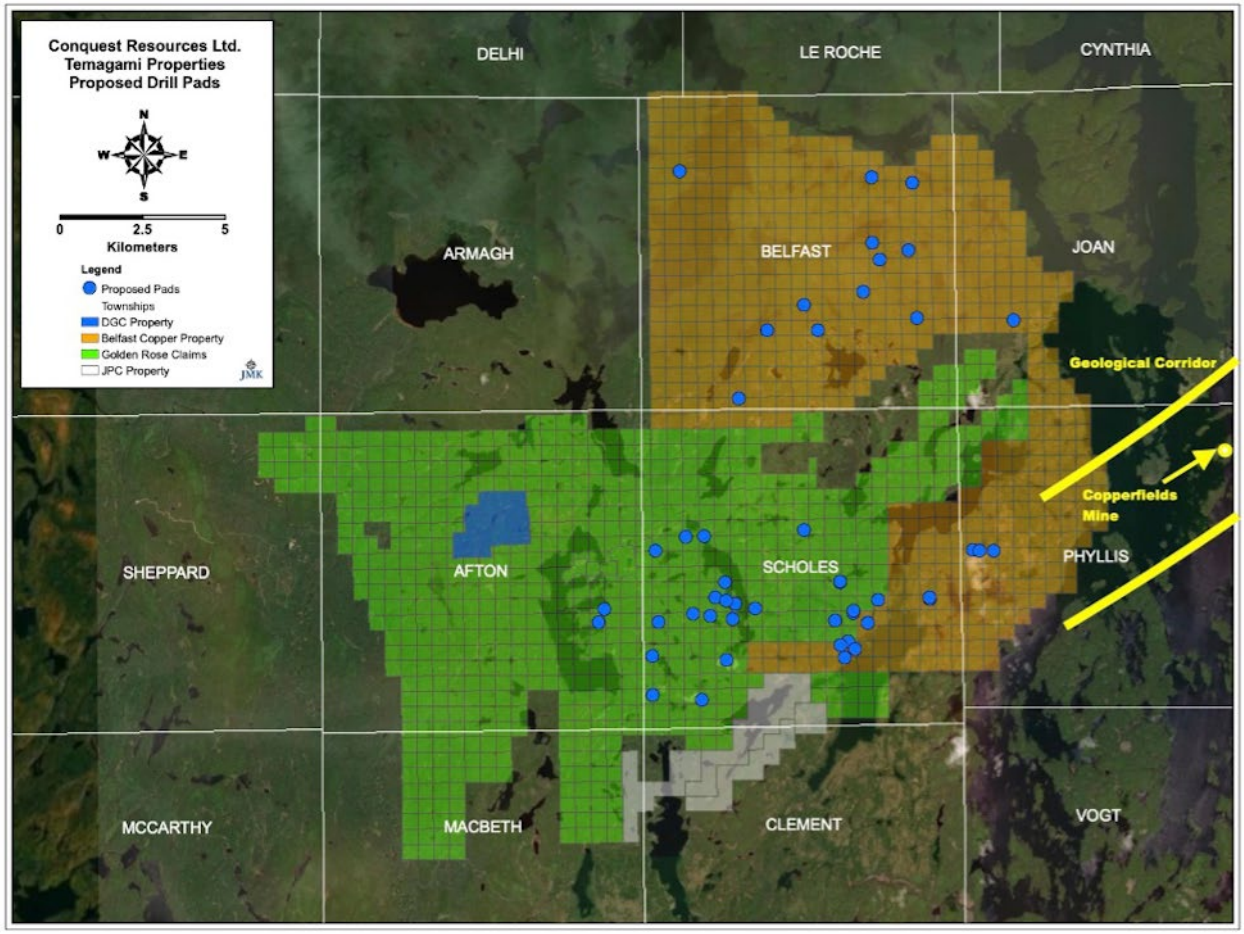

Figure 31. Satellite image map showing Conquest Resources' Belfast–TeckMag project land holdings. Figure *from* Conquest Resources' Teck-Belfast property web page: https://conquestresources.com/belfast-teck-mag-project/ [accessed January 27, 2025].

GRAYCLIFF EXPLORATION LTD. / EV MINERALS CORP.

In 2024, Graycliff Exploration Ltd. entered into a binding Letter of Intent to sell its Baldwin and Lunge properties (Figure 32) to EV Minerals Corp. (Graycliff Exploration Ltd. and EV Minerals Corp., news releases, February 23, 2024). As part of their due diligence, EV Minerals collected 35 grab samples from the Lunge property. Highlights of the assay results are given in Table 40.

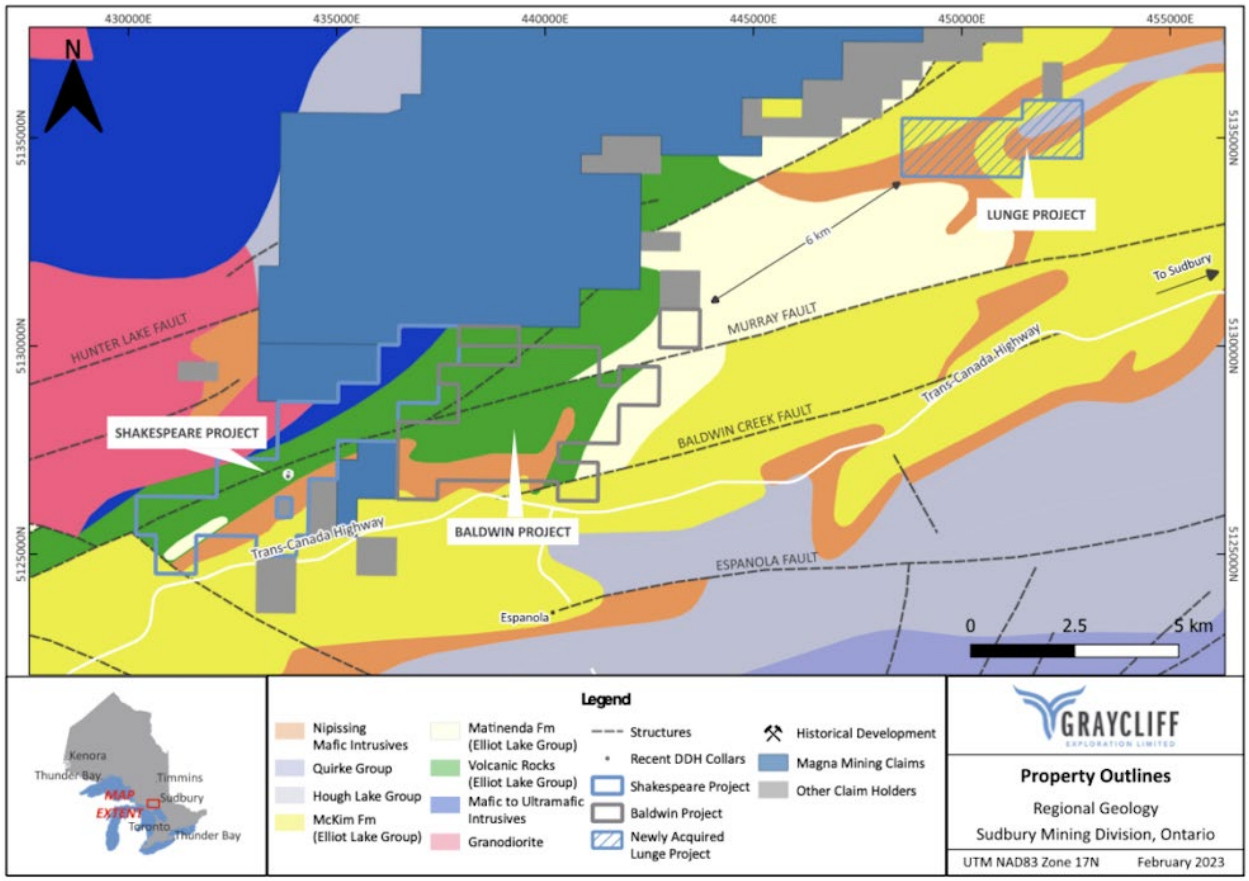

Figure 32. Geology map showing the locations of the Baldwin and Lunge projects (*from* Graycliff Exploration Ltd., news release, March 2, 2023).

Table 40. Highlights of grab samples [1] collected by EV Minerals on the Lunge property in 2024 (EV Minerals., news release, February 29, 2024).

Sample No.	Ni (%)	Cu (%)	Au (g/t)	Ag (ppm)
171001	0.90	0.65	0.01	1.50
171002	0.71	0.58	0.01	1.40
171004	0.15	2.44	0.00	5.30
171006	1.00	0.13	0.01	0.80
171008	1.15	0.07	0.01	0.90
171009	0.61	2.04	0.01	3.10
171011	0.39	1.90	0.01	2.60
171012	0.37	1.91	0.05	2.00
260842	0.22	2.54	0.02	5.50

Sample No.	Ni (%)	Cu (%)	Au (g/t)	Ag (ppm)
260843	0.65	0.87	0.01	1.50
260845	0.76	1.54	0.22	1.90
260846	0.65	1.15	0.01	1.90
260850	1.28	0.12	0.00	0.80
F420005	0.04	0.09	1.49	0.25
F420012	1.14	0.20	0.02	0.70
F420013	1.23	0.06	0.00	0.50

[1] *Grab samples are selective by nature and do not necessarily represent the true metal content of the mineralized zones.*

MACDONALD MINES EXPLORATION LTD. / CANUC RESOURCES CORP.

Scadding–Powerline–Jovan (SPJ) Polymetallic Gold Project

MacDonald Mines Exploration Ltd.'s Scadding–Powerline–Jovan (SPJ) polymetallic gold project is located approximately 40 km northeast of Sudbury in Davis, Street, Scadding, MacLennan, Falconbridge, Rathbun and Loughrin townships (Figure 33; *see* Figure 14 and Table 22 [#10]). The SPJ project covers 19 700 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 (IOCG; Schandl, Gorton and Davis 1994; Schandl and Gorton 2007). IOCG deposits have been recently placed in a metasomatic-iron-alkali-calcic system (MIAC; Corriveau, Montreuil, Blein et al. 2022; Corriveau, Montreuil, de Toni et al. 2022; Corriveau, Montreuil, Potter et al. 2022; Corriveau, Potter and Mumin 2022 and references therein). MacDonald Mines included the IOCG model in their interpretation (Yarie and Wray 2019). Exploration targets include nickel, gold, copper, cobalt, rare earth elements and IOCG deposits on the SPJ project (MacDonald Mines Exploration Ltd. webpage; https://macdonaldmines.com [accessed January 28, 2025]). Numerous mineralized showings and prospects occur on the SPJ Property (Figure 34). An historical resource (NI 43-101–noncompliant) was calculated in 1983 for the Scadding gold mine, and was reported in Yarie and Wray (2019) (Table 41).

On May 24, 2024, MacDonald Mines Exploration Ltd. announced, by a press release, that there were certain inconsistencies discovered in their assay results from the Scadding gold project and, as a result, all the assay data publicly released through press releases or in other documents (e.g., NI 43-101 Technical Reports) were withdrawn (MacDonald Mines Exploration Ltd., news release, May 24, 2024). On May 31, MacDonald Mines gave details on the assays impacted by the above inconsistencies, including comparison of the originally reported assays and the lab's Assay Certificates (MacDonald Mines Exploration Ltd., news release, May 31, 2024). An appendix for the May 31 press release was published that same day. The inconsistencies referred to above do not affect the 1983 Mineral Resource Estimate.

In December of 2024, MacDonald Mines announced that it had signed a Letter of Intent for Canuc Resources Corp. to acquire all issued and outstanding shares in MacDonald Mines Exploration Ltd. (MacDonald Mines and Canuc Resources, news releases, December 3, 2024). The Letter of Intent will be in place until April 20, 2025.

Table 41. 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)*

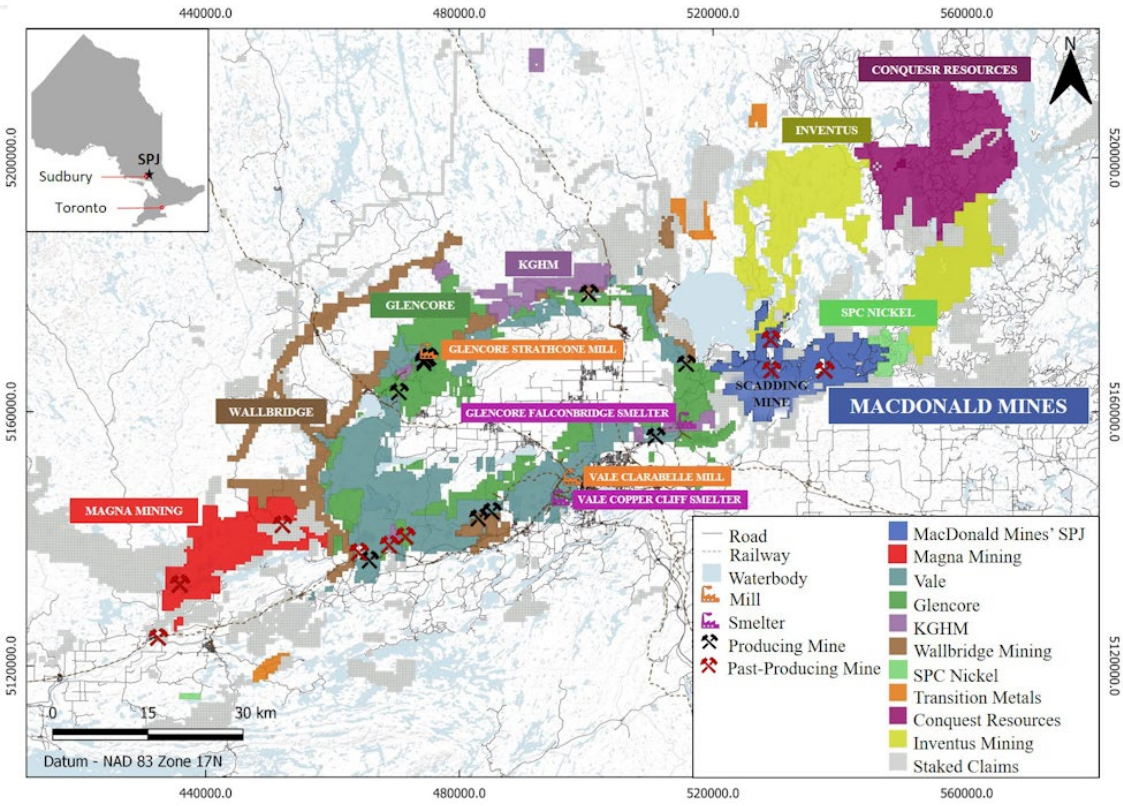

Figure 33. Map of the Sudbury Basin, showing the location of MacDonald Mines' SPJ project, and other major property positions in the District (figure *from* MacDonald Mines Exploration Ltd. webpage; https://macdonaldmines.com [accessed January 28, 2025]).

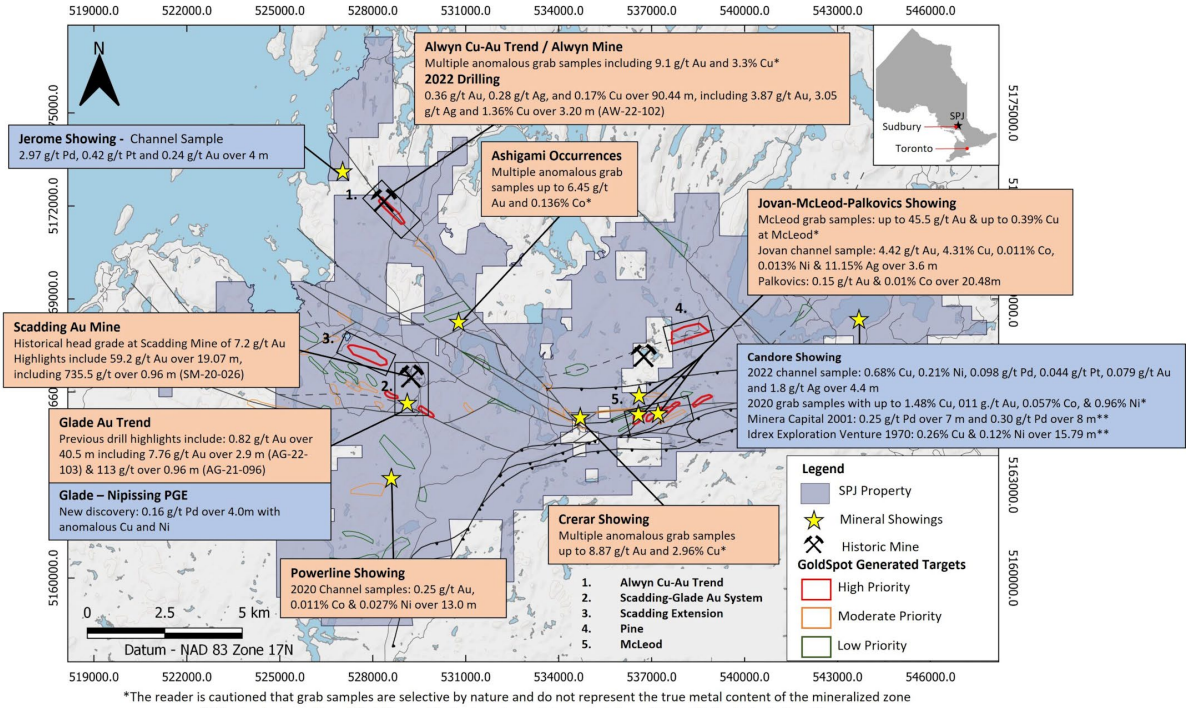

Figure 34. MacDonald Mines' SPJ project, showing the location of the Scadding gold mine and mineral occurrences in the area (figure *from* MacDonald Mines 2023).

MCFARLANE LAKE MINING INC.

McMillan–Mongowin Properties

The McMillan–Mongowin properties are located Mongowin and McKinnon townships (Figure 35), approximately 70 km southwest of Sudbury and 13 km south of Espanola (*see* Figure 14 [#29]). The properties are underlain by rocks of the Huronian Supergroup (Serpent Formation [Quirke Lake Group]; Gowganda and Lorrain formations [Cobalt Group]), as well as late diabase dikes. The area is folded around the Fox Lake anticline and cut by numerous faults, the House Lake and Fox Lake faults being considered significant to the mineralization (*see* Figure 35). The area falls in the "Huronian Gold Belt", which has been affected by a widespread sodic metasomatic event (metasomatic iron and alkali-calcic system) considered prospective for copper-gold mineralization (Cosec and Farrow 2011; Farrow 2017; Péloqun 2018; *see* "Recommendations for Exploration" this report).

In 2024, McFarlane Lake undertook an Induced Polarization (IP) survey over a 1.4 km^2 area around the McMillan Mine site, where gold is associated with iron sulphides (McFarlane Lake Mining, news release, April 23, 2024). A sample taken from the McMillan Mine site in 2024 returned values of 87.4 g/t gold and 0.59% copper (McFarlane Lake Mining, news release, September 10, 2024). In November, McFarlane Lake Mining began a drill program on the McMillan Mine property (McFarlane Lake Mining, news release, November 29, 2024). Several historical drill holes were opened, and downhole geophysical surveys undertaken. The current drill program proposes a minimum 3000 m of drilling. In addition to diamond drilling, McFarlane Lake Mining's active exploration permit covers line-cutting and geophysical surveys (McFarlane Lake Mining, news release, September 24, 2024). Regional (property-wide) exploration targets on the McMillan–Mongowin properties are shown on Figure 36 (McFarlane Lake Mining, news release, September 10, 2024).

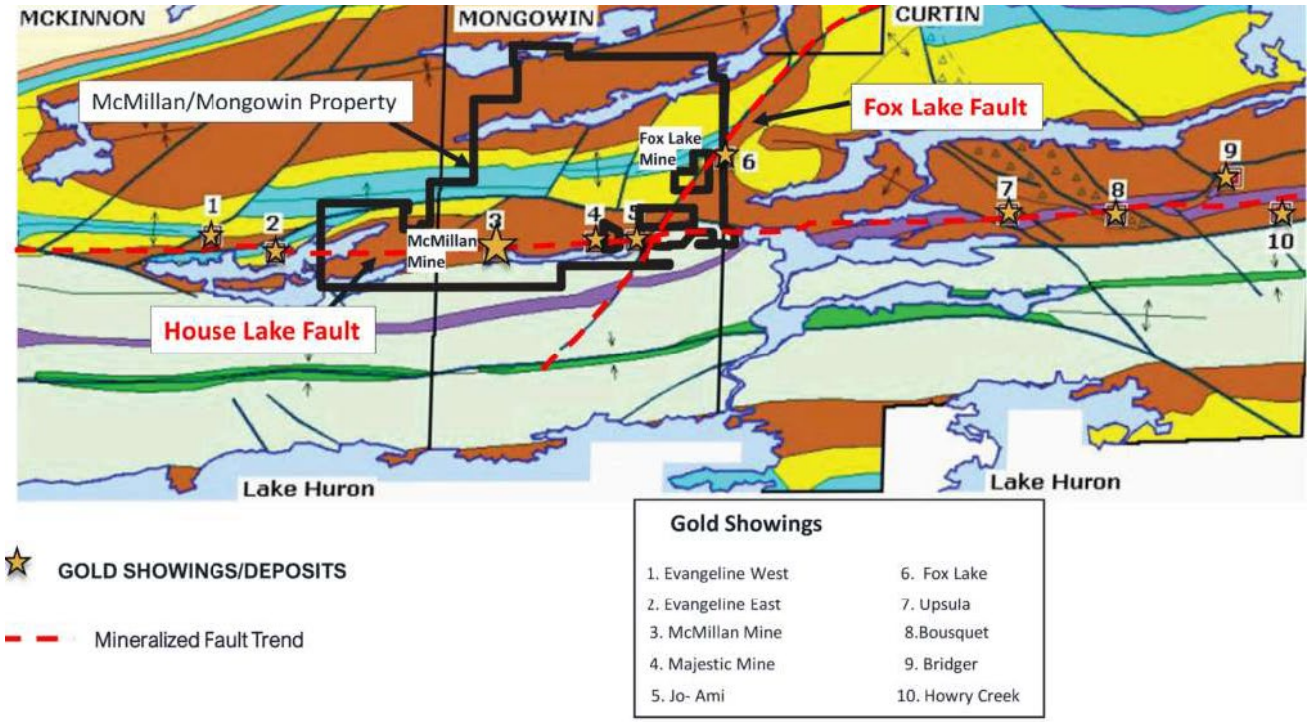

Figure 35. Map showing the location of McFarlane Lake's McMillan–Mongowin properties, and local gold showings and the structures thought to control the mineralization (figure *from* McFarlane Lake, news release, April 4, 2024).

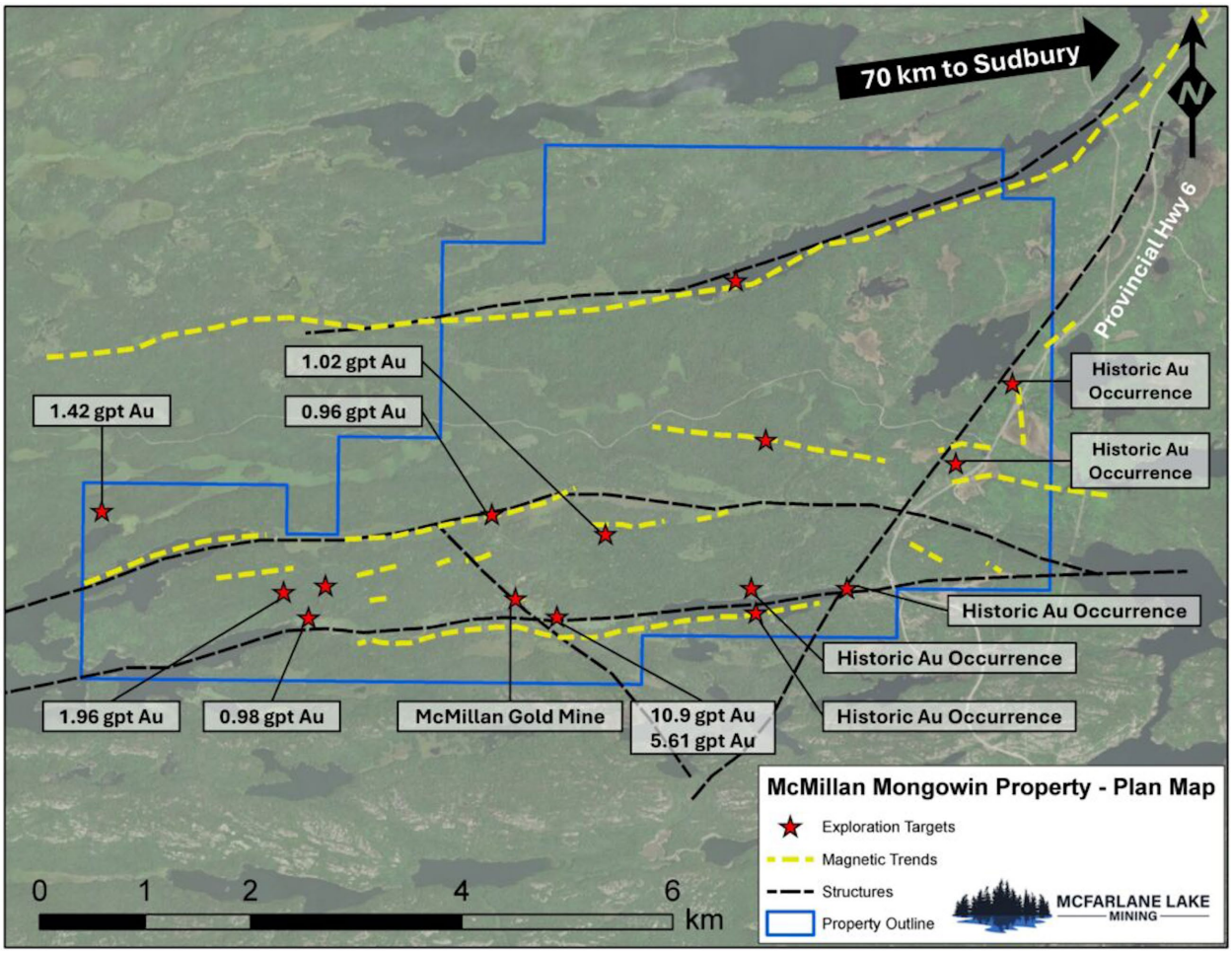

Figure 36. Map showing the location of regional surface exploration targets on McFarlane Lake's McMillan–Mongowin properties (figure *from* McFarlane Lake, news release, September 10, 2024).

OSPREY ADVANCED MATERIALS CORP.

Titan Property

Cache Gold Mines Corp. (on behalf of its wholly owned subsidiary, Osprey Advanced Materials Corp.) signed a Letter of Intent with Metalite Resources Inc. for Metalite to acquire 20% of the Titan property (*see* Figure 14 [#2]):

> Pursuant to the Titan Option, Metalite will have the option to acquire an undivided 20% interest in Osprey's Titan Project by incurring exploration expenditures of no less than CAD$800 000 prior to December 31, 2024. – Osprey Advanced Materials, news release, January 19, 2024

The Titan titanium vanadium property has a published Mineral Resource estimate (Prenn and Pettigrew 2017; Table 42).

Table 42. Mineral Resource estimate for the Titan titanium vanadium project (Prenn and Pettigrew 2017).

Category	Tonnes (Mt)	Fe_2O_3 (%)	V (%)	TiO_2 (%)
Inferred	46	48.32	0.24	14.88

Mt = Million tonnes

PREMIUM NICKEL RESOURCES CORP. / PREMIUM RESOURCES LTD.

In 2024, Premium Nickel Resources Corp. changed its name to Premium Resources Ltd. (Premium Resources Ltd., news release, November 18, 2024). Premium Resources Ltd. holds the Post Creek and Halycon properties in the Sudbury RGP District (*see* Figure 14 [#14]).

SPC NICKEL CORP.

Lockerby East Property – West Graham Deposit

The Lockerby East property is located approximately 20 km west of Sudbury in Graham and Denison townships (*see* Figure 14 [#19]). In 2023, SPC Nickel Corp. signed an agreement with Vale to acquire 100% ownership of the Crean Hill #3 patent in accordance with the criteria set out in the agreement (SPC Nickel Corp., news release, January 23, 2023). The Lockerby East property now includes the past-producing Lockerby East Mine (LKE), and the West Graham deposit that includes the Crean Hill #3 patent (Figure 37). The original SPC Nickel Lockerby East property consisted of 8 mining patents covering approximately 314 ha. The Crean Hill #3 patent is a single mining patent covering approximately 59 ha. SPC Nickel's property package is now approximately 373 ha. The property hosts 2 defined ore deposits: the LKE and West Graham (Conwest). The sulphide mineralization at both deposits is "contact style mineralization" occurring at or near the basal contact of the Sudbury Igneous Complex (SIC). The mineralization at the Crean Hill #3 patent is the westward extension of the West Graham deposit.

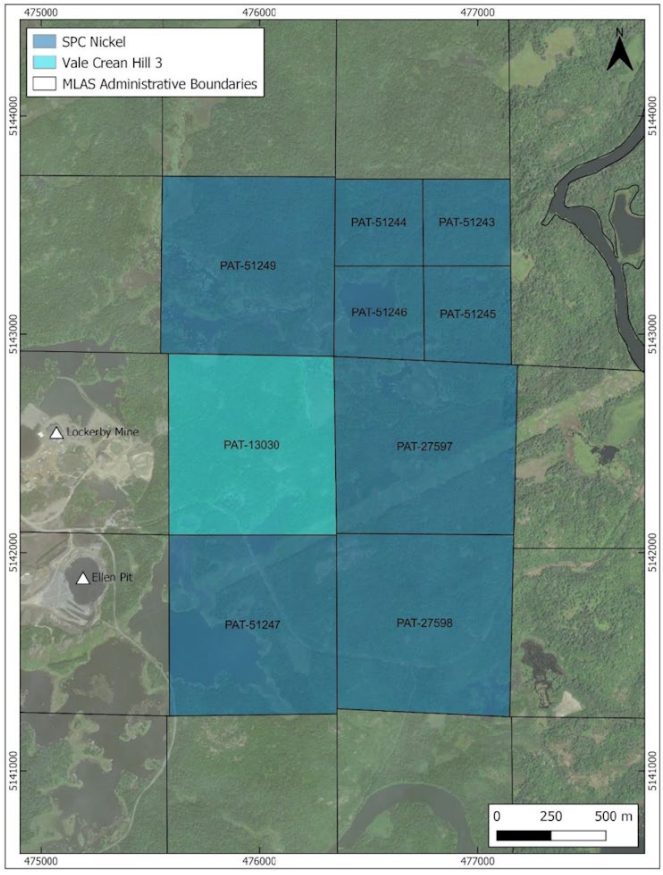

Figure 37. SPC Nickel's Lockerby East property, showing the patent claim dispositions, figure *from* Armitage and Eggers (2024).

In 2024, SPC Nickel released a mineral resource estimate for the LKE and West Graham deposits (Armitage and Eggers 2024; LKE deposit: Table 43; Figures 38 and 39; West Graham deposit: Table 44; *see* Figures 38 and 39).

SPC Nickel reported results of channel sampling from 2023: 139 samples at 1 m intervals over 8 continuous channels (SPC Nickel, news release, May 29, 2024; reported in Table 45).

In 2024, SPC Nickel initiated a metallurgical test program on the West Graham deposit (SPC Nickel, news release, April 2, 2024). Six shallow holes were used for the study; 236 kg of quartered core were shipped to Vale's Sheridan Park Metallurgical Facility in Mississauga, Ontario. Results from samples submitted to the Ontario Geological Survey Geoscience Laboratories for full PGM analyses were received (SPC Nickel, news release, May 7, 2024; Table 46).

SPC Nickel completed a 2596 m drill program, over 36 holes, in 2024 (Figure 40; SPC Nickel, news release, December 2, 2024). Highlights of the assay results from the drill program are given in Table 47 (SPC Nickel Corp., Lockerby East property webpage; https://spcnickel.com/projects/lockerby-east [accessed January 28, 2025]).

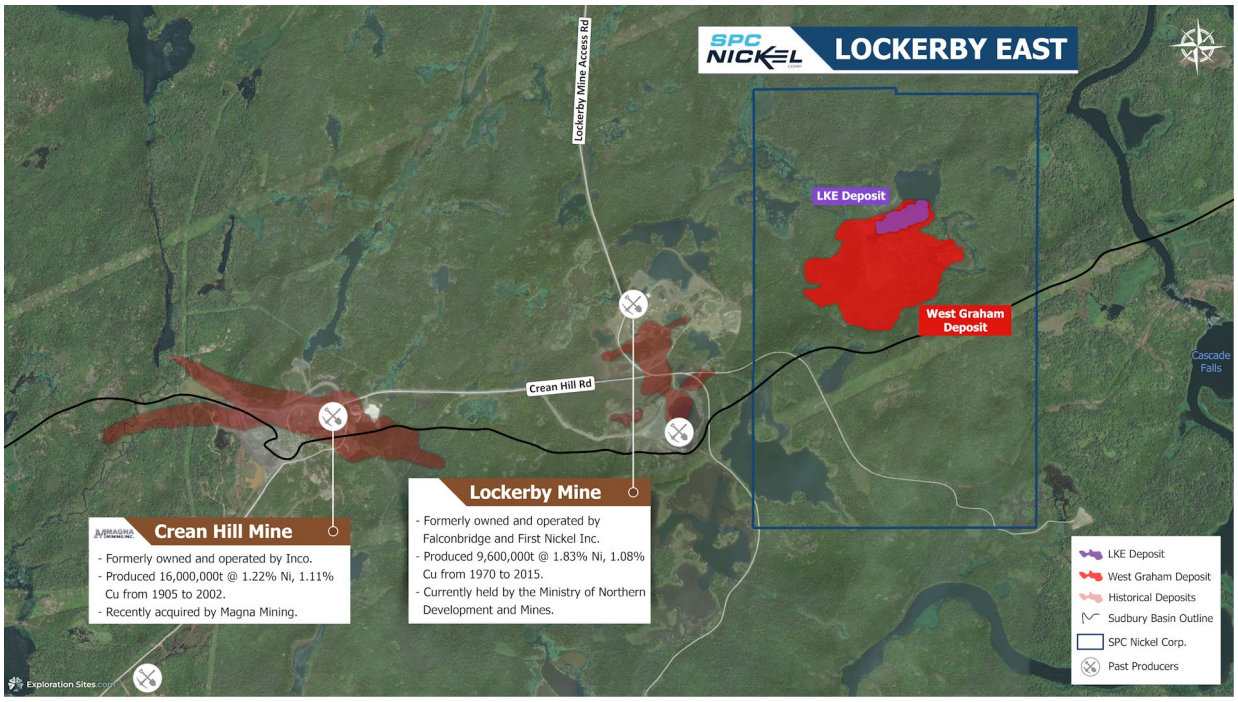

Figure 38. Aerial map of the Lockerby East property, showing the LKE and West Graham deposits and current known extent of the mineralized zone. Figure *provided by* SPC Nickel Corp., February 2024.

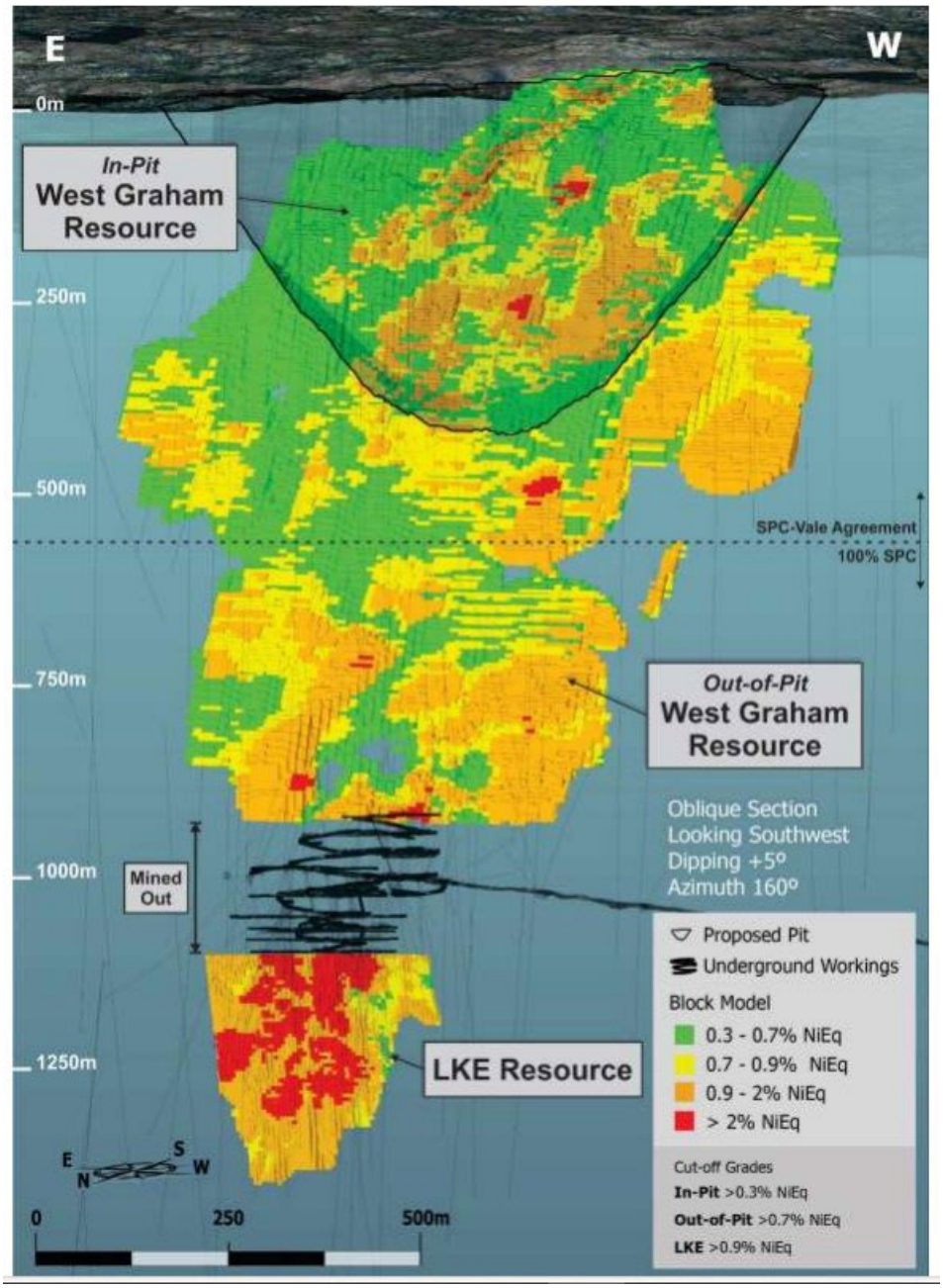

Figure 39. Oblique long section (oriented 160° looking southwest) of the Lockerby East property Mineral Resource, showing the new West Graham in-pit and out-of-pit Resources, and the Lockerby East historical resource. Figure *from* SPC Nickel Corp., news release, January 17, 2024.

Table 43. Mineral Resource estimate for the LKE deposit (SPC Nickel Corp., news release, March 4, 2024; Armitage and Eggers 2024).

Category	Cut-off Grade [1] (NiEq wt %)	Resource (kt)	Ni (wt %)	Cu (wt %)	Co (wt %)	Pt (g/t)	Pd (g/t)	Au (g/t)	NiEq [1] (wt %)
Underground									
Indicated	0.9	665	1.17	0.54	0.02	0.49	0.24	0.09	1.59
Inferred	0.9	124	0.99	0.42	0.02	0.57	0.36	0.07	1.39

[1] *NiEq% = Ni (%) + [Cu (%) × 0.369] + [Co (%) × 2.318] + [Pt / 31.1 × 4.779] + [Pd / 31.1 × 8.602] + [Au / 31.1 × 8.124]*

Table 44. Mineral Resource estimate for the West Graham deposit (SPC Nickel Corp., news release, January 17, 2024; Armitage and Eggers 2024).

Category	Cut-off Grade [1] (NiEq wt %)	Resource (kt)	Ni (wt %)	Cu (wt %)	Co (wt %)	Pt (g/t)	Pd (g/t)	Au (g/t)	Ag (g/t)	NiEq [1] (wt %)
In-Pit										
Indicated	0.3	19326	0.42	0.28	0.01	0.06	0.02	0.02	1.47	0.57
Inferred	0.3	3283	0.37	0.28	0.01	0.10	0.03	0.03	1.24	0.53
Out-of-Pit										
Indicated	0.7	3238	0.63	0.47	0.02	0.24	0.06	0.07	2.64	0.92
Inferred	0.7	3867	0.69	0.43	0.03	0.22	0.06	0.06	2.20	1.97

[1] *NiEq% = Ni (%) + [Cu (%) × 0.369] + [Co (%) × 2.318] + [Pt / 31.1 × 4.779] + [Pd / 31.1 × 8.602] + [Au / 31.1 × 8.124]*

Table 45. Assay results from channel samples, West Graham deposit (SPC Nickel Corp., news release; May 29, 2024).

Hole ID	Length [1] (m)	Ni (%)	Cu (%)	Co (%)	Pt (g/t)	Pd (g/t)	Au (g/t)	Ag (g/t)
CH-01W	13	0.2	0.25	0.01	0.03	0.02	0.02	1.68
CH-02W	6	0.14	0.09	0.01	0.02	0.01	0.01	0.7
CH-03W	15	0.28	0.29	0.01	0.04	0.02	0.03	1.76
CH-04E	6.5	0.42	0.26	0.02	0.03	0.01	0.09	1.26
CH-05E	17	0.94	0.44	0.04	0.05	0.02	0.02	2.33
CH-06E	38	0.62	0.31	0.02	0.04	0.02	0.01	1.43
CH-07E	13	0.21	0.18	0.01	0.02	0.01	0	1.3
CH-08E	13	0.64	0.34	0.02	0.04	0.03	0.01	1.9

[1] *Length refers to downhole length*

Table 46. PGM results for West Graham deposit samples (SPC Nickel Corp., news release; May 7, 2024).

Hole ID	Length [1] (m)	Ni [2] (%)	Cu [2] (%)	Pt (g/t)	Pd (g/t)	Au (g/t)	Os (g/t)	Ir (g/t)	Rh (g/t)	Ru (g/t)	Os+Ir+Rh+Ru (g/t)
WG-23-026	0.45	5.08	0.16	0.09	0.07	0.003	0.2	0.4	0.44	0.74	1.79
WG-23-026	0.5	3.01	0.72	0.09	0.06	0.02	0.16	0.34	0.31	0.73	1.54
WG-23-026	0.37	5.66	0.05	0.04	0.07	0.001	0.35	0.67	0.44	1.3	2.75
WG-23-026	0.57	5.88	0.06	0.58	0.04	0.002	0.12	0.26	0.42	0.47	1.28
WG-23-042	1	3.34	1.13	0.12	0.18	0.032	0.19	0.4	0.33	0.75	1.67
WG-23-042	0.5	4.19	0.08	0.13	0.12	0.007	0.05	0.11	0.15	0.15	0.45
WG-23-042	0.5	3.48	0.16	0.15	0.12	0.011	0.03	0.07	0.1	0.08	0.27

[1] *Length refers to downhole length*
[2] *Results previously reported*

Table 47. Assay result highlights for the West Graham deposit 2024 drill program (SPC Nickel Corp., Lockerby East property webpage; https://spcnickel.com/projects/lockerby-east [accessed January 28, 2025]).

HOLE ID	Length [1] (m)	Ni (%)	Cu (%)	Co (%)	Pt (g/t)	Pd (g/t)	Au (g/t)	Ag (g/t)
WG-24-087	16	1.05	0.3	0.03	0.06	0.02	0.03	1.82
WG-24-088	37.95	0.87	0.32	0.03	0.05	0.02	0.02	1.95
including	29	1.03	0.34	0.04	0.05	0.03	0.02	1.98
including	16	1.41	0.33	0.05	0.03	0.01	0.06	1.75
WG-24-091	9.2	0.81	0.36	0.03	0.07	0.02	0.02	2.24
WG-24-092	34.85	0.75	0.24	0.03	0.04	0.02	0.01	1.21
including	12	1.15	0.29	0.04	0.06	0.03	0.01	1.38
WG-24-094	9	0.81	0.36	0.03	0.03	0.02	0.02	1.97
WG-24-096	16	0.73	0.26	0.03	0.04	0.02	0.02	1.34
WG-24-098	9	0.72	0.37	0.02	0.08	0.02	0.02	1.78
WG-24-099	6	0.88	0.21	0.03	0.06	0.02	0.01	1.15
WG-24-101	14.7	0.83	0.19	0.03	0.05	0.02	0.01	1.52
WG-24-102	3	1.59	0.15	0.06	0.04	0.02	0.004	1.1
WG-24-106	7.2	0.77	0.4	0.03	0.04	0.02	0.02	2.16
WG-24-107	6	1.11	0.31	0.04	0.03	0.02	0.02	1.23
WG-24-108	10	1.04	0.5	0.03	0.07	0.02	0.02	2.57
including	2	1.61	0.34	0.05	0.06	0.01	0.01	1.65
WG-24-109	45.6	0.78	0.38	0.03	0.08	0.02	0.03	2
including	18	1.17	0.37	0.04	0.07	0.03	0.03	1.57
Including	10.5	1.46	0.32	0.05	0.09	0.03	0.04	1.4
AND	4.32	1.16	0.52	0.04	0.23	0.03	0.05	3.01
WG-24-112	7.5	0.93	0.37	0.03	0.12	0.04	0.03	2.36
WG-24-113	7.5	0.87	0.32	0.03	0.09	0.02	0.03	1.98
WG-24-116	12	0.81	0.77	0.03	0.07	0.05	0.03	3.74
WG-24-118	3	1.67	0.19	0.05	0.06	0.04	0.02	1.6

[1] *Length is downhole length not true thickness*

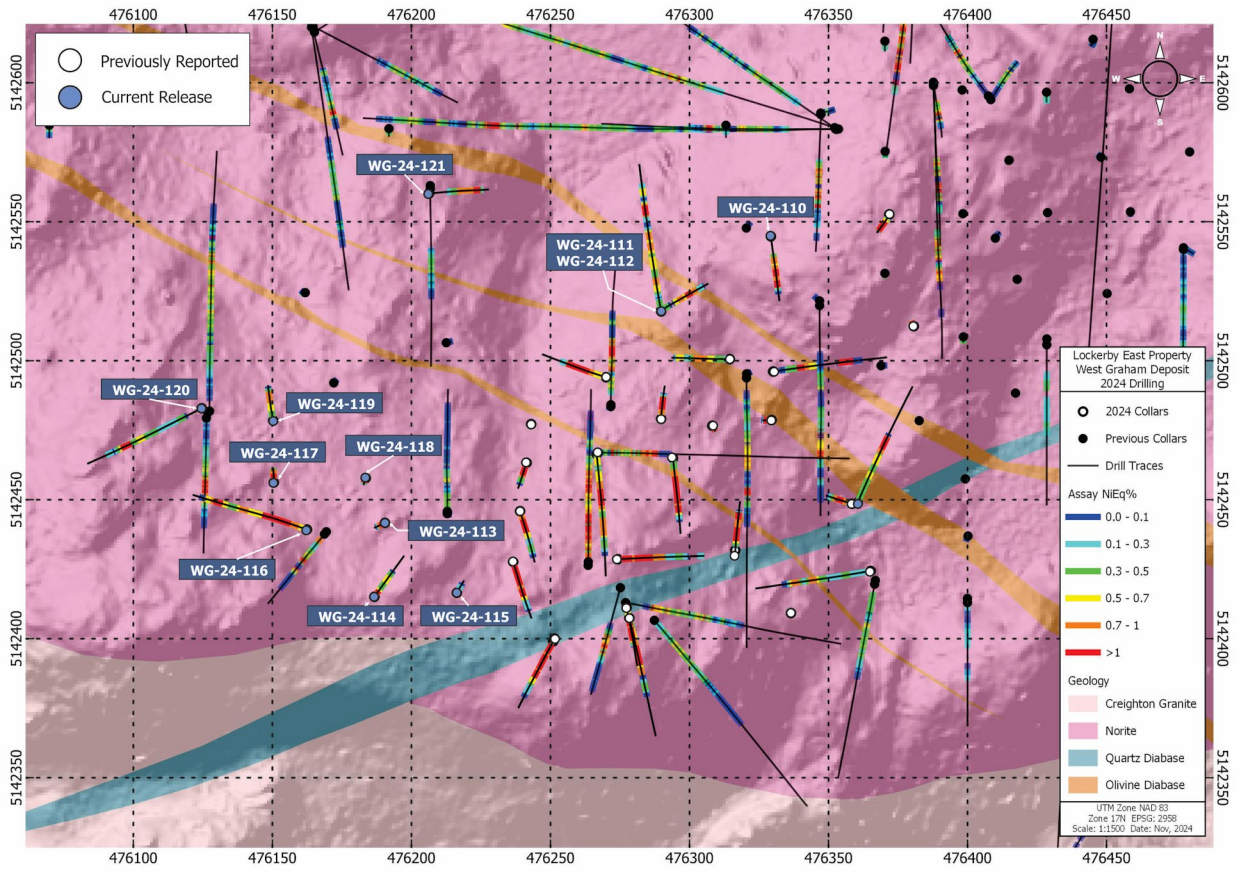

Figure 40. Geological map of the area drilled on the West Graham deposit in 2024, showing the drill-hole collars (SPC Nickel Corp., Lockerby East property webpage; https://spcnickel.com/projects/lockerby-east [accessed January 28, 2025]).

DISTRICT STAFF AND ACTIVITIES

In 2024, the Sudbury District RGP office was staffed by S. Péloquin, *P.Geo.*, District Geologist; B. McKinnon, District Geological Assistant; R. Todd, District Geological Assistant; and J. Beaudry, Summer Employment Opportunities program student (May to August). A summary of activities of the Sudbury District RGP office in 2024 is provided in Table 48.

In 2024, Sudbury District RGP office staff responded to 55 in-person client requests, 253 email, phone or text-message requests, and 8 remote requests. Requests included equipment loans, access to physical files, and advisory and research assistance. Prospectors, mining company personnel and members of the general public were served.

S. Péloquin, B. McKinnon and J. Beaudry attended the OGS Health and Safety Day in person in Sudbury, and S. Péloquin, B. McKinnon and J. Beaudry attended an additional Health and Safety event in Belleville. S. Péloquin completed Standard First Aid and CPR Training. J. Beaudry completed Utility Terrain Vehicle (UTV) training. “Point of Sale Machine Training”, was completed by all staff. This training is required because the RGP office in the Willet Green Miller Centre is housed with OGS point of sale equipment.

As part of continuing professional development, S. Péloquin also attended virtual and in-person talks and presentations of the Sudbury Prospectors and Developers Association, as well as talks at Laurentian University’s Harquail School of Earth Sciences. B. McKinnon and J. Beaudry participated in the ERGMS Student Field Trip lead by C. Gordon in June. S. Péloquin, B. Mckinnon and J. Beaudry participated in a Sault Ste. Marie RGP Office – Sault and District Prospectors Association field trip to the Elliot Lake area.

S. Péloquin attended and presented a talk at both the Mine Connect Export Forum in Sudbury in February, and the Northeastern Ontario Mines and Minerals Symposium in Timmins in October. S. Péloquin participated in the MineAfrica meeting in Sudbury in May with the Mineral Sector Analysis and Promotions Unit, the Mineral Development Branch, and the Information and Lands Branch. S. Péloquin, B. McKinnon and J. Beaudry participated in the 3 days of the Sudbury Gem and Mineral Show in July. S. Péloquin attended the Association de l’Exploration Minière du Québec (AEMQ) Xplor 2024 in October, with S. MacLean (Mineral Sector Analysis and Promotions Unit).

In collaboration with D. Bennett, OGS Indigenous Geoscience Liaison, S. Péloquin and B. McKinnon attended the Anishinabek Nation Land and Resource Forum in North Bay in February. S. Peloquin also attended and presented a talk at each of the Anishinabek GIS Day in November (with M. Levesque, OGS Indigenous Geoscience Liaison), and the Anishinabek Lake Huron Round Table in December, both in Sudbury. B. McKinnon attended the Sagamok Fall Harvest with M. Levesque in October.

B. McKinnon performed educational outreach for 3 days at an elementary school in May. Presentations and interactive activities were delivered to 9 classes, ranging from kindergarten to Grade 6.

S. Péloquin, B. McKinnon conducted a one-day field trip to the Sudbury Igneous Complex for graduate students from Memorial University of Newfoundland and Labrador in April. In May, S. Péloquin co-led the Student-Industry Mineral Exploration Workshop (S-IMEW) Sudbury Basin Field Trip with G. Mourre and B. Clarke (SPC Nickel Corp). S. Péloquin, B. McKinnon and J. Beaudry led a Sudbury Geology Field Trip for the Kirkland Lake and Timmins RGP offices in July, and a Geology Day for the Ontario Ministry of Natural Resources and Forestry – Stewardship Youth Ranger Program in August. Field Trips led or co-led are listed in Table 49.

Table 48. Summary of activities of the Sudbury District RGP office in 2024.

Activity	Number
Office visits by clients	55
Telephone/Email inquiries	253
Remote consultations and/or inquiries	8
Indigenous meetings and/or career events	4
Educational events (schools) (3 days)	1
Field trips attended	3
Field trips given	4
Symposia and/or trade shows attended	4
Assessment files and donations processed	50
Ontario Mineral Inventory records updated	10

Table 49. Field trips led or co-led by the Sudbury District geologist and staff in 2024.

Client	Location and Purpose
Memorial University of Newfoundland & Labrador	Sudbury Basin Geology Field Trip
S-IMEW (PDAC Student-Industry Mineral Exploration Workshop)	One-day field trips co-led with SPC-Nickel Corp.
Kirkland Lake & Timmins RGP Offices	Sudbury Basin Geology Field Trip
Ontario Ministry of Natural Resources and Forestry – Stewardship Youth Ranger	Sudbury Geology Day

The Ontario Mineral Exploration Information System (OMEIS) is an intranet-based application used by RGP and Mining Lands staff to maintain and update the Ontario Assessment File Database (OAFD); the Ontario Drill Hole Database (ODHD); the Ontario Mineral Inventory (OMI) database; and monthly exploration activity reports and property visits (Success Tracking and Activity Reporting (STAR)) are updated and maintained by RGP staff. In 2024, the assessment files and drill-hole data for the Sudbury office were entered and updated by B. McKinnon. S. Péloquin recorded the monthly exploration activities and property visits for the Sudbury District.

The Ontario Mineral Inventory (OMI) database is maintained by both the Sudbury District RGP office and the Northeast Regional Mineral Inventory Geoscientist. Sudbury District RGP office staff updated 10 OMI records in 2024. Edits made to the OMI database by the Mineral Inventory Geoscientist in the Sudbury RGP District in 2023 are included in the "Mineral Inventory Geoscientist" section in the Kirkland Lake District Report of Activities in this volume.

The Sudbury District RGP office delivers month-end reports on mining and exploration news and activity in the district. The reports are posted as "Activity Reports–Mineral Exploration" on the Ministry of Mines *OGSEarth* application webpage (www.geologyontario.mndm.gov.on.ca/ogsearth.html). The data provided by *OGSEarth* are available in Keyhole Markup Language (*.kml*) format and can be viewed using geographic information applications, such as the Google Earth™ mapping service. The month-end reports for any year can also be viewed in table format on the Ontario Geology and Geoscience webpage (www.geologyontario.mndm.gov.on.ca/mines/ogs/rgp/MER_listing_e.html).

The Sudbury District RGP office provides free, short-term loans of a Beep Mat, metal detector and very-low-frequency (VLF) instrument to qualified explorationists. A binocular microscope is available for in-office use. A gamma-ray spectrometer is available for Sudbury District RGP staff to take on mineral exploration property visits, at the client's request.

The office is located within the Ministry of Mines, Client Service Centre, 2nd Floor, Willet Green Miller Centre, 933 Ramsey Lake Road, Sudbury, ON, P3E 6B5. The office phone number is 705-670-5733. The Sudbury District Geologist can be reached at 705-280-6042, and the Sudbury District Geological Assistant at 705-670-5733.

PROPERTY VISITS

Property examinations include visits to clients' properties, independent visits to known mineral occurrences, and independent field work targeting specific commodities or geoscientific information. Table 50 lists the property visits by Sudbury District RGP geologist and office staff in 2024. Locations, keyed to the visit number in Table 50, are shown in Figure 41.

Table 50. Field visits by the Sudbury RGP District staff in 2024, in order of visit. Bold type indicates visits written up below.

Map No.	Proponent—Occurrence	Type	Location
1	**B. Haavisto – West Lake Mining Claims**	**Property visit**	**Louise Township**
2	Sudbury RGP - Sodic metasomatism (2 visits)	Independent visit	South of Espanola
3	A. Marich (ERGMS) – Quaternary geology along Highway 17 transect (2 days)	Field visit	North Bay – Lake Nipissing
4	15999529 Canada Inc – new claims	Property Visit	Dryden Township
5	GSC Critical Minerals – Bissett Creek Project (Northern Graphite Corp.)	Field Trip	Maria Township
6	GSC Critical Minerals – River Valley Palladium Project (New Age Metals Inc.)	Field Trip	Dana & Pardo townships
7	GSC Critical Minerals – MIAC Systems (MacDonald Mines Exploration Ltd.)	Field Trip	Scadding Township
8	D. Touchette (MDB – Inspections) – Cummings Lake Prospect	Field Visit	Scholes Township
9	**CBLT Inc. – Falcon Gold Mine**	**Property Visit**	**Falconbridge Township**

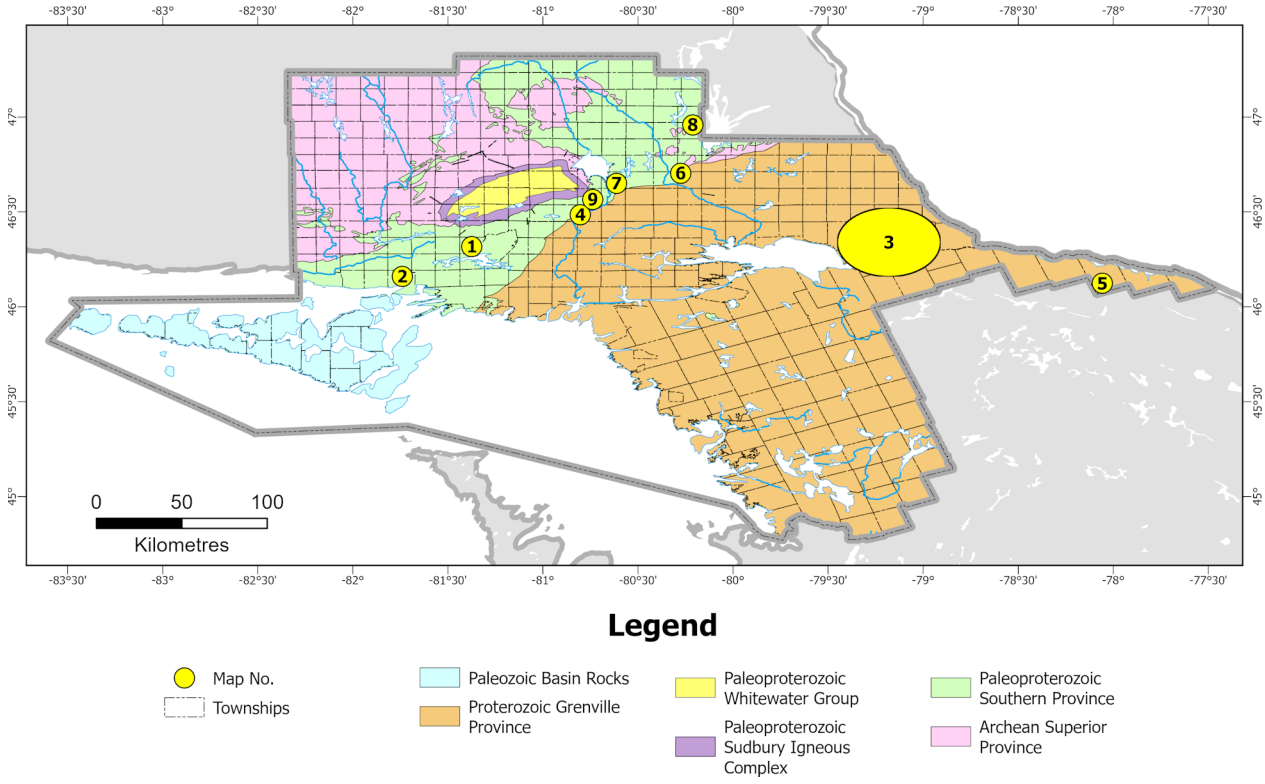

Figure 41. Map of the Sudbury RGP District showing locations of property visits in 2024 (keyed to Table 50; geology *modified after* Ontario Geological Survey 2011).

Three mineral exploration properties were visited by Sudbury RGP District staff in the 2024 field season. Staff also participated in a Geological Survey of Canada, Critical Minerals field trip, which included mineral exploration properties (Bissett Creek [Northern Graphite Corp]; River Valley PGM [New Age Metals Inc.]; Scadding MIAC [MacDonald Mines Exploration Ltd.). The Cummings Lake prospect was visited in September with D. Touchette (Inspection Officer, Mineral Development Branch). Other field visits included A. Marich's project (ERGMS Quaternary Geoscientist) in the North Bay–Lake Nipissing area, and areas of known sodic metasomatism south of Espanola (*see* Table 50 and Figure 41).

West Lake Mining Claims Property– B. Haavisto

In May 2025, S. Péloquin and J. Beaudry visited the West Lake Mining Claims property (Figure 41 [#1]) with B. Haavisto, John Morgan and A. Haavisto.

PROPERTY LOCATION

The West Lake Mining Claims property is located in Louise Township (*see* Figure 41 [#1]). In January 2025, the entire claim block consisted of 20 single claim cells and 1 multi-cell claim with an area of approximately 491 ha (Figure 42). Some of the claims are impeded by non-mining patent tenures. The property is approximately 40 km from Sudbury: take Highway 55 west of Sudbury to Panache Road (Regional Road 10; approximately 30 km); head south on Panache Road, through the town of Walden, to Grassy Lake Road (approximately 7.5 km); take Grassy Lake Road northwest to Tower Road (approximately 1 km); continue south-southwest on Tower Road to its end (approximately 2 km). The stops visited were accessed by ATV/UTV trails.

PREVIOUS AND RECENT WORK

Although there is evidence that the area was prospected earlier ("old pits and trenches"; Huggins 1999), the earliest exploration recorded over the West Lake Mining Claims was by BP Resources Canada Ltd. in 1987 (Table 51). Most of the significant work was done on the property between 1997 and 1999 by 1228328 Ontario Inc. (with Golden Blade Resources Inc. in 1999). The property was then known as the Louie Lake property and exploration was for nickel-copper-PGM, gold and silica. Work over that time included digging 3 trenches (2 of which were the focus of this property visit). Prospecting, sampling and geophysical surveys were also undertaken (*see* Table 51). Results from grab samples from the Main Pit (Pit #1) are given in Table 52. Diamond drilling on the property was located at the Fire Tower West occurrence (MDI41I06SW00036; Ontario Geological Survey 2025a), west of the area visited. B. Haavisto began registering mining claims in the West Lake area in 2018, and has increased his property position since that time. From 2018 to present, B. Haavisto has undertaken grassroots prospecting and rock sampling on the property.

In the fall of 2023, 2 grab samples, one from each of the West Lake pits, were submitted to the Ontario Geoscience Laboratories through the Sudbury RGP Office (Ontario Geoscience Laboratories 2024). The samples were analyzed for nickel-copper-cobalt by flame atomic absorption (AAF-101), for gold-platinum-palladium by lead fire assay with ICP–MS finish (IMP-101), and a multi-element ICP–MS with aqua regia digest was run (IML-101). Results for the AAF-101 analyses are given in Table 53 (IMP-101 and IML-101 did not return anomalous values) (Analytical methods are detailed in Ontario Geoscience Laboratories 2024; for QC notes, *see* "Analytical Information"). Bear in mind that grab samples are not systematic by nature and caution is advised in attributing the results to the entire property or occurrence.

The most recent Ontario Geological Survey township geology map of Louise Township dates from 1975; Map M2299 in Card, Palonen, Siemiatkowska (1975). The mineralization in the Louie Lake Nipissing sill was studied as part of L.S. Jobin-Bevan's doctoral thesis (Jobin-Bevans 2004).

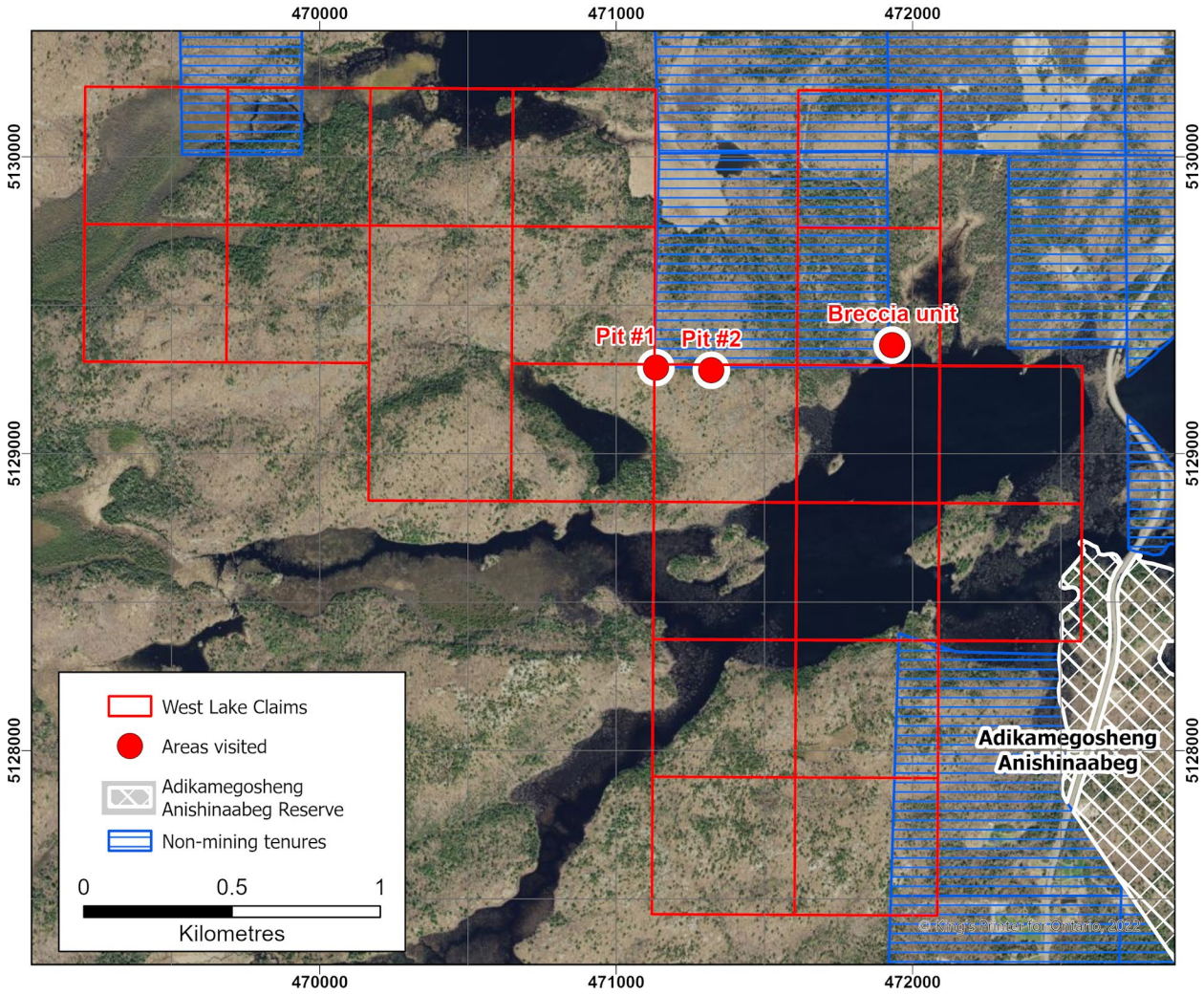

Figure 42. Aerial photo image showing the West Lake Mining Claims property with areas visited shown (aerial photo base map: Central Ontario Orthophotography Project [COOP] 2016)

Table 51. Assessment files covering the West Lake Mining Claims property (Ontario Geological Survey 2025b).

Proponent	Years	Work Done	Commodity	Assessment File ID	Covers Area Visited
BP Resources Canada Ltd.	1987	Airborne magnetometer and very low frequency electromagnetic surveys	Base metals	41J01NE0001	Yes
C Fielding, R Komarechka	1988	Geological survey / mapping	Silica	41I06SW0001	No
1228328 Ontario Inc	1997-1999	Geochemical, Geological survey / mapping, magnetic / magnetometer survey, open cutting (pit), prospecting by licence holder, overburden stripping, bedrock trenching	PGM [1]	41I06SW2003	Yes
1228328 Ontario Inc	1999	Assaying and analyses, Geochemical, Geological survey / mapping, magnetic / magnetometer survey, open cutting (pit), prospecting by licence holder	PGM	41I06SW2005	Yes

Proponent	Years	Work Done	Commodity	Assessment File ID	Covers Area Visited
1228328 Ontario Inc, Golden Blade Resources Inc	1999	Assaying and analyses, compilation and interpretation - ground geophysics, induced polarization, diamond drilling	PGM, base metals, gold, silica	41I06SW2001	Yes
1228328 Ontario Inc, Golden Blade Resources Inc	1999	Assaying and analyses, diamond drilling	PGM, gold, silica	41I06SW2002	No
1228328 Ontario Inc	2008	Recutting claim lines once every 5 years, prospecting by licence holder	PGM, base metals	20000003947	Yes
Ben Haavisto	2018	Prospecting by licence holder, rock sampling	Base metal, PGM	20000018295	Yes
Ben Haavisto	2020	Prospecting by licence holder, rock sampling	Base metal, PGM	20000019303	Yes
Ben Haavisto	2021	Prospecting by licence holder, rock sampling	Base metal, PGM	20000019404	Yes
Ben Haavisto	2021	Prospecting by licence holder, rock sampling	Base metal, PGM	20000019748	Yes
Ben Haavisto	2022	Digging pits, rock sampling, soil/till sampling	Base metal, PGM	20000021271	Yes
Ben Haavisto	2023	Prospecting by licence holder, rock sampling	Base metal, PGM	20000021331	Yes
Ben Haavisto	2023	Rock sampling	Base metal, PGM	20000021938	Yes
Ben Haavisto	2024	Prospecting by licence holder, rock sampling	Base metal, PGM	20000022397	Yes
Ben Haavisto	2024	Prospecting by licence holder, rock sampling	Base metal, PGM	20000022395	Yes

[1] *PGM = platinum group metals*

Table 52. Analytical results from grab samples from Pit #1 (Main Pit) on the West Lake Mining Claims property (Huggins 1999 and 2000).

Assessment File ID	Location	Ni ppm	Ni %	Cu ppm	Cu %	Co ppm	Co %
41I06SW2003	Main Pit	**3930**	**0.39**	967	0.10	**1310**	**0.13**
41I06SW2005	Main Pit	**3210**	**0.32**	1440	0.14	**918**	**0.09**
41I06SW2005	Main Pit	**1120**	**0.11**	859	0.09	**288**	**0.03**
41I06SW2005	Main Pit	**937**	**0.09**	1510	0.15	152	0.02

Note: *grab samples are indications and not necessarily representative of the mineralization.*
Bold type in the table indicates values above the threshold for an Occurrence in the Ontario Mineral Inventory classification

Table 53. Analytical results for grab samples from Pits #1 and #2 on the West Lake Mining Claims property.

Sample No.	Location	Method	Co ppm	Co %	Cu ppm	Cu %	Ni ppm	Ni %
24ASP-BH-F1-04	Pit #1	AAF-101	**352**	**0.04**	580	0.06	**1310**	**0.13**
24ASP-BH-P2-05	Pit #2	AAF-102	**497**	**0.05**	1296	0.13	**2169**	**0.22**

Note: *grab samples are indications and not necessarily representative of the mineralization.*
Bold type in the table indicates values above the threshold for an Occurrence in the Ontario Mineral Inventory classification

GEOLOGY

The West Lake Mining Claims property is underlain by Proterozoic, Huronian Supergroup sedimentary rocks of the Mississagi and Bruce formations (of the Quirke Lake and Hough Lake groups, respectively; Figure 43). A Nipissing mafic sill (Louie Lake sill; Jobin-Bevans 2004) intruded the Huronian Supergroup, as did later diabase dikes. The stratigraphy and sill are folded around the northeast-southwest trending West Lake syncline, and all lithologies, including the late diabase dikes, are cut by numerous faults. Northeast-southwest is the dominant fault direction, with northwest-southeast faults being rarer. These faults are in turn cut by east-west trending faults (*see* Figure 43) (Card, Palonen, Siemiatkowska 1975).

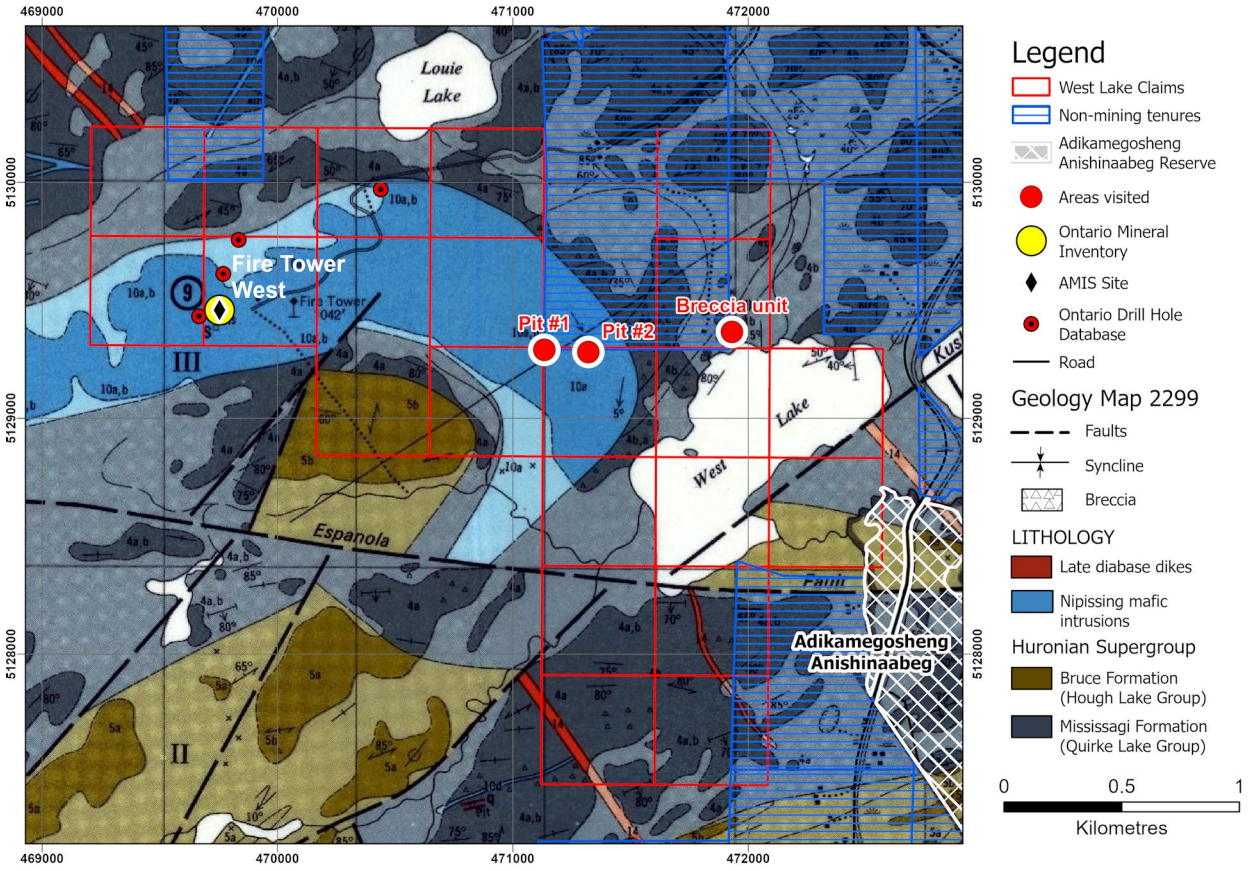

Figure 43. Geology map of the West Lake Mining Claims property, showing areas visited, as well as, the location of the documented OMI, ODHD and AMIS records within the property (Ontario Geological Survey 2025a, 2005c and Ministry of Mines 2025, respectively; geology map M2299 from Card, Palonen, Siemiatkowska 1975. NOTE: Map M2299 is georeferenced into ESRI ArcGIS PRO software, and there may be minor location discrepancies.)

Card, Palonen, Siemiatkowska (1975) describe the Mississagi Formation in Louise and Eden townships as consisting of feldspathic greywackes to feldspathic quartzites with interbedded argillite, siltstone and mudstone. The Bruce Formation is dominantly polymictic conglomerates. Sudbury Breccia was recognized in the Map M2299 area and was affected by the later deformation (folding and faulting). In Louise Township, a breccia unit resembling Sudbury Breccia was interpreted by Card, Palonen, Siemiatkowska (1975) to be of sedimentary origin. Two fenite complexes (Kusk Lake and Nemag Lake fenites; "leucocratic rocks altered by alkali metasomatism around carbonatite-alkalic complexes") were mapped in the 2 townships to the northeast of the West Lake Mining Claims property.

MINERALIZATION

Mineralization potential on the West Lake Mining Claims property comprises 1) base metals (nickel-copper-cobalt-PGM) associated with the Louie Lake sill (e.g., the Fire Tower West occurrence: MDI41I06SW00036; *see* Figure 43; Jobin-Bevans 2004, 2016; Sproule et al. 2007); and 2) gold-copper associated with the sodic metasomatic system that blankets the area (*see* "Recommendations for Exploration"). However, the main focus of exploration in the area was for base metals (nickel-copper-cobalt and PGM; *see* Tables 51, 52 and 53). The area has also been prospected for gold and silica. The Fire Tour West occurrence is hosted in the Louie Lake sill on the north limb of the West Lake syncline. It is described as an approximately 8 m zone of ~10% disseminated pyrrhotite with minor chalcopyrite

(MDI41I06SW00036; Ontario Geological Survey 2025a). A 1 m drill hole intersection gave assay results of 0.11% Cu, 0.08% Ni and 0.0125% Co. Within the same drill hole, another 1 m interval gave 198 ppb Pt and 80 ppb Pd (Huggins 2000). The 2 pits visited are also in the sill, but in the hinge of the West Lake syncline. Huggins (1999 and 2000) reported results for grab samples from those pits (*see* Table 52).

PROPERTY VISIT

Sudbury RGP staff visited the breccia unit in the Mississagi Formation on the north shore of West Lake and the 2 pits in the Louie Lake sill between West Lake and Louie Lake (*see* Figures 42 and 43).

The nature of the breccia unit was under question; whether it is related to the Kusk Lake fenite complex, is possibly Sudbury Breccia, or is a sedimentary layer as interpreted by Card, Palonen, Siemiatkowska (1975). The unit is up to 2 m in width, in sharp contact with the quartz sandstone (Photo 1). The southern contact is sharp-irregular; the northern is sharp-linear striking 235°/subvertical. On map M2299, the bedding on the outcrop strikes southwest with an 80° dip (no top direction is indicated). A sample was taken of the breccia groundmass for whole rock analyses to determine if alteration is present (results pending). However, the more likely origins of the breccia unit are Sudbury Breccia, or sedimentary as mapped by Card, Palonen, Siemiatkowska (1975). Mapping the continuation of this unit, within the West Lake Mining Claims property, and seeking other similar units for comparison would be necessary to make a proper determination. However, much of the specific unit, and its counterparts, outcrop outside the property boundary.

The 2 pits in the hinge of the West Lake syncline were visited (*see* Figures 42 and 43). Both pits (trenches) were excavated in 1997 (Huggins 1999) and the area is overgrown (Photo 2A and 2B). Pit #1 (trench #1; main trench) is on an outcrop edge and measures approximately 3 m by 9 m by 1 m deep. Pit #2 (trench #2; pit) is also on the edge of an outcrop and measures approximately 1 m by 1.5 m by 1 m. Both pits are in the Louie Lake gabbro sill. At Pit #1, there is a poorly exposed granitic unit west of the pit. The extent of this unit and its relationship to the gabbro is unknown (Photo 2C). Samples of the gabbro at both pits and of the granite were taken for whole rock analyses (results pending). The mineralization in the pits visited is finely disseminated magmatic sulphides with locally blebby sulphides (Photo 2D), as was described for the Fire Tower West occurrence (MDI41I06SW00036; Ontario Geological Survey 2025a). Assay results for grab samples from Pit #1 (main pit) are given in Table 52 and 53; assay results from a sample taken from Pit #2 (pit) are given in Table 53.

RECOMMENDATIONS

According to map M2299 (*see* Figure 43), the 2 pits visited and the Fire Tower West occurrence appear to be at the same level in the Louie Lake sill, and the bedding in the sedimentary units surrounding the gabbro indicate that the basal sill contact is the northeastern-most contact in the pit area. Nipissing intrusions can have multiple injections, and the mineralization can be near the base of the intrusion (Jobin-Bevans 2004, 2016) or perched in an upper injection phase (Sproule et al. 2007). The mineralization here appears perched. Therefore, exploration should focus on-strike between the Fire Tower West occurrence and the pit area, as well as on the lateral extensions away from the known mineralization. The cross section of the sill from base to top should be mapped to determine if there are potential mineralized zones, particularly towards the base of the sill.

Photo 1. Photos of the breccia unit on the north shore of West Lake. **A)** General aspect of the unit looking south. **B)** Details of the south contact with the Mississagi Formation sandstones, showing irregular nature of the contact (dashed line) and the sandstone clasts within the breccia. **C)** Details of the north contact, showing its sharp nature and presence of sandstone clasts. (Hammer is 32.5 cm long)

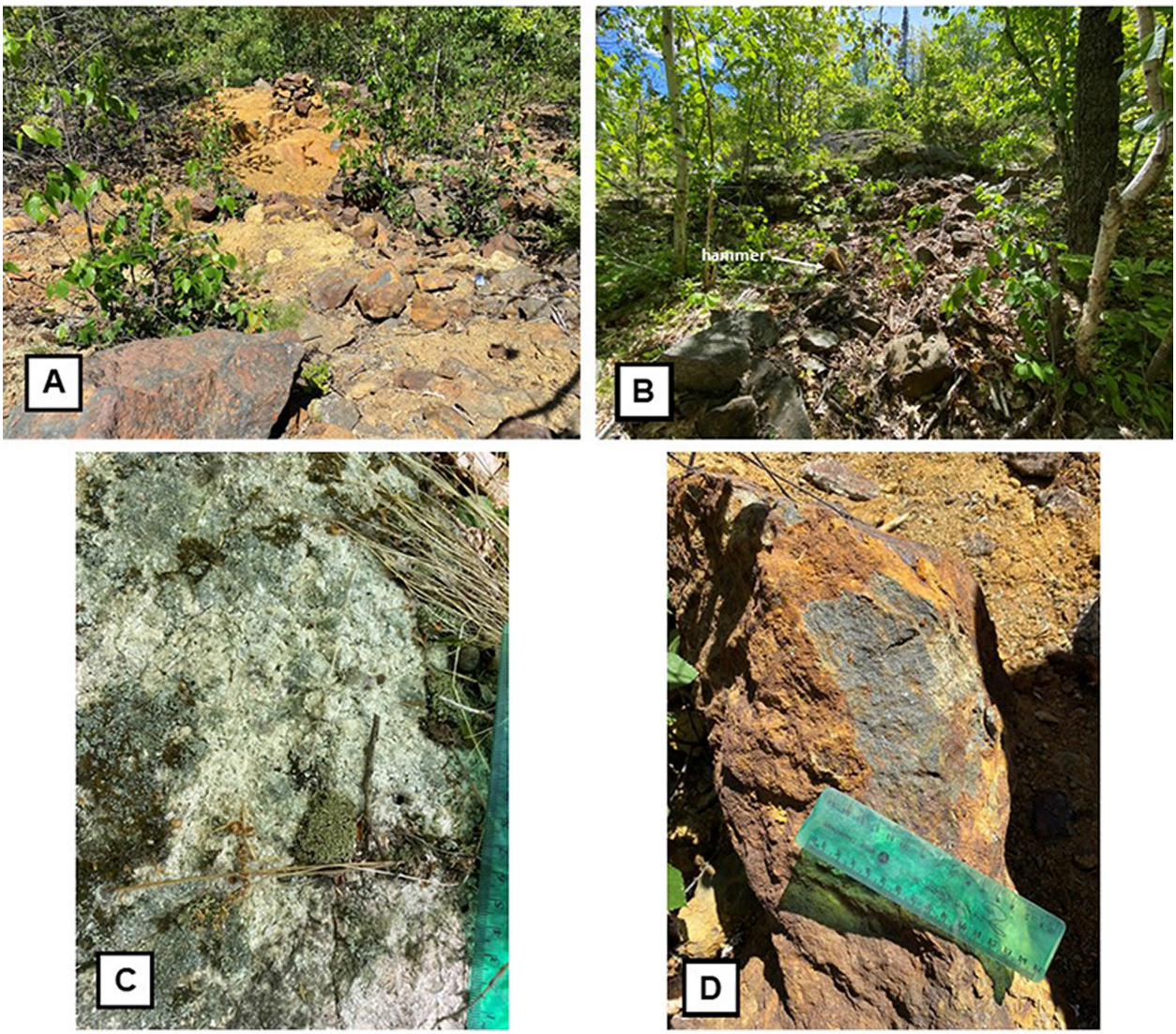

Photo 2. General photographs of the exploration pits. **A)** View of Pit #1 from the top of the outcrop (the rock in the foreground is approximately 75 cm long. **B)** View of Pit #2 looking toward the pit. (Hammer is 32.5 cm long). **C)** Poorly exposed granitic unit west of Pit #1. **D)** Loose mineralized rock with blebs of chalcopyrite in Pit #1.

Falcon Gold Project – CBLT Inc.

(see also "Exploration Projects"*)*

CBLT Inc's Falcon Gold project was visited by S. Péloquin and B. McKinnon in September 2024. The visit was hosted by Joerg Kleinboeck, Exploration Geologist for CBLT (*see* Figures 14 [#11] and 41 [#9], and Figure 30). CBLT acquired the Falcon Gold property (OMI record: MDII41I10SE00003) from Kinross Gold Corp. in June 2024 (CBLT Inc., news release June 5, 2024). The occurrence is also known under the names Beckley property and diamond-drill hole (DDH) Fgh-04-01 (OMI record: MDII41I10SE00003).

PROPERTY LOCATION

The Falcon Gold property is located in Falconbridge Township (Lot 5; south ½ of Concession 3 and north ¼ of Concession 2) within the limits of the City of Greater Sudbury, approximately 21 km from the

city centre (*see* Figure 14 [#11]). The property consists of 3 patent claims (PAT-44924, PAT-44925, PAT-46323) covering an area of 96 ha, which are adjacent to CBLT's Copper Prince property (*see* Figure 30). Access to the property is through the Glencore Smelter Industrial Complex in Falconbridge. Permission and property orientation from Glencore is required. Gravel roads within the Complex are taken to approximately 3.5 km of the site. From there UTV/ATV trails lead to approximately 1 km from the site. The final kilometre was hiked through the bush.

PREVIOUS AND RECENT WORK

The Falcon Gold occurrence was discovered in the late 1800s, with the first work recorded in the early 1900s. Since that time the property has intermittently been the target of exploration (Table 54). As the lands are patent claims, assessment work filing was not required, and much of the work was documented in internal company reports. Ten AMIS features are recorded on the property: a mine shaft, a structure (building foundation), a waste rock dump, and 7 trenches. The most recent comprehensive report on the property is by Bailey (1994). Much of the information on geology and mineralization below is taken from that report.

The Ontario Geological Survey (as its precursor) first mapped Falconbridge Township in the 1930s. Due to the economic importance of the Sudbury Igneous Complex that occurs in the township, it was mapped again in the 1950s and 1980s. Dressler's 1984 compilation map of the Sudbury area included Falconbridge Township. Ames et al. (2005) is the most recent compilation map covering Falconbridge Township.

In 2024, CBLT undertook a two-phase exploration program. Beginning with reconnaissance prospecting during the summer. During that phase, 23 grab samples were collected from outcrop and excavation waste piles. Of the 23 samples, 7 graded above 2 g/t gold (Table 39: CBLT Inc., press release, July 31, 2024 on Newsfile: https://www.newsfilecorp.com/release/218348/CBLT-Samples-up-to-25.7-gt-Au-at-Past-Producer-Falcon-Gold-Sudbury-Ontario). In the second phase of exploration, the area where the grab samples were taken was mechanically stripped (press release, July 31, 2024 on Newsfile: https://www.newsfilecorp.com/release/226807/CBLT-Commences-Phase-2-at-Past-Producer-Falcon-Gold).

Table 54. Exploration history of the Falcon Gold property, *from* OMI record MDII41I10SE00003.

Year	Proponent	Work Type	Technical File
c 1890	R. McConnell	staked claims	
c 1900	W.R. Berkley	shaft sinking to 46 ft. (14 m), 59 ft. (18 m) crosscut driven on bottom level	
1927-1934	unknown operator	drilling	
1934	L. Brooke and C.H. Hichcock	pumped out and sampled workings, drilled 5 holes	
1935	Tiblemont Mines Ltd	dewatering of shaft, 2000 ft (610 m) of diamond drilling	
1936-1937	Falcon Gold Mines Ltd.	shaft deepened to 215 level/feet (65.5 m); 21 drill holes 4031 ft (1229 m)	41I10SE0052
1948-1955	Falconbridge Limited	8 drill holes 8280.5 ft (2524 m)	41I10SE0200
	D. Owen	historical mineral resource Estimate. 36 000 tons (32 659 tonnes @ 0.21 t-oz/ton (7.19 g/tonne) [1]	
1987-1988	Falconbridge Ltd.	geological grid mapping; airborne geophysical survey and magnetometer survey, IP survey, VLF-EM survey, sampling; 24 drill holes 14 951 ft (4557 m), stripping	41I10SE0042
1994	G. Bailey (for Falconbridge Ltd.)	reconnaissance survey and sampling program	41I10SE0035
2003	Sears, Barry and Associates	ground magnetometer and VLF-EM surveys	41I10SE2015
2004-2005	Millstream Mines Ltd.	1 drill hole 1120.0 ft (341 m)	20000007865

[1] *historical, NI 43-101–noncompliant mineral resource estimate*

GEOLOGY

The Falcon Gold property is underlain by Huronian sediments of the Mississagi Formation of the Hough Lake Group, the Bruce and Espanola formations of the Quirke Lake Group, and Nipissing gabbroic intrusions (Figure 44). The property lies within the zone of sodic metasomatism also known as the "Huronian Gold Belt" (*see* "Recommendations for Exploration" this report), and along the eastward projection of the Garson Fault. Sudbury Breccia was observed on the property, and alteration facies recognized include carbonate-actinolite schist, silicification with pyrite, calcite veining, hematite staining and albitization (sodic metasomatism) (Bailey 1994).

The historical workings (trenches and shaft) are in the Bruce Formation according to the Ames et al. (2005) regional map (*see* Figure 44). However, detailed mapping of the area around the shaft (Falcon Gold Mines Ltd. 1937) and the extensive trenching in the same area (Bailey 1994; Figure 45) show the presence of argillaceous calcareous metasediments, considered to be of the Espanola Formation.

MINERALIZATION

Bailey (1994) describes the mineralization at Falcon Gold Mine:

> Gold-mineralization at the Falcon mine site was described as being associated with about 5% pyrite cubes to l cm in a carbonate-actinolite-chlorite-talc shear zone which strikes 105° - 115° and dips 65° - 70° SW. Diamond drilling in 1988 showed the zone to average 11 by 100 feet *[30.5 m]* and to extend to a vertical depth of 600 feet *[182.9 m]* and to be contained to the west by Nipissing Diabase and to the east by Sudbury Breccia.

PROPERTY VISIT

Sudbury RGP staff visited the trench in the area of the Falcon Gold Mine shaft (*see* Figure 45). The area was extremely overgrown, but the trenches and muck piles were evident (Photo 3). The poor outcrop exposure exhibited shearing, and the rocks in the muck pile showed the deformation, carbonate veining, albitization and pyrite-chlorite mineralization (Photo 4). Samples were taken of the veining, alteration and mineralization for mineralogical characterization and assaying (results pending).

During the property visit, CBLT was marking off and planning for clearing and mechanized stripping of the area. This was completed in October. Photo 5 shows the results of the stripping.

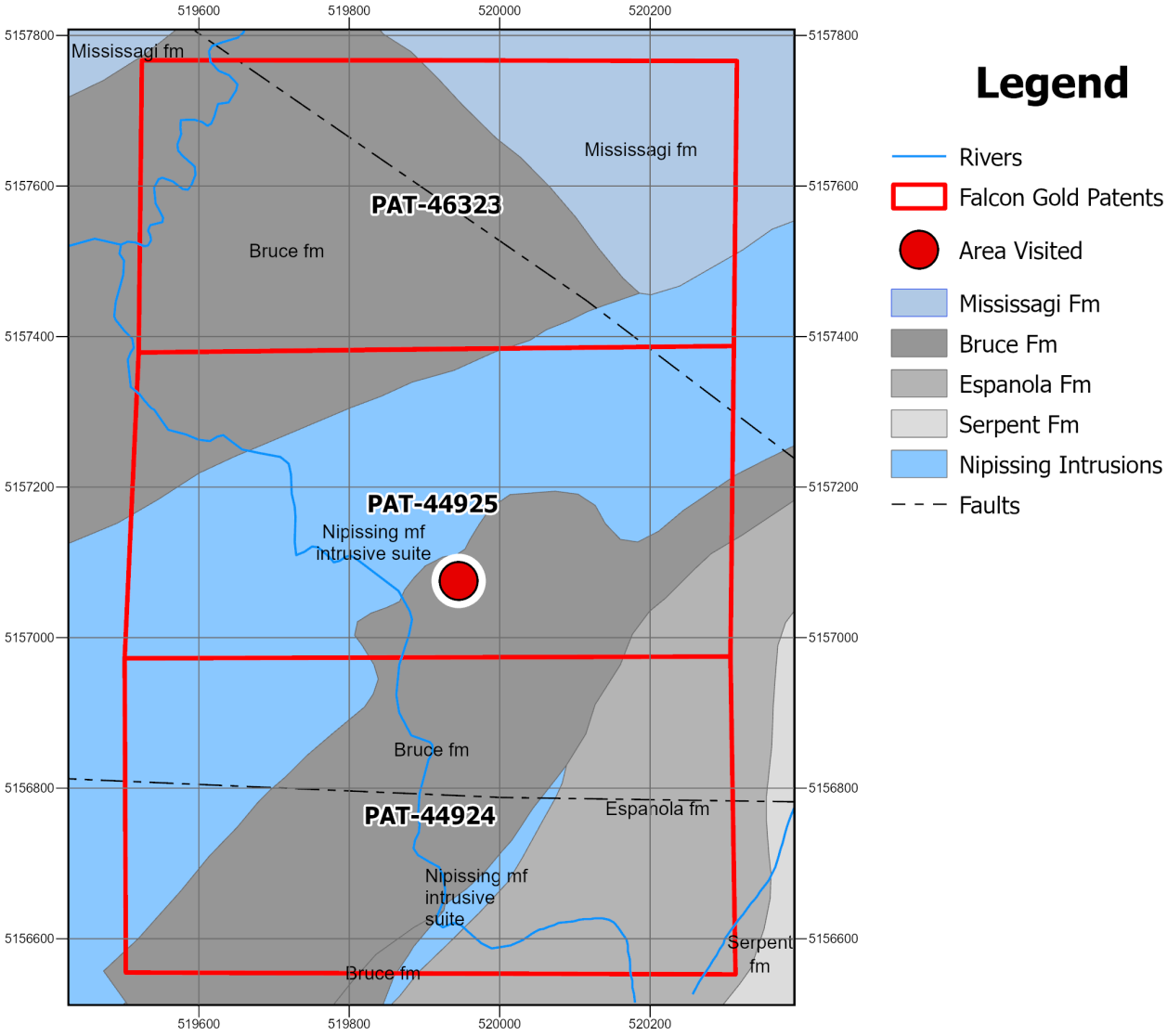

Figure 44. Geological map of the Falcon Gold property, showing the area visited (geology *from* Ames et al. 2005).

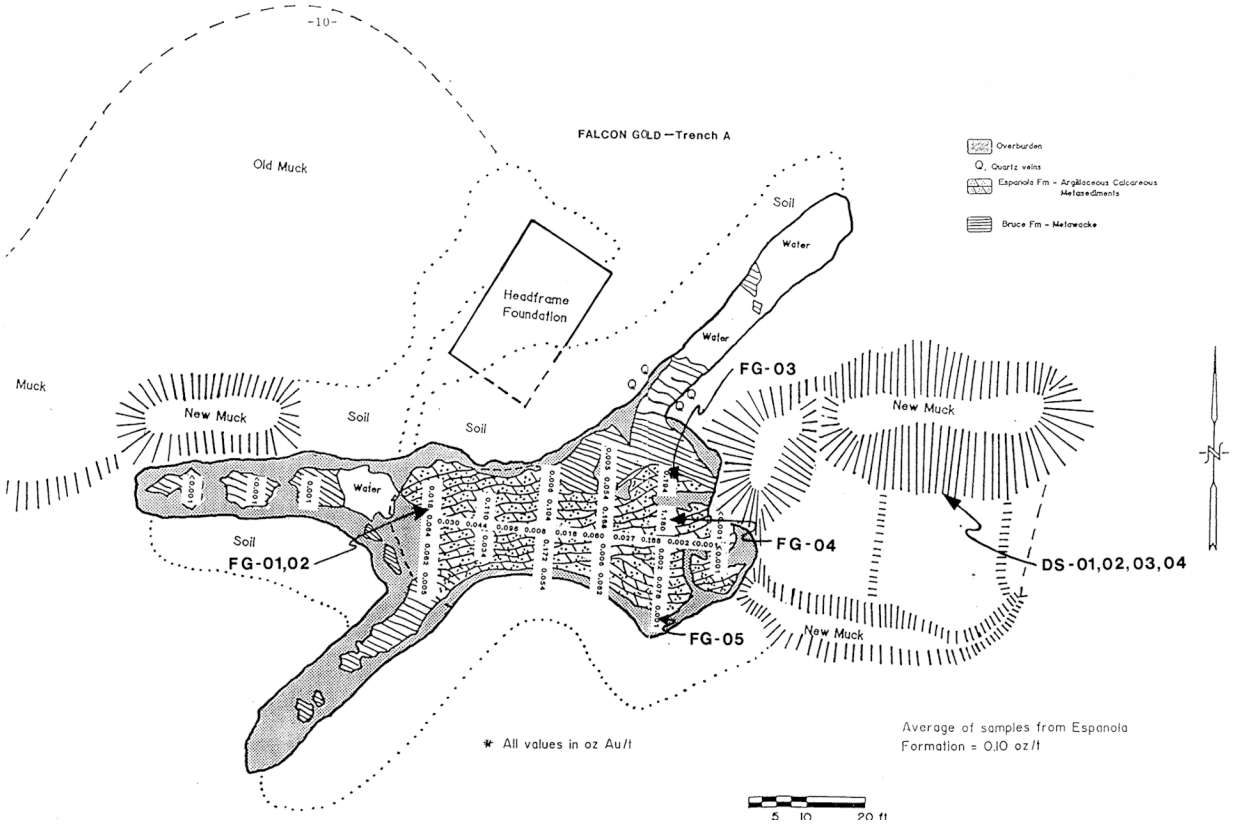

Figure 45. Detailed trench map in the area of the Falcon Gold Mine shaft (*from* Bailey 1994, Figure 3 (p.10)). Location of property visit. Note: the total length of the scale bar is 20 ft (6 m).

Photo 3. Photos of the Falcon Gold trench and muck piles. **A)** Looking westward down the east-west branch of the trench. **B)** Looking eastward from the same location to the muck piles at the end of the trench (*see* Figure 45 for trench layout).

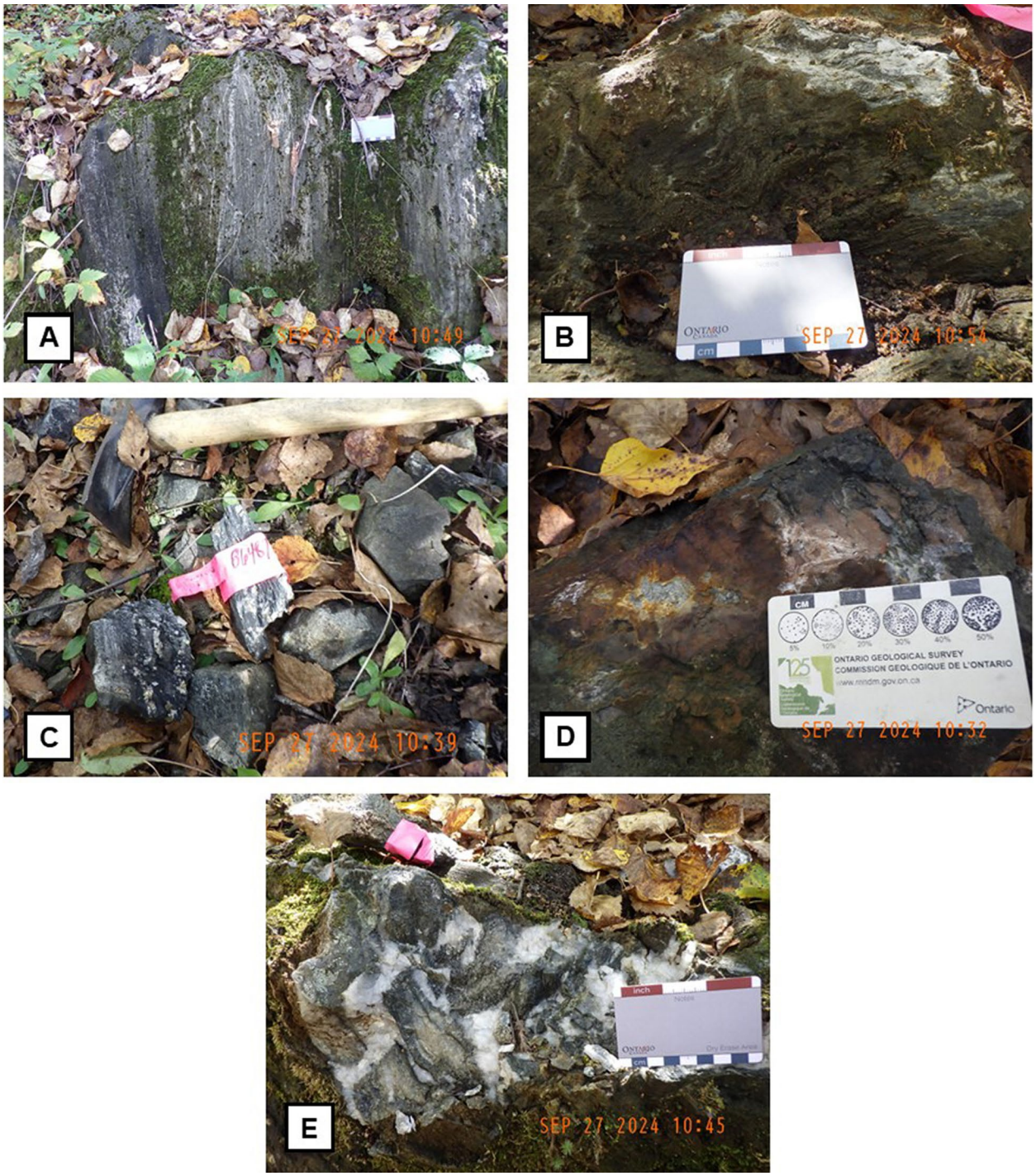

Photo 4. Field photos from Falcon Gold Mines trench and muck pile. Trench: **A)** sheared outcrop at edge of trench; **B)** close-up of deformation on outcrop in trench. Loose material: **C)** loose chlorite-pyrite mineralization in muck pile (Sample in photo is CBLT 86876: 8.96 g/t Au; *see* Table 39); **D)** albitized and silicified mineralized rock on muck pile; **E)** hydrothermally brecciated rock (quartz-carbonate vein matrix) on floor of trench.

Photo 5. Photo of newly exposed outcrop from overburden stripping at the Falcon Gold Mine property (photo provided by CBLT Inc.).

Analytical Information

All geochemical and mineralogical analyses undertaken by the Sudbury District Geologist Office (SDGO) were conducted by the Geoscience Laboratories (Geo Labs), an ISO 9001 certified laboratory. Because of the small sample batches submitted for assay and geochemical analyses, the SDGO relies on the rigours of the Quality Assurance and Quality Control (QA/QC) program of Geo Labs:

> "The Quality Assurance (QA) program at the Geo Labs consists of adding a duplicate for at least every ten samples as a measure of precision. Additionally, one inter-laboratory reference material (RM) and one blank (if appropriate) are generally included with every twenty samples to help assess accuracy. Geo Labs offers a variety of RMs (both certified and in-house) for matrix matching. A specific RM may be available upon request. The Geo Labs QA program is applied to all sample submissions."
> — Geo Labs (2024).

Geo Labs includes their QA/QC data with the results issued to the SDGO.

Details of the analytical techniques reported can be found in the Geo Labs (2024) Schedule of Fees and Services (Ontario Geoscience Laboratories 2024).

Please note that all samples taken were grab samples. Such samples are not systematic by nature and caution must be exercised in attributing the results to the entire property or occurrence.

RECOMMENDATIONS FOR EXPLORATION

Regional Sodic Metasomatism, Sudbury District: The Underlying Observations

The following article is significantly modified from Péloquin (2025)

Since the mid 1980s, the Sudbury Resident Geologist Program (RGP) has noted and studied the regional zone of sodic metasomatism in the District that lead to widespread albitite formation, and recommendations were made to explore for gold in that zone (Meyer et al. 1986, 1989, 1990; Meyer, Campbell and Toews 1987; Meyer, Campbell and Gates 1988; Gates 1991; Cosec and Gates 1992; Meyer, Cosec and Gates 1993; Cosec, Meyer and Gates 1994; Cosec and Farrow 2011; Farrow 2012, 2017; Farrow and Bardeggia 2016; Péloquin 2018, 2023). The metasomatism has also been the subject of academic and government studies (Schandl et al. 1992; Schandl, Gorton and Davis 1994; Schandl and Gorton 2007; Hamilton et al. 2023), particularly in the Wanapitei Lake area northeast of the City of Sudbury. However, the zone of metasomatism extends from the Bruce Mines area (Sault Ste. Marie RGP District) along the north shore of Lake Huron, to the Temagami area northeast of Wanapitei Lake, extending into the Cobalt Embayment in the Kirkland Lake RGP District (Gates 1991; *see also* Hailstone and Farrow 2003, Meyer et al. 2003 and Potter 2009; Figure 46). The area designated on the maps in previous *Recommendations for Exploration* was based on the sodic metasomatism that formed extensive zones of albitite, which was observed in the field, noted in reports, and included Ontario Mineral Inventory (OMI) occurrence locations with mineralization (Gates 1991; Schandl and Gorton 2007; *see* Figure 46). These observations are consistent with that expected from a metasomatic iron alkali-calcic (MIAC) system (Corriveau, Montreuil, Potter et al. 2022).

This summer, the Sudbury RPG office unearthed 2 original hard copy maps showing the locations where sodic metasomatism was observed by Sudbury RGP staff in the 1980s and 1990s. The regional observations (open pink circles on Figures 46 and 47) were originally plotted on maps M2361 and M2419 (Card and Lumbers 1977 and Giblin and Leahy 1979, respectively); the Wanapitei Lake area observations (open blue hexagons on Figures 46 and 47) were plotted on maps M2450 and M2451 (Dressler 1981a and 1981b, respectively). The locations shown on Figures 46 and 47 are approximations due to probable inaccuracy in field location, and the transferring of the observation locations to the digital map. It should also be noted that the observation locations are constrained by accessibility, both physical access (road and/or trail) and permission to access properties and/or claims. However, the locations, despite their inaccuracy, are important in that they helped define the extent of the regional sodic metasomatism as indicated on Figure 46.

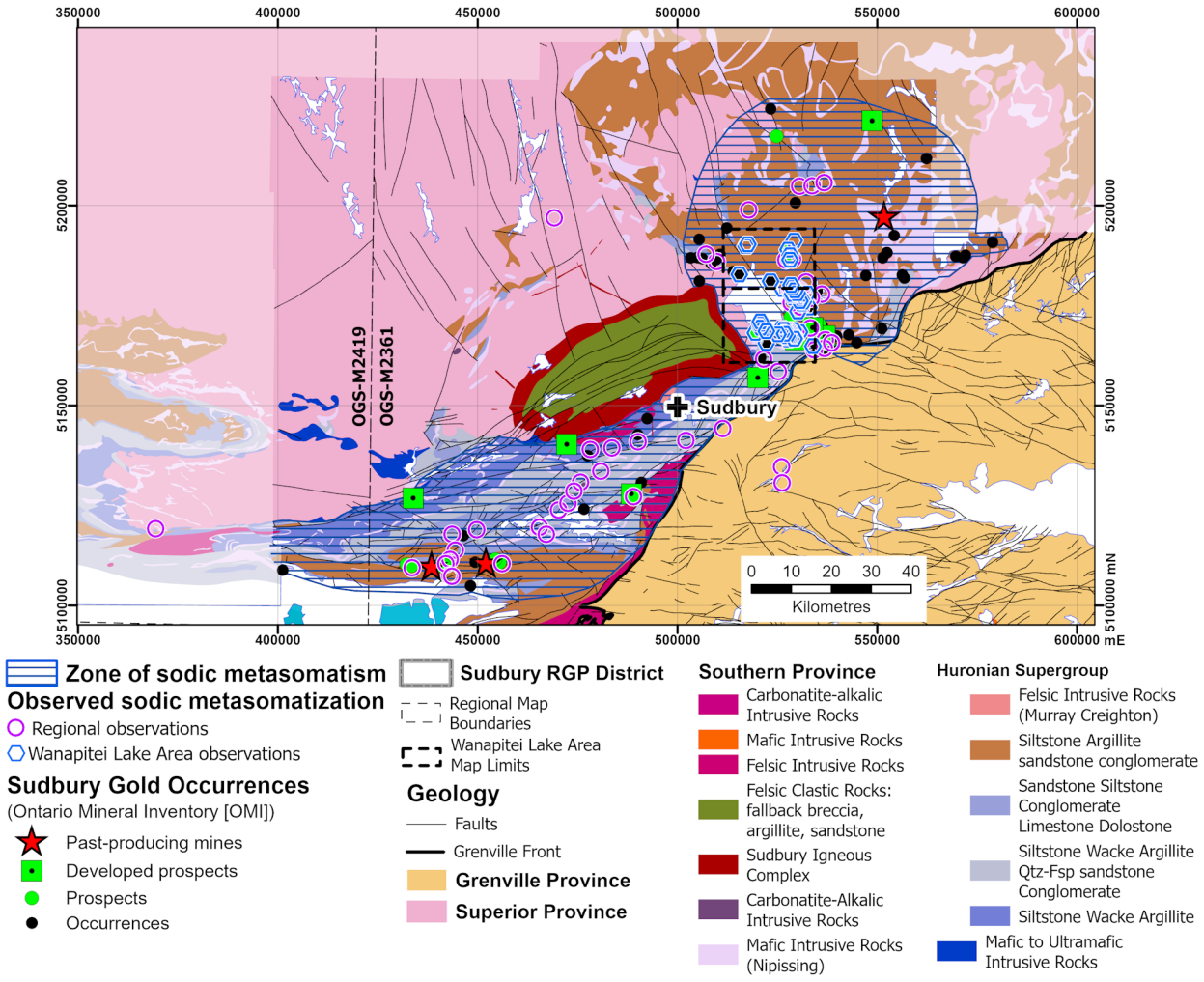

Figure 46. Regional geology map of the Sudbury RPG District, showing zone of sodic metasomatism as suggested by Gates 1991, and Hailstone and Farrow 2003, with locations where RGP staff observed metasomatism. Geology *modified from* Ontario Geological Survey (2011).

RECOMMENDATIONS FOR EXPLORATION

Regional sodic metasomatism that leads to the development of albitite is considered the regional "ground preparation" for the different types of mineralization found in MIAC (Corriveau, Mumin and Potter 2022, Figure 48; *see also* Corriveau, Potter and Mumin 2022). Details on the main alteration phase mineralogy and metal associations for MIAC systems, including examples for each mineralization type, can be found in Table 2 of Corriveau, Montreuil, Potter et al. (2022).

In the Sudbury RGP District, particularly the Wanapitei Lake area, the regional sodic metasomatism is associated with intense low temperature Ca-Mg-Fe±K alteration (Facies 5 in Figure 48), which presents a wide variety of metal associations (Corriveau, Mumin and Potter 2022). However, it is the local or property-scale alteration facies, including those overprinting albitite, that will point to the type of mineralization that may be present. The facies approach of mapping alteration facies, rather than single minerals or spatial associations of minerals, facilitates the interpretation of the system shown in Figure 48 (Corriveau, Montreuil, De Toni et al. 2022).

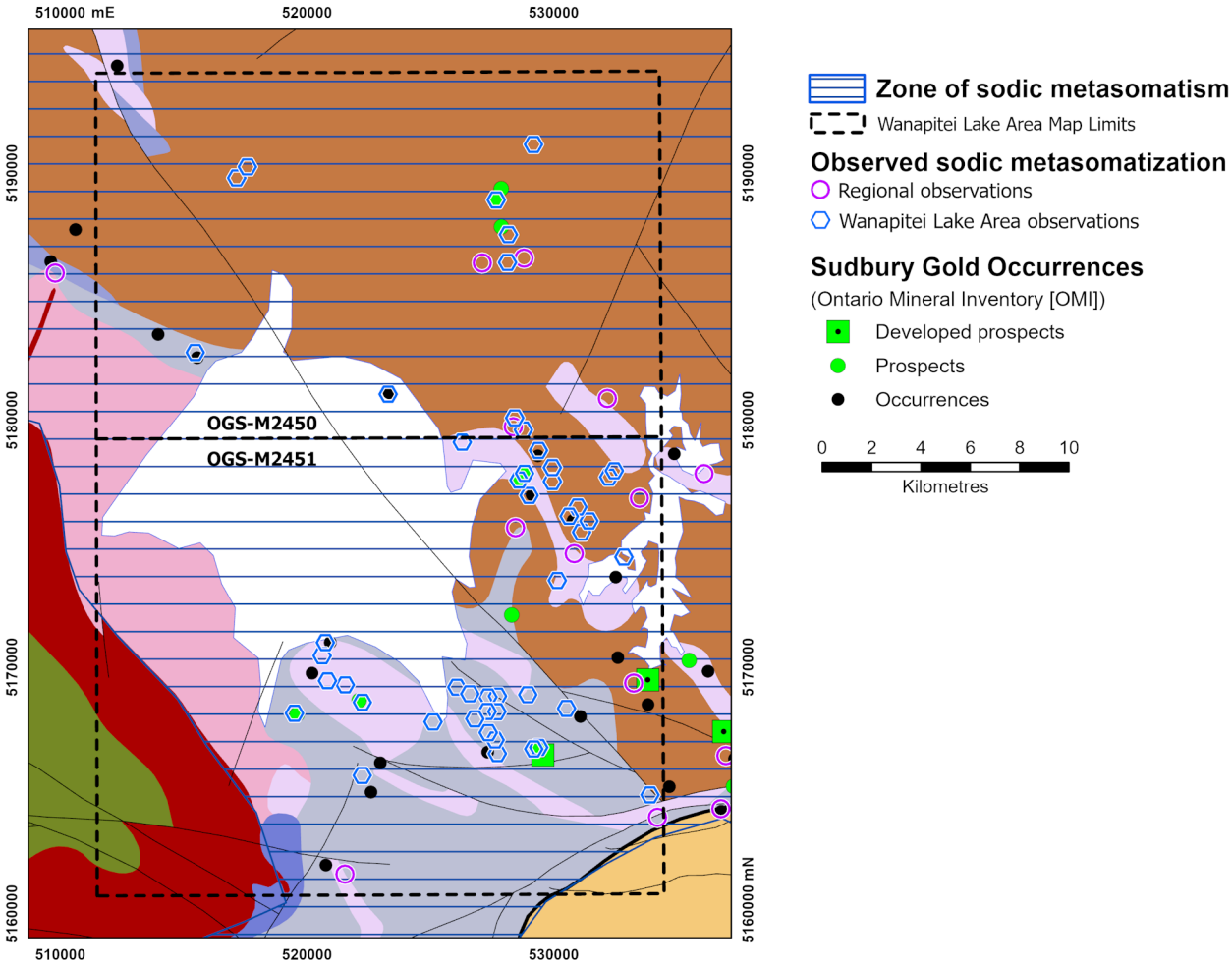

Figure 47. Local geology map of the Wanapitei Lake area (map limits are shown with dashed lines), showing locations where RGP staff observed sodic metasomatism. Geology *from* Ontario Geological Survey (2011); geology legend is same as in Figure 46.

Historically, deposit types within MIAC systems have commonly been assessed as more traditional deposit type such as VMS, which decreases the likelihood of discoveries. As the regional sodic metasomatism reported herein led regularly to the formation of regional albitite zones diagnostic of MIAC systems, the map circumscribes the area in which the mineralization types of known mineral occurrences, prospects and deposits may have to be re-examined in terms of the variety of deposit types that can form within MIAC systems. Companies in the Sudbury District are adopting the MIAC model to assist in their exploration. For example: MacDonald Mines Exploration Ltd. on their SPJ project (https://macdonaldmines.com/ [accessed February 7, 2025]; Inventus Mining Corp. on their Sudbury 2.0 project (http://www.inventusmining.com/cobalt-hill-lake-zone [accessed February 7, 2025]); Conquest Resources Ltd. on their Teck-Belfast project (press release, April 16, 2024); McFarlane Lake Mining Inc. on their MacMillan Mine/Mongowin project (McFarlane Lake Mines, Sudbury Prospectors and Developers meeting, January 28, 2025).

Deposits within MIAC systems notably include iron oxide-copper-gold (IOCG), iron sulphide copper-gold (ISCG), iron oxide-apatite (IOA), albitite-hosted Au-Co or U, W skarn, metasomatic Co-Bi-Au, and a wide range of other critical, base and precious metal deposits (Corriveau, Montreuil, Potter et al. 2022; Blein et al. 2023; Drejing-Carrol, Hitzman and Coller 2023; Fabris and Michaelsen 2024).

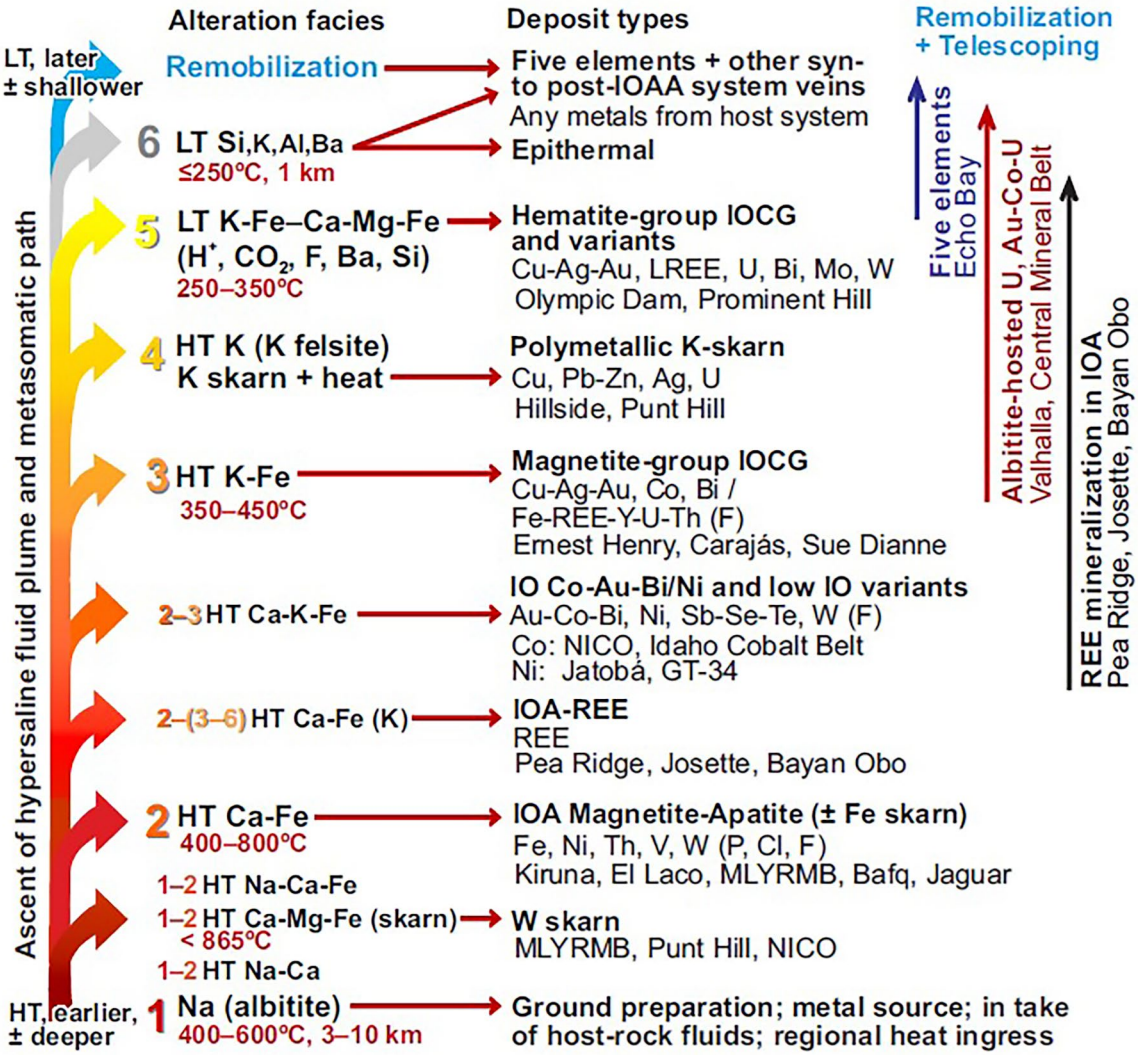

Figure 48. Metasomatic iron oxide alkali-calcic alteration (IOAA) facies (1 to 6) related to metasomatic iron alkali-calcic (MIAC) systems and their related mineral deposit types *from* Corriveau, Mumin and Potter (2022). Reproduced with permission. Abbreviations: IOA=iron oxide apatite; IO=iron oxide; LT=low temperature; HT=high temperature; MLYRMB=Middle-Lower Yangtze River Metallogenic Belt; REE=rare earth elements.

As each alteration facies has a distinct suite of deposit types as per Figure 48, mapping alteration types (in addition to albitite) in terms of MIAC alteration facies across the belt, and in the areas with mineralization, is key to assess the full mineral potential of the host mineral systems across the belt and explore them to secure critical metal resources for Ontario and Canada (Gadd et al. 2022).

It is to be noted that iron is an important component of MIAC alteration, and although low-iron alteration types (such as albitite) do occur, lithologies should be tested for their magnetism (metasomatic magnetite is common). However, the iron minerals can also be oxides, silicates, carbonates or sulphides, and thus may not be magnetic as observed in the Scadding mine area (Hamilton et al. 2023). The presence of structures (faults or folds), zones of higher deformation, or zones of changes in rock competency (such as contacts) should be noted, as they may have been the conduits for the fluids (ibid). Hydrothermal brecciation is commonly associated with the alteration. Known MIAC systems worldwide and their diagnostic alteration facies have very distinctive geochemical footprints, hence geochemistry is also a

useful tool to define alteration facies (Blein et al. 2022; Blein et al. 2023). A "barcode" method for the MIAC system, using molar proportions of Na-Ca-Fe-K-Mg, has been developed by Corriveau, Montreuil, Blein et al. (2022), and when plotted on maps and on the IOCG alteration discrimination (AIOCG[2]) diagram of Montreuil, Corriveau and Grunsky (2013), the geochemical footprints of deposits and host systems help interpret alteration facies, intensity of alteration, overprinting relationships and overall mineral potential in critical, base and precious metals of the region (Corriveau, Montreuil, Blein et al. 2022; Blein et al. 2023). The barcode signature and distribution of samples of MIAC systems on the AIOCG diagram as well as on the alteration box plot of Large et al. (2001) also significantly differ from those of VMS, epithermal, porphyry and SEDEX deposits (Corriveau et al. 2018; Corriveau, Montreuil, Blein et al. 2022).

When doing multielement analyses for this purpose, aqua regia digestion should be avoided, as it poorly dissolves these rocks. Four-acid digestion is a lower cost option for sample preparation method, but a fusion method prior to dissolution is recommended as it helps best to dissolve all minerals and does not underestimate K_2O where there are elevated as well as a wide range of metals including rare-earths (Corriveau et al. 2015). Accordingly, using legacy geochemical data to assess mineral potential should also account for the dissolution method used before plotting barcodes of sample unto the AIOCG diagram for mineral exploration and mineral potential assessment.

ACKNOWLEDGMENTS

I wish to thank Louise Corriveau for all the work she and her colleagues have done under the NRCan Targeted Geoscience Initiative program, for so openly sharing her knowledge and for her insightful review of this article.

OGS ACTIVITIES AND RESEARCH BY OTHERS

Ontario Geological Survey

Ontario Geological Survey (OGS) publications related to the Sudbury RGP District released in 2024 are given in Table 55.

In 2024, the Ontario Geological Survey, Earth Resources and Geoscience Mapping Section (OGS–ERGMS) had 6 projects working in the Sudbury RGP District, and 3 pan-provincial projects, which also included the Sudbury RGP District (Figure 49; Table 56) (Ontario Geological Survey 2024a).

The annual OGS Virtual Showcase was held from November 26 to 28, 2024. Presentations relevant to the Sudbury RGP District are listed in Table 57.

[2] The x-axis of the AIOCG diagram is $K/(K+Na+2Ca)_{molar}$ (AIOCG 1), and the y-axis is $(2Ca+5Fe+2Mn)/(2Ca+5Fe+2Mn+Mg+Si)_{molar}$ (AIOCG 2)

Table 55. Ontario Geological Survey publications released in 2024 that cover or include the Sudbury RGP District.

Title	Reference	Publication
Recommendations for Exploration 2023–2024	Ontario Geological Survey (2024b)	Ontario Geological Survey, Resident Geologist Program, Recommendations for Exploration
Report of Activities 2024, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake and Sudbury Districts	Chadwick et al. (2024)	Ontario Geological Survey, Open File Report 6411
Ontario Groundwater Geoscience 2024 Open House	Burt et al (2024)	Ontario Geological Survey, OFR 6406
Summary of Field Work and Other Activities, 2024	Ontario Geological Survey (2024a)	Ontario Geological Survey, OFR 6413
Ambient Groundwater Geochemical and Isotopic Data for Northeastern Ontario, 2016–2018	Dell and Hamilton (2024)	Ontario Geological Survey, MRD 401

Table 56. Ontario Geological Survey projects that were within or included the Sudbury RGP District. Numbers are keyed to Figure 49.

SoFW Article	Ongoing Project	Title	Reference
Sudbury Specific Projects			
8		Precambrian Geology and Mineral Potential of Totten Township, Superior Province, Sudbury District, Northeastern Ontario	Carter and Easton (2024)
10		Newly Identified Magmatic and Metamorphic Events in the Southern Province near Walford, Ontario	Easton et al. (2024)
11		Geoscience Studies in the Sudbury Area, Northeastern Ontario	Easton and Kamo (2024)
22		Groundwater Geochemistry Mapping Across the Ottawa Valley	Colgrove (2024)
25		Update on the Aggregate Resources of the North Bay Area, Central Nipissing District, Northeastern Ontario	Handley (2024)
	Q17	Quaternary Geological Mapping of the Eastern Part of the Lake Nipissing Basin, Northeastern Ontario: An Update Half a Century in the Making	Marich (2023)
Pan-provincial Projects			
12		Summary of Geophysical Projects and Activities	Biswas and. Evangelatos (2024)
15		Determination of Indicator Minerals in Archived Fine-Fraction Nonmagnetic Heavy Mineral Concentrate Samples Using Scanning Electron Microscope Energy Dispersive Spectrometry: An Update	Gao et al. (2024)
21		Proposed Nomenclature for New Water Well Records: Internal Test Results	Galvao and Burt (2024)

Table 57. Presentations from the 2024 OGS Virtual Showcase of relevance to the Sudbury RGP District.

Title	Speaker
Exploration, Mining and Resident Geologist Program Activity Update for the Kirkland Lake and Sudbury Districts	James Suma-Momoh - RGP
Precambrian Geology and Mineral Potential of Totten Township, Sudbury District	Nathan Carter - ERGMS
Drumlins, DeGeers, Deltas and Dunes: Landforms and the Regional Deglaciation of the Lake Nipissing Basin, Northeastern Ontario	Andrea Marich - ERGMS
Natural Geological Hazards and Land Use Planning	Catherine Daniels, Pierre Bousquet, Peter LeBaron and Colleen Kurcinka - RGP
Using Publicly Available Data Sets in GIS Software and GeologyOntario: Tips and Tricks	Justin Jonsson - RGP and Kei Yeung - ERGMS
RGP Drill Core Libraries: A Deep Look Under Your Feet	Greg Paju - RGP
Till Sample Locations Across Ontario: A New Provincial Database	Grant Hagedorn - ERGMS
Lidar as a Tool to Assist Mineral Exploration	Greg Paju - RGP
Drone Usage in Bedrock Mapping	Patrick Gervais, Thomas Gemmell, Gaëtan Launay - ERGMS

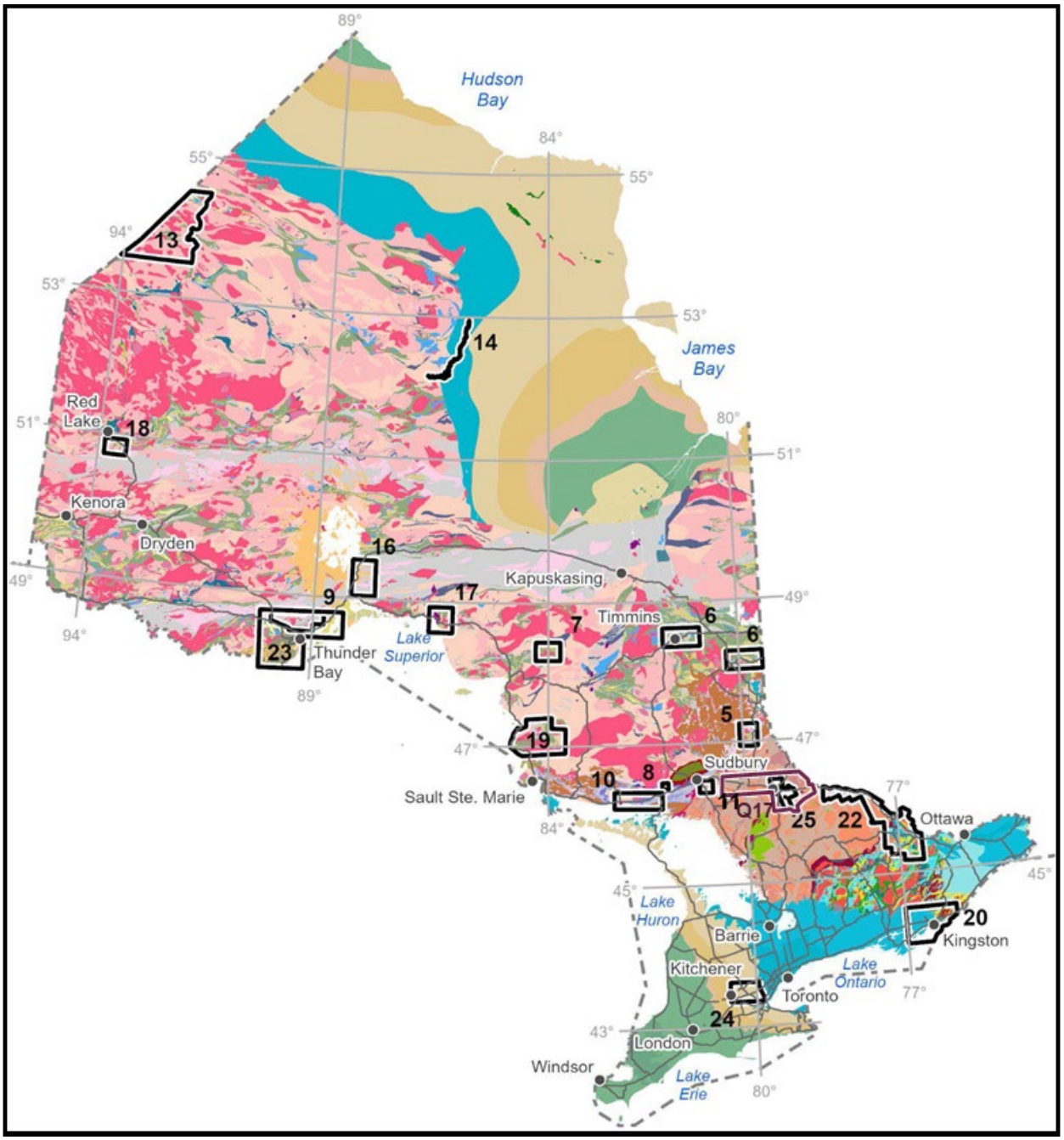

Figure 49. Locations of the Earth Resources and Geoscience Mapping Section projects in Ontario as described in *Summary of Field Work and Other Activities, 2024* (Ontario Geological Survey 2024a). Numbers correspond to *Summary of Field Work and Other Activities, 2024* article numbers; note articles 12, 15 and 21 are provincial in scope and are not indicated on the figure. An on-going project in the District (Q17; purple outline) has been added to the map. Numbers in the Sudbury RGP District are keyed to Table 56. Bedrock geology *from* Ontario Geological Survey (2011).

Academic Research

The following academic research projects were active within the Sudbury District in 2024.

HARQUAIL SCHOOL OF EARTH SCIENCES AND MERC (MINERAL EXPLORATION RESEARCH CENTRE), LAURENTIAN UNIVERSITY

Current Research

Lesher, C.M.: Genesis and localization of Ni-Cu-PGE mineralization in the Sudbury Igneous Complex (D. Peters, S. Baurier Aymat, H.V.L. Seibel, C.M. Lesher), NSERC–Vale CRD, 05/2018 to present

McDonald, A.M.: The mineralogy of sulphide ores from the North Range, Sudbury Basin (R.R. Keays, C. Gauld, L. Cochrane, B. Thompson, Vale)

PhD Candidates

Seibel, H.V.L.: Genesis and localization of Ni-Cu-PGE mineralization in the offset dikes of the Sudbury structure (Supervisor: Dr. C.M. Lesher)

Wang, Y.: Origin of mafic and ultramafic inclusions in the sublayer of the Sudbury Igneous Complex and their relationship with Ni-Cu-PGE mineralization (Supervisors: Dr. M. Lesher and Dr. P. Lightfoot)

MSc Candidates

Hall, M.: Emplacement mechanisms and spatial and temporal relationships between low sulphide and sharp walled vein systems in footwall mineralization in the Sudbury Camp (Supervisors: Dr. B. Lafrance and Dr. H. Gibson)

DEPARTMENT OF EARTH SCIENCES, CARLETON UNIVERSITY

Current Research

Mungall, J.: Origins and evolutions of magmas and the sulfide or oxide minerals they deposit as ores in the Sudbury Igneous Complex (J. Mungall, T. McLoughlin-Coleman)

MSc Candidates

McLoughlin-Coleman, T.: Finding gold with a machine learning technique by determining pyrite provenance: An example for a paleoplacer gold deposit, Pardo, Ontario (Supervisors: Dr. J. Mungall and Dr. R. H. Rainbird)

INSTITUTE OF GEOGRAPHY AND GEOLOGY, UNIVERSITÄT WÜRZBURG

Current Research

Götz, J.: PhD project: Possible causes and consequences of regional Na-metasomatism: the case of the Sudbury Impact Structure, Ontario, Canada

MSc (2024): Hydrothermal alteration at Aylmer Quarry, Greater Sudbury, Ontario

OTHER PUBLICATIONS

Barrett, T.J., Huss, G.R., Boyce, J.W., Robinson, K.L., Kring, D.A. 2024. A chlorine isotope transect across Sudbury Basin (Canada) impact deposits reveals systematic isotopic fractionation; Geology, 53(2), p.155-160. doi.org/10.1130/G52624.1

Birendra, S. 2024. Geochemical and Mineralogical investigations of mine tailings and mine-impacted sediments at Long Lake near Sudbury, Ontario; University of Ottawa thesis

Birendra, S., **Al, T. 2024.** Diagenetic iron-oxyhydroxides formed in suboxic to anoxic mine-impacted lake sediments near Sudbury, Ontario; Chemical Geology, v.658. doi.org/10.1016/j.chemgeo.2024.122131

Généreux, C., Lafrance, B. 2024. Revising PGE deposition and remobilization mechanisms using new data from the historic Vermilion and Crean Hill mines, Sudbury, Canada; Mineralium Deposita. doi.org/10.1007/s00126-024-01301-3

Généreux, C., Lafrance, B., Tinkham, D.K., Gordon, C.A., Simard, R. 2024. Transpression or polyphase deformation along craton margins: Insights from the Archean-Proterozoic boundary near Sudbury, Canada; Journal of Structural Geology, v.181. doi.org/10.1016/j.jsg.2024.105103

Taghipoor, S. 2024. In situ stress measurement using mini-frac testing in the Sudbury Basin; CIM Journal, 1-13. doi.org/10.1080/19236026.2024.2398955

Recent Publications

Publications received in, or of interest to, the Sudbury RGP District during 2024 are listed in Table 58.

Table 58. Publications received by, or of interest to, the Sudbury District RGP office in 2024.

Title	Author	Type and Year of Publication
Report of Activities 2023, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts	P.M. Malegus, E.G. Amyotte, R.L. Price, C.E. Kurcinka, T.K. Pettigrew, G. Meyer, N. Sabiri, A.E. Roziere-Howard and M.D. Levesque	Ontario Geological Survey, Open File Report 6407 (2024)
Report of Activities 2023, Resident Geologist Program, Thunder Bay North Regional Resident Geologist Report: Thunder Bay North District	S.V. Churchley, G.F. Paju, T.K. Pettigrew, G. Meyer, C.E. Kurcinka and N. Sabiri	Ontario Geological Survey, Open File Report 6408 (2024)
Report of Activities 2023, Resident Geologist Program, Thunder Bay South Regional Resident Geologist Report: Thunder Bay South District	D.A. Campbell, J.R.B. Jonsson, G. Meyer, T.K. Pettigrew, C.E. Kurcinka, N. Sabiri and J. Swiercz	Ontario Geological Survey, Open File Report 6409 (2024)
Report of Activities 2023, Resident Geologist Program, Timmins Regional Resident Geologist Report: Timmins and Sault Ste. Marie Districts	V. D'Angelo, M. Krukowski, B.K. Maity, P. Bousquet, C.M. Daniels, S.L.K. Hinz, G. Meyer, N. Sabiri, J. Swiercz and C.J. Adrianwalla	Ontario Geological Survey, Open File Report 6410 (2024)

Title	Author	Type and Year of Publication
Report of Activities 2023, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake and Sudbury Districts	P.J. Chadwick, A.S. Péloquin, J. Suma-Momoh, B.B. McKinnon, P. Bousquet, P.S. LeBaron, C.M. Daniels, S.L.K. Hinz, G. Meyer and N. Sabiri	Ontario Geological Survey, Open File Report 6411 (2024)
Report of Activities 2023, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Ontario Districts and Petroleum Operations	L.A. Mancini, M. Dorado-Troughton, J. Swiercz, P.S. LeBaron, S.L.K. Hinz, G. Meyer, N. Sabiri and L. Fortner	Ontario Geological Survey, Open File Report 6412 (2024)
Recommendations for Exploration 2023–2024	Ontario Geological Survey	Ontario Geological Survey, Resident Geologist Program, Recommendations for Exploration (2024)
Summary of Field Work and Other Activities, 2024	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6413, 2024

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. The information is taken from the Ontario Mineral Inventory database (OMI; Ontario Geological Survey 2024a), Ontario Geological Survey reports, assessment files (OAFD; Ontario Geological Survey 2024b) and mineral resource estimates from 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 59 and Figure 50.

Table 59. Mineral deposits not being mined in the Sudbury District in 2024 (keyed to locations on Figure 50).

No.	Deposit Name and MDI	Commodity	Resource References	Tonnage-Grade Estimates and/or Dimensions	Status
1	East Bull PGM Property MDI000000002507	PGM	Stone et al. (2022)	Indicated – 16.5 Mt @ 0.93 g/t PdEq Inferred – 16.3 Mt @ 0.99 g/t PdEq	Developed prospect with reported resources
2	Shakespeare Nickel MDI41I05SW00076	Cu Ni Pd Pt	Armitage et al. (2022)	Pit: Indicated: 16 508 kt @ 0.56% NiEq; Inferred: 1682 kt @ 0.54% NiEq Probable: 11.87 Mt @ 0.33% Ni, 0.35% Cu, 0.02% Co, 0.32 g/t Pt, 0.36 g/t Pd, 0.18 g/t Au Underground: Indicated: 3 832 kt @ 0.53% NiEq; Inferred: 2 355 kt @ 0.20% NiEq	Past producing mine with resources
3	Fostung Property MDI41I04NE00036	W Cu Mb Zn	Stryhas and More (2007)	12.4 Mt @ 0.213% WO_3	Developed prospect with reported resources
4	Agnew Lake Mine MDI41I05NE00009	U Tm	*Robertson and Gould (1983)	5 803 000 tons @1.0 lbs/ton U_3O_8	Past producing mine with resources
5	Crean Hill Mine MDI41I06NW00016	Cu Ni PGM	Armitage (2022)	Pit: Indicated: 16 790 Mt @ 1.08% NiEq Inferred: 434 Mt @ 0.82% NiEq Underground: Indicated: 14 531 Mt @ 2.07% NiEq Inferred: 1 170 @ 1.41% NiEq	Past producing mine with resources
6	Lockerby Mine MDI41I06NW00013	Ni Cu Co	Darling, Fuchs and Moore (2012)	Indicated: 1.16 Mt @ 2.60% NiEq Inferred: 0.53 Mt @ 3.2% NiEq Probable: 1.37 Mt @ 2.21% Ni, 1.39% Cu, 0.08% Co	Past producing mine with resources

No.	Deposit Name and MDI	Commodity	Resource References	Tonnage-Grade Estimates and/or Dimensions	Status
7	Lockerby East MDI000000003212	Ni Cu	Armitage and Eggers (2024)	Indicated: 665 kt @ 1.59% NiEq Inferred: 124 kt @ 1.39% NiEq	Past producing mine with resources
8	West Graham MDI41I06NW00072	Ni Cu	Armitage and Eggers (2024)	In Pit: Indicated: 19 326 kt @ 0.57% NiEq Inferred: 3 283 kt @ 0.53% NiEq Out of Pit: Indicated: 3 238 kt @ 0.92% NiEq Inferred: 3 867 kt @ 1.97% NiEq	Developed prospect with resources
9	Victoria Project MDI41I06NW00014	Ni Cu	KGHM International Ltd. (2015)	0.48 Mt @ 1.23% Ni, 1.41% Cu, 0.003% Co, 0.22 g/t Au, 0.47 g/t Pt, 1.35 g/t Pd	Past producing mine with resources
10	Vermilion MDI41I11SW00006	Zn Cu Ag Pb	Glencore Canada Corp. (2022)	3.2 Mt @ 4.3% Zn, 1.2% Pb, 1.3% Cu, 1.2% Ni, 53 g/t Ag, 0.9 g/t Au	Past producing mine with resources
11	Errington MDI41I11SW00005	Zn Cu Pb Ag	Glencore Canada Corp. (2022)	8.9 Mt @ 4% Zn, 1.1% Cu, 1.1% Pb, 52g/t Ag, 0.8g/t Au	Past producing mine with resources
12	Onaping Mine MDI41I11NW00012	Ni Cu	Glencore Canada Corp. (2017)	14 Mt @ 2.24% Ni, 1.01% Cu	Past producing mine with resources
13	Stralak River East Zone MDI41I13SE00044	Zn Cu Ag	*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	Developed prospect with reported resources
14	Geneva Lake Mine MDI41I13SE00002	Zn Pb Ag	*Constable (1989)	114 000 tons @ 10% Zn, 3% Pb across 5.3 ft width; 24 000 tons @ 8% Pb-Zn across 4 ft; 32 000 tons @ 6% Pb-Zn across 3 ft	Developed prospect with reported resources
15	Nickel Offsets Mine MDI41I14SE00004	Ni Pt Pd Au Cu	*Card and Meyn (1969)	1900 tons @ 0.73% Cu, 1.09% Ni	Past producing mine with resources
16	Nickel Lake Zone MDI41I11NE00018	Ni Cu	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 prospect with reported resources
17	Norman West MDI000000003067	Cu Ni Pt Pd	Lamontagne Geophysics Ltd. (2020)	Inferred: 2 360 000 tons @ 2.4% Cu, 0.7% Ni, 0.9 g/t Pt, 1.1 g/t Pd	Developed prospect with reported resources
18	Parkin Township Calcite MDI41I15SW00093	Calcite	*Gates (1991)	25 720 tons calcite, 121 700 tons mixed calcite and dolomite	Prospect
19	Wallbridge Xstrata Parkin Property MDI41I15SW00079	Ni Cu Pd Pt	*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 reported resources
20	Podolsky North Deposit MDI000000000773	Ni Cu Pt Pd	Farrow, Frayne and Ramnath (2008)	Indicated: 130 000 tons @ 6.56% Cu, 0.66% Ni, 0.20 oz/ton total precious metals	Developed prospect with reported resources
21	Nickel Rim MDI41I10NW00003	Ni Cu	*Thomson (1961)	747 624 tons @ 0.35% Cu, 0.90% Ni	Past producing mine with resources
22	Scadding Gold Mine MDI41I10NE00012	Au	Yarie and Wray (2019)	138 704 tons @ 12.89 g/t	Developed prospect with resources
23	Thayer–Lindsley Mine MDI41I10SW00039	Ni Cu PGM	Johns (1996)	Footwall mineralization: 930 000 tons @ 4.21% Cu, 2.23% Ni, 2.86 g/t Pt, 7.36 g/t Pd Sublayer mineralization: 6 140 000 tons @ 1.34% Cu, 1.58% Ni, 1.14 g/t Pt, 1.39 g/t Pd	Past producing mine with resources
24	Kirkwood Mine MDI41I10SW00007	Ni Cu	Farrow, Frayne and Ramnath (2008)	Indicated : 622 690 tons @ 0.49% Cu, 1.17% Ni Inferred : 1 752 000 tons @ 0.97% Cu, 1.27% Ni	Past producing mine with resources
25	Rutter Nepheline MDI41I02SE00005	Nepheline Syenite	*Farrow et al. (2012)	50 000 000 tonnes	Developed prospect with reported resources

No.	Deposit Name and MDI	Commodity	Resource References	Tonnage-Grade Estimates and/or Dimensions	Status
26	River Valley PGM Project MDI000000001421	Pd Pt Rh Au	Bradfield et al. (2023)	Measured and Indicated: 88 998 kt @ 0.54 g/t Pd (Constrained Pit) and 642.1 kt @ 1.08 g/t Pd (Out of Pit)	Developed prospect with reported resources
27	Eagle Rock Iron Mines Ltd. MDI41I16NE00036	Fe	*Meyn (1977)	328 million tons @ 27.2% soluble Fe	Developed prospect with reported resources
28	Lavergne Prospect MDI31L05NW00002	Cm Nd Yb La	Daigle (2012)	4.167 Mt @ 1.14% total rare earth oxides	Developed prospect with reported resources
29	Titan Property MDI31L14SW00014	Fe Ti	Prenn and Pettigrew (2017)	46 Mt @ 48.32% Fe_2O_3, 14.88% TiO_2, 0.24% V	Developed prospect with reported resources
30	Big Manitou Island Ore Zone MDI000000000676	Nb U	*Lumbers (1971)	24 494 tonnes @ 0.1% U_3O_8, 0.38% Nb_2O_5, 10% P_2O_5	Developed prospect with reported resources
31	Newman Deposit MDI31L05SE00009	U Nb	*Ferguson (1971)	5 163 500 tons @ 0.05% U_2O_8, 0.80% Nb_2O_5	Developed prospect with reported resources
32	Butler Vermiculite MDI31L11SE00003	Vermiculite	*Brown (2000)	Main zone: 83 762 tons @ 53.2% 33E zone: 20 025 tons @ 34.7%	Prospect
33	Brazeau Prospect MDI31L02NE00010	Fe Ti V	*Whiting (2004)	1 360 000 tonnes @ 0.58% V_2O_3	Developed prospect with reported resources
34	Bissett Creek Graphite Project MDI31L01SE00002	Graphite	Northern Graphite Corporation (2023)	69.8 Mt @ 1.74% Cg (graphitic carbon)	Developed prospect with reported resources
35	Rock Brook Resources Property MDI31E12SE00004	Carbonate	*Marmont (1988)	593 333 tons @ 77.939% total carbonates	Developed prospect with resources

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

***Unit abbreviations used**: lbs = pounds; Mt = million tonnes; oz/t = ounces per tonne; oz/ton = ounces per ton.*

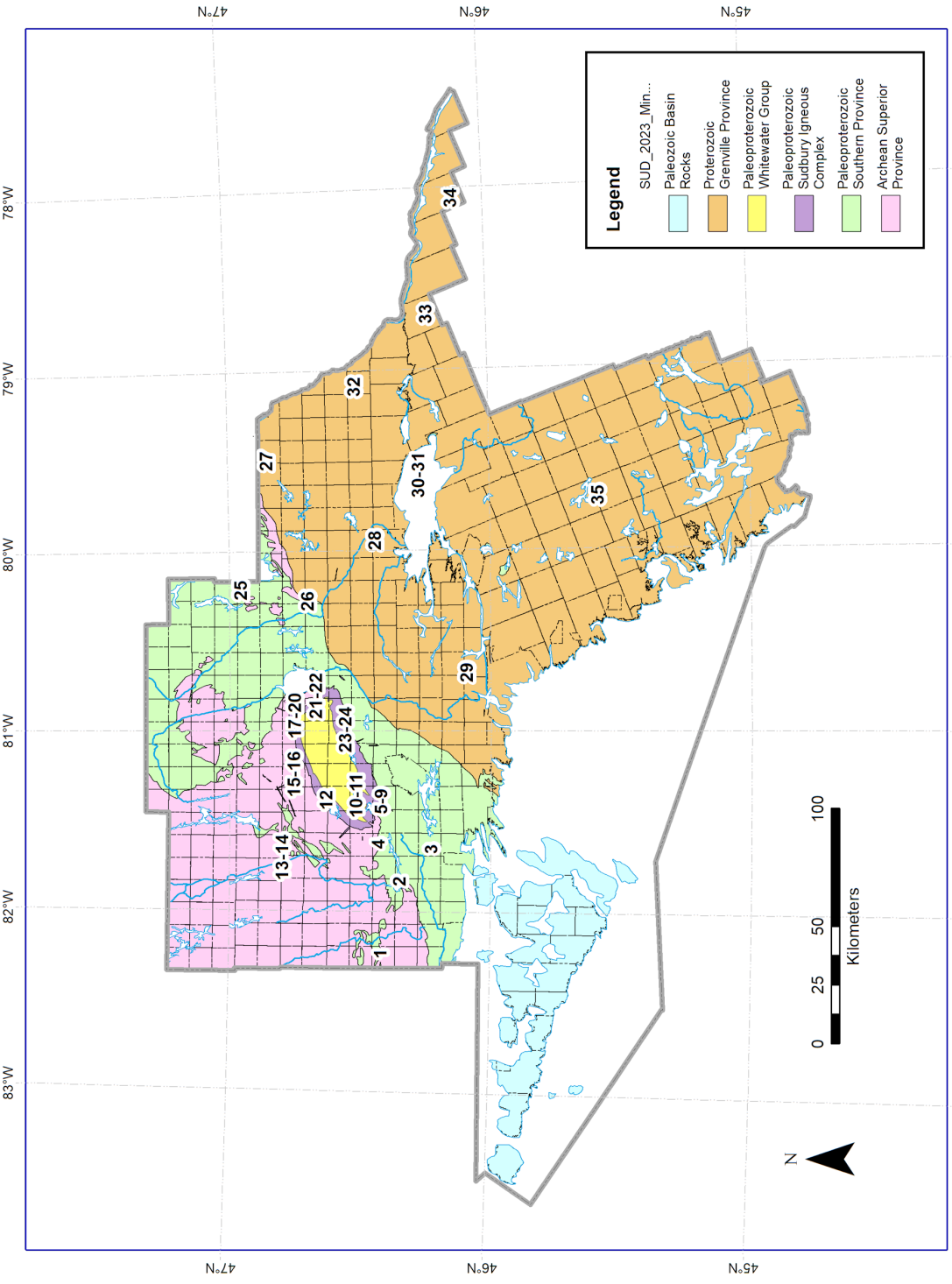

Figure 50. Mineral deposits not being mined in the Sudbury District in 2024, keyed to Table 59; geology *modified from* Ontario Geological Survey (2011) with overlain township fabric.

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.

REGIONAL LAND USE GEOLOGIST ACTIVITIES—SOUTHERN REGION

Land Use Planning Activities

The southern Regional Land Use Geologist (RLUG), based in Tweed, co-ordinates input into land-use planning activities in the Southern Ontario Resident Geologist District, part of the Sudbury District south of the French River, including Manitoulin Island, and part of the Sault Ste. Marie District (St. Joseph Island). From January 1 to October 27, 2024, the southern Regional Land Use Geologist position was staffed by Peter LeBaron, *P.Eng*. The Land Use Planning and Policy Co-ordinator (LUPPC) is the province-wide lead of the land use geology program. That position was held from January 1 to October 27, 2024, by Catherine Daniels*, P.Geo.*, and by Peter LeBaron, *P.Eng*., in an Acting position for the remainder of the year. The boundaries of the Regional Land Use Geologists' regions are indicated on Figure 51.

Figure 51. 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 2024, the southern Regional Land Use Geologist dealt with a variety of land-use planning issues throughout the Southern Ontario region. The following sections summarize the work that was done.

CROWN LANDS

The Ministry of Mines (MINES) is responsible for all geoscience mapping within the province and administers mineral exploration and development under the *Mining Act*. The Ministry of Natural Resources (MNR) is responsible for mineral aggregate extraction under the *Aggregate Resources Act*, in addition to being responsible for mapping and regulating many other natural resource features and activities.

The Ministry of Mines, through the Regional Land Use Geologist, engages with other Ministries 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; proposals to modify existing parks or create new ones; and various other initiatives related to Crown land use.

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*.

In 2024, there were no new Forest Management Plans submitted to the Southern Regional Land Use Geologist for comments and input.

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 MNR Natural Resources Information Portal (https://nrip.mnr.gov.on.ca/s/fmp-online).

Parks and Protected Areas

In March 2024, MINES received notice of a proposal by the Haliburton Highlands Land Trust to create a conservation reserve in the Haliburton Highlands. A mineral potential analysis of lands proposed for conservation was prepared by the southern RLUG and provided the Deputy Minister’s Office. No further developments on the proposal occurred during 2024.

Requests for comments regarding changes to the boundaries of 2 Areas of Natural and Scientific Interest (ANSIs) were received from the Ministry of Natural Resources. The requests were based upon a proposal

to develop a subdivision in the Garden Hill Pitted Outwash ANSI near Port Hope and a request for reduction in the size of the Forks of the Credit Caledon Meltwater Deposits ANSI by the Town of Caledon. R.P.M. Mulligan, Quaternary Geoscientist with the Ontario Geological Survey, provided comments on the significance of both ANSIs to assist MNR in making decisions on whether to allow the boundary changes.

Municipal and Private Lands

The Ministry of 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 southern 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 modified and changes came into effect October 20, 2024. The PPS 2024 is intended to provide a streamlined province-wide land use planning policy framework that enables more housing to be built faster in a way that protects the environment, public health and safety, and manages natural resources. It incorporates elements of the Provincial Policy Statement (PPS 2020) and "A Place to Grow: Growth Plan for the Greater Golden Horseshoe" (2019) and replaces those documents. There were no revisions in 2024 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, the Regional Land Use Geologist 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 and/or condominium applications. Although such decisions are normally made by municipal governments, some areas of the southern region are 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 MINES.

In 2024, the southern Regional Land Use Geologist provided maps, comments and other input as required for municipal planning activities that included

- 131 consent (severance) and plan of subdivision and/or condominium applications in 23 lower-tier and 3 single-tier municipalities
- 48 Official Plans and related planning initiatives (such as Official Plan amendments, zoning by-laws, and minor variances) in 12 communities
- 12 new draft Official Plans or Official Plan updates

The municipalities involved in these planning initiatives are listed in Table 60. The southern Regional Land Use Geologist area (*see* Figure 51) overlaps with the Sudbury and Sault Ste. Marie (SSM) Resident Geologist districts. Townships and municipalities within the Sudbury District that required input from the southern Regional Land Use Geologist in 2024 are identified with the district name in parentheses in Table 60.

Table 60. Municipal planning initiatives with Regional Land Use Geologist input, southern Ontario, 2024. The home district of townships and municipalities located outside the Southern Ontario Region is shown in parentheses.

Consent (Severance) and Subdivision and/or Condominium Applications
Consent, Bagot, Township of Greater Madawaska (3)
Consent, Bathurst, Township of Tay Valley
Consent, Brudenell, Township of Brudenell, Lyndoch and Raglan
Consent, Blithfield, Township of Greater Madawaska
Consent, Camden East, Township of Stone Mills (32)
Consent, Cameron, Township of Papineau-Cameron (3) (Sudbury)
Consent, Darling, Township of Lanark Highlands (2)
Consent, Dungannon, Town of Bancroft
Consent, Elzevir, Municipality of Tweed (2)
Consent, Herschel, Township of Hastings Highlands (2)
Consent, Hungerford, Municipality of Tweed (5)
Consent, Huntingdon, Municipality of Centre Hastings (5)
Consent, Lanark, Township of Lanark Highlands
Consent, Lavant, Township of Lanark Highlands (4)
Consent, McNab, Township of McNab–Braeside
Consent, Monteagle, Municipality of Hastings Highlands
Consent, North Burgess, Township of Tay Valley (3)
Consent, North Crosby, Township of Rideau Lakes
Consent, North Elmsley, Township of Drummond-North Elmsley (2)
Consent, Papineau, Township of Papineau–Cameron (9) (Sudbury)
Consent, Raglan, Township of Brudenell, Lyndoch and Raglan (2)
Consent, Ramsay, Township of Mississippi Mills
Consent, Rawdon, Township of Stirling-Rawdon (5)
Consent, Ross, Township of Whitewater Region (2)
Consent, Sebastopol, Township of Bonnechere Valley
Consent, Seneca, Haldimand County
Consent, Sheffield, Township of Stone Mills (11)
Consent, Smith, Township of Smith-Ennismore-Lakefield
Consent, Snowdon, Township of Minden Hills
Consent, South Burgess, Township of Rideau Lakes (2)
Consent, South Crosby, Township of Rideau Lakes (2)
Consent, South Sherbrooke, Township of Tay Valley (3)
Consent, Township of Calvin (2) (Sudbury)
Consent, Township of Faraday (2)
Consent, Township of Horton
Consent, Township of Madoc (3)
Consent, Township of Montague (3)
Consent, Township of Tyendinaga (7)
Plan of Subdivision, Camden East, Township of Stone Mills
Plan of Subdivision, South Burgess, Township of Rideau Lakes

Official Plans and Related Initiatives
Official Plan Amendment, Caledon, Town of (2)
Official Plan Amendment, Hastings County
Official Plan Amendment, Township of Mississippi Mills
Official Plan Amendment, Norfolk County
Official Plan Amendment, Northumberland County
Official Plan Amendment, Township of Stone Mills
Official Plan Amendment, City of Vaughan
Official Plan Amendment, Wellington County (2)
Zoning By-law amendment, Twp of Drummond-North Elmsley (3)
Zoning By-law amendment, Township of Mississippi Mills (7)
Zoning By-law amendment, Township of Rideau Lakes
Zoning By-law amendment, Township of Stone Mills (16)
Zoning By-law amendment, Township of Tudor and Cashel (2)
Zoning By-law amendment, Township of Whitewater Region
Minor variance, Township of Drummond-North Elmsley
Minor variance, Township of Mississippi Mills (4)
Minor variance, Township of Stone Mills (5)

Draft Official Plans and Official Plan Updates
Bonfield, Township of (Sudbury)
Bruce, County of
Caledon, Town of
Chisholm, Township of (Sudbury)
Greater Napanee, Town of
McKellar, Municipality of (Sudbury)
Parry Sound, Town of (Sudbury)
Perth, County of
Powassan, Municipality of (Sudbury)
Smiths Fall, Town of
Whitchurch-Stouffville, Town of

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 2024, 1 application for Exemption from Mining Tax was reviewed for the southern region. The subject property consists of a total of 36 contiguous mining patents within parts of Conger, Cowper and Foley townships, District of Parry Sound. Comments were provided to the Mining Lands Section to be consolidated with other information for the Ministry's consideration and decision.

FIRST NATIONS

The southern Regional Land Use Geologist provides information on mineral occurrence sites, past and present mining and exploration activity, geology and mineral potential for land parcels being considered for addition to land claim areas for First Nations communities in southeastern Ontario. No new land claims or additions to existing land claims were received for southern Ontario in 2024.

Other Activities

The Regional Land Use Geologist was able to accompany other Resident Geologist Program (RGP) staff of the Tweed office on 1 general interest field trip and 1 visit to an active mineral exploration property.

The southern Regional Land Use Geologist also undertook other related work in 2024, as outlined in the following sections.

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; activities under the *Mining Act*; the establishment of new parks and conservation reserves; forest management plans; and Crown land dispositions.

The southern Regional Land Use Geologist works with staff from MNR and other ministries to ensure that relevant geoscience information and provincial mineral interests are identified and accommodated early in the planning process of projects subject to Class EAs.

No Class EAs were submitted to the southern RLUG in 2024. In November, the LUPPC attended a presentation by the Ministry of the Environment, Conservation and Parks on proposed amendments to the Environmental Assessment Program that are intended to make the program more efficient, reduce duplication and align the level of assessment to potential environmental impact.

ENVIRONMENTAL REGISTRY

The Environmental Registry of Ontario (ERO) is an online resource that contains public notices about environmental matters being proposed by all Ontario government ministries covered by the Environmental Bill of Rights. The public notices contain information about proposals including new acts, regulations, policies and programs; plans to change or eliminate existing ones; and plans to issue permits for a wide range of activities across Ontario.

In 2024, most of the ERO postings relevant to southern Ontario were related to aggregate licences issued under the *Aggregate Resources Act*, notices of approval or amendments to Municipal Official Plans, Minister's Zoning Orders, and Provincial Park management, not requiring comments by the southern Regional Land Use Geologist.

Other significant southern Ontario items posted on the ERO in 2024 include proposals under Bill 185, "*Cutting Red Tape to Build More Homes Act, 2024*", one of which transfers planning responsibilities from 7 upper-tier municipalities to the Province (MMAH), including the Regions of Peel, Halton and York and the Regions of Waterloo, Durham, and Niagara and Simcoe County at a later date in 2025.

Province-wide ERO postings included items related to legislative amendments made through *Building More Mines Act, 2023* and proposed policies for a new provincial planning policy instrument regarding changes to the *Planning Act* and the *A Place to Grow Act*, which resulted in the release of the Provincial Policy Statement 2024 on October 20, 2024.

Other province-wide items included policies on regulating geologic carbon storage projects; expanding Protected Areas in Ontario (involving sites proposed for protection under the *Provincial Parks and Conservation Reserves Act 2006*); amendments to the *Oil Gas and Salt Resources Act*; and amendments to the *Mining Act*. The Ministry revoked Ontario Regulation 240/00 "Advanced Exploration, Mine Development and Closure under Part VII of the Act" (O. Reg. 240/00) in its entirety and replaced it with a new regulation. The new regulation, Ontario Regulation 35/24 "Rehabilitation of Lands" (O. Reg. 35/24), contains most of the existing provisions of O. Reg. 240/00, incorporates amendments to some existing provisions, and includes new provisions that support the authorities that were introduced in the *Building More Mines Act, 2023.* These amendments are intended to encourage innovation, decrease regulatory overlap, and place greater emphasis on the technical expertise of qualified persons and industry professionals.

POLICY AND GUIDANCE

In February 2024, a request for mineral potential assessment in an area of southwestern Ontario being considered for possible deep carbon storage was received from MNR. Mineral potential in southwestern Ontario for commodities extracted under the *Mining Act* consists only of gypsum and salt, both in the Salina Group, at least 400 m above the target carbon sequestration formation, indicating low potential for negative effects of CO_2 sequestration on current and future salt/gypsum mining operations.

In May 2024, the southern Regional Land Use Geologist and the Land Use Planning and Policy Co-ordinator provided comments on the proposed MNR process for Disposition of Public Lands in Municipalities. The comments were sent to the OGS Director for approval before forwarding to the office of the Assistant Deputy Minister, MINES.

In July 2024, the Regional Land Use Geologists provided comments to the Land Use Planning and Policy Co-ordinator on proposed amendments to the Provincial Planning Statement with respect to possible impact on MINES land use planning interests.

In September 2024, the southern Regional Land Use Geologist and the Land Use Planning and Policy Co-ordinator reviewed an MNR document presenting a proposal to create a regulatory framework to support the development of commercial-scale geologic carbon storage projects in Ontario, in preparation for the creation of a Geologic Carbon Storage Act.

In December 2024, the Land Use Planning and Policy Co-ordinator (Acting) reviewed a document from the Ontario Ministry of Agriculture and Rural Affairs on Agricultural Impact Assessment Guidelines.

Throughout 2024, the Land Use Planning and Policy Co-ordinator and the southern Regional Land Use Geologist participated in meetings of the OPS Biodiversity Network and provided comments on Canada's National Biodiversity Strategy outlining MINES plans related to biodiversity, including requirements under the *Mining Act* to progressively rehabilitate historical mines and submit progressive rehabilitation reports after completion of the work.

CONFERENCES AND OUTREACH ACTIVITIES

In 2024, the southern Regional Land Use Geologist attended or participated in the following events.

In-person:

- 2024 Resident Geologist Program Health and Safety and Field Training Week in Belleville and Tweed, including an introduction to the geology of the Tweed area.

- Attended the Bancroft Rockhound Gemboree, the Scarborough Mineral Show and the Waterloo Gem and Mineral Show to assist Tweed Resident Geologist Program staff in providing a booth with information about the mines of southern Ontario and the use of minerals in everyday life.
- Attended the Eastern Ontario Geoscience Open House in Ottawa and contributed to a joint Ontario Geological Survey presentation on current projects in eastern Ontario and the role of the OGS with respect to the importance of geoscience in land use planning.

Virtual meetings and conferences:

- Ontario Geological Survey Ontario Groundwater Geoscience 2024 Open House – a series of presentations over 2 days featuring presentations by various government agencies, consultants and academia on groundwater science, programs and policies.
- Ontario Geological Survey, Project Pulse – a series of technical presentations featuring project collaborations between OGS sections, such as the Earth Resources and Geoscience Mapping Section, the GeoServices Section and the Resident Geologist Program.
- Ontario Geological Survey Virtual Showcase 2024 – a series of technical presentations over 3 days featuring results of geoscience projects in progress by the Ontario Geological Survey, summaries of activities in all districts of the Resident Geologist Program, and updates on OGS data sets and online applications. Contributed to a joint Regional Land Use Geologist presentation on "Natural Geological Hazards and Land Use Planning" and attended 2 of 3 days of the Showcase.
- Kawartha Region Earth Sciences, Engineering and Metallurgy Network (KREEM) – monthly presentations and discussions on various aspects of geoscience, environment and engineering.

MINERAL INVENTORY GEOSCIENTIST ACTIVITIES—NORTHEASTERN AND SOUTHERN ONTARIO

The activities of the Mineral Inventory Geoscientist are described *in* "Mineral Inventory Geoscientist Activities—Northeastern and Southern Ontario" in 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.

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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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