An Update on Flake Analyses of Graphitic Rocks within Appalachian Terranes in Nova Scotia, Canada

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Introduction

One of many roles within the Geological Survey Division (GSD) of the Nova Scotia Department of Natural Resources (DNR) is leadership in the management and responsible development of the province's mineral resource assets. Launched in March 2024, Nova Scotia's Critical Minerals Strategy aims to accelerate the clean energy transition by advancing research on 20 key minerals and materials essential for technologies like batteries, wind turbines, and solar panels. Within the GSD includes a team of geoscientists and experts who are responsible for delivering high-quality geological data and supporting a wide range of rightsholders and stakeholders, including all levels of government, industry, academia, and the public.

Batteries are essential to Nova Scotia's energy transition. The demand for graphite, a key anode material in battery technology is projected to increase globally (~220%) in a net-zero 2050 scenario (IEA, 2025). Key battery minerals like graphite have been the subject of recent funding from Natural Resources Canada (NRCan)'s Critical Mineral Geoscience Data Initiative (CMGD; NRCan, 2025). In April 2025, the Graphite in Support of Battery Value Chains project[1] activities were initiated as part of a two-year (2025-2027) contribution agreement between NRCan and DNR.

As Nova Scotians adopt clean energy technologies, like electric vehicles (EVs) and grid battery storage (Figure 25), they become increasingly reliant on minerals mined and processed outside Canada[2]. Graphite is a soft, slippery, opaque carbon mineral historically used in steel production, refractories, lubricants, and electrical components. Graphite has a high thermal stability (melting point 3927°C), and strong electrical and thermal conductivity make it highly sought after for lithium-ion battery technology (USGS, 2020). Graphite flake size[3] is particularly important, as it affects conductivity, durability, and the economics of energy storage in a battery (Sun et al. 2014).

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[1] The Graphite in Support of Battery Value Chains project is referred to as "project" or "cmdg-3" within this update.

[2] In 2024, China was the world's leading producer of graphite, accounting for 79.4% of total production. Global graphite consumption reached 5.7 million tonnes, up from 5.2 million tonnes in 2023 (NRCan, 2026).

[3] Lo w electric resistivity of 2.45 μΩ-m (2.45e-6 Ω-m) and a high thermal (as opposed to electrical) conductivity of 498 W/m·K when mean size of graphite flakes in raw material are 425 μm (Sun et al. 2014). This project will consider ideal exploration performance to be greater than 40 μm.

Understanding Nova Scotia's geological setting, graphite deposit types, and flake characteristics is both economically strategic and essential to supporting the province's energy transition. The project objectives in Year 1 (April 1, 2025–March 31, 2026) focused on refining Nova Scotia's flake graphite geological model through a compilation of historic data and addressing key knowledge gaps, particularly flake size distribution and graphite liberation.

In winter 2025-2026, a total of eighty-five whole rock and reference samples (n=85; 71 core; 7 outcrop; 7 reference materials) and thirty-three (33) thin section rock slabs were submitted to AGAT Laboratories Ltd. in Calgary, Alberta for sample preparation, geochemical and mineral processing analyses (i.e. graphitic carbon content (n=80); flake size and flake liberation (n=28), stable isotope analysis (Carbon, Nitrogen, and Sulfur (C–N–S isotopes); n=6), and major element (n=13) and trace element geochemistry (n=6)). Additionally, thirty-three (33) polished thin sections were prepared by AGAT.

The results will guide the characterization of graphite quality (i.e. resource evaluation) and support the delineation of exploration targets and preliminary baseline conditions in Year 2 (April 1, 2026–March 31, 2027). A final report will be published in early 2027 by Nova Scotia DNR.

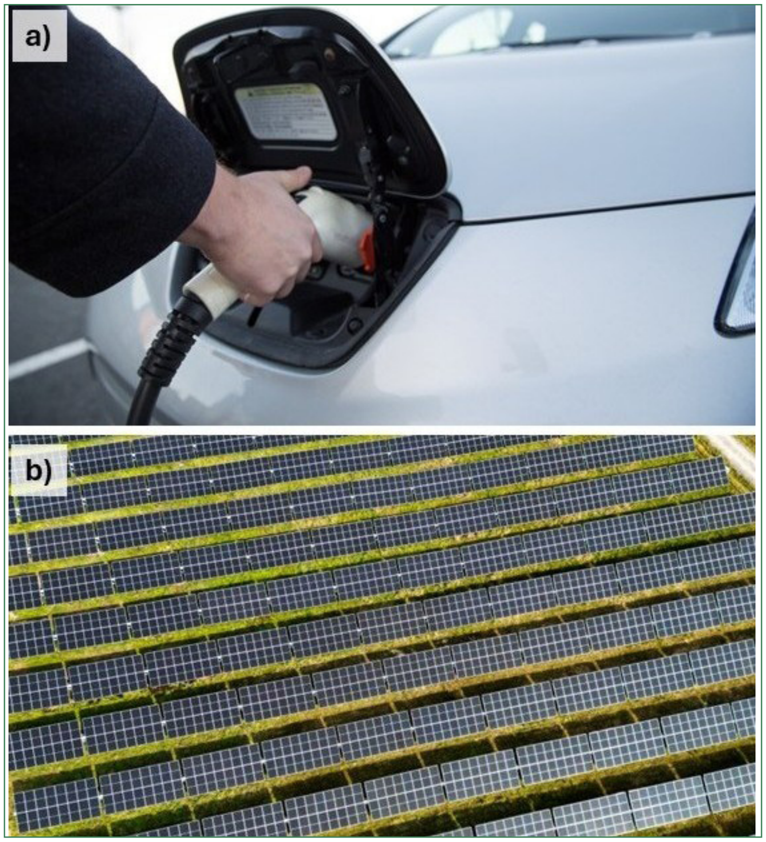

Figure 25. Graphite is projected to increase by ~220% in a 2050 net-zero scenario as Nova Scotians adopt clean energy technologies like this a) EV at a charging station in Halifax County; and grid battery storage to support clean energy solutions like this b) solar panel installation at the Berwick community solar garden in Kings County.

Activities

In 2025, plans were made to address information gaps regarding total graphitic content, and flake size and liberation analyses of graphitic rocks. Geological activities conducted between April and December 2025 included: 1) three-dimensional (3D) drill hole data compilation and preliminary geological modelling; 2) core and field sampling; and 3) whole rock laboratory analyses.

Downhole attributes from drill logs (i.e. drill holes (n=61; Figure 26; Appendix I); core intervals (n=944) representing ~4000 m total) were digitized using ArcGIS® Survey123 (Survey123) and integrated into a 3D geological workspace using Geoscience ANALYST, a product by ©Mira Geoscience Limited (ANALYST), to improve the useability of the historic data and serve as a visual representation throughout the project. Downhole lithological and structural attributes contributed to the decision-tree analysis based on key performance indicators (KPI[4]) that identified priority drill holes (i.e. the Frenchvale–Boisdale Hills area; notably Rear Boisdale, west of Campbell Lakes FV-10-05 and FV-10-04; Figure 28e). Geological characterization of the Frenchvale area confirmed dolomitic marble-hosted disseminated graphite (locally up to ~5%; Wightman, 2011; Black, 2010), calc-silicate skarn mineralization, tremolite–serpentine–phlogopite assemblages, and formed in a contact-metasomatic domain associated with pegmatitic, quartz-feldspathic intrusions (Figure 28c).

Applied geophysics (i.e. electric conductivity[5], and electromagnetism [EM]) can refine our understanding of highly prospective areas in Nova Scotia by making it easier to distinguish between electrically resistivity anomalies caused by graphite mineralization and other known conducting geological formations (e.g. porous rock filled with saline water, marine clay deposits, sulphides; Rønning et al., 2017; USGS, 2025; Mantos et al., 2025). Time domain EM surveys can delineate diamagnetic[6] graphite as weak magnetic low responses (Legault et al., 2015), and when coinciding with low resistivity may be an indicator of good quality graphite (Rønning et al., 2017). Where data was available, priority areas for the project developed with these combinations of geophysical insight and geological, geochemical, and mineral processing insight. Figure 29 illustrates a polygon sketch of structurally controlled, geophysical targets for the project, interpreted from low resistivity (i.e. < 48 ohm-metre (Ω-m); FV-08-03, FV-10-08), and weakly magnetic anomalies (i.e. < 0 nT/m) in relation to project activities in the Rear Boisdale area west of Campbell Lakes, Cape Breton County (modified after Wightman, 2017; Dube, 2020; Wightman, 2023; Halle, 2023).

Field Work

[4] Carbon-rich Proterozoic high-grade metamorphic rocks including dolomitic marble, skarn, schist, gneiss (i.e. parag-neiss), and metamorphic "complex" units. Project is using 2% or greater cut-off for total graphitic carbon values or non differentiated carbon values.

[5] Graphite is an electronically conducting mineral, and the resistivity in massive graphite ore bodies is commonly less than 2 Ω-m (the electronic conductivity of pure graphite is reported to be ca. 10-3 Ω-m; Telford et al. 1976; and 1 Ωm when exhibited with other minerals; Rønning et al., 2017), with conductivity higher than 500 mS/m, (0.5 S/m; Dalsegg 1994, Rønning et al., 2012, Rønning et al., 2014).

[6] Graphite is a diamagnetic mineral and may reduce the magnetic field (Reynolds, 2011; Rønning et al., 2017) of magnetic minerals like pyrrhotite that are also present in the rock.

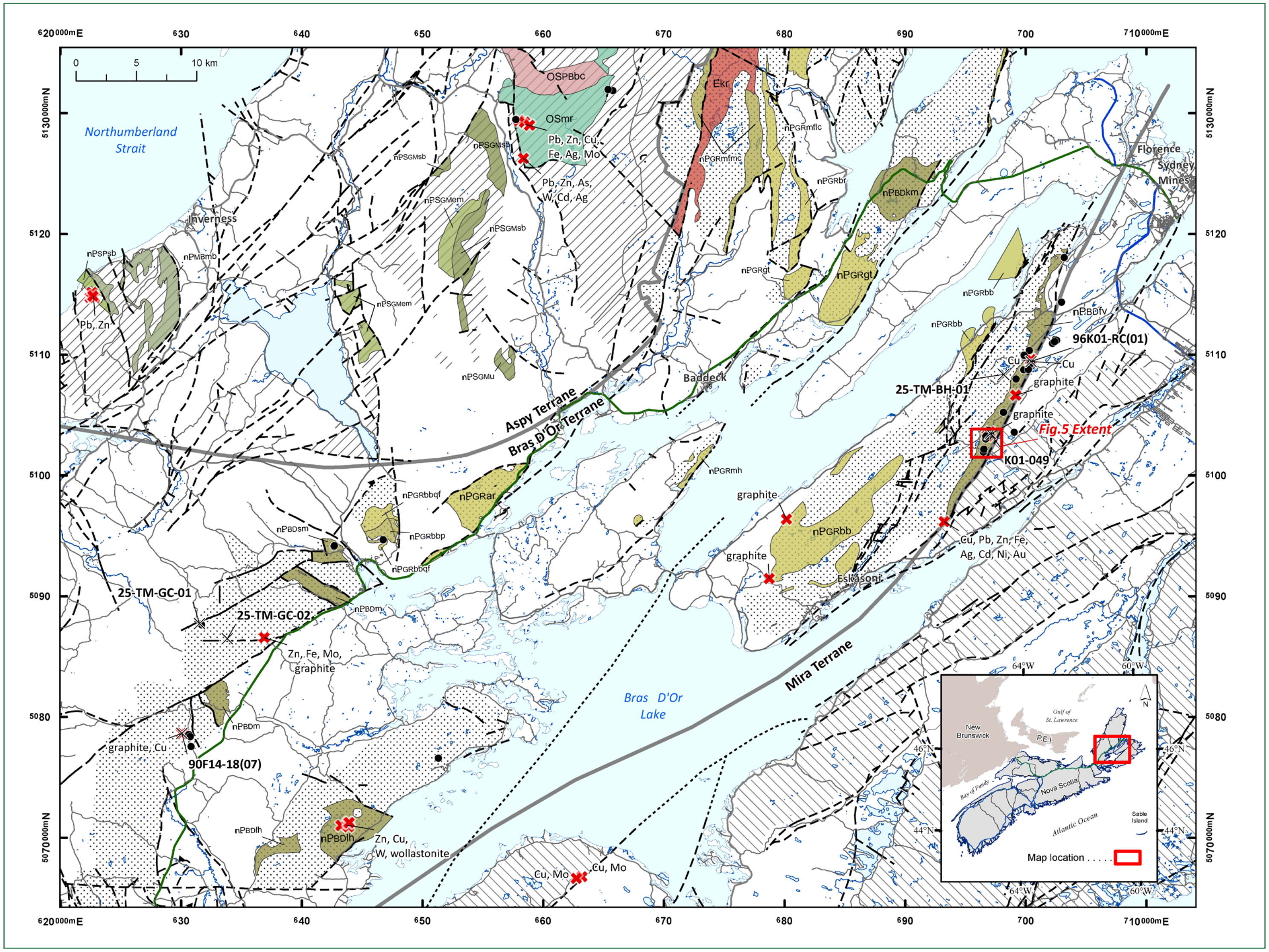

Figure 26. Overview map illustrating the location of sixty-one (61) drill holes digitized (many overlapping at this scale, see Appendix I for list of drill holes) as part of the 2025-2026 preliminary compilation of downhole attribute data in relation to historic mineral occurrences that list graphite as either a primary (labelled) or accessory mineral (not labelled) and a selection of geological rock unit target areas (KPI) with three (3) tectonic terranes in Cape Breton Island: Aspy, Bras d'Or, and Mira terranes (see Figure 27 for legend; modified after Barr and White, 2021; Barr et al., 2017; MacRae et al., 2024).

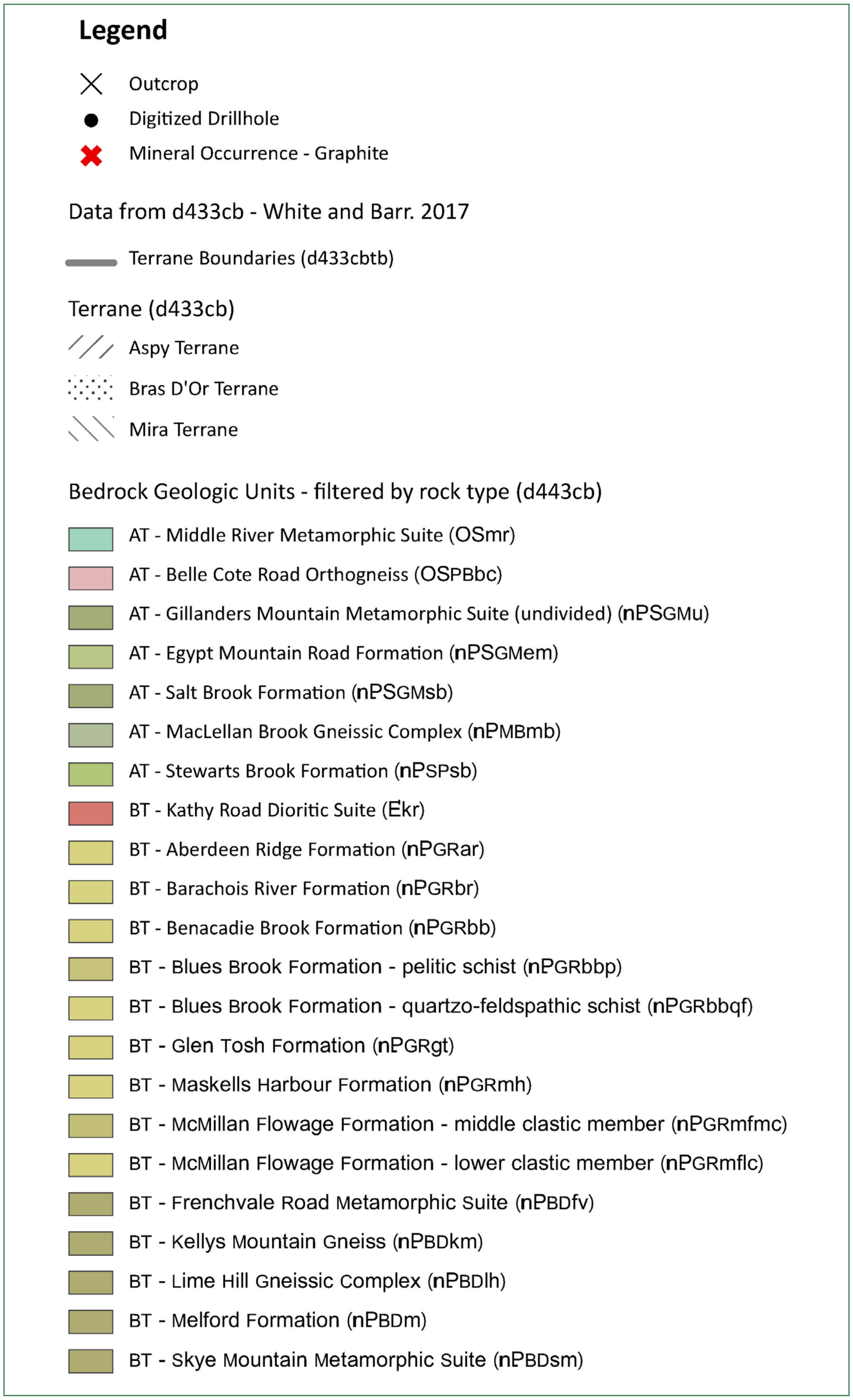

Figure 27. Legend for overview map (Figure 26).

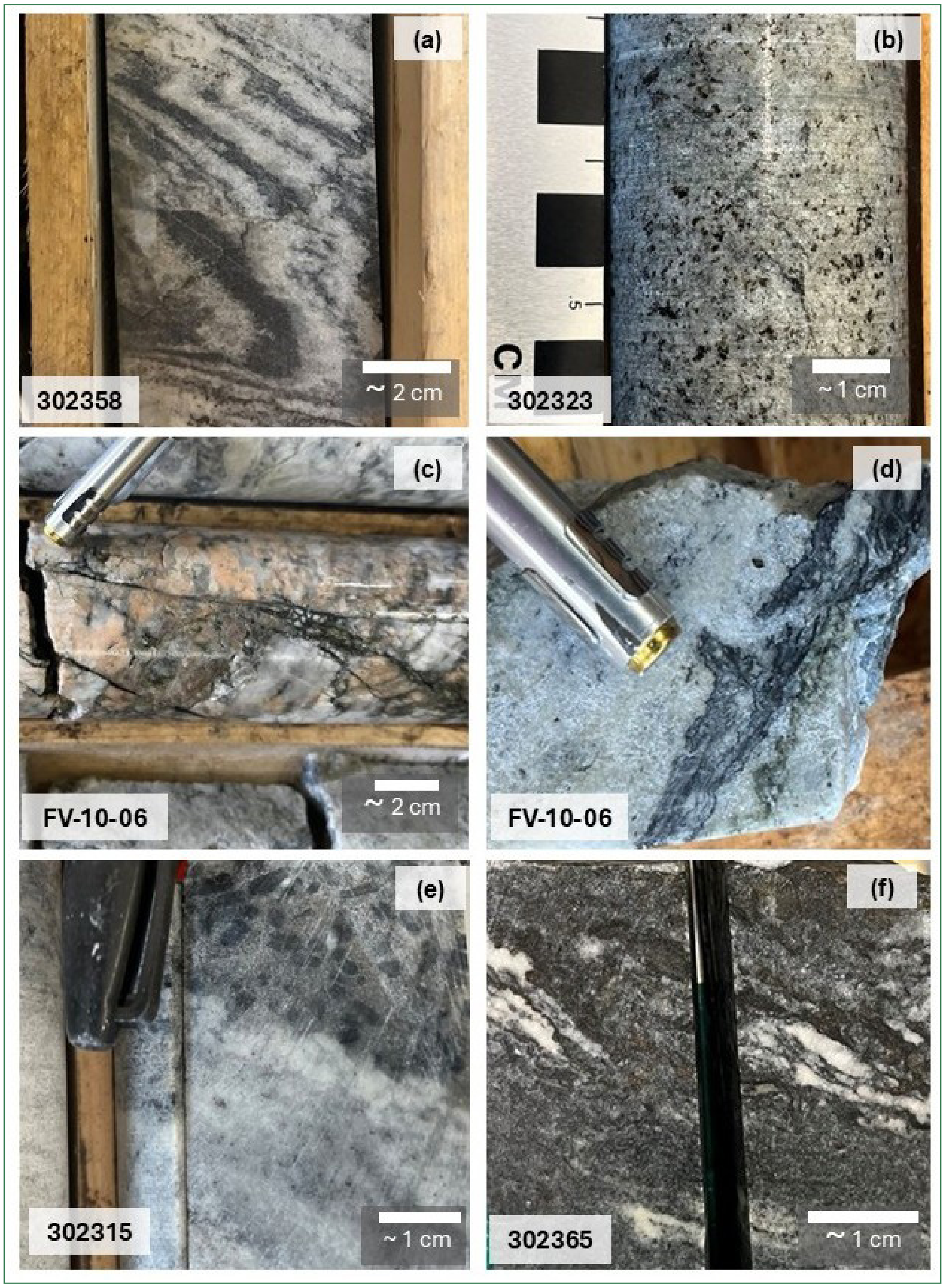

Figure 28. Highlights from 2025 drill core sampling: a) FV-08-04: compressive stress features (z-folds) in grey, banded, marble; b) FV-10-07: grey, marble, local serpentine; patchy graphite (suggested to be the siliceous marble unit "red zone" by Black 2005) in proximity to granitic pegmatite intrusions; c) FV-10-06: feldspar pegmatite (Boisdale Hills Pluton) with graphitic fractures; d) FV-10-06: graphite and calcite development near pegmatite contact (skarn) with marble; e) FV-10-04: light grey, weakly graphitic, tremolite banded marble; f) FV-10-04: black, sheared, pyritic biotite schist (locally graphitic; suggested to be the graphitic biotite gneiss unit "blue zone" by Black, 2005).

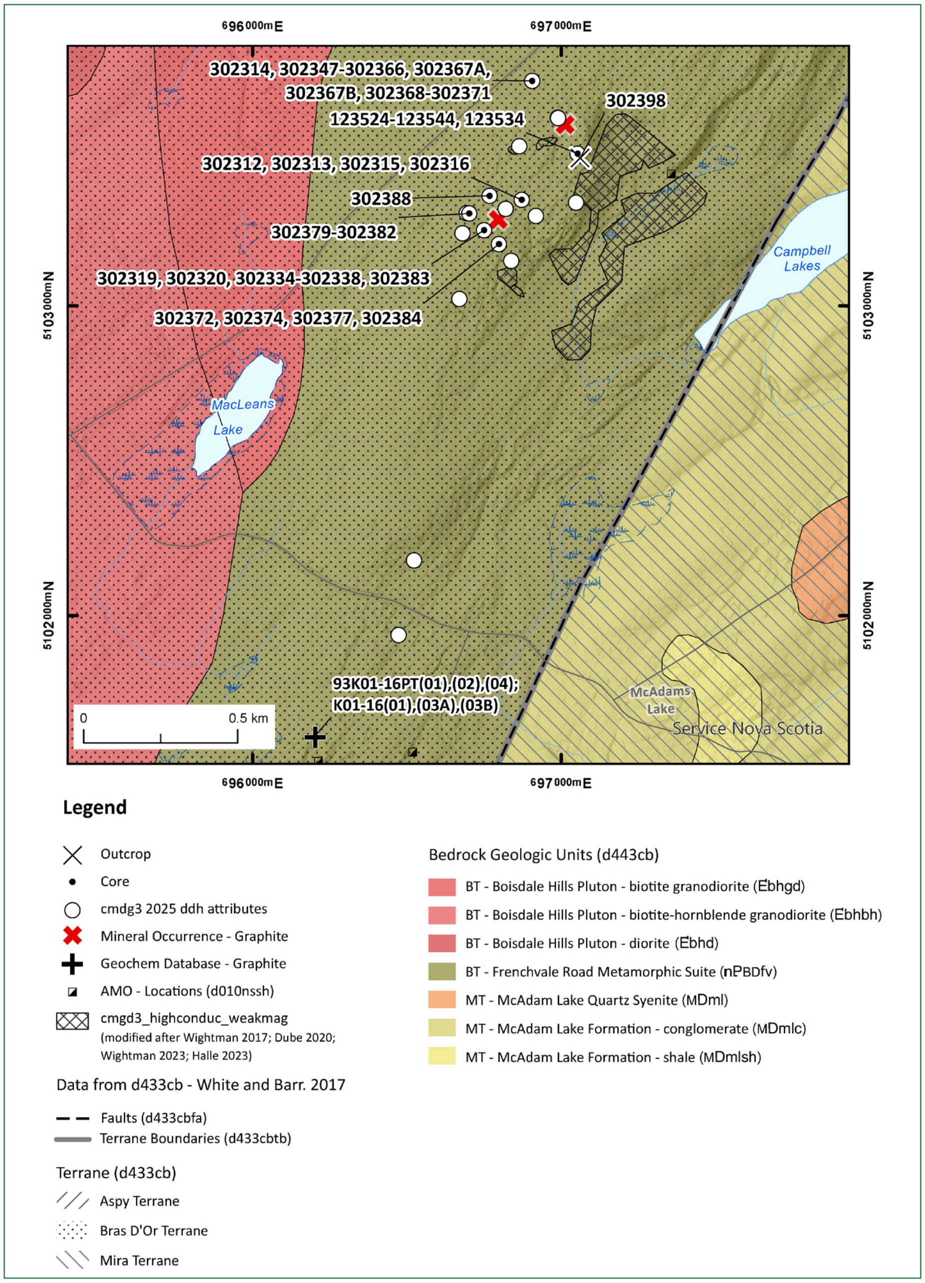

Figure 29. Geological map of Rear Boisdale, Cape Breton County and west of Campbells Lakes extending from the Frenchvale Road to McAdams Lake areas showing the location of drill holes (sampled, digitized), historic graphitic mineral occurrences and geochemical samples, in relation to a crosshatched polygon sketch representing high potential targets for the project, interpreted from low resistivity (i.e. < 48 Ω-m) and weakly magnetic anomalies (i.e. < 0 nT/m; modified after Milligan and Parsons, 1963; modified after Barr and White, 2021; Barr et al., 2017; MacRae et al., 2024; Fisher, 2006; modified after Wightman, 2017; Dube, 2020; Wightman, 2023; Halle, 2023).

In July 2025, four (4) outcrop samples were collected from Rear Boisdale, Cape Breton County and Glencoe, Inverness County (Table 2; Figure 26; Figure 29). Earlier drilling program practices did not always include measurements for the elevation (z-value) associated with the drill collar location, which is essential for a 3D geological model. A total of six (6; Table 3) ground elevation values (z) were collected for drill collar sites in Cape Breton County. Additional site visits are planned for Year 2 (2026-2027).

Table 2. Sample descriptions from 2025-2026 graphite sampling within the Bras d'Or Terrane.

Sample Location	Rock Type	Sample Description
Rear Boisdale, Cape Breton County	Graphitic marble	(302398; Frenchvale Road Metamorphic Suite) Dark gray, light green/blue, white; foliated, coarse-grained marble (calc-silicate calcitic dolomite); tremolite patches; graphite (TGC = 0.17%; Appendix II, III) & disseminated sulphides (fine, silvery), slight stockwork/boxwork veinlets of dark mineralization along slightly schistose plane.
Boisdale Hills, Cape Breton County	Biotite granodiorite	(302394; Boisdale Hills Pluton) Light pink, grey, medium-grained, biotite granodiorite (quartz-rich granitoid; Appendix III).
Upper Glencoe, Inverness County	Dolomitic marble	(302400; Blues Brook Formation, George River Metamorphic Suite) Dark grey, white; foliated, banded, medium- to fine-grained, high-purity calcitic limestone/marble. White calcite recrystallized veining. Dark grey surface weathering.
		(302399; Blues Brook Formation, George River Metamorphic Suite) Light grey, bright white, dark grey; foliated, banded, medium- to fine-grained, high-purity calcitic limestone/marble (TGC = 0.11%; Appendix II, III). Recrystallized calcite veinlets, dark grey sugary textured (crystal/grain). Dark grey, smooth, weathered surface.

Table 3. Ground elevations recorded with a handheld Garmin GPS from drill hole sites where the drill's collar eleveation was unknown within the Nova Scotia Drill Hole Database.

Location	Drill Hole Site	Ground Elevation (m)*
Frenchvale	FV-08-01/FV-24-01	225
	FV-08-02	226
	FV-08-03	215
	FV-08-04	213
McAdams Lake	453-4	150
	453-5	163

* Approximately ± 3-10 m error. Prefeasibility values should be measured with a Real-Time Kinematic (RTK) device to improve accuracy (i.e. ~ cm degree of error).

Sample Preparation

Forty-three (43) of the sixty-one (61; 70%) drill hole logs digitized have a portion of representative cored (HQ to BQ) whole rock material from several campaigns spanning from 1964 to 2010. It was decided that the Frenchvale area would be able to produce a higher amount and wider distribution of moderate to high grade graphitic metamorphic sedimentary core material compared to other locations[7] (Black et al. 2010, Wightman, 2011). This seemed particularly important in the FV-08-03 and FV-10-08 areas were both resistivity and magnetism are low (Wightman, 2017; Dube, 2020; Wightman, 2023; Halle, 2023).

In the summer of 2025, drill core was examined and sample intervals were planned at the Nova Scotia Core Library in Stellarton. In the fall of 2025, seventy-one (71) graphite-bearing drill core samples were cut using a diamond blade. A total of seventy-eight (n=78) rock samples collected between late 2024 and early 2026, and seven (n=7) reference materials were submitted to AGAT Laboratories in Calgary.

Between September and December 2025, thirty-three (33) thin section slabs from whole-rock samples were prepared for optical petrography. Prior to weighing all project samples,

[7] i.e. Core available from the Glendale and Glencoe area are suggested to be low grade metamorphic sedimentary rocks and was not a priority area for the project in 2025.

thin section slabs from select locations were cut into approximately 30 mm by 50 mm slabs at the Stellarton Core Library, using a diamond-blade saw. Slabs were labelled in an arrow using a permanent marker to indicate ideal polishing surface.

Analytical Methods

In fall 2025, the Nova Scotia Geological Survey Division obtained certified standard reference materials from CDN Resource Laboratories Ltd. in Langley, British Columbia to evaluate the laboratory performance of the carbon analysis (Appendix II; CDN Resources, 2014). Silica sand (SiO_2) from Shaw Resources in Shubenacadie, Nova Scotia, was used as blank material[8] to evaluate the laboratory cleanliness during graphitic carbon analysis. These standards and blank materials were inserted into the analytical workflow approximately every 10th sample, and some adjustments were made to position blanks after samples observed as being highly graphitic. Samples were secured in a plastic bag with a plastic zip-tie, stapled with an identification tag, and sealed in buckets (approximately 10 samples per bucket; average sample weight ~ 1.5 kg).

The procurement of analytical services for this project was through a standing offer with Canadian-owned AGAT Laboratories Ltd. (AGAT) in Calgary, Alberta. All eighty-five (85) samples arrived at the AGAT facility in three (3) separate shipments by late January 2026, and AGAT is managing the laboratory workflow and procedures for the following analytical packages (AGAT, 2026): Total Graphitic Carbon (TGC) Analysis by Combustion Infrared (IR) Detection (n=80; AGAT-284109); polished thin sections (n=33; AGAT-08109); Flake size distribution (%) by Scanning Electron Microscope (SEM; n=28; AGAT-08502; subdivided into individual fractions); Mineral Liberation Analysis (MLA) of graphite (i.e. Quantitative Evaluation of Minerals) by Scanning Electron Microscopy (QEMSCAN; n=28; AGAT-08714); Major Oxides (Lithium Borate Fusion, ICP-OES; n=13; AGAT-201076); Whole-Rock Lithogeochemistry (Lithium Borate Fusion, ICP-MS; n=6; AGAT-201078); Stable Isotope Analysis of by Elemental Analysis Isotope Ratio Mass Spectrometry (C–N–S isotopes; EA-IRMS; n=6; AGAT-20571[9]).

AGAT was provided rock descriptions of six (6) samples to aid with C–N–S isotopes and utilized the prepared thin section to determine if samples met requirements for testing by Scanning Electron Microscope (SEM) and Mineral Liberation Analysis (MLA/QEMSCAN) of graphite.

[8] This project assumes this sand product to be relatively carbon-free, with little to no silt, clay, or diamictons (known to occur within Wisconsian aged glaciolacustrine deposits).

[9] Internationally recognized standards (e.g. Vienna Pee Dee Belemnite (VPDB)) will be tested and reported by AGAT and used as a baseline for global consistency of C–N–S isotope values.

A portion of analytical results were received in February 2026 and April 2026 (Appendix II-IV), and the remaining analytics (i.e. graphite flake size by SEM, MLA of graphite by QEMSCAN, and C-N-S isotopes). Remaining results are expected in late April 2026. Environmental safety will be followed during the disposal of rejects (AEP, 2025; AGAT Laboratories, 2025), and pulps will be returned to the Stellarton Core Library for storage.

Despite very few samples meeting the projects KPI for TGC, field work in 2026-2027 will follow up on ideal TCG results at FV-08-04 (i.e. Frenchvale Road Metamorphic Suite) in Rear Boisdale, Cape Breton County, and slightly ideal TCG results at 1227-1 (i.e. Middle River Metamorphic Complex) near Sarach Brook, Inverness County.

Remarks

The new analytical results from Year 1 will be compiled into the 3D workspace, enhancing access and useability of important data and generating insight about potential use of Nova Scotia graphite for battery technology applications, and other industrial applications. Geochemical and geotechnical analyses will fill information gaps needed to support decision-making in Year 2.

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Appendix I

List of drill hole logs with digitized downhole attributes (in bold area 2025-2026 core sample).

Name	Terrane	Location
1227-1	Aspy	Savach Brook
1227-2	Aspy	Savach Brook
81-RB-1	Aspy	Ryan Brook
81-RB-2	Aspy	Ryan Brook
81-RB-3	Aspy	Ryan Brook
453-4	Bras D'Or	McAdam Lake
453-5	Bras D'Or	McAdams Lake
65-MM-1	Bras D'Or	Marble Mountain Quarry
71-10	Bras D'Or	Frenchvale Quarry
71-11	Bras D'Or	Frenchvale Quarry
71-12	Bras D'Or	Frenchvale Quarry
71-15	Bras D'Or	Frenchvale Quarry
71-17	Bras D'Or	Frenchvale Quarry
71-18	Bras D'Or	Frenchvale Quarry
71-2	Bras D'Or	Frenchvale Quarry
71-20	Bras D'Or	Frenchvale Quarry
71-28	Bras D'Or	Frenchvale Quarry
71-5	Bras D'Or	Frenchvale Quarry
71-6	Bras D'Or	Frenchvale Quarry
71-7	Bras D'Or	Frenchvale Quarry
71-9	Bras D'Or	Frenchvale Quarry
8-LG-66	Bras D'Or	Leitches Creek
AL-84-17	Bras D'Or	Scotch Lake
AL-84-6	Bras D'Or	Scotch Lake

Name	Terrane	Location
ALVA-03-1	Bras D'Or	Glendale
ALVA-03-2	Bras D'Or	Glendale
ALVA-03-3	Bras D'Or	Glendale
ALVA-03-4	Bras D'Or	Glendale
CV-1	Bras D'Or	Churchview
CV-2	Bras D'Or	Churchview
CV-3	Bras D'Or	Churchview
F51-6	Bras D'Or	Frenchvale - Frenchvale Road
FRV-08-04	Bras D'Or	Frenchvale Quarry
FRV-09-04	Bras D'Or	Frenchvale Quarry
FRV-11-04	Bras D'Or	Frenchvale Quarry
FV-08-01	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-08-02	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-08-03	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-08-04	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-10-01	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-10-02	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-10-03	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-10-04	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-10-05	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-10-06	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-10-07	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-10-08	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-10-09	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-10-10	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-23-01	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-23-02	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-24-01	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)

Name	Terrane	Location
FV-24-02	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-24-03	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
FV-24-04	Bras D'Or	Frenchvale (Rear Boisdale - Campbell Lakes)
GD-01-2002	Bras D'Or	Glendale
GLN 88-17	Bras D'Or	Glencoe
LC-1	Bras D'Or	Leitches Creek
LC-2	Bras D'Or	Leitches Creek
LC-3	Bras D'Or	Leitches Creek
LC-4	Bras D'Or	Leitches Creek
MC-21-01	Bras D'Or	Frenchvale - Sandy McLeod Lake
ULC 93-2	Bras D'Or	Upper Leitches Creek (Rifle Range Quarry)
ULC 93-3	Bras D'Or	Upper Leitches Creek
ULC 93-4	Bras D'Or	Upper Leitches Creek
WM-15	Bras D'Or	Whycocomagh Mountain
BM81-7	Mira	French Road - Blue Mountain
FR81-11	Mira	French Road - Blue Mountain

Appendix II

Analytical results of Total Graphitic Carbon (%; Furnace IR Finish; package 284-109; reported detection limit (RDL) = 0.05 %). Certified standards and blank materials are in red. Samples that meet key performance indicators for the project are in **bold**.

Sample ID	Graphite C %
	RDL: 0.05
123524	0.17
123525	0.18
123526	0.18
123527	0.17
123528	0.29
123529	0.19
123530	0.14
123531	0.18
123532	0.18
123533	0.21
123534	0.22
123536	0.17
123537	0.32
123538	0.25
123539	0.22
123540	0.62
123541	0.68
123542	0.69
123543	0.55
123544	0.61
123550	<0.05
302312	0.25

Sample ID	Graphite C %
	RDL: 0.05
302313	0.21
302314	2.80
302315	0.22
302316	0.21
302319	0.36
302320	0.47
302335	0.59
302336	0.46
302337	0.97
302338	0.60
302350	0.94
302354	2.73
302355	1.08
302361	0.95
302362	0.60
302363	1.36
302364	<0.05
302370	0.59
302372	0.69
302374	0.97
302379	0.22
302380	0.21
302381	0.25
302382	0.24
302383	0.29
302388	0.61
302400	0.13

Sample ID	Graphite C %
	RDL: 0.05
123535	0.53
302334	1.11
302347	0.60
302348	0.66
302349	0.90
302351	0.58
302352	0.40
302353	0.57
302356	0.63
302357	**2.45**
302358	0.78
302359	0.33
302360	0.89
302365	1.05
302366	0.94
302367	0.79
302368	0.70
302369	**3.19**
302371	1.02
302377	0.61
302384	0.05
302393	0.09
302395	0.11
302396	0.07
302397	1.09
302398	0.17
302399	0.11

Sample ID	Graphite C %
	RDL: 0.05
302401	1.53
302402	1.04
302403	1.13
302404	0.07

Appendix III

Analytical results of Lithium Borate Fusion - Summation of Oxides, ICP-OES Finish package 201-076; reported *RDL = 0.01 %*).

Sample ID	Al_2O_3	BaO	CaO	Cr_2O_3	Fe_2O_3	K_2O	MgO	MnO	Na_2O	P_2O_5	SiO_2	TiO_2	SrO	LOI @ 950 °C
							%.							
							RDL: 0.01							**%**
302340	15.40	0.05	4.65	<0.01	9.89	1.51	4.34	0.13	2.30	0.85	54.50	1.76	0.03	2.59
302341	16.70	0.02	4.68	<0.01	8.17	2.93	3.68	0.14	0.73	0.10	61.70	0.98	<0.01	6.30
302371	4.09	<0.01	39.60	<0.01	1.90	0.44	10.20	0.05	0.03	0.22	15.30	0.17	0.03	30.10
302377	16.40	0.06	3.82	0.01	9.31	2.45	6.68	0.14	1.00	0.10	57.90	0.78	0.03	4.88
302399	0.52	<0.01	63.10	<0.01	0.22	0.10	0.62	<0.01	<0.01	<0.01	1.67	0.03	0.02	41.80
302401	8.94	0.14	1.26	<0.01	5.41	2.11	1.29	0.05	0.95	0.10	76.20	0.51	<0.01	4.00
302403	11.80	0.31	2.43	0.01	4.89	1.54	2.04	0.07	2.42	0.13	70.60	0.78	0.02	3.70
302404	10.80	<0.01	31.40	<0.01	13.40	0.05	1.88	0.76	0.08	0.16	42.30	0.54	<0.01	5.98
302398	1.87	<0.01	36.40	<0.01	1.10	0.36	10.40	0.06	0.52	0.06	35.30	0.08	0.03	17.90
302393	0.28	3.24	14.80	<0.01	36.40	0.05	1.16	1.09	0.04	0.03	0.93	<0.01	0.09	14.40
302394	13.40	0.06	1.31	<0.01	2.13	3.05	0.56	0.06	3.46	0.06	74.50	0.23	0.02	1.10
302395	5.04	<0.01	30.50	<0.01	4.50	0.27	6.43	0.12	0.02	0.05	32.70	0.19	0.02	23.30
302396	3.29	<0.01	0.85	<0.01	27.90	0.09	2.29	0.01	0.75	0.02	53.50	0.19	<0.01	10.70

Appendix IV

Analytical results of Lithium Borate Fusion - Metals by ICP-MS Finish package 201-078; reported *RLD* are *italicized*.

Sample ID	Ba	Ce	Co	Cs	Dy	Er	Eu	Ga	Gd	Ge	Hf	Ho	In	La	Lu	Mo	Nb	Nd
	ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
	2	*0.1*	*0.5*	*0.1*	*0.05*	*0.05*	*0.05*	*0.1*	*0.1*	*1*	*0.1*	*0.05*	*0.2*	*0.1*	*0.05*	*2*	*0.1*	*0.1*
302340	404.00	58.00	19.50	1.40	5.22	2.83	1.59	18.30	6.80	1.00	3.00	0.97	<0.2	25.50	0.31	<2	12.10	32.90
302341	158.00	82.10	17.80	4.90	4.24	2.62	1.14	22.30	5.30	1.00	4.40	0.82	<0.2	40.20	0.37	3.00	12.70	36.80
302371	28.00	12.80	6.20	1.30	1.10	0.64	0.40	5.50	1.30	<1	1.10	0.22	<0.2	6.30	0.08	2.00	4.20	6.10
302401	1280.00	38.00	30.60	3.00	17.40	9.04	1.92	15.00	17.00	2.00	2.40	3.30	<0.2	13.00	0.68	24.00	5.60	40.00
302403	2910.00	32.90	18.60	5.00	3.85	2.39	1.15	15.70	4.00	2.00	2.80	0.76	<0.2	14.80	0.32	19.00	6.90	18.00
302404	16.00	62.20	23.10	1.50	4.94	2.71	1.79	16.00	6.50	3.00	3.60	0.92	3.70	31.70	0.34	<2	8.80	31.80

Sample ID	Ni	Pr	Rb	Sc	Sm	Sn	Sr	Ta	Tb	Th	Tl	Tm	U	V	W	Y	Yb	Zr
	ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**
	5	*0.1*	*0.2*	*0.5*	*0.1*	*1*	*0.5*	*0.5*	*0.1*	*0.05*	*0.05*	*0.05*	*0.05*	*5*	*0.5*	*0.5*	*0.05*	*0.5*
302340	47.00	7.20	50.70	22.80	7.00	2.00	213.00	1.00	0.90	7.39	0.12	0.35	1.55	170.00	3.40	25.80	2.26	109.00
302341	27.00	9.10	111.00	17.20	6.50	1.00	49.90	1.00	0.70	14.50	0.28	0.38	2.48	119.00	2.50	22.30	2.69	163.00
302371	16.00	1.50	14.50	3.80	1.30	<1	276.00	<0.5	0.20	2.58	0.15	0.09	1.68	43.00	3.70	6.40	0.59	43.50
302401	85.00	6.70	95.90	13.00	14.50	1.00	21.90	<0.5	2.60	3.67	0.40	1.11	6.50	165.00	1.60	86.40	5.88	102.00
302403	86.00	4.10	56.40	17.90	3.90	2.00	206.00	0.60	0.60	4.07	0.78	0.33	6.18	197.00	0.90	22.20	2.22	120.00
302404	35.00	7.20	2.90	12.90	6.90	169.00	47.50	0.70	0.80	5.49	0.05	0.35	1.19	50.00	5.00	28.80	2.38	132.00