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# ASSESSMENT REPORT

**July 19th, 2023**

# Pennock Lake Geophysics Assessment Report

Red Lake Mining Divisions
Setting Net Lake and Setting Net Creak area
NTS 53C12/53C13

**For:**
Green Technology Metals Ltd.
160 Logan Avenue
Thunder Bay, ON, Canada
P7A 6R1

**Prepared By:**
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# Assessment Report

**PENNOCK LAKE LITHIUM PROJECT – HIGH-RESOLUTION HELIBORNE MAGNETIC SURVEY**

## SUMMARY

Green Technology Metals (Green TM Resources (Canada) Ltd.) contracted Prospectair Geosurveys Inc. to conduct a heliborne high-resolution magnetic (MAG) survey of the Pennock Lake Lithium Project, which is 100% owned by Solstice Gold Corp and optioned by Green Technology Metals. The Pennock Lake Lithium Property is located immediately to the northwest of Pennock Lake and extends along the southwest shoreline of the larger Setting Net Lake. The heliborne high-resolution MAG survey covered the entire Pennock Lake Lithium Property totaling 306-line kms across 6 production flights. The survey was flown with traverse lines at 50 m spacing and control lines every 500 m. The residual Total Magnetic Intensity (TMI) of the Pennock Lake block is relatively active and varies over a range of 4,240 nT, with an average of -193 nT and a standard deviation of 324 nT.

Prospectair Geosurveys noted several lineaments within the block that appear curved, either by shearing or folding structures. If these possible structures are thought to be favorable in the exploration context of the Pennock Lake Lithium Property, they should be paid particular attention to and should be the object of a comprehensive structural interpretation.

The data collected from the heliborne high-resolution MAG survey conducted by Prospectair Geosurveys Inc provided high-resolution data and images of the Pennock Lake Lithium Project. The data will be used by Green Technology Metals to help define future prospecting targets.

# INTRODUCTION

Green Technology Metals engaged Prospectair Geosurveys Inc. to complete a heliborne high resolution MAG survey over the entirety of the Pennock Lake Lithium Project that is 100% owned by Solstice Gold Corp and optioned by Green Technology Metals. Prospectair Geosurveys Inc. completed the program between March 31st and April 2nd, 2023.

The Pennock Lake Lithium Project is located in the Pennock Lake area of the Red Lake Mining Division in the Province of Ontario (Figure 1). Green Technology Metals has engaged in exploration activities, including those reported here, to explore the project for spodumene-bearing LCT type pegmatites.

The coordinate system used throughout this report is NAD83 UTM Zone 15N.

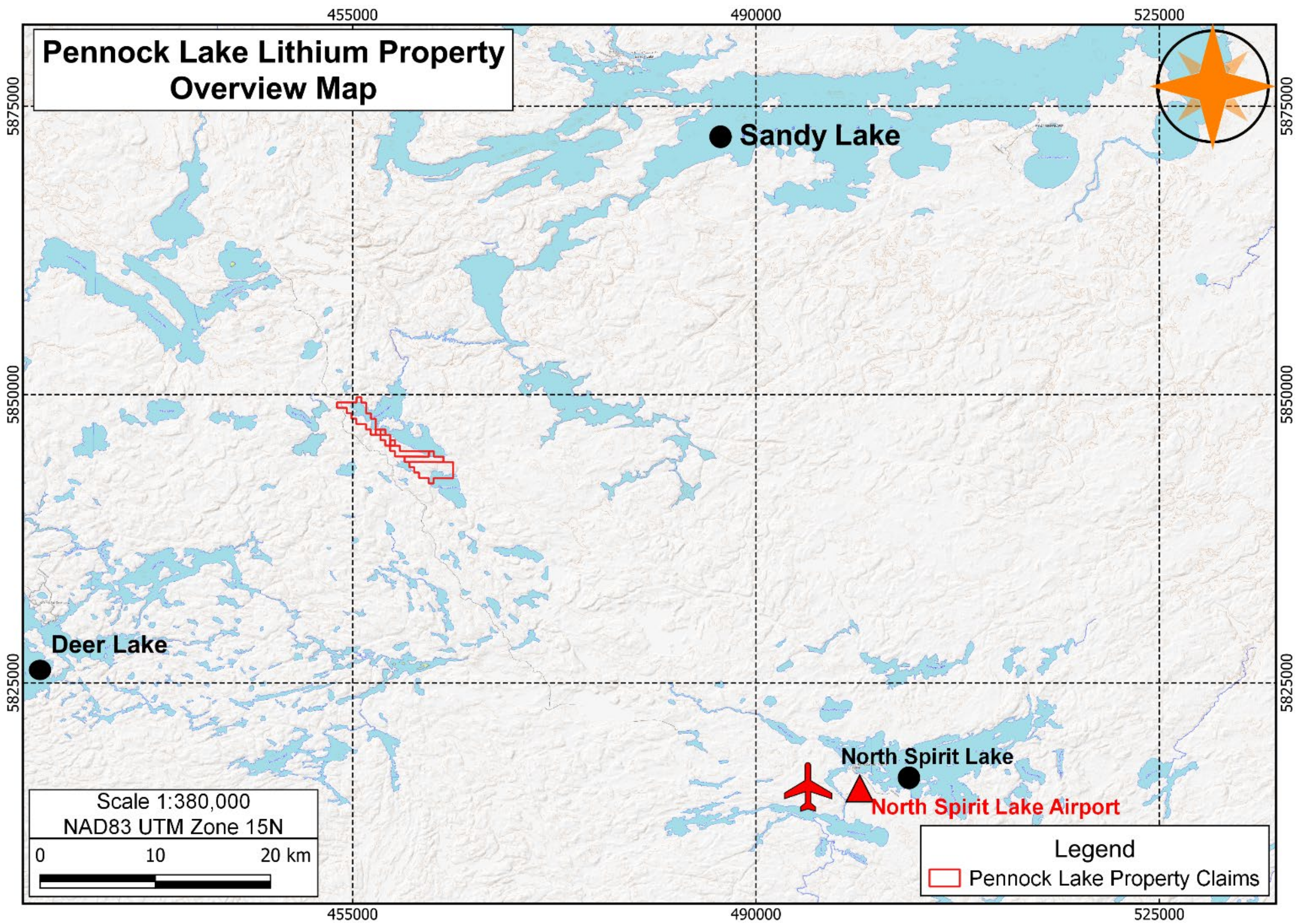


***Figure 1.*** *Pennock Lake Lithium Project property location.*

# 1. LOCATION, ACCESS, AND PHYSIOGRAPHY

The Pennock Lake Lithium Project is located approximately 574km northwest of Thunder Bay, the largest city in Northwestern Ontario, Canada. With respect to the closest First Nations communities, the Pennock Lake Lithium Property is located approximately 50 km northwest of North Spirit Lake, 30 km northeast of Deer Lake and 40 km southwest of Sandy Lake (Figure 1). The Project is located in the Red Lake Mining Division.

Access to the property is available year-round by chartered ski or float equipped aircraft from Red Lake, except for a short period of time for ice freeze up in the winter and ice break up in the spring. Bearskin Airlines and Wasaya Air service the nearby communities of Deer Lake, North Spirit Lake, and Sandy Lake with daily flights year-round. A few winter roads also extend to the outer edges of the property.

The property is located in an area of variable topographic relief typical of the Canadian Shield. Bedrock exposures are typically limited to ridges and shorelines.

# 2. PROPERTY OWNERSHIP AND CLAIMS

The Pennock Lake Lithium Property is composed of 5 multi-cell mining claims and 3 single-cell mining claims for a total of 8 mining claims (Table 1). Solstice Gold Corp holds 100% ownership of all claims which are optioned by Green Technology Metals (Green TM Resources (Canada) Ltd.). Figure 2 shows the Pennock Lake Lithium Property claims map.

***Table 1**. All Mining License of Occupation and Patents for the Pennock Lake Lithium Project.*

| TENURE # | TITLE | ANNIVERSARY | HOLDER | HECTARES | TOWNSHIP |
|---|---|---|---|---|---|
| 646116 | Multi-cell Mining Claim | 2023-03-29 | (100) Solstice Gold Corp. | 94.773 | Setting Net Lake Area |
| 622108 | Single Cell Mining Claim | 2022-12-04 | (100) Solstice Gold Corp. | 4.310 | Setting Net Lake Area |
| 622116 | Single Cell Mining Claim | 2022-12-04 | (100) Solstice Gold Corp. | 4.310 | Setting Net Lake Area |
| 622126 | Single Cell Mining Claim | 2022-12-04 | (100) Solstice Gold Corp. | 4.310 | Setting Net Lake Area |
| 646114 | Multi-cell Mining Claim | 2023-03-29 | (100) Solstice Gold Corp. | 38.800 | Setting Net Lake Area |
| 646106 | Multi-cell Mining Claim | 2023-03-29 | (100) Solstice Gold Corp. | 107.780 | Setting Net Creak Area |
| 646115 | Multi-cell Mining Claim | 2023-03-29 | (100) Solstice Gold Corp. | 12.919 | Setting Net Lake Area |
| 646107 | Multi-cell Mining Claim | 2023-03-29 | (100) Solstice Gold Corp. | 38.800 | Setting Net Lake & Setting Net Creak Area |

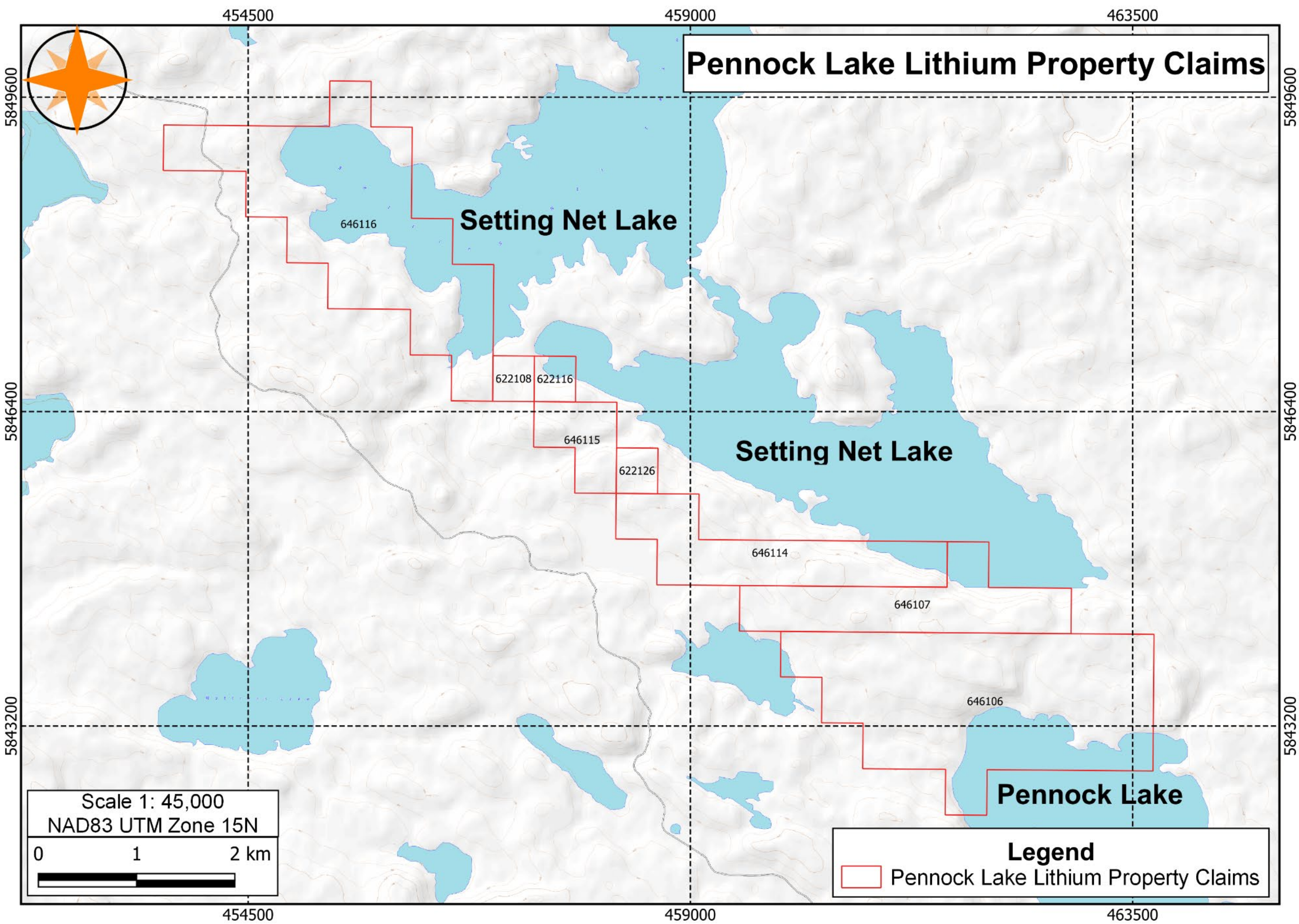


***Figure 2.*** *Map of the Pennock Lake Lithium Property claims.*

# 3. EXPLORATION HISTORY

The work history of the Pennock Lake Lithium Project and the surrounding area is summarized in Table 2. The work history of the area was modified after McCracken et al (2021).

***Table 2.*** *A summary of the work and exploration history of the Pennock Lake Lithium Project and surrounding areas (McCracken et al., 2021).*

| Year | Company/Organization | Activity | Highlights |
|---|---|---|---|
| 1926 | ODM | Reconnaissance survey | Reconnaissance scale mapping. |
| 1977 | OGS/GSC | Airborne radiometric | Regional survey with 5 km line spacing at 2.2 km stations. |
| 1990-1993 | OGS | Geological mapping | Identified anomalous Li, Cs, Ta, and Be in tourmaline-rich samples at Pakeagama Lake and discovered 5 rare metal occurrences over 35 km along the Bear Head Fault Zone. |
| 1998-1999 | OGS | Geological mapping- channel sampling | Completed detailed mapping and geochemistry (grab and channel samples) to establish **Pakeagama Lake Pegmatite** as world-class with Tanco-type mineralization. Significant mineralized zones were identified (285 ppm $Ta_2O_5$, 0.59% $Rb_2O$, 967 ppm $Cs_2O$, and 1.15% $Li_2O$ over 11.0 m) identified. |
| 2001 | HLM Houston Lake Mining | Ground geophysics | 26-km magnetic and VLF survey; the survey was unsuccessful in delineating the pegmatite zone, however, defined the contacts between metasedimentary and granitic rock that contains the pegmatites in overburden covered areas. |
| 2001 | HLM Houston Lake Mining | Geological channel sampling | Identified and confirmed high-grade lithium in the "Core Zone" of 4.5% $Li_2O$ over 13.9 m. |
| 2007 | Shoreham Resources Ltd. | High resolution aeromagnetic and radiometric survey | An air-borne tri-sensor high sensitivity magnetic and gamma ray spectrometer survey was performed to collect data for future prospecting of uranium. |
| 2008 | HLM Houston Lake Mining | Soil sampling | Re-established the grid for mapping the pegmatite and surrounding area. An Enzyme Leach survey was completed showing an apparent continuity of the anomalous zones away from the pegmatite to the southeast and east. This is most apparent with Cs, V, Ta, Li, Ga, and Nb. |

| | | | |
|---|---|---|---|
| 2008 | Shoreham Resources Ltd. | Soil sampling, prospecting and spectrometry | A 1-week prospecting and soil sampling program was conducted in order to assess the property for potential economic uranium mineralization. |
| 2013-2015 | HLM<br>Houston Lake Mining | Phase I, II, III, IV diamond drilling. | In the surrounding area completed 955m (Phase I), 1,489m (phase II), 1,641m (phase III) and 608m (phase IV). Drilling phase I intersected 154m Pegmatite zone grading 1.22% $Li_2O$ and a high-grade Lithium zone of 18 m grading 4.22% $Li_2O$. |
| 2018- 2019 | Frontier Lithium | Phase VII and VIII diamond drilling | Completed an additional 5 holes (1,340m drilling) and 4 holes (1,159m) at Spark Pegmatite. |
| 2019 | Frontier Lithium | Channel sampling | Completed 1 channel on the exposed surface of **Pennock Pegmatite**. |
| 2020 | Frontier Lithium | Channel sampling | Completed 2 channels on the exposed surface of **Bolt Pegmatite**. |

# 4. REGIONAL GEOLOGY

The Pennock Lake Lithium Property is situated about 3 km's northeast of the boundary between the Berens River (to the southwest) and Sachigo (to the northeast) subprovinces of the Archean-aged Superior Province (Card and Ciesielski, 1986 and Card, 1990). Both subprovinces are predominately composed of granitic and gneissic suites of rock that surround relatively isolated greenstone (volcano-sedimentary) belts and are separated by the Bear Head Lake Fault Zone (Figure 3) (McCracken et al., 2021). The Bear Head Lake Fault Zone, which has been traced along strike for over 140 kms, is the dominant structural feature in the region. The fault zone is composed of a several hundred meters thick zone of mylonite with cataclasites, tension gashes infilled by vuggy quartz-epidote-adularia, and potassic alteration indicating superimposed brittle deformation on the mylonite (Germundson, 2008). McCraken et al (2021) note the presence of nine major plutons consisting of two mica granites, which have been interpreted as fertile granites, over the 140 km strike length of the fault.

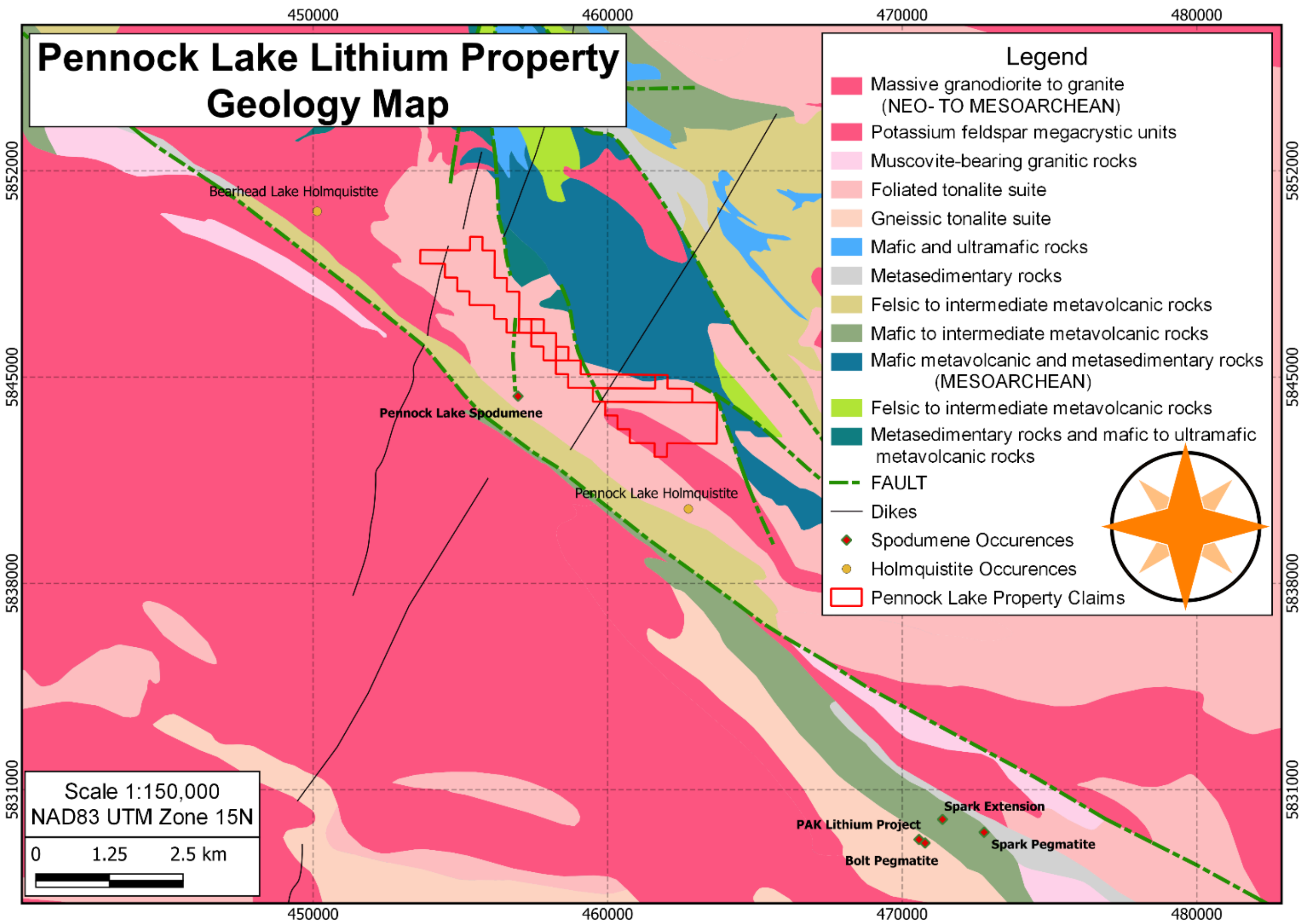


***Figure 3.*** *Geological map of the Pennock Lake Lithium Project. The green dashed line is the Bear Head Lake Fault Zone. Lithologies, faults and dikes are from the Ontario Geological Survey (2011).*

## 5. LOCAL GEOLOGY

The Pennock Lake Lithium Property is situated primarily within foliated tonalite and massive granodiorite to granite. Directly northeast of the property is the Favourable - Setting Net greenstone belt comprised of mafic metavolcanics and metasedimentary units. To the southeast of the property is the North Spirit Lake greenstone belt that is also predominantly comprised of mafic metavolcanics and metasedimentary units. These two greenstone belts are connected through the Bear Head Lake Fault zone and are metamorphosed to the greenschist facies with localized areas of amphibolite facies metamorphism within proximity of the Bear Head Fault zone (McCracken et al., 2021).

Though there are no known lithium occurrences within the Pennock Lake Lithium Project itself, several spodumene-bearing pegmatite occurrences and holmquistite occurrences have been documented nearby. Approximately 3 kms northwest of the property is the Bearhead Lake Holmquistite occurrence that was reported by Ayres (1972). Approximately 1.5 kms to the southwest of the property is the Pennock Lake Pegmatite Spodumene occurrence that was documented by Ayres in 1972 and later mapped / sampled by Frontier Lithium in 2018 (Ayres, 1972; McCraken et al., 2021). McCraken et al (2021) describe the Pennock Lake pegmatite as a 1.5 km-long pegmatite dike that is oriented east-west with intermittent exposure. The pegmatite contains white to light grey spodumene and lepidolite and crosscuts the main trend of the Bearhead Lake Fault Zone and ultimately culminates near a 16m wide exposed "blowout" at the western end. A channel was cut across the main blow-out area of the Pennock Lake Pegmatite in July 2019 with samples recording an average of 1.96% $Li_2O$ over 16 m or 2.35% $Li_2O$ over 12 m. 2 kms south of the Pennock Lake Lithium Property is the Pennock Lake Holmquistite occurrence that was also discovered by Ayres (1972). The holmquistite mineralization is reported to have been found within a 800 m to 1600 m northwest-trending pegmatite-bearing zone in the granitic batholith. Finally, several spodumene-bearing pegmatites, including the spark pegmatite, the bolt pegmatite, the PAK lithium project and the spark pegmatite extension, have been documented approximately 18 kms to the southeast of the Pennock Lake Lithium Property.

# 6. PROSPECTAIR GEOSURVEY - HIGH-RESOLUTION HELIBORNE MAGNETIC SURVEY

## Survey Specifications

A heliborne high resolution MAG survey was completed on the entirety of the Pennock Lake Lithium Property by Prospectair Geosurveys Inc. from March 31st to April 2nd, 2023. Survey operations were conducted out of the North Spirit Lake Airport (Figure 1), located 50 km to the southeast of the block. A total of 306 l-kms across 6 flights were completed for data acquisition using a helicopter owned by Prospectair, a Robinson R-44, registration C-GBOU. Table 3 summarizes the survey block particulars.

***Table 3.*** *Survey block specifications provided by Prospectair Geosurveys Inc.*

| Block | NTS Map sheet | Line-km flown | Flight numbers | Dates Flown |
|---|---|---|---|---|
| **Pennock** | 053C12, 053C13 | 306 l-km | Flt 1 to 6 | March 31 to April 2 |

Traverse lines (oriented N035°) were flown at 50 m spacing and control lines (oriented N125°) were spaced every 500 m. The average height above ground of the helicopter and magnetic sensor was 43 m and 24 m, respectively. Figure 5 shows the Pennock Lake claims and flight lines for the survey. The heliborne system used a non-oriented (strap-down) optically pumped Cesium split-beam with a sensitivity of 0.005 nT as the airborne magnetometer. The magnetic base station, which was set up in a secure location with low magnetic noise, consisted of 1 GEM GSM-19 overhauser magnetometer, a computer workstation and an array of spare parts and equipment. Other specifics of the survey equipment used by Prospectair Geosurveys can be found in the geophysical technical report in Appendix 1.

## Procedures and QA/QC

At the end of each production day, the collected data was sent to the Dynamic Discovery Geoscience office via the internet where the data was checked for quality control to ensure contractual specifications. Demobilization was allowed only after the full dataset was inspected. Data compilation including editing, filtering, quality control, and final data processing was performed by Joël Dubé, P.Eng. Processing was performed on high performance computers using Geosoft software Oasis Montaj version 2022.2. Other details of Prospectair Geosurveys procedures and QA/QC protocols, including information on data processing, can be found in the geophysical technical report shown in Appendix 1.

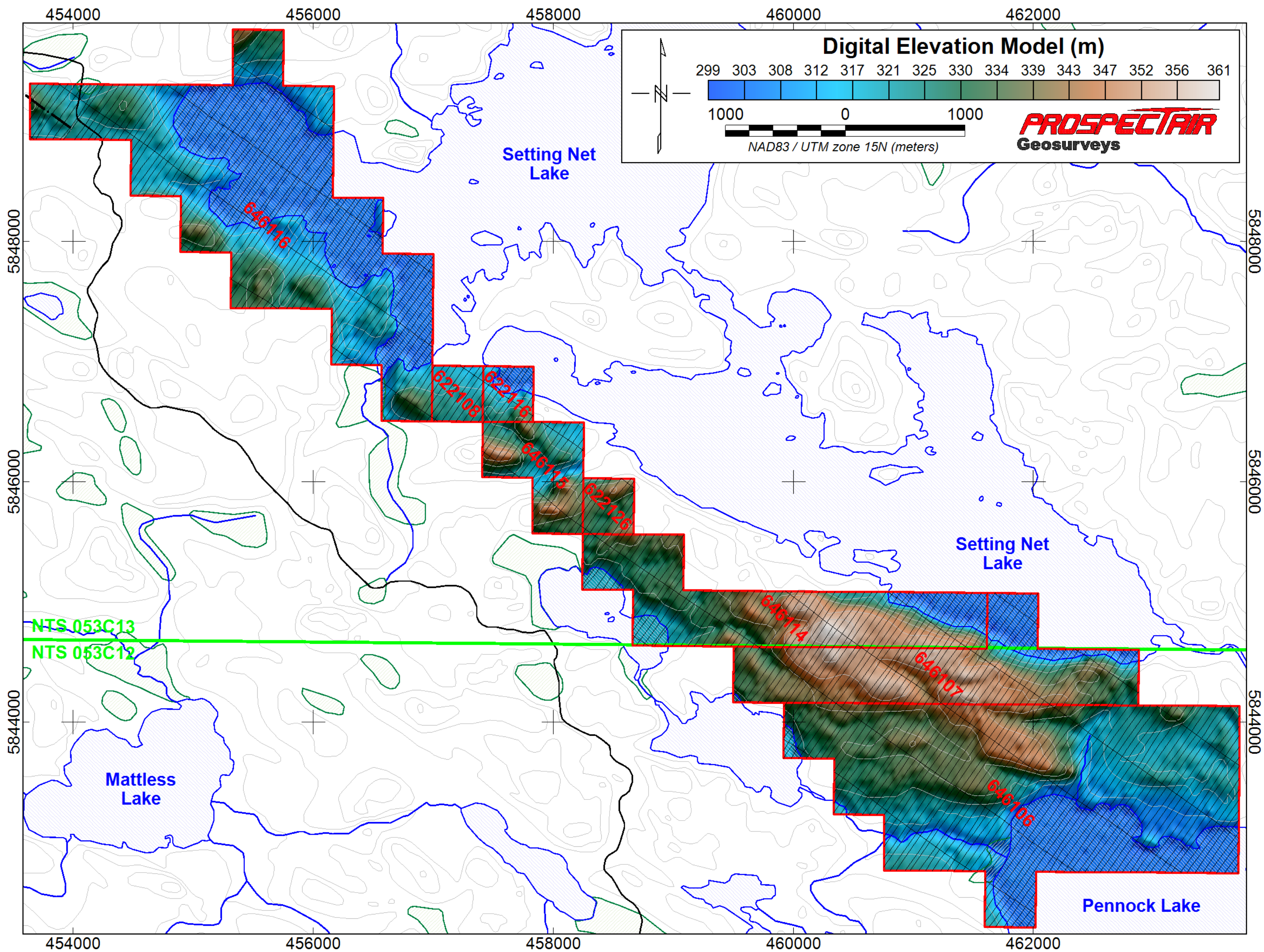


***Figure 5.*** *The Pennock Lake Lithium Property claims (outlined in red) and flight paths (black) of Prospectair Geosurveys heliborne high resolution MAG survey.*

## Results: High-Resolution Heliborne Magnetic Survey

The following is a summary of the results and discussion provided by Prospectair Geosurveys Inc:

The residual Total Magnetic Intensity (TMI) of the Pennock Lake Lithium Property (Figure 6) is relatively active and varies over a range of 4,240 nT, with an average of -193 nT and a standard deviation of 324 nT. The northwestern half of the property and a small area in the southernmost region of the property is mostly composed of low amplitude anomalies that is characteristic of areas dominated by meta-sedimentary or intermediate to felsic intrusive rocks. Stronger anomalies typical of mafic intrusives or volcanics are noted in the southeastern region of the property. The strongest anomalies within the property are covered by the Setting Net Lake and could be related to layers of mafic volcanic rocks, to either meta-sedimentary horizons enriched in magnetic minerals or to intermediate/mafic intrusions.

Magnetic lineaments, which are typically related to rock formations that are enriched in magnetic minerals such as magnetite and pyrrhotite, are generally trending NW-SE in the area, though variation is noted. In the northwestern part of the property, there are a few very straight lineaments striking N-S and NNE-SSW that could be related to mafic dykes. Several lineaments appear curved, either by shearing or folding structures, or at the contact zone with some possible intrusions in the area.

Of notable interest to the Pennock Lake Lithium Property are the structural features offsetting observed magnetic lineaments. These features are typically caused by faults, fractures, and shear zones. Faults and fractures could have acted as pathways for pegmatites to intrude/crystallize within and should therefore be assessed in future exploration programs.

Prospectair Geosurveys also notes the presence of a high-tension powerline that cuts the northwestern region of the property as they are known to be a possible source of non-geological noise in the magnetic data. Furthermore, high frequency anomalies located near the powerline should be treated with caution when planning future ground investigations of magnetic anomalies within the area.

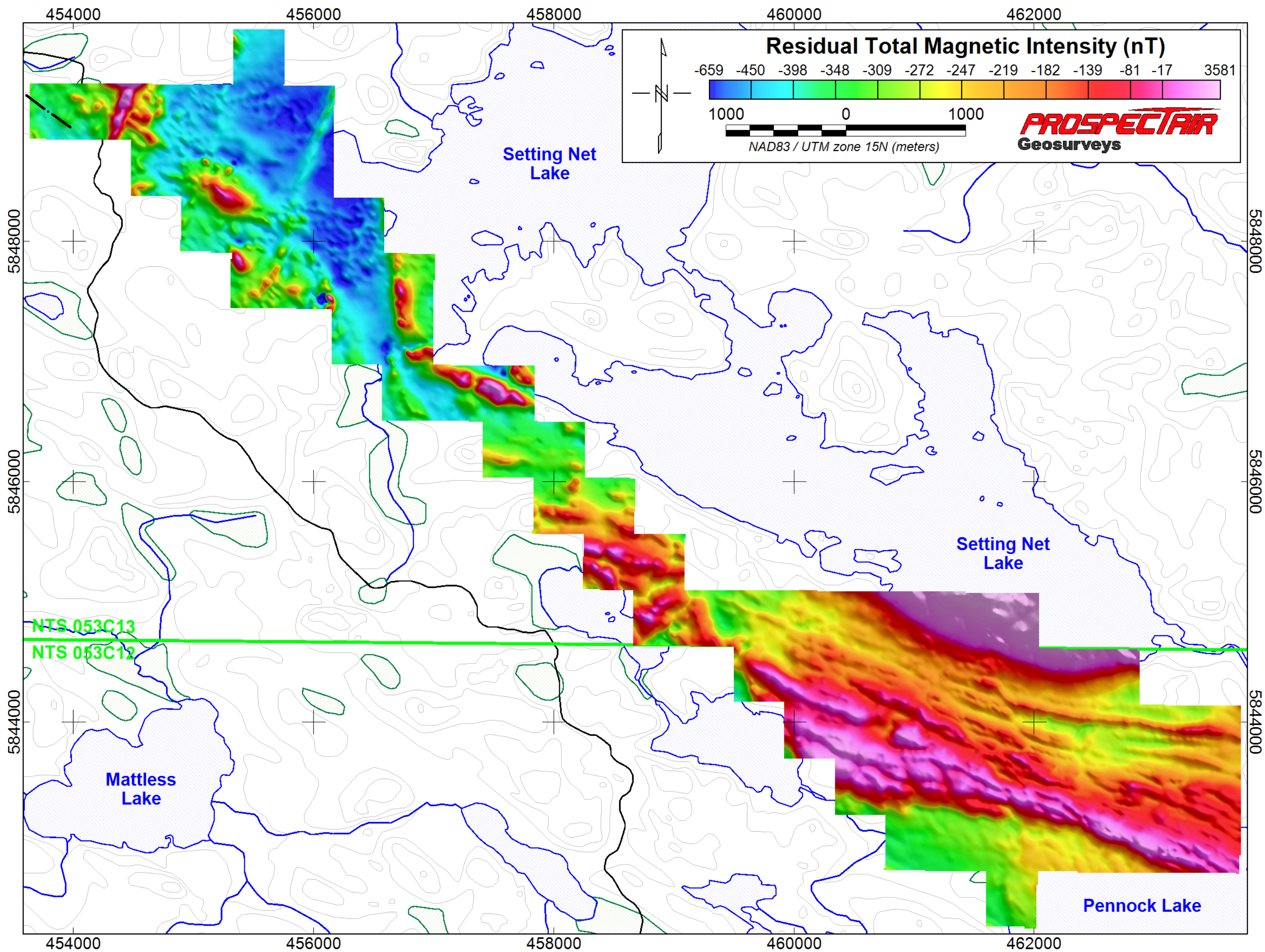


*Figure 6. The residual Total Magnetic Intensity (TMI) with equal area color distribution map of the Pennock Lake Lithium Property.*

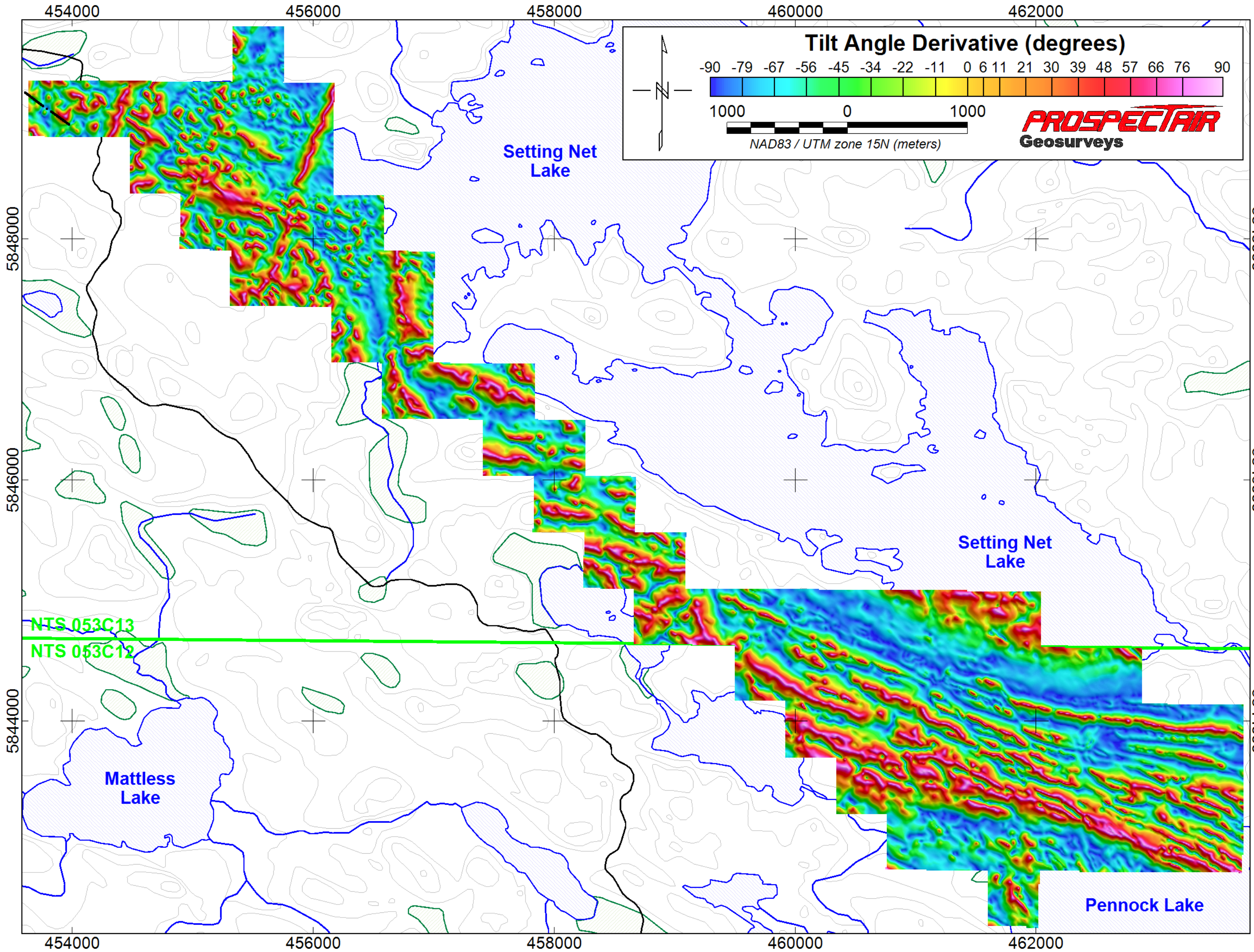


***Figure 7.*** *The Tilt Angle Derivative (TAD) map of the Pennock Lake Lithium Property.*

# 7. CONCLUSIONS

The data collected from the heliborne high-resolution MAG survey conducted by Prospectair Geosurveys Inc. provided high-resolution data and images of the Pennock Lake Lithium Project. The data collected from the survey will be used by Green Technology Metals to help define future potential drilling and prospecting targets.

# 8. STATEMENT OF EXPENDITURES – PROSPECTAIR GEOSURVEYS

Expenditures for the Prospectair Geosurveys high-resolution MAG survey of the Pennock Lake block totaled $62,840.00 pre-taxes. $56.840.00 was assigned to the flight lines and $6,000 was assigned to labor costs (mob-demob). Report writing completed by Bayside Geoscience totaled $7,760.00, which was split evenly amongst the claims. The allocation of expenses to each claim cell were calculated by determining the total line kilometers that were surveyed over each claim to calculate a proportion of the total cost. Table 4 summarizes the cost proportion for each claim.

***Table 4.*** *Summary of the cost proportion of Pennock Lake block per each claim.*

| | **Survey Flight Lines** | | | **Labor** | **Report Writing** | |
|---|---|---|---|---|---|---|
| **Tenure Number** | Line km's | Proportion | Cost | Mob/Demob Cost | Report Writing | Total Cost / Claim |
| **646116** | 94.69 | 30.98% | $ 17,610.25 | $ 750.00 | $ 970.00 | $ 19,330.25 |
| **622108** | 4.17 | 1.36% | $ 775.64 | $ 750.00 | $ 970.00 | $ 2,495.64 |
| **622116** | 4.42 | 1.45% | $ 822.69 | $ 750.00 | $ 970.00 | $ 2,542.69 |
| **622126** | 4.17 | 1.36% | $ 774.81 | $ 750.00 | $ 970.00 | $ 2,494.81 |
| **646114** | 38.66 | 12.65% | $ 7,189.20 | $ 750.00 | $ 970.00 | $ 8,909.20 |
| **646106** | 107.73 | 35.25% | $ 20,034.23 | $ 750.00 | $ 970.00 | $ 21,754.23 |
| **646115** | 13.01 | 4.26% | $ 2,420.35 | $ 750.00 | $ 970.00 | $ 4,140.35 |
| **646107** | 38.78 | 12.69% | $ 7,212.83 | $ 750.00 | $ 970.00 | $ 8,932.83 |
| | 306 | 100.00% | $ 56,840.00 | $ 6,000.00 | $ 7,760.00 | $ 70,600.00 |

## 9. SIGNATURES

I, Bailey Drover, of the City of Thunder Bay, in the Province of Ontario, do herby certify that:

1. I am currently employed with the geological consulting company Bayside Geoscience Inc.
2. I am an active, registered Geologist in Training with the Professional Geologist of Ontario (APGO Membership # 11240)
3. I am a graduate of Lakehead University, Thunder Bay, Ontario with an Honours Bachelor of Science (Geology) degree in May 2017 and a Master of Science (Geology) degree in May 2022.
4. I have been employed as a contract Geologist in Training with Bayside Geoscience Inc. from March 2022 – May 2022 and a staff Geologist in Training since May 2022.
5. I have no interest, either directly or indirectly, in the subject property.

Dated

July 19th, 2023

Thunder Bay, Ontario, Canada

Bailey Drover, M.Sc., G.I.T

I, Seyed Reza Ghavami Riabi, of the City of Thornhill, in the Province of Ontario, do hereby certify that:

1. I am currently employed by Bayside Geoscience Inc., a geological consulting company based in Thunder Bay, Ontario.
2. I am an active, registered Geologist in Training with the Professional Geologist of Ontario (APGO Membership #10757).
3. I attained a Ph.D. of Geology - Exploration Geochemistry degree from University of Pretoria -Pretoria, South Africa (2007), M.Sc. of Mining Exploration- Exploration Geophysics degree from AmirKabir University of Technology, Tehran- Iran, and B.Sc. of Mining Engineering - Mineral Exploration degree from Isfahan University of Technology, Isfahan- Iran.
4. I have worked as an exploration geologist for over 10 years focusing on project management from regional prospecting to local exploration of shear zone gold deposit, Cu-Au porphyry deposits, and VMS Cu-Zn-Pb projects.
5. I have been employed by Bayside Geoscience Inc. since August 2021.
6. I am currently providing geological services to Green Technology Metal through Bayside Geosciences Inc.
7. I have no interest, either directly or indirectly, in the subject property.

Dated

July 19th, 2023

Thornhill, Ontario, Canada


___________________________

S.Reza Ghavami Riabi, Ph.D. G.I.T.

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APPENDIX I

# Technical Report

## High-Resolution Heliborne Magnetic Survey

### Pennock Property, North Spirit Lake Area
### Red Lake Mining Division, Ontario, 2023


Green TM Resources (Canada) Ltd.
160 Logan Avenue
Thunder Bay, ON, Canada
P7A 6R1




Prospectair Geosurveys

Dynamic Discovery Geoscience

**Prepared by:**
***Joël Dubé, P.Eng.***


**May 2023**


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Survey flown by :

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## FIGURES



## TABLES

# I. INTRODUCTION

Prospectair Geosurveys conducted a heliborne high-resolution magnetic (MAG) survey for the mineral exploration company Green TM Resources (Canada) Ltd. on its Pennock Property located in the North Spirit Lake area, Red Lake Mining Division, Province of Ontario (Figure 1). The survey was flown from March 31 to April 2, 2023.

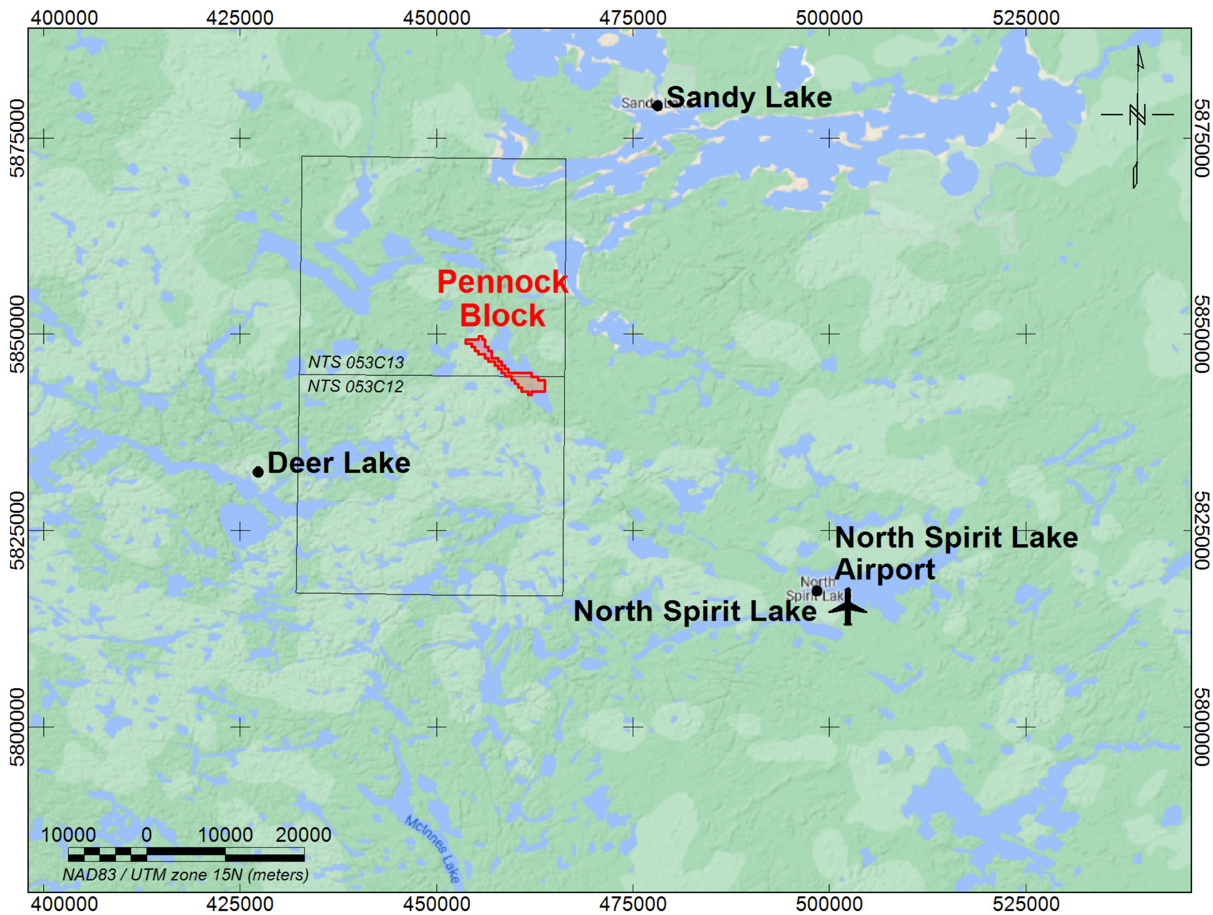
Figure 1: **General Survey Location**

One survey block was flown for a total of 306 l-km. A total of 6 production flights were performed using Prospectair's Robinson R-44, registration C-GBOU. The helicopter and survey crew operated out of the North Spirit Lake Airport located 50 km to the southeast of the block (Figure 2).

Table 1: **Survey block particulars**

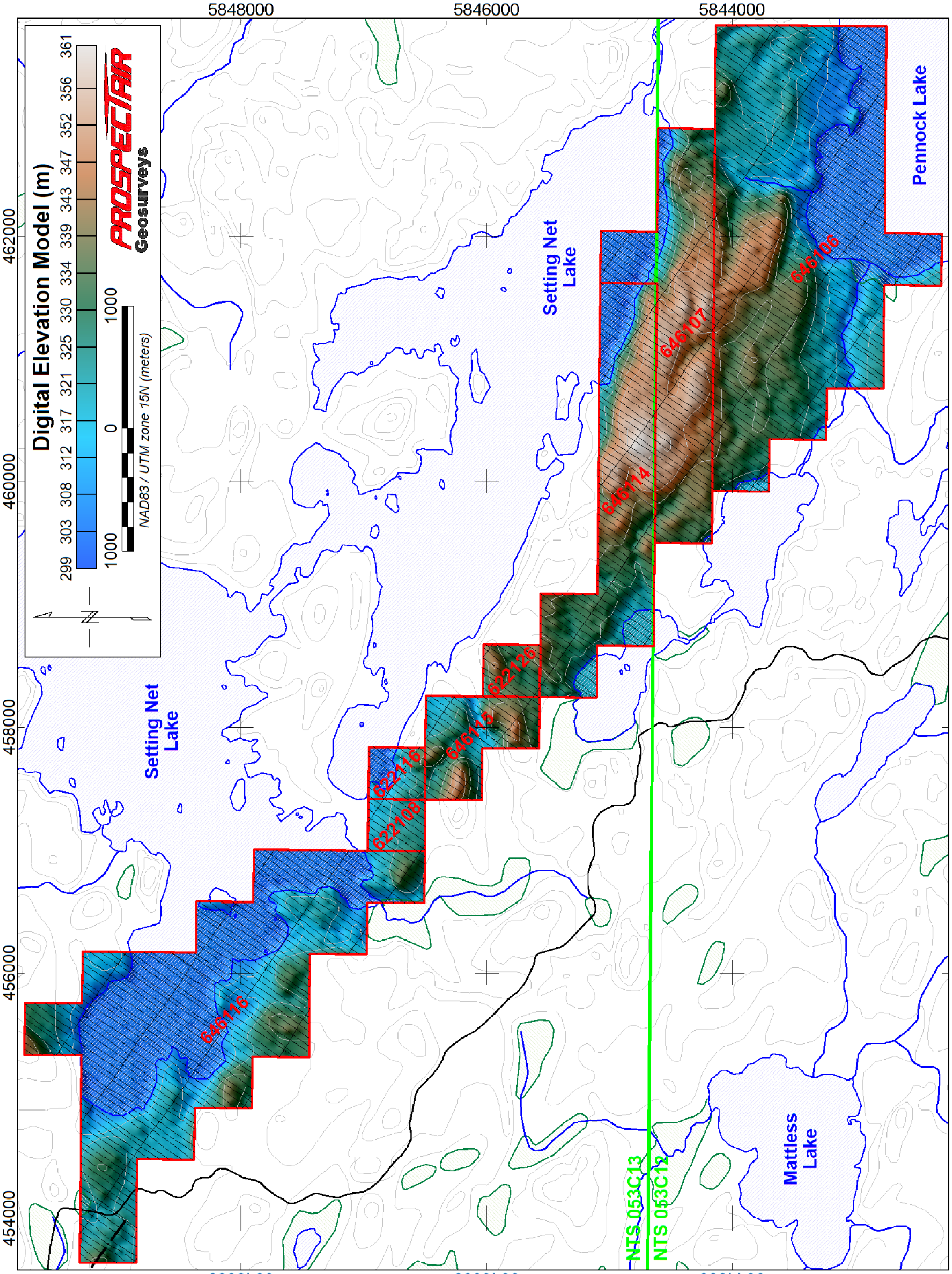
| Block | NTS Mapsheet | Line-km flown | Flight numbers | Dates Flown |
|---|---|---|---|---|
| Pennock | 053C12, 053C13 | 306 l-km | Flt 1 to 6 | March 31 to April 2 |

Figure 2: **Survey Location and base of operation**



The Pennock block was flown with traverse lines at 50 m spacing and control lines spaced every 500 m. The survey lines were oriented N035 and control lines were flown at an azimuth of N125. The average height above ground of the helicopter was 43 m and the magnetic sensor was at 24 m. The average survey flying speed was 30.3 m/s. The survey area is covered by forest, lakes and wetlands. The topography is mostly gently undulating, with a few low-level hills. The elevation is ranging from 299 to 361 m above mean sea level (MSL). The block is approximately located to the northwest of the Pennock Lake, extending along the southwest shore line of the larger Setting Net Lake. With respect to the closest First Nations communities, the block is located approximately 50 km northwest of North Spirit Lake, 30 km east of Deer Lake and 40 km southwest of Sandy Lake. From the ground, the block can be accessed using the road used to build and maintain the new high-tension powerline crossing the block in a NW-SE fashion. Note that the wires of this high-tension powerline were being installed at the time of the survey, and so only the finalized portion of the powerline, to the northwest of the block, is indicated on the maps and figures of this report. Coordinates outlining the survey block are given in Appendix A, with respect to NAD-83 datum, UTM projection zone 15N. The location of the Pennock Property claims (in red) and of the survey lines is shown on Figure 3. The Property claims numbers, as well as the approximate amount of line-km flown over each claim, are also listed in Appendix B.

Figure 3: **Survey lines and Pennock Property claims**



# II. SURVEY EQUIPMENT

Prospectair provided the following instrumentation for this survey:

**Airborne Magnetometer**
*Geometrics G-822A*
The heliborne system used a non-oriented (strap-down) optically-pumped Cesium split-beam sensor. These magnetometers have a sensitivity of 0.005 nT and a range of 15,000 to 100,000 nT with a sensor noise of less than 0.02 nT. The heliborne sensor was mounted in a bird made of non-magnetic material located 19 m below the helicopter when flying. Total magnetic field measurements were recorded at 10 Hz in the aircraft.

**Real-Time Differential GPS**
*Omnistar DGPS*
Prospectair uses an OmniStar differential GPS navigation system to provide real-time guidance for the pilot and to position data to an absolute accuracy of better than 5 m. The *Omnistar* receiver provides real-time differential GPS for the Agis on-board navigation system. The differential data set was relayed to the helicopter via the Omnistar network appropriate geosynchronous satellite for the survey location. The receiver optimizes the corrections for the current location.

**Airborne Navigation and Data Acquisition System**
*Pico-Envirotec AGIS-XP system*
The Airborne Geophysical Information System (AGIS-XP) is advanced, software driven instrument specifically designed for mobile aerial or ground geophysical survey work. The AGIS instrumentation package includes an advanced navigation system, real-time flight path information that is displayed over a map image of the area, and reliable data acquisition software. Thanks to simple interfacing, the radar and barometric altimeters and the Geometrics magnetometer are easily integrated into the system and digitally recorded. Automatic synchronization to the GPS position and time provides very close correlation between data and geographical position. The AGIS is equipped with a software suite allowing easy maintenance, upgrades, data QC, and project and survey area layout planning.

**Magnetic Base Station**
*GEM GSM-19*
A GEM GSM-19 Overhauser magnetometer, a computer workstation and a complement of spare parts and equipment serve as the base station. Prospectair establish the base station in a secure location with low magnetic noise. The GSM-19 magnetometer has resolution of 0.01 nT, and 0.2 nT accuracy over its operating range of 20,000- to 100,000 nT. The ground system was recording magnetic data at 1 Hz.

**Altimeters**

*Free Flight Radar Altimeter*

The Free Flight radar altimeter measures height above ground to a resolution of 0.5 m and an accuracy of 5% over a range up to 2,500 ft. The radar altimeter data is recorded and sampled at 10 Hz.

*Digital Barometric Pressure Sensor*

The barometric pressure sensor measures static pressure to an accuracy of ± 4 m and resolution of 2 m over a range up to 30,000 ft above sea level. The barometric altimeter data are sampled at 10 Hz.

**Survey helicopter**

*Robinson R-44 (registration C-GBOU)*

The survey was flown using Prospectair's Robinson R-44 helicopter that handles efficiently the light equipment load and the survey range for magnetic surveys. Table 2 presents the helicopter technical specifications and capacity, and the aircraft is shown in Figure 4.

Table 2: **Technical specifications of the R-44 Robinson helicopter**

| Item | Specification |
|---|---|
| Powerplant | One 195kW (260hp) Textron Lycoming O-540 |
| Rate of climb | 1,000 ft/min |
| Cruise speed | 223 km/h – 120 kts |
| Service ceiling | 14,000 ft |
| Range with no reserve | 645 km |
| Empty weight | 635 kg |
| Maximum takeoff weight | 1,090 kg |

Figure 4: **C-GBOU Robinson R-44**

# III. SURVEY SPECIFICATIONS

### Data Recording

The following parameters were recorded during the course of the survey:

In the helicopter:

- GPS positional data: time, latitude, longitude, altitude, heading and accuracy (PDOP) recorded at intervals of 0.1 s;
- Total magnetic field: recorded at intervals of 0.1 s;
- Pressure as measured by the barometric altimeter at intervals of 0.1 s;
- Terrain clearance as measured by the radar altimeter at intervals of 0.1 s;

At the base and remote magnetic ground stations:

- Total magnetic field: recorded at intervals of 1 s;
- GPS time recorded every 1 s to synchronize with airborne data.

### Technical Specifications

The data quality control was performed on a daily basis. The following technical specifications were adhered to:

- *Height* – 50m mean terrain clearance for the helicopter except in areas where Transport Canada regulations prevent flying at this height, or as deemed by the pilot to ensure safety. Traverse lines and control lines must be flown at the same altitude at points of intersection; the altitude tolerances are limited to no more than 30 m difference between traverse lines and control lines.
- *Airborne Magnetometer Data* – A 0.5 nT noise envelope not to be exceeded for more than 500 m line-length without a reflight.
- *Diurnal Specifications* – A maximum tolerance of 5.0 nT (peak to peak) deviation from a long chord of one minute at the base station.
- *Flying Speed* – The average ground speed for the survey aircraft should be 120 kph. The acceptable high limit is 180 kph over flat topography.
- *Radar Altimeter* – minimal accuracy of 5%, minimum range of 0-2500 m.
- *Barometer* – Absolute air pressure to 0.1 kPa.
- *Flight Path Following* – The line spacing not to vary by more than 30% from the ideal spacing over a distance of more than 300 m, except as required for aviation safety.

  For Pennock Block:

  Traverse lines: Azimuth N035, 50 m spacing.
  Control Lines: Azimuth N125, 500 m spacing.

# IV. SYSTEM TESTS

**Magnetometer System Calibration**

The survey configuration using a bird towed 19 m below any magnetic piece of the helicopter allows the simplification of the magnetic calibration requirement. Consequently, heading error and aircraft movement noise was considered negligible and no correction was applied to the data.

**Instrumentation Lag**

The magnetometer lag is a combination of two factors: 1) the time difference between when a reading is sensed, and when that value is recorded by the acquisition system, and 2) the time taken for the sensor to arrive at the location of the GPS antenna. The second factor is defined by the physical distance between the GPS antenna and any given sensor, and the speed of the aircraft. The average total magnetic lag value for the AGIS acquisition system has been calculated to 1.95 s for this survey.

# V. FIELD OPERATIONS

The survey operations were conducted out of the North Spirit Lake Airport from March 31 to April 2, 2023. The data acquisition required 6 flights. At the end of each production day, the data were sent to the Dynamic Discovery Geoscience office via internet. The data were then checked for Quality Control to ensure they fulfilled contractual specifications. The full dataset was inspected prior to provide authorization for the field crew to demobilize. The GSM-19 magnetic base station was set up in a magnetically quiet area close to the airport, at latitude 52.4871138°N, longitude 92.9734439°W. The survey pilot was Marc Patenaude and the survey system technician was Johnathan Drolet.

Figure 5: **Example of a magnetic base station setup**

# VI. DIGITAL DATA COMPILATION

Data compilation including editing and filtering, quality control, and final data processing was performed by Joël Dubé, P.Eng. Processing was performed on high performance computers optimized for quick daily QC and processing tasks. Geosoft software Oasis Montaj version 2022.2 was used.

**Magnetometer Data**

*General*

The airborne magnetometer data, recorded at 10 Hz, were plotted and checked for spikes and noise on a flight basis. An average of 1.95 second lag correction was applied to the data to correct for the time delay between detection and recording of the airborne data.

Ground magnetometer data were recorded at 1 sample per second and interpolated by a spline function to 10 Hz to match airborne data. Data were inspected for cultural interference and edited where necessary. Low-pass filtering was deemed necessary on the ground station magnetometer data to remove minor high frequency noise. The diurnal variations were removed by subtracting the ground magnetometer data from the airborne data and then adding back the average magnetic field value of the ground magnetometer.

The levelling corrections were applied in several steps. First, a correction for altitude was applied by multiplying the First Vertical Derivative (FVD) of the Total Magnetic Intensity (TMI) by the difference between the actual survey altitude and the average survey altitude. Standard levelling corrections were then performed using intersection statistics from traverse and tie lines. After statistical levelling was considered satisfactory, decorrugation was applied on the data to remove any remaining subtle non-geological features oriented in the direction of the traverse lines.

Once the Total Magnetic Intensity (TMI) was gridded, its First Vertical Derivative (FVD) and Second Vertical Derivative (SVD) were calculated to enhance narrow and shallow geological features. Finally, the component of the normal Earth's magnetic field, described by the International Geomagnetic Reference Field (IGRF), has been removed from the TMI to yield the residual TMI.

*Tilt Angle Derivative*

In order to enhance the subtle magnetic features some more, the Tilt Angle Derivative (TILT) was also computed for this project.

It has been shown that it is possible to use the Tilt Angle Derivative to estimate both the location and depth of magnetic sources (Salem et al., 2007).

When two bodies of different magnetic susceptibility are in contact, the vertical and horizontal gradients along a horizontal line perpendicular to the vertical contact are governed by the following equations:

$\delta M/\delta h=2KFc(z_c/(h^2+z_c^2))$
$\delta M/\delta z=2KFc(h/(h^2+z_c^2))$

where
K = susceptibility contrast
F = magnetic field's strength
$c = 1-\cos^2(\text{field Inclination})\sin^2(\text{field Declination})$
h = location along an horizontal axis perpendicular to the contact
$z_c$ = contact depth
$\delta M/\delta h = \text{sqrt}((\delta M/\delta x)^2+( \delta M/\delta y)^2)$

The Tilt Angle (θ) is defined as
$\theta = \tan^{-1}[(\delta M/\delta z)/( \delta M/\delta h]$

By substitution of the gradients we get
$\theta = \tan^{-1} [h/z_c]$

This has two main implications for any given anomaly:

1- The 0° angle line is located directly above the contact between a magnetic source and the surrounding rock. This allow for accurate estimation of source location.
2- The distance between the 0° and the +45° contour lines as well as the distance between the -45° and the 0° contour lines are equal to the depth of the source at the contact. This allow for a direct estimation of the depth of the source of the anomaly. The depth estimated with this method is actually the distance between the magnetic sensor and the top of the source. Knowing that the sensor was 24 m above the ground in average enables direct depth estimates.

In practice, the signal originating from multiple sources at different depth within a same area will cause juxtaposition of the Tilt Angle values, and complicate location and depth estimation. Nevertheless, the method remains an excellent tool for rapid assessment of sources characteristics, without the need for complex assumptions to be made or heavy computer requirements, as is the case with 3D Euler deconvolution or 3D data inversions.

*Gridding*
The magnetic data were interpolated onto a regular grid using a bi-directional gridding algorithm to create a two-dimensional grid equally incremented in x and y directions. The final grids of the magnetic data are supplied with a 10 m grid cell size. Traverse lines were used in the gridding process.

**Radar Altimeter Data**
The terrain clearance measured by the radar altimeter in metres was recorded at 10 Hz. The data were filtered to remove high frequency noise using a 1 sec low pass filter. The final data were plotted and inspected for quality.

**Positional Data**

Real time DGPS correction provided by Omnistar was applied to the recorded GPS positional data.

Positional data were originally recorded at 10 Hz sampling rate in geographic longitude and latitude with respect to the WGS-84 datum. The delivered data locations are provided in X and Y using the UTM projection zone 15 North, with respect to the NAD-83 datum. Altitude data were initially recorded relative to the GRS-80 ellipsoid, but are delivered as orthometric heights (MSL elevation).

**Terrain Data**

Terrain elevation data (also referred to as digital elevation model, or DEM) are computed from the altitude of the helicopter, given by DGPS recordings, and the radar altimeter data.

# VII. RESULTS AND DISCUSSION

The residual Total Magnetic Intensity (TMI) of the Pennock block, presented in Figure 6, is relatively active and varies over a range of 4,240 nT, with an average of -193 nT and a standard deviation of 324 nT.

Most of the surveyed area is affected by linear magnetic features characteristic of alternating sequences of mafic volcanics with sedimentary or intermediate to felsic volcanic rocks, with possibly some intrusive stocks or dykes locally. The northwestern half of the block, as well as a small area at its southern tip, is dominated by magnetic domains with relatively settled signal variations mostly consisting in low amplitude anomalies. This is characteristic of areas dominated by meta-sedimentary or intermediate to felsic intrusive rocks. The remaining areas to the southeast are rather characterized by active magnetic variations and stronger anomalies, which is typical of mafic intrusive or volcanic rocks. The strongest anomalies are found in the area covered by the Setting Net Lake to the southeast and could be related to layers of mafic volcanic rocks, to meta-sedimentary horizons enriched in magnetic minerals or to intermediate/mafic intrusions. Stronger anomalies are best seen on Figure 7 which shows the residual TMI data with a linear color distribution.

Magnetic lineaments are mostly generally trending NW-SE in the area, varying from E-W, in the eastern part of the block, to NNW-SSE, in some areas further towards the northwest. There are also a few very straight lineaments rather striking N-S and NNE-SSW, against the main trends, located in the northwestern part of the block, which could relate to mafic dykes. Several lineaments appear curved, either by shearing or folding structures, or possibly also at the contact zone with some possible intrusions in the area. These evidences are attesting that the area underwent strong deformation events in the past. In general terms, magnetic lineaments are related to rock formations that are enriched in magnetic minerals (magnetite and/or pyrrhotite).

In many areas, it is possible to detect structural features offsetting observed magnetic lineaments and causing abrupt interruption or changes of the magnetic response. These features are typically caused by faults, fractures and shear zones. If they are thought to be favorable structures in the exploration context of the Pennock project, they should be paid particular attention and should be the object of a comprehensive structural interpretation, which is beyond the scope of this report.

Shorter wavelength anomalies are greatly enhanced on the FVD (Figure 8) and on the TILT (Figure 9) products. Since the FVD attenuates longer wavelength anomalies, and the TILT enhances very weak amplitude anomalies, they are the preferred products for structural interpretation.

Regarding cultural interference, the high-tension powerline crossing the block in its northwestern part is known to be a possible source of non-geological noise in the magnetic data. As a consequence, high frequency anomalies located near such infrastructure are likely to originate from cultural sources and should be treated with caution when planning ground investigations of magnetic anomalies.

In addition, when the helicopter had to steeply climb up above this infrastructure for obvious safety reasons, the magnetic response can appear somewhat blurred, with anomalies being attenuated in amplitude and increased in wavelength because of the greater sensor distance from the ground. This can also result in local stripes parallel to survey lines in the data. This effect is really local and quickly fades out on either side of the overflown obstacle, but must be nevertheless considered when following-up on the results.

Figure 6: **Residual Total Magnetic Intensity with equal area color distribution**

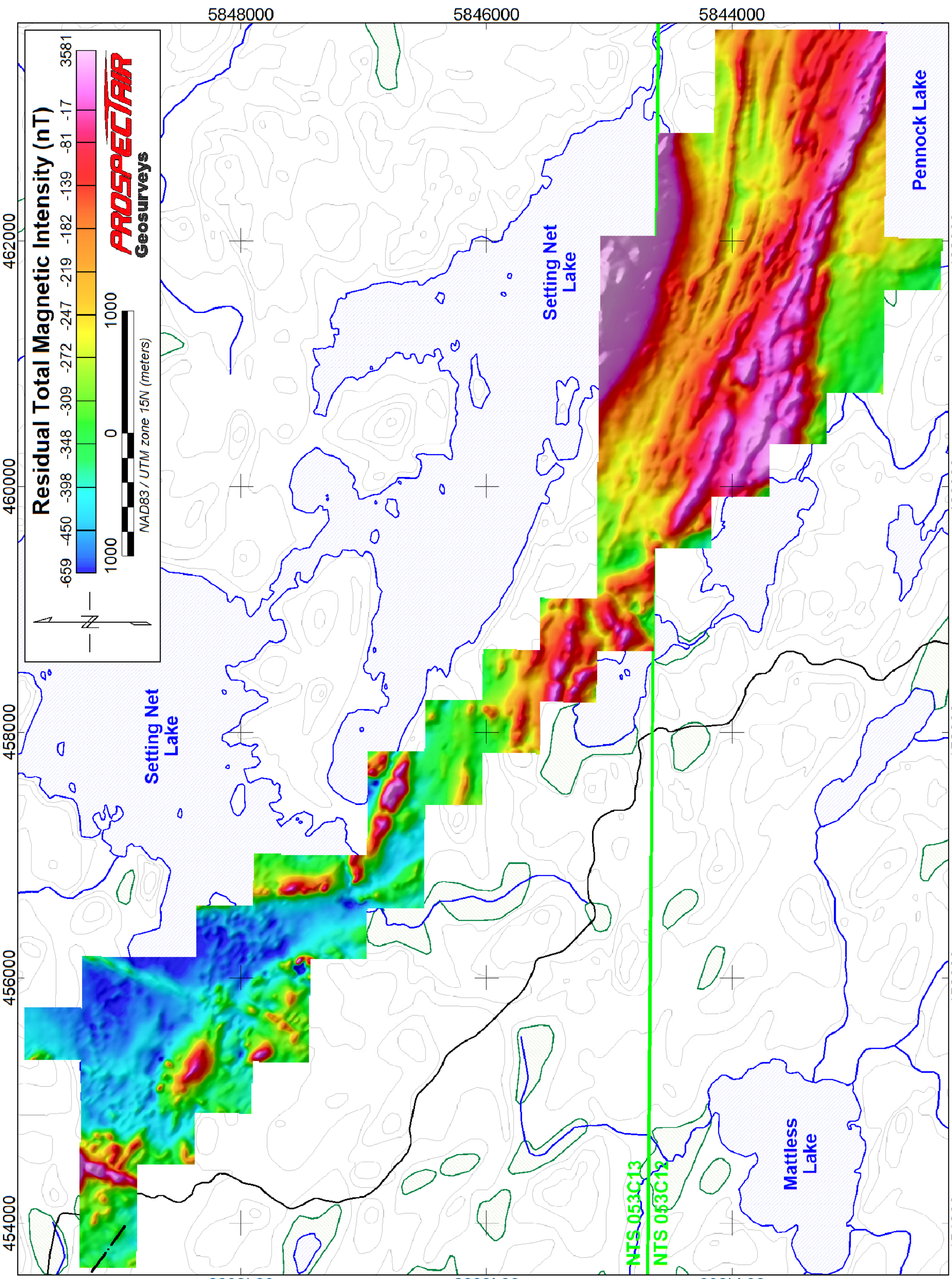


Figure 7: **Residual Total Magnetic Intensity with linear color distribution**

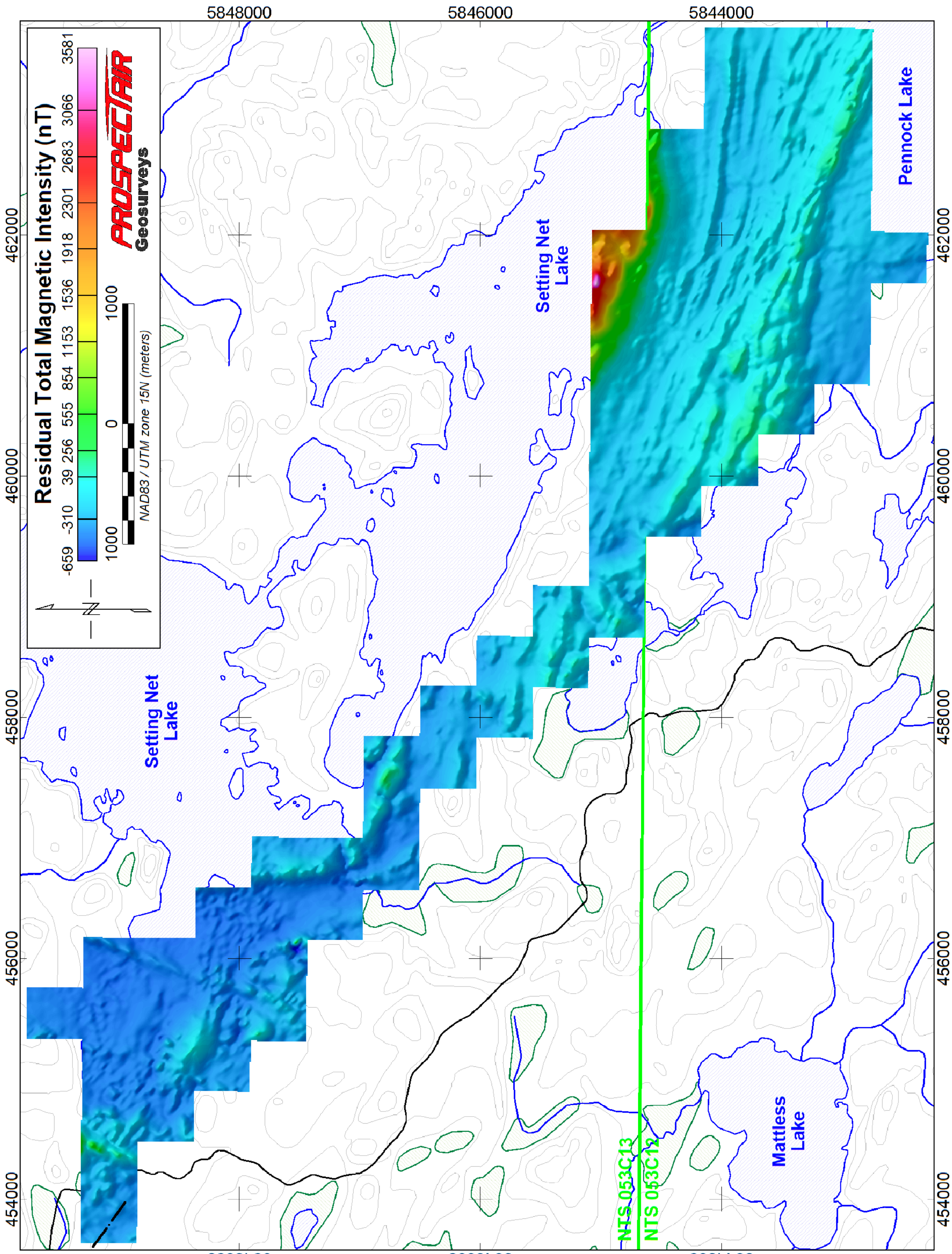


Figure 8: **First Vertical Derivative of TMI**

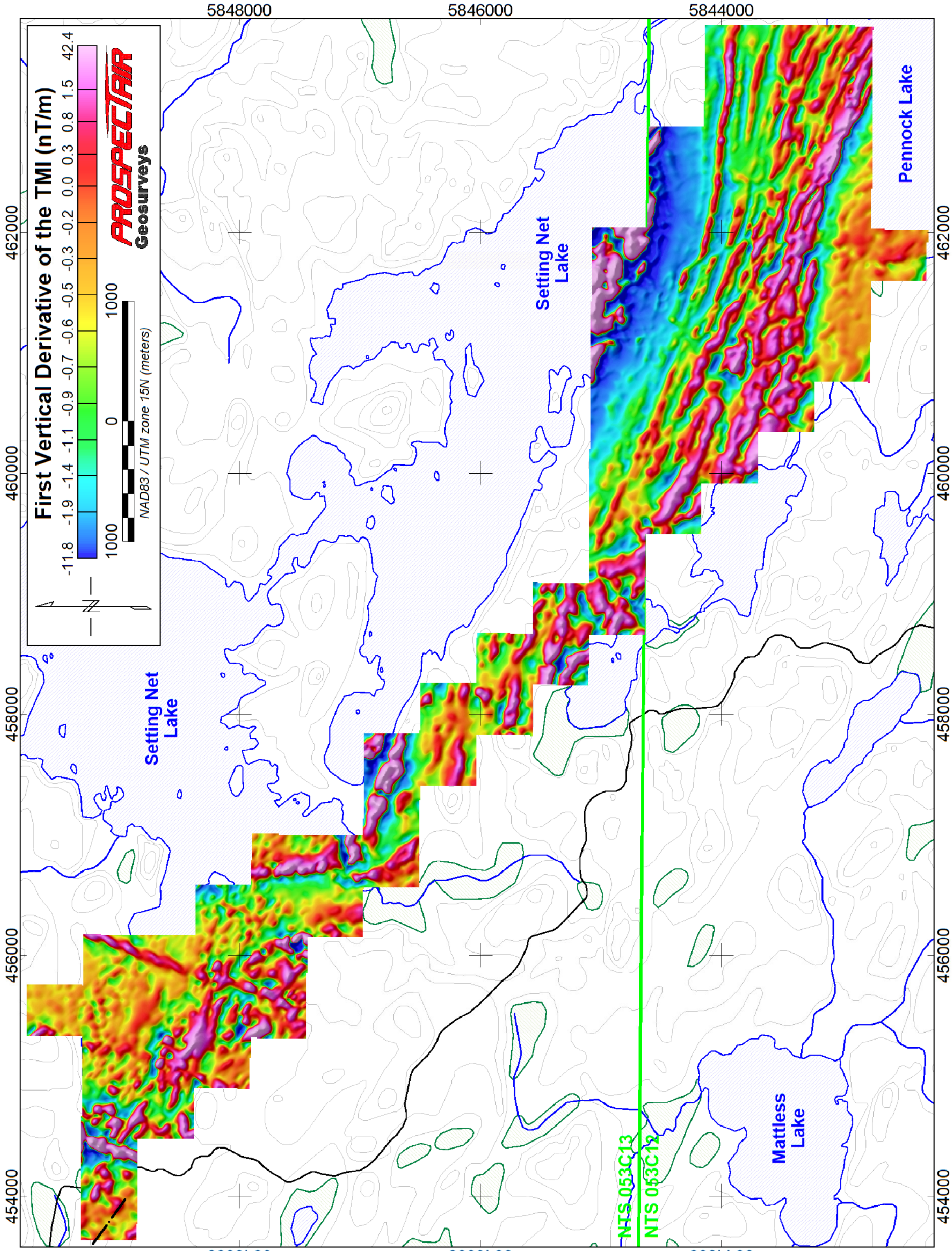
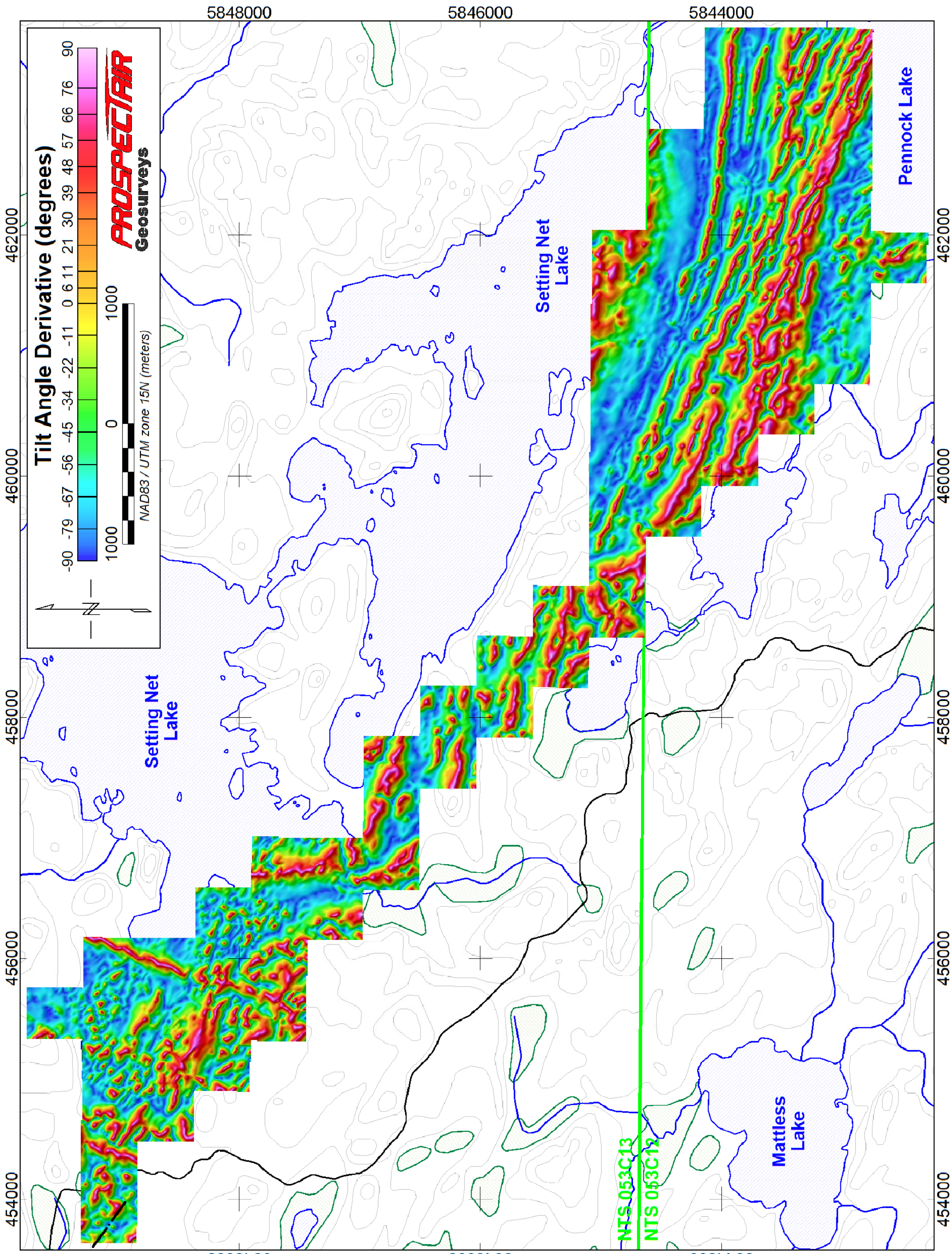


Figure 9: **Tilt Angle Derivative**



# VIII. FINAL PRODUCTS

**Digital Line Data**

The Geosoft database is provided with the channels detailed in Table 3.

Table 3: **MAG line data channels**

| No. | Name | Description | Units |
|---|---|---|---|
| 1 | UTM_X | UTM Easting, NAD-83, Zone 15N | m |
| 2 | UTM_Y | UTM Northing, NAD-83, Zone 15N | m |
| 3 | Lat_deg | Latitude in decimal degrees | Deg |
| 4 | Long_deg | Longitude in decimal degrees | Deg |
| 5 | Gtm_sec | Second since midnight GMT | Sec |
| 6 | Radar | Ground clearance given by the radar altimeter | m |
| 7 | Terrain | Calculated Digital Elevation Model (w.r.t. MSL) | m |
| 8 | GPS_Z | Helicopter altitude (w.r.t. MSL) | m |
| 9 | Mag_Raw | Raw magnetic data | nT |
| 10 | Mag_Lag | Lagged magnetic data | nT |
| 11 | Gnd_mag | Base station magnetic data | nT |
| 12 | Mag_Cor | Magnetic data corrected for diurnal variation | nT |
| 13 | TMI | Fully levelled Total Magnetic Intensity | nT |
| 14 | TMIres | Residual TMI (IGRF removed) | nT |

**Maps**

All maps are referenced to NAD-83 datum in the UTM projection Zone 15 North, with coordinates in metres. Maps are at a 1:15,000 scale and are provided in PDF, PNG and Geosoft MAP formats for the products detailed in Table 4.

Table 4: **Maps delivered**

| No. | Name | Description |
|---|---|---|
| 1 | DEM+FlightPath+Claims | Digital Elevation Model with flight path and property claims |
| 2 | TMI | Residual Total Magnetic Intensity |
| 3 | FVD | First Vertical Derivative of the TMI |
| 4 | TILT | Tilt Angle Derivative |

### Grids

All grids are referenced to NAD-83 in the UTM projection Zone 15 North, with coordinates in metres. Grids are provided in Geosoft GRD format, with a 10 m grid cell size, as well as in the Geotiff format for the products listed in Table 5.

Table 5: **Grids delivered**

| No. | Name | Description | Units |
|---|---|---|---|
| 1 | Terrain | Calculated Digital Elevation Model | m |
| 2 | TMI | Total Magnetic Intensity | nT |
| 3 | FVD | First Vertical Derivative of TMI | nT/m |
| 4 | SVD | Second Vertical Derivative of TMI | $nT/m^2$ |
| 5 | TMIres | Residual TMI (IGRF removed) | nT |
| 6 | TILT | Tilt Angle Derivative | Degree |

### Project Report

The report is submitted in PDF format.

Respectfully submitted,


Joël Dubé, P.Eng.
May 17, 2023

# IX. STATEMENT OF QUALIFICATIONS

Joël Dubé
7977 Décarie Drive
Ottawa, ON, Canada, K1C 3K3

Telephone: 819.598.8486
E-mail: jdube@ddgeoscience.ca

I, Joël Dubé, P.Eng., do hereby certify that:

1. I am a Professional Engineer specialized in geophysics, President of Dynamic Discovery Geoscience Ltd., registered in Canada.

2. I earned a Bachelor of Engineering in Geological Engineering in 1999 from the École Polytechnique de Montréal.

3. I am an Engineer registered with the Ordre des Ingénieurs du Québec, No. 122937, and a Professional Engineer with Professional Engineers Ontario, No. 100194954 (CofA No. 100219617), with the Association of Professional Engineers and Geoscientists of New Brunswick, No. L5202 (CofA No. F1853), with the Association of Professional Engineers of Nova Scotia, No. 11915 (CofC No. 51099), with Engineers Geoscientists Manitoba, No. 43414. (CofA No. 6897), with Professional Engineers & Geoscientists Newfoundland & Labrador, No. 10012 (PtoP No. N1134) and with the Northwest Territories & Nunavut Association of Professional Engineers & Geoscientists, No. L4447 (PtoP No. P1414).

4. I have practised my profession for 24 years in exploration geophysics.

5. I have not received and do not expect to receive a direct or indirect interest in the properties covered by this report.

Dated this 17th day of May, 2023

LICENSED PROFESSIONAL ENGINEER
J. P. DUBÉ
100194954
PROVINCE OF ONTARIO

______________________________
Joël Dubé, P.Eng. #100194954

# X. Appendix A – Survey block outline

**Pennock Block**

| Easting | Northing |
|---|---|
| 462017 | 5842289 |
| 461590 | 5842292 |
| 461594 | 5842756 |
| 460750 | 5842763 |
| 460754 | 5843226 |
| 460331 | 5843230 |
| 460335 | 5843693 |
| 459914 | 5843696 |
| 459917 | 5844160 |
| 459495 | 5844164 |
| 459499 | 5844627 |
| 458656 | 5844634 |
| 458660 | 5845098 |
| 458238 | 5845101 |
| 458242 | 5845565 |
| 457820 | 5845568 |
| 457824 | 5846032 |
| 457402 | 5846035 |
| 457406 | 5846499 |
| 456563 | 5846506 |
| 456567 | 5846970 |
| 456145 | 5846974 |
| 456149 | 5847437 |
| 455306 | 5847445 |
| 455311 | 5847908 |
| 454889 | 5847912 |
| 454893 | 5848376 |
| 454472 | 5848380 |
| 454476 | 5848843 |
| 453633 | 5848851 |
| 453638 | 5849320 |
| 455323 | 5849304 |
| 455328 | 5849767 |
| 455754 | 5849763 |
| 455750 | 5849300 |
| 456171 | 5849296 |
| 456163 | 5848369 |
| 456585 | 5848366 |
| 456580 | 5847902 |
| 457002 | 5847898 |
| 456994 | 5846971 |
| 457837 | 5846964 |
| 457833 | 5846500 |
| 458255 | 5846497 |
| 458251 | 5846033 |

| | |
|---|---|
| 458672 | 5846030 |
| 458668 | 5845566 |
| 459090 | 5845562 |
| 459086 | 5845099 |
| 462039 | 5845075 |
| 462035 | 5844612 |
| 462879 | 5844605 |
| 462876 | 5844142 |
| 463719 | 5844135 |
| 463709 | 5842740 |
| 462021 | 5842753 |

# XI. Appendix B – Property claims covered by the survey

| Tenure number | Holder | l-km within claim |
|---|---|---|
| 622108 | (100) Solstice Gold Corp. | 4.310 |
| 622116 | (100) Solstice Gold Corp. | 4.310 |
| 622126 | (100) Solstice Gold Corp. | 4.310 |
| 646106 | (100) Solstice Gold Corp. | 107.780 |
| 646107 | (100) Solstice Gold Corp. | 38.800 |
| 646114 | (100) Solstice Gold Corp. | 38.800 |
| 646115 | (100) Solstice Gold Corp. | 12.919 |
| 646116 | (100) Solstice Gold Corp. | 94.773 |