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Report on
Geological Mapping and
Hand Trenching
on the Southern Portion of the
Railway Property

Cell claims; 219926, 126604, 173281, 138072, 256738
(Lot 22, Concession 13),
Provincial Grid System;
31E01C398, 31D16K018, 31D16K019, 31D16K038, 31D16K039

Monmouth Township, Ontario
NTS – 31D/16 & 31E/01
Centre of cell claim 126604; Long 44.99782^{o} N, Lat 78.26566^{o} W

By

Bradley S Wilson
Kingston, Ontario

For

Municipality of Highlands East
P.O. Box 295
2249 Loop Road
Wilberforce, Ontario,
K0L 3C0

May 24, 2022
(Amended May 1, 2023)

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Introduction

For decades, recreational mineral collectors from around the world have been coming to south eastern Ontario to pursue their fascinating hobby by searching out mineral specimens from the many available collecting sites for which the region is famous. For this reason, many consider the region, often referred to in general as the Bancroft area, the "Mineral Capital of Canada".

A wide variety of minerals are known from hundreds of different occurrences throughout the region. Sadly, over the years, many of these localities have been closed to mineral collectors due, in part, to park and cottage development and a host of other land access issues. It has been suggested that fewer mineral collectors are coming to the region now than in the past. If this is true it may be, in part, because there are fewer collecting sites available to the collector. The Municipality of Highlands East has acquired a number of mineral claims to explore the possibility of developing these claims as new recreational mineral collecting destinations, thereby providing incentive for mineral collectors to return and stay in the region.

One of the original claims held by the Municipality of Highlands East, originally known as the Railway Claim, is the subject of this report. The original Railway legacy claim has now been replaced by a contiguous group of 5 cell claims, all of which are located 5.5 km southwest of the town of Wilberforce. Superb mineral specimens of apatite, diopside, zircon, uraninite, amphibole, feldspar and titanite from localities in the Wilberforce area are well known among mineral collectors. Although, some of these localities are within several kilometres of the Railway claim, mineral collecting sites were not known on the Railway claim prior to 2011 when this property was acquired by the Municipality of Highlands East. In 2011, a study was conducted on the claim which identified several sites of potential interest to recreational mineral collectors. This report documents detailed geological mapping and prospecting conducted in October, 2021, and May, 2022, on the southern quarter of the property. Also documented are the results of hand trenching on three newly discovered crystal-bearing occurrences.

Claim Information and History

The original Railway claim was staked on June 3, 2011 and its claim number was SO 1500019. It is owned by the Corporation of the Municipality of Highlands East. The Railway claim originally covered Lot 22, Concession 13 in Monmouth Township, Ontario. The centre of cell claim 126604 is Long 44.99782° N, Lat 78.26566 ° W. The original claim was located on crown land and was surrounded on all sides by privately owned land. See Figures 1 and 2 for location.

The original Railway Claim (SO 1500019) was converted to encumbered cell claims in April, 2018, when the Ministry of Development and Mines introduced its new online claim and mining lands management system, MLAS. The five cell claims that now cover the "Legacy" Railway Claim are; 219926, 126604, 173281, 138072, 256738 (Figure 3). Their Provincial Grid System numbers are; 31E01C398, 31D16K018, 31D16K019, 31D16K038, 31D16K039.

Only a small portion of 4 of these claims is available for mineral exploration because most of the land under each of these claims is under private ownership. Most of claim # 126604 lies on crown land and is available for exploration. Because the area of exploration interest now lies on multiple claims the area of interest will be referred to in this report as the Railway property. These five claims collectively carry a $1,000 annual exploration work commitment.

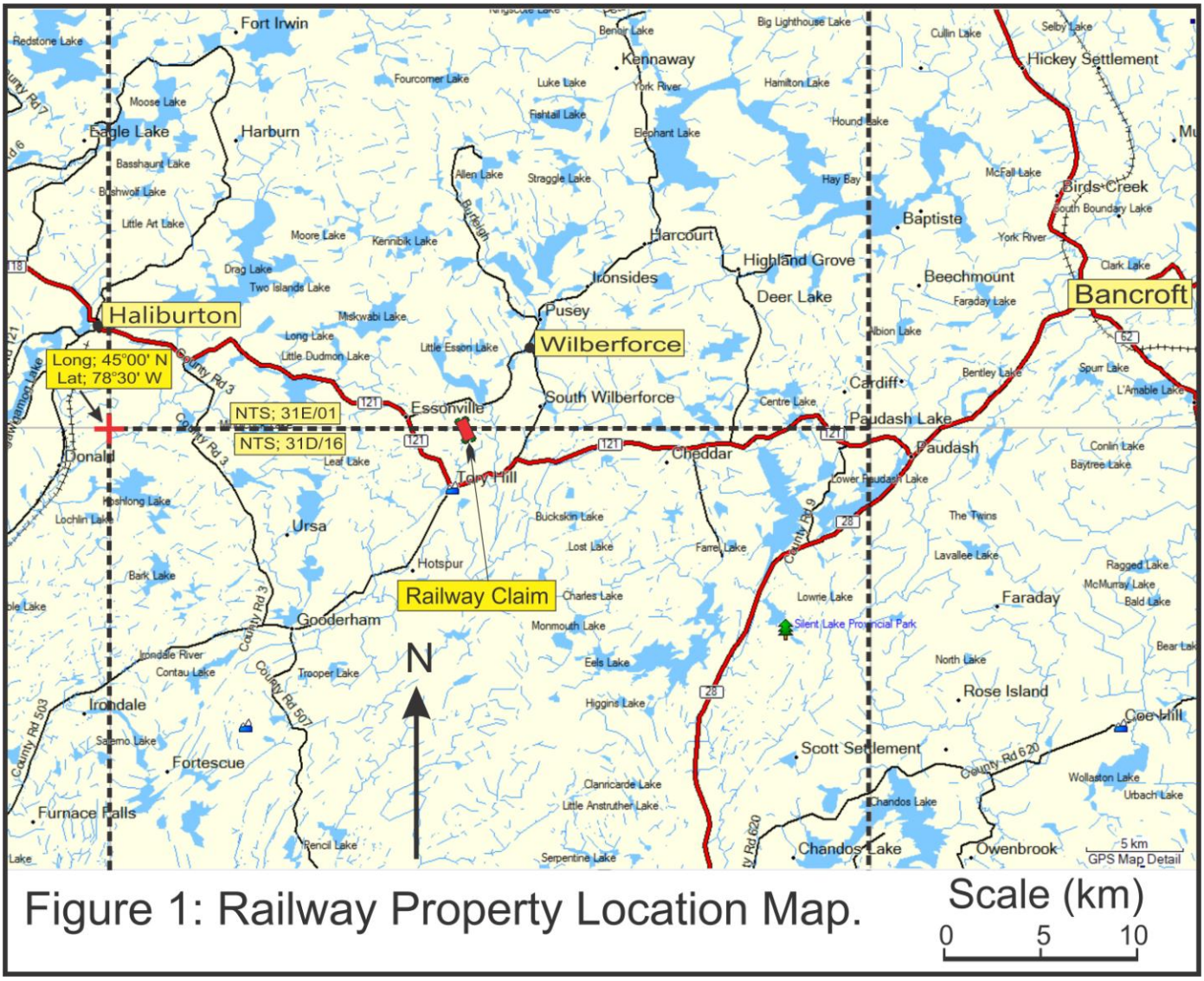


Figure 1: Railway Property Location Map. Scale (km) 0 5 10

Location and Access

The Railway property measures approximately 1000 by 400 metres in size and occupies most of Lot 22, Concession 13 in the township of Monmouth. It is located on NTS maps 31D/16 & 31E/01 and is approximately 20 kilometres ESE from Haliburton and 33 km WSW from Bancroft, the two largest towns in the region (Figure 1). The Railway property is approximately 5.5 kilometres southwest of Wilberforce, the easiest town from which to access the property. The centre of the property is located at approximately Long 44.99782° N, Lat 78.26566° W.

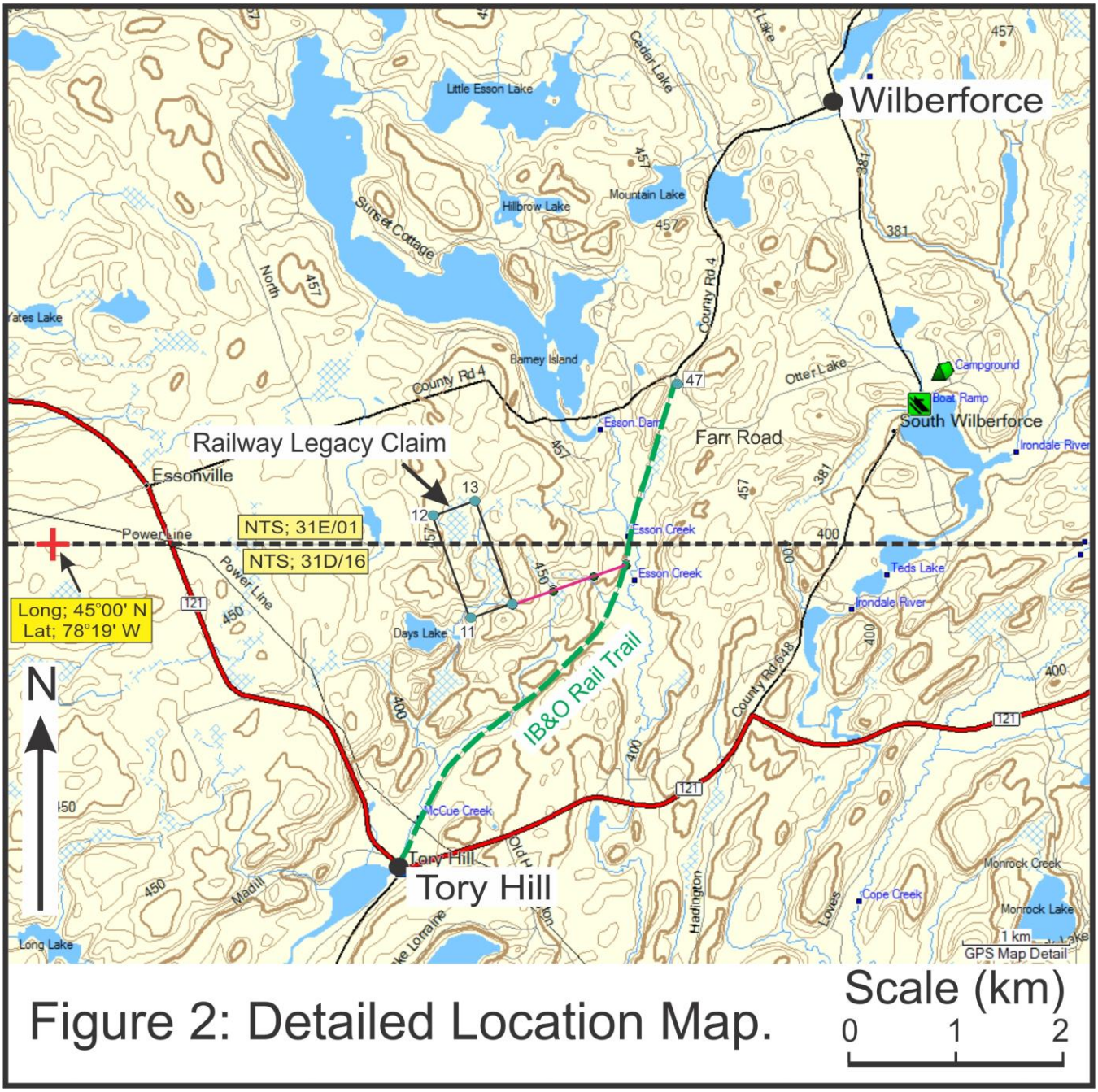
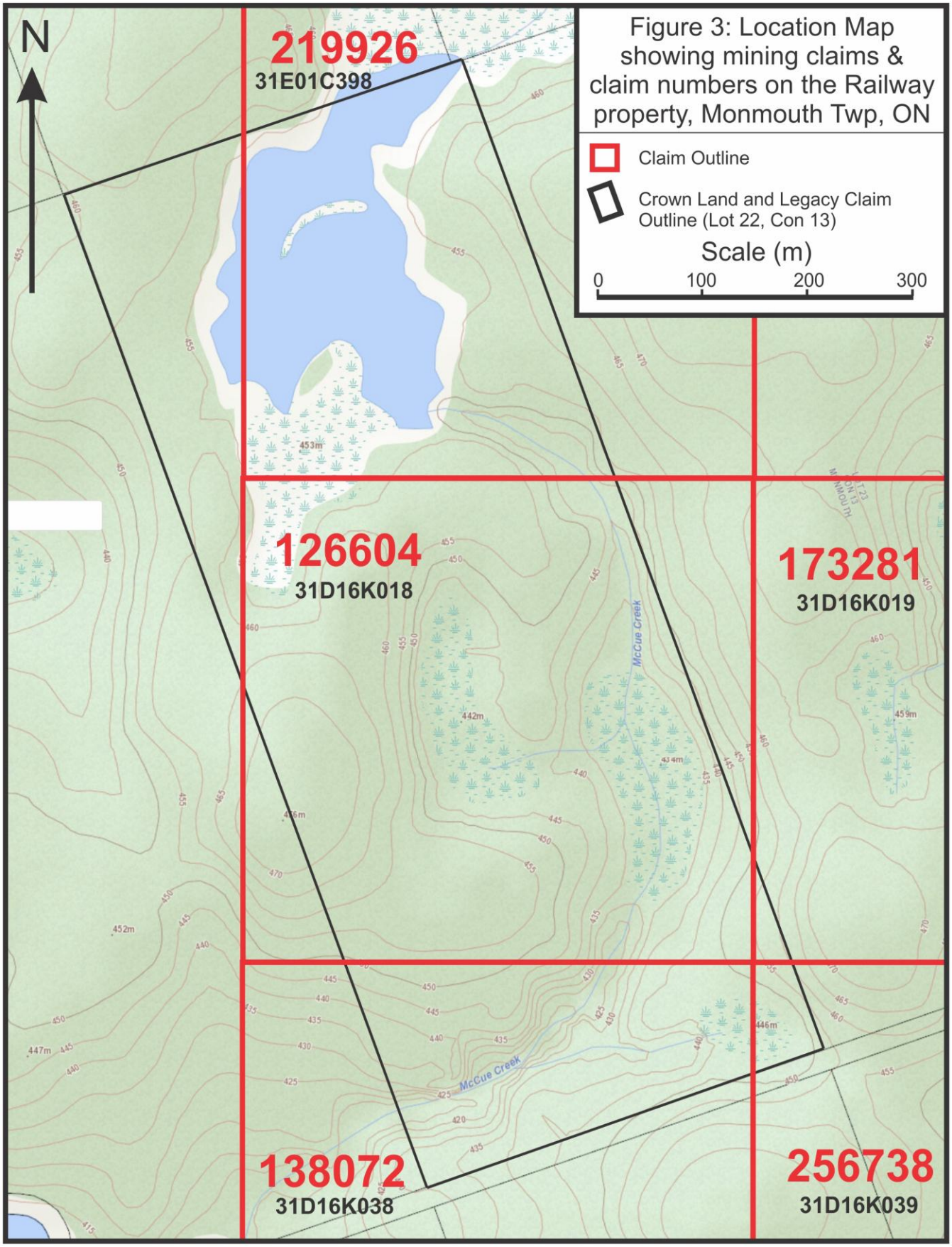


Figure 2: Detailed Location Map.

Railway property is surrounded by privately owned land, making access somewhat difficult. This is probably why few, if any, mineral collectors have visited this parcel of land in the past. The closest public road is almost 900 metres from the NE corner of the property. Fortunately, access to the property can be gained on foot by following a 20 metre wide right-of-way along the southern property boundary. Starting in Wilberforce, the easiest way to get to the property is by following Essonville Line, also called County Road 4, west about 3.5 km and then turning left (south) on to Farr Road. Essonville Line is paved, while Farr Road is gravel. An old railroad crosses Farr Road a few tens of metres south of Essonville Line (Figure 2). This old railroad bed is currently maintained as recreational trail for mountain bikes, motorcycles, ATVs, horses and pedestrians, called the IB & O Rail Trail. Travel southwest along this trail for 1.8 kilometres. At this point the unmarked right-of-way is reached. Travel approximately 1.1 kilometres bearing 250 degrees through the forest to reach the south east corner of the property. This line is marked on Figure 2 in red.


N
219926
31E01C398
126604
31D16K018
173281
31D16K019
138072
31D16K038
256738
31D16K039
McCue Creek
McCue Creek
Figure 3: Location Map showing mining claims & claim numbers on the Railway property, Monmouth Twp, ON
Claim Outline
Crown Land and Legacy Claim Outline (Lot 22, Con 13)
Scale (m)
0
100
200
300

Travel along the IB & O Rail Trail is straight forward and will not present much of a challenge to most mineral collectors. Travel along the right-of-way is much more challenging. Proper use of a compass and hand-held GPS unit is necessary to follow the right-of-way and avoid trespassing on private land. The terrain is quite rugged, bushy and in places, steep. Unless a trail is cut, travel along the right-of-way should only be attempted by relatively fit individuals familiar with wilderness travel and who possess orientation skills. Total travel distance to the southeast corner of the property from where a person can park is nearly 3 kilometres.

Previous Work

The Railway property is underlain by rocks of the Grenville Province of the Canadian Shield. On a regional scale Grenville Province rocks have been extensively studied and prospected for various ores over the last century. Authors, too numerous to mention, have studied and described these rocks. A township wide study was published in 1968 by Armstrong and Gittins, and in 1970 the same authors publish a detailed geologic map covering Monmouth Township. Armstrong and Gittins' study concentrated on the geology and economic mineral deposits of Monmouth and adjacent Glamorgan Townships and not on occurrences of crystals and minerals suitable for the recreational mineral collector.

A detailed work covering the property by Lowe (1977) documents geologic and radiometric surveys over a number of township lots including what is now the Railway property. Lowe was searching for radioactive minerals and not potential mineral collecting sites.

Guides to mineral collecting sites in southern Ontario have been published by various authors. One of the more recent guides covering the area is by Sabina (1986). Sabina (1986) describes mineral collecting sites throughout the Bancroft region, including those in the Wilberforce and Tory Hill areas. Two mineral collecting localities that Sabina (1986) describes, the "Woodcox and Fluor-richterite Occurrences", lie within two kilometres of the Railway property. In 2011, the owners of the Railway property initiated the first study to prospect for and evaluate potential occurrences of crystals and minerals of interest to recreational mineral collectors (Wilson, 2012). That study identified six potential crystal-bearing occurrences. To the best of the author's knowledge crystal-bearing occurrences on the Railway property were unknown prior to the initiation of that study.

Fieldwork and Terminology

For ease of reference, the five mineral claims which are the subject of this report that cover most of Lot 22, Concession 13 in the township of Monmouth are being referred to in this report as the "Railway property". The author spent 3.5 days prospecting and mapping on the Railway property on the following dates; October 6, 7 & 8, 2021 and May 5, 2022. In addition, three person-days were spent hand trenching at the three potential crystal-bearing sites that were identified during geological mapping by the author. The author spent two days on Oct 24, 2021 and May 6, 2022 hand trenching, and was assisted by Bob Beckett of Stouffville, Ontario on Oct 24, 2021. An additional 2.5 days were spent writing this report. The following is a breakdown of the time spent on the property and writing this report;

October 6, 2021	half day	Brad Wilson	fieldwork
October 7, 2021	full day	Brad Wilson	fieldwork
October 8, 2021	full day	Brad Wilson	fieldwork
October 24, 2021	full day	Brad Wilson	fieldwork
October 24, 2021	full day	Bob Beckett	fieldwork
May 5, 2022	full day	Brad Wilson	fieldwork
May 6, 2022	full day	Brad Wilson	fieldwork
May, 2022	2.5 days	Brad Wilson	report writing

Total number of days worked on the property = 6.5 days
Total number of days spent writing this report = 2.5 days

Assumptions have been made and a number of terms used by the author in preparing this report. Some of these need clarification. The minerals found on the Railway property and those named in this report were identified using standard field identification practices (observations of lustre, hardness, cleavage, crystal form, etc). No lab-based analytical work was performed to verify these identifications.

The terms “amphibole”, “black amphibole” and “tremolite” are used. Tremolite is an amphibole-group mineral. Amphiboles belong to a complex group of minerals whose individual mineral species are difficult, if not impossible, to identify without detailed analytical work. “Tremolite” is an amphibole whose tentative identification was based on a combination of elongate crystal form, 2 cleavages and a greenish to greyish-green colour. The term “black amphibole” is different from “tremolite” in this report in terms of both colour (black) and crystal habit. Black amphibole tends to occur as less elongate and more equant crystals. For ease of reporting, the author has used the general term “amphibole” to refer to a non-differentiated amphibole or mixture of black amphibole and tremolite. Unless noted otherwise, the term “crystal” is used to refer to a euhedral crystal. In other words, it’s a mineral completely bound by flat faces that formed during original mineral growth.

Property Geology and Geological Mapping

The Railway claim is underlain by high-grade metamorphic rocks of the Grenville Province of the Canadian Shield. Rocks of the Grenville Province are well known and have been described by many authors. These rocks host virtually all the known mineral and crystal occurrences that attract mineral collectors, both professional and recreational, to the Bancroft area.

The southernmost quarter of the Railway property was covered by detailed geological mapping and prospecting during this study (Figure 4).

Rocks mapped during this project fall into three basic units, 1) marble, which can grade into calc-silicate gneiss as the percentage of non-carbonate minerals increase, 2) paragneiss (metasedimentary rocks) consisting of quartzite, quartz-rich gneiss and quartz-feldspar gneiss and 3) intrusive granite and granitic pegmatite (Figure 5). Unconformably overlying these rocks are a thin and discontinuous veneer of recently developed soil and organic material and unconsolidated glacial deposits (till, sand and gravel) of Pleistocene age.

Unit 1 – Marble

The marble unit is highly variable and ranges from fairly pure, course-grained calcitic marble, typically with variable amounts of black amphibole, to a rock composed of nearly 100% amphibole. Black amphibole is usually subhedral to euhedral and typically ranges in size up to several centimetres across. Minerals that occur within calcite-rich marble include, black amphibole, phlogopite, diopside, apatite, tremolite, serpentine, chondrodite(?) and possibly others. The silicate mineral content of the marble can vary significantly over distances of less than a metre.

In places, this unit can contain little calcite and be composed of a chaotic mix of variable amounts of amphibole (both black and light greyish green), phlogopite, calcite and other minerals in minor amounts. In an area adjacent to the northeastern marsh, serpentine is a common accessory mineral in the marble. Light greenish grey tremolite is the dominant mineral in the tiny outcrops in the north central part of the map and in a few other outcrops marked “tr” on the geology map (Figure 5). Here, the rock is composed of mostly medium- to course-grained light greenish grey tremolite with only a small portion of calcite. Throughout the amphibole-rich areas within this unit, seams of course-grained calcite occur. Within some of these seams, euhedral crystals of tremolite occur and are marked “Tr” on the geology map (Figure 5). These areas hold potential as sites of

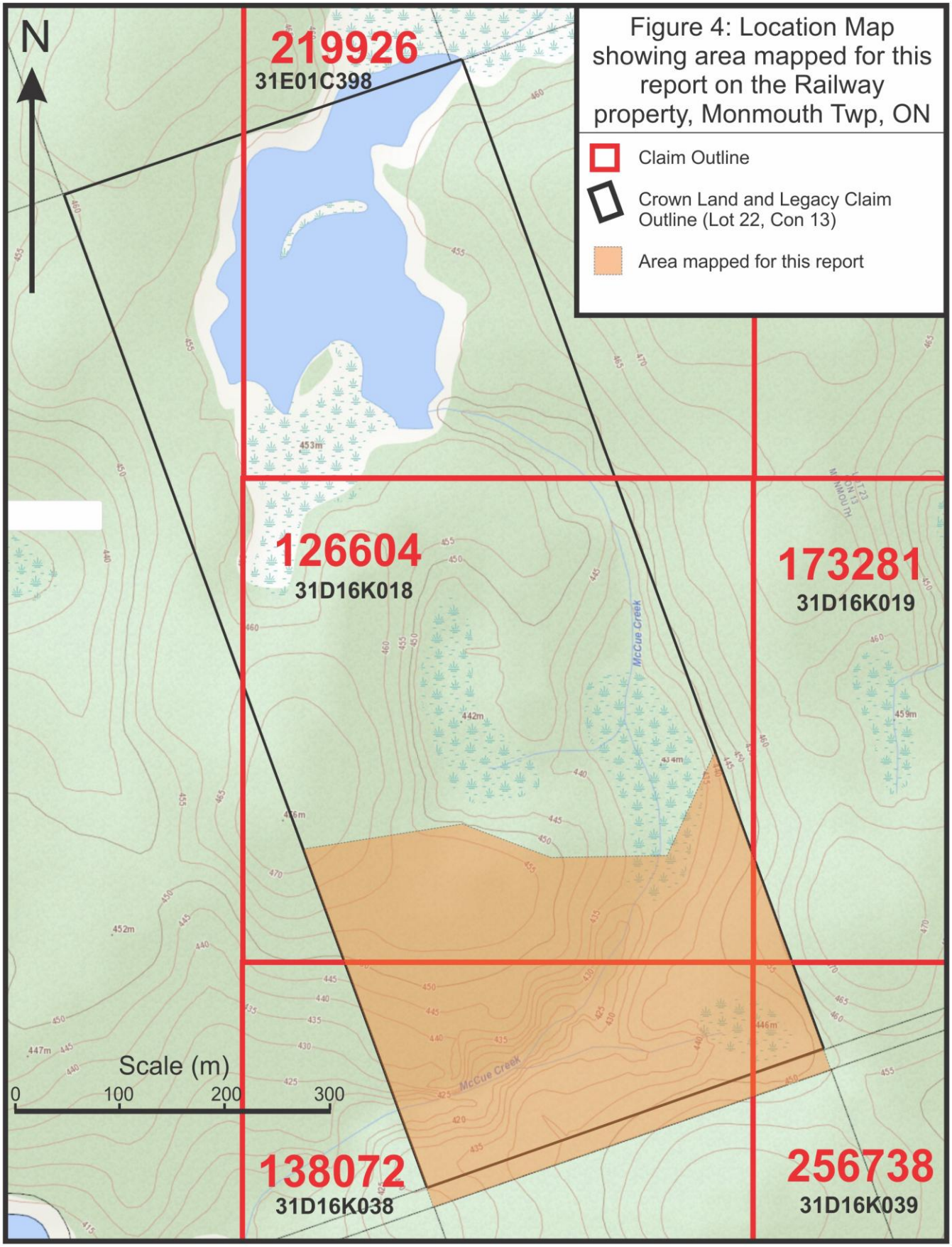


Figure 4: Location Map showing area mapped for this report on the Railway property, Monmouth Twp, ON
Claim Outline
Crown Land and Legacy Claim Outline (Lot 22, Con 13)
Area mapped for this report
N
219926
31E01C398
126604
31D16K018
173281
31D16K019
138072
31D16K038
256738
31D16K039
McCue Creek
Scale (m)
0
100
200
300

Figure 5: Geology Map of the Railway Property, Monmouth Twp, ON

Marble and calc-silicate gneiss

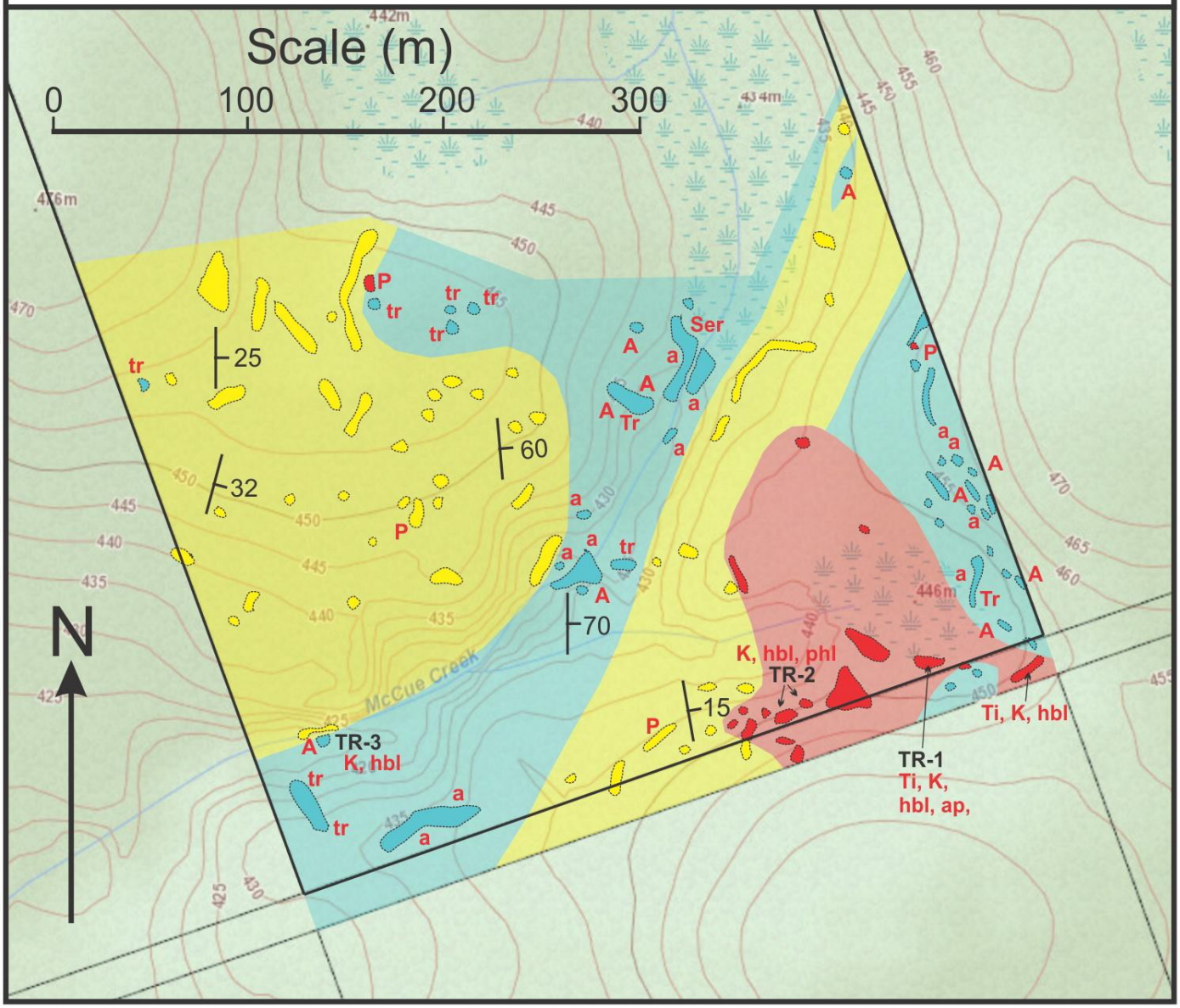
Quartzite & Paragneiss

Granite

P Granitic pegmatite

TR-1 Trench

Ser = serpentine in marble
A = amphibole in marble (> 50%)
a = amphibole in marble (< 50%)
tr = tremolite in marble (>80%)
Tr = tremolite crystals
hbl = black amphibole crystals
K = potassium feldspar crystals
Ti = titanite crystals
ap = apatite crystals
phl = phlogopite



interest to recreational mineral collectors. Careful and detailed exploration by recreational mineral collectors may yield collectable crystals.

Unit 2 – Paragneiss

The paragneiss unit is composed of mostly quartzite and quartz-rich gneiss. Paragneiss can also contain layers of orange-pink feldspar-rich gneiss composed of potassium feldspar, quartz and black amphibole, +/- biotite. Some of the thicker layers of feldspar-rich gneiss can resemble massive to poorly foliated granite.

Small dykes of granitic pegmatite up to ½ m or more in thickness cut paragneiss throughout the map area and are marked "P" on the geology map (Figure 5).

Unit 3 – Granite and Granitic Pegmatite

Unit 3 is brownish-red to orange-red feldspar-rich granite and is composed of medium-grained potassium feldspar, quartz, black amphibole and biotite. Unit 3 has a massive to very slightly foliated or gneissic texture and is interpreted to be intrusive within the map area. It crops out on the high land on the southeast corner of the property. It's possible that this unit could be a thick layer of the feldspar-rich gneiss that makes up part of the paragneiss unit. A broad program of geological mapping that extends beyond the railway property would be required to confirm this possibility.

Potential Mineral Collecting Sites

One of the purposes of this study was to identify sites on the Railway property where minerals and/or crystals suitable for the recreational mineral collector could be found. In addition to the 6 such sites found in 2011 by Wilson (2012), 3 new occurrences were found in this study and each of these has been hand trenched. These 3 sites are shown on the geology map (Figure 5). These 3 crystal-bearing occurrences would appeal to a range of mineral collectors from beginner to advanced connoisseur.

Hand Trenching

Trench 1

This site is located along and below a small cliff, about 4 metres high, of massive pink granite exposed along the southern shore of a small beaver-dammed pond at the southeast corner of the property. Along this section of cliff weathered, moss-covered euhedral crystals of black amphibole to 10-12 cm and course-grained anhedral calcite are exposed. This is most likely a vertically oriented calcite-filled vein structure lined with euhedral crystals where one side of the vein has broken away leaving the other side exposed. A small hand trench about 2 m long and 40 cm wide was dug beneath this exposure to learn more about the minerals that this vein might contain (Figure 6). Loose euhedral crystals and crystal groups of black amphibole, titanite to 4 cm and apatite to 3 cm were unearthed. This site would be of interest to recreational mineral collectors.

This vein structure appears to continue westward along the shoreline cliff, although it's covered by vegetation and is not nearly as well exposed as it is at Trench 1. At the southeastern end of the pond is another exposure of euhedral crystals which is marked on the geology map (Figure 5) as an occurrence of "Ti, K, hbl". Here, several boulders and broken outcrop possess surfaces covered in mostly broken or weathered euhedral crystals of black amphibole, potassium feldspar and titanite. This exposure may be an extension of the vein-like structure exposed at Trench 1.

Figure 6; Photo showing Trench-1

Trench 2

This site was identified as a potential crystal-bearing locality during mapping conducted in October, 2021.

Euhedral crystals of potassium feldspar up to 8 cm long were observed on several small boulders. In the immediate vicinity a linear depression in the soil was noted. Hidden under a log next to the depression, several additional euhedral crystals of potassium feldspar were noted at the base of a small outcrop. The author surmised that this soil depression could be due to calcite weathering away from an originally calcite-filled vein lined with euhedral crystals, similar to other mineral collecting sites in the region (eg; Bear Lake Road and Miller Mine, both near Tory Hill). This linear soil depression continued intermittently westward for about 10 metres. At this point, on the side of an outcrop is an exposure of euhedral crystals of black amphibole to 15 cm, potassium feldspar to 30 cm, phlogopite to 10 cm and possibly diopside.

In late October, 2021, the author and Bob Beckett returned to this site to create a hand trench in an attempt to further expose this site and better understand its mineral potential. Three quarter of the day was spent at this site while the remaining quarter of the day was spent at Trench 1. The west end of the outcrop area was cleaned off to better expose the potassium feldspar, black amphibole and phlogopite crystals (Figures 7 & 8). Minor amounts of extremely course-grained anhedral calcite were identified filling in the space between some of the euhedral crystals. The host for this vein-like crystal occurrence is massive pink granite.

Figure 7; Photo showing potassium feldspar and black amphibole crystals in western outcrop at Trench-2.

Figure 8; Photo showing closeup of potassium feldspar and black amphibole crystals in western outcrop at Trench-2.

Two small hand trenches were dug along the linear soil depression. The east trench was created at the initial site of the crystal-bearing boulders. This trench is approximately 2.5 m long and up to 0.7 m deep (Figure 9). Found in this trench were euhedral crystals of potassium feldspar up to 30 cm across and several samples consisting of euhedral to subhedral, intergrown black amphibole crystals (Figure 10). The bottom was filled with water.

Figure 9; Photo the eastern end of Trench-2.

Figure 10; Closeup Photo of potassium feldspar crystal from the eastern end of Trench-2.

A second centrally-located trench was created about half way between the east trench and the western outcrop exposure of crystals. The central trench is about 1 m long and extends downward at an angle of about 45 degrees to the south (Figure 11). This seems to follow what is likely a vein-like structure formerly filled with calcite and lined with euhedral crystals of potassium feldspar, black amphibole and possibly other minerals (apatite, phlogopite, titanite). In the area exposed by this trench, euhedral crystals of potassium feldspar to 40 cm are conspicuous while crystals of black amphibole to 4 cm are less abundant (Figure 12).

Trench 3

Trench 3 is hosted by a series of poorly exposed outcrop and frost heaved marble and associated calc-silicate rocks. In this area rocks are composed of a heterogeneous mix of calcite, amphiboles, phlogopite and feldspars. In places within the immediate vicinity of trench 3, samples of weathered and broken euhedral black amphibole and potassium feldspar crystals litter the ground.

The site of Trench 3 was originally a slight depression in the leave-covered ground. When the author scrapped away the leave litter, the bedrock edges of a vein-like structure became apparent. The trench is 2 m long, 30 cm wide and up to 60 cm deep (Figure 13). In spring, when the trench was created, the bottom 20-30 cm is water filled. The walls of Trench 3 are lined with euhedral black amphibole crystals to 15 cm across, small potassium feldspar crystals to 3 cm across and rare apatite crystals to ½ cm wide and 1-2 cm long (Figure 14). Extremely course-grained white calcite occurs, in places, in the middle of the vein and in between the euhedral crystals found attached to the walls. The vein's attitude is 015/85 degrees east.

All three of the trenched sites would be of interest to recreational mineral collectors.

Figure 11; Photo showing central portion of Trench-2.

Figure 12; Photo showing potassium feldspar crystal, 40 cm across, from central portion of Trench-2.

Figure 13; Photo showing Trench-3.

Figure 14; Closeup photo showing black amphibole crystals lining Trench-3.

Summary and Recommendations

The geology of the southern quarter of the Railway property was mapped and prospected in detail. Three rock units were identified; Unit 1, marble and calc-silicate gneiss; Unit 2, quartzite and paragneiss; Unit 3, granite and granite pegmatite. Three new crystal-bearing occurrences of interest to recreational mineral collectors were identified and each was hand trenched to better understand their mineral potential.

Based on the success of the current study in finding new crystal-bearing occurrences of interest to recreational mineral collectors, the author recommends the continuation of detailed mapping and prospecting over the remainder of the property. It seems likely that additional crystal-bearing occurrences will be identified by further study.

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Appendix 1;

Statement of Qualifications of the Author

I, Bradley S. Wilson of P.O. Box 352, Kingston, Ontario, K7L 4W2, do hereby state that I:

1/ graduated from Queen's University in 1982 with an Honours B.Sc. degree in Geology.
2/ graduated from Carleton University in 1987 with a M.Sc. degree in Geology.
3/ received a degree in gemmology in 1991 from the Canadian Gemmological Association (F.C.Gm.A).
4/ worked as an independent consultant on over 25 coloured gemstone projects since 1991.
5/ worked for mineral exploration companies since 1978 on dozens of projects either as a consultant or as a seasonal employee.
6/ conducted gemstone exploration on my own behalf nearly continuously since 1982.
7/ have no interest, direct or indirect, in the Railway property.
8/ performed the work described in this report.

Bradley S. Wilson

May 24, 2022
(Amended, May 1, 2023)