

**NI 43-101 – TECHNICAL REPORT:**  
**RALLEAU PROJECT,**  
**WILSON AND RALLEAU TOWNSHIPS,**  
**QUEBEC**  
**NTS 32F/01**

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Prepared for

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**DeepRock Minerals Inc.**

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by

**John Langton (M.Sc., P.Geo)**

of

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**MRB**  **associates**  
*G e o l o g i c a l   C o n s u l t a n t s*

**May 25<sup>th</sup>, 2017**

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**Appendix I:** Summary of Property Claim Statistics

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**Map 1:** Geological Compilation Map of the Property

**DATE AND SIGNATURE PAGE: QP**

This report is effective as at the 15<sup>th</sup> day of May, 2017.  
The date of issue of the report is the 25<sup>th</sup> day of May, 2017.

*\*The certificate on page 56 is considered the date and signature of this report in accordance with Form 43-101F1.*



The image shows a handwritten signature in blue ink, which appears to be 'J. Langton'. To the right of the signature is a circular blue ink seal. The seal contains the text 'GEOLOGUE / GEOLOGIST' at the top, a fleur-de-lis symbol in the center, 'JOHN P. LANGTON' below the symbol, '# 1231' below the name, and 'QUÉBEC' at the bottom.

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**John Langton, P.Geo.**  
**MRB & Associates**

Signed and Sealed this 25<sup>th</sup> day of May, 2017

## 1 EXECUTIVE SUMMARY

This report has been prepared for DeepRock Minerals Inc. (“DeepRock”), an incorporated company in the Province of British Columbia, and reporting issuer in British Columbia and Alberta (not currently listed for trading), with head offices at #1000-409 Granville Street, Vancouver, British Columbia, Canada, V6C 1T2.

The Ralleau Property (or, “the Property”), covers parts of Ralleau and Wilson townships on NTS map sheet 32F/01, approximately 50 kilometres east of Lebel-sur-Quevillon, a small community in north-western Quebec. The Property overlies a sequence of Archean volcanic rocks belonging to the Abitibi Greenstone Belt that have the potential to host volcanogenic massive-sulphide (VMS) and lode gold deposits.

Lebel-sur-Quevillon is approximately 620 km north-northwest of Montreal and 160 km northeast of the mining centre of Val d'Or. It is accessed by driving north on paved provincial Highway (Route 113), which joins the Trans-Canada Highway (Route 117) some 30 km east of Val-d'Or. Access to the Property is via all-season secondary and tertiary logging roads from Lebel-sur-Quevillon and typically takes 60 - 90 minutes, depending on road conditions.

The Property is situated in Category III lands as defined in the James Bay and Northern Quebec Agreement. Category III Lands are public lands on which Native people can, while respecting the principles of conservation, carry on their traditional activities year-round, and on which they have exclusive rights to certain animal species.

The Property is roughly rectangular, extending approximately 14 kilometres east-west and 4 km north-south, and comprises 59 contiguous, map-designated claims, covering 3,323.85 hectares.

The claims comprising the Property are owned 100% by Megastar Development Corp. (“Megastar”) and were in good standing as of April 10<sup>th</sup>, 2017 when DeepRock entered into an Option Agreement with Megastar to acquire a 50% ownership of the Property. Under terms of the Option Agreement, DeepRock will be deemed to have exercised its Option upon: 1) paying to Megastar \$100,000 cash in staged payments over a period of 3 years (beginning on the signing date); 2) allotting and issuing to Megastar a fully paid and non-assessable 750,000 shares, in stages, over the same 3 year period, and; 3) expending \$250,000 in exploration on the Property over the same period.

The Property area is within the Northern Volcanic Zone (NVZ) of the Abitibi Subprovince, Superior Province, in the western part of the Urban-Barry Greenstone Belt (UBGB). The mafic to felsic, volcanic and volcanoclastic rocks underlying the Property area are part of the basal, mafic-dominated sequence referred to as Volcanic Cycle I, which formed between 2,730 and 2,720 Ma, and comprise massive, pillowed and brecciated, tholeiitic basalt flows with local felsic and sedimentary units. With the exception of Proterozoic diabase dykes, all the rocks in the area are Archean. The NVZ rocks in the region of the Property underwent regional amphibolite-facies metamorphism and have locally retrograded to greenschist-grade. Although all of the rocks underlying the Property have been metamorphosed, the “meta” prefix has generally been omitted for simplicity from the rock descriptions in this Report.

The UBGB extends over 135 km along a general east-west trend, and varies between 4 km and 20 km across. It is bordered to the north by the Mountain and Father plutons and to the south by the Wilson and Souart plutons, which range from granodioritic to tonalitic in composition. Rocks directly underlying the Property, which is in the western part of the UBGB, belong to the Urban Formation and comprise mainly mafic to intermediate volcanic rocks with minor felsic volcanic and sedimentary rocks. Data from historic exploration campaigns indicate that the

Novellet Member, a dacitic to rhyolitic felsic volcanic unit that underlies the central axis of the Property, is the best prospective target for massive-sulphide deposits.

Lithology strikes east-west in the western part of the Property flexing gradually to northwest-southeast in the eastern part. This change in orientation is attributed to the effects of the southeast trending Cameron Deformation Zone that transects the eastern part of the Property. The Urban Deformation Zone, which forms a 2 km wide corridor through the central part of the western UBGB and affects the rocks underlying the Property, is also deflected by the Cameron Deformation Zone.

The geology underlying the Property comprises a setting favourable for volcanic massive-sulphide (VMS) mineralization, which is the primary exploration focus on the Property. Should evidence of prospective deposits of other commodities be identified, the scope of work and the models utilized would be expanded to include them. The principal geological control on mineralization on the Property is the association with the felsic volcanic Novellet Member, which appears to host most of the historic pits and showings.

Mineral exploration activity has been carried out sporadically on parts of the current Property and its immediate vicinity since the mid-1950s, including geological reconnaissance mapping, geophysical surveys, and limited diamond-drilling. Recent work has been carried out by Megastar, who acquired a 12-claim block north Lac Wilson in 2005 that evolved into the present Property.

Since 2005, Megastar has completed a reconnaissance geology survey (2005 - GM63677), a surface geophysical survey (2006 - GM62775), a diamond-drilling program (2006 - GM63676), trenching and sampling (2007 - GM63732), an airborne geophysical survey (2008 - 64158), a digital-database compilation of all earlier work (Langton and Stephens, 2010), and geological mapping, prospecting and sampling surveys over almost the entire property (2010 - GM65611; 2015 - GM69123). Felsic volcanic rocks, displaying characteristic hydrothermal alteration known to be associated with VMS-style deposits, had been identified from the geological review, diamond-drilling, and trenching.

There has been no exploration activity on the Property since 2014; however, DeepRock has initiated a prospecting and mapping program on the eastern part of the Property and a ground geophysical Induced Polarization (IP) survey on the western part of the Property. The results of DeepRock's current exploration programs are not addressed in this Report. There are no records of mineral production from the Property, nor any documented mineral resources on the Property.

The presence of alteration zones and the discovery of numerous Cu-Zn-Ag showings in the felsic Novelett Member, along with the presence of numerous geophysical anomalies that remain untested by diamond-drilling, accentuates the potential for the discovery of a VMS deposit on the Property.

Additional work is recommended for the Property, in the form of more detailed geological and geophysical work over those areas where the greatest potential exists, and subsequently followed by diamond-drilling program to test as many of the most promising anomalies as possible. A two-phase work program is recommended, the first phase being additional fieldwork and geophysics (\$57,500) to be completed during 2017. Contingent on positive Phase I results, the Phase II exploration program should comprise a pitting/trenching program and follow-up diamond-drilling (\$172,500).

## 2 INTRODUCTION AND TERMS OF REFERENCE

### 2.1 Purpose of Report

This report has been prepared for DeepRock Minerals Inc. (“DeepRock”, or “the Company”), a junior mining company headquartered at #1000-409 Granville Street, Vancouver, British Columbia, Canada, V6C 1T2.

In April 2017, MBR & Associates (“MRB”), a mineral exploration consulting firm, with head office in Val-d'Or, Quebec, was retained to review technical data on the Ralleau Property (or, “the Property”) for DeepRock, and to prepare an independent Technical Report (the “Report”) that is in compliance with disclosure and reporting requirements for mineral projects set forth in Canadian Securities Administrators’ National Instrument 43-101 (“NI 43-101”).

The purpose of this Report is to provide an independent summary of the Property for DeepRock’s Board of Directors, and to provide recommendations for further exploration. It is understood that the Report will be used to support the subsequent public disclosure of information regarding the Property by filing on SEDAR\* ([www.sedar.com](http://www.sedar.com)), as required by NI 43-101. It is also understood that information in the Report may be used as a basis for future financing of the Company.

*\*System for Electronic Document Analysis and Retrieval: the principal filing system of the Canadian Securities Commission.*

This Report describes the history of all known exploration work that has been carried out on the Property, but it focuses on work conducted by Megastar Development Corp. (“Megastar”) between 2005 and 2014. Recommendations for continued exploration on the Property and a supporting budget are presented.

This Report was prepared by John Langton (the “Author”) and is considered current as at May 25<sup>th</sup>, 2017. The effective date of the Report is May 15<sup>th</sup>, 2017.

### 2.2 Sources of Information

This Report relies heavily on two recent NI 43-101 Technical Reports produced for Megastar and entitled “*Technical Report on the Ralleau Property, Eeyou-Istchee Baie James Territory, Lebel-sur-Quevillon Area, Quebec*” (Moar, 2015), and “*NI 43-101 Technical Report - Ralleau Project NTS 32F/01 & 32F/02, Chibougamau District, Quebec*” (Stephens, 2011).

The bulk of the historical geological information was distilled from the Ministère de l'Énergie et des Ressources (MERN) Quebec’s records, which include government surveys and maps, and Assessment Work Reports (“GM”) filed with the MERN ‘SIGEOM’ document retrieval system (<http://sigeom.mrnf.gouv.qc.ca/>) by companies formerly working in the area of the Property.

Megastar conducted the most recent exploration campaigns on the Property from 2005-2014, the results of which were made available to the Author. A list of the principal material reviewed and used in the preparation of this document is included in the References section of this document.

### **2.3 Property Visit**

The Author visited the Property on April 30<sup>th</sup>, 2017 and May 10<sup>th</sup>, 2017 and explored the general landscape and surface features of the Property. Special attention was paid to those areas with lithological observations and diamond-drilling from previous exploration programs.

Since Mr. Langton's site visit, DeepRock has carried out a prospecting and mapping program on the eastern part of the Property and a ground geophysical Induced Polarization (IP) survey on the western part of the Property. The results of these exploration programs are pending and are not addressed in this Report.

Based on the site visits, Mr. Langton considers the exploration activity previously reported by Megastar to be accurate and reliable.

### **2.4 Units of Reference**

Unless otherwise stated, all currency amounts (\$) are reported in Canadian Dollars (CAD). Grid coordinates and maps are based on the Universal Transverse Mercator (UTM), 1983 North American Datum (NAD 83) system. Units of measurement include kilometres (km) and metres (m) for distance and hectares (ha) for area. Mineral grades and concentrations from assay results are given in percent (%), parts per million (ppm), and grams per metric tonne (gpt).



### 3 RELIANCE ON OTHER EXPERTS

The statements and opinions expressed in this document are given in good faith implementing generally accepted scientific judgement, principles and practices, based on information provided at the time of writing, and with the belief that such statements and opinions are not false and misleading at the date of this Report. Because of the inherent uncertainty in this process, no guarantee of conclusion is intended or can be given. MRB accepts no responsibility for damages, if any, suffered by any other party as a result of decisions made or actions based on this report.

The results of this Technical Report are not dependent on any prior agreements concerning the conclusion to be reached, nor are there any undisclosed understandings concerning any future business dealings.

The Author has relied on technical data provided by Megastar and the previous Technical Reports (Langton and Stephens, 2010; Stephens, 2011; Moar, 2015), which have been audited by the Author.

The Author has not verified title to the Property, but has relied on information supplied by Megastar and DeepRock in this regard. The Author has no reason to doubt that the title situation is other than that reported by Megastar and DeepRock.

Information on tenure and permits was obtained from the Ministère de l'Énergie et des Ressources (MERN) Quebec's website at <http://www.mrnfp.gouv.qc.ca/mines/index.jsp>, and the MERN Quebec GESTIM claim management system (<http://mern.gouv.qc.ca/english/mines/rights/rights-gestim.jsp>).

This Report was prepared in full accordance with NI 43-101 standards; however, as the scope of the services performed may not be appropriate to satisfy the needs of other parties, it is understood that any use that another party makes of this report, or any reliance or decisions made based upon it, except for the purposes legislated under provincial securities laws, are the sole responsibility of the other party.

The Author believes that the information used to prepare this Report, and to formulate its conclusions and recommendations, is valid and appropriate considering the status of the Property and the purpose for which the Report has been prepared.

## 4 PROPERTY DESCRIPTION AND LOCATION

The Property is located in the west-central part of Quebec, within National Topographic System (NTS) map sheet 32F/01 (Lac de la Ligne), approximately 160 km northeast of Val-d'Or, and some 50 km east-northeast of the community of Lebel-sur-Quevillon (**Figure 4.1** and **Figure 4.2**).

The centre of the Property has Universal Transverse Mercator (UTM) coordinates 399000 East, 5443000 North in Zone 18 of the NAD 83 geoid, and Latitude/Longitude coordinates of approximately 49°08'00" North / 76°23'00" West. The Property overlaps parts of Wilson and Ralleau townships, and comprises a contiguous block of 59 mineral claims, covering 3,323.85 hectares (ha) (**Figure 4.3**). Each claim covers an area of 30 seconds in latitude and 30 seconds in longitude.

The claims comprising the Property have not been legally surveyed. The boundary of each claim block was defined using the MRNFQ website at [www.mrnfq.gouv.qc.ca/mines/index.jsp](http://www.mrnfq.gouv.qc.ca/mines/index.jsp), and the GESTIM claim management system. There are no land claim issues, ownership disputes pending on the Property, or major environmental issues. All claims comprising the Property are in good standing. The renewal dates, rental fees, required minimum work and excess credits, as at the effective date of this Report (May 15<sup>th</sup>, 2017), are detailed in **Appendix I**. Details of claim renewals, work credits, claim access rights, allowable exploration, development, mining works, and site rehabilitation are summarized in the Mining Act of Quebec, available at [www2.publicationsduquebec.gouv.qc.ca](http://www2.publicationsduquebec.gouv.qc.ca).

Claims are renewed every two years at their expiration date. Since various blocks of claims have been registered at different periods of time, their expiration date is different from one claims block to other claim blocks. Renewal fees (in dollars) for each claim have to be paid at their expiration date and exploration work expenses totalling a minimum fixed amount of dollar/claim have to be reported. Explorations expenses reported which exceed the minimum requirement are kept for future renewal as "excess work credit". Those credits can also be used for the renewal of surrounding claims under some conditions.

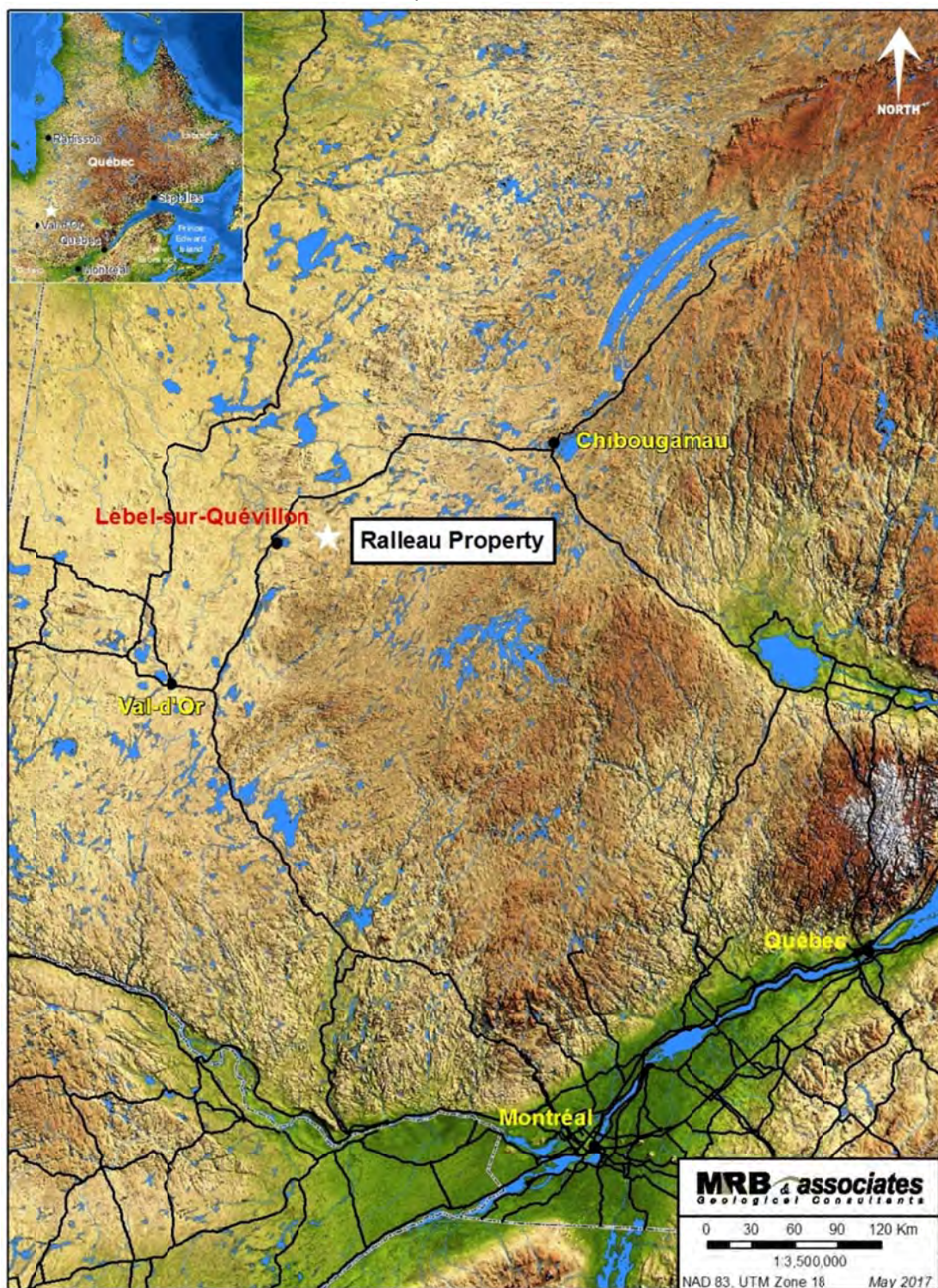
On April 10, 2017 Megastar Development Corp. ("Megastar") and DeepRock Minerals Inc. ("DeepRock") entered into an Option Agreement (the "Agreement") to acquire a 50% ownership on Megastar's wholly-owned Ralleau Property (the "Property"). Under the terms of the Agreement, DeepRock will be deemed to have exercised its Option upon: 1) paying to Megastar \$100,000 cash in staged payments over a period of 3 years (beginning on the signing date); 2) allotting and issuing to Megastar a fully paid and non-assessable 750,000 shares, in stages, over the same 3 year period, and; 3) incurring exploration expenditures of \$250,000 on the Property over the same 3 year period.

The current status of the claims comprising the Property show work credits of \$8,990.65 and obligated work requirements of \$78,480.00. According to the surface area and the location of the claims, rent fees for the Property currently amount to \$3,781.31. DeepRock must spend a minimum work requirement of \$69,489.35 by July 11, 2018 to support the renewal of all the claims comprising the Property.

The Property is situated in Category III lands as defined by the James Bay and Northern Quebec Agreement (JBNQA) (<http://www.qcc.ca/>). Category III Lands are public lands on which Native people can, while respecting the principles of conservation, carry on their traditional activities year-round, and on which they have exclusive rights to certain animal species. The Eeyou Istchee James Bay Regional Government established pursuant to the Agreement on Governance in the Eeyou Istchee James Bay Territory signed by the Cree and the Government of Quebec on July 2012, exercises jurisdictions, functions and powers on Category III Lands located south of the 55th parallel. The Regional Government is formally constituted with equal representation of Aboriginal and non-Aboriginal populations. The Property straddles Cree family traditional territories or Cree Trappelines of Mr. Sammy

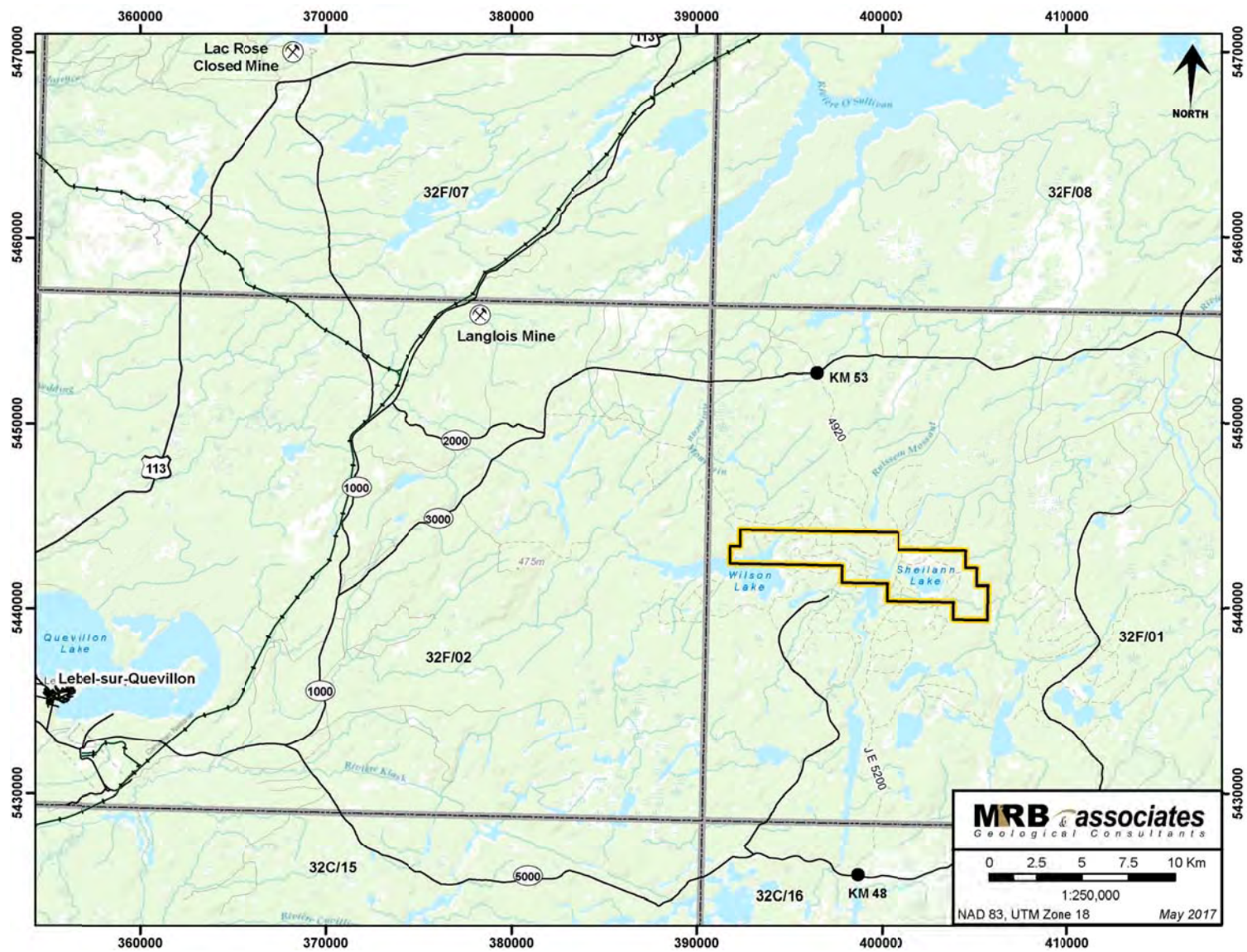


Blacksmith (trapline No W24C) and Mr Clarence Blacksmith (trapline No W24D) (Cree Mineral Exploration Board, 2014) members of the Cree First Nation of Waswanipi.



*Figure 4.1: Regional location map of the Property*





*Figure 4.2: Base map of the Property area*

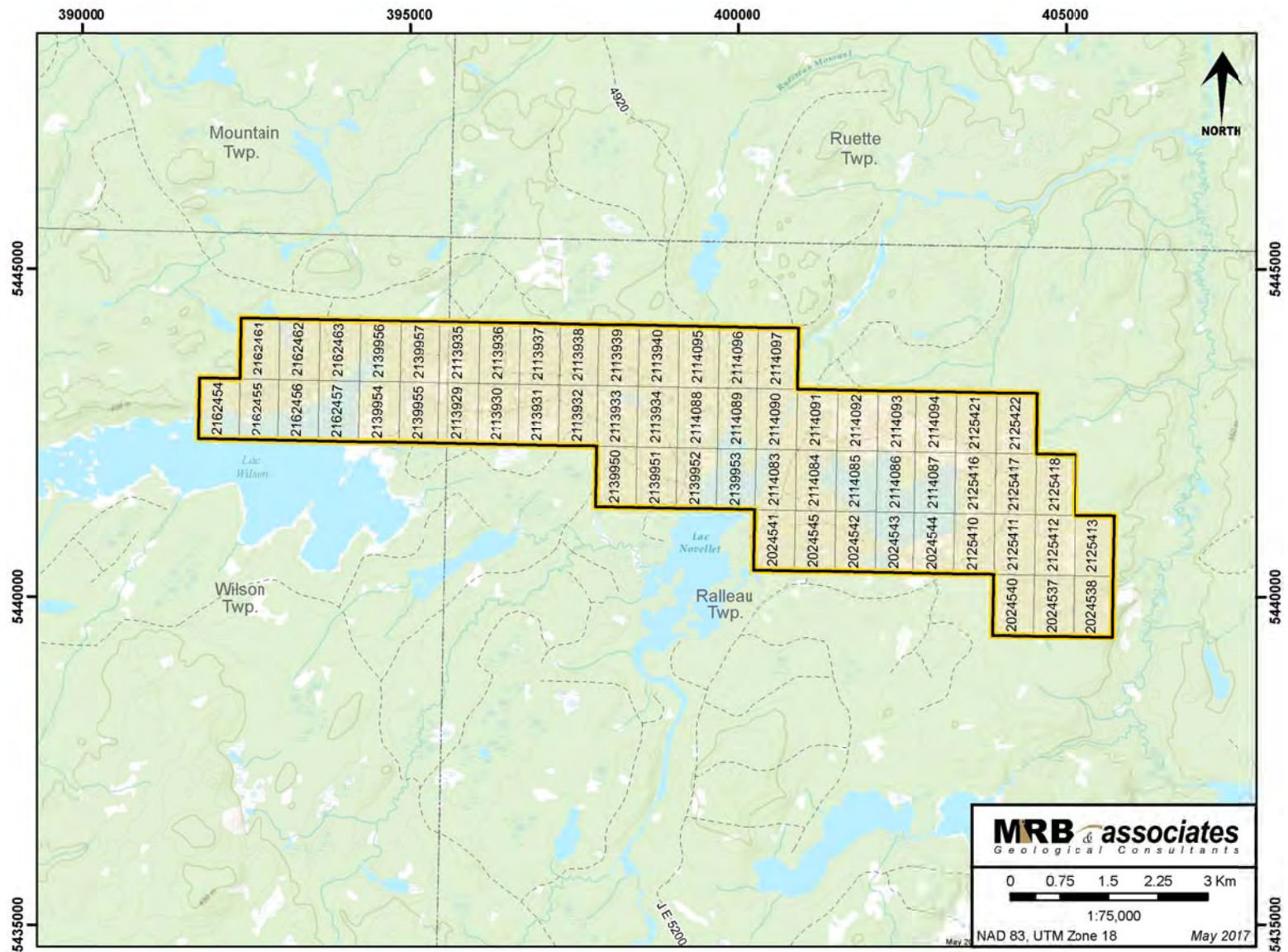


Figure 4.3: Property claim map



#### **4.1 Environmental Liabilities**

No environmental permits are currently assigned to the Property for exploitation purposes. Environmental permit(s) may be required at a later date to fulfil environmental requirements with the goal of returning the land to a use whose value is at least equal to its previous value, and to ensure the long term ecological and environmental stability of the land and its watershed; however, no environmental liabilities were inherited with any of the claims on the Property, and there are no environmental requirements that need to be fulfilled in order to maintain any of the claims in good standing at this time.

Neither are there any apparent environmental issues related to the exploration and/or development of the Property, with the possible exception that there are numerous prominent streams and lakes that may require precautions be taken during certain types of exploration activity, such as diamond drilling or stripping.

#### **4.2 Permits**

Exploration work permits may be required for future work on the Property. The appropriate Permit Applications for potential forthcoming work on the Property would be required to be submitted by DeepRock to MRNF Quebec. As operator, DeepRock has assured the Author that all exploration programs on the Property shall be conducted in an environmentally sound manner, and will follow, to the best of their abilities, the principles and guidelines outlined in the E3 Framework Document for Responsible Exploration, as according to industry best practices (<http://www.pdac.ca/e3plus/index.aspx>).

#### **4.3 Other Relevant Factors**

Each mining claim provides access rights to a parcel of land on which exploration work may be performed; however, the claim holder cannot access land that has been granted, alienated or leased by the Province for non-mining purposes, or land that is the subject of an exclusive lease to mine surface mineral substances, without first having obtained the permission of the current holder of these rights.

To the Authors' knowledge there are no significant factors and risks that may affect access, title, or the right or ability to perform work on the Property throughout the year.

## 5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

### 5.1 Accessibility

The Property is located approximately 160 km northeast of Val-d'Or and 50 km east of Lebel-sur-Quevillon. The town of Lebel-sur-Quevillon is accessible via Provincial Highway 113, which joins the Trans-Canada Highway (Route 117) some 30 km east of Val-d'Or (**Figure 5.1**). From Lebel-sur-Quevillon, the Property is easily accessed by truck via a network of secondary forestry roads (**Figure 5.2**). Ingress within the property is best realized by all-terrain vehicle (or snowmobile in winter) and by foot. Total driving time from Lebel-sur-Quevillon to the Property is typically 60 - 90 minutes, depending on road conditions.

From Lebel-sur-Quevillon, the main access route - to the central and western parts of the Property - is accommodated by travelling 53 km eastward on Haul Roads 1000 and 3000 to the junction of secondary road 4920, which leads 10 km southwards to the heart of the Property. The eastern part of the property (around Lac Sheilann) is accessed by travelling 36 km eastward on Haul Road 5000 from its junction with Haul Road 1000, and thence 15 km northward on road JE5200 (**Figure 5.2**).

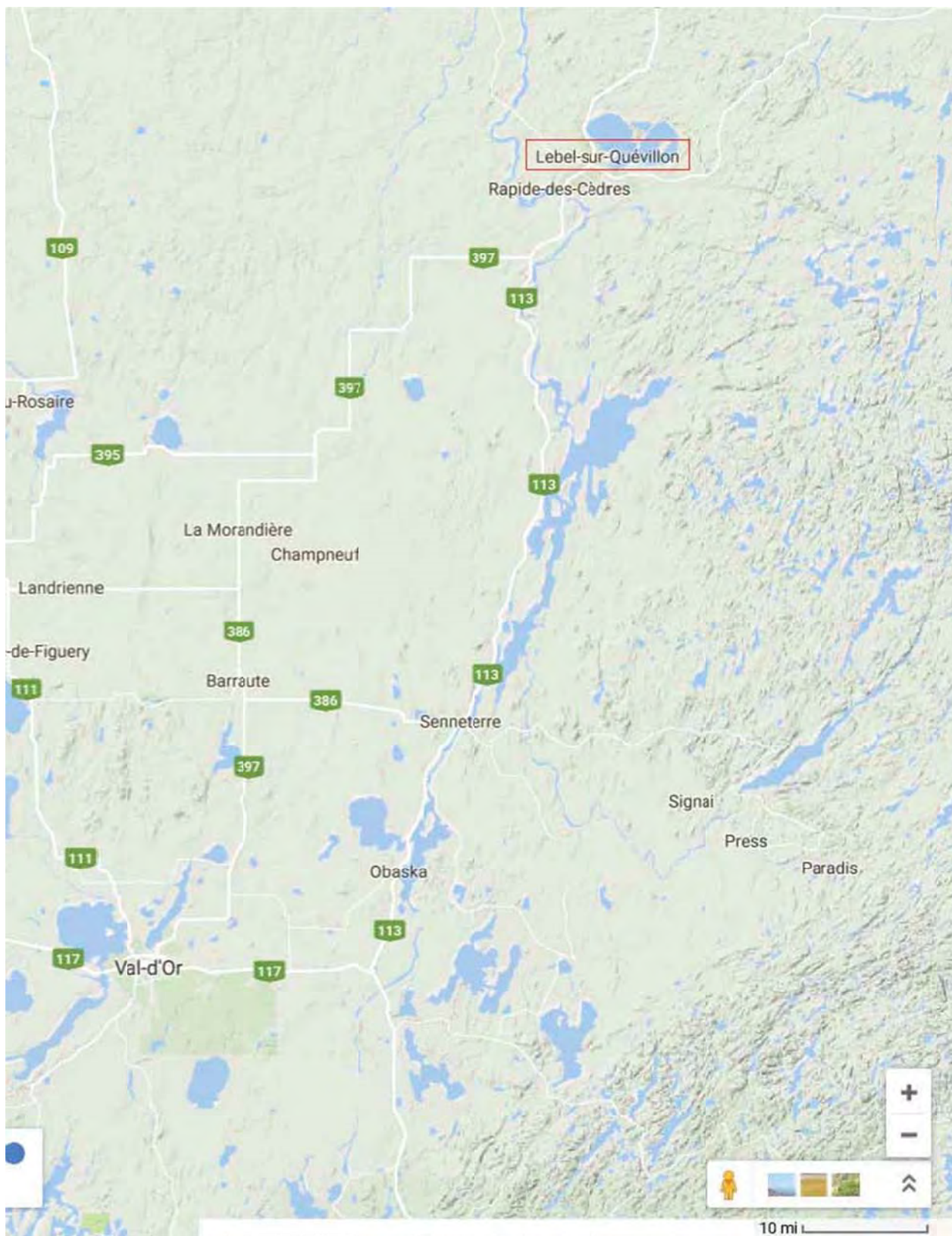
### 5.2 Climate

Climate data was obtained from Canadian Climate Normals, Environment Canada, [http://www.climate.weatheroffice.ec.gc.ca/climate\\_normals](http://www.climate.weatheroffice.ec.gc.ca/climate_normals). Data collected from the meteorological station in Lebel-sur-Quevillon between 1971 and 2000 show that the hottest summer temperature was 34.4°C and the coldest winter temperature was - 43°C. The average daily temperature was slightly above 1°C.

On average, the area experienced 929.4 mm of annual precipitation: 703.8 mm of rain and 225.6 mm of snow.

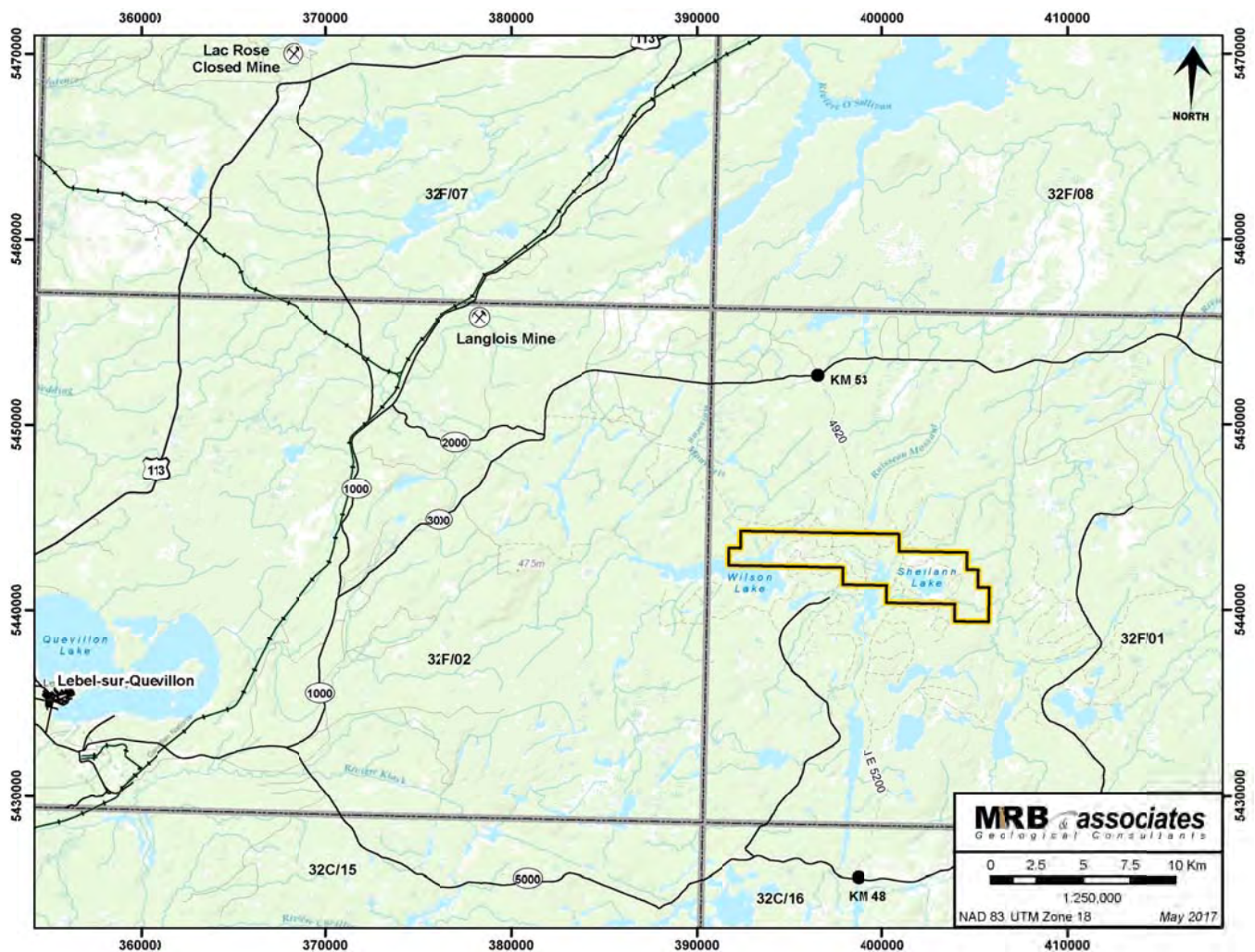
Between February and May, the prevailing winds in the region are from the northwest, whereas between June and January there is a predominance of winds from the southwest. The wind data was collected in Val-d'Or, between 1952 and 1980.

Exploration operations on the Property can be carried out year-round.



*Figure 5.1: Main provincial roads in the vicinity of Val-d'Or/Lebel-sur-Quévillon*





*Figure 5.2: Primary and secondary access roads in the vicinity of the Property*

### 5.3 Local Resources and Infrastructure

Lebel-sur-Quevillon, situated in the administrative region of Northern Quebec, is a small town providing housing, servicing, supplies, consumable, transport facilities and an experienced workforce. Services also include a health care centre with emergency services, primary and secondary schooling and provincial government services. The current population of Lebel-sur-Quevillon is 2,159 people (Statistics Canada, 2014). Lebel-sur-Quevillon has a municipal airstrip but it should be noted that there are presently no regular flights. The town of Val d'Or, located 160 km southwest has a regional airport with daily scheduled flight to Montreal. Other infrastructure in Lebel-sur-Quevillon area includes the Barraute-Lebel-sur-Quevillon-Franquet-Matagami freight railway line operated by Chemin de fer d'interet local du nord du Quebec (CFILNQ), a semi-autonomous division of Canadian National (CN), serving the administrative region of Abitibi-Temiscamingue and Nord-du-Quebec; a 315 kV power transmission line supplying Lebel hydroelectric substation, and; a 120 kV transmission line from Lebel substation to the Langlois Mine (Nyrstar) located some 20 km northwest of the Property. The Comtois sawmill (Resolute Forest Products) and the Langlois mine (Nyrstar) are main businesses operating in the Lebel-sur-Quevillon area.

The proximity of the Property to nearby mines and the mining centres of Chibougamau and Val-d'Or ensures the availability of equipment and personnel for exploration and mining.

## 5.4 Physiography

The Property lies in the Mistassini Highlands natural province of the Canadian Shield and is characterized by an irregular topography consisting of relatively flat lands dotted with hills that rise less than 100 m above the surrounding ground. Elevation ranges from 370 m to 430 m, with the highest area located north of Lac Sheilann. A few hills to the north of Lac Wilson attain an altitude of approximately 410 m. Local lake elevations are around 360 m. The Property is characterized by low-relief topography and an overall gentle slope towards the north. The physiography around the Property is largely attributed to the lithologies and structures of the underlying rocks, which in turn were sculpted by the most recent period of glaciation. Retreating glaciation left a generally thick veneer of moraine boulder till and eskers that cover much of the local bedrock and control the drainage. The outcrop exposure is minimal, and local swamps and wetlands are present throughout the Property.

Water from the central and eastern parts of the Property drains into Lac Novellet, which feeds into the O'Sullivan River and ultimately empties into James Bay via the Nottaway River system. Lac Wilson drains into the Wilson River, which flows south-west to Lac Quevillon.

Lakes, swamps and grassy meadows fill bedrock and drift depressions. Although most of the Property has been harvested by local forestry companies (**Figure 5.3**), the local terrain hosts a typical boreal forest mixture of fir (black spruce in the wetlands and jack pine in the drier areas) and tamarack, with local stands of aspen and yellow birch. Ground cover is generally in the form of grasses, caribou moss, and shrubs; the latter typically comprising willow, arctic birch, alders and Labrador tea.



*Figure 5.3: Google Earth image showing local physiography and outline of Property*



## 6 HISTORY

**\*Note:** The GESTIM and E-Sigeom sites allow on-line searching of the Province of Quebec's database of Provincial Assessment Reports or "Gestimes Minières" (GM's). The data are accessible online at <https://gestim.mines.gouv.qc.ca/> and <http://sigeom.mrnf.gouv.qc.ca/>.\*

The area in the vicinity of the Property has seen exploration programs completed by various companies since the 1950's. The historical exploration work pertaining to the area of the Property, but not necessarily to the entire Property, is summarized below.

### 6.1 Historic Exploration and Development Work

Most of the companies that have held property in the Property area since the 1950's only investigated small parcels of land and performed very limited work, usually consisting of reconnaissance mapping and magnetic and/or electromagnetic geophysical surveys, and preparation of simple reports. In a few cases, diamond-drilling was carried out to test geophysical anomalies and surface showings. No significant deposits have been found to date.

1940: Major geologic features at a scale of 1:63,360 (one inch to one mile) were published by the Ministère des Mines du Québec (Fairbairn, 1940 and 1946) for the Ralleau, Effiat and Carpiquet townships. Fairburn confirmed the presence of felsic rocks northwest of Lac Sheilann (RG028A).

1956: Cyprus Exploration Corporation Limited completed mapping in the area west of Lac Novellet. Following their investigations, Cyprus decided to discontinue further work (GM61348).

1956 (**1.5 km south of current Property**): Malartic Goldfields completed an airborne EM geophysical survey over prospective gold claims to the southwest of Lac Novellet, followed by reconnaissance mapping and a surface electromagnetic survey. Eight packsack drill-holes were bored over a long conductor identified from the survey, but none of the holes were able to penetrate the overburden. No further work was recommended, although the source of the conductor was never explained. At a later date, three short, vertical packsack drill holes (N1, N2 and N3) totalling 31.4 m were drilled in the same area and again failed to determine the source of the electromagnetic conductor that had been previously outlined in 1956 (GM05419; GM07306).

1956: Dome Exploration Company bored eight diamond drill-holes, totalling 610 m, on the southwest side of Lac Sheilann in the same general area as their earlier pitting/trenching/stripping program (for which no published documents were found). Mineralization in hole SA-5 consisted of 0.11% Cu over 1.8 m. Three other holes appear to have intersected the same mineralization at greater depth: S-A1, SA-1A, and SA-6, returned 0.61% Cu over 1.46 m, 0.21% Cu over 1.58 m, and 0.38% Cu over 2.9 m, respectively. Hole SA-2, drilled approximately 60 m further to the northwest, returned 0.12% Cu over 19.2 m in the upper part of the hole and 0.18% Cu over 5.2 m in a lower part of the hole. This location may be a candidate for more detailed geophysical surveys, such as a surface pulse-EM, as the area appears to be strongly anomalous in copper (GM04721).

1956: SPES Exploration investigated the copper potential of the area northeast of Lac Sheilann, as a result of an encouraging copper assay from a sample taken from a showing; however, after several weeks of reconnaissance prospecting, without success, the work was halted (GM05363).

1964 (**5 km west of current Property**): Mining Corporation of Canada Limited completed electromagnetic (EM) and magnetic geophysical surveys over areas north of Lac Wilson. Trenching, and results from 7 drill holes, produced encouraging results. One trench over 20 m long and 11 m wide, produced results of 4.4% Cu over 1.2 m and 1.9% Cu over 11.4 m. The best result from the drilling was 0.33% Cu over 14.3 m. Another nearby hole returned several metres of graphite and barren massive pyrite (GM15336, GM15337, GM15348).

1964-1965 (**5 km west of current Property**): Coniagas Mines Limited completed EM and Magnetic surveys and 6 diamond drill-holes near the northeast shores of Lac Wilson. The most favourable results were 0.27% Cu over 0.6 m, and 0.12% Cu over 7.3 m (GM15848; GM15849; GM17234).

1965: Anglo American conducted a magnetic survey over an area northeast of Lac Sheillan and followed up with a Crone EM survey that identified two conductors that were drill tested by holes R-1, R-1A, R-2 and R-3, totalling 421.2 m. The holes encountered disseminated, semi-massive to massive sulphide mineralization associated with graphite stringers, with mineralized intercepts as follows: R-1A encountered 1% pyrrhotite and chalcopyrite over 4.57 m; R-1 intersected 20% pyrrhotite over 2.90 m and up to 30% pyrrhotite over 1.52 m; R-2 intersected 60% pyrrhotite and pyrite over 15.24 m and 10-20% sulphides, including chalcopyrite, over 12.74 m, and; hole R-3 encountered 20% pyrrhotite and trace chalcopyrite over 1.07 m (GM15993; GM18253; GM19519).

1968 (**west of current Property**): Madison Syndicate and Atlantic Syndicate completed a horizontal loop EM survey and drilled five (5) holes, totalling 616 m. Results of two of the holes included: 0.42% Cu over 8.54 m and 0.37% Cu over 8.84 m. The location of this work was not provided (GM39363).

1981 (**between 1 km and 5 km west of current Property**): SEREM Limited completed work on a number of claims held north of Lac Wilson, including line cutting, horizontal loop MaxMin EM, and magnetic surveys. Fifteen conductive zones were identified. A proposed program to drill a number of the more promising conductors does not appear to have been completed (GM39363).

1986: Mines Sullivan Inc. evaluation report. CDI Surveys Inc. performed an interpretation of data collected by Questor Surveys a few years earlier, over areas covering the eastern half of the current Property. The survey outlined 31 EM conductors and delineated 8 target areas, of which two are located on the Property (near the western and southeastern shores of Lac Sheillan). It was noted that some of the conductive anomalies were not continuous, which may suggest greater opportunities for VMS-style systems. Magnetic susceptibility interpretation differences were believed to be caused by alternating zones of felsic to mafic volcanic rocks, plus several known structural features representing north-south lineaments (GM44514).

1988: Onyx Resources Inc. contracted Sagax Geophysics to carry out an Induced Polarization (IP) geophysical survey totalling 70 line-kilometres over the area directly south of Lac Sheillan (the "west grid"). The survey outlined a total of thirty-two (32) conductive bodies, the orientations of which corresponds to the general orientation of the previously interpreted geological contacts. Seven (7) of the anomalies were deemed as priority targets for testing by diamond-drilling (GM47599).

1992: SOQUEM, in cooperation with Explorateurs-Innovateurs de Quebec Inc. carried out a Beep-Mat survey over an area just north of Lac Wilson. Eleven conductive outcrops on strike with two strong electromagnetic conductors detected by the IP survey were exhumed (dynamited) and sampled. Analysis of the samples did not reveal any economic concentrations. The discovery of near-surface bedrock using the Beep Mat suggests that parts of the property are covered with only thin overburden and that further Beep Mat surveys are warranted (GM52037).

2003: The Lac de la Ligne map sheet (NTS 32F/01) was mapped at a scale of 1:50,000 by Bandyayera (RG2002-12). This work was undertaken mainly in order to update the geological maps of the Urban-Barry Greenstone Belt and evaluate the mineral potential of the area.

2005-2015: Megastar carried out various exploration programs following its acquisition of the original property claims in 2005, including: reconnaissance geology and reporting (2005 - GM63677); surface geophysical surveys (2006 - GM62775); diamond drilling (2006 - GM63676 ); trenching and sampling (2007 - GM63732), and; an airborne

geophysical survey (2008 - 64158); a digital-database compilation of all earlier work (Langton and Stephens, 2010); field truthing geophysical anomalies and detailed geological mapping (2010 - GM65611); National Instrument 43-101 Technical Report (2015 - GM69123). Megastar's exploration work is summarized as follows:

2005: Geological compilation: Megastar completed a limited geological compilation in the fall of 2005 shortly after the initial block of 12 claims had been acquired (Fournier, 2005; GM63677).

2006: Megastar initiated field exploration work in January of 2006, consisting of approximately 75 line-km of line cutting over areas of the original twelve (12) cells, in preparation for ground geophysical surveys (see Megastar News Release dated Jan. 31, 2006). Magnetometer and EM surveys were completed over the grid during March and April of 2006 following completion of the line cutting (Boileau, 2006; GM62775). The objective was to refine the geological interpretation and further characterize the historic airborne Input conductors.

The magnetic survey outlined a unit of low magnetic susceptibility that correlated with the Novellet Rhyolite identified in an earlier Government survey (RG2002-12). Based on local outcrop exposure of the Novellet Rhyolite, the RG2002-12 Report estimated it to be 500 m thick. The 2006 detailed ground magnetic survey conducted by Megastar indicated that the Novellet Member was more than 850 m thick, and extended across the entire Ralleau property. In addition, magnetic anomalies adjacent to the south contact of the rhyolite were coincident with reported surface mineralization and DeepEM conductors.

The DeepEM in-loop down-hole TDEM survey identified six (6) distinct DeepEM conductors, four (4) of which occurred within the favourable rhyolite Novellet Member. Drilling to test these conductors was recommended.

2006 - Exploration Drilling: Megastar completed five diamond-drill holes in 2006 for a total of 1,545.7 metres. Drilling was planned to test coincidental Magnetic, DeepEM conductors, and favourable geology that had been identified on the original twelve cells.

The locations of the five (5) diamond-drill holes are summarized in **Table 6.1**.

**Table 6.1: Summary of 2006 Diamond-Drilling Program**

Hole #	Length (m)	UTM (E) [NAD83, Zone 18]	UTM (N) [NAD83, Zone 18]	Azimuth	Dip
MAR-06-01	300	397688	5443970	360°	-50°
MAR-06-02	297	397502	5444364	180°	-50°
MAR-06-03	299	397275	5443238	360°	-50°
MAR-06-04	300	397861	5442897	360°	-50°
MAR-06-05	300	397846	5442459	360°	-50°

Best results of the drilling program are summarized in **Table 6.2**.

**Table 6.2: Selected “Best” Results From 2006 Diamond-Drilling Program**

Hole	Sample	From (m)	To (m)	Cu (ppm)	Zn (ppm)
MAR-06-01	60873	72.00	73.50	247	106
MAR-06-01	60872	66.23	67.50	38	205
MAR-06-02	63349	192.00	193.50	218	176
MAR-06-02	63358	241.50	243.00	19	473
MAR-06-03	61244	216.00	216.30	631	2130
MAR-06-03	61220	66.00	67.50	47	1475
MAR-06-04	61277	208.50	209.10	243	91
MAR-06-04	61264	157.50	159.00	42	126
MAR-06-05	60865	334.50	336.00	131	44
MAR-06-05	60833	159.00	160.60	59	157

All EM conductors were reportedly explained by the drill hole intersections. Although no economic Au, Ag, Cu or Zn mineralization was found in the samples analysed, the anomalous values correspond to an environment of geochemical alteration. Geochemical data was used to characterize the rock types, as well as their alteration type and intensity. Whole rock analyses of several samples showed depletion of Na<sub>2</sub>O in the footwall, whereas other samples exhibited K<sub>2</sub>O enrichment of hanging wall. These alteration styles are often associated with VMS environments. In addition, hole MAR-06-01 intersected a wide zone of sericitized rhyolite, a type of alteration also associated with VMS deposits (Piché, 2007; GM63676).

2008: Megastar completed a stripping and channel sampling program designed to follow up on potential VMS targets around Lac Sheillan (GM63732). A 15 kilometre snow road was opened to Site #1, where approximately one (1) metre of overburden was removed to expose the bedrock surface. Forty-seven (47) channel samples were taken from the outcrop over a distance of approximately 50 metres, in a north-south direction. A rock-saw channel was cut and the channel material chipped out over approximately one metre. The work exposed massive to semi-massive sulphides that appeared anomalous in copper and zinc. The sulphide enrichment appeared to have occurred along the contact between the felsic and mafic rocks. Fifty (50) samples were submitted to ALS Chemex of Val-d’Or for assay of gold, silver, copper and zinc content. Eight (8) of these samples were also sampled by whole rock methods for 14 metal compounds (GM63732).

Site #2, which was located about three kilometres west of Site #1, was excavated but encountered water, prohibiting the collection of samples. The site was rehabilitated and abandoned.

2008: In late April of 2008, Megastar engaged Abitibi Geophysique Ltd. of Val d’Or, Quebec, and Geotech Ltd. of Aurora, Ontario, to conduct a helicopter-borne Versatile Time-Domain Electromagnetic (VTEM) geophysical survey. The survey area totalled 1,456 line kilometres over 8,000 hectares, on Megastar’s entire 100% owned Ralleau project area (additional cells were acquired following the survey). Flight lines were spaced at 75 metre intervals, and accurately located using a GPS device and a radar altimeter for elevation (Abitibi Geophysics Report 08N045, 2008).

The VTEM system is particularly suited to identifying deeply buried, conductive ore bodies. This survey was intended to provide Megastar with priority drill targets that could be caused by underlying VMS deposits. The survey identified forty-nine (49) discrete anomalies classified according to conductivity and strike length as priorities 1 to 4. Eight (8) of these anomalies were classified as Priority 1, an additional eight (8) as priority 2, thirteen (13) were classified as priority 3, and finally twenty (20) more were classified as priority 4. Because VMS deposits are more often than not associated with anomalies of shorter strike length and moderate to low conductivity, Megastar believed that all 49 anomalies needed to be reclassified following a field mapping program to verify those anomalies that may be near surface, and corroborate them with favourable geological environments.

2010: Megastar solicited MRB & Associates to compile a comprehensive digital database of previous exploration work, prior to the 2010 summer exploration program (Langton and Stephens, 2010). During the summer, Megastar carried out a program that comprised ground-truthing the VTEM anomalies discovered by the 2008 airborne survey, as well as a detailed geological mapping and sampling program (Stephens 2011; GM65611).

One hundred and sixty-one (161) grab samples were collected during the course of the mapping in 2010 and sent to ALS Chemex Laboratories in Val d'Or, Quebec for multi-element (109 samples), whole rock (35 samples), gold (22 samples), and platinum and palladium (5 samples) analysis.

Of the samples submitted for trace element geochemistry, twelve returned over 200 ppm Cu, the highest concentration being ppm Cu (Sample 108412). Eight samples returned values exceeding 200 ppm Zn, the highest concentration being 1,190 ppm Zn (Sample 7899). No significant values were obtained from grab samples analysed for gold, platinum or palladium content. Thirteen samples were reported as having anomalous copper-zinc, as well as K-enrichment and Na and Ca depletion.

2014: Megastar retained Roger Moar, consulting geologist, on July 22<sup>nd</sup>, 2014 to conduct a geological mapping and lithogeochemical sampling program to augment the work done by Stephens in 2010. Fieldwork was carried out over a period of 44 days between August 5<sup>th</sup> and September 28<sup>th</sup>, 2014 (Moar, 2015; GM69123).

The 2014 exploration program was conducted to refine the accuracy of the geological map, obtain a better understanding of the geological setting of the property, and to define potential targets for VMS mineralization. The geological mapping program was conducted along north-south traverses totalling 94 km, and along the numerous forestry roads and access trails transecting the Property.

A total of 158 outcrops over an area of 20 km<sup>2</sup> were mapped during the course of the survey. All geological data was concatenated with earlier reconnaissance mapping data and used to produce geological maps of the Property. A total of ninety-four (94) grab samples of representative lithological units as well as mineralized outcrops were collected and analyzed for a group of 33 elements. **Table 6.3** shows a summary of the grab samples collected during the 2014 geological mapping program that contained significant concentrations of Cu and Zn.

Forty-seven (47) grab samples were sent for gold assay, but none returned notable values.

**Table 6.3: Summary of Grab Samples With Notable Cu and Zn - 2014 Program**

Sample	Easting	Northing	Cu (ppm)	Zn (ppm)	Description
Q592576	395878	5444293	2070	190	Weakly to moderately carbonatized fine-grained andesite; 2-3% pyrite and chalcopyrite associated with a sub-vertical shear zone striking E-W
Q592641	401501	5441397	1920	8360	Sericitized and chloritized shear zone (10 cm) affecting intermediate volcanic; up to 10% pyrite with minor amount of chalcopyrite
Q592645	404228	5441569	720	130	Massive, fine-grained basalt; moderately carbonatized with 3% disseminated Pyrite

The whole rock data was used to determine the composition and classification of the rock units on the Property. According to the results of Moar (2015), the rocks underlying the Property span the range from felsic to mafic, consistent with bimodal volcanism genesis, and are classified as subalkaline, island arc tholeiites, likely derived from the fractionation of a primitive, mantle-derived magma.



## 7 GEOLOGICAL SETTING AND MINERALIZATION

### 7.1 Regional Geology

The area of the Property is within the Northern Volcanic Zone (NVZ) of the Abitibi Subprovince, Superior Province (Chown et al., 1992), in the western part of the Urban-Barry Greenstone Belt (UBGB) (**Figure 7.1** and **Figure 7.2**). The mafic to felsic, volcanic and volcanoclastic rocks underlying the Property area are part of the basal, mafic-dominated sequence referred to as Volcanic Cycle I (Mueller et al., 1989), which formed between 2,730 and 2,720 Ma (Mortensen, 1993), and comprises massive, pillowed and brecciated, tholeiitic basalt flows with local felsic and sedimentary units. With the exception of Proterozoic diabase dykes, all the rocks in the area are Archean.

The NVZ rocks in the region of the Property underwent regional amphibolite-facies metamorphism and have locally retrograded to greenschist-grade. Although all of the rocks underlying the Property have been metamorphosed, the “meta” prefix has generally been omitted for simplicity from the following rock descriptions.

The cyclic volcanic and sedimentary successions of the NVZ represent oceanic supracrustal assemblages deposited in an ancient arc-rift setting that were later basally accreted and intruded by syn-volcanic, poly-phase granitoid plutons. This entire assemblage was deformed and shortened during the north-south compressional Kenoran Orogeny (<2708 Ma) with concomitant development of mainly south-directed, high-angle reverse thrusts, followed by regional dextral transpression. Syn-tectonic plutons (2703-2690 Ma) intruded the sequence, mainly along major shear zones and along the interfaces between the syn-volcanic plutons and the supracrustal rock sequences.

The UBGB extends in a generally east-west direction over 135 km and is between 4 km and 20 km wide. It is delimited to the north by the Mountain and Father plutons and to the south by the Wilson and Souart plutons (**Figure 7.3**), which range in composition from granodiorite to tonalite. The UBGB comprises mainly volcanic rocks imbricated by east to east-northeast oblique thrust-faults. Rheume and Bandyayera (2007) reviewed the lithostratigraphy of the Urban-Barry, Chapais and Chibougamau regions and proposed a sequence of three volcano-sedimentary cycles for the UBGB, dated between 2791 to 2707 Ma. Based on the work of Bandyayera et al. (2002, 2003, 2004a and 2004b), and Rheume and Bandyayera (2007) the UBGB has been subdivided into five formations: the Fecteau (2791 Ma), Lacroix, Chanceux, Macho (2718 Ma), and Urban (2707-2714 Ma).

The volcanic rocks of the Urban Formation are interpreted to represent the third and final volcano-sedimentary cycle of the Urban-Barry Greenstone Belt. With the exception of the volcano-sedimentary Hauy Formation, which has been dated at  $2691.7 \pm 2.9$  Ma (David et al., 2007), the Urban Formation is younger than the volcanic rocks of the Chibougamau-Chapais region. Rheume and Bandyayera (2007) proposed three interpretations to explain the age difference: (1) the volcanic events that formed the Urban Formation did not affect the Chibougamau-Chapais area; (2) the equivalent rocks were eroded, or; (3) they represent a local submarine volcanic basin, contemporary with the erosion of the volcanic centres in the Chibougamau-Chapais region. The Property is underlain by the Urban Formation, in the far western part of the UBGB.

The area has been affected by amphibolite-facies regional metamorphism characterized by the assemblage hornblende + actinolite + chlorite + biotite  $\pm$  garnet (Bandyayera et al., 2003); however, the central part of the Urban Formation has retrograded to greenschist facies, illustrated by the predominant mineral assemblage of albite + epidote + actinolite + chlorite + carbonate. The rocks surrounding the syn-volcanic felsic intrusions record amphibolite-facies, contact metamorphic conditions characterized by the assemblage hornblende + biotite + garnet.

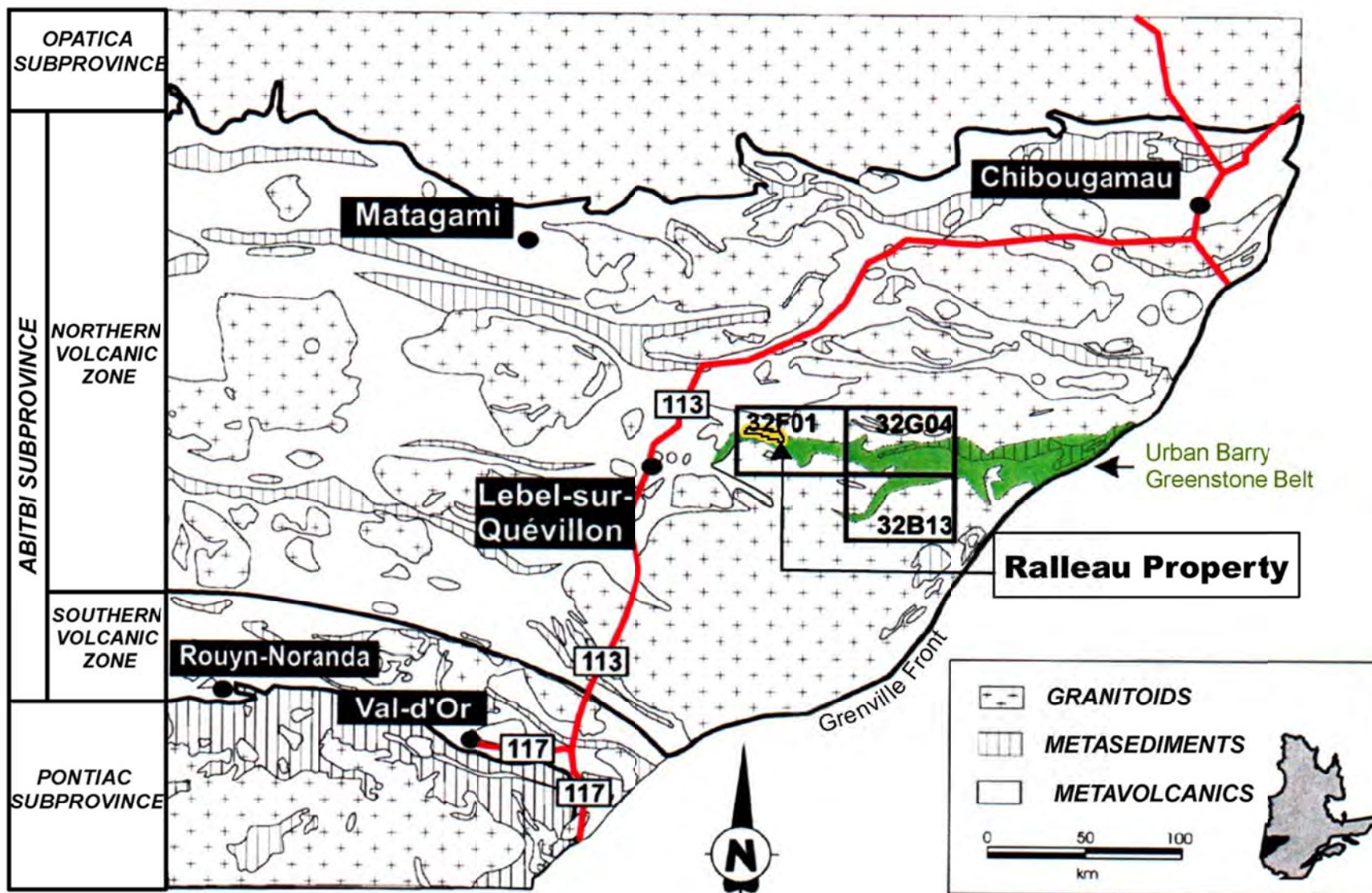
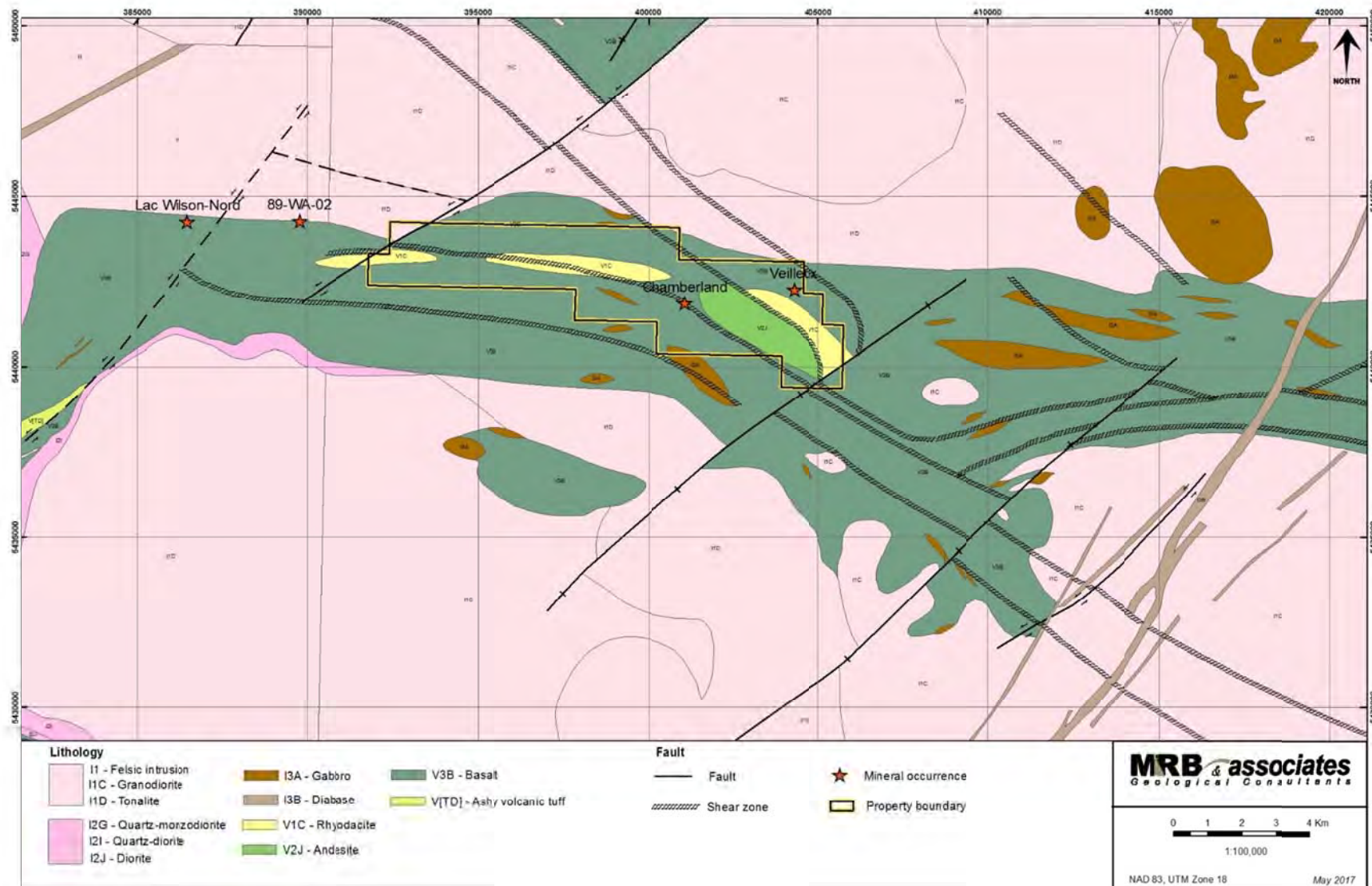


Figure 7.1: Regional map showing geological divisions of the Abitibi Subprovince (after Bandyayera et al., 2003)







*Figure 7.3: Local area geology underlying the Property.*



## 7.2 Local Geology

The Urban Formation, which was first defined in exposures near Lac Picquet and Lac Mesplet by Bandyayera et al. (2002), extends for more than 125 km between the Grenville Front and Lac Wilson (see **Figure 7.1** and **Map 1**). It is composed principally of tholeiitic, glomeroporphyritic basalt, syn-volcanic gabbro, felsic volcanic, and various sedimentary rocks. Mafic and andesitic rocks make up approximately 85% of the Urban Formation.

The mafic and andesitic rocks of the Urban Formation exhibit a variety of textures including aphyric, porphyritic, amygdular and pillowed units. The basalts are greyish green to dark green on weathered surfaces and dark greyish green on fresh surfaces. Mafic lavas are aphanitic and locally contain 2-5% amygdules (2-3 mm) filled with calcite and occasionally with quartz. The porphyritic units contain up to 15% plagioclase phenocrysts (2-5 mm). Pillowed basalts contain a relatively common epidote alteration at the centre of the pillows. These mafic flow units are chloritized, variably carbonatized and locally silicified.

The two main felsic volcanic units of the Urban Formation are the Novellet (2,714 Ma) and Freeman (2,707 Ma) members (Bandyayera et al., 2002, 2004b). The Freeman Member forms a 25 km long and 4 km wide band in the Lac Hebert area (NTS 32G/03) comprised of mainly rhyolitic to dacitic flows, lapilli tuffs and blocky tuffs of calc-alkaline affinity. The Novellet Member comprises mainly volcanic and volcanoclastic rocks and undifferentiated tuffs of intermediate to felsic composition, with calc-alkaline affinity. The felsic volcanic rocks of the Novellet Member have been dated at  $2714.1 \pm 1.1$  Ma by Bandyayera et al. (2003).

Several gabbro sills intrude the Urban Formation. They are massive to very weakly foliated, medium-grained and contain about equal proportions of chloritized amphibole and plagioclase. The gabbros are also weakly to strongly carbonatized. These sills are concordant with the regional foliation.

The Mountain Pluton, a relatively homogenous, syn-volcanic intrusion, lies along the northern contact of the Urban Formation, at the extreme north of the Property. The main intrusive phase of the Mountain Pluton on the Property is a biotite tonalite. In the field, this unit either occurs as small, isolated outcrops or as large zone of exposed rock on hill tops in the northeast part of Wilson Township. The biotite tonalite is medium-grained, homogeneous, and contains 60% subhedral plagioclase, 30% interstitial, blue quartz and approximately 10% fine-grained biotite. It is pale grey on fresh surfaces and weathers to a whitish grey. The Mountain Pluton also contains a granodiorite phase with 20-25% K-feldspar that crops out a few hundred metres north of the Property.

### 7.3 Property Geology

The latest interpretation of the geology underlying the Property is based primarily on the geological mapping programs carried out in 2010 (Stephens, 2011), which was modified somewhat by Moar (2015) during the 2014 summer field season.

The Property is situated within the western part of the Urban-Barry Greenstone Belt. The geology of the Property is dominated by mafic to intermediate volcanic rocks of the Urban Formation, and felsic volcanics of dacitic to rhyolitic composition of the Novellet Member. These lithological units mainly strike east-west in the western part of the Property, changing gradually to northwest-southeast in the eastern part of the Property. This changes in orientation is likely related to the influences of the Urban Deformational Zone and the Cameron Deformational Zone (see **Section 7.4**). Bedrock exposures are scarce, as glacial deposits and wetland areas cover much of the Property.

The following details of the Property geology are summarized from Stephens (2011) and Moar (2015):

Interpretation of the geology of the Property following the 2010 mapping program (Stephens, 2011) confirmed the original geological interpretation to be generally representative; however, as a result of analysis of the data from the field mapping program, and new information available from an up-to-date airborne magnetic survey, a more precise delineation of the geological units was possible. The relocation of the geological contacts and the new interpretation of the regional structure resulted in several significant changes, including:

- repositioning of the Lac Wilson felsic unit further north but following the same general trend;
- shifting of the Lac Wilson felsic 'dome' toward the west, and a reduction in its width from 400 m to just over 100m;
- identification of a narrow cherty horizon within the core of the Lac Wilson felsic dome;
- extension of the Lac Novellet felsic dome toward the east, across Lac Sheilann, and an increase in its width toward the west;
- elimination of the most easterly felsic dome indicated on the original geological maps, and replacement by a northwest-southeast trending shear zone within silicified intermediate rocks;
- field correlation of observed mafic intrusions in the field with many of the magnetic-high anomalies, and interpretation that similar magnetic-high anomalies likely reflect unmapped mafic intrusions;
- repositioning of many of the earlier mapped mafic intrusions due to direct field observation and correlation with magnetic maps;
- elimination of several of the faults or shears indicated on the original maps, and modification of others;
- addition of several new faults or shears;
- repositioning of several regional shears based on correlation with the topography of the Property;

A porphyritic, pillowed andesite has been defined between the Novellet Member and mafic rocks of the Urban Formation. Several outcrops of this unit were mapped in the central part of the Property, as well as west of Lac Sheilann. The andesites are a medium greenish grey on weathered surfaces and a light, greyish green on fresh surfaces. They contain 15-30% subhedral plagioclase phenocrysts (2 mm - 4 mm) in a fine-grained matrix with 5-15% euhedral amphibole and fine-grained biotite. The pillows are moderately to strongly deformed and vary in thickness between 15 cm and 30 cm. The long axis of the pillows measure approximately 50 cm and are oriented generally east-west with a steep to sub-vertical dip to the north. The borders (2 cm) of the pillows have a rusty appearance and contain disseminated pyrite. The centre of the pillows are depleted in mafic minerals and are weakly altered to epidote. The pillows are commonly deformed and contain a series of parallel fractures, several decimetres apart. The fractures are oriented north-northwest to north-northeast, and are locally filled with quartz.

The Novellet Member regroups a suite of dacitic to rhyolitic volcanic rocks underlying the central axis of the Property. It has an apparent width of 150 m - 180 m in the centre of the Property, and of 300 m - 350 m at the eastern and western parts of the Property. The felsic lavas are light grey and weather greyish-white to white. They contain 3-15%, millimetre-scale, blue quartz, 3-7% acicular amphibole and minor biotite in a fine-grained, quartzo-feldspathic matrix. Subhedral phenocrysts (2 cm -5 cm) of white plagioclase occur locally. The schistosity dips between 68° and 90° towards 350°-360°. Quartz veins are relatively rare and unmineralized. Alteration is characterized primarily by silicification, albitization and a weak sericitization. The Novellet Member is mainly exposed between Lac Wilson and Lac Novellet, and in the area surrounding Lac Sheilann.

A small quartz-feldspar porphyritic (QFP) dyke (outcrop RM-14-064) that intrudes mafic volcanic rocks of the Urban Formation lies just inside the northern Property boundary, due north of hole MAR-06-05. The QFP dyke, with an estimated thickness of 10 m, forms a small east-west escarpment. Although, the dyke is not widely exposed, it is interpreted to be concordant with the regional foliation. It is beige on weathered surfaces and speckled beige and medium grey on fresh surfaces. This unit contains 25-40% whitish, subhedral plagioclase phenocrysts (2 mm - 4 mm), 7% fine black biotite flakes and 3% millimetre-scale blue quartz eyes attenuated or flattened parallel to the east-west schistosity, set in a fine-grained quartzo-feldspathic groundmass. The unit is weakly sericitized and weakly mineralized with finely disseminated pyrite.

Intermediate volcanoclastic rock exposures are rare on the Property. They have been logged in drill core and mapped at a few locations north and west of Lac Wilson, north of Lac Novellet (at the mouth of the O'Sullivan River), and northwest of Lac Sheilann. They form relatively continuous bands, several tens of metres wide, at the contact with the Novellet Member. The intermediate tuffs are layered with alternating, centimetre-scale bands of greyish beige rock interlayered with darker-coloured, greenish grey rocks. The lighter coloured layers are fine-grained and composed of plagioclase, quartz, and 10% mafic minerals, including biotite, amphibole and chlorite. The darker coloured bands are coarser-grained and contain approximately 50% mafic minerals. This unit contains minor quartz-carbonate veins oriented parallel to the foliation. Fine-grained pyrite occurs locally disseminated parallel to the dominant foliation. Monogenic lapilli tuffs of intermediate composition are grey and beige on weathered surfaces and pale greenish-grey on fresh surfaces. This unit contains 30-40% elongated, felsic volcanic fragments in a fine-grained, chloritized matrix with minor pyrite. Sericite and biotite define the foliation.

Although rare, a few outcrops of metasedimentary rocks have been identified among the mafic and intermediate layers of the Urban Formation. Outcrop RM-14-006 (Moar, 2015) was mapped in the central part of the Property, approximately 500 m south of the felsic rocks of the Novellet Member. It consists of thinly laminated, schistose, very fine-grained metasediments interlayered within massive mafic lavas. Dark thin laminas indicate the presence of graphite. The metasediments are sericitized and weakly mineralized with pyrite. The bedding dips 70° towards 016°. Thin layers of greywacke occur sporadically within pillowed and porphyritic intermediate lava flows. A thin wacke layer mapped north of Lac Wilson (outcrop RM-14-109) is pale grey on weathered surface and medium grey on fresh surface. It forms a massive to thinly laminated, centimetric to decimetric thick layer. The unit is moderately magnetic and contains 3-4% finely disseminated magnetite.

Amphibolite occurs between Lac Novellet and Lac Sheilann (outcrops RM-14-136, RM-14-137 and RM-14-148). This unit includes amphibolites and garnet-amphibolites, which are interpreted to be recrystallized and metamorphosed basalts. Fresh rocks are dark greenish grey and weathered surfaces are dark green. They vary from medium-to coarse-grained and display a foliated texture. The amphibolites consist mainly of

hornblende, 10% plagioclase and up to 15% garnet porphyroblasts (1 mm - 10 mm). These amphibolites are weakly mineralized with pyrite and pyrrhotite, and are variably carbonatized.

A suite of felsic volcanoclastic rocks was mapped on a hill north of Lac Wilson (outcrop RM-14-111). The rocks are light grey on a fresh surface and weather to white on outcrops. This unit contains 20% angular to sub-rounded blocks (6.4 cm - 21.0 cm) and 30-40% lapilli fragments (0.2 cm - 3.0 cm). The matrix is fine-grained, tuffaceous and is composed of sericitized plagioclase, quartz and 20-25% fine-grained biotite. The fragments contain 5-15% rounded quartz phenocrysts (2 mm - 8 mm) and are commonly elongated parallel to the east-west foliation.

A few outcrops of felsic tuffs or reworked felsic volcanoclastic rocks were mapped in the Lac Wilson area (outcrops RM-14-123 to RM-14-126). The rocks are grey on a fresh surface and greyish-white when weathered. They are very fine-grained and composed primarily of quartz and feldspar with 3-7% biotite and disseminated magnetite. These units contain up to 15% angular to sub-rounded fragments (2 mm) of grey and blue quartz and 5-10% fragments/phenocrysts of white plagioclase. Locally, the rocks developed a schistose texture and are strongly sericitized. Overall, the unit is weakly mineralized with trace amounts of disseminated pyrite.



## 7.4 Structural Geology

The Urban-Barry Belt occupies a large synform bordered by felsic intrusive plutons. The belt is characterized by an overall east-west oriented schistosity consistent with the overall structural fabric of the Abitibi Subprovince and with the axis of the synform. The region has been sub-divided into several structural domains based on the orientation of planar and linear fabrics (Bandyayera et al., 2003). The synformal geometry is based on the geological observation that there is a reversal of the stratigraphic polarity on either side of the Urban-Barry Belt (Bandyayera et al., 2003).

The Urban Deformation Zone (UDZ) forms a two km wide, generally east-west corridor through the central part of the greenstone belt and affects the western and south-central part of the Property (see **Figure 7.2**). Deformation in the UDZ is characterized by intermediate to high strain producing a weak to moderate schistosity oriented 085°-110° with a sub-vertical dip. The UDZ hosts several decimetre- to metre-scale shear zones associated with chlorite, biotite and sericite alteration and locally containing minor pyrite.

The Cameron Deformation Zone is a southeast trending, late-stage structural zone, characterized by a series of anastomosing high-strain zones (shear zones) that transects the Property east of Lac Sheilann (see **Figure 7.2**). The Cameron Deformation Zone has been recognized as being auriferous along strike, and is associated with the Langlois Zinc Mine, a volcanogenic massive-sulphide (VMS) deposit approximately 20 km to the northwest of the Property.

Late-stage, brittle faults cross cut the region. They are oriented generally northeast and do not exhibit any significant displacement (see **Figure 7.2** and **Figure 7.3**).

## 7.5 Mineralization

Several areas of mineralization, or areas deemed to have potential to host mineralization, have been identified from the 2010 field reconnaissance work of Stephens (2011).

The known and recently discovered occurrences, include:

1. The Chamberland Occurrence. This occurrence is catalogued in the Provincial mineral occurrence database (Cogite #32F/01-0001), on-line at [http://sigeom.mines.gouv.qc.ca/signet/classes/I1102\\_aLaCarte?l=A#GITE](http://sigeom.mines.gouv.qc.ca/signet/classes/I1102_aLaCarte?l=A#GITE). The showing was discovered in 1956 and is adjacent to the southwestern shoreline of Lac Sheilann. Surface mineralization comprises disseminated sulphides of chalcopyrite (copper), pyrrhotite, pyrite, sphalerite (zinc) and silver. Sample Q592641 (GM69123) contains up to 10% pyrite and traces of chalcopyrite (0.84% Zn and 0.19% Cu).

The mineralization is hosted in a sequence of metasedimentary greywackes, pyroclastic intermediate tuffs, lapilli tuffs and polygenic tuff breccia (Novellet Member) in contact with porphyritic, pillowed and massive, amygdaloidal and porphyritic basalt and andesites, all belonging to the Urban Formation. Although affected by a shear zone that dips 42°→356°, the mineralization appears to be stratiform, and is oriented at 315°, parallel with the Cameron Deformation Zone, which passes through the area of the occurrence. The surface and sub-surface extent of the occurrence remains undefined. Altered volcanic rocks, which locally host up to 50% sulphides, have been identified within felsic to intermediate rocks in the immediate vicinity of this occurrence, parts of which exhibit moderate to strong sericitic and occasionally chloritic and carbonate alteration.

The sub-surface was investigated by an 8-hole diamond-drilling program (SA-1, SA1-A, and SA-2 to SA-7), totalling 2002.4 ft (610.3 m) in 1956 by Dome Exploration (Sigma Mines Quebec) Ltd. (GM04721). Selected “best” results include 0.53% Cu and 9.49 gpt Ag over 1.86 m (hole SA-6); 0.61% Cu and 2.97 gpt Ag over 1.46 m (hole SA-1). All eight (8) holes encountered mineralization, but no significant grade intervals were encountered.

2. North of Lac Sheilann, in the general area of airborne anomaly R-39 and R-39A (**Map 1**), silicified, sericitized, and altered mafic to intermediate rocks locally hosts up to 10% sulphides. Weathering is extensive in the area. The extent of the apparent mineralization was traced over a surface distance of approximately 50 metres, although exposure was discontinuous. The width of the alteration observed was in excess of 10 metres;
3. East of Lac Sheilann, in the same general area of airborne anomaly R-41 (**Map 1**). In 2006, overburden was removed from the shallow bedrock at this location and a continuous channel sample taken along a length of approximately 50 metres. Lithology consists of multiple zones of interlayered, narrow, felsic to mafic units intruded by gabbroic dykes. The mineralization primarily consists of small pockets of near-massive pyrite with very minor chalcopyrite and sphalerite, and stringers of 2-10% pyrite along the contacts between the gabbro sills and the volcanic rocks. Use of a beep mat over this area failed to trace the weak conductors beyond the limits of the stripped area;
4. The “Central Zone”, between Lac Novellet and Lac Wilson, in the same general area of airborne anomaly R-19 (**Map 1**). The location is host to several relic pits within the felsic Novellet Member that had reportedly returned significant Cu and Zn values;

5. The “South Centre Zone” is in the same general area of airborne anomalies R-21, R-27 and R-29 (**Map 1**) and occupies an pronounced generally east-west topographic valley. Although there are no outcrop exposures within the valley, elevated levels of sulphides in schistose rock, cut by a white quartz vein at the south edge of the valley, indicates the potential for gold mineralization. In 2006, Megastar drilled holes MAR-06-03, MAR-06-04 and MAR-06-05 on airborne anomalies R-21, R-29 and R-27 respectively. None of the holes returned notable gold assay values, but all intersected elevated concentrations of sulphides;

The “Northwest Gold Zone” and “Southeast Zone” of Stephens (2011) are no longer within the Property limits.

#### Geological Controls on Mineralization:

The principal geological control on VMS mineralization on the Property is the association with the felsic volcanic Novellet Member, which is host to most of the historic showings.

There is evidence of shear zones and faults on the Property. A prominent topographic feature that extends generally east-west across the western part of the Property is a deep ravine, coincident with a magnetic “low”, where three (3) of the 2006 diamond-drill holes (MAR-06-03, -04, -05) intersected discrete zones of sulphide mineralization. It is interpreted that this ravine is the surface representation of a major fault (shear zone?) system associated with the Urban Deformation Zone.

Mapping by Megastar in 2010 (Stephens, 2011) in areas adjacent to this ravine found wide parallel zones of high-strain within mafic units to the north, and mixed mafic-felsic units along the southern perimeter. Stephens noted that the sheared zones were accompanied by silicification, iron enrichment (primarily as pyrite, with occasionally trace chalcopyrite and sphalerite), hematite and/or epidote and/or carbonate alteration, primarily in the mafic rocks. The lithology and deformational features suggested the potential for gold mineralization. However, although numerous secondary offset shear zones and displacements, as well as the main high-strain zones, were sampled, no anomalous gold value assays were obtained.

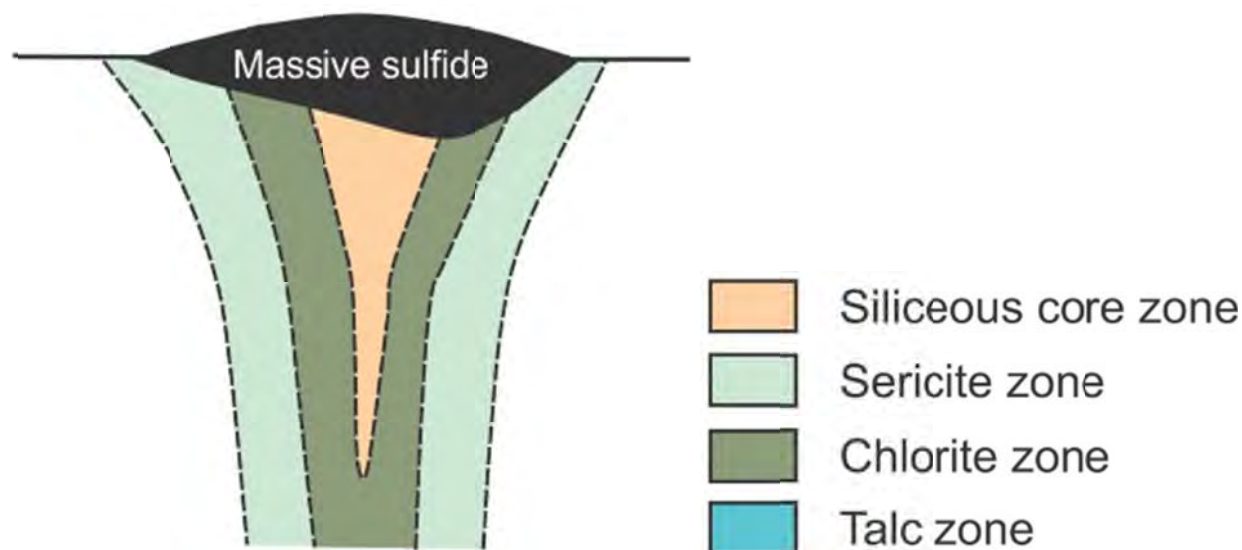
#### Alteration and Mineralization:

Volcanogenic massive sulphide deposits are formed in close temporal association with submarine volcanism by hydrothermal circulation and exhalation of sulphides. Hydrothermal circulation is generally considered to be driven via heat in the crust often related to deep-seated gabbroic intrusions. The convective hydrothermal circulation alters the host rocks resulting in zoned alteration haloes around, and mainly below, VMS deposits. These alteration zones are typically conical-shaped, stratigraphically discordant, and occur stratigraphically below the original fluid flow location, and not necessarily in the deposit itself. The most intense alteration is generally located directly underneath the main deposit associated with a stockwork feeder-vein systems, within the footwall volcanic sequence.

The alteration assemblages of the footwall alteration zone, from core outwards, are shown in (**Figure 7.4**) and summarized as follows;

1. silica alteration zone, found in the most intensely altered examples, resulting in complete silica replacement of the host rocks, and associated with chalcopyrite-pyrite stringer zones;
2. chlorite zone, found in nearly all examples, consisting of chlorite +/- sericite +/- silica. Often the host rock is entirely replaced by chlorite, which may appear as a chlorite schist in deformed examples;
3. sericite zone, found in nearly all examples, consisting of sericite +/- chlorite +/- silica;
4. silicification zone, often gradational with background silica-albite metasomatism.

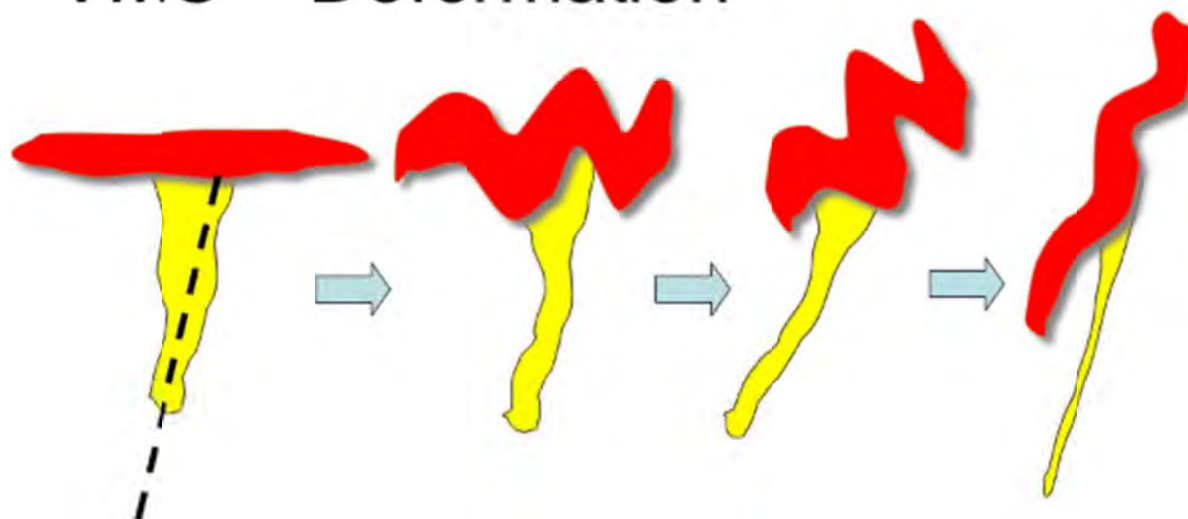
In all cases these alteration zones are metasomatism effects in the strictest sense, resulting in addition of potassium ( $K_2O$ ), silica, magnesium, and depletion of sodium ( $Na_2O$ ). The hangingwall to a VMS deposit is often weakly sodium depleted.



*Figure 7.4: Alteration zones beneath a model VMS deposit (after Gifkins et al., 2005)*

In ancient deposits, like those potentially underlying the Property, metamorphic, mineralogical, textural and structural changes within the host volcanic sequence disguise original metasomatic mineral assemblages. Furthermore, the underlying alteration zone has typically been displaced from the sulphides due to post-deposition tectonic deformation (**Figure 7.5**), hampering exploration efforts.

## VMS – Deformation



*Figure 7.5: Post-deposition deformation of VMS system showing schematic flattening and rotation of sulphide deposit (red) and alteration zone (yellow).*

With the objective of target-vectoring potential VMS deposit mineralization, the alteration chemistry of rocks underlying the Novelett Member and its flanking intermediate to mafic volcanic rocks were investigated by Stephens (2011), and by Moar (2015).

Stephens (2011) correlated samples having Na- and Ca-depletion, K-enrichment, and copper-zinc mineralization and disclosed that most samples with these correlations comprise sericitically altered intermediate to felsic volcanic rocks in the area around Lac Sheillan.

Moar (2015) showed that although most of his collected samples were generally unaltered, some showed a trend towards carbonate alteration. Based on various alteration indices (IFRAIS<sup>1</sup> and ISER<sup>2</sup>), anomalously altered rocks were noted northeast of Lac Wilson and east of Lac Sheilann. Sericite-altered rocks were only noted east of Lac Sheilann. Samples with anomalous K<sub>2</sub>O enrichment were noted north of Lake Wilson, whereas Na<sub>2</sub>O depletion was detected in a sample from the north-central part of the Property (Moar, 2015).

The 2006 diamond-drilling program intersected a sericitized quartz-phyric rhyolitic unit (319 m - 333 m down-hole) in hole MAR-06-05, characterized by low ISER values (GM63676). Although no anomalous Cu and Zn zones were intersected in hole MAR-06-05, it intersected the most abundant sulphide mineralization. The slightly Na<sub>2</sub>O-depleted and sericitized rhyolite unit is flanked to the south by a wide anomalous normative-orthoclase-zone affecting andesitic to dacitic rocks. Zones of K<sub>2</sub>O enrichment (>10%), were encountered in hole MAR-06-03 (45 m - 95 m), hole MAR-06-04 (145 m - 175 m), and hole MAR-06-05 (5 m -110 m).

$$^1\text{IFRAIS} = 100 \times (\text{Ab} + \text{Or} + \text{An} + \text{Cpx}) / ((\text{HChl} + \text{HSer} + \text{HPrl} + \text{HPrg}) + (\text{Ab} + \text{Or} + \text{An} + \text{Cpx})).$$

Unaltered rocks have an IFRAIS value of 100, whereas totally altered rocks have a value of 0.

$$^2\text{ISER} = 100 \times \text{ISER} / ((\text{HChl} + \text{HSer} + \text{HPrg} + \text{HPrl}) + (\text{Ab} + \text{Or} + \text{An} + \text{Cpx})).$$

ISER is a normative mineral alteration index that quantifies the degree of overall sericitization. Completely altered rocks have an ISER value of 100, whereas unaltered rocks have a value of 0.

In both equations, Ab is albite, Or is orthoclase, An is anorthite, Cpx is clinopyroxene, HChl is hydrothermal chlorite, HSer is hydrothermal sericite, HPrg is hydrothermal paragonite, and Hprl is pyrophyllite (Piché and Jébrak; 2004, 2006).

## 8 DEPOSIT TYPES

The following section describing VMS deposits is largely based on Franklin (1996), Galley et al. (2007), Gibson et al. (2007) and Hannington (2014).

The Property is relatively underexplored, having only been the subject of basic grassroots exploration to date. The geology underlying the Property comprises a setting favourable for volcanic massive-sulphide (VMS) mineralization, which is the primary exploration focus on the Property. Should evidence of prospective deposits of other commodities be identified, the scope of work and the models utilized would be expanded to include them.

The term “VMS deposit” commonly refers to volcanic-associated, volcanic-hosted and volcanogenic massive-sulphide deposits (Franklin, 1996; Large, 1992; Large et al., 2001; Galley et al., 2007; Hannington, 2014). These deposits typically occur as lenses of polymetallic massive-sulphide that form at or near the seafloor in submarine volcanic environments, and are classified according to base-metal content, gold content, and host-rock lithology (Franklin et al., 1981; Poulsen and Hannington, 1995; Morton and Franklin, 1987; Barrie and Hannington, 1999; Franklin et al., 2005; Galley et al., 2007). VMS deposits typically have underlying discordant to semi-discordant, extensively altered, stockwork systems, referred to as the feeder zone or stringer zone, that represent the conduit system of upward hydrothermal fluid flow beneath the deposits.

VMS deposits range in age from 3.4 Ga to actively forming deposits in modern seafloor environments (i.e., black smokers). The most common feature among all types of VMS deposits is that they form in extensional tectonic settings, including both oceanic seafloor spreading and arc environments. Ancient VMS deposits, such as those being targeted on the Property, formed mainly in oceanic and continental nascent-arc, rifted-arc, and back-arc settings.

Primitive bimodal mafic volcanic-dominated oceanic rifted arc and bimodal felsic-dominated siliciclastic continental back-arc terranes contain some of the world’s most economically important VMS districts. Most significant VMS mining districts host clusters of deposits that formed within calderas or along extensive rift systems. Their clustering is further attributed to a common deep-seated heat source (intrusions) that drives large-scale sub-seafloor fluid convection systems. These subvolcanic intrusions may also supply metals to the VMS hydrothermal systems through magmatic devolatilization.

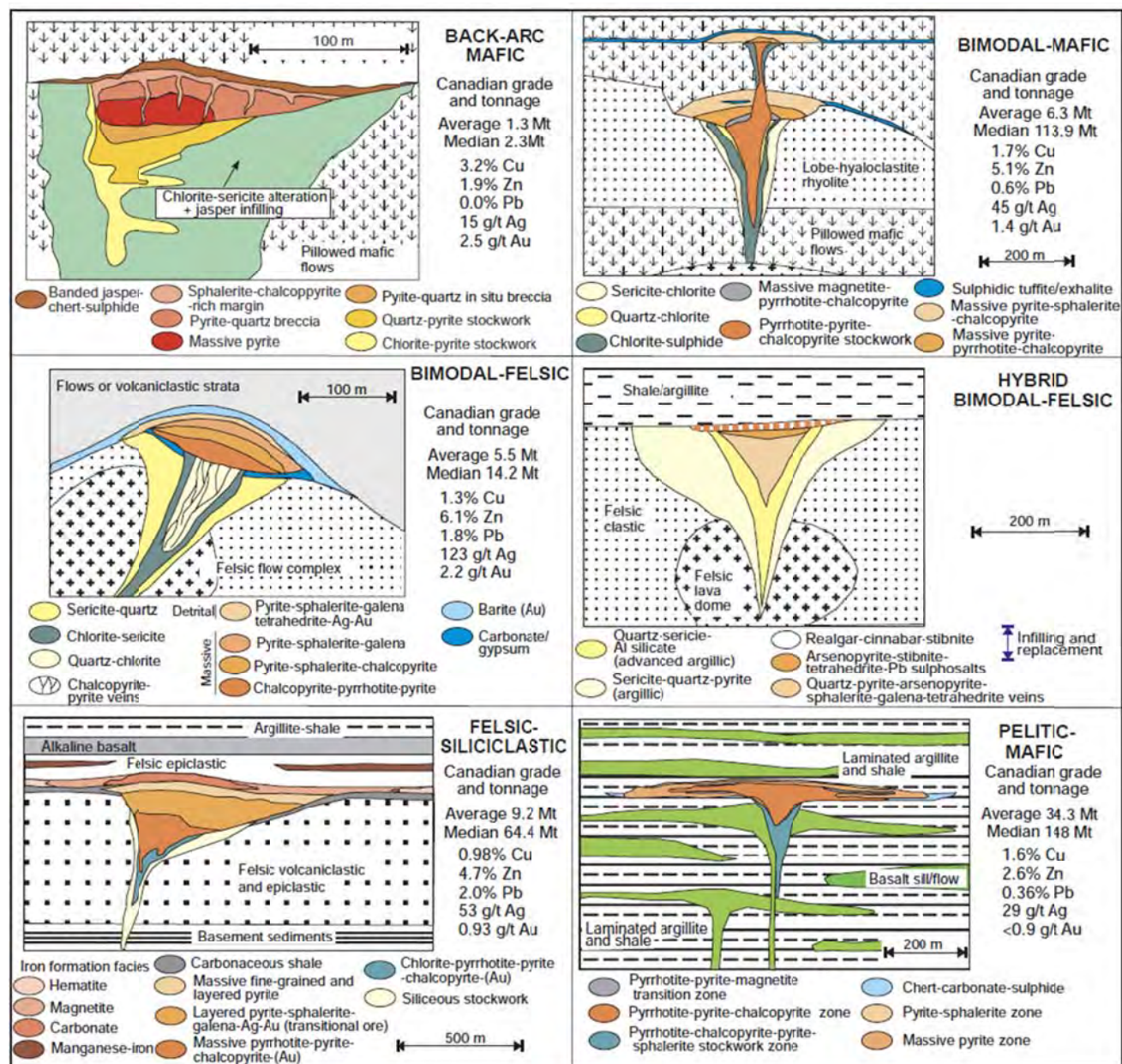
As a result of large-scale fluid flow, VMS mining districts are commonly characterized by extensive semi-conformable zones of hydrothermal alteration that intensify into zones of discordant alteration in the immediate footwall and hanging wall of individual deposits. VMS camps typically also host thin, but very extensive, units of ferruginous chemical exhalite deposits (e.g., chert, iron-formation).

VMS deposits are important sources of Cu, Zn, and Pb, and may contain significant concentrations of Ag and Au. There are close to 350 known VMS deposits (>200,000 t) in Canada and over 800 known worldwide. They have contributed 27% of Canada's historical Cu production, 49% of its Zn, 20% of its Pb, 40% of its Ag, and 3% of its Au (Galley et al., 2007).

The large majority of VMS deposits in Canada form in either bimodal mafic or bimodal felsic volcanic terranes dominated by basalt-basaltic andesite and rhyolite-rhyodacite. Prospective VMS-hosting arc terranes are characterized by bimodal volcanic successions that have a tholeiitic to transitional tholeiitic-calc alkaline composition. The felsic volcanics are characterized by low Zr/Y (<7) and low (La/Yb)<sub>N</sub> (<6) ratios, with elevated high-field-strength element contents (Zr >200 ppm, Y >30 ppm, and elevated LREE and HREE) typical of high-temperature, reduced magmas derived from partially hydrated crust (Barrie et al., 1993; Lentz, 1998).



The lithostratigraphic types of VMS are shown in **Figure 8.1**. According to this classification, the most probable deposit type for the Property corresponds to the bimodal-mafic model.



**Figure 8.1: Lithological classification of VMS deposits proposed by Barrie and Hannington (1999) (modified by Galley et al., 2007).**

As the model-name suggests, VMS deposits of this type are typically found within terranes dominated by mafic volcanic rocks, with lesser felsic volcanic rocks. It is often near the felsic-mafic contacts that these VMS deposits occur.

On the Property, most of the known sulphide showings and catalogued occurrences are spatially associated with the felsic volcanic Novellet Member.

Bimodal-mafic volcanic seafloor sequences are dominated by effusive volcanic successions (flows) and accompanying, large-scale, hypabyssal intrusions. This sub-seafloor environment supports high-temperature (>350°C) hydrothermal systems, from which VMS deposits are precipitated. The formation of the felsic exhalites on the mafic substrate is usually accompanied by silicification and/or chloritization of the underlying strata, the depth of which can be significant. In felsic volcanoclastic terrains, the generation of iron-rich exhalites can be accompanied by extensive K-Mg alteration of the felsic substrate.

#### Mineralogical Zonation

VMS deposits occurring in mafic volcanic rocks are characterized by significant amounts of iron-sulphides such as pyrite ( $\text{FeS}_2$ ), accompanied by less abundant pyrrhotite ( $\text{Fe}_{1-x}\text{S}$ ) or marcasite ( $\text{FeS}_2$ ), and variable amounts of chalcopyrite ( $\text{CuFeS}_2$ ) and sphalerite ( $\text{ZnS}$ ). VMS deposits dominated by felsic rocks are generally characterized by abundant but variable amounts of pyrite, chalcopyrite, and sphalerite, along with significant galena and tetrahedrite. Many deposits also show a zonation pattern in which the upper stockwork is dominated by chalcopyrite-pyrite±magnetite, with the basal part of the ore body dominated by pyrite-chalcopyrite, and the upper and outer margins dominated by sphalerite ±galena± barite. The gangue material varies according to several parameters such as metamorphic grade, age, and geologic setting of the VMS deposits. For deposits that occur at lower greenschist facies, the gangue material may consist of quartz, carbonate, barite, sericite, and chlorite. At higher metamorphic grades, chloritoid, garnet, amphibole, cordierite, gahnite, staurolite, kyanite, and andalusite are common gangue constituents.

#### Alteration Zonation

Alteration zones surrounding VMS deposits are caused by a complex interplay of ore-forming fluids, circulating seawater and host-rock interaction processes. Hydrothermal alteration varies widely from district to district and among individual VMS deposits. Alteration pipes beneath Cu-Zn deposits formed in deep water are generally characterized by a chloritic core and a sericitic outer zone (Franklin, 1996). Alteration associated with Zn-Pb-Cu deposits is dominated by sericite and quartz. Broad zones of semiconformable alteration will show increases in Ca-Si (epidotization-silicification), Ca-Si-Fe (actinolite-clinzoisite-magnetite), Na (spilitization), or K-Mg (mixed chlorite-sericite±Kfeldspar). The alteration zones associated with the feeder/stringer zone may extend vertically for several hundred metres below the VMS deposits and up to ten metres laterally forming a proximal hanging-wall alteration zone. Proximal alteration associated with discordant sulphide-silicate stockwork vein systems include chlorite-quartz- sulphide rich and sericite-quartz-pyrite±aluminosilicate rich assemblages, and are typically strongly depleted in Na and Ca due to high-temperature feldspar destruction. Most proximal alteration zones can be traced for up to twice the diameter of the massive-sulphide deposit and may extend to depths roughly 10 times the thickness of the deposit making them a much broader exploration target than the deposits themselves.

As the alteration zones around VMS deposits are much larger than the deposits themselves, systematic study of alteration-zone minerals and mineral assemblages (e.g., geochemical analysis, X-ray diffraction, oxygen isotope analysis) provide geologists with crucial target vectoring data for VMS exploration.



## 9 EXPLORATION

Mineral exploration activity has been carried out sporadically on parts of the current Property and its immediate vicinity since the mid-1950s, including geological reconnaissance mapping, geophysical surveys, and limited diamond-drilling.

Recent work has been carried out by Megastar, who acquired a 12-claim block north Lac Wilson in 2005 that developed into the present Property.

Since 2005, Megastar has completed a reconnaissance geology survey (2005 - GM63677), a surface geophysical survey (2006 - GM62775), a diamond-drilling program (2006 - GM63676), trenching and sampling (2007 - GM63732), an airborne geophysical survey (2008 - 64158), a digital-database compilation of all earlier work (Langton and Stephens, 2010), and geological mapping, prospecting and sampling surveys over almost the entire property (2010 - GM65611; 2015 - GM69123). There has been no exploration activity on the Property since 2014.

No exploration has been completed on the Property by DeepRock since signing the Agreement with Megastar; however, as at the effective date of this Report, DeepRock had initiated a prospecting and mapping program on the eastern part of the Property and a ground geophysical Induced Polarization (IP) survey on the western part of the Property. The results of DeepRock's current exploration programs are not addressed in this Report.

## 10 DRILLING

As at the date of this Report, DeepRock had not completed any diamond-drilling on the Property.

The most recent diamond-drilling on the Property comprised a 5-hole, 1,545 m program completed by Megastar in 2006 (GM63676). Unfortunately, drill-core from this program was lost when the facility in which it was being stored was demolished in late 2016.

## 11 SAMPLE PREPARATION, ANALYSES AND SECURITY

### 11.1 Overview

No information exists regarding the sample preparation, security and analytical procedures employed by historical exploration companies, i.e., those operating prior to the implementation of NI 43-101. It is the Author's opinion that, although the protocols that were employed followed the industry's standards for the time those programs were carried out, and that those past exploration programs were supervised by experienced geologist and engineers, there is no guarantee of the quality of the historically reported data, nor of the adequacy of any values reported. As such, the Author recommends that a rigorous Data Verification and Validation Program should be implemented by DeepRock for any analytical work on the Project going forward.

Protocols regarding sample preparation analysis and security that were employed in the course of the more recent exploration programs, i.e., those carried out by Megastar after implementation of NI 43-101 standards (GM62775; GM63676; GM63732; GM65611; GM69123; Langton & Stephens, 2011), are summarized herein.

ALS-Chemex Laboratories Ltd. of Val d'Or, Que. ("ALS"), an accredited lab, was the only assay laboratory employed by Megastar for their exploration programs. ALS Chemex has attained ISO 9001:2000 registration, which requires evidence of a quality management system covering all aspects of the assaying process. To ensure compliance with this system, regular internal audits are undertaken by staff members specially trained in auditing techniques.

Analytical methods selected by Megastar and employed by ALS for assay results over the course of their exploration programs are as follows:

- ME-XRF06: Whole-rock, fused disk method employing multi-element X-ray fluorescence (XRF) spectrometric analysis using a lithium borate flux;
- ME-XRF05: Whole-rock, pressed pellet procedure employing followed by multi-element XRF spectrometric analysis;
- ME-ICP61: Trace-level, multi-element assay method, employing 4-acid sample digestion followed by inductively coupled plasma-atomic emission spectrometry (ICP-AES) analysis;
- Au-AA23: Fire assay fusion procedure with atomic absorption spectroscopy (AAS) finish for trace-gold assay (lower detection limit of 0.005 ppm), from a 30 gm sample;
- Au-ICP21: Fire assay fusion procedure with ICP-AES finish for ultra-low trace-gold assay (lower detection limit of 0.001 ppm), from a 30 gm sample;
- Au-ICP22: Fire assay fusion procedure with ICP-AES finish for ultra-low trace-gold assay (lower detection limit of 0.001 ppm), from a 50 gm sample;
- PGM-ICP24: Fire assay fusion procedure with ICP-AES finish for ultra-low trace-assays of Platinum Group Metals from a 50 gm sample. Lower detection limits of 0.005 ppm for Platinum (Pt), 0.001 ppm for Palladium (Pa), and 0.001 ppm for Gold (Au);
- Ag-AA45, Cu-AA45, Zn-AA45: Aqua regia digestion technique followed by an AAS finish, for trace concentration assays. Lower detection limits of 0.2 ppm for Silver (Ag), 1 ppm for Copper (Cu), and 1 ppm for Zinc (Zn).

## **11.2 Quality Assurance and Quality Control (QAQC) Programs**

With respect to the 2006 drilling program by Megastar (GM63676), the core-logging and -sampling program was carried out under the direct supervision of Mathieu Piché (P.Geo.). Samples were analysed at ALS for whole-rock (ME-XRF05 and ME-XRF06), gold (Au-AA23), silver (Ag-AA45), copper (Cu-AA45) and ZINC (Zn-AA45) content. No blanks, standards, nor duplicates were submitted with the core-interval samples for QAQC purposes.

Samples collected during the the 2007 exploration campaign, which comprised a trench- and channel- and grab-sampling program (GM63732), were analysed at ALS for whole-rock (ME-XRF05 and ME-XRF06), gold (Au-AA23), silver (Ag-AA45), copper (Cu-AA45) and ZINC (Zn-AA45) content.

According to a Megastar News Release dated March 18, 2008, of the 50 samples submitted for analysis, six (6) were duplicate-assayed, and five (5) blanks and nine (9) “Standards” were inserted into the sample train for QAQC purposes; however, no mention of these QAQC procedures, nor specific analytical results of the duplicates, blanks and standards, are included in that News Release nor in Megastar’s 2008 Report (GM63732).

The samples submitted for analysis during the 2010 reconnaissance geological mapping and sampling program by Stephens (2011), were collected solely based on their potential to host anomalous mineralization (trace element geochemistry, or gold, and/or platinum and palladium content) or for confirmation on their specific rock properties (whole-rock analysis). There were no special preparation procedures other than to document the location of the sample, enter a brief description of the sample within the records, and to bag and tag the sample for control purposes at the laboratory. Samples collected during the 2010 program were selectively assayed for multi-element (ME-ICP61; ME-XRF-06), gold (Au-ICP21; Au-ICP22), and platinum group metal (PGM-ICP24) content. No special QAQC measures were employed other than using good geological practise in selection of the samples, and in the procedures used to secure the samples and deliver them to ALS.

Ninety-four of the grab samples of representative lithology and mineralization that were collected during the course of the 2014 exploration program (Moar, 2015; GM69123) were analyzed by ALS for a group of 33 elements using method ME-ICP61. Forty-seven (47) of the collected samples were analyzed for gold using method Au-AA24. Sixty-two (62) representative samples were also analyzed for whole rock using method ME-XRF26. As part of the QAQC protocol, two Certified Reference Material “standards” and two “blanks” were added to verify reproducibility, precision and contamination in the lab. These control samples were added to the submitted sample-stream, and represented approximately 4% of the total number of samples submitted for analysis.

The Certified Reference Material standards were provided by Analytical Solutions Ltd of Toronto and were prepared by “ORE Research” and “Exploration Pty. Limited” of Australia, both of which are certified companies for QAQC programs. Certified values of standard-sample OREAS 502, with a 95% confidence level ( $\pm 1.96$  standard deviations) are  $0.491 \pm 0.009$  gpt Au and  $0.755 \pm 0.009\%$  Cu. Certified values for standard-sample OREAS 504, at a 95% confidence level, are  $1.48 \pm 0.02$ gpt Au and  $1.137 \pm 0.014\%$  Cu.

An unmineralized, massive, medium-grained tonalite with no visible mineralization or alteration was used as material for the “blank” sample.

## **11.3 Summary**

The Author considers that the sample preparation, security, and analytical procedures are deemed to have been adequate for the nature the particular work involved that is reported herein; however, more rigorous QAQC protocol for all sample analyses should be put in place and followed by DeepRock going forward.

## 12 DATA VERIFICATION

A review of all the pertinent and available assessment files from the Ministère de l'Énergie et des Ressources naturelles (MERN) Quebec was completed. The Author has reviewed the reports containing information on the Property and believes the information to be accurate and that the sampling, sampling preparation, security, and analytical procedures that were in place at the time of the historic exploration programs were adequate. It is the author's opinion that the data used in the Report is adequate for the purposes of the Report; namely, to recommend an exploration program based on a distillation of all historical geological information compiled from known geological work performed or commissioned by the Province of Quebec and mineral exploration companies.

The Author (QP) did not collect independent samples from the Property for verification as it was not deemed necessary since the Property is in the early, grass-roots phase of exploration and no resource has been outlined. Furthermore, no independent samples of drill core could be obtained as the core from the recent (2006) diamond-drilling program by Megastar is no longer intact, having been recently disposed of when the storage facility in which it was being kept was demolished.

Along with a review of all available technical data and geoscientific literature, the author verified the location of several sample collection sites and the location of drill-hole collar MAR-06-03, during his site visits.

Independent verification of the results of the various 2005-2014, Megastar-supported, exploration programs was achieved by comparing the results reported by Megastar with copies of original, signed Assay Certificates obtained directly from ALS Chemex in Val-d'Or, QC. The two sets of Assay Certificates were found to be identical.

The Author is not aware of any sampling problems that would impact the accuracy and reliability of the original assay results. With the project being in an early phase of exploration, a rigorous quality assurance and control program of inserted standards as a measure of the accuracy of the analysis and blanks is recommended going forward, in order to determine the precision of results from any analytical laboratories utilized for sample assays.

## ITEMS 13 TO 22 – NOT APPLICABLE TO THIS REPORT

## **23 ADJACENT PROPERTIES**

There are no other Properties owned by DeepRock in the vicinity of the Property. As at the time of writing, the Author was not aware of any active exploration activities in the immediate area of the Property.

## **24 OTHER RELEVANT DATA AND INFORMATION**

The Authors are not aware of any environment, permitting, legal, title, taxation, socio-political issues, nor any other additional technical data available at the effective date of the Report that might lead an accredited investor to a conclusion contrary to that set forth in this Report, or that would materially affect the future exploration or potential mine development on the Property.



## 25 INTERPRETATION AND CONCLUSIONS

The Property is at an early, grassroots stage of exploration. A review of all available historic data on the Property shows that it is host to prospective VMS base-metal sulphide mineralization in an active mining camp recognized for sulphide and gold production.

Historic geological mapping and lithogeochemical sampling on the Property has been carried out in order to refine the accuracy of the geological map, obtain a better understanding of the geological setting, and to ultimately define potential targets for VMS mineralization. All geological data was compiled and merged with earlier reconnaissance mapping to produce geological maps covering the property at 1:7,500 scale, by Stephens (2010) and Moar (2015).

The Property includes areas of carbonate-, paragonite, and sericite-altered bimodal volcanic rocks. Recent exploration programs completed by Megastar Development Corp. (2005-2014) significantly improved understanding of the geological setting of the property. Of particular benefit was the improved delineation of the felsic Novelett Member, which is interpreted to have an important association with bimodal-mafic style VMS mineralization, as all of the known occurrences of sulphide mineralization on the Property are spatially associated with this felsic unit. The Novelett Member underlies the central east-west axis of the Property coincident with a magnetic “low”, and flanked by magnetically responsive basalts, andesites and gabbros of the Urban Formation.

Proximal alteration zones associated with stockwork vein systems underlying VMS deposits include assemblages that are typically strongly depleted in  $\text{Na}_2\text{O}$  and  $\text{CaO}$ , and enriched in  $\text{K}_2\text{O}$ , due to high-temperature feldspar destruction (Galley et. al., 2007). Alteration indices reveal that rocks anomalously altered in a style characteristic of VMS deposit alteration haloes rocks are present in the area northwest of Lac Novellet and east of Lac Sheilann. Numerous linear electromagnetic geophysical anomalies were outlined in both of these areas by an airborne survey in 2008 (GM64158; Cifuentes, 2008), only some of which have been tested by diamond-drilling.

The presence of alteration zones and the discovery of numerous Cu-Zn-Ag showings in the felsic Novelett Member, along with the presence of numerous geophysical anomalies that remain untested by diamond-drilling, accentuates the potential for the discovery of a VMS deposit on the Property, and additional geological investigative work is recommended.

## 26 RECOMMENDATIONS

Geological prospecting and geophysical methods were used by previous exploration programs (Megastar 2005-2014) to help identify areas of massive and disseminated VMS-style mineralization on the Property, around and along strike from documented historic occurrences and showings.

Geophysical anomalies generated by these surveys, especially the linear EM anomalies defined by the 2008 airborne survey (GM64158), were ground-truthed for evidence of surface expressions, and in some cases, drill-tested. In many cases, however, the source of the anomaly was not evident at surface, it being covered by glacial overburden, or it being a response to a sub-surface source. As such, many of these anomalies remain essentially untested.

Exploration should be directed towards testing all significant EM anomalies delineated by the 2008 survey (GM64158). As most of the linear EM anomalies on the Property are spatially associated with the Novellet Member, which is host to most of the sulphide showings, they represent the most interesting geophysical targets and should be more thoroughly investigated, to assess their economic potential.

An OreVision® IP survey is recommended over the area where diamond-drill holes MAR-06-03, -04 and -05, of the 2006 Megastar drilling campaign were collared. These 3 holes were designed to test linear EM anomalies R-21, R-29 and R-27 respectively, and intersected a series of linear sulphide horizons and alteration zones within the Novellet Member, parallel to the local strike. The OreVision® survey will provide important 3D information on the area between these holes, especially as the core from these holes is no longer available.

A pitting program is recommended to investigate the depth of overburden on all the linear EM anomalies within, or in close proximity to, the Novellet Member. Bedrock that is encountered under less than 1.2 m of overburden should be further exposed by trenching/stripping and systematically sampled. The most prospective of these anomalies should be tested by diamond-drilling. If warranted, follow-up down-hole electromagnetic surveys should also be carried out.

Further prospecting and detailed ground geophysical surveys are warranted, especially in the Lac Sheillan area of the Property, east of the O'Sullivan River. This area is the least explored by previous programs due to its restricted accessibility; however, numerous samples collected from this part of the Property show anomalous sulphide content, sericitic alteration, elevated K<sub>2</sub>O content, and Na<sub>2</sub>O and CaO depletion - all of which are indicators associated with VMS systems. In addition, a large part of the area is interpreted to be underlain by the Novellet Member.

If warranted, diamond-drilling and down-hole electromagnetic surveys should follow.

The two-phase exploration program to further define prospective areas of VMS mineralization underlying the Property is summarized in **Table 26.1**.

**Table 26.1: Summary of Recommended Exploration Program for Property**

Phase I	
IP Survey	\$40,000
Prospecting, Mapping & Report	\$10,000
Sub-Total	\$50,000
15% Miscellaneous	\$7,500
<b>Phase I Total</b>	<b>\$57,500</b>
Phase II	
Pitting / Trenching program	\$25,000
1,000 metre NQ Drilling Program, includes assaying, and reporting.	\$125,000
15% Miscellaneous	\$22,500
<b>Phase II Total</b>	<b>\$172,500</b>
<b>Exploration Total</b>	<b>\$230,000</b>

## 27 REFERENCES

- Bandyayera, D., Theberge, L. and Fallara, F., 2002.** Geologie de la region des Lacs Piquet et Mesplet (32G/04 et 32B/13). Ministere des Ressources Naturelles du Quebec; RG 2001-14; 48 pages.
- Bandyayera, D., Daigneault R. and Sharma, K.N.M., 2003.** Geologie de la region du lac de la Ligne (32F/OI). Ministere des Ressources Naturelles du Quebec; RG 2002-12; 33 pages.
- Bandyayera, D., Rheume, P., Caderon, S., Giguere, E. and Sharma, K.N.M., 2004a.** Geologie de la region du lac Lagace (32B/14). Ministere des Ressources Naturelles du Quebec; RG 2004-02; 32 pages.
- Bandyayera, D., Rheume, P., Doyon, J. and Sharma, K.N.M., 2004b.** Geologie de la region du lac Hebert (32G/03). Ministere des Ressources Naturelles du Quebec; RG 2003-07; 59 pages.
- Barrie, C.T., Ludden, J.N. and Green, A.H., 1993.** Geochemistry of Volcanic Rocks Associated with Cu-Zn and Ni-Cu deposits in the Abitibi Subprovince. *Economic Geology*, v. 88, pp. 1341-1358.
- Barrie, C.T., and Hannington, M.D., 1999.** Classification of volcanic-associated massive sulphide deposits based on host-rock composition; *in* Barrie, C.T., and Hannington, M.D., eds., *Volcanic-associated massive sulphide deposits-Processes and examples in modern and ancient settings: Reviews in Economic Geology*, v. 8, pp. 1-11.
- Boileau, P. 2006 (GM62775).** Ground Geophysical Surveys (Magnetic and Pulse-EM) Executed on the Ralleau Project, Ralleau Township, Province of Quebec; 16 pages.
- Chown, E.H., Daignault, R., Mueller, W. and Mortensen, I.K., 1992.** Tectonic evolution of the Northern Volcanic Zone, Abitibi belt, Quebec. *Canadian Journal of Earth Sciences*; v. 29, pp. 2211-2225.
- Cifuentes, C.E., 2008.** Megastar Development Corp., Helicopter-Borne Time Domain Electromagnetic VTEM Survey, Ralleau Grid, Quebec, Canada - Abitibi Geophysics Interpretation Report 08N045", 18 pages.
- David, J., Davis, D.W., Dion, C., Goutier, J., Legault, M. and Roy, P., 2007.** Datations U-Pb effectuees dans la Sous-province de l'Abitibi en 2005-2006. Ministere des Ressources Naturelles du Quebec; RP 2007-01; 17 pages.
- Fairbairn, H.W., 1940.** Preliminary report on Wetetnagami river area, Abitibi Territory. Services des Mines du Quebec, Division de la carte geologique; RP 151(A); 6 pages; Map 518.
- Fairbairn, H.W., 1946.** Wetenagami river area, Ralleau, Effiat and Carpiquet Townships. Services des Mines du Quebec, Division de la carte geologique; RG 028(A); 24 pages; Map 615.
- Franklin, J.M., 1996.** Volcanic-associated massive sulphide base metals; *in* Eckstrand, O.R., Sinclair, W.O., and Thorpe, R.I., eds., *Geology of Canadian Mineral Deposit Types: Geological Survey of Canada, Geology of Canada*, no. 8, pp. 158-183.
- Franklin, J.M., Gibson, H.L., Jonasson, I.R., and Galley, A.G., 2005.** Volcanogenic massive sulphide deposits; *in* Hedenquist, J.W., Thompson, J.F.H., Goldfarb, R.J., and Richards, J.P., eds., *Economic Geology 100th anniversary volume, 1905-2005: Littleton, Colo., Society of Economic Geologists*, pp. 523-560.



**Franklin, J.M., Sangster, D.M., and Lydon, J.W., 1981.** Volcanic-associated massive sulphide deposits; *in* Skinner, B. J., ed., Economic Geology Seventy-Fifth Anniversary Volume, Society of Economic Geologists, pp.485-627.

**Fournier, A., 2005 (GM63677).** Rapport de propriété Propriété Ralleau, Lebel-sur-Quévillon, Québec, 32F/01", Nievex Geoconseil Inc., 15 pages.

**Galley, A.G., Hannington, M.D., and Jonasson, I.R., 2007.** Volcanogenic massive sulphide deposits; *in* Goodfellow, W.O., ed., Mineral Deposits of Canada: A Synthesis of Major Deposit-Types, District Metallogeny, the Evolution of Geological Provinces, and Exploration Methods: Geological Association of Canada, Mineral Deposits Division, Special Publication No.5, p. 141-161.

**Gibson, H.L., Allen, R.L., Riverin, G., and Lane, T.E., 2007.** The VMS model; Advances and application to exploration targeting. In Ore Deposits and Exploration Technologies, Proceedings of Exploration 07: Fifth Decennial International Conference on Mineral Exploration, B. Milkereit (ed.), v. 5, p. 713-730.

**Giffkins, C.C., Herrmann, W. and Large, R.R., 2005.** Altered volcanic rocks: a guide to description and interpretation. Centre for Ore Deposit Research, University of Tasmania.

**Hannington, M.D., 2014.** Volcanogenic Massive Sulphide Deposits; *in* Holland, H.D. and Turekian, K.K., Treatise on Geochemistry 2nd edition, v. 13, pp. 463-488. Oxford: Elsevier.

**Langton, J. and Stephens, J., 2010.** Final Report, Megastar Development Corp., Report on Compilation of Work, Ralleau Project, Ralleau Township, Quebec, (NTS 32F01, 32F02).

**Large, R.R., 1992.** Australian volcanic-hosted massive sulphide deposits: features, styles and genetic models. Economic Geology, v. 87, pp. 471-510.

**Large, R.R., Gemmell, J.B., Paulick, H., and Huston, D.L., 2001.** The alteration box plot-A simple approach to understanding the relationship between alteration mineralogy and lithogeochemistry associated with volcanic-hosted massive sulphide deposits. Economic Geology, v. 96, pp. 957-971.

**Lentz, D.R., 1998.** Petrogenetic evolution of felsic volcanic sequences associated with Phanerozoic volcanic-hosted massive sulphide systems: the role of extensional geodynamics. Ore Geology Reviews Volume 12, Issue 5, September 1998, Pages 289–327.

**Moar, R., 2015 (GM69123).** Technical Report on the Ralleau Property, Eeyou-Istchee Baie James Territory, Lebel-sur-Quévillon Area, Quebec, 125 pp.

**Mortensen, J.K., 1993.** U-Pb geochronology of the eastern Abitibi subprovince, Part 2: Noranda-Kirkland Lake area; Canadian Journal of Earth Sciences, v. 30, pp. 29-41.

**Morton, R.L., and Franklin, J.M., 1987.** Two-fold classification of Archean volcanic-associated massive sulphide deposits: Economic Geology, v. 82, pp. 1057-1063.

**Mueller, W., Chown, E.H., Sharma, K.N.M., Tait, L. and Rocheleau, M., 1989.** Paleogeographic and paleotectonic evolution of a Basement-controlled Archean Supracrustal sequence, Chiougamau-Caopatina, Quebec. Journal of Geology, v. 97. pp. 399-420.

**Poulsen, H. and Hannington, M., 1995.** Auriferous volcanogenic sulphide deposits; *in* Eckstrand, O.R., Sinclair, W.D., and Thorpe, R.I., eds., *Geology of Canadian mineral deposit types*. Geological Survey of Canada, *Geology of Canada* no. 8; Geological Society of America, *Decade of North American Geology* v. P1, pp. 183-196.

**Piché, M. and Jébrak, M., 2004.** Normative minerals and alteration indices developed for mineral exploration. *Journal of Geochemical Exploration* 82, pp. 59–77.

**Piche, M. and Jebrak, M., 2006.** Determination of alteration facies using the NORMAT normative mineral alteration index: Selbaie Cu-Zn deposit, northern Abitibi greenstone belt, Canada. *Canadian Journal of Earth Sciences*, v. 43-12, pp. 1877-1885.

**Rheume, P. and Bandyayera, D., 2007.** *Revision stratigraphique de la Ceinture d'Urban-Barry*, Ministère des Ressources Naturelles et Faune, Quebec; RP 2006-08; 11 pages.

**Stephens, J., 2011 (GM65611).** Final NI 43-101 Technical Report -Ralleau Project -NTS 32F/01 & 32F/02, Chibougamau District, Quebec.

### **Assessment Report ("GM") Files and Government Publications:**

GM04721 - Diamond Drill Core Log and Sample Record - Sheilann Lake, Dome Exploration Company (Dome Exploration Limited (Sigma Mines Quebec Ltd.)), 1956, 15 pp.

GM05363 – Grant, G.W., Report on Sheilann Lake Property, Ralleau Twp, Quebec, Spes Explorations Limited, July 11, 1957, 4 pp.

GM05419 – Eakins, P.R., Report on Exploration Carried Out on the Novellet Claim Group – Ralleau Township, P.Q., Malartic Gold Fields Limited, Project CS14-1, June 1957, 6 pp.

GM07306 - Boyd, J.A., Report on assessment work. 1958, 7 pp.

GM07306(B) - Boyd, J.A., Diamond drill record, Novellet Lake property. 1957, pp.

GM15336 - MacFarlane, R.L. Geological report, Julien Option. 1964, 7 pp.

GM15337 - Britton, J.W., Mining Corporation of Canada (1964) Ltd. Geophysical Survey on Julien Option. 1964, 2 pp.

GM15348 - MacFarlane, R.L., Diamond drill record, Julien Option. 1964, 10 pp.

GM15848 - Marchant, M.L., Geological Report on Coniagas Mines Ltd., East Group, Wilson Twp., Project 476. 1964, 12 pp.

GM15849 - Seeber, O.A., Geophysical Report on the Property of The Coniagas Mines Ltd, Wilson Twp., Project 476. 1965, 6 pp.

GM15993 - Dumont, G.H., Report on magnetometer survey. 1965, 5 pp.

GM17234 - Drill Logs, holes 476-1 to 476-6. Coniagas Mines Ltd., East Group, Wilson Twp., Project 476. 1965, 17pp.

GM18253 - Honsberger, J.A., Geophysical survey report. 1966, 10 pages. 3 maps.

GM19519 - Honsberger, J.A., Diamond drill record. 1967, 11 pages. 1 map.

GM39363 – Girard, J., Projet NW Quebecois, Resultat du Leve Geologique sur la Propriete Wilson A, Serem Limitee, July 1982, 16 pp.

GM44514 – McCurdy, S.E., Project Novellor Exploration Priorities Incorporating the Interpretation of Airborne EM (Input) and Magnetics Data, CDI Surveys Inc., August 1986, 19 pp.

GM47599 – Nantel, J., Leve de Polarisation Provoquee - Propriete Novellor – Project 454, Ressources Onyx Inc., Sagax Geophysique Inc., August 1988, 23 pp.

GM52037 – Gaucher, E., Leve au Beep Mat Effectue sur le Projet des Cantons Mountain, Ruelle, Wilson, et Ralleau, Explorateurs-Innovateurs de Quebec Inc. et Soquem, Geosig Inc., Project No. 81.230, 5 janvier 1993, 4 pp.

GM61348 – Russell, G.A., Sheilann Lake, July 16, 1956, 6 pp.

GM62775 – Boileau, P., Ground Geophysical Surveys executed on the Ralleau Project, Megastar Development Corp., May 2006, 16 pp.

GM63676 - Piché, M., "Ralleau Property 2006 Diamond Drilling Campaign Report", Megastar Development Corp., January 2007, 30 pp.

GM63677 – Fournier, Antoine, Rapport de propriete Propriete Ralleau, Lebel-sur-Quevillon, Quebec, 32F/01, 16 septembre 2005, 9 pp.

GM63732 – Proulx, M., Report on the 2007 winter channel sampling program – Ralleau Project (32F01), Ralleau township, Abitibi, Megastar Development Corp., July 2008, 10 pp.

GM64158 - Cifuentes, C., Interpretation report, helicopter-borne time domain electromagnetic VTEM survey, Ralleau grid. 2008, 31 pp.

GM65611 - Stephens, J., Final NI 43-101 Technical Report, Ralleau Project, NTS 32F/01 & 32F/02, Chibougamau District, Quebec, 2011, 141 pp.

GM69123 - Moar, R., Technical Report on the Ralleau Property, Eeyou-Istchee Baie James Territory, Lebel-sur-Quevillon Area, Quebec, 2015, 125 pp.

RGO28A – Fairburn, H.W., Wetetnagami River Area, Ralleau, Effiat, and Carpiquet Townships, County of East Abitibi, Quebec Department of Mines, Geological Report No. 28, 1946, 19 pp.

RG2002-12 - Bandyayera, D., Daigneault R. and Sharma, K.N.M., Geologie de la Region du Lac de la Ligne (32F01), 17 juin 2006, 33 pp.

PR151 – Fairburn, H.W., Preliminary Report on Wetetnagami River Area, Abitibi Territory, Quebec Department of Labour, Mines, and Maritime Fisheries, P.R. No. 151, 1940, 5 pp.



**CERTIFICATE OF QUALIFICATION**  
**JOHN LANGTON**

**I, John Langton, M.Sc., P. Geo., of 1740 Sullivan Rd, Val-d'Or, Québec do hereby certify that:**

1. This Certificate applies to “NI 43-101 – TECHNICAL REPORT: RALLEAU PROJECT, WILSON AND RALLEAU TOWNSHIPS, QUEBEC NTS 32F/01” dated May 25<sup>th</sup>, 2017;
2. I graduated from the University of New Brunswick in 1985 with a B.Sc. in Geology and from Queen’s University, Kingston in 1993 with a M.Sc. in Geology, and I have practised my profession continuously since that time;
3. I am currently working and living in Quebec and I am a Professional Geologist currently licensed by the *Ordre des géologues du Québec* (Licence 1231); the Association of Professional Engineers and Geoscientists of New Brunswick (Licence M5467); and a Temporary Member of the Association of Professional Geoscientists of Ontario (Licence 1716);
4. I am part-owner of MRB & Associates, a Val-d’Or Quebec-based Geological Consulting firm;
5. I am the President, and hold a position on the Board of Directors of, Cartier Iron Corp., and am a minority share-holder of Cartier Iron Corp. and Eoro Resources Inc.;
6. I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a “qualified person” for the purposes of NI 43-101;
7. I have worked as an exploration and field geologist since 1985. I have knowledge and experience with regard to a various mineral deposit types, including the procedures involved in exploring for gold and base-metals, and with the preparation of reports relating to them;
8. I have been retained by DeepRock Minerals Inc., a company incorporated in the Province of British Columbia, and a reporting issuer in British Columbia and Alberta (not currently listed for trading), with head offices at #1000-409 Granville Street, Vancouver, British Columbia, Canada, V6C 1T2), as a contract/consulting geologist, and not as an employee;
9. I am familiar with the Property, having co-authored a compilation report in 2010 on the Property that is the subject of this Report;
10. I have prepared and take responsibility for all Sections of this Report, “NI 43-101 – TECHNICAL REPORT: RALLEAU PROJECT, WILSON AND RALLEAU TOWNSHIPS, QUEBEC NTS 32F/01” dated May 25<sup>th</sup>, 2017;
11. I visited the Property on April 30<sup>th</sup>, 2017 and May 10<sup>th</sup>, 2017;
12. I have no personal knowledge, as of the date of this certificate, of any material fact or change, which is not reflected in this report;

13. I am “independent” of DeepRock with respect to the conditions described in Section 1.5 of NI 43-101. Neither I, nor any affiliated entity of mine, is at present under an agreement, arrangement or understanding, nor expects to become an insider, associate, affiliated entity or employee of DeepRock, nor any of its associated or affiliated entities. Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three years from DeepRock, nor any of its associates or affiliates;
14. I have read NI 43-101 and Form 43-101F1 and have prepared the technical report in compliance with them and in conformity with generally accepted Canadian mining industry practice. As of the date of the certificate, to the best of my knowledge, information and belief, this report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

**DATED this 25<sup>th</sup> Day of May, 2017**



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***(Signed) John P. Langton, M.Sc., P. Geo.***

## **APPENDIX I**

### **Summary of Property Claim Statistics**

Claim #	Renewal Date	Expiring	Area (ha)	Work Credit (\$)	Work Obligation (\$)	Expenditures required (\$)	Rent (\$)	Owner
2113931	30-May-17	31-Jul-17	56.33	\$570.00	\$1,170.00	-\$600.00	\$64.09	Megastar Developments Corp (19263)
2113932	30-May-17	31-Jul-17	56.33	\$1,302.00	\$1,170.00	\$132.00	\$64.09	Megastar Developments Corp (19263)
2113933	30-May-17	31-Jul-17	56.33	\$355.00	\$1,170.00	-\$815.00	\$64.09	Megastar Developments Corp (19263)
2113934	30-May-17	31-Jul-17	56.33	\$202.00	\$1,170.00	-\$968.00	\$64.09	Megastar Developments Corp (19263)
2113935	30-May-17	31-Jul-17	56.33	\$0.00	\$1,170.00	-\$1,170.00	\$64.09	Megastar Developments Corp (19263)
2113936	30-May-17	31-Jul-17	56.33	\$0.00	\$1,170.00	-\$1,170.00	\$64.09	Megastar Developments Corp (19263)
2113937	30-May-17	31-Jul-17	56.33	\$17.00	\$1,170.00	-\$1,153.00	\$64.09	Megastar Developments Corp (19263)
2113938	30-May-17	31-Jul-17	56.32	\$49.00	\$1,170.00	-\$1,121.00	\$64.09	Megastar Developments Corp (19263)
2113939	30-May-17	31-Jul-17	56.32	\$110.00	\$1,170.00	-\$1,060.00	\$64.09	Megastar Developments Corp (19263)
2113940	30-May-17	31-Jul-17	56.32	\$139.00	\$1,170.00	-\$1,031.00	\$64.09	Megastar Developments Corp (19263)
2114083	30-May-17	31-Jul-17	56.34	\$17.00	\$1,170.00	-\$1,153.00	\$64.09	Megastar Developments Corp (19263)
2114084	30-May-17	31-Jul-17	56.34	\$311.03	\$1,170.00	-\$858.97	\$64.09	Megastar Developments Corp (19263)
2114085	30-May-17	31-Jul-17	56.34	\$330.00	\$1,170.00	-\$840.00	\$64.09	Megastar Developments Corp (19263)
2114086	30-May-17	31-Jul-17	56.34	\$17.00	\$1,170.00	-\$1,153.00	\$64.09	Megastar Developments Corp (19263)
2114087	30-May-17	31-Jul-17	56.34	\$17.00	\$1,170.00	-\$1,153.00	\$64.09	Megastar Developments Corp (19263)
2114088	30-May-17	31-Jul-17	56.33	\$139.00	\$1,170.00	-\$1,031.00	\$64.09	Megastar Developments Corp (19263)
2114089	30-May-17	31-Jul-17	56.33	\$200.00	\$1,170.00	-\$970.00	\$64.09	Megastar Developments Corp (19263)
2114090	30-May-17	31-Jul-17	56.33	\$78.00	\$1,170.00	-\$1,092.00	\$64.09	Megastar Developments Corp (19263)
2114091	30-May-17	31-Jul-17	56.33	\$111.00	\$1,170.00	-\$1,059.00	\$64.09	Megastar Developments Corp (19263)
2114092	30-May-17	31-Jul-17	56.33	\$80.00	\$1,170.00	-\$1,090.00	\$64.09	Megastar Developments Corp (19263)
2114093	30-May-17	31-Jul-17	56.33	\$0.00	\$1,170.00	-\$1,170.00	\$64.09	Megastar Developments Corp (19263)
2114094	30-May-17	31-Jul-17	56.33	\$0.00	\$1,170.00	-\$1,170.00	\$64.09	Megastar Developments Corp (19263)
2114095	30-May-17	31-Jul-17	56.32	\$322.00	\$1,170.00	-\$848.00	\$64.09	Megastar Developments Corp (19263)
2114096	30-May-17	31-Jul-17	56.32	\$261.00	\$1,170.00	-\$909.00	\$64.09	Megastar Developments Corp (19263)
2114097	30-May-17	31-Jul-17	56.32	\$78.00	\$1,170.00	-\$1,092.00	\$64.09	Megastar Developments Corp (19263)
2113929	30-May-17	31-Jul-17	56.33	\$0.00	\$1,170.00	-\$1,170.00	\$64.09	Megastar Developments Corp (19263)
2113930	30-May-17	31-Jul-17	56.33	\$0.00	\$1,170.00	-\$1,170.00	\$64.09	Megastar Developments Corp (19263)
2125410	30-Jul-17	30-Sep-17	56.35	\$11.00	\$1,170.00	-\$1,159.00	\$64.09	Megastar Developments Corp (19263)
2125411	30-Jul-17	30-Sep-17	56.35	\$11.00	\$1,170.00	-\$1,159.00	\$64.09	Megastar Developments Corp (19263)
2125412	30-Jul-17	30-Sep-17	56.35	\$11.00	\$1,170.00	-\$1,159.00	\$64.09	Megastar Developments Corp (19263)
2125413	30-Jul-17	30-Sep-17	56.35	\$11.00	\$1,170.00	-\$1,159.00	\$64.09	Megastar Developments Corp (19263)
2125416	30-Jul-17	30-Sep-17	56.34	\$11.00	\$1,170.00	-\$1,159.00	\$64.09	Megastar Developments Corp (19263)
2125417	30-Jul-17	30-Sep-17	56.34	\$301.62	\$1,170.00	-\$868.38	\$64.09	Megastar Developments Corp (19263)
2125418	30-Jul-17	30-Sep-17	56.34	\$10.00	\$1,170.00	-\$1,160.00	\$64.09	Megastar Developments Corp (19263)
2125421	30-Jul-17	30-Sep-17	56.33	\$10.00	\$1,170.00	-\$1,160.00	\$64.09	Megastar Developments Corp (19263)
2125422	30-Jul-17	30-Sep-17	56.33	\$10.00	\$1,170.00	-\$1,160.00	\$64.09	Megastar Developments Corp (19263)
2139950	12-Oct-17	13-Dec-17	56.34	\$132.00	\$1,170.00	-\$1,038.00	\$64.09	Megastar Developments Corp (19263)
2139951	12-Oct-17	13-Dec-17	56.34	\$132.00	\$1,170.00	-\$1,038.00	\$64.09	Megastar Developments Corp (19263)
2139952	12-Oct-17	13-Dec-17	56.34	\$10.00	\$1,170.00	-\$1,160.00	\$64.09	Megastar Developments Corp (19263)
2139953	12-Oct-17	13-Dec-17	56.34	\$10.00	\$1,170.00	-\$1,160.00	\$64.09	Megastar Developments Corp (19263)
2139954	12-Oct-17	13-Dec-17	56.34	\$0.00	\$1,170.00	-\$1,170.00	\$64.09	Megastar Developments Corp (19263)
2139955	12-Oct-17	13-Dec-17	56.33	\$0.00	\$1,170.00	-\$1,170.00	\$64.09	Megastar Developments Corp (19263)
2139956	12-Oct-17	13-Dec-17	56.33	\$0.00	\$1,170.00	-\$1,170.00	\$64.09	Megastar Developments Corp (19263)
2139957	12-Oct-17	13-Dec-17	56.33	\$0.00	\$1,170.00	-\$1,170.00	\$64.09	Megastar Developments Corp (19263)
2162454	23-Apr-18	24-Jun-18	56.34	\$0.00	\$1,800.00	-\$1,800.00	\$64.09	Megastar Developments Corp (19263)
2162455	23-Apr-18	24-Jun-18	56.34	\$0.00	\$1,800.00	-\$1,800.00	\$64.09	Megastar Developments Corp (19263)
2162456	23-Apr-18	24-Jun-18	56.34	\$0.00	\$1,800.00	-\$1,800.00	\$64.09	Megastar Developments Corp (19263)
2162457	23-Apr-18	24-Jun-18	56.34	\$281.00	\$1,800.00	-\$1,519.00	\$64.09	Megastar Developments Corp (19263)
2162461	23-Apr-18	24-Jun-18	56.33	\$0.00	\$1,800.00	-\$1,800.00	\$64.09	Megastar Developments Corp (19263)
2162462	23-Apr-18	24-Jun-18	56.33	\$129.00	\$1,800.00	-\$1,671.00	\$64.09	Megastar Developments Corp (19263)
2162463	23-Apr-18	24-Jun-18	56.33	\$0.00	\$1,800.00	-\$1,800.00	\$64.09	Megastar Developments Corp (19263)
2024537	11-Jul-18	11-Sep-18	56.36	\$0.00	\$1,800.00	-\$1,800.00	\$64.09	Megastar Developments Corp (19263)
2024538	11-Jul-18	11-Sep-18	56.36	\$0.00	\$1,800.00	-\$1,800.00	\$64.09	Megastar Developments Corp (19263)
2024540	11-Jul-18	11-Sep-18	56.36	\$0.00	\$1,800.00	-\$1,800.00	\$64.09	Megastar Developments Corp (19263)
2024541	11-Jul-18	11-Sep-18	56.35	\$641.00	\$1,800.00	-\$1,159.00	\$64.09	Megastar Developments Corp (19263)
2024542	11-Jul-18	11-Sep-18	56.35	\$641.00	\$1,800.00	-\$1,159.00	\$64.09	Megastar Developments Corp (19263)
2024543	11-Jul-18	11-Sep-18	56.35	\$641.00	\$1,800.00	-\$1,159.00	\$64.09	Megastar Developments Corp (19263)
2024544	11-Jul-18	11-Sep-18	56.35	\$641.00	\$1,800.00	-\$1,159.00	\$64.09	Megastar Developments Corp (19263)
2024545	11-Jul-18	11-Sep-18	56.35	\$641.00	\$1,800.00	-\$1,159.00	\$64.09	Megastar Developments Corp (19263)
<b>Totals</b>			<b>3323.85</b>	<b>\$8,990.65</b>	<b>\$78,480.00</b>	<b>\$69,489.35</b>	<b>\$3,781.31</b>	



**MAP 1**

**Geological Compilation Map of the Property**

