



Technical Report  
for the  
**Lady Project**

**BC Geological Survey  
Assessment Report  
33905**

Tenure Numbers:

414141; 414142; 397911

**EVENT #5438644**

**Satellite Remote Sensing Survey  
And Analyses  
of the**

**Lady Group of Mineral Tenures:**

Nanaimo Mining Division  
of  
British Columbia  
Canada

**Minfile Occurrences:** 092B029; 092B033

**ARIS #s:** 12525; 15136; 15881; 27259

Lat: 48.9251 ° Long: -123.9499°  
NAD 83

For

**MonsterZinc Resources Inc.**

By  
Auracle Geospatial Science Inc.  
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**June20 2013**

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## INTRODUCTION

In January of 2013, Auracle Geospatial Science Inc was asked by Monster Zinc Resources Inc. to conduct a primary phase mineral exploration remote sensing work for the Lady Group of Mineral Tenures. The Lady Tenures are located 15 km southwest of the City of Ladysmith, British Columbia on the East Coast of Vancouver Island. These tenures are considered prospective for both base and precious metals.

This project was designed to use microwave synthetic aperture radar satellite data and archived geoscience spatial data to search for signals which may represent mineralization, and other geological phenomena.

High resolution base image data was ortho-corrected to form a suitable base, with archived data ingested into a project Geographic Information System (GIS) and spatially aligned to construct an appropriate knowledge model. This model is also designed to act, in part as a special decision support tool, with which decision makers can view, distribute, and publish complex spatial information.

Radar data was acquired and used in this project. Radar data is not affected by most atmospheric conditions and can penetrate some ground cover. Radar is useful in detecting textural changes and structure. It does however, require very specialized software and processing to be converted from raw signals into ortho correct data.

The analysis needed to produce geologically relevant textural and lineament maps, is labour and computer intensive and requires specialized knowledge and specialized software. Responses are geographically-sensitive, responding differently to different climatic, physiographic, atmospheric and rock surface (e.g. weathered, solid outcrop, rubblely outcrop) conditions as well as varied incidence angles.

The results of these analyses are an extension of the project GIS, and knowledge model from which a series of representative maps were projected.

The methodologies employed in this work are evolving quickly in response to constantly improving locational precision sensors and systems, radiometric improvements in signal sensors, increased on-board data storage capacities, increased speed and number of satellite down-link facilities, as well as the constant improvements to computing science in all of its extents. This leads to higher spatial, radiometric and signal resolution data, and better analyses.

The analyses for geological content were conducted in collaboration with Geologist: Jacques Houle P. Eng., who has supplied important perspective as well as assisted in the archived data selection data and provided relevant information.

Ultimately the purpose of this work has been to begin the process of a multi-phase project within which to ingest data and use collaborative data-driven, knowledge-based remote sensing and GIS analysis to derive new and useful information. The results of this work include the new project GIS together with a series of maps delineating areas of interest which are considered to be prospective for further mineral exploration.

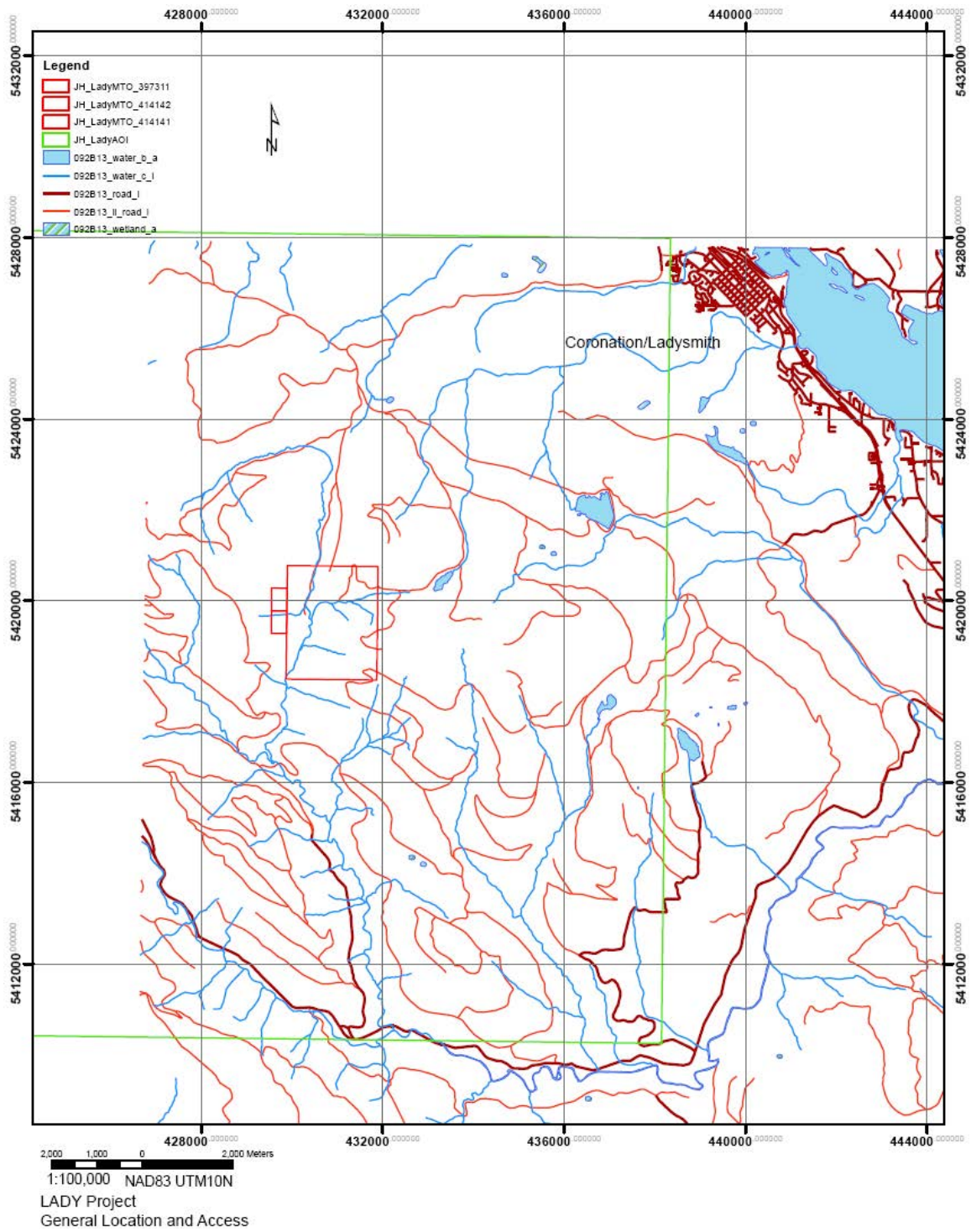


Illustration 1- General Location

## **PHYSIOGRAPHY AND ACCESS**

The Group occupies approximately 646 hectares of surface area, consisting of 3 legacy type mineral tenures, within the Nanaimo Mining Division. The Group is located approximately 15 km southwest of the Vancouver Island City of Ladysmith within the maritime coastal climate zone. Temperatures range from -09°C to 35° C. The Lady Group is located within the Vancouver Island Forest District, which has high vegetation cover (Primarily Species: Douglas Fir, red Cedar Hemlock and Spruce). There is sporadic outcropping throughout the Lil Group Tenures, with extensive outcropping at higher elevations and in steep terrain. Elevation ranges within the project area ranges between 500 meters to 11140 and is bisected by a major river. The project is only 10 from tidewater.

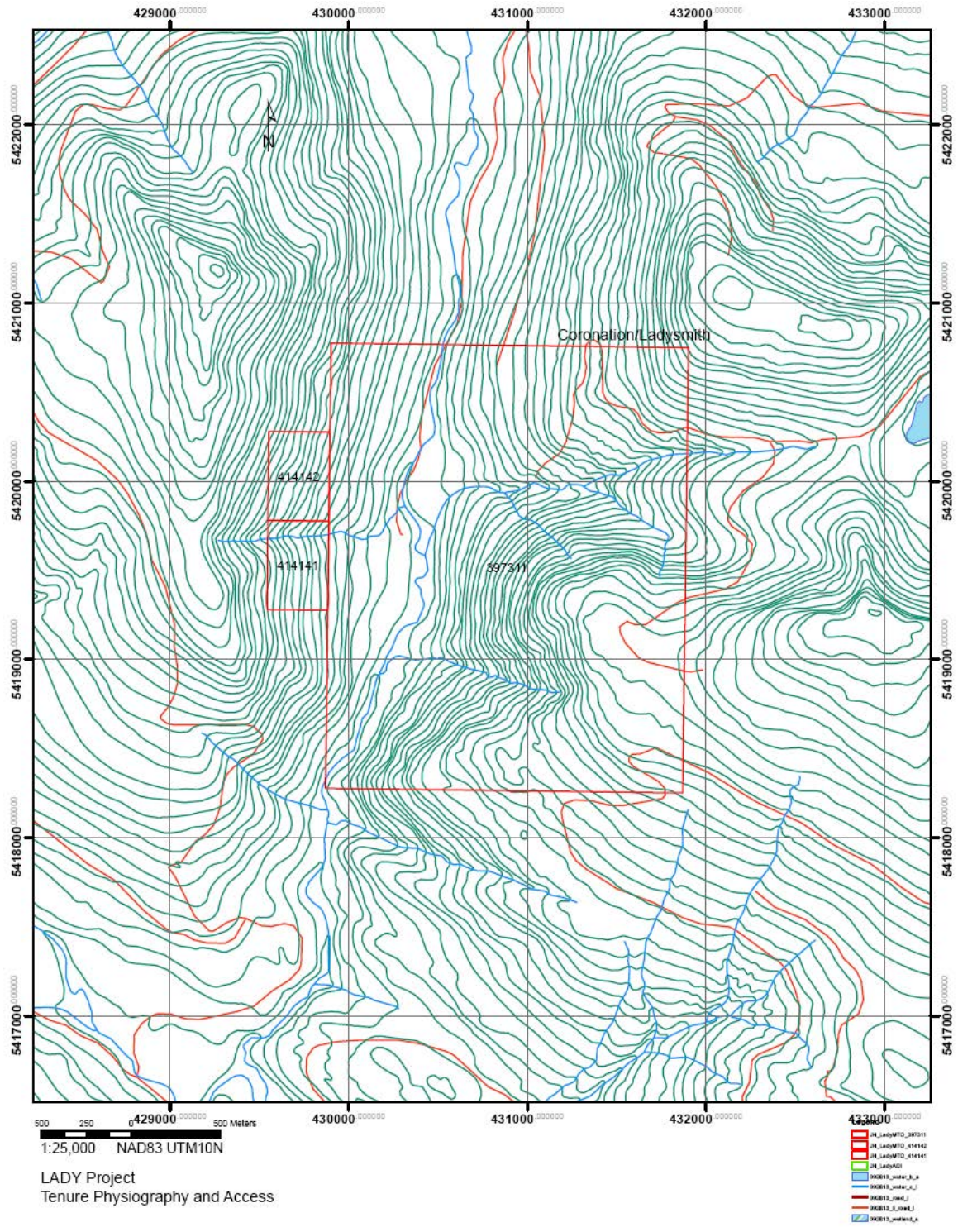


Illustration 2- Digital Elevation Model

# REGIONAL GEOLOGY

Regional geology, as delineated, is extracted from Geoscience BC digital 'Bedrock Geology' and 'Faults' downloads.

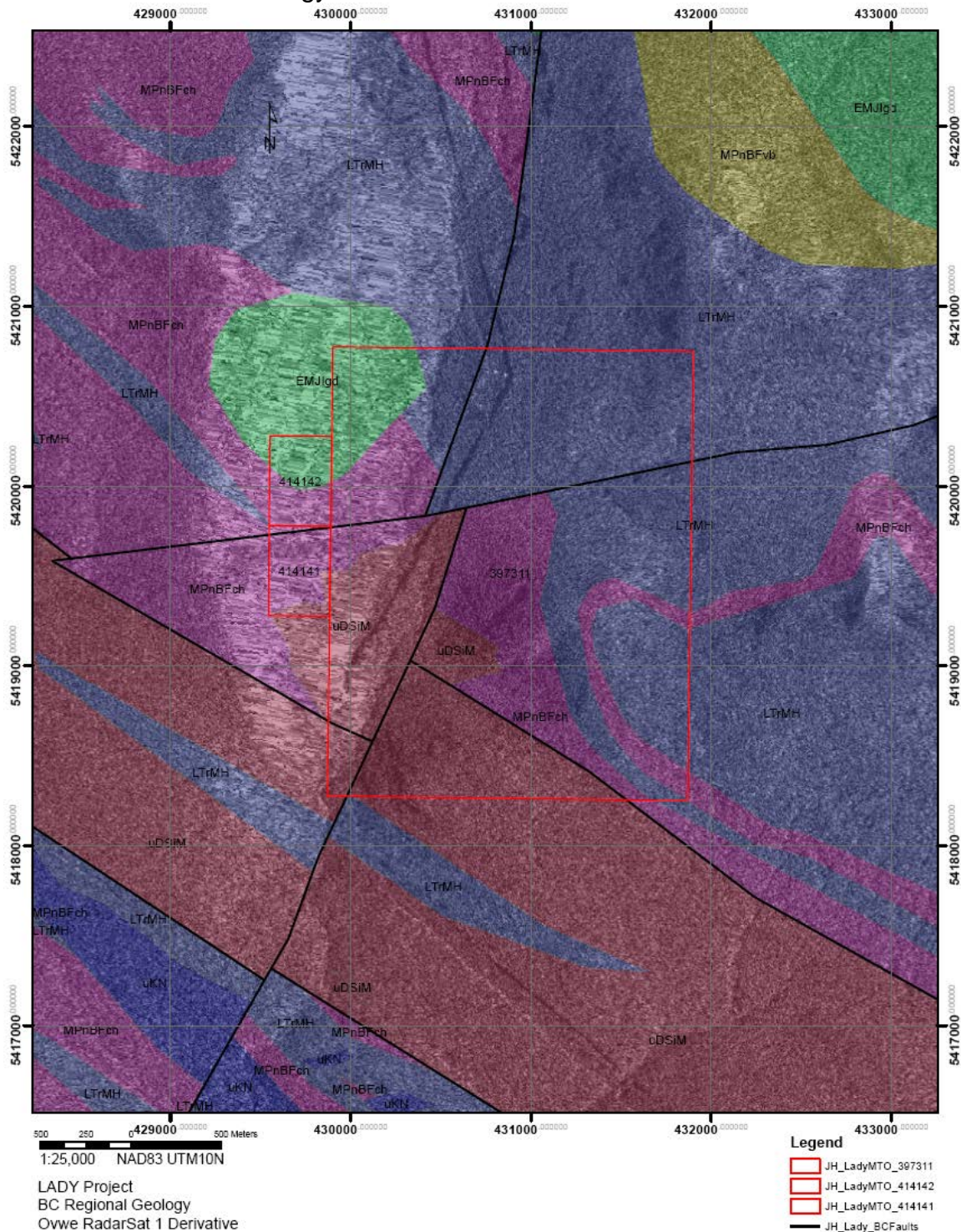
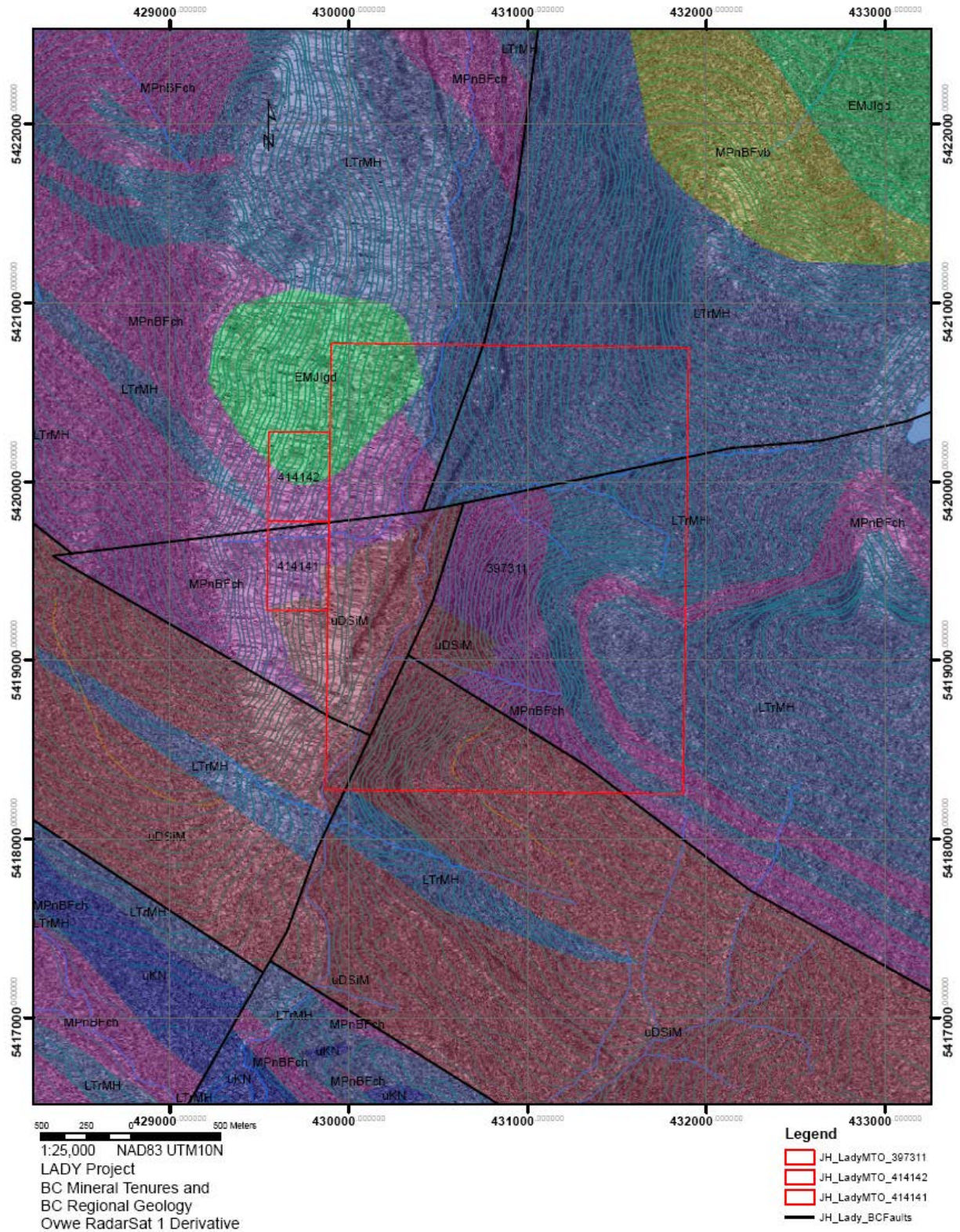


Illustration 3- Regional Geology

# MINERAL TENURE

The Lady Group of mineral tenures includes: 414141; 414142; and 397911. See attached "Covering Confirmation Letter" for verification of ownership and status



## PREVIOUS WORK

This general area has been explored for minerals since the early late 1800s, with early exploration specific to these properties beginning in the mid 1980s with work recorded in 2004.

There are two Government of British Columbia Minfile mineral occurrence reports for two developed prospects pertaining to this property:

92B 029-

<http://minfile.gov.bc.ca/Summary.aspx?minfilno=092B++029>

Capsule Geology:

The Lady A deposits are underlain by cherty sediments of the Upper Devonian McLaughlin Ridge Formation, Sicker Group. Locally, the sediments strike northwest and dip to the northeast at 50 to 60 degrees.

The Lady A (A zone) deposit is a stratabound taconite deposit composed of grey chert and red jasper hosting bands of very fine grained magnetite with minor specularite. The deposit consists of two lenses which outcrop along strike for a distance of 105 metres, attaining widths of up to 18 metres. An average thickness, determined from drilling, is less than 9 metres. The estimated reserves are 366,000 tonnes with an average grade of 25 per cent iron (Minister of Mines Annual Report 1956, page 135).

92B 033

<http://minfile.gov.bc.ca/Summary.aspx?minfilno=092B++033>

The Lady A (C zone) deposit is underlain by cherty sediments of the Upper Devonian McLaughlin Ridge Formation, Sicker Group. Locally the sediments strike northwest and dip to the northeast at 50 to 60 degrees. Intruding the strata are dykes and sills of gabbro and diabase (informally called the Mount Hall Gabbro) that are coeval with the Upper Triassic Karmutsen Formation, Vancouver Group.

The deposit is a stratabound taconite lens composed of grey chert and red jasper hosting bands of very fine-grained magnetite with minor hematite. The deposit outcrops along strike for a distance of 42 metres, having an apparent thickness of 12 metres. Drilling has revealed a downdip extent of at least 48 metres. A "conservative" estimate of reserves based on four drill holes put down in 1953 was reported to be 2.15 million tonnes grading 18 per cent iron (Buckham, 1953).

Past work reported within the boundaries of the Lady Group includes the following 4 internet distributed BC Government ARIS Occurrence/Work Assessment reports:

[http://aris.empr.gov.bc.ca/search.asp?mode=repsum&rep\\_no=27259](http://aris.empr.gov.bc.ca/search.asp?mode=repsum&rep_no=27259)

[http://aris.empr.gov.bc.ca/search.asp?mode=repsum&rep\\_no=15881](http://aris.empr.gov.bc.ca/search.asp?mode=repsum&rep_no=15881)

[http://aris.empr.gov.bc.ca/search.asp?mode=repsum&rep\\_no=12525](http://aris.empr.gov.bc.ca/search.asp?mode=repsum&rep_no=12525)

[http://aris.empr.gov.bc.ca/search.asp?mode=repsum&rep\\_no=15136](http://aris.empr.gov.bc.ca/search.asp?mode=repsum&rep_no=15136)

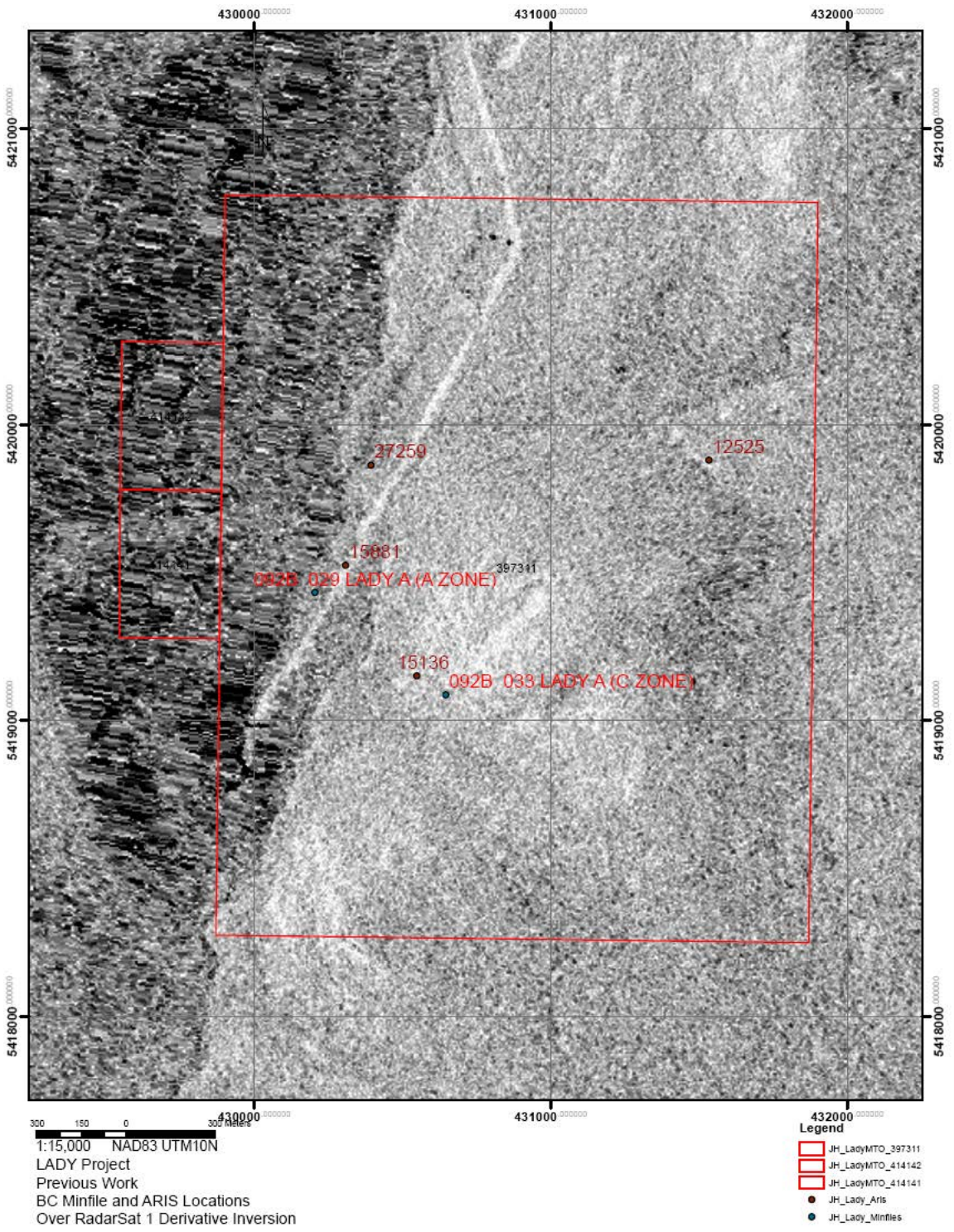


Illustration 5- Previous Work

## **DATA ACQUISITION**

Archived mineral exploration, geology and geographic data were collected from various sources including:

- BCGS
- BC RGS
- Geogratias
- Geobase

Satellite Remote Sensing data selection was based on suitability to the fusion process and availability as a continuum of like coverage. The acquired data included:

- RadarSat 1 Fine 6.25 m Synthetic Aperture c-band microwave Radar data from MDA Corporation Richmond BC

Historic archived data for the Lady Group (AOI) that had spatial reference was ingested as raster, vector, table and grid data., Conversions to a common datum (NAD 83) and projection (UTM 10N) were conducted where needed.

Raster data in the form of scanned maps was resampled (Warped) to fit using coordinates or identifiable geographic features. In some cases the raster data was then converted into vector data using 'heads-up' digitizing or raster feature extraction. Grid data was ingested using interoperability software to preserve the original content. Archived data selection was directed by Jacques Houle P. Eng according to applicability to this work.

### **Data Pre-Processing**

RadarSat 1 Fine CEOS data was converted to .tif format and corrected for:

- Antenna pattern
- Slant Range
- Radiometry
- Topographic distortion (Layover and foreshortening)

The ortho-corrected 6.25 m data was then filtered for speckle using a Sobel edge detection algorithm. This pre-processed radar data was checked for alignment against the optical data and corrected by shifting.

## **DATA PROCESSING**

### **Methodologies**

The methodologies used in this work are consistent with scientific standards conventionally used in these types of processes and analyses (Jensen, 1996; Harris, et al., 2010).

## Radar

The noise reduced and pre-processed Radar data was re-processed using a series of protocols including: Directional filters:  $160^{\circ}$  and  $90^{\circ}$ ; Laplace Transforms; and mathematic convolutions. Results from Mathematical Convolution images included Co-occurrence: Dissimilarity; Homogeneity; Entropy; and Means. These were projected using both nearest neighbour and cubic convolution resampling to improve and discriminate their varied linearity, texture or arcuate pattern. Results were projected using custom histogram display for improved visual discrimination.

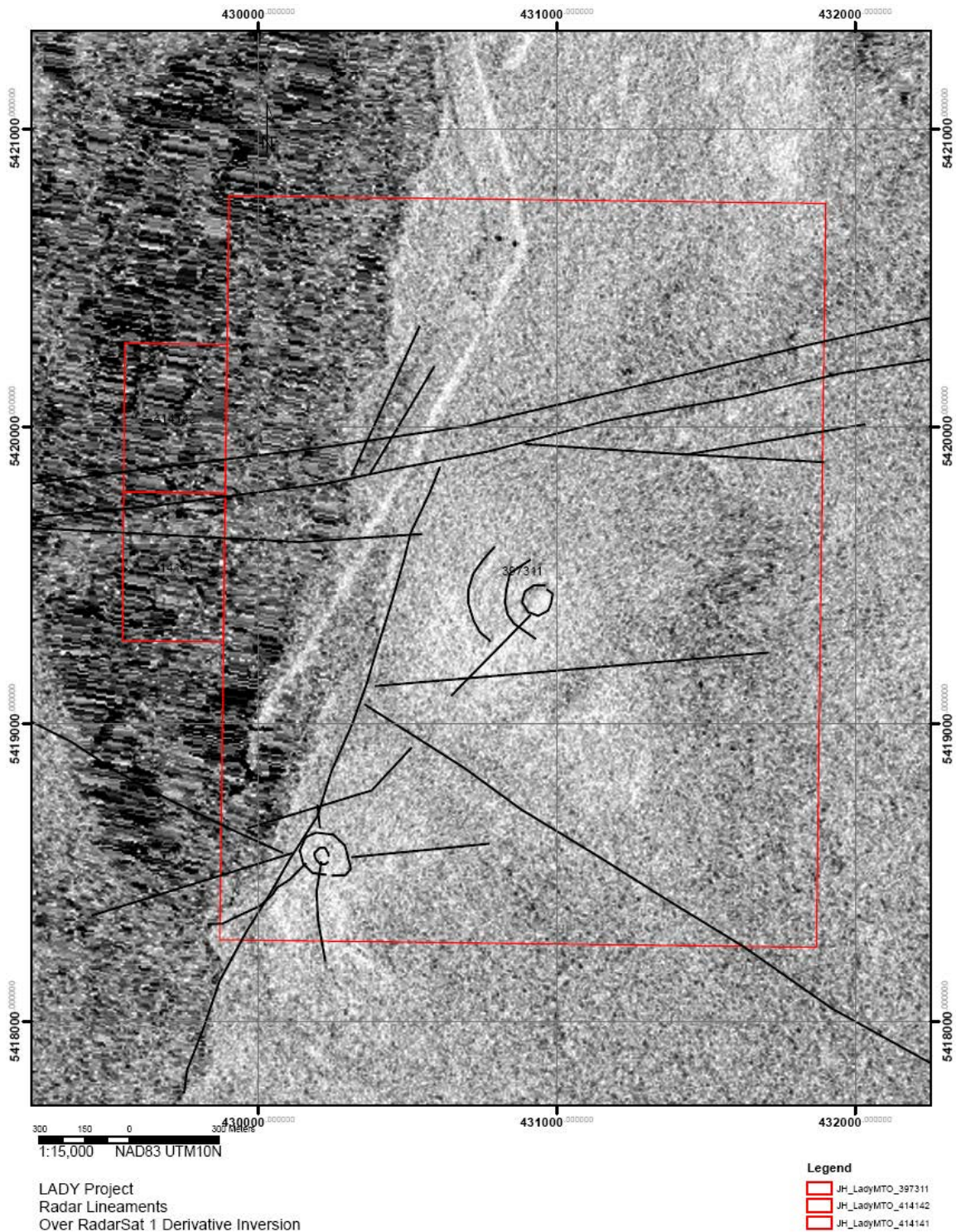


Illustration 7- Ortho-Correct Radar Image

The radar analyses resulted a lineament map displaying previously un-mapped structure.

## **DATA DESCRIPTION**

### Radar Data:

The acquired radar data was RadarSat-1 Fine, 6.25 metre spectral resolution C-Band microwave type, Synthetic Aperture (SAR) data. The RadarSat data is geocoded high density format data which was georeferenced and projected to the state datum. The georeferenced raw data was then ortho-corrected using a proprietary script. Radar data does not directly correspond to visual established geographic features and requires very specialized knowledge, software and equipment in order to correct for foreshortening and antenna pattern. This data was corrected spatially using a proprietary script and subsequently filtered using mathematical filters to enhance edges and to reduce inherent speckle and noise. The noise reduced data was re-processed using a series of protocols including: Directional filters: 110° and 90°; Laplace Transforms; and mathematic convolutions. Results from Mathematical Convolution images included Co-occurrence: Dissimilarity; Homogeneity; Entropy; and Means. These were projected using both nearest neighbour and cubic convolutions to improve and discriminate their varied: linearity; texture or accurate pattern.

## **RESULTS**

All result images were histogram balanced using a combination of linear and Gaussian filtering.

A Digital Elevation Model (DEM) covering the entire AOI was generated to an elevation accuracy of 1 m vertical located within a 3 m radius area. This greatly improves elevation and spatial accuracy of existing topographic data, (currently available at 1:50 000 scale, at +/- 25m vertical and located within a 30 m radius area.) The spatial accuracy of the DEM maps is significantly better in locating and placing geological, geophysical and geochemical information on maps and subsequently in using this information in UTM space to locate drill holes and trenches.

The altitude, orbital location, yaw and attitude of the satellite collecting the data are recorded at the point of capture of the data. When these are combined with the orbit velocity of 15 000 km/h, the data capture is relatively instant. On the

other hand, the air photos used to construct 1:50,000 topographic maps are collected as clusters of images collected on flights lines from a moving aircraft that have more highly variable YAW, tilt and attitude and much less accurate position location systems. Consequently printed topographic maps (and their shape file equivalents) often display by comparison, spatial offsets or error in the locations of features such as lakes, trails and streams. In other words, the internal accuracies of position within the satellite images are relatively more precise. Any improvement in accuracy results is a significant improvement in multivariate data alignment. This improvement allows us to integrate and fuse multidisciplinary data such as geophysics and geochemistry which are part of the strategic plan for further work.

Two final radar derivative maps were generated to provide linearity and texture. Vectors in the form of lineaments were extracted where justified by offsets to represent potential faults. *(See Appendix Figure 10)*

A topographic map was also created to include the watercourses and water-bodies as an extraction digitization of vector data from the Spectral NDVI image map.

An Elevation Contour map with 10, and 20 metre contours was extracted from the DEM together with a classified slope map.

## **RECOMMENDATIONS**

### **General**

The Second Phase of this work is designed to include High Resolution Satellite Spectral Image Data and a Geological interpretation

In subsequent work, it is recommended to use:

1. Higher Spectral/Spatial Resolution RadarSat 2 data (4 channel versus present 2 channel data)
2. Collection of 10 widely spaced DGPS Ground Control positions of significant geographic features for absolute correction and DSM
3. Collection of Ground Based Spectrometric data

It is anticipated that these strategic advances will make it possible to isolate those areas hosting potential mineral showings, to more quickly map them on the ground and to begin the process of evaluating their economic potential by undertaking detailed geophysical (IP) and drilling programs.

## REFERENCES

Harris, J.R., McGregor R., and Budkewitsch, P. (2010.) *Geological analysis of hyperspectral data over southwest Baffin Island: methods for producing spectral maps that relate to variations in surface lithologies*. Canadian Journal of Remote Sensing, 36, 412-435.

Jensen, J.R. (1996.) *Introductory Digital Image Processing: A Remote Sensing Perspective*. 3rd ed. Pearson Prentice Hall, Upper Saddle River;

## Statement of Qualification

I, **David J. McLelland**, do hereby certify that:

1. I am a Principal in:  
Auracle Geospatial Science Inc,  
325 Dorset Road Qualicum Beach,  
British Columbia, Canada V9K 1H5
2. I have received a Master of Science with Distinction in Remote Sensing and Geospatial Science from Manchester Metropolitan University's faculty of Earth and Environmental Science, and have received a postgraduate diploma in applied and theoretical GI Science from Simon Fraser University.
3. I have completed the B.C.I.T. B.C.Y.C.M. Mineral Exploration program, and Completed the B.C.I.T. B.C.Y.C.M. Advanced field School.
4. I have 10 years of experience in Remote Sensing, and I am the Remote Sensing Project Manager and responsible for the acquisition and management of data and execution of analyses.
5. This report was prepared on behalf of Auracle Geospatial Science Inc. who has been engaged by MonsterZinc Resources, to complete a remote sensing program on this property.
6. I have no material or financial interest in the subject properties or the companies that own them.
7. This report has been prepared in accordance with generally accepted scientific principles and is based upon the best information available at the time of preparation.

I am not aware of any material fact or material change with respect to the subject matter of the report that is not reflected in the report and therefore the omission of fact.

Date: June 20th 2013  
Qualicum Beach, British Columbia, Canada

*David J McLelland* MSc, PGdip, (FRGS, MCRSS)

<b>SW BC</b>								
MZ Lady								
2012 Work	Budget		Tenure Area 641 hectares					
Project Area	Lady Group		Mineral Expl	<b>Remote Sensing</b>				
Cost Categories	Type	Descript	Units	Rate	#	Qty	extended	
Personnel								
	Project Manager	Est Plan/acqu	\$/Day(8hr.)	\$600.00	1	1	\$600.00	
	QP		\$/Day(8hr.)	\$650.00	4	1	\$650.00	
	Field Assistants		\$/Day(8hr.)	\$350.00	1	0	\$0.00	
	GIStech		\$/Day(8hr.)	\$275.00	4	1	\$1,100.00	
	Geospatial Analyst		\$/Day(8hr.)	\$600.00	6	1	\$3,600.00	
	Remote Sensing Analyst		\$/Day(8hr.)	\$625.00	6	1	\$3,600.00	
Travel								
	Lodging	R and Board	\$/Day/Person					
	Lodging Short Stay	R and B	QP	\$/Day/Person				
	Meals		travel	\$/Day/Person				
	Vehicle			\$/Kilometre				
	Fuel	Unimog						
	Fares	Ferry						
		Ferry Passenger						
Misc Costs								
	Materials	Flags						
	Supplies							
	Misc.							
Communications								
	Satellite			\$/Week				
	Sat Phone			\$/month				
	Radio			\$/Week				
Field Equipment Rental								
	Unimog			\$/Day				
	Generator			\$/Week				
	Dryer heater			\$/Month				
	ATV			\$/Day				
	Aircraft	J Ranger		\$/Hour				
		Mob & [	fuel inc	\$/Minute				
		Daily	fuel inc	\$/Minute				
		L Ranger						
Tech Equipment Rental								
	Computer			\$/Day		1	0	\$0.00
	CDGPS			\$/Day				
	Gamma Ray Spectrometer			\$/Week				
	SWIR Spectrometer			\$/Week				
Sampling equipment Rental								
	Soil Probe		portable	\$/Week				
	Tips		wet cutti	\$/each				
	Core Tubes	36"	clr vinyl	\$ per set of 15				
Sample Analysis								
	Sample cutting			\$/per				
	Sample prep		RC					

	Drying		onsite	\$/week				
	Sample Bags			\$each				
	Microscopy			\$/per				
	Chemical analysis		lithogeo	\$perSample				
	Metallurgical analyses							
	Shipping							
Fuel								
	ATV			\$/Day				
	Probe			\$/Day				
	Heater		dryer	\$Day				
Data Acquisition							1	\$240.00
	ASTER							\$0.00
	TRIM							\$0.00
	WV2Stereo	100km						\$0.00
	3.8m Multi		3.8m				2	
	1 Pan		1m					
	SAR	Rsat	1F		\$0.50			\$2,100.00
	preprocessing	Rsat						\$2,100.00
	Processing	RS			\$500.00	24	1	
	Scanning Digital	36"	map	per lin inch	\$0.50	2,736	0	\$0.00
	Digitization	processing						\$240.00
Mapping and Reporting								
	Mapping							\$600.00
	Reporting	ppt						
	Printing and copying							\$125.00
	LS Printing							\$250.00
Licences and Permits								
	Exploration Permit							
	Bond							
	WCB	inc						
	Insurances	Equipment						
		Liability						
	ATV	in rental						
Total								\$15,205.00

Plus HST (ap