Geophysical and UAV Aerial Photogrammetry Surveys Report

Yukon Mineral Exploration Program (YMEP)

Twenty Mile Creek Placer Property

Dawson Mining District

NTS: 115N/08 & 115N/09
Latitude: 63° 33.44" N   Longitude: -140° 8.46" W

Lease List:

5 Mile Placer Lease
ID01810
Owner - Pierre Olivier-Caissy - 100%

5 Mile Placer Lease
ID01811
Owner – Robin Miller – 100%

Work Performed:

Mobilization/Job Prep:	9 to 11 October, 2020
Demobilization:	18 to 19, October, 2020
Drone Survey:	18 October, 2020
GPR Survey:	5 October, 2020
Res/IP Survey:	12 to 18, October 2020

Prepared for GroundTruth Exploration Inc.

Written by: Allison Feduk
January 29, 2021

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1 Introduction

Twenty Mile Creek is a left limit tributary of the Sixty Mile River. There are several gold-in-soil anomalies around Twenty Mile Creek particularly on White Gold Corporation's Dime property.

Shawn Ryan reviewed the various placer camps (outside the Klondike gold fields) in the Yukon and noticed a general theme: creeks flowing from significant gold deposits contain placer gold. Proven examples include Dublin Gulch deposit, Scheelite Dome, Clear Creek, Freegold Area, Moose Horn range, Mt Nansen, White Gold Deposit, Casino Deposit. This theory was the incentive to stake ten miles on Twenty Mile Creek.

GroundTruth Exploration Inc. was hired to conduct a UAV Drone survey on the 18th of October, 2020, seven DC Resistivity and Induced Polarization (Res/IP) surveys between the 12th to 18th of October, 2020, and a 589 line-m Ground Penetrating Radar (GPR) survey completed on 5th of October 2020.

The Res/IP and GPR work was intended to measure the depth to bedrock and to map underlying lithology thickness to determine if any paleochannels favorable to gold deposition could be detected.

2 Previous Investigations

Previous investigations include total ground magnetic surveys performed by GroundTruth Exploration Inc. for Joe Spurlock in the 2009, 2010 and 2012 field seasons. The purpose of the exploration program was to identify potential gold bearing magnetite rich placer channels on the Twenty Mile property.

3 Location and Access

The Twenty Mile Creek prospecting leases are located approximately 58 km South Southwest of Dawson City within the Sixty Mile watershed in west-central Yukon Territory. The targets are centered at 63° 33.44' N and -140° 8.46" W and located on NTS map sheets 115N/08 and 115N/09 (Figure 1). The lease is accessible by helicopter year-round and can be accessed in the winter, by snowmobile, via the Sixty Mile River. The Lammers Field Airstrip is located 10 km to the east of the property, which can be accessed year-round.

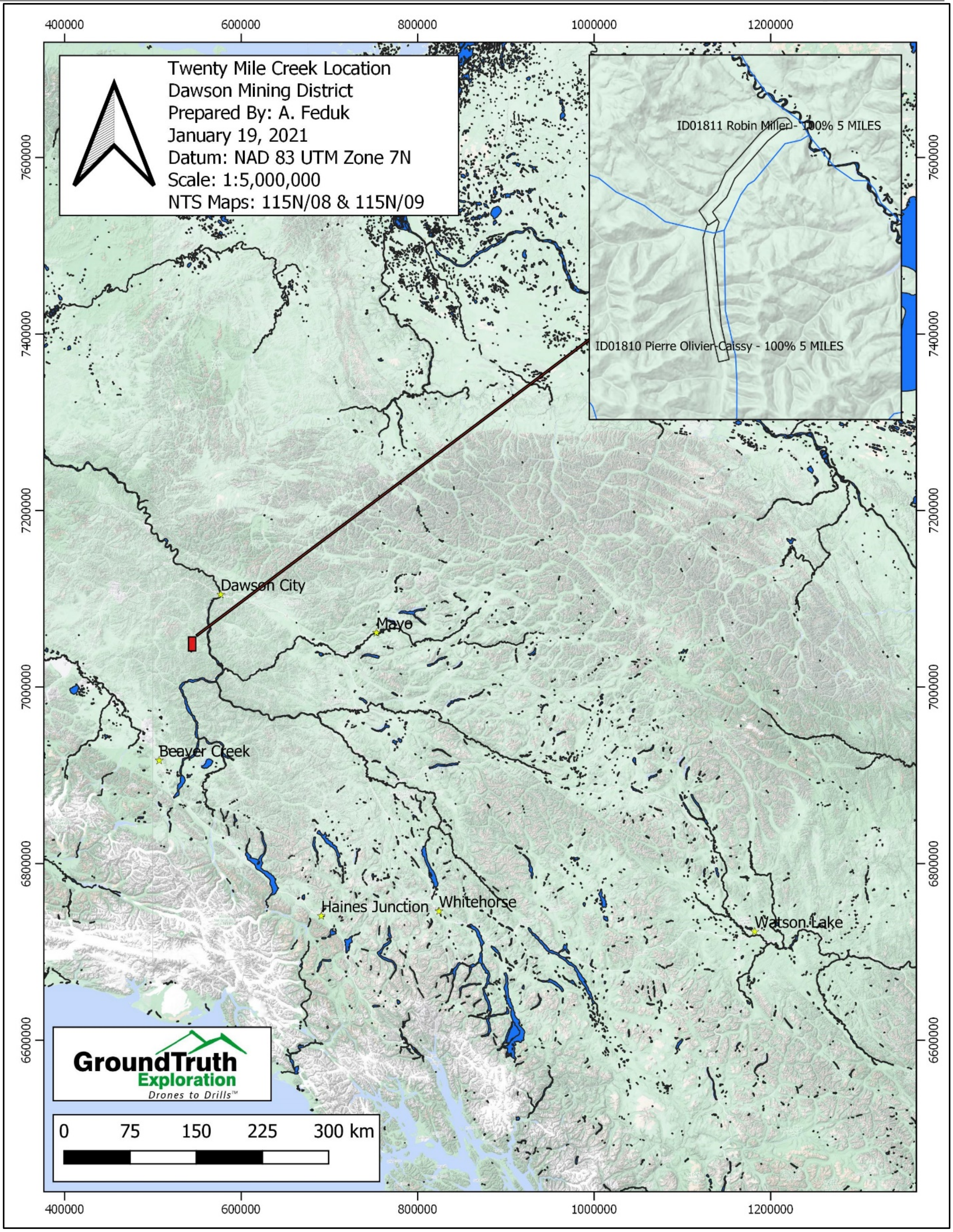

Figure 1: Twenty Mile Creek Location Map

4 Physiography and Climate

The landscape is composed broad valleys bordered by moderately sloped, tree-covered hills ranging in elevations from 396 m to 701 m. The area experiences typical climatic conditions of the central Yukon Territory. The territory has a sub-arctic continental climate with a summer mean of 10°C and a winter mean of -23°C with temperatures reaching as high as 35°C in the summer and as low as minus 55°C in the winter. The property lies within Canada's discontinuous permafrost zone, most of the valley bottoms in this area are filled with permafrost.

5 Geology

5.1 Regional Geology

Twenty Mile Creek is situated in the Yukon-Tanana Terrane (YTT). The YTT is a late Devonian to middle Mississippian continental magmatic arc extending from northern British Columbia into west-central Yukon and eastern Alaska and is bounded to the northeast by the Tintina fault and to the south-west by the Denali fault (Colpron et al., 2006).

The YTT is composed of four main assemblages including the Snowcap, Finlayson, Klondike and Klinkit (Colpron et al. 2006) intruded by the Dawson Range batholith (phase of the Whitehorse Suite), Prospector Mountain plutonic suite and Casino plutonic suites (Mortensen et al., 2010).

The Snowcap assemblage (PDS1) forms the base of the YTT consisting of quartzite, psammite, pelite and marble with minor greenstone and amphibolite. The Finlayson assemblage (DMF1) is composed of amphibolite, garnet amphibolite and schist. The Klondike assemblage (PK1, PK2) consists of muscovite-chlorite quartz phyllite, quartz-muscovite-chlorite schist, micaceous quartzite, psammite, phyllonite and schist. The Whitehorse Suite (mKqW, mKgW), a phase of the Dawson Range Batholith, consists of biotite quartz monzonite, biotite granite, leucogranite, monzogranite, granodiorite, diorite, granite and tonalite.â€ (Ryan et al., 2013). The Klinkit (CK1) is composed of mafic to intermediate metavolcaniclastic and metavolcanics rocks, with minor limestone and conglomerate (Colpron et al., 2006; Roots et al, 2004).

5.2 Property Geology

The Twenty Mile property is underlain by an Upper Cretaceous Carmacks volcanics unit from the mouth of the Twenty Mile Creek to 8 km upstream. This unit, uKC1, is composed of basalt, breccia, andesite, porphyry, dacite and trachyte with minor conglomerates and agglomerates. The upper portion of the creek is underlain by the Devonian Snowcap assemblage consisting of quartzite, psammite, pelite and marble; minor greenstone and amphibolite. Minor areas are underlain by the Mississippian Simpson Range consisting of orthogneiss, metagranodiorite, metadiorite and metatonalite and the Carboniferous Finlayson assemblage composed of intermediate to mafic volcanic and volcaniclastic rocks with the major lithology being amphibolite (Figure 2). This region is located in an unglaciated area, thus placer gold should be located close to the hard rock sources.

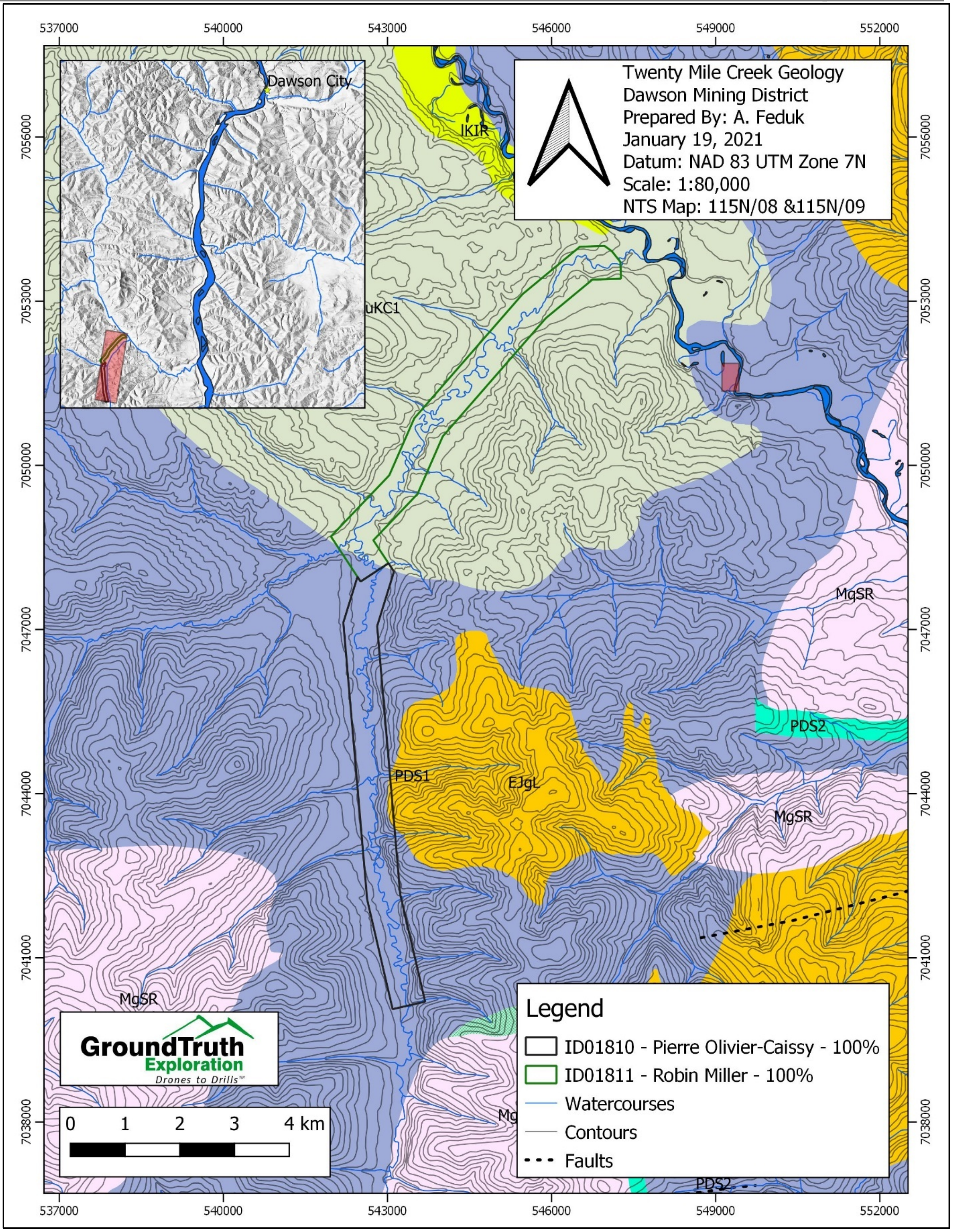

Figure 2: Twenty Mile Creek Geology Map

6 UAV Aerial Photogrammetry

6.1 Work Performed

The UAV survey consisted of a 1-day survey performed on October 18th, 2020. A lead UAV operator and assistant UAV operator (spotter) were employed to run the survey. A total of three flights were run to cover a portion of the leases.

The Drone survey lines and spatial resolution are approved by client prior to survey, and are designed in accordance with June 1, 2019 Transport Canada RPAS regulations. Typical flight time is approximately 30 minutes per flight, less if the operations area is experiencing high winds.

6.2 Personnel and Equipment

The Drone survey is typically conducted by one trained operator and one spotter. The lead operator is responsible for coordinating efficient operation of survey and ensuring optimal data quality, the spotter is responsible for maintaining visual contact with the drone, monitoring the radio, and looking for flight path conflicts with other aircraft in the area.

The following equipment is used for the completion of the survey:

UAV Drone:	Ebee Plus UAV 'Drone' with internal GPS & radio link
Camera:	S.O.D.A. 24MP custom EBee camera
Base Station:	Panasonic Toughbook laptop with radio link
Power Generation:	1000watt Honda generator
Radios:	VHF radio with aircraft frequencies
Processing:	Laptop computer with adequate RAM and GPU
Software:	Emotion software for flight planning/monitoring
	Postflight Pix4D for image Orthorectification
	Globalmapper for manual correction/cropping

6.3 UAV Survey Operating Procedures

The survey is completed in the field according to the following procedure:

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- Survey is planned using Emotion software prior to departing for field.
- Spatial resolution, footprint, number of planned flights and launch location is determined.
- Operator arrives onsite and sets up base station, UAV unit and ensures adequate launch and landing path is available.
- Prior to launch and at regular intervals during the survey, operator calls out on Aircraft frequencies to notify Drone survey in progress.
- Operator Hand launches aircraft and flies survey as planned with number of required flights and maintains visual contact with the UAV
- Data is downloaded from drone after each flight and inspected for quality.
- After survey, all imagery and drone data files are Orthorectified using Postflight Pix4D software package.

6.4 Data Processing

The collected data is downloaded in the field after every flight and checked for integrity. This allows any low-quality imagery to be identified and resurveyed while onsite. The drone imagery data is processed every evening by the lead operator in the field using Postflight Pix4D software. The initial orthorectified image product is generated by an automated process. This image is then cropped in Globalmapper or other GIS software to remove bad edges and areas that lack sufficient image coverage to be useful to the client. The final cleaned image and DEM product is the result of this manual QC process. The final Image and DEM are georeferenced to NAD83 UTM projection. A final QC report is generated automatically with the final cleaned product.

Standard data output:
Imagery: Georeferenced Orthoimage (geotiff format)
Digital Elevation Model: Gridded Elevation model (geotiff format)
Automated Quality Report: Report with survey statistics (.pdf format)

6.5 Results

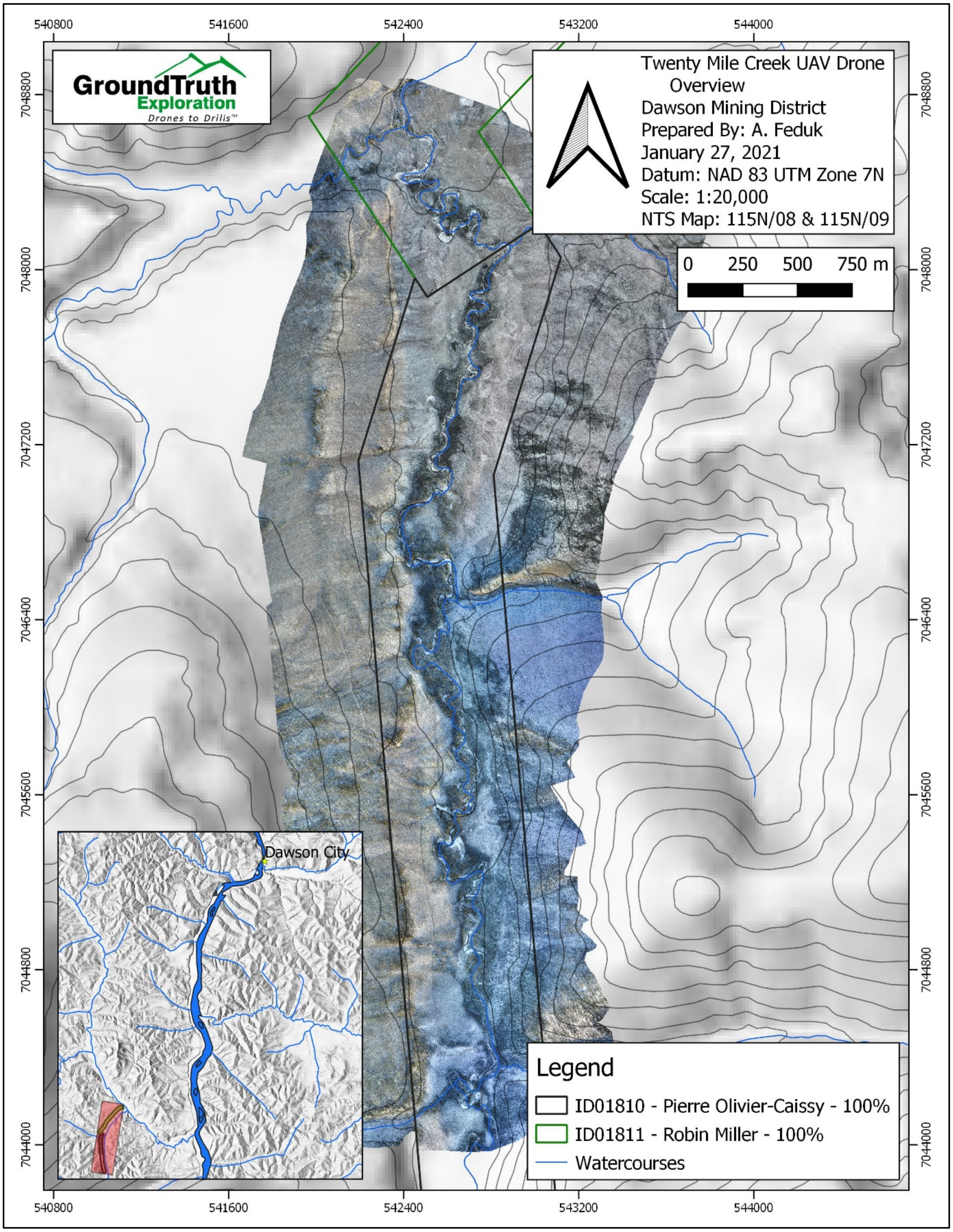

Figure 3: UAV Drone Imagery Overview

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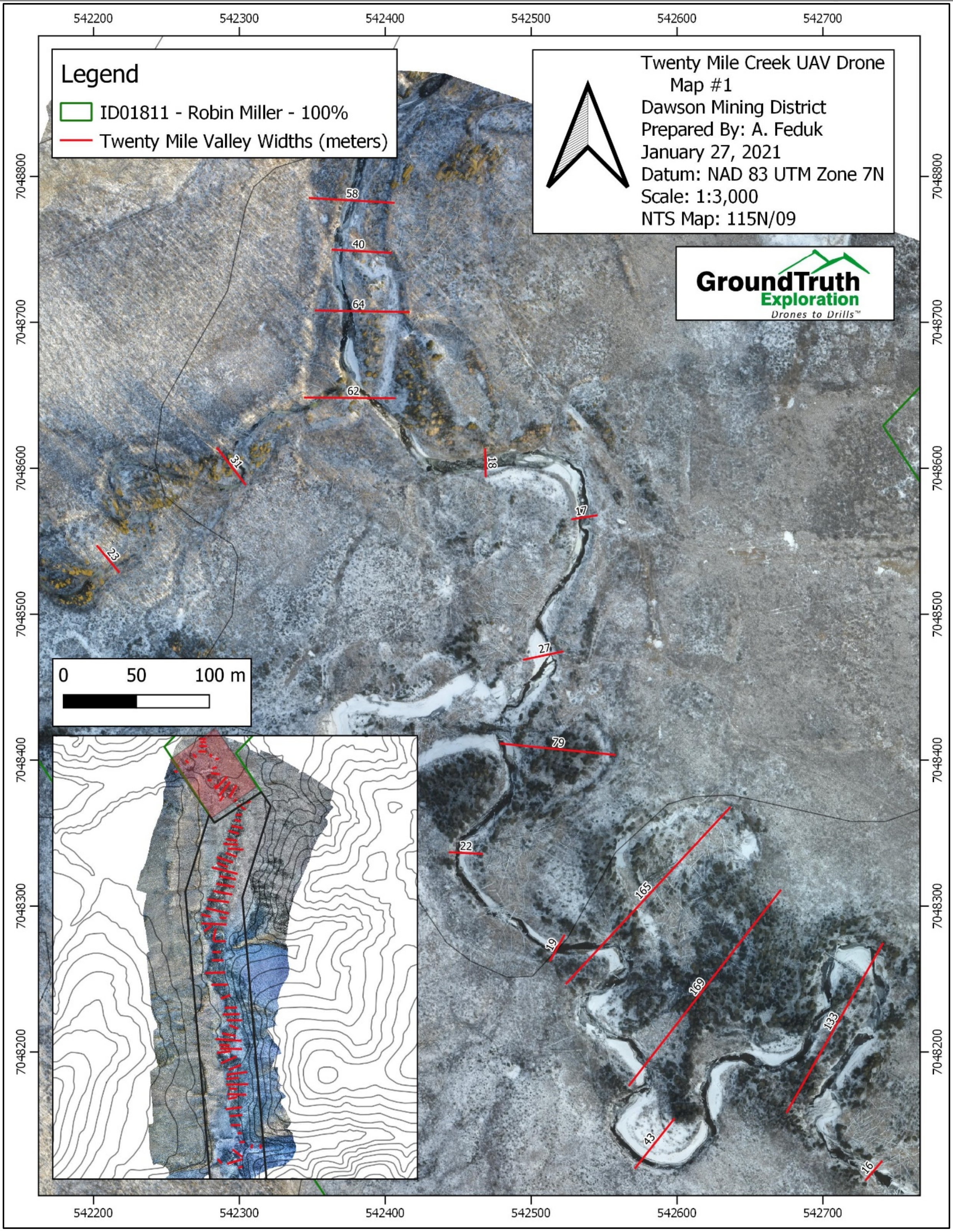

Figure 4: Twenty Mile Creek UAV Drone Map #1 with Valley Widths

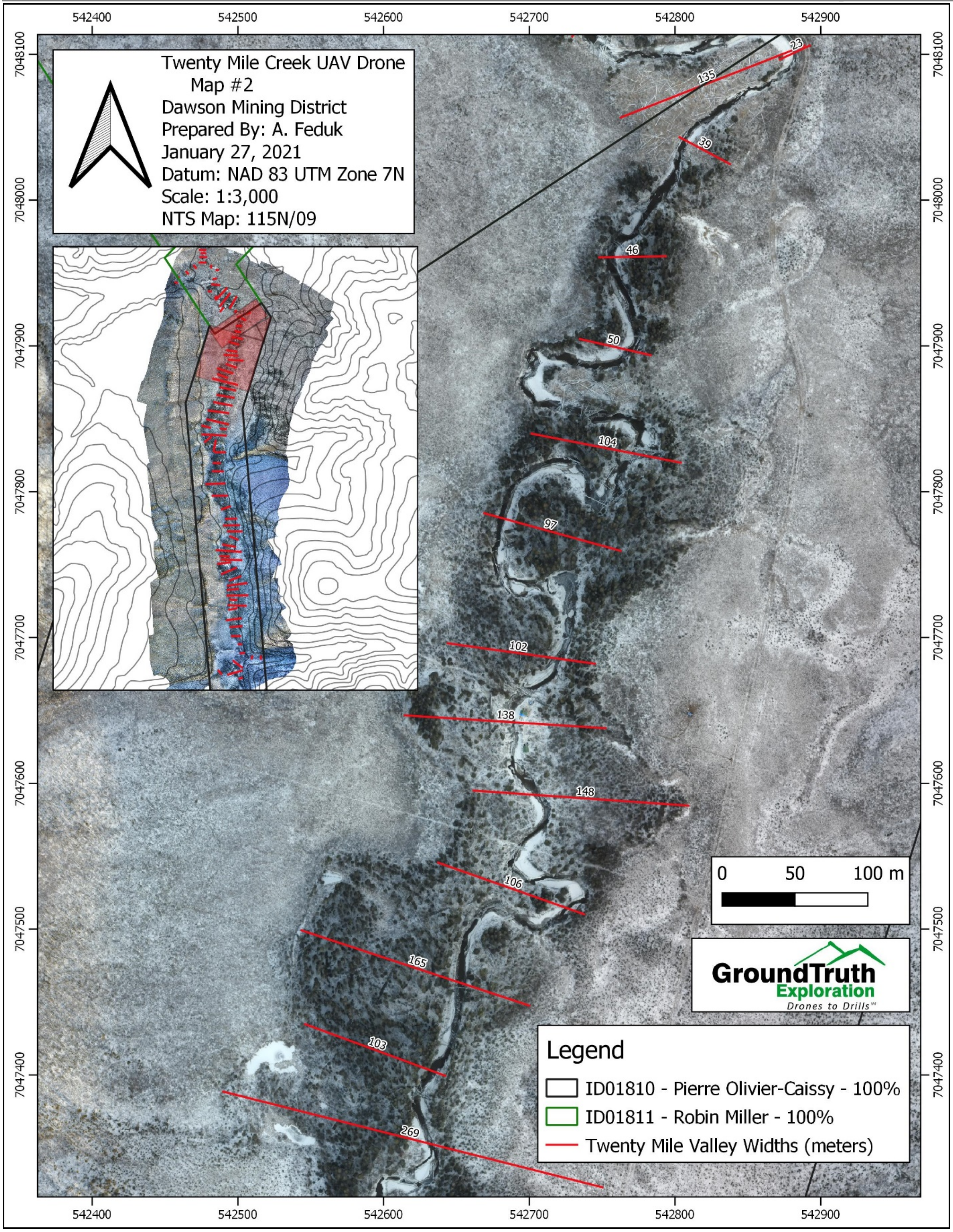

Figure 5: Twenty Mile Creek UAV Drone Map #2 with Valley Widths

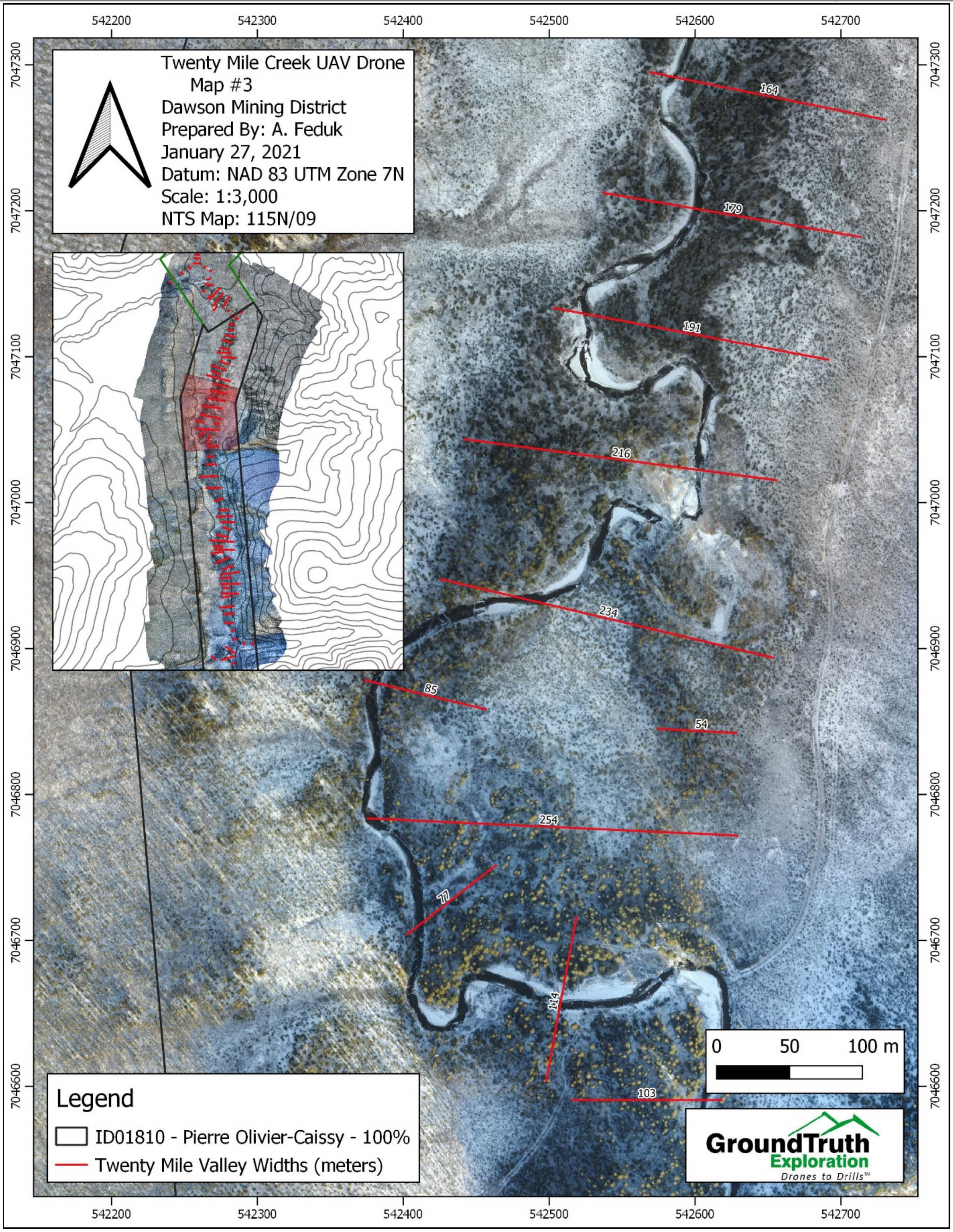

Figure 6: Twenty Mile Creek UAV Drone Map #3 with Valley Widths

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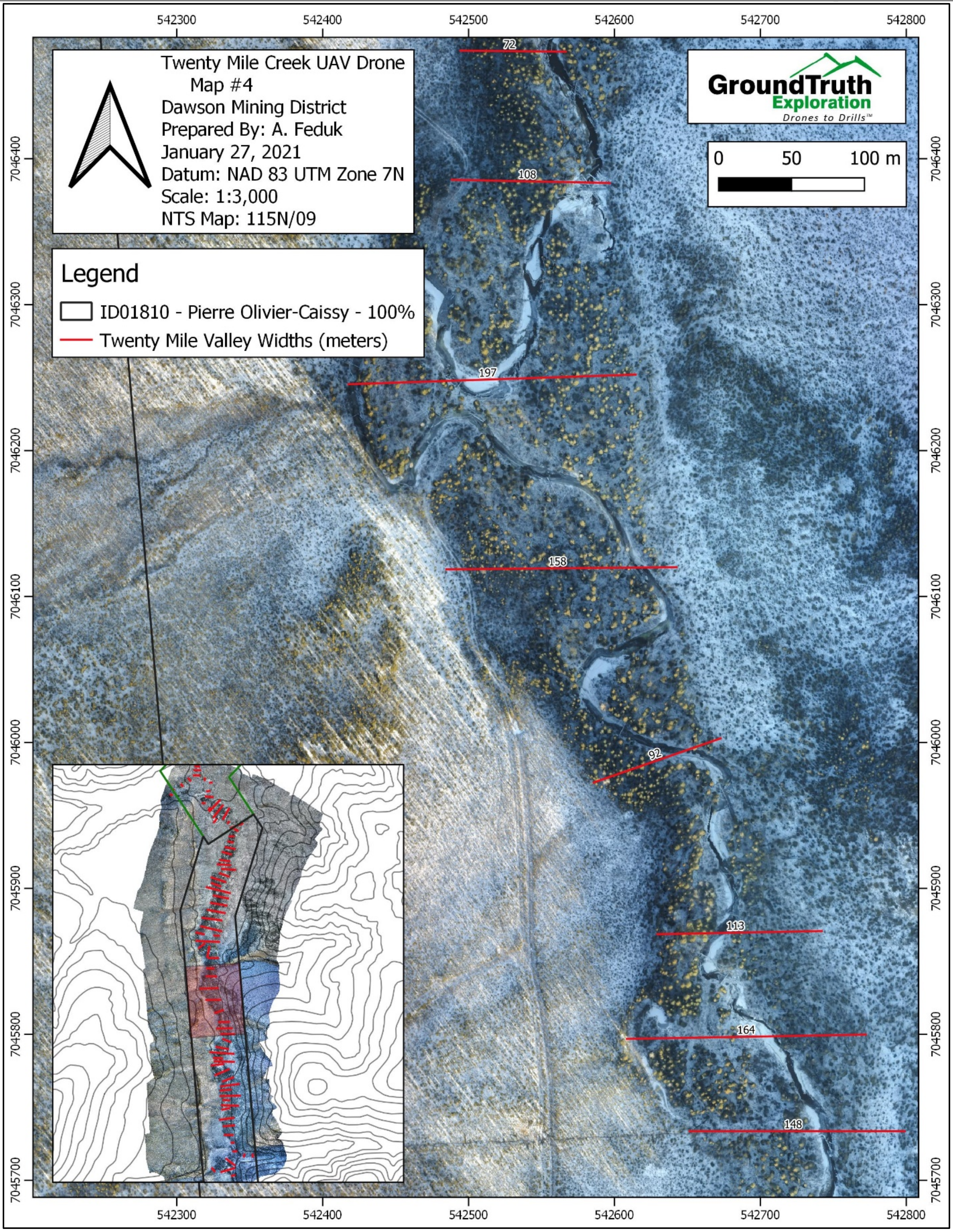

Figure 7: Twenty Mile Creek UAV Drone Map #4 with Valley Widths

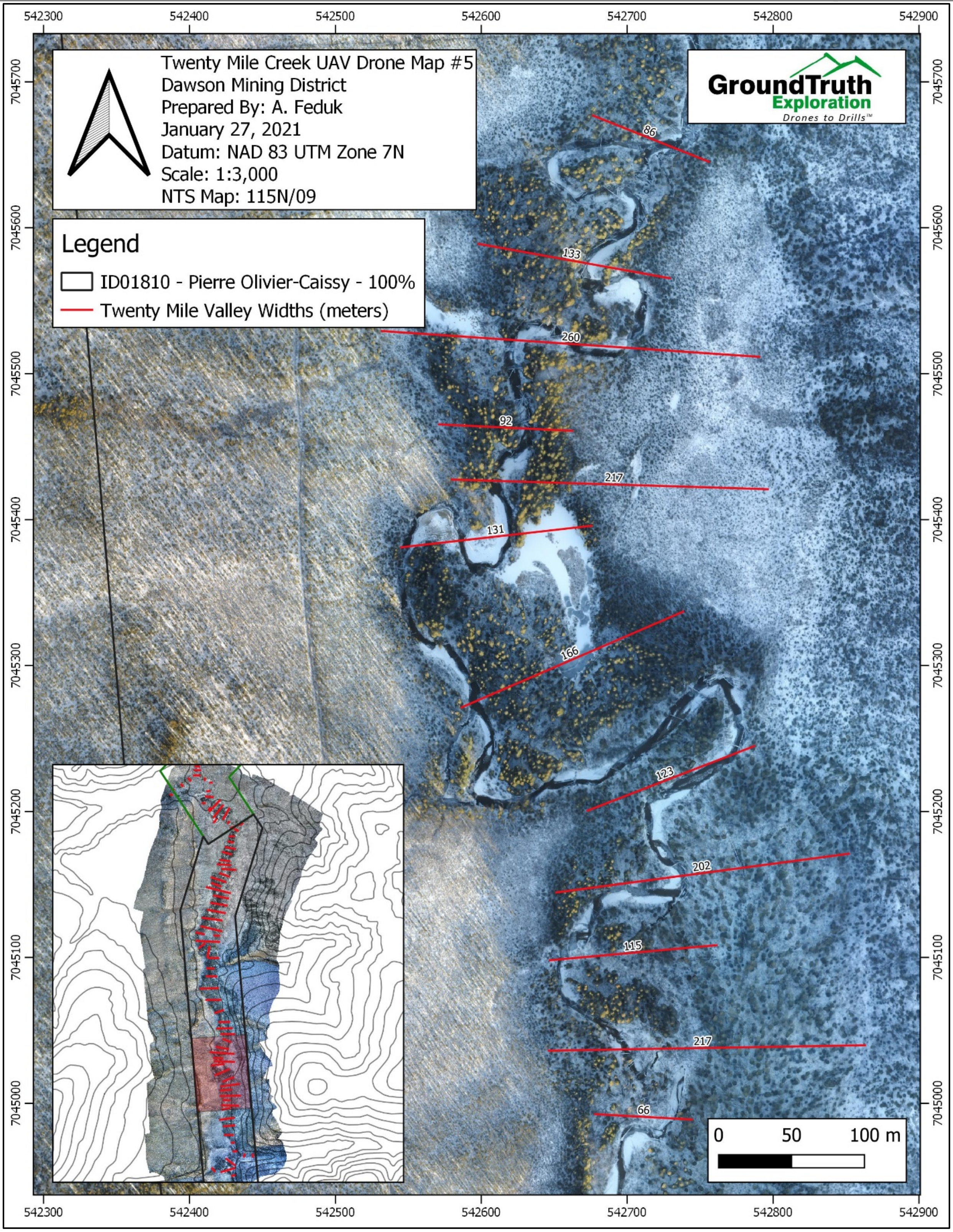

Figure 8: Twenty Mile Creek UAV Drone Map #5 with Valley Widths

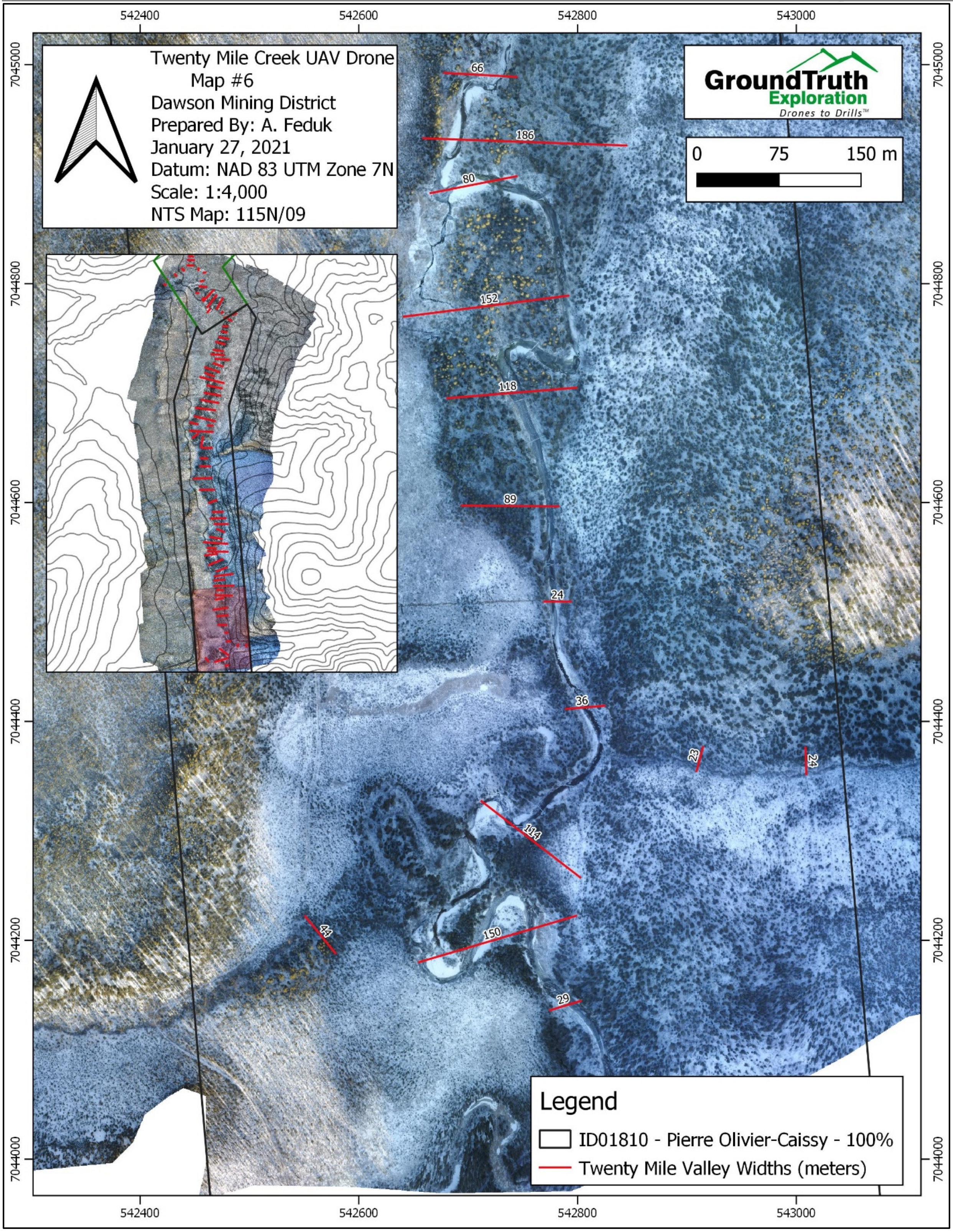

Figure 9: Twenty Mile Creek UAV Drone Map #6 with Valley Widths

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7 Resistivity and Induced Polarization Survey

7.1 Work Performed

The DC Resistivity and Induced Polarization (RES/IP) surveys were conducted from the 10th to the 18th of October 2020 on leases ID01810 and ID01811. The goal of these traverses is to define the fluvial deposits such as muck, sand, and gravel, and delineate the bedrock contact.

A total of seven traverses were completed on the Twenty Mile Creek study. Survey traverses TWMIP20-01, TWMI20-02, TWM20-04, TWMIP20-05 and TWMIP20-07 are composed of 84 electrodes spaced at 5 m, this results in a total line length of 415 ground meters with a potential depth of investigation up to 38.2 m. Traverse TWMIP20-06 is composed of 84 electrodes spaced at 4 m, resulting in a total line length of 332 ground meters and a potential depth of investigation up to 26 m. TWM20-03 is also composed of 84 electrodes spaced at 3 m, resulting in a line length of 249 ground meters and depth of investigation up to 22.9 m. TWMIP20-01 and TWMIP20-03 were performed over the same line to differentiate the results between a 3 m spacing and 5 m spacing.

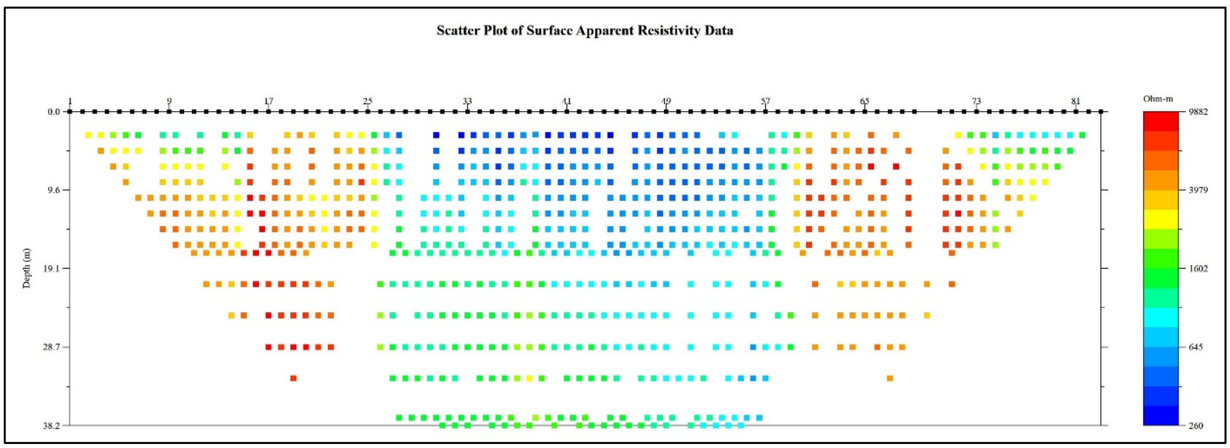

Figure 10: Resistivity Data from Line TWM20-02, an Example of Array Geometry

The RES/IP surveys are done using Advanced Geoscience's SuperSting high-resolution resistivity meter and passive cables. A modified Schlumberger Inverse array was used on all survey lines. This array is a sounding array optimized to delineate horizontal structures such as bedrock contacts and lithological units, has the best overall signal-to-noise ratio and the most lateral coverage. It is an ideal array for finding depths to stratigraphic layers such as muck, sand, gravel, and bedrock.

The traverse location was surveyed with a differential GPS unit capable of sub-meter accuracy. This data was used to both map the traverses and to create the terrain file that models elevation within the resistivity processing.

The crews camped on site and walked out to the survey lines from camp. A helicopter was used to mobilize and support the camp with supplies.

7.2 Working Procedure

- A crew of 4 is deployed to run survey.
- The midpoint of a traverse is located and the line is sighted-in using a compass and GPS.
- Minimal brush is cut along line to place pickets and set up equipment.
- Calcium Chloride (CaCl, 25% solution) is added to the base of all electrodes.
- 84 electrodes are inserted into the ground, spaced along the line at 3, 4 or 5 m.
- Electrodes are hammered to a depth of up to 50cm (10% of electrode spacing)
- Cables are laid and attached to the electrodes.
- Contact resistance test is conducted.
- Add electrodes and CaCl solution added to each electrode with CR > 2,000 Ohms. Contact resistance test is repeated.
- Continue to add electrodes and CaCl until satisfactory contact resistance values are achieved
- Operator initializes survey and uses DGPS and data collection software to document survey line parameters including electrode locations, topography, and geological/cultural features if present. Pickets are placed along the line every 50 m
- Crew cuts and prepares the next survey line.

7.3 Data Processing

The collected data is downloaded in the field after every array and checked for integrity. This allows any field errors to be identified before moving the equipment. The RES/IP data is processed daily by the lead operator using EarthImager2D software provided by Advanced Geosciences Inc. Resistivity data-misfits are removed, and the cleaned data-set is inverted. The same process is done with the IP data. Terrain corrections collected using a differential GPS are applied to the inversions. The DGPS data is processed using GNSS Solutions software. A .csv is created containing the DGPS traverse points collected. All raw instrument data from the DGPS and SuperSting are archived. An ESRI shapefile is created containing the traverse points collected.

The Resistivity and Induced Polarization data from each traverse are inverted separately to minimize the number of resistivity measurements that are filtered based on chargeability inversion parameters. Once data sets are filtered, measurements associated with the largest model misfit are removed, and the inversion process is repeated until the model L2-norm is calculated as close to 1 as possible. If survey noise was estimated accurately (3 – 5%), when the model L2-norm equates to one, the inversion algorithm has produced a model which has not iterated on measurement noise. This indicates inversion artifacts in the earth model are minimized.

7.4 Results

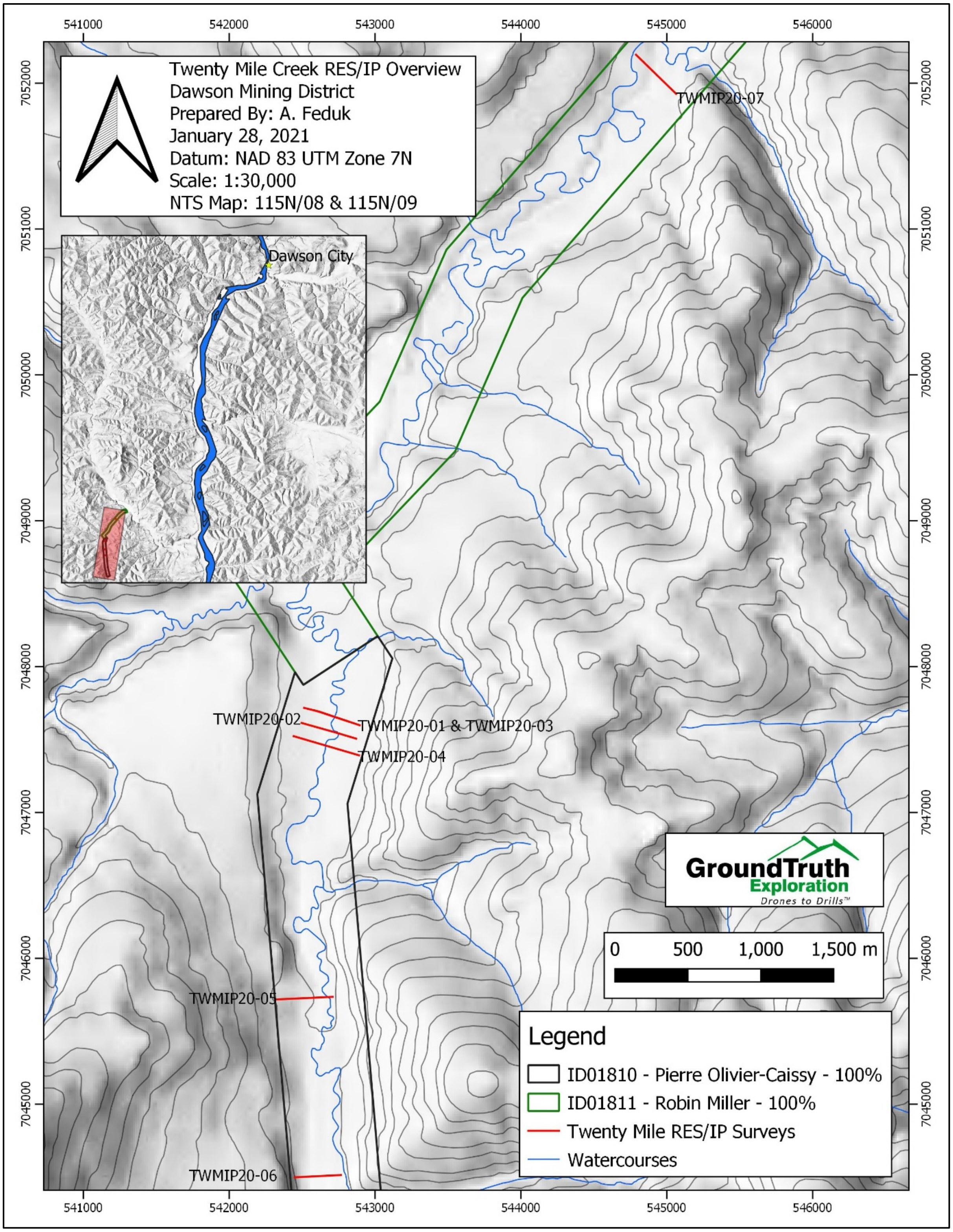

Figure 11: DC Resistivity and Induced Polarization Overview Map

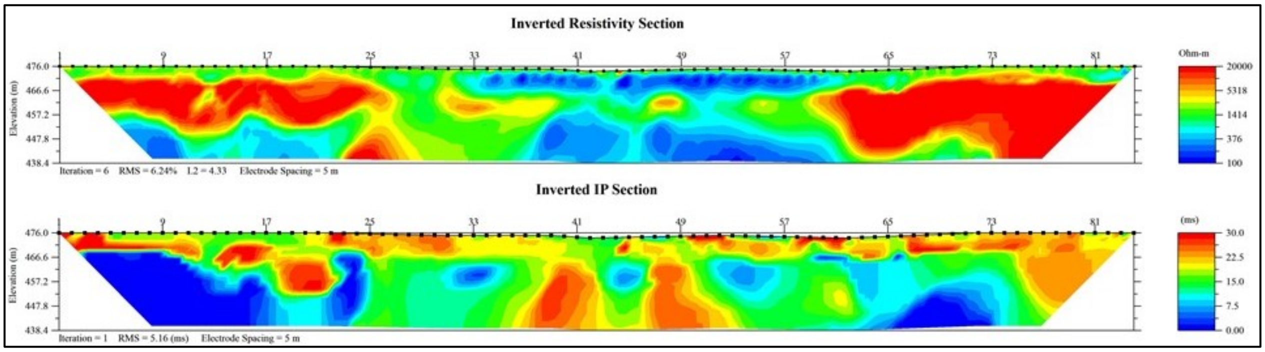

Figure 12: Resistivity and Chargeability 2D Inversion Profiles of TWMIP20-01

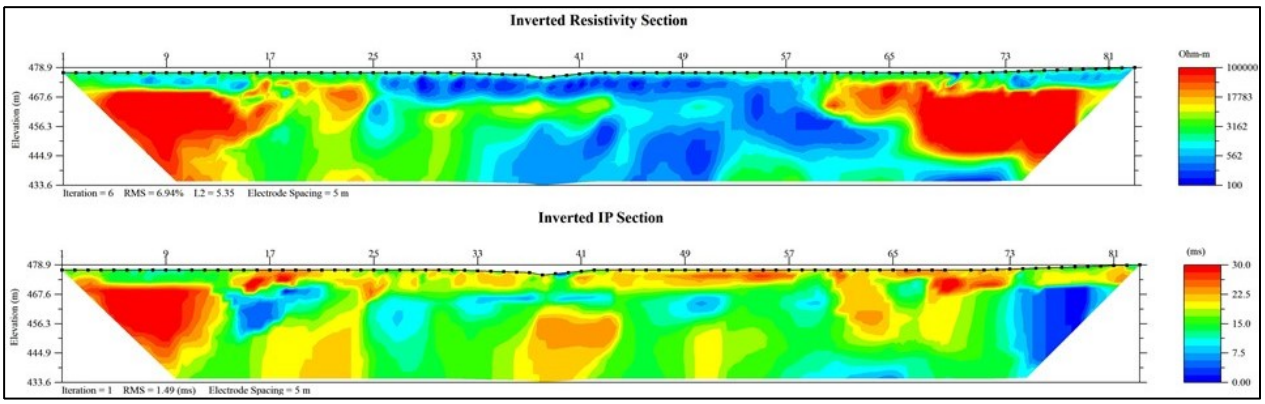

Figure 13: Resistivity and Chargeability 2D Inversion Profiles of TWMIP20-02

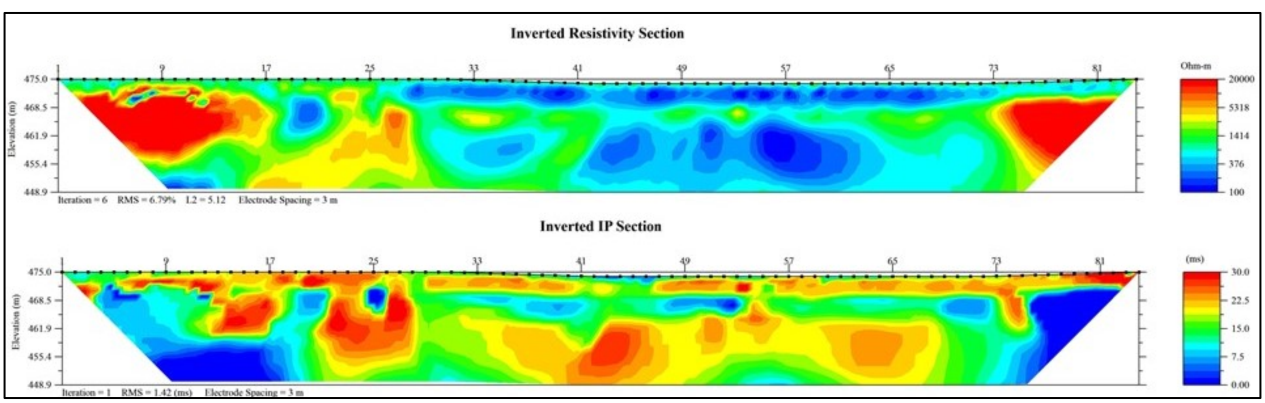

Figure 14: Resistivity and Chargeability 2D Inversion Profiles of TWMIP20-03

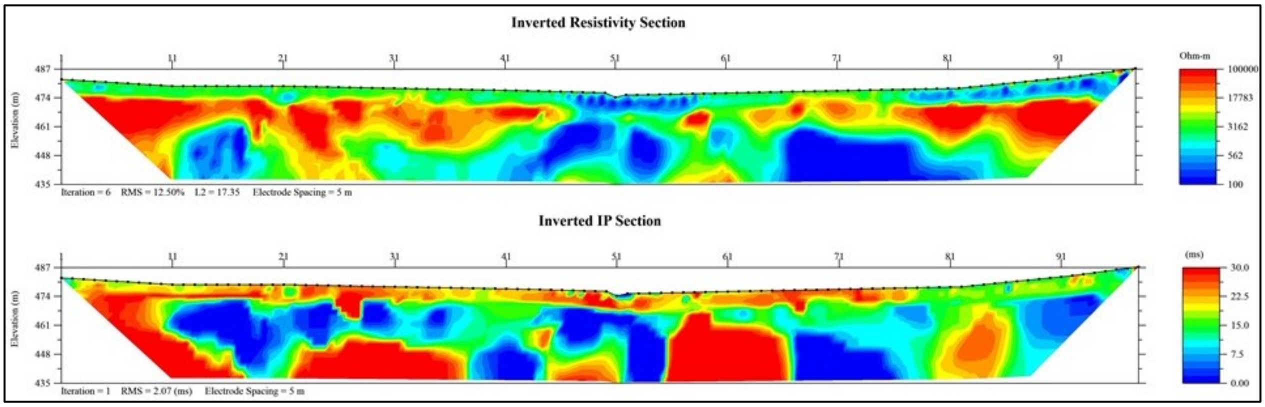

Figure 15: Resistivity and Chargeability 2D Inversion Profiles of TWMIP20-04

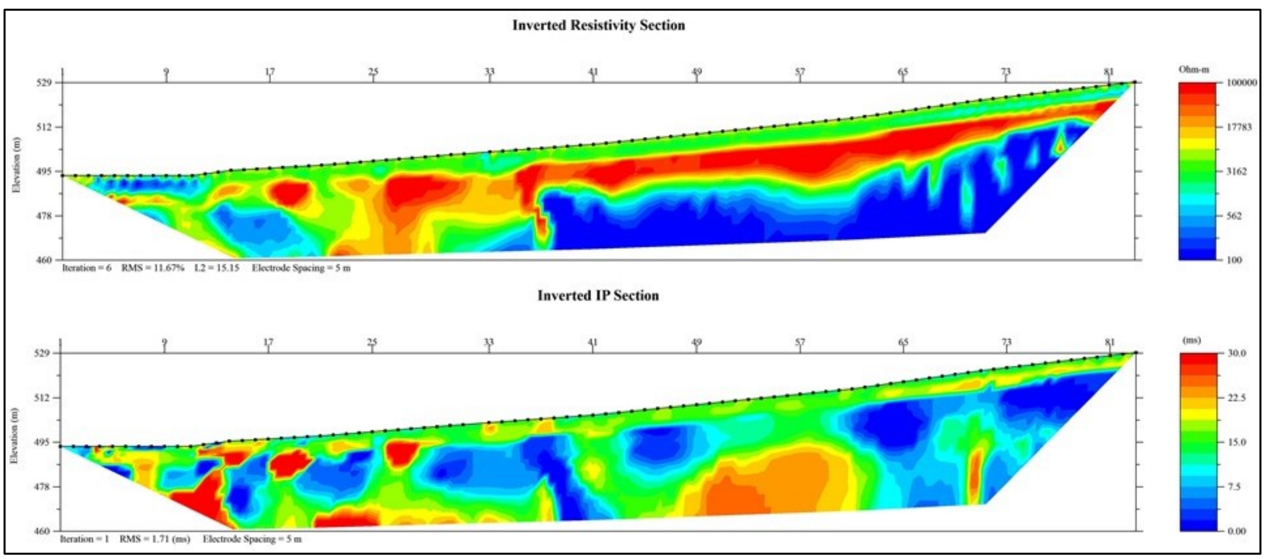

Figure 16: Resistivity and Chargeability 2D Inversion Profiles of TWMIP20-05

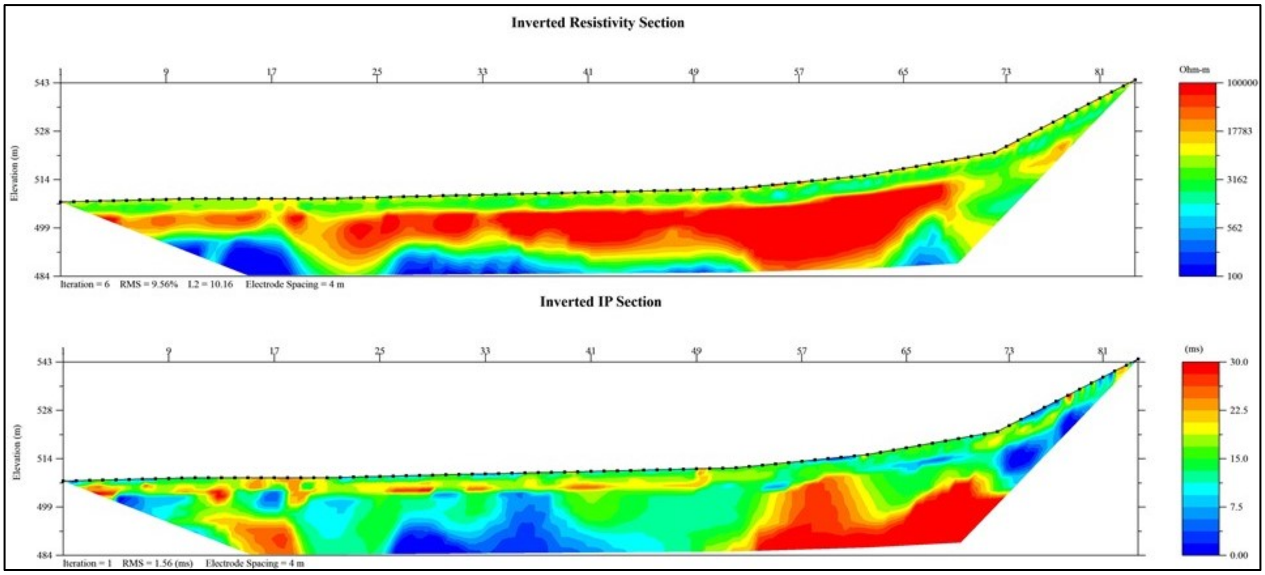

Figure 17: Resistivity and Chargeability 2D Inversion Profiles of TWMIP20-06

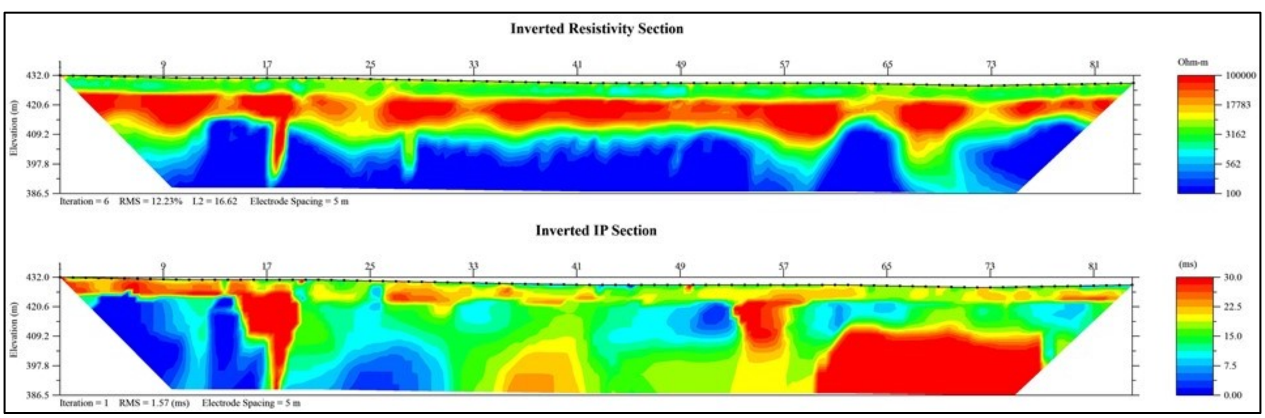

Figure 18: Resistivity and Chargeability 2D Inversion Profiles of TWMIP20-07

8 Ground Penetrating Radar Surveys

8.1 Work Performed

The Ground Penetrating Radar (GPR) survey was conducted on the 5th of October 2020, on Twenty Mile Creek. The goal of the GPR survey is to complement the drilling data for the identification of fluvial deposits and defining important contacts.

The traverses for the GPR consisted of 2 survey lines, with a total of 589 line-m, the 80 MHz survey totaled 294 line-m and the 160 MHz survey totaled 295 line-m (Figures 19 to 21).

The GPR system used was an ABEM MALA GX system with 80 MHz, 160 MHz shielded antennas and an integrated DGPS for more accurate positioning. The HDR technology offers fast data acquisition rates with a penetration depth of about 30 m at 80 MHz and > 15m at 160 MHz at a radar wave velocity of 0.085 m/ns.

A pulseEKKO PRO and Ultra system developed Sensors and Software, Canada with 50, 100 and 200 MHz central frequency antennas were tested in this study. Radar signals were processed and analyzed by the EKKO view deluxe software. Measurements were conducted using the common-midpoint (CMP) method for velocity profile estimation of radar waves.

8.2 Working Procedure for Ground Penetrating Radar

- A crew of 2 is deployed to run the survey.
- An operator runs the GPR unit while the other person cuts brush along lines. The brush must be cut low to the ground for the best survey results.
- The ABEM MALA GX system with 80 MHz or 160 MHz controller and shielded antenna are set up on the rough terrain cart.
- The machine is calibrated, and baseline is set for the X and Y coordinates of the start and stop positions.
- The rough terrain cart is rolled over the line.
- The data file is loaded into RadExplorer software for further processing.

8.3 Data Processing

The raw data is converted to SEGY format and imported to Geosoft for georeferencing

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and processing. The continuous measurement mode data is decimated to achieve 10 cm spacing intervals. Velocity analysis is performed on Common Mid-Point (CMP) datasets which were collected by PulseEKKO sensors and software for one test location. The GPR sections are processed by conversion of time sections, assuming a constant radar velocity. The radar wave velocity of 0.085 m/ns is selected from the velocity spectrum of CMP data for time to depth conversion. The GPR depth sections are plotted with downhole geology logs.

8.4 Results

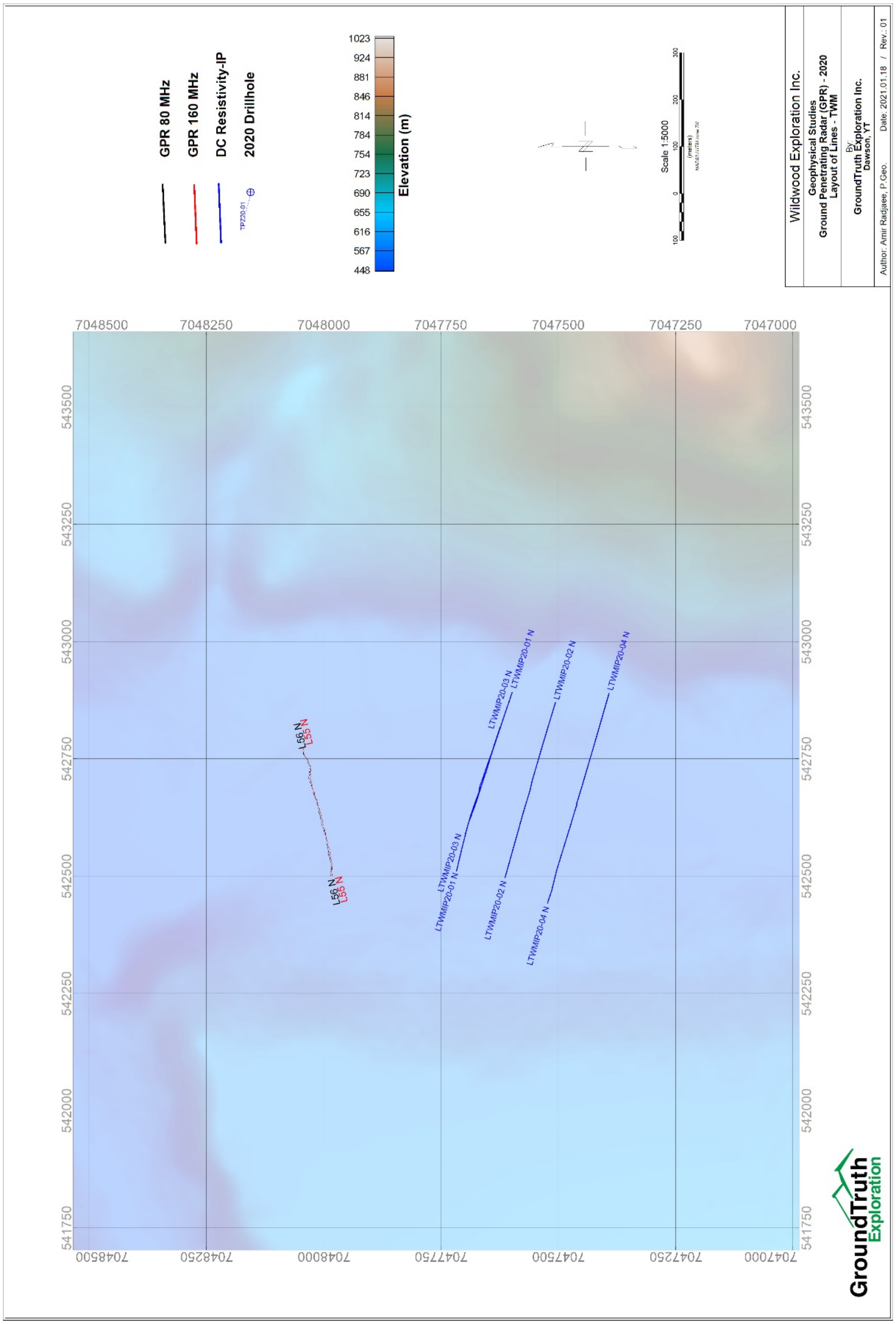

Figure 19: GPR Overview Map

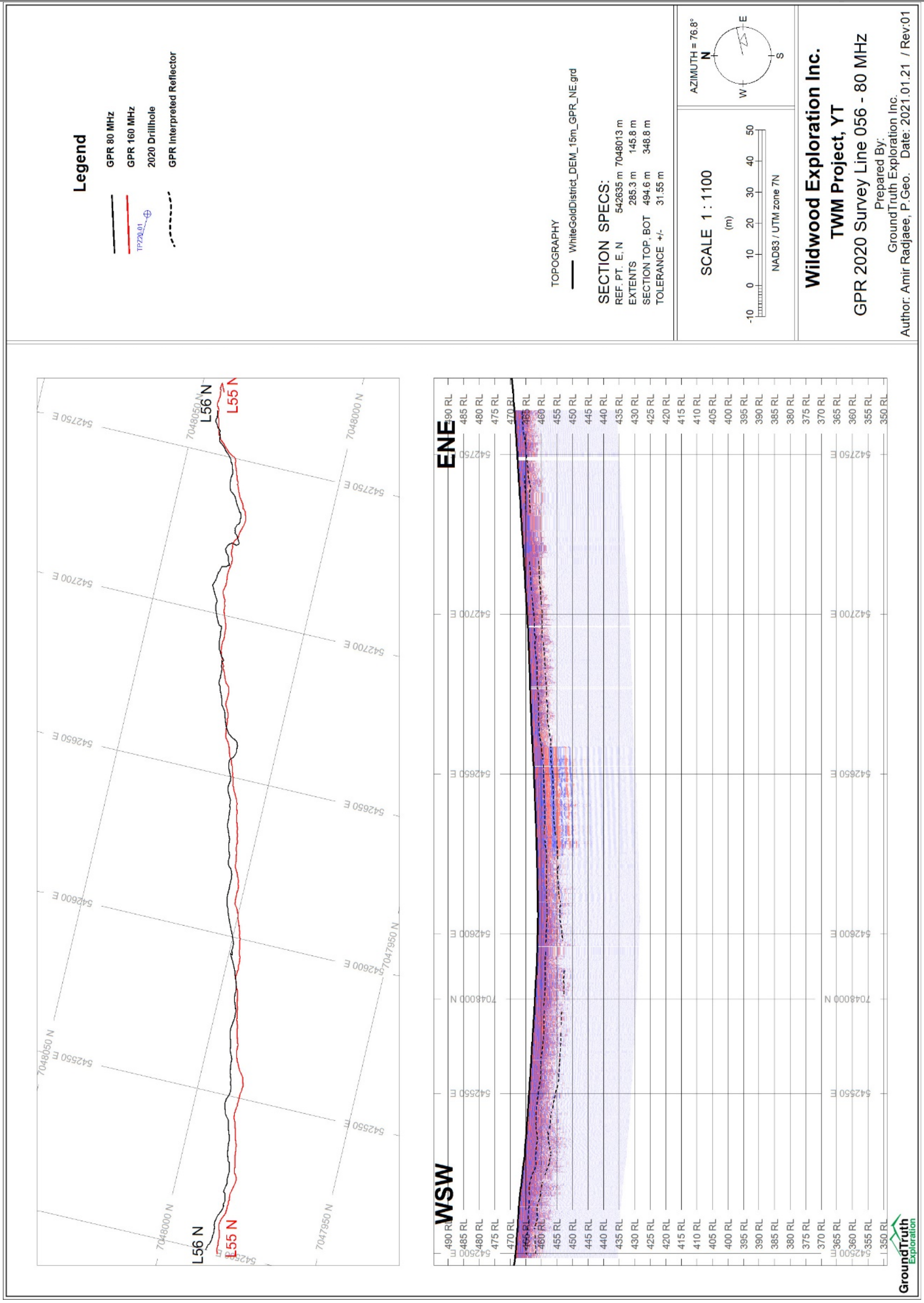

Figure 20: GPR Profile on Twenty Mile Creek, Line 056, 80 MHz

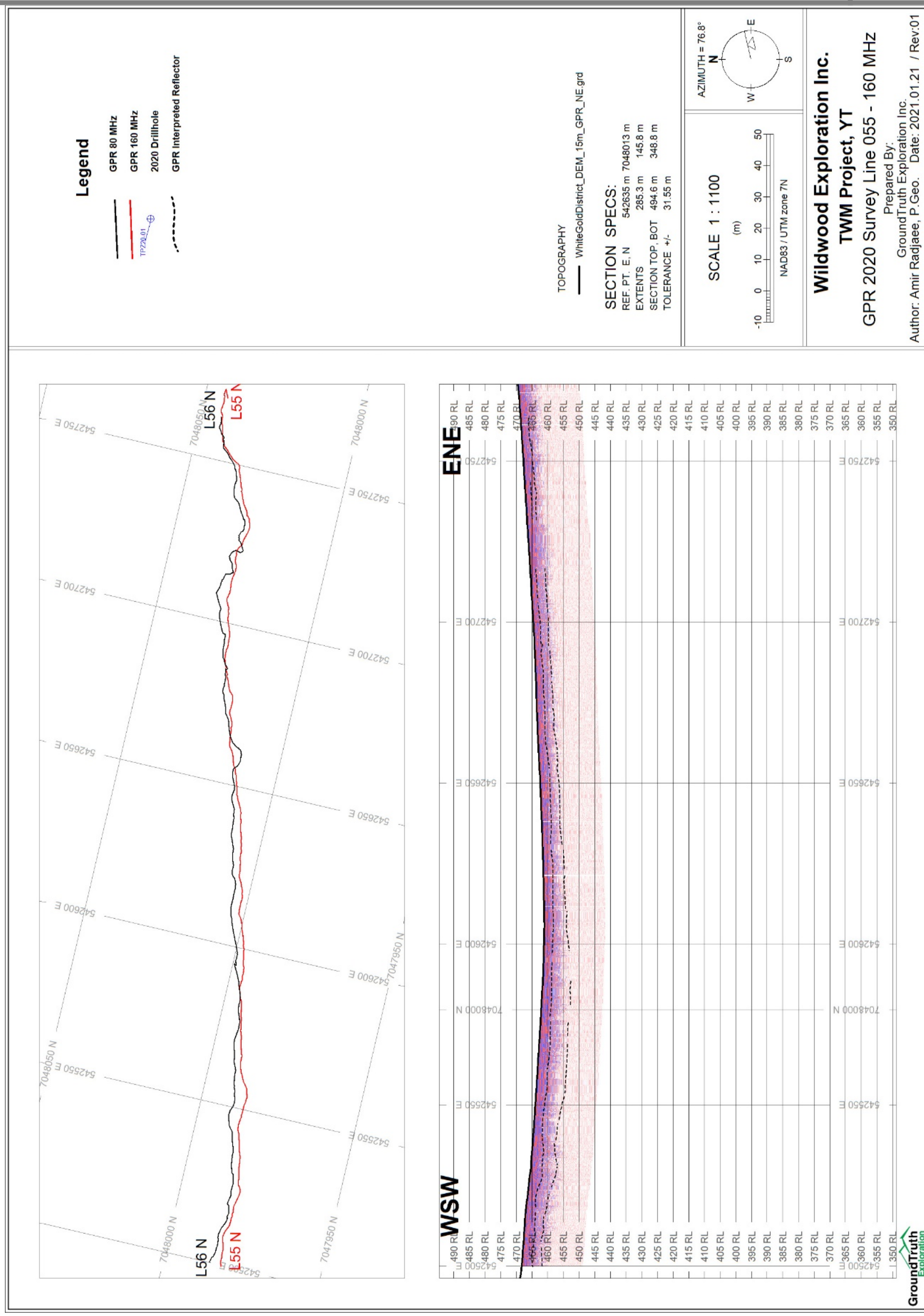

Figure 21: GPR Profile on Twenty Mile Creek, Line 055, 160 MHz

9 Discussion and Interpretation

The UAV Drone survey was successful in imaging the lease. This imagery will be useful for planning additional geophysical surveys and future drilling since ground conditions can be seen using the imagery. The imagery/topography allows us to get an accurate measurement of true valley floor width and margins from creek drainage. Future access and planning of exploration and mining work locations can be planned from this dataset. The figures shown in the above results sections show the imagery and topographic model and the level of detail which the local topography is imaged, along with measurements of the channel size at many points along the channel length.

The RES/IP profiles were found to be reasonably accurate in the interpretation of the lithological units, these units were characterized by different contrasts in resistivity. Since resistivity has ranges up to 100 orders of magnitude, the resistivity survey is only useful when the data is high quality, which is the case with all the surveys performed in the area. The IP surveys are inversely proportional to the RMS and there is a decline when the RMS increases. The IP data had little use in locating the zones of permafrost and the bedrock interface and was only used to compliment the resistivity profiles where the bedrock interface was unclear.

A low resistivity corresponds to fine-grained fluvial deposits, which is associated with water retaining capabilities of clay and other fine-grained sediments. The moderate to high resistivity is associated with coarse grained fluvial deposits, possibly permafrost, this correlation is attributed to the high porosity and permeability of the gravel deposits and its inability to retain water in the upper layers of the stratigraphic column. A high resistivity showed a correlation with the interpreted bedrock interface. This correlation is attributed to consolidated material, associated with the bedrock contact.

To complement the RES/IP surveys a GPR survey was employed. The GPR transmits high-frequency electromagnetic waves into the subsurface. When the electromagnetic waves contact different lithologies, with varying properties, the wave velocity is altered, and some energy is reflected or scattered back to the surface where the amplitude and arrival time are measured. GPR is dependent on differing dielectric permittivity and electrical conductivity which affect the attenuation of the GPR signal. Dielectric permittivity is highly dependent on the water in the pore space and mineralogy. Electrical conductivity is dependent on porosity, permeability, saturation, fluid salinity, temperature and clay content (Cassidy, 2009). Two main reflectors were identified in the GPR sections, the upper reflector is interpreted to be the permafrost boundary and the lower reflector the bedrock contact.

Imaging of the subsurface with a combination of the described geophysical surveys and proved to be of value to the identification of lithologic boundaries.

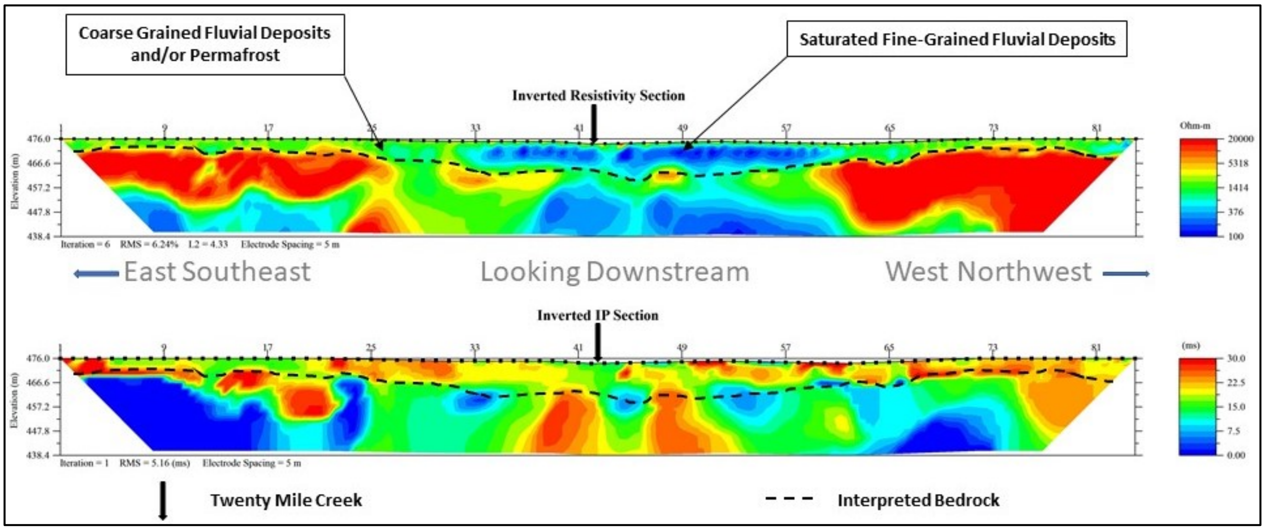

Figure 22: Resistivity and Chargeability Interpretation of TWMIP20-01

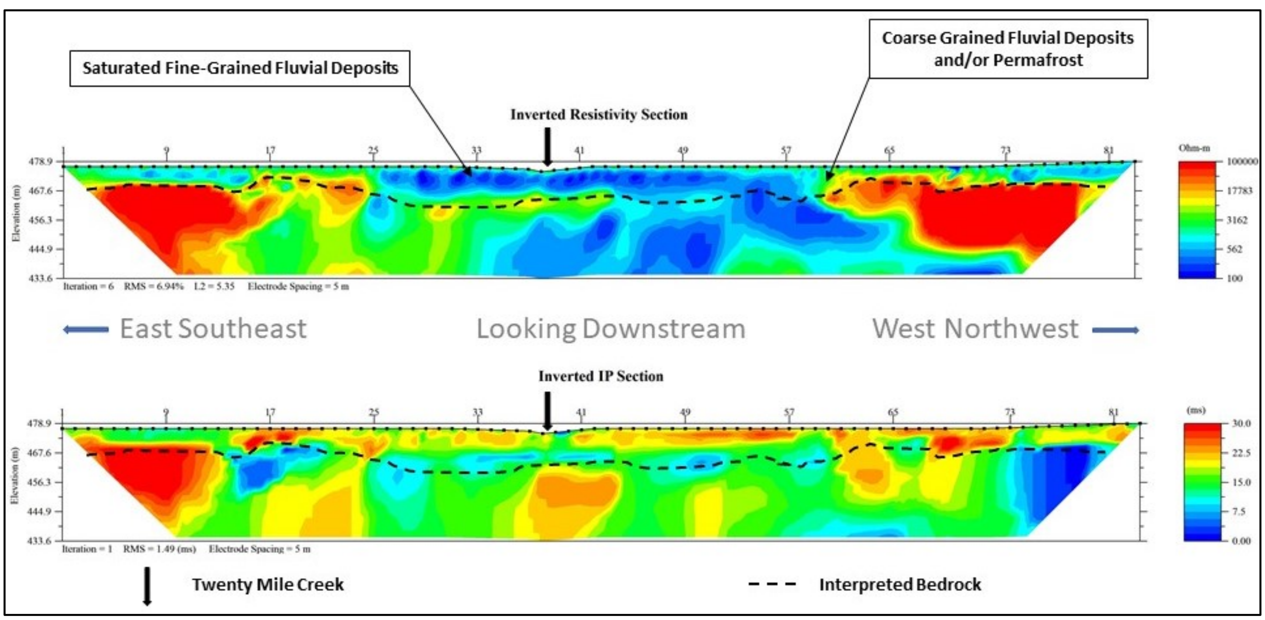

Figure 23: Resistivity and Chargeability Interpretation of TWMIP20-02

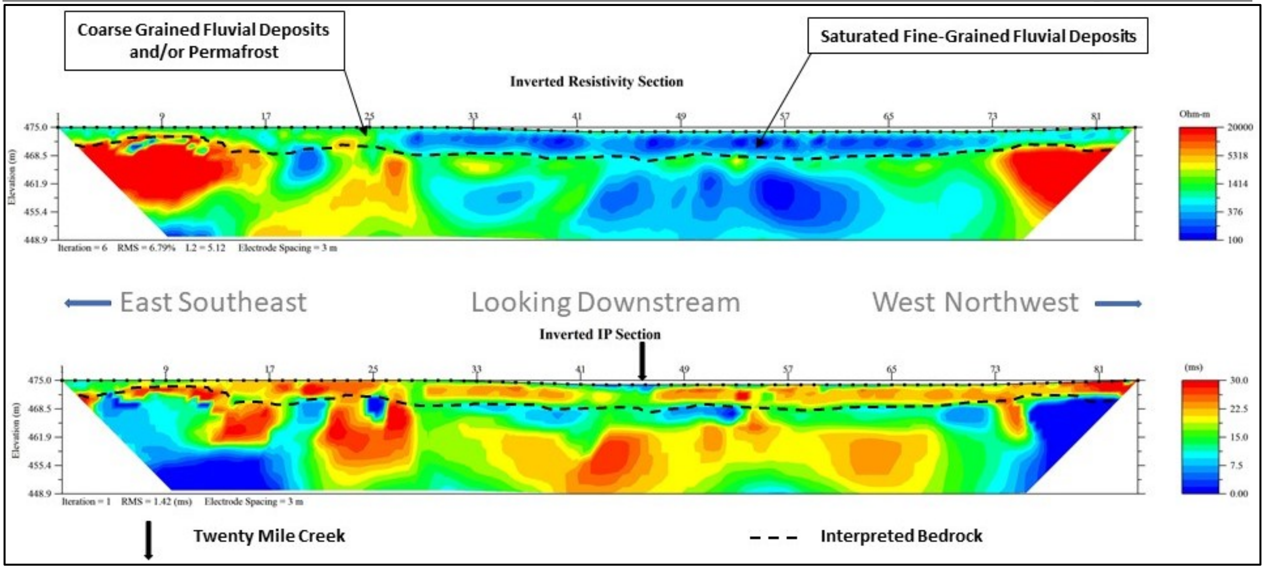

Figure 24: Resistivity and Chargeability Interpretation of TWMIP20-03

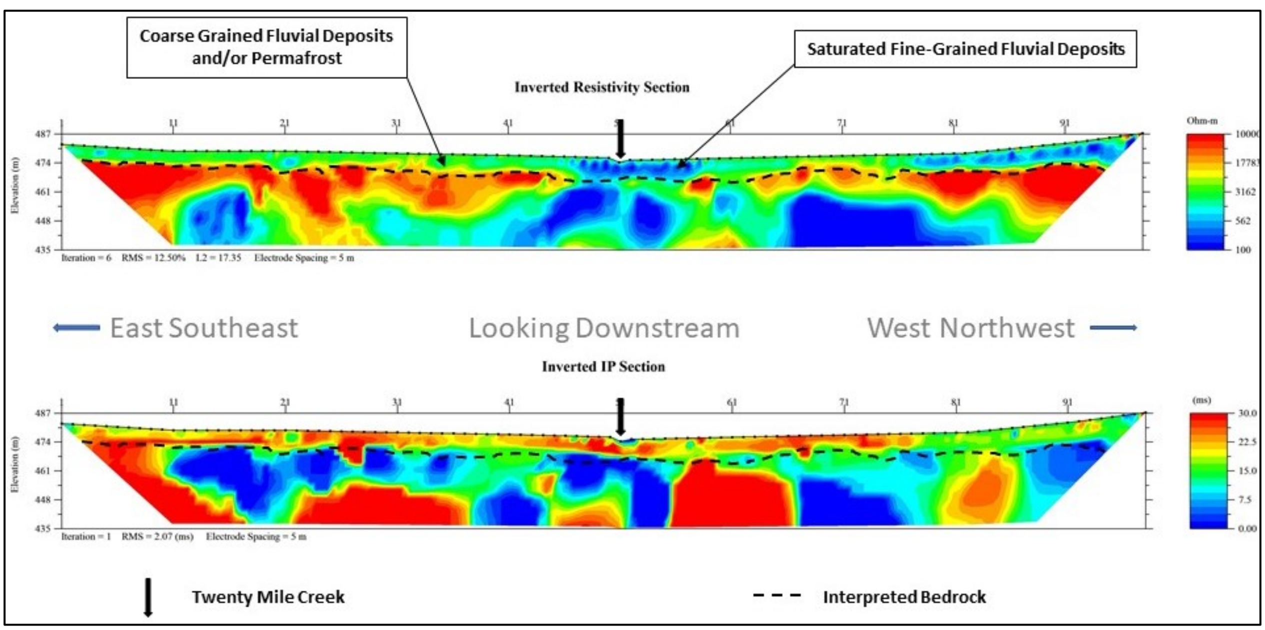

Figure 25: Resistivity and Chargeability Interpretation of TWMIP20-04

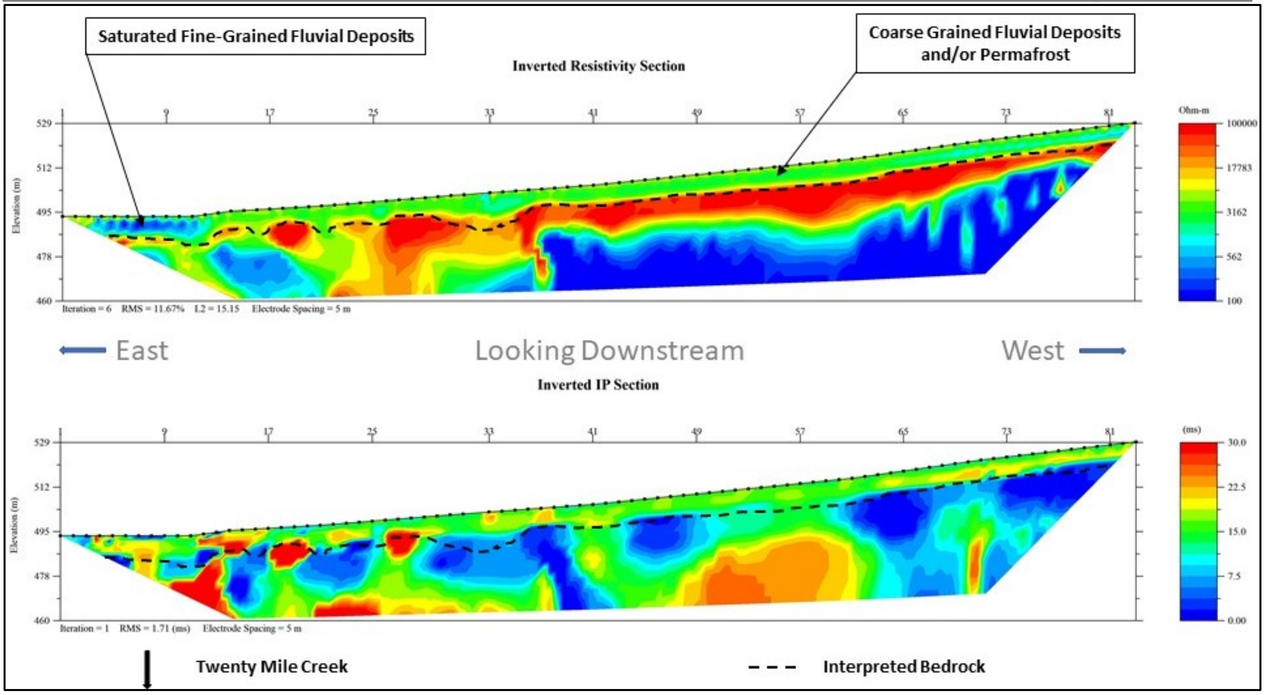

Figure 26: Resistivity and Chargeability 2D Inversion Profiles of TWMIP20-05

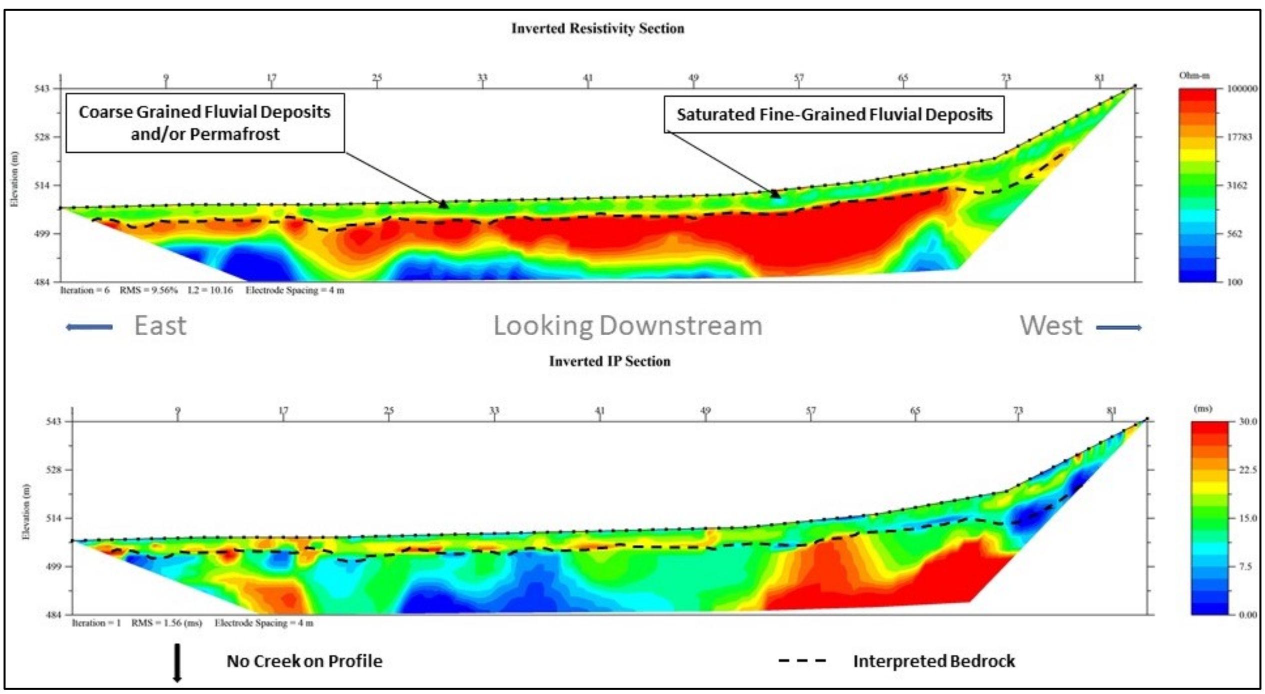

Figure 27: Resistivity and Chargeability 2D Inversion Profiles of TWMIP20-06

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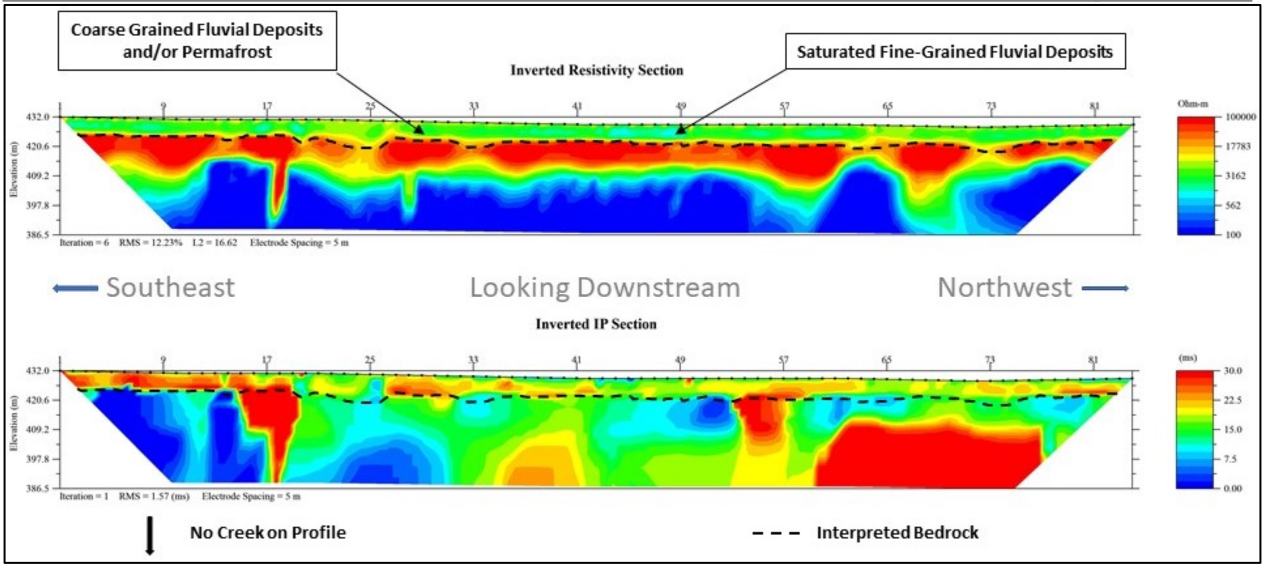

Figure 28: Resistivity and Chargeability 2D Inversion Profiles of TWMIP20-07

10 Recommendations

It is recommended to complete drill lines over all geophysical surveys performed during the 2020 field season. Drilling will confirm the lithological interpretation of the RES/IP and GPR data. Drilling will also confirm the economic viability of the placer deposits on Twenty Mile Creek.

11 Expenditures

Fixed Wing Support	
Great River Air	$3,093.73
Invoice: 10495	
Helicopter Support	
Great Slave Helicopters	$11,543.40
Invoice: Various	
RES/IP Wages & Equipment Rental	
GroundTruth Exploration Inc.	$28,287.50
Invoice: 10495	
GPR Wages & Equipment Rental	$3,441.89
GroundTruth Exploration Inc.	
Invoice: 10494	
Logistics	
GroundTruth Exploration Inc.	$933.46
Invoice: 10495	
RES/IP Data Processing	
GroundTruth Exploration Inc.	$700.00
Invoice: 10484	
Drone Survey	
GroundTruth Exploration Inc.	$955.00
Invoice: 10496	
Daily Field Expenses	$2,800.00
Report Writing	$1,000.00
Grand Total	**$52,754.98**

12 Qualification

I, Allison Feduk with a business address in Dawson City, Yukon, and residential address in Carlyle, Saskatchewan, do herby certify that:

1. I graduated from the University of Regina in the fall of 2011 with a Bachelor of Science in Geology.

2. From 2012 to present I have been actively engaged in mining and mineral exploration in Alberta and the Yukon Territory.

3. I have been an employee of GroundTruth Exploration Inc. since July of 2018.

4. I am not aware of any material fact or material change with respect to the subject matter of this report, the omission to disclose which makes this report misleading.

Dated this 31st day of January, 2021

Respectfully submitted,

Allison Feduk

13 References

Regional Geology: Colpron, M., Israel, S., Murphy, D.C., Pigage, L.C., and Moynihan, D., 2016. Yukon Bedrock Geology Map. Yukon Geological Survey, Open File 2016-1.

Regional Geology: Yukon Mining Map Viewer, Mining Claims Database – http://mapservices.gov.yk.ca/Mining/Load.htm

Mineral Titles: Yukon Mining Recorder, Mining Claims Database – www.yukonminingrecorder.ca

Topographic data: Natural Resources Canada, The Atlas of Canada - Toporama- http://atlas.gc.ca/toporama/en/index.html

Cassidy, N. J., 2009. Electrical and Magnetic Properties of Rocks, Soils and Fluids. In Ground Penetrating Radar: Theory and Applications, p. 41 – 72.

Clark, D. A. and Emerson, D. W.,1991. Notes on Rock Magnetization Characteristics in Applied Geophysical Studies. In Exploration Geophysics, p. 547 – 555.

Colpron, M., Nelson, J. L., and Murphy, D. C., 2006. A techtonostratigraphic framework for the pericratonic terranes of the Norther Cordillera: Canadian and Alaskan Cordillera: Geologic Association of Canada, p. 1 – 23.

Mortensen, J.K. and Allan, M.M., 2012. Summary of the Tectonic and Magmatic Evolution of Western Yukon and Eastern Alaska. In Yukon Gold Project Final Technical Report, Edited by Allan, M.M., Hart, C.J.R., and Mortensen, J.K. Mineral Deposit Research Unit, University of British Columbia, p. 7 – 10.

Mortensen, J. K., and Hart, C. J. R., 2010. Late and Post-Accretionary Magmatism and Metallogeny in the Norther Cordillera, Yukon and Eastern Alaska. Geological Society of America Annual Meeting, Denver, 31 October to 3 November 2010.

Nelson, J., Colpron, M., and Israel, S., 2013. The Cordillera of British Columbia, Yukon and Alaska: tectonics and metallogeny. In: Colpron, M., Bissig, T., Rusk, B., and Thompson, J.F.H., (Editors), Tectonics, Metallogeny, and Discovery - the North American Cordillera and similar accretionary settings. Society of Economic Geologists, Special Publication 17: 53-109.

Roots, C., Nelson, J., Mihalynuk, M. G., Harms, T. A., De Keijzer, M., and Simard, R. L., 2004. Bedrock Geology of Dorsey Lake, Yukon Territory. Yukon Geological

Survey, Geological Survey of Canada, Open File 4630.

Ryan, J. J., Zagorevski, A., Williams, S. P., Roots, C., Ciolkiewicz, W., Hayward, N., and Chapman, J. B., 2013. Geology of Stevenson Ridge (northeastern part), Yukon; Geological Survey of Canada, Canadian Geoscience Map 116 and 117.

14 Appendices

Box 70, DAWSON, YT
Y0B 1G0

Appendix A: Ground Penetrating Radar Report

Wildwood Exploration Inc.

Twenty Mile Placer (TWP) Project, YT

Geophysical studies

Ground Penetration Radar (GPR)

Prepared By:

GroundTruth Exploration Inc.

Dawson City, YT

Report #: WW-TWP-GPR20-Rev0 Jan. 20, 2025

Author: Amir Radjaee, P.Geo.

Outline:

- Introduction
- Data processing and Results
- Conclusion and recommendations
- Deliverables
- References

Introduction:

- GroundTruth Exploration has completed GPR surveys on the Twenty Mile (TWP) placer exploration property. The field work was performed from October 5, 2020. Total coverage of the survey amounted to 589 line-meter along 2 survey lines, including 294 line-meter with 80 MHz and 295 line-meter with 160 MHz GPR systems. This presentation report describes the survey, results and examples for preliminary interpretation of GPR depth sections.
- Although GPR has been attempted historically at various placer sites, newly developed measurement techniques such as HDR (High Dynamic Range) have enabled greater utilization of GPR by collecting precise and high-resolution data. This study aims to evaluate the feasibility of different GPR systems and frequencies in placer gold exploration sites. By correlating the radar reflectors to known geological features detected by boreholes, GPR has been used for a preliminary exploration of complex paleochannel systems.
- GPR is an obvious candidate for alluvial gold and diamond resource exploration in aggregate-filled paleochannels. GPR works based on transmitting an electromagnetic pulse in the radar frequencies range (between 10 MHz and 3 GHz) into the ground and recording the travel-time of reflections caused by contrasts in dielectric properties stratigraphic boundaries or diffracted by discrete objects like boulders. Previous studies have shown that GPR data reliably identifies the contacts between frozen and thawed zones in permafrost regions as well as mapping the bedrock surface and sedimentary stratigraphy of placer deposits.

Introduction:

- Attenuation of the radar signal and resolution of the GPR section are the main challenges in GPR surveys. Attenuation defines the continuous loss of amplitude that a wave experiences as it propagates through a particular medium. The rate at which the amplitude decreases is referred to as the attenuation constant, which depends on the physical properties of the media such as electrical conductivity. The attenuation increases with the increase of frequency. The vertical resolution is usually considered to be approximately one-quarter of the wavelength of the radar wave. The vertical resolution also increases by increasing antenna frequency. Therefore, there is an inherent tradeoff between vertical resolution and penetration, and depending on the application and survey objectives, the desired antenna frequency must be selected accordingly. So, a direct comparison between 80 MHz and 160 MHz GPR antennas is made in this study.
- Data were acquired using two different GPR systems supplemented by different antenna frequencies. The GPR systems applied (Figure 1) are described as follows:
  1. MALA GX HDR system developed by ABEM with 80 MHz, 160 MHz shielded antennas and an integrated DGPS for more accurate positioning. The GPR data were processed using the RadExplorer GPR processing software.
  2. PulseEKKO PRO and Ultra systems developed Sensors and Software with 50, 100 and 200 MHz central frequency antennas. Radar signals were processed and analyzed by the EKKO view deluxe software.

Introduction:

- For the MALA GX, the survey was performed in two measuring modes, continuous readings at constant time intervals of 0.3sec, and separate readings at constant distance intervals of 10cm using an odometer wheel.
- For the PulseEKKO system, measurements were conducted using the Common Mid-Point (CMP) method for velocity profile estimation of radar waves for depth conversion. Due to GPS malfunction issues, no line survey was performed.
- The survey parameters and measuring modes are summarized in Table 1. The outline of the survey area and layout of lines for the northern and southern lines of the TWP project is shown in Figure 2.

Table 1: REI project, survey parameters for GPR survey lines.

Date	Line	Survay Area	Target	IP Line	Drill Line	GPR System	Survey Mode
201005	55	TWM	TWM			MALA GX 160 MHz	Wheel @10cm readings
201005	56	TWM	TWM			MALA GX 80 MHz	Wheel @10cm readings

Figure 1: Field survey of 2020 GPR project, left is MALA GX system with 160 MHz shielded antenna, right is PulseEKKO with 200 MHz antenna.

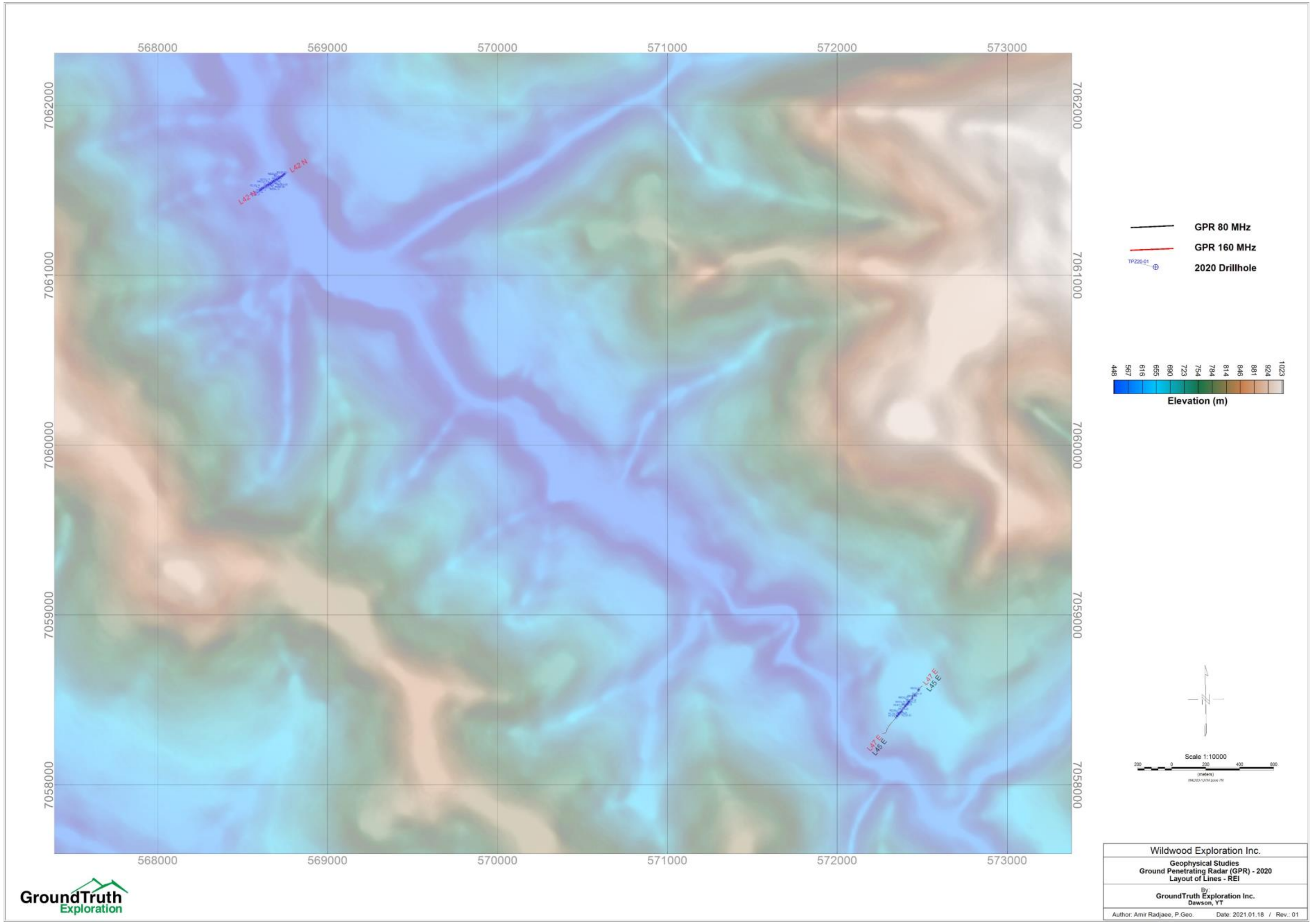

Figure 2: TWP project, layout of GPR northern lines.

Data processing and Results:

- All raw data are converted to SEG-Y format and imported to Geosoft for georeferencing and further processing. After QC/QA, the continuous measurement mode data are decimated to achieve 10cm spacing intervals.
- Velocity analysis (semblance velocity) performed on Common Mid-Point (CMP) datasets collected by PulseEKKO systems. The CMP velocity analysis for one selected test location measured using a 100 MHz antenna is presented in Figure 3.
- GPR depth sections are processed by conversion of time sections and assuming a constant radar velocity. Radar velocity is a function of dielectric permittivity of subsurface materials and is related to the ice content. Sediments with low ice contents typically have low radar velocity value and vice versa (i.e. 0.065 m/ns for unfrozen wet sandy/silty sediments and 0.10 for frozen saturated sandy/gravel sediments). The radar wave velocity of 0.085 m/ns is selected from the velocity spectrum of CMP data for time to depth conversion.
- The GPR depth sections along survey line are plotted. Figure 4 and 5 represents GPR sections with a primary interpretation. The reflectors were mapped by a quick visual evaluation of phases on the GPR time section first, then on the depth section. This interpretation of radar reflectors is subject to levels of errors and uncertainty associated with the estimated radar velocity for time to depth conversion of GPR data.

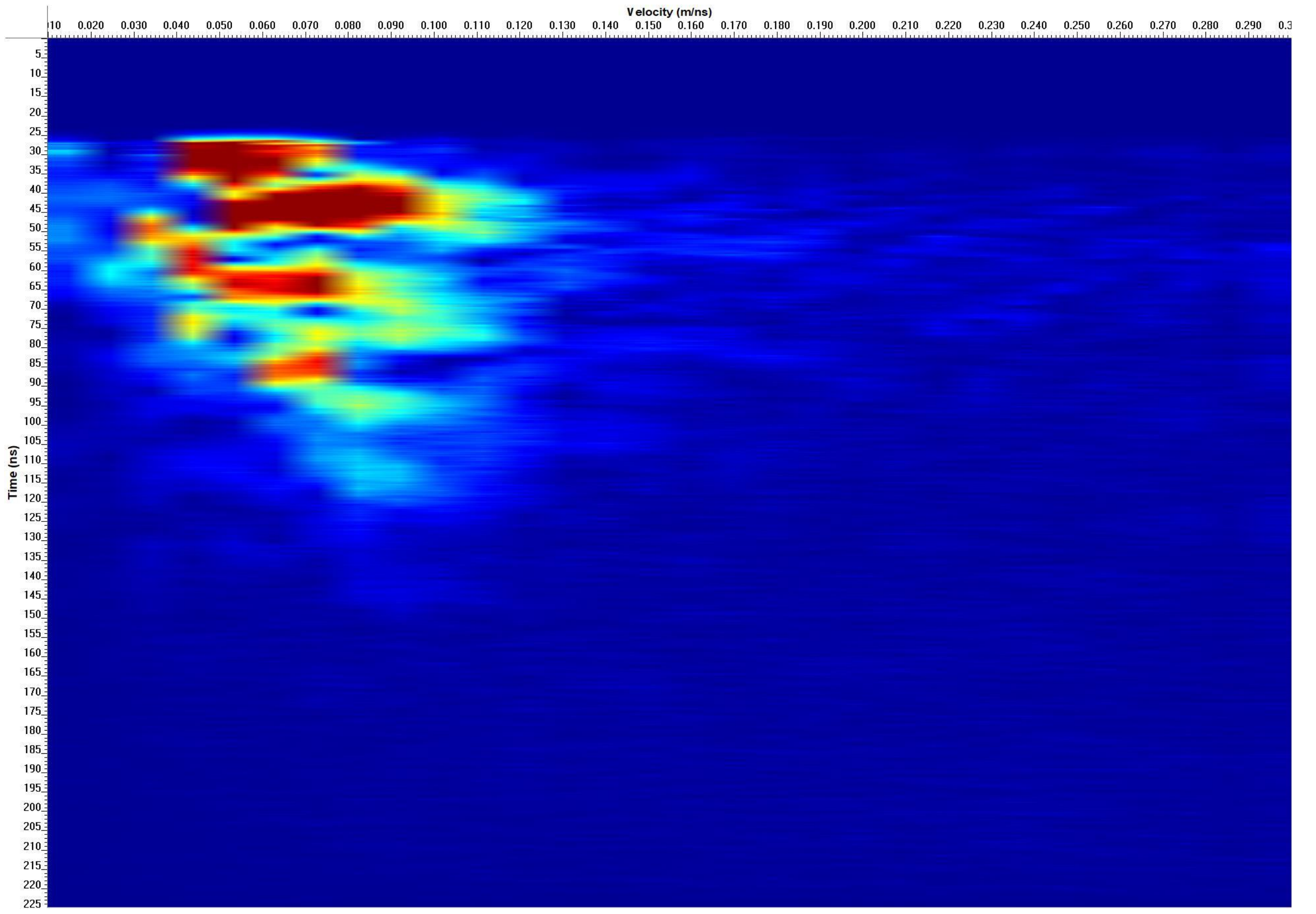

Figure 3: Velocity analysis (semblance velocity) performed on CMP data collected by PulseEKKO systems using a 100 MHz antenna.

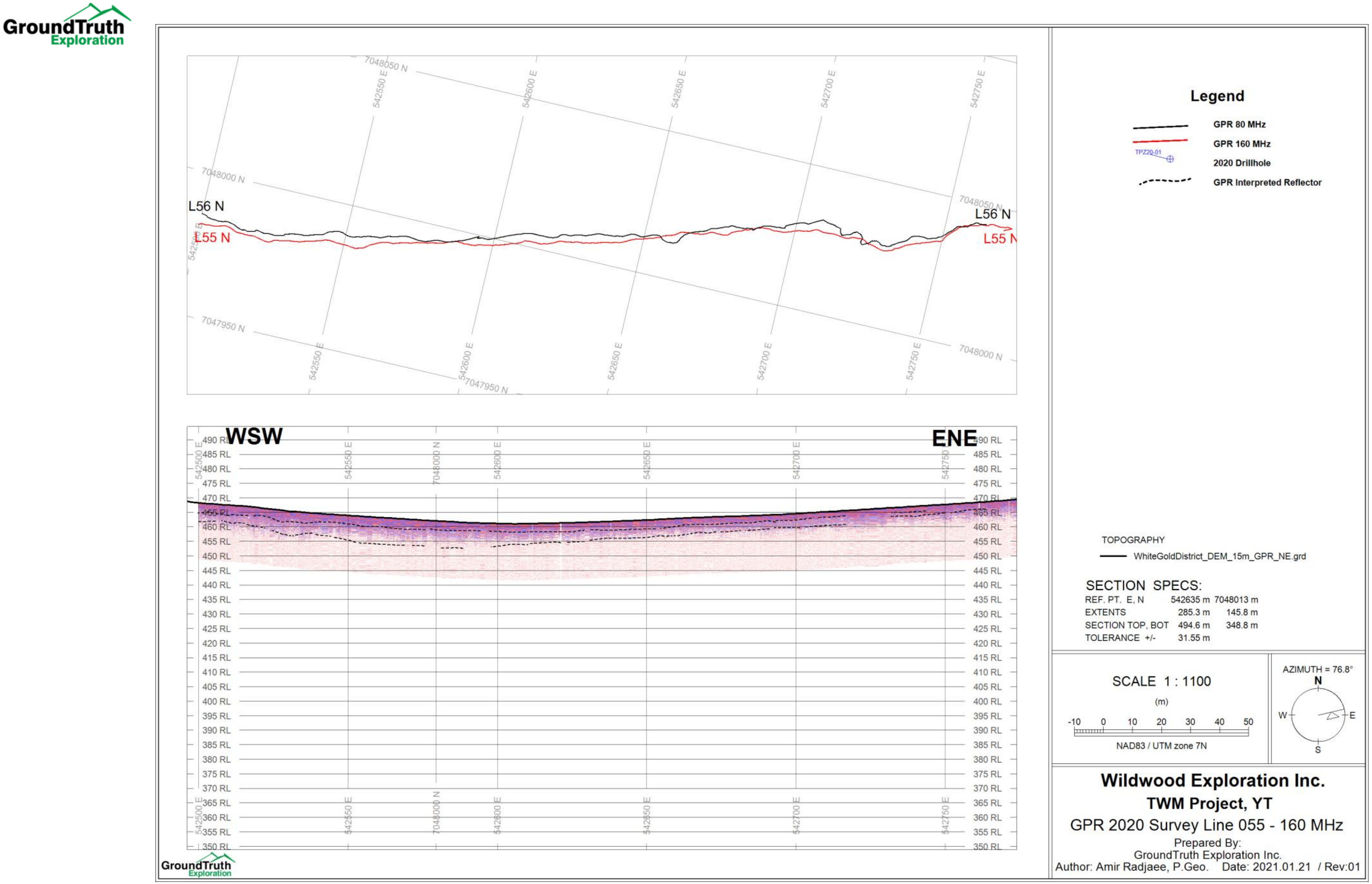

Figure 4: TWP 2020 GPR survey, section for line 42 with 160 MHz antenna.

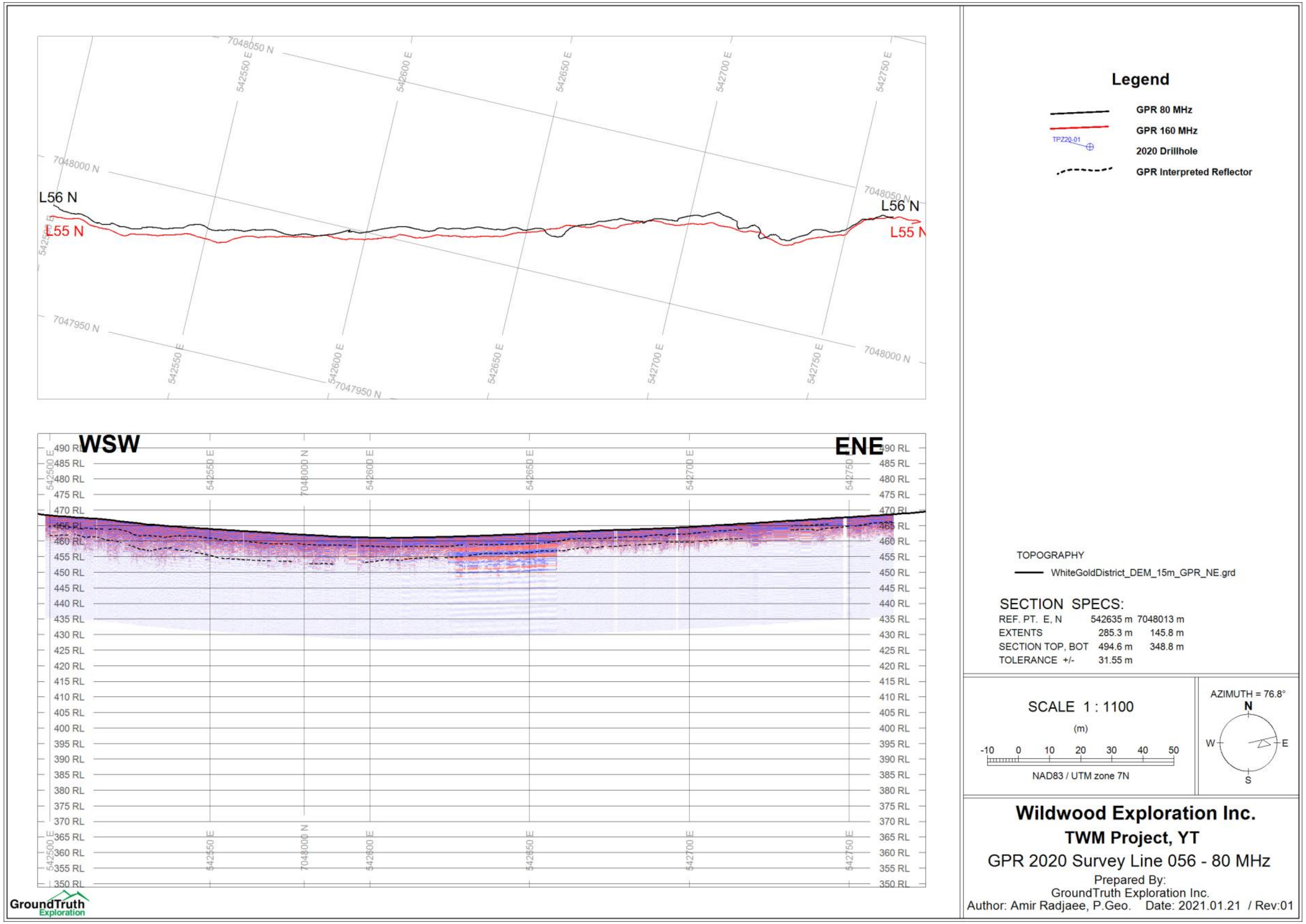

Figure 5: TWP 2020 GPR survey, section for line 47 with 160 MHz antenna.

Conclusion and recommendations:

- GPR technology is used to identify the contacts between frozen and thawed zones in permafrost, and mapping the bedrock surface and sedimentary stratigraphy of placer deposits. The method is gaining acceptance as standard practice for reconnaissance alluvial gold exploration.
- A variety of sediment structures such as channel fills and bedrock surfaces are commonly identified. In the survey area, penetration with the radar is generally moderate and frequently exceeds 10 m using an 80 MHz system. A high-resolution section acquired using a 160 MHz system with proper depth of penetration.
- One of the most successful applications for the GPR method in this study is the ability to image the details of subsurface stratigraphy features continuously. Radar images have shown that the layering boundaries are surprisingly comparable with borehole logs in most lines. These abrupt changes in horizon elevations are generally undetectable by drilling at any economic spacing.
- Some advanced data processing steps, such as lateral stacking of GPR traces and bandpass filtering, are recommended as further works.

Deliverables:

- Maps and sections in jpg format
- Layout of lines in shapefile format
- Raw instrument data files
- Presentation report

References:

- De Pascale J.P., Pollard W.H., Williams K.K., 2008, Geophysical mapping of ground ice using a combination of capacitive coupled resistivity and ground-penetrating radar, Northwest Territories Canada, JGR, 113, F02S90 1-15.
- Francke J., Yelf R., Applications of GPR for surface mining, Advanced Ground Penetrating Radar, 2003. Proceedings of the 2nd International Workshop.
- Kulyandin G.A., Fedorova L.L., Savvin D.V., Prudetskii N.D., 2016, GPR mapping of bedrock of alluvial gold deposits in permafrost, 16th International Conference of Ground Penetration Radar (GPR).

Appendix B: Invoices

GroundTruth Exploration

Box 70, Dawson, YT Y0B 1G0
Phone (867) 993-2499
Fax: (867) 993-5201

Invoice

Date	Invoice #
31-Dec-20	10495
Due	**Terms**
14-Jan-21	Net 14
	Twenty Mile

Invoice To:
Wildwood Exploration Inc.
Box 213
Dawson City, YT, Y0B1G0

Description			Proj	Total Amount
DC Resistivity/IP	Surveys		TWM	$ 28,287.50
	2D Inversions		TWM	700.00
	Camp		TWM	675.00
				$ 29,662.50
	Logistics		TWM	$ 933.46
	Rebills	**Fixed Wing**	**TWM**	$ 3,093.73
		Food	**TWM**	1,473.09
		Supplies	**TWM**	479.86
				$ 5,046.68

See attached for breakdown detail

Totals	**$ 35,642.64**
GST 5%	**$ 1,782.13**
Deposit Applied	
Total Due	**$ 37,424.77**

GST # 811084268 RT0001

Thank you for your business!

GroundTruth Exploration

Box 70, Dawson, YT Y0B 1G0
Phone (867) 993-2499
Fax: (867) 993-5201

Invoice

Date	Invoice #
31-Dec-20	10494
Due	**Terms**
28-Jan-21	Net 14

Invoice To:
Wildwood Exploration Inc.
Box 213
Dawson City, YT, Y0B1G0

Description	Proj	Total Amount
GPR Ground Services - Labour	JPP	$ 6,481.54
GPR Data Processing - Labour	JPP	4,005.23
GPR Logistics Support - Labour	JPP	770.62
GPR Planning and Admin Support - Labour	JPP	624.22
		$ 11,881.62
Equipment	JPP	18,267.56
GPR Camp	JPP	261.96
		$ 30,411.14
GPR Ground Services - Labour	JPP-REI	$ 1,450.91
GPR Data Processing - Labour	JPP-REI	896.58
GPR Logistics Support - Labour	JPP-REI	172.51
GPR Planning and Admin Support - Labour	JPP-REI	139.73
		$ 2,659.73
Equipment	JPP-REI	4,089.23
GPR Camp	JPP-REI	58.64
		$ 6,807.60
GPR Ground Services - Labour	TWM	$ 727.31
GPR Data Processing - Labour	TWM	449.43
GPR Logistics Support - Labour	TWM	86.47
GPR Planning and Admin Support - Labour	TWM	70.05
		$ 1,333.26
Equipment	TWM	2,049.84
GPR Camp	TWM	29.40
		$ 3,412.49

See attached for breakdown detail

Totals		**$ 40,631.22**
	GST 5%	**$ 2,031.56**
GST # 811084268 RT0001	**Deposit Applied**	**$ -**
	Total Due	**$ 42,662.78**

Thank you for your business!

GroundTruth Exploration
Box 70, Dawson, YT Y0B 1G0
Phone (867) 993-2499
Fax: (867) 993-5201

Invoice

Date	Invoice #
31-Dec-20	10496
Due	**Terms**
28-Jan-21	Net 14

Invoice To:
Wildwood Exploration Inc.
Box 213
Dawson City, YT, Y0B1G0

Description	Proj	Total Amount
Drone Survey and Processing	BLV	$ 1,686.50
Drone Survey and Processing	SHP	845.00
Drone Survey and Processing	TWM	955.00

See attached for breakdown detail

Totals	$ -	$ -	**$ 3,486.50**
		GST 5%	**$ 174.33**
		Deposit Applied	$ -
		Total Due	**$ 3,660.83**

GST # 811084268 RT0001

Thank you for your business!

Helicopter Expenditures

Date	Invoice	Source Name	Property	Amount
10/16/2020	IN003189	Great Slave Helicopters 2018 Ltd.	TWM	$3,097.80
10/17/2020	IN003190	Great Slave Helicopters 2018 Ltd.	TWM	$2,925.70
10/18/2020	IN003191	Great Slave Helicopters 2018 Ltd.	TWM	$3,269.90
10/11/2020	IN003155	Great Slave Helicopters 2018 Ltd.	TWM	$2,250.00
			Grand Total	$11,543.40