Northern Territory Government

Geophysics and Drilling Collaborations

CORE

Proposal Cover Sheet

Project title	Barossa
Applicant (Company Name)	PNX Metals Ltd
Applicant ABN	67 127 446 271
Applicant postal address	Level 1, 135 Fullarton Road Rose Park, SA 5067
Contact officer	Andy Bennett
Contact phone number	08 83643188
Contact fax number	08 83644288
Contact email address	andy@pnxmetals.com.au
Granted exploration licence number(s) where this proposal is to be undertaken	EL25748
Proposed type of exploration program for funding (diamond drilling, gravity survey etc)	Diamond Drilling
Brief summary of program (total number of metres to be drilled, number of gravity stations, total length of flight lines etc)	Two holes, comprising 325m diamond drilling are proposed to test for a new camp of VMS style mineralisation in the Burnside region of the Pine Creek Orogen
Total direct costs for the program including GST	$77,220
Amount of funding requested including GST	$38,610
Proposed timeframes for commencement and completion of program	September 2016 start and finish
Names and positions of signatories to the funding contract	Andy Bennett Exploration Manager
Signature of applicant	
Date	20/4/2016

FINAL REPORT FOR DRILLING AND GEOPHYSICS COLLABORATION FUNDING

BAROSSA PROSPECT

by

Andy Bennett

BSc (Hons), mAUSIMM

Contact: *andy@phoenixcopper.com.au*

Datum: *GDA94 Zone 52*

Target Commodities: *Pb-Zn-Ag-Cu-Au*

1:250000 *Pine Creek* *SD5208*

1:100000 *Batchelor* *5171*

February 2017

1. SUMMARY

In April 2016, PNX Metals Ltd ("PNX") submitted an application for co-funding of a drilling program at the Barossa prospect within the Burnside Project of the Pine Creek Orogen. PNX is an exploration company which has recently shifted attention towards base metals in the Northern Territory, having purchased the Iron Blow and Mount Bonnie base metal deposits, as well as earning into the substantial exploration ground held by Kirkland Lake Gold ("Kirkland Lake" – previously Newmarket). Barossa had been identified as a new prospect with the potential for VMS (volcanogenic massive sulfide)-style mineralisation in an area which has never been drilled or explored for base metals. The target evolved largely through geophysical targeting using modern VTEM data.

The objective of the proposed drilling was to test the source of the VTEM anomalies to determine whether they are indeed related to VMS mineralisation, or some other source, but primarily using Iron Blow and Mount Bonnie as known deposit analogues. A cluster of nine strong late time VTEM anomalies were identified, the cluster perhaps consistent with that of VMS deposit camps. The co-funded drilling consisted of drill testing only the most conductive two. Drilling was carried out between the 27th October 2016 and the 7th November 2016 and consisted of 328.7m HQ core drilling

Drilling intersected numerous folded sulfide-rich units within the Mt Bonnie Formation, which is the most likely cause of the VTEM anomalism. 179 samples (including QAQC) were submitted for assay analysis, including gold and an 11 element base metal suite, however no significant results were obtained. Samples have been sent for petrophysical testing to determine if the conductivity of the pyrrhotite-rich units explains the strength of the VTEM anomaly.

2. CONTENTS

FIGURES

TABLES

DIGITAL APPENDICES

File Name	Format
Barossa_CORE_01_ReportBody	pdf
Barossa_CORE_02_dhcollar	txt
Barossa_CORE_03_dhsurvey	txt
Barossa_CORE_04_dhlith	txt
Barossa_CORE_05_dhassays	txt
Barossa_CORE_06_dhQAQC	txt
Barossa_CORE_07_dh-pXRF	txt
Barossa_CORE_08_dhmagsus	txt
Barossa_CORE_09_dhstructure	txt
Barossa_CORE_10_dhgeotech	txt
Barossa_CORE_11_codelisting	txt
Barossa_CORE_12_MineralogicalReport	pdf
Barossa_CORE_13_filelisting	txt

3. INTRODUCTION

The Barossa prospect is situated within EL25748 granted on 1/10/2007 and held by Kirkland Lake. PNX entered into an agreement in 2014 with Kirkland Lake (who were then Crocodile Gold, and later Newmarket), whereby PNX can earn up to 90% interest in the tenement through staged expenditures covering a wider tenement group.

The area is located 13km NE of Bridge Creek on the Pastoral Lease No. 695 held by Ban Ban Springs Station. Access was obtained by re-establishing a deteriorated unsealed track northward from Brocks Creek, past the Rising Tide workings and along station tracks towards the Howley Hole, then approximately 3km of new track was established into the Barossa target area.

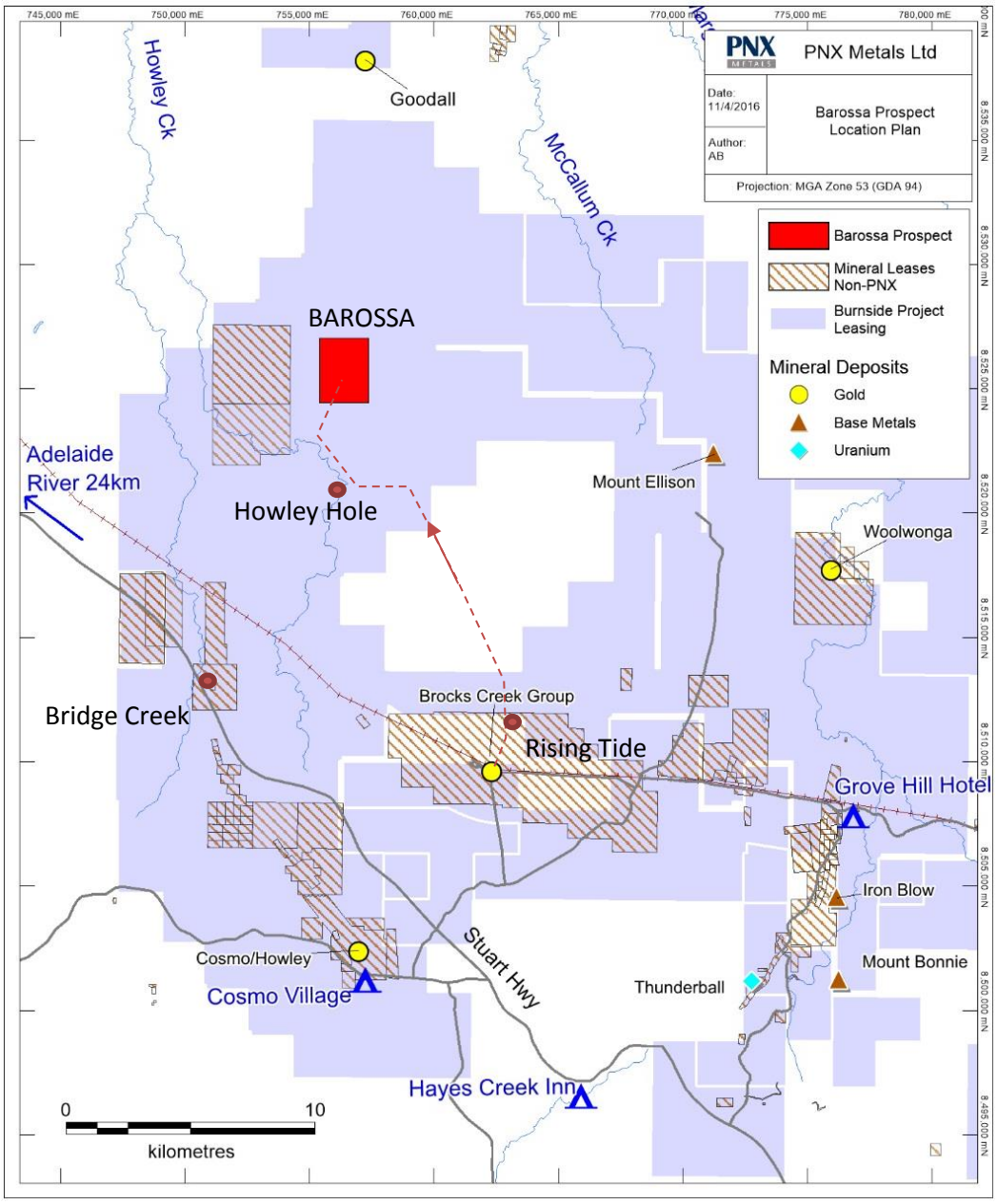

Figure 1: Barossa Prospect Location Map

4. REGIONAL CONTEXT

The Barossa prospect is located within the Archaean to Palaeoproterozoic Pine Creek Orogen, one of the major mineral provinces of Australia. The Pine Creek Orogen is a deformed and metamorphosed sedimentary basin up to 14 km maximum thickness covering an area of approximately 66,000 km2 and extending from Katherine in the south to Darwin in the north. It hosts significant resources of gold, uranium and platinum group metals, as well as substantial base metals, silver, iron and tin-tantalum mineralization.

The Pine Creek Orogen comprises series of late Archaean granite-gneiss basement domes, which are overlain by a fluvial to marine sedimentary sequence. Several highly reactive rock units are included within this sedimentary sequence including carbonaceous shale, iron stones, evaporite, carbonate and mafic to felsic volcanic units of the South Alligator and Finniss River Groups. This sequence has been subjected to regional greenschist facies metamorphism and multiphase deformation, which has resulted in the development of a northwest trending fabric. Subsequent widespread felsic volcanism and the intrusion of granitoids caused contact metamorphism, in aureoles between 500 m and 2 km wide that overprint the earlier regional metamorphism. After the granitoid intrusions an extensive array of northeast and northwest trending dolerite dykes intruded the metasedimentary sequence during regional extensional deformation.

The regional geology summarised in Figures 2 and 3. Locally, in the area of the Barossa target, a regional syncline is interpreted (Figure 2) which as defined loosely by the Gerowie Tuff – Mt Bonnie Formation and Burrell Creek contacts in the NTGS 1:250K mapping.

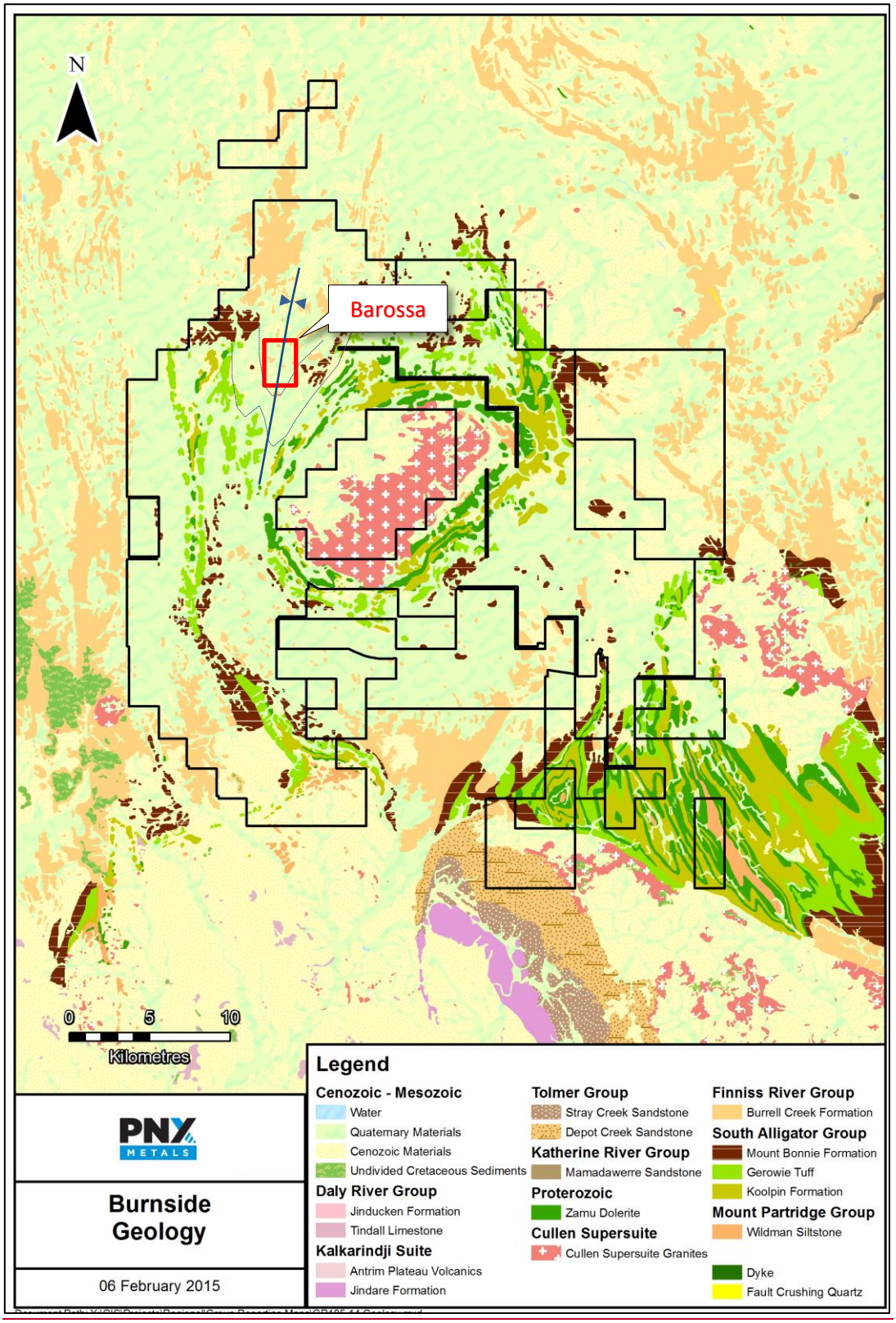

Figure 1: Regional Geology Burnside Project

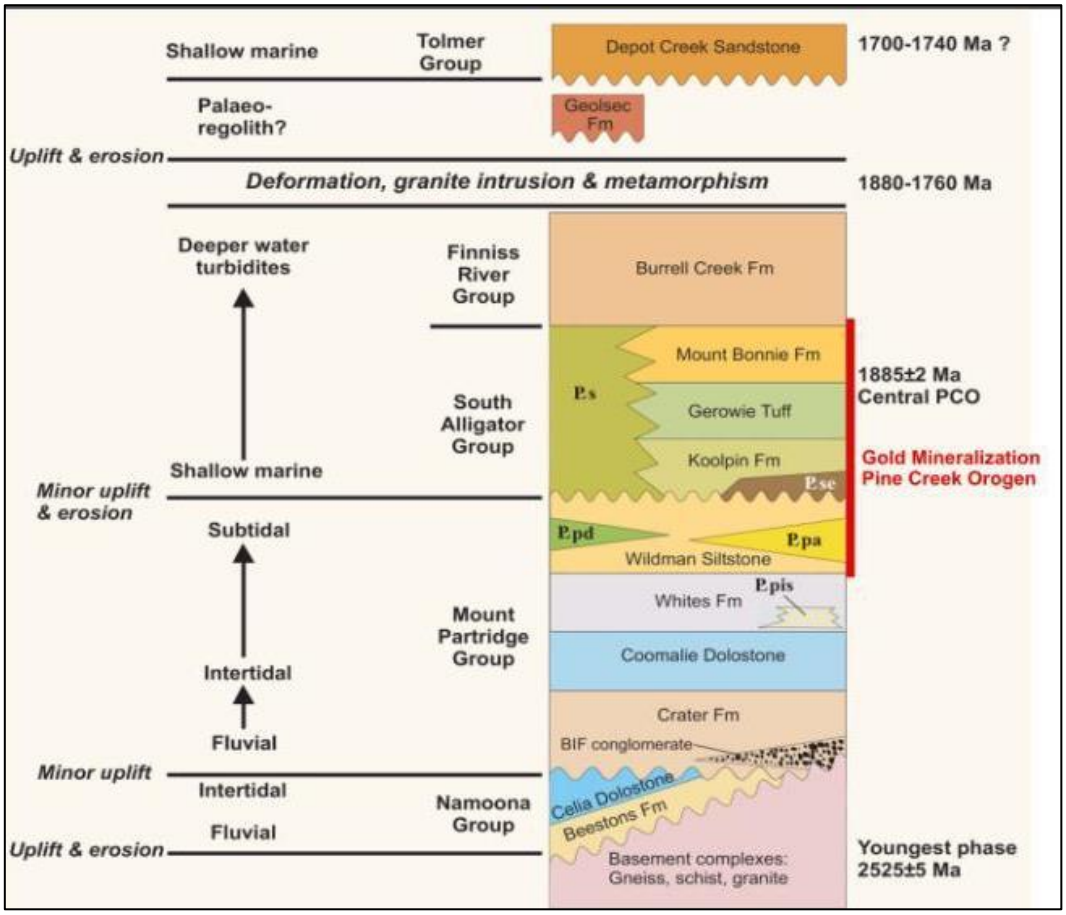

Figure 2: Stratigraphy in the Burnside Project area

5. PREVIOUS EXPLORATION

A significant amount of exploration has occurred within the Burnside Project area since discovery of gold at Yam Creek in the 1870's, however, very little has occurred in the area of the Barossa target until recent years, probably because it is mostly covered by alluvium, with little indication of gold mineralisation at surface. The known exploration in the study area of consequence is summarised below.

Early prospecting work has occurred since the 1870's although little is known about the activities in the Barossa area. BMR produced maps at 1:1 mile scale in the 1960's along with regional airborne magnetic-radiometric surveys; and various companies attempted regional base metals exploration through the search for ironstone bodies in the early 1970's.

EL29: Euralba Mining (CR1973-0134)

Euralba explored the area primarily for uranium, but noted a number of small copper workings up to a few kilometres south and southeast of the Barossa target which were considered too small to be of interest.

EL923: Commonwealth Aluminium (CR1974-0135)

Commonwealth Aluminium explored the area primarily for fluorite, but no work was undertaken in the Barossa area. Maps show the Barossa area covered by soil associated with the Howley Creek and the copper shows to the south are at the contact of the Zamu Dolerite and the Mt Bonnie Formation.

EL1195: Geopeko (CR1980-0230)

Geopeko completed an airborne electromagnetic and radiometric survey and reconnaissance mapping, mainly in the search for shale hosted base metal mineralisation akin to Mt Ellison. No field work was undertaken in the Barossa area, the nearest being the "Quest 169" prospect, however the geological maps show that the Barossa area to be in a large syncline near the base of the Mt Bonnie Formation – the same stratigraphic level as Iron Blow and Mt Bonnie VMS deposits.

EL2031: Mines Administration (CR1982-0190)

Primarily searching for uranium, Mines Administration completed ground radiometrics across the area on a 250x20m grid. One diamond hole "DH6" and one percussion hole, "PHD7" which are not accurately locatable, were drilled about 3-4 km to the SE of the Barossa area, with no significant results.

EL4066 and EL5319: WMC (CR1987-0101 and CR1991-0370)

WMC documented a major work program in the Mt Paqualin area, but none of it relates to the Barossa target area.

EL7786 & 9484: Northern Gold (information obtained from Kirkland Lake records)

Northern Gold either completed or compiled soil sampling data in the region in about 1994, along with some follow up shallow RAB drilling on 200x20 grid, but identified some anomalous gold trends which were not followed up with bedrock testing. Information is available digitally and is shown in Figure 3.

EL25748: Kirkland Lake – PNX

Kirkland Lake completed an aerial survey over much of the Burnside area in 2011 using Geotech Airborne Pty Ltd, collecting both magnetic and EM data. The northern part of the survey partially covers the Barossa target and was flown at 150m line spacing at 105-285^{o} direction. This first identified the presence of EM anomalies in the Barossa area.

Subsequently in 2012, the Barossa target was field checked, sampled (12 rock chips for Au analysis), mapped at 1:10K and multi-element ionic leach samples (on 100x25m pattern) were collected over the VTEM anomalies. Mapping showed that most of the area is covered with unconsolidated Quaternary material in which the weakly magnetic dolerite represents the most prominent outcrops as ridges, dykes and scattered patches. Dolerite was not recorded in any previous mapping. Structural features in the surrounding metasediments supported the idea of a regional syncline striking NNE-SSW with a possible northerly plunge. However, due to poor outcrop, the source of the VTEM anomalies was not determined. The ionic leach data is typically ambiguous but appears to show an anomalous trend sitting between the VTEM highs (Figure 4).

PNX are currently undertook modelling of the VTEM and magnetic datasets, some images of which are presented later in the report.

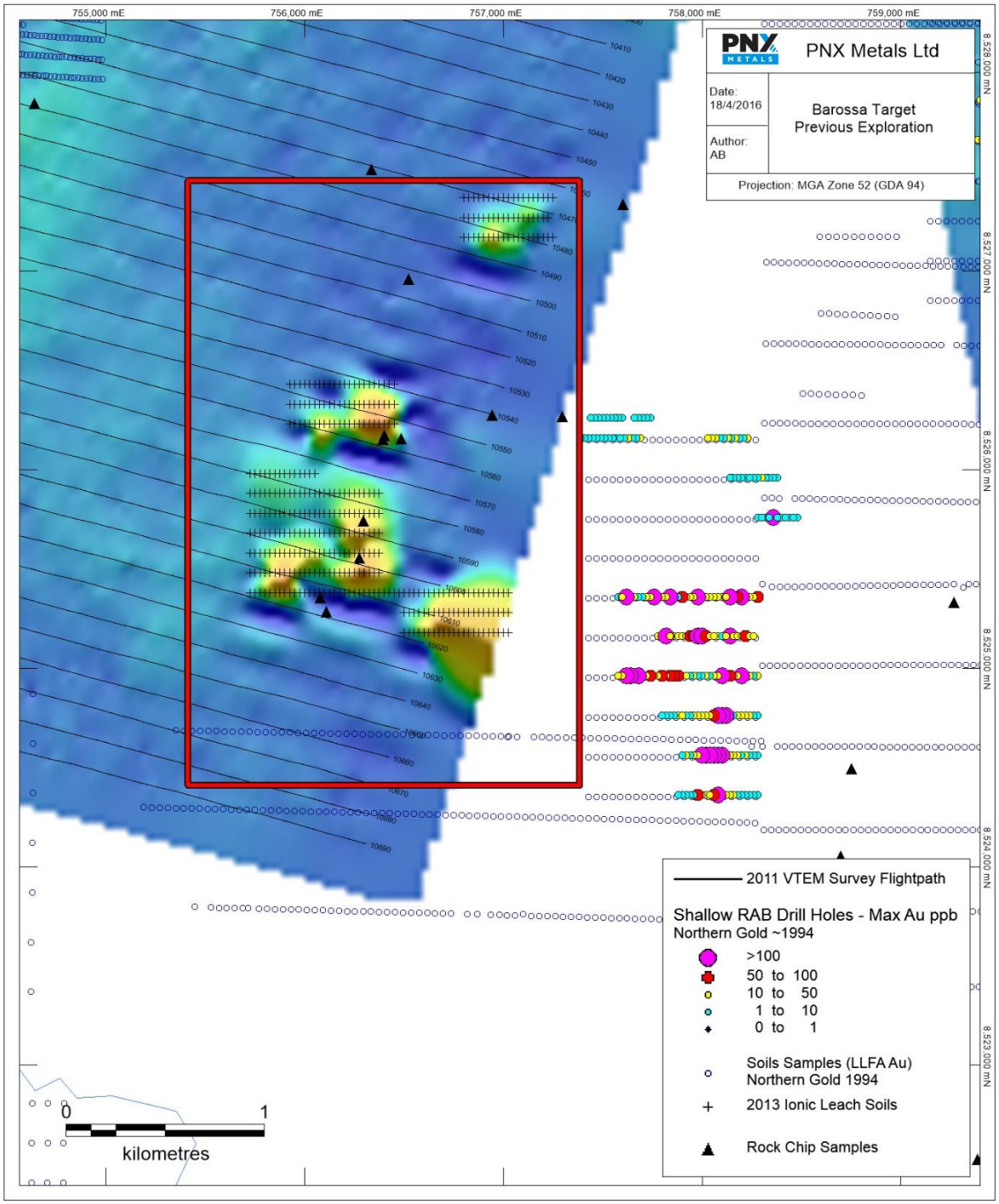

Figure 3: Barossa Target Previous Exploration Summary on VTEM dBdTZ_38_Nshade image

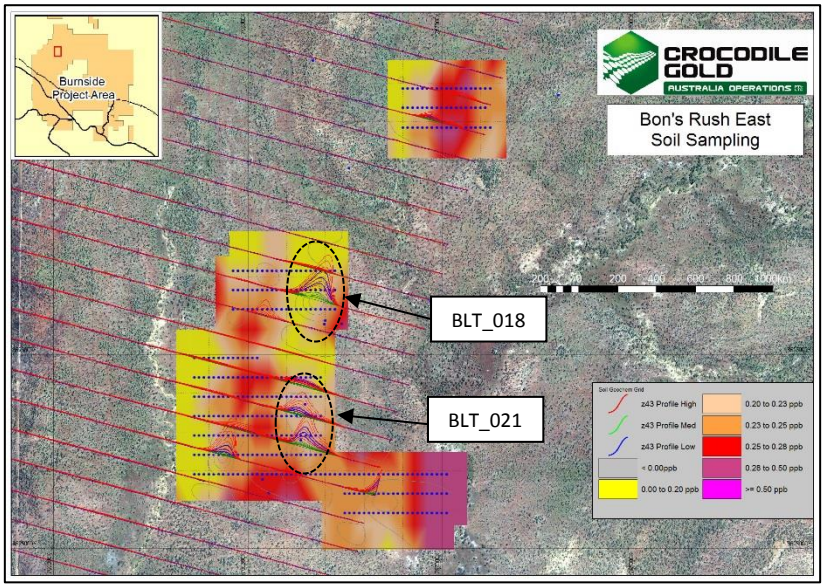

Figure 4: Ionic Leach Survey result over Barossa Target showing specific target areas in this study

6. EXPLORATION CONCEPT

The exploration concept at Barossa is influenced heavily by PNX's deposits at Iron Blow and Mount Bonnie. These deposits are approximately in the same stratigraphic location on opposite limbs of the Margaret Syncline, near the bottom of the Mount Bonnie Formation close to the contact with the underlying Gerowie Tuff. Both deposits are thought to be volcanogenic massive sulphide (VMS) deposits formed at or near the sea floor by submarine felsic volcanic activity, probably during the same volcanic event. The fumaroles circulated metal-rich hydrothermal fluids into the local sediments.

Most VMS deposits are thought to consist of two components (Figure 5):

- a dome or tabular-shaped stratabound lens of massive sulphide and
- a discordant stockwork of veins and disseminated sulphides representing the feeder system of the vent.

VMS deposits are usually small but valuable mineral deposits typically with combinations of Zn, Cu, Pb, Ag, and Au. Most significant VMS mining districts are defined by deposit clusters formed within rifts or calderas. The tendency to form in clusters may be attributable to a common heat source that triggers large-scale sub-seafloor fluid convection systems.

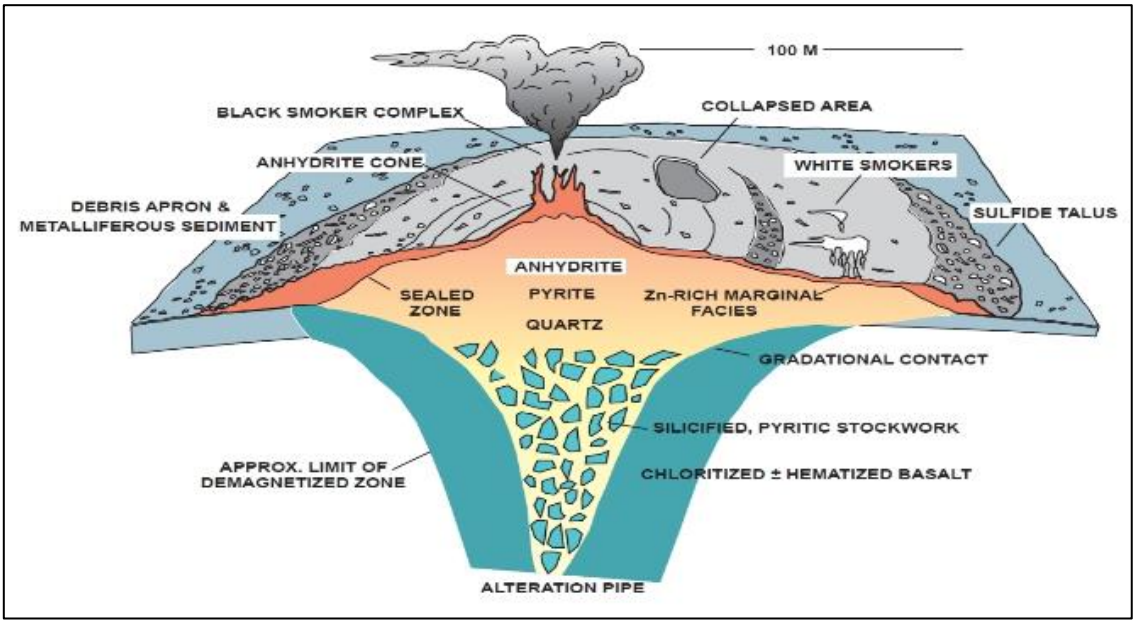

Figure 5: Schematic diagram of VMS deposits (from Galley et al 2007)

Both Iron Blow and Mt Bonnie are clearly identified as bullseye EM anomalies in the same VTEM dataset as is available for Barossa (Figure 6), caused by the massive sulfide content of the ore. Due to their pyrrhotite content, they also have bullseye magnetic anomalies.

At the Barossa target, there are nine strong VTEM conductors (Figure 6) with a general N-S trending orientation and lengths ranging from 215m (BLT_024) to 53m (BLT_030). EM flow conductivity of the VTEM profiles indicates target depths from 50m to 250m. BLT_020 and 026 in the northern part of the area gave an EM response indicating a depth of between 250m and 300m below surface with a conductor dipping to the WNW. Apart from the deep seated conductor BLT_023 (400m), the targets in the south are generally shallower (200m to 50m) with an easterly dip. In between, BLT_018 appears steeply dipping to the west. EM flow conductivity sections further suggest a general northern plunge for the conductors of BLT_018 (N), BLT_019 (NW), BLT_020 (NE), BLT_022 (NE) and BLT_024 (N). In contrast, BLT_021 appears to plunge SSW. There is no radiometric association with any of the conductors.

Each of these conductors may be indicative of massive sulfide mineralisation, as other conductive units in the region (usually associated with carbonaceous shales of the Kooplin Formation) are absent, and some distance away. Also, the bullseye geometry of the VTEM anomalies suggests they are not associated with carbonaceous stratigraphy. Nevertheless, the possibility of carbonaceous units being present locally within the Mount Bonnie Formation into fault or fold bound segments could be an alternative explanation for the EM responses. The cluster of anomalies was however considered consistent with a possible VMS camp setting.

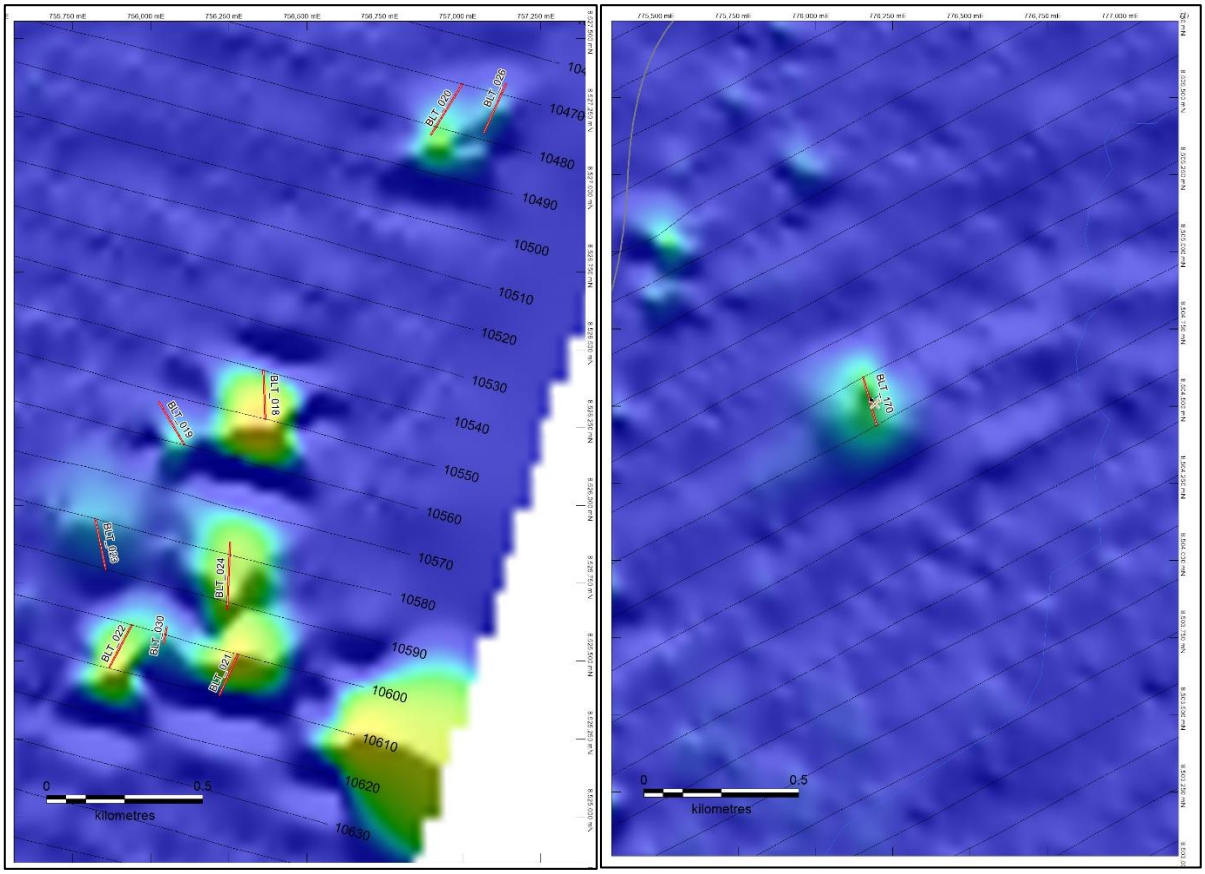

Figure 6: BfieldZ_38_Nshade images of (LHS) Barossa target and (RHS) Iron Blow polymetallic deposit

7. PROGRAM DETAILS

Two holes were drilled between the 27th October 2016 and the 7th November 2016 to test what were considered the highest priority geophysical responses amongst the nine VTEM anomalies, as described in Table 1 and Figure 7. Each hole tested a VTEM anomaly with a very different orientation, consistent with the synclinal setting interpreted.

Hole BADD001 was collared to test the conductor "BLT018" which was modelled as dipping quite shallow, only 27 degrees to the west over a strike extent of 125m.

Hole BADD002 was collared to test the conductor "BLT021" which was modelled as dipping 45 degrees to the east over a strike length of approximately 200m.

Table 1: Drilling Locations At Barossa

Hole	VTEM Target	East(MGA53)	North(MGA53)	Dip	Azi	Depth
BADD001	BLT018	756275	8525520	-70	270	151.9m
BADD002	BLT021	756345	8526310	-70	105	176.8m

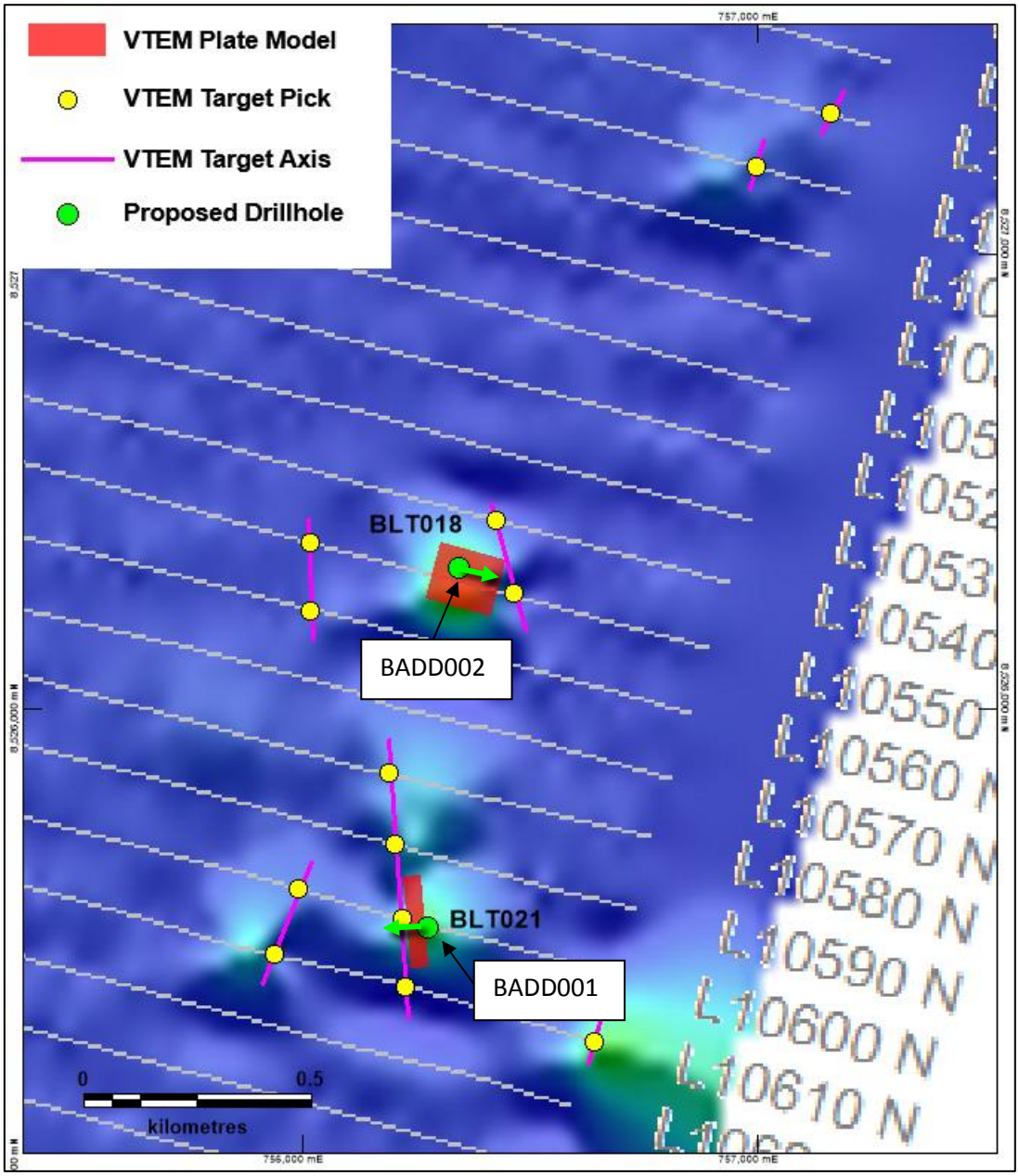

Figure 7: Proposed Drilling at Barossa on VTEM Channel 44 image

Drilling was cored from surface, using an Alton HD900 track mounted rig operated by WDA Drilling Services Pty Ltd. BADD001 was HQ tripled tubed to 23.8m and BADD002 was HQ tripled tubed to 28.7m, thereafter both were standard HQ to end of hole. Ground conditions were excellent, resulting in 30m per drilling shift. Core was orientated using an ACE orientation device and downhole surveys were collected at 30m intervals using a single shot Camtech Proshot device. 50mm PVC casing was inserted in both drill holes in anticipation of running downhole geophysical testing. Drill collar coordinates are accurate to only about +/- 5m from single GPS mode.

The drill core was returned to the Brocks Creek core facility for logging, magnetic susceptibility, portable XRF measurement, photography and cutting. All data collected is available in the digital appendices. The pXRF devices used were Niton XL3t500 (for BADD001) and a newer unit was available for BADD002 (Niton XL3t950)

Selected drill core was submitted for assaying at the Northern Australian Laboratory (NAL) facility in Pine Creek. A total of 179 samples were submitted using quarter core, all for 50g fire assay (FA50 code) gold analysis, and where significant sulfides were encountered, also for four acid digest 11-element ICP-OES analysis (Cu, Pb, Zn, As, Ag, S, Fe, Mn, Cd, Bi, Sb) – code G400.

Certified reference materials were inserted at a frequency of 1 per 25, duplicate quarter core was submitted at a frequency of 1 per 25 and blank material was inserted at a frequency of 3 per 100.

Two samples from BADD001 in the conductive pyrrhotite bands were sent to Terra Resources laboratories in Perth to measure their remanence, conductivity and susceptibility. Results were not available at the time of writing.

Eight drill core samples were sent to Pontifex and Associates Pty Ltd (Table 2).

Table 2: Thin Section Listing

SpecimenID	FROM	TO	Field Description
BTS1	20.86	20.98	GYWK
BTS2	34.88	34.96	well bedded SLST/turbidite
BTS3	36.46	36.53	SLST/MDST py altered
BTS6	55.66	55.73	SLST/MDST
BTS7	64.18	64.24	pyrrhotite-carb altered metasediment in fold limb
BTS9	102.77	102.84	SLST with cb veinlet
BTS10	109.49	109.55	SLST/SDST with nodular band
BTS12	135.38	135.44	pyrrhotite-carb altered metasediment in fold limb

8. RESULTS AND INTERPRETATION

Both drill holes BADD001 & 2 intersected stratiform bands of pyrrhotite (and lesser pyrite) mineralisation within a siltstone dominated turbiditic sediment, assumed to be of the Mt Bonnie Formation. The pyrrhotite bands occur in close association with their predicted location based on the geophysical modelling and as chemical sediments, represent the target stratigraphic units.

Pronounced folding is evident in BADD001, and pyrrhotite rich bands were commonly observed in the fold nose regions (eg. Figure 8). Although visually quite impressive, there was no significant mineralisation associated with any of the pyrrhotitic layers or surrounding sediments that were submitted for assay. Best results were:

- BADD001: 2.02m @ 0.065 g/t Au (from 30.98m)
- BADD002: 2.93m @ 0.115 g/t Au (from 68m)

Indicator elements for Au (As, Bi, Sb) were all very low. Zn, Pb and Cu assays were likewise all very low, and nothing else of economic significance showed up on the pXRF measurements.

Figure 8: BADD001 core at 52.7m (length approx 30cm)

Cross sections showing the magnetic susceptibility, Fe (pXRF) and Au (FA50) are shown in Figures 9 and 10 for BADD001 and BADD002 respectively. These illustrate the sulfide rich bands reasonably well.

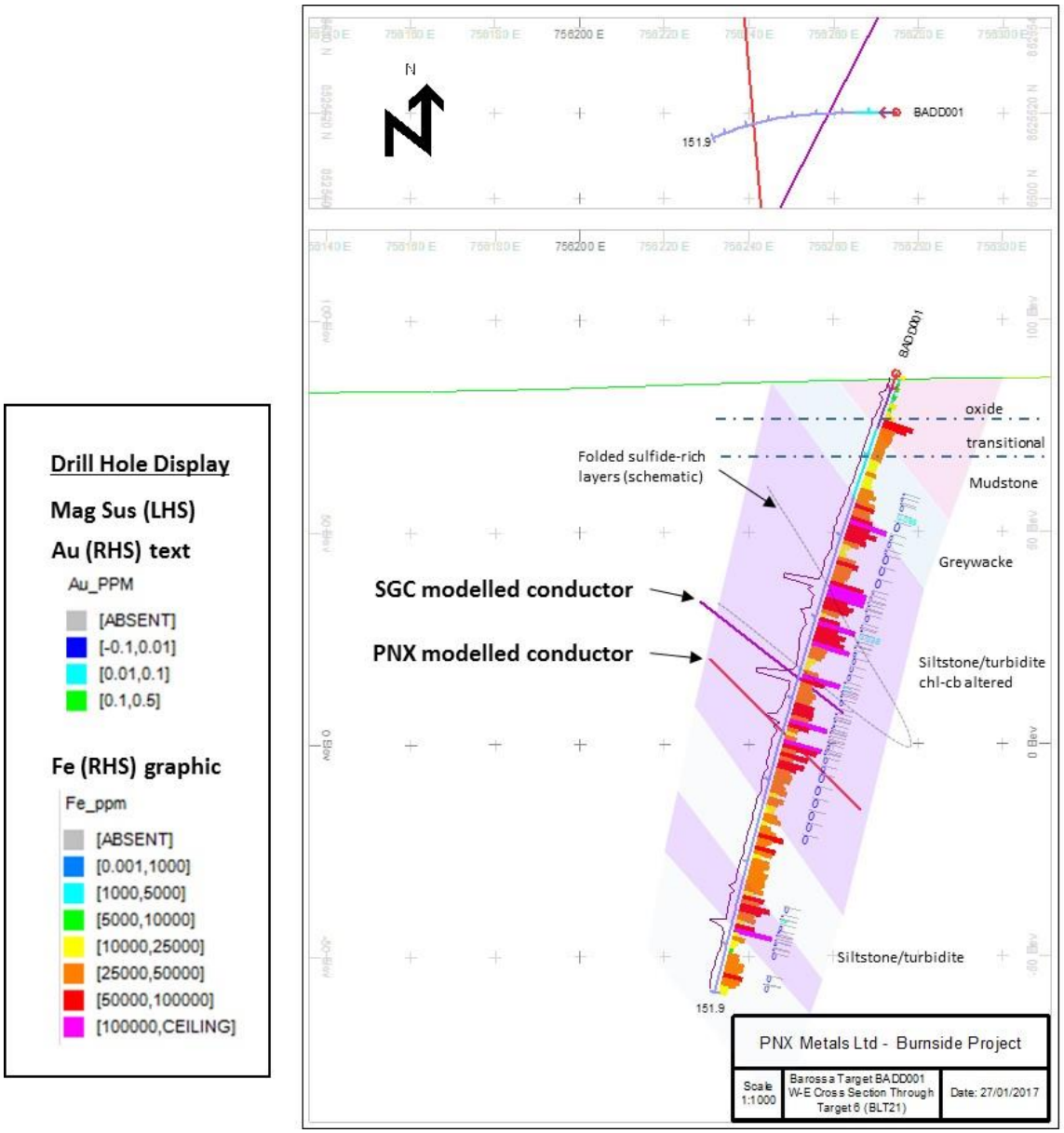

Figure 9: West-East Cross Section Showing BADD001 simplified geology

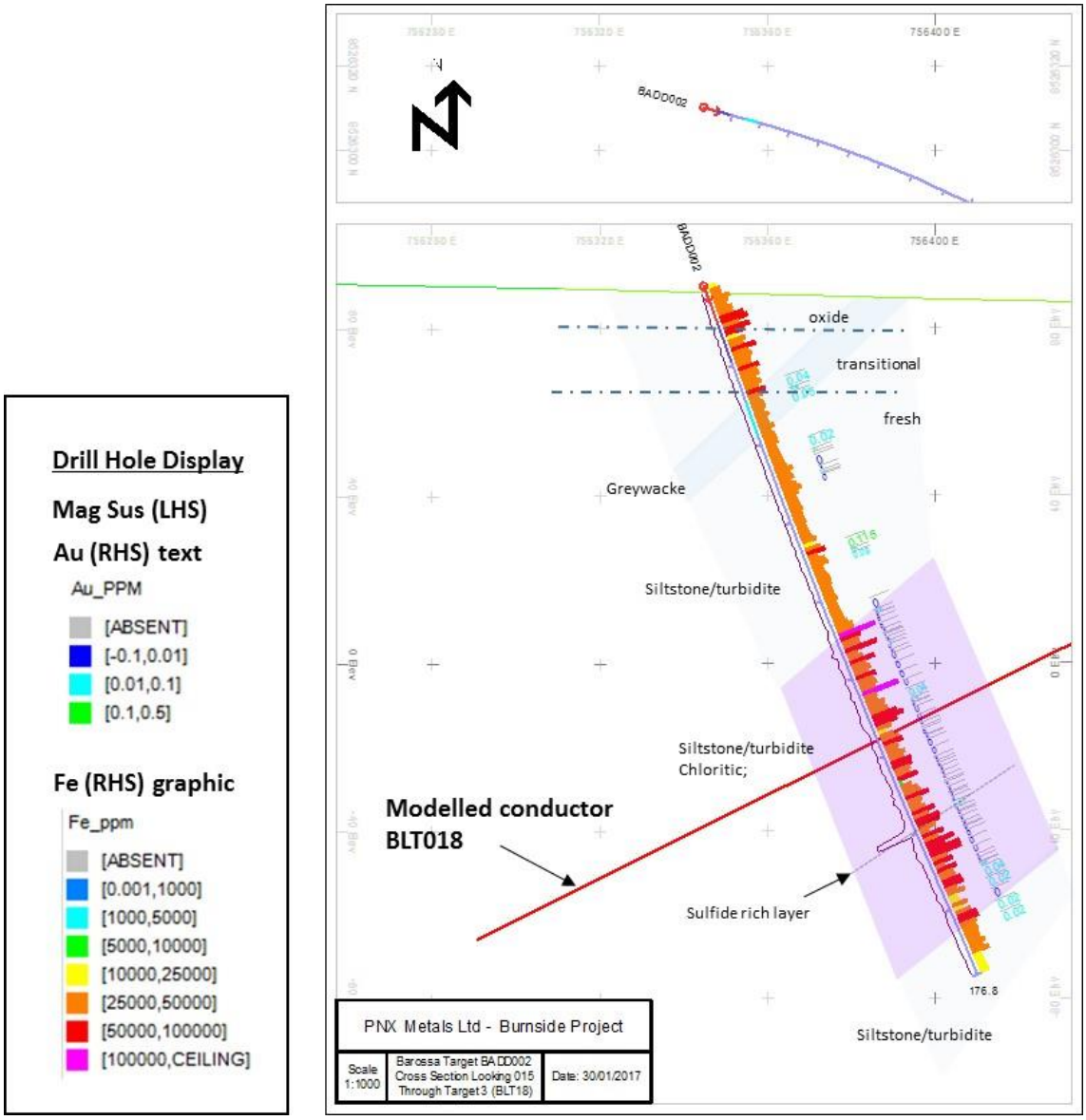

Figure 10: Cross Section through BADD002 Looking 015

Thin section work revealed that six of the eight core samples (BTS Nos #1, #2, #3, #6, #9 and #10) are interpreted as regionally metamorphosed very fine clastic sediments which were originally argillaceous, quartz/feldspar silt to very fine sandy sediments, now with metamorphic biotite derived from original "clays". The other two samples (BTS #7 and BTS #12) are calc-silicates dominated by metamorphic hornblende > chlorite > quartz, garnet, interpreted as metamorphosed chemical sediment, with up to 15% irregularly interlayered pyrrhotite.

The potential for an economic VMS deposit at Barossa has been significantly downgraded by these results. Testing of the conductivity of the sulfide rich samples will be completed to determine if the VTEM responses are satisfactorily explained. If not, downhole geophysics will be undertaken to find the source of a potentially greater body of sulfide concentration. The lack of even the slightest elevation in base metals, lack of carbonate alteration and lack of brecciation associated with the pyrrhotite however indicates that this is not the same geological environment that is observed at Iron Blow or Mt Bonnie.

The association of gold mineralisation within fold hinges (usually anticlinal) in the region has been well documented (eg Partington and McNaughton, 1997, Sener 2004), therefore the occurrence at Barossa of sulfides concentrated in hinge zones is not surprising, however it would appear that the volume of fluid has been insufficient in the areas tested to create a significant mineral and alteration system.

9. CONCLUSION

The potential of the Barossa Prospect to host economic mineralisation has been downgraded by the NT government co-funded drilling program in 2016. Drilling was successful in that it intersected stratiform sulfide mineralisation in a position well predicted by the geophysical models, however there were no indications of any economically relevant results. Further work is still required to determine whether the source of the VTEM anomalies are adequately explained by drill core results, and only two of the nine anomalies have been tested, however, early indications particularly in the form of assay results and lack of alteration point towards a poorly mineralised environment which has little similarity with the VMS system at Iron Blow or Mt Bonnie.