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WISHBONE GOLD PTY LTD EPM 19633 WISHBONE III ANNUAL REPORT 12 MONTHS ENDING 28/01/2017

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EXECUTIVE SUMMARY

Wishbone Gold Pty Ltd hold EPM 19633 Wishbone III which is located 60 km south of Townsville, North Queensland. This report documents work carried out over EPM 19633 Wishbone III in the year ending 28 February 2017.

Exploration during the reporting period has focused on desktop studies and work program proposal development based on reprocessing of geophysics over the EPM. Terra Search has completed the following work over the Wishbone III EPM 19633 project area:

- Collation of all previous mineral exploration data across the tenement;
- Interpretation of regional geology and geochemistry with respect to findings of the Geological Survey Queensland Metallurgical and Isotope dating Report 2016.

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1.0 INTRODUCTION

This report documents the work carried out over EPM19633 Wishbone III for period ending 28th January 2017. The tenement occurs 60 km south of Townsville, on the eastern edge of the Palaeozoic Ravenswood Batholith. The EPM was taken up to explore mainly for gold mineralisation. Work conducted to date includes compilation of historic open file data and reappraisal of exploration potential with respect to general outcomes of the 2015-2016 collaborative geological, metallogenic and isotope dating project undertaken by Geological Survey of Queensland.

2.0 LOCATION AND TENURE DETAILS

EPM19633 Wishbone III was granted to Wishbone Gold Pty Ltd on 30th January 2013. The area currently totals eight (8) sub blocks (Table 1) and lies within the Mingela (8258) 1:100,000 map sheet area and the Townsville (SE5514) 1:250,000 sheet area, which are in UTM Zone 55. Location of sub blocks and blocks are shown in Figure 1.

Sheet Name	Sheet Reference	Block	Sub Block
Mingela	8258	3273	WX
Mingela	8258	3345	CDE
Mingela	8258	3346	ABC

 Table 1: Sub block identification details.

The tenement forms part of the Wishbone Gold "Wishbone Project" which consists of three granted permits: EPM 18396, EPM 19633 and EPM 19696; with tenement details listed in Table 2. The tenements are located approximately 60 kilometres south of Townsville, in north Queensland. Location and access is shown on Figure 2.

Tenure	Name	Status	Date	Date	Date	Sub
			Applied	Granted	Expires	Blocks
EPM 18396	Wishbone II	Granted	19/11/2009	19/04/2011	18/04/2016	21
EPM 19633	Wishbone III	Granted	13/04/2012	30/01/2013	29/01/2018	8
EPM 19696	Wishbone IV	Granted	9/05/2012	30/09/2013	29/09/2018	40

Table 2: Wishbone Project tenure details.



Figure 1: Tenure Map

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Figure 2: Location Map on topography.

3.0 REGIONAL GEOLOGY

The project area occurs in the Ravenswood–Lolworth Province which consists of Proterozoic metamorphic basement and Cambro-Ordovician sedimentary volcanic and metamorphic rocks intruded into Silurian granitoids (Figure 4; Metals, 1986). The Province is overlain by marine shelf and continental sedimentary rocks of Devonian-Carboniferous age. The Ravenswood-Lolworth Province generally trends east to west and southeast, contrasting strongly to the surrounding provinces. To the north, a northeast trend controls rocks of the Hodgkinson and Broken River Provinces and Thomson Fold Belt to the south; and a north to northwest general trend within the New England Fold Belt to the east and southeast (Wyatt et al, 1970; Levington, 1981).

The Ravenswood-Lolworth Province has been previously mapped and examined by various geologists of the Commonwealth and State Governments in joint parties (Wyatt et al., 1970; Wyatt et al., 1971). These are set out in the 1:250,000 map sheets of the Townsville and Charters Towers area and explained in detail in Wyatt et al, 1970, and Wyatt et al, 1971. Descriptions of the regional geology have been produced in several exploration reports, notably Dalgarno (1967), Metals (1986), Hamilton (1987), Gannon (1988); and James (1997).

Oldest rocks in the area belong to the Charters Towers Metamorphics unit, which outcrop to the north and west of Charters Towers as roof pendants in the Ravenswood Granodiorite Complex (John, 1985). These Metamorphics have been estimated to be Cambro-Ordovician in age (John, 1985). Similar in age are the Kirk River Beds that occur at the head of the Kirk River to the east of the project area. The Kirk River Beds include an assemblage of micaceous shale, siltstone, lithic and feldspathic sandstone; and arkose (John, 1985).

All of the above units were intruded by the Ravenswood Granodiorite Complex (Hamilton, 1987). The intrusion of this complex was accompanied by a major orogeny which destroyed the existing sedimentary basin and produced a structural high which controlled later deposition. The intrusion of the Complex continued into the early Devonian (Hamilton, 1987).

The project area is mainly incorporated in the Ravenswood Batholith, the largest element of the Complex. The Ravenswood Batholith and Lolworth Batholiths were intruded during the Siluro-Ordovician time (Wyatt et al, 1970).

The Ravenswood Granodiorite Complex holds the most geological importance in the area. It extends to approximately 7,500 square kilometres, with most rocks in the project area being underlain by the complex. The Ravenswood Granodiorite complex consists of an older phase of granodiorite and tonalite with minor gabbro, diorite and granite, followed by and a younger phase consisting largely of granite (Wyatt et al, 1970). Rb-Sr dating has given a 481 Ma Isochron (Middle Ordovician) for the first phase and around 420 Ma (Late Silurian) for the second phase (Metals, 1986).

Several attempts have been made to classify rocks of the complex with Clarke (1969) subdividing it into separate phases and recognizing eight distinct subunits of the Batholith (John, 1985). The earliest and most widespread phase is the main granodiorite. The Glenell Granodiorite has been distinguished as a slightly later phase. Several phases of granite and adamellite which are later than the granodiorite have been named by Clarke. These include the Mosgardies Adamellite, the Millaroo Granite and the Kirklea Granite. They are referred to as the late acid phase, as distinct from the main granodiorite phase, on the 1:250,000 geological maps of Townsville and Charters Towers (Wyatt et al, 1970; Wyatt et al, 1971). The Collopy

Formation, of Mesozoic age, forms 'The Bluff'. The complex is intruded by a wide range of basic intermediate and acid dykes whose real ages and affinities cannot usually be determined. However, most are believed to post date the granodiorite (John, 1985). A stratigraphic column of the major lithological units and corresponding mineralisation periods are outlined in Table 1.

3.1 Structure

Some of the biotite and hornblende granodiorites of the first phase are foliated, suggesting a possible Middle Ordovician age for a major deformation event, which, particularly west of Charters Towers, affected the Cape River Beds, Mount Windsor Volcanics and the Charters Towers Metamorphics (John, 1985). The major tectonic episode appears to have been the Siluro—Devonian orogeny which is expressed as a regional upwarp with granitic and early Palaeozoic rocks occupying the axial region. Drag folds suggest slight overturning to the northwest with northeasterly oriented fold axes. Attitudes of the late Palaeozoic rocks reveal more localised areas of disturbance, the orientation of flow banding being the most obvious structural guide for the younger folding. The Collopy Formation is only gently folded with steep dips confined to faulted areas (Dalgarno, 1967).

Jointing and cleavage are developed in the Kirk River and Cape River Beds, and although there is evidence of folding in the Devonian - Carboniferous sequences, induration and jointing are not as pronounced as in these older rocks (Dalgarno, 1967). A striking structural feature lying south of Mingela is the Alex Hill Shear zone, which trends west from House Camp Mill to Marmy Creek. The zone is distinguished in aerial photographs by its strongly linear pattern. The rocks forming this linear pattern were mapped as mylonites in a report on Authority to Prospect No. 360M and were more recently mapped by the GSQ on the 1:100,000 Mingela sheet as Cambrian-Ordovician metamorphics (Figure 3; Rienks et al, 1996). This feature also wholly contains a sandstone outlier known as The Bluff which is regarded as being possibly Devonian in age. The 1:250,000 Townsville geological map sheet defines a broad zone of leucocratic granites adjacent to the shear zone (Wyatt et al, 1970). Some gold mineralisation, though outside the area covered by the Authority, appears to be related to the Alex Hill Shear Zone including Christian Kruck and Commotion and a number of unnamed workings which appear on the 1:250,000 geology sheet (Wyatt et al, 1970). A strong west-northwest fault trend diverges from the shear zone through the northern section of the Authority (Gannon, 1988).

ERA	PERIOD OR EPOCH	ROCK UNIT NAME OR SYMBOL		SYMBOL	RELATIONSHIPS	STRUCTURAL / DEPOSITIONAL ENVIRONMENT	REMARKS
		Qz			Superficial	Alluvium	Main source of underground water
AINOZOIC	QUATERNARY	Sellheim Formation Qe			Superficial	Probably high level deposits of the ancestral Burdekin River. Environment possibly lacustrine	Silicified wood locally abundant. Possibly of Pleistocene age (Wyett el at., 1965, 1969, 1987 and to press)
0	έλοι ν τερτιλόν	Tl					
	EARLI IENIIANI	Tu					
			С	C-Pb3	Intruded Ravenswood Granodiorite Complex, and C-Pb2		Resembles C-Pt2 phase of Tuckers Igneous Complex
		Boori Igneous Complex	С	C-Pb2	Intrudes C-Pb1 with strong shearing at contact. Intruded by C-Pb3	Episonal composite stock	Resembles C-Pt1 phase of Tuckers Igneous Complex
			С	C-Pb1	Intrudes Ravenswood Granodiorite Complex and Carboniferous volcanics (Cur)		Possibly magmatically related to C-Pb2 and C-Pb3 phases
	UPPER CARBONIFEROUS OR LOWER PERMIAN		С	C-Pt4	Intrudes all other phases of Tuckers Igneous Complex.	Episonal composite stock	Small dykes and veins. Other small masses marginal to the complex
			С	C-Pt3	Intrudes C-Pt1 and C-Pt2, Intruded by C-Pt4		Y-shaped sheet intrusion
٢)		Tuckers Igneous Complex	s C	C-Pt2	Intrudes Ravenswood Granodiorite Complex and Carboniferous Breccia (Cur). Intruded by C-Pt3 and C-Pt4		
LAEOZOI				C-Pt1	Intrudes Ravenswood Granodiorite, Complex and Carboniferous volcanics (Cuv). Intruded by, or possibly gradational to C-Pt2		Gabbro similar to gabbroic rocks (O- Dd) of doubtful age which form small masses throughout the Ravenswood Granodiorite Complex
ΡA	UPPER		С	C-Pg	One stock intrudes the Mt Windsor Volcanics.		
	CARBONIFEROUS OR LOWER PERMIAN		С	C-Pg1	A twofold intrusion in the north east of the area (in which C-Pg1 intrudes C-Pg) intrudes the Ravenswood Granodiorite complex	Episonal stocks	
		Cuv			Overlie or intrude the Ravenswood	Extrusives and	
	UPPER CARBONIFEROUS	Cur			Granodiorite complex. Intruded by the Boori and Tuckers Igneous Complexes	associated intrusives	Not appreciably folded. Gold mineralization in intrusive breccia at Mt Wright
	U. SILURIAN OR	JRIAN OR Barrabas			Intrudes Ravenswood Granodiorite Complex (O-Dr)	Post-tectonic intrusion	Associated copper and molybdenum mineralization at Kean's prospect. Isotopic age 394 to 30 m.y.
	L. DEVONIAN	L. DEVONIAN	S-Dbg	S-Dbg		Intrudes S-Db	Differentiate of S- Db

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		Ravenswood Granodiorite Complex	O-Da	Small separate unnamed intrusions. Some intrude the Mt Windsor Volcanics, others O-Dr and some O-Dg	Late stage differentiates	Small granitic masses related to the O- Dg / O-Dk period if intrusions				
			Kirklea Granite O-Dk	Intrudes O-Dr	Late stage differentiate	Lower intrusive contacts mostly gently dipping. Gold mineralization at Kirk. Isotopic age 454 +/+ 30 m.y.				
	MIDDLE ORDOVICIAN AND UPPER SILURIAN OR LOWER DEVONIAN		Millaroo Granite O- Di	Intrudes Kirk River beds. O-Dr, O-Dg. Intruded by breccia (Cur) at Mt Wright	Late stage differentiate	Contact shallowly or moderately dipping. Intruded by numerous dykes. Isotopic age 454 +/- 3.				
			Ravenswood Granodiorite Complex	Ravenswood Granodiorite Mos Complex Ada	Mosgardies Adamellite O-Dm	Intrudes O-Dr; probably intrudes O-Dg, but shearing obscures relationship; intruded by micro granite and micro diorite dykes	Possibly a contaminated differentiate	Southern contact flatly dipping beneath O-Dr. Minor associated gold mineralization. Isotopic age 454 +/- 30 m.y.		
			O-Dc	Intrudes O-Dr; intruded by granite dykes related to nearly O-Dn mass, and by Tuckers igneous Complex	Possible differentiate	No known associated mineralization				
			Glenell Granodiorite O-Dg	Intrudes O-Dr		Minor associated gold mineralization. Isotopic 454 +/- 30 m.y.				
CO									O-Dr	The initial and most widespread phases of the complex
		Kirk River Beds	C-Ok	Intruded by Millaroo Granite	Poorly sorted; graded bedding and turbidity structures	Gold mineralization at Bunkers Hill in Townsville 1:250,000 sheet area				
	CAMBRIAN ORDOVICIAN	Cape River beds	C-Oc	Roof pendant in main granodiorite phase of Ravenswood Granodiorite Complex (O-Dr)		Contact with main granodiorite phase (O-Dr) moderately dipping				
			Mount Windsor Volcanics C-Ow	Intruded by O-Dr, O-Dc, O-Dn, C-Pg. Contact with O-Dr generally faulted		Gold mineralization at Brookville and at various points in Robey Range				

TABLE 3: Stratigraphic column with a classification of gold deposits in the Lolworth-Ravenswood province (from Metals, 1986)



Figure 3: EPM19633 on 1:100K Geology Map.



Figure 4: Gold deposits shown on Aeromagnetics.

The majority of the EPM is covered by Quaternary alluvium derived from surrounding granitoids, metamorphics and sediments. One historic gold working is located within the Quaternary sediments in the centre of the EPM. In the northwest of the EPM Ordovician–Silurian Granitoids outcrop which host a line of deposits south of the EPM namely Cowhead Mountain (Au), Cowhead Reef (Cu), Mount Sulphide (Ag-Au), and Mount Sulphide East (Au-Cu; Figure 4). These deposits lie just north of the large mineralisation related Alex Hill Shear Zone. This zone separates the Granitoid intrusion to the north with an assemblage of Charters Towers Metamorphics, Neoproterozoic–Cambrian in age. The rocks of the metamorphics consist of mica schist; quartz-feldspar-biotite gneiss; hornblende schist; cordierite, andalusite and staurolite hornfels; chlorite schist; and marble. A small pocket of sandstones and conglomerates belonging to the Collopy Formation of late Devonian age is outcropped within the extensive Alex Hill Shear Zone south of the EPM. A further intrusion of pink to greenish grey, medium to coarse-grained, porphyritic biotite granite known as the Pocket Dam Granite outcrops to the south of the EPM (Rienks et al, 1996). This intrusive hosts several small gold deposits including Oaky Creek, Bex, as well as an unnamed small Cu occurrence.

Several other significant intrusive rock units have been mapped throughout the south of the EPM and host small gold and base metal deposits. These include the Brittany Granite which hosts the City of Melbourne (Au); the Ordovician – Devonian aged Ravenswood Batholith responsible for hosting the Mountain Maid (Au), Mount lyle (Au), Grass Hut (Au); as well as the Yulga Tonalite, not yet related to mineralisation (Figure 4; Rienks et al, 1996).

3.3 Deposit Types

On the basis of accumulated evidence, the gold deposits of the Lolworth-Ravenswood Province fall into two dominant styles and ages:

- Granite hosted mesothermal gold veins often classed as "plutonic" eg. Charters towers charters towers style quartz veins, with recorded ages of around 400 Ma (Devonian) that are similar to the age of many of the granites in which they are hosted; and
- Intrusive related gold systems associated with breccias and regarded as having high level sub volcanic (porphyry) affinities, eg. Mount Leyshon and Ravenswood-Mount Wright. Lower temperature, high and low sulphidation epithermal style precious metal deposits also well developed in the Drummond Basin to the south, eg. Pajingo and Silver Hills. Younger ages of around 290 Ma (permo-carboniferous).

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Figure 5: Porphyry, plutonic and epithermal styles of gold mineralisation in different igneous associations in North Queensland (modified from Morrison and Beams, 1995).

3.4 Plutonic Charters Towers Style Gold Lodes

Peters (1987) produced an excellent account of the Charters Towers lode gold mineralisation style, building on the detailed pioneering work of Jack, Reid and Connolly. The Charters Towers veins are regarded as deeper level or mesothermal and probably magmatic related lode deposits. Through going quartz veins infill fissures and faults. Gold bearing shoots occur within the veins at structurally controlled locations, eg. plunging shoots at the intersection of veins with planar features such as dykes or other faults. Many of the shoots occur along kilometre scale fault zones predominantly hosted by granitic rocks. The lodes of Charters Towers are typically narrow (0.3–1.2 m wide), high grade veins. Infill material varies along the fractures and the veins frequently display pinching and swelling. Associated sulphides are locally up to 5-10%. Sulphides are dominated by pyrite, galena and sphalerite. Historically throughout the Charters Towers district, prospectors have positively correlated high galena with gold grade. Wallrock alteration consists of narrow (2–3 times the lode width) selvages of intense sericite alteration adjacent to the quartz-sulphide veins.

Campbell and King (2012) neatly summarise recent research into mesothermal intrusive related systems with particular reference to North Queensland. Fluid inclusion data, for example, distinguished deposits such as Charters Towers from higher level epithermal deposits on the basis of higher salinity and relatively higher pressures and greater depths (Goldfarb et al., 2005; Kreuzer, 2003).

According to Kreuzer (2003), samples from the Charters Towers mines and the Rishton-Hadleigh Castle mines were isotope dated and found to be the same age within an indistinguishable range, indicating synchronous formation of auriferous veins dated at 404-408 Ma (Late Silurian to Early Devonian geological age) and spread across a significant segment of the Ravenswood Batholith host. Kreuzer (2003) has also made a number of additional conclusions on the mineralization in the District that relate directly or indirectly to potential mineralization in the Blue Doe area east of Mingela. These are:

- Nitrogen isotope data indicates that the granitoid hosted gold mineralization is derived from deep seated, granitic plutons or metamorphics and has risen through the crust to its present position uncontaminated by near surface ground water.
- Fluid inclusion studies on vein samples from the Brilliant, Day Dawn and Queen Reefs Mines in the Charters Towers area using petrography, microthermometry and laser Raman spectroscopy indicate that formation pressures of the gold bearing veins are equivalent to depths of 5 to 14 km. Mineralogical studies on gangue rock, alteration and metamorphic minerals support this range. The preferred depth range of formation is 5 ± 2 km. This is supported by Peters and Golding (1989).
- Oxygen and hydrogen isotope fractionation data indicate a formation temperature ranging from 170° to 360°C with a preferred value of 310°C. This temperature range is supported by studies of fluid inclusions, textures and wall-rock alteration mineralogy (also see Peters and Golding, 1989).
- The low permeability intrusions of the Ravenswood Batholith restricted and focused the ascending fluids rising from deep in the Earth's crust. Sudden fault rupturing focused the fluid flow into the active lode structures, precipitating gold and base metals by fluid mixing and subsequent chemical and pressure changes to the fluid.
- Geological and geophysical data indicate that the Charters Towers mineralization was not subjected to further significant deformation after the gold mineralization formed.
- The host structures in the Charters Towers area are characterized by vertical continuity to at least 1.3 km based on previous exploration drilling and previous mine workings (Towsey, 2005; Reid, 1917).
- The veins are located on the margins of gravity lows that coincide with distinct intrusions or complex igneous bodies (Towsey, 2005; Kreuzer, 2003).
- The deposits are hosted by country rock comprising mainly oxidized I-type granites, granodiorites and tonalities. I-type granites are derived by remelting of original igneous rock (Kreuzer, 2003; Peters, 1987; Towsey, 2005).

Studies on wallrock alteration by Kreuzer (2003) and Corbett and Leach (1995) indicate that the fluid was slightly acidic to near neutral (pH 5-6). They apparently agree that the oxidizing fluids have produced the red "hematite" alteration, destroying magnetite where it is in contact with the fluids and creating local magnetic lows. This creates a geophysical signature for exploration of de-magnetized areas adjacent to gravity lows (Towsey, 2005).

Current exposure of the Ravenswood Batholith is at its roof zone, meaning that there is a high probability that most of the gold bearing system is intact and has not been eroded away and dispersed, although reports of the Collopy Formation shedding gold to the drainage in the Mingela area may indicate that erosion and dispersion of at least some of the in place gold mineralization has occurred, (also see Towsey (2005) and Hutton et al. (1997)).

Studies by Dowling and Morrison (1989) and Kreuzer (2003) and Towsey (2005) of quartz veins from over 200 gold mines in North Queensland indicate that the Charters Towers gold bearing veins are typical of granitic rather than sub volcanic hosts. Campbell and King (2012) conclude that there is consensus amongst researchers and explorers who have worked on the Charters Towers vein systems that there is potential for additional gold bearing veins of economic significance to be discovered away from the gold deposits in the immediate Charters Towers

area, which suggests that the outlying areas may contain undiscovered deposits of economic interest. One important point about the Charters Towers vein systems that Campbell and King (2012) highlighted was that lodes have been mined down dip for more than 900 metres vertically. Drilling has intersected mineralization grading over 20 g/t gold at depths of over 1,200 metres. Although the host rocks for the mineralization have different local names when compared to those in the Mingela area (separated by only 40 km), the date of mineralization is the same.

3.5 Intrusive Related Gold Deposits

North Queensland intrusive related breccia systems are large bulk tonnage systems which can have an extensive depth extent, well in excess of 500 m vertical depth. Significant polymetallic mineralisation accompanies the hydrothermal system, present as sulphidic veins and alteration. These features are illustrated in Figures 6-7 for the multi million ounce gold breccia systems at Mount Leyshon and Mount Wright. According to Sillitoe (1991), intrusion related gold mineralization has the following characteristics:

- Metaluminous, subalkalic intrusions of intermediate to felsic composition that span the boundary between ilmenite and magnetite series;
- CO₂ bearing hydrothermal fluids;
- A metal assemblage that variably includes gold with anomalous bismuth, tungsten, arsenic, molybdenum, tellurium and/or antimony; and typically has non economic base metal concentrations;
- Comparatively restricted zones of hydrothermal alteration within granitoids; and
- A continental tectonic setting well inboard of inferred or recognized convergent plate boundaries.

Intrusive related systems discussed here may also contain significant associated metals such as copper and molybdenum mineralization. It is possible that some gold-bearing systems may lead into copper-gold porphyries or molybdenum-bearing intrusive systems.

Most centres of Permo-Carboniferous intrusive-extrusive activity in North Queensland occur in occasionally subtle but nonetheless clearly defined corridors which have various orientations. A northeast trending alignment of intrusive-extrusive and breccia complexes is prominent in the Leyshon and Pajingo corridors. These probably represent deep seated transcurrent structures or faults associated with development of the northeastern Australia continental margin in the late Palaeozoic. Key prospective characteristics of the Permo-Carboniferous, intrusive related gold mineralised systems in North Queensland are:

- Development along northeast trending mineralised corridors representing fundamental deep seated structures;
- Association with circular reversely magnetised features;
- Association with elevated base metal and porphyry-magmatic related geochemistry; and
- Extensive vertical development, with the concomitant possibility thatmineralisation will develop into large bulk tonnage deposits. For example Mount Wright, Mount Leyshon (Figure 6) and the Welcome Breccia (Figure 7) are all developed over a vertical extent of several hundred metres to more than one kilometre.



Figure 6: Model of Mount Leyshon intrusive and breccia system (Orr, 1995).



Figure 7: Cross section of drilling results by Resolute Mining at the Welcome Deposit Resolute Mining Limited Annual Report (2011).

The Mount Leyshon corridor also intersects the Alex Hill Shear Zone within the vicinity of the EPM. The 1988 announcement by Gold Mines of Kalgoorlie Ltd (GMK) of an indicated open pit resource of 0.63 million tonnes grading 3.1 g/t Au at Althea/Christian Kruck, just to the west of the EPM testifies to the importance of this area.

4.0 EXPLORATION BY WISHBONE GOLD

The main activity undertaken by Wishbone Gold during the 12 months to 28 January 2017 was a further desktop study including a full evaluation of previous exploration over the Wishbone III tenement to support the permit application. Findings of the 2015-2016 collaborative geological, metallogenic and isotope dating program by Geological Survey of Queensland (GSQ; Beams and Morrison, 2016) was also participated in by Wishbone Gold by way of providing unpublished company work in these tenements.

The GSQ Report has been reviewed by Wishbone Gold with respect to any significant findings that may alter the areas and style of exploration activities; consequently Wishbone Gold held off from advanced fieldwork activities until the GSQ project was completed and the final report made available. The following details all relevant previous exploration over the EPM area.

4.1 **Previous Exploration**

4.1.1 Geology and Geochemistry

Mining and exploration in the Mingela Project area falls naturally into three distinct periods:

- i) Historical gold and polymetallic mining 1868-1920;
- ii) Predominantly base metal exploration 1959-1982; and

iii) Predominantly gold exploration 1982–2000, with minor emphasis on Cu-Au and polymetallic targets.

The general exploration approaches in these periods are outlined below, together with summary results of the key explorers. The previous extent of drilling and mineral occurrences are presented in Figure 8. Previous extent of surface geochemistry including stream, rockchips and soils are presented in Figures 9-11.

4.1.2 Historical Gold and Polymetallic Mining in the Ravenswood and Charters Towers areas

Geological observations were made by some of the earliest explorers over 100 years ago. Gold was discovered in the Ravenswood district in 1868; in Charters Towers in 1871 and in the Kirk field about the same time. Various reports have been prepared by the Geological Survey of Queensland geologists on mines in the district including a report on the Kirk diggings by Morton in 1938. Many reports cover the old mines and prospects in the Ravenswood district, which is to the southeast of the EPM (John, 1985).

The Queensland Mines Department drilled four diamond drill holes beneath Mount Wright in 1955-56 (Connah, 1956). These indicated that possible lateral extensions beyond the open cut were confined to a small area to the southwest and that at about 15 m below the open cut floor the mineralised zone averaging 6.0 to 7.5 g/t Au was about 360 square metres in area (Hewlett, 1985).

MAT Exploration Pty Ltd in 1969 conducted a drainage geochemical survey for base metals in the area. A total of 302 stream sediments were collected and assayed for Cu, Pb, Zn and Sb. All streams draining Mount Wright were anomalous in Pb and Zn. These anomalies were concluded to relate to the presence of known Mn-Zn-Pb lodes of no economic significance. The 1970 program by MAT was largely concerned with testing for a large tonnage low grade gold deposit of breccia pipe style at Mount Wright. They geologically mapped Mount Wright in detail paying particular attention to hydrothermal alteration and brecciation around the "Mother Lode" open pit. In an attempt to find pathfinder elements for gold to use in geochemical soil and rock sampling they reassayed 59 samples previously assayed for Au only, for Ag, As, Sb, Cu, Mo, Pb and Zn. No consistent correlation was found between high Au and any other element and so further geochemical sampling was not attempted (Hewlett, 1984).

Assay results were generally disappointing with a majority of values in the vicinity of the breccia pipe assaying between 0.1 ppm and 0.7 ppm Au. Seven values above 1.0 ppm Au were encountered, with a maximum of 4.5 ppm Au. It was concluded that the chances of economic mineralisation at Mount Wright were negligible and the ATP was relinquished. Twelve percussion holes totaling 1124 ft. (341.6 m) were drilled within the ATP away from Mount Wright and 25 holes totaling 2567 ft. (780.3 m) were drilled on a grid pattern at 65 m centred on Mount Wright (Hewlett, 1984).

4.1.3 Historical Gold and Polymetallic Mining in the Mingela area

Up until the 1980's limited prospecting had been undertaken on many of the old workings around the Mingela region, with the bulk of the work being centered on the mining leases of Christian Kruck, Welcome, Evening Star and Sulphide Mountain (Metals, 1986).

It is reported in the Geological Survey of Queensland Bulletin that early prospecting was carried out in a haphazard manner with little really bona fide work. The historic workings were selectively developed on vertical "felsic" dykes and quartz reefs in the country rock, and this material was handpicked (Metals, 1986).

4.1.4 Predominantly Base Metal Exploration 1959-1982

Camira Mines N.L. thoroughly summarised all previous base metal exploration in CR14258. Investigations by companies include work done by North Broken Hill Ltd. in 1959-60. They drilled Keans Prospect and Titov Prospect for copper-molybdenum, but grades appear to have been low (John, 1985). New Consolidated Goldfields Australasia Pty. Ltd. carried out further work in the area around the two prospects in 1966 and 1967. This included 2 diamond drill holes near the Titov Prospect. Results were not encouraging, so the project was abandoned (John, 1985).

Planet Metals Ltd carried out drainage geochemical sampling, soil geochemical sampling and a diamond drilling programme. Porphyry copper and molybdenum deposits were their targets and they eventually withdrew. Drilling encountered mainly pyrite mineralization and it is understood that further work did not produce encouraging results (John, 1985).

Aberfoyle Exploration Pty. Ltd. also summarized the previous exploration well in CR13241.

Anaconda Australia Inc. explored for porphyry copper deposits in the area in 1966 and investigated numerous small shear related copper showings within narrow linear alteration zones to the north of Mount Wright around Oaky Creek. They concluded that the occurrences were of no economic importance (Hewlett, 1984).

North Broken Hill Ltd geologically mapped and sampled Mount Wright during the early 1960's. They obtained gold values from 0.6 ppm Au to 11.4 ppm Au and concluded that insufficient tonnage of higher grade material existed to warrant further testing (Hewlett, 1984).

Kinmine Mining Pty Ltd from 1979-82 in conjunction with Eastern Copper Mines NL concluded that a broad zone of significant Au-Ag mineralisation exists on the south flank of Mount Wright associated with sulphide rich zones of altered granite. High order Cu-Pb-Zn values were found occurring close to the Mount Wright intrusion. They concluded there was little potential or encouragement for the discovery of bulk tonnage low grade gold-silver mineralisation outside the areas of known mineralisation, which were held under mining leases by various individuals and/or mining companies. In addition, Eastern Copper investigated alluvial gold occurrences around Elphinstone, Plumtree, Connolly and Four Mile Creeks. Samples were assayed for Cu, Pb, Zn and Au. Gold was detected in five samples of alluvium from Elphinstone and Connolly Creeks. It was recommended that bulk sampling be conducted; it is not known if this was done (Hewlett, 1984).

4.1.5 Predominantly Gold Exploration in Period 1982-2000

Camira Metals (EPM2642) undertook a regional pan concentrate survey on the streams which encompassed the area of the EPM and surrounding to the north, west and south. Many areas within the EPM were specifically not targeted due to the problems with extracting a concentrate in the granite country. Camira Metals held several mining leases throughout their exploration program including Himalaya, Margaret, Mount Sulphide, Mount Wright, and the Silver Valley Area. Background geochemical values were obtained for each site however they were later relinquished due to unfeasible economic interest by the company (John, 1985).

Aberfoyle Exploration Pty. Ltd. (3578) targeted a stretch of ground from the eastern half of the EPM southeast to Mount Wright. The main exploration target was a large tonnage (greater than 500,000 tonne) gold deposit amenable to open cut mining methods. Preliminary reviewing of the previous exploration allowed Aberfoyle to target five main mine workings notably 'Ravenswood Boulder', 'Outsider', 'Old Dominion', 'Big Ben' and 'Wild Irish Girl' (Hewlett, 1984). Aberfoyle's exploration program included air photo interpretation, stream sediment -60 mesh sampling, and follow-up reconnaissance geological mapping and sampling. Rock sampling following air-photo interpretations revealed breccia pipe occurrences at the 'Mother Lode' open pit. Further sources to 12 stream sediment gold anomalies were ascribed to contamination from the Mount Wright gold mine workings, numerous narrow quartz veins occurrences of no economic significance, and alluvially transported sands and soils carrying anomalous gold (Hewlett, 1985).

Following the development of Landsat linear and mineral field interpretation, Metals Exploration Ltd targeted the Mingela region for its considerable potential for further economic accumulations of gold in quartz vein fissure style and greisen type deposits. (Metals, 1986). Exploration methods included reconnaissance sampling and mapping of eight main gold occurrences (City of Melbourne, Grass Hut, Christian Kruck, Milnes Reward, Weany Creek Diggings, Rose of Allandale, King Solomon Mine, and Welcome). The field work indicated: The highly anomalous nature of all the areas sampled; a strong structural component in the control and distribution of mineralisation, with the best gold values are associated with the Alex Hill Shear Zone; the potential for conjugate fault – set mineralisation in nearly all areas; the presence of wall rock alteration, and fe-metasomatism in the host rock surrounding the lode-structures; disseminated sulphide mineralisation in the form of pyrite, arsenopyrite, galena, sphalerite and tertrahedrite (up to 180 ppm Ag); a close relationship between late acid phases and altered granodiorite-tonalite-diorite is favorable for gold mineralisation; pervasive potassic alteration is a conspicuous feature extending about 100 metres on either side of the mineralized zone; gold values appear to be restricted to narrow stockworks of quartz veins and to leaders and reefs which generally follow regional and / or fault plane trends; the low grade mineralisation could be more widespread in zones of extensive hydrothermal alteration (Metals, 1986).

Gold Mines of Kalgoorlie went on to follow up several of the target areas mapped out by Metals Exploration Pty Ltd under the same EPM. Target areas included The exploration methods included Althea / Christian Kruck, Chas Madge, Grass Hut, Kitty Cummins, Milnes Reward, Rose of Allandale, and Welcome. The exploration methods used throughout the program included stream sediment, soil, and rock chip sampling, reverse circulation drilling, rotary air blast drilling, diamond drilling, airborne and ground magnetics, airborne radiometrics and induced polarization surveys (James, 1999). The program was stopped prematurely after a change in company management and reports can not be located (James, 1999).

Newmont Australia Ltd on behalf of the Ellenvale Joint Venture with Epithermal Gold, conducted a helicopter borne stream sediment survey on the Ellenvale area (Hamilton, 1987). Target areas included Mount Norman, Ross River Mountain, and Surgeons Lookout. A total of 24 values in excess of 1.0 ppb Au were collected. This survey outlined 15 anomalies with 9 of them being resampled, with some of the original anomalous values not being able to be repeated during the follow up rock sample values. Causes of the positively identified anomalies were attributed to: minor base metal mineralisation of skarns developed at the contact of Permo-Carboniferous granite and the Fanning Group; higher background values of the late stages of the Permo Carboniferous Granites; reworking of alluvial gold from the Mesozoic Collopy Formation (Hamilton, 1987).

In a photo geological study of the area, Australian Overseas Mining Ltd (AOM) found that the Welcome prospect appears to lie on an arcuate structure forming an east-west alignment with the Milnes Reward trend of workings before swinging north-westwards towards a prominent silicified dyke. They noted it is possible that this arc structure forms the southwest quadrant of a larger ring fracture (Gannon, 1988). AOM targeted several prospects within their north and south blocks, to the west of the EPM, including Nosita Prospect, Evening Star / Leviathan, The Range, Banana, Breadfruit Creek, Exelry/Eneby, Fanning Downs, Maidavale, Mitchell, One Mile Creek, Pinnicles, South heathfield, Station Creek, Sullivans Reef, Tea Tree Creek, Well Creek, Windsor Dam (Holtzmann, 1990). Exploration included a stream sediment program, rock chip sampling and regional sampling and remote sensing. Au was determined through the aqua regia method and assays >0.5 g/t were redetermined by fire-assay. Significant Au grades were obtained in the northern block including 12 ppm (Banana), 9.0 ppm (Nosita), 30 ppm (Sullivans Reef), as well as at the southern block with 8.5 ppm (Mitchell), 15.0 ppm (Breadfruit Creek), and several other prospects yielding grades between 1 ppm and 2.65 ppm Au.

Dalrymple Resources Pty Ltd used the field assistance of Terra Search Pty Ltd employees to conduct several stream sediment and follow up rock chip surveys in an area enclosing the eastern portion of the current EPM and extending to the east and north. Several anomalous

regions were targeted including Bluff Creek, Bluff North, Cicada / Hanging Valley, Four Mile, Hill Top, Horse Camp Mill, Kings Cross, March Fly, Oaky Hill North and West Haughton (Beams, 1991). A BCL stream sediment sampling program with reconnaissance rock chip sampling identified four prospects including Bunkers Hill, Oaky Mill North, Oaky Mill and Hilltop. Oaky Mill grab samples returned assay values of 5.34 g/t, 2.69 g/t and 23.20 g/t Au (Lesh, 1988).

Hilltop Prospect (11 km east of Grass Hut) consists of a 1.5 km along strike 50 cm wide milky quartz vein returning rock chip values of 0.3 g/t Au, 900 ppm Pb, 20 g/t Ag, and 0.12% Cu (Lesh, 1988). A regional BCL sampling survey returned fourteen samples with assay values in excess of 5 ppb Au with a maximum of 137 ppb Au (Ryan, 1989). Kings Cross Prospect (4 km west of Mount Sulphide) has returned drainage BCL samples with values of 15.7, 2.2, 11.9, 16.5 and 1.7 ppb Au with rock chip returning up to 0.1 g/t Au (Ryan, 1989).

Regional rock chip samples returned assay values up to 23.6 ppm within the Mount Sulphide area (Ryan, 1989). Pan Concentrate stream sediment sampling returned values of 60.7 ppm Au equating to 0.93 ppm "Alluvial Grade" in the Cicada Prospect with maximum BCL stream sediment value of 137.0 ppb Au (Beams, 1989). Hanging Valley also produced anomalous pan concentrate alluvial gold with sample values such as 4.69 g/t, 12.85 g/t, 6.85 g/t, 9.36 g/t and 7.39 g/t (Beams, 1989). Further mapping including magnetic susceptibility surveys of the prospects and important lithologies was also included in the exploration program (Beams, 1990).

Of Dalrymple's exploration program, 47 BCL samples returned values over 1 ppb in close proximity to the EPM. Indications are that the whole thickness of the coarse sandstones and conglomerates of the Devonian to Carboniferous Collopy Formation is shedding gold. Limited alluvial grade calculations indicated this detectable coarse gold only translates to 0.05 to 0.1 g/t Au (Beams, 1990). Metana Minerals conducted a short exploration program consisting of three reconnaissance trips during June 1988, completing rock chip and minor stream sediment sampling. Results were found to be discouraging (Davis, 1989).

Pioneer Minerals Australia Ltd also undertook a short exploration program with 28 stream sediment samples and 10 rock chip samples collected over its two EPMs. Two anomalous gold samples and associated base metal anomalies were taken from the Black Mountain greisen zone (Syvret, 1990). MIM exploration considered the area for its potential to host mesothermal vein (Ravenswood or Christian Kruck) style and subvolcanic breccia complex (Mount Leyshon or Mount Wright) style mineralization (James, 1999). Work included geological mapping, reconnaissance heliborne regional traversing, rock chip, stream sediment sampling, soil sampling, costeaning, plus percussion and diamond drilling of potential target areas. Geophysical methods have included ground magnetic and heliborne magnetic and radiometric surveys plus gravity, IP and CSAMT/MIP surveys in the vicinity of Ravenswood (James, 1999).

Follow up of anomalous BCL samples returned samples with values of 2 ppb, 7 ppb, 4 ppb and 6 ppb Au with associated base metal anomalies, within and around the eastern margins of the EPM. MIM found these values discouraging and did not follow up on these anomalies (Summers, 1994). A soil survey along the Alex Hill Shear Zone roughly 12 km east of the northern extent of the EPM returned values of 1.1, 5.8, 3.4, 13.2, 1.4 and 2.8 ppb Au, with anomalous base metal values (James, 1997). Stream Sediment Sampling just to the east of the EPM extents returned values of 3.9 ppb Au and 1.6 ppb Au on the western margin of the EPM (James, 1998).

Mingela (within EPM area)								
Prospect	Years	Au (kg)	Ore (tones)	Grade (g/t)				
Seven Mile Creek	?	?	?	?				
	iii							
Su	rrounding Pros	pects (outside of	EPM area)					
Prospect	Years	Au (kg)	Ore (tones)	Grade (g/t)				
Grass Hut	1887-1910	68 (Bullion)	2014	33.76				
Mount Sulphide	1934-1940	1.86	64	29.06				
		21.21 Ag	"	331.40				
Rose of Allandale	1900	0.325	24.4	13.32				
	1935-1951	17.014	614.7	27.68				
Rose of Allandale	1940-1941	2.644	73.12	36.16				
No. 1 SW								
Rose of Allandale	1940-1941	?	?	14.0				
No. 2 SW								
Rose of Allandale	1940	?	?	23.0-31.0				
No. 1 NE								
King Solomon	1893-1900	2.737 (Bullion)	45.7	59.9				
Christian Kruck Reward	1893-1896	1.8	31	58.06				
New Caledonian	1906-1931	467.5	?	30				
Native Bee East	1940-1941	0.42	45	9.33				
Kitty Cummings	1933-1936	4.65	340	13.68				
City of Melbourne		56.7	1983					
		(2000ounces)						
Welcome	1906-1953	91.0	3658	25				

4.2 Historical Gold Production for Mingela Prospects

Table 4: Historical gold production in the Lolworth-Ravenswood Province (Dalrymple Resources Pty Ltd, 1988).

4.3 Mining History in the Mingela Area

Aberfoyle Exploration Pty Ltd summarised several mining operations within their EPM3578, within the Mingela area but outside of the Wishbone EPM.

- Numerous small shear related quartz vein and lode type occurrences worked for gold and silver occur throughout EPM3578 principally to the west of Mt. Wright and in the southern part of the EPM. These include shows such as "Ravenswood Boulder", "Outsider", "Old Dominion", "Big Ben" and "Wild Irish Girl". Production statistics are not known (Hewlett, 1985).
- The main producer of gold within EPM3578 was Mount Wright from the "Mother Lode", a breccia pipe, with production from 1917 until 1929 with further production from 1938-1942. This production (incomplete) was 5982 tons of ore, which yielded 474 oz of bullion (about 350 oz Au); 197 tons of concentrate yielded 1,106 oz Au, 700 oz Ag and 1.06 tons Cu (Clarke, 1971, p.43).

Camira Mines N.L. also summarized several mining operations within their EPM which is in the vicinity of the EPM and is therefore important to Wishbone Gold Pty Ltd.

 <u>Grass Hut Area</u> - Mining commenced some time before 1887 and work was intermittent up to 1910 (Levingston 1974). Country rock is hornblende granodiorite of the Ravenswood Granodiorite Complex. The veins are very steep and are composed of white quartz with pyrite, and some calcite in places. (John, 1985).

- <u>The City of Melbourne</u> Workings were the deepest of the area, and went down to about 100 metres. Three shafts are sited over a strike length of about 275 metres. Total recorded production to 1910 is 1,983 tons for 2,000 ounces of bullion ranging from 400 to 700 fine (John, 1985).
- <u>Fanning Area</u> There are a number of prospects in the Fanning area, southwest of Mingela. Many are north of the Flinders Highway. Of those south of the highway, there are two prospects within A to P 2642M. These are Butterfly and Native Bee East (John, 1985).
- <u>Butterfly (formerly Native Bee)</u> Six shafts were sunk over a length of about 105 metres. They only reached 9 to 12 metres in depth, but one shaft did reach 18 metres. At the bottom of this deeper shaft a drive followed a fissure which dipped about 60°SW. This contains quartz veins. At the end of the drive a 2-metre crosscut followed another fissure dipping SE at about 70°. This is associated with a diorite dyke. Nothing payable was reported (John, 1985).
- <u>Native Bee East</u> The lode is in altered diorite. This is probably a dyke in red granite country rock. The association of mineralization with dykes has been seen in other localities. Workings extend over a length of 76 metres in which there are 8 shafts, but none go deeper than 6 metres, except the main shaft which is 19 metres. There are drives from the main shaft at 9 metres, 11 metres and 15 metres. The vein was reported to be about 3 cm. wide with pyrite and galena. Recorded production is 45 tons of ore for 14 ounces of gold in 1940-41 (John, 1985).
- <u>Mount Sulphide</u> This vein was prospected in 1934-35 and in 1940. It is up to 1 metre in width and it contains quartz, pyrite, chalcopyrite, galena and sphalerite. Records indicate that 64 tonnes of ore were treated with a return of 62 ounces of gold and 707 ounces of silver. Workings only reached 10 metres, and local knowledge has it that gold values become better at depth. This area is being held by Camira Mines NL under mining lease applications (John, 1985).
- <u>Himalaya and Margaret</u> The most important old workings within the boundary of A to P 2642M are the Himalaya and Margaret properties. These are in the extreme south of the A to P, where it becomes a small southern lobe protruding from the main body of the A to P. These two properties are now controlled by Camira Mines N.L. Other old mines in the vicinity the old Kirk Mining Field are the Crescent, Morning Star and Three Sisters. These are outside the A to P. The last named mined was the deepest in the district and has been reported to have reached 430 metres in depth (John, 1985).
- <u>Buck Reef</u> This reef is found to the south of Sulphide Mountain. It outcrops in the bank of Crooked Creek and runs southwards up to the top of the ridge above. The strike is N15E with a very high dip to the west. Width varies from around 4 metres on the top down to about 2 metres in the creek bank. At this point there are carbonates in the footwall. On the hillside the vein is mainly buck quartz, hence the name. Two samples were taken near the top of the hill and the third was from the creek bank. There is nothing of interest in Buck Reef and no further work is justified (John, 1985).
- <u>The Bluff</u> The Bluff is made up of Mesozoic sediments, mainly sandstone and conglomerate. There are no old prospects in these rocks, but two samples were taken from two separate conglomerate beds to test for background values (John, 1985).



Figure 8: Extent of previous drilling and mineral occurrences in vicinity of Wishbone tenements.



Figure 9: Extent of previous surface stream geochemistry.

Figure 10: Extent of previous surface rock chip geochemistry.

Figure 11: Extent of previous surface soil geochemistry.

5.0 EXPLORATION DURING CURRENT REPORTING PERIOD

Data from regional aeromagnetics and radiometrics have been subsetted around EPM19633. The reprocessing, quality control assurance and presentation of data were performed by geophysicist Mr Tim Beams, at Terra Search Townsville Office. The aeromagnetic data was gridded and imaged using Geosoft's Oasis software. Source of the aeromagnetic data is the Fifth Edition of the Magnetic Map of Australia, Geoscience Australia 2010.

No fieldwork was undertaken in the reporting period, as Wishbone Gold were keen to await the report of the Geological Survey of Queensland for their collaborative geological and metallogenic study of the Charters Towers – Ravenswood – Mingela areas, which was reported in October 2016 (Beams and Morrison, 2016). Implications of that study are now being assessed with respect to confidently planning forward work.

6.0 IMPLICATIONS FOR EXPLORATION AND RECOMMENDATIONS

The airborne magnetics and radiometrics in conjunction with the limited mapping and sampling within the tenement complete the current data set and understanding of EPM19633. Surface exploration within the EPM will be difficult due to the Quaternary alluvium covering the majority of the tenement. Incorporation of ground magnetic modelling and airborne magnetic data will be used to identify the major and possible unnoticed structures beneath cover. It is evident that the processed aeromagnetics have given some explanation to the intrusive nature of the geology masked beneath the Quaternary Alluvium. The advanced reprocessed RGB magnetics in particular identify a strong correlation between previous discoveries and the deep blue trending linear features. It is reasonable to assume that these linear features are projecting the trend of potentially mineralised structures throughout the region. Several of these structures crosscut the tenement producing primary targets for follow up ground magnetics and drill targeting.

Potential for discovering similar mineralisation styles as those occurring within the area are certainly possible given the relatively untested nature of the tenement. Drilling will be necessary to test any targets identified during the initial phases of exploration to gain an understanding of the underlying geological framework and controls on mineralisation.

Other prospective areas within the EPM have been outlined for follow up on the ground. Of considerable interest is the east-west trending structure in the northwest of the tenure, parallel to the regional Alex Hill Shear Zone. This structure and its relationship with the high level felsic intrusive to the west are of great significance and provide initial targeting for contact exploration. There may also be potential for alluvial gold within the Quaternary alluvium. Further understanding of the relationships between stratigraphy and mineralisation will further exploration programs into the future.

Figure 12: Recommended primary target areas in EPM19633 with overlaying regional 1:100,000 geology.

Figure 13: Exploration target areas in EPM19633 on RGB overlay of RTP Aeromagnetics and 100k Geology outlines.

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