MLN1123 Annual Technical Report

05 JAN 2016 – 04 JAN 2017

Title Holder: Mount Isa Mines Limited

Operator: McArthur River Mining Pty Ltd

Commodities: Zn & Pb

Bauhinia Downs 1:250,000 SE53-3

Borroloola 1:100,000, 6165

Date	7th of February, 2017
Department, Area	McArthur River Mine Technical Services, Geology Department
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Abstract

The McArthur River mine is one of the world's largest zinc, lead and silver mines, situated about 70 kilometres southwest of Borroloola, near the Gulf of Carpentaria in the Northern Territory. It is operated by McArthur River Mining (MRM), a subsidiary of the Swiss mining company Glencore.

Although discovered in the 1950s, when it was originally named the HYC ("Here's Your Chance") deposit, mining operations did not commence until 1995. MLN1123 sits contiguously with MLN1122 which encompasses MLN1121 and the open pit area. Tenure for the lease was granted in 1993.

MLN1123 contains support infrastructure for the McArthur River Mine, including the tailings dam, the camp area and the majority of the runway. Normal mining operations took place throughout the year with most of MLN1123 being utilised for mining operations infrastructure and mine access routes.

During the reporting period, two exploratory programs were completed. This included a geophysical survey using Electrical Resistivity Imaging (ERI) as well as a drilling program. The aims of the ERI survey were to:

- Define key geological structures influencing groundwater pathways; and,
- Identify drill targets to define these structures further.

The drilling program aimed at:

- Identifying targets of potential high groundwater transport as defined by the ERI Survey;
- Waste Characterisation; and,
- Instrument installation.

The ERI survey identified two targets for drilling which were drilled during the 2016 reporting period. These drillholes identified faulted structures throughout MLN1123. A total of 100 samples (including QAQC) from the waste characterisation drilling were submitted to ALS Brisbane with 74% of returned samples considered environmentally benign.

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Location

The McArthur River Mine is located 70 kilometres southwest of the township of Borroloola in the Gulf Region of the Northern Territory, approximately midway between Darwin and Mount Isa (Figure 1).

Figure 1: McArthur River Mine site location (Grenfell, 2012)

The mine site is contained within five contiguous leases (MLN1121, MLN1122, MLN1123, MLN1124 & MLN1125), located on McArthur River Station Pastoral Lease. The bulk of the mine's infrastructure is located on Barney Hill, on the western end of MLN1122. The layouts of the McArthur River Mine site leases are shown in Figure 2.

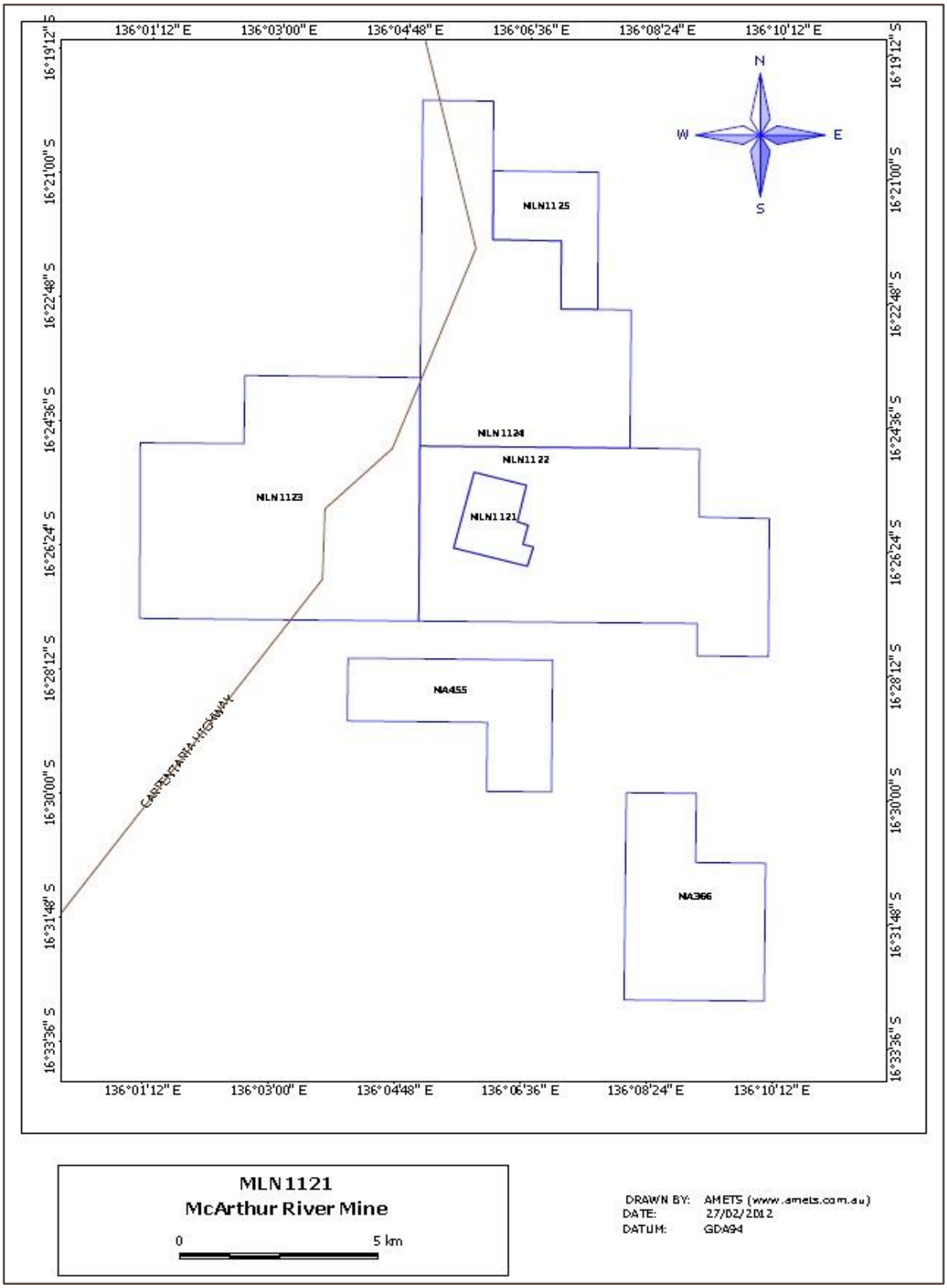

Figure 2: McArthur River Mining mineral leases

Table 1: McArthur River Mineral Leases (Grenfell, 2012)

Lease Type	Name	Lease Number	Owner	Date Granted	Expiry Date
MLN	HYC	MLN1121	McArthur River Mine	5/01/1993	4/01/2043
MLN	GLYDE	MLN1122	McArthur River Mine	5/01/1993	4/01/2043
MLN	BUFFALO	MLN1123	McArthur River Mine	5/01/1993	4/01/2043
MLN	EMU	MLN1124	McArthur River Mine	5/01/1993	4/01/2043
MLN	EMU EAST	MLN1125	McArthur River Mine	5/01/1993	4/01/2043

The orebody, named Here's Your Chance (HYC) on MLN1121, was discovered by Mount Isa Mines Limited geologists in 1955, however development did not commence until 1995. This gap in time between the deposit's discovery and development resulted from the unusual structure and extensive faulting of the orebodies and the extremely fine-grained nature of the ore, which combined to make commercial exploitation of the resource unfeasible for many years. A number of technological advancements in mining, ore treatment and concentrate transport, were necessary before the project could proceed on an economic basis.

A small decline and pilot plant were constructed on site in 1975, with the consequent preparation of a feasibility study and environmental report in 1979. In addition to poor recovery rates, no market existed at that time for the low-grade lead and zinc concentrates produced by the pilot plant. Subsequent metallurgical developments in fine grinding technology and the emergence of a market for high-grade bulk concentrate for use by smelters using the Imperial Smelting Process (ISP) technique resulted in the deposit becoming a viable project to go into production.

Construction of the project commenced in 1994, with the first shipment of concentrate loaded in mid-1995. In 2005, MRM announced its intention to convert the underground Zn-Pb mine to an open pit operation to enable the mine to continue production. Approval from the NT Government was granted in 2006 and a test pit was developed and later expanded. In March 2007, MRM announced an AUD50 million expansion of its concentrator to increase its capacity from an annual throughput of 1.8 million tonnes of ore to 2.5 million tonnes.

On 17 December 2008, a decision by the Full Bench of the Australian Federal Court invalidated the original approach granted for the MRM expansion due to a procedural error by the Federal Government. As a result, all mining and civil works were suspended. MRM resubmitted its application to the Federal Environment Minister shortly after this judgement and on 22 January, the Minister gave preliminary conditional approval for the expansion subject to a 10-day consultation period. Stockpiled ore was processed at the site while mining was suspended but was depleted by 23 January at which time the operation was placed into care and maintenance. On 20 February, the Minister approved MRM's open pit development and operations and mining recommenced.

In March 2011, Xstrata Zinc announced it was investigating an integrated development plan involving its European and Canadian smelters to increase capacity at MRM. The plan would secure the long-term future of the operation in the face of a decline in the traditional international markets for the bulk zinc-lead concentrate produced by the mine.

The MRM Phase 3 Development Project proposes increasing capacity from 2.5 million tonnes of ore per annum to 5.5 million tonnes and increasing production from 360,000 dry metric tonnes to 800,000 dry metric tonnes per annum.

A draft Environmental Impact Statement was lodged in January 2012 followed by a Supplementary EIS in May 2012. On 17 July 2012, the Northern Territory Government released an environmental assessment report which recommended the project can be managed without unacceptable environmental impacts and could proceed subject to commitments on seven operational issues being enforced under an approved Mining Management Plan.

Geology

The McArthur Basin comprises Carpentarian and Adelaidean rocks extending from the Alligator river in the Northern Territory to the Queensland border including the greater part of Arnhem Land and the Gulf of Carpentaria drainage region.

The sediment hosted stratiform HYC deposit has similarities with ore-bodies at Mount Isa and Hilton in Queensland. It is about 1.5km long and 1.0km wide with an average thickness of 55m.

The sediment hosted stratiform HYC deposit occurs near the base of the HYC pyritic shale member, within the Middle Proterozoic McArthur Group. The member comprises a sequence of inter-bedded pyritic bituminous dolomitic siltstones, sedimentary breccias and volcanic tuffs.

The HYC deposit has been folded and eroded along its western margin, which is covered with 30m of soil. This western margin contains the Hinge ore zone, which is sub-vertical with a strike length of 1.0km and vertical height of 200m. The northern margins inter-finger with sedimentary breccias and the southern margin grades into thinned nodular barren pyritic siltstone. On the eastern margin the ore-body thickens and is folded to form the Fold Zone, which has a strike length of over 600m. The southeastern corner is down faulted 110m by the northeastern trending Woyzbun Fault.

Climate

The climate of the McArthur River region is tropical monsoonal, with a pronounced wet season between December and March and generally dry conditions for the remainder of the year, although a build-up to the wet season with some rain often occurs during November.

Mean annual rainfall for the mine site is 715mm with the area around the port at Bing Bong receiving a mean annual total of 1040mm. Mean annual evaporation varies from 3,000mm at the mine site to around 2,300mm at the coast. Average daily minimum and maximum temperatures for McArthur River are 12°C to 29°C in June whilst in December they range from 25°C to 38°C.

Winds during the dry season blow predominantly from the southeast to south in the morning and change to blow from the east to northeast in the afternoon. During the wet season, there is no predominant wind

direction in the morning, whilst in the afternoon, winds predominate from the north to east. McArthur River has more calm observations than those in coastal locations (Draft Environmental Impact Statement 1992) (DEIS1992).

Extreme events include cyclones, floods, droughts and fire. Cyclones are an annual threat to coastal areas in the Gulf region. The McArthur River Minesite is outside the cyclone risk area but is affected by the tropical low pressure systems that can result in flooding. Flooding is an annual risk at McArthur River. Gross departures from the normal annual cycle are possible.

Physiography and Hydrology

The mine site is situated adjacent to the McArthur River, in the middle reaches of the river's catchment, between the confluences of the Kilgour and Glyde Rivers. The catchment area of the river above the mine site is approximately 10,000km^2. The 100 year average recurrence interval (ARI) flood level at the mine site is 39.5 meters. All major infrastructure on the site is located above this level. With the exception of some spring fed tributaries, most of the flow of the McArthur River comes from wet season rains. The river ceases to flow in some dry seasons, and most stretches, particularly in the vicinity of the mine area, can dry to a series of large isolated pools. During the wet season the river can become extremely turbid when in flood. Flow data for the McArthur River in terms of ARI is 7,250 (m^3/s) for 1 in 100 year event (RL 40 m), whilst 1,000 (m^3/s) for 1 in 2 year event (DEIS, 1992).

The main creek systems which bound the tailings and mine site, are Barney and Surprise Creeks. Barney Creek has a catchment area of 600km^2 at the mine site. The creeks are dry throughout most of the year. This is particularly the case for Surprise Creek, which has a catchment size of only 85km^2, and normally flows for only a few days each wet season.

McArthur River mine site has two main aquifers in the immediate vicinity, the alluvial aquifer and the lower fault aquifer. The alluvial aquifer is readily linked to the McArthur River and contains good quality fresh water. The faults in the dolomite and shales contain groundwater that is linked to the alluvial aquifer in part.

The dominant relief is low escarpments, plateaux and ridges, with limestone or dolomite rocks of Paleozoic age or older in the western part of the McArthur River catchment upstream of the project site, and sandstone and conglomerate rocks in the eastern sub- catchments, including the Kilgour and Glyde Rivers.

The tailings storage facility is located adjacent to the Carpentaria Highway. This structure stands approximately 10 meters high over 83 hectares. Current disturbance for McArthur River Mining Leases totals 455 hectares, which represents 3.5% of mining lease area.

Land Use

Land use is predominantly cattle grazing on large pastoral properties and the occasional mining activity. Encompassing all mining leases is McArthur River Station, which is 100% owned by Colinta Holdings, an MIM Holdings subsidiary. Other regional pastoral enterprises are owned by private persons, companies, and Aboriginal groups.

McArthur River Station stocks approximately 10,000 head of cattle over 8,000 square kilometres, utilising approximately one third of the area for grazing. Cattle have been excluded from the Barney Hill mining and processing areas.

McArthur River Mine is located in one of the more sparsely populated areas of Northern Australia. Populations of townships fluctuate with people leaving outstations in the wet season.

Activities Undertaken During 2016-2017

Geophysical Survey

During July and August an Electrical Resistivity Imaging (ERI) survey was completed around the Northern Overburden Emplacement Facility (NOEF) and Tailings Storage Facility (TSF).

Consulting company GHD completed the survey using a FlashRES_UNIVERSAL 61 channel resistivity meter. Data collected was then interpreted using Geosoft software. The projects aims were to:

- Identify key geological structures influencing groundwater transport focussing on previously mapped faults; and,
- Define drill targets for the upcoming drill program.

The ERI survey completed on MLN1123 is shown in Figure 3 and Figure 4 below.

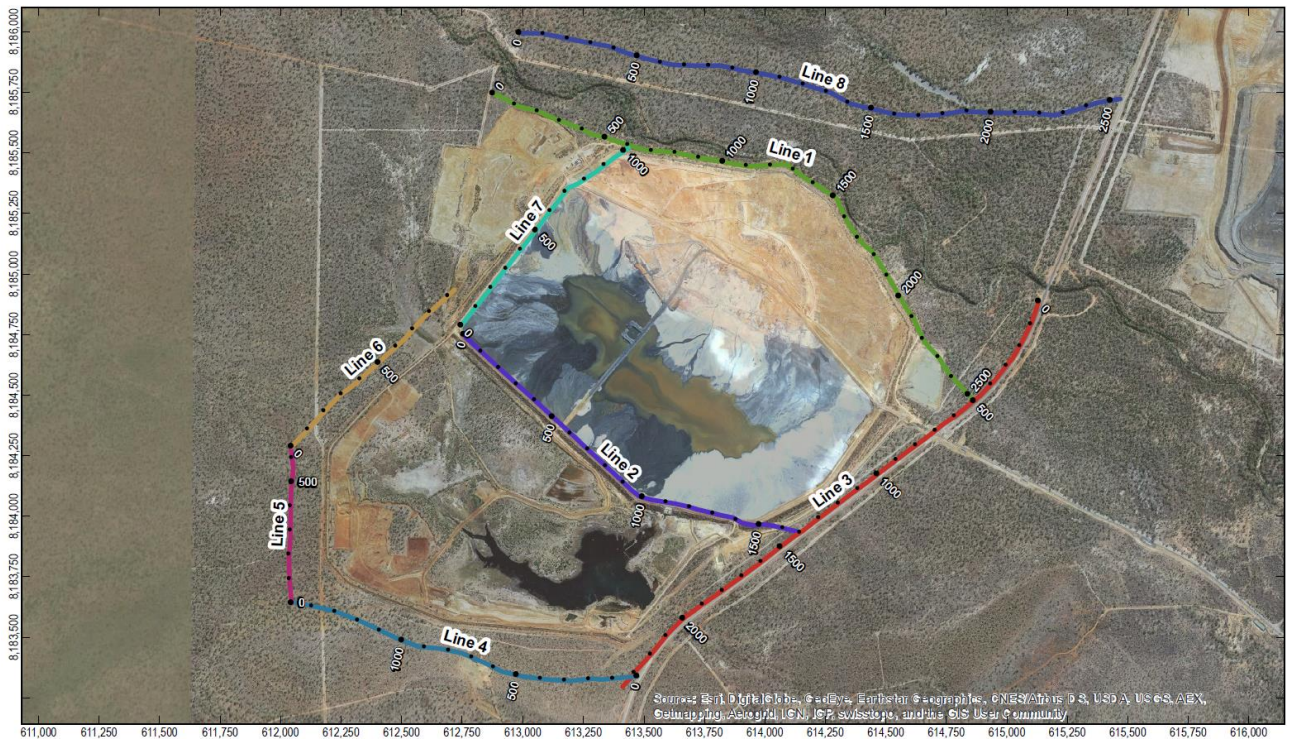

Figure 3: ERI lines 1-8 completed on MLN1123. From Anderson, 2016

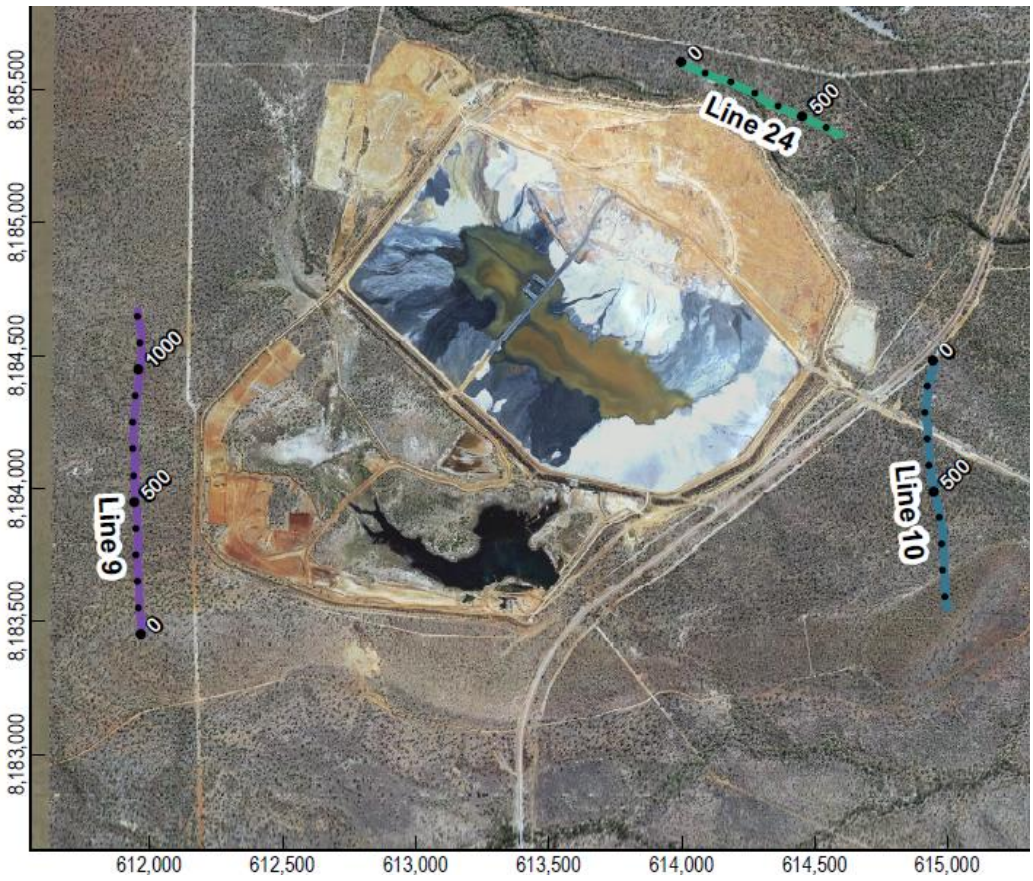

Figure 4: ERI lines 9, 10 and 24 completed on MLN1123. From Anderson, 2016.

Results defined two areas where structures could influence groundwater movement significantly and needed further investigation. These were then targeted in the later diamond drilling program.

Drilling

A site wide drilling program was completed in December 2016. The program encompassed MLN1121, MLN1122, MLN1123 and MLN1124 with its main aim focussed on determining ground water flow structures around site as well as installation of monitoring equipment.

Fifteen Reverse Circulation (673 metres) and three diamond drill holes (226.20 metres) were completed on MLN1123 during the reporting period.

Table 2 below outlines location of holes drilled on MLN1123. Figure 5 below shows hole locations in regards to the tailings dam.

Table 2: Holes drilled during the reporting period.

Hole ID	Drill Method	Easting (m)	Northing (m)	RL	Total Depth	Purpose
J36/82/16b	DDH	614477.1	8184235	39.9	26.6	Piezometer installation
J36/82/16	DDH	614476.3	8184234	39.9	76.6	ERI anomaly
E44/56/16	DDH	614465.2	8185072	41.6	123	ERI anomaly
L44/63/16	RC	614482.7	8185050	41.2	60	Piezometer installation
L46/86/16	RC	614303.6	8185269	41.9	60	Hydro RC Test
M48/53/16	RC	614154.6	8185442	42.5	51	Piezometer installation
M49/47/16	RC	613234.2	8185597	45.3	51	Waste Characterisation
M52/22/16	RC	612137.9	8185848	47.5	40	Waste Characterisation
K42/82/16	RC	612085.8	8184855	45.2	40	Waste Characterisation
H28/45/16	RC	612134.9	8183478	45.0	40	Waste Characterisation
H26/99/16	RC	612886.2	8183315	47.6	40	Waste Characterisation
H26/70/16	RC	614280.8	8183208	35.3	40	Waste Characterisation
H29/50/16	RC	615065.1	8183511	51.4	40	Waste Characterisation
H28/60/16	RC	615153.2	8183407	40.4	40	Waste Characterisation
J36/07/16	RC	614715	8184252	39.7	51	Piezometer installation
J37/51/16	RC	609743.3	8184356	58.4	40	Waste Characterisation
K40/12/16	RC	610003.6	8184657	62.0	40	Waste Characterisation
K40/57/16	RC	610556.4	8184733	58.2	40	Waste Characterisation

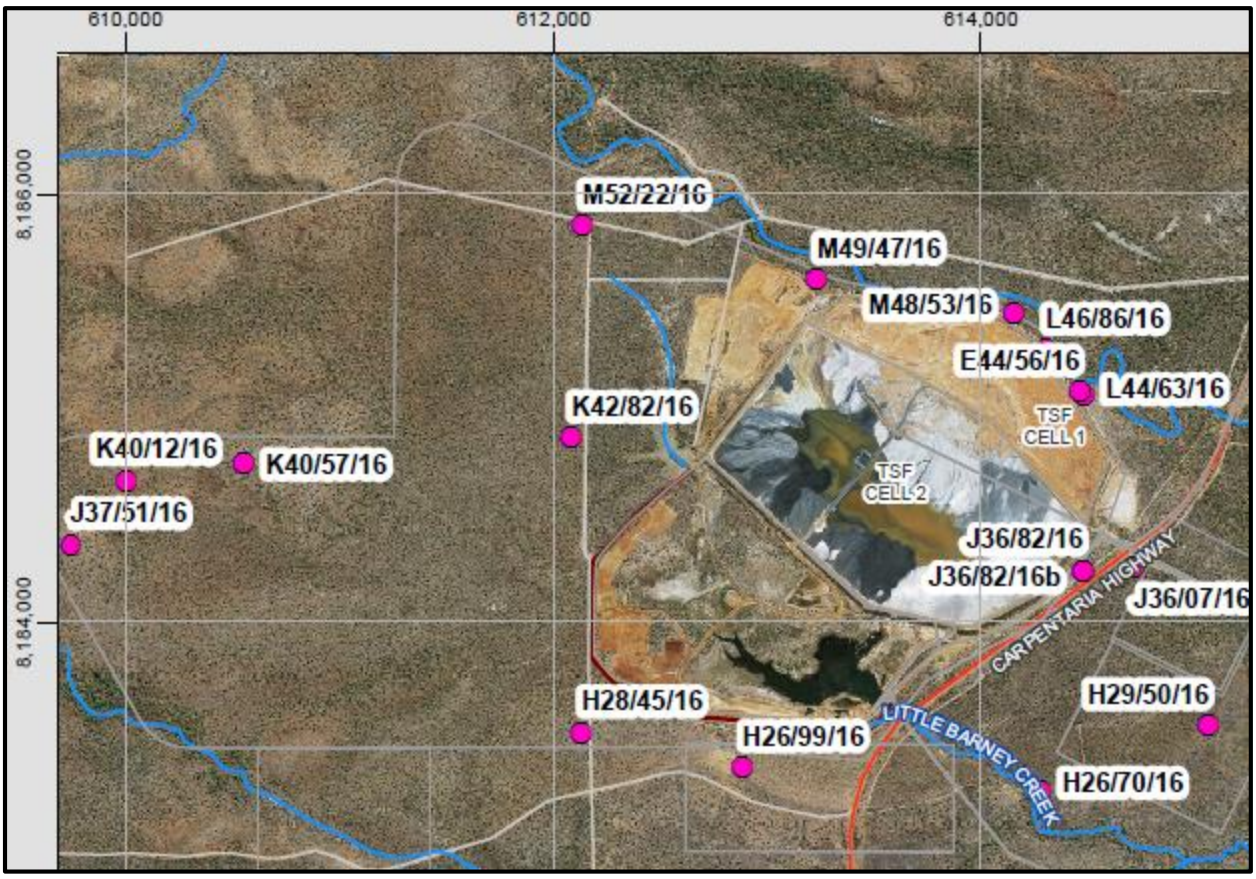

Figure 5: Drill hole locations on MLN1123

A total of 100 samples (including QAQC checks) were dispatched to ALS Brisbane for geochemical analysis. Results returned show that the majority of samples (74%) returned are considered to be environmentally benign. The remainder (28%) was classed as Metalliferous Saline, High Capacity NAF (MS-NAF(HC)), due to increased concentration in metals.

The data was processed and imported to the site geological database, for modelling and interpretation.

Conclusion

In addition to normal mining activities on MLN1123, two exploratory programs were completed. This included:

- ERI survey to define groundwater pathways;
- Diamond drilling to further define potential fluid pathways; and,
- RC program for waste characterisation and piezometer installation.

All programs were successfully completed with analytical results classing the majority of samples as environmentally benign. All instrumentation was successfully installed.

There are currently no plans for exploratory programs in the upcoming reporting period.

References

Anderson, M, (2016). Seepage Pathway Investigation, Internal Consultant Report, GHD, 40p.

Grenfell, K, (2012). MLN1121 Annual Technical Report, Statutory Government Report, McArthur River Mining, 17p.

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