Merlin Diamonds Limited

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Year 21
MINERAL LEASE MLN1154
"MERLIN DIAMOND PROJECT"

Annual Report For The Period
1st January 2018 to 31st December 2018

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1 ABSTRACT

This report details exploration and evaluation activities carried out by Merlin Diamonds Limited (MDL) over Mineral Lease MLN1154 for the period 1st January 2018 to 31st December 2018.

Exploration

Merlin Diamonds (Merlin) reviewed the results of the 2017 drilling program and conducted further research work to locate new exploration targets which may represent presence of kimberlite pipes in the mine lease area. An anomalous circular topographic feature was identified south of Excalibur pipe on the satellite image. Merlin is planning to field inspect this conspicuous topographic feature and carry out sampling. Further follow-up investigation will be undertaken if field sampling returned encouraging results.

Environmental Monitoring

The Mining Management Plan (MMP) for the 2018 Merlin mining program was compiled by enviroMINDed and submitted in April. MMP sought approval of trial conventional mining for diamonds at Merlin Mine. Merlin planned to extract approximately 90,000 tonnes of ore from Ector, Gawain, Ywain, Kay and Excalibur pits. To gain access to the pit floor and mine Ector, Gawain, Ywain and Kay, each pit will require dewatering. This program was approved by the DPIR in May, with Authorisation Number 0736-01, providing permission for Merlin to commence work.

Merlin further sought approval to include Excalibur pit in the proposed mining campaign at Merlin Mine and its inclusion in the current Mine Management Plan. DPIR approved the request on 22 June 2018 accepting the reason that the proposed mining does not increase disturbance footprint.

Merlin was intended to visit 2017 drill sites to assess progress of rehabilitation work but was unable to complete this task. Merlin is now planning to complete this work during 2019.

Water quality and water level testing in mine pit voids and strategic water bores around the lease was completed in 2017. This report provides details of ground water quality field and laboratory results.

In September 2018 DPIR mining officers visited Merlin Mine site while taking a general site visit in the broader Borroloola Area. The objective of their visit to Merlin Mine was to undertake aerial drone survey of Ector and Kaye pits and waste rock dump.

Mine Development

Following on from mining operations in 2017, Merlin has carried out dewatering of Ector, Gawain

and Excalibur pits. Dewatering of Ector and Gawain pits was completed by the end of March and followed by dewatering of Excalibur pit which was completed by mid August.

Since the start of current phase of trial mining there have been constant ongoing problems with the old processing plant including the scrubber. From January to March 2018, Merlin completed onsite refurbishment of scrubber and DMS plant and commissioned scrubber, dewatering screen and DMS. Mobile screening plant introduced into new circuit to remove over size before entering the scrubber. Stockpiled ore from Kay and other pits was processed by the conventional method. Over 1000 diamonds were recovered. The recovered stones included 7.313 carats fancy yellow diamond, 1.448 carats blue/green diamond along with 6 pink diamonds weighing a total of 1.03 carats and the largest being 0.28 carats.

TOMRA XRT unit which was commissioned in December 2017 was reprogrammed and received enhancement modification to run large size fraction of 8mm-40mm at a higher feed rate.

Mining contract for Merlin Mine was granted to the Rusca Bros Services. Rusca Bros was mobilised to site in June and carried out mining of fresh ore mainly from Ector pit. An estimated 60,000 tonnes of ore from Ector pit was mined during July 2018. Hauling of the ore to Merlin ROM continued until early August where it was stockpiled for processing.

From July to September, more than 30,000 tonnes of fresh ore from Ector pipe and stockpiles was processed. Ore was separated into three different size fractions (+4mm to -8mm, +8mm to -18mm and +18mm to -40mm) for head feed to XRT unit. Approximately 20,000 tonnes ore mostly from Ector was sorted at the XRT unit. Recovery of diamonds was disappointing as only one diamond from +8 to -18mm size fraction was recovered. The cause of failure to recover diamonds was due to XRT unit 'not functioning fully'.

Two size fractions, +4mm to -8mm and +8mm to -18mm, collected from XRT reject bins were mixed with previously screened +2mm to -4mm size fraction to prepare head feed of +2mm to -18mm for DMS plant. Processing of this size fraction at DMS plant and by Flowsort recovery system recovered diamonds.

During May to September, Merlin recovered a total of 2844.118 carats stones from Ector and stockpile. A number of very fine gems were identified, including two large high quality white diamonds weighing 18.4 and 9.5 carats. In addition to that Merlin has also reported recovery of over 1000 diamonds from stockpiles on the ROM during first quarter of 2018.

Both DMS plant and scrubber are over 30 years old and were repeatedly breaking down during the operation. This resulted in long downtime due to shutdown of processing operation. To rectify this situation the Company has decided to source a new trommel scrubber from China and a new DMS plant from South Africa.

In September 2018, a parcel of polished and rough diamonds was presented for sale by tender in Antwerp. Total sale price received was US$392,241; however, not all diamonds have been sold. Merlin has also decided to announce diamonds production on a quarterly basis.

Merlin has engaged an external mining consultant to conduct a study to determine the best options for mining at Merlin Mine and in particular options to mine underground at Palsac, Ywain, Gwain and Excalibur.

Expenditure

Total expenditure on the mining lease amounted to **$5,823,844.45** as per the breakdown in the expenditure report for the reporting period 1st January to 31st December 2018.

2 INTRODUCTION

This report details exploration and mine development activities carried out by Merlin Diamonds Ltd (MDL) over Mineral Lease MLN1154 for the period 1st January 2018 to 31st December 2018. The exploration target within the Merlin mine lease is diamond-bearing kimberlite pipes. Merlin has reviewed the results of the 2017 drilling program and conducted further research work to locate new exploration targets which may represent presence of kimberlite pipes in the mine lease area. An anomalous circular topographic feature was identified south of Excalibur pipe on the satellite image. Merlin is planning to field inspect this conspicuous physical feature and carry out sampling. Further follow-up investigation will be undertaken if field sampling returned encouraging results.

Furthermore, the Company continued to improve ore processing methods to re-establish efficient and high yielding diamond recovery commercial-scale mining operation which is also effective to retrieve large size diamonds.

Mining contract for Merlin Mine was awarded to Rusca Bros Services. Rusca Bros mined approximately 60,000 tonnes of ore from Ector pit. Over 30, 000 tonnes ore has been processed. Approximately 20,000 tonnes of it has been sorted by the TOMRA XRT sorter.

In the first quarter of 2018 mining operation returned over 1000 diamonds from stockpiles on the ROM. In addition to that, Merlin has also recovered 2844.118 carats from Ector and stockpiles between May and September period.

Table 1 summarises the work undertaken on the mining lease during the reporting period and Map 1 (Exploration Index Map) shows the locations.

TABLE 1: Summary of work undertaken during 2018 reporting period

Work	**Explanation**
Exploration	Review of past exploration work on the lease. An anomalous circular topographic feature was identified south of Excalibur pipe on the satellite image. This conspicuous physical feature will be further investigated.
Environmental Monitoring	Rehabilitation work was undertaken at each drill target during September 2017, prior to the wet season. MDL will inspect each drill target in 2019 to monitor the progress of rehabilitation work.
	Merlin site inspection by DPIR team made in September 2018.
	The Mining Management Plan for the 2018 Merlin mining program was compiled by enviroMINDed and submitted in April. Approval of Mining MMP was granted in May 2018.

TABLE 1 cont: Summary of work undertaken during 2018 reporting period	
Work	**Explanation**
Mine Development	Processing of kimberlite from Kay Pit and crushed stockpiled continued to June 2018.
	Mining contractor Rusca Bros Services mobilised to site in late June.
	Mining from Ector Pit was carried out in July. Estimated total ore mined was 60,000 tonnes. Over 30,000 tonnes of ore has been processed.
	Like in the past, Merlin continued to utilise conventional mining methods during 2018.
	Diamond industry experts strongly recommended the installation of a TOMRA XRT diamond recovery system which will reliably detect all diamonds including coated, low luminescent, and Type II diamonds.
	A TOMRA unit was sourced, purchased and delivered to Merlin in November 2017. The unit was successfully commissioned in late December. Further reprogramming and enhancement modification to run large size fraction of 18-40mm at a higher feed rate was completed in early 2018. Over 20,000 tonnes of ore was sorted by the TOMRA XRT Sorter.
	In the first quarter of 2018 mining operation returned over 1000 diamonds from stockpiles on the ROM. In addition to that, MDL recovered 2844.118 carats from Ector and stockpiles between May and September 2018.
	Processing ceased in September to allow the company to review mining operation and the commissioning of the new DMS plant. Meanwhile mine is being put on care and maintenance.
	In September 2018, a parcel of polished and rough diamonds was presented for sale in Antwerp.
	Merlin has engaged an external mining consultant to conduct a study to determine the best options for mining at Merlin Mine and in particular options to mine underground at Palsac, Ywain, Gwain and Excalibur.

3 LICENCE DETAILS

Mineral Lease 1154 was granted to Ashton Mining Limited on the 15th June 1998 and replaced Exploration Retention Licenses (ERL's) 141 and 142. The area covered by the ERL's was previously held under 'Substitution Exploration License' 8630, which replaced the original licenses 6424, 7267,

7581, 7859, 7860 and 7861 in July 1995. ERL141 comprised 736 hectares and ERL142, located to the south of ERL141, comprised 888 hectares. On the 17th December 1996, application for a mineral lease was made over the ERL's, covering an area of 2,350 hectares. On granting of the mineral lease, the ERLs were automatically surrendered.

The Licence was acquired from Ashton Mining in November 2004 and is currently held by Merlin Operations Pty Ltd (formerly Merlin Diamonds Pty Ltd). The Licence is managed by Axis Consultants Pty Ltd, and operated by Merlin Diamonds Limited (formerly North Australian Diamonds Limited).

TABLE 2: Licence Details for MLN1154

Project Name	Tenement ID	Application Date	Grant Date	Expiry Date	Area (ha)
Merlin	MLN 1154	17/12/1996	15/06/1998	31/12/2022	2,350

4 LOCATION AND ACCESS

The Licence lies within the Bauhinia Downs (SE53-03) 1:250,000 map sheet and the Glyde (6164) 1:100,000 sheets. Access to the lease is via a 64 kilometre formed gravel road, heading south from Carpentaria Highway. The turn-off to Merlin is approximately 6 kilometres south-west of the McArthur River Mine turn-off, and 43 kilometres north-east from Cape Crawford.

The mineral lease is located on a plateau, referred to as the 'Merlin Plateau', that is part of the Bukalara Ranges. The Merlin Plateau occurs at an elevation of approximately 200 m above mean sea level and is approximately 10 km north-south by 5 km east-west. The plateau itself is host to twelve kimberlite pipes, a small breccia pipe (Perceval) and a further two kimberlite pipes (Emu 1 and Emu 2) dissected by Matheson Creek that bounds the plateau to the north.

Map 2 shows the location of the Merlin Diamond Project.

5 GEOLOGY

The Merlin kimberlite field is located in the Batten region of the Northern Territory, Australia, 80 km south of the township of Borroloola. The field comprises fifteen kimberlite intrusions distributed in four discrete clusters. The two largest kimberlite pipes within the field, Emu 1 and Emu 2, were discovered in 1985 by CRA Exploration. The remaining kimberlite pipes were discovered by the Australian Diamond Exploration Joint Venture, seven years later.

5.1 REGIONAL GEOLOGY

The Batten region is situated on the eastern side of the North Australian Craton. This area lies to the south of the western edge of the Gulf of Carpentaria and is dominated by the relatively undeformed Middle Proterozoic McArthur Basin that extends over an area of 180,000 km^2 (Pietsch *et al.*, 1991).

The basin forms part of the North Australian Platform overlying the Early Proterozoic Pine Creek Inlier, Arnhem Block and Murphy Inlier (Plumb *et al.,* 1990). Early Proterozoic basement rocks in the McArthur Basin include the Scrutton Volcanics, which have been dated by U - Pb in zircon at 1857± 30 Ma (Pietsch *et al.,* 1991).

A major structural feature of the southern McArthur Basin is the Batten Trough, also known as the Batten Fault Zone, which is a 70 km wide zone of extensive faulting that trends north-northwest. The Batten Trough is bounded on the east by the Emu Fault and obscured to the west by the Roper Group of sedimentary rocks. The Trough is one of several asymmetric syn-sedimentary grabens that developed in the McArthur Basin after deposition of the Tawallah Group, possibly as a failed intra-continental rift similar and parallel to the Mt Isa Orogen (Plumb & Wellman, 1987). Up to twelve kilometres of sediments was deposited within the Batten Trough in a westwards thinning wedge, compared to four kilometres of sediments on the adjacent Bauhinia and Wearyan shelves.

Smaller structures with a similar north-northwest trend are associated with the Emu pipes to the north, suggesting that the Merlin Field probably lies on a similar, regional structure. A northwest-trending fault, known as the Merlin Fault, parallels the Emu Fault and extends from the Sacramore-Palomides pipe in the southern part of the Merlin Field, through to the Ector-Kay cluster in the north.

Neoproterozoic/lower Cambrian-aged Bukalara Sandstone, 30 to 100 metres thick, overlies the McArthur Basin sedimentary rocks in much of the Batten region and frequently forms topographic plateaux. Flood basalts of Cambrian age become prevalent in the southern portion of the region, although they are generally obscured by younger sediments. The Merlin kimberlite field represents the youngest known volcanic event in the region.

Map 3 shows the regional geological setting of the Merlin Kimberlite Field.

5.2 MERLIN PLATEAU GEOLOGY

The Merlin Plateau is a preserved, Tertiary-aged (Pietsch *et al.,* 1991) planation surface, with a slight declination to the north of less than 1 degree. The plateau surface comprises a scrubby sand-drifted plain underlain by laterite and, in some instances, ferricrete, which in turn is underlain by a flat-lying sequence of Neoproterozoic/lower Cambrian Bukalara Sandstone. A characteristically intensive jointing pattern dissects the sandstone sheet surface and controls a dendritic to trellis pattern of tributary drainage. The eastern margin of the plateau sharply abuts an uplifted block of Proterozoic aged sediments of the McArthur Group, while more regionally, the plateau lies between NNW trending faults that parallel the Emu fault to the west.

Cretaceous sedimentation has been widespread in the area but the rocks have now been largely removed by erosion for a distance extending some 200 km south from the Gulf of Carpentaria coastline. This stripped area is characterised by well-dissected drainage interspersed with isolated,

remnant, poorly drained, pisolite-covered planation surfaces. On the Merlin Plateau, the southern limit of the stripped Cretaceous is marked by a well-defined escarpment, which also represents a major drainage divide. Streams to the south flow southwards to the Georgina Basin, while those on the north side of the escarpment flow north to the Gulf of Carpentaria. Isolated outcrops of Cretaceous-age, plant fossil-bearing silicified sandstone occurs on the plateau within the lease.

The youngest sediments on the Merlin Plateau are surficial deposits of gravel, silt, sand, and ferricrete, which occur within numerous drainages and blanketing the sandstone.

Map 4 shows the surface geology of the Merlin Plateau and the mining lease. This geological map was derived from air photograph interpretation. Ground-based mapping has shown that the extent of the Cretaceous cover is greater than determined by the air photo interpretation.

5.3 KIMBERLITE PIPES

The Merlin ore rock is diamond-bearing kimberlite - an ultramafic volcanic rock comprised of magnesium-rich minerals. The magma that formed this volcanic rock was sourced from deep in the Earth's mantle, and rose rapidly towards the surface to form an explosive phreatic volcanic eruption. The kimberlite 'pipes' represent the root zone beneath the surface volcano that has been removed by erosion. The pipes are long, narrow bodies that extend deep beneath the surface.

The Devonian-age kimberlite pipes of the Merlin diamond field (Jacques, 1998) intruded up through the McArthur Basin and Bukalara Sandstone rock units. Three discrete clusters of kimberlite pipes are present within the elongate Merlin field, which extends over an area of ten kilometres by five kilometres. The distance between the clusters is approximately three kilometres.

The thirteen kimberlite vents, representing eleven discrete pipes, are named (from south to north) Perceval, Excalibur, Launfal, Launfal North, Sacramore, Palomides, Tristram, Gawain, Ywain, Gareth, Ector, Kay, and Bedevere. The pipes vary in diameter from 20 to 125 metres and, from drilling data, appear to maintain a consistent diameter at depth.

The Merlin kimberlites, which are geochemically similar to the Aries kimberlite in the Kimberley region of Western Australia, represent the upper diatreme facies of the kimberlite system. The intrusions are dated at 367 Ma (Devonian), which coincides with the peak of the Alice Springs Orogeny, which affected most of central Australia.

Kimberlite is a class of volatile-rich (dominantly CO_2), potassic ultramafic igneous rocks, commonly exhibiting a distinctive inequigranular texture resulting from the presence of macrocrysts set in a fine-grained matrix. The macrocryst assemblage is dominated by rounded anhedral crystals of olivine (or its alteration products). Other common crystals are magnesium ilmenite, Cr-poor titanium pyrope, Cr-poor clinopyroxene, phlogopite, enstatite, and Ti-poor chromite. The matrix minerals

include: second generation euhedral primary olivine and phlogopite, together with perovskite, Cr-spinel, diopside, monticellite, apatite, calcite, and primary to late stage serpentine.

The kimberlites encountered in the Merlin pipes comprise olivine-rich kimberlite and kimberlite breccia, and are a hybrid mixture of the parental magma, mantle xenoliths and xenocryts (such as olivine and also diamond). They also incorporate country rock xenoliths, such Bukalara Sandstone and Proterozoic sediments. The kimberlite is highly-weathered to approximately 100 metres below surface.

A characteristic feature of the Merlin kimberlites, with the exception of the two Emu pipes that lie to the north of the Merlin Plateau, is that the pipe structures are corked by fossiliferous, Cretaceous-aged, mudstone/sandstone sedimentary in-fill sequences that can be up to 42 metres thick. Due to the planar nature of the Merlin plateau and the widespread distribution of iron pisolites and sand, the sedimentary rocks infilling the pipes are not distinguishable at the surface.

6 PREVIOUS EXPLORATION

Merlin Diamonds Ltd acquired MLN1154 mining licence from Ashton Mining via Rio Tinto in 2004. At that time the company was called Striker Resources, which was then renamed North Australian Diamonds. The following is brief summary of the exploration work undertaken by Merlin Diamonds Ltd since 2004.

6.1 2004-2005 ACTIVITY

MLN1154 was acquired by Striker Resources NL in November 2004. The company name was changed to North Australian Diamonds Limited on 23rd August 2005. The tenement was held under Bulgurri Diamonds, which is a 100% wholly-owned subsidiary company of NADL.

Following acquisition of the Merlin mineral lease, a review of available data was undertaken and a work program implemented. Field exploration activities were significantly restricted due to the timing of the acquisition and minimal opportunity for exploration until after the wet season.

Field work during the period included reconnaissance of previously-identified anomalous targets, loam sample collection and drill testing of selected targets.

6.2 2005-2006 ACTIVITY

Exploration completed during 2006 reporting period included the collection of 273 loam samples as follow-up to existing indicator mineral anomalies. A total of 192 soil geochemical samples were collected across the lease to further define indicator mineral anomalies. A total of 7.58 line

kilometres of ground magnetic data was collected across several areas of the lease as follow-up to identified indicator mineral anomalies. A line spacing of 50 metres was used, with a station spacing of 5 m or 10 m.

Resource delineation drilling at the Tristram kimberlite pipe increased the inferred resource from 410,000t to 740,000t. Wide-diameter drill samples were collected and processed to recover 36 tonnes of kimberlite for a grade of six carats per hundred tonnes (cpht). Wide-diameter drill samples were also collected at a previously untested breccia pipe located 400 metres to the south of Excalibur pipe. This pipe, named Perceval, reported a grade of 56 cpht and is comprised of hypabyssal kimberlite and considered to be similar to Ywain pipe in both size and nature.

6.3 2006-2007 ACTIVITY

During this period, the company changed the name from Bulgurri Diamonds Pty Ltd to Merlin Diamonds Pty Ltd, which is a 100% wholly owned subsidiary company of NADL.

Exploration included processing of 169 loam samples collected during the previous reporting period. Trial mining operations included mining of kimberlite from existing open pits and processing approximately 25,000 tonnes of material that recovered 11,810 carats of diamonds. A Prefeasibility Study of Gawain and Ywain pipes was completed to evaluate the economics of underground operations that identified a potentially economic project. The study identified the need for further resource definition and geotechnical drilling to move the project to Feasibility stage.

6.4 2007-2008 ACTIVITY

Activities included completion of thirteen diamond drill holes for a total of 3,674 metres. In addition, fourteen samples of drill core were processed to recover micro-diamonds for grade determination.

Sixteen samples of kimberlite, each about one cubic metre in size, were excavated from within the open mining pits and processed for diamonds for grade determinations and comparison with deeper core samples. This work was undertaken to confirm the continuation of grade with depth.

6.5 2008-2009 ACTIVITY

Activities included processing diamond drill-core and pit samples for total diamond content. This work was to determine resource grades and to confirm the continuation of grade at depth within the tested pipes.

As a prelude to undertaking prefeasibility production trials, the Merlin pilot processing plant was upgraded in a series of stages aimed at increasing throughput to 50 tonnes per hour (tph) and to test a number of process components that enable finalization of the processing flow-sheet.

6.6 2009-2010 ACTIVITY

Activities completed included a geotechnical drilling program at Palsac, Bedevere and Launfal as well as an exploration drilling program at Tailings Dam and Bedevere. Down-hole spoil geochemical samples were collected from Bedevere and indicator minerals from Tailings Dam.

Plant Spillage samples were collected. A high-resolution ground EM survey was conducted over Excalibur South and Perceval. COMEX test work was also conducted over the Merlin Mine and samples sent to COMEX in Norway for pyrite/diamond test-work.

6.7 2010 ACTIVITY

This report details exploration and evaluation activities carried out for the period June to December 2010 as the reporting period for the mineral lease was changed to 1st January to 31st December.

During the reporting period, a total of 21,207 tonnes of kimberlite from Kay pipe was processed through the Merlin Processing Plant as part of Pre-Feasibility Production Trials. A total of 2,177.25 carats of diamonds was recovered.

6.8 2011 ACTIVITY

A detailed desktop review of all available data was commenced and by a Consultant Research Manager in Perth. A comprehensive database exists that includes historic and current heavy mineral samples, drilling data and drill spoil samples, various phases and types of surface geochemistry, airborne geophysics, ground geophysics, and geological mapping. A detailed review of all these datasets had not been undertaken since MDL acquired the Mining Licence from Ashton Mining in 2004. The aim of the review was to identify new kimberlites within the Mining Licence and immediate surrounds.

A total of 491 drill spoil samples from the 2010 reverse circulation drilling program were sent to the Company's Perth laboratory for processing for kimberlite indicator minerals and diamonds. A major review of the mineral resource estimate was completed resulting in the compilation of a JORC compliant Mineral Resource Estimate.

6.9 2012 ACTIVITY

Activities included completion of processing down-hole drill spoil samples from the 2010 reverse circulation drilling program.

A detailed desktop study of available geoscientific data was completed that identified numerous targets. An external consultant geophysicist produced a report that identified additional targets.

Over 400 soil geochemical samples were collected to determine appropriate locations for the subsequent drilling program, which comprised 128 holes for a total of 3,568 metres. No kimberlite was identified.

Feasibility studies continued throughout 2012 with a proposed borehole mining program scheduled to commence in early to mid 2013.

6.10 2013 ACTIVITY

An extensive loam and stream gravel sampling program commenced over the mining lease and surrounding exploration licence EL26944 targeting the unconformity between the Bukalara Sandstone and the overlying Cretaceous Sandstone. A total of 110 samples were collected with 61 samples processed during the reporting period. Thirty-two samples reported positive results and highlight the potential for additional discovery within the mining lease.

Twenty geophysical targets were identified for further investigation using an EM34-3 ground electromagnetic instrument. A total of 43 line kilometres were completed. Pending further investigation, a number of these targets may be recommended for drill testing during the next reporting period.

A borehole mining trial operated for a four-week period and achieved success in a number of key areas. Further engineering works are required to increase the rate of production to sustain an economic operation.

6.11 2014 ACTIVITY

Exploration activities were less extensive than the previous period. In 2013, a loam and stream gravel sampling program was commenced over MLN1154 and surrounding exploration licence EL26944. Processing and assessment of the results continued during 2014 with 40 samples observed for indicator minerals. To date, 101 samples have been processed with 59 positive results, and a total of 2 microdiamonds and 268 kimberlitic chromite grains recovered.

During 2014, three targets were identified for investigation using a Geonics EM34-3 ground electromagnetic instrument. A total of 12.6 line kilometres were completed. The targets were a mixture of historic ground gravity, ground electromagnetic and geochemical anomalies. .

A detailed desktop review of all available data (geophysical, geochemical and indicator mineral results) undertaken by a Consultant Research Manager in Perth was completed. Some 58 geophysical targets with potential kimberlite signatures were identified within the mining lease.

During the year, the Company completed a review of results from the hydraulic borehole mining trial completed in September 2013. Following this review, additional mining methods were investigated.

The methods considered were chosen because they could potentially provide a quicker path to restarting mining operations with lower upfront capital costs. A detailed feasibility study was completed on the chosen alternative of mechanical clamshell grab mining situated upon a barge floating on the flooded open pits.

6.12 2015 ACTIVITY

The company-owned diamond exploration laboratory at Wangara in Perth, WA, closed down in mid 2015. This facility serviced all exploration projects held by Merlin Diamonds across the NT as well as WA. As storage facilities at the Laboratory were very full, a review of the samples held was undertaken prior to its closure in June. Samples, such as concentrates, duplicates and other non-critical material, were de-catalogued and the material discarded. No drill core was discarded, although RC drill chips were relinquished as they were not considered of any further value.

The company continued to review progress of rehabilitation in exploration areas by way of an annual photographic survey. The 2015 survey was undertaken in April and the photographs included in the exploration MMP for the lease.

Water testing in the flooded mine pits and groundwater bores at strategic places around the mining lease has been on-going - results are included in the annual environmental report.

A review of all exploration undertaken on MLN1154 was undertaken in order to identify drill-ready high-confidence targets. Six targets were identified, and one potential target.

6.13 2016 ACTIVITY

No on-ground exploration occurred during 2016. Planning for the proposed 2017 RC drill program commenced, with fourteen targets prioritised from the 2014 Geophysical Review. A further fifteen targets have been identified as requiring additional on-ground work, such as detailed ground EM, to resolve the target.

The company continued to review rehabilitation progress using a photographic survey undertaken after the wet season, and at the end of the following dry season. The 2016 surveys were undertaken in April and November. Water quality and water level testing in mine voids and strategic water bores around the lease continued using a TPS 90 FLT water quality meter and a Herron Dipper T water level meter.

During the year, MDL achieved a number of steps towards re-establishing full production at the Merlin Diamond Mine. The Mining Management Plan was approved in September 2016 initiating the

first on-ground work. Key steps taken during the year included:

- Simplification of the processing plant's throughput format and introduction of contract mobile crushing & screening at the front end;
- Improvements to Final Recovery with the inclusion of Flowsort x-ray sorting machines.
- The Flowsort x-ray recovery circuit was successfully commissioned with the first diamonds recovered from DMS concentrate in early October.

During October to December 2016, processing comprised dry-screening at 20 mm, and crushing the oversize ore stockpiled from previous mining campaigns using a mobile screen and cone-crusher. In late November, open-cut mining commenced in Kay Pit and by the end of the reporting period, 72,390t of kimberlite had been mined.

By the 31st December, 12,334 tonnes of ore had been processed through the plant returning 982 diamonds for 310.79 carats. Of this about 5,800 tonnes comprised the stockpiled oversize, and 6,529 tonnes was kimberlite mined from Kay Pit.

6.14 2017 ACTIVITY

During the reporting period, exploration focus has been on testing targets selected from the company's extensive historical database comprising airborne and ground geophysical, soil geochemical, and indicator mineral datasets. Forty-two priority targets were selected for drill testing, and high-resolution ground EM surveys were undertaken over six to assist with resolving the target prior to finalising drill collar locations. A total of 155 RC holes were drilled for 2,871 metres. No kimberlite pipe was intersected except a narrow kimberlite fissure between Kay and Bedevere was confirmed.

Rehabilitation work was undertaken at each drill target. Rehabilitation work was completed in September 2017 just before onset of wet season.

Water quality and water level testing in mine pit voids and strategic water bores around the lease was completed during the year. Sampling and analysis of the Merlin TSF monitoring bores was also reinstated. Merlin submitted all historical and current environmental monitoring data to DPIR as requested.

Small scale mining activity at the Merlin Mine continued during the reporting year. During the 2016-2017 operation a total of 84,054 tonnes of ore was processed that returned 20,473 diamonds for 4633.807 carats, with 37 stones in excess of 5 carats and the largest being 35.74 carats.

The ore processing ceased in June 2017 to allow the company to assess and rectify a number of problems identified with the diamond recovery process. The company consulted with the diamond

industry experts. On their recommendation TOMRA XRT diamond recovery system was installed and commissioned in late December. This diamond recovery system has the ability to reliably detect all diamonds included coated/embedded, low luminescent and Type II diamonds.

The company continued to review rehabilitation progress using a photographic survey, with 2017 survey undertaken in November just before the commencement of the wet season. Water quality and water level testing in mine voids and strategic water bores around the lease continued using a TPS 90 FLT water quality meter and a Herron Dipper T water level meter. Water monitoring results from field sampling and laboratory analysis and their detailed interpretation will be provided in 2018 MMP update. A proposed updated water monitoring schedule that aligns with current and proposed site operations will also be included for approval in the MMP update.

7 EXPLORATION - 2018

During the reporting period, Merlin reviewed the results of 2017 drilling program. This drill program targeted untested geophysical, soil geochemical, and indicator mineral anomalies across the Merlin mining lease. A total of 155 holes were drilled for 2,871 metres. No kimberlite pipes were intersected during the program, although the presence of a narrow kimberlite fissure between Kay and Bedevere was confirmed.

In mid September 2017, rehabilitation work was undertaken at each drill target. Merlin intended to revisit the drill sites to confirm progress of rehabilitated work. Visit to the drilling area is now planned for 2019.

Merlin Diamonds has identified an anomalous circular topographic feature south of Excalibur pipe on a satellite image of a Merlin Lease area (Figure 1). The Company consider that it may represent an outcrop of a kimberlite pipe. Merlin is planning to field inspect this feature and carry out sampling in 2019. Positive results will encourage the Company to conduct further investigation including drilling.

8 ENVIRONMENTAL MONITORING – 2017-2018

Environmental monitoring at the mine site was conducted during 2017. The environmental data collected during the monitoring was included in the updated Mining Management Plan (MMP) which was submitted to the DPIR in January 2018. DPIR reviewed the MMP and asked MDL to address all comments listed in its response letter. MMP was resubmitted in April 2018 after addressing DPIRS's comments. On 17 May 2018, DPIR informed that MMP meets the requirements of section 40 of the Mining Management Act and the Merlin can commence mining four pits – Gwain, Ywain, Ector and Kaye. Merlin further sought approval to include Excalibur pit in the proposed mining campaign at Merlin Mine and its inclusion in the current Mine Management Plan. DPIR approved the request on 22 June 2018 accepting the reason that the proposed mining does not increase disturbance footprint.

Water quality and water level testing data in mine pit voids and strategic water bores around the lease were presented in the last year annual report. This annual report, however, describes ground water quality field and laboratory results. Field water quality monitoring data was collected using a TPS 90 FLT water quality meter and a Herron Dipper T water level meter. Water monitoring results from field sampling and laboratory analysis and their detailed interpretation can be found in the 2018 MMP update. A proposed updated water monitoring schedule that aligns with current and proposed site operations was also included for approval in the MMP update.

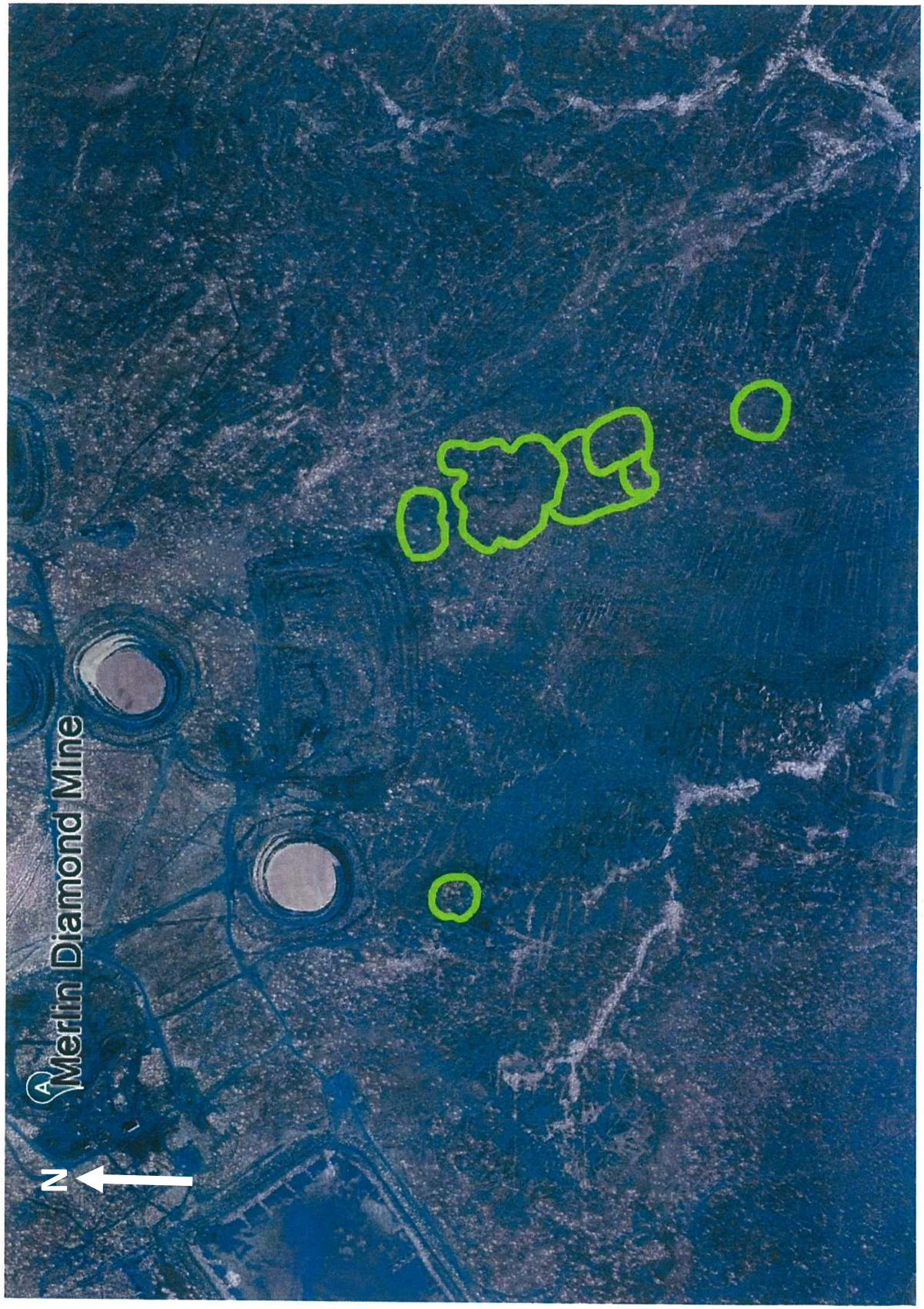

Figure 1: A satellite image of Merlin diamond mine showing location of circular topographic feature located south of Excalibur pipe.

8.1 GROUNDWATER QUALITY-FIELD RESULTS

In 2017 an audit of groundwater bores was conducted to determine which bore is still available and accessible for monitoring. Groundwater bores available are shown in Table 3.

Table 3: Groundwater bores available for data collection

No.	Bore	Easting	Northing	Description
1	1	641890	8138363	Uncased failed exploration water bore.
2	2	642132	8137763	Uncased failed exploration water bore.
3	9	643104	8136964	Uncased – failed exploration water bore
4	10	642207	8139509	Airstrip Bore – Production.
5	16	642210	8139530	Airstrip Bore – Monitoring.
6	35	643057	8135274	SE Excalibur Bore – Production.
7	42	641474	8136204	Tailings Bore – Monitoring. Near TSF Production 43.
8	45	641495	8135491	MB04 TSF Monitoring.
9	46	642488	8135278	MB03 TSF Monitoring.
10	50	642274	8135864	MB01 TSF Monitoring- near plant/ROM.
11	51	642508	8135963	MB02 TSF Monitoring- next to MB01- near plant.

Groundwater samples collected from production bores 10 (Airstrip Bore) and 33 (Office Bore), which are both permanently equipped with pumps for domestic water supply, are taken from the inlet pipe prior to where it enters the water tank. Water is pumped for a period of time prior to sampling, to ensure only fresh water from the aquifer is sampled. Samples for dissolved metals analysis are field filtered using disposable 45µm filters fitted to disposable syringes. Collected samples are placed in a chilled esky in the field and refrigerated at site until they can be dispatched to the NTEL Intertek (NATA accredited) laboratory in Darwin.

Field data collected in June 2017 from bores 45, 50 and 51 resulted in EC readings of 109, 107, 110 µS/cm respectively (Figure 2). Electrical conductivity remains within baseline range for bores 45 and 50; however, bore 51 has decreased to 110µS/cm. pH recorded 5.5 in bore 45, 7.5 to 7.7 in bore 46 and decreased as water was pumped out of Bore 50 from 5.45 to 4.96 (after 60L was purged). Historical field data indicated groundwater is naturally acidic with pH readings from 5.2 to 5.8. This is consistent with field data collected currently at bores 45, 50 and 51.

Figure 2: TSF1 monitoring bore 50 – field water quality data.

8.2 GROUNDWATER QUALITY-LABORATORY RESULTS

Groundwater Laboratory data shows slightly acidic groundwater trend continues in the Airstrip bore (Bore 10 and 16) and the Office/Plant bore (Bore 33). Bore 16 is utilised for the camp drinking water supply and the Office/Plant bore (Bore 33) is pumped to the diamond recovery area for processing diamond concentrate. EC levels remain below 120 uS/cm.s

Nitrate concentrations in groundwater range from 0.01 to 1.93 mg/L with the highest readings consistently from the Airstrip bore. Nitrate concentrations remain within the accepted back ground level of 2 mg/L and are below the maximum level considered suitable for drinking water in Australian Drinking Water Guidelines (100 mg/L).

Alkalinity levels are low (between 2 and 22 mg/l) indicating groundwater across the mine lease has moderate to low capacity to buffer (neutralise) acids. The combination of naturally low Alkalinity, Hardness (<0.1 to 7.2 mg/L, Total Dissolved Salt (20 – 70 mg/L, Bicarbonate (2 to 22 mg/L) and almost non-existent Calcium (0.1 to 0.7 mg/L) indicates the groundwater has the potential to be corrosive.

Copper levels are consistently high (3 to 1650 µg/L), particularly from the camp taps (up to 1650 µg/L). Likewise high copper and iron levels have been experienced in some groundwater bores. However, Airstrip bore iron levels remained below 0.3 mg/L and copper remained below 2 mg/L and continue to meet drinking water guidelines.

Baseline readings for ground water were measured prior to mining and from the up-gradient Airstrip Bore and Bore 2. Metals concentrations are extremely variable. A number of aluminium, copper, and zinc concentration were above the ANZECC limits, and there were occasional high readings of chromium, nickel and lead.

Since 2012 Aluminium concentration in both the monitoring and production bore at the Airstrip have above the ANZECC trigger value of 55µg/L three times (150, 60 and 110 µg/L). Copper concentrations continue to increase to levels between 33.2 and 1650 µg/L. Similarly, zinc concentrations appear to have increased in this bore with 366µg/L measured in 2017. It is possible the increase in metals is caused by naturally corrosive groundwater corroding metals within the bore and associated pipework resulting in elevated metals in the water. Metals in the drinking water supply remain within the Australian Drinking Water Guideline limits.

Future water quality monitoring of the Airstrip Bore will aim to detect any further increases in copper and zinc concentrations as well as monitor the occasional spike in nickel and lead concentration in this bore. Again, it is possible that naturally corrosive groundwater at Merlin is related to the historical spikes in metal concentrations seen in various equipped bores around the lease.

Metals concentrations in bores located down-gradient of mining operations, measured during the time of mining and in 2012 were not significantly different to baseline. Most aluminium concentrations were below the ANZECC trigger value, and copper and zinc levels were often above the ANZECC trigger levels but were within range of the baseline concentration discussed above. Once-off spikes in nickel and cadmium were also detected in the Kay Bore and Office/Plant Bore (33).

Barium concentrations remain elevated (12 to 138µg/L) but remain below the ADWG limit of 2mg/L. Bore 2 is down-gradient of the main area of mining pits, waste rock dumps and the processing plant. Any future increase in this metal will be monitored closely as per the on-going monitoring program. Similarly although chromium concentrations were low in 2012, the incidence of high chromium concentration in other bores measured in 1998, 2000 and 2015 warrant monitoring of this metal in future.

It should be noted that barium and chromium are often elevated in both mining pit water and groundwater across the site and these are likely equivalent to pre-mining levels given the presence of kimberlite – an ultramafic rock type which contains high concentration of a number of metals and

rare earth elements.

8.3 DPIR SITE INSPECTION

In September 2018 DPIR mining officers visited Merlin Mine site while taking a general site visit in the broader Borroloola Area. The objective of their visit to Merlin Mine was to undertake aerial drone survey of Ector and Kaye pits and waste rock dump. Recapping their visit, DPIR advised MDL to undertake following actions:

- Address all comments listed in the MMP Authorisation Variation Letter.
- TSF1 Monitoring bore 50 – collect field water quality data.
- Merlin water account – submit water data in correct ESDAT format.

Merlin is taking steps to address matters raised in the MMP Authorisation Letter issued by DPIR. Field water quality data for TSF1 monitoring bore 50 will be collected according to the schedule presented by Merlin in the Water Management Plan. This is to ensure no acidic seepage occurring and evaluate the potential risk, if any, on the long term stability of the TSF.

With regard to submission of water data in correct ESDAT format, Merlin has already submitted this data to the DPIR in May 2017. Merlin will ensure to continue updating this register as new data become available.

9 MINE DEVELOPMENT - 2018

During the year, a number of pits were dewatered in preparation for mining. In late June mining contractor Rusca Bros mobilised to the site and started mining Ector pit. Approximately 60,000 tonnes of ore was excavated from the pit floor.

Processing of the ore was carried out by using conventional processing plant and newly commissioned TOMRA XRT Sorter. During early 2018 old stockpiles from ROM that also include ore from Kaye pit was processed after the DMS plant and scrubber was refurbished.

MDL has recovered a number of large and impressive stones. It included two large high quality white diamonds 18.4 carats and a 9.5 carats, a 7.313 carats fancy yellow diamond, along with multiple blue, green and pink diamonds. Merlin also sold one large white stone of 17.4 carats by tender to Safdico International Ltd for USD$5000 per carat. Safdico will cut and polish this diamond and resell it to share the profit between Merlin and itself.

Merlin Diamonds Limited was in production from January through to September 2018, when processing ceased whilst the company assessed ways to improve efficiency, increase ore processing capacity and implement advance diamonds recovery methods that recover all diamonds including larger ones.

9.1 DEWATERING OF ECTOR, GAWAIN AND EXCALIBUR PITS

During the year, Merlin has completed dewatering of Ector, Excalibur, and Ywain Pits. Prior to that, Company has almost dewatered high grade Gawain Pit which likely to return significant profitability (PHOTO 1, 2). With the success of the 2017 mining campaign, Merlin has continued to utilise conventional mining methods during 2018.

PHOTO 1: Gawain pit being de-watered (February 2018)

PHOTO 2: Dewatered Ector Pit.

9.2 MINING IN ECTOR PIT – JUNE-SEPTEMBER

During the year, fresh kimberlite ore was mined from the Ector Pit. Mining contract was awarded to Rusca Bros Services. Rusca Bros mobilised to the site in late June 2018 and commenced mining of Ector pit. By the end of July, approximately 60,000 tonnes of ore was recovered from Ector pit and hauled to ROM pad (PHOTO 3). Ector is a large kimberlite pipe that has one of the highest proportions of large diamonds compared to other pipes at the Merlin Kimberlite Field and has had little mining in the past. Ease of Mining has allowed plenty of ore being hauled to the ROM pad in a short time frame and facilitated processing of the ore by the state of the art XRT machine at an increased feed rate.

PHOTO 3: Part of stockpile from Ector pit on the ROM pad.

PHOTO 4: Hauling from Kay Pit to ore pad

During the mining a Cat D10 bulldozer was used to rip the floor of the pit and push the broken kimberlite into piles. A 30-tonne excavator loaded the ore into a Cat D400 or Cat 740 six-wheeled articulated truck that hauled the ore to an ore pad sited at the top of the pit (PHOTO 4).

Mining ceased at the end of July. Hauling the kimberlite ore to Merlin ROM was undertaken using a combination of dual trailer roadtrains when the roads were sufficiently dry and the articulated trucks when the road conditions were too wet. Hauling continued until all of the freshly mined ore stockpiled for processing.

9.3 ORE PROCESSING – JANUARY-JUNE

Processing of kimberlite ore was achieved using dense media separation (DMS) module, scrubber and TOMRA XRT Sorter (Figure 3).

A simplified front-end format, introduced in late 2016, utilised cone crushing and wet-screening to produce a 1.5mm to 20mm feed for the DMS plant. This format worked well for treating the dry oversize stockpiles, but was less effective for the more 'sticky' kimberlite ore. Hence, in mid January 2017, a scrubber was installed to replace the wet-screen. This significantly improved the quality and suitability of the sized feed to the DMS and increased throughput.

In early 2018, the old DMS plant and scrubber were put back into production and previously mined stockpiles were processed to ensure it was working properly. Whilst it worked, it was breaking down and parts were constantly required for repairs. Merlin, therefore, decided to complete onsite refurbishment of scrubber and DMS Plant (PHOTO 5, 6). Furthermore, the Company needed to bring in more hired equipments to assist preparing head feed for the DMS plant and for the new TOMRA XRT Sorter.

PHOTO 5: View of refurbished scrubber

PHOTO 6: View of refurbished DMS Plant

In March 2018, Merlin introduced mobile screening plant into new circuit to remove oversize material before entering scrubber (PHOTO 7). The new mobile screening unit removes oversize +40mm to -200mm material; preventing it to pass through the processing plant. Oversized material is stockpiled on the ROM pad for further crushing to -40mm. Merlin has purchased a new jaw crusher which will be introduced into the processing circuit to treat oversize material (PHOTO 8).

Initially, Merlin processed left over stockpile from Kaye on ROM pad. From July the Company started processing freshly mined Ector ore. Processing of Ector ore continued until September when plant was put on care and maintenance. Over 30,000 tonnes of ore (mainly from Ector pit) was prepared for further processing by XRT sorter and DMS plant.

PHOTO 7: Mobile screening plant used to prepare feed for TOMRA. Feed for TOMRA was screened in three size fractions +4 to -8mm, +8 to -18mm, and +18 to -40mm.

PHOTO 8: New Jaw crusher to be installed at Merlin Mine

9.4 TOMRA XRT SORTER TO ENHANCE RECOVERY OF LARGER DIAMONDS

A suitable TOMRA XRT unit was sourced, purchased and delivered to Merlin in November 2017 (PHOTO 9). The unit has been installed, and construction work for the feed bin and conveyors completed. The unit was successfully commissioned in late December 2017. In early 2018, XRT unit was reprogrammed and received enhancement modification to run larger size fraction of +18 to -40mm at a higher feed rate.

The TOMRA diamond recovery system complement the conventional concentration and recovery process of the current DMS plant followed by the Flowsort X-ray sorting. The advanced x-ray transmission (XRT) technology reliably detects all diamonds, including coated, low luminescent, and Type II diamonds that are difficult to detect with traditional x-ray technology. The XRT technology allows obtaining a high purity level in sorting material, irrespective of size, moisture or surface coating. The XRT machine helps to capture larger diamonds before being lost in the crushing process or sorting process (i.e. being transferred to non-fluoro or oversized material).

Mobile crushing and screening equipments were brought in and were added to the front of the existing circuit to prepare feed for a TOMRA XRT sorter. The TOMRA unit has been calibrated to process Merlin ore between +4mm to -40mm size fraction. The ore was screened into three size fractions before each size fraction was passed through the XRT sorter. These size fractions were: +4 to -8mm, +8 to -18mm, and +18 to -40mm. The -4mm fraction has been stockpiled for processing through the DMS plant at a later date. The +40mm material, which comprises mostly country rock clasts, is also stockpiled separately.

PHOTO 9: The Merlin TOMRA XRT is housed in a sea-container mounted on a raised platform when fully operational; concentrate from the TOMRA will be delivered to a hopper housed in a secured cage

During the year, TOMRA has processed approximately 20,000 tonnes of ore (mainly from Ector and very little from other pits) from January to September period. Feed to the XRT sorter was via a hopper, belt feeder and conveyor, with the rejects and accept products being conveyed from the sorter (PHOTO 10, 11). The feed rate to the circuit was maintained at 100 tonnes per hour. Recovery of diamonds was disappointing. Merlin recovered just one diamond from +8 to -18mm size fraction and no diamond was produced from +4 to -8mm and +18 to -40mm size fractions. The cause of poor yield of diamonds was due to XRT unit 'not functioning fully'.

PHOTO 10: View of TOMRA XRT processing circuit.

PHOTO 11: Batch feeding sized ore to TOMRA unit

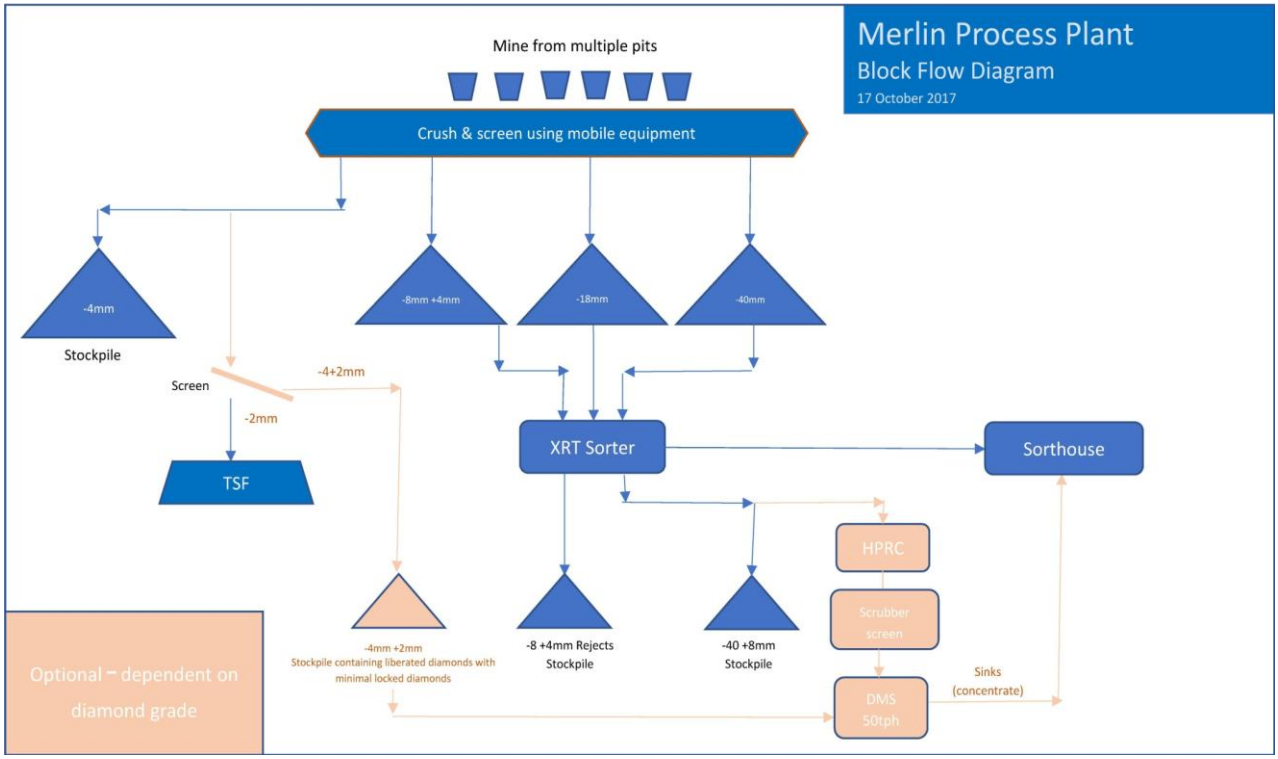

FIGURE 3: Process Flowchart for TOMRA XRT Sorter. Some suitable adjustments were made to process the ore.

9.5 DENSE MEDIA PLANT (DMS)

The previously screened -4mm size fraction which was stockpiled at ROM was reprocessed to recover +2mm to -4mm size fraction (PHOTO 12). This size fraction was combined with +4mm to -8mm and +8mm to -18mm size fractions retrieved from XRT sorter reject bins. The resulting +2mm -18/20mm size fraction was then fed directly into the DMS plant at a head rate of approximately 40 tonnes per hour. The recovered heavy concentrate product was sent to the final recovery unit - Flowsort X-Ray Machine.

PHOTO 12: Mobile screening unit.

9.6 FINAL RECOVERY AND PRODUCTION RESULTS

During the January to June period, final recovery was conducted using a Flowsort recovery system (PHOTO 13). The two twin-stage x-ray sorting machines housed in a mobile caravan were purchased from Ellendale diamond mine in the West Kimberley, transported to Merlin mine site, and commissioned in October 2016.

PHOTO 13: Modular Flowsort X-ray Sorter housed in a mobile caravan

Recovered concentrate from the DMS plant is screened into three size fractions: +2 to -4mm, +4 to -8mm, and +8 to -18mm. Each size fraction is then passed separately through the twin-stage x-ray sorting machines. Most diamonds fluoresce under x-rays, and this emitted light triggers a detector which diverts that portion of the concentrate stream to a recovery bin. The Flowsort concentrate from each size fraction was then dried and hand-sorted in a secure area with the diamonds separated manually from the gangue minerals.

9.7 FUTURE UPGRADE TO THE PROCESSING AND RECOVERY CIRCUIT

Both DMS plant and scrubber are over 30 years old and have been repeatedly breaking down during the operation. This caused the long downtime due to shutdown of processing operation. To improve this situation the Company decided to acquire a new Trommel Scrubber and a new DMS plant.

Trommel Scrubber

Trommel and scrubber are key equipments in any mineral recovery process (PHOTO 14, 15, 16, 17). Combining the two, by taking a top grade scrubber and adding a high performance screening and

sizing trommel on to the end of it will result in streamlining the process. In turn reducing downtime and increasing throughput. Merlin has placed order for trommel scrubber wash plant which is being sourced from China. The new scrubber, screen and conveyor belts are being prepared for shipment and are expected to arrive sometime in 2019. Merlin anticipates by incorporating this new trommel scrubber in the processing plant, head feed will increase from 50 tonnes per hour to 100 tonnes per hour which translate directly into doubling the production of diamonds. Furthermore, scrubber will significantly reduce the recirculation of oversize material and give Merlin the ability to feed damp ore directly from pit.

Screened material from mobile screening unit will be transferred to the scrubber. Scrubber will discharge material on to Merlin's new high-performance screening and sizing trommel unit, which will separate material into three different size fractions; -1mm, +2mm -18mm and +18mm –40mm. The -1mm material will be transported to the tailing dam, the +2mm –18mm will be processed in DMS module and +18mm -40mm material will be conveyed to the XRT machine for screening.

PHOTO 14: On order trommel scrubber unit

PHOTO 15: On order high frequency vibrating screen

Figure 16: On order conveyor belt

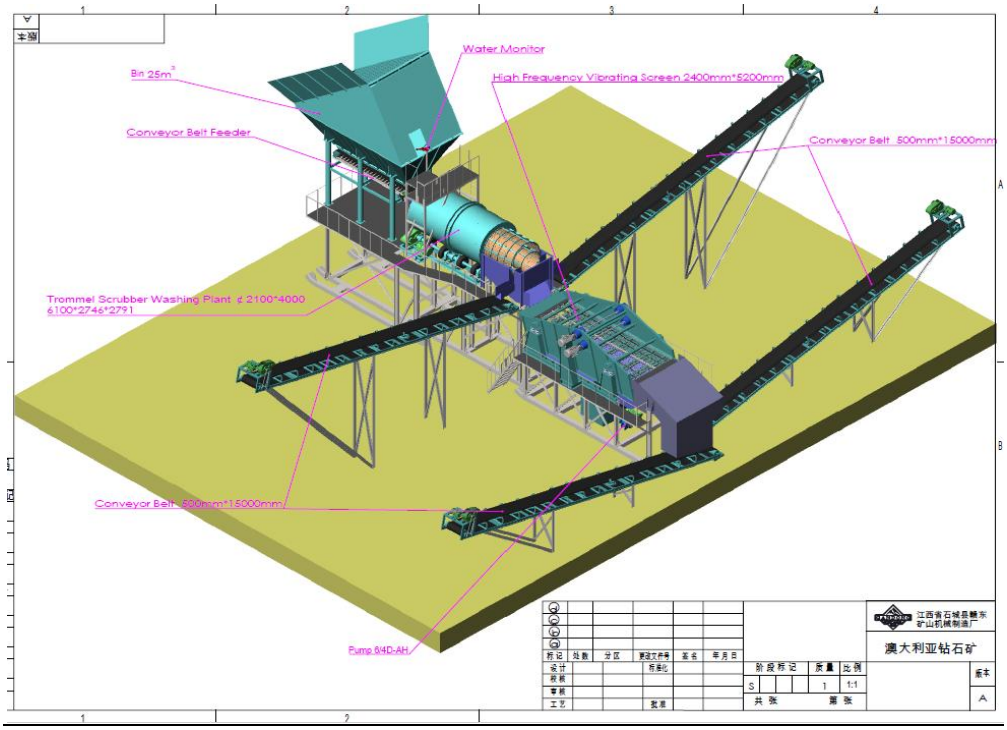

PHOTO 17: New scrubber and trommel wash plant

Dense Medium Separation

Dense medium separation (DMS) is a simple process reliant on specific gravity (PHOTO 18). It is robust process when conducted across mixed sizes fraction from 1mm-20mm with extremely high separation efficiency. This technology has been used in diamond recovery for decades. It has been improved and refined over time, with South Africa leading the market producing high quality plants. Merlin has ordered new DMS circuit from South Africa. With its addition, Merlin anticipates an increase in the +2mm -18mm production rate from 15tph to 40tph. Furthermore, Merlin existing and new DMS modules together will increase head feed rate upwards of 150 tonnes per hour and will offer reliability of continuous operating recovery circuit in the event of one breakdown or required maintenance checks.

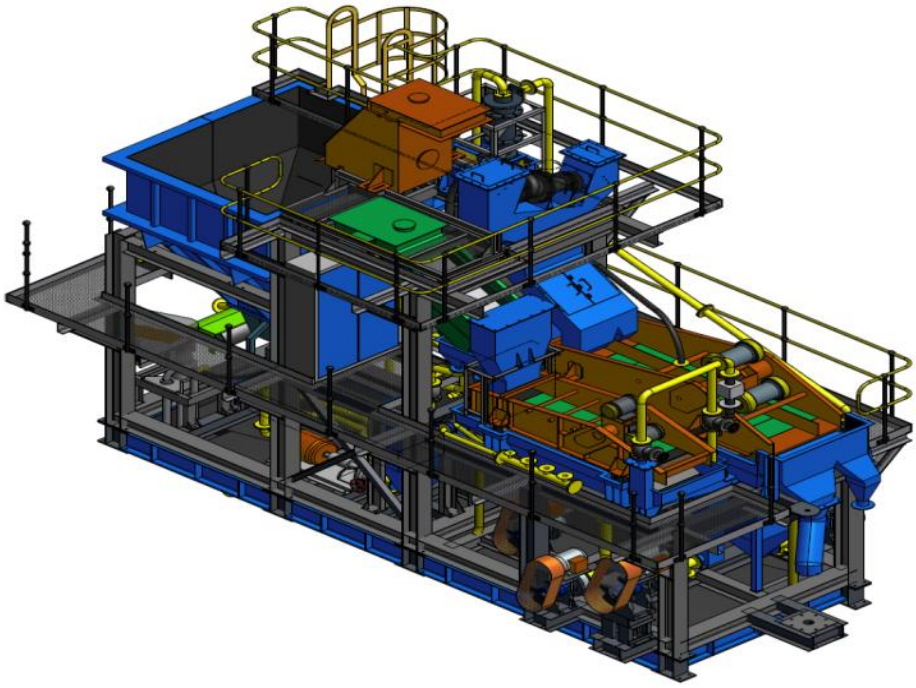

PHOTO 18: On order new DMS module.

9.8 DIAMONDS PRODUCTION

The Merlin Mine has continued to demonstrate its potential to produce significant large high-quality diamonds. The 2018 operations returned a total of 2844.118 carats between May to September 2018 period. In addition to that Merlin also recovered over 1000 diamonds during the first quarter of 2018. This diamond production was from the processing of mainly freshly mined ore from Ector pit and stockpiles. A number of very fine gems and larger stones (18.4 to 1 carat range) were identified within the recovered parcel, with 32 pink stones weighing together 6.639 carats (Photos 19, 20, 21, 22).

Merlin is particularly well known for its very high quality white stones. In September, one large white stone 17.4 carat was sold to Safdico International Ltd for US$5000 per carat. Following cutting and polishing by Safdico, it is now a 5 carat D flawless white diamond. Safdico will sell this cut and polished diamond on behalf of Merlin and proceed will be shared on a 50/50 basis after the deduction of price paid by Safdico. Merlin was expected to receive further income of US$90,000.

PHOTO 19: Pink diamonds totalling 6.639 carats recovered from Merlin Diamond Mine.

PHOTO 20: Blue/green (1.448 cts), Pink (total wt: 1.03 cts) and yellow (7.33 cts) diamonds

PHOTO 21: Collection of variety of diamonds recovered.

PHOTO 22: Two white large stunning diamonds (18.4 carats and 9.5 carats) among others smaller diamonds. Typical of the high quality diamonds from the Merlin diamond mine.

PHOTO 23: Assortment of high quality yellow/champagne, cognac, white diamonds mostly from Ector.

PHOTO 24: Assortment of quality diamonds from Ector pit.

In addition to high-quality clear white diamonds, Merlin is also known for producing a variety of coloured stones. The 2018 production reflected this mix and produced clear white stones and assortment of pink, yellow/champagne, blue/green and cognac stones. Photos 19, 20, 21, 22, 23, 24 depict collection of variety of diamonds recovered during the current phase of mining.

9.9 FUTURE DIRECTION

Merlin has engaged in discussions with external mining consultant, Mining Plus, to conduct a study to determine the best options for mining at Merlin and in particular options to mine underground at Palsac, Ywain, Gawain and Excalibur. The scope of study to be agreed between the parties will determine, for each deposit, the practicality and high level economics of the potential options. The outcome of the study can be used to guide and prioritise future work by determining which deposit is likely to most viably mined first and which mining methodology that better suits. The Palsac and Excalibur deposits consist of a single diamond pipe at depth with Ywain and Gawain being two diamond pipes at relative close distance whereby the possibility of sharing some of the underground infrastructure may be possible.

Mining of Ector and processing of stockpiles will be reviewed following the commissioning of the new DMS plant at the end of the wet season. Meanwhile Processing ceased in September 2018, and the mine operation returned to 'Care & Maintenance'.

9.10 SALE OF DIAMONDS FROM 2018 PRODUCTION

In September 2018, a parcel of polished and rough diamonds was presented for sale by tender in Antwerp. Total sale price received was US$392,241, however not all diamonds have been sold. Merlin has also decided to announce diamonds production on a quarterly basis.

10 EXPENDITURE STATEMENT

The expenditure for the reporting period amounted to **$5823844.45**, with the breakdown detailed in the 2018 annual expenditure report.

The activities covered by the 'pre-feasibility' expenses listed in section G include Preparation and approval of mining MMP, mining in Ector Pit, processing of kimberlite, diamond recovery, and investment in new processing and diamond recovery systems that will maximise the company's recovery of low luminescent and large diamonds.

11 REFERENCES

- Crawford, D, 2015. *Mine Management Plan for Merlin MLN1154 - 2015.* Merlin Diamonds Limited.
- Keys, G, 2018. *Mine Management Plan for Merlin MLN1154 - 2018.* Report prepared for Merlin Diamonds Limited.
- Jacques, A.L. (1998) *Kimberlite and Lamproite Diamond Pipes.* IN: AGSO Journal of Australian Geology & Geophysics, 17(4), pp 153-162.
- Kammermann, M., 2007. *Annual Report. Year 10. ML1154 'Merlin'*. North Australian Diamonds Limited Report 08-033.
- Kammermann, M., 2012. *Annual Report. Year 14. ML1154 'Merlin'.* North Australian Diamonds Limited Report 12-042.
- Keys, G., 2018. *2018 Mining Management Plan*. Report prepared for Merlin Diamonds Limited.
- Pietsch, BA; Rawlings DJ; Creaser, PM; Kruse, PD; Ahmad, M; Ferenczi, PA ; Findhammer, TLR 1991. *Bauhinia Downs 1:250,000 Geological Series Explanatory Notes.* Northern Territory Geological Survey.
- Plumb, KA; Wellman, P., 1987. McArthur Basin, Northern Territory: mapping of deep troughs using gravity and magnetic anomalies*. BMR Journal of Australian Geology and Geophysics*, 10(3), pp 243-252.
- Plumb, K.A.; Ahmad, M; Wygralak, A.S., 1990. Mid-Proterozoic basins of the North Australian craton – regional geology and mineralisation. In: FE Hughes (ed). *Geology of the Mineral Deposits of Australia and Papua New Guinea. Volume 1.* Australasian Institute of Mining and Metallurgy, Melbourne. Monograph 14, pp 881-902.
- Reddicliffe, T.H., 1996. *Merlin Kimberlite Field, Batten Province, Northern Territory*. M.Sc. Thesis, Department of Geology and Geophysics, The University of Western Australia
- Reddicliffe, T.H., 2009. *Annual Report. Year 11. ML1154 'Merlin'.* North Australian Diamonds Limited Report 09-031.
- Reddicliffe, T.H., 2011. *Mineral Resource Estimate for the Merlin Project.* North Australian Diamonds Limited Report 11-067.
- Rockett, G.M.I., 2015. *Annual Report. Year 17. MLN1154 'Merlin Diamond Project'.* Merlin Diamonds Ltd Report 15-001.
- Rockett, G.M.I., 2016. *Annual Report. Year 18. MLN1154 'Merlin Diamond Project'.* Merlin Diamonds Ltd Report 16-001.
- Rockett, G.M.I., 2017. *Annual Report. Year 19. MLN1154 'Merlin Diamond Project'.* Merlin Diamonds Ltd Report 17-001.