



Merlin Diamonds Limited

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ANNUAL REPORT Year 20 MINERAL LEASE MLN1154 “MERLIN DIAMOND PROJECT”

Annual Report For The Period
1st January 2017 to 31st December 2017

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Operator: Merlin Diamonds Limited

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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 2017 to 31st December 2017.

Exploration

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.

The exploration Mining Management Plan for the 2017 Merlin drill program was compiled by enviroMINDed and submitted in April. The program was approved by the DPIR in May, with Authorisation Number 0736-01, providing permission for Merlin to commence work.

Drilling commenced on 11th July, and was completed on 21st August, with a total of 155 holes 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, all necessary rehabilitation work was undertaken at each drill target prior to the commencement of the wet season.

Environmental Monitoring

The company reviews rehabilitation progress using a photographic survey. The 2017 survey was undertaken in November, just prior to onset of the wet season.

Water quality and water level testing in mine pit 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. Sampling and analysis of the Merlin TSF monitoring bores was also reinstated.

In October 2016, DPIR requested Merlin Diamonds Ltd to provide all (historical plus current) environmental monitoring data collected from across the mine site. This was required by the Department as a part of its own internal audit of all environmental data collected from mining operators. Merlin submitted the data to the DPIR in May 2017.

In June 2017 DPIR officers visited Merlin for a site familiarisation, with areas of interest included mining, site infrastructure, plus environmental management and site training.

Mine Development

Following on from operations in late 2016, mining of kimberlite from Kay Pit continued during January and February. An estimated 100,295 tonnes of ore were mined during the period November 2016 to February 2017. Hauling of the kimberlite to Merlin ROM continued until late March with an estimated 98,350 tonnes stockpiled for processing.

From January to June, an estimated 71,720 tonnes were processed through the dense media separation (DMS) plant front end, bringing the total for the 2016-2017 campaign to 84,504 tonnes. During this period, the processed ore comprised a mix of reprocessed stockpiled rejects, blended Kay kimberlite ore, and 100% Kay kimberlite ore.

During January to June, final recovery was undertaken using a Flowsort recovery system, followed by hand-sorting. A total of 20,473 stones for 4,633.807 carats were recovered between October 2016 and June 2017. A number of very fine gems were identified, including 37 stones weighing in excess of five carats.

In September, a parcel of polished and rough diamonds was presented for sale by tender in Antwerp, with one stone, a 13.27 carat white gem Z rough diamond returning a very high sale price of US\$11,897.51 per carat.

Merlin Diamonds Limited suspended ore processing in June 2017, whilst the company explored ways to improve efficiency, and enhance recovery of the larger diamond sizes. Following consultation with diamond industry experts, the installation of a TOMRA XRT machine was recommended. The TOMRA diamond recovery system replaces the conventional concentration and recovery process of the DMS plant followed by the Flowsort X-ray sorting.

A suitable TOMRA unit was sourced, installed at Merlin and successfully commissioned in late December. The TOMRA XRT ore sorting machine uses advanced x-ray technology to 'look' for carbon, so it can detect coated diamonds and diamonds still trapped in kimberlite rock, as well as low luminescent, and Type II diamonds that are difficult to detect with traditional x-ray technology. It is also able to process much larger size fractions than conventional DMS systems that only handle up to 20 mm fraction. The TOMRA XRT unit at Merlin has been calibrated to handle up to 40 mm fraction, greatly increasing the capacity of the plant to recover the larger-sized diamonds for which Merlin is renowned.

Expenditure

Total expenditure on the mining lease amounted to **\$6,779,592.35** as per the breakdown in the expenditure report for the reporting period 1st January to 31st December 2017.

2 INTRODUCTION

This report details exploration and evaluation activities carried out by Merlin Diamonds Ltd (MDL) over Mineral Lease MLN1154 for the period 1st January 2017 to 31st December 2017. The target for exploration within this lease is diamond-bearing kimberlite intrusives. In addition, the company is undertaking an evaluation of ore processing methods to re-establish commercial-scale mining operations within the lease.

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

Work	Explanation
Exploration	42 targets selected from historical geophysical and geochemical datasets. Prioritisation of targets was based on similarity to the geophysical and geochemical signatures of known Merlin kimberlite pipes.
	Exploration Operations Mining Management Plan approved in May 2017 - Authorisation Number 0736-01
	Detailed ground electromagnetic surveys undertaken over six of priority targets - total 17.6 line kilometres.
	RC drill program commenced 11 th July, and completed 21 st August, with 155 holes drilled for 2,871 metres. No kimberlite pipes were intersected during the program.
	Rehabilitation work undertaken at each drill target during September, prior to the wet season rains.
Environmental monitoring	Photographic review of rehabilitation and erosion monitoring was undertaken in November at the end of the dry season.
	Water quality and water level testing in mine pit voids and strategic water bores around the lease continued.
	Sampling of the TSF monitoring bores was reinstated.
	Submission of all historical and current environmental monitoring data to the DPIR in May 2017
	Merlin site inspection by DPIR team made in June 2017.
Mine Development	Mining from Kay Pit continued through January and ceased on 8 th February due to weather conditions. Estimated total ore mined from Kay during 2016-2017 campaign was 100,295 tonnes.
	Processing of kimberlite from Kay Pit and crushed stockpiled rejects continued to 21 st June with 84,054 tonnes processed during the 2016-2017 campaign.

TABLE 1 cont: Summary of work undertaken during 2017 reporting period

Work	Explanation
Mine Development (continued)	The 2016-2017 operations returned 20,473 diamonds for 4,633.807 carats, with 37 stones in excess of 5 carats and the largest being 35.74 carats.
	Processing ceased on 21 st June to allow the company to assess and rectify a number of problems identified with the diamond recovery process.
	In September, a parcel of polished and rough diamonds was presented for sale in Antwerp.
	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. The unit was successfully commissioned in late December.
	With the success of the 2016-2017 mining campaign, Merlin will continue to utilise conventional mining methods during 2018.

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	Sub-Blocks	Area (ha)
Merlin	MLN 1154	17/12/1996	15/06/1998	n/a	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 km² (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 CO₂), 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 xenocrysts (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.

7 EXPLORATION - 2017

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 compiled by previous owners of the lease. Since 2004, this work has been supplemented by additional indicator mineral sampling in areas with insufficient sample density, and detailed ground EM surveys over anomalous areas. An RC drill program was proposed to test these targets. Prior to finalising the collar locations, six detailed ground EM surveys were undertaken to help resolve the target.

7.1 TARGET SELECTION

A total of 12 kimberlite pipes and one breccia pipe (Perceval) have been discovered within the Merlin Mine Lease. Building on work undertaken in previous years, 42 targets were selected from an extensive review of all historical geophysical and geochemical datasets. Prioritisation was based on each target's similarity to the geophysical and geochemical signatures of known Merlin kimberlite pipes, with many targets proximal to unresolved positive indicator mineral results.

The Merlin kimberlites discovered to date on the plateau have small areal extents compared to most kimberlite fields world-wide. The largest of the pipes (Kay and Ector) are about 120 metres in diameter, with most of the intrusions being 50 metres in diameter or smaller. Ywain (with the highest grade) is about 22 metres in diameter. As a direct consequence of the likely small diameter size of any undiscovered kimberlites, the drill collar grid over the target anomalies needed to be tight; hence most of the proposed drill grids were 20 metre spacing. With the additional uncertainty of anomaly location, due to conflicting datasets, the number of drill-holes proposed to test each anomaly was high.

The priority target locations are shown on [Map 5](#) and their features summarised in [Appendix I](#).

7.2 EXPLORATION OPERATIONS MINING MANAGEMENT PLAN

The exploration MMP for the 2017 Merlin drill program was compiled by enviroMINDED and submitted in April. The MMP sought permission to conduct a number of ground electromagnetic (EM) surveys as preliminary work, leading to a reverse circulation (RC) drill program of 5,500 metres over 42 targets. An estimate of the drill collar numbers and planned drill metres for each target was included in the MMP.

A variation of Authorisation Number 0736-01 was approved by the DPIR in May 2017, providing permission for Merlin to commence work on the exploration program.

7.3 GROUND EM SURVEYS

During 2017, high-resolution ground electromagnetic surveys were undertaken over six priority targets selected from the exploration data review. These surveys utilised a Geonics EM34-3 ground electromagnetic instrument, with line-spacing at 25 metres and sample spacing at 20 metres. The EM34-3 was used in the horizontal dipole mode (*i.e.* coils held vertically), with 20-metre separation.

A total of 17.6 line-kilometres were completed. The targets were a mixture of historic ground gravity, aeromagnetic, and geochemical anomalies.

Table 3 summarises the surveys, Appendix II presents the survey results as maps, and all data is submitted as Appendix III in digital format (MLN1154_2018_A_01_GeophysicalLog.txt)

TABLE 3: Summary of Ground Electromagnetic Surveys				
Target	Anomaly Type	Survey Parameters	Total Line Kilometres	Conclusions
JW08-KJT01	Magnetic + geochemical	360m x 11 lines	3.96 km	No significant EM response over mag target. Three weak targets local to geochemical anomalies
JW31	Gravity + magnetic	Area A: 400m x 6 lines Area B: 240m x 7 lines	4.08 km	No EM response over gravity + mag targets, weak discrete EM high to east of northern gravity target
JW69	Weak gravity low	240m x 8 lines	1.92 km	A weak EM response over gravity low, plus a discrete weak EM anomaly
KJT03	Discrete magnetic high	260m x 6 lines	1.56 km	No EM response over magnetic target, however there is a discrete weak EM anomaly to west
KJT04	Discrete magnetic high	240m x 8 lines	1.92 km	No EM response over magnetic target, discrete weak EM anomaly to the east was drilled in 2012
KN03-JW73	Strong soil geochemical response – Nb, Ce, Cr, & Ni	380 x 9 lines 180m x 4 lines	4.14 km	Survey did not resolve a significant conductive target hence conclude geochemical result due to the presence of laterite acting as a chemical 'sponge'
Total:			17.58 line-kilometres	

7.4 RC DRILL PROGRAM

Ground preparation for the drill program commenced as soon as approval for the MMP was received, with most drill pads prepared in May, as the drill rig was due on-site in late May. Photographs were taken of each drill site prior to clearing.

In mid-May the original drill company, GeoDrilling from Darwin, withdrew from the contract due to timing conflicts. A replacement rig was sought from Orbit Drilling based in Perth however this rig did not arrive on-site until early July.



PHOTO 1: Orbit Drilling Hydco RC 40 drill rig with booster compressor

Drilling commenced on 11th July, and was completed on 21st August. The drilling method was reverse circulation (RC) with a drill-hole width of 120mm. The rig was a Hydco RC 40 mounted on a 6 x6 UD Nissan. The support truck, a 6x6 Trakker, had with capacity to carry 2,500L of water and 4,500L diesel, and the personnel truck was a 2006 4x4 Mitsubishi Canter. As most of the holes drilled were less than 20 metres in depth, with the deepest being 60 metres, residence time for all equipment at each drill-site was usually one to two hours.

The original exploration plan was for a single hole at the centre of each target to be drilled to 50 metres as a reference hole. This target depth was selected because the thickest section of Cretaceous sediments overlying Merlin kimberlites is about 45 metres. Hence, if the geologist logging the spoil did not recognise the sediments as Cretaceous infill rather than Bukalara Sandstone, he or she would not pull up too early and miss the kimberlite. The additional holes in the grid were planned at 20-25 metres deep, as logging would be correlated with the original hole to confirm stratigraphy. Overlapping angled holes of 60 degrees were planned for testing the magnetic targets.

After a few days of drilling, it was apparent the Orbit drill rig was experiencing significant difficulty when drilling deeper than 25 metres due to the high water table and problems with down-hole air pressure. The rig's on-board compressor was unable to keep the ground water out of the hole, leading to problems with blocked bits due to wet clay layers and subsequent drill collar blow-outs. When the booster compressor was utilised, the drill spoil sample was reduced to powder with

minimal rock chips making down-hole logging impossible. Hence, instead of drilling one hole at the centre of each target to a set depth, the primary hole was taken only to a depth where the geologist was certain the rock-type was Bukalara Sandstone and not Cretaceous infill. Remaining holes were taken to between 15 to 20 metres depth, and logged by comparing with the stratigraphy with that of the first hole. Overlapping angled holes at magnetic targets were changed to a line of short vertical holes at 10-metre collar spacing.



PHOTO 2: Orbit rig in action – drill spoil samples on right-hand-side

There are a number of features that allow accurate differentiation between the Bukalara Sandstone sequence and the Cretaceous Sandstone sequence – these include:

- Grain size and sorting – the sandstone horizons in the Bukalara are well-sorted and are fine to medium in grain size compared with the very clay-rich and poorly-sorted Cretaceous sandstones;
- Reference horizons – green and pink-brown siltstone/mudstone bands common to the Bukalara sequence do not occur in the Cretaceous infill.

On completion, each drill-hole was plugged using a concrete plug positioned 0.5 metres, or further, down the drill-hole and then backfilled. A metal peg was installed to mark the site of each drill-hole and the drill collar coordinates were confirmed later using a Sokkia GIR1450 (OmniSTAR) DGPS.

Maps 6 to 10 show the locations of the drill collars and target anomalies.

7.4.1 Results

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.

A table summarising the program's conclusions is in Appendix IV, and all collar and down-hole lithology data is submitted in digital format as Appendix V (MLN1154_2018_A_02_DrillCollars.txt) and Appendix VI (MLN1154_2018_A_03_LithoLogs.txt).

7.5 REHABILITATION OF 2017 DRILL PADS

In mid September, rehabilitation work was undertaken at each drill target. It was deemed necessary to prioritise this work as vegetation regrowth was already occurring on the drill pads. The following work was undertaken at each drill-site:

- A loader was used to back-blade topsoil over the pads and to level out any ruts left by the drill rig and support truck;
- All remaining PVC collars were cut off at least 40 cm below ground level and the cement plug installed down the hole before backfilling;
- A mound of sand was placed over the collar site to allow for subsidence and limit water pooling;
- Drill spoil sample piles were spread out and covered with soil so as to blend in;
- Branches and dried vegetation pushed to the side of the pad during clearing were spread across the area;
- Representative photographs were taken at each drill target location with the coordinates and orientation recorded;
- All metal drill-collar pegs were collected and any remaining rubbish removed from each site.

As the equipment used for this drill program was relatively light-weight, and the residence time short, ripping of the drill pads was not considered necessary. In some places, the sand was very soft, especially where grasses were sparse, and achieving a smooth finish was difficult. It was decided that leaving gentle mounds was preferable to increasing the damage to vegetation by persisting with the loader.

A photographic record of the drill site rehabilitation work is presented in Appendix VII.

8 ENVIRONMENTAL MONITORING - 2017

The company reviews rehabilitation progress by way of a photographic survey, with the 2017 survey undertaken in November just prior to commencement of the wet season. This monitoring survey is included in the updated Mining Management Proposal (MMP) submitted to the DPIR in January 2018.

Water quality and water level testing in mine pit 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 can be found 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.

8.1 STANDING WATER LEVELS

Groundwater levels in meters below ground level (m/bgl) have been plotted in [Figure 1](#) for bores 2, 9, 16, 31, 35, 45, 46, 50 and 51.



FIGURE 1: Changes in groundwater levels measured between July 2012 and June 2017

Overall groundwater levels in monitoring bores are relatively shallow, sitting between 3.84 m and 35.9 m/bgl. With the exception of Bore 2, all of the monitoring bores respond to wet season rainfall by showing short term water level increase following a rainfall event. Over the dry season months most bores recede back to stable levels. Overall, groundwater levels have slightly increased since monitoring resumed in 2012. Bore 31 has the most notable increase of 4 metres from 35.9 m/bgl in 2012 to 31.93 m/bgl in 2016. Bores 9, 16, and 35 also show similar, subtle rising trends.



PHOTO 3: Measuring the standing water level of a tailings monitoring bore using a Heron Dipper T meter

Figure 1 indicates Bore 2 levels have risen gradually from depths of 17.3 to 15.87 m/bgl since 2012 and appears to be the least responsive to rainfall. Bore 9 also gradually rose almost 3 metres until October 2014, where it has remained between 23.45 and 23.77 m/bgl. It follows a similar response pattern to Bore 16 when rainfall is received with less magnitude. Bore 16 is the monitoring bore for the Airport production bore which supplies water to the camp. During pumping, the bore draws down and after large rainfall events it has risen up as much 13 metres.

Bore 31 has gradually increased 4 metres from 35.9 to 31.93 m/bgl and, up until recently, Bore 35 has maintained a level within 1.66 m. However, this bore showed a decline in June 2017 to 15.07 m/bgl and will continue to be monitored. Bore 46 has declined from around 3.84 to 5.17 m/bgl since April 2016.

Bores 45, 50 and 51 have not been monitored since 2012 but they have been added to the monitoring schedule due to their proximity to TSF1. During June 2017 they were recorded at 8.15, 7.41 and 11.51 m/bgl respectively.

The TPS 90 FLT water quality meter was sent for repairs in late 2016 as the 'pH' and 'dissolved oxygen' probes were faulty. The meter was returned to site in May 2017, and sampling of the pit voids for field water quality resumed. Results plotted in the 2018 MMP update indicate overall pit void water is of good quality.

Pit water quality varies depending on the activity occurring in the pit. For example during the

reporting period, Kay Pit was dewatered into the nearby Ector Pit, and tailings from the plant operations were pumped into Sacramore Pit. These activities have short term impacts on pit water quality due to increased turbidity.



PHOTO 4: Gareth pit void field data collect in May 2017

Water neutrality - pH has gradually increased from between 6 and 7 to between 7.4 and 10 since early 2013. The gradual pH increase is most likely attributed to the water being exposed to alkaline kimberlite material (ore) remaining in the mine pits.

Electrical Conductivity - EC is between 100 and 200 $\mu\text{g}/\text{L}$ for most pits, indicating salinity levels are relatively low.

Oxidation-Reduction Potential - ORP > 100–300 mV indicates oxidation is occurring, and ORP in the interval 0–100 mV indicates a transient oxidation–reduction situation may be occurring. From 2013 until 2017, redox readings range from 50 – 250 mV, indicating pit waters have been both oxidising and transitioning into a reduction situation. The most recent field sampling (May 2017) returned redox above 100 mV in all pits indicating they were oxidising at the time.

8.2 TSF MONITORING BORES

During the reporting period, Merlin's TSF monitoring bores were sampled and analysed for the first time since 2003. All field and laboratory results are detailed in the MMP update, and trends from those results are described below.



PHOTO 5: Sampling TSF MB 46 – June 2017

Electrical conductivity measured in bores located around the TSF from 1999 to 2003, ranged from 30 to 240 $\mu\text{S}/\text{cm}$. The most recent sampling in 2017 ranged from 50 to 100 $\mu\text{S}/\text{cm}$. EC levels remain below the ANZECC 2000 trigger value of 250 $\mu\text{S}/\text{cm}$, and continue to decline.

Alkalinity measured in bores located around the TSF, and down-gradient of the TSF, during mining operations were comparatively high in MB02 and MB03 (27 to 86 mg/L). In comparison, the alkalinity in bores downstream of the TSF (bores MB07, MB08, MB09, MB10) was very low to negligible. Overall, alkalinity levels in groundwater across the mine site continue to have a moderate to low capacity to buffer (neutralise) acids.

Cation and anion (Cl, Ca, K, Mg, Na) concentrations measured in groundwater bores across the mine site did not differ significantly, except for MB02 where concentrations were comparatively higher in parallel with the higher EC concentrations.

Nitrate (NO_3 as N) levels were below 0.05 mg/L during all sampling rounds, except in 2002 and more recent sampling in 2017 when Bore 45 (MB04) returned 0.06 and Bore 46 (MB03) returned 0.17 mg/L. These readings are above the ANZECC 2000 trigger value (0.16 mg/L), however this trigger value is conservative and designed for surface waters. The study 'Contamination of Australian Groundwater Systems with Nitrate' (LWRRDC 1999) considers nitrate concentrations in groundwater across Australia of less than 2 mg/L NO_3 (as N) as "background" and concentrations above 10 mg/L as "contaminated". In addition, the Australian Drinking Water Guidelines (NHMRC,

NRMMC 2011) specify a guideline level of <11.3 mg/L (NO₃ as N) as suitable for drinking. Nitrate concentrations in groundwater across the site are all within the background level of 2 mg/L and also all well below the maximum level considered suitable for drinking water.

Barium and chromium concentrations were generally higher and more consistently above the ANZECC 2000 guidelines – up to 684 µg/L for barium and, until recently, above 1 µg/L for chromium. Excluding Bore 45 (MB04), barium levels in TSF bores have declined since 1999 sampling. Most recent sampling in 2017 indicates chromium levels have declined to between 0.3 to <0/1 µg/L in TSF bores. High aluminium and lead concentrations of up to 2350 µg/L and 26 µg/L respectively were previously recorded, however 2017 sampling indicates aluminium levels are below 26 µg/L and lead levels have reduced to below 1.04 µg/L.

8.3 SUBMISSION OF ENVIRONMENTAL MONITORING DATA

In October 2016, DPIR requested Merlin to provide all (historical plus current) environmental monitoring data collected across the mineral lease. This was required by the Department as a part of its own internal audit of environmental data that has been collected from the mining operators. Merlin was required to submit this environmental monitoring data in a pre-formatted Microsoft Excel worksheet. The required information for Water Data included:

- Sample location registry
- Well construction registry
- Level measurements data
- Field parameter data
- Laboratory analysis data – filtered
- Laboratory analysis data – totals

Over the time, the Company's collected historical environmental data has been saved in various formats, some in Microsoft Excel format, and others in Adobe PDF format. Merlin was able to bring this data into one pre-formatted Microsoft Excel worksheet which was submitted to the DPIR in May 2017.

8.4 DPIR SITE INSPECTION

In June 2017 DPIR officers visited Merlin for a site familiarisation as the controlling officer had not previously been to site. Areas of interest included mining, site infrastructure, plus environmental management and site training. Merlin is currently considering DPIR recommendations that include:

- A Closure Plan for the existing Waste Rock Dump (WRD) that will be assessed against current status of the WRD;
- ANCOLD 2012 standards to apply to proposed tailings dam modifications;
- Weeds on the TSF require active management.



PHOTO 6: DPIP inspecting rehabilitated exploration sites – June 2017

9 MINE DEVELOPMENT - 2017

The Merlin Project is renowned for top-quality white diamonds and large 'specials'. The largest diamond recovered in Australia to date weighed 104.73ct and came from Merlin. During the reporting period, a number of impressive stones were recovered including a 13.27ct very high quality white flawless gem.

Merlin Diamonds Limited was in production from January through to June 2017, when processing ceased whilst the company assessed ways to improve efficiency, and enhance the recovery of the larger diamond sizes.

9.1 MINING IN KAY PIT – JANUARY-FEBRUARY

Following on from operations in November and December 2016, mining of kimberlite ore from Kay Pit continued during January and February. 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 7: Loading haul-truck in Kay Pit



PHOTO 8: Hauling from Kay Pit to ore pad

Mining ceased on 8th February because conditions in the pit, and on the haul ramp, became too difficult due to persistent rain. A further 27,365 tonnes had been excavated, bringing the estimated total mined from Kay to 100,295 tonnes for the period November 2016 to February 2017.

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 late March, with an estimated total of 98,350 tonnes stockpiled for processing.

Note: the total tonnes mined and tonnes hauled to the ROM are estimates as the articulated trucks and roadtrains were not fitted with a weightometer. Hence tonnages were estimated using 40 tonnes per load for the articulated trucks, and 72 tonnes per load for the dual road train, and this may have been excessive.

9.2 ORE PROCESSING – JANUARY-JUNE

Processing of kimberlite ore was using a dense media separation (DMS) plant. 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, 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 through-put.



PHOTO 9: Scrubber commissioned in January 2017

From January to June, 71,720 tonnes was processed through the plant front end, bringing the total for the 2016-2017 campaign to 84,504 tonnes. [Table 4](#) summarises the split between reprocessed stockpiled rejects, blended Kay ore, and 100% Kay ore for this period. All tonnages are estimates, based on a nominal three cubic-metres per bucket and average rock density of 1.8.

TABLE 4: Summary of Ore Types Processed in 2016-2017 Campaign			
Ore Type	Stockpiled Rejects Tonnes	Kimberlite (Kay) Tonnes	Total Tonnes
Historic stockpiled rejects - crushed	11,416	0	11,416
Crushed stockpiled rejects blended with Kay kimberlite	5,881	8,283	14,164
Kimberlite (Kay ore) - crushed	0	51,484	51,484
Kay ore scrubber oversize from 2016-2017 processing	6,990	0	6,990
TOTALS	24,287	59,767	84,054

The scrubber produced a clean product sized at +1.5mm -20mm that was fed directly into the DMS, and the heavy concentrate product was then sent to the final recovery unit.

9.3 FINAL RECOVERY AND PRODUCTION RESULTS

During the January to June period, final recovery was undertaken using a Flowsort recovery system. 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, and commissioned in October 2016.



PHOTO 10: Modular Flowsort X-ray Sorter housed in a mobile caravan

Concentrate from the DMS is screened into three size fractions: +1.5 to -3.5mm, +3.5 to -8mm, and +8 to -16mm. 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.

Historical hand-sort tails from the 2013 processing campaign were re-processed as they predated the installation of the Flowsort machines. A parcel of concentrate collected from spillage at the DMS was also processed.

Table 5 summarises the production results for the 2016-2017 campaign.

Ore Type	Total Tonnes	Total Carats	Grade (cpht ¹)	+1.5 to -3.5mm	+3.5 to -8mm	+8 to -16mm	Average Stone Size	Largest Stone
Rejects - crushed	11,416	458.679	4.02	2,512	243	2	0.17	8.26
Rejects blended with 'Kay' kimberlite	14,164	853.090	6.02	3,547	394	19	0.22	18.48
'Kay' Kimberlite	51,484	2,979.47	5.79	12,480	1,252	146	0.21	35.74
'Kay' scrubber oversize	6,990	285.386	4.08	1,333	125	6	0.19	8.74
Historical Recovery Tails	n/a	17.206	n/a	176	5	0	0.10	1.56
ROM concentrate spillage cleanup	n/a	39.976	n/a	425	3	0	0.09	0.57
TOTALS	84,054	4,633.807	5.51	20,473	2,021	174	0.20	35.74

¹ cpht is metric carats per 100 tonnes

9.4 DIAMONDS

The Merlin Mine has continued to demonstrate its potential to produce significant large high-quality diamonds. The 2016-2017 operations returned a total of 20,473 stones for 4,633.807 carats. A number of very fine gems and larger stones were identified within this parcel, with 37 stones weighing in excess of five carats.

Merlin is particularly well known for its very high quality white stones. In September, a 13.27 carat very high quality 'D' colour diamond sold for a total of US\$157,880. This stone, once polished, would receive the GIA grade of D flawless, which is the highest possible grade for a diamond. [Photo 11](#) shows the stone in its natural un-cut state.



PHOTO 11: Very high-quality 'D' colour diamond weighing 13.27 carats

In addition to high-quality clear white diamonds, Merlin is also known for producing a variety of coloured stones. On 13th April 2017, production included a possible pink diamond – if verified, this may be the first ‘pink’ stone to be recovered at Merlin.



PHOTO 12: A sample of coloured diamonds totalling 3.835 carats

A selection of stones were cut and polished and [Photo 13](#) shows eight high-quality polished stones from the 2016-2017 production.



PHOTO 13: High-quality polished diamonds from recent production

9.5 REVIEW AND REASSESSMENT

Processing ceased on 21st June 2017, and the mine operation returned to 'Care & Maintenance'. The company made this decision as a number of problems had been identified with the kimberlite processing method that needed to be addressed.

9.5.1 Tonnage Discrepancies

As noted earlier, the total kimberlite ore mined from Kay pit during the 2016-2017 campaign was 100,295 tonnes, with 98,350 tonnes being the amount estimated as hauled to the Merlin ROM. Both amounts are based on truck counts and a nominal weight per load as the trucks were not fitted with a weightometer. Some kimberlite ore remained on the ore pad near Kay Pit, as the lumps were too large for the processing plant, and this is estimated at about 3,000 tonnes.

In comparison, the total Kay kimberlite fed through the front-end of the DMS processing plant was estimated at 59,767 tonnes. This significant difference between tonnes mined and tonnes processed is a result of not having a weightometer on the loader, and the feed tonnage being an estimate of bucket loads.

For accurate assessment of grades, a loader fitted with a reliable weightometer will be needed for future work.

9.5.2 Potential for Diamond Losses

The grade recovered from the Kay lamproite ore during the 2016-2017 processing campaign was lower than anticipated from historical work. The unblended kimberlite returned a grade of 5.79 cpht, with an average stone size of 0.21 carats/stone. There are a number of causes that could lead to potential diamond losses.

Losses from the Scrubber

Although the scrubber installation greatly improved through-put and it was significantly more effective at de-sliming the feed to the DMS, the screens used in the scrubber were prone to holes. The screens comprised an upper size of 20 mm and a lower size of 1.5 mm and it was the finer screen where holes were regularly detected, meaning stones would have been lost to tailings. The average stone size of 0.21 carats is larger than the average stone size recovered by Rio Tinto from Kay kimberlite, which was 0.178 carat/stone for the same bottom cut-off of 1.5mm (+3 DTC). This adds support to the conclusion that diamonds from the finer fraction were lost and this would result in a lower overall grade.

Any diamonds larger than 20 mm, or encased in rock greater than 20 mm, will also be lost to the oversize from the scrubber.

Flowsort screens

The Flowsort x-ray recovery unit currently sorts in three size fractions: +1.5mm to -3.5mm, +3.5mm to -8mm, and +8mm to -16mm. The concentrate product from the DMS is +1.5mm to -20mm. The largest diamond recovered from the recent campaign weighed 35.74 carats and was described as a 'broken octahedral' stone. It was fortunate this stone was recovered as an octahedron measuring 16 mm weighs about 37.7 carats, so the stone was close to the largest recoverable size using the current Flowsort set-up.

9.6 SALE OF DIAMONDS FROM 2016-2017 PRODUCTION

In September, a parcel of polished and rough diamonds was presented for sale by tender in Antwerp through Koin International DMCC. One of the stones, a white gem Z rough diamond weighing 13.27 carats achieved a very high sale price of US\$11,897.51 per carat. The price achieved for the sale of this stunning stone auger well for future white diamond production at Merlin, especially the larger sized stones.

9.7 INSTALLATION OF A TOMRA XRT TO ENHANCE RECOVERY OF LARGER DIAMONDS

Merlin is renowned for its large high-quality diamonds, and Australia's largest diamond was recovered by Rio Tinto from Gareth pipe, in the northern cluster. Kay and Ector, the two largest kimberlite pipes in the Merlin Field, reported the highest proportion of larger stones from production data than any of the other kimberlites. However, the grades are lower making it all the more important that diamond recovery is maximised.

Following consultation with leading diamond industry experts, installation of a TOMRA XRT machine was strongly recommended. The TOMRA diamond recovery system replaces 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.

A suitable TOMRA unit was sourced, purchased and delivered to Merlin in November. The unit has been installed, and construction work for the feed bin and conveyors completed. The unit was successfully commissioned in late December, although no significant production work was undertaken during the remainder of December.



PHOTO 14: TOMRA XRT Sorting Machine



PHOTO 15: 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

The TOMRA unit has been calibrated to process Merlin ore between +4mm to -40mm in size. The ore is screened into three fractions before each fraction is passed through the XRT. The size fractions are: +4 to -8mm, +8 to -18mm, and +18 to -40mm.

During the commissioning phase, the TOMRA has processed screened scrubber oversize from the 2016-2017 processing of kimberlite from Kay Pit. The oversize was processed through a mobile screening plant into the required size fractions and stockpiled on the ROM for batch feeding. The minus 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 16: Mobile screening plant used to prepare the TOMRA feed into the three size fractions

Stockpiled trommel and scrubber oversize from Ashton and Rio Tinto production makes up much of the Merlin ROM and holds potential to carry stones larger than 20mm that would have been rejected as part of the oversize. Merlin is trialling this material through the TOMRA to establish economic potential as it is a readily available resource that will carry production through the first few months of 2018.



PHOTO 17: Much of the Merlin Rom is comprised of trommel oversize – a potential resource

Feed to the sorter is via a hopper, belt feeder and conveyor, with the rejects and accept products being conveyed from the sorter. The feed rate to the circuit is capable of being maintained at 60 tonnes per hour, with process water requirements estimated at 60 cubic meters per hour. In 2018, the ore feed preparation will be extended to utilise a jaw crusher, cone crusher, screens and conveyors with front-end loaders feeding the plant and removing the sized products. A new scrubber and trommel will be introduced once the plant moves on to mined kimberlite.

Figure 2 shows the planned Process Flowchart for the plant.



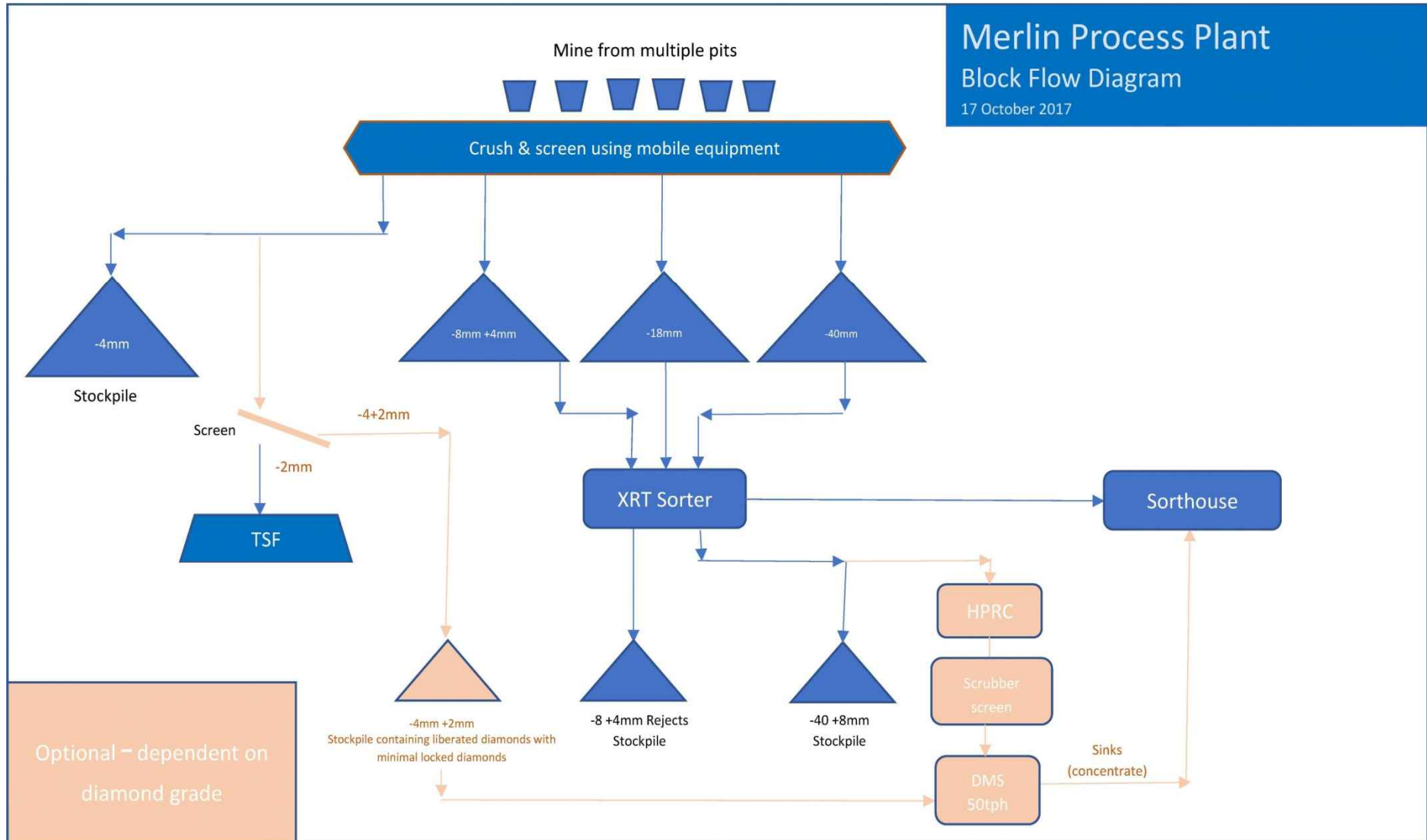
PHOTO 18: Batch feeding sized ore to TOMRA unit

The TOMRA XRT ore sorting machine uses advanced x-ray technology to ‘look’ for carbon, so it can detect coated diamonds and diamonds still trapped in kimberlite rock. The downside is that it also detects pieces of wood and plant roots, as well as carbonate minerals. Pieces of wood are a challenge whilst re-processing stockpiled trommel oversize, however when the ore feed reverts to mined kimberlite, this problem will be eliminated. Carbonate can be minimised by the use of filters and further calibration.

The benefits of utilising sensor-based sorting over traditional concentration methods can be summarised as:

- High recovery: Highly efficient sorters recover more stones, including coated and low or non-luminescent diamonds, enclosed by other material, at low mass pull. Large diamonds can be recovered prior to crushing lessening the likelihood of breakages.
- Effective concentration: By creating cost-effective and precise concentrations of kimberlite, prior to liberation and recovery, the systems increases productivity and decreases costs.

FIGURE 2: Process Flowchart for TOMRA XRT



9.8 UPDATED MINERAL RESOURCES AND ORE RESERVES

During the 2016-2017 campaign, a total of between 60,000 to 100,000 tonnes was mined and processed from Kay and the probable ore reserve estimate has been altered to reflect this.

9.8.1 Probable Ore Reserve Estimate

The combined Probable Ore Reserve for all diamond pipes at the Merlin diamond mine is 3.95 million tonnes for an average grade of 15 carats per hundred tonnes (cpht) representing a total contained 0.60 million carats. The Probable Ore Reserve was estimated on mechanical clamshell mining methods and results from the 2014 feasibility study.

Table 6 summarises the Probable Ore Reserve.

TABLE 6: Probable Ore Reserve Summary @ +5 DTC lower cut-off					
	VOLUME (Mbcm)	DENSITY (t/m ³)	PROBABLE ORE RESERVE (Mt)	GRADE (cpht)	RESERVE (Mcts)
Ywain	0.03	2.1	0.06	58	0.03
Gawain	0.13	2.1	0.27	32	0.08
Excalibur	0.12	2.0	0.25	31	0.08
Palomides/Sacramore	0.17	2.3	0.39	17	0.07
Launfal/Launfal North	0.05	2.4	0.13	14	0.02
Gareth	0.04	2.1	0.08	19	0.02
Kay	0.52	1.8	0.94	12	0.11
Ector	0.90	2.0	1.83	10	0.19
TOTAL	1.96	2.0	3.95	15	0.60
Mbcm = million bank cubic metres; Vm ³ = tonnes per cubic metre; Mt = million tonnes; cpht = carats of diamonds per hundred tonnes; Mcts = millions of carats of diamonds					

Note: The information in this 'Probable Ore Reserve Summary' is based on information compiled by Dr DS Tyrwhitt who is a member of the Australasian Institute of Mining and Metallurgy. Dr DS Tyrwhitt is an independent consultant to the Company and has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as Competent Person as defined in the 2004 edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Dr DS Tyrwhitt consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

These Ore Reserves are stated as at 30 September 2014 and are defined as ore delivered to the processing plant, and have been revised to deduct the estimated tonnes of ore mined from Kay in 2016-2017. The Probable Ore Reserve is not additional material to the Mineral Resource estimates reported below but is included within the Indicated category of the Mineral Resource estimate.

Rounding of tonnage and carats may result in computational discrepancies

9.8.2 Inferred and Indicated Mineral Resource Estimates

The combined Indicated and Inferred Mineral Resource for all diamond pipes at the Merlin diamond mine is 27.8 million tonnes for an average grade of 16 cpht representing a total contained 4.35 million carats.

Table 9 summaries this resource.

TABLE 9: 2014 Mineral Resource Summary @ +5 DTC lower cut-off					
	INDICATED RESOURCE (Mt)	INFERRED RESOURCE (Mt)	TOTAL RESOURCE (Mt)	GRADE (cpht)	RESOURCE (Mcts)
<i>Ywain</i> ²	0.07	0.07	0.14	60	0.08
<i>Gawain</i> ²	0.99	0.60	1.59	31	0.49
<i>Excalibur</i> ¹	0.35	0.23	0.58	29	0.17
<i>Launfal/Launfal North</i> ¹	1.46	1.48	2.94	14	0.40
<i>Palomides/Sacramore</i> ¹	7.24	6.42	13.66	17	2.30
<i>Tristram</i> ^{2,3}		0.61	0.61	6	0.04
<i>Kay</i> ²	1.11	1.74	2.85	10	0.29
<i>Ector</i> ¹	2.04	2.81	4.85	9	0.46
<i>Gareth</i> ¹	0.12	0.06	0.18	18	0.03
<i>Bedevere</i> ^{1,3}		0.40	0.40	22	0.09
TOTAL	13.4	14.4	27.8	16	4.35
¹ Resource grade based on previous mining operation recovery using a +0.95mm slotted bottom screen & reported at +5DTC cut-off					
² Resource grade based on bulk sample test-work using a +0.8mm slotted bottom screen and reported at +5DTC cut-off					
³ Insufficient data available to determine cut-off grade for <i>Tristram</i> and <i>Bedevere</i> pipes.					
Mt = million tonnes; cpht = carats of diamonds per hundred tonnes; Mcts = millions of carats of diamonds.					

Note: The information in this 'Mineral Resource Summary' is based on information compiled by Mr Michael Kammermann, a Competent Person who is a Member of The Australasian Institute of Geoscientists.

Mr Kammermann was employed by Axis Consultants Pty Ltd and engaged by Merlin Diamonds Ltd to prepare the documentation for the Mineral Resource estimates. Mr Kammermann has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Kammermann consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

Rounding of tonnage and carats may result in computational discrepancies.

10 EXPENDITURE STATEMENT

The expenditure for the reporting period amounted to **\$6,779,592.35**, with the breakdown detailed in the 2017 annual expenditure report.

The expenditure attributed directly to on-ground exploration on the Merlin mineral lease totalled \$338,395.61

- Geological activities: \$18,193.05
- Geochemical activities: \$12,697.32
- Geophysical activities: \$19,513.76
- RC drill program: \$275,834.34
- Rehabilitation activities: \$12,157.14

The activities covered by the 'pre-feasibility' expenses listed in section G include environmental monitoring, mining in Kay Pit, processing of kimberlite, diamond recovery, and investment in a superior diamond recovery system that will maximise the company's recovery of low luminescent and large diamonds.

11 PROPOSED EXPENDITURE AND WORK PROGRAM

Exploration

The 2017 exploration drill program failed to discover any additional kimberlite pipes within the Merlin mining lease. In 2018, the company will reassess its exploration priorities, and investigate new exploration techniques that have been utilised successfully in Canada.

All earthworks required to rehabilitate the exploration drill sites were completed. The re-vegetation success of the drill pads, as shown in [Appendix VII](#), will be determined in May 2018 by visual inspection.

Environmental Monitoring

Vegetation monitoring of selected sites by photography will continue annually each May, and included in the relevant MMP updates.

A water monitoring schedule that aligns with the proposed site operations was included for approval in the 2018 MMP update.

Mine Development

In 2018, Merlin will recommence dewatering Ector and Gawain pits in preparation for mining operations to commence following the wet season, with the priority being Gawain due to the kimberlite's high grade. With the success of the 2016-2017 mining campaign, Merlin will continue to utilise conventional mining methods during 2018.

The feasibility of utilising the 'mechanical clamshell mining' method was reviewed and further investigated in 2017. The result showed it to be a cost-prohibitive mining method due to the specialist nature of equipment required, and a production risk as it remains an unproven mining technique. It was concluded that, in the short term, it is preferable to continue to employ conventional mining techniques.

It is estimated that up to 90,000 tonnes of kimberlite ore per month will be extracted from a combination of Gawain, Kay and Ector pits. Mining is expected to occur at a rate of approximately 150 tonnes per hour using the following equipment (or equivalent):

- 1 x 45 tonne excavator;
- 1 x D10 dozer;
- 2 x articulated dump trucks;
- 1 x 972 wheel loader; and
- 1 x multi combination truck.

As the kimberlite ore does not contain waste rock, a dozer will be used to rip the pit floor prior to digging and loading. Once the ore is loaded into the dump trucks, it will be hauled and stockpiled at the Merlin ROM where it will be fed into a crushing and screening plant. At this stage there is no requirement for drill and blast operations, or further waste rock to be mined and dumped.

During 2018, tailing deposition from processing will continue into Sacramore Pit, with Launfal Pit to be used for additional tailings deposition if required. The preferred option of re-commissioning the existing tailings facility (TSF1) requires further investigation and approval.

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