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MANDALAY RESOURCES CORPORATION

TECHNICAL REPORT ON THE BJÖRKDAL GOLD MINE, SWEDEN

NI 43-101 Report

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1 SUMMARY

EXECUTIVE SUMMARY

Roscoe Postle Associates Inc. (RPA) was retained by Mandalay Resources Corporation (Mandalay) to prepare an independent Technical Report on the Björkdal Gold Mine (Björkdal or the Mine), located in Västerbotten County in northern Sweden. The purpose of this report is to support the disclosure of Mineral Resources and Mineral Reserves for Björkdal and the satellite Norrberget deposit (Norrberget), located approximately four kilometres east-southeast of the Björkdal Mine. Mineral Resources and Mineral Reserves are estimated as of December 31, 2018, based on a drill hole database cut-off date of September 30, 2018 for Björkdal and September 30, 2017 for Norrberget. This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). RPA most recently visited the Björkdal Mine, including Norrberget, from September 22 to 25, 2017.

Björkdal ("Birch Valley") produces gold from a combined open pit and underground operation, with approximately 62% of plant feed currently delivered from the underground, with the remainder coming from the open pit (35%) and the stockpile (3%). Total mill feed for 2018 was 1.25 million tonnes. The average reconciled grade for 2018 was 1.29 g/t Au. The Björkdal plant uses conventional crushing and grinding, followed by a combination of gravity and flotation processing techniques to recover gold to concentrates which are sold to smelters in Europe. The plant capacity is 3,700 tonnes per day (tpd) and the plant is currently operating at approximately 3,400 tpd. Gold recovery for 2018 averaged approximately 90%, and production totalled approximately 46,662 ounces of gold in concentrates. An expansion of the flotation circuit in the plant was completed in 2017. Plant recovery increased by 1.2% between 2016 and 2017, and an additional 0.8% from 2017 to 2018.

The 2017 Pre-Feasibility Study (PFS) for Norrberget envisions an open pit mining operation feeding the existing Björkdal plant. No changes have been made to the underlying assumptions for the Norrberget PFS since the last Technical Report dated March 29, 2018.

Table 1-1 lists the Mineral Resource estimate for the Mine prepared by RPA with an effective date of December 31, 2018. Mineral Resources are reported inclusive of Mineral Reserves. Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral

Resources and Mineral Reserves dated May 10, 2014 (CIM (2014) definitions) were used for the estimate.

TABLE 1-1 MINERAL RESOURCES AT THE BJÖRKDAL MINE AND NORRBERGET DEPOSIT AS OF DECEMBER 31, 2018
Mandalay Resources Corporation – Björkdal Mine

Location	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
		Indicated Resources		
Björkdal	Open Pit	2,947	2.30	218
	Underground	7,416	2.98	711
	Stockpile	2,700	0.64	56
	Subtotal	13,063	2.36	985
Norrberget	Open Pit	144	3.29	15
Total, Indicated		**13,207**	**2.36**	**1,000**
		Inferred Resources		
Björkdal	Open Pit	2,516	1.32	107
	Underground	1,922	2.63	162
	Subtotal	4,438	1.89	269
Norrberget	Open Pit	3	4.03	0.5
Total, Inferred		**4,441**	**1.89**	**270**

Notes:
1. Björkdal Mineral Resources are estimated using drill hole and sample data as of September 30, 2018 and depleted for production through December 31, 2018.
2. Norrberget Mineral Resources are estimates using drill hole and sample data as of September 30, 2017.
3. CIM (2014) definitions were followed for Mineral Resources.
4. Mineral Resources are inclusive of Mineral Reserves.
5. Mineral Resources are estimated using an average gold price of US$1,400/oz and an exchange rate of 9.0 SEK/US$.
6. Bulk density is 2.74 t/m^3.
7. High gold assays were capped to 30 g/t Au for the open pit mine.
8. High gold assays for the underground mine were capped at 60 g/t Au for the first search pass and 40 g/t Au for subsequent passes.
9. High gold assays at Norrberget were capped at 24 g/t Au.
10. Interpolation was by inverse distance cubed utilizing diamond drill, reverse circulation, and chip channel samples.
11. Open pit Mineral Resources are estimated at a cut-off grade of 0.35 g/t Au and constrained by the resource pit design.
12. Underground Mineral Resources are estimated at a cut-off grade of 0.95 g/t Au.
13. A nominal two metres minimum mining width was used to interpret veins using diamond drill, reverse circulation, and underground chip sampling.
14. Stockpile Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au and are based upon surveyed volumes supplemented by production data.
15. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
16. Numbers may not add due to rounding.

RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate.

Table 1-2 lists the Mineral Reserve estimate for the Björkdal Mine and Norrberget deposit as of December 31, 2018.

TABLE 1-2 MINERAL RESERVES AT THE BJÖRKDAL MINE AND NORRBERGET DEPOSIT AS OF DECEMBER 31, 2018
Mandalay Resources Corporation – Björkdal Mine

Location	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
		Probable Reserves		
Björkdal	Open Pit	3,768	1.23	149
	Underground	4,754	2.36	360
Norrberget	Open Pit	162	2.80	15
Stockpile	Stockpile	2,700	0.64	56
Total, Probable		**11,384**	**1.58**	**580**

Notes:
1. Mineral Reserves are estimated using drill hole and sample data as of September 30, 2018 and depleted for production through December 31, 2018.
2. CIM (2014) definitions were followed for Mineral Reserves.
3. Open Pit Mineral Reserves are based on mine designs carried out on an updated resource model, applying a block dilution of 100% at 0.0 g/t Au for blocks above 1.0 g/t Au and 100% at 0.6 g/t Au for blocks between 0.4 g/t Au and 1.0 g/t Au. The application of these block dilution factors is based on historical reconciliation data. A cut-off grade of 0.4 g/t Au was applied. Open Pit Mineral Reserves for Norrberget are based on 15% dilution at zero grade and 100% extraction.
4. Underground Mineral Reserves are based on mine designs carried out on an updated resource model. Minimum mining widths of 3.5 m for stopes (after dilution) and 3.8 m for development were used. Dilution was applied by adding 0.5 m on each side of stopes as well as an additional 10% over break dilution. Further dilution, ranging from 10% to 100%, was added on a stope by stope basis depending on their proximity with other stopes. An overall dilution factor of 14.5% was added to development. Mining extraction was assessed at 95% for contained ounces within stopes and 100% for development. A cut-off grade of 1.00 g/t Au was applied. An incremental cut-off grade of 0.4 g/t Au was used for development material.
5. Stockpile Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au and are based upon surveyed volumes supplemented by production data.
6. Mineral Reserves are estimated using an average long-term gold price of US$1,200/oz, and an exchange rate of 9.0 SEK/US$.
7. Tonnes and contained gold are rounded to the nearest thousand.
8. Totals may appear different from the sum of their components due to rounding.

RPA is not aware of any mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

CONCLUSIONS

The Björkdal plant has processed approximately 31.2 million tonnes of ore to December 31, 2018 to produce a total of approximately 1.39 million ounces of gold at an average feed grade of 1.55 g/t Au. Both open pit and underground mining methods have been employed on the property.

GEOLOGY AND MINERAL RESOURCES

- The gold mineralization at the Mine occurs as a large number of sub-parallel, steeply dipping, narrow quartz veins. The veining is locally structurally complex with many Reidel-type vein geometries as well as small quartz veinlets and pods. The strike limits of the veins appear to be bounded largely by the Björkdal shear to the east and the Quartz Mountain shear to the west.

- Mandalay has made good progress towards upgrading its geologic knowledge of the Björkdal deposit and the controls on the distribution of the mineralization with the goal of developing a robust high-quality deposit model.

- Many areas of the Björkdal Mine property are unexplored or under-explored and so are considered to offer good exploration potential. Additional gold mineralization is found at the Norrberget deposit, as well as in the Storheden and the Morbacken areas of the property.

- Mandalay has carried out significant amount of exploration and in-fill drilling in the near-mine area, which has resulted in the expansion of the previously known limits of the gold mineralization, and has discovered a new area of gold mineralization in 2018 that is referred to as the Aurora Zone.

- Mandalay has adopted the LeachWELL assaying method for determining the gold content of the samples. The method is considered suitable for determination of gold grades on samples containing coarse gold particles. The results to date are showing that, while room for improvement remains, the method is providing a better degree of precision as compared with a conventional fire assay method.

- The Mineral Resource sample database consisting of diamond drill (DDH), reverse circulation (RC), and chip samples collected by Mandalay is acceptable for Mineral Resource estimation purposes. The historical chip sample data is also considered adequate for use in estimation of the Mineral Resources, provided that the assay values are weighted for the width of the mineralized wireframe model.

- The Björkdal open pit (OP) wireframes were based on a nominal 0.3 g/t Au cut-off value over a minimum of two metres. The underground (UG) wireframes were based on a nominal two metres minimum width at a cut-off value of 0.5 g/t Au. A total of 76 new vein wireframe models were created for the current Mineral Resource estimate. In total, 485 mineralized wireframe models were created for the underground mine and 526 wireframe models were created for the open pit mine.

- A dual capping value approach was used for estimation of the gold grades contained within the mineralized wireframe models in the underground mine. In this approach, the composited assays for DDH and RC drill holes are capped to values of 60 g/t Au and 40 g/t Au. Two different area of influences are then used when estimating the block grades for each mineralized wireframe. The higher grade capped composites are used within a first pass search ellipse with a 15 m radius while the lower grade capped composites are used for subsequent estimation passes. A single capping value of 40 g/t Au was applied to the composited samples contained within the chip sample database. A value of 30 g/t Au has been selected as the capping value for the DDH, RC, and chip samples contained within the open pit wireframes. This capping value was also applied to all samples contained within the dilution domain volume.

- A short study was undertaken to evaluate the effectiveness of alternate work flows to improve the accuracy of the estimated tonnage and grade for the Aurora Zone. The study also examined the impact of including the detailed channel sample information on the accuracy of modelling the distribution of the gold grades. The study concluded that the inclusion of the detailed channel sample data is a key item for estimation of the gold distribution at local scales. The study also suggested that modifying the search parameters to reduce the number of samples used for the estimate and to allow for a single drill hole will yield slightly better estimates.

- Mandalay initiated a program in 2016 whereby the stope volumes in the underground mine are determined using the cavity monitoring system (CMS). This program was continued through 2017 and 2018, but was limited by equipment availability. This is a critical item to permit completion of detailed reconciliation studies for the underground mine.

- Comparison of the predicted tonnages and grades from the year end 2017 Long Term block model against the realized tonnages and grades as defined by the year end 2018 Grade Control model demonstrate that the sample collection, assaying, and estimation procedures used to prepare the Long Term Mineral Resource estimates are reasonable.

- At a cut-off grade of 0.35 g/t Au, the Björkdal Mineral Resources in the open pit mine comprise 2.95 million tonnes at an average grade of 2.30 g/t Au containing 218,000 ounces of gold in the Indicated Mineral Resource category and 2.52 million tonnes at an average grade of 1.32 g/t Au containing 107,000 ounces of gold in the Inferred Mineral Resource category.

- At a cut-off grade of 0.95 g/t Au, the Björkdal Mineral Resources in the underground mine comprise 7.42 million tonnes at an average grade of 2.98 g/t Au containing 711,000 ounces of gold in the Indicated Mineral Resource category and 1.92 million tonnes at an average grade of 2.63 g/t Au containing 162,000 ounces of gold in the Inferred Mineral Resource category.

- The primary gold mineralization at Norrberget is contained within bands of veinlets and alteration containing amphibole in a package of interbedded mafic tuffs and volcaniclastics.

- Mineralization wireframes were generated using a 0.4 g/t Au cut-off and a two metre minimum horizontal width. The wireframes represented a primary band of continuous mineralization and two limited footwall bands of mineralization.

- Samples within the Norrberget domains were capped at 24 g/t Au, affecting seven out of the 311 samples within the mineralized domains. Intercepts within the domain were composited to 1.0 m lengths with a minimum sample length of 0.5 m.

- Bulk density was applied to block model from average densities obtained average densities for each lithology. The mineralization has an average density of 2.78 g/cm^3.

- The low number of mineralized samples at Norrberget necessitated the use of Inverse Distance Weighted interpolation rather than the Ordinary Kriging method. Continuity analysis of grade contours was reviewed to help define high grade trends that were used to inform the interpolation parameters.

- At a cut-off grade of 0.35 g/t Au, the Norrberget Mineral Resources comprise 144,000 tonnes at an average grade of 3.29 g/t Au containing 15,000 ounces of gold in the Indicated Mineral Resource category and approximately 500 ounces of gold in the Inferred Mineral Resource category.

MINING AND MINERAL RESERVES

- At a cut-off grade of 0.4 g/t Au, open pit Probable Mineral Reserves at Björkdal are estimated to be approximately 3.77 million tonnes grading 1.23 g/t Au, containing 149,000 ounces of gold.

- At a cut-off grade 1.0 g/t Au for stopes and incremental cut-off grade of 0.4 g/t Au for development material, underground Probable Mineral Reserves are estimated to be approximately 4.75 million tonnes grading 2.36 g/t Au, containing 360,000 ounces of gold.

- Stockpile Mineral Reserves are estimated to be approximately 2.70 million tonnes grading 0.64 g/t Au, containing 54,000 ounces of gold, at a cut-off grade of 0.4 g/t Au.

- At Norrberget, there are approximately 162,000 tonnes at 2.80 g/t Au for a total of 15,000 ounces of contained gold.

- The current Mineral Reserves for Björkdal support a mine life of approximately nine years at near full mill capacity with the exception of the last year. Gold production averages approximately 70,000 oz per year. The nine year mine life is an improvement over past estimates. There are a number of opportunities that could further extend the mine life:
    - Continue upgrading Inferred Mineral Resources to Indicated Mineral Resources.
    - Analyze the potential to relocate surface infrastructure which could result in additional open pit mining.
    - Identify remnant underground mining areas with in-situ Mineral Resources that could be extracted in a safe and cost effective manner.

- The low grade stockpile represents an option for Björkdal to operate its mill at full capacity. Additional material is expected to be placed into the stockpile over the remaining life of mine (LOM), which will allow Björkdal to run at or near capacity in all years of the LOM.

- Due to the variable quality of the material that comprises the low grade stockpiles, grade variations in the feed to the mill are anticipated.

- The proposed open pit mine plan will eventually recover the existing crown pillar. This pillar contains infrastructure servicing the underground operations that will be interrupted by open pit mining. It also contains a large number of voids from previous underground mining that may cause some operational issues during mining and potentially some high wall stability concerns. An additional portal will be developed to access the underground mine so that crown pillar mining can occur in parallel to underground extraction.

- The underground Mineral Reserves at Björkdal are based on an effective mining width of 3.5 m. There are currently a number of areas in the mine where multiple stopes are in close proximity to each other. This could result in certain stopes having additional dilution. In RPA's opinion, additional drilling is required in these areas to collect the additional grade, structural, and geotechnical data necessary to safely maximize reserve extraction and minimize dilution.

- Structural features such as folding and their impact on metal distribution are not well understood and are therefore not considered in the current underground mining method. Advanced knowledge of such features could result in a change in mining method and Mineral Reserves.

- RPA considers it essential that continued attention be given to local and global rock mechanics issues during future mine design as underground stresses are redistributed.

- The current open pit mining operation employs contractors for most unit operations. RPA considers that, in the event that open pit Mineral Reserves are significantly increased, potential exists to convert to a mine-owned fleet and reduce operating costs.

- There is very limited reconciliation between stope grade estimates and the reconciled mill production, although the site has conducted some reconciliation in 2017 and 2018. Stope tonnages are estimated from the stope design volume and are tracked by bucket and truck count. There is no regular reconciliation between mill tonnage and specific stope production. A CMS is used to compare actual stope volumes.

- Mining losses were included as direct gold losses and not ore tonne losses. As the dilution from stopes in close proximity to each other has been slightly underestimated, these two errors approximately offset each other.

- The lack of reconciliation and small errors in mining loss calculation and proximal stope dilution mean the actual mining losses, dilution, and dilution grade used in the Mineral Reserve estimate are estimates and the correct determination of these values may change the Mineral Reserves.

- The nature of the mining method is such that development ore will always represent a large proportion of the underground tonnage production.

- Mining at the planned Norrberget open pit will be carried out with the same contract fleet used at Björkdal. The total mine life for Norrberget is estimated at seven months.

PROCESSING

- Björkdal has been successful in recovering nearly 90% of the gold, with approximately 75% of the gold recovered in gravity concentrates (i.e., gravity concentrate, middlings, and Knelson concentrate) and an additional 12% to 17% of the gold recovered in flotation concentrates.

- Recent additions to the processing equipment, reagent changes, and improvements in the processing strategy have improved the gold recovery by 1% to 2%.

- Preliminary metallurgical tests using samples from Norrberget show that the mineralogy is more complex and the gold grain sizes are smaller which requires a finer grind size to achieve liberation. Since the deposit is small, it is not anticipated that modifications to the existing processing plant will be cost effective. Therefore, the data indicates that the average gold recovery for Norrberget will be approximately 75%.

PERMITTING

- A new operating permit was granted in December 2018 and remains valid for ten years. Expansion of the tailings management facility (TMF) and its continuing operation is covered by the new permit.

- A compensation agreement for lost grazing land and increased operating costs for the reindeer herders was signed in April 2017. This agreement is valid for the planned operating life of the Björkdal Mine.

- The Norrberget deposit is not covered by the above agreement. A new mining concession has been granted that covers Norrberget and is valid until January 2044.

- The newly granted environmental permit includes an updated closure and reclamation plan.

RISKS

- The Mine has been in production for over 25 years and is a mature operation. In RPA's opinion, there are no significant risks or uncertainties that could reasonably be expected to affect the reliability or confidence in the exploration information, Mineral Resource or Mineral Reserve estimates, or projected economic outcomes.

- Björkdal experienced some operational challenges in 2018 relating mainly to a sudden contract cancellation for the underground haulage in Q2 2018. An alternative contractor was able to provide some additional trucks on short notice, however, the trucks were older and provided very poor availabilities. In December 2018, newer trucks arrived to site and the production normalized. These operational challenges resulted in lower grades from the open pit and stockpiles being fed to the mill and, therefore, lower gold production.

RECOMMENDATIONS

RPA presents the following recommendations:

GEOLOGY AND MINERAL RESOURCES

- Improve the precision of the duplicate sample assay results by examining the impact of using a larger aliquot or a finer grind size.

- Consider the preparation of a two kilogram pulp from the coarse reject material at a frequency of approximately one sample in 50, to permit a review of the precision of the analytical method.

- Examine the distribution of the gold contents within the mineralized wireframes by contouring the gold grades longitudinal projections. The results will be useful in short term planning and will improve the targeting of exploration and in-fill drilling programs.

- Continue collecting chip samples of the veins and wall rocks from underground and open pit locations.

- Continue to refine the operating procedures to allow more confidence in underground reconciliations. Particular attention should be paid to obtaining high quality surveys of all stope voids on a regular and timely basis. This information should then be integrated into the material tracking and metal accounting systems to then permit comparisons to be made from the block model predicted to the mine actual production and then on to the mill output. A dedicated software system may provide invaluable aid in this case. Increasing the confidence in reconciliation is the key hurdle to generating a Measured Mineral Resource at Björkdal.

- Continue efforts to understand the source of the local-scale variances between the predicted and recovered amounts of gold at the stope scale. Efforts should also continue to reduce these variances to an acceptable level for a given time period.

- Incorporate variance studies of block model predicted versus actual tonnage, grade and contained gold content into the normal-course work flow, to be carried out on a quarterly basis. Future variance studies should incorporate any drill hole information that may be available. Future variance studies should also examine the relationship between predicted and actual tonnage and grade on a pre-dilution basis.

- Undertake studies to measure the mining recoveries, mining dilution, and the dilution grade of the plant feed from the open pit mine directly.

- Undertake studies to measure the mining recoveries, mining dilution, and the dilution grade of the plant feed from the underground directly.

- Continue drilling programs to both search for new areas of mineralization on the Mine property and expand the limits of the known mineralization.

- At Norrberget, additional drilling is recommended to delineate the mineralization at depth and along strike.

MINING

- Adjust the mining loss estimate to include an estimate of lost ore tonnes.

- Review all the proximal stopes and update the dilution estimate in those stopes.

- Complete a comprehensive stope survey to enable a useful reconciliation of planned tonnes and actual production. The reconciliation results should be used to improve mining practices and modify the planned Mineral Reserves.

- Undertake an investigation of minimum mining widths in the underground mine with the goal of reducing hangingwall and footwall dilution.

- Continue the ongoing review of the current production monitoring and control system, including grade control, stockpile management, campaign milling, production data collection, reporting, and management control.

- Improve underground production control systems as data becomes available, which would allow for reconciliation between mill feed production tonnes and grade and individual stope production estimates.

- In conjunction with the underground production control system, improve reconciliation of production from open pit with the mill feed production tonnes and grade.

- The economics at Norrberget are marginal and as such further work should be carried out to reduce the capital expenditures.

MINERAL PROCESSING

- Continue to monitor the performance of all unit operations and to optimize plant performance to achieve the highest economic outcome possible.

- Continue to evaluate historic data and to use the results to estimate future plant gold recovery and operating costs.

- Future metallurgical tests for Norrberget should use variability samples with a range of head grades from throughout the deposit using test conditions that evaluate what the metallurgical response will be in the existing processing facility.

ECONOMIC ANALYSIS

This section is not required as the property is currently in production, Mandalay is a producing issuer, and there is no material expansion of current production.

TECHNICAL SUMMARY

PROPERTY DESCRIPTION AND LOCATION

The Björkdal property is located in Västerbotten County in northern Sweden, at approximately 20°35′26″ E longitude and 64°56′7″ N latitude (WGS84). Björkdal is located approximately 28 km northwest of the municipality of Skellefteå and approximately 750 km north of Stockholm. The property is accessible via Swedish national road 95 or European highway route E4 followed by all-weather paved roads. On the property, gravel roads link the main site gate entrance to the surface infrastructure. The nearest airport, located in Skellefteå, has regular daily service to Stockholm.

The Norrberget property is located approximately four kilometres east of the Björkdal Mine and is currently accessible via a forest road.

LAND TENURE

Mandalay is a publicly listed company that effectively holds 100% of Björkdal through the Swedish registered companies Björkdalsgruvan AB (Björkdalsgruvan) and its subsidiary Björkdal Exploration AB (Björkdal Exploration). The Björkdal property consists of nine mining concessions, owned by Björkdalsgruvan, and 19 exploration permits, owned by Björkdal Exploration.

A tenth mining concession, covering the Norrberget deposit, was granted in January 2019 and is held by Explor Björkdalsgruvan AB, which also holds two exploration permits, Malånäset nr 100 and Malånäset nr 101.

The holder of an exploitation concession must pay an annual minerals fee to the landowners of the concession area and to the State. The fee is 0.2% of the average value of the minerals mined from the concession, 0.15% of which is paid to the landowners in proportion to their share of ownership of the concession area. The remaining 0.05% is paid to the State to be used for research and development in the field of sustainable development of mineral resources. The fee is estimated after consideration of the amount of mined ore, the amount of minerals in the ore, and the average price of the mineral during the year or by use of an equivalent value.

The Norrberget nr 200, 300, and 400 exploration concessions are subject to a 2% net smelter return (NSR) in favour of North Atlantic Natural Resources AB (NAN).

HISTORY

BJÖRKDAL

The Björkdal deposit was originally discovered in 1983 by Terra Mining AB (Terra Mining) during a till sampling program which discovered anomalous gold values in the glacial till profile.

Anomalous gold values in bedrock were discovered in 1985 and definition drilling began in 1986.

Definition drilling was coincident with metallurgical testing and positive feasibility studies were completed in 1987. Terra Mining commenced mining operations at Björkdal in July 1988. In 1996, Terra Mining was purchased by William Resource Ltd. (William). William continued to operate the mine until the end of June 1999 when it was petitioned into bankruptcy. The assets were bought through public auction in June 2001 by International Gold Exploration, which operated the Mine from September 2001 until 2003 when it was acquired by Minmet plc (Minmet).

In 2006, Gold-Ore Resources Ltd. (Gold-Ore) acquired an option from Minmet to purchase the holding company for the mine. On December 31, 2007, Gold-Ore exercised its option and acquired all the shares of Björkdalsgruvan AB. During exploration and development of the Björkdal Mine, Gold-Ore generated cash flow from gold sales from the operation of the plant at the mine, fed by stockpiled material, open pit mining, and underground development operations, which commenced on a full scale basis in mid-2008. In January 2009, Gold-Ore's management concluded that there were sufficient mineral reserves and resources at Björkdal for at least a five year mine life and declared commercial production.

In May 2012, Elgin Mining Inc. (Elgin) acquired all of the issued and outstanding common shares of Gold-Ore. On June 4, 2014, Mandalay announced that it had entered into an arrangement agreement pursuant to which Mandalay would acquire all the outstanding common shares of Elgin. The transaction was completed on September 10, 2014.

The Mine has produced a total of 1.39 million ounces since the start of production in 1988.

NORRBERGET

The Norrberget deposit was discovered by COGEMA in 1994 and drilling occurred until 1996. In 1997, COGEMA withdrew from Sweden, and the exploration permits around the Björkdal dome including the Norrberget deposit were taken up by North Atlantic Natural Resources AB (NAN).

On September 28, 2007, Gold-Ore purchased exploration permits surrounding the Björkdal property from NAN. The property was acquired by Elgin and subsequently passed to Mandalay through the acquisition process described above.

GEOLOGY AND MINERALIZATION

The Skellefteå region lies within an ancient cratonic block named the Fennoscandian shield and consists of Paleoproterozoic-aged rocks that host several world-class volcanogenic massive sulphide (VMS) copper, zinc, and lead deposits. Mineralization in the Skellefteå region is focused within and around the Skellefteå belt, a regionally extensive, northwest trending structural feature 120 km long and 30 km wide, which consists of deformed and metamorphosed Paleoproterozoic volcanic, sedimentary, and igneous rocks. The stratigraphy in the Mine area is divided into two groups, the Skellefte Group (lower division) and the Vargfors Group (upper division). The Björkdal gold deposit is hosted within the upper portions of the Skellefte Group, which is dominated by successions of mafic volcanic flows that are interbedded or intercalated on a large scale with clastic sediments.

As a result of detailed litho-stratigraphic mapping, petrological observations, and geochemical analysis undertaken by Mandalay/Björkdalsgruvan, geologists have observed that host rock geology, metamorphism, and alteration styles are much more complex and variable than previously documented. Instead of a large, massive plutonic-type intermediate intrusion occupying the domal structure observed within the Björkdal area, a variable and complex alteration signature overprints many different rock-types including pyroclastic, volcano-sedimentary, tuffaceous, extrusive-volcanic (andesitic to basaltic compositions), sub-volcanic intrusive (andesitic compositions), and sedimentary (silici-clastics, shales and carbonates) lithologies. Common alteration and metasomatic styles include silicification, carbonatization, calc-silicate (actinolite) alteration, albitization, chloritization, potassic (biotite and K-feldspar), epidotization, pyritization, tourmalinization, with various skarn-type alteration assemblages common in areas where a calcareous host rock is present (including actinolite, tremolite, pyroxene, and minor garnet).

Overlying this basal assemblage, and locally truncating the quartz veins, are packages of metasediments and metavolcanic rocks. Directly above the basal assemblage is a unit colloquially referred to as a limestone (or sometimes marble). The limestone occurs as an immediate hangingwall to, or as rafts within, the volcanic and clastic units. The location of the hangingwall contact is variable and the contact is seen as a key marker horizon for exploration.

At Björkdal, the majority of gold is associated with the anastomosing, sheeted quartz-vein network. This epigenetic vein network consists of several hundred sub-parallel quartz veins and is structurally controlled. The veins are vertical to sub-vertical dipping, strike between azimuth 040° and azimuth 055°, and vary between a few centimetres to over two metres in width. Gold-rich veins are nearly always associated with the presence of minor quantities of sulphide minerals such as pyrite, pyrrhotite, marcasite, and chalcopyrite alongside more common non-sulphide minerals such as tourmaline and biotite. Scheelite and bismuth-telluride alloys (i.e., tsumoite) are also commonly found within the gold-rich quartz veins and are both excellent indicators of gold mineralization.

At Norrberget, the mineralization is stratabound within an interbedded altered volcaniclastic package that sits unconformably below a 30 m to 40 m thick marble unit. Gold mineralization has been observed up to 50 m below this contact. The mineralization is primarily associated with amphibole alteration bands and veinlets. The gold is very fine grained and rarely visible. Where gold grains have been observed, they are found to be on the boundary or in the interstitial material between grains. High grade gold is mostly found in areas with low to no pyrite.

EXPLORATION STATUS

For the period of January 2015 to September 2018, Mandalay drilled a total of 103,097 m of exploration diamond-core drilling from underground stations at the Björkdal Mine. This drilling has most recently focused on the eastward strike-extension of known vein systems (mostly in the Main, Central, and Lake Zones). For the period of January 2015 to September 2018, Mandalay has drilled a total of 21,614 m of exploration diamond-core drilling and 81,609 m of exploration RC drilling from surface-based setups at the Björkdal Mine. Similar to the underground exploration strategy, the surface drilling was prioritized around the margins of the current open pit mine in order to estimate Inferred and Indicated Mineral Resources in the near-mine environment. The majority of this drilling took place in the vicinity of the Quartz-Mountain, East Pit, and Nylund areas.

Mandalay carried out a 2,542 m diamond-core drilling program at Norrberget which confirmed the results of historical drilling and extended the limits of mineralization. A 1,400 m RC drill program in-filled and further extended the resource down-dip in 2017.

There is high likelihood of further discoveries in the Björkdal area, as deposit models currently being formulated and tested by Mandalay geologists are proving successful and much of the held ground remains either unexplored or under-explored.

MINERAL RESOURCE ESTIMATE

BJÖRKDAL

RPA reviewed data for Björkdal and has independently prepared Mineral Resource estimates using a drill hole database with a cut-off date of September 30, 2018 for the underground drill hole and chip sample databases and September 30, 2018 for the open pit drill hole and grade control sample databases. The Mineral Resource estimate has an effective date of December 31, 2018. Mineral Resources were estimated for open pit, underground, and stockpile areas (Table 1-1).

An updated 3D model of the marble unit was constructed from available drill holes and geological mapping information, using the understanding gained during 2018. This model was then used as a constraint in the block models, as this unit is currently viewed as being a poor host for mineralization. Similarly, a 3D surface was created of the hangingwall shear zone, which was also subsequently used to constrain the block model.

Mandalay built individual mineralized wireframes separately for OP and UG domains. The OP wireframes were based on a nominal 0.3 g/t Au cut-off value over a minimum of two metres. The UG wireframes were based on a nominal two metres minimum width at a cut-off value of 0.5 g/t Au. The OP mineralized wireframe models were grouped into five separate areas and a total of 485 individual wireframe models were created for the open pit mine. A total of 22 wireframe models were also created for mineralization located at the Storheden deposit. The UG mineralized wireframe models were grouped into four separate areas and a total of 526 individual wireframe models were created for the underground mine.

Mandalay elected to maintain a dual capping value approach for estimation of the gold grades contained within the mineralized wireframe models in the underground mine. In this approach, the composited assays for diamond drill holes and RC drill holes are capped to values of 60 g/t Au and 40 g/t Au. A value of 30 g/t Au has been selected as the capping value for the diamond drill hole, RC drill hole, and chip samples contained with the open pit wireframes. This capping value was also applied to all samples contained within the dilution domain volume.

An upright, non-rotated block model was constructed to model the mineralization in the underground and open pit mines together. Gold grades were estimated into the blocks by means of inverse distance cubed (ID^3) interpolation algorithm. A total of three interpolation passes were carried out to estimate the grades in the underground block model. A two-pass search strategy was applied to estimate the grades in the open pit block model. A single-pass estimation strategy was applied when estimating the grades for the dilution domain in the open pit mine block model.

Separate cut-off grades were developed for reporting of the underground and open pit Mineral Resources. Each cut-off grade was developed using the January to September 2018 actual cost information along with a gold price of US$1,400 per ounce and an exchange rate of 9.0 SEK/US$. The cut-off grade for reporting of Mineral Resources was determined to be 0.95 g/t Au within the underground mine and 0.35 g/t Au for the open pit mine.

RPA classified the Mineral Resources as Indicated and Inferred based on drill hole spacing, grade continuity, and reliability of data. All material contained within either the North or South stockpile areas was classified into the Indicated Mineral Resource category.

NORRBERGET

RPA reviewed data for Norrberget and has independently prepared Mineral Resource estimates using a drill hole database with a cut-off date of September 30, 2017. RPA estimated the Norrberget Mineral Resources for the previous Technical Report dated March 29, 2018 and that Mineral Resource estimate remains unchanged as of the effective date of this report. Mineral Resources were estimated within an open pit.

RPA generated three mineralized domains for Norrberget that reflected packages of mineralized and altered material above a 0.35 g/t Au cut off that was a minimum of two metres in horizontal width.

RPA reviewed the Norrberget data and capped the grades to ensure that sporadic high grade values were not over represented. A 24 g/t Au capping value was applied. The capped samples were flagged by the mineralized domain wireframes and the intercepts were composited on a 1.0 m length between the wireframe boundaries, with a minimum residual of 0.5 m.

A block model that encompassed the mineralization wireframes and sufficient waste to constrain the resource within a pit was generated. Gold grade were interpolated into the mineralized blocks using ID^3. A total of three interpolation passes were carried out to estimate the grades in the block model.

Cut-off grades were developed using the January to September 2017 actual cost information from Björkdal along with a gold price of US$1,400 per ounce. The exchange rate has changed since the previous report from 8.4 SEK/US$ to 9.0 SEK/US$, however, RPA does not expect this change to have a material impact on the Mineral Resource at Norrberget. The cut-off grade for reporting of Mineral Resources for Norrberget was determined to be 0.35 g/t Au.

RPA classified the Mineral Resources as Indicated and Inferred based on drill hole spacing, grade continuity, and reliability of data.

MINERAL RESERVE ESTIMATE

Open pit and underground Mineral Reserve estimates were prepared by RPA using mine designs based on the updated Mineral Resource model. The Mineral Reserves have an effective date of December 31, 2018.

BJÖRKDAL

For the Björkdal open pit, potential pits were evaluated via pit optimization. A selective mining unit (SMU) of 5 m x 3 m x 3 m was used in the block model, and was reblocked to 10 m x 6 m x 6 m to improve processing time. Based on historical reconciliation data for the Björkdal open pit, a tonnage dilution factor of 100% at 0.6 g/t Au was applied to blocks between 0.4 g/t Au and 1.0 g/t Au. For blocks above 1.0 g/t Au within the Björkdal open pit, compiled reconciliation data of the open-pit high grade and low grade ore supports the use of a block dilution of 100% at 0.1 g/t Au. Based on the results of several pit optimization runs, the majority of ore tonnage is located in the crown pillar along the east wall of the pit.

Underground Mineral Resource estimate was based on a minimum mining width of 3.5 m for stopes (after dilution) and 3.8 m for development. Dilution was applied by adding 0.5 m on each side of stopes and adding 10% to development. The resulting overall stope dilution averages approximately 30% at zero grade. Mining extraction was assessed at 95% for contained ounces within stopes and 100% for development. For stopes, a cut-off grade of 1.0 g/t Au was applied, while for development, an incremental cut-off grade of 0.4 g/t Au was used.

NORRBERGET

The Norrberget Mineral Reserve estimate remains unchanged from the previous Technical Report dated March 29, 2018, since the underlying assumptions have not changed with the exception of the exchange rate (9.0 SEK/US$ versus 8.4 SEK/US$). RPA does not expect the change in the exchange rate to have a material impact on the Mineral Reserve at Norrberget.

For the Norrberget open pit, potential pits were evaluated using the Lerchs-Grossmann pit optimization algorithm and a parent block size of 6 m x 4 m x 4 m. As no production has occurred within the Norrberget open pit, a reconciled dilution and extraction factor cannot be obtained, and as a result, a dilution factor of 15% and extraction factor of 100% has been nominally assigned based on reconciled production data from mining shallow dipping structures at the Björkdal open pit.

MINING

BJÖRKDAL

At the Björkdal open pit, mining is carried out by contractors using trucks and loaders. The existing mining capacity with the current equipment configuration is approximately 8 Mtpa. Loading is carried out with a combination of front end loaders and excavators. Ore and waste are hauled using 90 t capacity trucks. Production drilling is also carried out by contractors.

The underground mining method used at the Björkdal Mine is longhole stoping with a sub-level spacing of 15 m to 20 m, depending on the zone. Cross-cuts are established perpendicular to the vein system. Veins are then developed by drifting on each sub-level from the cross-cut. All pre-production vein, cross-cut, and ramp development is drilled and blasted using conventional trackless mining equipment.

The current operating permit and mill constraints limit the total Björkdal production capacity to 1.5 Mtpa. The average underground mine production rate is currently limited to approximately 0.6 Mtpa based on the large number of working areas and associated logistical constraints. The open pit operation, on the other hand, has the theoretical capability of satisfying the 0.9 Mtpa difference, however, it is constrained by the availability of reserves and the presence of surface infrastructure.

The resulting production strategy was to maximize the amount of open pit reserves without significantly interfering with surface infrastructure and then to extract the remaining reserves from underground.

Open pit mining for Björkdal is scheduled to deliver an average of approximately 540,000 t of ore annually to the mill throughout the LOM. Overall material production from underground ranges between approximately 475,000 tpa to 720,000 tpa over the eight year mine life and is within the current underground haulage capacity of 1.0 Mtpa.

NORRBERGET

At Norrberget, open pit mining will be carried out by the existing contractors using trucks and excavators. Ore and waste are planned to be hauled using trucks with 40 t and 90 t capacities, respectively. Production drilling will also be completed by contractors. The ore and waste blast bench heights are projected to be five metres and ten metres, respectively. The blasting sequence direction is planned to be along the strike of the orebody to minimize dilution.

The Norrberget mining schedule is integrated into the Björkdal open pit schedule to minimize potential production shortfalls and to provide added flexibility to the deliverable mill feed. The currently prepared LOM plan for Norrberget will provide incremental high grade feed of 162,000 tonnes to the mill for approximately seven months. Stripping of overburden will commence in January 2021 to allow for ore production to occur from Q4-2021 to Q3-2022, when the ore production rate at the Björkdal open pit is low.

MINERAL PROCESSING

The mineral processing plant at Björkdal commenced operation in 1989. Since that time, it has processed more than 31 million tonnes of ore from open pit and underground sources and produced approximately 1.4 million ounces of gold. Currently, the concentrator throughput is 1.2 Mtpa and the overall gold recovery is 90% of which 73% is obtained from the gravity processes and 17% from flotation.

The concentrator includes primary, secondary, and tertiary crushing, primary and secondary grinding, a series of gravity concentration steps, regrinding, and flotation to produce three gravity concentrates and a flotation concentrate.

A new plant project designed to increase rougher flotation retention time and to install a second stage of cleaner flotation was completed in 2017. In 2018, an Expert Control System was installed. The projects increased gold recovery by approximately 2%.

The TMF is located in an area of gently undulating relief approximately 1.5 km north of the processing plant. Approximately 31 million tonnes of tailings have been deposited since mining began at Björkdal in 1988.

Material from the Norrberget deposit has more complex mineralogy than the mineralogy at Björkdal. Preliminary metallurgical tests show that the gold recovery in the existing plant will be at least 15% lower than the gold recovery for Björkdal ore.

ENVIRONMENTAL, PERMITTING AND SOCIAL CONSIDERATIONS

All operations are fully permitted in accordance with Swedish environmental and health and safety legislation. A new operating permit (M 771-17) was granted in December 2018 and remains valid for ten years from the date of issue at which point a new permit will be required.

Operation and expansion of the TMF is covered under the latest environmental operating permit.

A full environmental audit is carried out every three years by an independent consultant and the local authorities. The monitoring, control, and management policies and procedures are well documented and entirely appropriate to the type of operation.

The newly granted environmental permit includes an updated closure and reclamation plan. Mandalay presently has US$1.7 million (SEK 16 million) in a secured reclamation account held by the Swedish authorities and this will be increased to US$4.49 million (SEK 43 million).

CAPITAL AND OPERATING COSTS

A summary of capital requirements anticipated over the LOM is summarized in Table 1-3.

TABLE 1-3 CAPITAL COST SUMMARY
Mandalay Resources Corporation – Björkdal Mine

Description	Value (US$ '000)
Sustaining Capital Fixed Assets	21,556
Capital Development Underground	21,385
Pre-Strip Open Pit	40,146
Total Sustaining Capital	**79,646**
Growth Capital Fixed Assets	23,474
Total LOM Capital Expenditure	**106,560**

Operating costs for the LOM plan are shown below in Table 1-4.

TABLE 1-4 LIFE OF MINE OPERATING COSTS
Mandalay Resources Corporation – Björkdal Mine

Description	LOM (US$ '000)	Annual Average (US$ '000)	Unit Cost (US$/t proc)
Mining	138,835	17,180	12.20
Processing	86,013	9,822	7.56
G&A	80,954	9,244	7.11
Royalties and Refining	14,440	1,604	1.27
Total Operating Cost	**320,243**	**39,677**	**28.29**

2 INTRODUCTION

Roscoe Postle Associates Inc. (RPA) was retained by Mandalay Resources Corporation (Mandalay) to prepare an independent Technical Report on the Björkdal Gold Mine (Björkdal or the Mine), located in Västerbotten County in northern Sweden. The purpose of this report is to support the disclosure of Mineral Resources and Mineral Reserves for Björkdal and the satellite Norrberget deposit (Norrberget), located approximately four kilometres east-southeast of the Björkdal Mine. Mineral Resources and Mineral Reserves are estimated as of December 31, 2018, based on a drill hole database cut-off date of September 30, 2018 for Björkdal and September 30, 2017 for Norrberget. RPA was previously retained by Mandalay to prepare a Technical Report that disclosed the results of the 2017 Mineral Resource and Mineral Reserve estimates for the Björkdal Mine (RPA, 2018). This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101).

Björkdal ("Birch Valley") produces gold from a combined open pit and underground operation, with approximately 62% of plant feed currently delivered from the underground, with the remainder coming from the open pit (35%) and the stockpile (3%). Total mill feed for 2018 was 1.25 million tonnes. The average reconciled grade for 2018 was 1.29 g/t Au. The Björkdal plant uses conventional crushing and grinding, followed by a combination of gravity and flotation processing techniques to recover gold to concentrates which are sold to smelters in Europe. The plant capacity is 3,700 tonnes per day (tpd) and the plant is currently operating at approximately 3,400 tpd. Gold recovery for 2018 averaged approximately 90%, and production totalled approximately 46,662 ounces of gold in concentrates.

The 2017 Pre-Feasibility Study (PFS) for Norrberget envisions an open pit mining operation feeding the existing Björkdal plant. No changes have been made to the underlying assumptions for the Norrberget PFS since the last Technical Report dated March 29, 2018.

Mandalay is a publicly listed Canadian mining company that holds 100% of Björkdal through its wholly-owned subsidiaries in Sweden. Mandalay's other operating mine is located in Australia (Costerfield).

SOURCES OF INFORMATION

Site visits to Björkdal were carried out by Reno Pressacco, M.Sc.(A), P.Geo., RPA Principal Geologist, from September 20 to 22, 2016, as well as Jack Lunnon, CGeol, RPA Senior Geologist, Kathleen Ann Altman, Ph.D., P.E., RPA Principal Metallurgist, and David JF Smith, CEng, RPA Principal Mining Engineer, from September 22 to 25, 2017. RPA visited all of the Björkdal open pit and underground operations, the processing plant, and surface infrastructure including the assay laboratory. A visit was also made to the Norrberget Project site.

The report was prepared by Reno Pressacco, Jack Lunnon, Derek Holm, FSAIMM, RPA Senior Mining Engineer, Ian T. Weir, P.Eng., RPA Senior Mining Engineer, Kathleen Ann Altman, and David JF Smith, all of whom are independent Qualified Persons (QP). Mr. Pressacco is responsible for Sections 2 to 12, 23, and 24 and parts of Sections 1, 14 (Björkdal Mineral Resources), 25, 26, and 27. Mr. Lunnon is responsible for parts of Section 1, 14 (Norrberget Mineral Resources), 25, and 26. Messrs. Smith, Holm, and Weir share responsibility for Sections 15, 16, 18 to 22, and parts of Sections 1, 25, 26, and 27. Dr. Altman is responsible for Sections 13 and 17, and parts of Sections 1, 25, 26, and 27.

Discussions in relation to the year end 2018 Mineral Resource and Mineral Reserve estimates, discussions were held with personnel from Mandalay:

- Mr. Chris Gregory, Vice President – Operational Geology and Exploration
- Mr. Ryan Austerberry, Björkdal Site Manager
- Mr. Jose Javier Santabarbara, Björkdal Senior Resource Geologist
- Ms. Helena Moosberg-Bustnes, Björkdal Plant Manager
- Ms. Åsa Corin, Björkdal Geology Manager
- Mr. Samuel Miller, Björkdal Senior Exploration Geologist
- Mr. Mika Laakso, CRS Laboratory Manager
- Mr. Anton Anundsson, Technical Services Manager
- Mr. Nils Lindberg, Björkdal Open Pit Engineer
- Mrs. Charlotte Odenberger, Environmental Manager
- Mr. David Berglund, ALS Laboratory Manager

The documentation reviewed, and other sources of information, are listed at the end of this report in Section 27 References.

LIST OF ABBREVIATIONS

Units of measurement used in this report conform to the metric system. All currency in this report is US dollars (US$) unless otherwise noted.

a	annum
A	ampere
bbl	barrels
btu	British thermal units
°C	degree Celsius
C$	Canadian dollars
cal	calorie
cfm	cubic feet per minute
cm	centimetre
cm^2	square centimetre
d	day
dia	diameter
dmt	dry metric tonne
dwt	dead-weight ton
°F	degree Fahrenheit
ft	foot
ft^2	square foot
ft^3	cubic foot
ft/s	foot per second
g	gram
G	giga (billion)
Gal	Imperial gallon
g/L	gram per litre
Gpm	Imperial gallons per minute
g/t	gram per tonne
gr/ft^3	grain per cubic foot
gr/m^3	grain per cubic metre
ha	hectare
hp	horsepower
hr	hour
Hz	hertz
in.	inch
in^2	square inch
J	joule
k	kilo (thousand)
kcal	kilocalorie
kg	kilogram
km	kilometre
km^2	square kilometre
km/h	kilometre per hour
kPa	kilopascal
kVA	kilovolt-amperes
kW	kilowatt
kWh	kilowatt-hour
L	litre
lb	pound
L/s	litres per second
m	metre
M	mega (million); molar
m^2	square metre
m^3	cubic metre
µ	micron
MASL	metres above sea level
µg	microgram
m^3/h	cubic metres per hour
mi	mile
min	minute
µm	micrometre
mm	millimetre
mph	miles per hour
MVA	megavolt-amperes
MW	megawatt
MWh	megawatt-hour
oz	Troy ounce (31.1035g)
oz/st, opt	ounce per short ton
ppb	part per billion
ppm	part per million
psia	pound per square inch absolute
psig	pound per square inch gauge
RL	relative elevation
s	second
st	short ton
stpa	short ton per year
stpd	short ton per day
t	metric tonne
tpa	metric tonne per year
tpd	metric tonne per day
US$	United States dollar
USg	United States gallon
USgpm	US gallon per minute
V	volt
W	watt
wmt	wet metric tonne
wt%	weight percent
yd^3	cubic yard
yr	year

3 RELIANCE ON OTHER EXPERTS

This report has been prepared by RPA for Mandalay. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to RPA at the time of preparation of this report, and
- Assumptions, conditions, and qualifications as set forth in this report.

For the purpose of this report, RPA has relied on ownership information provided by Mandalay in Sections 1 and 4 of this Technical Report. RPA has not researched property title or mineral rights for the Mine and expresses no opinion as to the ownership status of the property.

RPA has relied on Mandalay for guidance on applicable taxes, royalties, and other government levies or interests, applicable to revenue or income from the Mine.

Except for the purposes legislated under provincial securities laws, any use of this report by any third party is at that party's sole risk.

4 PROPERTY DESCRIPTION AND LOCATION

The Björkdal property is located in Västerbotten County in northern Sweden, at approximately 20°35′26″ E longitude and 64°56′7″ N latitude (WGS84). In the Swedish coordinate system used for government maps (Rikets Nät, RT 90) the Björkdal property is located at approximately X: 7212073 and Y: 1726146. The Norrberget property is located approximately four kilometres east of the Björkdal Mine. Björkdal Mine is situated approximately 28 km northwest of the municipality of Skellefteå and approximately 750 km north of Stockholm (Figure 4-1).

SWEDISH MINING LAWS AND REGULATIONS

The Minerals Act (1991:45) came into force on July 1, 1992. The Mining Inspectorate of Sweden (Bergsstaten) is the agency responsible for decisions concerning permits for exploration (exploration permits) and mining (exploitation concessions). The Mining Inspectorate also carries out inspections of mines and provides information on mineral legislation and prospecting in Sweden.

On June 11, 2014, the Swedish Parliament amended the provisions of the Minerals Act (1991:45) governing exploration works. As per this bill, exploration permit holders are required to provide more detailed information about their exploration works.

An exploration permit does not give the right to undertake exploration work in contravention of any environmental regulations applying to the area. Applications for exemption are normally submitted to the County Administration Board (Länstyrelsen).

Acts and regulations governing exploration work include:

- Minerals Act (1991:45)
- Mineral Ordinance (1992:285)
- Environmental Code (1998:808)
- Work Environment Act (1977:1160)
- Work Environment Ordinance (1977:1166)


Legend:
International Boundary
National Capital
Major Cities
Road
Rivers
N
BJÖRKDAL GOLD MINE
Norwegian Sea
NORWAY
SWEDEN
FINLAND
RUSSIA
ESTONIA
LATVIA
DENMARK
Gulf of Bothnia
Gulf of Finland
Skagerrak
Kattegat
North Sea
VESTERALEN
LOFOTEN
ALAND ISLANDS
Harstad
Narvik
Kiruna
Malmberget
Jokkmokk
Bodo
Mo
Sandnessjoen
Mosjoen
Boden
Lulea
Pitea
Skelleftea
Storuman
Vilhelmina
Lycksele
Umea
Ornskoldsvik
Ostersund
Harnosand
Sundsvall
Hudiksvall
Mora
Falun
Borlange
Gavle
Uppsala
Vasteras
Stockholm
Sodertalje
Karlstad
Orebro
Mariestad
Nykoping
Norrkoping
Linkoping
Motala
Mellerud
Vannersborg
Uddevalla
Falkoping
Boras
Goteborg
Jonkoping
Nassjo
Vastervik
Visby
Varberg
Varnamo
Oskarshamn
Vaxjo
Kalmar
Halmstad
Oland
Helsingborg
Hassleholm
Karlskrona
Kristianstad
Lund
Malmo
Ystad
Copenhagen
Roskilde
Korsor
Odense
Esbjerg
Vejle
Arhus
Viborg
Holstebro
Alborg
Frederikshavn
Oslo
Drammen
Porsgrunn
Arendal
Kristiansand
Stavanger
Haugesund
Bergen
Hamar
Lillehammer
Floro
Alesund
Molde
Andalsnes
Trondheim
Steinkjer
Namsos
Ivalo
Kolari
Kelloselka
Kuolo-yarvi
Kamilarvi
Rovaniemi
Kemi
Oulu
Kajaani
Kokkola
Iisalmi
Vaasa
Seinajoki
Kuopio
Aanekoski
Jyvaskyla
Varkaus
Jamsa
Mikkeli
Pori
Tampere
Rauma
Hameenlinna
Lahti
Kouvola
Kotka
Turku
Helsinki
Tallinn
Hiiumaa
Parnu
Saaremaa
Ventspils
Riga
Muonioalven
Torneälven
Luleälven
Skellefteälven
Umeälven
Ångermanälven
Indalsälven
Storsjon
Ljusnan
Osterdalalven
Dalalven
Klaralven
Vanern
Vattern
Gotaalv
Lagan
Glama
Lagen
Otra
Kemijoki
Iijoki
Oulujoki
Ounasjoki
Luirojoki
8°
16°
24°
68°
64°
60°
56°
0 50 100 Kilometres
0 50 100 Miles
March 2019
Source: RPA, 2016.
Mandalay Resources Corporation
Björkdal Mine
Västerbotten, Sweden
Location Map

Figure 4-1

- The Work Environment Authority's Statute Book (AFS)
- Off-Road Driving Act (1975:1313)
- Off-Road Driving Ordinance (1978:594)
- Forest Conservation Act (1979:429)
- Forest Conservation Ordinance (1993:1096)
- Heritage Conservation Act (1988:950)
- Heritage Conservation Ordinance (1988:1188)
- Protection Act (2010:305)

PROPERTY OWNERSHIP AND LAND TENURE

Mandalay is a publicly listed company that effectively holds 100% of Björkdal through the Swedish registered companies Björkdalsgruvan AB (Björkdalsgruvan) and its subsidiary Björkdal Exploration AB (Björkdal Exploration). The Björkdal property consists of nine mining concessions, owned by Björkdalsgruvan, and 19 exploration permits, owned by Björkdal Exploration, as listed in Tables 4-1 and 4-2 and shown on Figure 4-2. A tenth mining concession, Norrliden K nr 1, covering the Norrberget deposit, was granted in January 2019 and is held by Explor Björkdalsgruvan AB. Explor Björkdalsgruvan AB also holds two additional exploration permits, Malånäset nr 100 and Malånäset nr 101.

TABLE 4-1 EXPLOITATION CONCESSIONS
Mandalay Resources Corporation – Björkdal Mine

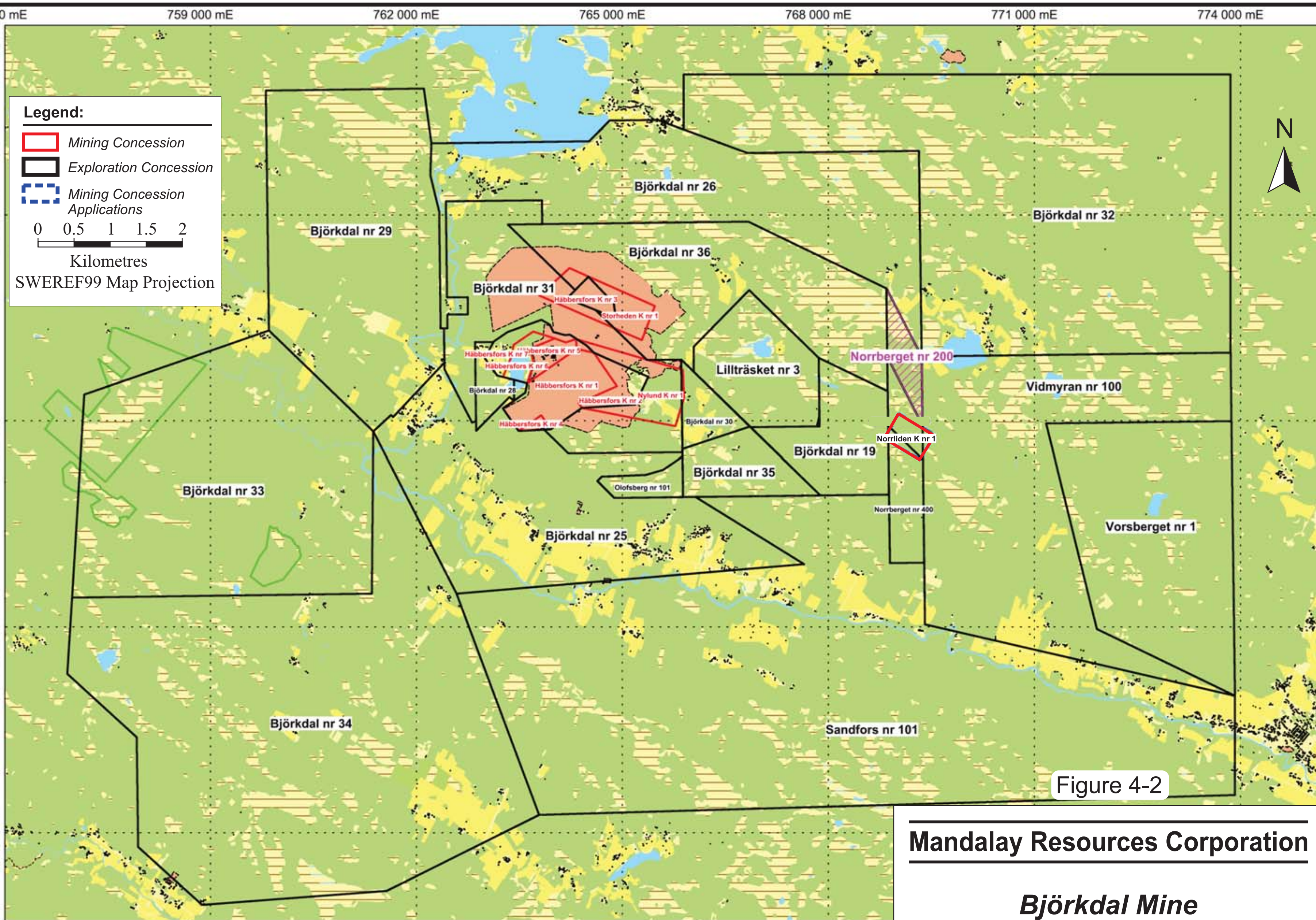
Permit Name	Size (ha)	Expiry Date
Häbbersfors K nr 1	98.6894	January 1, 2031
Häbbersfors K nr 2	34.8839	February 2, 2025
Häbbersfors K nr 3	18.8864	April 29, 2027
Häbbersfors K nr 4	5.0012	November 21, 2025
Häbbersfors K nr 5	21.8263	March 6, 2034
Häbbersfors K nr 6	23.4887	April 24, 2038
Häbbersfors K nr 7	32.1100	January 17, 2042
Nylund K nr 1	73.4700	January 30, 2043
Storheden K nr 1	61.27	November 8, 2043
Norrliden K nr 1*	18.51	January 1, 2032
Total	**388.1359**	

Note. * Permit held by Explor Björkdalsgruvan AB

TABLE 4-2 EXPLORATION PERMITS
Mandalay Resources Corporation – Björkdal Mine

Permit Name	Size (ha)	Expiry Date	Remarks
Björkdal nr 26	978.80	February 7, 2019	Application for Extension
Björkdal nr 25	967.70	May 9, 2020	
Björkdal nr 19	225.00	October 18, 2017	Application for Exploitation Concession
Björkdal nr 28	39.53	October 14, 2023	
Björkdal nr 31	540.52	November 7, 2020	
Norrberget nr 300	37.50	May 23, 2017	Application for Exploitation Concession
Norrberget nr 400	87.47	October 01, 2018	Application for Exploitation Concession
Olofsberg nr 101	42.79	February 15, 2019	Expired – covered by concession buffer zone
Björkdal nr 29	1,073.89	November 30, 2020	
Björkdal nr 30	64.03	February 23, 2021	
Björkdal nr 32	2,219.60	October 27, 2018	Application for Extension
Sandfors nr 101	3,267.82	June 9, 2021	
Björkdal nr 33	1,409.35	October 19, 2020	
Björkdal nr 34	2,520.16	November 9, 2020	
Björkdal nr 35	135.43	October 17, 2021	
Björkdal nr 36	670.40		Application Submitted, replacing Björkdal nr 10
Malånäset nr 100*	591.84	March 20, 2019	Application for Extension
Malånäset nr 101*	687.77	March 28, 2021	
Lillträsket nr 3	246.59	October 17, 2021	
Vorsberget nr 1	804.73	May 25, 2021	
Vidmyran nr 100	1,197.50	March 10, 2023	
Total	**17,808,42**		

Note. * Permit held by Explor Björkdalsgruvan AB



Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Property Map

March 2019

Source: Mandalay Resources Corp., 2019.

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Björkdal nr 19, Norrberget nr 300, and Norrberget nr 400 permits were locked by the application for the Norrberget exploitation concession. As the exploitation concession now has been granted, an application for Björkdal nr 37 has been submitted, and this area covers the previous Björkdal nr 19, Norrberget nr 200, Norrberget nr 300, and Norrberget nr 400 exploration permits.

An application for the exploration permit Björkdal nr 36 has been submitted to the relevant authority. This permit replaces the previous Björkdal nr 10, which had reached its 15-year maturity. Mandalay has met all of the required milestones in respect of the renewal of this permit and anticipates that it will be granted in due course.

Olofsberg nr 101 has expired and is under moratorium, however, the area is largely covered by concession buffer zone.

The Björkdal deposit is located on Häbbersfors exploitation concessions.

EXPLOITATION CONCESSIONS

Key facts for exploitation concessions are:

- An exploitation concession is valid for 25 years based on an application fee.
- The concession period can be extended for ten years at a time without special application if regular exploitation operations are in progress when the period of validity expires.
- An additional fee is sometimes paid to some landowners for a safety zone for blasting. This is an agreement between the Mine and landowners, and is not due to any legal obligations.

EXPLORATION PERMITS

Obligations to retain exploration permits include:

- An application fee of SEK500, or approximately US$70, per every 2,000 ha area.
- Annual fees for exploration total approximately SEK500,000, or approximately US$70,000 per annum.
- Compensation for damage and encroachment to landowners upon completion of the operation.

SURFACE USAGE/LAND LEASE

Mandalay has indicated to RPA that all land required for the Björkdal mining concessions has been designated to the company. Some of the land is owned by Mandalay, while some is still owned by landowners with long term surface leases to the company. If the Mine activity is shut down for some reason, land is returned to the landowners after reclamation work is completed.

Björkdal is located in reindeer habitat belonging to the Sami village Mausjaure in the west and to the Sami village Svaipa in the east. The habitats are not active and there are no issues with the indigenous Sami population.

ENVIRONMENTAL LIABILITIES AND PERMITTING

Mandalay reports that Björkdal is fully permitted in accordance with Swedish environmental and health and safety legislation. The latest mining permit was issued in December 2018 and is in good standing. Under Swedish law, there is no time limit on the permit, however, the government may make adjustments as required to meet any regulation changes. A new permit related to the Mine tailings area was obtained on December 11, 2018 and is valid for a period of ten years.

ROYALTIES, BACK-IN RIGHTS, PAYMENTS OR OTHER ENCUMBRANCES

The holder of an exploitation concession must pay an annual minerals fee to the landowners of the concession area and to the State. The fee is 0.2% of the average value of the minerals mined from the concession, 0.15% of which is paid to the landowners in proportion to their share of ownership of the concession area. The remaining 0.05% is paid to the State to be used for research and development in the field of sustainable development of mineral resources. The fee is estimated after consideration of the amount of mined ore, the amount of minerals in the ore, and the average price of the mineral during the year or by use of an equivalent value.

The Norrberget nr 200, 300, and 400 exploration concessions are subject to a 2% net smelter return (NSR) in favour of North Atlantic Natural Resources AB (NAN).

DISCUSSION

RPA is not aware of any environmental liabilities on the property and Mandalay has confirmed that it is in possession of, or in the process of obtaining, all required permits to conduct the proposed work on the property. RPA is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the property.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

ACCESSIBILITY

The Björkdal property is located approximately 40 km by road northwest of the municipality of Skellefteå (population of 72,000) and is accessible via Swedish national road 95 or European highway route E4 followed by all-weather paved roads. Norrberget is located approximately four kilometres east of the Björkdal Mine and is accessible via a forest road.

On the Björkdal property, gravel roads link the main site gate entrance to the surface infrastructure. Gravity concentrates are trucked from the Mine to Skellefteå where they are loaded on ships for delivery to smelting customers in Europe. Sulphide flotation concentrates are trucked to nearby processing facilities. The nearest airport, located in Skellefteå, has regular daily service to Stockholm.

CLIMATE

This area of Sweden has a subarctic climate with mild summers and cold snowy winters. The climate is, however, moderated by proximity to the Gulf of Bothnia, so that while winters are cold, they are much less so than winters at similar latitudes in other parts of the world. The average low temperature for January is -14°C. The short summers are also reasonably warm for latitudes near the Arctic Circle. The average daily high temperature in July is 19°C, although, in recent years, temperatures above 30°C have been recorded. Yearly precipitation is low at less than 600 mm, with August being the wettest month at over 71 mm. Precipitation is quite low near the coast, but snow may lie on the ground for up to four months. Due to its high latitude, July is typified by an average of 21 hours of daylight while the average for December is four. Climatic conditions do not affect Björkdal's or Norrberget's exploration activities, and the Björkdal Mine and processing operations function year round.

LOCAL RESOURCES

The Västerbotten region has a long history of mining activity and Skellefteå is an industrial town. The region is home to several competence centres and two universities with the bulk of Sweden's academic and vocational units related to mining, metallurgy, and geology located within a radius of 130 km. There are also a number of specialized companies, suppliers, and contractors linked to the mining industry including world-class manufacturers of mining equipment and machinery. Both experienced and general labour is readily available within the region. Björkdal has had success in hiring experienced staff and personnel with good mining expertise. The Mine enjoys the support of local communities as mining is accepted as a socially responsible and necessary contributor to the local economy.

INFRASTRUCTURE

BJÖRKDAL

The Björkdal Mine site hosts extensive surface and underground infrastructure, including the following:

- Well-kept gravel site roads,
- An administrative building consisting of office space, kitchen facilities, and a mine dry,
- An open pit with ramp access to the underground operations,
- Underground development consisting of ramps and sub-levels,
- Raw ore stockpile facility containing eleven 5,000 t to 7,000 t capacity raw ore stockpiles,
- Primary jaw crushing facility with 400 t coarse ore stockpile,
- Secondary crushing facility,
- 5,000 t fine ore stockpile and reclaim facility,
- 3,600 tpd mill, gravity gold plant, and flotation plant,
- An internal metallurgical assay laboratory,
- Company and contractor maintenance facilities,
- A core logging facility with covered storage, sample preparation laboratory, and grade control assay laboratory,
- 250 ha TMF,
- Raw water supply and storage,
- Water treatment plant,
- Explosive magazine and mixing facilities,

- Storage facilities for chemical reagents and bulk supplies,
- An off-site covered core storage facility,
- Swedish grid electrical power,
- Fresh water access.

NORRBERGET

Currently, there is no infrastructure at the Norrberget deposit other than forest access roads and exploration drill pads. Water for drilling is obtained from surface streams, or pumped from previous drill holes.

In RPA's opinion, there are sufficient surface rights for mining operations and related infrastructure.

PHYSIOGRAPHY

The Björkdal property is located at an average elevation of 140 MASL. The terrain around Björkdal is relatively subdued with low hills and numerous shallow lakes. Glacial till forms the main soil cover over the area. The vegetation around Björkdal is dominated by managed forests of spruce and birch with some areas of cultivated land.

6 HISTORY

PRIOR OWNERSHIP

BJÖRKDAL

The Björkdal deposit was originally discovered in 1983 by Terra Mining AB (Terra Mining) during a till sampling program which discovered anomalous gold values in the glacial till profile. Anomalous gold values in bedrock were discovered in 1985 and a definition drilling program began in early 1986.

The definition drilling program was coincident with a metallurgical test work program, and feasibility studies that were completed in May 1987. The feasibility studies returned a positive outcome and Terra Mining commenced mining operations at Björkdal in July 1988. In 1996, Terra Mining was purchased by William Resource Ltd. (William). William continued to operate the Mine until the end of June 1999, when it was petitioned into bankruptcy. The assets were bought through public auction in June 2001 by International Gold Exploration, which operated the Mine from September 2001 until 2003 when it was acquired by Minmet plc (Minmet).

In 2006, Gold-Ore Resources Ltd. (Gold-Ore) acquired an option from Minmet to purchase the holding company for the Mine. On December 31, 2007, Gold-Ore exercised its option and acquired all the shares of Björkdalsgruvan AB. During exploration and development of the Mine, Gold-Ore generated cash flow from gold sales from the operation of the plant at the mine, fed by stockpiled material, open pit mining of new material, and underground development operations, which commenced on a full scale in mid-2008. In January 2009, Gold-Ore's management concluded that there were sufficient mineral reserves and resources at the Mine for at least a five year mine life and declared commercial production.

In May 2012, Elgin Mining Inc. (Elgin) acquired all of the issued and outstanding common shares of Gold-Ore. Gold-Ore's common shares were delisted from the TSX and Elgin graduated from a TSX Venture listed company to a TSX listed company.

On June 4, 2014, Mandalay announced that it had entered into an arrangement agreement pursuant to which Mandalay would acquire all the outstanding common shares of Elgin. The transaction was completed on September 10, 2014.

NORRBERGET

The Norrberget deposit was discovered by COGEMA in 1994 and drilling occurred until 1996. In 1997, COGEMA withdrew from Sweden and disposed of all assets in the region. The exploration permits around the Björkdal dome and covering the Norrberget deposit were taken up by NAN.

On September 28, 2007, Gold-Ore purchased exploration permits surrounding the Björkdal property from NAN. The property was acquired by Elgin and subsequently passed to Mandalay through the acquisition process described above. A 2% NSR royalty consideration is in effect to NAN for any production from the concession package. This is detailed in Section 4.

PREVIOUS RESOURCE ESTIMATES

BJÖRKDAL

A detailed description of the Mineral Resource and Mineral Reserve estimates prepared by Minmet, Gold-Ore, and Elgin was presented in previous Technical Reports by RPA (2015, 2017, and 2018) and is not reproduced here. The previous estimates of Mineral Resources and Mineral Reserves were prepared by RPA for Mandalay in 2014, 2016, and 2017.

A summary of the Mineral Resource estimates for the Björkdal property as of December 31, 2017 is presented in Table 6-1. A summary of the Mineral Reserve estimates for the Björkdal property as of December 31, 2017 is presented in Table 6-2. These Mineral Resource and Mineral Reserve estimates are superseded by the current estimates contained in Sections 14 and 15 of this Technical Report.

TABLE 6-1 MINERAL RESOURCES AT THE BJÖRKDAL MINE AND NORRBERGET DEPOSIT AS AT DECEMBER 31, 2017
Mandalay Resources Corporation – Björkdal Mine

Location	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
Indicated Resources				
Björkdal	Open Pit	3,589	2.08	240
	Underground	6,782	3.03	660
	Stockpile	2,383	0.64	49
	Sub-total	12,754	2.31	949
Norrberget	Open Pit	144	3.29	15
Total, Indicated		**12,898**	**2.33**	**965**
Inferred Resources				
Björkdal	Open Pit	2,368	1.26	96
	Underground	2,455	2.34	184
	Subtotal	4,823	1.81	280
Norrberget	Open Pit	3	4.03	0.5
Total, Inferred		**4,826**	**1.81**	**281**

Notes:
1. Mineral Resources are estimated using drill hole and sample data as of September 30, 2017 and depleted for production through December 31, 2017.
2. CIM (2014) definitions were followed for Mineral Resources.
3. Mineral Resources are inclusive of Mineral Reserves.
4. Mineral Resources are estimated using an average gold price of $1,400/oz and an exchange rate of 8.4 SEK/US$.
5. Bulk density is 2.74 t/m^3.
6. High gold assays were capped to 30 g/t Au for the open pit mine.
7. High gold assays for the underground mine were capped at 60 g/t Au for the first search pass and 40 g/t Au for subsequent passes.
8. High gold assays at Norrberget were capped at 24 g/t Au.
9. Interpolation was by inverse distance cubed utilizing diamond drill, reverse circulation and chip channel samples.
10. Open pit Mineral Resources are estimated at a cut-off grade of 0.35 g/t Au and constrained by the resource pit design.
11. Underground Mineral Resources are estimated at a cut-off grade of 0.95 g/t Au.
12. A nominal two metres minimum mining width was used to interpret veins using diamond drill, reverse circulation, and underground chip sampling.
13. Reported Mineral Resources are exclusive of previously mined underground development and stopes.
14. Stockpile Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au and are based upon surveyed volumes supplemented by production data.
15. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
16. Numbers may not add due to rounding.

TABLE 6-2 MINERAL RESERVES AT THE BJÖRKDAL MINE AND NORRBERGET DEPOSITAS AT DECEMBER 31, 2017
Mandalay Resources Corporation – Björkdal Mine

Location	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
		Probable Reserves		
Björkdal	Open Pit	4,537	1.30	189
	Underground	4,321	2.41	334
Norrberget	Open Pit	162	2.80	15
Stockpile	Stockpile	2,383	0.64	49
Total, Probable		**11,403**	**1.60**	**587**

Notes:
1. Mineral Reserves are estimated using drill hole and sample data as of September 30, 2017 and depleted for production through December 31, 2017.
2. CIM (2014) definitions were followed for Mineral Reserves.
3. Open Pit Mineral Reserves are based on mine designs carried out on an updated resource model, applying a block dilution of 100% at 0.1 g/t Au for blocks above 1.0 g/t and 100% at 0.6 g/t Au for blocks between 0.4 g/t and 1.0 g/t. The application of these block dilution factors is based on historical reconciliation data. A cut-off grade of 0.4 g/t Au was applied. Open Pit Mineral Reserves for Norrberget are based on 15% dilution at zero grade and 100% extraction.
4. Underground Mineral Reserves are based on mine designs carried out on an updated resource model. Minimum mining widths of 3.5 m for stopes (after dilution) and 3.8 m for development were used. Dilution was applied by adding 0.5 m on each side of stopes as well as an additional 10% over break dilution. Further dilution, ranging from 10% to 100%, was added on a stope by stope basis depending on their proximity with other stopes. An overall dilution factor of 14.5% was added to development. Mining extraction was assessed at 95% for contained ounces within stopes and 100% for development. A cut-off grade of 1.00 g/t Au was applied. An incremental cut-off grade of 0.4 g/t Au was used for development material.
5. Stockpile Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au and are based upon surveyed volumes supplemented by production data.
6. Mineral Reserves are estimated using an average long-term gold price of US$1,200/oz, and an exchange rate of 8.4 SEK/US$.
7. Tonnes and contained gold are rounded to the nearest thousand.
8. Totals may appear different from the sum of their components due to rounding.

PAST PRODUCTION

BJÖRKDAL

Table 6-3 shows Björkdal's annual gold production since 1988.

TABLE 6-3 BJÖRKDAL ANNUAL GOLD PRODUCTION (1988-2018)
Mandalay Resources Corporation – Björkdal Mine

Year	Production (kt)	Feed grade (Au g/t)	Recovery (%)	Gold Production (oz)
1988	148	2.29	89.1	9,683
1989	475	2.86	90.9	39,727
1990	613	2.56	89.9	45,350
1991	765	2.64	89.8	58,270
1992	872	2.94	89.9	74,133
1993	840	3.33	90.7	81,549
1994	877	2.62	92.0	67,980
1995	1,157	2.11	90.0	70,646
1996	1,276	2.31	91.0	86,210
1997	1,288	2.49	89.6	92,416
1998	1,317	1.77	89.7	67,227
1999	635	1.50	89.8	27,500
2000	-	-	-	-
2001	303	1.09	84.1	8,922
2002	1,190	1.02	86.4	33,723
2003	1,198	1.30	86.4	43,274
2004	1,194	0.94	85.0	30,665
2005	1,197	0.68	84.7	22,172
2006	1,210	0.61	86.8	20,591
2007	1,109	0.63	85.5	19,214
2008	1,170	0.89	87.5	29,288
2009	1,064	1.24	88.4	37,568
2010	1,155	1.23	89.0	40,729
2011	1,233	1.16	88.7	40,782
2012	1,274	1.19	87.7	42,839
2013	1,261	1.32	87.8	46,946
2014	1,318	1.24	88.2	46,292
2015	1,303	1.22	88.1	44,921
2016	1,289	1.35	87.9	49,140
2017	1,262	1.75	89.1	63,210
2018	1,251	1.30	88.9	45,721
Total	**31,244**	**1.55**	**88.35**	**1,386,688**

NORRBERGET

There has been no production from the Norrberget deposit.

7 GEOLOGICAL SETTING AND MINERALIZATION

The following discussion and figures were provided by Mr. Samuel Miller, Mandalay, Björkdalsgruvan Senior Exploration Geologist.

REGIONAL GEOLOGY

The Skellefteå region consists of Paleoproterozoic-aged rocks that host several world-class volcanogenic massive sulphide (VMS) copper, zinc, and lead deposits that have been worked for nearly a century. The Skellefteå district lies within a large and ancient cratonic block named the Fennoscandian shield. The Fennoscandian shield spans much of Finland and northwestern Russia, extending further westward throughout Sweden and Norway.

Mineralization in the Skellefteå region is focused within and around a regionally extensive, west to northwest trending structural feature named the Skellefteå belt (Figure 7-1). The Skellefteå belt is 120 km long and 30 km wide and consists of deformed and metamorphosed volcanic, sedimentary, and igneous rocks that are all Paleoproterozoic in age. Deformation and metamorphism is attributed to the Paleoproterozoic-aged Svecokarelian orogeny that occurred around 1.88-1.8 Ga. Metamorphism associated with the Svecokarelian orogeny ranges in intensity from greenschist to amphibolite facies.

REGIONAL STRATIGRAPHY

The stratigraphy of the Skellefteå area consists of Paleoproterozoic-aged volcanic, volcanoclastic, and sedimentary rocks. The stratigraphy is divided into two large litho-stratigraphic groupings that are named the Skellefte Group (lower division) and the Vargfors Group (upper division) as defined by Allen et al. (1996). The Skellefte Group is dominated by extrusive volcanic successions that are interbedded/intercalated on a large scale with clastic sediments, with volcanic rock-types within the Skellefte Group classified as rhyolite, dacite, andesite, and basalt rock-types. Sedimentary lithologies consist of black coloured pyritic mudstone and shale, volcanoclastic rocks, breccia conglomerates, and minor carbonates.

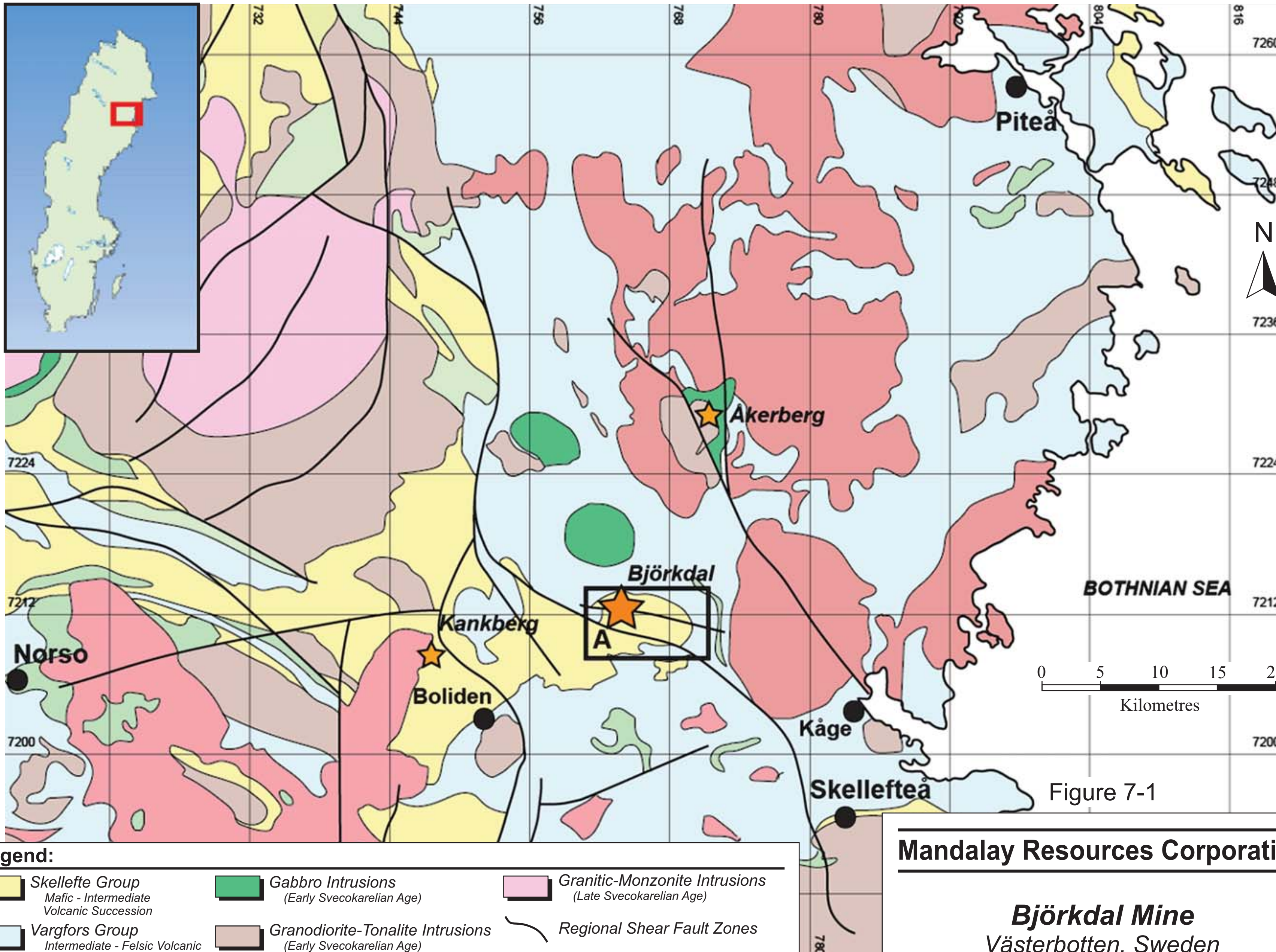

Figure 7-1

Legend:

Skellefte Group *Mafic - Intermediate Volcanic Succession*	*Gabbro Intrusions* *(Early Svecokarelian Age)*	*Granitic-Monzonite Intrusions* *(Late Svecokarelian Age)*
Vargfors Group *Intermediate - Felsic Volcanic And Sedimentary Succession*	*Granodiorite-Tonalite Intrusions* *(Early Svecokarelian Age)*	*Regional Shear Fault Zones*
Vargfors Group *Mafic Volcanic Succession*	*Granite Intrusions* *(Late Svecokarelian Age)*	*Significant "Low-Sulphide" Gold Deposits*

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Regional Geology

March 2019

Source: Mandalay Resources Corp., 2016.

RPA

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The overlying Vargfors Group is dominated by clastic sedimentary rocks with lesser mudstone and carbonates, sporadically interbedded with thin volcanic successions. The lower portions of the Vargfors Group consist of abundant conglomerate and sedimentary breccia. Locally, rare carbonate beds are observed interbedded within these conglomerates, while the finer-grained siliciclastics may contain a carbonate-rich matrix (Allen et al., 1997). Total stratigraphic thickness of the entire Skellefte and Vargfors groups is in the order of seven kilometres (three and four kilometres respectively; Allen et al., 1996).

The stratigraphic successions are locally intruded by igneous rocks thought to belong to the Jörn granitoid suite. Relative ages of these intrusive bodies are constrained through radiometric dating and field relationships indicate a contemporaneous emplacement age with the volcanic rocks belonging to the Skellefte Group, with lithic intrusive clasts found within the overlying Vargfors Group (Lundberg, 1980; Claesson, 1985; Wilson et al., 1987). Compositions of these intrusive rocks of the Jörn granitoid suite range considerably from felsic to mafic with end-member compositions respectively represented by gabbros and granites.

REGIONAL STRUCTURE

The rocks of the Skellefteå belt are observed to have undergone two major shortening events and metamorphism during the Svecokarelian orogeny. The first of the major shortening events resulted in folding and shearing; folding consists of vertical to upright isoclinal folds with east to northeast striking axial planes, while shear zones are oriented sub-parallel to the axial planes of the folds. The later shortening event produced structures mainly dominated by shearing, with only minor folding coaxially overprinting the earlier generation of folding (Weihed et al., 2003).

PROJECT GEOLOGY

Existing literature on the geological setting of the Björkdal gold deposit describes auriferous veins hosted within the outer margin of a large quartz-monzodiorite or tonalitic intrusion that is surrounded by supra-crustal rocks. The contact between the intrusion and surrounding rocks is represented by a "major thrust duplex", which also serves to truncate the mineralized vein-system (Bergström and Weihed in Kathol and Weihed, 2005, and references within). Radiometric dating of zircons extracted from the Björkdal host rocks (Lundström and Anthal, 2000) return ages of 1,905 Ma (although many zircon forming events are apparently observed) that are considered to represent the emplacement age of the intrusion. The oldest intrusive rocks within the Skellefteå district are the Jörn granitoids which are documented to post-date the Björkdal intrusive rocks dating between 1,890 and 1,870 Ma (Kathol et al., in Kathol and Weihed, 2005). The 1,905 Ma emplacement age corresponds to the reported depositional age of the Bothnian Basin sediments in which the Björkdal intrusion is hosted (Claesson and Lundqvist, 1995). Therefore, the formational interpretations of geological features in the Björkdal area (such as Björkdal dome) do not really align well with the regional chronological framework presented in literature. The property-scale geological setting is presented in Figure 7-2.

LOCAL GEOLOGY

As a result of detailed litho-stratigraphic mapping, petrological observations, and geochemical analysis undertaken by Mandalay/Björkdalsgruvan geologists have observed that host rock geology, metamorphism, and alteration styles are much more complex and variable than previously documented. Instead of a large, massive plutonic-type intermediate intrusion occupying the domal structure observed within the Björkdal area, a variable and complex alteration signature overprints many different rock-types including pyroclastic, volcano-sedimentary, tuffaceous, extrusive-volcanic (andesitic to basaltic compositions), sub-volcanic intrusive (andesitic compositions), and sedimentary (silici-clastics, shales and carbonates) lithologies. Common alteration and metasomatic styles include silicification, carbonatization, calc-silicate (actinolite) alteration, albitization, chloritization, potassic (biotite and K-feldspar), epidotization, pyritization, tourmalinization, with various skarn-type alteration assemblages common in areas where a calcareous host rock is present (including actinolite, tremolite, pyroxene, and minor garnet). While alteration and metasomatic zonation of these various styles is present, the spatial distribution has not clearly been defined. A major control on the alteration zonation appears to be host rock lithology (protolith composition) and proximity to major fluid driven heat sources (i.e., hydrothermal systems).

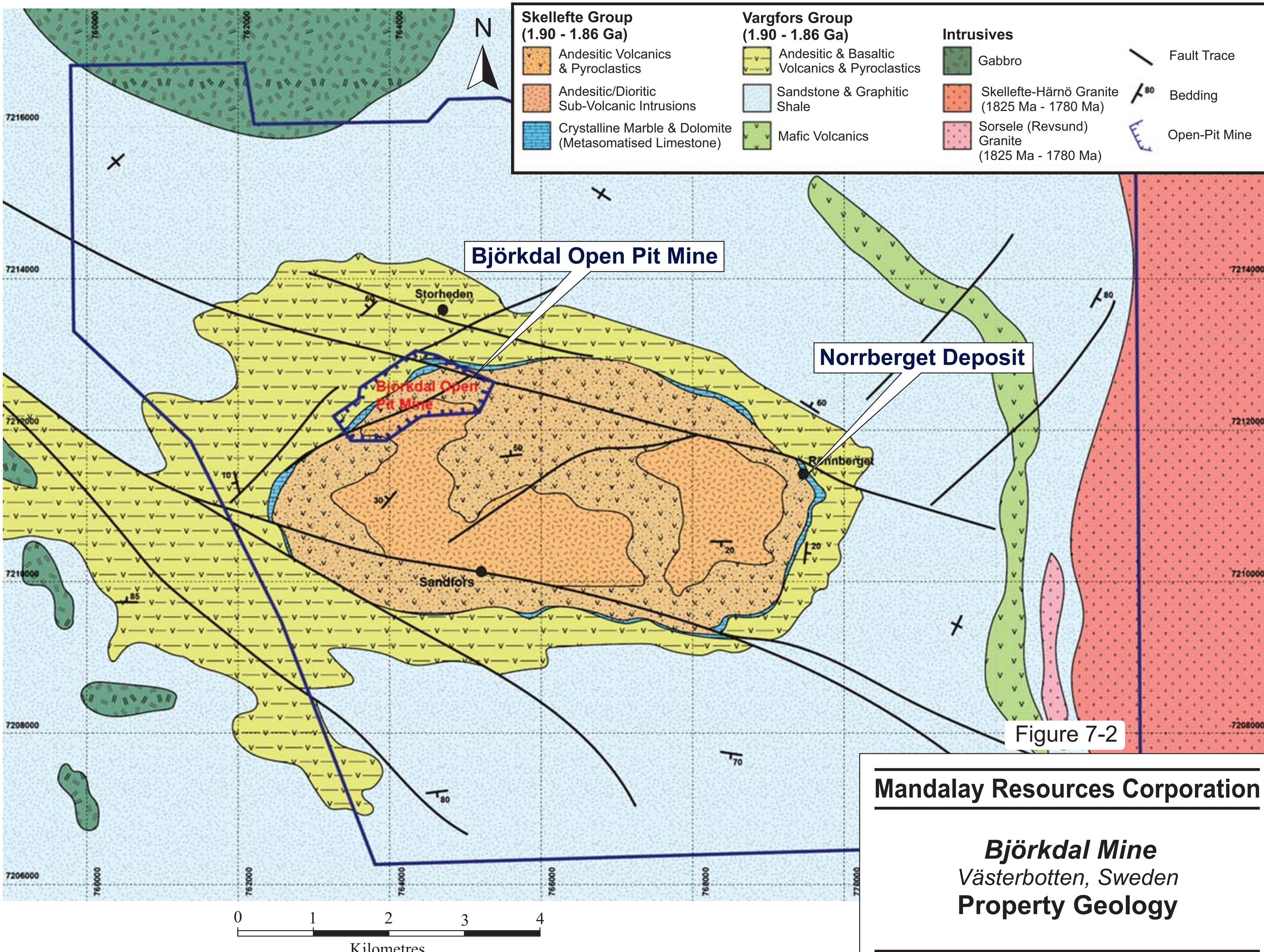

Figure 7-2

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Property Geology

March 2019

Source: Mandalay Resources Corp., 2016.

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LOCAL STRATIGRAPHY

A litho-stratigraphic column of geologic units observed in the Björkdal area is presented in Figure 7-3. The lowest succession found at the Mine and in the surrounding area consists of a unit of volcaniclastic sandstones and conglomerates, interbedded with lavas, ignimbrites, tuffs, bedded sandstone, and mudstone/shales. A large sub-volcanic intrusion (interpreted as an andesitic laccolith) locally intrudes this volcanic succession in the south and southwestern margins of the current open pit, but has not yet been encountered elsewhere within the Mine area.

A massive unit of crystalline marble sharply overlies these lower volcanic and clastic units. Overlying the crystalline marble is a thin pyroclastic unit (characterized by abundant “fiamme” clasts), which is then abruptly overlain by a basaltic lava containing abundant amygdaloids (defined by actinolite and carbonate in-fill). Above this basalt, the stratigraphy appears to become increasingly marine in genesis, with the overlying units consisting of laminated and interbedded tuffs and mudstone (basaltic geochemical composition), finely laminated mudstones and siltstone, and poorly sorted sandstone. Gradationally overlying these clastic sediments is a monotonous series of graphitic and pyritic shale (pyrite is often altered to pyrrhotite), interbedded with poorly sorted siltstone and sandstone with minor course-sand/grit beds. Partial Bouma sequences are observed within the more clastic intervals of this upper shale succession.

The local stratigraphy at the Mine is related with the upper and lower portions of the Skellefte and Vargfors groups, respectively (as defined in Allen et al., 1997). The units present below the upper contact of the crystalline marble are interpreted to correlate with the upper portions of the Skellefte Group. These carbonate units are interpreted to represent the eastward, deeper-water, lateral-equivalent of Kautsky’s (1957) “Menstäsk conglomerate”, described as consisting of lime-cemented marine conglomerate and sedimentary breccia. As such, the upper contact of this calcareous unit is here defined as an approximate stratigraphic position of the Skellefte-Vargfors Group boundary.

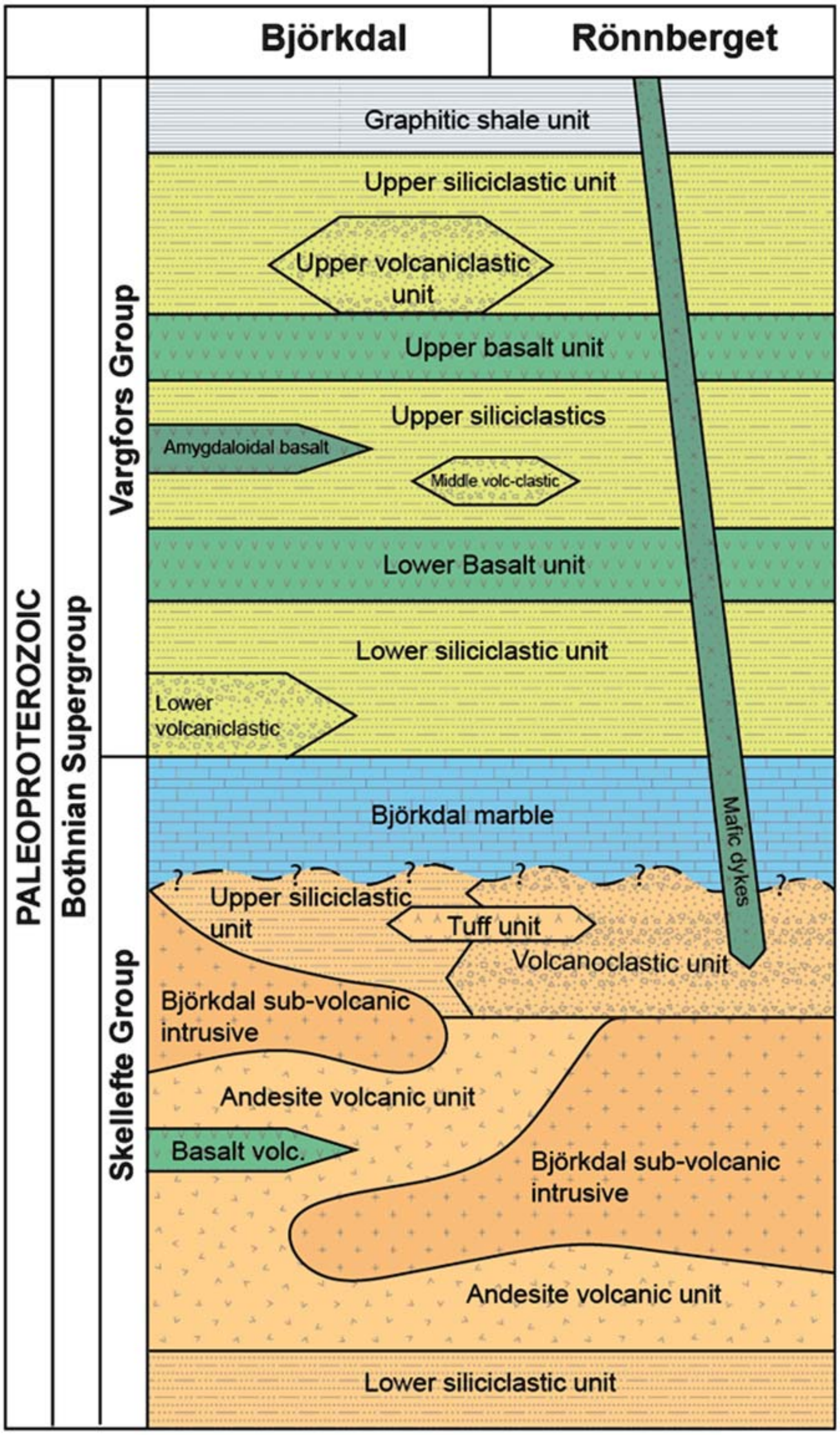


Figure 7-3

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Björkdal Stratigraphy

March 2019

Source: Mandalay Resources Corp., 2016.

LOCAL STRUCTURE

The local structure of the Björkdal deposit is dominated by shallow, north-dipping brittle-ductile faults and shears, and steeper, northeast dipping brittle-ductile shears. In previous descriptions (Weihed et al., 2003), only the north-dipping structures have been identified, interpreted as “regional-scale thrust-duplexes”. The majority of kinematic indicators identified on both of these significant sets of structures appear to be dominantly strike-slip. The brittle structures consist of fault-gouge that has undergone sporadic re-healing and cementation by carbonate, silica, and sericite. Brittle-ductile structures consist of highly sheared fabrics and/or rotated and boudinaged quartz veins that may include masses of very mildly foliated biotite (Figure 7-4). Interestingly, these structures are sometimes significantly mineralized in gold. Additionally, where this brittle-ductile set of northeast dipping structures cross-cuts the marble unit, significant calc-silicate, silicification, and sulphide alteration occurs. These heavily altered lenses of marble are interpreted as having been skarnified by hydrothermal fluids travelling within this network of brittle-ductile shear and fault structures.

Figure 7-4

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Shear Hosted Mineralization

March 2019 ***Source: Mandalay Resources Corp., 2016.***

MINERALIZATION

BJÖRKDAL

The Björkdal gold deposit is a lode-style, sheeted vein deposit hosted within the upper portions of the Skellefte Group sediments. Gold is found within quartz veins that range in thickness from less than a centimetre to over several decimetres. These veins are usually observed as vertical to sub-vertical dipping veins that strike between azimuth 000° and azimuth 090°, with the majority of veins striking between azimuth 030° and 060°. The veining is locally structurally complex, with many cross-veining features observed and thin mineralized quartz veinlets in the wall rocks proximal to the main quartz veins (Figure 7-5).

Gold-rich quartz veins are most often associated with the presence of minor quantities of sulphide minerals such as pyrite, pyrrhotite, marcasite, and chalcopyrite alongside more common non-sulphide minerals such as actinolite, tourmaline, and biotite. Scheelite and bismuth-telluride compounds (i.e., tellurobismuthite and tsumoite) are also commonly found within the gold-rich quartz veins and are both excellent indicators of gold mineralization.

Gold occurs dominantly as free gold, however, gold mineralization is also associated with bi-telluride, electrum, and pyroxenes. Silver is seen as a minor by-product of the Björkdal processing plant, however, very little is known about its deportment within the deposit, although it is assumed to be associated with electrum.

Figure 7-5

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Complex Veining Styles Observed Underground

Source: Mandalay Resources Corp., 2016.

NORRBERGET

The primary mineralization at Norrberget is observed to be associated with amphibole alteration bands and veinlets, and where mafic tuffs and volcaniclastic rocks are interbedded, contrary to what is observed at Björkdal (Figure 7-6). The mineralization is preferentially emplaced where there is a structural change to the rock such as at lithological contacts, altered bands and where shearing interacts with the interbedded sequences, due to the changing in the rheological characteristics of the unit. Zones where pyrrhotite and pyrite occur and are absent appear to be lithological controlled within the volcaniclastic package which can indicate a differing redox based upon temperature change and fluid evolution.

The mineralization at Norrberget is limited to 50 m stratigraphically below the lower marble contact, which is believed to be a result of the cooling and redox changes of the fluid as it passes through the units.

The gold is very fine grained and rarely visible. Where gold grains have been observed, they are found to be on the boundary or in the interstitial material between grains. High grade gold is mostly found in areas with low to no pyrite.

Figure 7-6

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Norrberget Mineralization

Source: Mandalay Resources Corp., 2019.

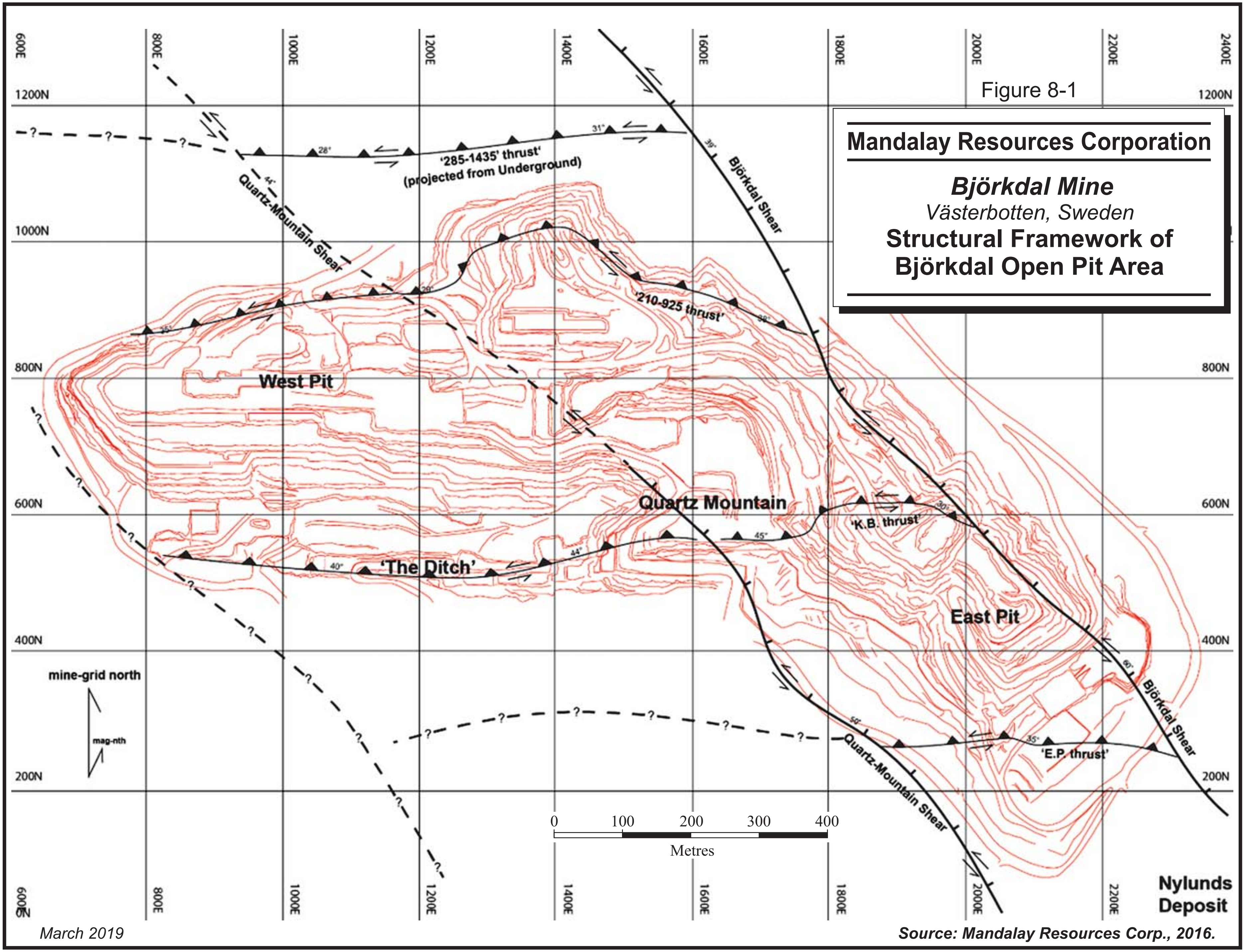
8 DEPOSIT TYPES

BJÖRKDAL

At Björkdal, the majority of gold is associated with the anastomosing, sheeted quartz-vein network. This epigenetic vein network consists of many hundreds of sub-parallel quartz veins (typically striking 030° to 090° from true north) and is structurally controlled. Strong structural control suggests a strong spatial and chronological relationship of the mineralization with orogenic/tectonic processes, as is commonly observed in mesothermal/greenstone-gold systems. However, the mineral associations at the Mine and the larger alteration area could also be indicative of alternative depositional mechanisms responsible for the mineralization at Björkdal, as there are some similarities to skarn and/or porphyry systems.

STRUCTURAL DEVELOPMENT OF MINERALIZATION

In general, mineralized veins cross-cut or overprint most rock textures such as bedding, schistosity, folding, shearing, and large-scale alteration, suggesting that mineralization occurred rather late in the orogenic cycles in northern Sweden (i.e., the 1.88 - 1.80 Ga Svecokarelian orogeny). Three significant north-dipping, strike-slip shear systems (striking approximately 100° to 110° from true north) have been identified in and around the Björkdal deposit and have been informally named as the Björkdal shear, Quartz-Mountain shear, and Storheden shear. The majority of the known Björkdal deposit is located between the Björkdal and Quartz-Mountain shears, with the Björkdal shear representing a hangingwall structure and the Quartz-Mountain shear representing a footwall contact to mineralization. The mineralization system continues below the Quartz-Mountain shear, where it becomes the hangingwall to the mineralization in the West Pit area. The footwall contact to mineralization within the West Pit has not yet been identified, but is believed to pass through the far western margin of the West Pit with a similar strike and dip to the above-mentioned shear systems (Figure 8-1).



March 2019

Source: Mandalay Resources Corp., 2016.

A series of flat-dipping, sub-parallel shear structures appear to provide an oblique link between the major shears described above. These are informally named the 285-1435, 210, K.B. (Kvartz Berget), and E.P. (East Pit) shears, and can generally be described as shallow dipping at approximately 25° to 35° and striking 070° to 090° from true north. While these structures appear to have thrust-like geometry, the kinematic indicators can be somewhat ambiguous but seem to possess strong strike-slip motion as well as some reverse thrust features (slickenside markings). Folding is often intense in the vicinity of these structures whose axial planes are oriented sub-parallel to the shear planes (i.e., semi-recumbent folds). The folding is thought to represent drag-folding from reverse-shear/thrust movement. It is unclear how these structures genetically relate to the major Björkdal and Quartz-Mountain shears, however, they appear to represent second order structures to the Björkdal-Quartz-Mountain shear systems as they do seem to emanate and diverge out of the Björkdal shear (Figure 8-1).

The quartz veins at the Mine can generally be described as sub-vertical in dip, striking between azimuths 020° and 090° from true north. There is a minor set of sub-vertically dipping veins, striking approximately at azimuth 330° from true north. All vein sets contain gold mineralization, with higher grades occurring at vein intersections. Slip orientation of slickenside lineations in vein walls (principally the 030° to 090° vein set) indicates a strike-slip movement, with both sinistral and dextral features observed within a single vein.

ALTERATION

Alteration assemblages at Björkdal are varied and complex with both regional and local scale alteration systems observed. The regional-scale alteration can be loosely defined in terms of certain key minerals such as albite, epidote, and k-feldspar. While silica, carbonate, actinolite, chlorite, and biotite are often more abundant than albite, epidote, and k-feldspar, they are very widespread and too common to be used to define any clear spatial zonation. As such, alteration zonation around the Björkdal structural dome can be generally described as follows: the southern portions are dominated by significant K-feldspar assemblages, the northern portion is dominated by albite, and part of the central to north-central portion of the dome contains noticeable amounts of epidote (Figure 8-2). The genetic and chronological relationships between the gold mineralization and alteration are unclear, however, known gold mineralization has much more intensive associated silicification, particularly in areas of faulting and shearing, suggesting a close relationship between alteration intensity and gold mineralization.

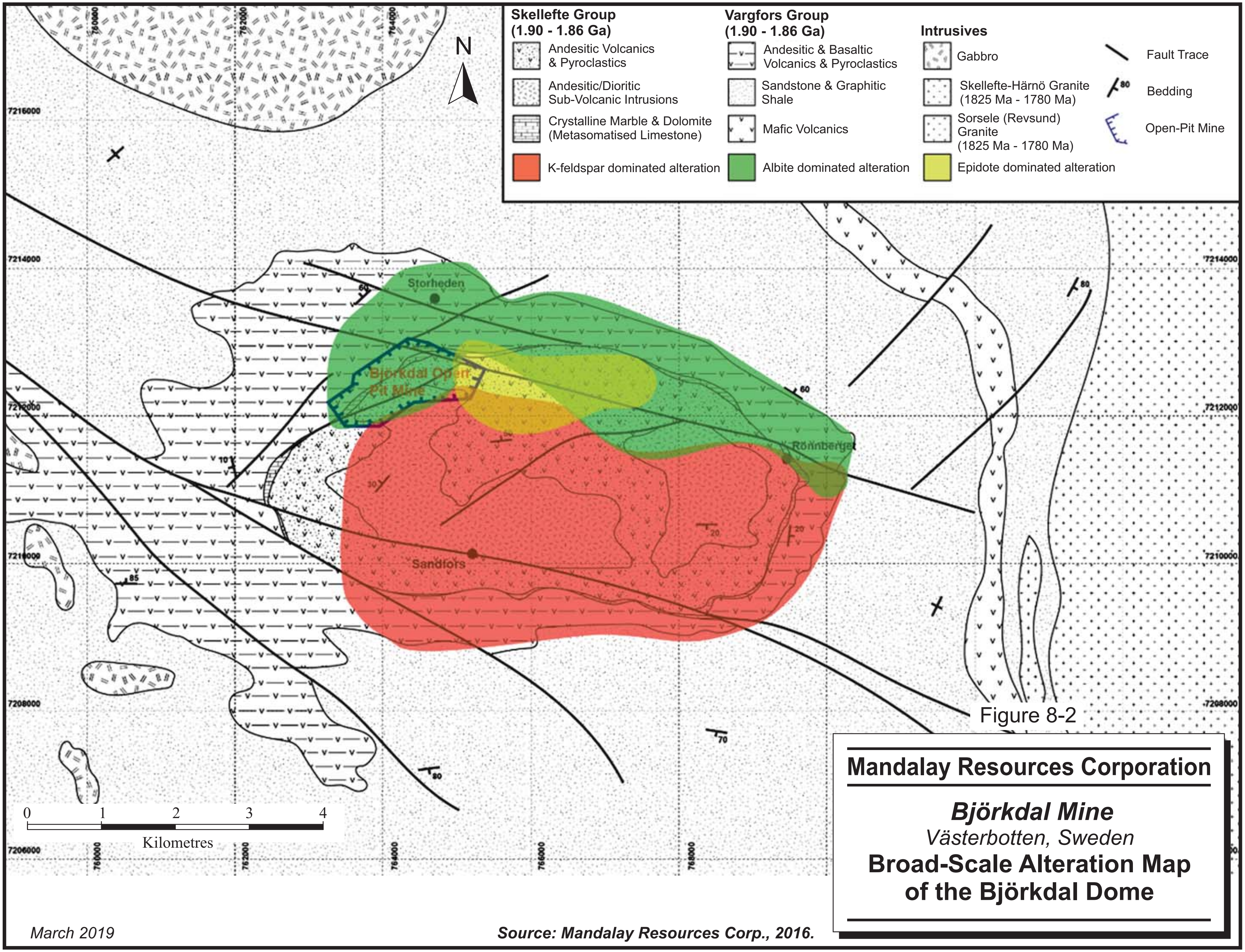


Figure 8-2

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Broad-Scale Alteration Map of the Björkdal Dome

March 2019

Source: Mandalay Resources Corp., 2016.

Alteration at Björkdal typically consists of silicification and albitization of the wall rock that extend up to one metre from the vein walls. Areas of intense silicification and albitization are observed to have completely recrystallized the wall rock in some cases. Disseminated actinolite, chlorite, sericite, and pyrite, with rarer occurrences of epidote, pyroxene, garnet, and sphene occur within these vein wall alteration halos.

In areas of the Mine where the most intense alteration is in contact with the Björkdal marble unit, strong skarnification occurs. This skarnified marble unit consists of silica, chlorite, amphibole, actinolite, hornblende, pyroxene, and clinopyroxene. Gold mineralization in these areas is related with silica-pyrrhotite-actinolite clotted disseminations of 1 cm to 2 cm diameters.

MINERALOGY

The main type of mineralization found in the Björkdal gold system is dominated by vertical to sub-vertical dipping quartz-filled veins. Common accessory minerals contained within these veins are (in approximate order of occurrence): tourmaline, calcite, biotite, pyrite, pyrrhotite, actinolite, scheelite, chalcopyrite, bismuth-tellurides (pilsenite and tsumoite), gold, and electrum. Gold mineralization is most closely related to the bismuth-telluride minerals, and is also more reliably encountered in veins with high abundances of pyrrhotite, pyrite, scheelite, and/or chalcopyrite. In general, veins of pure quartz and free of the accessory minerals listed above are generally quite poor hosts for significant quantities of gold mineralization. As such, the informal terminology of “clean veins” and “dirty veins” has been adopted at the mine site in order to quickly describe vein-fill characteristics. Structural analysis of these two distinct vein-fill types from the Main Zone -325 and -340 levels suggests that the “cleaner” veins will more often strike between 030° and 040° from true north, while the “dirty”, inclusion-rich veins are more likely to strike between 050° and 090° from true north. This structural-geochemical relationship suggests that vein development in the Björkdal deposit occurred as more than a single “vein-forming” event, and that the fluids responsible for the vein-fill and mineralization were evolving with time.

NORRBERGET

STRUCTURAL DEVELOPMENT OF MINERALIZATION

The major controls on the mineralization at Norrberget include the large scale shear zone that marks the base of the marble unit, the rheological differences between different stratigraphic units, the variation in the lithological and porosity of the volcanic package, and the development of the fluid system which utilized the shear zone.

These large scale shear zones run extensively through the area along the base of the marble unit which extends beyond the Björkdal Mine and across Norrberget. The mineralization occurs principally within a package of heterogeneous volcaniclastics containing interbedded ash falls, flows, and tuffs which have varying composition along with differing porosity and rheological characteristics.

Where the Norrberget volcaniclastics are not sheared, they are packaged conformably between metasedimentary rocks and mafic volcanic rocks above and medium grained subvolcanic intrusions and volcanic rocks below.

ALTERATION

The fluid system is believed to have utilized the shear contact at the base of the marble. A strongly silicified unit sits on top of the volcaniclastics which themselves are sheared throughout with a pervasive amphibole-albite-silica+carbonate alteration assemblage. The contact between the silicified and amphibole altered packages is gradual over a short distance. Lower in the package, K-feldspar/hematite and epidote can be observed, however, the underlying volcanic/subvolcanic rocks are not sheared to the same extent.

The evolution of the fluid system is believed to have first formed a pervasive silica-biotite+actinolite alteration which took advantage of the porous groundmass of the unaltered volcaniclastic package. The variable grain size and large angular fragments observed in drill core of the units below the lower marble contact resulted in a higher porosity and therefore a more substantial level of silicification. When additional shearing along with albite and actinolite alteration fluids were present at a later stage, the more robust silicified units were subjected to less shearing and alteration. This later stage of actinolite and albite alteration (where gold forms along their contacts) occurred primarily within the upper package of interbedded volcaniclastic rocks and crystalline tuffs, which is immediately below the upper pervasively silicified unit. The steeper quartz-amphibole veins, some of which contain gold and associated minerals, utilized the same association as the mineralized altered bands.

VEINING

Although not as prevalent as at Björkdal, quartz veining occurs across Norrberget. A significant proportion of the veins occur in a similar orientation to the altered bands with quartz patches being associated with the alteration banding indicating that these are syngenetic to the alteration. A separate set of quartz veins can be observed to cross-cut the predominant fabric at a steeper dip between 65° and 85°, although with variable directions. A small proportion of these can be identified as being gold-bearing with a limited selection containing very high grades. The high grade veins do not appear to have similar orientation to one another. The mineralogy of these steeper veins is similar to the shallower veins indicating that they were formed in the latter stages of the same fluid system.

MINERALIZATION

The mineralization at Norrberget is stratabound within an interbedded altered volcaniclastic package that sits unconformably below a 30 m to 40 m thick marble unit. Gold mineralization has been observed up to 50 m below this contact. Gold mineralization is principally hosted in an amphibole-albite banded alteration and is also common where volcaniclastics are interbedded with crystalline tuff units. Theses alteration bands vary between one centimetre and 50 cm in thickness, are typically fine to medium grained, and appear to be sheared. Trace sulphides and minor quartz/carbonate are associated with the bands.

Gold is also associated with the amphibole veinlets with the mafic crystalline tuff associated with carbonate and minor sulphides. Lesser amounts of gold can also be found within the heavily silicified volcaniclastics where minor amphibole is observed. Where visible gold can be identified within alteration banding, it is observed to be between or on the contact of grains.

Although veining is common, gold mineralization is rarely associated with the quartz veins. Visible gold has been identified in veins consisting of grey fractured quartz along with amphibole, carbonate, silver, minor chalcopyrite, pyrrhotite, and galena. Veins consisting of quartz, carbonate, and albite with euhedral amphibole crystals can also carry gold mineralization, however, the gold grade is not consistent along them. These veins can be intermixed and individual veins can continue for up to 50 m.

9 EXPLORATION

BJÖRKDAL

RPA reviewed the historical exploration work and found that pre-Mandalay work programs were not well documented. In general, it would appear that no significant regional exploration had taken place since the original Terra Mining ownership (ca. 1983-1999). Since the previously filed resource estimations (year-end 2017 for both underground and open pit targets), Mandalay has conducted both underground and surface diamond-core and reverse circulation (RC) drilling, both within and near the active production areas, in addition to regional prospects.

Geophysical studies have also been carried out in order to identify the "geophysical fingerprint" of Björkdal-style mineralization with the ultimate aim of developing exploration targets beneath the significant till cover that blankets the majority of the Björkdal property. Geological mapping has also been conducted on the limited surface exposure of bedrock over the property, in addition to compiling and assessing all known and relevant documentation and results from various exploration efforts by several past owners of the Mine and the surrounding exploration permits held by Mandalay through Björkdalsgruvan (and its subsidiary, Björkdal Exploration).

UNDERGROUND EXPLORATION

For the period of January 2015 to September 2018, Mandalay drilled a total of approximately 103,097 m of exploration diamond-core drilling from underground stations at the Björkdal Mine. This drilling has most recently focused on the eastward strike-extension of known vein systems (mostly in the Main, Central, and Lake Zones). The drilling has also focused to the north with the goal of searching for new vein systems (Lake Zone North) that may lie proximal to the underground mine in order to estimate Inferred and Indicated Mineral Resources. The drilling programs employed an initial broader spaced drilling density that is sufficient to classify the newly discovered mineralization into the Inferred Mineral Resource category. Subsequent in-fill drilling was then carried out in order upgrade the mineralization classification into the Indicated Mineral Resource category.

SURFACE EXPLORATION

For the period of January 2015 to September 2018, Mandalay has drilled a total of approximately 21,614 m of exploration diamond-core drilling and 81,609 m of exploration RC drilling from surface-based setups at the Björkdal Mine. Similar to the underground exploration strategy, the surface drilling was prioritized around the margins of the current open pit mine in order to estimate Inferred and Indicated Mineral Resources in the near-mine environment and for grade control purposes. The majority of this drilling took place in the vicinity of the Quartz-Mountain, East Pit, and Nylund areas.

NORRBERGET

The Norrberget area was extensively drilled from 1994 to 1996 by COGEMA before interest in the prospect declined under subsequent owners. After the area was purchased by Gold-Ore in 2007, some sporadic drilling campaigns were undertaken without significant discovery.

After Mandalay acquired Elgin, a program of re-logging and reassaying the existing core from the prospect was undertaken. This resulted in renewed interest in the area and in 2016, a 2,542 m diamond-core drilling program confirmed the historical results and extended the limits of mineralization. A 1,400 m RC drill program in-filled and further extended the resource down-dip in 2017.

REGIONAL EXPLORATION

During the summer months of 2015, 2,492 m of diamond-core drilling was completed around the greater Björkdal region in order to test a number of geochemical and structural targets. Significant mineralization was intersected in two drill holes, DDE2015-001 and DDE2015-008, in the Storheden and Morbacken areas respectively (Figure 9-1).

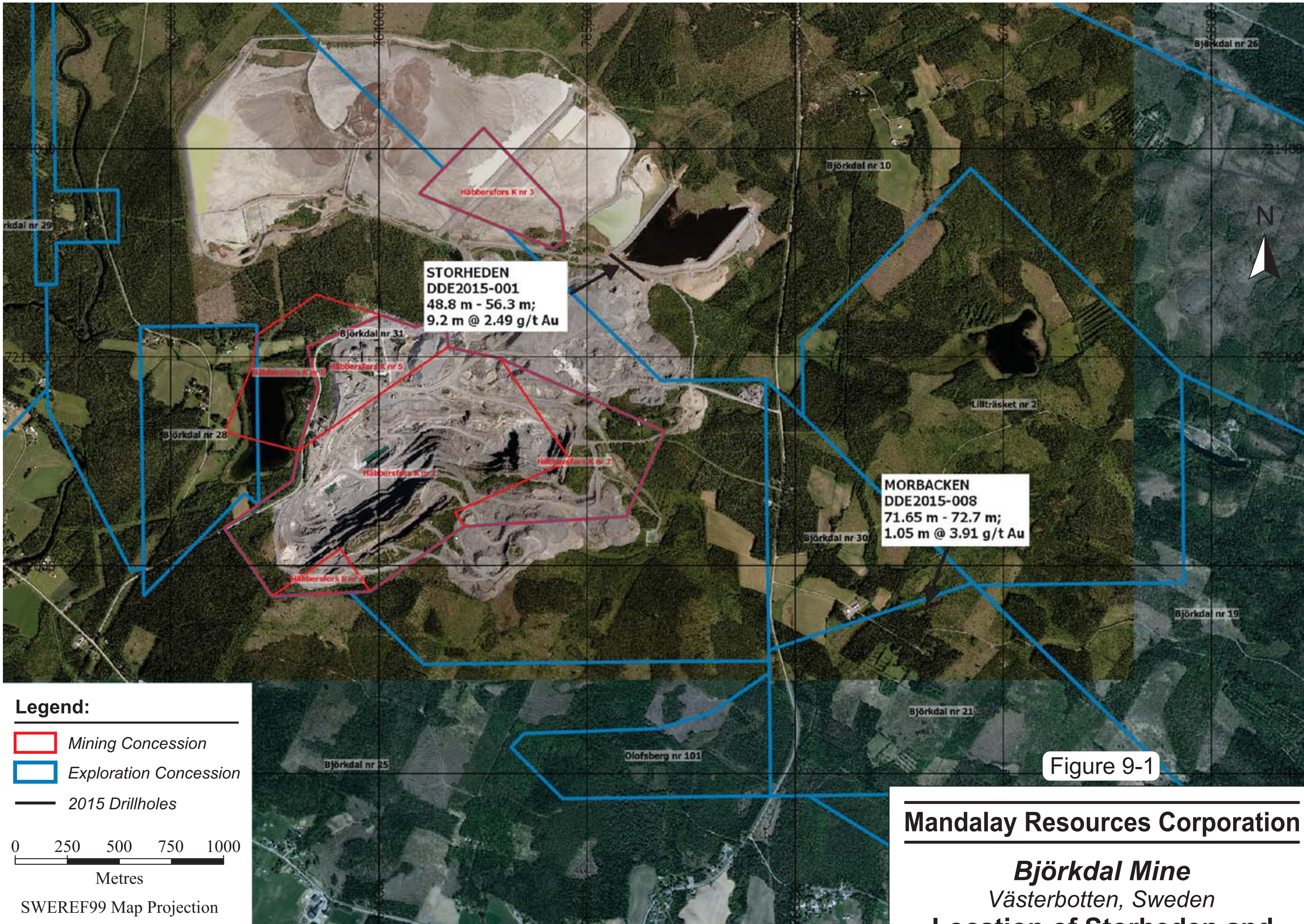


Figure 9-1

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Location of Storheden and Morbacken Discovery Areas

March 2019

Source: Mandalay Resources Corp., 2017.

The potential of Storheden area was further tested with 2,136 m of diamond-core drilling and 1,408 m of RC in 2016 and 2017. These drilling programs have confirmed the existence of a mineralized system of shear hosted quartz veins extending below the current site of the TMF.

Target generation completed in 2015 and 2016 consisted of geophysical surveys and re-interpretation of existing geophysical magnetic and electric surveys. These surveys ranged from regional scale airborne surveys to high resolution downhole electric logging and had the objective to establish some geophysical characteristics indicative of mineralized rock systems in the greater Björkdal exploration land package. It has been established that areas of significant mineralization have detectable effects on both magnetic (ground magnetics) and electrical (chargeability) properties of the host geology. As such, these surveys are being incorporated with geochemical and structural geological data with the objective to identify highly prospective ground. The targets that have been generated will be prioritized and then systematically tested in the immediate future.

In 2017, ground magnetic surveys and till sampling programs were expanded across high potential areas within the tenement package. High resolution outcrop mapping and sampling was also carried out to further develop the macro-scale understanding of the property's potential.

In 2018, two small scale (~5 km^2) ground magnetic surveys were carried out in highly prospective areas within the tenement package. Outcrop mapping and sampling was also carried out in the northern region of the tenement package in order to build upon the continuously growing regional geological model.

EXPLORATION POTENTIAL

In RPA's opinion, the geological setting and terrains of the Björkdal area present excellent exploration potential, as a number of targets have already been identified within a five kilometre radius of the mining operation. The deposit models currently being formulated and tested by Mandalay geologists are proving successful, with near-mine exploration efforts being well rewarded of late. To date, the lateral limits of the Björkdal deposit have not been reached, with mineralization remaining open to the north, east, and west of the current mine.

Although the existing underground development layout is not ideally suited to target the various geometries of mineralized systems at Björkdal, the efficiency of exploration drilling is high, as several economic targets can be intersected in a single drill hole. Once potential in-mine targets are identified, suitable drill platforms should be designed that can be developed from existing and planned footwall access systems.

There is high likelihood of further discoveries being made in the Björkdal area, as much of the held ground remains either unexplored or under-explored.

10 DRILLING

BJÖRKDAL

Drilling has been carried out on a periodic basis as exploration and development progressed at the Mine. The Mineral Resource drill hole database cut-off date was September 30, 2018. All holes completed before September 2014 were drilled by previous owners.

HISTORICAL DRILLING

1986 TO 2004

It is reported that during the period between 1986 and 2004, a total of 1,148 holes were completed at Björkdal (Table 10-1).

TABLE 10-1 HISTORICAL DRILL HOLE TYPE SUMMARY
Mandalay Resources Corporation – Björkdal Mine

Drill Hole Type	Number of Drill Holes
Direct Circulation	343
Diamond Drill Hole	128
Reverse Circulation	677
Total	**1,148**

An additional 6,110 historical direct circulation (DC) grade control holes were also drilled for mine planning purposes in the open pit. However, problems were identified with downhole sampling and grade contamination issues in these drill holes. Consequently, these holes have not been used in subsequent Mineral Resource estimates.

2006 TO 2014

In March 2006, Gold-Ore collared a portal for the Eastern Tunnel at Björkdal. The tunnel was designed to provide access for diamond drill rigs to test for the along-strike extension of the orebody mined in the open pit (northern extension). Drilling from the surface was considered a less attractive option as it required drilling through several hundred metres of country rock until the mineralized zones were intersected. The underground excavation also provided access for mapping, bulk sampling, and some feed for the processing plant.

Underground diamond drilling for exploration, development, and grade control was essentially continuously carried out from 2006 to 2014 (Table 10-2). RC drilling was initiated in the open pit in 2010 for grade control purposes.

TABLE 10-2 SUMMARY OF DRILLING FROM 2006 TO 2014
Mandalay Resources Corporation – Björkdal Mine

		Underground		Open Pit	
Year	**Drill Hole Type**	**Number of Drill Holes**	**Metres (m)**	**Number of Drill Holes**	**Metres (m)**
2006	Core	91	7,954	-	-
2007	Core	109	10,454	19	3,303
2008	Core	40	2,577	-	-
2009	Core	43	5,892	9	469
2010	Core	30	5,112	37	2,756
	RC	-	-	76	2,978
2011	Core	52	10,271	15	1,325
	RC	-	-	127	3,862
2012	Core	48	8,490	34	4,685
	RC	-	-	258	9,904
2013	Core	42	9,178	14	1,631
	Core (In-fill)	43	2,812	-	-
	RC	-	-	317	10,006
2014	Core	43	9,218	-	-
	Core (In-fill)	23	2,308	-	-
	RC	-	-	225	6,982
	Core	14	3,864	3	622
Total		**578**	**78,130**	**1,134**	**48,523**

MANDALAY 2014-2018 DRILLING

A summary of the drilling programs performed by Mandalay from September 2014 to September 2018 is provided in Table 10-3. The location of the drill holes completed at the Björkdal Mine in 2018 are shown in Figure 10-1.

TABLE 10-3 SUMMARY OF DRILLING COMPLETED FROM 2014 TO 2018
Mandalay Resources Corporation – Björkdal Mine

Year	Drill Hole Type	Underground Number of Drill Holes	Underground Metres (m)	Open Pit Number of Drill Holes	Open Pit Metres (m)
2014	Core (In-fill)	19	1,614		
	RC			65	2,103
	Core	12	3,302	5	632
2015	Core (In-fill)	150	11,880		
	RC			439	13,959
	Core	58	14,151	56	9,145
2016	Core (In-fill)	280	32,252		
	RC			558	28,468
	Core			14	4,087
2017	Core (In-fill)	211	23,839		
	RC			597	24,924
	Core			13	2,377
2018*	Core (In-fill)	164	20,974		
	RC			383	14,290
	Core			37	5,904
Total		**894**	**108,012**	**2,167**	**105,889**

Note * 2018 drilling includes drill holes completed to September 30, 2018.

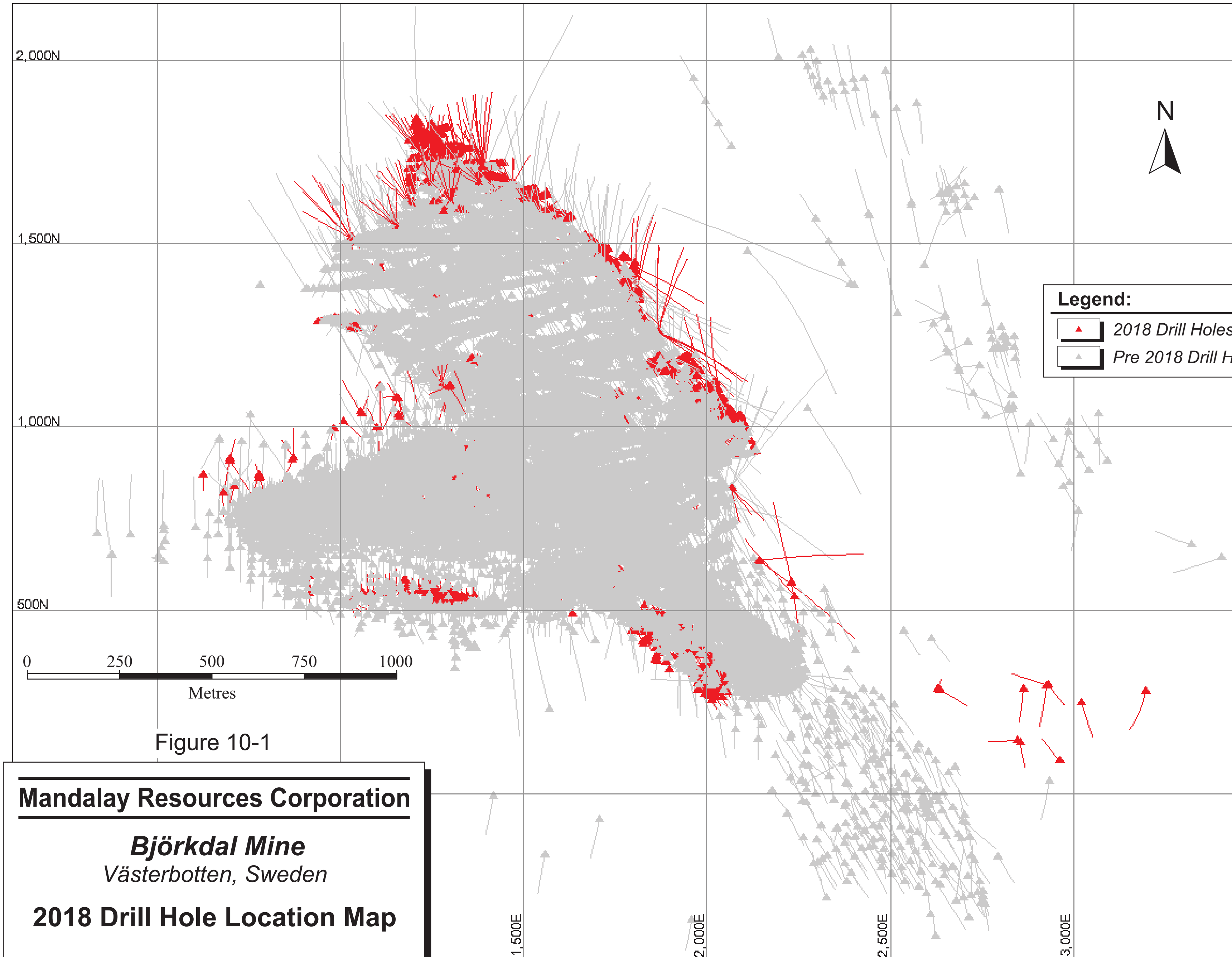


Figure 10-1

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

2018 Drill Hole Location Map

March 2019

Source: RPA, 2019.

One of the goals of the drilling completed in 2018 was to follow up on some encouraging drill hole intersections that were returned from drilling completed in 2017 on a newly discovered mineralized zone that is located along the northern, down-plunge continuation of the mineralized veins exploited by the underground mine. The details from this newly discovered zone (referred to as the Aurora Zone) were disclosed in Mandalay (2018). The drill hole information available at the time suggested that the zone extends along a strike length of approximately 250 m and has been outlined over a distance of approximately 150 m vertically. A summary of the significant intersections returned from the Aurora Zone is provided in Table 10-4.

TABLE 10-4 SUMMARY OF SIGNIFICANT INTERSECTIONS, AURORA ZONE
Mandalay Resources Corporation – Björkdal Mine

Hole ID	Core Length (m)	True Width (m)	Au (g/t)
DOD2017-065	10.41	9.14	1.13
DOD2017-067	7.85	6.25	1.05
DOD2017-071	14.85	13.22	1.61
DOD2017-072	8.93	6.92	0.92
DOD2017-073	13.20	7.96	1.76
DOD2018-057	10.30	8.12	1.38
DOD2018-058	16.78	14.67	0.52
DOD2018-059	17.33	15.19	2.75
DOD2018-060	6.70	5.60	0.30
DOD2018-061	10.83	8.68	0.60
DOD2018-062	13.39	8.64	7.10
DOD2018-063	6.74	5.32	1.22
DOD2018-064	8.70	6.62	2.10
DOD2018-065	7.53	6.43	0.57
DOD2018-066	6.84	5.11	1.51
DOD2018-067	5.47	4.27	0.51
DOD2018-068	7.25	6.37	0.36
DOD2018-076	8.56	7.42	0.94
DOD2018-077	5.90	5.22	2.56
DOD2018-078	9.75	8.02	1.28
DOD2018-088	12.86	7.40	0.99
DOD2018-090	10.18	7.60	1.68
DOD2018-091	16.56	11.98	1.95
DOD2018-092	16.24	11.63	2.61
DOD2018-093	20.20	15.26	1.08
DOD2018-094	16.68	13.73	0.90
DOD2018-095	24.59	18.03	0.43
DOD2018-110	14.05	9.69	0.31

Hole ID	Core Length (m)	True Width (m)	Au (g/t)
DOD2018-111	10.67	7.63	1.33
DOD2018-112	12.40	8.29	0.64
DOD2018-113	9.50	7.19	4.31
DOD2018-120	17.72	14.10	2.68
DOD2018-121	11.60	10.68	1.82
DOD2018-122	8.60	8.26	3.82
DOD2018-123	11.50	11.46	4.97
DOD2018-124	11.30	11.08	0.94
DOD2018-169	7.05	4.90	9.04
MU6-037	17.89	13.59	0.75
MU7-028	19.15	17.04	1.71
MU7-029	21.55	15.16	1.51
MU7-030	15.24	9.18	6.18
MU8-001	19.50	15.32	3.07
MU8-002	19.50	16.42	1.33
MU8-003	8.15	7.23	0.98
MU8-004	17.86	14.20	0.97
MU8-005	16.10	14.67	0.53
MU8-033	15.69	14.96	2.70
MU8-035	16.04	8.35	1.70
MU8-036	6.97	4.58	5.86
MU8-037	6.34	4.29	9.21
MU8-038	3.60	3.49	3.87
MU8-039	4.80	4.50	3.97
MU8-040	2.42	1.42	1.91
MU8-041	4.70	2.63	12.51

DIAMOND DRILLING

All underground exploration drilling since September 2014 has been conducted with wireline diamond-core drilling methods by experienced Swedish drilling contractors Protek Norr AB and Styrud Arctic AB. Drilling has been carried out with dedicated underground exploration drill rigs in the Hagby series WL66 and WL76 sizes (50.5 mm and 57.5 mm diameter core, respectively). All drill holes are surveyed with modern computerized gyroscopic tools at hole completion, while also being regularly check-surveyed for unexpected deviation as the drilling progresses using modern multi-shot “camera” downhole tools. Core orientation tools are used on all holes in order for geologists to measure the orientation of all geological structures identified. Contractors work two shifts per day (nine hour shift), seven days per week and average approximately 1,000 m per month.

Surface exploration since September 2014 has been carried out with wireline diamond-core drilling methods by experienced Swedish and Finnish drilling contractors Styrud Arctic AB, Katie OY, and Arctic Drilling Company OY and experienced international drilling operator Mason & St John; based in the UK. Various drilling equipment sizes have been used depending on project needs and are as follows: WL66 (50.5 mm core diameter), NQ2 (50.7 mm core diameter), and WL76 (57.5 mm core diameter). All drill holes are surveyed with modern computerized gyroscopic tools at hole completion, while also being regularly check-surveyed for unexpected deviation as the drilling progresses using modern multi-shot "camera" downhole tools. Core orientation tools are used on all holes in order for geologists to measure the orientation of all geological structures identified. Contractors work two shifts per day (12 hour shift), seven days per week and average approximately 1,200 m per month. Drill holes that are collared in unconsolidated materials (i.e., soil and till) are cased with traditional methods with either Boart Longyear, or Hagby series casing rods and bits.

Due to the degree of silicification and alteration of the deposit and regional geology, rock quality is generally excellent, reflected in core recovery values generally in excess of 95%.

Production and development optimization holes are primarily drilled with Mandalay-owned and operated drill rigs and drilling staff, although contractors have been used at times when extra capacity is required (Styrud Arctic AB and Protek Norr AB). Starting in 2013, in-fill underground diamond drilling programs using WL46 drill string (28.8 mm diameter core) were implemented, the rig has been decommissioned as of May 2018. In March 2016, an Atlas Copco model Diamec U4 data rig was purchased. The rig is operated by three drillers working single shifts using a WL56/39 drill string (39.0 mm diameter core). They work seven days a week, producing 25 m per shift. In December 2018, a fourth shift was added to this rig. This rig is primarily used for development optimization.

All drilling is designed and supervised by Mandalay/Björkdalsgruvan geologists. Drill hole layouts are designed with the aid of Surpac 3D software.

REVERSE CIRCULATION DRILLING

Exploration RC drilling was undertaken during the summer of 2016 in order to quickly provide in-fill information for the Nylunds surface deposit. The drilling was undertaken by an experienced international drilling operator Mason & St John based in the UK, and local Swedish drilling contractors Styrud Arctic AB. Drilling was undertaken with a multi-purpose drilling rig equipped with 5.5 in. RC diameter bit on 6 m rods (Mason and St John) and 5.5 in. RC diameter bit on 3 m rods (Styrud Arctic AB). Holes are surveyed at completion with modern computerized gyroscopic tools. Samples are taken every one metre of drilling where they are split directly out of the cyclone in a riffle-splitter. Two samples are collected; one is sent directly to the laboratory for analysis while the other is sieved and washed in order for geological logging to take place. A booster compressor is used on deeper holes (150 m + hole depth) to maintain dry samples when water ingress increases with depth, or water bearing fracture networks are intercepted. Drilling is conducted in either one or two shifts per day, seven days per week where up to 100 m of drilling is possible per shift.

RC drilling has been utilized for grade control in the open pit since 2010 to define the gold bearing quartz veins which can vary in scale from one centimetre to greater than one metre. The standard drill pattern is approximately a 7.5 m by 15 m by 18 m grid where holes are planned to intersect perpendicular to the quartz vein orientation. The number of planned drill holes also depends upon the location of historical drill holes. In the western part of the mine, holes are drilled 0°/180° (mine grid) with a dip of -40° and in the eastern part, 330°/150° with a dip of -40°. This is due to the general orientation of mineralized zones (quartz veins) in these respective areas of the surface deposit. Each grade control hole generally covers three or four benches, or approximately 20 m vertical depth for a 32 m long hole. Longer holes (up to 70 m long) are occasionally drilled in order to condemn areas by confirming that they are barren of gold mineralization. These longer holes are surveyed at hole completion in order to ascertain their deviations.

Drilling is performed by drill contractors Styrud Arctic AB utilizing 5 in. RC diameter bit on 3 m rods. Drill cuttings are sampled every one metre via a cyclone. RC drilling is performed year-round. RPA recommends that Björkdal geologists also record any water intersections encountered during RC drilling operations.

All RC drill holes are planned by Mandalay/Björkdal geologists using Surpac 3D software.

UNDERGROUND CHIP SAMPLING

Each on-vein development (OVD) face has been mapped, photographed, and sampled since 2015. The geologists first mark up the area to be sampled with spray paint. The sampler then uses a hammer and bucket to collect representative samples from shoulder to knee height and across the entire face. While this methodology does not strictly follow a channel sample line, it may in fact better represent the variability within the mineralized zone.

After the sample is taken, the sample number is recorded on the face map, together with the date and name of the OVD. The sample is then placed into a plastic sample bag and closed with a sample tag inside. The bucket is either washed out if water is available or replaced with a clean one, in order to conduct the next sample. A standard and blank is inserted every 50^{th} sample.

The samples are delivered by the sampler directly to the on-site laboratory facility located next to the core processing facility.

The chip sample location paint marks are later surveyed by the mine surveyors. Samples are entered into an Excel spreadsheet to calculate a final grade for the cut taken and later into an Access database using GeoSpark.

UNDERGROUND SLUDGE SAMPLING

Sludge sampling of the development drill hole cuttings (approximately 70 holes) is carried out for every round of the OVD. Sludge samples are not used for Mineral Resource estimation but are used to assist in stope design, production grade estimates, and reconciliation exercises.

After a round is drilled off, the sampler draws a line, and using a pick axe, alongside the drilled face, fills about half a bucket with the collected material (approximately 7 kg). To be as representative as possible, the sample is collected throughout the height of the sludge pileover. The sample is taken approximately one metre away from the drilled face. When rounds are drilled at +17% gradient, the drill cuttings usually flow away from the face, and when rounds are drilled at a -17% gradient, the drill cuttings flow towards the face. On such occasions, the sampler seeks to find the place where the drill cuttings are "constant" all the way from side to side. Rocks greater than five centimetres in diameter are removed before the cuttings are put in the bucket.

After the sample is taken, the bucket number is recorded, together with the date and name of the drive, on a patch in the bucket. The bucket is transported up from the underground by the sampler and taken to the on-site laboratory.

While the underground sludge sampling is generally not useful due to reliability of the sample collection and assaying, the results do in fact appear to highlight high grade gold domains.

SURVEYS

SURVEY GRIDS

The coordinate system used at Björkdal is the Mine Grid. The Mine Grid is rotated 29.67° west of true north. The 0 RL elevation was based upon the highest point in the vicinity of the Mine ("Quartz Mountain"), an area which is now mined out.

DIAMOND DRILLING

Currently, all diamond drill hole collars are surveyed. Downhole surveys are also carried out to record hole azimuth and dip of holes. Exploration drill holes are orientated and single shot surveyed with EZ Shot as they are being drilled, while also surveyed every three metres with a Gyro Smart downhole surveying tool.

Prior to 2010, only limited numbers of drill holes were downhole surveyed using a Maxibor instrument. As of 2015, downhole surveys are carried out using a Gyro Smart tool surveying every three metres upon completion of the hole.

REVERSE CIRCULATION DRILLING

All RC drill hole collars are surveyed. No downhole surveys are taken for grade control holes less than 70 m in length. All exploration drill holes are surveyed along their full length on completion of drilling.

The open pit grade control technician uses spray paint as well as wooden sticks to mark planned hole locations. The technician adjusts the X and Y positions as there will be differences in planned Z-coordinate and actual ground level. To ensure the correct azimuth, a marked wooden stick is placed approximately seven metres in front of the collar.

Upon completion of drilling, the technician measures the collar and direction of the drill hole with a Trimble TSC3. Unannounced visits are randomly performed during drilling operations to ensure that the dip and azimuth of the drill hole is correct. The azimuth is measured with total station and the reported measured deviations have not been greater than ±1°.

UNDERGROUND CHIP SAMPLING

All underground channel chip samples are based on surveyed points in relation to the Mine Grid. The Mine Geologist paints up sample locations. The chip sample locations are then turned into "drill holes" using a collar location and calculated azimuth, dip, and length.

Underground surveying is also used to map the trace of vein contacts along the face and back of the sill drifts. This data is incorporated in geological mapping and vein wireframing.

NORRBERGET

Drilling at Norrberget has been carried out across three distinct periods in line with the priorities of the previous holders of the exploration concessions. The Mineral Resource drill hole database cut-off date was September 30, 2017. All holes completed before September 2014 were drilled by previous owners.

HISTORICAL DRILLING

1994-1996 DRILLING

The Norrberget deposit was first drilled by COGEMA in 1994 as part of a program investigating the margins of the Björkdal dome and assess the potential for further significant gold deposits in the area. Further diamond drilling campaigns were carried out in 1995 and 1996 to define and extend the potential resource in this area (Table 10-5).

TABLE 10-5 SUMMARY OF HISTORICAL DRILLING COMPLETED FROM 1994 TO 1996 – NORRBERGET DEPOSIT
Mandalay Resources Corporation – Björkdal Mine

Year	Drill Hole Type	Number of Drill Holes	Metres
1994	Core	16	3,324
1995	Core	32	4,480
1996	Core	35	3,333
Total		**83**	**11,137**

2009-2014 DRILLING

A hiatus in drilling occurred while the exploration concessions were under the ownership of NAN, no significant work was carried out on the deposit between 1997 and 2009. After the regional tenement package was purchased by Gold-Ore, there was renewed interest in the area surrounding Björkdal. Several small diamond drilling campaigns were carried out at

Norrberget and the immediate surrounds by Gold-Ore and their successors Elgin between 2009 and 2014 (Table 10-6).

TABLE 10-6 SUMMARY OF HISTORICAL DRILLING COMPLETED FROM 2009 TO 2014 – NORRBERGET DEPOSIT
Mandalay Resources Corporation – Björkdal Mine

Year	Drill Hole Type	Number of Drill Holes	Metres
2009	Core	11	1,028
2010	Core	1	200
2011	Core	6	1,391
2014	Core	6	1,757
Total		**24**	**4,376**

MANDALAY 2015-2017 DRILLING

After the 2014 acquisition of the property by Mandalay, much of the core from previous drilling campaigns was re-logged and reassayed to confirm the accuracy of historical results and test the geological model for the area. In 2016, a diamond drilling program was undertaken to confirm the historical drilling and extend the resource. A small RC drilling campaign took place in the summer of 2017 to in-fill the known mineralization.

A summary of the drilling programs performed by Mandalay from 2015 to September 2017 is provided in Table 10-7.

TABLE 10-7 SUMMARY OF MANDALAY DRILLING COMPLETED FROM 2016 TO 2017 – NORRBERGET DEPOSIT
Mandalay Resources Corporation – Björkdal Mine

Year	Drill Hole Type	Open Pit Number of Drill Holes	Metres
2016	Core	24	2,542
2017	RC	12	1,400
Total		**36**	**3,942**

DIAMOND DRILLING

Diamond drilling at Norrberget since 2016 has been carried out with wireline diamond-core drilling methods by experienced Finnish drilling contractors Oy Kati AB. Drilling equipment has been appropriate to produce core to the WL76 (57.5 mm core diameter) standard. All drill holes are surveyed with modern computerized gyroscopic tools at hole completion, while also being regularly check-surveyed for unexpected deviation as the drilling progresses using modern multi-shot "camera" downhole tools. Core orientation tools are used on all holes in order for geologists to measure the orientation of all geological structures identified. Contractors work two shifts per day (12 hour shift), seven days per week and average approximately 1,200 m per month. Drill holes that are collared in unconsolidated materials (i.e., soil and till) are cased with traditional methods with either Boart-Longyear, or Hagby series casing rods and bits.

All drilling is designed and supervised by Mandalay/Björkdal geologists. Drill hole layouts are designed with the aid of Surpac 3D software.

REVERSE CIRCULATION DRILLING

Exploration RC drilling was undertaken at Norrberget during the summer of 2017 in order to quickly provide in-fill information for the deposit. The drilling was undertaken by an experienced international drilling operator, Mason & St John, based in the UK. Drilling was undertaken with a multi-purpose drilling rig equipped with 5.5 in. RC diameter bit on 6 m rods. Holes are surveyed at completion with modern computerized gyroscopic tools. Samples are taken every one metre of drilling where they are split directly out of the cyclone in a riffle-splitter. Two samples are collected; one is sent directly to the laboratory for analysis while the other is sieved and washed in order for geological logging to take place. A booster compressor is used on deeper holes (150 m + hole depth) to maintain dry samples when water ingress increases with depth, or water bearing fracture networks are intercepted. Drilling is conducted in either one or two shifts per day, seven days per week where up to 100 m of drilling is possible per shift.

All RC drill holes are planned by Mandalay/Björkdal geologists using Surpac 3D software.

SURVEYS

SURVEY GRIDS

The coordinate system used at Norrberget is SWEREF99.

DIAMOND DRILLING

Currently, all diamond drill hole collars are surveyed. Downhole surveys are also carried out to record hole azimuth and dip of holes. Exploration drill holes are orientated and single shot surveyed with EZ Shot as they are being drilled, while also surveyed every three metres with a Gyro Smart downhole surveying tool.

Prior to 2010, only limited numbers of drill holes were downhole surveyed using a Maxibor instrument. From 2015 onwards, downhole surveys were carried out using a Gyro Smart tool surveying every three metres upon completion of the hole.

REVERSE CIRCULATION DRILLING

All RC drill hole collars are surveyed. All holes are surveyed along the full length of hole, at completion with modern computerized gyroscopic tools.

11 SAMPLE PREPARATION, ANALYSES AND SECURITY

Samples from Björkdal and Norrberget were prepared and analyzed at ALS Minerals, an independent, ISO-accredited laboratory located in Piteå, Sweden, and on-site at Björkdal. Samples were also analyzed by CRS Minlab Oy (CRS), an independent, ISO 9001:2008 certified laboratory located in Kempele, Finland. Whole core samples and RC samples were sent directly to the laboratories for sample preparation and assaying. Assaying was conducted utilizing the PAL1000 and LeachWELL process. Quality assurance and quality control (QA/QC) included the use of standard reference samples, blanks, duplicates, repeats, and internal laboratory quality assurance procedures. Underground chip and sludge samples were collected by geological technicians and delivered directly to the on-site laboratory. The on-site laboratory with a PAL1000 unit was established in June 2016 and was run by CRS until April 2018. Since April 2018, the on-site laboratory has been run by ALS Minerals. The mine sludge samples have not been used for the Mineral Resource estimation.

Mandalay procedures and standards are applied to both Björkdal and Norrberget sample preparation, analyses, and security.

DIAMOND DRILL CORE SAMPLING

The standard Björkdal procedure is for diamond drill rig personnel to place the recovered drill core into wooden trays labelled at the drill site with the drill hole number and metreage values. End-of-run metreage markers are placed in the core tray between the end and start of each recovered drill run. For underground drilling, the core trays are placed on a pallet containing up to 24 boxes, strapped, and then brought up to surface where they are delivered to the Björkdal on-site core processing facility. During surface drilling operations, the core is delivered each day to the Björkdal on-site core processing facility by the drilling company.

Upon receipt, the boxes are sorted out sequentially by hole number and the core is oriented in the box. Then the core is cleaned with fresh water and measured to check metreages. Any discrepancies are reported back to the drill foreman for confirmation.

The geologist generally logs twelve boxes at a time. The core is visually inspected, logged for rock quality designation (RQD), structure, lithology, alteration and sampling, where samples are separated and bounded by geological contact such as lithological, alteration and veining contacts. Criteria for sampling include:

- All veins (for example, quartz, carbonate, sulphides, tourmaline, calc-silicates, etc.). Sampling intervals of either side of veined material are taken based on geology, and are between 0.15 m and 1.0 m in length.
- Lithological and alteration contacts.
- All faults.
- Highly fractured or altered segments, and other interesting areas (abundant sulphides).

Core logging data captured is entered directly into a local GeoSpark database. Geological data collected includes:

Lithology:

- rock code grain size, foliation, texture name and texture intensity fields, and general description

Alteration:

- types and degree of alteration

Veining:

- only for quartz veins ≥ 5 cm in width including comments of visible minerals observed (i.e., sulphides, visible gold, tourmaline, etc.) as well as the number of veins in the interval. For veins less than 5 cm in width, this information is captured by an entry in the structural table using a zero width.

Structures:

- type of structure (for example, bedding, foliation, fault, vein, etc.)
- measuring data from oriented core

Geotechnical:

- Calculation of RQD for a maximum length of six metres

After every table of boxes is logged, digital photos of wet drill core are taken. These are saved to and stored on the Björkdal file server.

Sample tags are placed and stapled in the boxes before taking a photograph to make sure they do not move before sampling. The minimum sample length varies from 15 cm for WL66 and NQ2 core to 30 cm for WL46 (drill rig decommissioned in 2018) and WL 56 core to ensure reasonable minimum sample weights. The maximum sample length is 1.2 m.

A geological technician samples the whole core (unless the drill core is WL76 in which case it is halved and then sampled), carefully breaking the core with a hammer at the sample locations. The samples are placed into plastic bags with a sample tag and sample number written on each bag with a permanent marker pen. The plastic bags are twisted closed and sealed with a zip tie. The sample is then placed into a wooden palletized box which contains a Fabrene bailer bag for transport to a laboratory.

The Björkdal analytical quality control program includes blanks and standards. Protocol calls for blanks to be inserted in the sample stream at a rate of approximately one in 20 samples and after every sample containing visible gold. Blank material is obtained from a dimension stone outlet (Granitti Natursten AB of Piteå, Sweden) that sourced the rock from a granite quarry in Finland. A 500 g blank sample is used. Björkdal inserts 100 g certified reference material (CRM) samples at a rate of one in a 20 sample batch. Björkdal purchased the bulk CRMs from Geostats Pty Ltd, Western Australia. The geological technician weighs and bags CRM at the sample preparation laboratory (SPL). The blanks and CRMs are inserted into the bailer bags stream prior to shipment. Once full, the bailer bag is tied shut with security tags, and the pallet receives a timber lid, and thick plastic is then draped and stapled shut over the top of the box in order to protect it from the elements during loading and transport.

DIAMOND DRILL CORE SAMPLE PREPARATION AND ANALYSIS

The majority of the samples have been assayed by CRS, which represents Activation Laboratories Ltd. (Actlabs) in Scandinavia under the name of Actlabs Finland. CRS is an ISO 9001:2008 certified company with an internal quality management system. Actlabs, founded in 1987, is an ISO 17025 accredited laboratory company, which has 30 different laboratories in 14 countries. CRS' main laboratory is located in Kempele, Finland, directly east of Björkdal across the Baltic Sea (or approximately 410 miles by road). The samples are shipped to CRS by Savikko Oy, a Finnish trucking company.

In April 2018, ALS Minerals took over the on-site laboratory in Björkdal from CRS. The laboratory mainly analyses grade control samples such as chip samples and sludge samples, but also RC samples and drill core samples from development optimisation drilling.

SAMPLE PREPARATION

CRS PROCEDURES

- Drying of wet samples in drying ovens.
- Weighing (received weight) and listing preparation of received samples.
- Crushing of samples until >80% < 2 mm. The crusher is cleaned with pressurized air after every sample and run through with blank stones between batches.
- Splitting to 500 g subsample with rotating sample divider for PAL1000. The sampler divider is cleaned with pressurized air between every sample. There are two duplicate split samples in a PAL1000 run.

ALS PROCEDURES

ALS Piteå and ALS Björkdal are accredited laboratories in accordance with the International Standard ISO/IEC 17025:2005. The ALS sample preparation facility in Piteå and Björkdal has internal standard procedures and quality controls for sample preparation in place to ensure that samples are prepared in compliance with industry standards. The laboratory also has a digital Laboratory Management Information System (LIMS).

The sample preparation procedures carried out on Björkdal's diamond drill core samples at the Piteå facility consisted of the following:

- Logging each sample upon arrival in the LIMS system and attaching a bar code label.
- Drying of wet samples in drying ovens.
- Fine crushing of samples to better than 70% of the sample passing two millimetres.
- Splitting sample using rotary splitter.
- Pulverizing a sample split of up to 1,500 g to better than 85% of the sample passing 75 µm.

The sample preparation procedures carried out on Björkdal's diamond drill core samples at the Björkdal facility consisted of the following:

- Logging each sample upon arrival in the LIMS system and attaching a bar code label.
- Drying of excessively wet samples in drying ovens.

- Fine crushing of samples to better than 70% of the sample passing two millimetres.
- Splitting to 500 g subsample using rotary splitter.

The ALS Piteå sample preparation flowchart is shown in Figure 11-1.

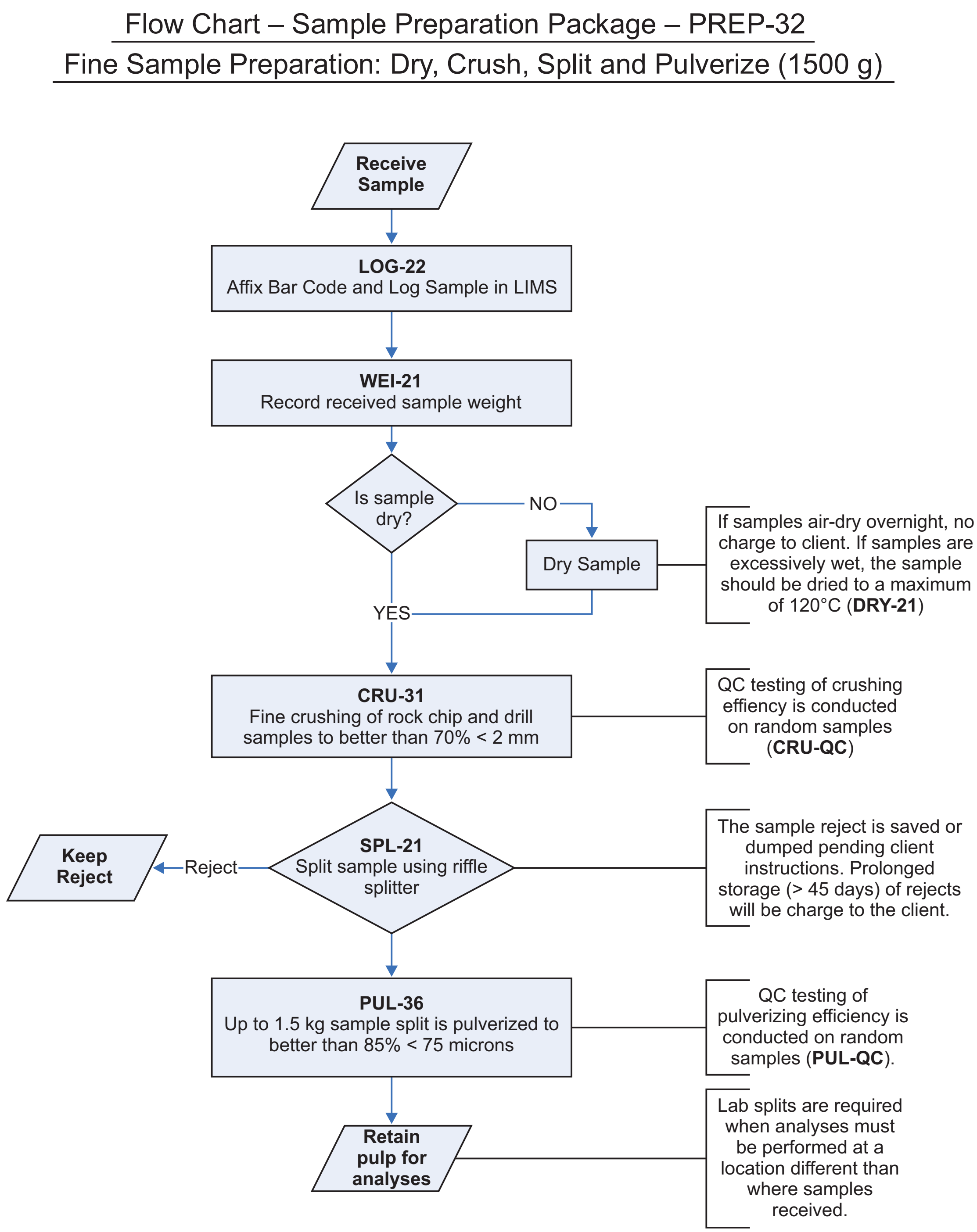


Figure 11-1

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

ALS Minerals
Sample Preparation Flowchart

March 2019

Source: ALS Minerals, 2015.

SAMPLE ANALYSIS

ALS

Some resource definition drill core is analyzed at ALS Piteå by ALS procedure code Au-AA15 consisting of gold analysis by accelerated cyanide leach using LeachWELL Assay Tabs with an atomic absorption spectroscopy (AAS) finish. The analysis method has a lower limit of 0.01 g/t Au and an upper limit of 300 g/t Au.

The ALS process for cyanide extractable gold using the LeachWELL accelerant includes:

- A 500 g pulverized sample is weighed into a reaction vessel (plastic lidded bottle).
- One litre of water, hydrated lime, and a LeachWELL 60x/cyanide mixture are added.
- The container is sealed and rolled for a minimum of two hours.
- The vessel is subsequently left to stand for one to two hours before a 10 mL aliquot of the supernatant liquid is analyzed by AAS.

ALS reports that the plastic bottles are cleaned after every use. The test tubes are only used one time. A photograph of the ALS Piteå LeachWELL laboratory is shown in Figure 11-2.

CRS

Most drill core is analyzed at the CRS laboratory in Kempele, Finland using PAL1000 with an AAS finish. The analysis method has a lower limit of 0.05 g/t Au and an upper limit of 300 g/t Au, or a lower limit of 0.01 g/t Au if the Di-isobutyl Ketone (DiKB) extraction method is employed on the residue sample in order to extract all possible gold from the sample (usual method for exploration drill-core). The PAL1000 machine contains 52 steel pots, each having the maximum capacity of 1,000 g sample, 1,000 mL water, and grinding media (steel balls). Samples are completely pulverized (typically to better than 90% < 75 µm) and simultaneously leached with cyanide. The solution is analyzed for gold by AAS (Figure 11-3).

Figure 11-2

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

ALS Pietå LeachWELL Assay Laboratory

March 2019

Source: Björkdal Mine, 2015.

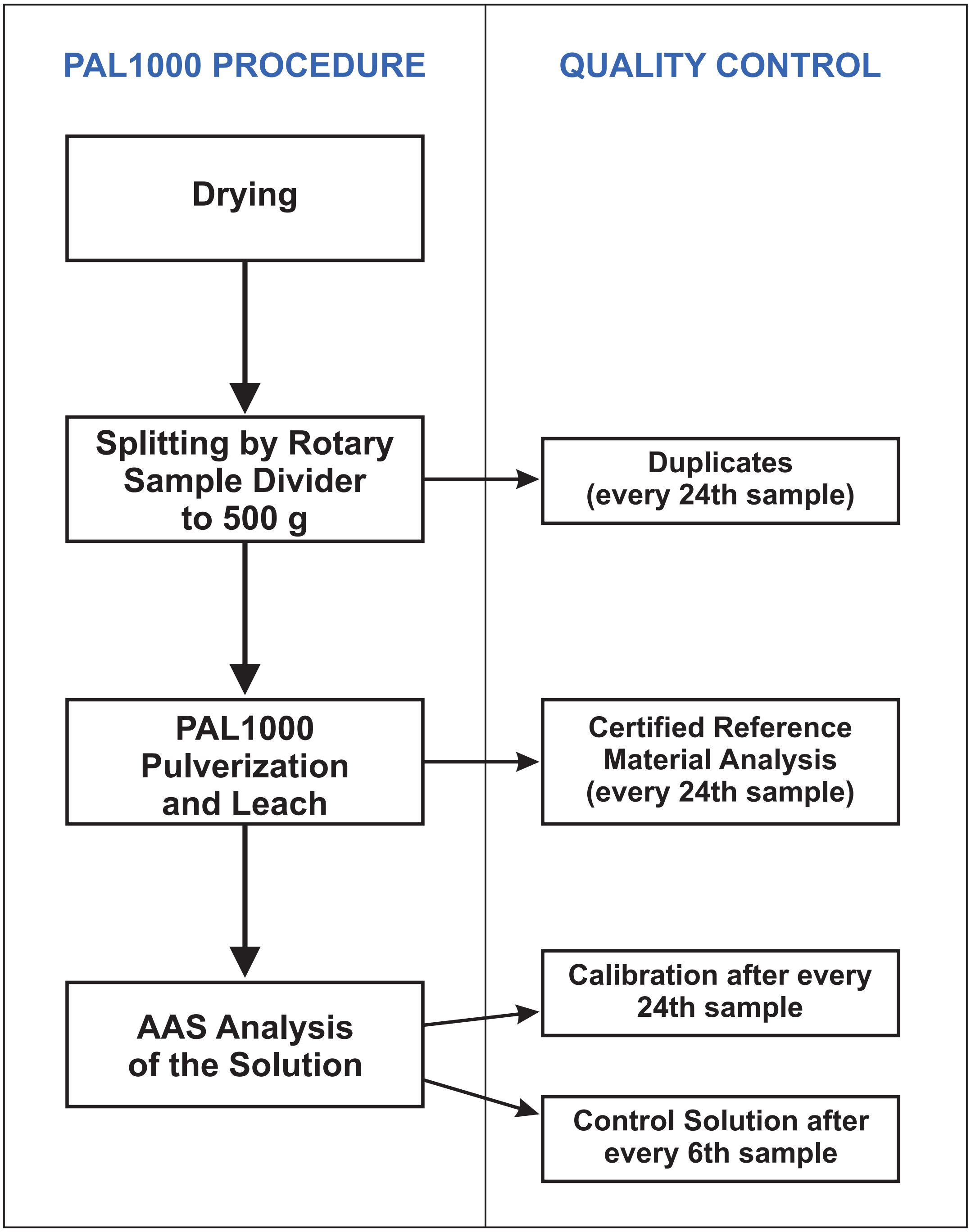


Figure 11-3

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

CRS Sample Preparation Flowchart

March 2019

Source: CRS, 2015.

Check assaying is done to evaluate the level of precision, accuracy, and analytical errors that may be present at the primary assay laboratory. The CRS laboratory sends a subsample every 50th sample to the secondary certified reference laboratory Actlabs based in Ancaster, Ontario. There a 50 g sample is analyzed with fire assay (FA) with an AAS or gravimetric finish.

Samples are reanalyzed if the results of the quality control for a batch are deemed unsatisfactory (i.e., more than three standard deviations from the expected value).

REVERSE CIRCULATION SAMPLE PREPARATION AND ANALYSIS

SAMPLE PREPARATION

Exploration RC drilling consists of 5.5 in. diameter RC holes that are sampled every metre. Drill cuttings are dropped out of the cyclone though a large riffle splitter at the completion of a one metre drilling interval. Two samples are collected, one sample of approximately three to four kilograms in a single calico bag, and a further sample of 20 kg or more collected in a large green nylon bag. Both bags have sample numbers written on them, and a ticket number is placed inside each bag. The calico bag samples are placed within a boxed pallet for transport directly to the laboratory, while the larger nylon bags are neatly placed in an ordered row for later chip sampling from a site geologist. These chips are sieved, washed, and placed in chip-trays for later lithological, alteration, and mineralogy (i.e., quartz, carbonate, sulphide, etc.) logging. Data from logging is entered directly into the GeoSpark database program. Standards and blanks are alternately inserted approximately every 20 samples into small sealed plastic bags, and then within numbered calico bags (with their corresponding numbered sample tag) and inserted among the samples that are placed within the boxed pallet.

RC grade control drilling in the open pit consists of five inch diameter holes with one metre samples on approximately 15 m spacing with 7.5 m in-fill spacing where possible. Drill cuttings are divided by a rotary splitter and collected in calico bags and a sample tag is added after removal from the drilling rig. The amount of sample collected is approximately three to four kilograms. The drillers then take a further sample, sieve it so the fine content is removed, and place it in an RC Lithology Sample Tray. The RC chips are then logged in the same way as the exploration RC samples.

Samples that are placed in a large boxed pallet are transported to the on-site laboratory. At the on-site laboratory, the RC samples are poured on a metal tray and dried at 90°C until the samples are dry (approximately 24 hours). The samples are then placed in numbered plastic bags. The blanks and CRMs are inserted into the bailer bags prior to shipment at a rate of one standard and one blank sample for each hole. Once full, the bailer bag is secured with a security zip tie.

SAMPLE ANALYSIS

Historically, RC samples were sent to ALS Piteå for LeachWELL assaying. In 2014, Björkdal sent a limited number of RC samples to the Svartliden Mine Laboratory (Svartliden), located approximately 200 km west of Björkdal. RC samples are currently assayed at the on-site laboratory run by ALS or at the CRS laboratories in Kempele, Finland with PAL1000.

The PAL1000 machine contains 52 steel pots, each having the maximum capacity of 1,000 g sample, 1,000 mL water, and grinding media (steel balls). Samples are completely pulverized (typically to better than 90% < 75 µm) and simultaneously leached with cyanide. The solution is analyzed for gold by AAS. Assay limits are 0.05 g/t Au to 300 g/t Au.

Check assaying is done to evaluate the level of precision, accuracy, and analytical errors that may be present at the primary assay laboratory. CRS laboratory sends a subsample every 50^{th} sample to a secondary certified reference laboratory Actlabs based in Ancaster, Ontario. There, a 50 g sample is analyzed with FA with an AAS or gravimetric finish.

Samples are reanalyzed if the results of the quality control for a batch is deemed unsatisfactory (i.e., more than three standard deviations from the expected value). All RC rejects are stored for one year after all assays have been received, checked, and inserted into the master database (GeoSpark Source) by the database geologist. After one year, 90% of the rejects are discarded.

All RC data is reviewed and then stored in the secure network GeoSpark drill hole database system. RPA recommends that standard protocols and written procedures for QA/QC review be implemented by a designated Database Manager.

CHIP AND SLUDGE SAMPLE PREPARATION PROCEDURES

CHIP SAMPLE PREPARATION

The in-mine chip samples are prepared and analyzed at the on-site ALS laboratory. Chip samples are generally approximately five kilograms in weight and are poured onto a tray and dried at 100°C until the sample is dry (approximately three hours). The entire sample is then crushed in a jaw crusher until 70% of the material is less than two millimetres. The jaw crusher is cleaned with blank stones and pressurized air after every sample. The sample is then split into a 500 g subsample with a rotary splitter and the leftover amount of sample is archived. The rotary splitter is cleaned with pressurized air after every sample. The samples are placed into numbered plastic bags and moved over to the laboratory.

SLUDGE SAMPLE PREPARATION

The in-mine sludge samples are prepared and analyzed at the on-site ALS laboratory. The collected drill cutting sample is poured on a tray and dried at 100°C until the sample is dry (approximately six hours).

The sample is split into a 500 g subsample with a rotary splitter and the left over sample is archived. The rotary splitter bins are cleaned with compressed air after each sample. Samples are then placed into numbered plastic bags and moved over to the laboratory.

CHIP AND SLUDGE SAMPLE ANALYSIS

Assaying of the in-mine chip and sludge samples are conducted at ALS's on-site laboratory using the PAL1000. Samples are completely pulverized (typically to better than 90% < 75 µm) and simultaneously leached with cyanide. The solution is analyzed for gold by AAS. Assay limits are 0.05 g/t Au to 300 g/t Au.

Check assaying is done to evaluate the level of precision, accuracy, and analytical errors that may be present at the primary assay laboratory.

Samples are reanalyzed if the results of the quality control for a batch are deemed unsatisfactory (i.e., more than three standard deviations from the expected value). The samples are assayed using PAL1000 cyanide leaching and the jars are cleaned with quartz sand and water after every run. Two CRMs, two duplicates, and a blank sample are inserted in every run.

The following standard procedures are undertaken for mine chip and sludge samples at the ALS on-site laboratory:

1. The 500 g sample is placed in a numbered plastic sample bag.
2. The sample is inserted into the PAL1000 machine jars together with a cyanide pill and 500 mL of water.
3. The jars are sealed and machine is run for 1.5 hours.
4. 10 mL of fluid is extracted from the jars with an auto-pipette into a numbered single-use test-tube in a rack. The tip on the autopipette is changed regularly and always cleaned with water.
5. The rack with the test-tubes is moved to the AAS-machine.
6. Analysis of the solution is performed by AAS.

Blank tests are run daily throughout the process in order to rule out the possibility of contamination in any of the various analysis steps. The AAS analysis is calibrated before each measurement with standard solutions containing known gold grades. Once all the QA/QC has passed and the assays have been reported, the PAL machine is thoroughly cleaned with water.

QUALITY ASSURANCE AND QUALITY CONTROL

No QA/QC data is available for historical drilling prior to 2004. RC drilling for grade control purposes carried out from 2006 to 2013 and assayed at ALS did not include any QA/QC insertions into the sample stream. From 2013 to 2014, standard and blank samples were inserted into the sample stream with one blank and one standard sample inserted per RC drill hole. In 2014, RC samples were sent to the uncertified CRS and Svartliden laboratories.

A full description of the details and results of the QA/QC programs carried out prior to Mandalay's acquisition of the Björkdal Mine in 2014 can be found in RPA (2015).

Following Mandalay's acquisition of the Björkdal Mine in 2014, the QA/QC protocols were updated to include the regular insertion of blanks and multiple standards within each 20 sample batch. A blank sample was also inserted after every sample containing visible gold. External check assaying is carried out at the Actlabs facility located in Ancaster, Ontario using a conventional FA method. All samples collected from the regional exploration programs, the underground and near-mine surface-based exploration programs, and the grade control sampling during 2015 and January to September 2016 were included in the QA/QC program. A summary of the QA/QC samples taken from 2015 to October 31, 2018 is provided in Table 11-1.

TABLE 11-1 SUMMARY OF QA/QC SAMPLING
Mandalay Resources Corporation – Björkdal Mine

Year	Blanks	Standards	Other	Total
2015	105	464		569
2016	1,732	2,359	233	4,324
2017	1,768	2,357	222	4,347
2018	1,454	2,052	243	3,749

Mandalay manages the results of the QA/QC program by compiling all of the results from the blank samples and CRMs into an Excel spreadsheet where the grades of the sample in question are compared to the second and third standard deviation results.

Starting in 2016, control charts are also prepared by the laboratory on a routine basis during the normal course reporting of the analytical results from the LeachWELL assays. As the LeachWELL process reports the recovered portion of the gold within any given sample, a comparison of the LeachWELL results with the stated recommended value of a CRM is not valid. Rather, the control charts for the CRMs are slightly modified to report and compare the recoveries of a sample to the certified standard. The results from the blank samples are graphically presented using conventional scatter plots. RPA examined the results of the CRM and blank samples processed in 2018 and found no material issues.

Examination of the results from a program of duplicate sample analysis where the precision of the analytical method is examined by means of two assays from the same pulp sample is not possible in this case, as the entire one kilogram of pulverized material is submitted to the LeachWELL analytical method. Consequently, no pulp material remains from which to extract a second sample for duplicate analysis.

SECURITY

The Björkdal mine site has not experienced any major security issues. Access to the open pit and underground is restricted to authorized personnel in mine or contractor vehicles.

Björkdal drill and mine samples, as well as Norrberget exploration samples, are transported from the site to the Björkdal on-site core logging and sample preparation facility, which is located within a secure area. All diamond drill core is logged into laptop versions of GeoSpark. The stand-alone logging laptop computers are typically backed up on a daily basis. The GeoSpark database is located on the Björkdal server, with daily backups and access restrictions based on user level.

Only persons permitted by Björkdal are allowed to handle the samples, and measures are in place to limit and deny the access by persons not considered to be authorized.

Commercial freight companies are used to transport the samples to the appropriate independent sampling and assaying laboratories. Sample shipment lists are emailed to the assay laboratory.

DISCUSSION AND RECOMMENDATIONS

In RPA's opinion, the sample preparation, analysis, and security procedures at Björkdal and Norrberget are adequate for use in the estimation of Mineral Resources.

Björkdal utilizes the PAL1000, or LeachWELL, cyanide leach assaying technique for all samples. RPA agrees that PAL1000 is suitable on large samples (>500 g) for deposits with coarse or particulate gold and, in Björkdal's case, should provide a reduction in sampling errors over FA techniques. RPA notes that PAL1000 assays report cyanide recoverable gold, and not necessarily total gold.

In RPA's opinion, the QA/QC program as designed and implemented by Mandalay is adequate and the assay results within the database are suitable for use in a Mineral Resource estimate.

In 2016 and 2017, Mandalay undertook a program of collecting field duplicate samples and assaying both samples to extinction. This program has highlighted that variability is present both within a single sample and between field duplicates.

RPA recommends that Mandalay consider the preparation of a two kilogram pulp from the coarse reject material at a frequency of approximately one sample in 50, to permit a review of the precision of the analytical method.

12 DATA VERIFICATION

BJÖRKDAL

RPA carried out a program of validating the assay tables in the drill hole databases by means of spot checking a selection of drill holes completed in 2018 that intersected the underground mineralized wireframe domains, and so were relevant to the current Mineral Resource estimate. RPA proceeded to carry out its drill hole database validation exercise by comparing the information contained within the assay tables of the digital database against the assays presented in the original laboratory certificates. Additional checks included a comparison of the drill hole collar locations with the digital models of the topographic surfaces and excavation models as well as a visual inspection of the downhole survey information. No material discrepancies were noted.

RPA is of the opinion that the Björkdal drill hole and chip sample data are adequate for the purposes of Mineral Resource estimation.

NORRBERGET

RPA carried out a site visit to the Norrberget site on September 24, 2017. RPA reviewed the drill program and inspected the drill rig and pad setup. No drilling was underway at Norrberget during the site visit, although active drilling was observed at Björkdal.

RPA received the Norrberget dataset in July 2017 as an Access database that contained all drilling up until the completion of the 2016 exploration program. Additional 2017 drilling was completed and appended to the drill hole database on October 4, 2017.

RPA validated the database using standard software tools to check for errors within the database. One sample (un-mineralized) was observed as having an identical From and To value. This sample was reviewed by Björkdal staff and edited to reflect the true intercept width from neighbouring samples.

RPA also compared a selection of the values within the database assay table to the original certificates.

A check was undertaken to ensure that the drill hole elevation was comparable with the digital terrain model (DTM) surface. No material discrepancies were observed.

RPA is of the opinion that the Norrberget drill hole data are adequate for the purposes of Mineral Resource estimation.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

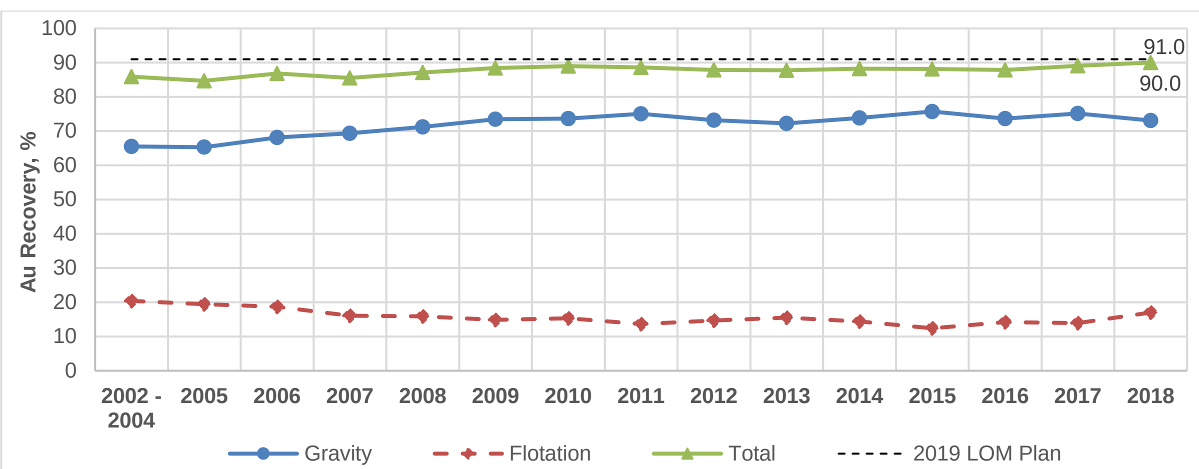
BJÖRKDAL

The mineral processing plant at Björkdal commenced operation in 1988. Since that time, it has processed approximately 31 million tonnes of ore from open pit and underground sources and produced approximately 1.4 million ounces of gold.

The original plant design was based on pilot plant data that was generated in 1987. Since then, numerous studies and metallurgical test programs have been carried out by mine staff, third party consultants, and Ph.D. students from the Mineral Engineering department at the University of Luleå. This work has included mineralogical characterization studies of the tailings, work index and abrasion index studies, and numerous internal studies on grinding/liberation/ recovery relationships.

Since the plant has been operating for an extended period of time processing ore from both the open pit and the underground mines, in RPA's opinion, the historical data provides the best estimates of the anticipated plant performance in the future. Figure 13-1 provides an overview of the plant recovery data for the gravity, flotation, and total plant recovery starting in 2002 and compares it to the estimated recovery from the life of mine (LOM) plan.

FIGURE 13-1 PLANT RECOVERY DATA 2002 TO 2018



More details about the recovery and concentrate grades for the various products are provided in Tables 13-1 through 13-5.

TABLE 13-1 GRAVITY CONCENTRATE PRODUCTION DATA
Mandalay Resources Corporation – Björkdal Mine

Year	Throughput (t)	Feed Grade (g/t Au)	Gravity Conc (kg)	Gravity Conc (kg Au)	Gravity Conc Grade (g/t Au)	Gravity Conc Recovery (% of Total Au)
2011	1,215,015	1.17	1,396	840	602,164	59.3%
2012	1,385,094	1.20	1,620	946	584,259	57.1%
2013	1,261,366	1.32	1,431	886	619,126	53.3%
2014	1,318,486	1.24	1,516	920	607,094	56.4%
2015	1,302,723	1.22	1,453	913	628,302	57.6%
2016	1,288,926	1.35	1,296	858	662,148	49.3%
2017	1,261,803	1.75	1,925	1,128	585,888	51.1%
2018	1,248,710	1.29	1,516	777	522,025	48.2%
Total	**10,282,123**		**12,125**	**7,269**	**4,811,005**	
Average	1,285,265	1.31	1,516	909	601,376	54.1%
LOM Plan	1,297,591	1.54	1,653	992	600,000	58.8%

TABLE 13-2 MIDDLING CONCENTRATE PRODUCTION DATA
Mandalay Resources Corporation – Björkdal Mine

Year	Middling Conc (kg)	Middling Conc (kg Au)	Middling Conc Grade (g/t Au)	Middling Recovery (% of Total Au)
2011	130,378	162.1	1,243	11.4%
2012	156,186	209.7	1,343	12.7%
2013	165,536	271.2	1,638	16.3%
2014	214,209	241.1	1,125	14.8%
2015	201,114	249.6	1,241	15.7%
2016	229,982	383.8	1,669	22.1%
2017	249,168	484.3	1,944	22.0%
2018	247,352	366.1	1,480	22.7%
Total	**1,593,926**	**2,368**		
Average	199,241	296.0	1,485	18.0%
LOM Plan	346,842	450.9	1,300	25.0%

TABLE 13-3 KNELSON CONCENTRATE PRODUCTION DATA
Mandalay Resources Corporation – Björkdal Mine

Year	Knelson Conc (kg)	Knelson Conc (kg Au)	Knelson Conc Grade (g/t Au)	Knelson Recovery (% Total Au)
2011	143,144	60.1	420	4.2%
2012	199,071	57.0	286	3.4%
2013	182,977	44.9	245	2.7%
2014	148,679	43.4	292	2.7%
2015	135,735	37.8	279	2.4%
2016	131,487	39.2	298	2.3%
2017	105,356	46.2	438	2.1%
2018	99,710	34.8	349	2.2%
Total	**1,146,159**	**364**		
Average	143,270	45.4	317	2.7%
LOM Plan	180,358	54.1	300	3.0%

TABLE 13-4 FLOTATION CONCENTRATE PRODUCTION DATA
Mandalay Resources Corporation – Björkdal Mine

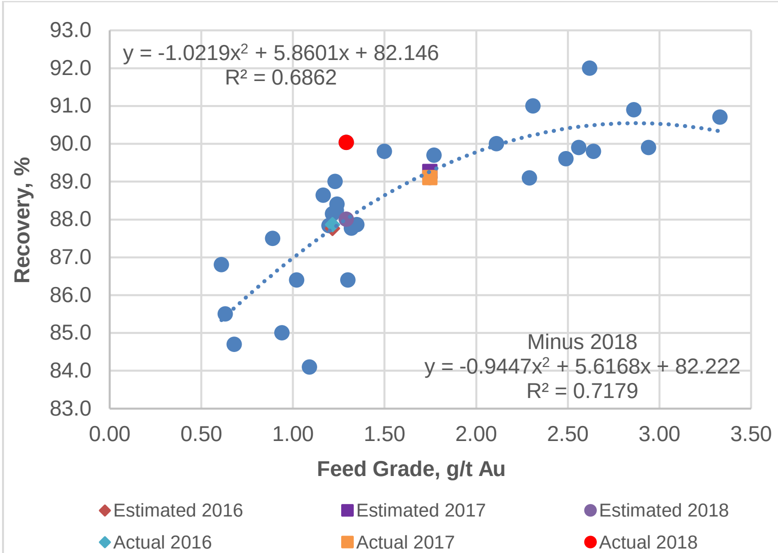
Year	Flot Conc (kg)	Flot Conc (kg Au)	Flot Conc Grade (g/t Au)	Flot Recovery (% of Au in Flot Feed)
2011	2,226,703	192.7	86.6	54.5
2012	2,374,103	242.8	102.3	54.6
2013	2,513,183	257.7	102.6	55.9
2014	2,744,565	235.1	85.7	55.1
2015	2,841,315	196.7	69.2	51.1
2016	3,175,085	247.2	77.9	53.9
2017	4,134,021	307.1	74.3	56.1
2018	4,067,108	755.8	185.8	63.0
Total	**24,076,083**	**2,436**	**101.2**	
Average	3,009,510	304.5	101.2	56.0
LOM Plan	4,088,106	306.6	75.0	60.7

TABLE 13-5 PLANT PRODUCTION DATA
Mandalay Resources Corporation – Björkdal Mine

Year	Throughput, kt	Feed Grade, g/t Au	Gravity Recovery (% of Total Au)	Flotation Recovery (% of Total Au)	Plant Recovery (% of Total Au)	Tailings (g/t Au)	Tailings (kg Au)	Production (oz Au)
2011	1,215	1.17	75.0	13.6	88.6	0.131	161	40,358
2012	1,385	1.20	73.2	14.6	87.8	0.146	202	46,808
2013	1,261	1.32	72.3	15.5	87.8	0.161	203	46,941
2014	1,318	1.24	73.8	14.4	88.2	0.145	192	46,292
2015	1,303	1.22	75.7	12.4	88.1	0.144	188	44,920
2016	1,289	1.35	73.6	14.3	87.9	0.164	211	49,140
2017	1,262	1.75	75.2	13.9	89.1	0.190	240	63,186
2018	1,249	1.29	73.1	17.0	90.0	0.129	161	46,662
Total	10,282						1,558	384,331
Average	1,285	1.31	74.0	14.5	88.4	0.151	195	48,041

A new plant project designed to increase rougher flotation retention and to install a second stage of cleaner flotation was completed in 2017. In 2018, an Expert Process Control System was installed. The projects, along with changes to reagents and improvements to the processing strategy, increased gold recovery by approximately 2%. In 2018, the average feed grade was only 1.29 g/t Au and the gold recovery was 90%, which indicates that the plant modifications were successful in increasing gold recovery. A graph demonstrating the relationship between feed grade and recovery (i.e., 1988 through 2018) is provided as Figure 13-2. The recovery estimates based on feed grade for 2016 and 2017 and using the formula generated from historical data fall squarely on the trend line, as well as the actual recoveries, but the actual recovery for 2018 is much higher than the estimate.

FIGURE 13-2 HISTORICAL PLANT GRADE-RECOVERY DATA



In evaluating the 2016 through 2018 data, in RPA's opinion, the relationship between feed grade and recovery is weak, and the equations to date do not show a strong correlation, however, there appear to be correlations between feed grade and tailings grade for the plant recovery, the gravity recovery, and the flotation recovery, as shown in Figure 13-3.

FIGURE 13-3 2016-2018 PLANT GRADE TAILINGS GRADE RELATIONSHIPS

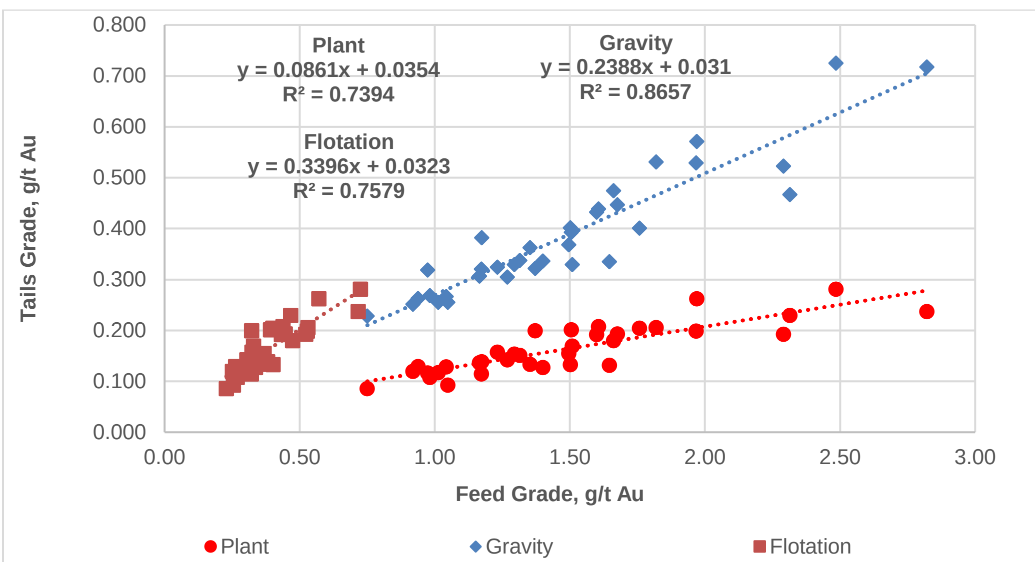


Figure 3-4 provides the monthly tonnages and feed grades for 2016, 2017, and 2018.

FIGURE 13-4 2016-2018 OPERATING DATA

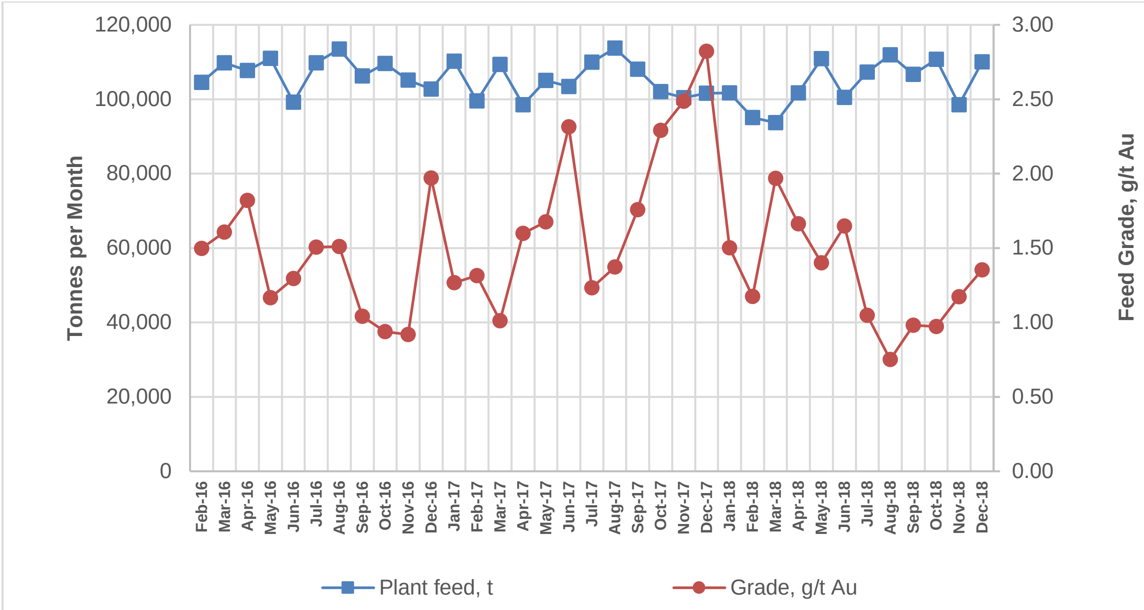


Figure 13-5 compares the 2018 recoveries for the various products with the 2019 LOM budget. Based on this data, the budgeted recovery should be possible.

FIGURE 13-5 2018 GOLD RECOVERY DATA

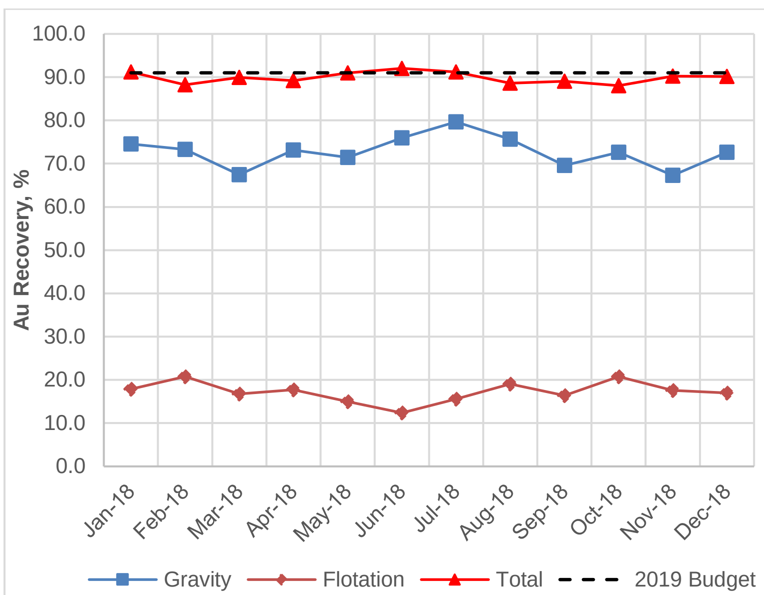
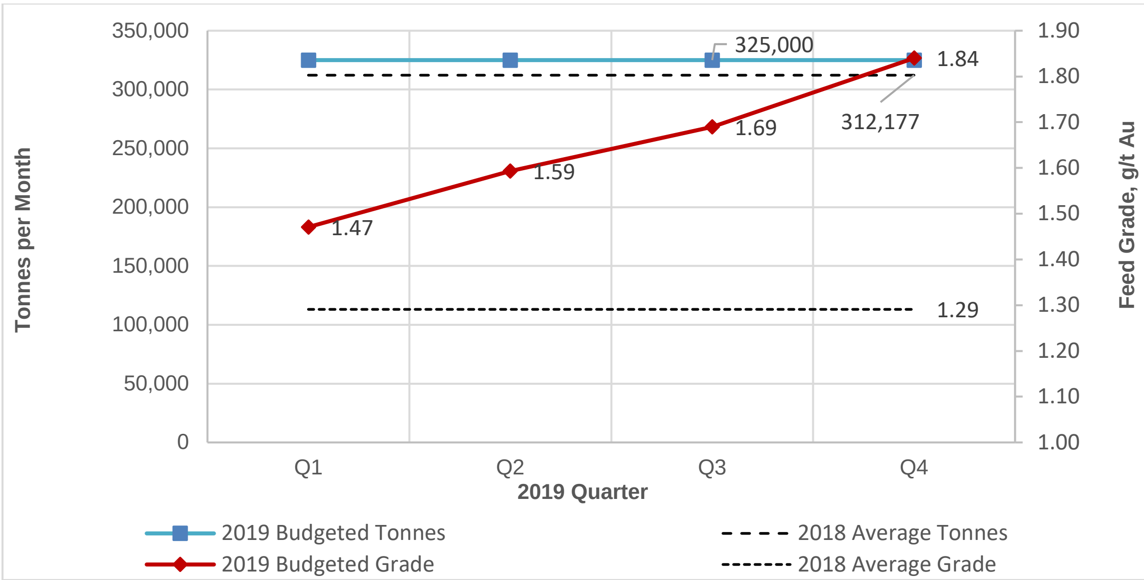


Figure 13-6 compares the 2019 budget to the 2018 averages for tonnage and grade. The average budgeted tonnage for 2019 is approximately 325,000 tonnes per quarter compared to an average of 312,177 in 2018. The average budgeted head grade in 2018 is 1.65 g/t Au compared to an average of 1.29 in 2018.

FIGURE 13-6 2019 BUDGET COMPARED TO 2018 AVERAGES



RPA makes the following observations based on the historical data:

- The gravity concentrate, middling concentrate, and Knelson concentrates grades used in the LOM plan appear to be similar to historical operating data.
- The budgeted tonnages and recoveries for 2019 appear to be reasonable based on historical operating data.

Since no significant change in ore types is anticipated in the future, RPA is of the opinion that utilizing historical data to predict future performance in the processing plant is appropriate and that the historical ore types and operating data are representative of the anticipated future performance.

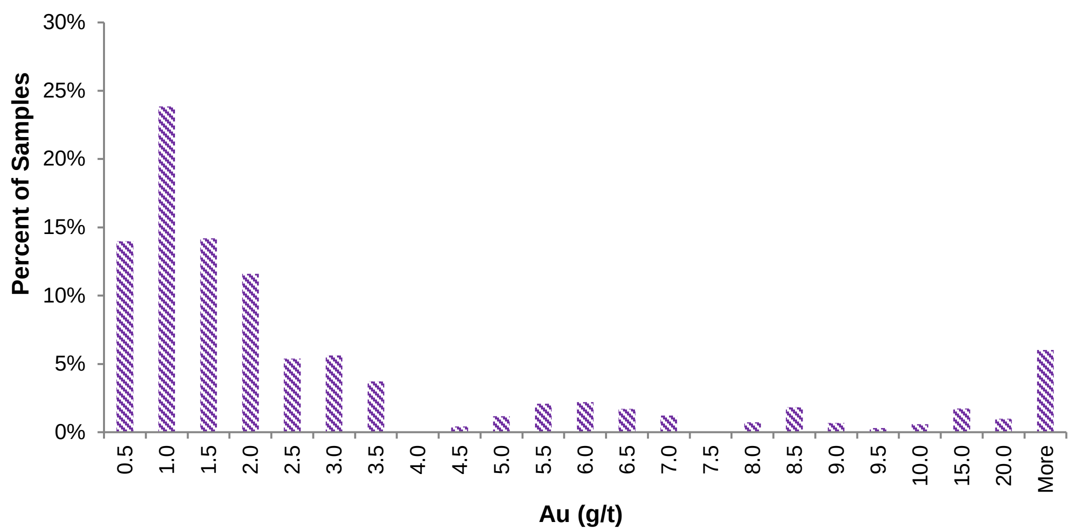
RPA is not aware of any processing factors or deleterious elements that could have a significant effect on economic extraction.

NORRBERGET METALURGICAL TEST PROGRAM

ALS Kamloops was commissioned in September 2017 to conduct a pre-feasibility level metallurgical testing program to support the Norrberget Mineral Resource and Mineral Reserve estimates for this Technical Report.

During the September 2017 site visit, RPA selected samples to complete the testing program using available quarter drill core. It was hoped that additional sample material would be available from the RC holes that were being drilled at the time of the site visit, however, upon review of the drill hole locations, it was determined that they fell outside of the areas that are expected to be mined. RPA selected material for three samples based on the grade distribution of the assay data base for samples above the cut-off grade, as shown in Figure 13-7, however, some of the material was below the cut-off grade because the intervals of lower grade material were small and it is anticipated that it will be mined since it is surrounded by higher grade material.

FIGURE 13-7 NORRBERGET DEPOSIT GRADE DISTRIBUTION DATA



The samples selected included a Master Composite sample that was estimated to be approximately the average grade of the deposit (i.e., 2.0 g/t Au), a Low Grade sample that was estimated to be near the cut-off grade for the Mineral Resource (i.e., 0.5 g/t Au), and a High Grade sample that was estimated to be approximately 5.0 g/t Au.

The locations of the drill holes are shown in Figure 13-8.

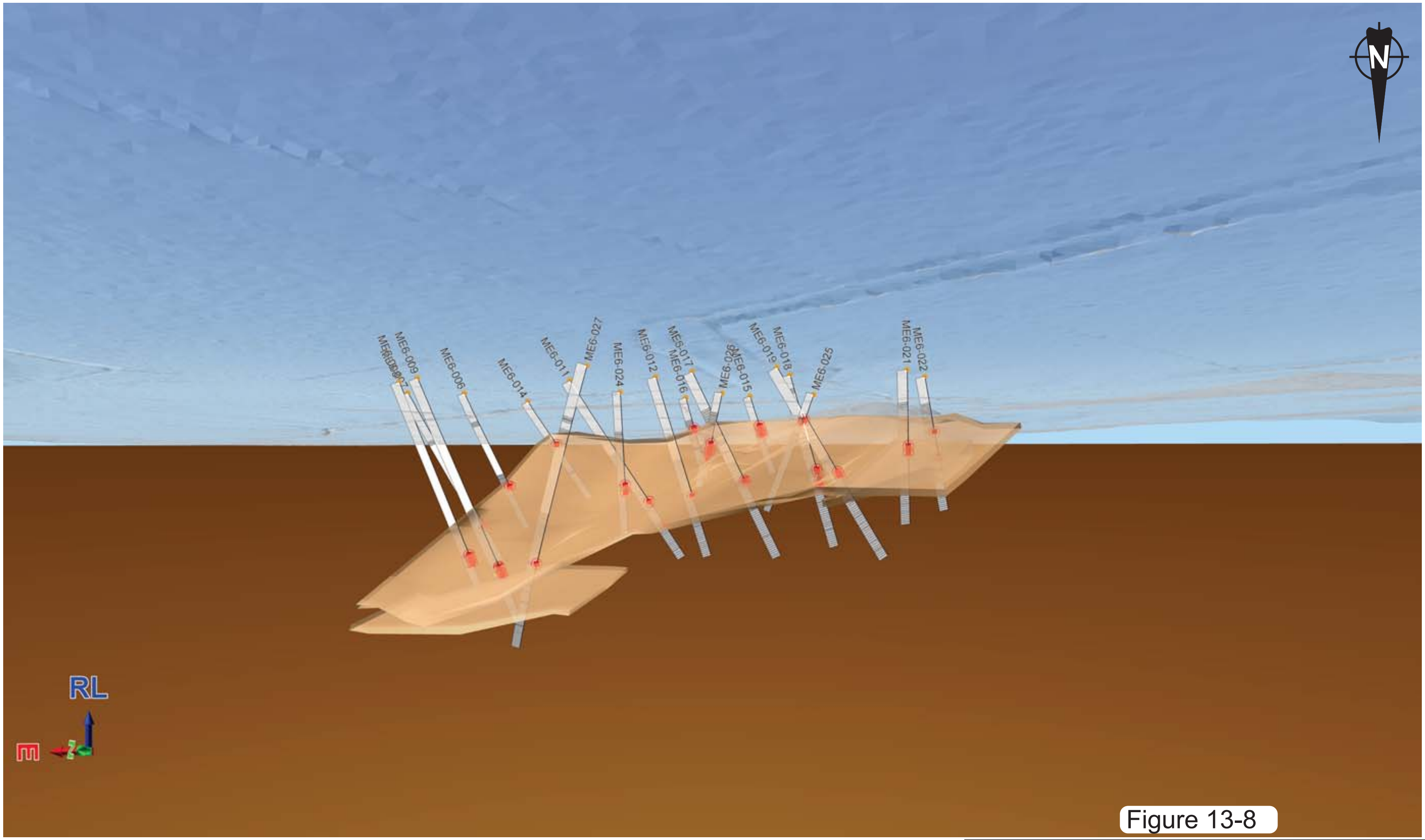


Figure 13-8

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Metallurgical Sample Locations

Source: RPA, 2018.

HEAD GRADES

The composite samples were assayed by fire assay. The results are shown in Table 13-6.

TABLE 13-6 ALS COMPOSITE SAMPLE ASSAYS
Mandalay Resources Corporation – Björkdal Mine

Sample	Au (g/t)	Fe (%)	S (%)
Master	6.17	1.90	0.08
Low Grade	0.79	1.77	0.07
High Grade	6.22	2.70	0.07

The Master Composite Au grade was three times higher than estimated from the geological data for the drill core intervals that were used. Since material from Björkdal is consistently difficult to assay due to the presence of gold nuggets, it is anticipated that the calculated head grades from the metallurgical tests will be more accurate. Table 13-7 compares the assay data with the calculated head grades from the tests that have been completed at the date of this report.

TABLE 13-7 ALS MASTER COMPOSITE HEAD GRADE COMPARISONS
Mandalay Resources Corporation – Björkdal Mine

Data Source	Au (g/t)
Estimated	1.93
Assayed	6.17
KM5489-01	5.36
KM5489-02	5.17
KM5489-03	5.18
KM5489-04A	5.01
KM5489-05A	5.21
KM5489-06B	7.77
KM5489-07B	5.19
KM5489-08A	4.80
KM5489-09A	5.28
KM5489-12A	5.67
KM5489-20A	4.75
KM5489-21A	5.16
Assay by Size	6.52

The calculated head grades are somewhat lower than the assayed head grades but still significantly higher than the estimated head grade. The assay procedure used by the Björkdal geological staff for drill-hole assays is the Cyanide Extractable Gold Using LeachWELL accelerant on 500 g samples which has historically been more accurate than traditional fire assays due to the larger sample size. In order to evaluate whether the large difference is estimated grade and actual grade of the Master Composite was a sample preparation problem or an analytical problem, splits of the sample were sent to CRS and ALS in Piteå Sweden for analysis using the LeachWELL procedure. CRS completed the geological assays for Norrberget. The results are shown in Table 13-8.

TABLE 13-8 MASTER COMPOSITE HEAD GRADE ANALYSIS USING LEACHWELL
Mandalay Resources Corporation – Björkdal Mine

Laboratory	Au (g/t)
CRS	6.95
ALS Piteå	5.61
ALS Piteå QC	5.58

BOND BALL MILL WORK INDEX

One Bond ball mill work index test was completed using the Master Composite sample. The result is 12.2 kWh/t, which is similar to the Björkdal ore which is currently being processed.

GRAVITY GOLD RECOVERY

Gravity gold recovery tests were completed using three grind sizes to determine whether there is any relationship to gravity gold recovery and grind size. The results of the three tests and a fourth test that was used to prepare feed for a flotation test are provided in Table 13-9.

TABLE 13-9 ALS MASTER COMPOSITE GRAVITY GOLD RECOVERY DATA
Mandalay Resources Corporation – Björkdal Mine

Test	K_{80} (µm)	Calculated Head (g/t Au)	Recovery (%)
KM5489-01	244	5.36	48.2
KM5489-02	180	5.17	50.5
KM5489-03	172	5.18	51.1
KM5489-04A	193	5.01	51.3

The gravity gold recovery is approximately 50% and appears to be independent of the particle size. Based on these results, the decision was made to conduct further tests at the standard

Björkdal particle size of 80% passing (K_{80}) 206 µm. Due to some discrepancies with the grind calibrations, this was subsequently changed to K_{80} 193 µm.

FLOTATION TESTS

A series of flotation tests were conducted using the Master Composite sample in order to evaluate optimum flotation conditions for the Norrberget material. Four gravity plus rougher flotation tests and five gravity plus cleaner flotation tests were conducted. Following the optimization phase of the test program, one gravity plus rougher flotation test and one gravity plus cleaner flotation test was conducted using the High Grade sample and the Low Grade sample. The results are shown in Table 13-10. The selected conditions were used for tests KM5489-12A and KM5489-20A.

TABLE 13-10 ALS FLOTATION TEST DATA
Mandalay Resources Corporation – Björkdal Mine

Test	K_{80}, (µm)	Gravity		Con Grade (g/t Au)	Rougher Flotation Recovery (%)	Cleaner Flotation Recovery (%)	Concentrate Grade (g/t Au)	Total Recovery (%)
		Calculated Head (g/t Au)	Recovery (%)					
Master Composite								
KM5489-04A	193	5.0	51.3	167.2	23.8		57.2	75.0
KM5489-05A	193	5.2	51.2	185.7	24.8		34.7	76.0
KM5489-06B	90	7.8	60.6	320.0	25.1		66.8	85.7
KM5489-07B	140	5.2	53.0	204.9	26.6		43.5	79.6
KM5489-08A	193	4.8	47.2	158.0		27.1	64.2	74.3
KM5489-09A	193	5.3	63.2	221.3		8.00	62.1	71.2
KM5489-12A	193	5.7	52.4	199.7		25.3	40.6	77.7
KM5489-20A	193	4.7	42.2	153.7		32.6	29.6	74.8
KM5489-21A	47	5.2	54.6	183.1		37.1	20.7	91.8
Average		5.4						
Low Grade								
KM5489-11A	214	0.57	38.2	14.8	29.5		5.4	67.7
KM5489-13A	214	0.66	41.1	17.5		26.1	4.7	67.2
Average		0.62						
High Grade								
KM5489-10A	189	5.9	37.7	140.7	25.2		52.6	62.9
KM5489-18A	189	6.9	37.6	157.0		37.7	52.3	75.3
Average		6.4						

ESTIMATED RECOVERY

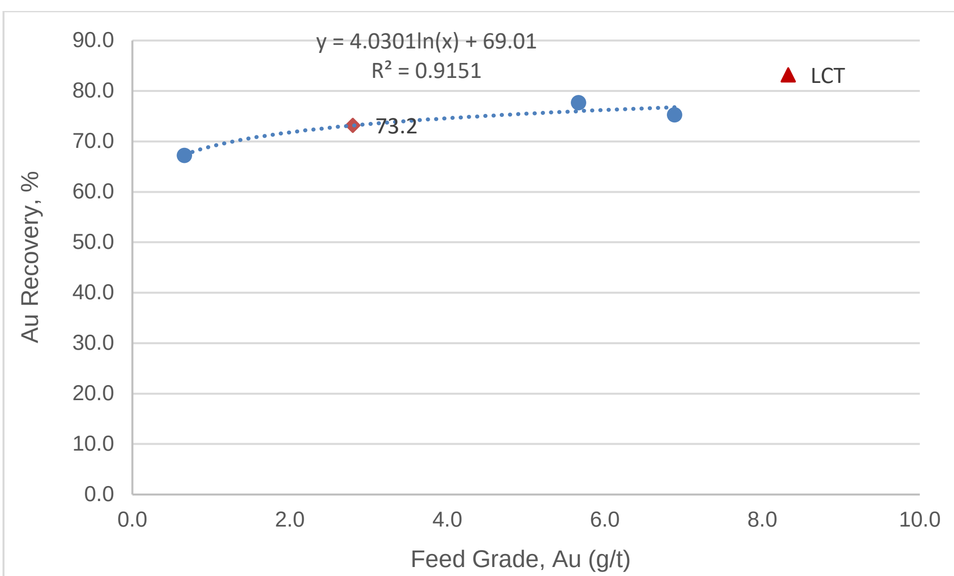
The Norrberget deposit has a metallurgical response that is different from the Björkdal ore. In order to achieve the 91% recovery that Björkdal has, it was necessary to grind to a particle size that has a K_{80} of 47 µm. Due to the small size of the Norrberget deposit, it is not anticipated that it would be cost effective to modify the grinding circuit to achieve this recovery. Since it is expected that there is a relationship between grade and recovery, RPA analyzed the limited data that is available to estimate the recovery at the average grade that will be processed over the LOM (i.e., 2.8 g/t Au). The data used to estimate is provided in Table 13-11. RPA chose the results from KM5469-12A for the Master Composite and did not use the results from KM5489-20A because the calculated head grade was much lower than the calculated head grades for the majority of the tests.

TABLE 13-11 TEST DATA USED TO ESTIMATE RECOVERY
Mandalay Resources Corporation – Björkdal Mine

Sample	Au (g/t)	Recovery (%)	Gravity	Flotation
Master	5.7	77.7	52.4	25.3
Low Grade	0.66	67.2	41.1	26.1
High Grade	6.9	75.3	37.6	37.7

Figure 13-9 shows the graphical results of the recovery estimate.

FIGURE 13-9 RECOVERY ESTIMATE FOR NORRBERGET



As shown in Figure 13-9, a locked cycle test (LCT) using the Master Composite sample was also conducted by ALS. In general, LCT data is more accurate in estimating plant performance than the open circuit flotation tests and LCT recoveries are somewhat higher than recoveries from open circuit tests. In this case, the calculated head grade was excessively high, which, in RPA's opinion, skews the data. Based on the evaluation using limited data, RPA estimates that the average gold recovery will be a total of 75% with approximately 45% of the gold recovered in the gravity circuit and the remaining 28.2% recovered in the flotation circuit.

QEMSCAN AND DIAGNOSTIC LEACH

In order to evaluate the differences in the mineralogy between Björkdal and Norrberget, diagnostic leach tests and QEMSCAN bulk mineral analysis (BMA) and trace mineral search (TMS) were completed using the bulk concentrate from test 20.

The diagnostic leach tests showed that the majority of the gold was cyanide leachable, which indicates that it was exposed. Very little of the gold was encapsulated in silicates. It is theorized that the particles may be too small to be recovered by flotation.

The mineral composition from the BMA is provided in Table 13-12 and the sulphide deportment is provided in Table 13-13.

TABLE 13-12 ALS MINERAL COMPOSITION OF BULK CONCENTRATE
Mandalay Resources Corporation – Björkdal Mine

Mineral	Mineral Content (wt. %)
Chalcopyrite	1.4
Molybdenite	0.1
Sphalerite	0.1
Galena	<0.1
Pyrrhotite	17.3
Pyrite	2.0
Iron Oxides	0.3
Feldspars	32.5
Amphibole	19.4
Quartz	9.1
Micas	6.2
Carbonates	3.9
Chlorite	1.8
Epidote	2.3
Sphene (Titanite)	1.7
Apatite	0.6
Bismuth Telluride	0.4
Others	0.8
Total	**100**

Notes:
1. Chalcopyrite includes trace amounts of Bornite, Chalcocite/Covellite and Tennantite/Enargite.
2. Iron Oxides includes Magnetite, Hematite and Goethite/Limonite.
3. Feldspars includes Feldspar Albite, Plagioclase Feldspar and K Feldspar.
4. Micas includes Biotite/Phlogopite and trace amounts of Muscovite.
5. Carbonates includes Calcite and trace amounts of Ankerite.
6. Others includes Nickel Iron Sulphide, Cobaltite(?), Gold/Electrum and unresolved mineral species.
7. A Particle Mineral Analysis was used for the data.

TABLE 13-13 ALS SULPHUR DEPORTMENT OF BULK CONCENTRATE
Mandalay Resources Corporation – Björkdal Mine

Mineral	Test 20 Bulk Concentrate (%)
Chalcopyrite	6.2
Molybdenite	0.6
Sphalerite	0.3
Galena	0.1
Pyrrhotite	79.6
Pyrite	12.9
Other Sulphur Bearing Minerals	0.5
Total	**100**

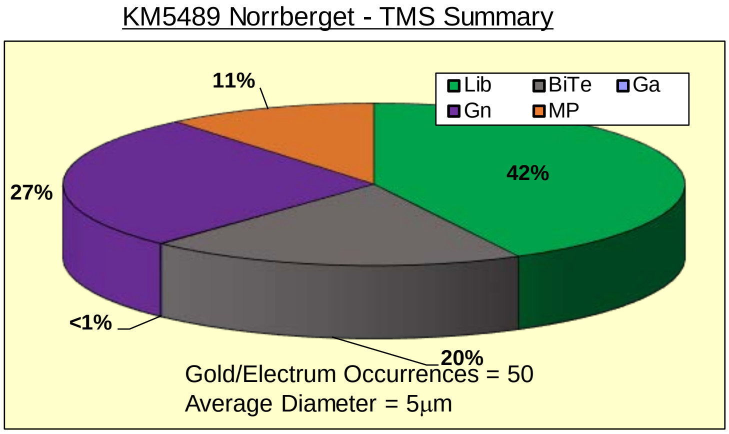
Notes:
1. Chalcopyrite includes trace amounts of Bornite, Chalcocite/Covellite and Tennantite/Enargite.
2. Other Sulphur Bearing Minerals includes Nickel Iron Sulphide and Cobaltite(?).

Figure 13-10 compares the results of the TMS for Norrberget with results from an earlier Björkdal study.

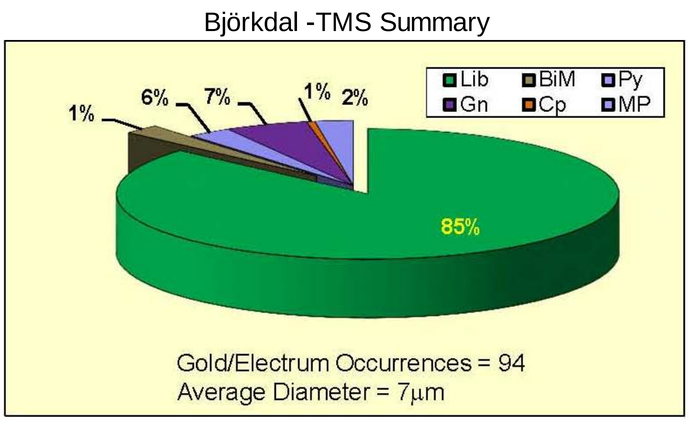
Fifty gold bearing particles were assessed. The electrum particles measured on average > 80% gold per the x-ray spectra. From the figure it can be seen that the gold/electrum occurrences identified for the Norrberget bulk concentrate appear to be more complex. A lower percentage of the gold surface area was identified as liberated gold/electrum particles, whereas a higher percentage was associated with either bismuth-telluride particles, non-sulphide gangue particles, or in multiphase form. The average mean projected diameter of gold bearing particles was also somewhat finer than that for the Björkdal bulk concentrate, at 5 µm versus 7 µm.

RPA is not aware of any processing factors or deleterious elements that could have a significant effect on potential economic extraction.

FIGURE 13-10 QEMSCAN TMS RESULTS FOR NORRBERGET AND BJÖRKDAL



Note: Lib - Liberated Gold particle; BiTe - Gold particle with Bismuth-Telluride;
Ga - Gold particle with Galena; Gn - Gold particle with Non-sulphide Gangue;
MP - Gold particle in Multiphase.
Data above is shown on an adjusted gold particle surface area basis,
where particles greater than 50 percent area are considered liberated.



Note: Lib - Liberated Gold particle; Cp - Gold particle with Chalcopyrite;
Py - Gold particle with Pyrite; Gn - Gold particle with Non-sulphide Gangue;
FeOx - Gold particle with Iron Oxides; MP - Gold particle in Multiphase.
Data above is shown on an adjusted gold particle surface area basis,
where particles greater than 50 percent area are considered liberated.

14 MINERAL RESOURCE ESTIMATE

SUMMARY

Table 14-1 presents a summary of Björkdal and Norrberget Mineral Resources as of December 31, 2018.

TABLE 14-1 MINERAL RESOURCES AT THE BJÖRKDAL MINE AND NORRBERGET DEPOSIT AS OF DECEMBER 31, 2018
Mandalay Resources Corporation – Björkdal Mine

Location	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
		Indicated Resources		
Björkdal	Open Pit	2,947	2.30	218
	Underground	7,416	2.98	711
	Stockpile	2,700	0.64	56
	Subtotal	13,063	2.36	985
Norrberget	Open Pit	144	3.29	15
Total, Indicated		**13,207**	**2.36**	**1,000**
		Inferred Resources		
Björkdal	Open Pit	2,516	1.32	107
	Underground	1,922	2.63	162
	Subtotal	4,438	1.89	269
Norrberget	Open Pit	3	4.03	1
Total, Inferred		**4,441**	**1.89**	**271**

Notes:
1. Björkdal Mineral Resources are estimated using drill hole and sample data as of September 30, 2018 and depleted for production through December 31, 2018.
2. Norrberget Mineral Resources are estimates using drill hole and sample data as of September 30, 2017.
3. CIM (2014) definitions were followed for Mineral Resources.
4. Mineral Resources are inclusive of Mineral Reserves.
5. Mineral Resources are estimated using an average gold price of US$1,400/oz and an exchange rate of 9.0 SEK/US$.
6. Bulk density is 2.74 t/m^3.
7. High gold assays were capped to 30 g/t Au for the open pit mine.
8. High gold assays for the underground mine were capped at 60 g/t Au for the first search pass and 40 g/t Au for subsequent passes.
9. High gold assays at Norrberget were capped at 24 g/t Au.
10. Interpolation was by inverse distance cubed utilizing diamond drill, reverse circulation and chip channel samples.
11. Open pit Mineral Resources are estimated at a cut-off grade of 0.35 g/t Au and constrained by the resource pit design.
12. Underground Mineral Resources are estimated at a cut-off grade of 0.95 g/t Au.
13. A nominal two metres minimum mining width was used to interpret veins using diamond drill, reverse circulation, and underground chip sampling.
14. Stockpile Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au and are based upon surveyed volumes supplemented by production data.

15. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
16. Numbers may not add due to rounding.

RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate.

BJÖRKDAL

TOPOGRAPHY AND EXCAVATION MODELS

Mandalay carried out a LiDAR survey in July 2016 to provide a digital surface for rendering onto an aerial photograph that was taken at the same time (Figure 14-1). The digital surface created from that survey was edited by Mandalay to incorporate the topographic surface of the open pit mine as of November 30, 2018. The resulting integrated model of the topographic surfaces was provided to RPA in a digital format that was suitable for use in coding the block models and estimating the Mineral Resources.

Access to the underground workings is by means of two adits that are located in the north wall of the open pit mine. Due to the shallow plunge of the mineralized vein system, each new level is accessed by means of ramp only. Excavation of the gold-bearing material is carried out using a blast hole sub-level retreat method.

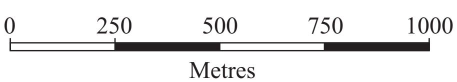


Figure 14-1

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Plan View of the LIDAR Topographic Surface as at September 30, 2016

March 2019

Source: Mandalay Resources Corp., 2016.

The excavated volume of development headings is determined by Mandalay staff on a weekly basis using a reflector-less total station unit that is able to measure the excavated volume of a given advance using reference survey spads that have been placed into the walls of a drive. The resulting digital data is downloaded into the Surpac software package which is then used to construct a three-dimensional model of the excavated volume. This three-dimensional model is then merged with the existing excavation volume. The resulting solid volume is checked for validity and is ultimately used to code the block model for the excavated material. The block model is coded for the development excavations using the stated sub-block resolution.

An area of uncontrolled subsidence has occurred in the upper reaches of the underground mine such that access to this area is no longer possible. A simple generalized wireframe model was created to encompass this area. All blocks within this volume were coded as depleted volumes for the long-term block model. As the mine staff consider that any mineralized wireframes within this volume have the potential for being recovered by means of open pit mining methods, this subsidence area was not considered as excavated for the open pit mining surface.

Mandalay is modifying the procedures by which the excavated volume of the stoped out material is determined. Under the new protocols, the excavated volume of a given stope is measured using a cavity monitoring system (CMS) survey once mining of the stope has terminated. The raw digital data that is produced from the initial survey is processed using the software package that accompanies the CMS unit to produce a reasonable three dimensional digital shape of the mined out volume. This data is then converted into the Surpac file format for use in coding of the block model.

Due to a number of uncertainties relating to the past quality of the shapes resulting from the CMS surveys and the exact location of the mineralization in three-dimensional space relative to the mineralized wireframe models, a slightly different method is used to code the excavated volumes of the stopes into the block model. For the 2018 Mineral Resource estimate, all parent blocks and sub-blocks that are either completely within or are touching a given stope excavation model are considered to have been excavated. The block model is coded accordingly.

A topographic survey of the North and South stockpile areas was conducted on November 20, 2018. The base of the stockpiles was taken from an earlier topographic surface that was completed prior to the commencement of building these piles. The volumes of the two stockpiles were reported from the resulting merged surfaces and the tonnage was estimated using a bulk density of 1.80 t/m^3, representing a swell factor of approximately 35%.

As of November 20, 2018, the development had reached an elevation of approximately -480 m (approximately 300 m vertically from surface, Figure 14-2).

DESCRIPTION OF THE DATABASES

The presence and distribution of the gold mineralization found at the Björkdal Mine is defined by means of diamond drill holes (DDH), RC drill holes located in the open pit mine, chip/channel samples taken from underground faces, and channel samples taken of blasted rock in the open pit mine for grade control purposes. Samples of the sludge created from development drilling are also collected for information purposes but are not used for preparation of Mineral Resource estimates. All information is entered into the GeoSpark geological database management system. Information from the chip sampling programs is entered into the master database system as pseudo-drill holes to facilitate their use in the Mineral Resource estimation process.

The Mine operates on a metric local grid coordinate system wherein the local grid north is 29.67° west of true north (i.e., local grid north is approximately towards azimuth 330° true). All drill hole and sampling information is entered into the GeoSpark master database using this local grid coordinate system.

Subsets from this master database are extracted and used for estimations on an as-needed basis. For the preparation of the 2018 Mineral Resource estimate for the Mine, all of the drill holes contained within the master database were used to prepare the estimate. All of the drill hole data are in the MS Access database format and were modified for use by the Surpac mine modelling software package. Additional fields to store such information as the composited assay values and wireframe flags were created as required during preparation of the Mineral Resource estimate.

The cut-off date for the drill hole database is September 30, 2018, and includes all drilling carried out at the Storheden deposit. The location of the drill holes which were used to prepare the 2018 Mineral Resource estimate are shown in Figure 14-3. A summary of the database is provided in Table 14-2.

TABLE 14-2 SUMMARY OF THE BJÖRKDAL DRILL HOLE DATABASE AS AT SEPTEMBER 30, 2018
Mandalay Resources Corporation – Björkdal Mine

Hole Type	No. Holes	Total Length (m)
	Surface	
CH	526	285.82
DDH	399	57,572.37
GP	5,457	4,792.36
RC	4,019	213,858.4
Total, Surface	**10,401**	**276,508.95**
	Underground	
CH	21,380	25,214.35
DDH	1,428	177,192.64
Total, Underground	**22,808**	**202,406.99**
Grand Total	**33,209**	**478,915.94**

Plan View

Sectional View

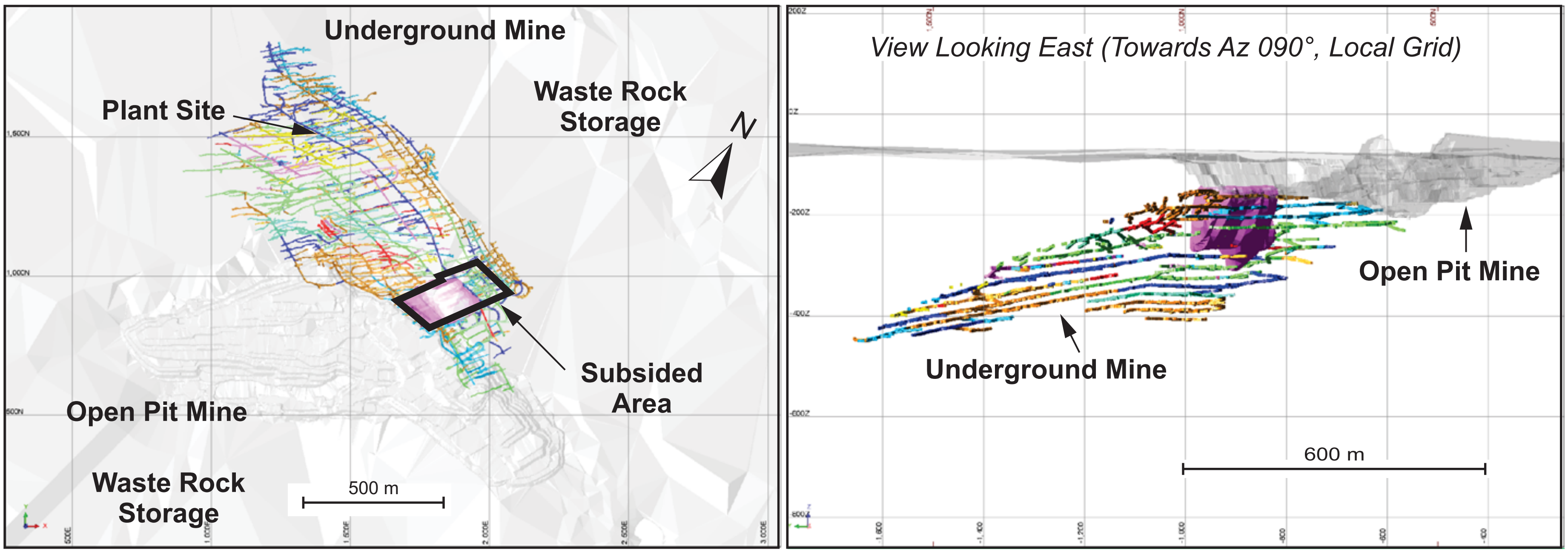


Figure 14-2

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Plan and Section View of the Mine Workings

March 2019

Source: RPA, 2019.

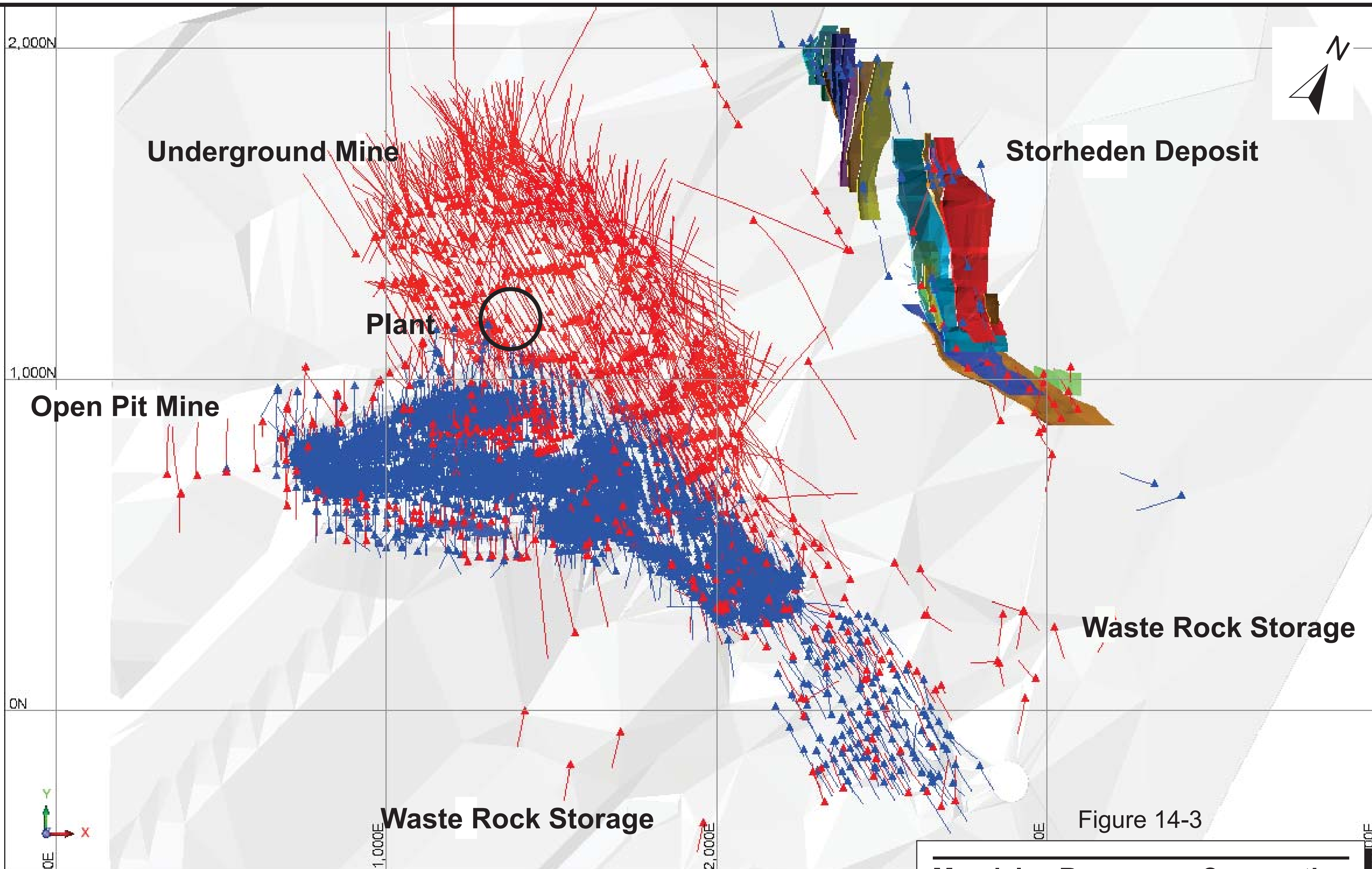


Figure 14-3

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Plan Map of the Drill Hole Locations

Legend:

- *Diamond Drill Hole*
- *Reverse Circulation Drill Hole*

0 250 500 750 1000

Metres

March 2019

Source: RPA, 2019.

RPA

www.rpacan.com

LITHOLOGY AND MINERALIZATION WIREFRAMES

Wireframe models of the mineralized veins were utilized in geological and grade continuity studies to constrain the block model interpolation. Wireframe models of the Björkdal veins were constructed by Mandalay and reviewed by RPA. RPA notes that the vein models reflect the grades relating to a targeted vein only and do not include any potentially significant unsampled mineralization that may be present between the veins.

The mineralization is structurally controlled, hence construction of a lithological model is deemed to be unnecessary other than creation of a surface of the bottom of the marble unit. An updated 3D model of the hangingwall marble unit was constructed from available drill hole and geological mapping information, using the understanding gained during 2018. This surface was then used as a constraint in the block models, as this unit is currently viewed as being a poor host for mineralization (Figure 14-4). Similarly, a 3D surface was created of the hangingwall shear zone, which was also subsequently used to constrain the block model. Models of the various constraining fault surfaces were prepared and were used as guides in preparation of the mineralization wireframes.

Mandalay built individual mineralized wireframes separately for open pit (OP) and underground (UG) domains. For ease of use, the individual vein wireframes were grouped according to their spatial locations. The OP wireframes were based on a nominal 0.3 g/t Au cut-off value over a minimum of two metres. The UG wireframes were based on a nominal two metre minimum width at a cut-off value of 0.5 g/t Au. New tables were created in the database for each vein group and were coded with the intersection information for the individual mineralized wireframes in the open pit and underground mines.

Figure 14-4

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Relationship of Quartz Veins to the Marble Contact, Open Pit Mine

March 2019

Source: RPA, 2016.

OPEN PIT VEIN MODELS

The interpretation for the OP mineralized wireframes was guided by mapped quartz veins on various benches in the pit (Figure 14-5). RPA noted that a large number of above cut-off grade samples were not consistently associated with mapped OP veins or with drill hole intervals with high percentages of quartz logged (Figure 14-6). Generally speaking, the RC drilling seemed to have wider mineralized intercepts with lower grades, while the nearby core drilling revealed narrower intercepts with higher grades. The wireframes were created to a minimum width of two metres and were projected to a nominal 30 m away from the last drill hole intercept horizontally, and to a nominal 15 m vertically. The wireframes were driven to mid-distance when barren holes were encountered at the lateral limit of a vein, while occasionally the veins were driven through barren holes to preserve the continuity of the vein.

The OP mineralized wireframe models were grouped into five separate areas as follows: East Pit (EP), West Pit (WP), Quartz Mountain (QM), Shear-Hosted (SKS) and Nylund. In total, 485 individual wireframe models were created for the open pit mine (Figure 14-7).

A total of 22 wireframe models were also created in 2017 for mineralization located at the Storheden deposit but were not used in the current Mineral Resource update.

Figure 14-5

Mandalay Resources Corporation

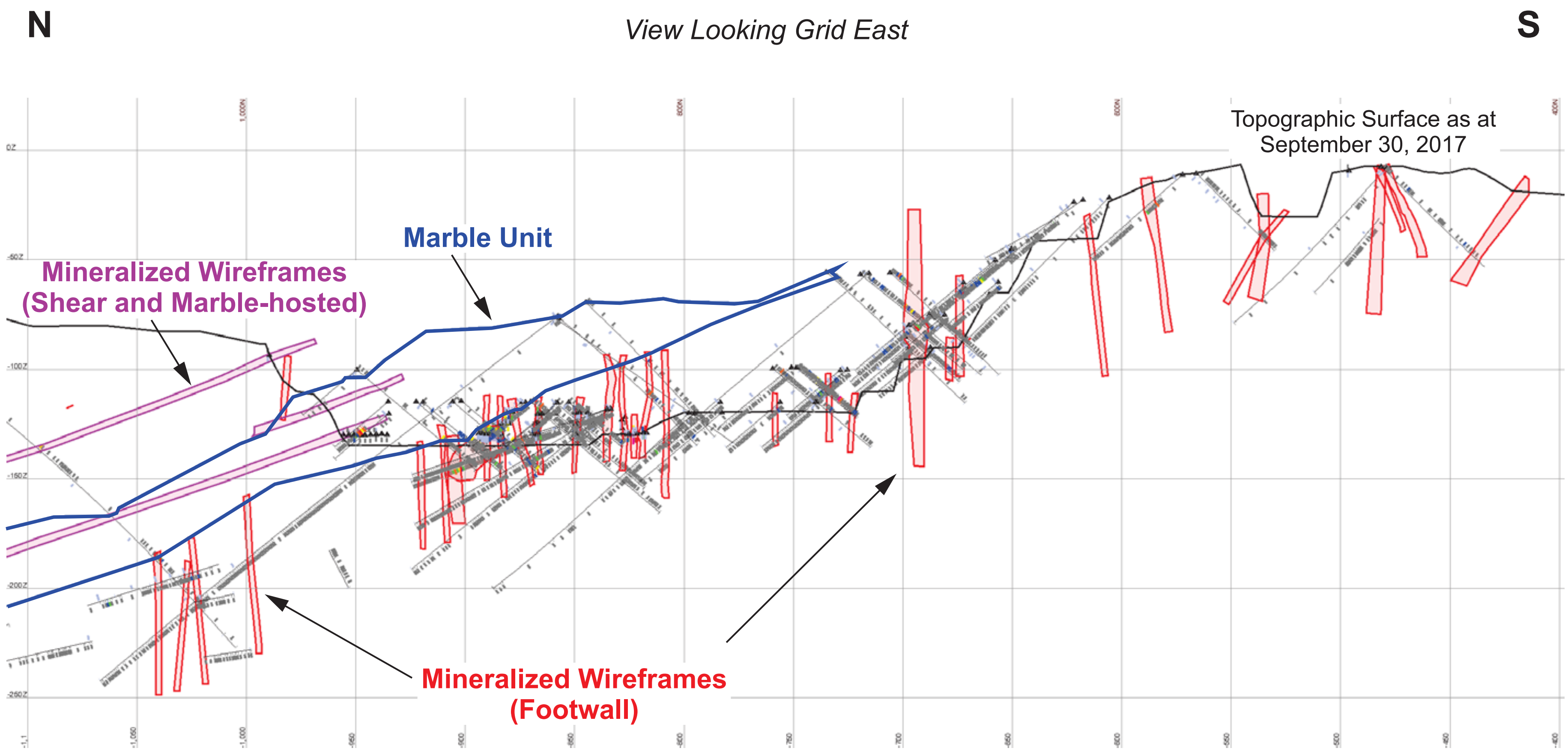
Björkdal Mine

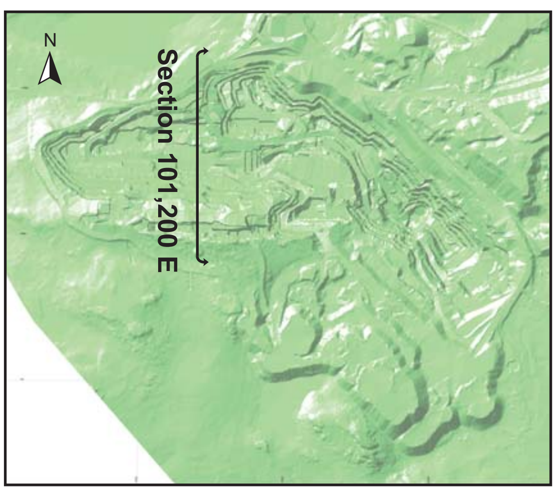
Västerbotten, Sweden

Example of a Quartz Vein in a Shot Rock Pile, Open Pit Mine

March 2019

Source: RPA, 2016.





0 25 50 75 100
Metres

Figure 14-6

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Representative Cross Section of the Open Pit Mineralization

March 2019

Source: RPA, 2018.

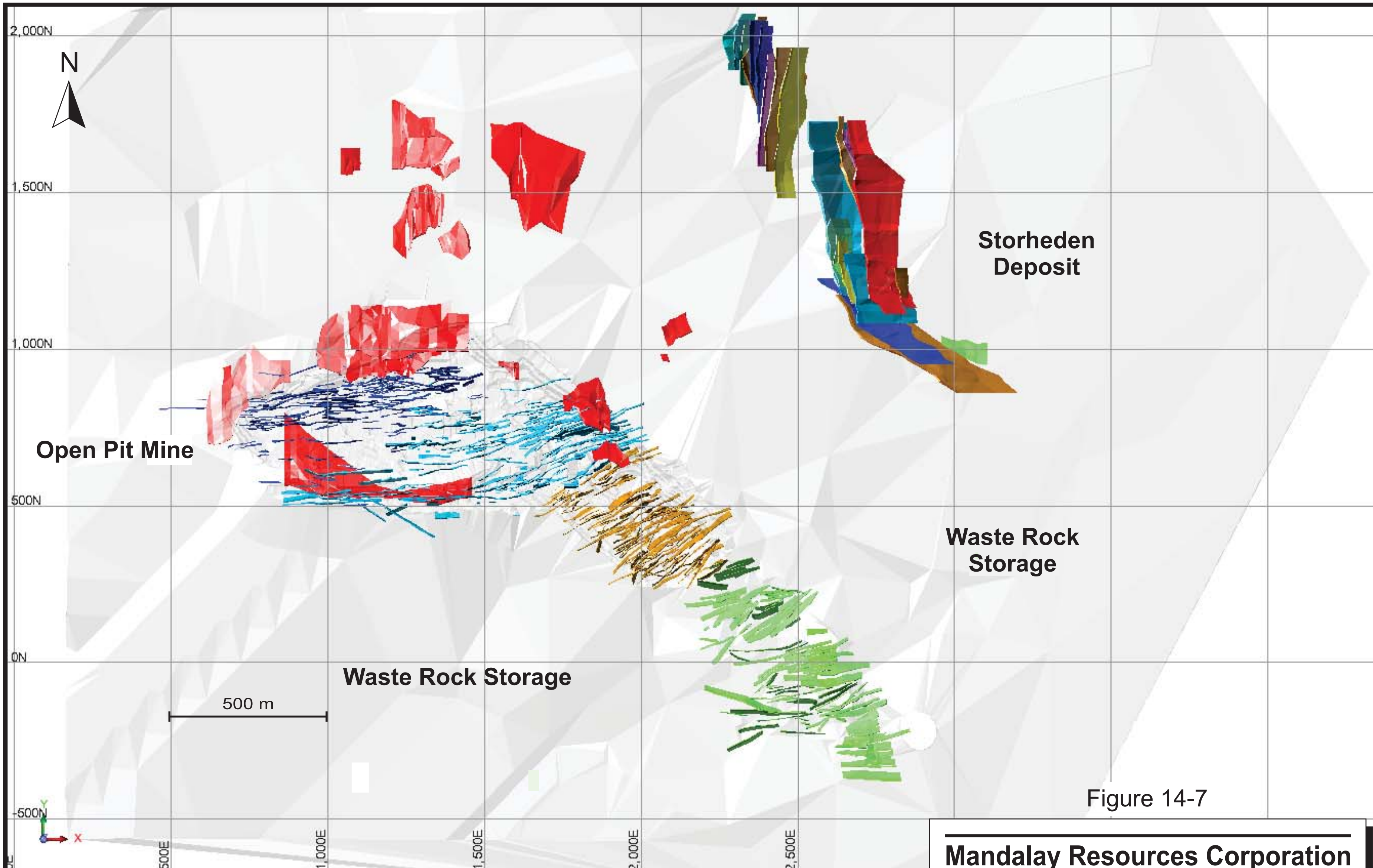


Figure 14-7

Legend:

East Pit | SKS | West Pit | Quartz Mountain | Nylund

March 2019

Source: RPA, 2019.

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Location of Open Pit Mineralized Wireframes

RPA

www.rpacan.com

UNDERGROUND VEIN MODELS

The construction of the UG vein wireframes was guided by quartz veins mapped in the underground developments, face and wall chip samples, as well as existing underground stopes. Vein shapes from the 2015, 2016, and 2017 interpretation work were retained where no additional information was collected. The wireframes were constructed to a minimum width of two metres and were projected up to 30 m away from the last drill hole intercept horizontally, and up to 15 m vertically. The veins were driven through lower grade intercepts or occasionally through barren holes to preserve vein continuity. In many cases, the widths of the mineralized wireframes were drawn larger than the widths of the above cut-off grade assays so as to achieve the minimum width criteria (Figure 14-8). The wireframes were extended to drill hole mid-distance when barren holes were encountered at the lateral limit of a vein.

The goal of the UG wireframes was to create continuous models of the mineralized lenses, hence sometimes slight departures from local or general trends might be observed. The general structural fabric of the deposit is characterized by several dominant directions, as shown by the mapped underground veins. These veins show anastomosing, splaying or cross cutting relationships, rendering interpretation and construction of individual wireframes difficult at times, due to occasional multiple interpretation options. The underground chip sampling along any given vein shows marked grade variations, with occasional grouping of higher grades forming ore shoots locally.

The UG mineralized wireframe models were grouped into four separate areas as follows: Central Zone (CZ), Lake Zone (LZ), Main Zone (MZ), and South Zone (SZ). In total, 526 individual wireframe models were created for the underground mine (Figure 14-9).

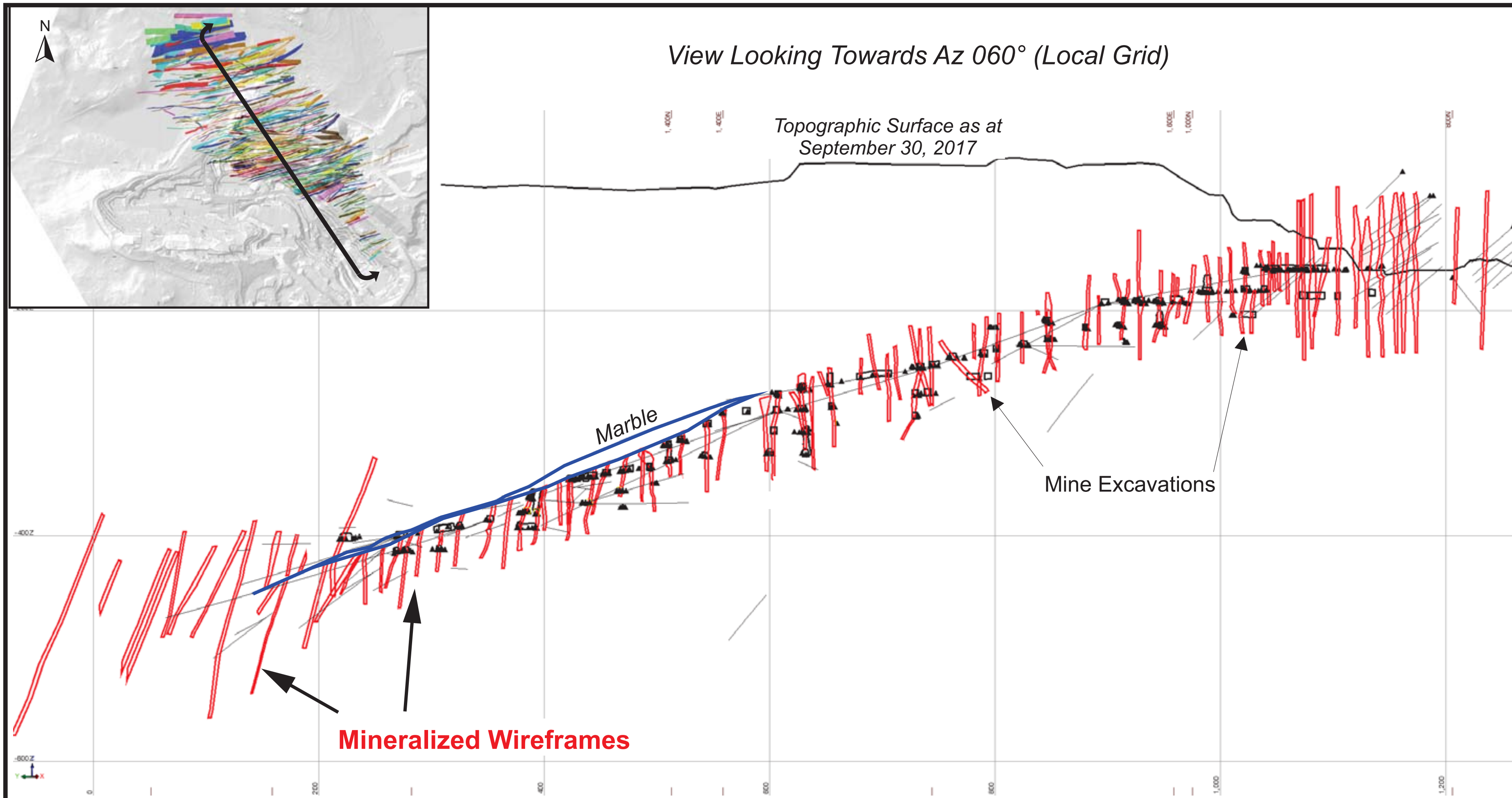


Figure 14-8

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Representative Cross Section of the Underground Mineralized Wireframe Interpretations

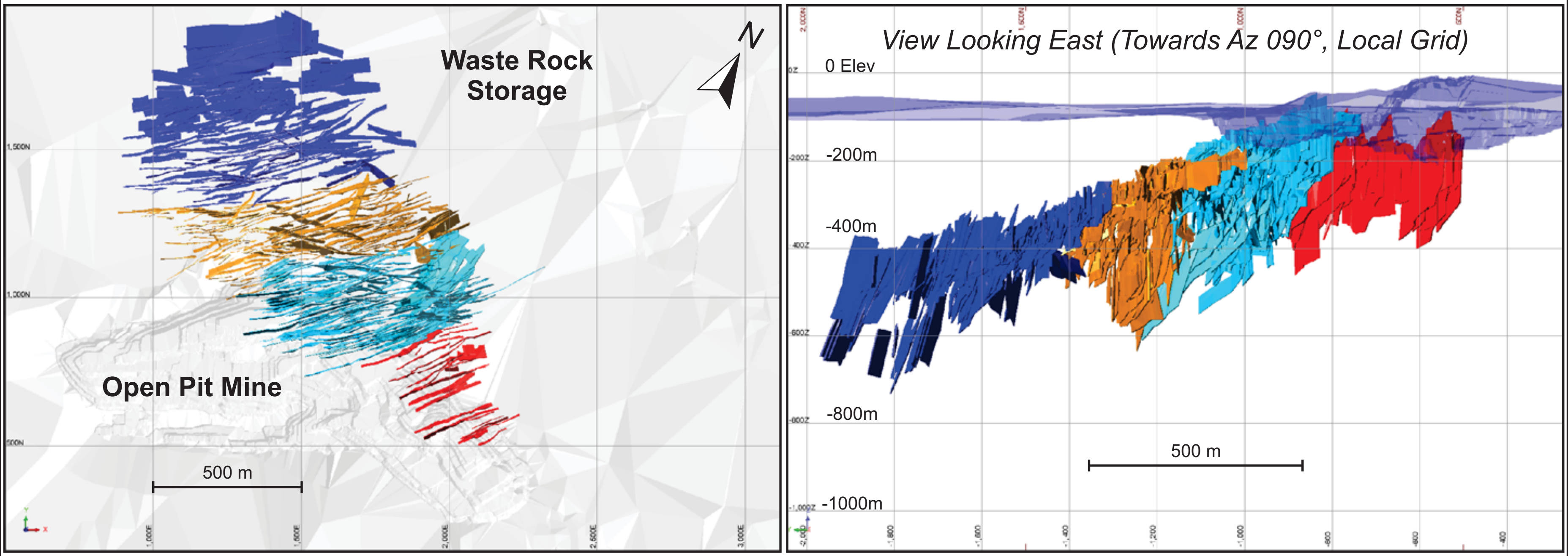
March 2019

Source: RPA, 2016.

RPA

www.rpacan.com

Plan View **Sectional View**



Legend:

Central Zone | Lake Zone | Main Zone | South Zone

Figure 14-9

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Location of Underground Mineralized Wireframes

March 2019

Source: RPA, 2019.

COMPOSITING METHODS AND GRADE CAPPING

UNDERGROUND MINE

Chip Sample Data

The chip sample information for the underground mine has been classified by Mandalay according to the degree of confidence based on the date at which the sample was collected. Those chip samples collected prior to Mandalay's purchase of the Björkdal operations have been assigned a confidence level code of either 10 or 20 in an attempt to recognize the limitations of the sample collection procedures at the time. Those samples collected subsequent to Mandalay's purchase are assigned a confidence level code of 30 or 40 to acknowledge the revised sample collection procedures whereby chip samples are collected across the full width of a given face. Many of the chip samples collected prior to Mandalay's purchase were taken of vein material only, with no sample being collected of either of the walls of the vein.

For those chip samples with a confidence level code of either 10 or 20, the grade of the resulting composited, capped sample grade was mathematically diluted to a nominal width of 2.5 m by using the length of the given chip sample as a weighting factor prior to use in estimating the block model grades.

Diamond Drill Holes and RC Drill Holes

Visual examination of the assay tables related to the diamond drill hole data revealed the presence of a large number of un-sampled intervals within and abutting the boundaries of the interpreted mineralization wireframes. Zero values are regularly entered for all such intervals of null values by means of a computer script prior to creation of composited assays. The resulting edited sample information for the diamond drill holes and RC holes was composited into nominal equal lengths of one metre using the best-fit compositing algorithm of the Surpac mine modelling software package. Composited assay values were created on an individual, vein-by-vein basis. Similarly, the assay results in the chip sample databases were composited into nominal equal lengths of one metre using the best-fit composting function. Both the drill hole and RC samples were assigned a confidence level code of 50 in recognition that these samples are taken on a fully diluted, full-length basis.

Capping Values

The composited assay information for the various versions of chip samples, underground diamond drill holes and the RC drill holes were examined in detail on an individual basis by means of frequency histograms, decile analyses and probability plots to determine whether capping values are best applied according to the sample type. The results of this analysis showed no material difference in the statistics for the three sample types and that applying the same capping levels to all three sample types was reasonable.

Mandalay elected to maintain the dual capping value approach for estimation of the gold grades contained within the mineralized wireframe models in the underground mine as was used for the previous estimates of the underground Mineral Resources. In this approach, the composited assays for diamond drill holes and RC drill holes are capped to values of 60 g/t Au and 40 g/t Au. Two different areas of influence are then used when estimating the block grades for each mineralized wireframe. The higher grade capped composites are used within a first pass search ellipse with a 15 m radius while the lower grade capped composites are used for subsequent estimation passes. The summary statistics of the composited, capped assay values for the underground samples that were used to prepare the estimated block model grades are provided in Table 14-3.

TABLE 14-3 SUMMARY STATISTICS OF THE COMPOSITED, CAPPED SAMPLES BY ZONE, UNDERGROUND MINE
Mandalay Resources Corporation – Björkdal Mine

Item	Uncapped (g/t Au)	Capped 60 (g/t Au)	Capped 40 (g/t Au)
Central Zone (CZ)			
Mean	4.58	1.80	1.73
Median	0.17	0.12	0.12
Mode	0.01	0.01	0.01
Standard Deviation	31.94	5.84	5.25
CoV	6.97	3.24	3.03
Sample Variance	1,020.22	34.09	27.53
Minimum	0	0	0
Maximum	1,701.54	60	40
Count	10,171	10,171	10,171
Lake Zone (LZ)			
Mean	3.29	1.66	1.60
Median	0.12	0.10	0.10
Mode	0.01	0.01	0.01
Standard Deviation	20.99	5.56	5.05
CoV	6.37	3.35	3.15
Sample Variance	440.65	30.87	25.50
Minimum	0.00	0.00	0.00

Item	Uncapped (g/t Au)	Capped 60 (g/t Au)	Capped 40 (g/t Au)
Maximum	1,020.00	60.00	40.00
Count	16,576	16,576	16,576
	Main Zone (MZ)		
Mean	5.40	2.02	1.89
Median	0.17	0.12	0.12
Mode	0.01	0.01	0.01
Standard Deviation	44.62	6.69	5.68
CoV	8.26	3.31	3.01
Sample Variance	1,990.78	44.69	32.31
Minimum	0.00	0.00	0.00
Maximum	4,105.46	60.00	40.00
Count	20,739	20,739	20,739
	South Zone (SZ)		
Mean	2.55	1.35	1.26
Median	0.13	0.09	0.09
Mode	0.01	0.01	0.01
Standard Deviation	21.48	5.22	4.34
CoV	8.43	3.87	3.44
Sample Variance	461.28	27.26	18.85
Minimum	0.00	0.00	0.00
Maximum	1,153.20	60.00	40.00
Count	4,000	4,000	4,000
	Skarn Zones (SKS)		
Mean	1.36	1.02	0.98
Median	0.10	0.09	0.09
Mode	0.01	0.01	0.01
Standard Deviation	13.70	4.49	4.05
CoV	10.11	4.42	4.15
Sample Variance	187.73	20.18	16.39
Minimum	0.01	0.00	0.00
Maximum	655.23	60.00	40.00
Count	2,657	2,657	2,657

OPEN PIT MINE

Wireframe Models

As for the drill holes intersecting wireframes for the underground mine, zero values were entered for all such intervals of null values in the open pit drill hole database prior to creation of composited assays. The resulting edited sample information for the diamond drill holes and RC holes was composited into nominal equal lengths of one metre using the best-fit compositing algorithm of the Surpac mine modelling software package. Composited assay values were created on an individual, vein-by-vein basis. The open pit sub-set of composite samples included a number of grade control shovel samples that were taken along the width of the observable veins only. These shovel samples were assigned a confidence code of 10 or 20. As with samples from the underground mine, all samples were composited into nominal equal lengths of one metre using the best-fit composting function.

The composited assay information for the open pit samples were examined in detail on an individual basis by means of frequency histograms, decile analyses, and probability plots to confirm that applying the same capping levels to all three sample types was reasonable.

Mandalay elected to maintain the capping value approach for estimation of the gold grades contained within the mineralized wireframe models in the open pit mine as was used for the previous estimates of the open pit Mineral Resources. In this approach, a capping value of 30 g/t Au has been maintained for the diamond drill hole, RC drill hole, and chip samples contained with the open pit wireframes. The summary statistics of the composited, capped assay values used to prepare the estimated block model grades are provided in Table 14-4.

TABLE 14-4 SUMMARY STATISTICS OF THE COMPOSITED, CAPPED SAMPLES BY ZONE, OPEN PIT MINE
Mandalay Resources Corporation – Björkdal Mine

Item	Uncapped (g/t Au)	Capped 30 (g/t Au)	Uncapped (g/t Au)	Capped 30 (g/t Au)	Uncapped (g/t Au)	Capped 30 (g/t Au)
	East Pit (EP)		**Nylunds (NYL)**		**Quartz Mountain (QM)**	
Mean	2.46	0.92	0.65	0.60	2.93	0.99
Median	0.1	0.08	0.08	0.08	0.08	0.08
Mode	0.05	0.05	0.08	0.08	0.01	0.01
Standard Deviation	29.36	3.24	3.14	2.29	41.84	3.31
CoV	11.93	3.53	4.80	3.79	14.29	3.35
Sample Variance	861.83	10.52	9.85	5.25	1,750.52	10.98
Minimum	0	0	0.00	0.00	0.00	0.00
Maximum	1,602.39	30	80.77	30.00	3,155.00	30.00
Count	11,566	11,566	2,440	2,440	14,025	14,025
	Skarns (SKS) – OP		**West Pit (WP)**			
Mean	1.06	0.65	2.07	0.85		
Median	0.06	0.05	0.09	0.08		
Mode	0.01	0.01	0.05	0.01		
Standard Deviation	5.48	2.69	18.21	3.01		
CoV	5.17	4.14	8.80	3.52		
Sample Variance	29.98	7.24	331.65	9.04		
Minimum	0.00	0.00	0.00	0.00		
Maximum	161.07	30.00	901.00	30.00		
Count	1,882	1,882	10,250	10,250		

Dilution Model

Examination of the distribution of the gold grades for the portion of the Björkdal deposit located within the open pit mine reveals the presence of a significant number of above cut-off grade assay values that are located outside of the limits of the mineralized wireframe models. The current view for these samples is that they represent other occurrences of gold mineralization that are not hosted by a regular series of narrow, steeply dipping quartz veins as represented by the wireframe models. Examples of these types of occurrences could be breccia and/or stockwork styles of quartz veins, vertically dipping quartz veins with limited vertical or lateral extent, or narrow quartz veins that have dips that are not vertical (Figure 14-10). Operational experience from the grade control program supports this view, as a significant amount of additional mineralization is located within the open pit mine each year outside of the modelled zones as a result of sampling at a detailed scale.

Figure 14-10

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Quartz Vein Breccia and Stockwork, Open Pit Mine

March 2019

Source: RPA, 2016.

All diamond drill hole and RC drill hole samples that are located outside of the mineralized wireframe models were flagged and composited to nominal equal lengths of one metre using the best-fit compositing algorithm of the Surpac mine modelling software package.

The composited assay information for the open pit diamond drill holes and the RC drill holes located outside of the mineralized wireframe models was examined by means of a frequency histogram to determine an appropriate capping value. A capping value of 30 g/t Au has been selected for the diamond drill hole and RC drill hole samples contained with the dilution model.

BULK DENSITY

In 2013, Björkdal collected 136 grab samples selected based on lithology from the open pit and underground for specific gravity analyses. The samples were sent to ALS Piteå for OA-GRA08 specific gravity analysis, whereby the specific gravity was determined by a simple water immersion technique on whole rock samples. A summary of all results is shown graphically in Figure 14-11. Table 14-5 presents the summary statistics with the two granodiorite outliers removed.

FIGURE 14-11 BOX AND WHISKER PLOT OF SPECIFIC GRAVITY MEASUREMENTS

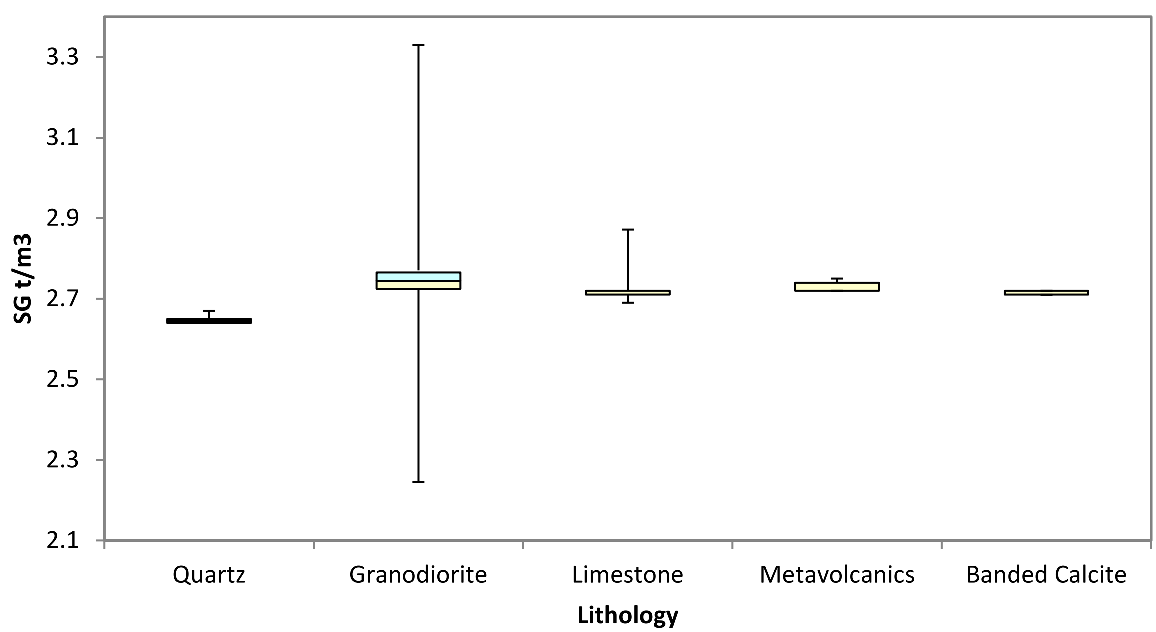


TABLE 14-5 SUMMARY STATISTICS FOR SPECIFIC GRAVITY
Mandalay Resources Corporation – Björkdal Mine

Lithology	Count	Mean	Std. Dev.	Range	Minimum	Maximum	CV
Quartz	48	2.646	0.01	0.03	2.64	2.67	0.26%
Granodiorite	46	2.739	0.02	0.08	2.7	2.78	0.82%
Limestone	20	2.737	0.05	0.18	2.69	2.87	1.98%
Metavolcanics	13	2.734	0.01	0.03	2.72	2.75	0.46%
Banded Calcite	5	2.716	0.01	0.01	2.71	2.72	0.20%

A global bulk density of 2.74 t/m^3 was applied to the entire deposit for resource modelling.

RPA considers this value appropriate based on the percentage of quartz and granodiorite that is mined.

TREND ANALYSIS

MINERALIZED WIREFRAMES

Given the large number of mineralized wireframes that comprise the Mineral Resource estimate, the distribution of the gold grades was examined in detail for selected wireframe models only. For this exercise, individual data files were prepared that contained the average gold grade across the entire width for each of the selected mineralized wireframe models. Contours of the average gold grades were then constructed using the contouring function contained within the Surpac software package. The results are presented as longitudinal projections (Figures 14-12 and 14-13). Additional longitudinal projections were presented in RPA (2017 and 2018).

A review of the distribution of the gold grades in the longitudinal projections confirms the conclusions presented in RPA (2017):

- Not all portions of the mineralized wireframes contain gold grades that are above the nominated cut-off grade.
- Some of the mineralized wireframes contain pockets of high grade (>10 g/t Au) values. In general terms, where the density of sample information is sufficiently high, the size of the high grade pockets is generally less than 50 m.
- Each of the mineralized wireframes contain different amounts of high grade (>10 g/t Au) areas or pockets.
- The distribution of the gold grades at the detailed, local scale differs from vein to vein.
- The detailed distribution of gold grades within a given vein varies from place to place within a given vein wireframe. Areas of low grade and high grade mineralization do not

occur with a constant orientation and can occur at different orientations within a given vein.

- The level of understanding of the location, size, and shape of the high grade pockets is directly related to the density of sample information.
- Inclusion of chip sample information along with drill hole data provides a major improvement in the ability to trace the location, size, and shape of the high grade pockets and low grade areas.

On the basis of the knowledge learned from this trend analysis exercise, RPA recommends that efforts continue to examine the distribution of the gold contents within the mineralized wireframes by contouring the gold grades on longitudinal projections. The results will be useful in short term planning and will improve the targeting of exploration and in-fill drilling programs.

RPA also recommends that Mandalay continue collecting chip samples of the veins and wall rocks from underground and open pit locations.

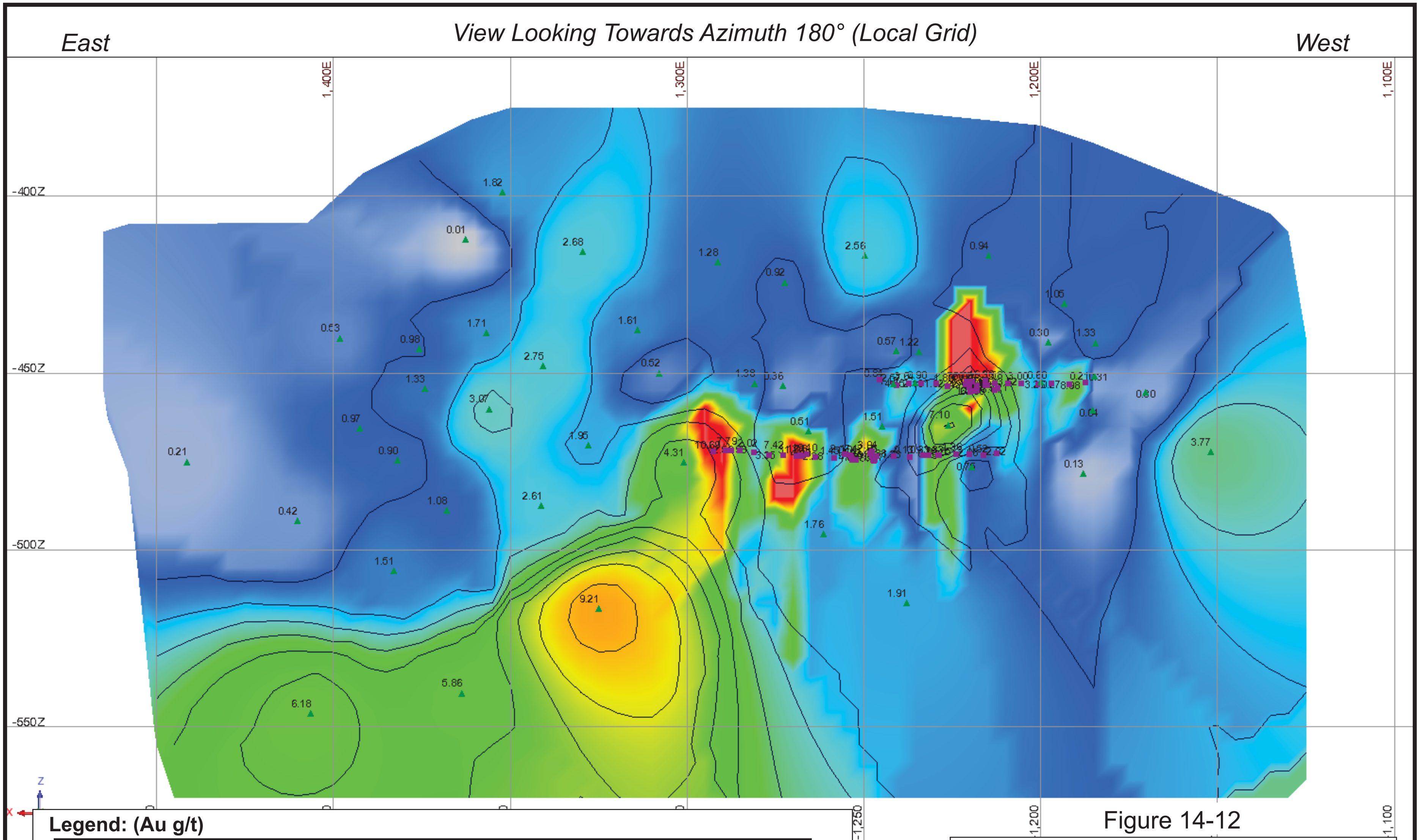


Figure 14-12

Legend: (Au g/t)

- Undefined
- < 1.00
- 1.00 - 2.00
- 2.00 - 3.00
- 3.00 - 4.00
- 4.00 - 5.00
- 5.00 - 6.00
- 6.00 - 7.00
- 7.00 - 8.00
- 8.00 - 9.00
- 9.00 - 10.00
- > 10.00

- Drill Hole - Core
- Chip Sample - Pre-Mandalay

0 25 50 75 100

Metres

March 2019

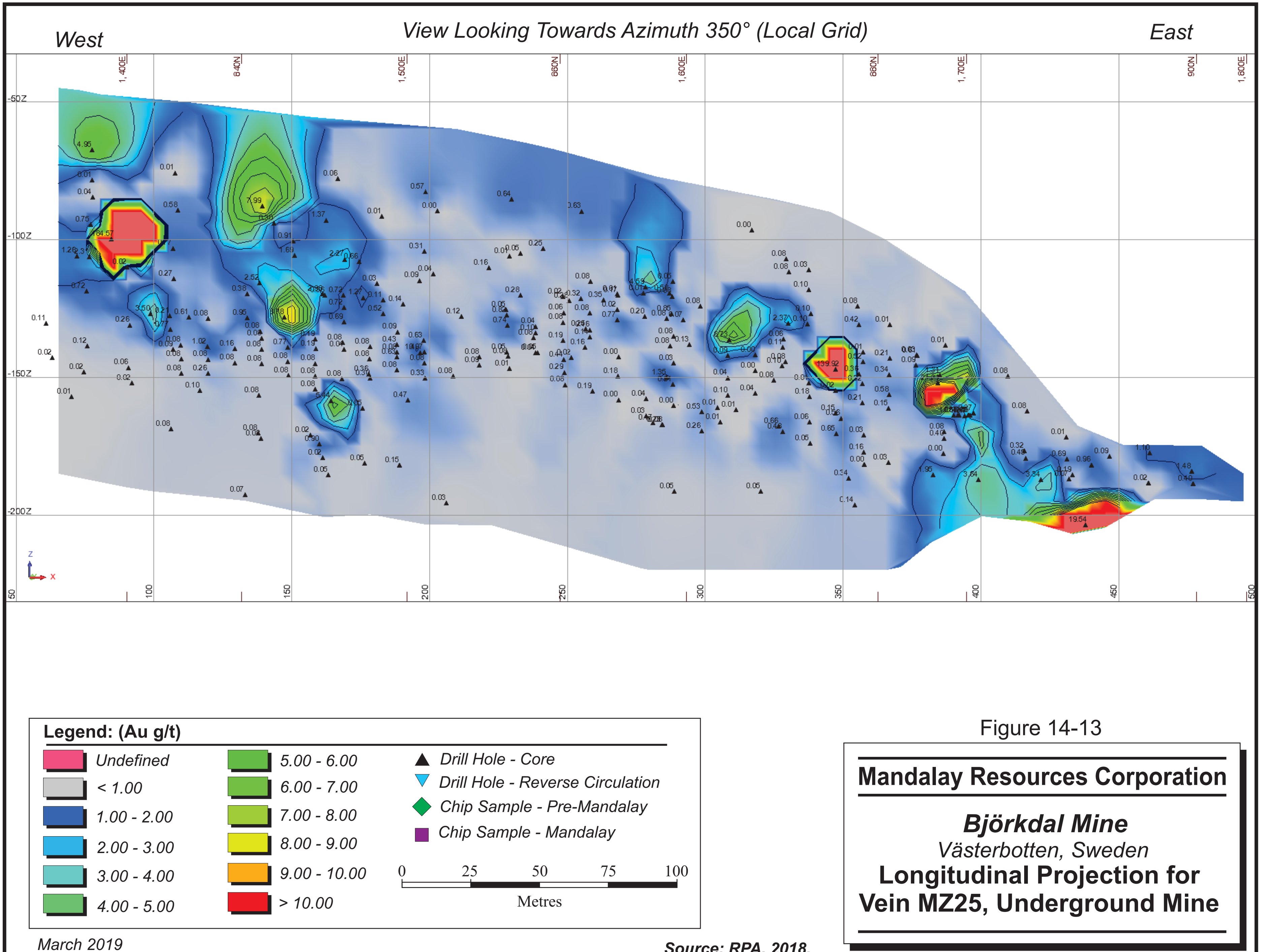
Source: RPA, 2018.

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Longitudinal Projection for Vein LZ180, Underground Mine



Source: RPA, 2018.

Figure 14-13

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Longitudinal Projection for Vein MZ25, Underground Mine

VARIOGRAPHY

The results of the variography studies presented in RPA (2017) were adopted for use in preparation of the current Mineral Resource estimate. These variography studies were conducted on a small number of selected mineralized wireframes for the open pit and underground mines.

A variography study was also carried out for the mineralization contained within the newly discovered Aurora Zone (Wireframe number LZ180) as described in Mandalay's news release of November 14, 2018 (Mandalay, 2018). In brief, the results indicated that the mineralization contained within this mineralized zone bears similar variographic characteristics to the mineralization contained within the other mineralized wireframes found within the underground mine (Figures 14-14 and 14-15).

FIGURE 14-14 ALONG STRIKE VARIOGRAM, VEIN LZ180

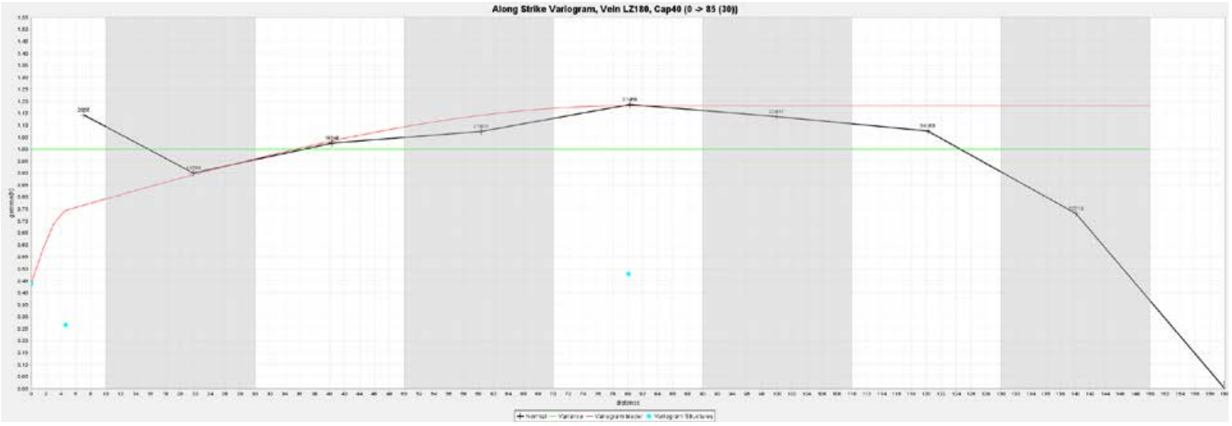
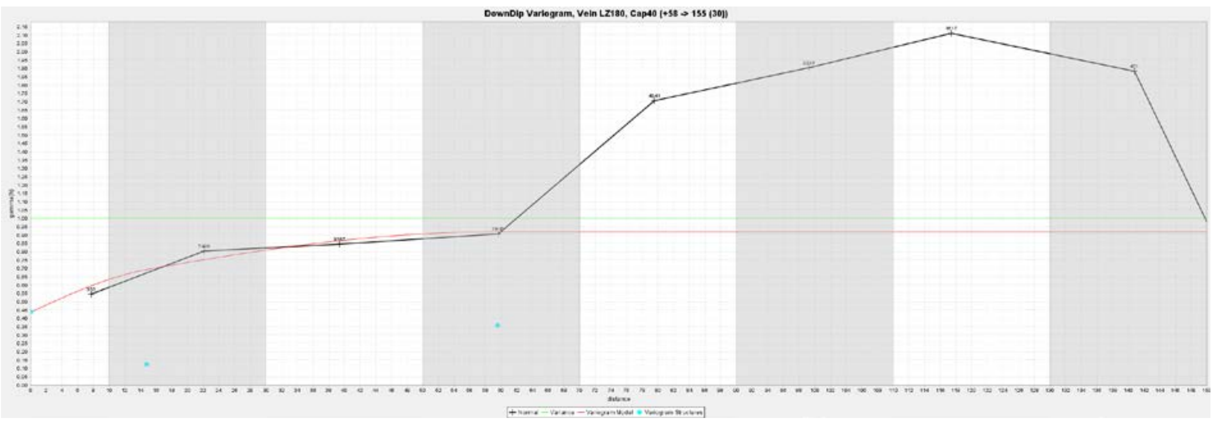


FIGURE 14-15 DOWN DIP VARIOGRAM, VEIN LZ180



BLOCK MODEL CONSTRUCTION

An upright, non-rotated block model was constructed to model the mineralization in the underground and open pit mines together.

The block model was constructed using the Surpac version 6.9 software package and comprised an array of 3 m x 3 m x 5 m (Y, X, and Z) sized blocks using one level of sub-blocking to a minimum size of 1.5 m x 1.5 m x 2.5 m. The model was oriented parallel to the local grid coordinate system (i.e., no rotation or tilt). The selection of the block sizes for this model was based upon experience gained by the mine staff. A number of attributes were created to store such information as rock code, material densities, estimated gold grades, mineral resource classification, mined out material and the like. The block model origin, dimensions, and attributes are provided in Tables 14-6 and 14-7.

TABLE 14-6 SUMMARY OF THE BLOCK MODEL ORIGINS AND BLOCK SIZES
Mandalay Resources Corporation – Björkdal Mine

Type	Y (Northing)	X (Easting)	Z (Elevation)
Minimum Coordinates	-500	290	-760
Maximum Coordinates	2,002	3,002	50
User Block Size	3	3	5
Min. Block Size	1.5	1.5	2.5
Rotation	0.000	0.000	0.000

TABLE 14-7 SUMMARY OF THE BLOCK MODEL ATTRIBUTES
Mandalay Resources Corporation – Björkdal Mine

Attribute Name	Type	Decimals	Default	Description
au4wit	Real	2	0	Gold grade for Whittle optimization
au_id3	Float	-	-0.00001	Gold grade by inverses distance, power 3
avg_dist_true	Float	-	-99	Average true distance of informing samples
class	Integer	-	0	1=measured, 2=indicated, 3=inferred, 4=failure zone
density	Real	-	2.74	Rock density
depleted	Integer	-	0	0=remaining, 1=development, 2=stopes, 3=stopes plus touching
material	Character	-	WAST	Material codes for Whittle optimization
nearest_true	Float	-	-99	True distance to nearest informing sample
no_samples	Integer	-	-99	Number of informing samples
nr_dh	Integer	-	-99	Number of drill holes used in the estimate
pass	Integer	-	0	Estimation pass
pp_depleted	Real	-	0	Partial percentage for coding of depletion solids
vein	Character	-	0	Vein Id (Use >0 to see all)
vein_group	Character	-	0	Vein group ID (MZ, SZ, LZ, CZ, QM, EP, WP, NYL, or SKS)
waste_domain	Integer	-	0	Domain code for interpolation of grades in waste

Gold grades were estimated into the blocks by means of ID^3 interpolation algorithm. A total of three interpolation passes were carried out to estimate the grades in the underground block model. The first pass employed composite samples that had been capped to a maximum of 60 g/t Au and used a search radius of 15 m. The second and third passes used composite samples that were capped to 40 g/t Au and used longer search radii of 35 m and 70 m, respectively.

A two-pass search strategy was applied when estimating the grades for the blocks contained within the mineralized wireframes contained within the open pit mine.

When estimating the grades of the mineralized wireframes, “hard” domain boundaries were used along the contacts of the mineralized wireframe models. Only those composite samples contained within the respective wireframe model were allowed to be used to estimate the grades of the blocks within the wireframe in question, and only those blocks within the wireframe limits were allowed to receive grade estimates. When estimating the grades for the dilution domain, “soft” domain boundaries were applied to minimize any artifacts at the dilution domain boundaries. A summary of the search strategies employed to estimate the grades into the block model is presented in Table 14-8.

TABLE 14-8 SUMMARY OF SEARCH STRATEGIES
Mandalay Resources Corporation – Björkdal Mine

Underground Mine

Item	Pass 1	Pass 2	Pass 3
Boundary Conditions-Data	Hard	Hard	Hard
Boundary Conditions-Blocks	Write to wireframe only	Write to wireframe only	Write to wireframe only
Major Axis	Isotropic	Isotropic	Isotropic
Major Axis Direction	Isotropic	Isotropic	Isotropic
Semi-Major Axis	Isotropic	Isotropic	Isotropic
Semi-Major Direction	Isotropic	Isotropic	Isotropic
Minor Axis	Isotropic	Isotropic	Isotropic
Minor Direction	Isotropic	Isotropic	Isotropic
Major/Semi-Major Ratio	1.01	1.01	1.01
Major/Minor Ratio	1.02	1.02	1.02
Length of Major Axis (m)	15	35	70
Minimum Number of Drill Holes	2	2	2
Weight by Sample Length	Y	Y	Y
Minimum Number of Samples	4	4	4
Maximum Number of Samples	20	20	20
Max No. of Samples/Hole	20	20	20
Search Ellipse Type	Ellipsoid	Ellipsoid	Ellipsoid
Estimation Algorithm	ID^3	ID^3	ID^3

Open Pit Mine, Mineralized Wireframes

Item	Pass 1	Pass 2
Boundary Conditions-Data	Hard	Hard
Boundary Conditions-Blocks	Write to wireframe only	Write to wireframe only
Major Axis	Isotropic	Isotropic
Major Axis Direction	Isotropic	Isotropic
Semi-Major Axis	Isotropic	Isotropic
Semi-Major Direction	Isotropic	Isotropic
Minor Axis	Isotropic	Isotropic
Minor Direction	Isotropic	Isotropic
Major/Semi-Major Ratio	1.01	1.01
Major/Minor Ratio	1.02	1.02
Length of Major Axis (m)	35	70
Minimum Number of Drill Holes	2	2
Weight by Sample Length	Y	Y
Minimum Number of Samples	5	5
Maximum Number of Samples	15	15
Max Number of Samples/Hole	15	15
Search Ellipse Type	Ellipsoid	Ellipsoid
Estimation Algorithm	ID^3	ID^3

Open Pit Mine, Dilution Domain

Item	Waste Domain 1	Waste Domain 2
Boundary Conditions-Data	Soft	Soft
Boundary Conditions-Blocks	Write to Domain 1 only	Write to Domain 2 only
Major Axis	Along Strike (60 m)	Down Dip (80 m)
Major Axis Direction	0°@110°	0°@040°
Semi-Major Axis	Down Dip	Northeast
Semi-Major Direction	-90°@020°	0°@130°
Minor Axis	Across Strike	Southeast
Minor Direction	0°@020	-90°@130
Major/Semi-Major Ratio	1.3	1.01
Major/Minor Ratio	1.7	1.2
Length of Major Axis (m)	60	60
Weight by Sample Length	Y	Y
Minimum Number of Samples	5	5
Maximum Number of Samples	15	15
Max Number of Samples/Hole	15	15
Search Ellipse Type	Ellipsoid	Ellipsoid

BLOCK MODEL VALIDATION

COMPARISON OF COMPOSITE SAMPLES TO BLOCK MODEL

Block model validation efforts began with a comparison of the average block grades with the averages of the informing composite samples for a selection of the ten largest veins as measured by the estimated contained gold. The purpose of the comparison is to perform a high-level check as to whether any data-related errors may have occurred during the estimation process and to provide a general basis for the overall accuracy of the estimated block model grades.

The exercise is slightly complicated for the underground block model due to the variable capping strategy that was used to estimate the block grades. The reported block model average grades then are the blended grades that were estimated using two capping values, which makes a direct comparison with composite data difficult. Considering that the large majority of the blocks were estimated using a capping value of 40 g/t Au, RPA elected to use the average composite grades using that capping value as a base for comparison (Table 14-9). A comparison of the wireframe volumes to the block model volumes is presented in Table 14-10.

TABLE 14-9 COMPARISON OF BLOCK MODEL ESTIMATED GRADES TO COMPOSITE SAMPLES
Mandalay Resources Corporation – Björkdal Mine

Wireframe	LZ180	MZ5	MZ25	CZ1	MZ7
Composite Mean	1.97	2.44	2.46	2.78	2.43
Block Model Average	2.17	2.39	2.40	2.24	2.20
Wireframe	**MZ6**	**SZ10**	**MZ4**	**MZ53**	**SKS4**
Composite Mean	3.90	2.32	2.07	1.66	1.15
Block Model Average	2.97	2.03	1.74	1.93	0.61

TABLE 14-10 COMPARISON OF BLOCK MODEL VOLUMES TO WIREFRAMES
Mandalay Resources Corporation – Björkdal Mine

Wireframe Group	Number of Wireframes	Wireframe Volume (m^3)	Block Volume (m^3)	Differences (m^3)	Differences (%)
Central Zone (CZ)	134	2,290,837	2,262,309	-28,528	-1%
Main Zone (MZ)	150	3,778,799	3,647,724	-131,075	-3%
Lake Zone (LZ)	215	5,354,663	5,265,333	-89,330	-2%
South Zone (SZ)	27	1,482,594	1,477,368	-5,226	0%
East Pit (EP)	104	2,148,712	2,111,831	-36,881	-2%
West Pit (WP)	135	1,621,428	1,605,016	-16,412	-1%
Quartz Mountain (QP)	132	3,178,888	3,084,866	-94,022	-3%
Nylund (NYL)	92	3,226,029	3,220,484	-5,545	0%
Shear & Skarns	22	2,103,491	2,099,499	-3,992	0%

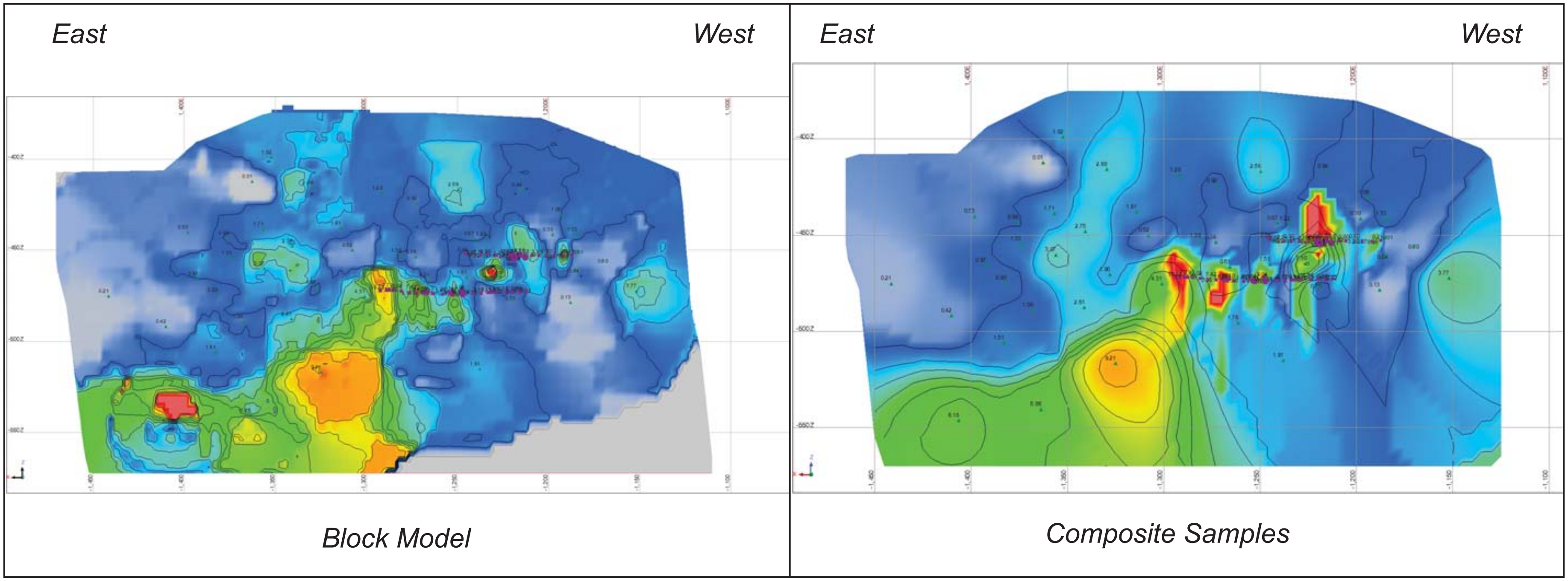
VISUAL COMPARISONS

In order to gauge the accuracy of the local estimate, visual comparisons were carried out that compared the contoured grade distributions prepared during the trend analysis exercise described above with the estimated block grades (Figure 14-16). Additional comparisons were presented in RPA (2017) and RPA (2018). Overall, reasonable spatial correlations were observed.

SWATH PLOTS

Similarly, RPA created a number of swath plots for selected wireframes from the underground mine (Figure 14-17). While some local variations were observed between the composite average grades and the block average grades, no material discrepancies were noted.

View Looking Towards Azimuth 180° (Local Grid)



Block Legend:

Undefined	5.00 - 6.00
0.00 - 1.00	6.00 - 7.00
1.00 - 2.00	7.00 - 8.00
2.00 - 3.00	8.00 - 9.00
3.00 - 4.00	9.00 - 10.00
4.00 - 5.00	10.00 - 101.00

- Drill Hole- RC
- Drill Hole- Core
- Chip Sample - Mandalay
- Chip Sample - Pre-Mandalay

0 25 50 75 100
Metres

March 2019

Source: RPA, 2018.

Figure 14-16

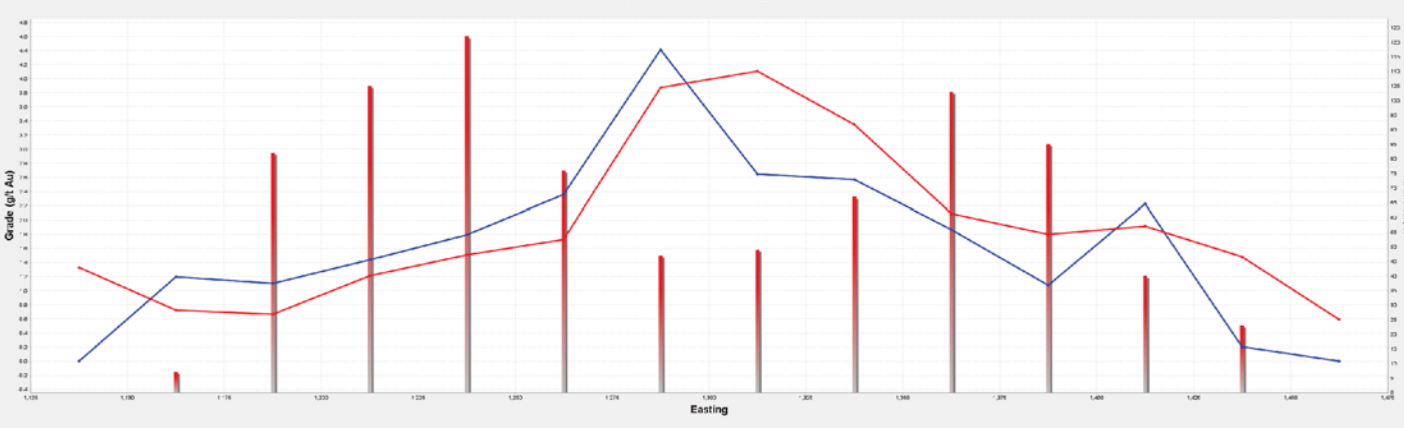
Mandalay Resources Corporation

Björkdal Mine

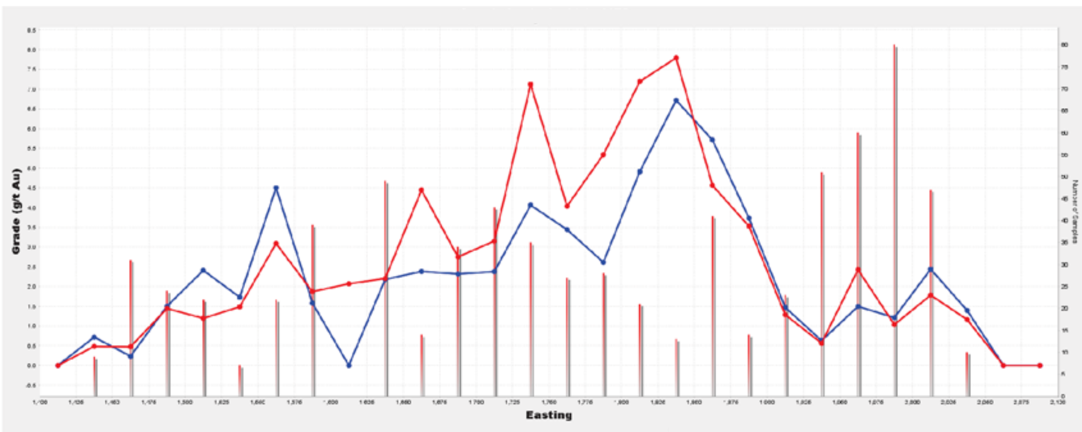
Västerbotten, Sweden

Comparison of Block Model Grades vs. Contoured Grades, Vein LZ180

Vein LZ180



Vein MZ5



Vein MZ25

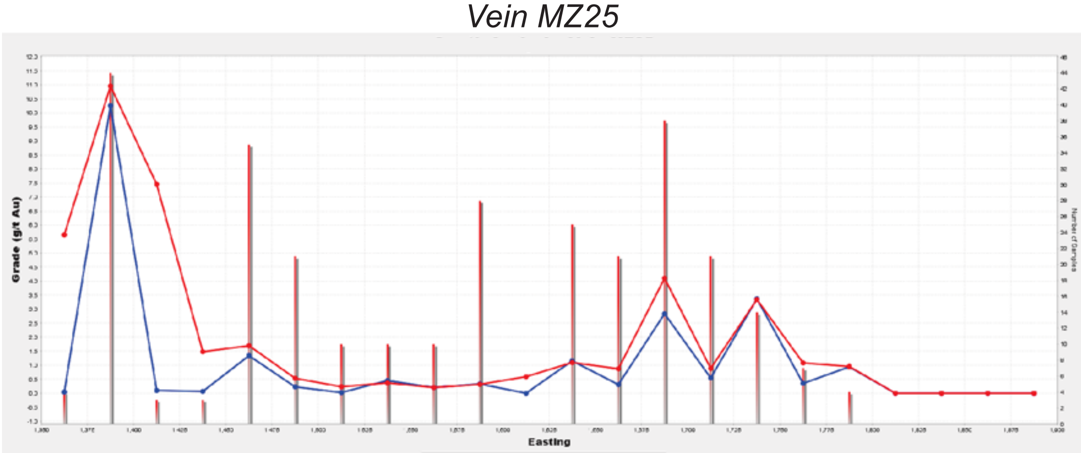


Figure 14-17

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Swath Plots

Legend:

- *Number of Samples*
- *Composites*
- *Block Grades*

March 2019

Source: RPA, 2019.

RECONCILIATION TO PRODUCTION STATISTICS

PLANT PRODUCTION STATISTICS

Reconciliation activities were conducted which compared the predicted tonnages, grades, and contained metal from the block model against the plant production data for 2018. The plant processes each available material type present in the plant stockpile area in individual batches and records the production statistics by material type. In total, the plant processed 433,662 tonnes at an average grade of 1.10 g/t Au from the open pit mine, 663,945 tonnes at an average grade of 1.56 g/t Au from the underground mine, and 151,103 tonnes at an average grade of 0.66 g/t Au from the long-term stockpile (Table 14-11).

TABLE 14-11 SUMMARY OF 2018 PLANT PRODUCTION STATISTICS
Mandalay Resources Corporation – Björkdal Mine

Feed Source	Mined Tonnes	Mined Grade (g/t Au)	Mined Oz Au	Processed Tonnes	Processed Grade (g/t Au)	Processed Oz Au
Open Pit Mine						
Ore A	313,874	1.22	12,311	361,394	1.19	13,827
Ore B to mill (B+)	75,257	0.54	1,307	72,268	0.66	1,533
Open Pit Total	**389,131**	**1.09**	**13,618**	**433,662**	**1.10**	**15,360**
Underground Mine						
Stope Ore (A+)	310,054	1.64	16,348	338,647	1.68	18,291
Development Ore (A)	170,666	2.03	11,139	178,713	2.00	11,492
Development B Ore (B)	120,296	0.54	2,089	146,585	0.73	3,440
Underground Total	**601,016**	**1.53**	**29,575**	**663,945**	**1.56**	**33,223**
Long-Term Stockpile						
Open Pit Ore B Stockpile (B)	409,848	0.60	7,906	22,851	0.61	448
Underground Development B Ore Stockpile	66,507	0.64	1,368	128,252	0.67	2,758
Stockpile Total	**476,355**	**0.61**	**9,275**	**151,103**	**0.66**	**3,206**
All Production						
Total	**1,466,502**	**1.11**	**52,468**	**1,248,710**	**1.29**	**51,790**

DESCRIPTION OF THE MATERIAL FLOWS

All of the material extracted from the underground stopes is placed directly onto the designated pile at the plant stockpile area. Material from development drives on the veins is taken to surface and is initially placed in a designated laydown area in the open pit while waiting for assay results. Once the grade of a given advance has been determined, material having grades over 0.40 g/t Au is then transported to one of two designated piles in the plant stockpile area, one for material with grade over 1.0 g/t Au and one with grade below 1.0 g/t Au. The remaining mineralized waste material is placed onto either the North or South long-term stockpile.

After blasting, the ore in the open pit mine is mined in three flitches of 2.5 m in height. Quartz veins are the predominant host material, however, gold can persist for a short distance along vein extensions without a quartz host. The host material provides an excellent visual clue for guiding of detailed sampling and for excavation. Detailed sampling is carried out on the top of each blast using a hand shovel to collect sample at approximately a five metre interval along the strike of the vein. Results are used to prepare dig plans.

Material from the open pit mine having grades greater than 1 g/t Au is classified as “A-ore” and is placed directly onto a designated pile at the plant stockpile area. Material in the open pit that has been determined to have gold grades between 0.40 g/t Au and 1 g/t Au is classified as “B-ore”. Depending upon the plant capacity, the B-ore material from the open pit is either placed onto a designated pile at the plant stockpile area or is co-mingled on the long-term stockpiles with the B-ore material from the underground mine. The tonnages of the ore excavated from the open pit mine are determined from truck counts. The grade of the ore in the open pit mine is determined on an in-situ basis from the detailed channel samples taken on each flitch.

Material from the North and South long-term stockpiles is fed to the plant when sufficient capacity is available. The stockpile volumes are determined on a monthly basis using drone-based laser topology equipment and an average density of 1.8 t/m^3. The plant maintains a monthly record of the amount of feed received from the stockpiles on a combined basis. A short-term stockpile of crushed ore (nominal -8 mm in size) is maintained in close proximity to the plant fine ore bin to maintain the plant throughput in the event of unforeseen shortages in feed. This fine ore stockpile has also been used to feed the plant on a batch basis.

A daily sampling procedure is followed to calculate the provisional gold content in connection with the sale of concentrates and also for determining the daily average feed grade. Samples are taken from the high grade gravity concentrate containing approximately 60% Au, the middlings concentrate containing approximately 1,500 g/t Au, the Knelson concentrate containing approximately 300 g/t Au, and the flotation concentrate containing approximately 100 g/t Au. The tailings stream containing approximately 0.1 g/t Au is sampled every 20 minutes and the results are compiled and reported on a shift composite basis. The tailings densities are determined using Marcy scales and the tailings flow rate is measured with a flow meter. Daily feed grades are calculated using the gold content in the four concentrates, the tailings stream, and the total daily tonnage throughput. The daily tonnage is determined using three calibrated weightometers located ahead of the primary grinding circuit.

The material flows and sampling points at the Björkdal Mine are summarized in Figures 14-18 and 14-19, respectively.

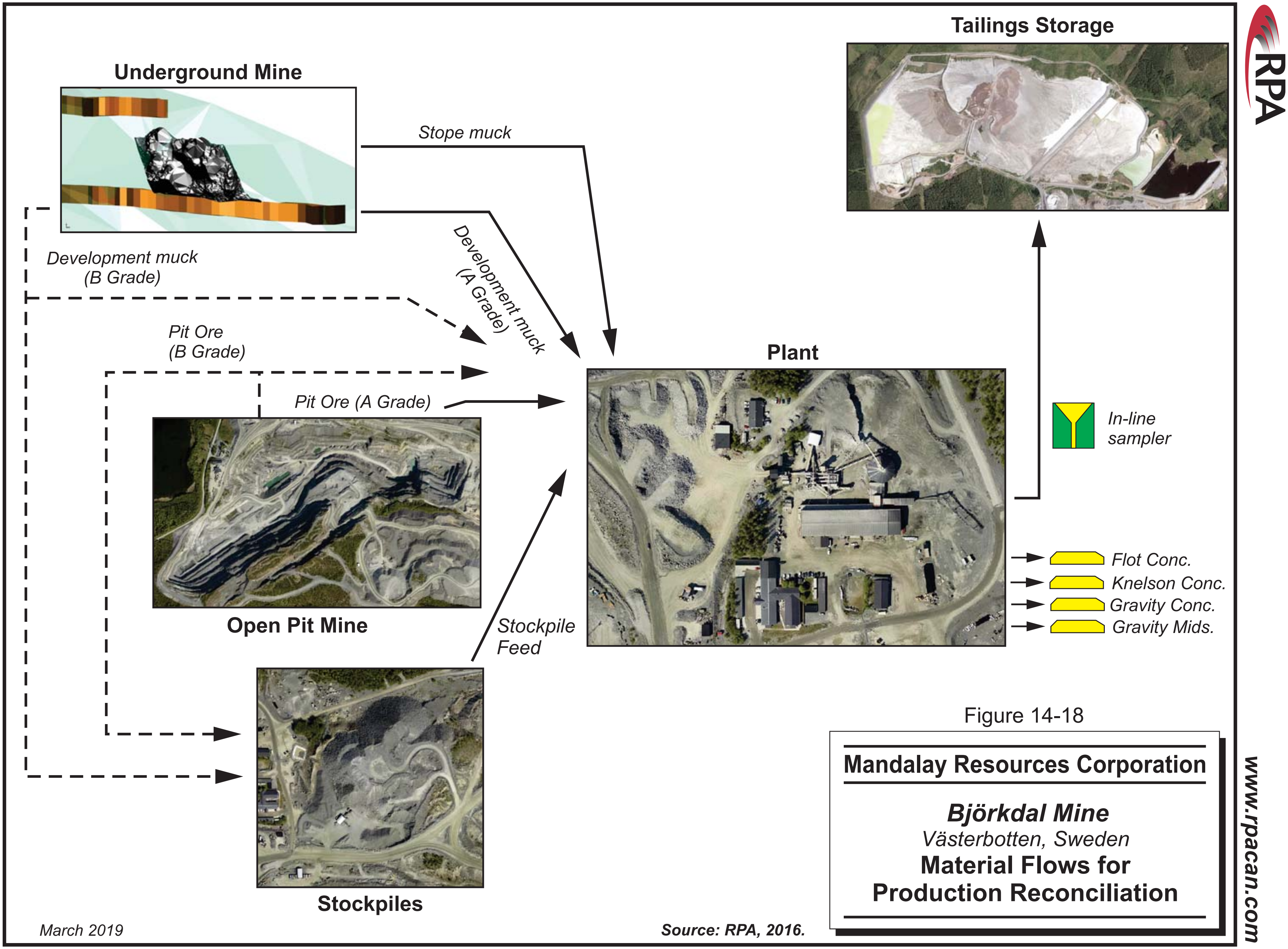


Figure 14-18

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Material Flows for Production Reconciliation

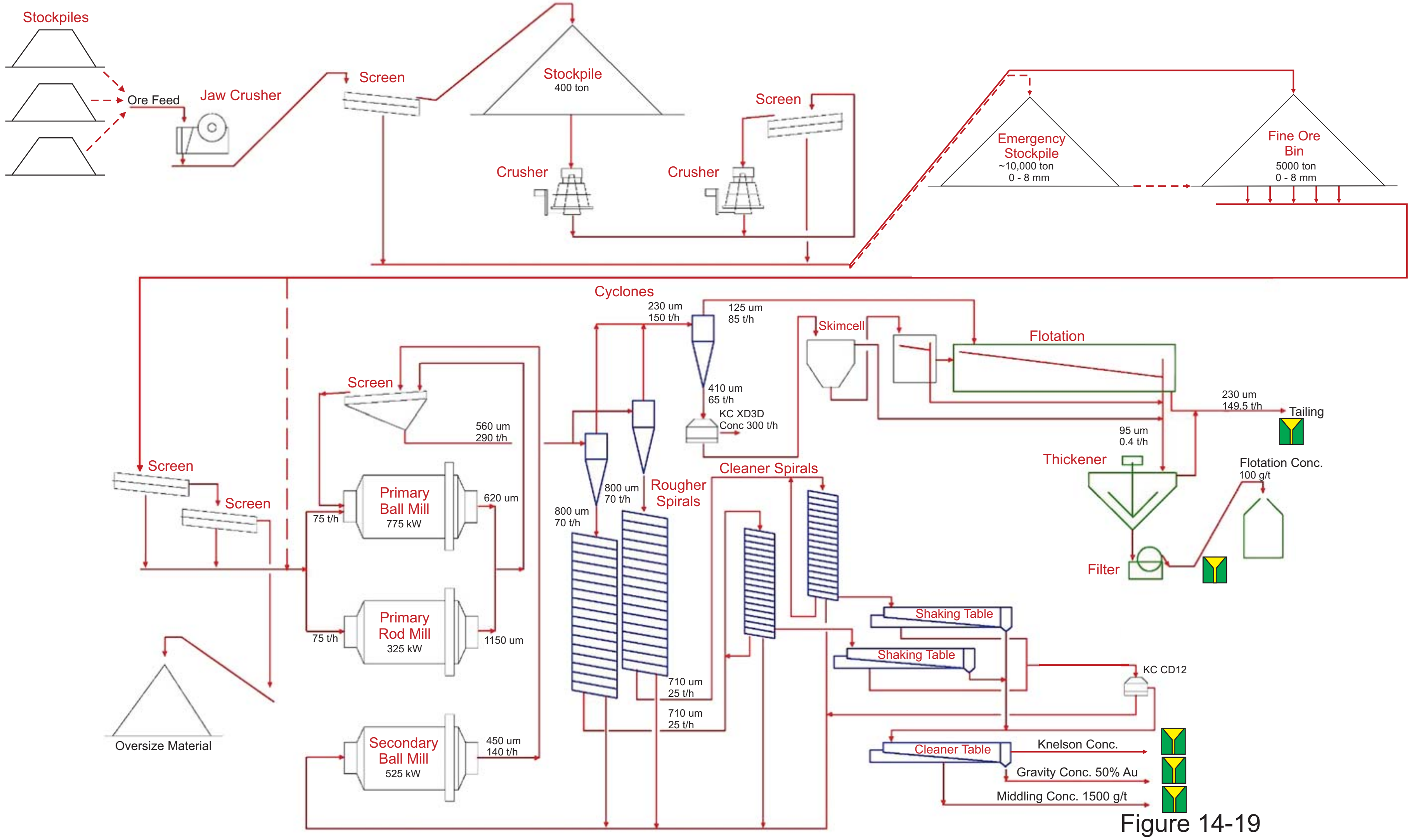


Figure 14-19

Note: Plant feed grades are determined by back-calculation from gold produced and tailings tonnage and grade

Existing Sampling Point

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Sample Point Locations Used for Mine to Mill Reconciliation

March 2019

Source: WIDcon AB, 2014.

MODEL-TO-MILL RECONCILIATIONS, OPEN PIT MINE

A comparison of the predicted tonnage, grade, and gold content between the year-end 2017 long-term model and the 2018 grade control model (constructed using the same parameters as the long-term model and updated more frequently as additional sample information became available) to plant production statistics was carried out for January to December 2018 (Table 14-12). For this comparison, the tonnages and grades were reported from the model at a block cut-off grade of 1.0 g/t Au for all material, on a blast by blast basis, representing the A-ore. As the A-ore was directly fed to the mill, it can therefore be directly compared to predicted tonnes, grade, and contained gold.

It is important to understand that the reports from the long-term and grade control models consider the undiluted, in-situ tonnes and grade only while the plant production data is reporting the mill feed tonnes and grade which are inclusive of mining dilution (internal, planned, and unplanned) and mining losses, and so these factors must be considered when analyzing the information.

Similarly, the predicted tonnages and grades from the 2018 planned dig packets were compiled for comparison with the grade control model and the plant production data. It is important to understand that these tonnes and grade represent the planned diluted and recovered material on an in-situ basis, while the plant production data represents the actual tonnes and grade recovered after the material is extracted from the open pit mine.

TABLE 14-12 2018 RECONCILIATION DATA, OPEN PIT MINE
Mandalay Resources Corporation – Björkdal Mine

Open Pit: A Ore (> 1 g/t Au)

	Long-Term Model (as at January 1, 2018, In-situ)			Grade Control Model (In-situ)			Planned Dig Packets (Diluted, Recovered)			Milled (Plant Feed)		
Quarter	**Tonnes**	**Grade (g/t Au)**	**Oz Au**	**Tonnes**	**Grade (g/t Au)**	**Oz Au**	**Tonnes**	**Grade (g/t Au)**	**Oz Au**	**Tonnes**	**Grade (g/t Au)**	**Oz Au**
Q1	32,768	2.90	3,053	35,138	3.26	3,686	68,403	1.29	2,830	64,370	1.79	3,704
Q2	45,735	2.65	3,904	38,234	2.59	3,183	67,069	1.23	2,650	96,256	1.22	3,773
Q3	32,127	2.43	2,504	27,958	3.01	2,707	42,192	1.25	1,696	55,824	0.83	1,496
Q4	54,807	2.52	4,432	60.477	2.72	5,297	75,840	1.24	3,023	100,788	0.95	3,067
2018 Total	**165,437**	**2.61**	**13,893**	**161,807**	**2.86**	**14,873**	**253,504**	**1.25**	**10,199**	**317,238**	**1.18**	**12,040**

It can be seen that the tonnages, grades, and contained metal are all in good agreement between the year-end 2017 long term block model and the 2018 grade control model for the

A-Ore in the open pit mine. The current year-end 2018 long term model was prepared using the same work flows and estimation parameters.

MODEL-TO-MILL RECONCILIATION, UNDERGROUND MINE

A comparison of the predicted tonnage, grade, and contained gold between the year-end 2017 long-term model and the 2018 grade control model (constructed using the same parameters as the long-term model and updated more frequently as additional sample information became available) to plant production statistics was carried out for January to December 2018 for both development material and for stopes (Tables 14-13 and 14-14).

For the stope material, valid CMS scans were not always available due to equipment failure and the implementation of new protocols around the scanning of stope voids. For stopes where valid scans were not available, the designed excavation was used, along with an expansion factor applied to account for likely overbreak.

For development material, the surveyed monthly drive solids were used to report the predicted tonnes, grade, and contained gold for these areas. It is important to note that not all development material is milled. Material that the grade control program identifies as waste or very low grade is rejected and sent to the appropriate waste or low grade stockpiles. No cut-off grade was applied to the model for the underground reports.

TABLE 14-13 2018 STOPE RECONCILIATION DATA, UNDERGROUND MINE
Mandalay Resources Corporation – Björkdal Mine

Underground: Stopes

Quarter	Long-Term Model (January 1, 2018			Grade Control Model			Trucked Material			Milled		
	Tonnes	Grade (g/t Au)	Oz Au	Tonnes	Grade (g/t Au)	Oz Au	Tonnes	Grade (g/t Au)	Oz Au	Tonnes	Grade (g/t Au)	Oz Au
Q1	73,317	1.55	3,653	85,041	1.35	3,700	96,531	0.70	5,277	98,170	1.66	5,248
Q2	91,843	1.99	5,886	87,110	1.80	5,039	81,742	1. 68	4,415	87,599	2.10	5,917
Q3	71,110	1.36	3,102	61,485	1.52	3,009	55,215	1.54	2,740	53,632	1.19	2,048
Q4	71,253	2.06	4,780	70,638	2.02	4,591	87,854	1.58	4,475	80,475	1.54	3,986
2018 Total	**307,523**	**1.76**	**17,421**	**304,274**	**1.67**	**16,339**	**321,342**	**1.64**	**16,907**	**319,876**	**1.67**	**17,199**

TABLE 14-14 2018 DEVELOPMENT RECONCILIATION DATA, UNDERGROUND MINE
Mandalay Resources Corporation – Björkdal Mine

Underground: Development

Quarter	Long-Term Model (January 1, 2018			Grade Control Model			Trucked Material			Milled		
	Tonnes	Grade (g/t Au)	Oz Au	Tonnes	Grade (g/t Au)	Oz Au	Tonnes	Grade (g/t Au)	Oz Au	Tonnes	Grade (g/t Au)	Oz Au
Q1	139,729	0.54	**2,448**	137,125	0.59	2,586	100,713	**1.10**	3,572	80,758	1.45	3,770
Q2	140,332	0.91	4,085	140,211	0.92	4,165	130,843	**1.11**	4,686	94,217	1.61	4,865
Q3	115,223	0.74	2,757	111,920	0.93	3,341	96,330	0.94	2,922	70,563	1.38	3,127
Q4	131,129	0.54	2,297	130,557	0.93	3,919	122,084	0.96	3,773	85,293	1.21	3,326
2018 Total	**526,413**	**0.68**	**11,587**	**519,813**	**0.84**	**14,011**	**449,970**	**1.03**	**14,953**	**330,831**	**1.42**	**15,088**

It can be seen that the tonnages, grades, and contained metal are all in good agreement between the year-end 2017 long term block model and the 2018 grade control model for the stope muck from the underground mine. For the development muck, it can be seen that the average grade of this material in the grade control model is approximately 22% higher than was predicted from the long-term model, while the tonnage was slightly lower. This has resulted in the grade control model predicting approximately 21% more metal than the long-term model.

The current year-end 2018 long term model was prepared using the same work flows and estimation parameters as were used to prepare the year-end 2017 long term model.

RPA recommends that Mandalay continue to refine its operating procedures to continue to collect accurate information for use in reconciliation studies. Particular attention should be paid to obtaining high quality scans of all stope voids on a regular and timely basis. This information should then be integrated into the material tracking and metal accounting systems to permit comparisons to be made for the block model versus the mine actual production and then the mill output.

MINERAL RESOURCES CLASSIFICATION CRITERIA

The definitions for resource categories used in this report are consistent with CIM (2014) definitions and adopted by NI 43-101.

In respect of the block model for the veins in the underground mine, all blocks that were located within a mineralization wireframe whose grades were estimated in either the first or second estimation passes were assigned a preliminary classification of Indicated Mineral Resources. Those blocks whose grades were estimated in the third estimation pass were assigned a preliminary classification of Inferred Mineral Resources. No Measured Mineral Resources were assigned.

The preliminary classifications were subsequently refined to reflect the location of the marble contact. Only those blocks within the mineralized wireframes that were located below the marble contact retained their classifications as either Indicated or Inferred Mineral Resources. Any blocks within the mineralized wireframes in the MZ, LZ, CZ, or SZ vein groups that were located above the Upper Shear surface were removed from the Mineral Resource classification and their block grades reduced to zero.

Similarly, in respect of the block model for the open pit mine, all blocks that were located within a mineralization wireframe whose grades were estimated in the first estimation pass were assigned a preliminary classification of Indicated Mineral Resources. Those blocks whose grades were estimated in the second estimation pass were assigned a preliminary classification of Inferred Mineral Resources. No Measured Mineral Resources were assigned.

Finally, all blocks that received an estimated grade within the waste domain were assigned a preliminary classification of Inferred Mineral Resources.

As with the block model for the underground mine, the preliminary classifications were subsequently refined to reflect the location of the Upper Shear surface. Only those blocks that were located below this surface retained their classifications as either Indicated or Inferred Mineral Resources. Any blocks that were located above the surface for the EP, WP, QM, or NYL vein groups were removed from the Mineral Resource classification and the block grades reduced to zero.

A series of manual clean-up passes were also carried out on a number of veins in the underground and open pit mines to address areas of the veins that were estimated from a single drill hole.

RESPONSIBILITY FOR THE ESTIMATE

The estimate of the Mineral Resources for the Björkdal Mine presented in this report was prepared by Mr. Reno Pressacco, M.Sc.(A), P.Geo., who is a Qualified Person as defined in NI 43-101, and is independent of Mandalay.

CUT-OFF GRADE AND RESOURCE REPORTING CRITERIA

Separate cut-off grades were developed for reporting of the underground and open pit Mineral Resources. Each cut-off grade was developed using the January to September 2018 actual cost information along with a gold price of US$1,400 per ounce and an exchange rate of 9.0 SEK/US$. The cut-off grade for reporting of Mineral Resources was determined to be 0.95 g/t Au within the underground mine and 0.35 g/t Au for the open pit mine.

Metal prices used for reserves are based on consensus, long term forecasts from banks, financial institutions, and other sources. For resources, metal prices used are slightly higher than those for reserves.

To fulfill the NI 43-101 requirement of "reasonable prospects for eventual economic extraction", Mandalay prepared a preliminary open pit resource shell using the Whittle parameters reported in Section 15 and based on a US$1,400/oz gold price.

The criteria used to report the Mineral Resources within the open pit mine included:

- All blocks located above the resource pit surface
- Not depleted for mining;
- Not including loose or backfill material;
- Within either a mineralized wireframe model, the mineralized waste domain model, or the failure zone;
- Having estimated block grades greater than 0.35 g/t Au, and
- Having a Mineral Resource category of either Indicated or Inferred.

The criteria used to report the Mineral Resources within the underground mine included:

- All blocks within a mineralized wireframe;
- Located below the open pit reporting shell;
- Not depleted for mining or the subsidence area;
- Having estimated block grades greater than 0.95 g/t Au; and
- Having a Mineral Resource category of either Indicated or Inferred.

BJÖRKDAL MINE MINERAL RESOURCE ESTIMATE

The Mineral Resources are inclusive of Mineral Reserves. The Mineral Resources are reported using excavation volumes and surfaces current as of November 30, 2018 and depleted for mining in December 2018 (Table 14-15).

TABLE 14-15 SUMMARY OF BJÖRKDAL MINERAL RESOURCES – AS OF DECEMBER 31, 2018
Mandalay Resources Corporation – Björkdal Mine

Category	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
Indicated	Open Pit	2,947	2.30	218
	Underground	7,416	2.98	711
	Sub-total	10,363	2.79	929
	Stockpile	2,700	0.64	56
Total Indicated		**13,063**	**2.36**	**985**
Inferred	Open Pit	2,516	1.32	107
	Underground	1,922	2.63	162
Total Inferred		**4,438**	**1.89**	**269**

Notes:
1. Björkdal Mineral Resources are estimated using drill hole and sample data as of September 30, 2018 and depleted for production through December 31, 2018.
2. CIM (2014) definitions were followed for Mineral Resources.
3. Mineral Resources are inclusive of Mineral Reserves.
4. Mineral Resources are estimated using an average gold price of US$1,400/oz and an exchange rate of 9.0 SEK/US$.
5. Bulk density is 2.74 t/m^3.
6. High gold assays were capped to 30 g/t Au for the open pit mine.
7. High gold assays for the underground mine were capped at 60 g/t Au for the first search pass and 40 g/t Au for subsequent passes.
8. Interpolation was by inverse distance cubed utilizing diamond drill, reverse circulation and chip channel samples.
9. Open pit Mineral Resources are estimated at a cut-off grade of 0.35 g/t Au and constrained by the resource pit design.
10. Underground Mineral Resources are estimated at a cut-off grade of 0.95 g/t Au.
11. A nominal two metres minimum mining width was used to interpret veins using diamond drill, reverse circulation, and underground chip sampling.
12. Stockpile Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au and are based upon 2018 material flows.
13. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
14. Numbers may not add due to rounding.

RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate.

NORRBERGET

The following description for Norrberget was taken from the 2018 Technical Report (RPA, 2018). No changes have been made to the Mineral Resource estimate since the underlying assumptions have not changed with the exception of the exchange rate (9.0:1 versus 8.4:1). RPA does not expect the change in exchange rate to have a material impact on the Mineral Resource at Norrberget.

TOPOGRAPHY MODEL

A DTM generated from Surpac software was provided to clip the block model. The drill hole collars within the resource database were checked against the DTM elevation and all were within 0.03 m difference except drill hole 2009610, which was less than 0.30 m.

DESCRIPTION OF THE DATABASE

RPA received the Norrberget dataset in July 2017 as an Access database that contained all drilling up until the completion of the 2016 exploration program. Additional 2017 drilling was completed and appended to the drill hole database on October 4, 2017. No drilling has been carried out since October 4, 2017.

The database was imported into Micromine v 2016.1 (SP 2) geological modelling software for data validation and modelling. The database contained 167 drill holes, however, 107 of these drill holes were flagged as occurring significantly outside the licence area of Norrberget 300. The remaining 72 drill holes were used for the resource database and block model interpolation.

A summary of the resource database is provided in Table 14-16.

TABLE 14-16 SUMMARY OF NORRBERGET MINERAL RESOURCE DATABASE
Mandalay Resources Corporation – Norrberget Deposit

Item	Record Count/Details
Drill Holes	72
Total Length (m)	6,972.10
Downhole Survey	1,607
Lithology	480
Assay Values	5,526
Assay Length (m)	5,385.10

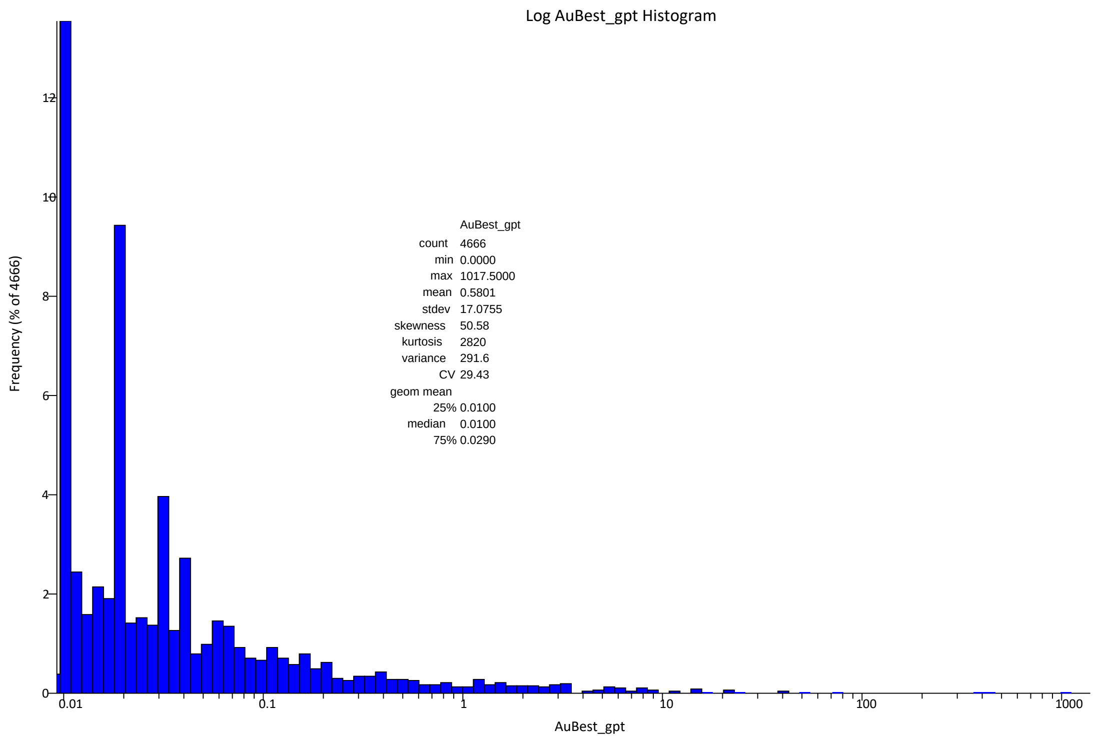
The imported data was validated to check for issues such as duplicate drill holes, survey issues, typos, samples beyond end of hole, etc. One assay sample was identified as being invalid as a result of the From and To depths being the same value. This sample was well below cut-off grade and the depths were corrected to match the neighbouring intercepts. Nine drill holes did not have a collar survey, however, the first downhole survey measurement was taken at a three metre depth.

The resource database is considered by RPA to be sufficiently reliable for grade modelling and Mineral Resource estimation.

LITHOLOGY AND MINERALIZATION WIREFRAMES

The Norrberget mineralization occurs within bands of veinlets and alteration containing amphibole in a package of interbedded mafic tuffs and volcaniclastics. RPA reviewed the geological logging and was not able to differentiate suitably the grade from waste rock using the lithology and alteration logging. RPA reviewed the assay data statistically and spatially and observed a second gold grade population at approximately 0.4 g/t Au. RPA's wireframes were built based on an approximately 0.4 g/t Au wireframe cut-off grade. The raw gold assay histogram is shown in Figure 14-20.

FIGURE 14-20 RAW AU DATA HISTOGRAM



Fourteen cross sections were created on a 20° azimuth across the strike of the deposit to match the main direction of drilling. As the drill hole spacing and direction was not a constant, these sections were created between 6 m and 40 m apart, although most were between 20 m and 25 m apart. Due to the variable cross section spacing, each cross-sections window of view extended half the distance to the next cross section to cover the entire deposit.

Polylines were generated around the mineralization and as the mineralization has been observed to be fairly continuous these shapes were extrapolated. A two metre minimum mining width was applied which had the result of bringing in some waste material into the model in small intercepts. Some mineralization below the 0.4 g/t Au cut-off grade was included within the model to allow for geological continuity.

The sectional polylines were joined together in three dimensions to form valid and closed wireframes that contained the mineralization along the length of the deposit. In total three mineralization wireframes were created, one main wireframe that ran the length of the deposit, and two small footwall wireframes that occur at either end. Other above cut-off intercepts occurred in both the hanging and footwall, however these could not be traced to adjacent sections without significant waste material being incorporated and were therefore rejected.

A bedrock surface was generated from contouring the depth of the first bedrock intercept downhole and creating a DTM of the contours. The bedrock surface was used to clip the top of the mineralization wireframes. The final volumes of the mineralization wireframes are:

- Min_1 = 187,642 m^3
- Min_2 = 11,909 m^3
- Min_3 = 14,733 m^3

Figure 14-21 illustrates an orthogonal view of the mineralization wireframes (Pink = Min_1, Orange = Min_2, Red = Min_3) below the topographic surface (brown) supplied by Mandalay.

Additional surfaces were generated through contouring the boundary intercept between the volcanics and mafics and the volcanics and limestone for the purposes of flagging density values to the block model.

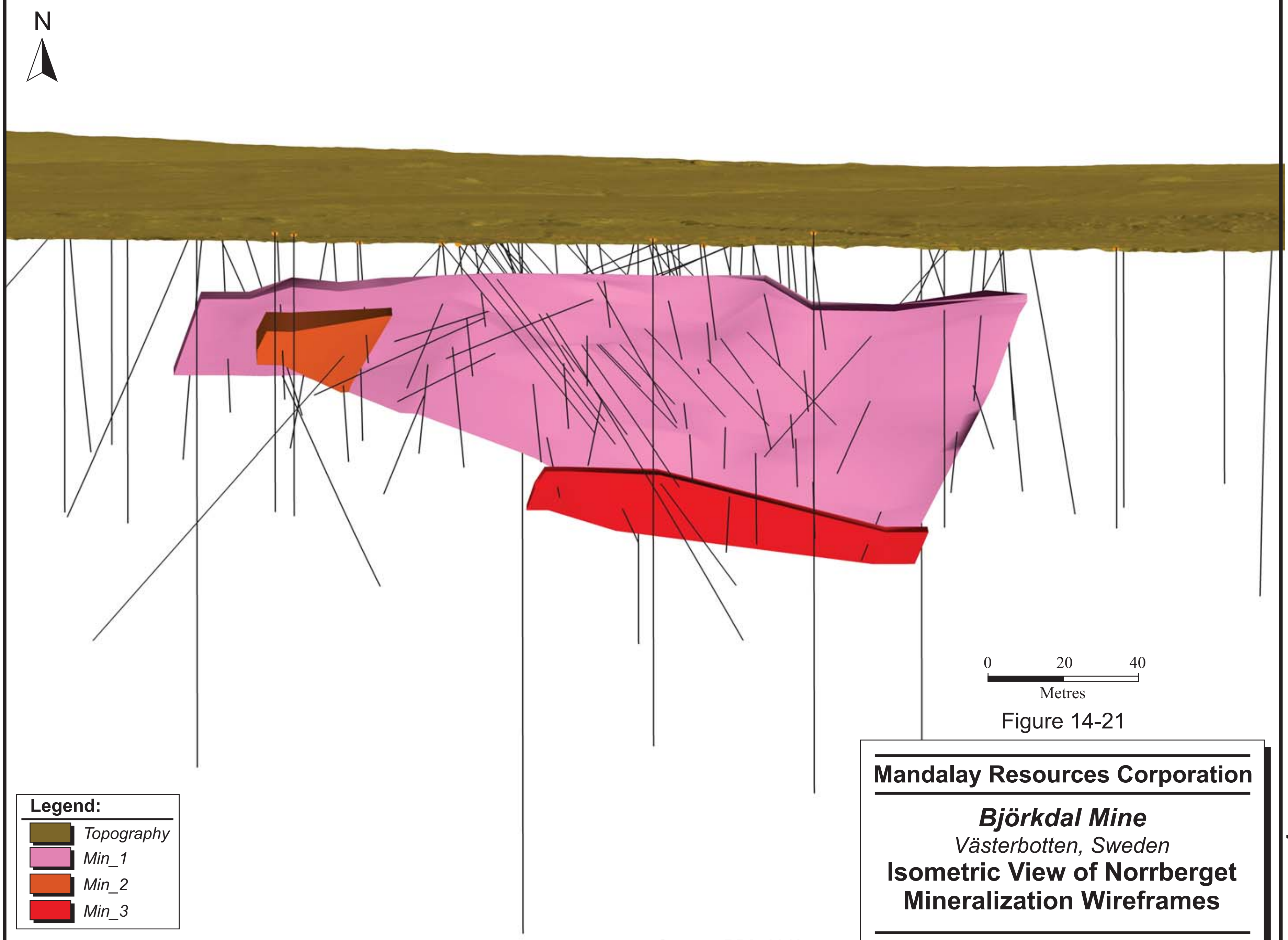


Figure 14-21

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Isometric View of Norrberget Mineralization Wireframes

March 2019

Source: RPA, 2018.

RPA

www.rpacan.com

COMPOSITING METHODS AND GRADE CAPPING

Samples within the domain wireframes were flagged with the domain name. Statistics for samples in the entire dataset and within the domain only are presented in Table 14-17.

TABLE 14-17 SUMMARY OF NORRBERGET SAMPLE STATISTICS
Mandalay Resources Corporation – Norrberget Deposit

Data	No. of Samples	Min (g/t Au)	Max (g/t Au)	Mean (g/t Au)	Var. (g/t Au)	StDev. (g/t Au)	CV (g/t Au)
All	8,519	0.00	1,017.50	0.36	167.21	12.93	35.79
Within Domains	327	0.00	1,017.50	7.75	4,115.79	64.15	8.28

GRADE CAPPING

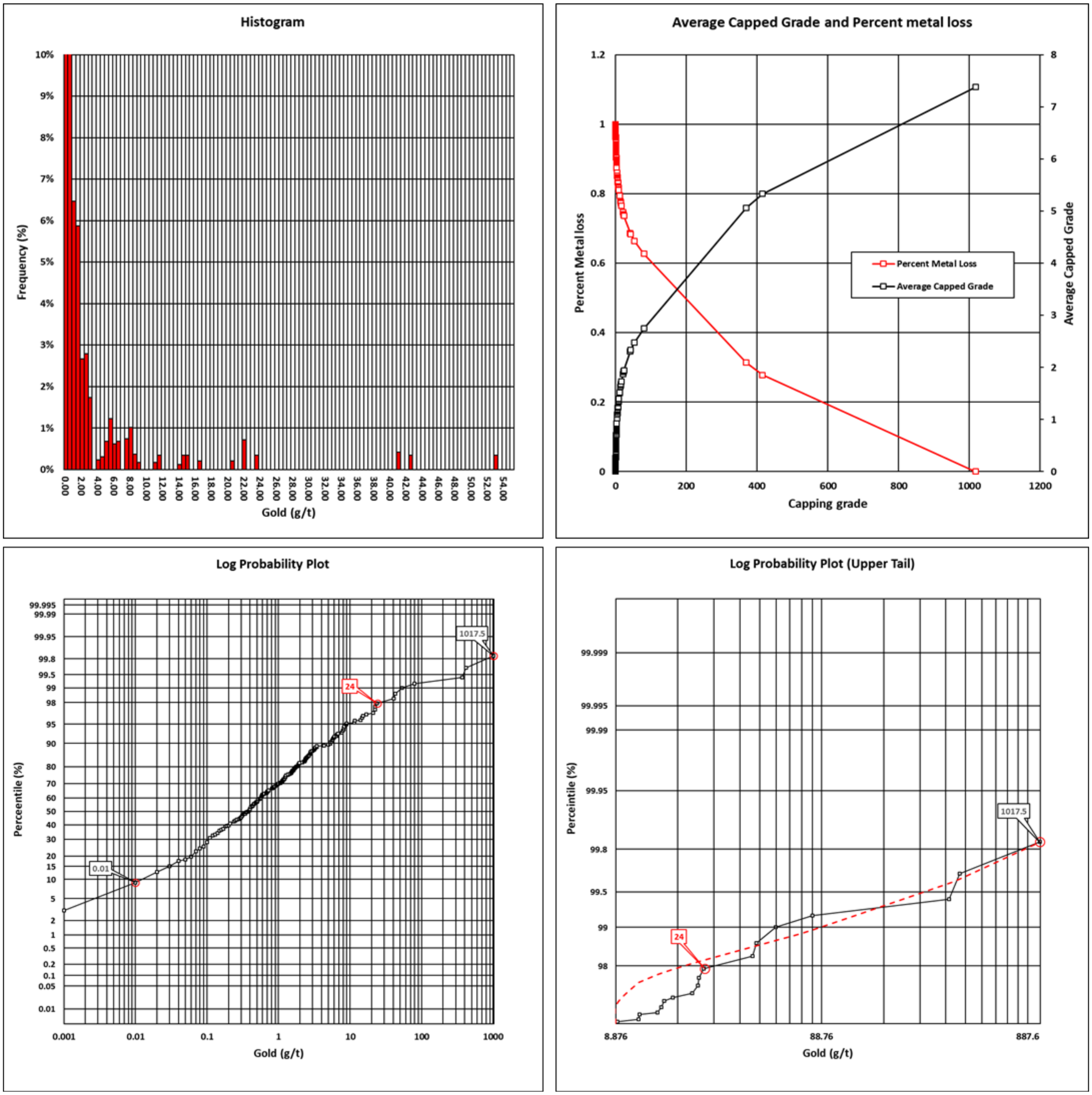
Gold projects are often susceptible to nugget effect where anomalous high grades can be encountered during assay analysis. Erratic high grade values can be over-represented during block model interpolation, resulting in significant over-estimation of the local gold grade. Gold values were observed as high as 1,017.5 g/t Au within the Norrberget resource dataset. To remove the influence of these high grade samples, a top-cut (capping) level is applied where the grade is observed to become erratic. Histograms, probability plots, and decile analysis were reviewed for all gold samples contained within the combined mineralization wireframes. The domains were not analyzed separately due to the small sample numbers in domains Min_2 and Min_3. The gold capping analysis is illustrated in Figure 14-22.

Table 14-18 outlines the capping values and statistics for the combined mineralized domain.

TABLE 14-18 SUMMARY OF GOLD CAPPING
Mandalay Resources Corporation – Norrberget Deposit

Metal	Unit	Dataset	Cap	No of Samples	Min	Max	Mean	StDev	CV	No of Caps	Metal Loss
Au	g/t	Uncapped	24	311	0.00	1,017.50	7.38	65.55	8.88	7	74%
		Capped			0.00	24.00	1.95	4.66	2.39		

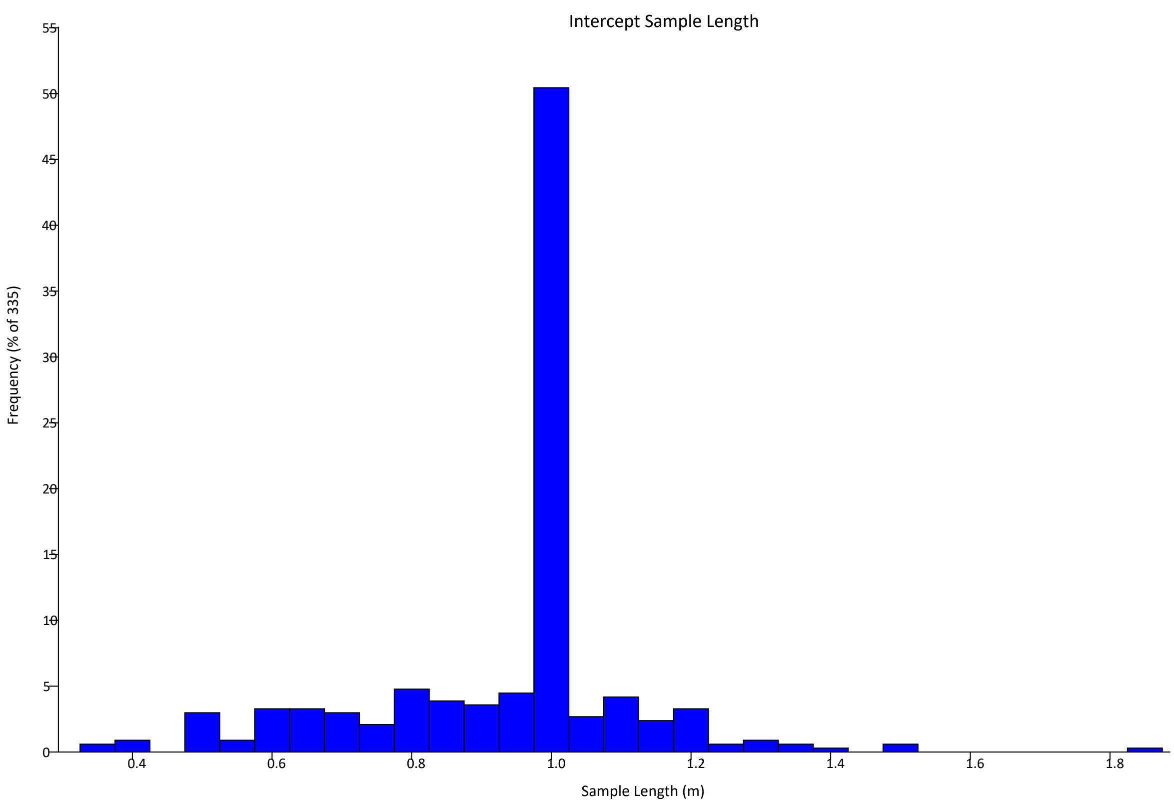
FIGURE 14-22 CAPPING ANALYSIS OF GOLD WITHIN VEIN DOMAINS, NORRBERGET



COMPOSITING

Sample lengths within the mineralized domains ranged between 0.35 m and 1.86 m, with over 50% occurring at 1.00 m ± 0.05 m (Figure 14-23). The samples within the mineralized domain wireframes were composited on a one metre interval. Intercepts that were less than 0.50 m after compositing were removed from the estimation database to ensure that they did not overly influence the resource estimation.

FIGURE 14-23 HISTOGRAM OF SAMPLE LENGTHS WITHIN VEIN DOMAINS



BULK DENSITY

Density measurements were taken during a previous exploration program that collected 358 samples from four diamond drill holes. Sample densities were calculated using Archimedean principles of measuring a sample in air and immersed in water. An average bulk density for each lithology is presented in Table 14-19.

TABLE 14-19 MEAN BULK DENSITY BY LITHOLOGY
Mandalay Resources Corporation – Norrberget Deposit

Lithology	Density (g/cm^3)
Overburden	1.80
Mafic Tuff	2.78
Mineralization	2.78
Mafic Volcaniclastic	2.72
Limestone	2.76

VARIOGRAPHY

The capped and composited intercepts were loaded into Snowden Supervisor v8.6 for continuity analysis and semi-variogram modelling. Due to the low sample numbers present within the wireframed domains it was not possible to model meaningful semi-variograms.

To review the continuity analysis, the data was loaded into Leapfrog Geo and the gold grade values contoured, which defined a trend for the high grade zone that matched a trend observed in Snowden Supervisor. These trends were used to inform the interpolation parameters.

BLOCK MODEL CONSTRUCTION

An empty block model was created of sufficient size to encompass the three mineralized domains and allow suitable waste for a pit shape that would be required to constrain the Mineral Resource. A parent block size of 6 m by 4 m by 4 m in the X, Y, and Z directions was used, providing 85 blocks in the X direction, 80 blocks in the Y direction, and 34 blocks in the Z direction. The blocks were rotated by 105° from north to match the strike of the mineralization. The block model has been clipped below the DTM surface supplied by Mandalay. In total, the block model contains 240,291 blocks.

Sub-blocking was applied along the boundaries of the mineralized domains to a minimum of 2.0 m in all directions. The blocks were flagged with each mineralized domain separately so that a hard boundary could be applied. A summary of the block model dimensions is provided in Table 14-20.

TABLE 14-20 BLOCK MODEL DIMENSIONS
Mandalay Resources Corporation – Norrberget Deposit

Origin			Block Model Length (m)			Parent Block Dimension (m)			Minimum Sub Block Size (m)	Block Model Rotation
X	Y	Z	X	Y	Z	X	Y	Z	X, Y or Z	
768,900	7,211,600	0	470	350	130	6.0	4.0	4.0	2.0	105°

The block model attributes are outlined in Table 14-21.

TABLE 14-21 BLOCK MODEL ATTRIBUTES
Mandalay Resources Corporation – Norrberget Deposit

Variables	Default	Type	Description
EAST	0	Real	X Position
NORTH	0	Real	Y Position
RL	0	Real	Z Position
_EAST	0	Float	X Block Size
_NORTH	0	Float	Y Block Size
_RL	0	Float	Z Block Size
SG	0	Real	Specific Gravity
Run	0	Character	Search Pass Number
Class	0	Character	Block Classification
Domain	0	Character	Mineralisation Domain Name
RPA_Cap_Au	0	Real	Capped Au Grade
AuBest_gpt	0	Real	Uncapped Au grade
POINTS	0	Short	Number of Samples Used
STD_DEV	0	Real	Standard Deviation
Hole Count	0	Short	Number of Drill Holes Used
AVERAGE DISTANCE	0	Float	Average Distance of Samples
CLOSEST DISTANCE	0	Float	Closest Sample Distance
NN_RPA_Cap_Au	0	Real	Nearest Neighbour Au Grade

The block model was flagged using ID^3 for the blocks as no meaningful variograms could be modelled. A simultaneous Nearest Neighbour (NN) interpolation was undertaken using the same parameters to provide a check against the ID^3 model.

The orientation and radius of the search ellipse were calculated using the parameters observed during the continuity analysis. The continuity analysis highlighted a perceived strong 15° plunge to the deposit.

Three passes of a search ellipsoid were undertaken during interpolation, each run having an increasing search radius and a decreasing minimum number of interpolants to ensure that all blocks were interpolated with an estimated grade. All domains were estimated using a hard boundary. The parameters used for the ID^3 interpolation are outlined in Table 14-22.

TABLE 14-22 BLOCK MODEL INTERPOLATION PARAMETERS
Mandalay Resources Corporation – Norrberget Deposit

Run	Axis 1 Radius (m)	Axis 2 Radius (m)	Axis 3 Radius (m)	Max Samples	Max Samples Per Hole	Min Points (Total)	Min Holes	Search Ellipse		
								Azi (°)	Plunge (°)	Dip (°)
1	33.3	16.6	16.6	12	2	3	3	5	15	5
2	50	25	25	8	2	3	2	5	15	5
3	100	25	25	8	2	1	1	5	15	5

BLOCK MODEL VALIDATION

RPA reviewed the interpolated block model to ensure that it is representative of the input data. This validation used the following methodologies:

- Volumetric comparison between domain wireframes and flagged block model.
- Visual comparison of composite grade to interpolated block grades in plan and long/cross section.
- Statistical comparison between raw, composite and interpolated block grades.
- Swath plots comparing the interpolated block grades (ID^3 and NN) against composite sample grades.

COMPARISON OF COMPOSITE SAMPLES TO BLOCK MODEL

A comparison between the wireframe volume and the resultant flagged block model volume is presented in Table 14-23.

TABLE 14-23 WIREFRAME VOLUMES VS. BLOCK MODEL VOLUMES
Mandalay Resources Corporation – Norrberget Deposit

Domain	Wireframe Volume (m^3)	Block Model Volume (m^3)	Difference	
			(m^3)	(%)
Min_1	187,643	186,272	-1,371	-0.73%
Min_2	11,909	12,128	219	1.84%
Min_3	14,734	16,088	1,354	9.19%
Total	**214,286**	**214,488**	**202**	**0.09%**

The results show that although there are some significant differences between the wireframe volumes in Min_2 and Min-3, most likely a result of the limited volume of these domains resulting in a higher chance that the centroid of the block will occur near the edges of the wireframe. The main mineralized domain (Min_1) however, has a much smaller volume difference (-0.73%). When compared overall, the difference between the wireframe volumes and the block model volumes are negligible. This indicates that the trade-off between the block size and minimum practical block size for Mineral Resource estimation purposes is at an acceptable level.

Table 14-24 summarizes the statistical properties of the ID^3 Norrberget block model.

TABLE 14-24 NORRBERGET BLOCK MODEL STATISTICS
Mandalay Resources Corporation – Norrberget Deposit

Domain	Count	Min (g/t Au)	Max (g/t Au)	Mean (g/t Au)	Variance	StDev	CV
Min_1	7,740	0.00	18.01	1.50	3.63	1.91	1.27
Min_2	358	0.00	4.23	0.80	1.33	1.15	1.44
Min_3	910	0.03	3.32	0.96	0.78	0.88	0.92

Table 14-25 outlines the minimum, maximum, and mean grade for the capped assays, composited intervals and the block model.

TABLE 14-25 COMPARISON OF AU STATISTICS
Mandalay Resources Corporation – Norrberget Deposit

	Capped Assay (g/t Au)			Composites (g/t Au)			Block Model (g/t Au)		
Domain	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Min_1	0.00	24.00	2.09	0.00	24.00	2.03	0.00	18.01	1.50
Min_2	0.00	5.62	0.64	0.00	5.62	0.67	0.00	4.23	0.80
Min_3	0.02	5.05	1.34	0.02	5.05	1.34	0.03	3.32	0.96

VISUAL COMPARISONS

Figures 14-24 and 14-25 illustrate a visual comparison of the block grade versus the composite grade in section and plan, respectively. These images show that the block grade is appropriate to the local scale composite grade and that it does not appear that the block model is over smoothed. The intersection appears significantly smaller than the blocks in Figure 14-24 as a result of the steep drill hole angle and relatively shallow domain relative to the plan view.

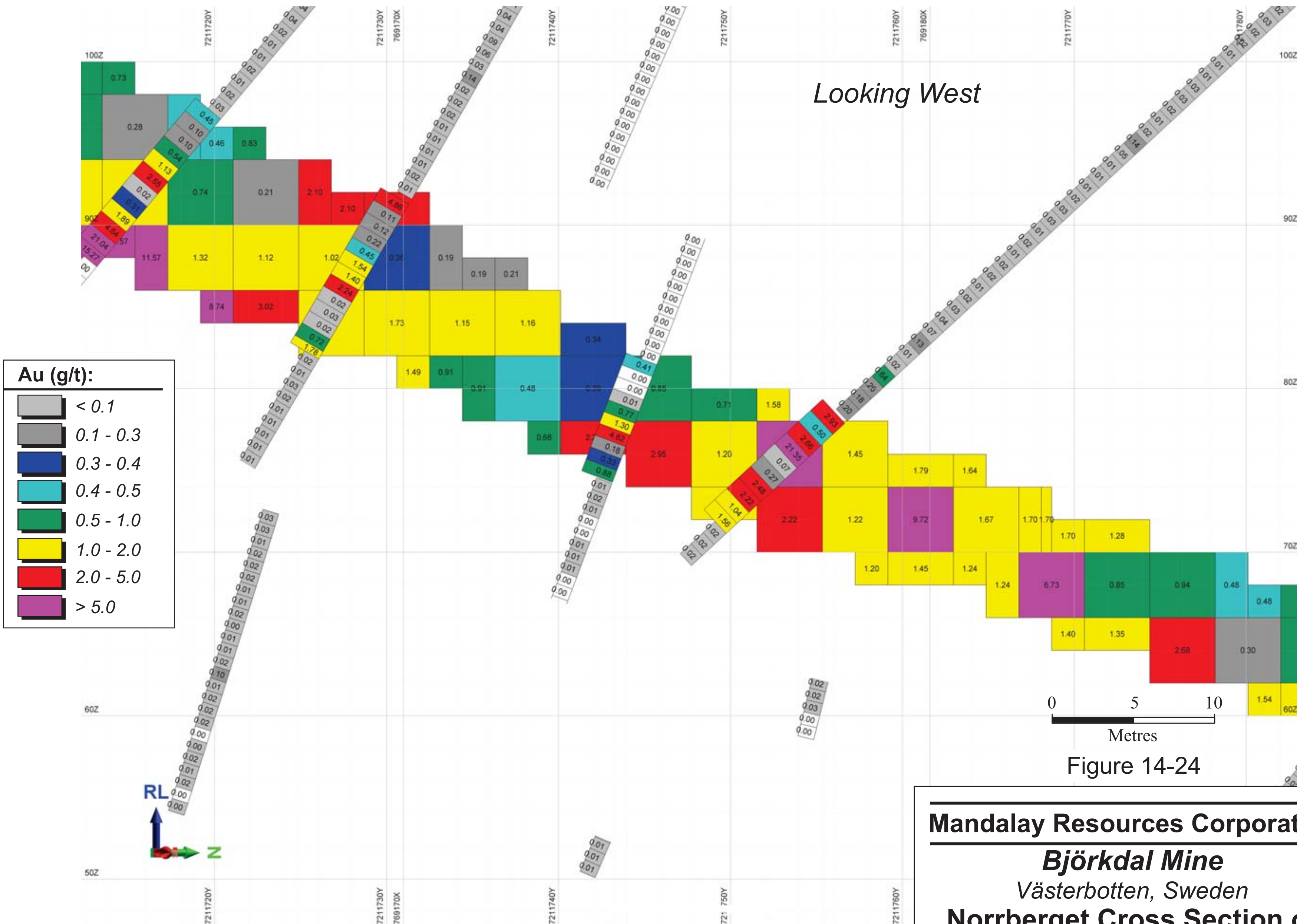


Figure 14-24

Mandalay Resources Corporation

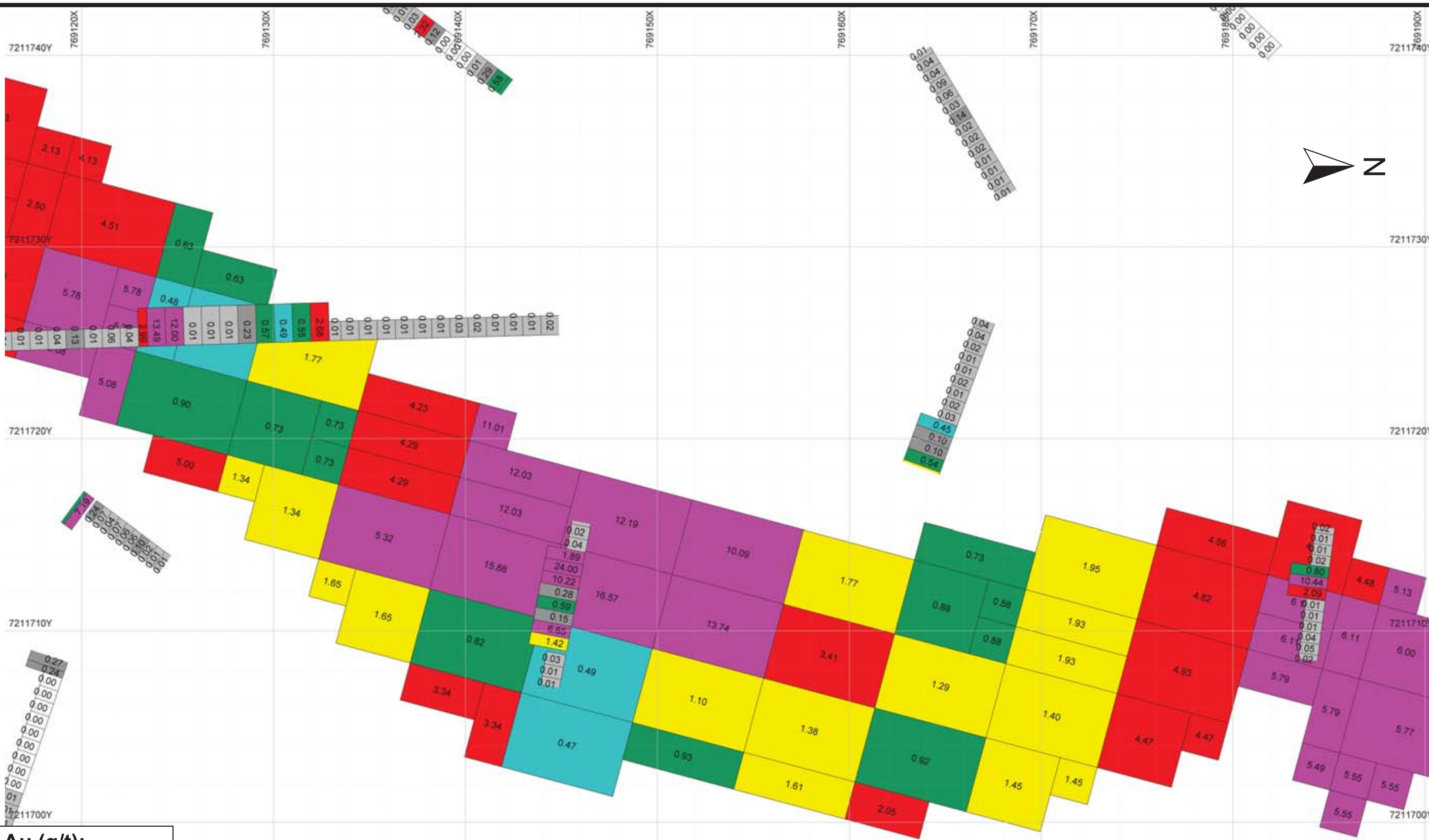
Björkdal Mine

Västerbotten, Sweden

Norrberget Cross Section of Block Grades versus Composite Grades

March 2019

Source: RPA, 2018.



Au (g/t):

- < 0.1
- 0.1 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- 2.0 - 5.0
- > 5.0

0 5 10
Metres

Figure 14-25

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Norrberget Plan of Block Grades versus Composite Grades

March 2019

Source: RPA, 2018.

RPA

SWATH PLOTS

The trend (swath) plots presented in Figures 14-26 to 14-28 compare the capped composite grades against the ID^3 and NN interpolations along a particular orientation. These plots indicate that the ID^3 block model is supported by the underlying data and that the grade is not overly smoothed.

These results indicate that the block model grade is reflective of the input capped and composited sample grades.

FIGURE 14-26 TREND PLOT (EAST) ANALYSIS OF ID^3 AND NN ANALYSIS VERSUS COMPOSITE SAMPLES

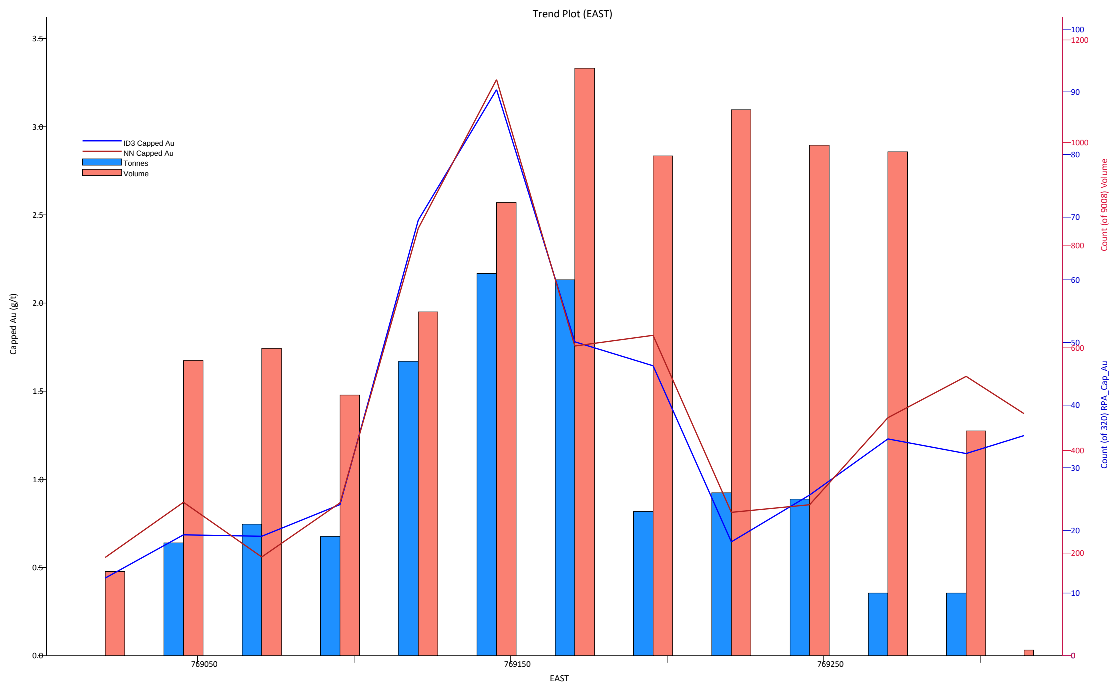


FIGURE 14-27 TREND PLOT (NORTH) ANALYSIS OF ID^3 AND NN ANALYSIS VERSUS COMPOSITE SAMPLES

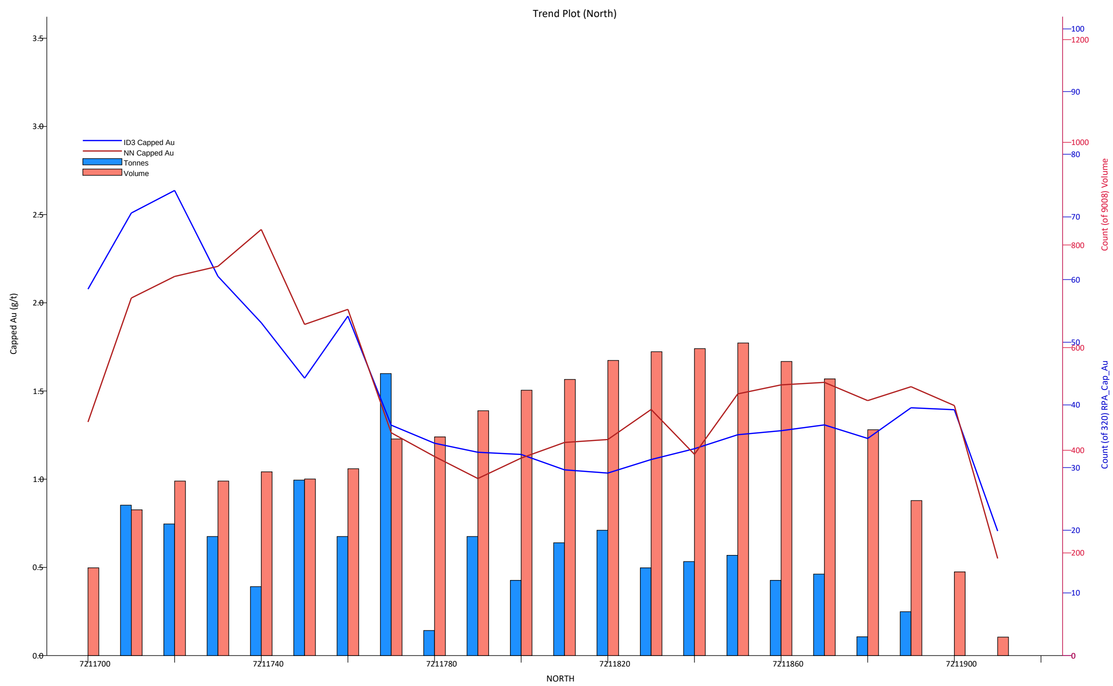
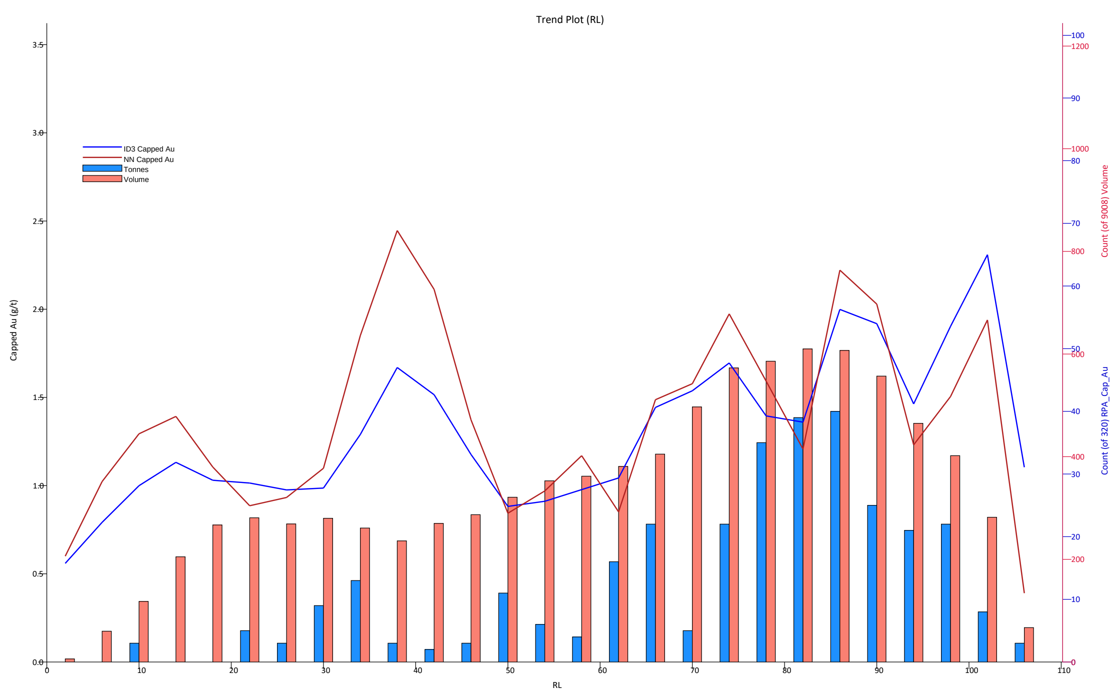


FIGURE 14-28 TREND PLOT (ELEVATION) ANALYSIS OF ID^3 AND NN ANALYSIS VERSUS COMPOSITE SAMPLES



MINERAL RESOURCES CLASSIFICATION CRITERIA

Definitions for resource categories used in this report are consistent with CIM (2014) definitions and adopted by NI 43-101.

It has previously been reported by Geovista in March 2017 that no drill holes prior to 2004 have QA/QC data available for them. This was taken into account when classifying the Mineral Resource. Wireframes were created to surround areas of potential similar classification to ensure that the classification was contiguous and no spotted dog classification was applied. Some blocks were included within the classification wireframes that may not meet the criteria for the purposes of continuity.

Indicated blocks were those which was interpolated by drill holes that had an average spacing of less than 40 m for drill holes completed since 2004, interpolated primarily within pass one or two and are within domain Min_1.

Inferred blocks were blocks that did not meet the classification parameters for Indicated and all blocks within the two smaller domains (Min_2 and Min_3) due to their limited number of interpolants. Inferred material included blocks that were primarily interpolated using pre-2004 drill holes.

RESPONSIBILITY FOR THE ESTIMATE

The estimate of the Mineral Resources for Norrberget presented in this report was prepared by Mr. Jack Lunnon, M.Sc., CGeol, who is a Qualified Person as defined in NI 43-101, and is independent of Mandalay.

CUT-OFF GRADE AND RESOURCE REPORTING CRITERIA

The cut-off grade for the Norrberget deposit was developed using the January to September 2017 actual cost information along with a gold price of US$1,400 per ounce and an exchange rate of 9.0 SEK/US$. The cut-off grade for reporting of Mineral Resources was determined to be 0.35 g/t Au.

To fulfill the NI 43-101 requirement of “reasonable prospects for eventual economic extraction”, Mandalay prepared a preliminary open pit resource shell using the Whittle parameters used in Section 15 and based on a gold price of US$1,400 per ounce.

The criteria used to report the Mineral Resources at Norrberget included:

- All blocks located above the resource pit surface.
- All blocks with a grade above 0.35 g/t Au.
- A Mineral Resource category of either Indicated or Inferred.

NORRBERGET DEPOSIT MINERAL RESOURCE ESTIMATE

Table 14-26 presents the Norrberget Mineral Resource estimate as of September 30, 2017.

TABLE 14-26 NORRBERGET MINERAL RESOURCE ESTIMATE AS OF SEPTEMBER 30, 2017

Mandalay Resources Corporation – Norrberget Deposit

Category	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
Measured	-	-	-
Indicated	144	3.29	15
Total Measured + Indicated	**144**	**3.29**	**15**
Inferred	3	4.03	0.5

Notes:

1. Norrberget Mineral Resources are estimated using drill hole and sample data as of September 30, 2017.
2. CIM (2014) definitions were followed for Mineral Resources.
3. Mineral Resources are inclusive of Mineral Reserves.
4. For Norrberget, a nominal two metres minimum mining width was used to interpret veins using diamond drill and reverse circulation drill samples.
5. Bulk density is 2.74 t/m^3.
6. High gold assays at Norrberget were capped at 24 g/t Au.
7. Interpolation was by inverse distance cubed.
8. Open pit Mineral Resources are estimated at a cut-off grade of 0.35 g/t Au and constrained by a resource pit shell.
9. Mineral Resources are estimated using an average gold price of US$1,400/oz and an exchange rate of 9.0 SEK/US$.
10. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
11. Numbers may not add due to rounding.

RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate.

15 MINERAL RESERVE ESTIMATE

SUMMARY

The Mineral Reserves estimated by Mandalay, with an effective date of December 31, 2018, are listed in Table 15-1. The Mineral Reserve estimate for the Björkdal Mine and Norrberget deposit is 11.4 million tonnes at a grade of 1.58 g/t Au, for a total of 580,000 ounces of contained gold. The Mineral Reserve estimate for Norrberget is 162,000 tonnes at a grade of 2.80 g/t Au, for a total of 15,000 ounces of contained gold.

TABLE 15-1 SUMMARY OF MINERAL RESERVES AT THE BJÖRKDAL MINE AND NORRBERGET DEPOSIT AS OF DECEMBER 31, 2018
Mandalay Resources Corporation – Björkdal Mine

Location	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
		Probable Mineral Reserves		
Björkdal	Open Pit	3,768	1.23	149
	Underground	4,754	2.36	360
Norrberget	Open Pit	162	2.80	15
Stockpile	Stockpile	2,700	0.64	56
Total Probable Mineral Reserve		**11,384**	**1.58**	**580**

Notes:
1. Mineral Reserves are estimated using drill hole and sample data as of September 30, 2018 and depleted for production through December 31, 2018.
2. CIM (2014) definitions were followed for Mineral Reserves.
3. Open Pit Mineral Reserves are based on mine designs carried out on an updated resource model, applying a block dilution of 100% at 0.0 g/t Au for blocks above 1.0 g/t Au and 100% at 0.6 g/t Au for blocks between 0.4 g/t Au and 1.0 g/t Au. The application of these block dilution factors is based on historical reconciliation data. A cut-off grade of 0.4 g/t Au was applied. Open Pit Mineral Reserves for Norrberget are based on 15% dilution at zero grade and 100% extraction.
4. Underground Mineral Reserves are based on mine designs carried out on an updated resource model. Minimum mining widths of 3.5 m for stopes (after dilution) and 3.8 m for development were used. Dilution was applied by adding 0.5 m on each side of stopes as well as an additional 10% over break dilution. Further dilution, ranging from 10% to 100%, was added on a stope by stope basis depending on their proximity with other stopes. An overall dilution factor of 14.5% was added to development. Mining extraction was assessed at 95% for contained ounces within stopes and 100% for development. A cut-off grade of 1.00 g/t Au was applied. An incremental cut-off grade of 0.4 g/t Au was used for development material.
5. Stockpile Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au and are based upon surveyed volumes supplemented by production data.
6. Mineral Reserves are estimated using an average long-term gold price of US$1,200/oz, and an exchange rate of 9.0 SEK/US$.
7. Tonnes and contained gold are rounded to the nearest thousand.
8. Totals may appear different from the sum of their components due to rounding.

RPA is not aware of any mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

BJÖRKDAL

OPEN PIT OPTIMIZATION

Potential pits were evaluated using Whittle 4.7X software package, which employs the Lerchs-Grossmann pit optimization algorithm. The parameters used to derive the selected pit optimization are presented in Table 15-2.

Overall pit slopes of 45° and 50° were determined using actual pit slope angles achieved in the main pit. The overall pit slopes for Nylunds were approximately 42° after accounting for ramps which had a larger impact on overall slope angles since the Nylund pits are much smaller than the main pit. Operating costs and mill recovery are based on actual operating data from 2018.

Dilution and extraction factors are based on a reconciliation data exercise and are discussed in detail in Section 14 of this report.

A selective mining unit (SMU) of 5 m x 3 m x 3 m was used in the block model but was reblocked in Whittle to 10 m x 6 m x 6 m to improve processing time.

TABLE 15-2 WHITTLE RESERVE PIT PARAMETERS
Mandalay Resources Corporation – Björkdal Mine

Parameter	Unit	Input
Pit Slopes (Main Pit)	degrees	45 to 50
Pit Slopes (Nylunds)	degrees	42
Pit Slopes (Overburden)	degrees	18
Mining Cost (Overburden)	US$/t	1.44
Mining Cost (Rock)	US$/t	2.33
Process and General & Administrative Cost	US$/t	13.33
Process Recovery	%	89.7
Mining Extraction	%	100
Mining Dilution	%	100
Base Gold Price	US$/oz Au	1,200
Exchange Rate	SEK/$US	9.0:1
Block Size	m	5x3x3
Block Size (reblocked)	m	10x6x6

Several Whittle shells were run and the results show that the majority of ore tonnage in the pit optimization is located in the crown pillar along the east wall of the pit. This pillar contains the two main portal accesses to the underground operation and associated infrastructure and mine services.

Open pit mining of the ore in, and adjacent to, the crown pillar was selected in preference to underground mining to provide an earlier ore release and to supplement mill feed from underground mining throughout the mine life.

DILUTION AND EXTRACTION

OPEN PIT

Current mining parameters and loading equipment allow for reasonably good selectivity, however, dilution levels are much higher than typical open pit parameters given the thin veined nature of the Björkdal deposit.

At Björkdal, open pit ore is classified as “A-ore” when the modelled grade is greater than 1.0 g/t Au and material from 0.4 g/t Au to 1.0 g/t Au is classified as “B-ore”. The lower grade material is only processed when there is a shortage of A-ore available at the primary crusher, and is normally deposited directly on the long term stockpile. The A-ore is sent directly to the primary crusher for processing. The results of 18 months of reconciled open-pit A-ore production were compared against the modelled tonnes and grade on a blast by blast basis. This exercise shows that while the contained ounces of the A-ore reconciles well with the model, the tonnage is significantly understated. This is a result of the tonnes being reported using a block cut-off rather than a mining shape. The compiled data supports the use of a block dilution of 100% at 0.1 g/t Au for blocks above 1.0 g/t Au.

Based on the historical reconciliation data, a tonnage dilution factor of 100% at 0.6 g/t Au was applied to blocks between 0.4 g/t Au and 1.0 g/t Au. This represents the additional low-grade material that is frequently encountered on a bench to bench scale.

RPA recommends an improved reconciliation process that compares the block model, grade control model, and declared ore mined (mill data). Each mining design shape (individual ore mining shape) should be compared to gain a better understanding of the source of dilution in order to determine the quantities of “planned dilution” (internal dilution that must be mined) versus “unplanned dilution” (external waste that is being mined as a result of mining beyond designated mining shapes).

UNDERGROUND

Underground mining dilution was applied in the Deswik software package and was assigned to the stope shapes as 0.5 m in the footwall and 0.5 m in the hangingwall. The minimum mining width is 2.5 m, which results in a final minimum width of 3.5 m after dilution is applied.

General dilution of 10% was added to all the stopes, with additional dilution manually applied where two stopes, each on a different vein system, were too close to each other to be mined without expecting some further dilution. The dilution applied for proximal stopes ranged from 10% to 100%, with an average of 25%. The overall stope dilution averages approximately 30% at zero grade.

A mining recovery rate of 95% was applied to the in-stope ounces, rather than to the ore tonnes. The 5% ore loss that would usually be applied was split into the 5% gold that was lost and the 5% tonnage that was retained and allocated as a further stope dilution (bringing the total stope dilution to 35%). No losses were applied to the development in ore.

Extraction rates and dilution estimates are loosely based on reconciliation results. Reconciliation work to date has been either limited or has had results with known quality issues.

RPA recommends that Björkdal complete a reconciliation exercise for a representative number of stopes, and investigate methods to reduce the minimum mining width, in order to reduce dilution.

CUT-OFF GRADE

OPEN PIT

Based on the reconciliation exercise between the 2018 block model and the 2018 mill data explained in Section 14, an additional block dilution factor of 100% was applied in the Whittle optimization stage which accounts for both planned and unplanned dilution. The inclusion of dilution in the Whittle optimization process increases the effective cut-off grade and results in a smaller pit shell since ore blocks will have to carry a higher grade to offset the additional dilution material that would be processed.

In the December 31, 2017 Mineral Reserve estimate, a final pit design (2018 Pit Design) was carried out based on the 2018 Whittle shell (2018 Whittle Shell). For the December 31, 2018

Mineral Reserve estimate, the 2018 Pit Design was left unchanged since the Whittle output was very similar between 2018 and 2019. RPA has reviewed the 2019 Whittle Shell with the 2018 Pit Design and agrees that a detailed pit redesign was not required for purposes of Mineral Reserve reporting.

Mining solids were created from the final pit design shells and the resource block model was used to report tonnes and grade for all blocks above the in-situ 0.4 g/t Au cut-off grade. The in-situ cut-off grade is calculated as a pit discard cut-off using only the processing and general and administrative (G&A) costs as operating costs, since it is assumed that once the material is mined, it will either be sent to the mill or the waste dump. Since dilution was accounted for in Whittle, RPA only applied an in-situ cut-off grade to ensure that blocks that were above the in-situ cut-off grade were included in the mine plan. These blocks were then fully diluted and reported as Mineral Reserves and form the basis of the LOM plan.

UNDERGROUND

The cut-off grade for underground mining was calculated based on several criteria. Consideration was given to the type of mining activity on which the cut-off parameter would be applied. The cut off grades apply to the run-of-mine (ROM) head grade and are not in-situ grades as they include dilution and losses. For stopes, a cut-off grade of 0.99 g/t Au was calculated, while, for development, a lower cut-off grade of 0.46 g/t Au was calculated. As these are similar to the cut-off grades determined in 2018, the 2018 values were retained for the purposes of mine planning. The 2018 values were a stoping cut-off grade of 1.0 g/t Au and a development cut-off grade of 0.4 g/t Au. Both of these grades are marginal cut-off grades.

The stoping cut-off grade is based on the direct stoping cost average from 2017 and 2018, and excludes all development, making it a marginal grade. Based on the full cost of mining in 2018, a full cost cut-off grade is approximately 1.21 g/t Au. As under 15% of the stope tonnes are between the full cost and marginal cost cut-off grades, there is enough high value material to support the development that is assumed to exist for the remaining marginal material.

The 0.4 g/t Au cut-off grade is the grade at which processing the development material becomes economically viable. As this material will be mined anyway to access the stopes, the only costs to consider whether it should be processed or discarded are the processing costs.

Most of the development material above this grade, but below 1.0 g/t Au, will be sent to a low grade stockpile for future processing.

The 0.4 g/t Au cut-off grade for development material is consistent with the pit discard calculation for open pit mining. The cut-off grade calculation is shown in Table 15-3.

TABLE 15-3 UNDERGROUND CUT-OFF GRADE CALCULATION
Mandalay Resources Corporation – Björkdal Mine

Parameter	Unit	Value
Metal Price	US$/oz	1,200
Exchange Rate	SEK/US$	9.0
Process Recovery	%	91.0
Net Payable	%	98.3
Stoping Cost	US$/t	18.39
Process Cost	US$/t	7.56
G&A Cost	US$/t	7.11
Transport and Refining Cost	US$/t	1.20
Cut-Off Grade Cost	US$/t	34.52
Cut-Off Grade	g/t Au	0.99
Incremental Cut-Off Grade	g/t Au	0.46

Costs were based on Björkdal's actual stoping and other costs for 2017 and 2018 and forecasted results for the first three quarters of 2019.

Metal prices used for Mineral Reserves are based on consensus, long term forecasts from banks, financial institutions, and other sources. For Mineral Resources, metal prices used are slightly higher than those for Mineral Reserves.

NORRBERGET

OPEN PIT OPTIMIZATION

The following description for Norrberget was taken from the 2018 Technical Report (RPA, 2018). No changes have been made to the Mineral Reserve estimate since the underlying assumptions have not changed with the exception of the exchange rate (9.0 SEK/US$ versus

8.4 SEK/US$). RPA does not expect the change in the exchange rate to have a material impact on the Mineral Reserve at Norrberget.

TABLE 15-4 WHITTLE RESERVE PIT PARAMETERS
Mandalay Resources Corporation – Björkdal Mine

Parameter	Unit	Input
Pit Slopes (South West Wall)	degrees	36
Pit Slopes (North West and North East Walls)	degrees	52
Pit Slopes (Overburden)	degrees	25
Mining Cost (Overburden)	US$/t	1.55
Mining Cost (Solid Waste)	US$/t	2.50
Mining Cost (Ore)	US$/t	2.97
Process Cost	US$/t	7.63
General and Administrative Cost	US$/t	6.65
Process Recovery	%	75
Mining Extraction	%	100
Mining Dilution	%	15
Base Gold Price	US$/oz Au	1,200
Block Size	m	6x4x4

Pit slopes were determined based on a geotechnical assessment carried out by SRK Consulting (SRK) in October 2017 (Di Giovinazzo, 2017). The northwest and northeastern wall sectors have slope angles of 52° while the southwest (footwall) sector has a slope angle of 36°.

A dilution factor of 15% and extraction factor of 100% was added based on reconciled production data from mining shallow dipping structures at Björkdal.

The Whittle optimization was carried out at the parent block size of 6 m x 4 m x 4 m.

Mining costs were based on actual 2017 mining costs at Björkdal, the higher cost of mining ore (increase of approximately 19%) is due to the longer trucking distance to the Björkdal Mill. An overall gold recovery of 75% is based on recent metallurgical work as discussed in Section 13 of this report.

DILUTION AND EXTRACTION

OPEN PIT

Current mining parameters and loading equipment allow for reasonably good selectivity, and dilution levels are expected to be much lower as the shallow dipping geometry of the orebody will be more amenable to mining than the narrow vertical veins at Björkdal.

Because no production has taken place at Norrberget, a reconciled dilution and extraction factor cannot be obtained. A dilution factor of 15% and extraction factor of 100% has been drawn out of reconciled production data from mining shallow dipping structures at the Björkdal open pit, and therefore it is reasonable to assume that the similar conditions at Norrberget will yield similar results.

CUT-OFF GRADE

OPEN PIT

After the Whittle pit optimization was completed, a final pit design was carried out based on the Whittle shell. Mining solids were created from the final pit design shells and the resource block model was used to report tonnes and grade for all blocks above the in-situ 0.4 g/t Au cut-off grade for Björkdal. The in-situ cut-off grade is calculated as a pit discard cut-off using only the processing and G&A costs as operating costs, since it is assumed that once the material is mined, it will either be sent to the mill or the waste dump. Since dilution was accounted for in Whittle, RPA only applied an in-situ cut-off grade to ensure that blocks that were above the in-situ cut-off grade were included in the mine plan. These blocks were then fully diluted and reported as Mineral Reserves and form the basis of the LOM plan.

16 MINING METHODS

The current operating permit and mill constraints limit the total Björkdal production capacity to 1.7 Mtpa. The average underground mine production rate is currently limited to approximately 0.6 Mtpa based on the large number of working areas and associated logistical constraints. The open pit operation, on the other hand, has the theoretical capability of satisfying the 0.9 Mtpa difference, however, it is constrained by the availability of reserves and the presence of surface infrastructure.

The resulting production strategy was to maximize the amount of open pit reserves without significantly interfering with surface infrastructure and then to extract the remaining reserves from underground. The resulting production strategy was to maximize the underground extraction with the remaining ore coming from open pit and stockpiles.

BJÖRKDAL

MINE DESIGN

OPEN PIT

A pit design (2018 Pit Design) was created based on the Whittle output shell using Deswik mine planning software. The final pit outline, along with topography and crown pillar for reference, is presented in Figure 16-1.

The final pit bottom is at the -240 level. Single ramps, with widths of 15 m, are used in the first series of benches to access ore in the pit bottom. These single ramps converge into a double ramp at the -160 level pit and finishes at the northeast side of the pit rim. The pit is designed slightly wider than the Whittle shell in order to achieve a reasonable mining width to operate the equipment. RPA has assumed approximately 30 m to 40 m to be a reasonable width based on the equipment size.

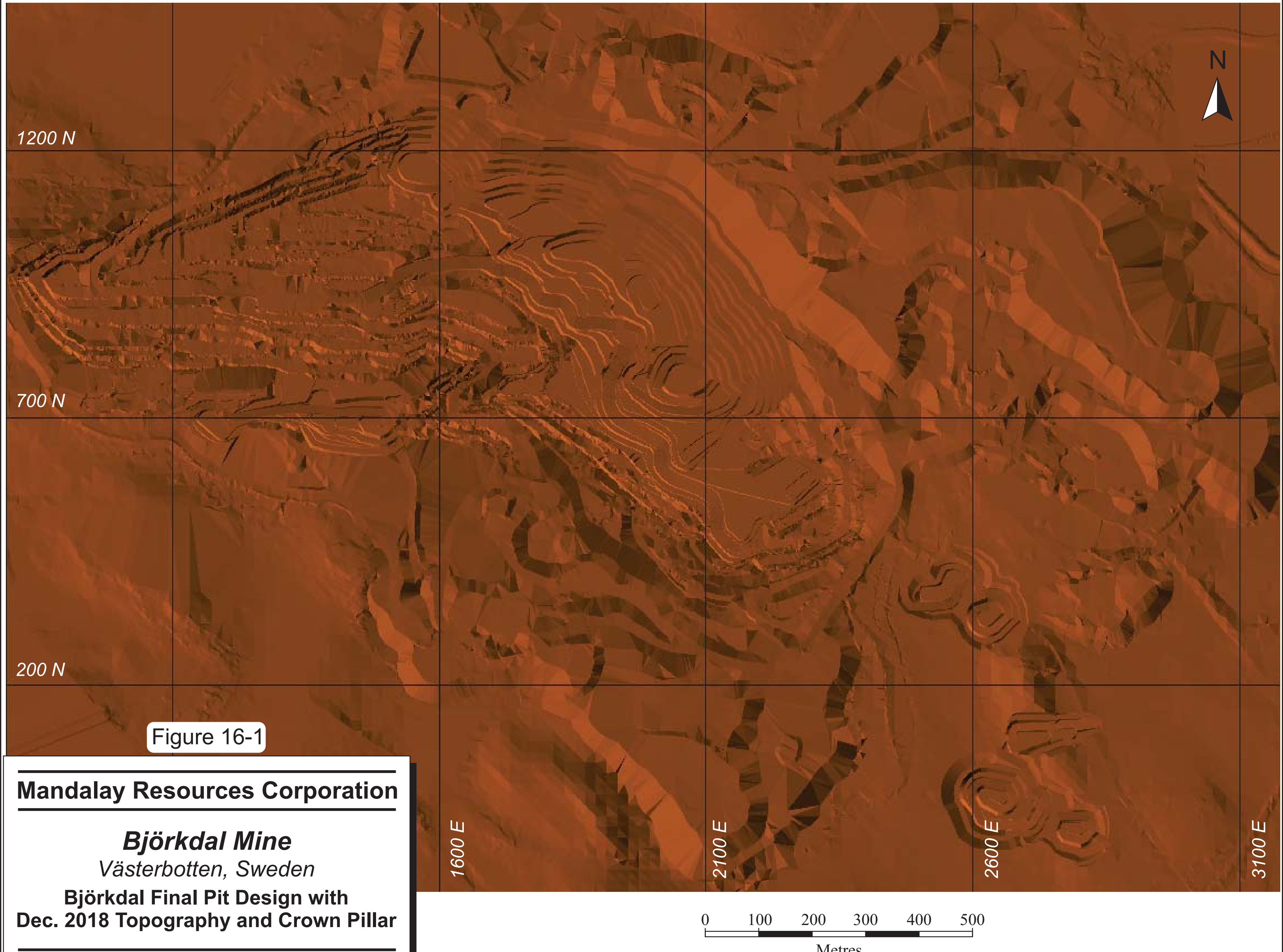


Figure 16-1

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Björkdal Final Pit Design with Dec. 2018 Topography and Crown Pillar

March 2019

Source: RPA, 2019.

Benches are 5 m high, and are taken in groups of two to four with an 8 m to 10 m wide berm every 10 m to 20 m. A 72° to 85° bench face angle (BFA) is used to give an overall wall slope of 42° to 52°.

The pit design parameters used are shown in Table 16-1 and are based on the current operating practices at Björkdal.

TABLE 16-1 BJÖRKDAL PIT DESIGN PARAMETERS
Mandalay Resources Corporation – Björkdal Mine

Parameter	Unit	Input
Overall Slope Angle	degrees	42-52
Bench Face Angle	degrees	70-85
Berm Width	m	8-10
Bench Height	m	5
Benches per Berm	#	2-4
Double Ramp Width	m	24
Single Ramp Width	m	15
Ramp Slope	%	10

UNDERGROUND

Indicated Mineral Resource blocks greater than 1.0 g/t Au were used as a basis for initial stope designs generated by Auto Stope Designer, an automated layout function that is part of Deswik software. Stope design parameters are presented in Table 16-2.

TABLE 16-2 BJÖRKDAL UNDERGROUND STOPE DESIGN PARAMETERS
Mandalay Resources Corporation – Björkdal Mine

Parameter	Unit	Input
On-Vein Development Size	m	3.8 m wide x 4.9 m high
Maximum Stope Height	m	25
Undiluted Minimum Mining Width	m	2.5
Allowance for Overbreak	m	0.5 x 2
Diluted Minimum Mining Width	m	3.5
Maximum Mining Width	m	12
Minimum Inter-Vein Pillar Width	m	5
Stope Mining Extraction	%	95
On-Vein Mining Extraction	%	100
Block Size	m	5x3x5
Design Cut-off Grade Based on US$1,200/oz Au	g/t Au	1.0

The resulting stopes were evaluated manually and adjustments were made where necessary. Stopes were evaluated based on size, grade, and relative distance to existing development. Stopes that were not economically viable were removed from reserves. Most stopes that were within five metres of each other were combined into larger stopes and dilution was applied based on the additional internal waste captured in the new stope. The five metre pillar requirement is based on actual mining conditions experienced at Björkdal. The current stope designs do not incorporate localized geotechnical and geological considerations including detailed knowledge of hangingwall and footwall contacts, fault zones, and structural features such as folding.

MINING METHOD

OPEN PIT

Open pit mining is carried out by contractors using trucks and loaders. The existing mining capacity with the current equipment configuration is approximately 8 Mtpa. Loading is carried out with a combination of front end loaders (FEL) and excavators. Ore and waste are hauled with 90 t capacity trucks. Production drilling is currently done by NBT (contractor). The ore blast bench height is five metres, utilizing a 3.25 m x 4.5 m drill pattern. The drill holes are all drilled vertically, with a sub-drilling of 0.5 m.

Delivery of explosives and igniters and charging/blasting services in Björkdal is contracted out to EPC Sverige AB (EPC), a wholly owned subsidiary of the French explosives company EPC Groupe. Two detonators are placed in the bottom of each drill hole. The SSE type emulsion explosive (velocity 5,500 m/s) is used for blasting. The specific charge is approximately 0.25 kg per tonne. Stemming depth is approximately 2.4 m and comprises a fine gravel material from mined waste material.

In order to minimize ore dilution, the blasting sequence “direction” is normally along strike of the quartz veins. The swelling factor is 50% resulting in a 7.5 m high blasted bench that will be mined in three consecutive flitches, each with a height of 2.5 m. As presently planned, waste blasts will be mined in either 7.5 m or 15 m benches, assuming a 50% swell factor.

Excavator operators are given ore maps that are created by the pit geologist (Figure 16-2).

The open pit excavation solid is shown in Figure 16-3.

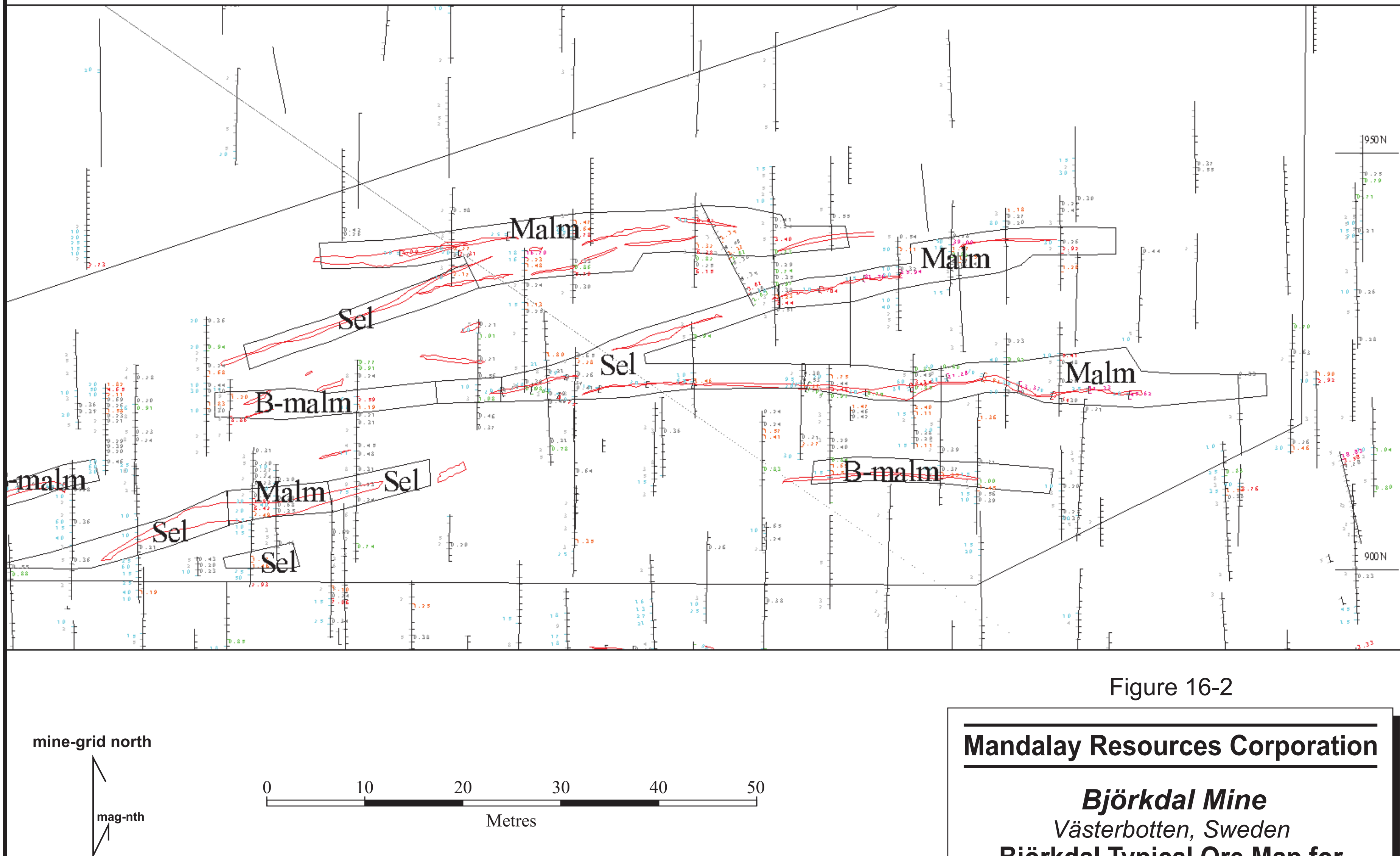


Figure 16-2

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Björkdal Typical Ore Map for Excavator Digging

March 2019

Source: Mandalay Resources Corp., 2017.

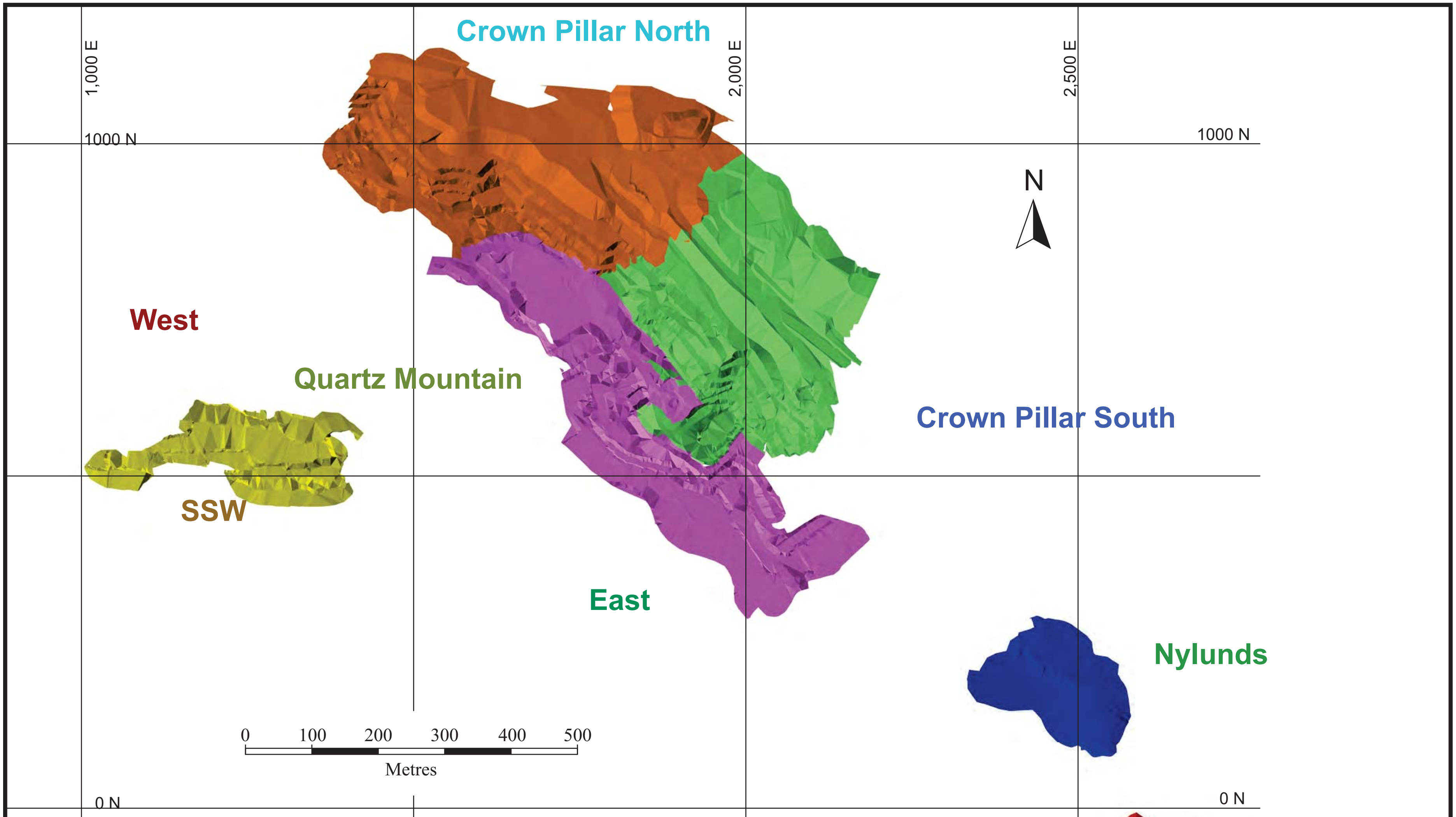


Figure 16-3

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Björkdal Open Pit Mining Excavation Solid

March 2019

Source: RPA, 2019.

Operators also receive digital maps that they can display on the screen in the cab. Maps contain drilling information, A-ore and B-ore zones, and selective mining areas. A-ore is sent to the mill whereas B-ore is generally sent to the low grade stockpile, however, it is occasionally sent directly to the mill when insufficient A-ore is available.

The ore zones are also marked out on the ground in all three consecutive flitches, each flitch with a height of 2.5 m. Excavator operators mark the ore map with the parts of the blast they have loaded as an A-ore, B-ore, and waste. To help excavators to separate waste and ore, pit geologists are in the field giving instructions to the excavator operator.

The open pit ore production schedule has sufficient flexibility to maintain access to at least one of the two existing underground portals at all times. Detailed planning and scheduling will be required to minimize disruption to the underground mining operation. A geotechnical assessment of the high wall integrity as it penetrates mined out stopes will be required.

Waste mined during the life of the open pit will be placed on the existing North and South waste dumps.

UNDERGROUND

The known Björkdal underground deposit lies within a footprint of approximately 1,200 m x 400 m and has a vertical extent of approximately 300 m. Descriptions of the geology and styles of mineralization have been provided in Sections 7 and 14.

The underground mining method used at the Björkdal Mine is longhole stoping with a sub-level spacing of 15 m to 20 m, depending on the zone. Cross-cuts are established perpendicular to the vein system. Veins are then developed by drifting on each sub-level from the cross-cut. All pre-production vein, cross-cut, and ramp development is drilled and blasted using conventional trackless mining equipment.

Stoping blocks are currently drilled with approximately 15 m long 64 mm up-holes connecting to the bottom of the overlying stope using Atlas Copco Simba S7D, M7C, or ME7C drill rigs. When production drilling is completed, initial slot raises are developed and drill lines blasted in groups of three to five rings using a burden of 1.5 m and retreating towards the hangingwall. The material is removed between blasts, which also allows void for the following blast.

Remotely operated scoops are used to muck the stopes to nearby rehandle areas or directly into trucks.

All underground material is loaded by Volvo L180F front end loaders (FELs) or Sandvik 514 load-haul-dump (LHD) trucks, and hauled to surface by a contractor using Volvo L90 and 25 t highway trucks. The objective of the current materials handling strategy is as follows:

- Development material from cross-cuts and ramps above a grade of 0.4 g/t Au is hauled to a B-ore stockpile at the mill.
- OVD material is either hauled to the OVD production ROM stockpile where it is classified as waste or ore and sent to the appropriate location, or, where it is evidently high grade, is sent directly to the production stockpile.
- All stope production, regardless of grade, is hauled to the stope production stockpile.
- Waste material is hauled to surface waste dumps or to backfill areas underground if required.

In consideration of the variable vein geometry and existing equipment configuration, 3.5 m has been measured as the average minimum mining width. This includes provision for a 0.5 m overbreak on both the hangingwall and footwall sides of the stope.

Mined out stopes are mostly left open without any backfill. The current top-down footwall to hangingwall retreat system results in the placement of ramp development outside the marble contact, while cross-cut pillars are within the ore zone. A portion of remnant material above cut-off grade that is adjacent to previously mined out stopes is currently excluded from the underground Mineral Reserves but warrants a more detailed evaluation. Recovery of pillar areas is planned at the end of the mine life.

The underground mine production rate is planned to range from 475,000 tpa to 720,000 tpa. The OVD will be carried out over approximately five years and stope production will be carried out over approximately eight years. A drop in production is planned after the fifth year, when underground output drops to a range between 475,000 tpa to 550,000 tpa, with the balance being made up with open pit tonnes. The underground mine design is presented in Figure 16-4.

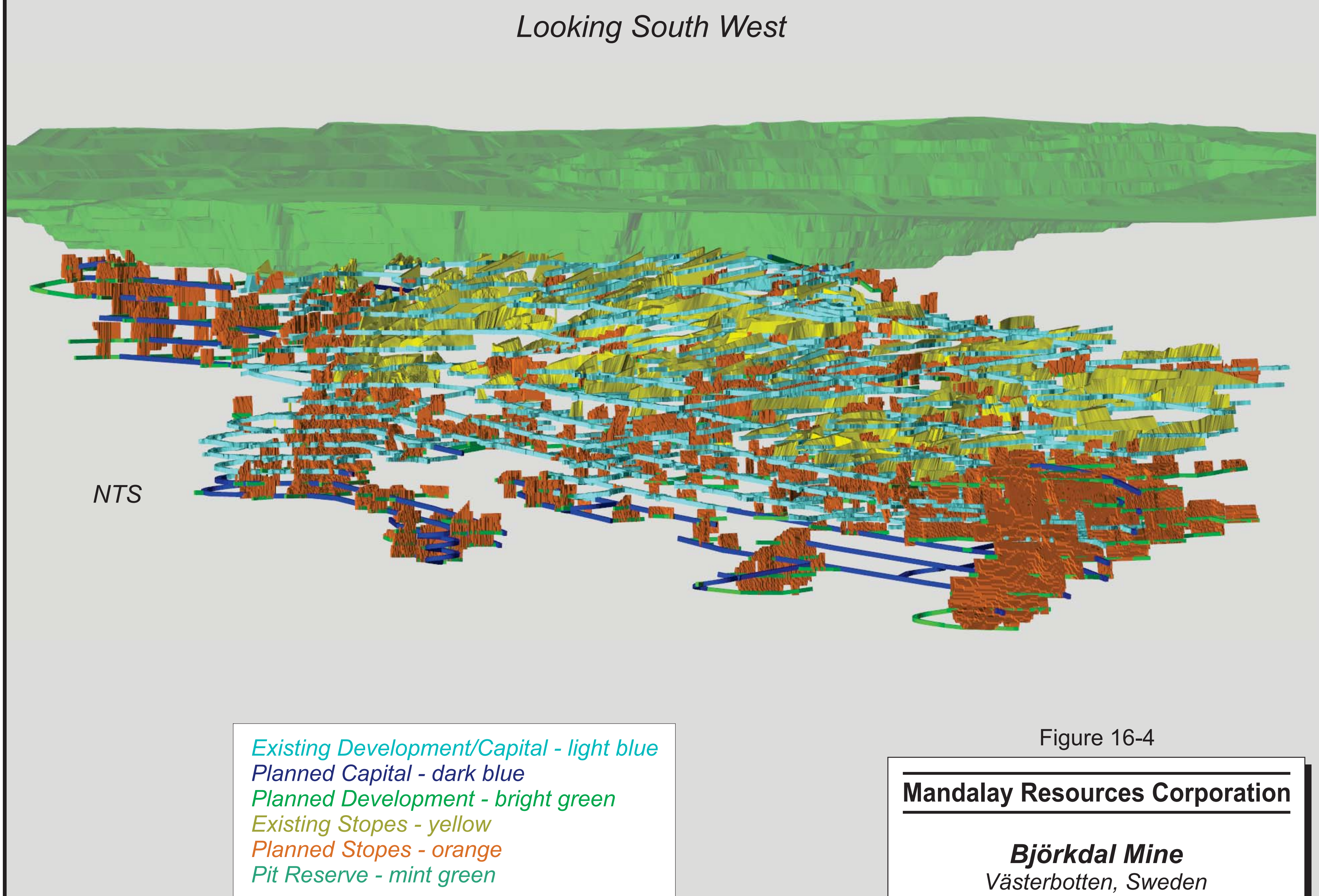


Figure 16-4

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Björkdal Underground Mine Layout

March 2019

Source: Mandalay Resources Corp., 2019.

Primary access to the underground operation is via ramp systems originating from two portals located in the wall of the existing open pit. Open pit mining in the east wall will disrupt this access as well as the supply of other services such as emergency egress, electrical, ventilation, and mine drainage systems. An additional portal will be developed before open pit mining makes the old portals inaccessible, to ensure continuity of the supply of all necessary services.

To recover the crown pillar between the open pit and underground, two additional portals are planned. This will allow continued mining from the underground while the crown pillar is being recovered.

The majority of material mined underground is hauled to the surface as there is currently minimal underground waste disposal. Waste is only used where required to regain access over a mined out stope.

Stope grades are evaluated using an internal grade control model and the sludge grades from OVD are used to cross reference the grade control model. Individual stopes are being batch tested through the plant to gain a greater understanding of the local performance of these models and the grade variability within a stope panel. Stope tonnages are estimated from the stope design volume and are tracked by equipment bucket and truck count. A CMS is used to compare actual stope volumes. RPA recommends that grade control testing continue on individual stopes to determine the accuracy of the grade control model.

The nature of the mining method is such that OVD comprises not more than 36% of the total underground tonnage production. Currently, the separation in OVD between what is considered ore and waste is 0.4 g/t Au, which is consistent with the open pit cut-off grade. All OVD is mined, hauled to a surface ROM stockpile, and sent to processing if sample data confirms a grade of over 0.4 g/t Au. While efforts are made to identify areas of waste development, a portion of cross-cut and ramp material is combined and hauled to a low-grade surface stockpile and processed as B-ore.

The current surface stockpile management system was created to allow campaign milling of ore from different sources so that gold and tonnage could be reconciled back to the ore source.

LOW GRADE STOCKPILES

Selective open pit mining at Björkdal commenced in 2009 with ore greater than 1.0 g/t Au being separated and milled as A-ore and material between 0.3 g/t Au and 1.0 g/t Au being stockpiled as B-ore.

Batch milling experience from these stockpiles has indicated that mill feed averages 0.65 g/t Au. Approximately two million tonnes of B-ore has been classified as an Indicated Mineral Resource at a grade of approximately 0.65 g/t Au.

For the LOM, it is assumed that this material can be milled as incremental ore during periods when the mill capacity exceeds the combined supply of open pit and underground mill feed. Assuming a rehandling cost for stockpiled material results in a cut-off grade between 0.3 g/t Au and 0.4 g/t Au.

GEOTECHNICAL AND SLOPE STABILITY

A structural and kinematic inter-ramp slope stability analysis for the Björkdal Mine was carried out by SRK in October 2012 (Saiang, 2012). The following summarizes the results of the analysis.

The objective was to assess or validate the inter-ramp slope angles for the proposed steepening of certain sectors of the pit. The proposed inter-ramp slope angle of 70º and an inter-ramp height of 40 m have been validated. The minimum factor of safety obtained for this angle and height is 1.48, which indicates that the slopes will be stable, as long as they are not excessively damaged by blasting. Inspection of the pit walls must be carried out on a scheduled basis to identify existence of tension cracks and the possibility for one-off types of failure. Water or pore pressure has not been accounted for in this study and may need visual monitoring to see if water is of any concern for the slopes.

The analyses utilized data that was captured during the cell mapping program conducted at the mine in the mid-1990s. Although old, this data appeared to be the only mapping data available and is also thought to be reliable and applicable for structural analysis of the open pit. Structural analysis shows that the dominant joint sets have similar orientations to the gold-bearing quartz veins and dip steeply either parallel or sub-parallel to quartz veins. As a result, the hangingwall side is less prone to any major instability because the intersections of joints do not daylight at the slope face. This is clearly evident at Björkdal where the hangingwall side of the pit is very stable even though slope angles are near vertical. This is also confirmed by the stereographic and kinematic analyses performed in this study. On the footwall side, however, potential instabilities are observed. Structural and kinematic analyses show that there is no major threat for the footwall slopes or pit walls.

The rock mass at Björkdal is of very high quality. Test work carried out at Björkdal has shown that Geological Strength Index (GSI) is estimated to be between 70 and 80, and intact strength exceeds 200 MPa. This data is evidenced by the fact that approximately 50% of the entire underground development excavations are unsupported, neither with shotcrete nor rockbolts. A visual observation of the open pit slopes indicates near-vertical to vertical benches and narrow stable berms.

In 2016, SRK carried out an additional slope design review (Di Giovinazzo, 2016). The review entailed the following:

- Review of overall pit slope conditions and discussion on pit development history and current slope stability issues
- More detailed observation of key cutback areas being Quartz Mountain, South Wall of East Pit, and North Wall of West Pit
- Review of large block planar failure in the Quartz Mountain slope
- Discussion of mine plan, objectives, blasting practices, and improvement projects
- Commenced photogrammetry of the Quartz Mountain area
- Completed photogrammetry of three key areas

The outcome of the review highlighted the opportunity for the potential of 25 m high benches (5 m benches in sets of five) with the potential to maintain the BFAs at 75°, and reduce the berm width to eight to ten metres. The 2017 pit design has incorporated the 25 m high benches, 75° BFA and 8 m to 10 m berm widths. The review also highlighted the differing geotechnical character of various geographical and geological sectors of the mine. These sectors have been used to assign varying BFAs (from 70° to 85°), bench heights (from 10 m to 20 m), and localized face azimuths to avoid planar failure in the Quartz Mountain area.

GROUND SUPPORT

Rock mechanic consultants have made several visits to the Björkdal underground mine since start of its operation in 2009 and, in general, consider the rock quality and ground conditions to be extremely good. The most recent inspection was carried out by Itasca Consultants AB (Itasca) of Luleå in June 2015. Approximately 50% of the underground development requires ground control and simple standard procedures have been established. Mechanical scaling of all development is carried out immediately following blasting. Shotcrete and resin rebar are used in the pre-production OVD on an as-required basis and shotcrete followed by systematic resin bolting is used for permanent development such as ramps and cross-cuts. Longer bolts are installed in wider intersections with unfavourable structure orientations. Permanent development is also re-scaled every 12 months.

In some areas of the mine, the spacing between the parallel vein systems is small and the resulting pillar between the mined stopes has collapsed. Itasca has made a general recommendation that a minimum 10.0 m pillar is required around permanent development.

Ground control equipment at Björkdal includes an Atlas Copco Scaletec, a Jama 8000 scaler, a Sandvik DS4L bolting machine, and a Normet 71100 Shotcrete unit supported by the delivery of concrete directly to the face by a local supplier.

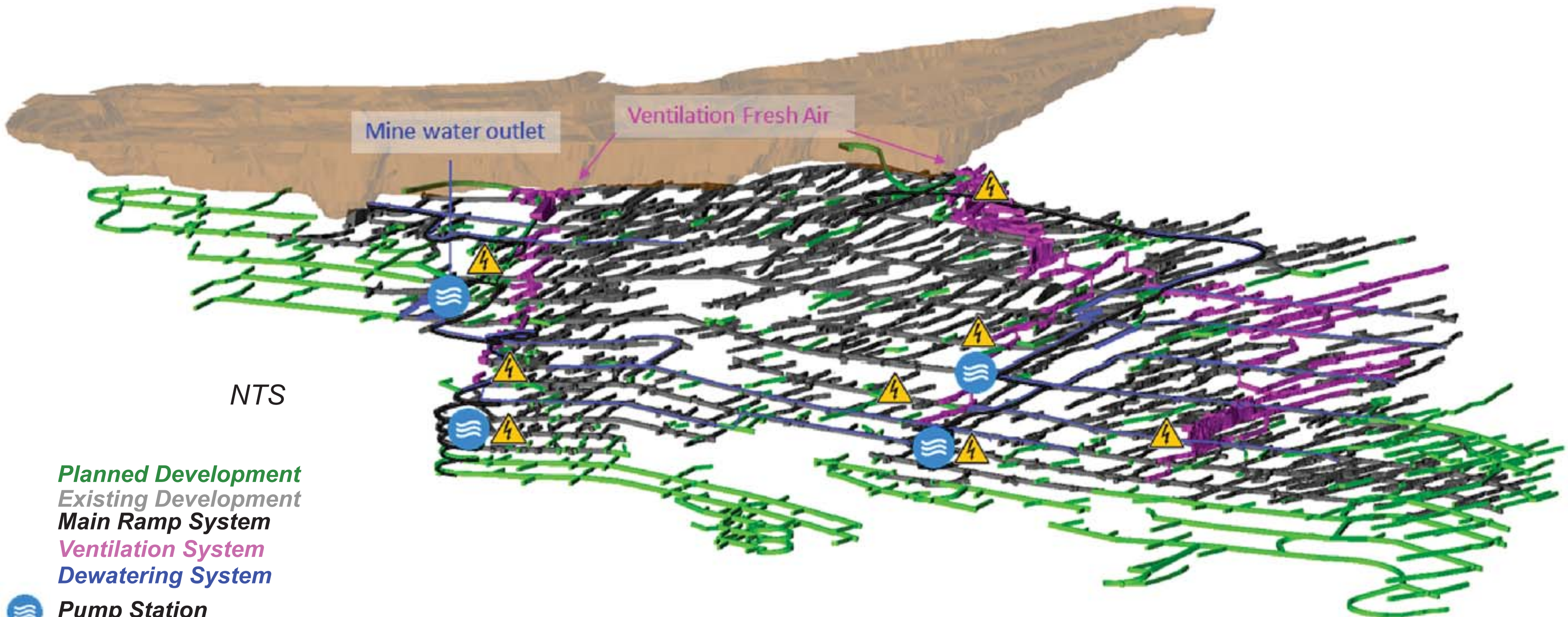
RPA considers it essential that Björkdal continue to monitor local ground conditions as mining progresses. Global rock mechanic issues should be incorporated during future mine design studies as underground stresses are redistributed.

INFRASTRUCTURE

The underground mine workings are accessed by two ramps located in the wall of the existing open pit. The ramps cut through the orebody and connect to cross-cuts that run perpendicular to the vein structure. All material mined underground is hauled to the surface via these two ramps by a contractor using rigid trucks.

A layout of the underground infrastructure is presented in Figure 16-5.

Looking South West



NTS

Planned Development
Existing Development
Main Ramp System
Ventilation System
Dewatering System
Pump Station
Electrical Substation

Figure 16-5

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Björkdal Underground Infrastructure Layout

March 2019

Source: Mandalay Resources Corp., 2019.

DEWATERING

Heavy storm events can result in a substantial influx of water into the underground mine via high permeability fault systems connecting with the open pit. The site is currently in the process of upgrading the pumping system.

The 340/ramp 2 pump station handles all the water that comes from production and groundwater inflows from Lake Zone and Central Zone. The water is pumped from the working faces with submersible pumps in lifts to the 340/ramp 2 pump station. The 340/ramp 2 pump station pumps the water using two large submersible pumps (2 x 90 kW) in one horizontal 800 m section of in two 150 mm diameter pipes to the Main Zone pump station. The water flow from this area varies between 10 m^3/h and 70 m^3/h, depending on the level of production activities and the season.

The Main Zone pump station, located on the 265 level, sends all underground pump water to surface using three centrifugal pumps (3 x 75 kW), with a capacity of 180 m^3/hr in total. The water is transported in one vertical lift of 200 m to surface in a 250 mm diameter steel pipe. The mine water then flows in a ditch to a clear water basin where the water is treated to remove suspended solids and nitrates.

The pump water that comes to the Main Zone pump station is mainly from the Lake Zone 340/ramp pump station, but also from the working faces in the deeper levels of the Main Zone, which is pumped with submersible pumps similar to Lake Zone.

Total annual pumped water from underground to surface is approximately 750,000 m^3.

VENTILATION

The underground ventilation system is simple and effective. Fresh air is introduced into the mine via two primary intake air shafts located adjacent to the open pit and is distributed to the working areas by means of 10 secondary fans installed throughout the mine. Fresh air is drawn through old stopes to avoid the need for heating during the winter months. The return air is exhausted via two main ramp systems into the open pit.

ELECTRICAL

Björkdal has combined 400 V/1,000 V electrical sub-stations as well as single 400 V and 1,000 V sub-stations. Separate cables for both 1,000 V and 400 V are used.

All underground mining equipment requiring electrical power operate on 1,000 V while pumps and fans operate on 400 V. Electrical sub-stations are placed in strategic locations, close to fresh air ventilation shafts and near production faces.

Underground communication uses a digital leaky feeder system that covers the entire mine. Communication between personnel is carried out using Motorola two-way radios.

MINE EQUIPMENT

OPEN PIT

Open pit mining production is carried out by contractors. The open pit mining equipment used at Björkdal is presented in Table 16-3.

TABLE 16-3 BJÖRKDAL OPEN PIT MINING EQUIPMENT
Mandalay Resources Corporation – Björkdal Mine

Make	Model	Type	Owner	Units
CAT	IT 62	FEL	Björkdal	1
CAT	775 FQ	Truck	Swerock	1
CAT	980 K	FEL	Swerock	1
CAT	329	Excavator	Swerock	1
CAT	6015	Excavator	Swerock	1
CAT	962	FEL	Swerock	1
Komatsu	785-7	Truck	Swerock	7
Komatsu	PC1250	Excavator	Swerock	1
Komatsu	WA600	FEL	Swerock	1
Volvo	180-E	FEL	Swerock	1
Volvo	990G	Grader	Swerock	1

UNDERGROUND

With the exception of materials handling, haulage to the surface, and road maintenance, underground mining activities are carried out by Björkdal personnel. The underground mining equipment used at Björkdal is presented in Table 16-4.

TABLE 16-4 BJÖRKDAL UNDERGROUND MINING EQUIPMENT
Mandalay Resources Corporation – Björkdal Mine

Make	Model	Type	Owner	Units
Atlas Copco	Simba	Longhole Drilling	Björkdal	3
Atlas Copco	Boomer M2C	Drifting	Björkdal	2
Atlas Copco	Scaletec MC	Scaler	Björkdal	2
JAMA	8000	Scaler	Björkdal	1

Make	Model	Type	Owner	Units
Gia	UV211	Charging unit	Björkdal	1
Normet	7110	Shotcreting	Björkdal	1
Sandvik	DS4L	Bolter	Björkdal	1
Sandvik	LH 410 1	RC loader	Björkdal	2
Sandvik	514	RC loader	Björkdal	1
Volvo	5350	Water dumper "A25"	Björkdal	1
Volvo	L 90F	Production	Björkdal	1
Volvo	L 90F	Mine construction	Viddes gräv	1
Volvo	L 180F	Loader	Björkdal	1
Volvo	L 180H	Loader	Björkdal	1
Volvo	L110F	Charging unit	EPC	1
Volvo	FMX500	Hauling	Swerock	5
Volvo	L70	Road Maintenance	Swerock	1

NORRBERGET

MINE DESIGN

OPEN PIT

A pit design for Norrberget was created based on the Whittle output shell using Deswik mine planning software. The pit design parameters used are shown in Table 16-5 and are based on the current operating practices at Björkdal.

TABLE 16-5 NORRBERGET PIT DESIGN PARAMETERS
Mandalay Resources Corporation – Björkdal Mine

Parameter	Unit	Input
Overall Slope Angle	degrees	36-52
Bench Face Angle	degrees	70-75
Berm Width	m	5
Bench Height	m	5-10
Benches per Berm	#	1
Single Ramp Width	m	15
Ramp Slope	%	10

The final pit bottom is at the 70 level, approximately 50 m below the original topography. A single 15 m wide ramp is used to access the orebody. The ramp loops around the pit, entering at the north end. The pit is designed slightly wider than the Whittle shell in order to achieve a reasonable mining width to operate the equipment. RPA has assumed approximately 30 m to 40 m to be a reasonable width based on the equipment size.

Benches are 5 m high in ore blasts and 10 m high in waste areas. A berm is left after each 5 m or 10 m bench. A 70° to 75° BFA is used to give an overall wall slope of 36° to 52°.

The final pit outline, along with topography and crown pillar for reference, is presented in Figure 16-1.

MINING METHOD

At Norrberget, open pit mining will be carried out by the existing contractor, SweRock AB, using trucks and excavators. These contracts are integrated as a total mining contract for the combined Björkdal and Norrberget tonnage.

Ore is planned to be hauled using 40 t capacity trucks and waste is hauled using 90 t capacity trucks.

Production drilling is planned to be carried out by contractor, currently done by NBT. The ore blast bench height is 5 m, utilizing a 3.25 m x 4.5 m drill pattern. The drill holes are all drilled vertically, with a sub-drilling of 0.5 m. Waste benches are planned to be 10 m in height with a drill pattern and sub drilling the same as for the ore blasts.

Delivery of explosives and igniters and charging/blasting services in Björkdal is contracted out to EPC Sverige AB (EPC), a wholly owned subsidiary of the French explosives company EPC Groupe. Two detonators are placed in the bottom of each drill hole. The Site Sensitized Emulsion (SSE) type emulsion explosive (velocity of 5,500 m/s) is used for blasting. The specific charge is approximately 0.25 to 0.30 kg per tonne. Stemming depth is approximately 2.4 m and comprises a fine gravel material from mined waste material.

In order to minimize ore dilution, the blasting sequence direction is planned to be along the strike of the orebody. For ore blasts, the swelling factor is 50% resulting in a 7.5 m high blasted bench that will be mined in three consecutive flitches, each with a height of 2.5 m. Waste blasts will be mined all in a single 15 m flitch, assuming a 50% swell factor.

Ore-waste boundaries will be marked out by open pit geologists and the digitized string boundaries will be uploaded to the integrated GPS system within the excavator. Open pit geologists will be available to verify the mapped contacts and ensure mucking takes place as planned.

The mining schedule at Norrberget is integrated into the Björkdal open pit schedule to minimize potential production shortfalls and to provide added flexibility to the deliverable mill feed.

Waste mined during the life of the open pit will be placed on the north side of the open pit and will contribute to sound attenuation from the operation of the pit.

GEOTECHNICAL AND SLOPE STABILITY

In July 2017, SRK was engaged to carry out a geotechnical assessment of the Norrberget deposit. The assessment included the following:

- analysis of drill core from existing logs and photographs,
- intact rock strength,
- jointing and structure,
- kinematic analysis,
- SBlock analysis, and
- recommendations for slope designs to be used in for pit optimization and pit design.

The review recommended that the pit design be split into two distinct sectors: the southwest (footwall to the ore) and the northeastern sector (hangingwall). The southwest sector has been designed with an overall slope angle of 36° and a BFA of 70°. The northeastern sector has been designed with an overall slope angle of 52° and a BFA of 75°. The shallower design of the southwest sector does not significantly raise the strip ratio of the Norrberget mine as the recommended overall slope angle closely mirrors the dip of the ore-body.

HYDROLOGICAL STUDIES

In 2016, Golder Associates AB (Golder) was commissioned to carry out a hydrological study of the Norrberget area. Water handling at Norrberget will be integrated into the water management plan for Björkdal. Water quality of discharge from the mine and existing surface waterways will be monitored by Björkdal staff to comply with local regulations and the operating conditions of the environmental permit.

Golder concluded that the groundwater level at Norrberget is 115 MASL and the existing topography at the site averages 120 MASL. At an expected pit depth of 57 MASL (60 m below surface) the expected groundwater infiltration rate is 800 m^3 per day and the expected contribution of surface run-off and rainfall is 450 m^3 per day. This leads the analysis to conclude that pumping requirements at Norrberget should not exceed 1,250 m^3 per day. The estimated area of influence on the local groundwater system has been assessed to have a radius of approximately 450 m to 500 m from the centre of the pit.

Pumping is planned to use portable pumps to dewater the workings, as required, and waste water will be discharged to the sedimentation dam northwest of the Norrberget pit.

The proposed open pit design is located at the confluence of two minor streams. Stream diversion trenches will be dug north and south of the planned pit to steer water from these two streams around the open pit and reconnect with the original drainage east of the pit design. A further trench will be constructed on the gently sloping west side of the designed pit to redirect surface water drainage away from the proposed pit and into the northern stream channel.

MINE EQUIPMENT

Mine equipment for Norrberget will be provided by mining contractors as it is needed. The equipment quantities are envisioned as shown in Table 16-6.

TABLE 16-6 NORRBERGET OPEN PIT MINING EQUIPMENT
Mandalay Resources Corporation – Norrberget Mine

Make	Model	Type	Owner	Units
Atlas Copco	L7	Coprod	NBT	1
		Charging trucks	EPC	1
Volvo	A40	Dumper	Swerock	2
Volvo	ECR305	Excavator	Swerock	1
CAT	777G	Truck	Swerock	2
CAT	5110	Excavator	Swerock	1

CONSOLIDATED LIFE OF MINE PLAN

The LOM plan for Björkdal comprises production from Björkdal underground, open pits at Björkdal and Norrberget, and historic stockpiles and is shown in Table 16-7.

TABLE 16-7 LIFE OF MINE PRODUCTION PLAN
Mandalay Resources Corporation – Björkdal Mine

		Average/Total	2019	2020	2021	2022	2023	2024	2025	2026	2027
MINING PRODUCTION - UNDERGROUND											
Total Rock (inc capital)	t	4,994,256	687,951	736,709	788,889	689,831	558,269	521,753	530,261	475,625	4,967
Waste	t	286,458	55,265	114,947	74,660	37,723	3,863	0	0	0	0
Ore	t	4,754,024	658,929	632,756	719,883	655,223	554,626	521,753	530,261	475,625	4,967
Stope Tonnes	*t*	4,006,672	420,059	450,939	501,554	555,261	546,253	521,753	530,261	475,625	4,967
Development Tonnes	*t*	747,351	238,870	181,817	218,329	99,963	8,373	0	0	0	0
Grade	g/t Au	2.36	2.2	2.1	2.1	1.9	2.6	2.8	2.9	2.6	1.4
Gold mined	oz	360,012	46,661	42,907	48,036	40,245	46,605	46,790	49,162	39,384	220
Capital Development	M	7,888	3,433	2,717	1,244	480	14	0	0	0	0
MINING PRODUCTION - OPEN PIT											
Total Rock (inc capital)	t	18,124,202	3,799,248	3,324,197	3,704,078	1,451,900	1,733,450	2,367,363	1,743,964	0	0
Waste	t	9,943,196	2,706,201	1,224,908	1,205,670	851,324	1,237,276	1,512,236	1,205,580	0	0
Capital prestripping	t	4,413,092	439,366	1,785,575	2,035,150	53,819	19,137	49,086	30,959	0	0
Ore	t	3,767,914	653,681	313,714	463,259	546,757	477,037	806,041	507,425	0	0
Grade	g/t Au	1.26	1.1	1.4	1.3	1.4	1.2	1.3	1.2	0.0	0.0
Gold mined	oz	153,161	22,495	14,413	19,542	24,229	17,978	34,271	20,234	0	0
Strip Ratio		2.6	4.1	3.9	2.6	1.6	2.6	1.9	2.4	0.0	0.0
MINING PRODUCTION - STOCKPILE											
Ore Recovered	t	2,808,602	13,410	353,530	119,326	113,137	275,308	0	292,545	824,375	816,971
Grade	g/t Au	0.65	0.6	0.6	0.6	0.7	0.7	0.0	0.7	0.7	0.7
Gold	oz	58,737	280	7,387	2,493	2,365	5,754	0	6,120	17,246	17,091

		Average/Total	2019	2020	2021	2022	2023	2024	2025	2026	2027
TOTAL											
Ore	t	11,221,938	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000	821,938
Grade	g/t Au	1.58									
Gold	oz	569,597	68,899	64,708	70,019	66,514	70,183	80,467	74,867	56,630	17,311
Surface Waste	t	14,356,288	3,145,567	3,010,483	3,240,820	905,143	1,256,414	1,561,322	1,236,539	0	0
Underground Waste	t	286,458	55,265	114,947	74,660	37,723	3,863	0	0	0	0
PROCESSING FEED											
Underground											
Ore	t	4,754,024	658,929	632,756	719,883	655,223	554,626	521,753	530,261	475,625	4,967
Grade	g/t Au	2.4									
Open Pit											
Ore	t	3,659,312	627,660	313,714	460,791	531,639	470,066	778,247	477,194	0	0
Grade	g/t Au	1.3									
Stockpile											
Ore	t	2,808,602	13,410	353,530	119,326	113,137	275,308	0	292,545	824,375	816,971
Grade	g/t Au	0.7									
Total ore	t	11,221,938	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000	821,938
Grade	g/t Au	1.6	1.6	1.5	1.7	1.6	1.7	1.9	1.8	1.4	1.9
Gold	oz	569,598	68,899	64,708	70,019	66,514	70,183	80,467	74,867	56,630	17,311
Recovery	%	90.90%	90.20%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%
Gold recovered	oz	517,783	62,147	58,884	63,717	60,528	63,866	73,225	68,129	51,533	15,753

BJÖRKDAL OPEN PIT

Open pit mining for Björkdal is scheduled to deliver an average of approximately 540,000 t of ore annually to the mill throughout the LOM. Ore is initially scheduled from the Quartz Mountain, SWW, and West Pit areas. Pre-stripping of the South Crown Pillar commences as ore mining continues in the East area of the Main Pit and Nylunds Pits. As ore becomes available in the South Crown Pillar area, pre-stripping commences in the North Crown Pillar. Ore in the North Crown Pillar becomes accessible as mining in the South Crown Pillar is nearing completion. The mine planning allows for sufficient flexibility to always allow at least one portal access entry to the underground workings. The “mined out” solid is presented in Figure 16-3.

NORRBERGET OPEN PIT

The LOM plan for Norrberget is integrated into the LOM at Björkdal and provides incremental high grade feed of 162,000 tonnes to the mill for approximately seven months. Stripping of surface overburden is scheduled to commence in January 2022 and ore production is anticipated from Q4 2021 to Q3 2022, at a time when the ore production rate at Björkdal is low due to availability of minable ore.

BJÖRKDAL UNDERGROUND

The Björkdal underground mine commenced production in 2008 and in the ensuing ten full years of production from 2009 through 2018 has provided an average mill feed of approximately 600,000 tpa.

Mine production in the LOM plan is scheduled from two main sources; stopes and OVD. Overall material production from underground ranges between approximately 475,000 tpa to 720,000 tpa over the eight year mine life and is within the current underground haulage capacity of 1.0 Mtpa.

Björkdal has a significant amount of underground development workings in place, which allows for flexibility in mine scheduling. Pillar recovery is scheduled for the latter years of production.

17 RECOVERY METHODS

INTRODUCTION

The original plant was designed and built by Davy McKee in 1987 for Terra Mining. There have been a number of major changes made to the processing circuit with the primary objective of increasing plant throughput while maintaining gold recovery. The modifications are summarized in Table 17-1.

TABLE 17-1 PLANT MODIFICATIONS
Mandalay Resources Corporation – Björkdal Mine

Year	Modifications
1989	Plant commenced operation
1990	New 750 kW regrind mill installed
1992	Sala 6.6 m^3 flotation cell installed
1993	2 – 75 kW Sala Agitated Mills (SAM) installed before flotation circuit
1994	A sorting plant and a new mill facility were constructed and commissioned in December 1994
2005	Knelson CD12 and a small regrind mill (7.5 kWh) installed in the gravity section
2009	Knelson XD30 installed before flotation
2013	The Reichert cones were replaced by Rougher spirals; an Outokumpu SkimAir-240 flotation cell and a new double deck screen were installed in the grinding circuit
2017	Flotation expansion installed and commissioned, increased flotation capacity and increased recovery
2018	Expert Process Control System installed (Mintek), commissioning ongoing

PROCESS DESCRIPTION

A simplified process flowsheet is provided in Figure 17-1.

The concentrator includes primary, secondary, and tertiary crushing, primary, and secondary grinding, a series of gravity concentration steps, regrinding, and flotation to produce three gravity concentrates and a flotation concentrate.

Ore is delivered to a series of small stockpiles that are utilized to campaign ore through the processing facility in order to provide reconciliation data for various parts of the mines. From the stockpiles, a front end loader feeds a jaw crusher. Discharge from the jaw crusher is screened. The screen undersize is nominally minus 8 mm. The material is conveyed to a 5,000 t fine ore bin or to an emergency stockpile. Screen oversize is stored in a 400 t stockpile. Ore is reclaimed from the stockpile and fed to a secondary cone crusher. Discharge from the cone crusher is conveyed to a second screen. Undersize from the screen is combined with the undersize from the first screen and stored in the fine ore bin or the emergency stockpile. Oversize from the second screen is fed to a tertiary cone crusher. The discharge from the tertiary crusher is combined with the discharge from the secondary cone crusher and fed to the second screen. Thus, the ore is recirculated through the tertiary cone crusher until it meets required product size (i.e., minus 8 mm).

Crushed ore is reclaimed from the fine ore bin and passed across a series of two screens prior to being fed to the primary grinding circuit. The screen oversize is directed to an oversize material stockpile. The screen undersize is split and fed to the primary ball mill and primary rod mill that are operated in parallel. Discharge from the primary mills is fed to a classifying screen. The screen oversize is returned to the primary ball mill for additional grinding. Screen undersize has a particle size of approximately 80% passing (P_{80}) 560 µm. The slurry is pumped to hydrocyclones for additional classification.

The cyclone underflow (P_{80} 800 µm) is fed to rougher spiral concentrators. Tailings from the rougher spirals are returned to the secondary ball mill hydrocyclone. Underflow from the cyclone is fed to the secondary ball mill. Overflow from the cyclone bypasses the secondary mill, is combined with the discharge from the ball mill, and is fed to the classifying screen along with the discharge from the primary mills.

Concentrate from the rougher spirals is fed to the cleaner spiral classifiers. Tailings from the cleaner spirals are combined with the tailings from the rougher spirals and processed in the secondary ball mill circuit. Concentrate from the cleaner spirals is cleaned on shaking tables. Tailings from the shaking table are fed to a regrind mill. The discharge from the regrind mill is fed to a Knelson centrifugal gravity concentrator. Tailings from the Knelson concentrator are combined with the tailings from the rougher and cleaner spiral concentrators and processed in the secondary ball mill circuit. Concentrate from the shaking tables and the Knelson concentrator are fed to the cleaner shaking table where two concentrate grades are produced. The gravity concentrate contains approximately 50% gold and the middlings from the cleaner shaking table contain approximately 1,500 g/t Au.

Overflow from the cyclone that follows the classifying screen (P_{80} 230 µm) is further classified in the flotation cyclones. The flotation cyclone underflow (P_{80} 410 µm) is fed to a Knelson concentrator. The Knelson concentrate is fed to a single SkimAir flash flotation cell. The SkimAir flotation concentrate reports to the final flotation product thickener, while the tailings from the SkimAir cell are combined with the flotation cyclone overflow (P_{80} 125 µm) as feed to three banks of conventional rougher flotation cells that operate in series. Tailings from the rougher flotation circuit feed the scavenger flotation circuit that contains three conventional flotation cells. Concentrate from the scavenger flotation circuit is recombined with the feed to the rougher flotation circuit. Tailings from the scavenger flotation circuit are the final tailings from the plant. Rougher flotation concentrate is cleaned in the first cleaner flotation circuit that consists of one bank of four conventional flotation cells and the second cleaner flotation circuit that consists of one tank flotation cell. Tailings from the first cleaner flotation circuit are returned to the feed of the rougher flotation circuit and tailings from the second cleaner flotation circuit are returned to the feed of the first cleaner flotation circuit. The second cleaner flotation concentrate is collected in the final flotation product thickener along with the SkimAir flotation concentrate. The flotation concentrate is dewatered in the flotation concentrate thickener and filtered prior to shipment.

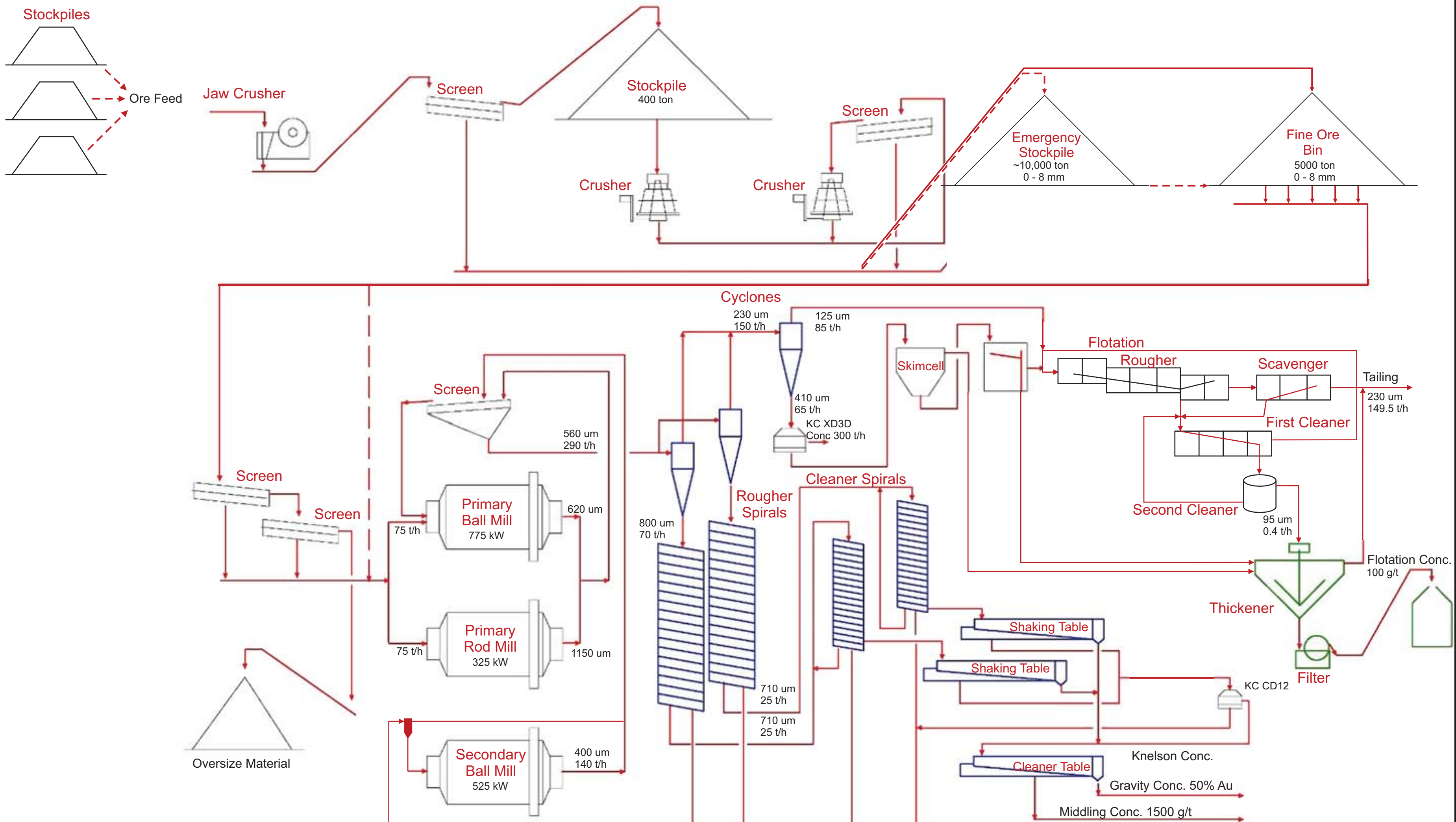


Figure 17-1

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Process Flowsheet

March 2019

Source: Modified from WIDcon AB, 2014.

18 PROJECT INFRASTRUCTURE

BJÖRKDAL

A site surface plan based on a LIDAR survey conducted in July 2016 shows the overall extent of the Mine operation and infrastructure and is presented in Figure 18-1.

TAILINGS MANAGEMENT FACILITY

The TMF is located in an area of gently undulating relief approximately 1.5 km north of the processing plant. Approximately 31 million tonnes of tailings have been deposited since mining began at Björkdal in 1988.

As of December 1, 2016, the Björkdal staff estimated that the remaining permitted capacity available is approximately 4.9 million tonnes. More recent studies have estimated that the current TMF will reach capacity in mid-2020. Further expansion of the TMF has been approved under the latest environmental operating permit that was received on December 11, 2018 and remains valid for a period of ten years.

TMF expansions have been planned by the independent consultants, Tailings Consultants Scandinavia (TCS), and preliminary construction work is scheduled to begin in 2019 following the grant of the environmental operating permit. The expanded facility will involve the establishment of a new sedimentation clearing pond at Lillträsket, the conversion of existing clearing ponds to tailings storage and will result in expanded capacity to hold approximately 15 million tonnes of mill tailings.

(Imagery current as at July 2016)

0 200 400 600 800 1000
Metres

Figure 18-1

Mandalay Resources Corporation

Björkdal Mine

Västerbotten, Sweden

Site Infrastructure Layout

March 2019

Source: Mandalay Resources Corp., 2016.

PROCESS WATER SUPPLY

Water for the process plant is supplied from two sources. Two submersible pumps located at the Kåge River supply approximately 700,000 m^3 of raw water annually to plant water tanks via two pipelines. Existing water rights allow Björkdal to withdraw up to 50 L/s, equivalent to 180 m^3/h and 1.58 million m^3/yr. A second pump station located at the TMF recycles cleared water to the processing plant. Approximately 55% of the process water is recycled from the tailings system and the remaining 45% is drawn from the Kåge River.

At present, the Björkdal Mine is diverting approximately 400,000 m^3 per year of water from the underground and open pit mines to the tailings facility and this allows a 55:45 ratio to prevail throughout the year. The result is that less water is discharged from the tailings system and less fresh make-up water is required.

POWER SUPPLY

The power supply for the site is provided by Skellefteå Kraft AB, the local power company. The electricity is sourced from relatively low-cost hydro power and is delivered to Björkdal via the Swedish power grid.

COMMUNICATIONS

On-site communications include regular land line telephone, internal radio communication, and internet service. Back-up of the Björkdal computer servers is completed automatically through high speed internet to a service company in Skellefteå.

WASTE ROCK DUMPS

The waste rock from open pit mining and low grade ore stockpiles currently amount to more than 60 million tonnes. An additional moraine stockpile amounts to more than one million tonnes.

Previous characterization studies conducted have shown that waste rock contains very low levels of heavy metals and sulphur and concluded that the waste should be considered inert.

There are currently two active waste dump areas; the North and South waste dumps, as shown in Figure 18-1. Under the new operating permit application, the capacity of the waste rock dumps has been expanded to over 53 million tonnes. This capacity is sufficient to cover the needs of the current mine life.

SURFACE FACILITIES

The Björkdal Mine operation has all the facilities associated with an open pit and underground gold mine and includes the items listed below:

- Raw ore stockpile facility containing eleven 5,000 t to 7,000 t capacity raw ore stockpiles for plant feed
- Primary jaw crushing facility with 400 t coarse ore stockpile
- Secondary crushing facility
- 5,000 t fine ore stockpile and reclaim facility
- 3,600 tpd mill and gravity gold plant, and flotation plant
- Heavy equipment maintenance facility
- Ancillary buildings for office facilities, and assay laboratories
- 250 ha TMF
- Raw water supply and storage
- Water treatment plant
- Core storage facility
- Explosive magazine and emulsion and ANFO mixing facilities
- Storage facilities for chemical reagents and bulk supplies

NORRBERGET

There is little existing infrastructure at Norrberget aside from a forest access road, currently used for forestry and hunting access to the surrounding area. Given the small size of the deposit and short mine life, it is envisaged that the bulk of the required infrastructure will be able to be somewhat temporary in nature.

MINE WATER SUPPLY

Water to support Norrberget mining operations is planned to be sourced from Lillträsket, a small surface lake approximately two kilometres northwest of the proposed operation. Lillträsket is planned to be used as a sedimentation clearing pond for the Björkdal TMF and appropriate land purchases have been made to facilitate its conversion to this use. As the pit progresses deeper, it is expected that much of the water required for mining can be recycled from dewatering operations.

A pipeline is planned to follow the existing track between Lillträsket and the deposit as this will obviate the need to construct a dedicated maintenance track. Pipe will be constructed to service both the dewatering discharge needs of the Mine and the supply of mining operations water.

Fresh water supply for drinking and washing is planned to be trucked in. On the Björkdal Mine site, fresh water is provided from an on-site bore and this may prove to be the most economical option for fresh water supply at Norrberget. No investigations as to water quality for this purpose have yet been carried out.

POWER SUPPLY

The power supply for Norrberget is planned to be an extension of the existing Swedish electricity grid from Nylunds (approximately 3.5 km east). The major power supplier in the region is Skellefteå Kraft AB, the energy supply mix is dominated by locally sourced hydro power and is relatively low cost.

The planned route for the cable extension follows the course of the existing access road and a small sub-station is planned to service the operation of the site.

Other options for site power supply are currently being further investigated by Björkdal staff; this may provide opportunities to reduce required capital investment or unlock operational benefits.

COMMUNICATIONS

A system of three radio repeater stations is planned to integrate the Norrberget site into the larger Björkdal radio system. This system is required for safe operations to be overseen by management and technical staff and will allow ore haulage trucks to operate around the existing open pit.

In addition to the radio system, cellular phone signal is available in the area.

A GPS base station will be installed to facilitate surveying of the surface mine and allow GPS excavator control and communication. This can be integrated into the current system at Björkdal.

WASTE ROCK DUMPS

Based on the current Mineral Reserves, it is forecast that approximately 0.5 million tonnes of loose glacial cover and approximately 1.95 million tonnes of solid waste rock will be removed from the Norrberget open pit. This material is planned to be stockpiled on the both the north and south sides of the designed open pit. These piles will be designed to function as sound attenuation barriers to reduce the impact on the amenity of the small village of Norra Bastuträsk, approximately 1.7 km to the northeast of the proposed workings.

SURFACE FACILITIES

There is little requirement for permanent surface facilities at Norrberget. The short mine life and proximity to existing facilities at Björkdal minimize the need for any extensive construction. Office space for technical and management staff will be accommodated within the extant buildings at the Björkdal Mine. Portable units are planned to be used to supply the required toilet/shower block, change house, and heated muster room.

Other surface infrastructure that would typically be required will be shared with the Björkdal site.

ORE HAULAGE ROAD

The existing forest access track will be widened and upgraded to a standard suitable for heavy vehicle access from Route 870 (Fällfors Road) to the deposit at Norrberget, a stretch of approximately 3.5 km. Existing access tracks will be suitable for ore haulage from Route 870 to the primary crusher stockpile area.

Construction of the road upgrade will require culverts in three places, to allow the passage of a surface stream and for two of the surface water diversion trenches described in Section 16.

19 MARKET STUDIES AND CONTRACTS

MARKETS

The principal commodity at Björkdal is gold, which is freely traded at prices that are widely known, so that prospects for sale of any production are virtually assured.

CONTRACTS

Björkdal produces four salable products: a gravity concentrate, a middlings concentrate, a Knelson concentrate, and a flotation concentrate. The sales agreements are summarized in Table 19-1.

TABLE 19-1 SUMMARY OF SALES AGREEMENTS
Mandalay Resources Corporation – Björkdal Mine

Product	Counter Party	Gold Payable (%)	Silver Payable (%)
Gravity Concentrate	Aurubis	99.75	98.50
Middlings Concentrate	Aurubis	97.50	97.00
Knelson Concentrate	Aurubis	98.00	97.00
Flotation Concentrate	Boliden	95.00	95.00

The above mentioned sales agreements provide for a concentrate treatment charge, refining charges for gold and silver, and minor penalty provisions for any excessive amounts of bismuth, tellurium, and fluorine contained in the concentrates.

The terms of the concentrate sales agreement are confidential but have been reviewed by RPA and are considered appropriate for the product and within industry norms. The specific terms of the agreements are included in the RPA assessment of the economic viability of the LOM plan.

Other contracts that exist with the Mine and suppliers include those for:

- Open Pit Loading/Hauling: Bennys Gräv AB contract expired mid-2018, SweRock AB undertook a new contract thereafter.

- Open Pit Drilling: Norrbottens Bergteknik AB

- Blasting: EPC Sverige AB for the supply of emulsion and ANFO explosives and blast hole loading for both open pit and underground.
- Exploration Diamond Drilling: Contracted on an as-needs basis.
- Electrical: Boliden Electro AB provides all electric services.
- Underground Ore Transport: Porjus Entreprenad AB is responsible for the loading and haulage to the surface of all material mined underground.
- RC drilling: Styrud AB.
- Variety of leased mining equipment.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

ENVIRONMENTAL STUDIES

A full environmental audit is carried out every three years by an independent consultant and the local authorities. The monitoring, control, and management policies and procedures are well documented and entirely appropriate to the type of operation.

The Mine has low sulphide content and, as a result, no acid rock drainage (ARD) potential exists. Gold is recovered by mechanical and gravity processes with no use of cyanide. There are no harmful elements associated with the Mine tailings and the tailings have been declared non-toxic by the authorities. Previous characterization studies conducted have shown that waste rock from open pit mining contains very low levels of heavy metals and sulphur and have concluded that the waste should be considered inert.

Water quality is monitored on a regular basis at eight strategically placed monitoring stations. The Upper Lillträsk Creek and Upper Kåge River stations are located upstream of the mining area and provide reference water quality data; two stations on the mine property monitor discharge quality from the mine water system (PP1) and the TMF (PP2); and four additional stations located in Lower Lillträsk Creek, Kåge River, and Röjmyr Creek to monitor changes in the receiving watershed.

Sampling is performed by certified samplers and the protocol includes analyses for a suite of twenty-one metals; pH; temperature; ammonium-nitrogen, phosphates and phosphorus; nitrogen, nitrates and nitrites; oil and total suspended solids (TSS).

Björkdal reports that the discharge water quality from both the mine water management system (PP1) and the TMF (PP2) have historically exceeded permissible levels for nitrates and TSS. Elevated levels of phosphorus and phosphates have also been noted at PP1.

The Mine has conducted several studies to establish the cause for these elevated values and to address elevated nitrogen and TSS levels. In 2015, the underground mine water discharge was diverted into the tailings pond and nitrogen levels declined as a result of degradation of nitrogen due to a longer residence time and dilution. During 2018, all mine discharge water was being discharged to the TMF through PP2, and PP1 has been removed from the control and monitoring system. This change has been approved by the environmental court and is anticipated to resolve all issues with elevated nitrites and TSS.

PERMITTING

All operations are fully permitted in accordance with Swedish environmental, health and safety legislation.

A new operating permit (M 771-17) was granted in December 2018 and remains valid for ten years.

Under the existing long-term water-use permit, Björkdal is permitted to use the Kåge River as a water source for the processing plant. The allowed amount is 50 L/s (180 m^3/h). The plant uses approximately 150 m^3/h and half of this is recycled from the tailings facility. Water used at the mine site for purposes other than the processing plant is sourced from dug wells.

The current two permits required for the operation are shown in Table 20-1.

TABLE 20-1 PERMITS
Mandalay Resources Corporation – Björkdal Mine

Permits	Valid from Date	Valid to Date	Type
M 771-17	2018-12-03	2028-12-03	Environmental permit
VD DVA 9/87	1987-05-26	No expiry date	Water-use permit

SOCIAL OR COMMUNITY REQUIREMENTS

There are no issues with community impact. The Mine is located in a part of Sweden that has a long history of mining activity and mining is accepted as a socially responsible and necessary contributor to the local economy.

The Björkdal property is located in an area where the Svaipa Sami village (the local indigenous group) retains winter grazing rights for their reindeer herds. A compensation agreement for lost grazing land and increased operating costs for the reindeer herders was signed in April 2017. This agreement remains valid for the planned operating life of the Björkdal Mine.

The Norrberget deposit is not covered by the above agreement. A new mining concession has been granted that covers Norrberget and is valid until January 2044.

HEALTH AND SAFETY MANAGEMENT PLAN

The management at Björkdal has a strong focus on the safety of all personnel employed at, or visiting, the operation and is committed to the following fundamental objectives:

- No personnel employed by Björkdal or its contractors should suffer either injury or illness arising from being employed at the Björkdal site.
- All personnel, contractors, service providers, and suppliers must rate safety and the protection of the environment as core values.

Safety meetings to discuss workplace Occupational Health and Safety (OHS) issues are conducted by relevant department or contractor supervisors and presented to individual work groups. Safety meetings are held weekly and are attended by all members of the work group.

All managers and employees at Björkdal have completed the DuPont STOP safety system training and any hazards identified are treated with high priority.

In 2018, all Björkdal staff undertook a comprehensive program focused on safety culture and improving attitudes towards safe work habits. The program was carried out by a boutique safety consultancy, RMS Switzerland.

Other safety related initiatives being, or having been, introduced in 2018/2019 include:

- The introduction of self-rescuers for all personnel working or entering the underground mine.
- An updated and improved site induction for all Björkdal employees and contractors has been introduced. This is available online and can be undertaken prior to personnel coming to the site.
- A maintenance planning system is being implemented which will result in the proactive maintenance of all equipment and ensure the completion of pre-start checks.
- A maintenance workshop is now available for the regular maintenance of all light vehicles.

The safety statistics reporting at Björkdal is based on the following classifications:

- Medical Treatment Frequency Rate (MTIFR),
- Lost Time Injury Frequency Rate (LTIFR).
- Total Reportable Injury Frequency Rate (TRIFR),

The incident classification is presented in Table 20-2. MTIFR and LTIFR statistics for 2015 through 2017 are presented in Table 20-3.

TABLE 20-2 INCIDENT CLASSIFICATION
Mandalay Resources Corporation – Björkdal Mine

Incident Classification	Statistical Grouping		
	TRIFR	MTIFR	LTIFR
First Aid	✓	✓	
Medical Treatment	✓	✓	
Restricted Duties	✓		
Lost Time	✓		✓
Fatality(s)	✓		✓

TABLE 20-3 STATISTICS FOR MTIFR AND LTIFR
Mandalay Resources – Björkdal Mine

Year	MTIFR	LTIFR
2015	22.24	16.68
2016	0	12.28
2017	9.73	12.97

The Björkdal health and safety statistics for 2018 are summarized in Table 20-4.

TABLE 20-4 2018 HEALTH AND SAFETY STATISTICS
Mandalay Resources – Björkdal Mine

Class	Value
Fatalities	0
Lost Time Incidents (LTI)	4
Restricted Work Incidents (RW)	0
Medical Treatment (MT)	8
Total Hours, Contracted Time Björkdal	321,403
Total Hours, Worked for Contractors	225,400
Total Recordable Incident Rate (TRIFR)	20.89
Medical Treatment Incident Rate (MTIFR)	7.29
Lost Time Incident Rate (LTIFR)	6.94

MINE CLOSURE REQUIREMENTS

Mine closure and reclamation plans are submitted and approved as an Annex to the Environmental Permit. The approved plan provides an overview of reclamation requirements that follow the July 2004 European Commission guidelines for Best Available Practice for the management of tailings and waste rock in mining activities. Six months prior to mine closure, a detailed remediation plan is to be submitted to the regulator.

The newly granted environmental permit includes an updated closure and reclamation plan. Mandalay presently has US$1.7 million (SEK 16 million) in a secured reclamation account held by the Swedish authorities and this will be increased to US$4.49 million (SEK 43 million).

21 CAPITAL AND OPERATING COSTS

CAPITAL COSTS

BASIS OF ESTIMATE

The Björkdal Mine is an on-going operation with the necessary facilities, equipment, and manpower in place to produce gold. The basis for the LOM plan is the Probable Mineral Reserve estimate outlined in Section 15. RPA has reviewed the LOM and cost estimates in sufficient detail to be satisfied that economic extraction of these Probable Mineral Reserves is justified. The majority of the capital cost estimates contained in this report are based on quantities generated from the open pit and underground development requirements and data provided by Björkdal.

A summary of capital requirements anticipated over the LOM is summarized in Table 21-1.

TABLE 21-1 CAPITAL COST SUMMARY
Mandalay Resources Corporation – Björkdal Mine

Description	Value (US$ '000)
Sustaining Capital Fixed Assets	21,556
Capital Development Underground	21,385
Pre-Strip Open Pit	40,146
Total Sustaining Capital	**79,646**
Growth Capital Fixed Assets	23,474
Total LOM Capital Expenditure	**106,560**

SUSTAINING CAPITAL

The sustaining capital cost estimate provides for the periodic addition of capital required to maintain the operations at its existing levels. Sustaining capital is broadly divided between three areas: spending on fixed assets, ongoing underground development, and open pit pre-stripping. Pre-stripping costs include the removal of approximately 4.9 million tonnes of open pit waste rock and overburden, while underground development includes the advancement of 7,888 m of cross-cuts and ramps to facilitate access to future mining areas. Costs are estimated based on actual cost history at Björkdal. The fixed asset estimate includes provision for equipment replacement; maintenance of the underground ventilation, electrical distribution, and mine water management systems; equipment replacement in the process plant and the replacement of items associated with tailings disposal, water treatment, and other general items.

GROWTH CAPITAL

Growth capital for this reporting year is solely to support the establishment of the open pit at the Norrberget satellite deposit. Initial capital investments for the Norrberget deposit are scheduled to begin in the fourth quarter of 2020.

OPERATING COSTS

BASIS OF ESTIMATE

The Mine maintains detailed and all-inclusive operating cost records that provide an excellent basis for the estimate of future operating costs. Björkdal produced a cash flow estimate based on the budgeted costs for 2019. This estimate was checked against 2017 and 2018 costs provided by Björkdal. The majority of Björkdal's operating costs are based in Swedish Kroner. All costs have been converted to US dollars using exchange rate assumptions of 9.0 SEK/US$.

Unit costs used to estimate LOM operating costs are summarized in Table 21-2. RPA notes that the annual fluctuation in production levels is relatively low, such that the effect of fixed versus variable expenses is minimized.

TABLE 21-2 UNIT COST INPUTS
Mandalay Resources Corporation – Björkdal Mine

Activity	Units	Value
Open Pit Mining	US$/t moved	2.33
Open Pit Mining	US$/t ore moved	8.26
Underground Mining - Development	US$/t ore	29.33
Underground Mining - Stoping	US$/t ore	18.39
Stockpile Mining	US$/t moved	1.33
Processing	US$/t processed	7.56
G&A	US$/t processed	7.11

LIFE OF MINE OPERATING COSTS

RPA has used the Björkdal unit costs to estimate LOM operating costs. Operating costs for the LOM plan are shown in Table 21-3.

TABLE 21-3 LIFE OF MINE OPERATING COSTS
Mandalay Resources Corporation – Björkdal Mine

Description	LOM (US$ '000)	Annual Average (US$ '000)	Unit Cost (US$/t proc)
Mining	138,835	17,180	12.20
Processing	86,013	9,822	7.56
G&A	80,954	9,244	7.11
Royalties and Refining	14,440	1,604	1.27
Total Operating Cost	**320,243**	**39,677**	**28.29**

The LOM has been prepared on the basis that all planned mining activities can be carried out using Björkdal's existing manpower. It is assumed that current contract prices will remain unchanged for mining activities performed by a contractor such as open pit mining and underground rock haulage.

Cost inputs have been priced in real Q4 2018 dollars, without any allowance for inflation or consideration to changes in foreign exchange rates.

22 ECONOMIC ANALYSIS

This section is not required as the property is currently in production, Mandalay is a producing issuer, and there is no material expansion of current production. RPA has verified the economic viability of the Mineral Reserves via cash flow modelling, using the inputs discussed in this report.

23 ADJACENT PROPERTIES

There are no adjacent properties relative to this Report.

24 OTHER RELEVANT DATA AND INFORMATION

No additional information or explanation is necessary to make this Technical Report understandable and not misleading.

25 INTERPRETATION AND CONCLUSIONS

The Björkdal plant has processed approximately 31.2 million tonnes of ore to December 31, 2018 to produce a total of approximately 1.39 million ounces of gold at an average feed grade of 1.55 g/t Au. Both open pit and underground mining methods have been employed on the property.

GEOLOGY AND MINERAL RESOURCES

- The gold mineralization at the Mine occurs as a large number of sub-parallel, steeply dipping, narrow quartz veins. The veining is locally structurally complex with many Reidel-type vein geometries as well as small quartz veinlets and pods. The strike limits of the veins appear to be bounded largely by the Björkdal shear to the east and the Quartz Mountain shear to the west.

- Mandalay has made good progress towards upgrading its geologic knowledge of the Björkdal deposit and the controls on the distribution of the mineralization with the goal of developing a robust high-quality deposit model.

- Many areas of the Björkdal Mine property are unexplored or under-explored and so are considered to offer good exploration potential. Additional gold mineralization is found at the Norrberget deposit, as well as in the Storheden and the Morbacken areas of the property.

- Mandalay has carried out significant amount of exploration and in-fill drilling in the near-mine area, which has resulted in the expansion of the previously known limits of the gold mineralization, and has discovered a new area of gold mineralization in 2018 that is referred to as the Aurora Zone.

- Mandalay has adopted the LeachWELL assaying method for determining the gold content of the samples. The method is considered suitable for determination of gold grades on samples containing coarse gold particles. The results to date are showing that, while room for improvement remains, the method is providing a better degree of precision as compared with a conventional fire assay method.

- The Mineral Resource sample database consisting of DDH, RC, and chip samples collected by Mandalay is acceptable for Mineral Resource estimation purposes. The historical chip sample data is also considered adequate for use in estimation of the Mineral Resources, provided that the assay values are weighted for the width of the mineralized wireframe model.

- The Björkdal OP wireframes were based on a nominal 0.3 g/t Au cut-off value over a minimum of two metres. The UG wireframes were based on a nominal two metres minimum width at a cut-off value of 0.5 g/t Au. A total of 76 new vein wireframe models were created for the current Mineral Resource estimate. In total, 485 mineralized wireframe models were created for the underground mine and 526 wireframe models were created for the open pit mine.

- A dual capping value approach was used for estimation of the gold grades contained within the mineralized wireframe models in the underground mine. In this approach, the composited assays for DDH and RC drill holes are capped to values of 60 g/t Au and 40 g/t Au. Two different area of influences are then used when estimating the block grades for each mineralized wireframe. The higher grade capped composites are used within a first pass search ellipse with a 15 m radius while the lower grade capped composites are used for subsequent estimation passes. A single capping value of 40 g/t Au was applied to the composited samples contained within the chip sample database. A value of 30 g/t Au has been selected as the capping value for the DDH, RC, and chip samples contained within the open pit wireframes. This capping value was also applied to all samples contained within the dilution domain volume.

- A short study was undertaken to evaluate the effectiveness of alternate work flows to improve the accuracy of the estimated tonnage and grade for the Aurora Zone. The study also examined the impact of including the detailed channel sample information on the accuracy of modelling the distribution of the gold grades. The study concluded that the inclusion of the detailed channel sample data is a key item for estimation of the gold distribution at local scales. The study also suggested that modifying the search parameters to reduce the number of samples used for the estimate and to allow for a single drill hole will yield slightly better estimates.

- Mandalay initiated a program in 2016 whereby the stope volumes in the underground mine are determined using the CMS. This program was continued through 2017 and 2018, but was limited by equipment availability. This is a critical item to permit completion of detailed reconciliation studies for the underground mine.

- Comparison of the predicted tonnages and grades from the year end 2017 Long Term block model against the realized tonnages and grades as defined by the year end 2018 Grade Control model demonstrate that the sample collection, assaying, and estimation procedures used to prepare the Long Term Mineral Resource estimates are reasonable.

- The primary gold mineralization at Norrberget is contained within bands of veinlets and alteration containing amphibole in a package of interbedded mafic tuffs and volcaniclastics.

- Mineralization wireframes were generated using a 0.4 g/t Au cut-off and a two metre minimum horizontal width. The wireframes represented a primary band of continuous mineralization and two limited footwall bands of mineralization.

- Samples within the Norrberget domains were capped at 24 g/t Au, affecting seven out of the 311 samples within the mineralized domains. Intercepts within the domain were composited to 1.0 m lengths with a minimum sample length of 0.5 m.

- Bulk density was applied to block model from average densities obtained average densities for each lithology. The mineralization has an average density of 2.78 g/cm^3.

- The low number of mineralized samples at Norrberget necessitated the use of Inverse Distance Weighted interpolation rather than the Ordinary Kriging method. Continuity analysis of grade contours was reviewed to help define high grade trends that were used to inform the interpolation parameters.

- The Mineral Resource estimate for Björkdal and Norrberget effective December 31, 2018 is listed in Table 25-1.

TABLE 25-1 MINERAL RESOURCES AT THE BJÖRKDAL MINE AND NORRBERGET DEPOSIT AS AT DECEMBER 31, 2018
Mandalay Resources Corporation – Björkdal Mine

Location	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
		Indicated Resources		
Björkdal	Open Pit	2,947	2.30	218
	Underground	7,416	2.98	711
	Stockpile	2,700	0.64	56
	Subtotal	13,063	2.36	985
Norrberget	Open Pit	144	3.29	15
Total, Indicated		**13,207**	**2.36**	**1,000**
		Inferred Resources		
Björkdal	Open Pit	2,516	1.32	107
	Underground	1,922	2.63	162
	Subtotal	4,438	1.89	269
Norrberget	Open Pit	3	4.03	0.5
Total, Inferred		**4,441**	**1.89**	**270**

Notes:
1. Björkdal Mineral Resources are estimated using drill hole and sample data as of September 30, 2018 and depleted for production through December 31, 2018.
2. Norrberget Mineral Resources are estimates using drill hole and sample data as of September 30, 2017
3. CIM (2014) definitions were followed for Mineral Resources.
4. Mineral Resources are inclusive of Mineral Reserves.
5. Mineral Resources are estimated using an average gold price of US$1,400/oz and an exchange rate of 9.0 SEK/US$.
6. Bulk density is 2.74 t/m^3.
7. High gold assays were capped to 30 g/t Au for the open pit mine.
8. High gold assays for the underground mine were capped at 60 g/t Au for the first search pass and 40 g/t Au for subsequent passes.
9. High gold assays at Norrberget were capped at 24 g/t Au.
10. Interpolation was by inverse distance cubed utilizing diamond drill, reverse circulation and chip channel samples.
11. Open pit Mineral Resources are estimated at a cut-off grade of 0.35 g/t Au and constrained by a resource pit shell.
12. Underground Mineral Resources are estimated at a cut-off grade of 0.95 g/t Au.
13. A nominal two metres minimum mining width was used to interpret veins using diamond drill, reverse circulation, and underground chip sampling.
14. Stockpile Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au and are based upon surveyed volumes supplemented by production data.
15. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
16. Numbers may not add due to rounding.

MINING AND MINERAL RESERVES

- The Mineral Reserve estimate for Björkdal and Norrberget effective December 31, 2018 is listed in Table 25-2.

TABLE 25-2 MINERAL RESERVES AT THE BJÖRKDAL MINE AS AT DECEMBER 31, 2018
Mandalay Resources Corporation – Björkdal Mine

Location	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
		Probable Reserves		
Björkdal	Open Pit	3,768	1.23	149
	Underground	4,754	2.36	360
Norrberget	Open Pit	162	2.80	15
Stockpile	Stockpile	2,700	0.64	56
Total, Probable		**11,384**	**1.58**	**580**

Notes:
1. Mineral Reserves are estimated using drill hole and sample data as of September 30, 2018 and depleted for production through December 31, 2018.
2. CIM (2014) definitions were followed for Mineral Reserves.
3. Open Pit Mineral Reserves are based on mine designs carried out on an updated resource model, applying a block dilution of 100% at 0.0 g/t Au for blocks above 1.0 g/t Au and 100% at 0.6 g/t Au for blocks between 0.4 g/t Au and 1.0 g/t Au. The application of these block dilution factors is based on historical reconciliation data. A cut-off grade of 0.4 g/t Au was applied. Open Pit Mineral Reserves for Norrberget are based on 15% dilution at zero grade and 100% extraction.
4. Underground Mineral Reserves are based on mine designs carried out on an updated resource model. Minimum mining widths of 3.5 m for stopes (after dilution) and 3.8 m for development were used. Dilution was applied by adding 0.5 m on each side of stopes as well as an additional 10% over break dilution. Further dilution, ranging from 10% to 100%, was added on a stope by stope basis depending on their proximity with other stopes. An overall dilution factor of 14.5% was added to development. Mining extraction was assessed at 95% for contained ounces within stopes and 100% for development. A cut-off grade of 1.00 g/t Au was applied. An incremental cut-off grade of 0.4 g/t Au was used for development material.
5. Stockpile Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au and are based upon surveyed volumes supplemented by production data.
6. Mineral Reserves are estimated using an average long-term gold price of US$1,200/oz, and an exchange rate of 9.0 4 SEK/US$.
7. Tonnes and contained gold are rounded to the nearest thousand.
8. Totals may appear different from the sum of their components due to rounding.

- The current Mineral Reserves for Björkdal support a mine life of approximately nine years at near full mill capacity with the exception of the last year. Gold production averages approximately 70,000 oz per year. The nine year mine life is an improvement over past estimates. There are a number of opportunities that could further extend the mine life:
  - Continue upgrading Inferred Mineral Resources to Indicated Mineral Resources.
  - Analyze the potential to relocate surface infrastructure which could result in additional open pit mining.
  - Identify remnant underground mining areas with in-situ Mineral Resources that could be extracted in a safe and cost effective manner.

- The low grade stockpile represents an option for Björkdal to operate its mill at full capacity. Additional material is expected to be placed into the stockpile over the remaining LOM, which will allow Björkdal to run at or near capacity in all years of the LOM.

- Due to the variable quality of the material that comprises the low grade stockpiles, grade variations in the feed to the mill are anticipated.

- The proposed open pit mine plan will eventually recover the existing crown pillar. This pillar contains infrastructure servicing the underground operations that will be interrupted by open pit mining. It also contains a large number of voids from previous underground mining that may cause some operational issues during mining and potentially some high wall stability concerns. An additional portal will be developed to access the underground mine so that crown pillar mining can occur in parallel to underground extraction.

- The underground Mineral Reserves at Björkdal are based on an effective mining width of 3.5 m. There are currently a number of areas in the mine where multiple stopes are in close proximity to each other. This could result in certain stopes having additional dilution. In RPA's opinion, additional drilling is required in these areas to collect the additional grade, structural, and geotechnical data necessary to safely maximize reserve extraction and minimize dilution.

- Structural features such as folding and their impact on metal distribution are not well understood and are therefore not considered in the current underground mining method. Advanced knowledge of such features could result in a change in mining method and Mineral Reserves.

- RPA considers it essential that continued attention be given to local and global rock mechanics issues during future mine design as underground stresses are redistributed.

- The current open pit mining operation employs contractors for most unit operations. RPA considers that, in the event that open pit Mineral Reserves are significantly increased, potential exists to convert to a mine-owned fleet and reduce operating costs.

- There is very limited reconciliation between stope grade estimates and the reconciled mill production, although the site has conducted some reconciliation in 2017 and 2018. Stope tonnages are estimated from the stope design volume and are tracked by bucket and truck count. There is no regular reconciliation between mill tonnage and specific stope production. A CMS is used to compare actual stope volumes.

- Mining losses were included as direct gold losses and not ore tonne losses. As the dilution from stopes in close proximity to each other has been slightly underestimated, these two errors approximately offset each other.

- The lack of reconciliation and small errors in mining loss calculation and proximal stope dilution mean the actual mining losses, dilution, and dilution grade used in the Mineral Reserve estimate are estimates and the correct determination of these values may change the Mineral Reserves.

- The nature of the mining method is such that development ore will always represent a large proportion of the underground tonnage production.

- Mining at the planned Norrberget open pit will be carried out with the same contract fleet used at Björkdal. The total mine life for Norrberget is estimated at seven months.

PROCESSING

- Björkdal has been successful in recovering nearly 90% of the gold, with approximately 75% of the gold recovered in gravity concentrates (i.e., gravity concentrate, middlings, and Knelson concentrate) and an additional 12% to 17% of the gold recovered in flotation concentrates.

- Recent additions to the processing equipment, reagent changes, and improvements in the processing strategy have improved the gold recovery by 1% to 2%.

- Preliminary metallurgical tests using samples from Norrberget show that the mineralogy is more complex and the gold grain sizes are smaller which requires a finer grind size to achieve liberation. Since the deposit is small, it is not anticipated that modifications to the existing processing plant will be cost effective. Therefore, the data indicates that the average gold recovery for Norrberget will be approximately 75%.

PERMITTING

- A new operating permit was granted in December 2018 and remains valid for ten years. Expansion of the TMF and its continuing operation is covered by the new permit.

- A compensation agreement for lost grazing land and increased operating costs for the reindeer herders was signed in April 2017. This agreement is valid for the planned operating life of the Björkdal Mine.

- The Norrberget deposit is not covered by the above agreement. A new mining concession has been granted that covers Norrberget and is valid until January 2044.

- The newly granted environmental permit includes an updated closure and reclamation plan.

RISKS

- The Mine has been in production for over 25 years and is a mature operation. In RPA's opinion, there are no significant risks or uncertainties that could reasonably be expected to affect the reliability or confidence in the exploration information, Mineral Resource or Mineral Reserve estimates, or projected economic outcomes.

- Björkdal experienced some operational challenges in 2018 relating mainly to a sudden contract cancellation for the underground haulage in Q2 2018. An alternative contractor was able to provide some additional trucks on short notice; however, the trucks were older and provided very poor availabilities. In December 2018, newer trucks arrived to site and the production normalized. These operational challenges resulted in lower grades from the open pit and stockpiles being fed to the mill and, therefore, lower gold production.

26 RECOMMENDATIONS

RPA presents the following recommendations:

GEOLOGY AND MINERAL RESOURCES

- Improve the precision of the duplicate sample assay results by examining the impact of using a larger aliquot or a finer grind size.

- Consider the preparation of a two kilogram pulp from the coarse reject material at a frequency of approximately one sample in 50, to permit a review of the precision of the analytical method.

- Examine the distribution of the gold contents within the mineralized wireframes by contouring the gold grades longitudinal projections. The results will be useful in short term planning and will improve the targeting of exploration and in-fill drilling programs.

- Continue collecting chip samples of the veins and wall rocks from underground and open pit locations.

- Continue to refine the operating procedures to allow more confidence in underground reconciliations. Particular attention should be paid to obtaining high quality surveys of all stope voids on a regular and timely basis. This information should then be integrated into the material tracking and metal accounting systems to then permit comparisons to be made from the block model predicted to the mine actual production and then on to the mill output. A dedicated software system may provide invaluable aid in this case. Increasing the confidence in reconciliation is the key hurdle to generating a Measured Mineral Resource at Björkdal.

- Continue efforts to understand the source of the local-scale variances between the predicted and recovered amounts of gold at the stope scale. Efforts should also continue to reduce these variances to an acceptable level for a given time period.

- Incorporate variance studies of block model predicted versus actual tonnage, grade and contained gold content into the normal-course work flow, to be carried out on a quarterly basis. Future variance studies should incorporate any drill hole information that may be available. Future variance studies should also examine the relationship between predicted and actual tonnage and grade on a pre-dilution basis.

- Undertake studies to measure the mining recoveries, mining dilution, and the dilution grade of the plant feed from the open pit mine directly.

- Undertake studies to measure the mining recoveries, mining dilution, and the dilution grade of the plant feed from the underground directly.

- Continue drilling programs to both search for new areas of mineralization on the Mine property and expand the limits of the known mineralization.

- At Norrberget, additional drilling is recommended to delineate the mineralization at depth and along strike.

MINING

- Adjust the mining loss estimate to include an estimate of lost ore tonnes.
- Review all the proximal stopes and update the dilution estimate in those stopes.
- Complete a comprehensive stope survey to enable a useful reconciliation of planned tonnes and actual production. The reconciliation results should be used to improve mining practices and modify the planned Mineral Reserves.
- Undertake an investigation of minimum mining widths in the underground mine with the goal of reducing hangingwall and footwall dilution.
- Continue the ongoing review of the current production monitoring and control system, including grade control, stockpile management, campaign milling, production data collection, reporting, and management control.
- Improve underground production control systems as data becomes available, which would allow for reconciliation between mill feed production tonnes and grade and individual stope production estimates.
- In conjunction with the underground production control system, improve reconciliation of production from open pit with the mill feed production tonnes and grade.
- The economics at Norrberget are marginal and as such further work should be carried out to reduce the capital expenditures.

MINERAL PROCESSING

- Continue to monitor the performance of all unit operations and to optimize plant performance to achieve the highest economic outcome possible.
- Continue to evaluate historic data and to use the results to estimate future plant gold recovery and operating costs.
- Future metallurgical tests for Norrberget should use variability samples with a range of head grades from throughout the deposit using test conditions that evaluate what the metallurgical response will be in the existing processing facility.

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28 DATE AND SIGNATURE PAGE

This report titled "Technical Report on the Björkdal Mine, Sweden" and dated March 28, 2019 was prepared and signed by the following authors:

	(Signed and Sealed) ***"Reno Pressacco"***
Dated at Toronto, ON March 28, 2019	Reno Pressacco, M.Sc.(A), P.Geo. Principal Geologist
	(Signed and Sealed) ***"Jack Lunnon"***
Dated at London, UK March 28, 2019	Jack Lunnon, CGeol. Senior Geologist
	(Signed and Sealed) ***"David JF Smith"***
Dated at London, UK March 28, 2019	David JF Smith, CEng. Principal Mining Engineer
	(Signed and Sealed) ***"Derek Holm"***
Dated at London, UK March 28, 2019	Derek Holm, FSAIMM Senior Mining Engineer
	(Signed and Sealed) ***"Ian Weir"***
Dated at Toronto, ON March 28, 2019	Ian Weir, P.Eng. Senior Mining Engineer
	(Signed and Sealed) ***"Kathleen Ann Altman"***
Dated at Lakewood, CO March 28, 2019	Kathleen Ann Altman, Ph.D., P.E. Principal Metallurgist

29 CERTIFICATE OF QUALIFIED PERSON

RENO PRESSACCO

I, Reno Pressacco, M.Sc(A)., P.Geo., as an author of this report entitled “Technical Report on the Björkdal Mine, Sweden”, prepared for Mandalay Resources Corporation and dated March 28, 2019, do hereby certify that:

1. I am a Principal Geologist with Roscoe Postle Associates Inc. of Suite 501, 55 University Ave., Toronto, ON, M5J 2H7.

2. I am a graduate of Cambrian College of Applied Arts and Technology, Sudbury, Ontario, in 1982 with a CET Diploma in Geological Technology, Lake Superior State College, Sault Ste. Marie, Michigan, in 1984, with a B.Sc. degree in Geology and McGill University, Montreal, Québec, in 1986 with a M.Sc.(A) degree in Mineral Exploration.

3. I am registered as a Professional Geologist in the Province of Ontario (Reg. #939). I have worked as a geologist for a total of 32 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Review and report as a consultant on numerous exploration and mining projects around the world for due diligence and regulatory requirements, including preparation of Mineral Resource estimates and NI 43-101 Technical Reports.
   - Numerous assignments in North, Central and South America, Europe, Russia, Armenia and China for a variety of deposit types and in a variety of geological environments; commodities including Au, Ag, Cu, Zn, Pb, Ni, Mo, U, PGM, REE, and industrial minerals.
   - A senior position with an international consulting firm.

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I visited the Björkdal Mine on September 20 to 22, 2016.

6. I am responsible for Sections 2 through 12, 14 (Björkdal Mine Mineral Resources), 23, and 24, and relevant disclosure in Sections 1, 25, 26, and 27 of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have previously prepared public domain Mineral Resource estimates for the property that is the subject of the Technical Report.

9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 28th day of March, 2019

(Signed and Sealed) ***"Reno Pressacco"***

Reno Pressacco, M.Sc.(A)., P.Geo.

JACK LUNNON

I, Jack Lunnon, CGeol, EurGeol, as an author of this report entitled "Technical Report on the Björkdal Mine, Sweden", prepared for Mandalay Resources Corporation and dated March 28, 2019, do hereby certify that:

1. I am a Senior Geologist of RPA UK Ltd. of One Fetter Lane, Suite 601, London, UK EC4A 1BR.

2. I am a graduate of the University of Southampton, United Kingdom, in 2009 with a Master of Geology (MGeol).

3. I am registered as a Chartered Geologist with the Geological Society of London (Reg. #1022611) and European Geologist with the Federation of European Geologists (Reg. #1456). I have worked as a Geologist for a total of eight years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Mineral Resource estimation and reporting on deposits worldwide for due diligence and regulatory requirements.
   - Experienced user of geological and resource modelling software.
   - Supervision of exploration properties in Africa and the Middle East.

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I visited the Björkdal Mine and Norrberget Project from September 22 to 25, 2017.

6. I am responsible for parts of Section 14 (Norrberget Mineral Resources) and relevant disclosure in Sections 1, 25, 26, and 27 of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have prepared a previous Technical Report dated March 29, 2018 on the property that is the subject of the Technical Report.

9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 28th day of March, 2019

(Signed and Sealed) ***"Jack Lunnon"***

Jack Lunnon, CGeol, EurGeol

DAVID JF SMITH

I, David J.F. Smith, CEng, as an author of this report entitled “Technical Report on the Björkdal Mine, Sweden”, prepared for Mandalay Resources Corporation and dated March 28, 2019, do hereby certify that:

1. I am Principal Mining Engineer and Managing Director with RPA UK Ltd. of One Fetter Lane, Suite 601, London, UK EC4A 1BR.

2. I am a graduate of the University of Newcastle upon Tyne, United Kingdom in 1978 with a BSc(Eng) in Mining Engineering.

3. I am registered as a Chartered Engineer in the UK with the Engineering Council and am a Fellow of the Institute of Materials, Minerals and Mining (Membership #43860). I have worked as a mining engineer for a total of 40 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Review and report as a mining consultant involved in numerous consulting and engineering assignments including; project technical evaluations, technical report preparation for project financing and fund-raisings, IPOs, merger and acquisitions, due diligence reviews and engineering studies from scoping to basic engineering
   - Numerous consulting assignments on gold and base metal mine development projects and operating mines
   - Senior positions with a leading international mining and tunnelling contractor, managing international mine and tunnel construction projects as well as developing a successful engineering consulting business
   - Board director for an international mining consulting firm, responsible for leading the UK technical staff, and ensuring the technical quality of the firm’s consulting assignments across the consulting division

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I previously visited the Björkdal Mine on September 22 to 25, 2017.

6. I share responsibility with my co-authors on Sections 15, 16, and 18 to 22 and parts of Sections 1, 25, 26, and 27 of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have prepared a previous Technical Report dated March 29, 2018 on the property that is the subject of the Technical Report.

9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 28th day of March, 2019

(Signed and Sealed) *"David JF Smith"*

David JF Smith, CEng

DEREK HOLM

I, Derek Holm, FSAIMM, as an author of this report entitled "Technical Report on the Björkdal Mine, Sweden", prepared for Mandalay Resources Corporation and dated March 28, 2019, do hereby certify that:

1. I am Senior Mining Engineer with Roscoe Postle Associates Inc. of One Fetter Street, Suite 601, London, UK EC4A 1BR.

2. I am a graduate of the University of Witwatersrand, South Africa, in 2000, with a B.Sc. (Honours) degree in Mining Engineering.

3. I am a Fellow of the Southern African Institute of Mining and Metallurgy (Reg.# 402974). I have worked as a mining engineer for a total of 18 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Four years of gold production experience
   - Mine design and scheduling for various underground gold mines over a period of ten years
   - Mineral Reserve estimation in accordance with regulatory requirements
   - Operational and feasibility study reviews for operators, lenders, and for legal proceedings

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I did not visit the Björkdal Mine.

6. I am responsible for portions of Sections 15, 16, 21, and 22 regarding underground operations and relevant disclosure in Sections 1, 25, 26, and 27 of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have had no prior involvement with the property that is the subject of the Technical Report.

9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 28th day of March, 2019

(Signed and Sealed) ***"Derek Holm"***

Derek Holm, FSAIMM

IAN WEIR

I, Ian Weir, P.Eng., as an author of this report entitled “Technical Report on the Björkdal Mine, Sweden”, prepared for Mandalay Resources Corporation and dated March 28, 2019, do hereby certify that:

1. I am a Senior Mining Engineer with Roscoe Postle Associates Inc. of Suite 501, 55 University Ave Toronto, ON, M5J 2H7.

2. I am a graduate of Queen’s University, Kingston, Ontario, in 2004 with a B.A.Sc. degree in Mining Engineering.

3. I am registered as a Professional Engineer in the Province of Ontario (Reg.# 100143218). I have worked as a mining engineer for a total of 11 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Project evaluation, mine planning, and financial analysis for NI 43-101 reporting.
   - Supervision of mine development at a copper mine in Chile from the pre-stripping phase to a fully operational mine.
   - Mining engineer at gold and copper open pit projects in Chile and USA.

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I have previously visited the Björkdal Mine, from April 13 to 18, 2015.

6. I am responsible for portions of Sections 15, 16, and 18 to 22 regarding open pit operations and relevant disclosure in Sections 1, 25, 26, and 27 of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have prepared previous Technical Reports dated January 16, 2017 and March 29, 2018 on the property that is the subject of the Technical Report.

9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 28th day of March, 2019

(Signed and Sealed) ***“Ian Weir”***

Ian Weir, P.Eng.

KATHLEEN ANN ALTMAN

I Kathleen Ann Altman, Ph.D., P.E., as an author of this report entitled "Technical Report on the Björkdal Mine, Sweden", prepared for Mandalay Resources Corporation and dated March 28, 2019, do hereby certify that:

1. I am Principal Metallurgist with RPA (USA) Ltd. of Suite 505, 143 Union Boulevard, Lakewood, Co., USA 80228.

2. I am a graduate of the Colorado School of Mines in 1980 with a B.S. in Metallurgical Engineering. I am a graduate of the University of Nevada, Reno Mackay School of Mines with an M.S. in Metallurgical Engineering in 1994 and a Ph.D. in Metallurgical Engineering in 1999.

3. I am registered as a Professional Engineer in the State of Colorado (Reg. #37556). I have worked as a metallurgical engineer for a total of 38 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Review and report as a metallurgical consultant on numerous mining operations and projects around the world for due diligence and regulatory requirements.
   - I have worked for operating companies, including the Climax Molybdenum Company, Barrick Goldstrike, and FMC Gold in a series of positions of increasing responsibility.
   - I have worked as a consulting engineer on mining projects for approximately 20 years in roles such a process engineer, process manager, project engineer, area manager, study manager, and project manager. Projects have included scoping, prefeasibility and feasibility studies, basic engineering, detailed engineering and start-up and commissioning of new projects.
   - I was the Newmont Professor for Extractive Mineral Process Engineering in the Mining Engineering Department of the Mackay School of Earth Sciences and Engineering at the University of Nevada, Reno from 2005 to 2009.

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I visited the Björkdal Mine from September 22 to 25, 2017.

6. I am responsible for Sections 13 and 17 and relevant disclosure in Sections 1, 25, 26, and 27 of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have prepared previous Technical Reports dated January 16, 2017 and March 29, 2018 on the property that is the subject of the Technical Report.

9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 28th day of March, 2019

(Signed and Sealed) ***"Kathleen Ann Altman"***

Kathleen Ann Altman, Ph.D., P.E.