Costerfield Operation, Victoria, Australia
NI 43-101 Technical Report

Report prepared for

Costerfield Operation, Victoria, Australia
NI 43-101 Technical Report

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Date of Report: 30 March 2020

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Costerfield Operation
Victoria, Australia

NI 43-101 Technical Report

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This Technical Report has been prepared as a National Instrument 43-101 Technical Report, as prescribed in Canadian Securities Administrators' National Instrument 43-101, Standards of Disclosure for Mineral Projects (NI 43-101) for Mandalay Resources Corporation. The data, information, estimates, conclusions and recommendations contained herein, as prepared and presented by the authors, are consistent with:

- Information available at the time of preparation
- Data supplied by outside sources, which has been verified by the authors as applicable
- The assumptions, conditions and qualifications set forth in this Technical Report.

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This document contains forward-looking information as defined in applicable securities laws. Forward-looking information includes, but is not limited to, statements with respect to the future production, costs and expenses of the project; the other economic parameters of the project, as set out in this technical report, including; the success and continuation of exploration activities, including drilling; estimates of mineral reserves and mineral resources; the future price of gold; government regulations and permitting timelines; requirements for additional capital; environmental risks; and general business and economic conditions. Often, but not always, forward-looking information can be identified by the use of words such as plans, expects, is expected, budget, scheduled, estimates, continues, forecasts, projects, predicts, intends, anticipates or believes, or variations of, or the negatives of, such words and phrases, or statements that certain actions, events or results may, could, would, should, might or will be taken, occur or be achieved. Forward-looking information involves known and unknown risks, uncertainties and other factors which may cause the actual results, performance or achievements to be materially different from any of the future results, performance or achievements expressed or implied by the forward-looking information. These risks, uncertainties and other factors include, but are not limited to: the assumptions underlying the production estimates not being realized, decrease of future gold prices, cost of labor, supplies, fuel and equipment rising, the availability of financing on attractive terms, actual results of current exploration, changes in project parameters, exchange rate fluctuations, delays and costs inherent to consulting and accommodating rights of local communities, title risks, regulatory risks and uncertainties with respect to obtaining necessary permits or delays in obtaining same, and other risks involved in the gold production, development and exploration industry, as well as those risk factors discussed in Mandalay Resources Corporation's latest Annual Information Form and its other SEDAR filings from time to time. Forward-looking information is based on a number of assumptions which may prove to be incorrect, including, but not limited to: the availability of financing for Mandalay Resources Corporation's production, development and exploration activities; the timelines for Mandalay Resources Corporation's exploration and development activities on the property; the availability of certain consumables and services; assumptions made in mineral resource and mineral reserve estimates, including geological interpretation grade, recovery rates, price assumption, and operational costs; and general business and economic conditions. All forward-looking information herein is qualified by this cautionary statement. Accordingly, readers should not place undue reliance on forward-looking information. Mandalay Resources Corporation and the authors of this technical report undertake no obligation to update publicly or otherwise revise any forward-looking information, whether as a result of new information or future events or otherwise, except as may be required by applicable law.

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List of Abbreviations

Abbreviation	Meaning
2D	two-dimensional
3D	three-dimensional
AAS	atomic absorption spectroscopy
AGD	AGD Mining Pty Ltd
ALS	ALS Minerals
AMC	AMC Consultants Pty Ltd
Amdel	Amdel Limited Mineral Services Laboratory
AMML	Australian Minmet Metallurgical Laboratories
ANFO	ammonium nitrate fuel oil
As	arsenic
Au	gold
AUD	Australian dollar
AuEq	gold equivalent
BBMWi	Bond Ball Mill Work Index
BEng	Bachelor of Engineering
BSc	Bachelor of Science
BV	Bureau Veritas
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CRF	cemented rock fill
CV	Coefficient of Variation
dBA	A-weighted decibels – expression of the relative loudness of sounds in air as perceived by the human ear
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
dmt/month	dry metric tonnes per month
DTM	digital terrain model
EPA	Environmental Protection Agency
ERC	Environmental Review Committee
EVC	Ecological Vegetation Class
FAR	fresh air rise
FAusIMM	Fellow of The Australasian Institute of Mining and Metallurgy
g/t	grams per tonne
GAICD	Graduate of the Australian Institute of Company Directors
GDip	Graduate Diploma
Genalysis	Genalysis Laboratory Services
Geostats	Geostats Pty Ltd
GPS	global positioning system
ha	hectares
HBr	hydrobromic acid
HCl	hydrochloric acid
HV	high voltage

Abbreviation	Meaning
ICP	inductively coupled plasma
IP	induced polarisation
IS	Interactive Scheduler
kg	kilogram
km	kilometers
kt	kilotonnes
Ktpa	kilotonnes per annum
kV	kilovolts
kVA	kilovolt amperes
kW	kilowatts
kWh	kilowatt hours
L	liters
LoM	life-of-mine
L/s	liters per second
LHD	load-haul-dump
m^3	cubic meters
m^3/s	cubic meters per second
Ma	million years
Mandalay	Mandalay Resources Corporation Pty Ltd
MAusIMM(CP)	Chartered Professional Member of The Australasian Institute of Mining & Metallurgy
MBA	Master of Business Administration
MEM	Mid-East Minerals NL
Metcon	Metcon Laboratories
ML	million liters
mm	millimeters
MMI	mobile metal ion
MODA	McArthur Ore Deposit Assessments Pty Ltd
mRL	meters reduced level
MRSD Act	Mineral Resources (Sustainable Development) Act 1990
MVA	megavolt amperes
MW	megawatts
NE	northeast
NI 43-101	National Instrument 43-101
NNE	north-northeast
NNW	north-northwest
NW	northwest
On Site	On Site Laboratory Services
oz	ounces
Pa	metric unit for pressure, Pascal
PLC	programmable logic controller

Abbreviation	Meaning
QA/QC	quality assurance/quality control
QP	Qualified Person
RAR	return air raise
R-B	Robinsons–Browns
RBA	Silurian Regional Basement Aquifer
RC	reverse circulation
RO	reverse osmosis
RoM	run-of-mine
RPD	relative paired difference
RQD	rock quality designation
SAA	shallow alluvial aquifer
Sb	antimony
SD	standard deviation
SoR	Slope of Regression
SRK	SRK Consulting (Australasia) Pty Ltd
t	tonnes
t/month	tonnes per month
tpa	tonnes per annum
TSF	tailings storage facility
UCS	unconfined compressive strength
USD	US dollars
V	volts
WCC	Western Canadian Coal Corporation
WPV	Work Plan Variation

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1 Executive summary

1.1 Introduction

SRK Consulting (Australasia) Pty Ltd (SRK) in conjunction with Mandalay Resources Costerfield Operations Pty Ltd has prepared the Costerfield Operation NI 43-101 Technical Report for the continuing operations at Augusta Mine in connection with the addition of mineralisation sourced from the Cuffley Lode. This report updates the finding of the Mineral Resources and Mineral Reserves listed in the previously filed NI 43-101 compliant Technical Report of 6 February 2019.

This Technical Report is based on Mineral Resources that conform to Canadian Securities Administrators' National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101).

Mandalay Resources Corporation (Mandalay) is a publicly listed company listed on the Toronto Stock Exchange (TSX) and trading under the symbol MND. In 2009, Mandalay completed the acquisition of AGD Mining Pty Ltd (AGD), the sole owner of the Costerfield Operation, resulting in AGD becoming a wholly owned subsidiary of Mandalay.

1.2 Property description and location

The Costerfield Operation is located within the Costerfield mining district, approximately 10 km northeast of the town of Heathcote, Victoria.

The Augusta Mine has been operational since 2006 and was the sole ore source for the Brunswick Processing Plant until December 2013 when ore production started from the Cuffley deposit located approximately 500 m to the north of the Augusta Mine workings. The Cuffley, Augusta and Brunswick deposits are being mined in conjunction with the Youle deposit, which produced its first ore in August 2019.

All ore is processed at the Brunswick Processing Plant, and associated infrastructure, all of which are located within Mining Licence MIN4644. The Mining Licence is located within Exploration Lease EL3310, which is 100% held by Mandalay Resources Costerfield Operations Pty Ltd.

The Augusta Mine is located at latitude of 36° 52' 27" south and longitude 144° 47' 38" east. The Brunswick Processing Plant is located approximately 2 km northwest of Augusta. The Cuffley Lode is located approximately 500 m north-northwest of the Augusta workings and is accessed by an underground decline from Augusta. The Brunswick deposit is located approximately 1.4 km north-northwest of the Augusta workings and 680 m north-northwest of the Cuffley deposit. The Youle deposit is located 2.2 km north of the Augusta workings and 1.6 km north of the Cuffley deposit.

1.3 Accessibility, climate, local resources, infrastructure and physiography

Access to the Costerfield Operation is via the sealed Heathcote–Nagambie Road, which is accessed off the Northern Highway to the south of Heathcote. The Northern Highway links Bendigo with Melbourne.

The nearest significant population to Costerfield is Bendigo, which has a population of approximately 100,000 and is located 50 km to the west-northwest. The Costerfield Operation is a residential operation with personnel residing throughout central Victoria and Melbourne. Local infrastructure and services are available in Heathcote, the largest town within the vicinity of the Costerfield Operation.

The Augusta Mine site is located on privately held land, while the Brunswick Processing Plant is located on unrestricted Crown land. The surrounding land is largely rocky, rugged hill country administered by the Department of Environment, Land, Water and Planning (DELWP) as State Forest. The Puckapunyal Military Area is located on the eastern boundary of the Project area.

The area has a Mediterranean climate with temperature ranges from -2°C in winter (May to August) to +40°C in summer (November to February). Annual rainfall in the area is approximately 500 mm to 600 mm, with the majority occurring between April and October. The annual pan evaporation is between 1,300 mm and 1,400 mm.

The weather is amenable to year-round mining operations; however, construction activity is restricted to the summer months as high winter rainfall can lead to saturated ground conditions that can affect surface activities.

1.4 History

Exploration for antimony gold deposits in the Costerfield area of Central Victoria started in the early 1850s and resulted in the discovery of the main Costerfield Reef in 1860. At around the same time, the Kelburn (Alison) Reef and Tait's Reef were discovered at South Costerfield.

The Alison Mine ceased operations in 1923, while the South Costerfield/ Tait's Mine operated sporadically from the 1860s until 1978 and was the last shaft mine to operate on the field.

In 1970, Mid-East Minerals NL identified a large bedrock geochemistry anomaly south of Tait's Shaft, which it called 'Tait-Margaret'. This was subsequently drilled by the Mines Department in 1977 and mineralized veins were intersected.

In 2001, AGD drilled the 'Tait-Margaret' anomaly, which was renamed 'Augusta'. AGD commenced underground mining of the Augusta resource (N, C, W and E Lodes) in 2006. Brownfields exploration core drilling by Mandalay in 2011 located a faulted offset of the Alison Lode beneath the old Alison Mine and New Alison Mine workings. The deeper offset mineralisation was renamed the Cuffley Lode. Subsequent definition drilling throughout 2011 and 2012 resulted in an initial Inferred Mineral Resource for the Cuffley Lode being established in January 2012. Further infill and extension drilling has continued and converted more of this Inferred Mineral Resource to Measured and Indicated in 2013.

1.5 Geological setting and mineralisation

The Costerfield gold-antimony field is located within the Costerfield Dome in the Melbourne Zone, which consists of a very thick sequence of Siluro-Devonian marine sedimentary rocks.

The western boundary of the Costerfield Dome is demarcated by the Cambrian Heathcote Volcanic Belt and north-trending Mt William Fault. The Mt William Fault is a major structural terrain boundary that separates the Bendigo Zone from the Melbourne Zone. The Dome is bounded to the east by the Moormbool Fault, which has truncated the eastern limb of the Costerfield Anticline, resulting in an asymmetric dome structure.

The quartz-stibnite lodes are controlled by north-northwest-trending faults and fractures located predominantly near the crest, on the western flank of the Costerfield Dome.

The Augusta deposit currently comprises 11 lodes: E Lode, W Lode, NM Main Lode, NE Lode, NSW Lode, NS Lode, NW Lode, P1 Lode, P2 Lode, K Lode, and B Lode. The Cuffley deposit is comprised of five lode structures: Cuffley Main (CM Lode), Cuffley East (CE Lode) Cuffley Deeps (CD Lode), Cuffley Intermediate (CI Lode, comprised of three sub-lodes) and Alison South (AS Lode). The Youle deposit consists of the Youle Main Lode, South Splay, North Splay and Doyle lodes.

The lodes are all located in the west-dipping Costerfield Formation (as defined by Talent, 1965), which is a series of thickly bedded mudstones and siltstones featuring heavy bioturbation. The Augusta and Cuffley deposits are bounded between two large, low-angle west-dipping parallel thrust faults named the Adder Fault (upper) and the King Cobra Fault (lower), which are typically in the range of 250 m apart. The Brunswick deposit is located approximately 300 m to the north and 400 m to the east of the Cuffley/ Augusta complex, and is also situated within the Costerfield Formation.

Mining has demonstrated that mineralized splay veins and oblique, cross-cutting fault structures influence grade in the north-northwest-trending lodes. The lodes can vary from massive stibnite with microscopic gold to quartz-stibnite with minor visible gold, pyrite and arsenopyrite. In some cases, gold occurs in quartz veins with little or no stibnite. The Costerfield Operation is currently extracting ore from the AS, BSPL, CD, CM, E, K, KR, NM, NSP48, W, Brunswick, Youle and Youle E Lodes.

1.6 Deposit types

The Costerfield gold-antimony field is part of a broad gold-antimony province mainly confined within the Siluro-Devonian Melbourne Zone. Although antimony commonly occurs in an epithermal setting (in association with silver, bismuth, tellurium and molybdenum), the quartz-stibnite-gold narrow veins of the Melbourne Zone are mesothermal-orogenic and are part of a 380–370 Ma tectonic event. The quartz-stibnite-gold veins contain only accessory amounts of pyrite and arsenopyrite and trace amounts of galena, sphalerite and chalcopyrite. Pyrite and arsenopyrite also occur in the wall rocks in narrow alteration halos around the lodes; traces of gold are also found in the Brunswick Reef wall rocks. Gold in Central Victoria is believed to have been derived from underlying Cambrian greenstones. The origin of the antimony is less certain.

The mineralisation at Costerfield consists of fault-hosted veins that are mostly less than 1.5 m in width and that have been formed in multiple phases. The earliest phase consists of bedding-parallel laminated quartz veins, which are barren. The laminated quartz phase is followed by a quartz-pyrite-arsenopyrite phase that contains erratic coarse gold. The last phase consists of massive stibnite, which contains evenly distributed fine-grained gold. The Costerfield ‘lodes’ or ‘reefs’ are typically anastomosing, *en échelon*-style narrow vein systems dipping 25° to 70° west to steep east (70° to 90° east). Mineralized shoots plunge steeply north at the southern end of the field.

1.7 Mineral Resource estimates

The Mineral Resources are stated here for the Augusta, Cuffley and Brunswick deposits with an effective date of 31 December 2019. The Mineral Resource is depleted for mining up to 31 December 2019. The estimate includes remnant mineralisation that remains in pillars that have been assessed for mining.

The Mineral Resources are reported at a cut-off grade of 3.5 g/t Au equivalent (AuEq), with a minimum mining width of 1.2 m. The gold equivalence formula used is calculated using typical recoveries at the Costerfield processing plant and using a gold price of USD1,500 per troy ounce and an antimony price of USD10,000 per tonne, as follows:

- AuEq = Au (g/t) + 1.52 × Sb (%)

All relevant diamond drillhole and underground face samples in the Costerfield Property available as of 30 November 2019 for the Augusta, Cuffley and Brunswick deposits were used to inform the estimate.

Details of the Augusta, Cuffley, Brunswick and Youle Mineral Resources are stated in Table 1-1.

Table 1-1: Mineral Resources at Costerfield, inclusive of Mineral Reserves, as at 31 December 2019

Category	Inventory (kt)	Gold Grade (g/t)	Antimony Grade (%)	Contained Gold (koz)	Contained Antimony (kt)
Measured	283	9.6	4.5	87	12.7
Indicated	830	9.6	2.9	256	24.0
Measured + Indicated	**1,113**	**9.6**	**3.3**	**344**	**36.7**
Inferred	533	6.8	1.7	117	9.0

Notes:
1. Mineral Resources are estimated as of 31 December 2019 and depleted for production through 31 December 2019.
2. Mineral Resources are stated according to CIM guidelines and include Mineral Reserves.
3. Tonnes are rounded to the nearest thousand, contained gold (oz) rounded top the nearest thousand and contained antimony (t) rounded to the nearest hundred.
4. Totals may appear different from the sum of their components due to rounding.
5. A 3.5 g/t AuEq cut-off grade over a minimum mining width of 1.2 m is applied where AuEq is calculated at a gold price of USD1,500/oz, and an antimony price of USD10,000/t.
6. The AuEq value is calculated using the formula AuEq = Au g/t + 1.52 * Sb %.
7. Geological modelling and sample compositing were performed by Cael Gniel, BSc(Hons), who is a full-time employee of Mandalay Resources. The models were independently verified by Danny Kentwell, FAusIMM, a full-time employee of SRK Consulting.
8. The Mineral Resource estimation was performed by Cael Gniel, who is a full-time employee of Mandalay Resources, and Chris Davis, MAusIMM, who is a full-time employee of Mandalay Resources. The resource models were verified by Danny Kentwell, FAusIMM, a full-time employee of SRK Consulting. Danny Kentwell is the qualified person under NI 43-101, and the Competent Person for the Resource.

1.8 Mining methods

Mining within the Augusta Mine targets several individual lodes (including the W, NM, E, K and Cuffley Lodes), which vary in width from 0.1 m to 1.5 m and dip between 45° and 85°. This lode geometry is favourable for long-hole cemented rock fill (CRF) stoping using mechanized mining techniques.

Throughout Cuffley, the sub-level spacing of 10 m floor to floor (7 m backs to floor) has predominantly been established to ensure stable spans, acceptable drilling accuracies and blasthole lengths. A sub-level spacing of 15 m has been developed for two select areas. This involved drilling up from the lower level to 8 m and drilling and firing the remainder from the upper level using downholes.

The Brunswick orebody has applied a sub-level spacing of 12 m floor to floor (9 m backs to floor). This has been established due to better drill accuracy and the wider orebody (average diluted stope width of 2.0 m vs 1.5 m in Cuffley and Augusta).

Stoping within the Youle orebody has been designed with a sub-level spacing of 9 m floor to floor (6 m backs to floor vertically, 6–13 m backs to floor along the dip of the orebody). This reduced sub-level spacing has been designed to minimize dilution and improve recovery in the flatter dipping Youle stopes. The orebody dip varies greatly in Youle between 40° and 85°, which is dependent on the influence of the No. 4, No. 3 and Orb Weaver Faults. To optimize the extraction of ore where the dip is shallower than 45°, ore development and stope geometry will be adjusted to steepen the footwall of the stopes.

1.9 Mineral Reserve estimate

From the Mineral Resource, a mine plan was prepared based only on Measured and Indicated Mineral Resource blocks, primarily using the long-hole CRF stoping method. A cut-off grade of 4.0 g/t AuEq and minimum mining widths of 1.8 m for development and 1.2 m for stoping were used, with planned and unplanned dilution at zero grade. Financial viability of the Proven and Probable Mineral Reserves was demonstrated at metal prices of USD1,300/oz Au and USD7,000/t Sb and a USD:AUD exchange rate of 0.70. The Mineral Reserve estimate is presented in Table 1-2.

Table 1-2: Mineral Reserves at Costerfield, as at 31 December 2019

Category	Inventory (kt)	Gold Grade (g/t)	Antimony Grade (%)	Contained Gold (koz)	Contained Antimony (kt)
Proven	114	9.5	4.8	35	5.4
Probable	360	14.6	3.4	169	12.4
Proven + Probable	474	13.4	3.8	204	17.8

Notes:
1. Mineral Reserves are estimated as of 31 December 2019 and depleted for production through to 31 December 2019.
2. Tonnes are rounded to the nearest thousand, contained gold (oz) rounded to the nearest thousand and contained antimony (t) rounded to the nearest hundred.
3. Totals are subject to rounding error.
4. Lodes have been diluted to a minimum mining width of 1.5 m for stoping and 1.8 m for ore development.
5. A 4.0 g/t AuEq cut-off grade is applied.
6. Commodity prices applied are as follows: gold price of USD1,300/oz, antimony price of USD7,000/t and exchange rate USD:AUD of 0.70.
7. The AuEq value is calculated using the formula AuEq = Au g/t + 1.28 * Sb %.
8. The Mineral Reserve is a subset, a Measured and Indicated only schedule, of a Life of Mine Plan that includes mining of Measured, Indicated and Inferred Mineral Resources.
9. The Mineral Reserve estimate was prepared by Daniel Fitzpatrick and Dylan Goldhahn, AAusIMM, who are full-time employees of Mandalay Resources, and was independently verified by Anne-Marie Ebbels, MAusIMM, CP (Mining) who is a full-time employee of SRK Consulting and a qualified person under NI 43-101.

The Mineral Reserve does not include any portion of the 533,000 tonnes of Inferred Mineral Resources.

1.10 Metallurgy and recovery methods

All mill feed is processed at the existing Brunswick Processing Plant at Costerfield, which is capable of processing sulphide gold-antimony containing material to produce gold-antimony concentrate and a separate gravity gold concentrate. The plant consists of a two-stage crushing circuit, two ball mills in series with classification and gravity concentration in closed circuit. The flotation circuit consists of a rougher, scavenger and single-stage cleaner circuit to produce antimony-gold flotation concentrate. The gravity gold concentrates can be either blended with the final flotation concentrate and bagged for shipment to customers in China or further refined via tabling to make a gravity concentrate that is sent to refineries. The flotation tailings are sent to a tailings storage facility (TSF) to the north of the Brunswick Processing Plant – the Bombay TSF.

Ore from the Augusta underground mine, including Cuffley deposit, has been the sole feed for the Brunswick Processing Plant since mining began at Augusta in 2006. The metallurgical performance of the Augusta, Cuffley Brunswick and more recently, the Youle ores has been demonstrated over this period of operation and has delivered stable throughput and consistent recoveries.

SRK considers historical throughput to be the best indicator of future forecast throughput when processing similar ores. Through ongoing optimisation and minor low capital cost debottlenecking projects, the plant capacity has been increased to the current 2016–2019 capacity, which can consistently exceed 13,000 t/month and regularly approaches 14,000 t/month. Figure 1-1 shows a reduction in plant throughput in the latter half of 2019, as the mine supply became a restriction and the scats stockpile (previously providing up to 400 t/month in 2018) was depleted, the reduction in throughput was not a mill constraint. Similar mine production limitations of approximately 11,000 t/month are expected through to April 2020, returning to levels of 13,000 t/month for the remainder of the year.

Figure 1-2 shows that the mill throughput was relatively consistent from 2017 to 2019, up to the first quarter of 2019, after which mine limitations restricted the throughput. Based on historical data, the antimony recovery has been robust to changes to mill throughput up to 14,000 dmt/month. This trend is expected to continue.

The gold recovery versus throughput relationship is less clear, and there is evidence to show that a flotation residence time restriction has negative implications on the gold recovery due to the slower floating gold associated arsenopyrite characteristic of Brunswick ores. The inclusion of the new StackCell® (flotation cell) as a primary rougher in the flotation plant is expected to improve the Brunswick ore flotation recoveries by providing increased residence time and kinetics of flotation. In any case, the Brunswick ores will be depleted by the end of 2020, at which time the Youle deposit will become the sole feed source. The metallurgical testwork undertaken on the Youle ore demonstrates better gold recovery behaviours more typical of historical Cuffley and Augusta ores.

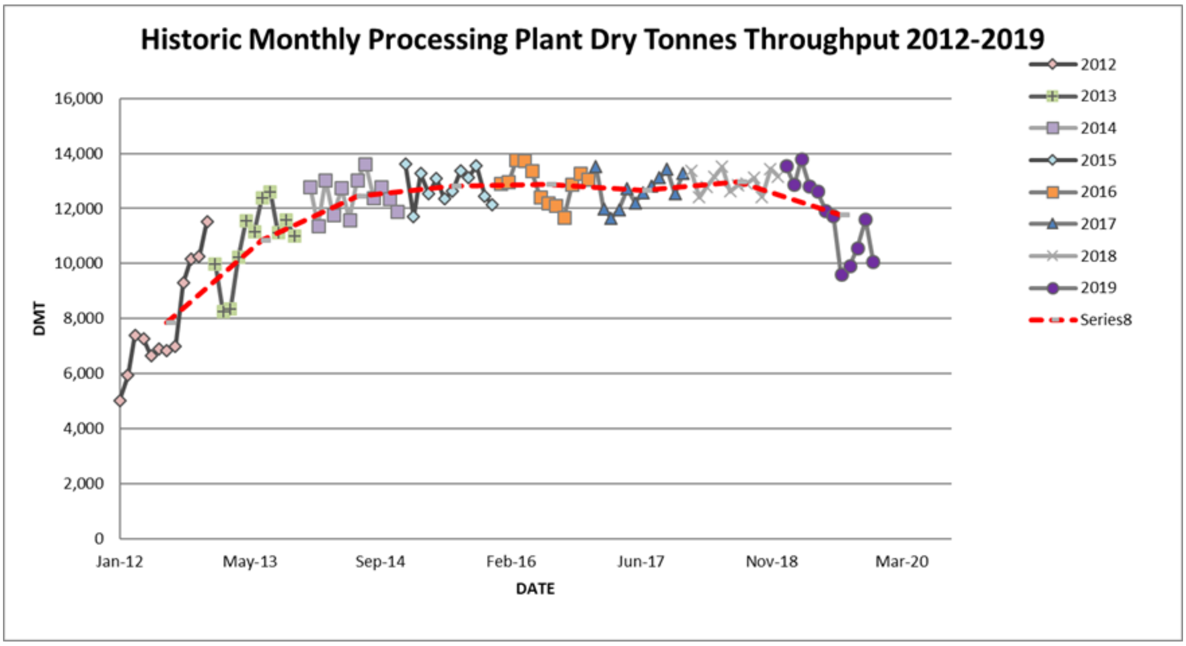

Figure 1-1: Historical Brunswick Processing Plant throughput April 2012 to December 2019

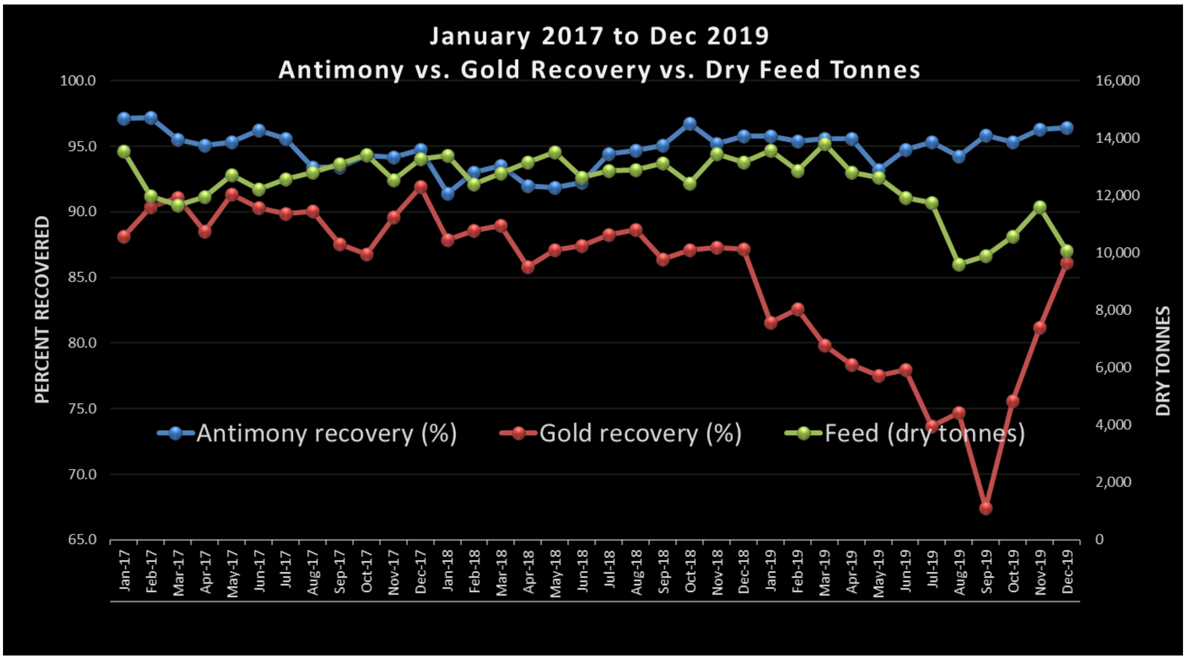

Figure 1-2: Metallurgical recoveries vs throughput for the Cuffley/ Augusta/ Brunswick ore blend – 2017 to 2019

1.11 Project infrastructure

The Costerfield Operations surface facilities are representative of a modern gold-antimony mining operation. The Augusta Mine site comprises the office and administration complex, underground workshops and surface infrastructure to support the underground operations. The Brunswick site comprises the gold-antimony processing plant and associated facilities, surface workshop, tailings storage facilities, reverse osmosis plant, and the core farm and core processing facility.

The Splitters Creek Evaporation Facility is situated on a 30 ha parcel of land located approximately 3 km from the Augusta site. The facility provides an additional 120 ML per year of net evaporation. The purpose of the facility is to evaporate groundwater extracted from the Costerfield Operations and thereby maintain dewatering rates from the underground workings.

1.11.1 Underground infrastructure

The Augusta Decline has been developed from a portal within a box-cut with the majority dimensions of 4.8 m high by 4.5 m wide at a gradient of 1:7 down. Most of the decline development has been completed with a twin boom jumbo; however, development of the decline from the portal to 2 Level was completed with a road-header, and this section of decline has dimensions of 4.0 m high by 4.0 m wide. The decline provides primary access for personnel, equipment and materials to the underground workings.

Access to the Cuffley Lode is via a single decline that connects to the existing Augusta Decline at the 1,030 mRL. The Cuffley Decline currently extends down to approximately 895 mRL. At the 935 mRL, the Cuffley Incline extends off the Cuffley Decline and accesses mineral resources from the 945 mRL to the 1,020 mRL. The 4800 Decline accesses the southern part of the Cuffley Lode, which is positioned south of the East Fault. This decline commences at the 960 mRL and extends to the 804 mRL. Access to the Brunswick and Youle lodes is via a single incline, from the existing Cuffley Decline at 925 mRL.

1.11.2 Services

The Costerfield Operation purchases electricity directly from the main national electricity grid and has connections at the Brunswick Processing Plant, Cuffley Mine and Augusta Mine.

The Costerfield Operation has an existing arrangement for high voltage (HV) electrical supply of 2,222 kVA shared between the Augusta Mine and Cuffley Mine and a 1,000 kVA supply at the Brunswick Processing Plant. Powercor owns and manages the central Victorian electrical distribution infrastructure. ERM Business Energy is the current electrical retailer. A 1 MVA 4.5 V/ 11 kV step-up transformer is located on the Cuffley site to allow emergency generator backup.

The site's power system enables peak lopping of any load over the 3 MVA of network capacity with the synchronized generators only when needed. This enables islanded generators to be removed from site. Generation from diesel is only used when needed and is synchronized with the grid. The system also enables the site to have up to 3 MVA of backup power isolated from the network if required.

1.12 Contracts

The antimony-gold concentrate produced from the Costerfield mine is sold directly to smelter(s) capable of recovering both the gold and antimony from the concentrates, such that Mandalay receives payment based on the concentration of the antimony and gold within the concentrate. The terms and conditions of commercial sale are not disclosed, pursuant to confidentiality requirements. The marketing of the concentrate is conducted through West End Mining & Consulting Pty Ltd.

1.13 Environmental studies, permitting and social impacts

The environmental and community impacts associated with the proposed expansion of the current Costerfield Operation have been assessed with the aim of defining permitting and approvals required and evaluating whether risks to the project can be appropriately managed.

Existing controls in relation to noise, air quality, blast vibration, waste rock and groundwater are expected to be appropriate but will require ongoing focus.

Mandalay has implemented a Community Engagement Plan which describes processes and strategies to manage community expectations and provide transparent information to keep stakeholders informed. This plan is considered an appropriate framework to manage any community concerns associated with the mine's expansion and to foster ongoing support for the operation.

The Department of State Development, Business and Innovation (DSDBI) facilitates the permitting and approvals process and will engage with relevant referral authorities as required. The DSDBI may prescribe certain conditions on the approval, which may include amendments to the environmental monitoring program. The Work Plan approval process involves a thorough consultation process with the regulatory authorities, and any conditions or proposed amendments requested to the Work Plan Variation (WPV) are generally negotiated to the satisfaction of both parties.

1.14 Capital and operating costs

The costs for the project described in the following section have been derived from a variety of sources, including:

- Historical production from the Costerfield Operation, predominantly from the past 12 months completed by Mandalay
- Manufacturers and suppliers
- First principles calculations (based on historical production values)
- Costs including allowances for power, consumables and maintenance.

All cost estimates are provided in 2019 Australian dollars (AUD) and are to a level of accuracy of ±10%. Escalation, taxes, import duties and customs fees have been excluded from the cost estimates.

For reporting purposes, summary tables provide estimates in AUD and US dollars (USD). The USD amounts have been estimated using an AUD:USD exchange rate of 0.70. The total capital required for the Costerfield Operation is summarized in Table 1-3.

Table 1-3: Costerfield Operation – capital cost estimate

Description	Total	CY 20 (AUD M)	CY 21 (AUD M)	CY 22 (AUD M)
Plant	4.3	2.1	1.6	0.5
Administration	0.3	0.2	0.1	0.0
Environment	1.2	0.6	0.3	0.3
Exploration	11.1	5.6	5.0	0.5
Mining	5.2	3.6	1.4	0.2
Total plant and equipment	**22.1**	**12.1**	**8.4**	**1.6**
Capital development	15.5	15.4	0.1	-
Total capital cost	**37.6**	**27.5**	**8.5**	**1.6**

Note: Totals may not add up due to rounding.

The Mineral Reserve operating costs include both direct and indirect costs. Direct operating costs include ore drive development and stope production activities. All costs not directly related to mine construction, development and production activities have been included in the indirect operating costs. The operating cost inputs for the Costerfield Operation are summarized in Table 1-4.

Table 1-4: Costerfield Operation – operating cost estimate

Description	Operating cost	
	AUD M	**AUD/t**
Mining	113	240
Processing	23	49
Site services, general and administration	29	61
Total	**166**	**350**

Note: Million dollar values are rounded to nearest million; 'AUD/t' values are rounded to the nearest dollar.

1.14.1 Offsite costs

Mandalay uses a third-party company to arrange the sale and transport of concentrate from the Brunswick Processing Plant to the smelter in China. The Mandalay portion of the selling expenses is calculated from historical costs and comprises road transport from the Brunswick Processing Plant to the Port of Melbourne, ship transport from Melbourne to China, shipment documentation, freight administration and assay exchange/ returns.

Mandalay pays royalties to the State Government of Victoria for antimony production and from 1 January 2020, Mandalay will pay a royalty on gold production. Mandalay also pays compensation agreement liabilities to the State Government of Victoria.

Royalties payable include a 2.75% royalty on antimony and gold production less any selling expenses and depend on metal prices and exchange rates at the time of sale.

1.15 Economic analysis

SRK has verified the economic viability of the Mineral Resource via cashflow modelling using the inputs discussed in this report.

1.16 Adjacent properties

The Costerfield Operation Mining Lease (MIN4644) is completely enveloped by exploration leases held by Mandalay Resources Costerfield Operations Pty Ltd. In the immediate area of the Augusta Mine there are no advanced projects, and no other Augusta-style antimony-gold operations in production in the Costerfield district. Exploration on adjacent prospects (EL3316, EL5490 and EL5406) is at an early stage and not relevant for further discussion in relation to this Technical Report.

1.17 Other relevant data and information

Additional information that is deemed relevant to ensure this Technical Report is understandable and not misleading is as discussed below.

1.18 Interpretation and conclusions

It is the opinion of the Qualified Person (QP) that the positive results of the financial analysis demonstrate Mandalay's ability to maintain and manage the economics of the project. The work has been undertaken at an appropriate level to support the release of the Mineral Resource and Mineral Reserve estimates.

The reconciliation results show good precision and reasonable accuracy between the resource block model data and the processing plant data. Unquantified errors such as stockpiling, ore waste misallocation, and unplanned dilution influenced the reconciliation data. Over the period, the ounces of gold predicted by the model were 10% higher than produced by the plant. The tonnes of antimony predicted by the model were 16% higher than produced by the plant. Most of the over-estimation occurred in the Cuffley Main area, where realized lode thicknesses were far less than modelled due to narrowing of the lode between levels, and veins being discontinuous between levels. After exclusion, the model overcall is reduced significantly – to 4% Au and 10% Sb. This overcall is likely due to the inclusion of discontinuous splay veins in the wireframe that were not captured during stoping. These areas are now mined out and depleted from the 2019 Mineral Resource estimate.

SRK makes the following observations:

- Inferred Mineral Resources have not been included in the economic evaluation.
- There has been a history of conversion of Inferred to Indicated Mineral Resources resulting in additional Mineral Resources from outside the Mineral Reserve being included in the life-of-mine (LoM) plans, which have the potential to improve the project economics.
- Mandalay has demonstrated an ability to improve the mining method and productivity based on improved geological information and thus mine designs and planning.

1.19 Recommendations

The Costerfield Property is an advanced property and Mandalay has a history of successful exploration and mining on the property. SRK has observed that the degree of technical competency evident in the work performed by Mandalay geologists is high, particularly in the structural analysis of the local geology. Therefore, there is no requirement for additional work programs over and above the existing operational plans.

SRK recommends that ongoing exploration and resource definition drilling at West Costerfield, Brunswick and Margaret, as well as near-mine drilling, continue as planned to target ongoing Mineral Resource extension.

SRK recommends that Mandalay continually reviews the cut-off grade strategy to balance cashflow, net present value and mine life, and that the assessment of the Brunswick deposit continues.

2 Introduction

SRK has worked in conjunction with Mandalay to prepare the Costerfield Operation NI 43-101 Technical Report. The report validates the viability of mining and processing mineralisation from continuing operations at the Costerfield Operation. The Costerfield Operation is located within the Costerfield mining district, approximately 10 km northeast of the town of Heathcote, Victoria. The Augusta Mine has been operational since 2006 and has been the sole ore source for the Brunswick Processing Plant until December 2013, when ore production started from the Cuffley deposit located approximately 500 m to the north of the Augusta Mine workings. The Brunswick and Youle deposits are being developed to extend the current mine life of the Costerfield Operation. Mining of the Youle deposit commenced in the fourth quarter of 2019.

The Costerfield Operation is contained within Mining Lease MIN4644 and comprises the following:

- Underground mine with production from the Augusta, Cuffley, Brunswick and Youle lodes
- A conventional flotation processing plant (Brunswick) with a current capacity of approximately 150,000 tpa of feed
- Mine and mill infrastructure including office buildings, workshops, core shed and equipment.

Mandalay is a publicly traded company listed on the Toronto Stock Exchange (TSX) and the OTCBQ Venture Market, trading under the symbols MND and MNDJF respectively. Mandalay's head office is located at 76 Richmond Street East, Suite 330, Toronto, Ontario, Canada M5C 1P1. In 2009, Mandalay completed the acquisition of AGD Mining Pty Ltd (AGD) from Cambrian Mining Limited (Cambrian), a wholly owned subsidiary of Western Canadian Coal Corporation (WCC), resulting in AGD becoming a wholly owned subsidiary of Mandalay.

Units of measurement used in this report conform to the SI (metric) system as illustrated in the List of Abbreviations.

2.1 Scope of work

The scope of work, as defined in a letter of engagement executed in August 2019 and subsequent discussions between Mandalay and SRK, includes the review of documents provided by Mandalay and prepared documentation as required for the NI 43-101 Technical Report on the Costerfield Operation, in compliance with NI 43-101 and Form 43-101 F1 guidelines.

This work involved the review of the following aspects of this project:

- Review the Mineral Resource estimate and update for Augusta and Cuffley deposits prepared by Mandalay
- Review of the Brunswick, Sub King Cobra, Cuffley Deeps and Youle Mineral Resource estimates
- Review the mine design and mining schedules for Augusta, Cuffley, Brunswick and Youle lodes
- Review and comment on the project infrastructure aspects
- Review and comment on the metallurgical and processing aspects
- Review the environmental considerations
- Review the capital and operating cost estimates
- Review the financial modelling
- Make recommendations for additional work.

2.2 Work program

The Costerfield NI 43-101 Technical Report herein is a collaborative effort between Mandalay and SRK. SRK has independently reviewed the work completed by Mandalay.

The Mineral Resource and Mineral Reserve Statement reported herein was prepared in conformity with generally accepted CIM 'Exploration Best Practices' and 'Estimation of Mineral Resource and Mineral Reserves Best Practices' guidelines. This Technical Report was prepared following the guidelines of the Canadian Securities Administrators National Instrument 43-101 and Form 43-101 F1.

The Technical Report was assembled in Melbourne during the months of January to March 2020.

2.3 Basis of Technical Report

This report is based on information provided by Mandalay to SRK and verified during site visits conducted between 2012 and 2020 and additional information provided by Mandalay throughout the course of SRK's investigations. SRK has no reason to doubt the reliability of the information provided by Mandalay.

2.4 Qualifications of SRK and SRK team

The SRK Group comprises over 1,300 professionals, offering expertise in a wide range of resource engineering disciplines. The SRK Group's independence is ensured by the fact that it holds no equity in any project and that its ownership rests solely with its staff. This fact permits SRK to provide its clients with conflict-free and objective recommendations on crucial judgment issues. SRK has a demonstrated track record in undertaking independent assessments of Mineral Resources and Mineral Reserves, project evaluations and audits, technical reports and independent feasibility evaluations to bankable standards on behalf of exploration and mining companies and financial institutions worldwide. The SRK Group has also worked with many major international mining companies and their projects, providing mining industry consultancy service inputs.

The compilation of this Technical Report was completed by the lead author Anne-Marie Ebbels, Principal Consultant (Mining), BEng (Mining), MAusIMM (No 111006), CP (Mining). By virtue of her education, membership of a recognized professional association and relevant work experience, Anne-Marie Ebbels is an independent Qualified Person (QP) as defined by NI 43-101.

Danny Kentwell, Principal Consultant (Resource Evaluation), MSc Mathematics and Planning (Geostatistics), FAusIMM, conducted a review of the Mineral Resources and geological aspects of this Technical report. Mr Kentwell is, by virtue of his education, membership of a recognized professional association and relevant work experience, an independent QP as defined by NI 43-101.

Simon Walsh, SRK Associate Principal Metallurgist, BSc (Extractive Metallurgy & Chemistry), MBA Hons, MAusIMM CP(Met), GAICD undertook a review of the metallurgical, mineral processing and infrastructure aspects of the project. By virtue of his education, membership of a recognized professional association and relevant work experience, is an independent QP as defined by NI 43-101.

Internal SRK Peer Review of this Technical Report was completed by Peter Fairfield.

Peter Fairfield, SRK Associate Principal Consultant, BEng (Mining), FAusIMM (No 106754), CP(Mining) conducted a peer review of non-geological aspects of this Technical Report. Peter Fairfield is, by virtue of his education, membership of a recognized professional association and relevant work experience, an independent QP as defined by NI 43-101.

Table 2-1 lists the individuals who, by virtue of their education, experience and professional association, are considered QPs, as defined in NI 43-101, for this report. The table defines the areas of responsibility for the QPs, who all meet the requirements of independence as defined in NI 43-101.

2.5 Acknowledgements

SRK would like to acknowledge the support and collaboration provided by Mandalay personnel for this assignment. Their collaboration was greatly appreciated and was instrumental to the success of this project. Most of the resource estimation and mine planning work was completed by Mandalay personnel, with supervision and review by SRK. The Mandalay personnel with significant roles were Chris Davis, and Dylan Goldhahn, who was involved in the reserves, scheduling and mine design work. Cael Gniel, a full-time employee of Mining Plus, undertook the geological modelling and resource estimation work on Mandalay's behalf. Vince Cullinan undertook the mineral processing and metallurgical testwork, and April Westcott the geological technical report writing and compilation of the report.

2.6 Declaration

SRK's opinion contained herein and effective at 31 December 2019 is based on information collected by SRK throughout the course of SRK's investigations which, in turn, reflect various technical and economic conditions at the time of writing. Given the nature of the mining business, these conditions can change significantly over relatively short periods of time. Consequently, actual results may be significantly more or less favourable.

This report may include technical information that requires subsequent calculations to derive sub-totals, totals and weighted averages.

Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where these occur, SRK does not consider them to be material.

SRK is not an insider, associate or an affiliate of Mandalay, and neither SRK nor any affiliate has acted as advisor to Mandalay, its subsidiaries or its affiliates in connection with this project. The results of the technical review by SRK are not dependent on any prior agreements concerning the conclusions to be reached, nor are there any undisclosed understandings concerning any future business dealings.

Table 2-1: List of Qualified Persons

QP	Position	Employer	Date of last site visit	Professional designations	Area of Responsibility and report sections
Anne-Marie Ebbels	Principal Consultant (Mining)	SRK	3 February 2020	BEng (Mining), GDip (Computer Studies), MAusIMM(CP)	Sections 1–6, Section 15-16, Sections 18–27
Danny Kentwell	Principal Consultant (Resource Evaluation)	SRK	December 2019	MSc Mathematics & Planning (Geostatistics), FAusIMM	Sections 7–12, Section 14
Simon Walsh	Principal Metallurgist & Director	Simulus Engineers (SRK Associate)	1 September 2015	BSc (Extractive Metallurgy), MBA Hons, MAusIMM(CP), GAICD	Metallurgy, Processing and Infrastructure: Sections 13, 17 and 18
Peter Fairfield	Principal Consultant	Miner Insight Pty Ltd	23 January 2018	BEng (Mining), FAusIMM, CP (Mining)	SRK Peer Review

3 Reliance on other experts

3.1 Marketing

Marketing information for this report, specifically Section 19, relies entirely on information provided by Roskill Information Services Ltd.

A specific marketing study was not completed for this report.

4 Property description and location

4.1 Property location

The Costerfield Operation is located within the Costerfield mining district of Central Victoria, approximately 10 km northeast of the town of Heathcote and 50 km east of the City of Bendigo, as shown in Figure 4-1.

The Costerfield Operation encompasses the underground Augusta Mine including the Cuffley, Brunswick and Youle deposits, the Brunswick Processing Plant, Splitters Creek Evaporation Facility, Brunswick and Bombay TSFs and associated infrastructure.

The Augusta Mine (Augusta) is located at latitude of 36° 52’ 27” south and longitude 144° 47’ 38” east. The Cuffley deposit is located approximately 500 m north-northwest of the Augusta workings. The Brunswick deposit is located approximately 1.4 km north-northwest of the Augusta workings and 680 m north-northwest of the Cuffley deposit. The Youle deposit is located north of the Augusta workings and Cuffley deposits approximately 2.2 km and 1.6 km respectively. The Brunswick Processing Plant is located approximately 2 km northwest of the Augusta Mine.

All deposits are accessed via the decline from Augusta.

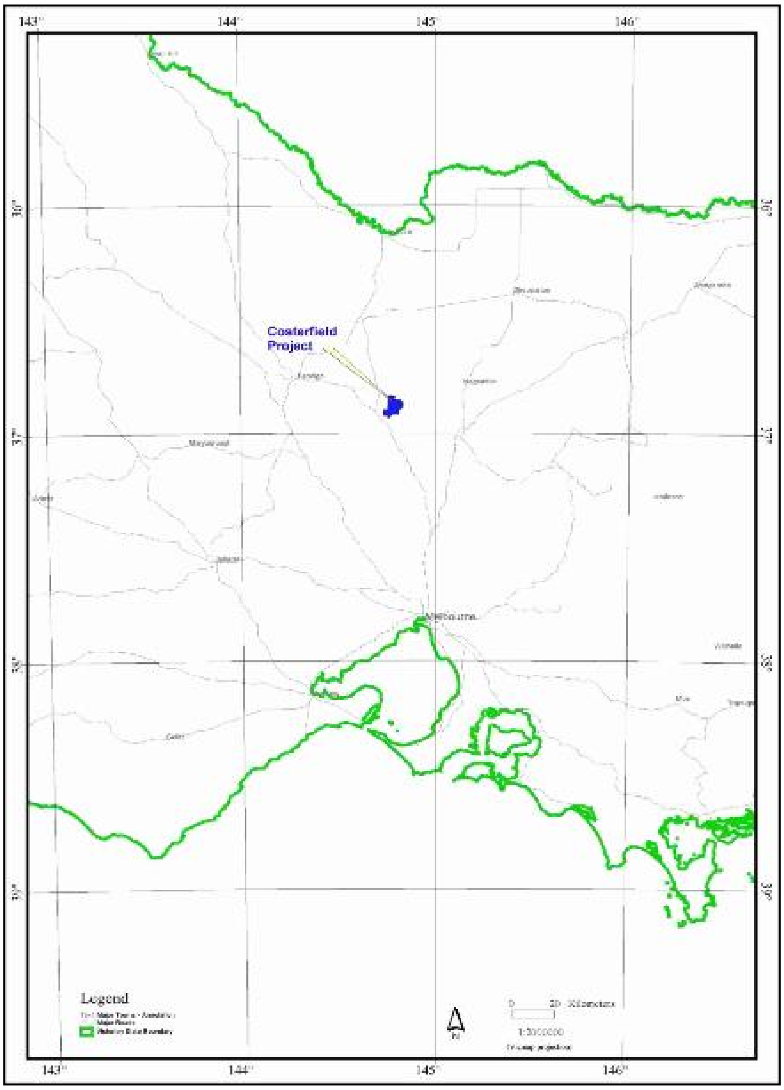

Figure 4-1: Location of Costerfield Operation

Source: Encom Discover MapInfo Pro.

4.2 Land tenure

Tenure information for the two Mining Licences and three Exploration Licences is shown in Table 4-1.

Table 4-1: Granted tenement details

Tenement	Name	Status	Company	Area	Grant Date	Expiry Date
MIN4644	Costerfield	Granted	AGD Operations P/L	1,219.3 ha	25/02/1986	30/06/2026
EL3310	Costerfield	Granted	AGD Operations P/L	59.0GRATS	17/09/1993	17/09/2020 Renewal Pending
EL5519	Antimony Creek	Application	Mandalay Resources Costerfield Operations Pty Ltd	8.0 GRATS	28/05/2015	27/05/2023
EL5432	Peels Track	Granted	AGD Operations P/L	4.0 GRATS	23/08/2012	22/08/2022
ELA 6842	Costerfield West	Under Application	Mandalay Resources Costerfield Operations Pty Ltd	29 GRATS	Submitted 2/10/2018	Pending
ELA6847	Costerfield East	Under Application	Mandalay Resources Costerfield Operations Pty Ltd	35 GRATS	Submitted 2/10/2018	Pending
MIN5567	Splitters Creek	Granted	Mandalay Resources Costerfield Operations Pty Ltd	30 ha	20/02/2013	21/02/2023

Note: 1 GRATS is equivalent to 1 km^2

Mandalay manages the Costerfield Operation and holds a 100% interest in tenements MIN4644, MIN 5567, EL3310, EL5432, and EL5519, as shown in Figure 4-2 and Figure 4-3. In November 2018, two exploration licence applications (ELAs 6847 and 6842) were submitted to the Department of Jobs, Precincts and Regions (DJPR). These two tenements are located to the east and west of the existing Costerfield tenements and cover 64 km^2, as shown in Figure 4-3. For the past 12 months, these licence applications have been undergoing the right to negotiate (RTN) process in accordance with the Native Title Act (NTA) to allow any potential indigenous claimants (if existing) to reach a section 31 agreement. To commence this process, the DJPR contacts the Native Title Tribunal to search for relevant registers to identify any native title claimants or body corporates. The DJPR is required to advertize in accordance with section 29 of the NTA to allow any potential claimants to become registered. There is a 4-month period (which ends on 4 March 2020) following the notification process, in which native title persons may submit (and have registered) a native title claim. Where no native title claim is registered at the end of the 4-month notification period, then native title processes will have been deemed addressed and will be assessed under the *Mineral Resources (Sustainable Development) (MRSD) Act*.

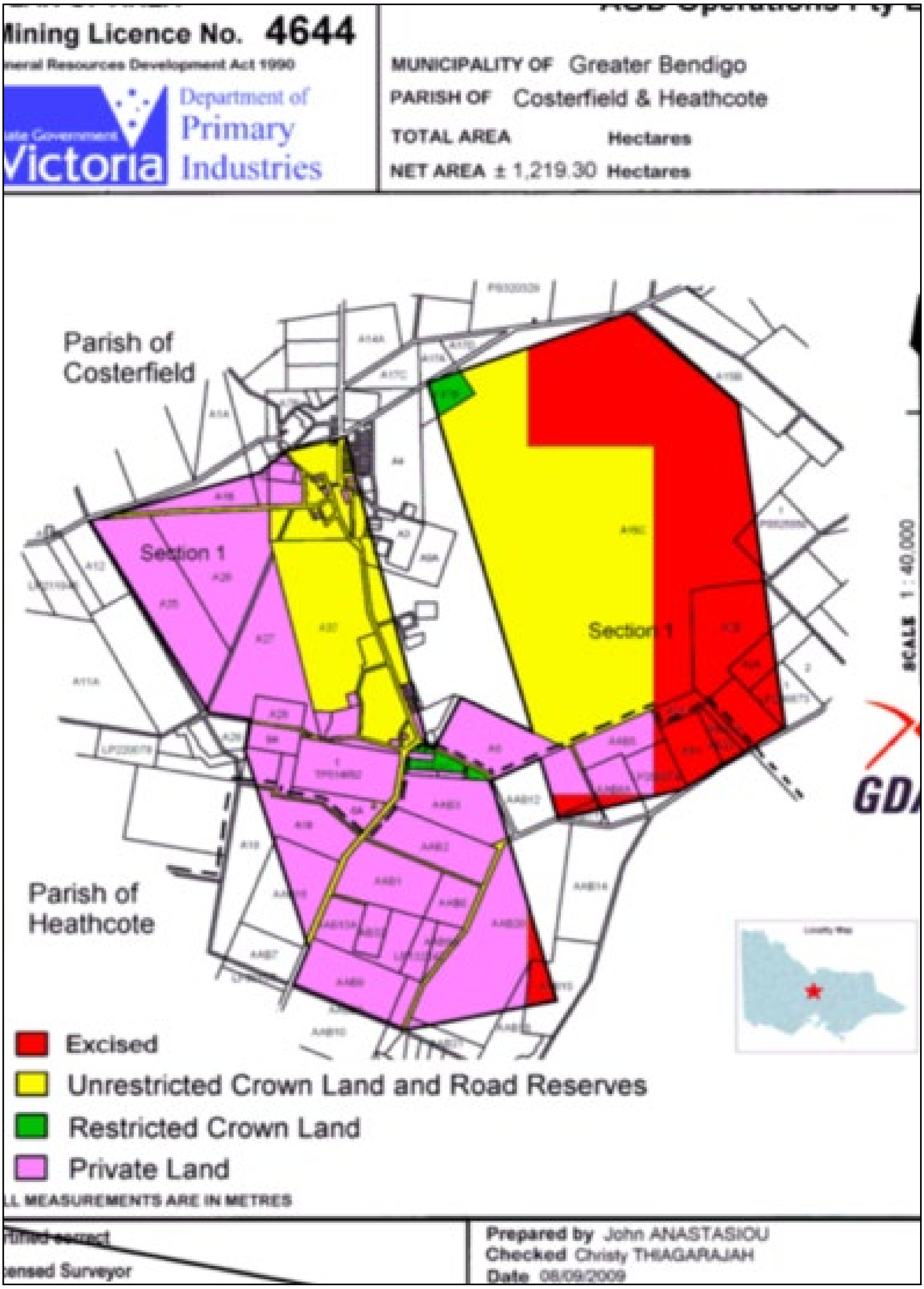

Figure 4-2: Plan of area – MIN4644

Source: DSDBI, Victorian State Government, 2009.

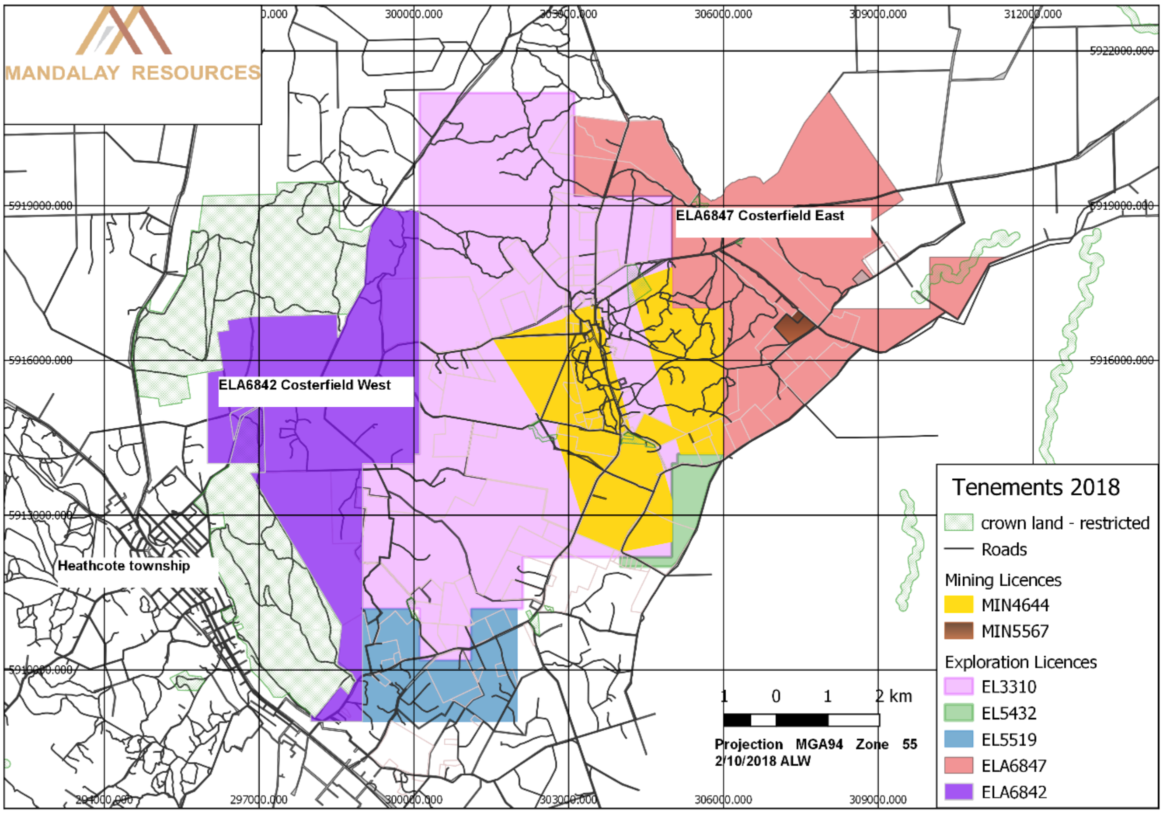

Figure 4-3: Current Mandalay Resources Mining and Exploration Lease boundaries showing two Exploration Licence applications to the east and west of current tenements

Source: Mandalay Resources, October 2018.

4.3 Underlying agreements

The sustainable and responsible development of mineral resources in Victoria is regulated by the State Government of Victoria through the MRSD Act 1990.

The MRSD Act, which is administered by the DJPR (formerly the DEDJPR), requires that negotiation of access and/ or compensation agreements with landowners affected by the work plans is undertaken between the mining tenement applicant and the relevant landowner prior to a Mining Licence being granted or renewed. In accordance with this obligation, Mandalay has compensation agreements in place for land allotments owned by third-party landowners that are situated within the boundaries of MIN4644.

Mandalay owns the land that contains MIN 5567 and therefore no compensation agreements are required.

4.4 Environmental liability

In October 2018, a bond review was carried out and the value of the rehabilitation policy was increased by AUD0.224M to AUD4.079M in total for MIN4644 and MIN5567. The rehabilitation bond for MIN4644 is currently AUD3.331M.

There is a further AUD10,000 bond paid to DJPR for tenements EL3310 and EL5432 and with VicRoads for licences for pipelines that are crossing roads.

The rehabilitation bond for MIN5567, the lease on which the Splitters Creek Evaporation Facility has been constructed, was calculated in October 2018 and AUD0.75M was set aside.

The total bond for MIN4464, the lease where the Augusta Mine site and Brunswick Processing Plant is situated, is AUD3.331M. The bond was increased in the latest bond review, due to the addition of the Brunswick vent shaft in 2018.

Rehabilitation is undertaken progressively at the Costerfield Operation, with the environmental bond only being reduced when rehabilitation of an area or site has been deemed successful by the DJPR. This rehabilitation bond assumes that all rehabilitation is undertaken by an independent third party. Therefore, various project management and equipment mobilisation costs are incorporated into the rehabilitation bond liability calculation. In practice, rehabilitation costs may be less if Mandalay chooses to utilize internal resources to complete rehabilitation.

Other than the rehabilitation bond, the project is not subject to any other environmental liabilities. Table 4-2 presents the breakdown of liability bonds from recent bond reviews.

Table 4-2: Total liability bond calculations

Area	Amount
Total Rehabilitation Liability Augusta Mine Site (MIN4644)	$1,419,000
Total Rehabilitation Liability Brunswick Process Plant Site (MIN4644)	$1,912,000
Total Rehabilitation Liability Splitters Creek Evaporation Facility (MIN5567)	$748,000
Total Rehabilitation Liability for the Costerfield Operations	**$4,079,000**

Source: Mandalay Resources, October 2018.

4.5 Royalties

Royalties apply to the production of antimony and are payable to the Victorian State Government through the DJPR. This royalty is applied at 2.75% of the revenue realized from the sale of antimony produced and gold produced, less the selling costs. The gold royalty is effective from 1 January 2020.

There are no royalty agreements in place with previous owners.

Royalties are payable to the Victorian State Government through DJPR if waste rock or tailings are sold (or provided to) to third parties, because they are deemed to be ‘quarry products’. The royalty rate is AUD0.87/t.

4.6 Taxes

Mandalay reports that, as at December 2019, a tax loss is available with fraction carried forward.

Income Tax on Australian company profits is set at 30%.

4.7 Legislation and permitting

MIN4644 has a series of licence conditions that must be met and are the controlling conditions upon which all associated Work Plan Variations (WPVs) are filed with the regulatory authority. Apart from the primary mining legislation, which consists of the MRSD Act, operations on MIN4644 are subject to the additional following legislation and regulations, for which all appropriate permits and approvals have been obtained.

Legislation:

- *Environment Protection Act 1970*
- *Planning and Environment Act 1987*
- *Environmental Protection and Biodiversity Conservation Act 1999*
- *Flora and Fauna Guarantee Act 1988*

- *Catchment and Land Protection Act 1994*
- *Archaeological and Aboriginal Relics Preservation Act 1972*
- *Heritage Act 1995*
- *Forest Act 1958*
- *Dangerous Goods Act 1985*
- *Drugs, Poisons and Controlled Substances Act 1981*
- *Public Health and Wellbeing Act 2008*
- *Water Act 1989*
- *Crown Land (Reserves) Act 1978*
- *Radiation Act 2005*
- *Conservation, Forests and Lands Act 1987*
- *Wildlife Act 1975.*

Regulations:

- Dangerous Goods (Explosives) Regulations 2011
- Dangerous Goods (Storage and Handling) Regulations 2000
- Dangerous Goods (HCDG) Regulations 2005
- Drugs, Poisons and Controlled Substances (Commonwealth Standard) Regulations 2011
- Mineral Resources Development Regulations 2002.

Mandalay is currently operating under an approved Work Plan in accordance with section 39 of the MRSD Act. WPVs are required when significant changes from the Work Plan exist and it is deemed that the works will have a material impact on the environment and/ or community. Various WPVs have been approved by the DJPR and are registered against the tenement.

On 17 September 2020, EL3310 will expire. Mandalay will be applying for a retention licence prior to this date to retain the licence area.

To the best of the author’s knowledge, there is no other significant factor or risk that may affect access, title, or the right or ability to perform work on the property.

5 Accessibility, climate, local resources, infrastructure and physiography

5.1 Accessibility

Access to the Costerfield Operation is via the sealed Heathcote–Nagambie Road, which is accessed off the Northern Highway to the south of Heathcote. The Northern Highway links central and north central Victoria with Melbourne.

The Augusta Mine site is accessed off the Heathcote–Nagambie Road via McNicols Lane, which comprises a sealed/gravel road that continues for approximately 1.5 km to the Augusta site offices.

The Brunswick Processing Plant is located on the western side of the Heathcote–Nagambie Road, approximately 1 km further north of the McNicols Lane turnoff. The Brunswick site offices are accessed by a gravel road that is approximately 600 m long.

5.2 Land use

Land use surrounding the site is mainly small-scale farming consisting of grazing on cleared land, surrounded by areas of lightly timbered box–ironbark forest. Most of the undulating land and alluvial flats is privately held freehold land.

The surrounding forest is largely rocky, rugged hill country administered by DJPR as state forest. The Puckapunyal Military Area is located on the eastern boundary of the project area.

The Augusta Mine site is located on privately held land, while the Brunswick Processing Plant is located on Unrestricted Crown land.

All underground workings are, accessed via the Augusta Mine, is located beneath Unrestricted Crown land that consists of sparse woodland, with numerous abandoned shafts and workings along the historical Alison and New Alison mineralized zone.

5.3 Topography

The topography of the Costerfield area consists of relatively flat to undulating terrain with elevated areas to the south and west, sloping down to a relatively flat plain to the north and east. The low-lying area of the plain is a floodplain. The area ranges in elevation from about 160 m above sea level in the east, along Wappentake Creek, to 288 m above sea level in the northwest.

5.4 Climate

The climate of central Victoria, in which the Costerfield Operation is located, is Mediterranean in nature and consists of hot, dry summers followed by cool and wet winters. Annual rainfall in the area is approximately 500–600 mm, with the majority occurring between April and October. The annual pan evaporation is between 1,300 and 1,400 mm.

The temperature ranges from -2°C in winter (May to August) to +40°C in summer (November to February). Monthly average temperature and rainfall data from Redesdale (the nearest weather recording station to Costerfield), which is some 19 km southwest of Heathcote, is shown in Figure 5-1.

The weather is suitable for year-round mining operations though occasional significant high rainfall events may restrict surface construction activity for a small number of days.

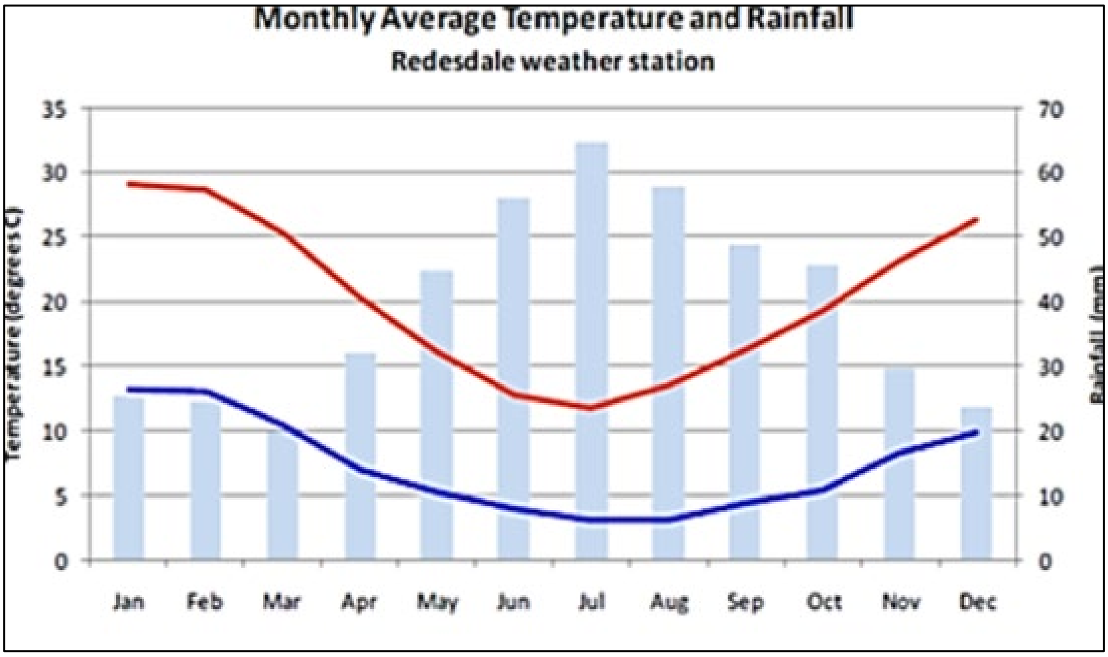

Figure 5-1: Monthly average temperature and rainfall

Source: Bureau of Meteorology

5.5 Infrastructure and local resources

The nearest significant population to Costerfield is Bendigo, located 50 km to the west-northwest, with a population of approximately 100,000. The Costerfield Operation is a residential operation, with personnel residing throughout central Victoria, as well as Melbourne. Local infrastructure and services are available in Heathcote.

The Augusta Mine site consists of a bunded area that includes site offices, underground portal, workshop facilities, waste rock storage area, settling ponds, mine dam, change house facilities and laydown area. Augusta has operated as an underground mine since the commencement of operations in 2006. The Cuffley, Brunswick and Youle operations use the infrastructure associated with the current Augusta operations. The Augusta Mine box-cut, portal and workshop are shown in Figure 5-2.

On 28 July 2018, first ore was extracted from the Brunswick deposit and was accessed via an incline ramp from the Cuffley Mine. In December 2019, first ore was extracted from the Youle deposit and was accessed via capital development from the Brunswick incline.

Figure 5-2: Augusta box-cut, portal and workshop

The Brunswick complex consists of a processing plant, run-of-mine (RoM) pad, site offices and Brunswick Open Pit, as shown in Figure 5-3. The Brunswick Processing Plant consists of a 150,000 tpa gravity-flotation gold-antimony processing plant, with workshop facilities, site offices, TSFs, core shed and core farm. It produces an antimony-gold concentrate that is trucked to the Port of Melbourne, 130 km to the south and transferred onto ships for export to foreign smelters.

Figure 5-3: Aerial view of Brunswick Processing Plant and Brunswick Open Pit

The Brunswick Processing Plant has 1 × 500 kVA duty generator that supplies power to the reverse osmosis (RO) plant, plant compressed air, active flow and Brunswick-to-mine pumping. An 800 kVA generator is also on standby for backup, in the event of mains failure.

The Costerfield Operation has a current agreement with Powercor for 2 MW to be shared across the two HV supply points (Cuffley, Augusta, Brunswick and Youle). Once above 2 MVA, Mandalay is required to maintain a power factor (PF) of 0.9 (2 MW at 0.9 is 2.222 MVA), therefore there is a requirement to remain below 2.222 MVA across the two HV supply points. The Brunswick site has a contracted amount for 980 amps low voltage (LV) (706 kVA).

Process water for the Brunswick Processing Plant is drawn from the brine stream of the RO plant and is supplemented by brine currently in storage when the RO plant is not in operation. The Augusta Mine re-uses groundwater that has been dewatered from the underground workings. Potable water is trucked in from Heathcote, while grey water is stored in tanks and sewage is captured in sewage tanks before being trucked offsite by a local contractor.

The Splitters Creek Evaporation Facility evaporates groundwater extracted from the operations, thereby maintaining dewatering rates from the underground workings. Additional detail is provided in Section 20.

Additional TSF capacity was provided during 2018 with a lift on the existing Bombay TSF. The currently utilized Bombay TSF will provide enough tailings storage capacity until Q2 2020.

Construction of the next facility on Brunswick is scheduled to be completed 2020 and is designed for phased downstream lifts of up to 4 m.

Planning approval has been granted for an additional 2.7 m lift of the Bombay TSF to provide further storage capacity.

6 History

6.1 Introduction

From the 1860s, beginning with the initial discovery of the Costerfield Reef, until 1953, several companies have developed and mined antimony deposits within the Costerfield area. Some underground diamond drilling is known to have occurred during the period of 1934 to 1939 when the Gold Exploration and Finance Company of Australia operated the Costerfield Mine, but details of these holes are scarce and poorly recorded.

Significant exploration of the Costerfield area using modern exploration techniques did not occur until 1966.

6.2 Ownership and exploration work

This section describes the work carried out by different owners over time and Table 6-1 presents a summary of the historical drilling statistics by each company at Costerfield since 1966.

Table 6-1: Historical drilling statistics for the Costerfield property

Company	Year	Meters (Diamond)	Meters (Percussion/ Auger)
Mid-East Minerals	1966–1971	3,676.2	
Metals Investment Holdings	1971	1,760.8	
Victoria Mines Department	1975–1981	3,213.0	
Federation Resources NL	1983–2000		2,398.3
AGD/Planet Resources JV	1987–1988		1,349.2
AGD NL	1987–1988		1,680.8
	1994–1995	1,368.5	5,536.0
	1996	195.5	2,310.0
	1997		725.0
AGD Operations *NB: From 2004 drilling descriptions have been reported in double years (i.e. 2004-2005) because reporting has been in keeping with the Australian fiscal year (1 July to 30 June). Please note that from 2016, descriptions, including drilling meters for exploration will be reported in calendar year to coincide with the Canadian fiscal year (1 January to 31 December).	2001	3,361.1	
	2002	907.5	
	2003	1,522.0	
	2004	3,159.9	
	2005	4,793.4	
	2006–2007	4,763.4	
	2007–2008	2,207.2	
	2008–2009	2585.95	
Mandalay Resources	2009–2010	574.5	547.0
	2010–2011	9890.0	732.0
	2011–2012	18,581.4	7,295.6
	2012–2013	25,774.8	3,838.0
	2013–2014	20,817.0	3,906.0
	2014–2015	18,439.0	2,732.0
	2016	34,678.0	
	2017	26,403.0	
	2018	34,656.0	
	2019	9,556.0	
Subtotal		**232,884.15**	**33,049.00**

6.2.1 Mid-East Minerals (1968–1971)

From 1968 to 1969 the price of antimony rapidly rose from USD0.45 to USD1.70 per pound. This encouraged Mid-East Minerals (MEM) to acquire large amounts of ground around Costerfield.

Between 1969 and 1971, MEM conducted large-scale geochemical, geophysical, and diamond drilling programs. These were conducted across the south Costerfield area encompassing the Alison Mine and south towards Margaret's, encompassing both the Cuffley deposit and the Augusta Mine areas. Diamond drilling for MEM was most successful at the Brunswick Mine. Falling antimony prices in 1971 caused MEM to abandon its projects.

6.2.2 Metals Investment Holdings (1971)

A series of diamond drillholes was completed by Metals Investment Holdings in 1971. Most drilling occurred to the north of the Alison Mine, with the exact locations of the holes unknown. Two drillholes were situated to the north of the Tait's Mine (north of Augusta), of which minimal detail remains.

6.2.3 Victorian Mines Department (1975–1981)

A series of diamond drillholes was completed by the Victorian Mines Department in the late 1970s. Most drilling occurred to the south of the Brunswick Mine. However, two holes (M31 and M32), drilled approximately 150 m to the south of the South Costerfield Shaft (in the Augusta Mine area), intersected a high-grade reef. This reef was interpreted as the East Reef, which was mined as part of the South Costerfield Mine.

6.2.4 Federation Resources NL (1983–2000)

Federation Resources undertook several campaigns of exploration in the Costerfield area but focused on the Robinsons–Browns (R-B) prospects to the east of the Alison Mine. The exploration conducted identified a gold target with no evidence of antimony. This target has yet to be followed up by Mandalay because it is viewed as a low-priority target.

Federation Resources conducted desktop studies on the area above the Augusta Mine, noting the anomalous results of the soil geochemistry programs conducted by the Victorian Mines Department and Mid-East Minerals, but did not conduct drilling at this location.

6.2.5 Australian Gold Development NL/Planet Resources JV (AGD) (1987–1988)

Australian Gold Development NL conducted a short reverse circulation (RC) drilling program in conjunction with their JV partner Planet Resources in 1987. This drilling consisted of a total of 21 holes for 1,235 m across the broader Costerfield area. Gold was assayed via atomic absorption spectrometry (AAS), which compromised antimony grades. Drilling was also carried out with a tri-cone bit, which could have led to serious contamination.

6.2.6 Australian Gold Development NL (AGD) (1987–1997)

From 1987 to 1997, Australian Gold Development undertook several programs of exploration and mining activities predominantly focused around the Brunswick Mine. A series of RC holes was drilled during 1997, testing for shallow oxide gold potential to the north of the Alison Mine. Several occurrences of yellow antimony sulphides were noted but these were not followed up.

6.2.7 AGD Operations Pty Ltd (2001–2009)

In 2001, AGD (formerly Australian Gold Development) and Deepgreen Minerals Corporation Ltd entered into an agreement to form a joint venture to explore the Costerfield tenements. The agreed starting target was the MH Zone, now known as the Augusta Mine.

2001

AGD's drilling of the MH Zone commenced on 5 April 2001. In total, 27 holes were completed for 3,301.1 m. All holes were drilled with an initial PQ or HQ collar to approximately 25 m depth and then finished with an NQ-sized drill bit, the purpose of which was to maximize core recoveries. Triple-tube drilling was also employed in areas to maximize recoveries. Cobar Drilling Company Pty Ltd, based in Rushworth, was contracted for the drilling program. Less competent rock adjacent to the mineralisation was successfully recovered during this program but core loss was still estimated to be up to 15% within the mineralized zones. All holes were downhole surveyed and orientated during drilling. Collar locations were surveyed by Cummins & Associates of Bendigo.

This drilling was confined to an area 180 m south of the South Costerfield Shaft and over approximately 400 m of strike.

It was identified that, because of prolonged mining and exploration undertaken in the Costerfield area, up to three metric grids were in use. The drilling undertaken in 2001 at Augusta was based on the mine grid established in the late 1950s. This grid set-up remains in use in present-day mining and exploration activities.

2002

In 2002, AGD completed a further five holes at the MH Zone for a total 732.3 m, including 41.7 m blade, 309.3 m of RC hammer and 381.3 m of HQ diamond drilling. Drillhole MH034 intersected an unmineralized zone at 55 m downhole. This is hypothesized to represent the Alison line of lode towards the south.

Towards the east of the MH Zone, AGD completed two lines of soil sampling comprising 400.5 m of aircore drilling in 88 holes. The known MH lodes were highly anomalous and a weak, gold-only trend was outlined 180 m east of the MH Zone. This zone was drilled by diamond drillhole MH028, which contained a large siliceous lode zone with low-grade gold values.

To the south of the MH Zone, AGD sampled two soil lines in 42 holes. It was later recognized that these holes probably did not sample basement siltstones. A further line of 21 soil holes confirmed this prognosis. These holes picked up widespread anomalous gold geochemistry with a central strong anomaly. A total of 218 m of aircore drilling was completed.

2003

In 2003, the MH Zone was renamed the Augusta deposit. In total, 30 diamond drillholes for 1,514 m were drilled by AGD as part of an infill and extension program to the Augusta deposit. The main purpose of this drilling was to prove continuity of the deposit to near surface, in preparation for open-pit mining and to extend the mineralized system both north and south. Mineralisation was shown to extend north to the South Costerfield Shaft and upwards to the surface. To the south, drilling confirmed that the lode system, although present, was not economic.

Each hole was logged in detail and geological lode thickness and recovered thicknesses were recorded. Core loss was estimated to be less in this drill program when compared to previous drilling programs, even though the majority of drillholes were drilled in the weathered zone.

In addition to the infill and extension program, 14 RC drillholes were drilled as part of a metallurgical testwork program. These holes were drilled at low angles to the lodes, specifically to obtain the required sample mass for the metallurgical testwork.

2004/2005

Between October 2004 and April 2005, AGD completed a 26-hole diamond drilling program at the Augusta deposit. Apart from 5 m percussion pre-collars and 4 RC geotechnical holes, the holes were drilled by HQ triple-tube diamond drilling.

The objectives of the diamond drilling program were:

- Improvement in mineralisation definition by increasing drillhole density
- Extension of the mineralisation model by drilling around the deposit periphery
- Increasing the Mineral Resource and Mineral Reserve.

2006/2007

AGD's drilling activities throughout 2006 and 2007 comprised grid drilling of the Brunswick deposit and drilling of the periphery of the Augusta deposit for a total of 7,562 m of diamond drilling.

This comprised the following drillholes:

- 31 holes, totalling 4,994 m, drilled under the old Brunswick open pit for resource estimation
- 17 holes, totalling 755 m, drilled into the upper northern end of W Lode
- 20 holes, totalling 1,813 m, drilled north of the Augusta Mine to test E Lode's northern extent.

The Brunswick Resource definition drilling was drilled using HQ triple tube with a modified Longyear LM75 drill rig by Boart Longyear drilling. The area under the pit was drilled on a 40 × 40 m pattern.

Due to initial difficulty with following W Lode underground, a Bobcat-mounted Longyear LM30 diamond drilling rig was used to infill drill the near-surface portion of W Lode. This drilling was carried out using a narrow-kerf LTK60-sized core barrel, with a total of 17 holes, totalling 755 m, being drilled adjacent to the Augusta box cut.

On completion of the Brunswick and W Lode drilling, both the LM75 and the LM30 rigs were used to drill north of the Augusta Mine, tracing the northern extent of E Lode towards the old South Costerfield workings. A total of 20 holes for 1,813 m were drilled north of the Augusta Mine.

Development of the Augusta Decline commenced during the first quarter of 2006. By the end of the second quarter, all the surface infrastructure had been completed together with open cut mining of E and C Lodes. Decline development commenced during June 2006 and underground production by the end of the third quarter of 2006.

2007/2008

AGD's drilling activities throughout 2007 and 2008 comprised reconnaissance drilling of the Tin Pot Gully Prospect and drilling along strike and down-dip of the existing Augusta deposit. A total of 3,395.6 m of diamond drilling was carried out during the year. This comprised the following:

- 13 holes, totalling 1,188 m, drilled under the Tin Pot Gully Prospect
- 11 holes, totalling 2,207 m, drilled into the Augusta deposit, particularly to test W and E lodes.

Encouraging results highlighted down-dip and strike extensions in terms of vein widths and grades, as described below:

- W Lode: 8 out of the 11 drillholes confirmed W Lode continuity down-dip, with true thicknesses ranging from 0.254 to 0.814 m at grades of 22.50–89.26 g/t Au and 16.19–47.20% Sb.
- E Lode: 3 out of the 8 holes drillholes confirmed E Lode continuity down-dip, with true thickness ranging from 0.074 to 0.215 m at grades of 4.24–5.1 g/t Au and 3.25–32.2% Sb.
- N Lode: 6 holes out of the 11 holes intercepted N Lode or a similar structure in the hanging

wall of W Lode, showing true thicknesses from 0.09 to 0.293 m at grades 6.82–46.9 g/t Au and 6.81–27% Sb.

Based on these results, AGD commissioned AMC to undertake a resource estimate for the Augusta deposit, in January 2008.

Between February and June 2008, Silver City Drilling Company completed 11 drillholes, totalling 2,207.2 m that were drilled on the northern section of the Augusta deposit, particularly from 4,411 mN to 4,602 mN.

The 11 surface drillholes covered an area of approximately 18,740 m^2, delineating a 120 m down-dip continuation, below 4 Level, of the three dominant Augusta Lodes: W Lode, E Lode, and N Lode.

Holes ranged in size from HQ to NQ and LTK46.

By June 2008, capital development reached 7 level (1,081 mRL). Development was completed on E Lode on 5 Level and was halfway through completion on 6 level. W Lode development was completed down to 4 Level and development on 5 Level was just beginning. Handheld/airleg rise mining had begun.

2008/2009

AGD's drilling activities throughout 2008 and 2009 comprised drilling along strike and down-dip from the existing Augusta resource. A total of 2,585.95 m of diamond drilling was completed.

Drilling during 2008 and 2009 was concentrated on the definition of the W Lode resource. Five drillholes tested the depth extent of W Lode. Another 13 holes were designed as infill holes to test ore shoots and gather geotechnical data. Holes ranged in size from HQ to NQ and LTK46.

By June 2009, capital development reached 9 Level (1,070 mRL). Ore drive development was constrained to levels along E and W Lodes. Stoping along W Lode was conducted and additional development along E Lode used three mining methods – floor benching, cut and fill and long-hole stoping.

2009/2010

In 2009, AGD Mining Pty Ltd/ AGD Operations Pty Ltd was acquired by Mandalay Resources Corporation.

Drilling from July 2009 to June 2010 comprised mainly drilling along strike and down-dip from the existing Augusta resource (MIN4644). In total, 332.5 m of diamond coring was undertaken targeting the Augusta resource.

In addition, 547 m of bedrock geochemistry (Augusta South) aircore drilling was completed within MIN4644.

Outside the main field, 120.5 m of diamond drilling was completed at the True Blue Reef prospect within EL3310 and 122.8 m of diamond drilling at the Hirds Reef prospect within EL 4848.

Drilling during this reporting period was concentrated on the definition of the W Lode resource. Four drillholes tested the depth extent of W Lode. Another six holes were designed as infill holes to test ore shoots and gather geotechnical data.

From July 2009 to June 2010, capital development reached 1,020 mRL (155 m below surface). Ore drive development was carried out on E Lode and W Lode.

2010/2011

Drilling from July 2010 to June 2011 was undertaken on two projects, the 'Augusta Deeps' drilling project and the 'Brownfields Exploration' project. The Augusta Deeps project was undertaken with the view to extending the current Augusta resource to depth (MIN4644). The objective of the Brownfields Exploration project was to find additional ore sources within Mandalay's tenements, to supplement the Augusta deposit ore. The initial emphasis of the Brownfields Exploration project was to identify sources of ore within 1 km of the Augusta Decline. In total, 9,890.7 m of diamond coring and 732 m of auger drilling was undertaken as part of the two projects.

Capital development reached 976 mRL (200 m below surface). Ore drive development was carried out on E and W Lodes.

2011/2012

Drilling was undertaken on four projects; the Augusta Deeps drilling project, the Alison/ Cuffley drilling project, the 'Brownfields'/ Target Testing drilling project and the Target Generation – Bedrock Geochemistry auger drilling project.

The Augusta Deeps project was undertaken with the view to extending the current Augusta resource to depth and along strike (MIN4644). The Alison/ Cuffley project was undertaken to outline the recently discovered Cuffley Lode and to define an initial Inferred Mineral Resource.

The objective of the Brownfields Target Exploration project was to find additional ore sources within Mandalay's tenements, to supplement the Augusta deposit ore. The initial emphasis of the Brownfields project was to identify sources of ore within 1 km of the Augusta Decline. The drilling program is now more regional.

The Bedrock Geochemistry auger drilling project is revealing anomalous zones under shallow alluvial/ colluvial cover throughout the tenements.

In total, 18,581.4 m of diamond coring and 7,295.6 m of auger drilling was undertaken as part of the four projects from July 2011 to June 2012.

On 17 June 2011, MB007 intersected the Cuffley Lode, just below a flat fault that had stopped production at 5 Level in the Alison mine in 1922. Resource drilling commenced in July 2011.

The Cuffley Lode is 500 m north-northwest of the Augusta deposit workings and scoping studies commenced in 2011 to access the deposit from the Augusta Decline.

From July 2011 to June 2012 capital development reached 926 mRL (252 m below surface) and ore drive development was carried out on E and W Lodes.

2012/2013

On 7 February 2013, AGD Operations Pty Ltd underwent a name change to Mandalay Resources Costerfield Operations Pty Ltd.

Drilling was undertaken on two primary projects; Cuffley Resource Drilling and Augusta Resource Drilling.

In total, 25,774.8 m of diamond drilling and 3,838 m of auger drilling were undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield from July 2012 to June 2013.

From July 2012 to June 2013 capital development reached 878 mRL (300 m below surface) and ore drive development was carried out on E, W and N Lodes.

2013/2014

In 2013/2014, the focus was on finalising the Cuffley and Augusta resource drilling.

In total, 20,817 m of diamond drilling and 3,906 m of auger drilling was undertaken on Mandalay

Resources Costerfield Operations Pty Ltd tenements at Costerfield.

During 2014, mining took place along the Augusta and Cuffley deposits. Development on C1 and C2 lodes within the Cuffley deposit began in January 2014. Both deposits were accessed through the Augusta portal, with Cuffley capital infrastructure exiting the Augusta Decline at the 1030 Level.

2014/2015

Exploration in 2015 was focused on extending the Cuffley and Augusta Resources both along strike and at depth. The expansion of the Cuffley resource included the commencement of drilling in the Cuffley Deeps and Sub King Cobra regions.

In total, 18,439 m of diamond drilling and 2,732 m of RC drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield.

During 2015, mining took place along the Augusta and Cuffley deposits. Both deposits were accessed through the Augusta portal, with Cuffley capital infrastructure exiting the Augusta Decline at the 1030 Level.

*NB: From 2004, drilling descriptions have been reported in double years (e.g. 2004/2005) because reporting has been in keeping with the Australian fiscal year (1 July to 30 June). Please note that from 2016, descriptions, including drilling meters for exploration have been reported in calendar years to coincide with the Canadian fiscal year (1 January to 31 December).

2016

Exploration in 2016 was focused predominantly on near-mine and opportunistic targets close to existing infrastructure and capital development, with the primary focus to extend LoM. In addition to near-mine exploration, Mandalay has carried out exploration drilling on accessible targets within 1 km of the existing portal.

In total, 34,678 m of diamond drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield during 2016. Throughout the year, mining took place along the Augusta and Cuffley deposits. Within the Augusta deposit, ore was extracted through drive development and stoping along N Lode north, with a small amount of development and stoping occurring on B and E Lodes. Development and stoping were continued on the Cuffley C1 and C2 lodes during 2016 and both the Augusta and Cuffley lodes were accessed through the Augusta portal with Cuffley capital infrastructure exiting the Augusta Decline at the 1030 Level.

2017

Exploration in 2017 was focused predominantly on near-mine and opportunistic targets close to existing infrastructure and capital development, with the primary focus to increase immediate mine life. A strong focus for the year was on carrying out infill and extension of the Brunswick resource whilst also increasing in-mine resources through opportunistic drilling projects. A successful target testing campaign was also underway investigating the depth continuation of mineralisation underneath the Costerfield mine.

In total, 26,403 m of diamond drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield during 2017. Throughout the year, mining took place along the Augusta and Cuffley deposits. Within the Augusta deposit, ore was extracted through drive development and stoping along N Lode north and NV Lode. A small amount of development and stoping occurred on B, K and NE lodes. Development and stoping continued on the Cuffley C1, C2 and CD lodes during 2017. Both the Augusta and Cuffley lodes were accessed through the Augusta portal with Cuffley capital infrastructure exiting the Augusta Decline at the 1030 Level.

2018

A strong focus for 2018 exploration was on replacing depletion, increasing reserve grade and extending the mine life. Exploration in 2018 resulted in the inclusion of the high-grade Youle Lode in Mineral Reserves. At Youle, 94,282 oz Au and 7,000 t Sb was added to the Mineral Reserves at grades of 11.2 g/t Au and 2.7% Sb.

Exploration also involved carrying out infill and extension drilling of the Brunswick and Youle resources while also increasing in-mine resources through opportunistic drilling projects. The Youle resource drilling also informed the decision to mine the Youle Lode.

The goals achieved in 2018 included:

- Successful infill and resource drilling of the Youle deposit
- Commencement of capital development at the Youle deposit
- Regional exploration with drill testing of the Costerfield mine extension, Augusta East and Brunswick line of lode
- Commencement of mining of the Brunswick deposit.

In total, 34,656 m of diamond drilling was undertaken on Mandalay’s tenements at Costerfield during 2018.

Throughout the year, the Augusta, Cuffley and Brunswick deposits were mined, all of which were accessed through the Augusta portal with Cuffley capital infrastructure exiting the Augusta Decline at 1030 Level.

2019

The exploration focus for 2019 was centered around drilling of the Costerfield Youle deposit; which has included both infill and extensional drilling to delineate the high-grade Youle zone to the north and expand on extending mineralisation near current and planned development. The northern drilling extended to the McDonald’s target up to 400 meters along strike, to test for extensions to historical surface workings and delineation of the Youle Lode to the north.

With the commencement of mining on the Youle Lode, underground resource definition drilling continued at Youle together with optimisation of production in areas to be mined in the next 6 to 12 months. Mine geology advancement was undertaken through production optimisation drilling (POD), to provide confidence in grade, location of veining, geotechnical performance and viability ahead of mining.

As Mandalay continued with the Youle expansion program, it also commenced deep target testing of the Costerfield line of lode following Mandalay’s developing understanding of gold enrichment environments. The first two holes (totalling 2,509 m) of the four-hole program were completed. This provided additional context for previous deep high-grade gold intercepts at Augusta. The program is set to continue in 2020 targeting areas underneath the Augusta/ Cuffley system.

In 2019, the Brunswick deposit was actively mined, and definition drilling was undertaken.

In 2019, the goals achieved included:

- Commencement of mining of the Youle lode in September 2019
- Initiation of the northern Youle extension program, aimed at extending the Youle resource to the north and at depth
- Expanding and increasing the existing Indicated Mineral Resource of the Youle Lode
- Regional target generation was completed by conducting extensive surface mapping, drillhole

database integration, soil geochemistry and evaluation of geophysical data; this work assisted the generation of a three-dimensional (Leapfrog-based) integrated structural and geological model of the Costerfield region

- Expanding the orebody knowledge and Resource tonnage in the near-mine environment, particularly the extension and infill in the Brunswick ore system.

Throughout the year, 9,556 m of diamond drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield.

6.3 Historical Mineral Resource and Reserve estimates

Mandalay has reported Mineral Resources and Mineral Reserves from 2010 to 2019. Mineral Resources are presented in Table 6-2 and Mineral Reserves are presented in Table 6-3.

These estimates have been superseded by the current Resource and Reserve estimates in this report.

Table 6-2: Historical Mineral Resources, Mandalay Resources – Costerfield Project

Effective Date	USD/oz Au	USD/oz Sb	Cut-off grade (AuEq g/t)	Measured Mineral Resource					Indicated Mineral Resource					Inferred Mineral Resource				
				Tonnes (‘000)	Au (g/t)	Sb (%)	Au ounces (‘000)	Sb tonnes	Tonnes (‘000)	Au (g/t)	Sb (%)	Au ounces (‘000)	Sb tonnes	Tonnes (‘000)	Au (g/t)	Sb (%)	Au ounces (‘000)	Sb tonnes
1/03/2010	1,000	6,000		67.2	16.9	10.0	36.4	6,749	189.6	9.6	4.6	58.4	8,683	245.7	7.8	4.2	61.5	10,202
31/12/2011	1,100	9,850	4.6	158.4	12.9	7.8	65.5	12,291	202.4	7.3	3.7	47.7	7,502	375.0	12.7	5.6	152.9	21,183
31/12/2012	1,600	12,500	4.7	167.0	8.0	4.9	42.7	8,202	367.0	10.0	3.5	117.9	12,912	610.0	7.1	3.2	139.8	19,490
31/12/2013	1,400	12,000	3.9	191.4	8.4	4.3	51.5	8,157	606.0	9.6	4.0	186.4	24,237	570.0	7.4	3.7	135.3	21,342
31/12/2014	1,400	12,000	3.8	213	9.8	4.5	67	9,600	786	6.9	3.3	175	26,300	519.0	5.3	2.6	89.0	13,700
31/12/2015	1,400	11,000	3.8	247	12.1	4.6	96	11,000	798	7.6	3.4	194	27,000	491	4.3	2.0	68.0	9,700
31/12/2016	1,400	10,000	3.5	286	9.5	4	88	11,400	812	5.9	2.5	155	20,600	611	5.5	1.5	108.0	9000
31/12/2017	1,400	10,000	3.5	290	9.2	4.2	86	12,100	971	5.7	2.5	177	23,900	379	6.6	1.1	80.0	4,000
31/12/2018	1,400	10,000	3.5	245	8.5	4.0	67	9,800	1073	8.2	2.9	283	31,000	497	8.0	1.9	128	9,500

Table 6-3: Historical Mineral Reserves, Mandalay Resources - Costerfield Project

Effective Date	USD/ oz Au	USD/ oz Sb	Cut-off grade (AuEq g/t)	Proven Mineral Reserves					Probable Mineral Reserves					Total Mineral Reserves				
				Tonnes ('000)	Au (g/t)	Sb (%)	Au ounces ('000)	Sb tonnes	Tonnes ('000)	Au (g/t)	Sb (%)	Au ounces ('000)	Sb tonnes	Tonnes ('000)	Au (g/t)	Sb (%)	Au ounces ('000)	Sb tonnes
1/03/2010	1,000	6,000		20.1	16.9	9.7	10.9	1,953	45.4	11.4	5.8	16.7	2,636	65.6	13.1	7.0	27.6	4,588
31/12/2011	1,600	12,000	4.6	41.9	13.2	7.9	17.7	3,300	46.5	6.4	4.0	9.6	1,860	88.4	9.6	5.8	27.3	5,160
31/12/2012	1,600	12,500	4.7	48.1	11.0	6.5	17.0	3,128	130.0	8.1	3.2	33.9	4,161	178.2	8.9	4.1	50.9	7,289
31/12/2013	1,200	10,000	5.0	71.0	8.3	4.4	18.9	3,124	350.0	9.4	3.4	106.0	11,900	421.0	9.2	3.6	124.9	15,024
31/12/2014	1,200	10,000	5.0	98.0	10.4	4.5	32.0	4,400	333.0	7.4	3.3	80.0	11,200	431.0	8.1	3.6	112.0	15,600
31/12/2015	1,200	9,000	4.0	125	12.0	3.9	48.0	5,500	366	8.2	3.7	97.0	13,400	491	9.2	3.9	145.0	18,900
31/12/2016	1,200	8,000	4.0	184	8.1	3.5	48	6,400	434	5.7	2.6	80.0	11,100	619	6.5	2.8	128.0	17,501
31/12/2017	1,200	8,500	4.0	152	7.3	3.5	36	5,300	470	5.7	2.5	86.0	12,000	622	6.1	2.8	122.0	17,200
31/12/2018	1,200	8,500	4.0	76	8.4	4.0	20	3100	461	10.8	3.1	160.0	14,200	537	10.4	3.2	180.0	17,200

6.4 Historical production

The operation of the Augusta Mine was taken over by Mandalay in December 2009. Prior to the acquisition of the operation, the mine had been operating since early 2006 with a 3-month closure in 2008/2009. During this time approximately 95,000 tonnes of ore were extracted producing 25,000 ounces of gold and 4,200 tonnes of antimony. The production record from the start of 2010 to the end of 2019 is shown in Table 6-4.

Table 6-4: Historical mine production – Mandalay Resources – Costerfield Project

Year	Inventory (kt)	Gold grade (g/t)	Antimony grade (%)	Gold Metal (koz)	Antimony Metal (tonnes)
2010	50.7	7.4	4.2	12.0	2,140
2011	72.0	7.3	3.7	16.8	2,637
2012	96.3	8.3	4.3	25.6	4,166
2013	129.6	9.1	4.2	37.7	5,418
2014	167.1	9.1	3.8	48.8	6,345
2015	153.6	11.2	4.2	55.6	6,484
2016	158.4	9.6	3.4	49.0	5,407
2017	140.6	8.2	3.3	37.1	4,612
2018	151.6	5.7	2.4	27.6	3,572
2019	137.5	5.2	2.6	23.0	3,538

7 Geological setting and mineralisation

7.1 Regional geology

The Costerfield gold-antimony mineralisation zone is located at the northern end of the Darraweit Guim province, in the Western portion of the Melbourne Zone. In the Heathcote area of the Melbourne Zone, the Murrindindi Supergroup within the Darraweit Guim Province encompasses a very thick sequence of Siluro-Devonian marine sediments. These consist predominantly of siltstone, mudstone, and turbidite sequences.

The western boundary of the Darraweit Guim Province is demarcated by the Cambrian Heathcote Volcanic Belt and north-trending Mt William Fault. The Mt William Fault is a major structural terrain boundary that separates the Bendigo Zone from the Melbourne Zone.

The lower Silurian Costerfield Siltstone is the oldest unit in the Heathcote area and is conformably overlain by the Wappentake Formation (sandstone/siltstone), the Dargile Formation (mudstone), the McIvor Sandstone, and the Mount Ida Formation (sandstone/mudstone).

The Melbourne Zone sedimentary sequence has been deformed into a series of large-scale domal folds. These major north-trending, sub-parallel folds in the Darraweit Guim Province include, from west to east: the Mount Ida Syncline; the Costerfield Dome/ Anticline; the Black Cat and Graytown anticlines; and the Rifle Range Syncline. These folds tend to be upright, open, large wavelength curvilinear structures.

The folds have been truncated by significant movements along two major north-trending faults, the Moormbool and Black Cat faults.

The Moormbool Fault has truncated the eastern limb of the Costerfield Anticline, resulting in an asymmetric dome structure. The Moormbool Fault is a major structural boundary separating two structural subdomains in the Melbourne Zone. West of the Moormbool Fault is the Siluro-Devonian sedimentary sequence, hosting the gold-antimony lodes. The thick, predominantly Devonian Broadford Formation sequence occurs to the east of the fault and contains minor gold-dominant mineralisation.

7.2 Property geology

The Costerfield gold-antimony mineralisation is located on the Costerfield Dome, which contains poorly exposed lower Silurian Costerfield Siltstone at its core. Within the Costerfield area, four north-northwest (NNW)-trending zones of mineralisation have been identified.

They are, from the west:

- Antimony Creek Zone, about 6.5 km southwest of Costerfield, on the outer western flank of the Costerfield Dome
- Western Zone, about 1.5 km west of Costerfield, on the western flank of the Costerfield Dome
- Costerfield Zone, near the crest of the dome, centered on the Costerfield township and hosting the major producing mines and deposits
- Robinsons–Browns (R-B) Zone, 2 km east of Costerfield.

The Costerfield Siltstone-hosted quartz/ sulphide lodes in the Costerfield Zone are controlled by NNW-trending faults and fractures located predominantly on the west flank of the Costerfield Anticline. This is shown in Figure 7-1.

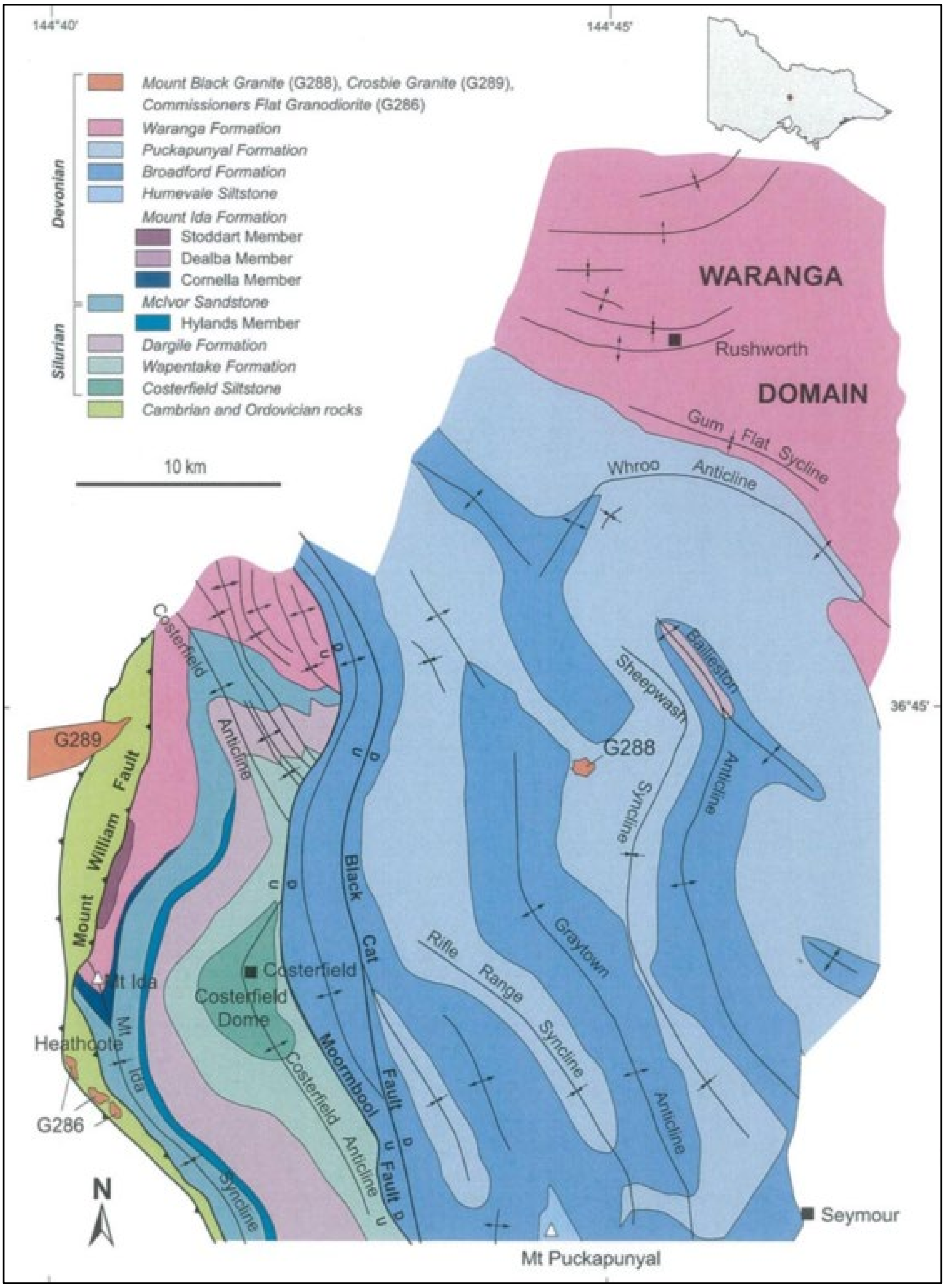

Figure 7-1: Geological map of the Heathcote – Colbinabbin – Nagambie region

Source: Vandenberg et al., 2000.

The mineralized structures in the Costerfield Zone, which dip steeply east or west, are likely to be related to the formation of the Costerfield Dome and the subsequent development of the Moormbool Fault. The main reef systems appear to be developed in proximity to the axial region of the Costerfield Dome. However, due to poor surface exposure, the spatial relationship is based solely on limited underground mapping at the northern end of the zone. The mapping also shows that later faulting (conjugate northwest (NW) and northeast (NE) faulting) has severely disrupted the mineralized system in the north.

Host rocks are Silurian Costerfield Formation siltstones and mudstones (Costerfield Siltstone). These siltstones and mudstones are estimated to be approximately 600 m thick and are the oldest exposed rocks in the local area.

Significant portions of the local area are obscured by alluvium and colluvium deposits, which have washed out over the plains via braided streams flowing east off the uplifted Heathcote Fault Zone. Some of this alluvial material has been worked for gold but workings are small-scale and limited in extent. Most of the past mined hard rock deposits were found either out-cropping or discovered by trenching within a few meters of the surface. The Augusta deposit was discovered late in the history of the field (1970) by bedrock geochemistry, buried under 2–6 m of alluvium that was deposited at the meandering Mountain Creek/ Wapentake Creek confluence.

Locally, the sedimentary succession of the Costerfield area has been deformed into a broad anticlinal dome structure with numerous cross-cutting reverse thrust faults. This domal structure is thought to have resulted from two separate tectonic events, the first producing shortening in an east-west direction (folding and thrust faulting) and the second producing north-south shortening (gentle warping and mild folding). The anticlinal hinge zone of the Costerfield Anticline has been thrust over its eastern limb by the north-south trending King Cobra Fault zone (Figure 7-2).

Figure 7-2: Costerfield property geology and old workings

Source: Mandalay, 2012.

7.3 Stratigraphy of the Costerfield Formation

Recent stratigraphic investigations focused around the currently active Augusta workings within the South Costerfield area have found many previously unrecognized stratigraphic units and structural features. Sub-surface stratigraphic mapping (drillhole data) has indicated that the local host of mineralisation, the Costerfield Formation, is far more stratigraphically complex than previous investigations have documented. This detailed stratigraphic mapping has consequently identified the complex structural geology of the Costerfield area. These new observations are documented below.

The stratigraphy of the Heathcote-Costerfield region is presented in Figure 7-3. The oldest outcropping strata documented in the region is the Costerfield Formation and is regarded as lowest-Silurian in age (Sandford and Holloway, 2006). The Costerfield Formation is then overlain by muddy siltstones and sandstones of the lower Silurian-aged Wappentake Formation, then Dargile Formation. Upper Silurian sedimentation is recorded in coarser silici-clastic successions of the McIvor Sandstone that is then finally overlain by the early-Devonian Mt Ida Formation (Figure 7-3). The Mt Ida Formation records the terminal phase of sedimentation in the greater Heathcote region. The overall stratigraphic thickness of this succession is unknown. However, estimations of true stratigraphic thickness have been in the range of 6–7 km, without any significant depositional hiatus.

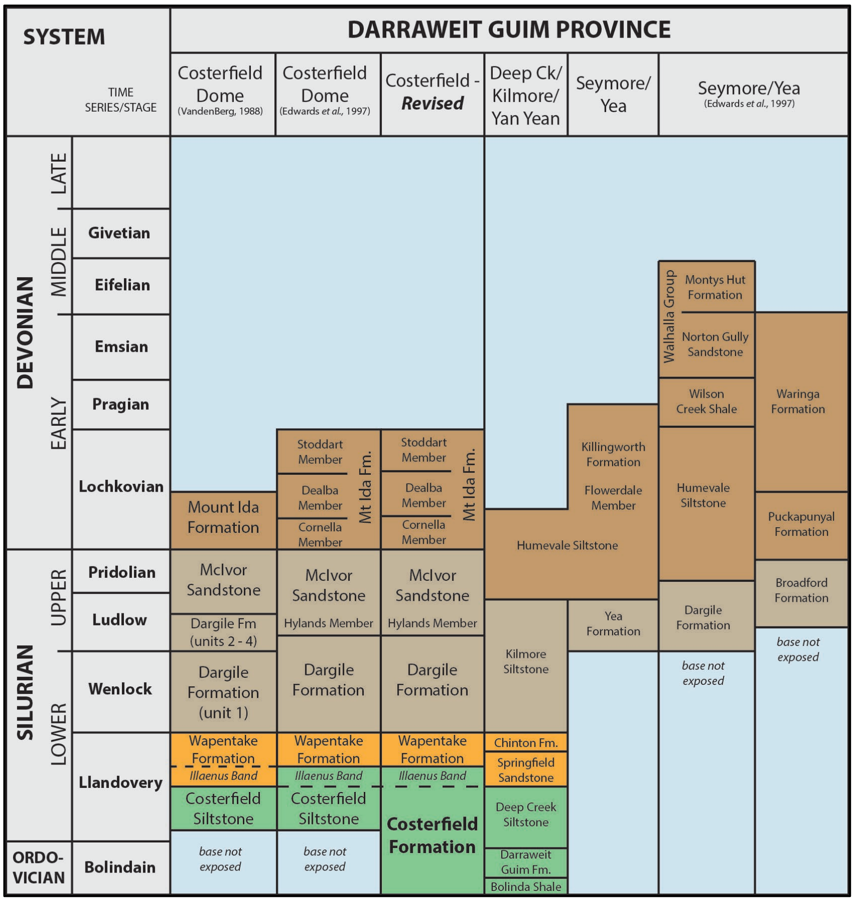

Figure 7-3: Regional stratigraphic chart of the Costerfield region illustrating age relationships of defined sedimentary succession of the Darraweit Guim Province

Modified from Edwards et al., 1997.

The Costerfield Formation (as defined by Talent, 1965) is a series of thickly bedded mudstones and siltstones featuring heavy bioturbation. The 'Formation' nomenclature (that assigned by Talent, 1965) is chosen to be used within this report instead of the later re-assigned name of 'Costerfield Siltstone' (as re-defined by Vandenberg, 1988). It is recommended that the 'Siltstone' nomenclature be abandoned as it has become a misleading term inferring the unit is composed of siltstone-dominant lithologies. Rather, the unit consists of dominantly mudstone lithologies, with siltstones and sandstone representing the lesser constituents as relatively thin interbedded occurrences.

The Costerfield Formation is dominated by weakly bedded mudstones and silty mudstones with some lesser siltstone and sandstone constituents. The Formation is informally divided into lower and upper portions based on a significant lithological change mid-way through the succession. Estimations of the true stratigraphic thickness of the Formation are made difficult due to significant faulting in the area; however it is estimated to be in the range of 450–550 m in thickness, with the lower and upper portions of the Formation being around 200 and 300 m thick respectively. Informal lithostratigraphic units defined from the Lower Costerfield formation are named the Siliciclastic unit, Quartzite beds. Lithostratigraphic units defined from the Upper Costerfield formation are named the Lower siltstone unit, Augusta beds and the Upper siltstone unit (Figure 7-4).

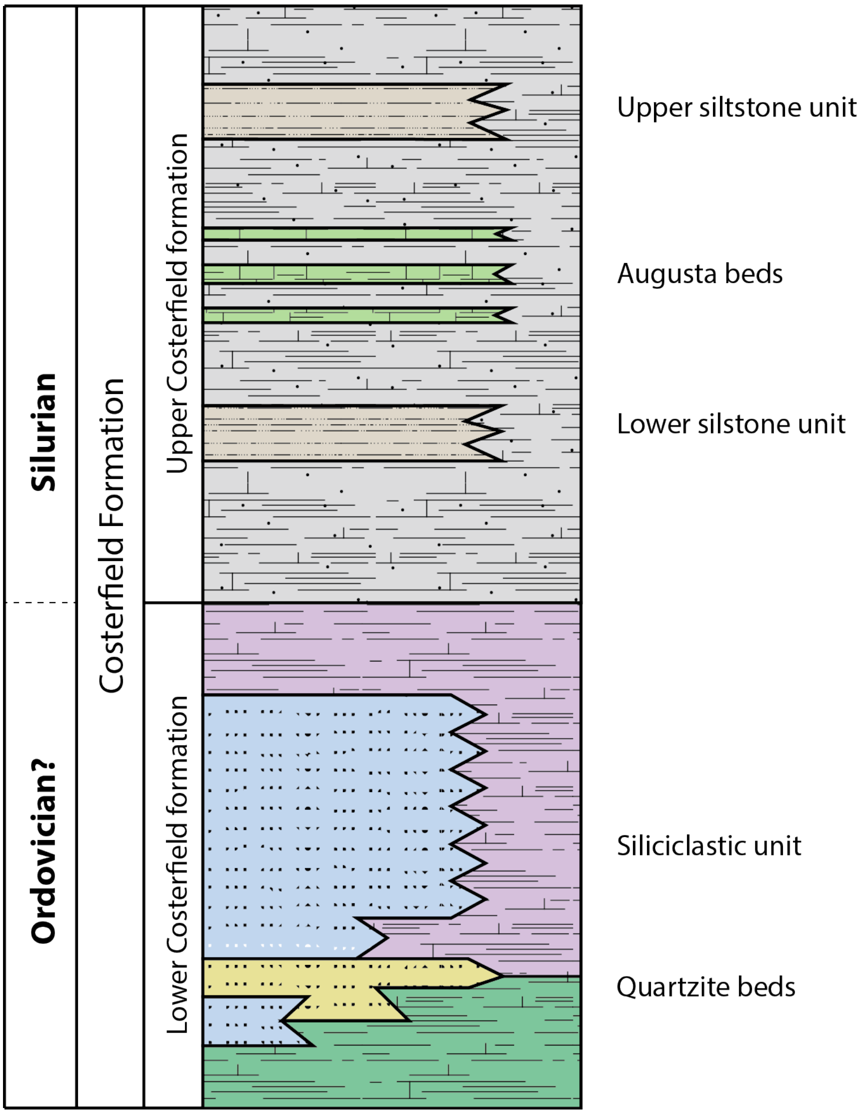

Figure 7-4: Stratigraphic column of the Costerfield Formation illustrating the relative positions of newly defined (informal) stratigraphic units

Source: Thomas Fromhold, Mandalay, 2014.

7.4 Structural geology of the South Costerfield area

Resource definition diamond drilling for the Augusta and Cuffley deposits has resulted in an enormous collection of geological data from the South Costerfield area. From this, construction of highly refined cross section interpretations has been possible. These cross sections have revealed that the Augusta and Cuffley deposits are bounded between two large, low angle west-dipping parallel thrust faults named the Adder Fault (upper) and the King Cobra Fault (lower). They are typically in the range of 250 m apart in the South Costerfield area where they are recognized.

The area between these two large faults is also heavily faulted, resulting in a defined zone of intense brittle deformation. Three significant second order faults occur within the fault zone. These faults (named the Flat, Red Belly and Tiger faults) are interpreted as having listric geometry, most likely mimicking the larger structure of the Adder and King Cobra faults.

These faults are all observed as extremely brittle structures, with larger faults (namely the Adder and King Cobra faults) occurring as a 1–2 m zone of fault pug, with several meters of extremely heavily fractured and sheered rock in both the foot- and hanging-walls. This zone of intense brittle deformation and shortening is bounded by the larger Adder and King Cobra faults and regarded to represent a regional scale thrust fault or thrust zone. It has been informally named the Costerfield Thrust. Mandalay interprets the Costerfield Thrust to be the southern extent of the historically recognized 'Costerfield Fault'. Stratigraphic interpretations suggest that overall shortening (stratigraphic displacement) across the Costerfield Thrust is in the order of around 1 km.

An additional series of brittle faults are observed within this thrust system striking in an NNE direction (i.e. the East Fault). These faults have a sub-vertical dip and are generally observed as 1–2 m-thick zones of unconsolidated breccia with minor pug on the fault plane itself. The lateral extent of these faults is uncertain; however, they appear to be localized structures as correlation through the entire suite of drilling data is difficult. Offset across these steep dipping faults appears mostly strike-slip and overall vertical offset is tentatively estimated to be on the scale of less than 50 m. Lateral offset is presently unknown.

Ductile deformation of the Costerfield Formation occurs as a broad anticlinal structure with a wavelength in an estimated range of 1.5–2 km. Smaller parasitic folds are observed to have a northerly striking fold axis that dips slightly to the east. These parasitic folds are assumed to mimic the larger-scale folding of the area. Ductile to semi-ductile veining/ faulting is evident within the Costerfield Formation and occur as 20–100 mm laminated quartz veins. They are typically bedding parallel, although laminated veins cross cutting stratigraphy are not uncommon. Displacement across these faults/ veins is uncertain as their bedding-parallel characteristics mean estimation of displacement through stratigraphic observations is not possible. Veins that crosscut bedding do appear to record displacement in the range of 10 to potentially 100s of meters.

7.5 Structural geology of Brunswick area

Recent resource definition diamond drilling of the Brunswick deposit has resulted in an increase of geological data, particularly at depth below the previously mined Brunswick shear.

The Brunswick deposit is located northwest of the current Cuffley workings, proximal to the Brunswick plant. Drilling completed in 2008 confirmed the deposit is comprised of a single main thrust structure that occurs as a strongly sheared, well mineralized pug zone as well as a stibnite quartz vein.

Since late 2015, the conceptual model of the Brunswick lode evolved from a relatively linear, single plane into a series of panels, progressively separated by low-angle thrust faults. These flat faults have the effect of transposing the lode panel below several meters westward. Flat faults bisect lode structures in many other places throughout the field, including Alison/ Cuffley, Costerfield (the Kendall system), Margaret and Margaret East, and N Lode to varying degrees.

The PK (Penguin–Kiwi) panel (between 900–1000 mRL) is the first down-dip, major offset of the Brunswick lode, with an apparent displacement of around 15 m to the west (Figure 7-5). The panel is separated into two parts in the north, by a hanging wall splay of the Penguin Fault. Most drillholes in the splay-bound portion of the PK panel are low grade, although most of them are close to the bounding faults and potentially could be effective fault blanks.

The Brunswick Emperor–Kiwi Panel is bound down-dip by the footwall plane of the Kiwi fault and is interpreted to dip more strongly to the west with proximity to the fault plane.

The Brunswick Kiwi–Rooster Panel is bound up-dip by the hanging wall plane of the Kiwi fault, a duplexing of the Kiwi fault is seen to the west of the Emperor–Kiwi Panel and is interpreted to be an indicator of post-mineralisation movement on the Kiwi fault. The complex relationship between the footwall and hanging wall of the Kiwi fault is now interpreted to be both pre-syn and post-Brunswick shear mineralisation. This interpretation is key to bounding the mineralisation on different fault planes. The continuity of ore shoots across flat faults such as the Kiwi highlight the potential for the ore shoots to continue at depth below the Kiwi fault.

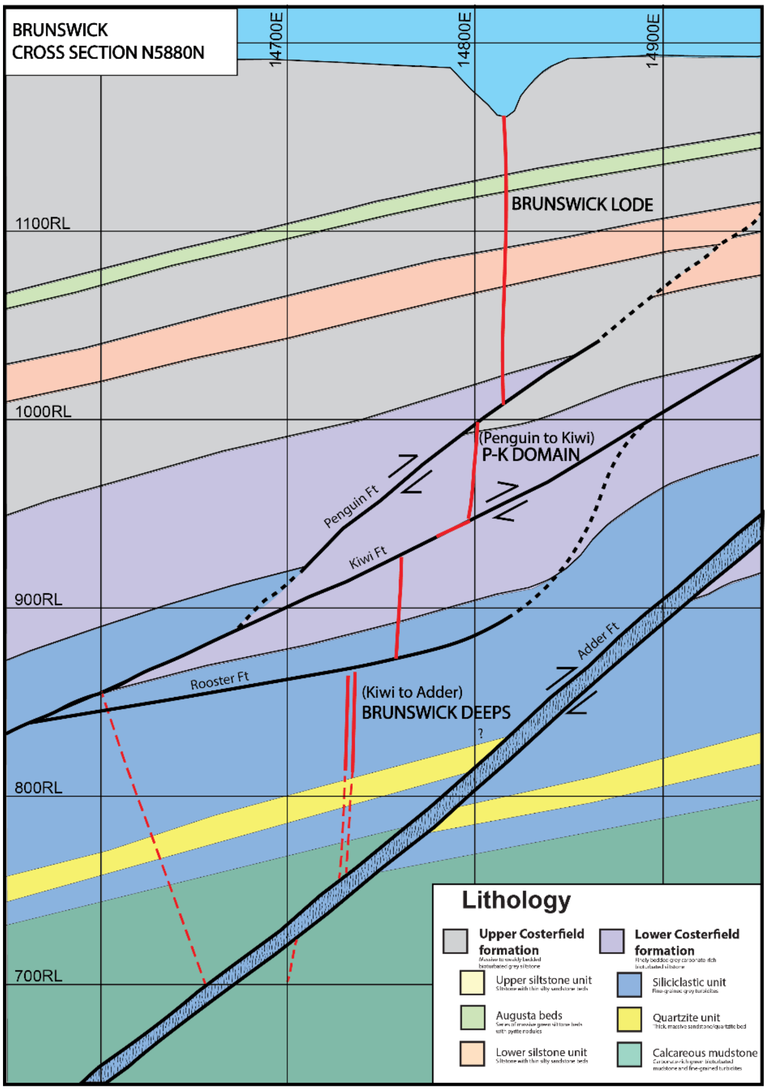

Figure 7-5: Cross section through the Brunswick system, showing the progressive panel offsets with depth

Source: Mandalay Resources 2017.

7.6 Structural geology of Costerfield Youle area

The Youle lode, named after one of the original prospectors in the district, dips west, and is identified as the down-dip continuation of the vertical Kendall lode, offset westward over the west-dipping No.4 thrust fault (Figure 7-6). The strike of Youle extends 600 m in length and a vertical length of 150 m.

Mineralisation exists at surface and is vertically continuous in one plane until the intersection with a flat fault (Whitelaw back) where mineralisation switches planes to the west. Section 8 contains a detailed description of the deposit type and mineralisation.

Historically, both the east-dipping Costerfield reef and west-dipping Kendal reefs (Figure 7-6) were mined underground to a depth of ~270 m.

Mandalay has drilled the historical Costerfield mine area in three campaigns (2011, 2014 and 2017/2018). The company reported significant early results from the Youle drill program in July 2017 and April 2018. Drilling was accelerated in late 2017 after it was clear that Mandalay was committed to developing the Brunswick lode, as the access to Youle relied on the Brunswick decline being in place. In September 2019, Mandalay commenced on-vein development of the Youle lode, which lies approximately 800 m north of the Brunswick lode.

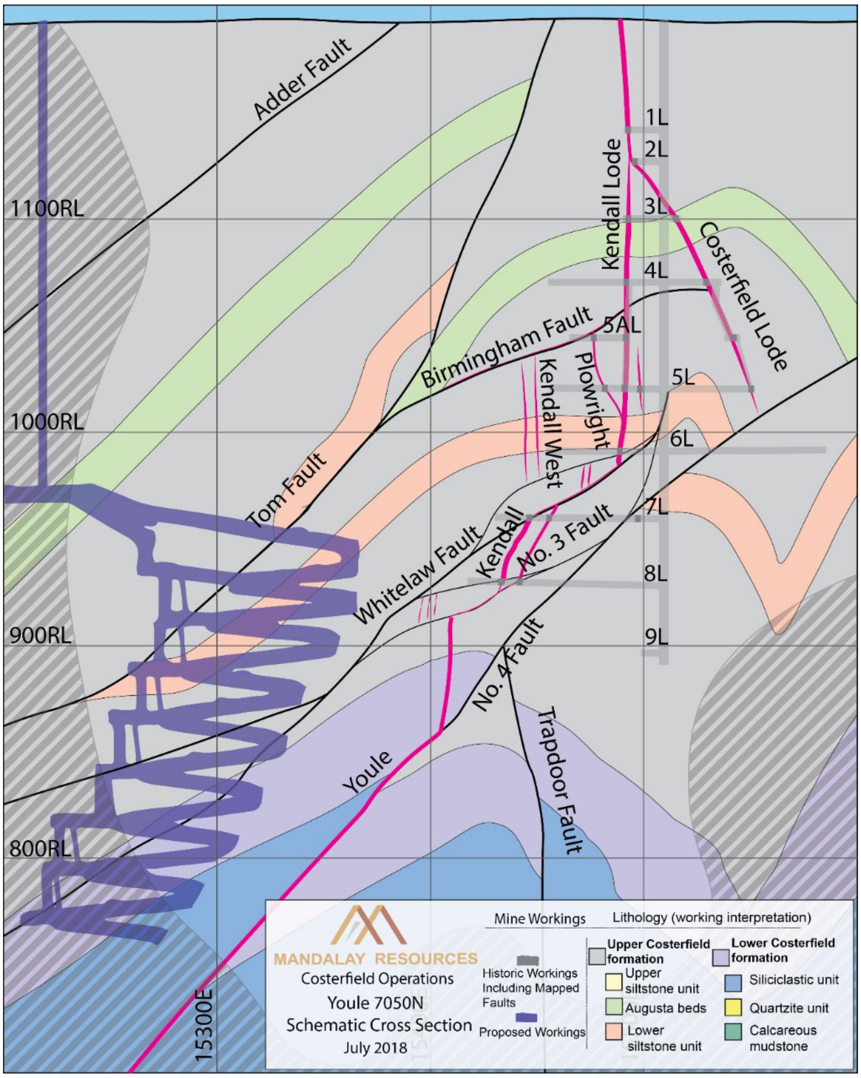

Figure 7-6: Cross section through the Costerfield system, showing the west-dipping Youle and Doyle systems and planned development

Source: Mandalay Resources 2019

8 Deposit types

The Costerfield field is part of a broad gold-antimony province mainly confined to the Siluro-Devonian Melbourne Zone. Although antimony often occurs in an epithermal setting (in association with silver, bismuth, tellurium, molybdenum, etc.), the quartz-stibnite-gold narrow veins of the Melbourne Zone are mesothermal-orogenic and are part of a 380–370 Ma tectonic event. Gold in Central Victoria is believed to have been derived from the underlying Cambrian greenstones. The origin of the antimony is less certain.

The mineralisation occurs as narrow veins or lodes, typically ≤500 mm wide, hosted within low-grade (anchizone) mudstone and siltstone of the Lower Silurian Costerfield formation. Gold mineralisation of >20 g/t with an average grade of ~9 g/t is typically hosted within and/ or alongside veined stibnite with ~4% Sb (Fromhold et al, 2016). Mineralized shoots in the Costerfield property are structurally controlled by the intersection of the lodes with major cross cutting, puggy, sheared fault structures. Exploration in the property is guided by predictions of where these fault/lode intersections might be, using data from structural/ geological mapping, diamond drill logging and 3D computer modelling using Surpac software.

Large, flat, west- and northwest-dipping reverse faults have displaced the lodes in the Costerfield Mine at the northern end of the mineralisation extent. The Youle lode dips west and is identified as the down-dip continuation of the vertical Kendall lode, offset westward over the west-dipping No.4 thrust fault. The strike of Youle extends 600 m in length and a vertical length of 150 m. It has been recognized that such thrust faults occur throughout the field. At the Alison Mine, production stopped in 1922 because the lodes were 'lost' on a flat west-dipping fault, since named the Adder Fault. Drilling in 2011 successfully intersected a displaced lode below the fault, now known as the Cuffley Main Lode. Since the discovery of the Cuffley lode, exploration has continued with success at depth and along strike and the persistent low angle west-dipping faults that continue to influence gold-antimony mineralisation.

8.1 Property mineralisation

The economic mineralisation in the property occurs at the southern end of a system of steeply-dipping quartz-stibnite lodes, with thicknesses ranging from millimeters to 1 m and extending over a strike of at least 4 km. Individual lodes can persist for up to 800 m strike and 300 m down-dip. The lode system is centered in the core of the doubly plunging Costerfield Anticline and is hosted by Costerfield siltstones.

Vein fill mineralogical contents and proportions are found to differ from vein-to-vein throughout the Augusta, Cuffley, Brunswick and Youle lodes. However, the texture and chronological order of each vein mineral generation remains remarkably consistent across all lodes. A diagrammatic illustration of this chronological order of vein history (i.e. paragenesis) of the August and Cuffley deposits is illustrated in Figure 8-1. The overall paragenetic sequence is ordered as follows: laminated quartz, fibrous carbonate (siderite and ankerite), crystalline quartz (rhombic quartz), stibnite, opaline quartz and milky quartz. Acicular stibnite and botryoidal calcite are not generally associated with the main quartz-stibnite vein structures and are therefore regarded as a post-mineralisation mineralogical occurrence most likely associated with meteoric events.

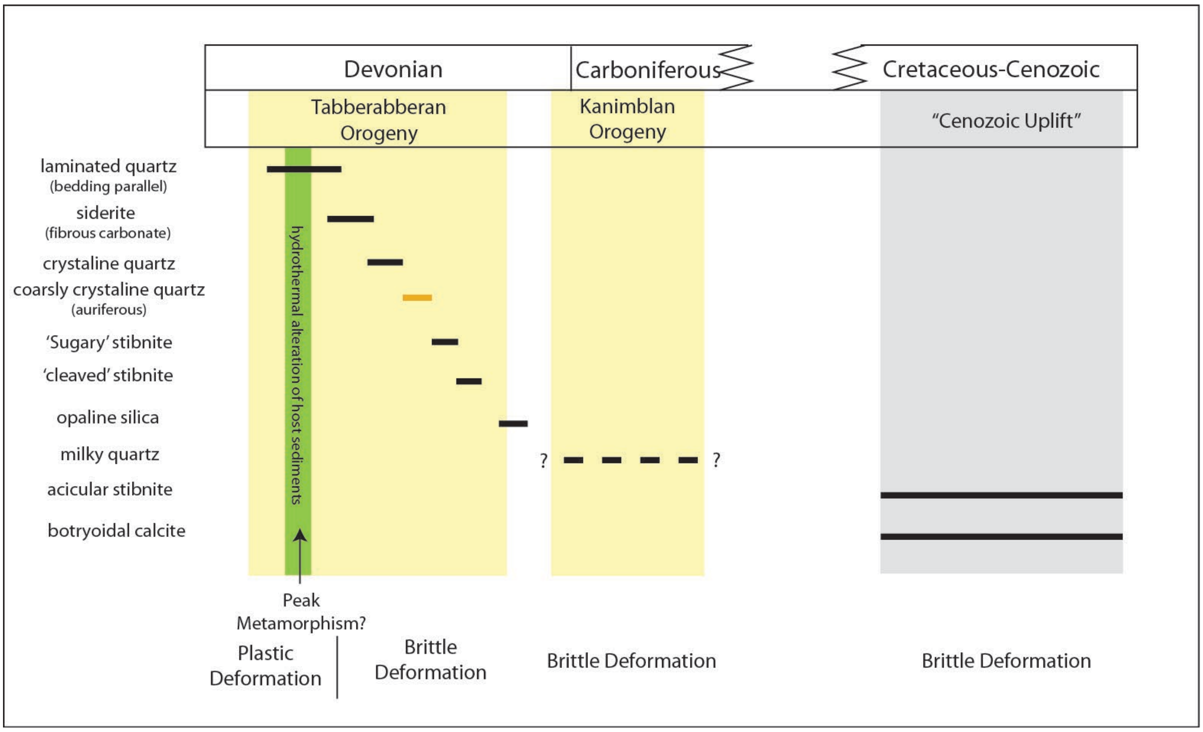

Figure 8-1: Paragenetic history and vein genesis of the Costerfield region

Source: Thomas Fromhold, Mandalay, 2014.

The Costerfield lodes are typically anastomosing, *en échelon* style, narrow-vein systems, dipping from 25–70° west to steeply east (70–90°). Mineralized shoots are observed to plunge to the north (when structurally controlled) and south (when bedding controlled).

The mineralisation occurs as single lodes and vein stockworks associated with brittle fault zones. These bedding and cleavage parallel faults, that influence the lode structures, range from sharp breaks of less than 1 mm to dilated shears up 3 m wide that locally contain fault gouge, quartz, carbonate and stibnite. Cross faults, such as those seen offsetting other Costerfield lodes, have been identified in both open pit and underground workings. Section 7.4 contains detailed description of the structural geology).

Mineralized lodes vary from massive stibnite with microscopic gold to quartz-stibnite, with minor visible gold, pyrite and arsenopyrite. Stibnite is clearly seen to replace quartz. Gold can also be hosted by quartz.

Figure 8-2 is a photograph of typical mineralization as described above and as seen in Augusta. A close-up photograph of the mineralized lode is shown in Figure 8-3.

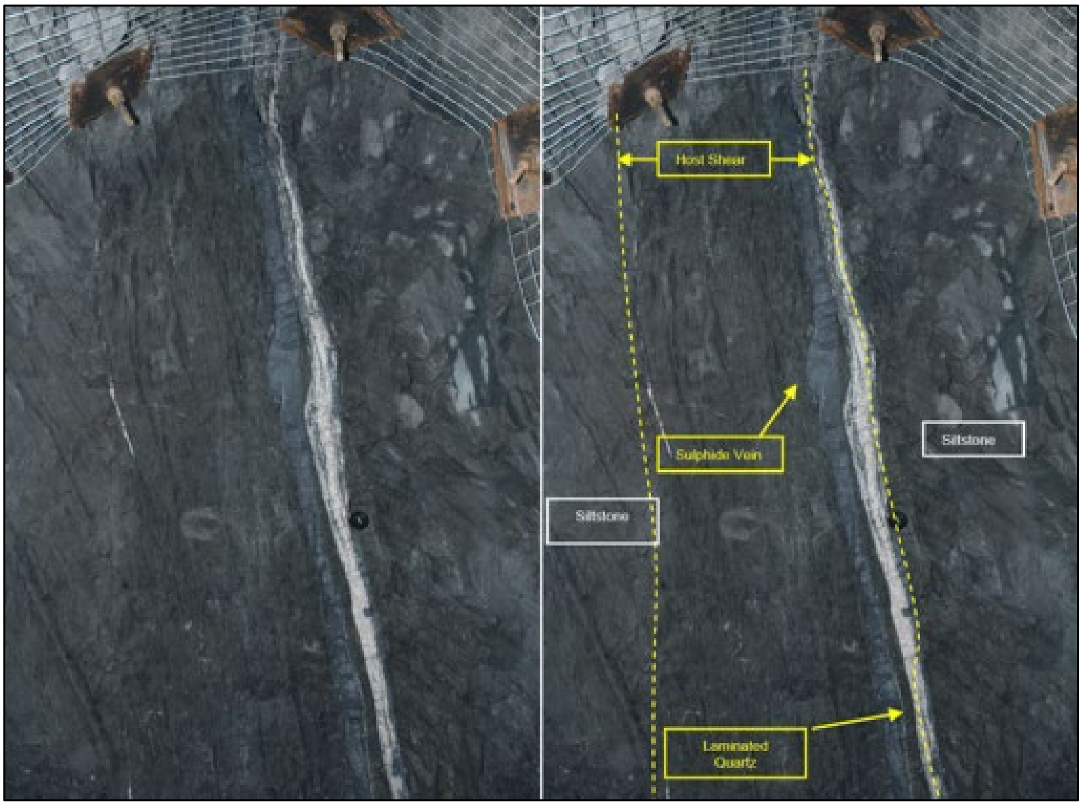

Figure 8-2: Two views of E Lode 1070 Level South, looking south with annotation on right-hand side

Source: SRK Consulting, 2010.

Note: The mining face is approximately 1.8 m wide and 2.8 m high. For scale, the lens cap is 67 mm diameter.

Figure 8-3: Close-up of mineralisation in west-dipping E Lode 1070 Level looking south

Source: SRK Consulting, 2010.

Note: For scale, the lens cap is 67 mm diameter.

8.2 Deposit mineralisation

Mandalay has estimated resources within the Augusta, Cuffley Brunswick and Youle deposits of the Costerfield region. The Augusta deposit currently comprises 10 lodes that make up the 2020 Mineral Resource inventory: E Lode, B Lode, B Splay, W Lode, N Lode, NS 48, NW Lode, P1 Lode, K Lode and C Lode.

The Cuffley deposit is currently comprises five lode structures, Cuffley Main (CM Lode), Cuffley East (CE Lode), Cuffley Deeps (CD Lode), Cuffley Deeps Lower (CDL lode) and Alison South (AS Lode). The Sub King Cobra domain below Cuffley consists of SKC C, SKC CE, SKC LQ and SKC W.

The Brunswick deposit comprises the main Brunswick lode structure (Brunswick shear) and Brunswick KR and takes in a portion of mineralisation between the Kiwi and Rooster faults (Figure 8-6).

The Youle deposit consists of Youle Main Lode, South Splay, North Splay and Doyle lodes (Figure 8-7).

8.2.1 Augusta Lodes

E Lode has an approximate strike length of 600 m and a down-dip extent of 200 m. The lode sub-crops beneath shallow alluvium and has been mined by open pit and underground methods. The dip of the lode varies from 42° in the south to 72° in the north. Its true thickness ranges from less than 0.1 m to 2.8 m, with an average width of 0.34 m where it has been mined.

Bob (B) Lode lies 30 m east of N Lode, striking approximately 30°, extending 200 m laterally. It has a vertical extent of 150 m and dips 80° towards the west. Lode widths vary between 0.05 m and 1.8 m, averaging 0.31 m. Bob Splay (BSP) splays off Bob Lode at 4640 mN striking 10° and dipping 75° west.

W Lode lies about 50 m west of E Lode and occurs over a strike length of approximately 420 m. It has a known down-dip extent of approximately 350 m and remains open at depth. The dip of W Lode is approximately 55° above the 1,100 mRL. Below this elevation, it gradually steepens to between 70° and 80° at around the 900 mRL. Its true thickness ranges from less than 0.1 m to 2.7 m, with an average width of 0.36 m where it has been mined.

NW Lode is located 5–10 m to the west of N Main, just above the hanging wall plane of the King Cobra. It is a localized lode with a strike extent of 70 m and a vertical extent of 25 m. Mineralisation is subvertical along bedding planes. True thickness of the lode ranges from 0.1 m to 2 m and averages 0.40 m.

P1 Lode lies approximately 80 m to the west of E Lode. The lode dips at approximately 85° to the east and occurs over a strike length of approximately 80 m, with a down-dip extent of approximately 150 m. It is interpreted as a small transfer structure between W Lode and N Main Lode. The true thickness ranges from less than 0.1 m to 1.9 m, with an average width of 0.40 m where it has been mined.

K Lode lies 30 m west of E lode, immediately north of the W Lode termination. It is a bedded parallel, laminated quartz-stibnite vein. It strikes at approximately 340°, extending up to 100 m laterally and has a consistent 60° dip to the west extending 70 m vertically. Mineralisation appears to be less significant on the western side of N Lode. The lode thickness varies from 0.1 m to 0.7 m, averaging 0.27 m.

C Lode lies an average of 20 m to the west of W Lode. It has a strike extent of 200 m before curving at both the southern and northern extents to intersect W Lode. Its geometry mirrors that of W Lode, dipping approximately 60° to the west. It is exposed at the surface and extends down-dip to 180 m. The true thickness varies from 0.1 m to 1.5 m.

8.2.2 Cuffley Lodes

The northwest-striking Cuffley Main (CM) Lode lies approximately 200 m to the west of E Lode and appears as an offset depth continuation of the Alison east and west lodes (possibly correlates with the 'west lode'). The upper reaches of Cuffley are separated from the Alison Reefs by a flat (30°–40°) west-dipping fault (Flat Fault) and extends though smaller fault offsets and splay veins to the King Cobra Fault over a vertical extent of ~300 m. Along-strike stibnite veining is split into two domains by a northwest-dipping fault (East Fault). The intersection of the mineralized corridor with this fault identifies the northerly plunging extent of the southern domain of economic mineralisation. The southern domain exists for ~150 m with a gentle strike change leading into the East Fault with west to northwest dipping.

Immediately north of the East Fault, a zone of sub-economic mineralization exists within a small (5–200 mm) sheared zone. Gold and antimony concentrations within the shear increase rapidly, coincident with small scale faulting ~50 m north of the East Fault, marking the northern domain of the Cuffley deposit. The northern domain exists for ~150 m before the accommodating structure pinches to a series of small veinlets and shears.

The vein dilation within the mined areas of Cuffley exhibits a vein width of up to 4 m. On average the width is ~0.4 m. The proximity and intersection of sub-parallel quartz veins is observed to be a large control on dilation. Local splaying on veining has been identified as the main Cuffley shear diverts from the underdeveloped cleavage planes of the country rock.

Extending below the Cuffley lode, the Cuffley Deeps (CD) mineralization was previously thought to be a structurally offset continuation of Cuffley Main below the Tiger Fault. Revised interpretation informed by mining activity suggests the two lodes are continuous (Figure 8-4). The western shift of Cuffley Deeps relative to Cuffley Main is caused by a shallow rollover of the lode. In the area of this rollover, the lode dips approximately 50° to the west. Cuffley Deeps has a strike extent of 500 m and a depth vertical extent of 200 m below the abovementioned rollover. Cuffley Deeps Lower (CDL) sits below the interpreted Fox Fault, above the King Cobra hanging wall. These faults define the upper and lower limits of the lode. It extends 250 m laterally and approximately 50 m vertically.

Extending below the Cuffley Deeps mineralisation, the four Sub King Cobra zones of mineralisation have been identified: the Central Main (SKC C), Central East (SKC CE), Central LQ (SKC LQ) and Western (SKC W) targets. These targets sit to the west of and below the Cuffley Deeps mineralisation. The known high-grade portion of the Central target extends vertically 100 m and 300 m along strike and is situated on the eastern limb of a large anticline the mineralisation that is breached by the King Cobra thrust system. The Western target sits below and to the west of the Central target and is likely to be an offset depth extension of the Central target.

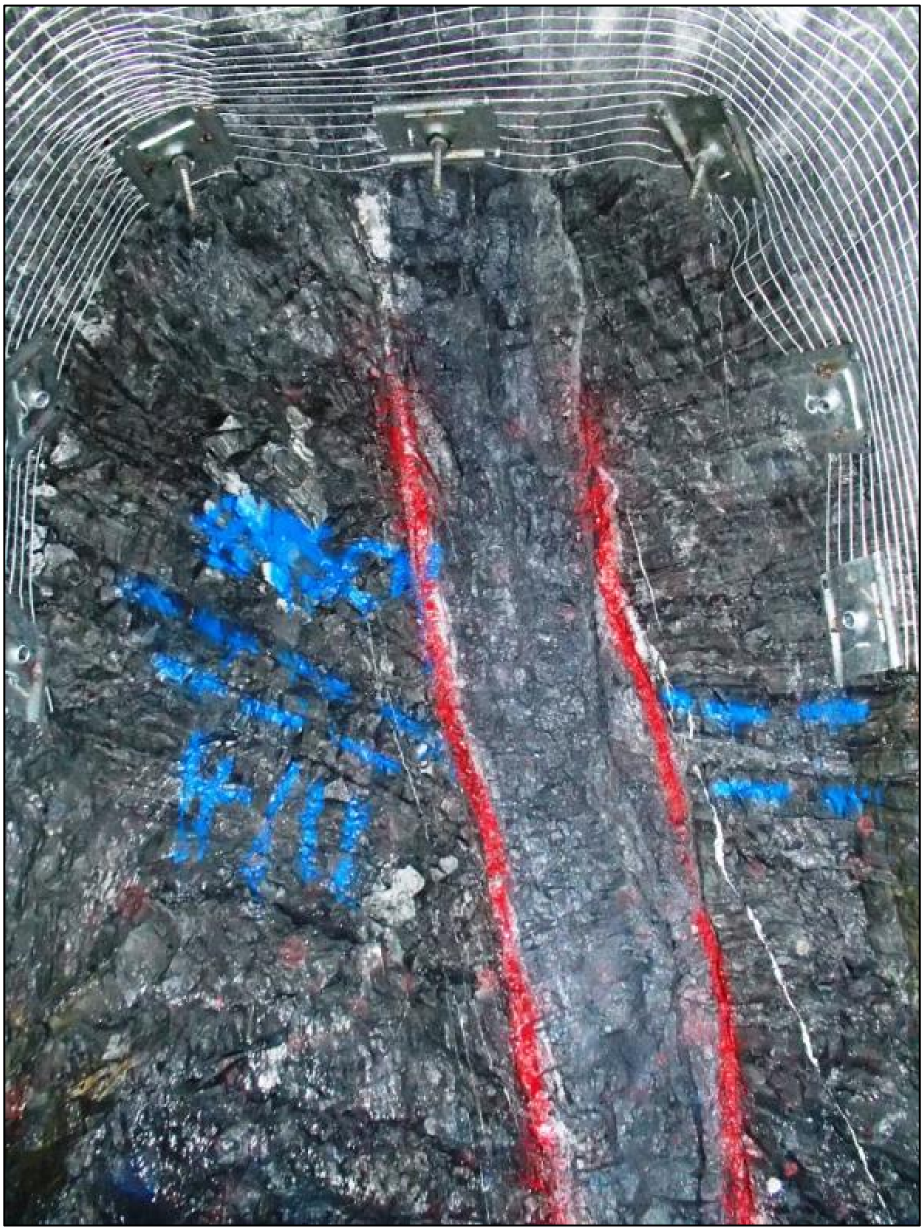

Figure 8-4: Cuffley deposit looking north – 895L C2 North lode

Note: For scale, the end of rock bolt is 300 mm × 300 mm.

8.2.3 Brunswick Lodes

The Brunswick deposit comprises the main Brunswick lode structure (Brunswick shear) and the Brunswick KR panel, which takes in a portion of mineralization between the Kiwi and Rooster faults (Figure 8-6). The Brunswick Lode lies approximately 600 m northwest of the northern most point of the Cuffley Lode (Figure 8-5). The lode is sub-vertical and occurs over a strike length of approximately 450 m, with a down-dip extent of approximately 200 m, with an average true thickness of 1.28 m.

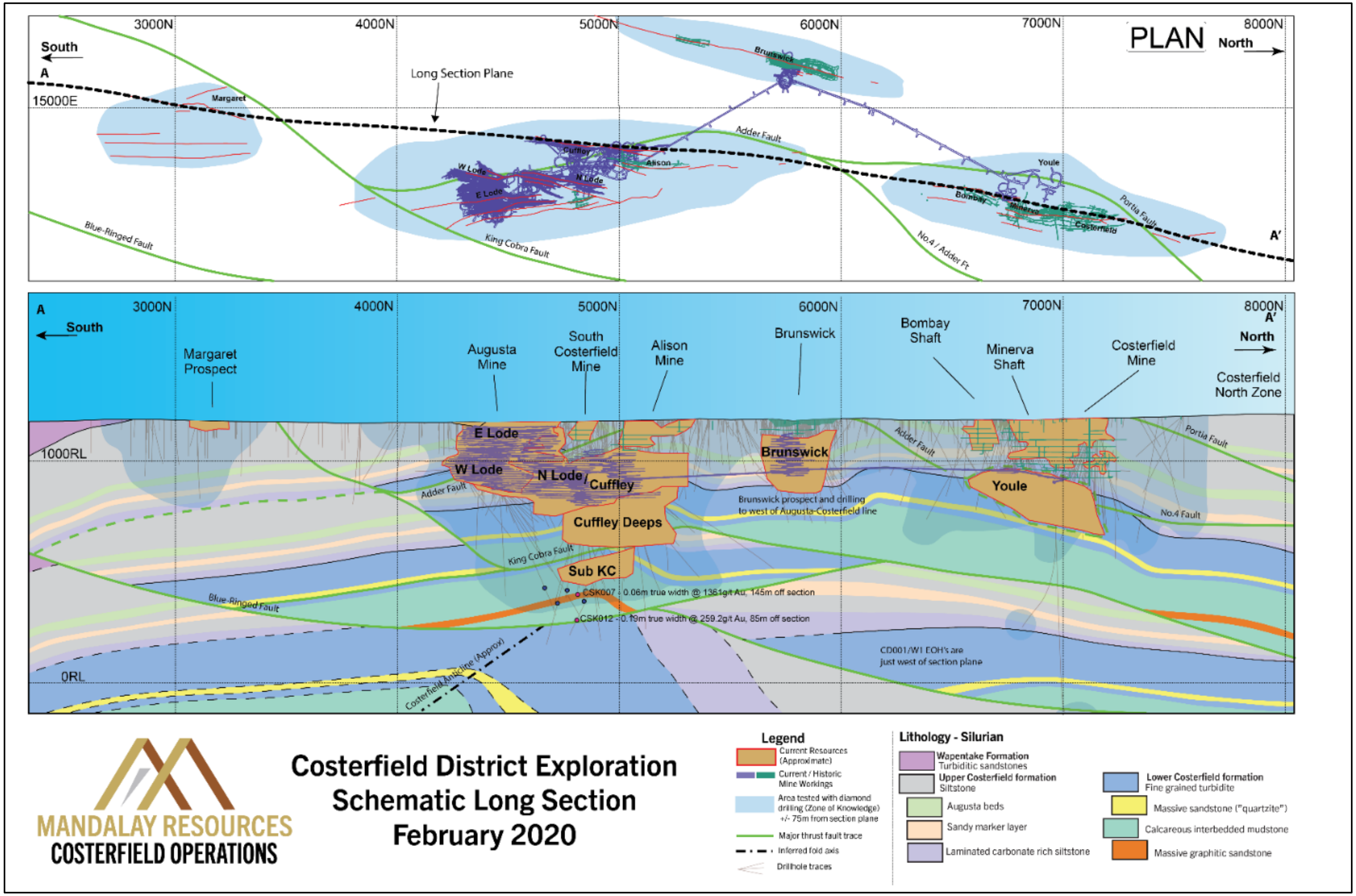

Figure 8-5: Costerfield District Exploration, schematic long section and plan view of Augusta, Cuffley, Brunswick and Youle lodes

Source: Mandalay Resources 2020.

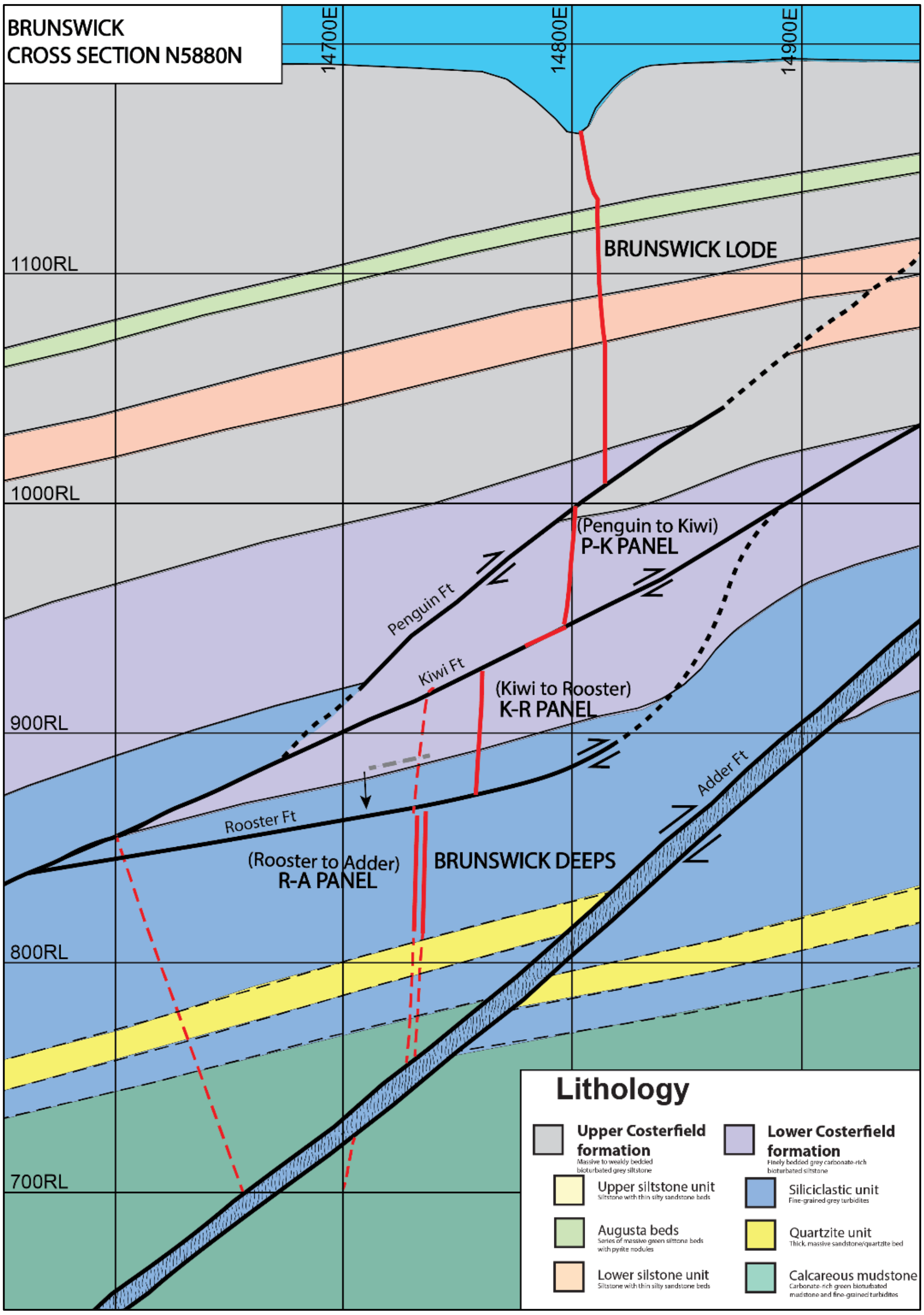

Figure 8-6: Brunswick cross section 5880N showing Brunswick Main Lode and the K-R panel

Source Mandalay Resources 2017.

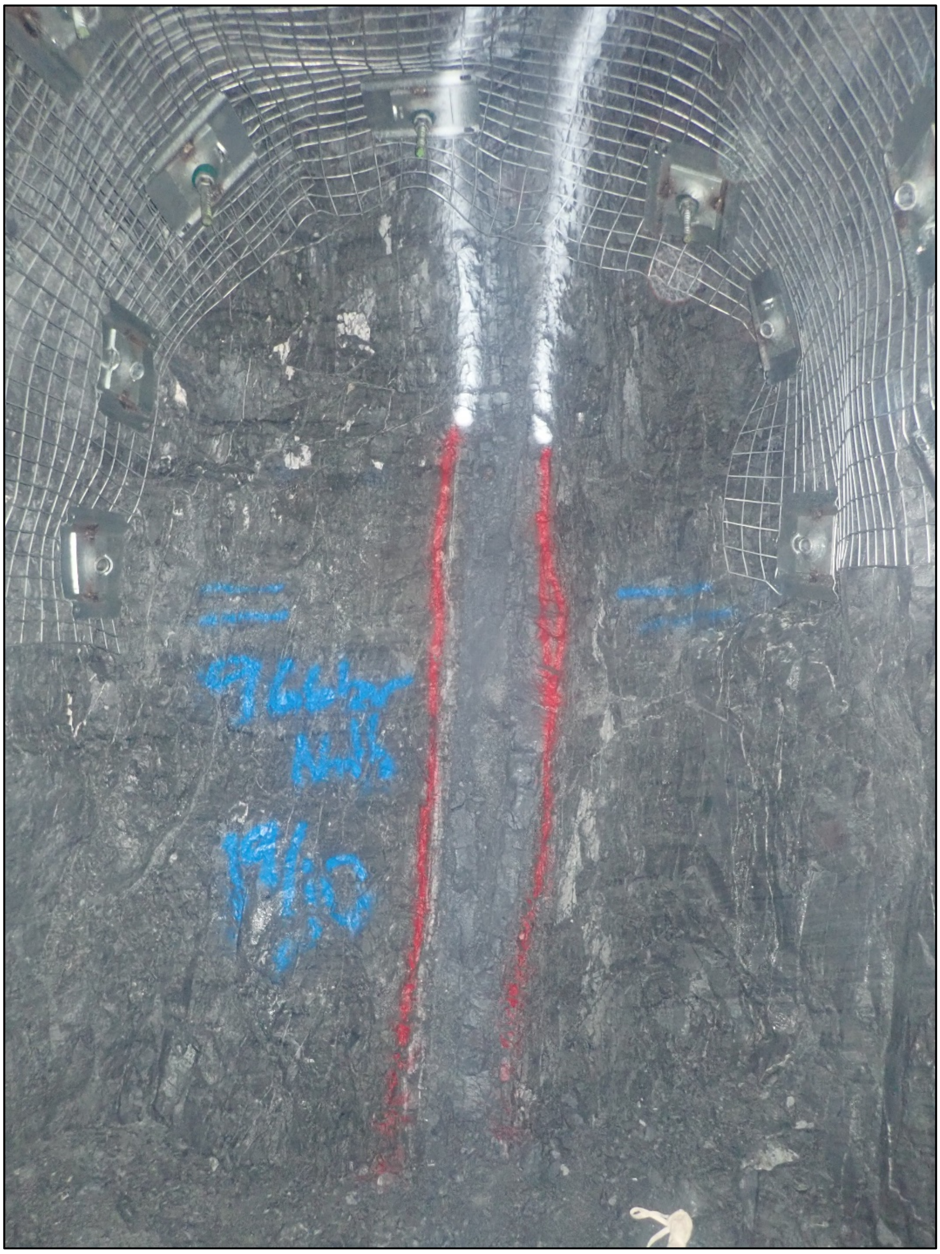

Figure 8-7: Brunswick ore drive photo at 966Nth Level

Source Mandalay Resources 2018.

Note: For scale, the end of rock bolt is 300 mm × 300 mm

8.2.4 Youle lodes

The Youle deposit extends below the historical Costerfield, Minerva and Bombay group of mines located approximately 800 km northeast of Brunswick (Figure 8-5). Mineralization was identified in 2011 in drillhole MB012, which struck the down-dip continuation of the vertical Kendall Lode, offset westward over the west-dipping No. 3 thrust fault (Figure 8-8). In 2016, drillhole BC006W1 revealed the existence of a high-grade NNW-striking, west-dipping lode structure, Youle. The Youle lode dips at a shallower angle than the mineralized lodes in Augusta and Cuffley and has been identified as the down-dip continuation of the vertical Kendall Lode offset westward over the west-dipping No.5 thrust fault (Figure 8-8).

Diamond drilling of Youle so far has demonstrated consistent structural and grade continuity over much of its extent, extending along strike 600 m in length and a vertical length of 200 m. The lode ranges in true thickness between 0.16 and 1.37 m. Similar to Augusta and Brunswick lodes, mineralisation is confined to quartz – stibnite veins.

In September 2019, Mandalay commenced on-vein development of the Youle vein, which lies approximately 800 m north of the Brunswick Lode. With the orebody accessed, Mandalay initiated its first stope in the final weeks of 2019 and expects a ramp-up of development and stoping over the next 12 to 18 months.

The mining of Youle has validated the exploration models with the exposure of expected mineralisation styles in ore-drives and mineralisation interactions with major faults. It has also illustrated how tight the controls are on mineralisation with respect to grade, structure type, orientation and domain settings. One example of this is that the grade has been enriched in a 75°–80˚ to 290˚ dip/ dip direction above the No.4 HW fault in the extensional domain below the flat Orbweaver/No.3 faults. The No.4 Fault (Figure 8-8) merge point with Youle has acted as a clear domain boundary between a structurally complex upper setting that incudes flat faults like the No.3 and Orbweaver faults, the Sigilliate Fault (a sub-vertical, oblique strike-slip fault and major shear), and west-dipping thrust fault splays such as the No.4 HW fault.

Below the No.4 Fault merge, the Youle main mineralisation has developed in a multi-generational thrust fault setting that includes variable laminated quartz and secondary quartz generations that are overprinted by the stibnite-quartz-gold mineralisation. The Youle main structure is the dominant fault and has not been observed in drilling to be cross-cut by other fault structures. Apparent grade controls on mineralisation and thickness are interaction zones with other secondary faults such as the No.4 and No.4 HW faults, Trapdoor faults, No.3 and the Orbweaver faults. The fault orientation relative to the primary compression direction at the time of mineralisation is also important. A dip direction of ~290˚, as per the previously mentioned enrichment, appears to maximize the extension and mineralisation. Bedding to fault orientation is a likely influence on this orientation, with the west limb of the anticline the most prospective horizon.

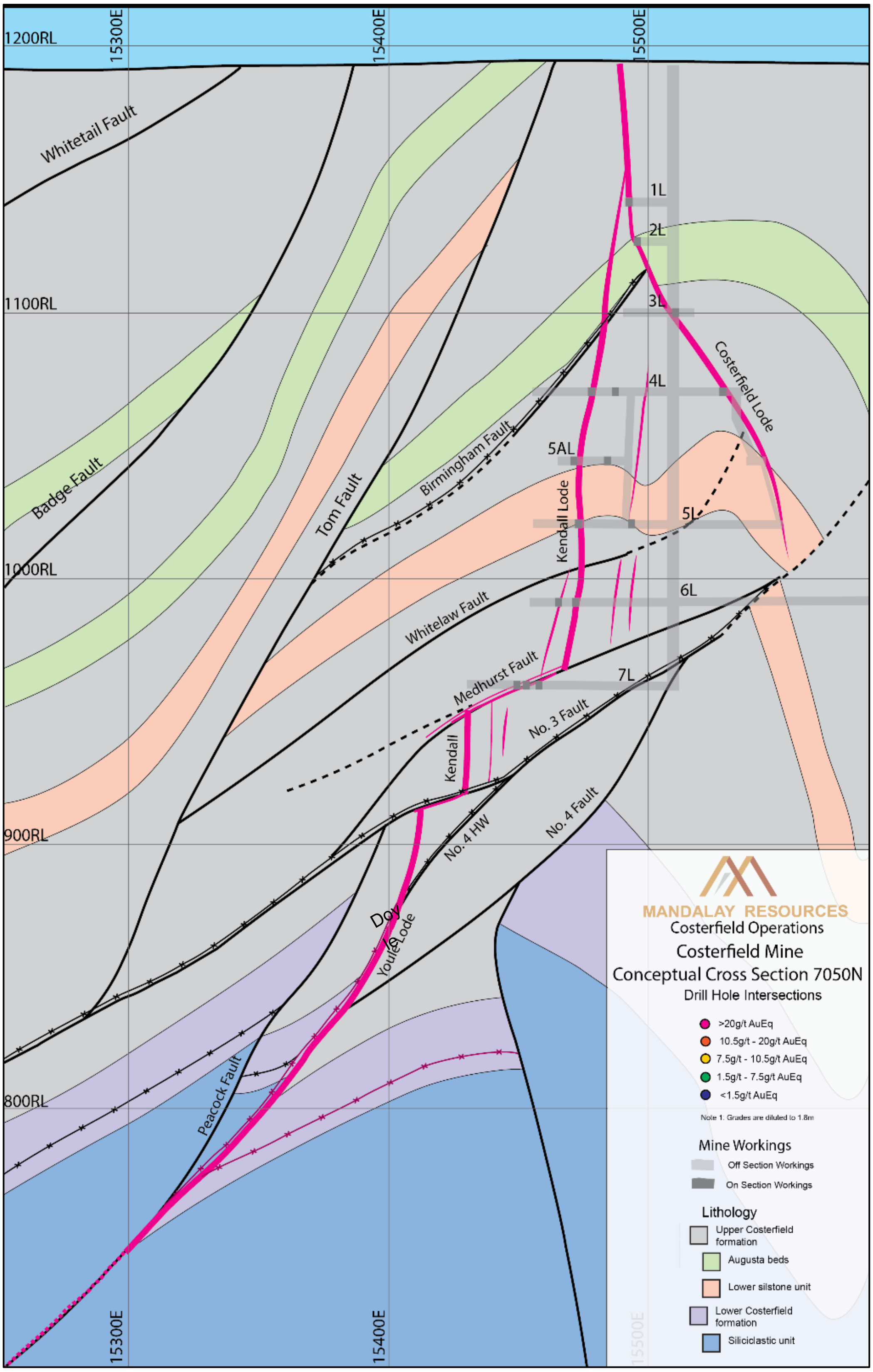

Figure 8-8: Cross section through the Costerfield system, showing the west-dipping Youle and Doyle systems

Source: Mandalay Resources 2019.

Figure 8-9: Typical Youle vein in 917 Level, 6911Nth

Source: Mandalay Resources Feb 2020.

Note: The pictured vein averaged 0.89 m wide and assayed at 183 g/t Au and 57.3% Sb for a diluted face grade of 126.2 g/t AuEq.

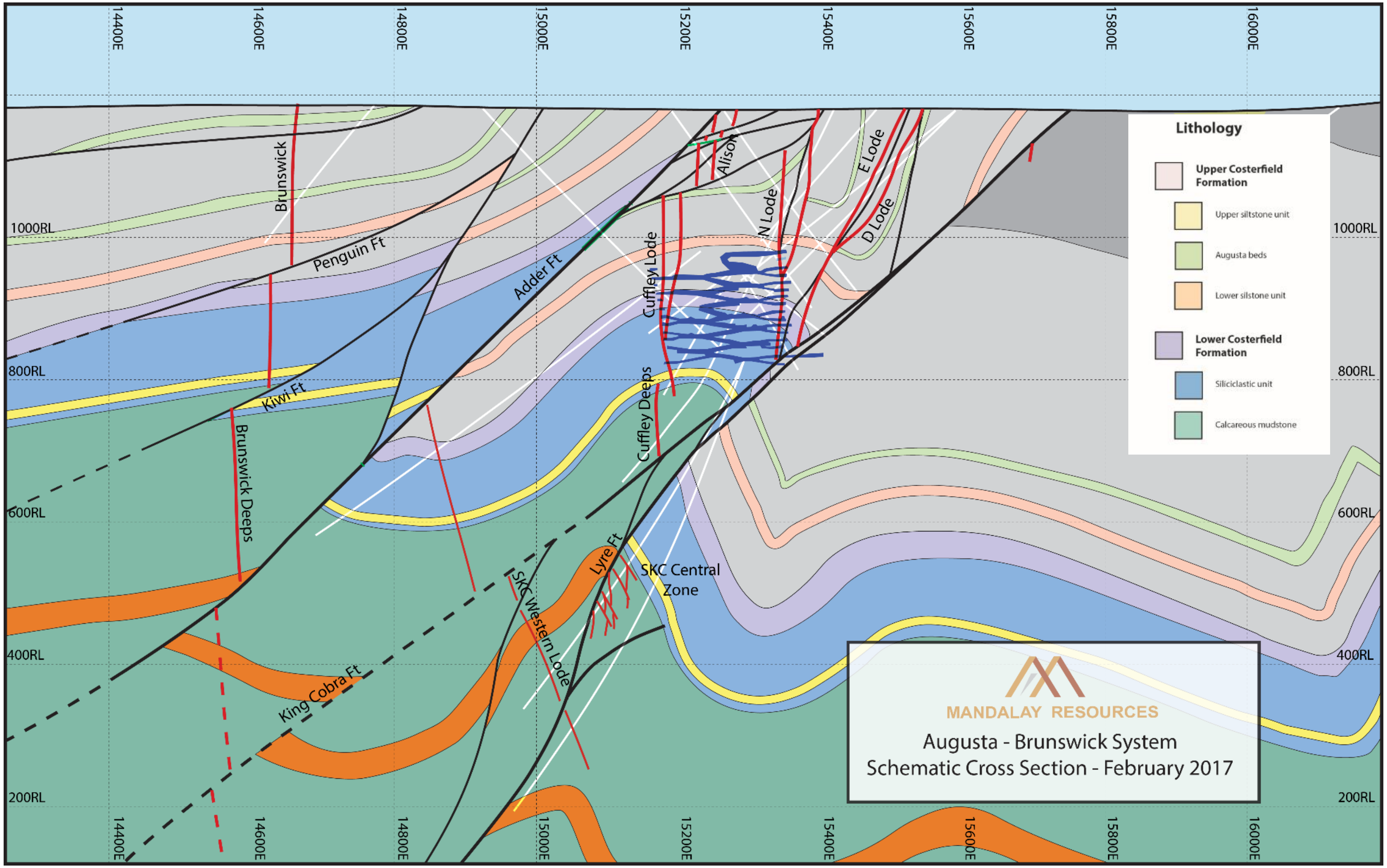

Figure 8-10: Structural relationship between the Augusta, Cuffley, and Brunswick Lode systems

9 Exploration

Exploration work that led to the discovery of the Augusta, Cuffley, Brunswick and Youle deposits has consisted of predominantly diamond drill testing of interpreted geological targets, together with geological mapping, geophysics and geochemistry and trenching. Geochemical methods have proven to be applicable in detecting gold-antimony mineralisation. Section 10 contains Mandalay diamond drilling details from 2009 to the present.

9.1 Costean/ trenching

Previous owners have undertaken trenching, but records of these exploration activities are limited.

9.2 Petrophysical analysis

In 2006, AGD submitted a suite of 22 rock and mineralized samples from all known deposits around Costerfield for testing by Systems Exploration (NSW) Pty Ltd. The aim was to determine their petrophysical properties and to identify the most effective geophysical methods that could be used in the field to detect similar mineralisation.

Of the samples submitted, thirteen were mineralized and were sourced from Augusta, Margaret, Antimony Creek, Costerfield, Bombay, Alison and Brunswick; two were weathered mineralisation sourced from Augusta; seven were waste.

The following petrophysical measurements were made:

- Mass properties
  - dry bulk density
  - apparent porosity
  - grain density
  - wet bulk density
- Inductive properties
  - magnetic susceptibility
  - diamagnetic susceptibility
  - electromagnetic conductivity
- Galvanic properties
  - galvanic resistivity
  - chargeability.

Although there are measurable differences in the physical properties of mineralized and non-mineralized material at Costerfield, they are marginal at best, and it is unlikely that the differences present would result in clear geophysical signatures. The only field techniques recommended for trialling were ground-based magnetic, gravity, and induced polarisation (IP) profiling.

9.3 Geophysics

9.3.1 Ground geophysics

Based on the results of the petrophysical testing program, a limited program of ground magnetic, gravity, and IP profiling, with optimal measurement parameters, was carried out across the Augusta deposit. None of the techniques were found to be effective at detecting the known mineralisation at Augusta.

9.3.2 Airborne geophysics

A low-level detailed airborne magnetic and radiometric survey was undertaken in 2008 by AGD over the AGD tenements, including both Augusta and Cuffley. The airborne survey was conducted on east–west lines spaced 50 m apart, with a terrain clearance of approximately 50 m. Survey details are included in a logistics report prepared by UTS (UTS, 2008).

Magnetic data was recorded at 0.1 second intervals and radiometric data was recorded at 1 second intervals. Additional processing was undertaken by Greenfields Geophysics. Interpretation of the radiometric and magnetic data resulted in regional lineament trends across the tenements, which assist in interpreting the local buried structures.

9.4 Geochemistry

9.4.1 Mobile metal ion

Based on historical geochemical surveys over the Augusta deposit, as described by Stock and Zaki in 1972, and informal recommendations by Dr G McArthur of McArthur Ore Deposit Assessments Pty Ltd (MODA), it was decided by AGD geologists to trial mobile metal ion (MMI) analytical techniques on samples collected on traverses across the Augusta lodes in 2005.

Using two geophysical traverse lines across the Augusta deposit, 5 m spaced samples were collected from the soil horizon and submitted to Genalysis Laboratory Services (Genalysis) for MMI analysis of gold, arsenic, mercury, molybdenum and antimony via inductively coupled plasma (ICP).

While the other elements showed no correlation to the underlying mineralisation, the gold and antimony results appeared to show a broad anomaly across the mineralisation, indicating that the technique could be useful for regional exploration.

9.4.2 Bedrock geochemistry

The effectiveness of bedrock geochemistry was demonstrated by Mid-East Minerals NL (MEM) in 1968 to 1970, when a grid south of the South Costerfield/Tait's Shafts was sampled. What is now known as the Augusta gold-antimony deposit was highlighted by the resultant anomalies. Although MEM drilled three shallow (22–57 m) diamond drillholes to test the anomalies and intersected stibnite stringers, they did not proceed any further. Both conventional surface soil and bedrock samples were collected to compare techniques; although the surface samples were anomalous (and cheaper), bedrock samples defined the lodes more precisely.

A geochemical aircore drilling program was carried out during March 2010 to test the zone between Augusta South and the Margaret Mine (south of the operating Augusta Mine). The three east–west traverses were across cleared grazing paddocks, south of Tobin's Lane, Costerfield. A total of 104 holes were drilled for a cumulative total of 547 m and an average hole depth of 5.2 m. The antimony halo was subdued where the high-grade lode is greater than 50 m below top-of-bedrock. This subdued bedrock geochemistry anomaly could mean either a low-grade lode exists at shallow depth or a high-grade lode exists at depth.

From December 2011, Mandalay engaged Starwest Pty Ltd to undertake the Augusta East Auger drilling program. A total of 2,615 auger holes were drilled for 7,295.6 m between December 2011 and June 2012. The survey revealed three anomalous zones, as shown in Figure 9-1.

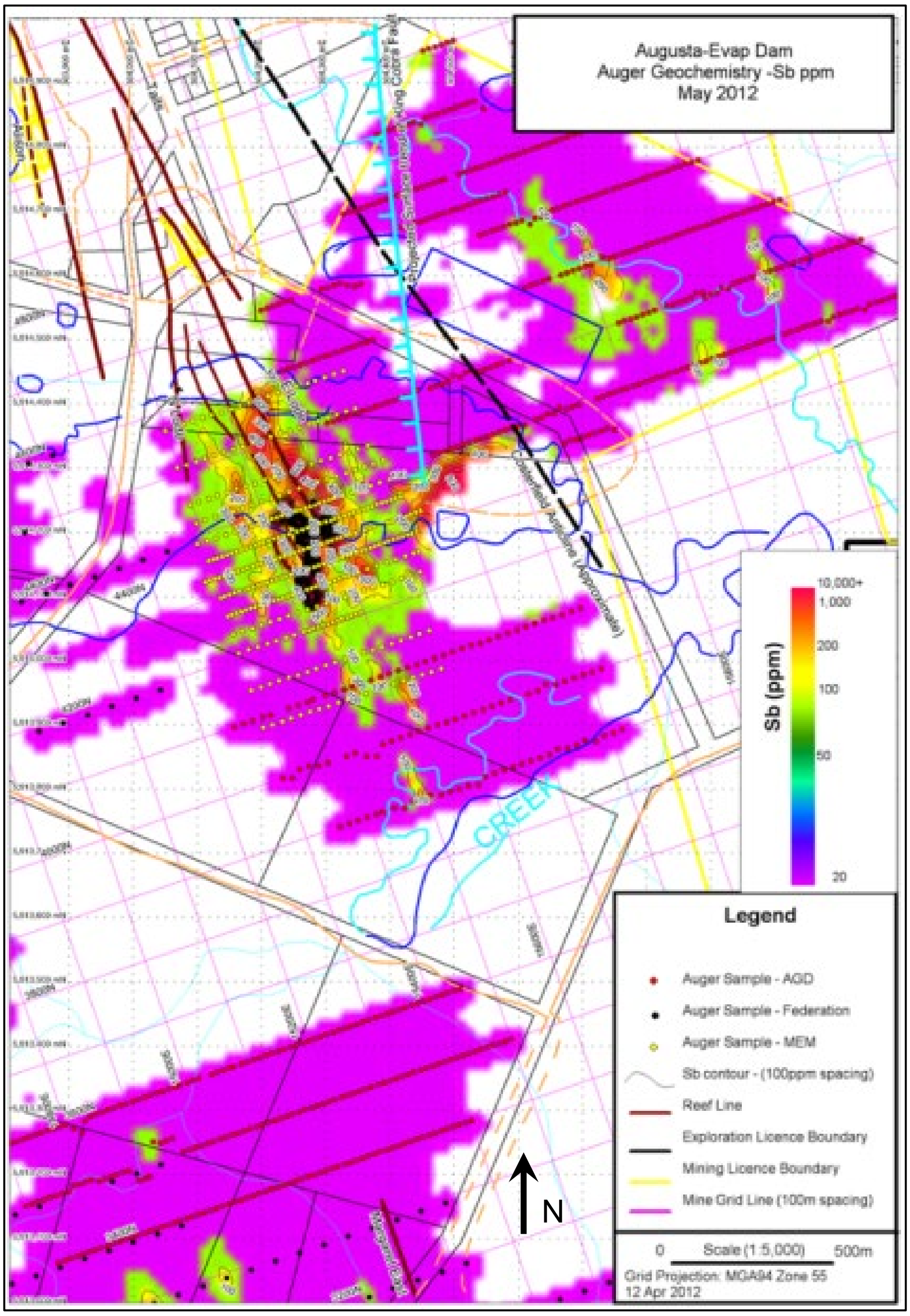

Figure 9-1: Auger geochemistry results displayed as antimony contours

Source: Mandalay, 2012.

A total of 1,375 auger holes were then drilled by Mandalay from 15 April to June 2014 for 3,906 m. Holes were drilled over exploration licences EL3310 and EL5432 and mining licence MIN4644, covering six prospect areas, Augusta, Cuffley, Brunswick, North and West Costerfield and Margaret's Reefs. A prospect location summary is as follows:

Cuffley

In all, 76 holes were drilled on two lines over the underground Cuffley deposit to test the relationship between bedrock geochemistry and known gold–antimony orebodies below the surface. The Cuffley orebody does not outcrop at surface due to termination of the vein system at a flat fault approximately 100 m below the surface. The depth to the ore zone may explain the low to moderate level of anomalism displayed from the auger drilling. The anomaly covers a broad zone that roughly correlates to the Cuffley orebody at depth.

Augusta Mine extension

To the east, west and south of the existing Augusta Mine site, 124 holes were drilled to explore for extensions of the known underground orebodies. The auger drilling to the east and west detected no elevated levels of either gold or antimony and no further work is planned in these areas.

The two lines drilled to the south displayed a narrow zone of high anomalism, which correlates directly to extensions of known orebodies. Diamond drilling between this area and the mine intersected no economic mineralisation and therefore this area represents a low priority drilling target.

Brunswick

To the west and south of the Brunswick open cut, 247 holes were drilled to test for extension of the known orebody. No elevated anomalism was detected to the west, but a narrow high-grade intersection was returned from drilling 500 m south of the Brunswick pit, suggesting extension of the orebody.

In 2017, soil sampling was conducted over two lines of bedrock geochemistry to test the effectiveness of this method. The results of this testing show anomalism broadly corresponding to the anomalism in the bedrock geochemistry data. Further testing is required but these initial results indicate this method may be used in place of bedrock geochemistry in areas that require low impact exploration.

Margaret’s Reef

Margaret’s Reef auger drilling was carried out on private property 1 km south of the current Augusta mining operations with a total of 536 holes. Previous auger drilling in this area was done on a wider sample spacing of 40 m and was not considered deep enough to provide consistent results, so lines were re-drilled in this program. Sample spacing of 10 m over the previous anomalous results gave a clearer indication of vein structures at depth.

Margaret’s Reef appears to be made up of several reef vein systems, as suggested from previous RC and DD drilling. The veins strike approximately northwest, which is a similar vein orientation to those seen underground at Augusta and Cuffley and may represent a fault-displaced extension of one of these systems. The proximity to the King Cobra Fault to the east appears to have structurally complicated the vein systems, which may explain why the anomalism appears discontinuous in nature. Wide zones of high anomalism correlate to known historical workings over the reef. The highest result received from auger drilling, not proximal to current mining operations, was received from the northernmost line at Margaret’s Reef with grades of 5.42 g/t Au and 3.25% Sb, suggesting economic mineralisation at surface.

Several high priority DD targets have been planned, including a target beneath the abovementioned high result, to give further structural information on this vein system. Recent diamond drilling failed to follow up on the high-grade intersection from hole MM001 (drilled in 2001) of 1 m at grades of 33 g/t Au and 14% Sb. Further diamond holes are now planned to consider the bedrock geochemistry to help prove an economic resource exists in this area. There is a current exploration agreement in place with the landowner to provide immediate access.

West Costerfield

A total of 336 auger holes were drilled in 2014 at West Costerfield to test near historical workings to the east and add continuity to the south of the previous auger program. The previous geochemistry program delineated the True Blue anomaly to the west but only the northern section of the West Costerfield reef was explored.

A broad anomaly was defined over the West Costerfield reef and continues south with high gold values and only moderate antimony results. The anomaly runs along the Mountain Creek drainage zone to the south but widens and slightly changes orientation towards north near the small historical pits that define the West Costerfield reef. Though the antimony anomalism is subdued in contrast with the high gold values, there are interpreted gold-antimony veins below surface similar in style to those intersected in a single diamond drillhole over True Blue.

In 2015, 38 follow-up RC drillholes were drilled to test the anomaly identified in the 2014 auger drilling program. The RC drilling has resulted in the identification of mineralisation that warrants follow-up diamond drilling.

9.4.3 Soil geochemistry

In October 2017, a soil geochemistry program was conducted at Brunswick South to verify historical sample lines along the southern strike of the Brunswick lode. A mechanical hand-held auger was used to take 28 samples over two traverse lines at an average depth of 720 mm. This program proved to successfully verify the historical assay data results, showing a correlation of mineralisation with the new assay data with indications of possible strike extension to the Brunswick lode.

9.5 Aerial photogrammetry survey

AGD commissioned Quarry Survey Solutions of Healesville, and United Photo and Graphic Services Pty Ltd of Melbourne, to organize and carry out aerial photogrammetry of the Costerfield Project tenements, as well as the Augusta Mine Site in 2005.

High-level (24,000 ft) photo coverage was carried out in November 2005. This was followed by low-level (8,000 ft) coverage over the Augusta Mine Site in January 2006.

A second low-level (4,000 ft) flight was carried out in April 2006, at the time of maximum surface excavation, prior to the commencement of backfilling of the E Lode pit.

The various photo sets were subsequently used to generate a digital terrain model (DTM) and a referenced orthophotographic scan of the Costerfield central mine area. This area essentially extended from Costerfield south to the Margaret area, thereby encompassing most of Mining Licence MIN4644.

In 2019, Mandalay engaged AAM Group to carry out a detailed LiDAR (3D laser mapping) aerial survey over a 175 km^2 area, covering all its exploration tenements. This survey creates a highly accurate and detailed photographic model of the earth surface with a height accuracy down to +/-10 cm (Figure 9-2). The survey had a twofold benefit, both for Mandalay's Future Ore project and Youle inrush risk assessment. The survey revealed accurate topographical features that assisted Mandalay to undertake flood simulations studies to plan for future 100-year flooding risks at the Costerfield operation for mining infrastructure and provide a preparedness in the event of a flood. The images also accurately displayed geology-dependent landforms and historical mining features, assisting exploration geologists to build on data capture for regional geological exploration.

The LiDAR scanner is attached to an aeroplane that flies 1,000 m above surface and records the time differential between the emission of laser pulses and the reception of the reflected signal from the environment.

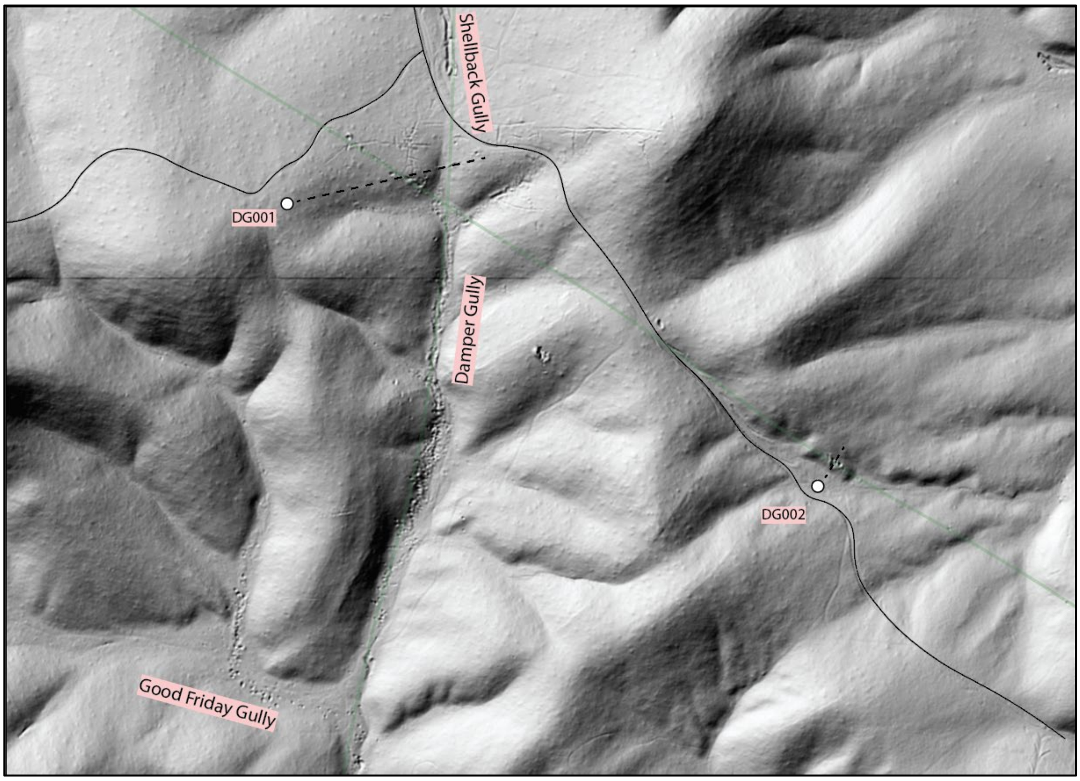

Figure 9-2: An example of the LiDAR imagery over the north of EL3310 over the 'Damper Gully' prospect

Source: Mandalay, 2019.

9.6 Surface mapping and 3D geological model

Mandalay's Future Ore program continued throughout 2019. Surface geological mapping was ongoing, which has led to the assembly of a comprehensive regional 3D model, using Leapfrog software (Figure 9-3 and Figure 9-4), of Mandalay's tenements. Traverse mapping commenced in November 2018 and was ongoing throughout 2019, together with the compilation of the 3D model. This work has greatly assisted Mandalay geologists to prioritize prospects, with the goal to delineate future ore sources and generate brownfields exploration targets.

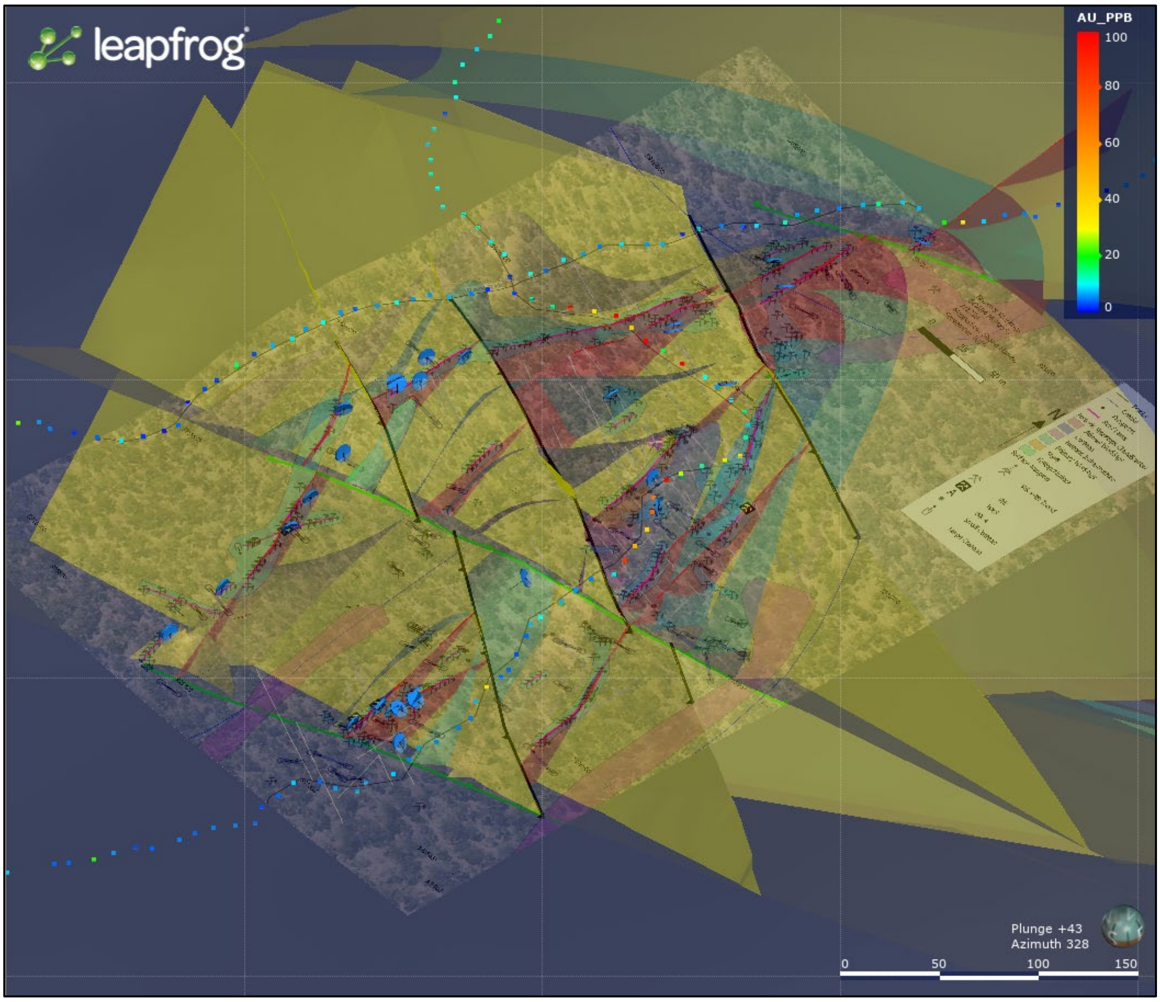

Figure 9-3: Computer screenshot, showing a compilation of the regional geology in Leapfrog software

Source: Mandalay, 2019.

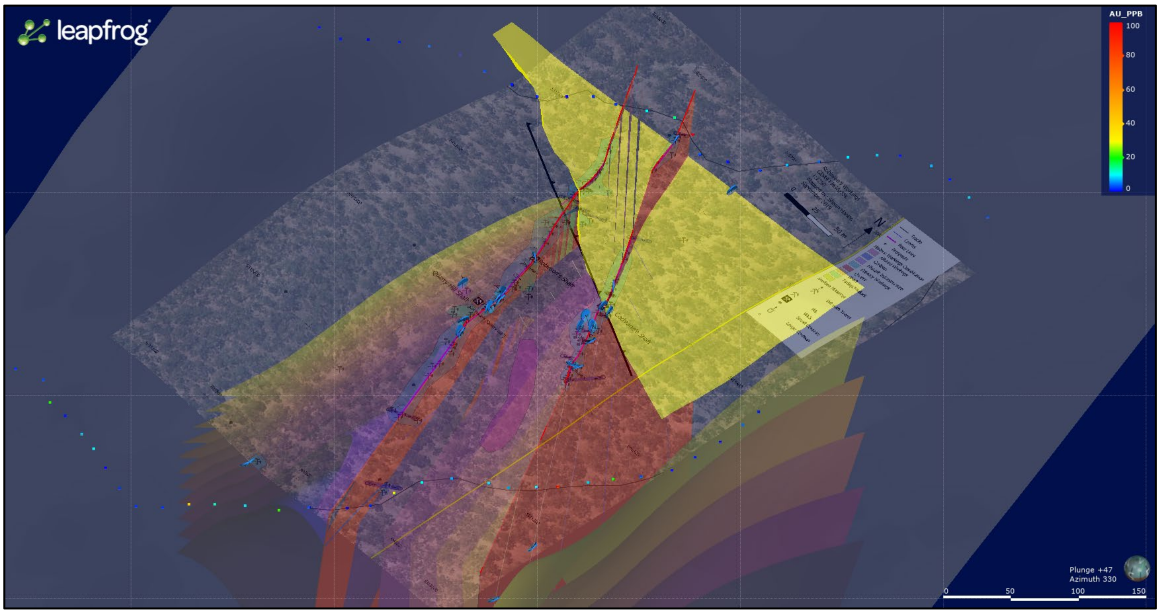

Figure 9-4: Computer screenshot, showing a compilation of the geology of the Robinsons prospect in Leapfrog software

Source: Mandalay, 2019.

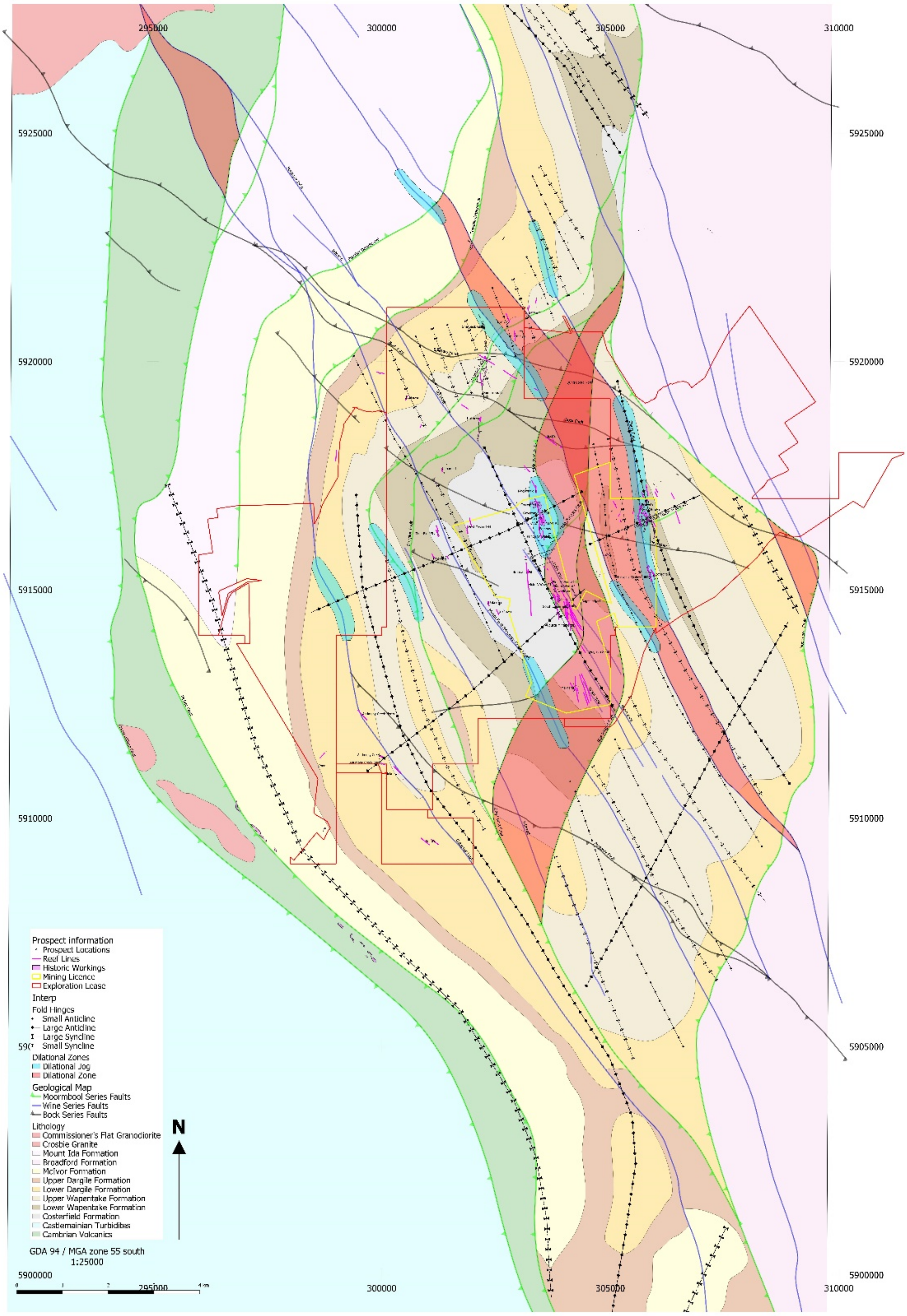

Figure 9-5: Geological map of the Costerfield tenements showing dilational zones and fold hinges

Source: Mandalay, 2019.

Note: This compilation is the final product of 2019's 'Future Ore Project'; incorporating field mapping, historical drilling and surface sampling.

10 Drilling

10.1 Mandalay Resources (2009–Present)

On 1 December 2009, Mandalay took over the Costerfield Operations from AGD and continued with exploration across tenements MIN4644, EL3310 and EL4848. As of December 2019, Mandalay holds tenements MIN4644, MIN5567, EL3310, EL5519 and EL5432. The drilling is summarized in Table 10-1.

Table 10-1: Drillhole summary

Year	Meters (Diamond)	Meters (Percussion/Auger)
2009	458.9	547.0
2010	4,032.0	0
2011	13,515.0	0
2012	18,581.4	7,295.6
2013	24,329.0	3,838.0
2014	20,817.0	3,906.0
2015	18,439.0	2,732
2016	32,995.0	0
2017	27,827.0	0
2018	34,656.0	0
2019	9,556.0	0
Total	**205,206.3**	**18,318.0**

10.2 2009/2010

Drilling from 1 July 2009 to 30 June 2010 mainly comprised drilling along strike and down-dip from the existing Augusta resource. In total, 458.9 m of diamond coring was undertaken.

In addition, 547 m of bedrock geochemistry aircore drilling was completed within MIN4644 at Augusta South.

Augusta drilling from 1 July 2009 to 30 June 2010 concentrated on the definition of the W Lode resource. Four drillholes tested the depth extent of W Lode. Another six holes were designed as infill holes to test mineralized shoots and gather geotechnical data. A list of significant intersections for this period was announced to the market in January 2011 (Mandalay, January 2011).

10.3 2010/2011

Exploration from 1 July 2010 to 30 June 2011 was undertaken on two projects – the Augusta Deeps project and the Brownfields Exploration project. The Augusta Deeps project was undertaken with the view to extending the current Augusta resource to depth.

Augusta drilling from 1 July 2010 to 30 June 2011 concentrated on the infill and extension beneath Augusta to further define the resource below the 1,000 mRL. In total, 10,622.7 m were drilled beneath the Augusta Mine workings and resulted in the definition of further Indicated and Inferred Mineral Resources. A list of significant intersections for this period was announced to the market in August 2011 (Mandalay, August 2011).

10.4 2011/2012

Exploration from 1 July 2011 to 30 June 2012 was undertaken on four projects– the Augusta Deeps drilling project (W Lode and N Main Lode), the Alison/ Cuffley drilling project, the Brownfields/ target testing drilling project and the target generation/ bedrock geochemistry auger drilling project.

The Augusta Deeps project was undertaken with the view to extend the current Augusta resource to depth and along strike. N Main Lode was drilled both from underground and surface-based rigs. The Alison/ Cuffley drilling project was designed to infill drill a portion of the lode to Indicated Mineral Resource category and to endeavour to 'bound' the limits of the lode to Inferred Mineral Resource category.

In total 18,581.4 m of diamond coring, and 7,295.6 m of auger drilling was undertaken as part of the four projects. All drilling was carried out by Starwest Pty Ltd using one LM75 diamond drill rig, two LM90 diamond rigs, one Kempe underground diamond drill rig and a modified Gemco 210B track-mounted auger rig.

Drilling of the Augusta deposit from July 2011 to December 2012 was undertaken with the view to extend the W, E and N Main Lodes Inferred and Indicated Mineral Resource and give confidence in the structural continuity of W and N Main Lode. A total of 78 holes were drilled from surface and underground, totalling 16,170.4 m of drilling. A list of significant intersections for this period was announced to the market in July 2012 (Mandalay, August 2011).

The Cuffley Lode resource drilling program began in July 2011 (AD series of holes), following the MB007 discovery. As a follow-up program, four holes were drilled (AD001–ADD004). AD004 went through the fault blank and AD003 appears to have only intersected the Alison Lode above the Adder Fault in the vicinity of some old stopes.

From hole AD005 onwards, the drilling strategy involved drilling at least two holes on each mine grid cross section on an approximate spacing of 80–100 m. Holes have been drilled both from west to east and east to west, depending on site logistics.

A portion of the drilling in 2011/2012 was infill drilling (100 m below the Alison Shaft 5 Level) at a spacing of 40 m, to define the lode to Indicated Mineral Resource category where the planned access decline would first intersect the lode. One deep hole, AD022 (5025N cross section) intersected the Cuffley Lode (1.04 m/59.7 g/t Au, 0.37% Sb) at 700 mRL, 490 m below the surface. This provided confidence in the depth continuity of the lode to Inferred Mineral Resource category initially, to 'bound' the extent of the lode.

10.5 2012/2013 Cuffley Lode drilling

From 1 July 2012 to 30 June 2013, Mandalay drilled 24,329.0 meters of diamond drilling, targeting the Cuffley Lode from surface. These focused on infill drilling the central, high-grade part of the Cuffley Lode to convert some of the Inferred Mineral Resources to the Indicated category. Longitudinal projections of these intersections relative to the Mineral Resource are provided in Section 14. The Cuffley Lode dips approximately 85° towards 097°. All downhole sample lengths have been converted to true thicknesses using the dip of the lode and the orientation of the drillhole. MH335 and MH336 were drilled as wedges and therefore, they have significantly lower collar elevations and shallower dips than the other drillholes. Due to the narrow high-grade nature of the mineralisation, it is not meaningful to report significantly higher-grade intercepts within lower grade intercepts, and therefore they are not reported here.

10.6 2014 Cuffley/ N Lode drilling

In 2014, the focus was on finalising the Cuffley and Augusta resource drilling. The goals achieved included:

- Expanding the existing Inferred Mineral Resource of the Cuffley Lode, both along strike and at depth
- Increasing the confidence of the central part of the Cuffley Lode to aid mine development and stoping the Cuffley Lode
- Expanding the existing Inferred Mineral Resource of the Augusta deposit, specifically targeting N Lode along strike from the existing N Lode development
- Infill and extension of the Cuffley resource to the north and south together with the 'Cuffley Shallows' in between the Flat Fault and the Adder Fault.

In total, 20,817 m of diamond drilling and 3,906 m of auger drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield during 2013/2014. A total of 5,735 m was drilled for the purposes of target testing, 9,390 meters for resource expansion and conversions and 5,692 m for resource infill drilling. All drilling activity was conducted by Starwest Pty Ltd using two Boart Longyear LM90s, one Boart Longyear LM75, one pneumatic Kempe U2 and a modified Gemco 210B track-mounted auger.

Note * Mineralized intercepts stated in this table may not be the same as the intercepts composited and used within the Resource estimation.

10.7 2015 Cuffley/ N Lode/ Cuffley Deeps/ Sub King Cobra drilling

Exploration in 2015 was focused on extending the Cuffley and Augusta resources both along strike and at depth. The expansion of the Cuffley resource included the commencement of drilling in the Cuffley Deeps and Sub King Cobra regions. The goals achieved included:

- Expanding the existing Inferred Mineral Resource of the Cuffley Lode, both along strike and by defining a resource below the Cuffley Lode at depth
- Commencing drilling at depth below the Cuffley deposit into the Cuffley Deeps and Sub King Cobra areas
- Increasing the confidence of the central part of the Cuffley Lode to aid mine development and stoping the Cuffley Lode
- Expanding the existing Inferred Mineral Resource of the Augusta deposit, specifically targeting N Lode along strike from the existing N Lode development
- Infill and extension of the Cuffley Mineral Resource to the north and south together with the Cuffley Shallows in between the Flat Fault and the Adder Fault.
- Follow-up RC drilling at West Costerfield to test the geochemical anomaly identified in 2014 by the auger bedrock drilling program.

In total, 18,439 m of diamond drilling and 2,732 m of RC drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield during 2014/2015. All drilling activity was conducted by Starwest Pty Ltd using two Boart Longyear LM90s, one Boart Longyear LM75 and one pneumatic Kempe U2, except for the RC drilling, which was carried out by Blacklaws Drilling using a Hanjin surface rig.

10.8 2016 Cuffley Deeps/ Cuffley South/ M and New lode/ Sub King Cobra Drilling/ Margaret/ Brunswick

Exploration from January to December 2016 was focused on extending and upgrading the Cuffley and Augusta resources to build 'life of mine' capacity and replace mine depletion together with exploring near-mine targets in proximity to current underground infrastructure. The expansion of the Cuffley resource included the continuation of drilling in the Cuffley Deeps, Cuffley South and Sub King Cobra regions, together with the addition of new target areas. The goals achieved included:

- Expanding the existing Inferred Mineral Resource of the Cuffley Lode, and further definition of the Cuffley Deeps and Sub King Cobra resources below the Cuffley Lode at depth
- Continuation of infill and exploration drilling in the Cuffley Deeps and Sub King Cobra areas, leading to a resource expansion of Cuffley Deeps and an Inferred Mineral Resource on the Sub King Cobra domain
- Infill drilling of Cuffley Deeps delineated further prospective zones and a new ore system; namely mid lode (M Lode) located between the Cuffley line of lode and N Lode
- Further development of Cuffley Lode, which informed our understanding and increased confidence in Cuffley Deeps at depth and along strike
- Infill and extension of the Cuffley resource to the north and south together with Cuffley Shallows in between the Flat Fault and the Adder Fault
- Recommencement of drilling on Brunswick and further testing of the deposit to the south and at depth
- Brownfields drilling on the Margaret Reef, which identified the Margaret East mineralisation.

In total 32,995 m of diamond drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield during 2016. All drilling activity was conducted by Starwest Pty Ltd using four Boart Longyear LM90s, one Boart Longyear LM75 and one pneumatic Kempe U2.

10.9 2017 Brunswick, K Lode and N Lode

Exploration from January to December 2017 was focused on extending and upgrading the Brunswick resource with the aim to convert it to Reserve. Focus in the second half of 2017 was also on extending resource around Cuffley and Augusta to build 'life of mine' and replace mine depletion, together with exploring near-mine targets close to current underground infrastructure.

The goals achieved included:

- Expanding and increasing the existing Indicated Mineral Resource of the Brunswick Lode, and further definition and testing of Brunswick at depth and Brunswick South
- Expanding the knowledge and Resource in the near-mine environment, in particular extension and infill of K Lode and N Lode splays including N Lode East in the Augusta system
- Definition and grade increase of C Lode.

In total 26,403 m of diamond drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield during 2017. All drilling activity was conducted by Starwest Pty Ltd using four Boart Longyear LM90s, one Boart Longyear LM75 and one pneumatic Kempe U2.

10.10 2018 Costerfield (Youle) and Brunswick

Exploration from January to December 2018 was predominantly focused on extending, bounding and upgrading the Youle resource. A total of 20,847 m was devoted to resource expansion and conversion drilling, with the remaining 13,809 m put into target generation. Focus in the second half of 2018 was also on extending the resource around Brunswick and Augusta to build 'life of mine' and replace mine depletion, together with exploring near-mine targets in proximity to current underground infrastructure. The goals achieved included:

- Defining the Youle Lode west-dipping, high-grade orebody, and continuation of Kendall-style mineralisation
- Building an Indicated Mineral Resource and a Mineral Reserve around Youle with integration into the LoM plan
- Further definition and testing of Brunswick at depth
- Expanding the knowledge and resource in the near-mine environment, in particular, extension and infill of Cuffley North Lode (1,272 m), D lode (240 m) and Cuffley line drilling (335 m)
- Brownfields drilling was also undertaken at Augusta East (1,479 m), looking for southern extension of the Augusta deposit and Mountain Creek (1,253 m) testing to the south of the Brunswick deposit.

In total 34,656.0 m of diamond drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield during 2018 (Table 10-2). All drilling activity was conducted by Starwest Pty Ltd using five Boart Longyear LM90s, one Boart Longyear LM75 and one pneumatic Kempe U2.

10.11 2019 Brunswick and Youle

Exploration from January to December 2019 was predominantly focused on extending, bounding and upgrading the Youle resource. This drilling involved both infill and extensional drilling to delineate the high-grade Youle zone to the north and on extending mineralisation near current and planned development. A total of 3,863 m was devoted to resource expansion and conversion drilling, with the remaining 5,693 m put into target generation. The focus of target generation was near the Youle resource, in particular the northern extension and the McDonalds prospect to the north. In May 2019, Mandalay kicked off the Costerfield deep drilling program targeting below the Youle orebody. One parent hole and wedge were drilled as part of this program, totalling 2,510 m.

With the commencement of mining on the Youle Lode, underground resource definition drilling continued at Youle, together with optimisation of production in areas to be mined in the next 6 to 12 months. Mine geology advancement was undertaken through production optimisation drilling (POD), to provide confidence in grade, location of veining, geotechnical performance and viability ahead of mining.

As Mandalay continued with the Youle expansion program, it also commenced a deep target testing of the Costerfield line of lode, following its developing understanding of gold enrichment environments. The first two holes (totalling 2,509 m) of a four-hole program were completed. This drilling program provided additional context for previous deep high-grade gold intercepts at Augusta. The program is set to continue in 2020, targeting areas underneath the Augusta/ Cuffley system.

In 2019, the Brunswick deposit was being actively mined and definition drilling was undertaken in the past 12 months.

In 2019, the goals achieved included:

- Commencement of mining the Youle Lode in September 2019
- Initiation of the northern Youle extension program, aimed at extending the Youle resource to the north and at depth
- Expanding and increasing the existing Indicated Mineral Resource of the Youle Lode

- Regional target generation was completed by conducting extensive surface mapping, drillhole database integration, soil geochemistry and evaluation of geophysical data; this work had aided in the generation of a three-dimensional (Leapfrog-based) integrated structural and geological model of the Costerfield region
- Expanding the orebody knowledge and resource tonnage in the near-mine environment, particularly the extension and infill in the Brunswick ore system.

In total 9,556.0 m of diamond drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield during 2019 (Table 10-2). All drilling activity was conducted by Starwest Pty Ltd using five Boart Longyear LM90s, one Boart Longyear LM75, one pneumatic Kempe U2 and one LM30 rig.

Table 10-2: Significant intercepts Youle (BC holes) 2019

Hole ID	Total hole depth (m)	Intercept Easting (Mine Grid)	Intercept Northing (Mine Grid)	Intercept elevation (Mine Grid)	True width (m)	Au grade (g/t)	Sb grade (%)	AuEq (g/t) over 1.8 m
BC011	330.9	15450	7054	1002	0.10	6.8	13.7	1.7
BC012	450.1	15394	7094	828	0.58	60.6	53.1	49.6
BC014	402	15353	6523	1022	0.16	0.50	7.82	1.3
BC016	386.9	15399	6745	952	0.18	16.20	55.80	11.4
BC018	420.3	15341	6694	846	0.13	1.11	0.01	0.1
BC019	431.7	15340	6925	834	0.37	120.90	11.10	28.6
BC020	395.7	15410	7126	858	0.08	9.05	5.43	0.8
BC021	389.4	15384	7189	846	0.64	0.56	0.84	0.7
BC022	389.4	15400	7191	810	0.10	0.72	7.40	0.8
BC023	500.6	15373	7185	789	0.64	2.45	1.54	1.8
BC024	500.6	15378	7185	756	0.15	0.26	0.96	0.2
BC020	399.9	15395	6887	915	0.27	165.1	20.7	30.2
BC022	600.0	15339	7035	788	0.09	37.0	10.0	2.73
BC023	500.9	15329	7109	757	0.16	551.0	25.6	54.25
BC023W1	458.5	15352	7114	792	0.38	148.7	8.8	34.19
BC025W1	497.9	15324	6947	815	0.49	50.3	4.9	16.08
BC027	431.0	15337	6853	837	0.12	12.1	4.1	1.31
BC029W1	422.5	15349	6881	863	0.40	33.8	24.0	16.80
BC030	404.4	15370	6885	889	0.13	13.5	9.4	2.19
BC031	441.1	15365	6781	917	0.41	108.1	22.4	33.52
BC032W1	381.0	15368	6962	863	0.33	73.1	16.0	18.64
BC033	440.5	15373	6935	882	0.29	22.3	19.5	9.19
BC028	362.1	15404	6849	946	2.30	1.1	1.5	4.8
BC032	451.3	15364	7019	826	0.66	338.8	14.4	133.1
BC032W2	428.7	15385	7025	850	0.32	73.1	16.0	18.1
BC036	351.0	15398	6787	949	0.41	55.7	40.1	28.9
BC036W1	326.4	15399	6785	952	1.65	93.9	31.1	136.4
BC037	441.0	15302	6874	820	0.24	31.3	17.0	8.2

Hole ID	Total hole depth (m)	Intercept Easting (Mine Grid)	Intercept Northing (Mine Grid)	Intercept elevation (Mine Grid)	True width (m)	Au grade (g/t)	Sb grade (%)	AuEq (g/t) over 1.8 m
BC038	447.0	15395	7078	865	0.09	65.4	20.1	4.9
BC039	483.3	15341	7080	780	0.09	31.5	16.2	2.8
BC040	381.9	15362	6694	950	0.29	54.5	1.6	9.1
BC045A	423.9	15353	6910	860	0.86	1.4	2.6	2.8
BC046	459.0	15360	7076	805	0.24	15.2	7.1	3.7
BC047	440.9	15399	7016	880	1.40	152.0	18.1	142.7
BC048	460.6	15325	6990	793	0.88	16.7	2.4	10.2
BC049	443.9	15378	7054	831	0.15	50.7	21.9	7.7
BC050	428.5	15366	6991	837	1.26	2.7	1.8	4.1
BC050W1	419.5	15370	7002	837	1.27	11.4	3.3	12.1
BC051	436.2	15379	6988	862	0.14	39.9	26.9	6.6
BC052	520.2	15307	7119	728	0.58	65.7	8.0	25.7
BC055	489.2	15299	7062	739	0.26	199.7	5.2	30.5
BC056	490.2	15292	7003	752	0.09	51.7	22.1	4.7
BC057	447.0	15404	6932	902	0.35	13.0	8.1	5.3
BC058A	448.1	15325	6881	842	0.60	129.6	10.4	48.9
BC059	437.2	15359	7043	805	0.45	33.6	6.5	11.4
BC061	474.2	15387	7145	826	0.31	61.9	41.5	23.2
BC020	399.9	15395	6887	915	0.27	165.1	20.7	30.2
BC022	600.0	15339	7035	788	0.09	37.0	10.0	2.7
BC023	500.9	15329	7109	757	0.16	551.0	25.6	54.3
BC023W1	458.5	15352	7114	792	0.38	148.7	8.8	34.2
BC025W1	497.9	15324	6947	815	0.49	50.3	4.9	16.1
BC027	431.0	15337	6853	837	0.12	12.1	4.1	1.3
BC029W1	422.5	15349	6881	863	0.40	33.8	24.0	16.8
BC030	404.4	15370	6885	889	0.13	13.5	9.4	2.2
BC031	441.1	15365	6781	917	0.41	108.1	22.4	33.5
BC032W1	381.0	15368	6962	863	0.33	73.1	16.0	18.6
BC033	440.5	15373	6935	882	0.29	22.3	19.5	9.2
BC067W1	531.2	15441	7251	817	0.09	1.07	8.7	19.8
BC071	492.1	15392	7156	849	0.26	18.4	5.7	3.9
BC075	357.5	15608	7356	1048	0.45	1.3	7.3	3.1
BC075	357.5	155.21	7439	1122	0.42	7.2	4.4	3.2

10.12 Drilling methods

Due to the extensive historical drilling conducted throughout the history of the Costerfield area, and because mining has already depleted much of the Augusta resource above 1000 mRL, the following sections mainly relate to drilling completed after 1 January 2010 and below 1000 mRL.

The Augusta deposit has been subject to ongoing development and diamond drilling since commencement of mining operations in 2006. The current Mineral Resource estimates are completed using all historical drilling data and then depleted for areas already mined.

Between 2006 and 2011, several drilling companies were contracted to provide both surface and underground drilling services at Costerfield. To ensure consistent results and quality of drilling, Starwest Drilling Pty Ltd was made the preferred drilling services supplier in 2011 and has been operating on site since.

Since 2011, underground diamond drilling has been completed predominantly using an LM90, drilling HQ2- or NQ2-sized drillholes. Production optimisation drilling was completed by either a Kempe or Diamec rig using LTK48-sized core, with information from these drillholes used for structural and detailed grade information. In 2019, an LM30 rig drilling BQTK was used underground for additional optimisation drilling. Surface drilling has been conducted with HQ2 and NQ2, with HQ3 used for core presentation in poor ground zones or for noise reduction reasons.

Prior to 2011, various sized drillholes and methods were used during drilling. These included HQ2, HQ3, NQ2, LTK60, LTK48 and 5”1/8’ to 5”5/8’ RC. Details of these holes were not always recorded. However, because most of this drilling is in areas that are already depleted by mining, the risk associated with this drilling data is perceived to be low.

10.13 Collar surveys

Since 2006, drillhole collars have been surveyed according to the current Costerfield Mine Grid, either by Mandalay surveyors or by GWB Survey Pty Ltd. Between 2006 and 2011, Adrian Cummins & Associates provided surveying of both underground and surface collar locations.

Presently, initial collar locations are sited using a hand-held GPS, with drilling azimuths provided by compass. Holes are then surveyed by Mandalay surveyors on completion. In some instances, drill hole collar data are manipulated to account for known and quantified survey error within the mine. The distance from the drillhole collar to a known underground survey station is measured and then the collar is calculated and used until the collar is surveyed by Mandalay surveyors.

Between the late 1990s and 2001, most drillholes appear to have been located using a GPS. Drillhole collar locations prior to the 1990s were usually sited via tape and compass. Where possible, historical drillholes were surveyed in 2005 by Adrian Cummins & Associates, but this was not always possible.

Collars surveyed after 2001 are recorded in the *acQuire* drillhole database as being surveyed. Unsurveyed/unknown drillholes are recorded as either GPS or unknown and are given an accuracy of within 1 m.

10.14 Downhole surveys

Since 2011, all holes have been downhole-surveyed using an electronic, single-shot survey tool. An initial check survey is completed at 15 m to ensure that the collar set-up is accurate. Thereafter, surveys are conducted at 30 m intervals, unless ground conditions are unsuitable to conduct a survey. In those cases, the survey is completed when suitable ground conditions are subsequently encountered.

Between 2001 and 2018, all drillholes were surveyed via either electronic single-shot or film single-shot survey tools. Prior to 2001, survey information exists for most holes, but the methods and records of these surveys are not readily available.

10.15 Data management

In November 2016, Mandalay exploration purchased the geoscientific information management software *acQuire*. The acquisition of this software package took place as drilling data collection was rapidly expanding and the new software would improve overall efficiency in data collection and handling costs. It would also improve on overall integrity of data and minimize human error in storing of data. Prior to the purchase of *acQuire*, Excel and Access databases were used.

10.16 Logging procedures

The following information only relates to drilling completed after 1 January 2010 and below 1000 mRL in the Augusta and Cuffley deposits.

Augusta core is geologically logged at the core preparation facility at the Brunswick Processing Plant site. Core is initially brought to the facility by either the drill crews at the end of shift or by field technicians who work in the core preparation facility. Core is generally stored on pallets while waiting for processing.

Field technicians initially orientate all core to the alignment provided by the drill crews using an electronic core orientation device. This orientation is transferred along the length of the run, with each drill run having been orientated. If a discrepancy is found between two adjacent runs, the next run is orientated, and the two best-matching orientations are used. If no orientation is recorded by the drill crews, the core is simply rotated to a consistent alignment of bedding or cleavage, with no orientation mark made on the core.

Depth marks are made on the core at one-metre intervals using a tape measure, taking core loss and overdrill into account. If core loss is encountered, a block is placed in the zone of core loss. If problems are encountered with driller core blocks, the drill shift supervisor is advised and depth marking stops until the problem is rectified.

Field technicians then collect rock quality designation (RQD) data directly onto a digital tablet device using *acQuire software*. RQD data is collected corresponding to drill runs and includes the 'from' depth, 'to' depth, run length in meters, the recovered length in meters, the recovery as a percentage, the length of recovered core greater than or equal to 10 cm, and the number of fractures. From this data, an RQD value is calculated. This data is logged 'live' into acQuire via the '*Toughbook'* computer to the company server.

Once depth marks are placed on the core, site geologists then log lithology, sample intervals, structural data, and geotechnical data (if applicable) directly to acQuire.

All measurements of structural features, such as bedding, cleavage, faults and shears are made using an orientated core wrap-around protractor and protractor for alpha and beta measurements using the orientation line on the core. If no orientation line is available, only alpha measurements are made. Measurements are recorded directly into acQuire and are also scribed onto the core using wax pencil. As the logging is 'live', data is automatically backed up and stored on the company server.

After geological logging has been completed, all trays are photographed before sampling. Once sampling is completed, the trays are put on pallets and moved to a permanent core storage area.

10.17 Drilling pattern and quality

10.17.1 Augusta

Drilling completed prior to 1 January 2010 informed areas of the resource that have largely been mined, so the following discussion relates to drilling completed after 1 January 2010 and below 1000 mRL.

Drilling is generally conducted with planned intercepts based on northing at an interval of approximately 40 m and 30 m up- and down-dip. Because most drilling at Augusta is now conducted from underground and Cuffley Lode is the primary target of most of this drilling, the pattern and density achieved on N Main Lode can vary greatly. Where increased geological confidence is required, infill holes specifically targeting NE or E Lodes have been drilled at a nominal 40 meters. Surface drilling, targeting depth extensions of the Augusta deposit, is generally conducted on 100 m sections along strike, with intersections spaced 80 to 100 m up- and down-dip.

10.17.2 Cuffley

Initial drilling of the Cuffley Lode was intended to be done in a W pattern on an approximate 50 m by 50 m offset grid. This pattern was started with AD001 through to and including AD004. To aid interpretation, this pattern was changed to a 100 m grid based on mine grid northings, with 50 m to 80 m between holes on a given section. This pattern allowed better interpretation to be completed on sections.

For infill drilling between the 820 mRL and 1020 mRL of the Cuffley Lode, the W pattern was used to maximize strike direction information. This is as opposed to depth information, which is gained by drilling on section. This infill drilling was conducted on a nominal 30 m (RL) by 40 m (N) grid.

10.17.3 Brunswick

Drilling post-2010 was conducted by bounding and infilling the existing Inferred Mineral Resource, based on fault interpretation. Extension within the Penguin–Kiwi fault panel used an initial W pattern, which was then infilled using wedges.

The Kiwi–Rooster fault panel was also drilled using a W pattern with an approximate 40 m spacing.

10.17.4 Youle

Drilling was completed on an initial testing density of approximately 100 m to define the bounds of mineralisation as an Inferred Mineral Resource before an infill drill program. Final drill spacing accomplished was 40–50 m, using a combination of parent and daughter holes. Holes were twinned by wedge drilling to obtain metallurgical samples and duplicates in high-grade gold zones.

A combination of west to east, and east to west drillholes were used to test both west-dipping Youle-style mineralisation and Augusta/ Brunswick-style vertical mineralisation respectively. The dominant drill direction in the infill program on Youle was west to east. Youle underground drilling was ongoing throughout the year, mainly for increased geological confidence ahead of development, but also for near-mine exploration along strike and down-dip of the Youle Lode.

10.18 Interpretation of drilling results

Drilling results are initially interpreted on paper cross sections. Interpretations are then scanned and registered into the mine planning software package *Surpac*. These sections are then used to interpret wireframes between drillholes that are snapped to the drillhole in three-dimensional (3D) space. Figure 10-1 illustrates a typical cross sectional interpretation completed for the Augusta deposit.

Mappable stratigraphic units are represented with various colors, faults and lodes marked with heavy black lines.

Mandalay has recently acquired software package *Leapfrog Geo* to assist in the structural and geochemical interpretation of drillholes and surface mapping in 3D space.

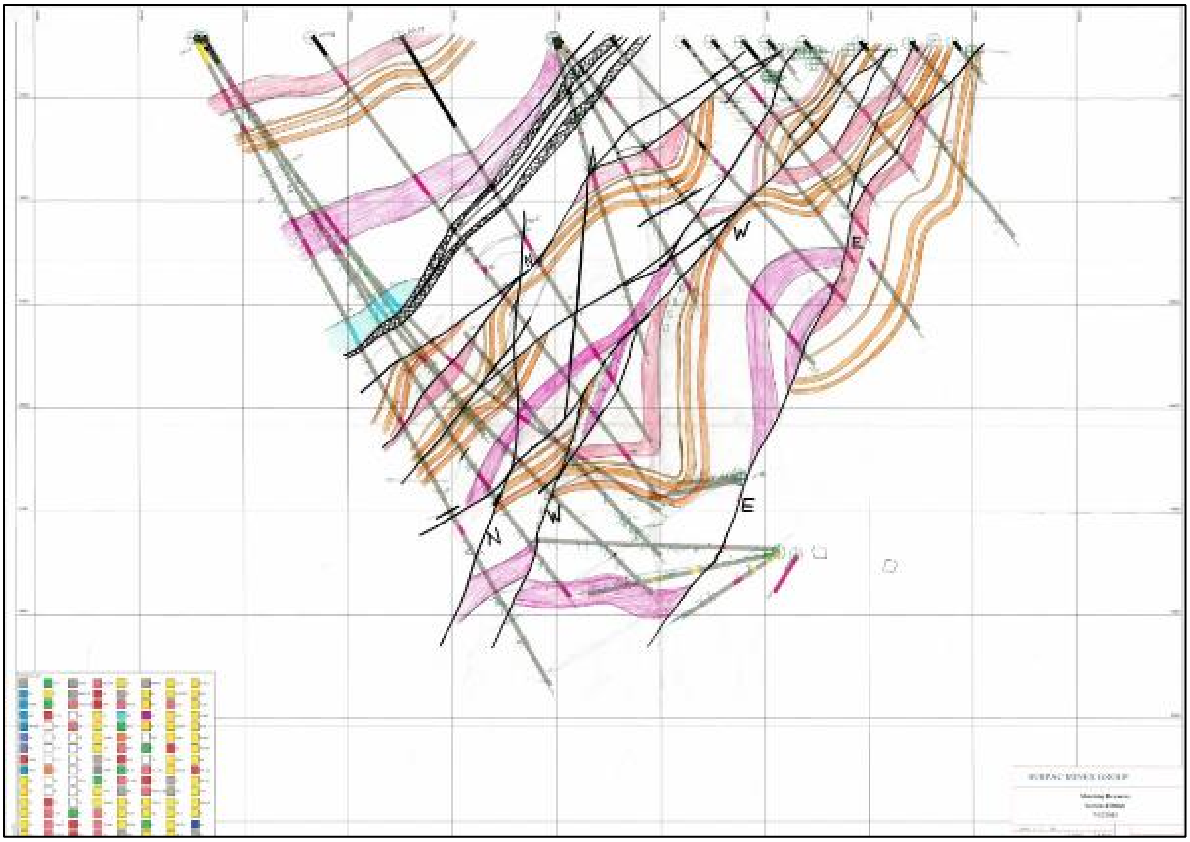

Figure 10-1: Example of cross section at 4300 mN post-drilling geological interpretation of the Augusta deposit

Source: Mandalay, 2014.

10.19 Factors that could materially impact accuracy of results

The greatest factor that has the potential to materially impact the accuracy of results is core recovery. Historically, this was an issue for all methods of drilling in the Augusta area. Mandalay has employed methods of drilling and associated procedures that ensure the highest recovery possible. Where recovery is poor, a repeat hole is drilled via a wedge.

Information gained from historical drilling is still used in resource estimation. However, because much of the drilled area has already been depleted by mining, the associated risk is reduced significantly.

Surveying of the collar and downhole follows industry best practice[1] given the location of drill collars and the expected deviation encountered during drilling. Therefore, potential for significant impact on results is minimized.

Sampling is also of a consistent and repeatable nature, with appropriate QA/QC methodologies employed. The assay method used is also considered to be appropriate for this style of mineralisation.

[1] Survey techniques are consistent with the Canadian Institute of Mining and Metallurgy and Petroleum (CIM) Exploration Best Practice Guidelines.

11 Sample preparation, analyses, and security

11.1 Sampling techniques

Samples used to inform the Augusta, Brunswick and Youle block model estimates are sourced from both drill core and channel sampling along the ore development drives.

11.1.1 Diamond core sampling

The mineralisation style at Costerfield is discrete therefore, not all diamond drill core is required to be sampled. Sample intervals are determined and marked on the core by Mandalay geologists.

General rules that are applied in the selection of sample intervals are as follows:

- All stibnite-bearing veins are sampled.
- A waste sample is taken either side of the mineralized vein (30–100 cm).
- Areas of stockwork veining are sampled.
- Laminated quartz veins are sampled.
- Massive quartz veins are sampled.
- Siltstone is sampled where disseminated arsenopyrite is prevalent.
- Puggy fault zones are sampled at the discretion of the geologist.

A Mandalay exploration field technician samples the core. To obtain a consistent sample, the diamond drill core is cut in half with a diamond saw along the top or bottom mark of the orientated core.

Sampling intervals for drill core used for resource estimation purposes are no smaller than 3 cm in length and no greater than 1.0 m in length. The average sample length for drill core samples within the Youle drill program was 40 cm for 2019. Drillholes that were designed and drilled for metallurgical analysis have had sample intervals up to 2 m in length.

The northern side of the core is sampled to ensure that the same side of the core is sampled consistently. Where there is a definitive lithological contact that marks the boundary of a sample, the sample is cut along that contact. If by doing this, the sample is less than 5 cm in length, the boundary of the sample is taken at a perpendicular distance from the center of the sample, which achieves the 3 cm requirement.

Samples from RC drilling are not used in the estimation of the Youle Mineral Resource, although some RC and hammer drilling is used to establish pre-collars for deeper diamond drillholes.

11.1.2 Underground face sampling

Approximately 80% of all drive faces are sampled. Each development cut is approximately 1.8 m along strike. Samples are taken at a frequency of between 1.8 and 5 m along strike. Underground face samples are collected using the following method:

- The face is marked out by the sampler to show the limits of the lode and the bedding angle and any geological structures that may offset the lode are marked on the face.
- Sample locations are marked out so that the sample is taken in a direction that is perpendicular to the dip of the lode from the footwall to hanging wall.
- The face and lengths of the sample are measured.
- The face is labelled with the heading, dated and photographed.
- Each sample is collected as a channel sample using pick or pneumatic chisel and placed into a sample bag.

- Care is taken to obtain a representative sample.
- Where there are two or more lode structures in the face, samples are also taken of the intervening siltstone.
- Samples are between 0.5 and 2 kg in weight.
- The sample length can vary from 5 cm to 1.5 m across the structures.
- Sample is taken as rock chips and placed in a pre-numbered sample bag with a unique ID.
- The face is sketched on a face sample sheet and sample details recorded.
- The location of the face is derived from survey pickups of the floor and backs of the ore drive.
- Face samples are taken at the appropriate orientation to the mineralisation and are representative of the mine heading being sampled.

11.2 Data spacing and distribution

Within the Augusta and Cuffley, Brunswick and Youle deposits, the distance between drillhole intercepts is approximately 40 m by 30 m. This is reduced to 20 m by 20 m in areas of structural complexity. Face sampling along drives is done at a frequency of between 1.8 and 5.0 m along strike and 5 to 10 m down-dip.

11.3 Testing laboratories

Assaying of the drill core and face samples is predominantly completed by On Site Laboratory Services (On Site) in Bendigo. This laboratory is independent of Mandalay and holds a current ISO/IEC 17025 accreditation. ALS Global (Brisbane) and Bureau Veritas (Perth) have also been used to verify the accuracy of On Site.

After Mandalay dispatches the core or face samples, the assaying laboratory's personnel undertake sample preparation and chemical analysis. Results are returned to Mandalay staff, who validate and input the data into the relevant databases.

11.4 Sample preparation

The following sample preparation activities are undertaken by Mandalay staff:

- Sample material is placed into a calico bag previously marked with a unique sample ID.
- The sample characteristics are marked on a sample ticket stub and placed in the bag.
- Calico bags are loaded into plastic bags such that the plastic bags weigh less than 10 kg.
- An assay request sheet is completed and placed into the plastic bag.
- Plastic bags containing samples are sealed and transported to On Site in Bendigo via private courier.

The following sample preparation activities are undertaken by On Site staff:

- Samples are received and checked against the submission sheet.
- A job number is assigned, and worksheets and sample bags are prepared.
- Samples are placed in an oven and dried overnight at 80°C.
- The entire sample (up to 3 kg) is jaw-crushed to approximately 2 mm; if >3 kg the sample is split and 50% of the sample used.
- The entire sample is then milled and pulverized to 90% passing 75 µm.
- Samples are then split, with 200 g for analysis and the remaining sample returned to its sample

bag for storage and eventual return to Mandalay.

11.5 Sample analysis

Augusta drill core and face samples are assayed for gold, antimony, arsenic, and iron. Gold grades are determined by fire assay/ atomic absorption spectroscopy (AAS).

The following procedure is undertaken by On Site for gold:

- 25 g of pulp is fused with 180 g of flux (silver).
- Slag is removed from the lead button and cupellation is used to produce a gold/ silver prill.
- 0.6 mL of 50% nitric acid is added to a test tube containing prill, and the test tube is placed in a boiling water bath (100°C) until fumes cease and silver appears to be completely dissolved.
- 1.4 mL of hydrochloric acid (HCl) is added.
- On complete dissolution of gold, 8 mL of water is added once the solution is cooled.
- Once the solids have settled, the gold content is determined by flame AAS.

Antimony grades are determined using acid digest/ AAS. Where the sample contains antimony in excess of 0.6% concentration, the following procedure is undertaken:

- 2 g of sample is added to a flask of distilled water (20 mL).
- 30 mL of 50% nitric acid is added.
- 20 mL of tartaric acid is added.
- 80 mL of 50% HCl is added and allowed to stand for 40 minutes.
- 5 mL of hydrobromic acid (HBr) is added.
- The solution is mixed for one hour and left to stand overnight until fuming ceases.
- The sample is heated until color changes to light yellow and white precipitate dissolves.
- When cool, the sample is diluted to 200 mL with distilled water.
- Antimony content is determined by AAS.

11.6 Laboratory reviews

Mandalay personnel conduct periodic visits to the On Site Laboratory Services in Bendigo and meet regularly with the laboratory managers. In 2019, visits were scheduled monthly at the On Site laboratory and quarterly at the Costerfield office.

Tours of the laboratory are normally completed in the presence of On Site's Laboratory Manager, Mr Rob Robinson.

Notes and minutes from laboratory visits and meeting with laboratory staff are preserved on the Mandalay server.

Mandalay conducted check assay programs in July 2019 and October 2019. This process involved obtaining a pulped sample from On Site, splitting it, and submitting pulps to three laboratories for comparison. In 2019, the same samples were sent to On Site, ALS Global (Orange) and Bureau Veritas (Perth). The results of the most recent program (Oct 2019) are outlined in Section 11.7.4.

11.7 Assay Quality Assurance and Quality Control

11.7.1 Standard reference materials

In total, eight standards have been used for quality control in 2019. Five have been made from material collected from Augusta and Brunswick (AGD08-02, MR-C1, MR-C2, MR-F1 and MR-F2), and are routinely submitted to On Site. AGD08-02 is an antimony-only standard, while MR-C1, MR-C2, MR-F1 and MR-F2 are antimony and gold standards.

Mandalay also routinely uses three commercially available standards sourced from Geostats Pty Ltd. G310-6 is a gold-only standard, GSB-05 is an antimony-certified and gold-indicated standard, and GSB-02 is an antimony and gold standard.

At least 1 standard is sent with each batch of exploration samples (on average 1 standard per 25 samples) and with each batch of the underground face samples (on average 2 different standards per batch).

Results from January 2019 to December 2019 for gold and antimony are displayed in Figure 11-1 to Figure 11-13. A standard assay result is considered to be compliant when it falls inside the three standard deviation (SD) limits defined by the standard certification. When a batch fails to comply with the three SD limits defined by the standard certification, all significant assay results from that batch are re-assayed. Significant assay results are defined as samples that may be used in a future resource estimate. Any actions or outcomes are recorded as comments on the QA/QC database.

A review of the results shows the following:

- Gold (and antimony) standard GSB-02 (CRM Assay 23.64 g/t Au) displays good compliance for the period, with one outlier outside the ±3SD limits (Figure 11-1) which was likely due to instrument bias, with the antimony analyte also reporting high on this batch.
- Gold standard G310-6 (CRM 0.65 g/t Au) displayed in Figure 11-2 shows good compliance for 2019 with no outliers outside the ±3SD limit. There is a general trend towards the lower limits from the beginning to the end of the period, indicating a low bias in the accuracy in the assay results for that period.
- Gold (and antimony) standard MR-C1 (CRM 82.30 g/t Au) displayed in Figure 11-3 shows good compliance for 2019 with no outliers outside the ±3SD limits. The supply for this standard was exhausted in March 2019.
- Gold (and antimony) standard MR-F1 (CRM 8.17 g/t Au) displays good compliance for the period, with no outliers outside the ±3SD limits (Figure 11-4). MR-F1 shows a slight high bias between the +1 and +2SD limits throughout 2019.
- Gold (and antimony) standard MR-C2 (CRM 76.73g/t Au) displayed in Figure 11-5 shows good compliance for 2019 with no outliers outside the ±3SD limits. This new standard has only been in use for three months; the apparent 2019 trend towards the upper limits over the period may settle with further analyses reported.
- Gold (and antimony) standard MR-F2 (CRM 12.18 g/t Au) displays fair compliance with eight outliers outside the ±3SD limits, which is likely to be due to instrument bias (Figure 11-5). MR-F2 also shows a significant bias to the lower limits with every analysis reporting under the certified assay value. This was another new standard created in 2019, with the first three months showing potential to improve performance in 2020.
- Antimony standard AGD08-02 (CRM Assay 1.75% Sb) displayed in Figure 11-7, shows excellent compliance with one outlier outside the ±3SD limits, which is likely to be due to instrument error. A minor high limits bias was noted across the period, with a drift to slightly less precise results in the latter half.
- Antimony standard GSB-05 (CRM Assay 0.18% Antimony) shows poor compliance for the period with all assays on or below the ±3SD limits. Precision is good with all assays clustered but showing a clear bias to the lower limits (Figure 11-8). Discussion with the contract laboratories indicated

that the high-range antimony AAS finish is quite ‘noisy’ under 0.2% Sb so future assays will be requested to be run as low-range first to gain better accuracy.

- Antimony standard GSB-02 shown in Figure 11-9 (CRM Assay 31.04% Sb) shows excellent compliance for the period, with one assay outside the ±3SD limits which was likely due to instrument error, with the gold analyte also reporting high on this standard in this laboratory batch. There is minor high bias over the period but not any significant drift in the accuracy in the assay results and assay values generally within 1SD limits.
- Antimony standard MR-C1 (CRM Assay 53.73% Sb), displayed in Figure 11-10, shows excellent compliance for 2019 with no outliers outside the ±3SD limits. The supply for this standard was exhausted in March 2019.
- Antimony standard MR-F1 (CRM Assay 3.44% Sb), displayed in Figure 11-11, shows poor compliance for the period, with a portion of the assays outside the ±3SD limits and all but one assay in the high limits range. Investigation and further testing by Geostats and On Site demonstrated the high bias is a result of the tight standard deviation (<5%) yielded by the XRF fused bead methodology used to certify the standard during production.
- Antimony standard MR-C2 (CRM Assay 46.01% Sb), displayed in Figure 11-12, shows fair compliance for the period, with no assays outside the ±3SD limits. An apparent high bias between the +1 and +2SD limits is considered to be a result of the differing methods used to certify the standard versus the method that On Site uses. The results show a strong degree of precision within that band.

– On Site performs most of the antimony analyses using additives to maintain the analyte in solution, whereas the laboratories which were used to certify the standard did not. This difference in sample preparation accounts for the slight high bias.

– Mandalay considers that the level of compliance and bias displayed by the existing standards is good and demonstrates the reliability of the gold and antimony grades used to inform the block model estimate.

- Antimony standard MR-F2 (CRM Assay 4.03% Sb), displayed in Figure 11-13, shows poor compliance for the period, with a significant portion of the assays outside the ±3SD limits. There is a trend toward the higher +3SD limits. This has been a new standard for 2019, produced by Geostats from Mandalay Costerfield feed material. The trend noted across the three months of use has shown assay results slowly dropping toward the CRM and becoming more precise.
    - Of 35 analyses, 2 were between +1SD and +2SD, 10 were between +2 and +3SD, and 23 were over +3SD.
    - Geostats’ contract laboratories had difficulty maintaining the antimony in solution for four-acid digests with ICP finish during the round-robin process. Because On Site analyses using two-acid digests with AAS finish, this is assumed to be a major factor in the apparent high bias for this antimony standard.
    - All MR-F2 results reported fall within an 11% range around an average of 4.4.

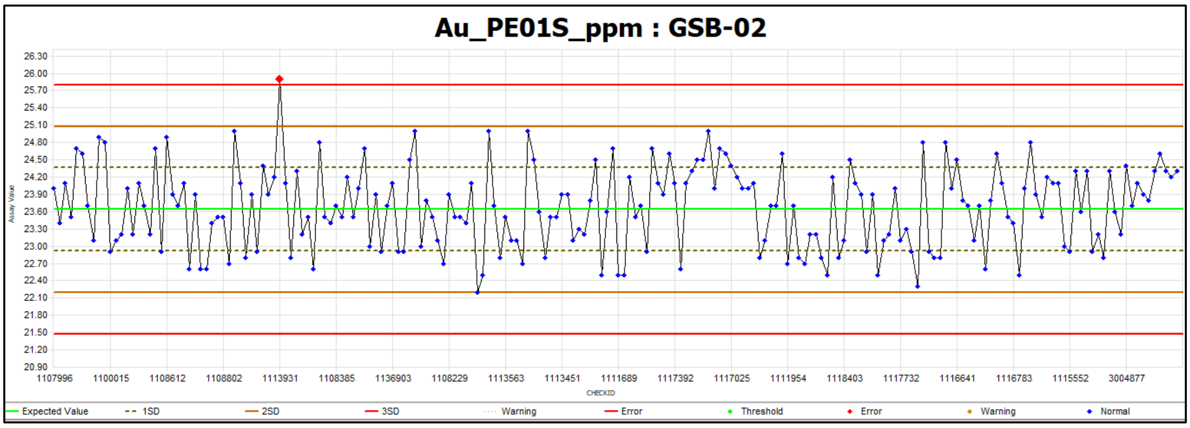

Figure 11-1: GSB-02 Gold Standard Reference Material – Assay Results for 2019

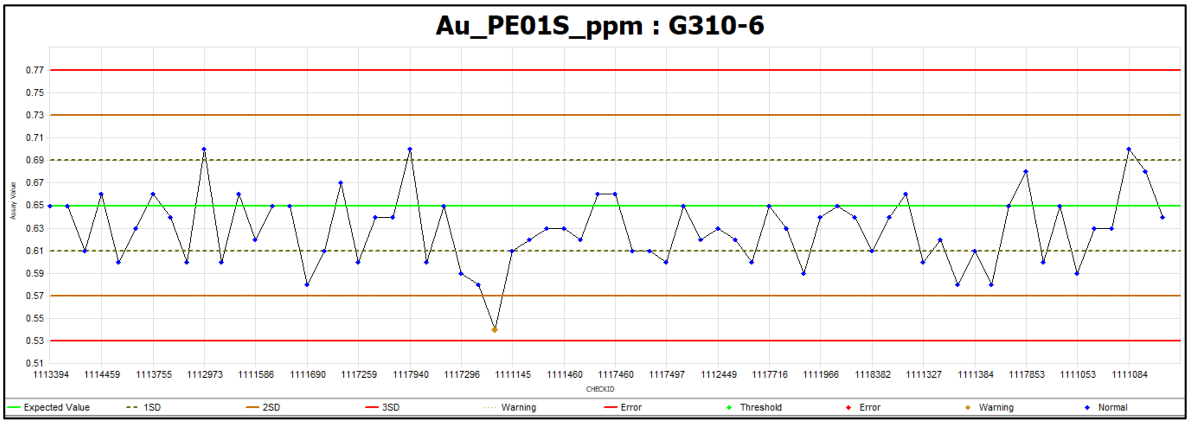

Figure 11-2: G310-6 Gold Standard Reference Material – Assay results for 2019

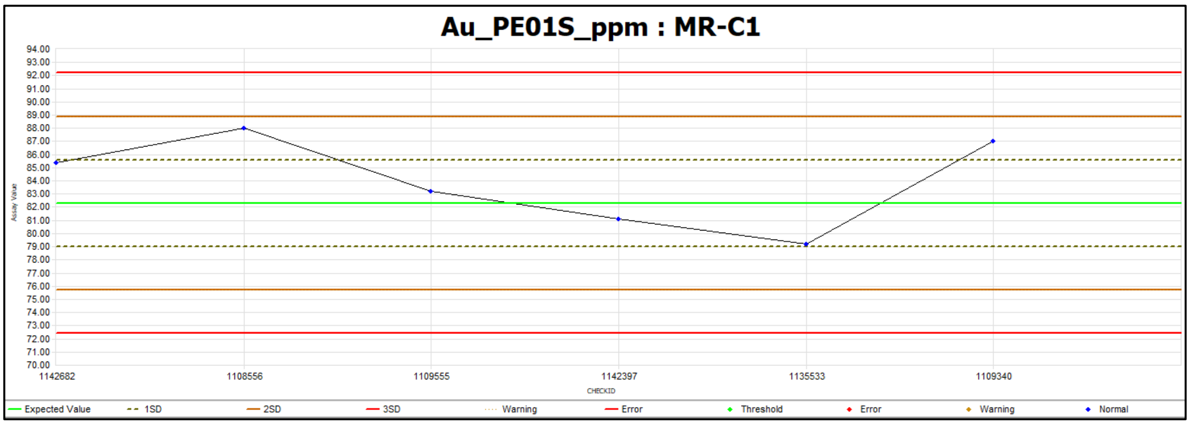

Figure 11-3: MR-C1 Gold Standard Reference Material – Assay results for 2019

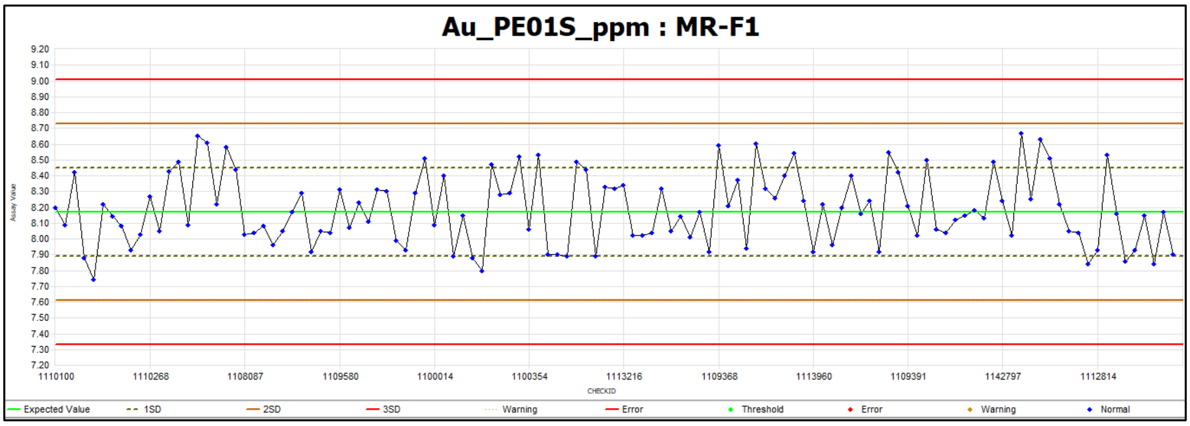

Figure 11-4: MR-F1 Gold Standard Reference Material – Assay results for 2019

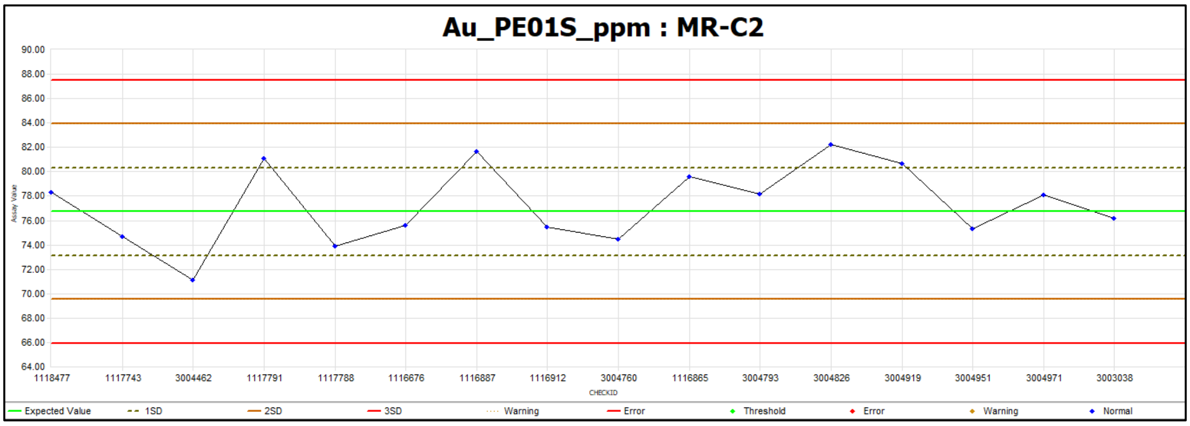

Figure 11-5: MR-C2 Gold Standard Reference Material – Assay results for 2019

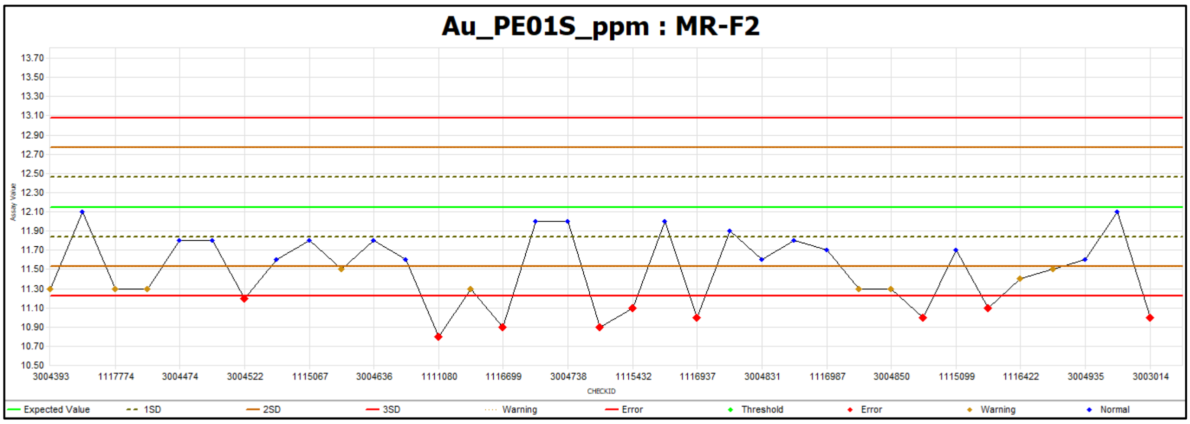

Figure 11-6: MR-F2 Gold Standard Reference Material – Assay results for 2019

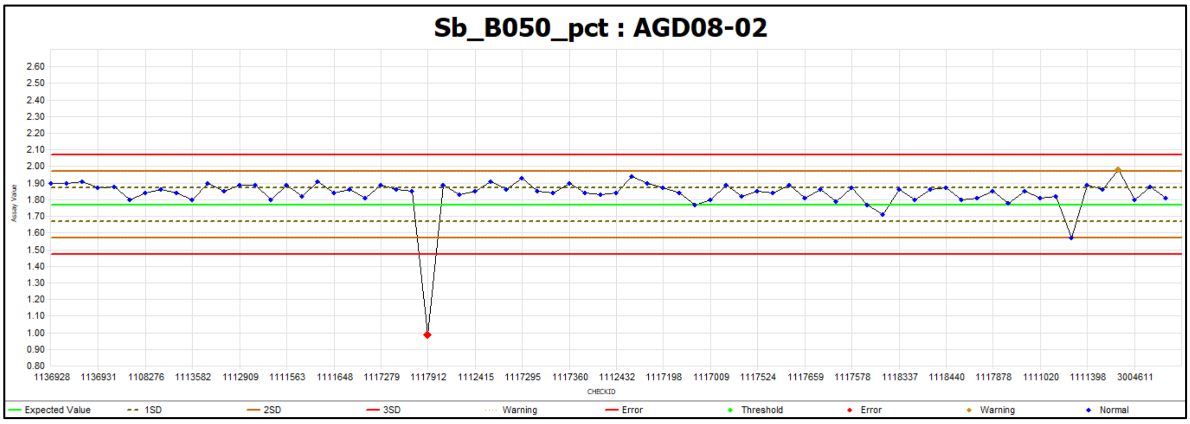

Figure 11-7: AGD08-02 Antimony Standard Reference Material – Assay results for 2019

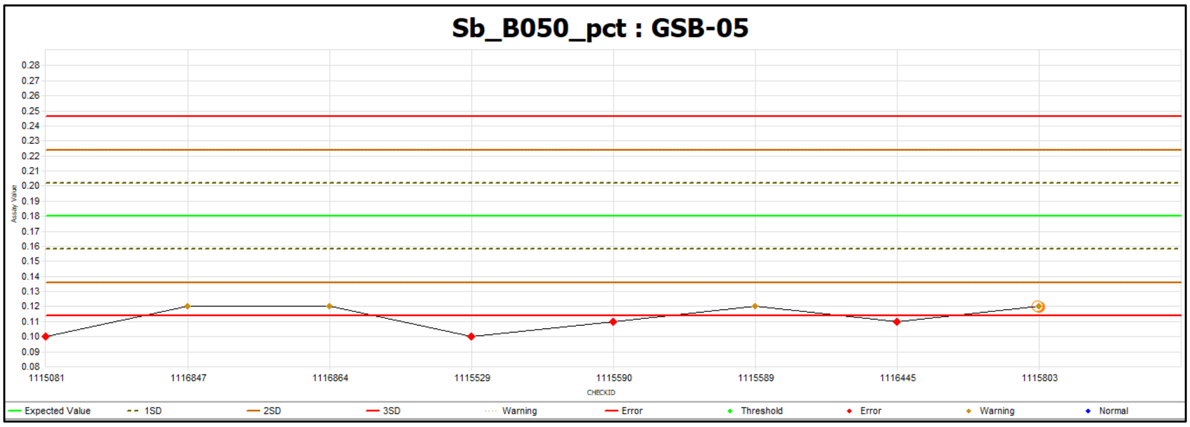

Figure 11-8: GSB-05 Antimony Standard Reference Material – Assay results for 2019

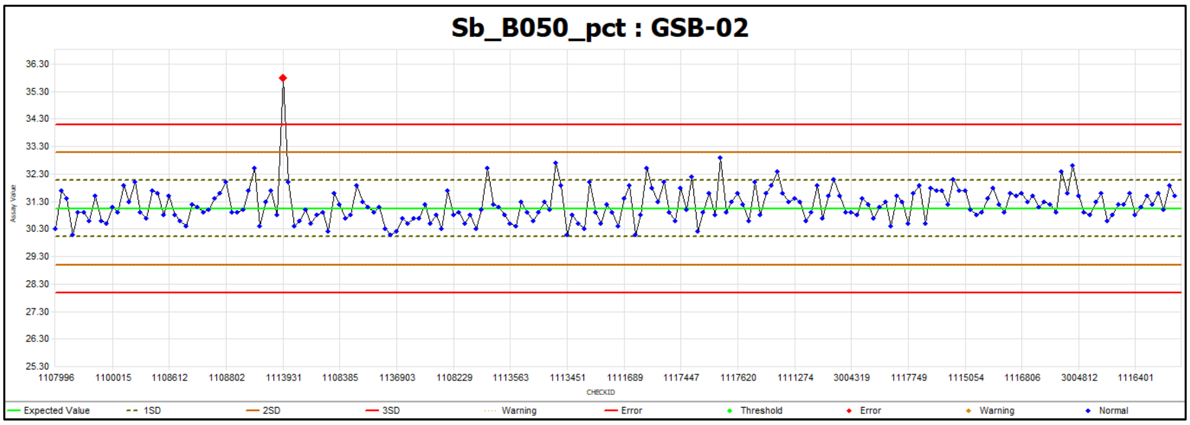

Figure 11-9: GSB-02 Antimony Standard Reference Material – Assay results for 2019

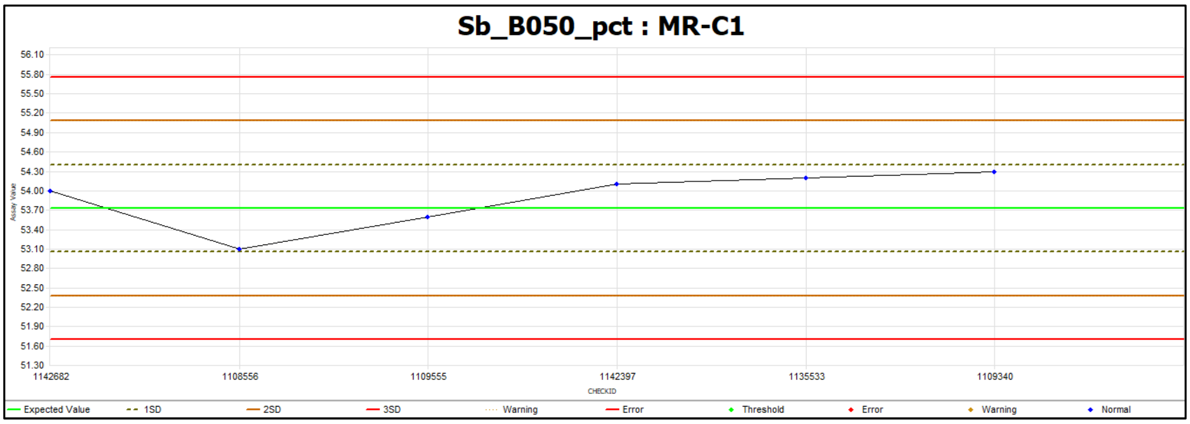

Figure 11-10: MR-C1 Antimony Standard Reference Material – Assay results for 2019

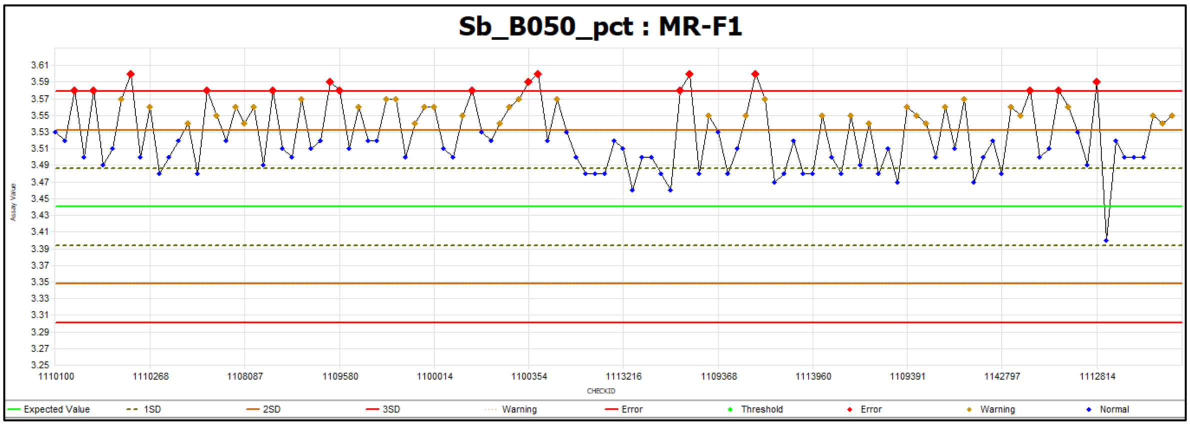

Figure 11-11: MR-F1 Antimony Standard Reference Material – Assay results for 2019

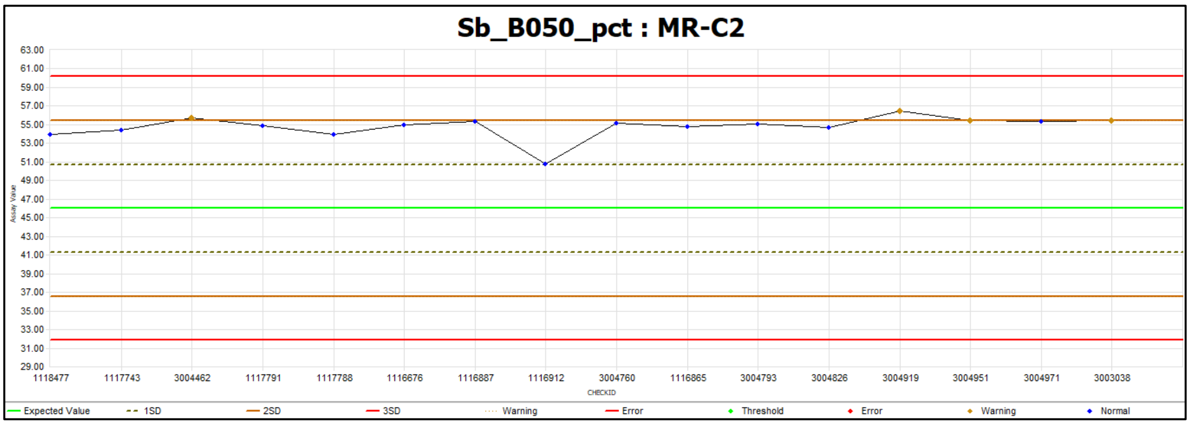

Figure 11-12: MR-C2 Antimony Standard Reference Material – Assay results for 2019

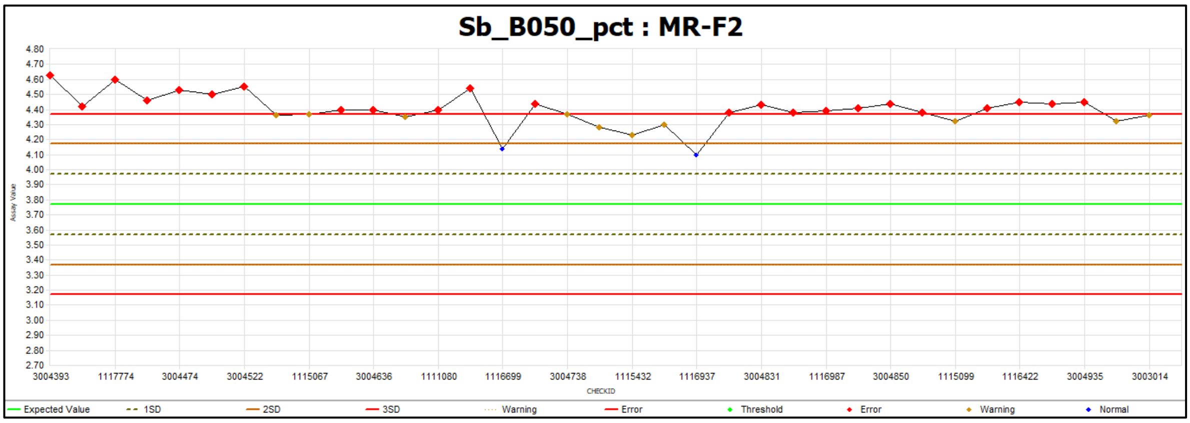

Figure 11-13: MR-F2 Antimony Standard Reference Material – Assay results for 2019

11.7.2 Blank material

Mandalay sends uncrushed samples of basalt as blank material, at a ratio of 1 in every 30 samples, to On Site to test for sample hygiene and contamination. Greater than or equal to three times the detection limit is regarded as an unacceptable assay on blank material. In the case of gold at On Site, this is >0.02 g/t Au.

Figure 11-14 and Figure 11-15 below show the performance of the blanks for 2019. These data are a combination of all mine face sample and exploration drillhole data. Results this year display exceedance of several samples, up to 0.6 g/t Au and 2.75% Sb, with 91% of antimony assays and 92% of gold assay within the detection limits. The variability of results is likely to be attributed to the fact that there is always some contamination when assaying high-grade gold and stibnite, which is prone to smearing.

There were a few incidences of significant contamination during the crushing or preparation stage at the On Site laboratory. On Site staff clean the pulverizer and crusher after each sample is processed using a high-pressure air gun. In June 2019, On Site installed new venting cabinets with high power extraction fans to house the pulverizers. The improvements to the laboratory facility have seen improvement in hygiene with fewer examples of low contamination. A quartz wash run between samples is requested on specific batches to limit contamination in cases where visible gold is observed in drill core. As seen in the graph below, most contamination has been extremely high, attributed to the higher-grade ore that is being mined in the Youle and Brunswick zones. Given the very high gold grades at the mine, it is not considered by Mandalay and SRK to be an issue that will have any material impact on the Mineral Resource estimate.

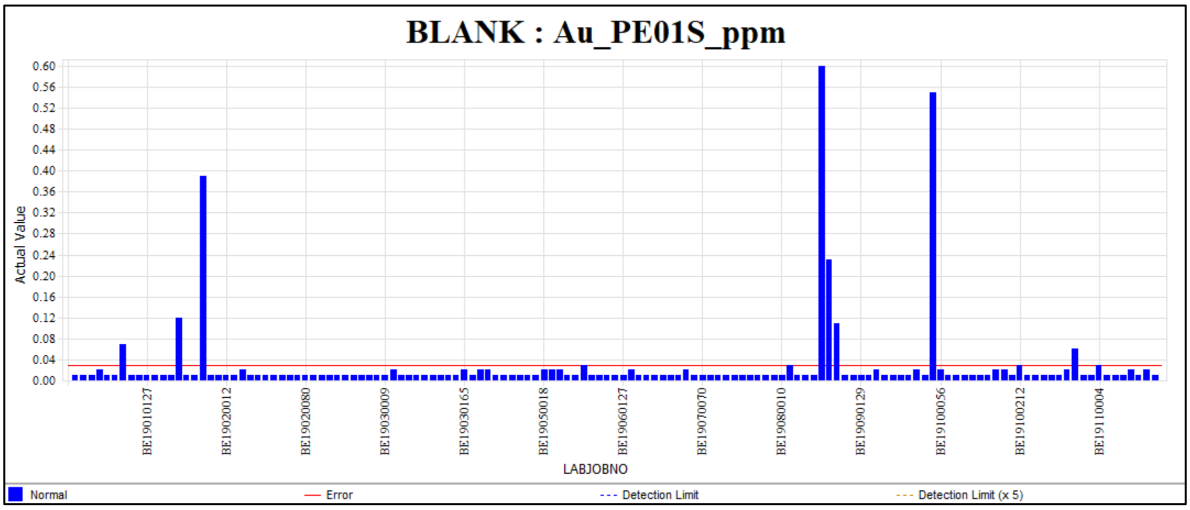

Figure 11-14: Gold Blank assay results for 2019

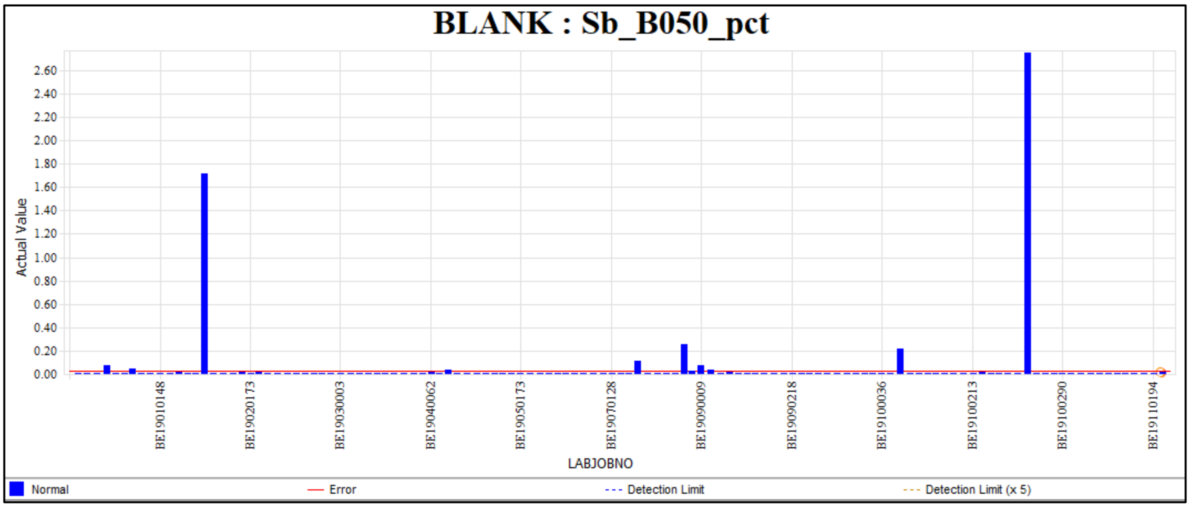

Figure 11-15: Antimony Blank assay results for 2019

11.7.3 Duplicate assay statistics

A summary of laboratory duplicate statistics assayed by On Site for original gold and antimony assays versus duplicate assays for 2019 is presented in Table 11-1 and Table 11-2. The duplicates are assayed on separate aliquots of the same sample pulp from both mine face sample and exploration drill core samples. A scatter plot of this data is presented in Figure 11-16 and Figure 11-18, which shows no significant bias between the original and duplicate assays for the antimony and gold datasets.

A relative paired difference (RPD) plot using the same duplicate dataset is presented in Figure 11-17 and Figure 11-19. It is desirable to achieve 90% of pairs at less than 10% RPD in the same batch, or less than 20% in different batches or different laboratories (Stoker, 2006). The duplicate gold dataset achieved 88.67% of pairs at less than 10% RPD and 99.72% of pairs at less than 20% RPD, which demonstrates acceptable precision in the gold assays by On Site. This is a slight improvement on the 2018 data, which showed 88.21% and 98.78% respectively. The duplicate antimony dataset achieved 93.79% of pairs less than 10% RPD, which demonstrates exceptional precision in the antimony assays, although it is a slight drop from the 2018 result of 94.24%.

Table 11-1: Summary of On Site duplicate gold statistics

Description	Original	Duplicate
Number of samples	715	715
Mean	22.46	22.71
Maximum	4000.00	4040.00
Minimum	0.16	0.16
Population Std Dev	161.32	163.48
Coefficient of Variation	7.18	7.20
Bias	-1.14%	
Correlation Coefficient	1.00	
Percent of samples < 10% RPD	**88.67**	

Table 11-2: Summary of On Site duplicate antimony statistics

Description	Original	Duplicate
Number of samples	338	338
Mean	10.615	10.608
Maximum	62.60	60.90
Minimum	0.16	0.16
Population Std Dev	14.16	14.20
Coefficient of Variation	1.33	1.34
Bias	0.07%	
Correlation Coefficient	1.00	
Percent of samples < 10% RPD	**93.79**	

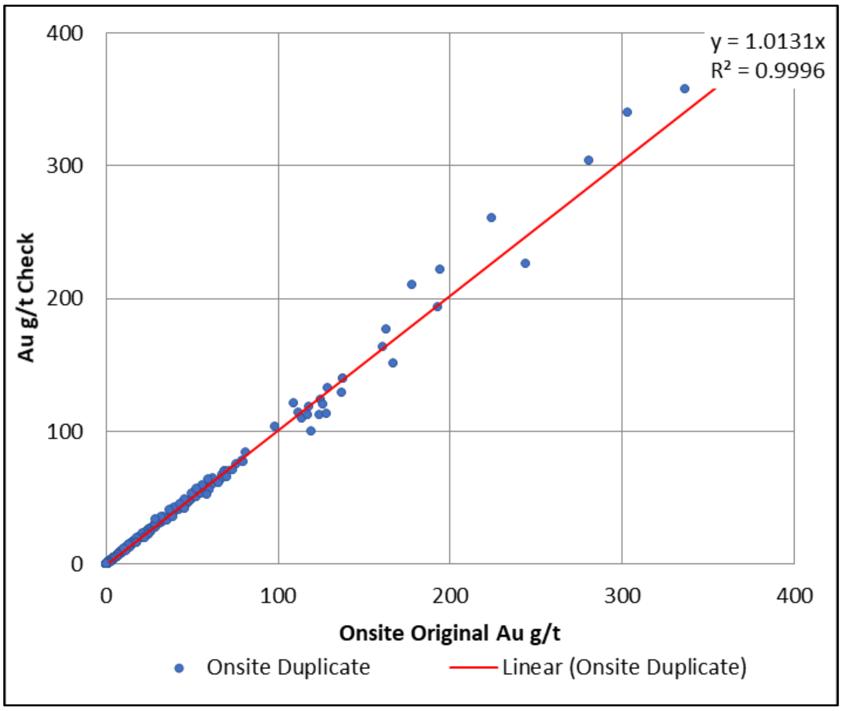

Figure 11-16: Scatter plot for On Site gold duplicates (g/t) for 2019

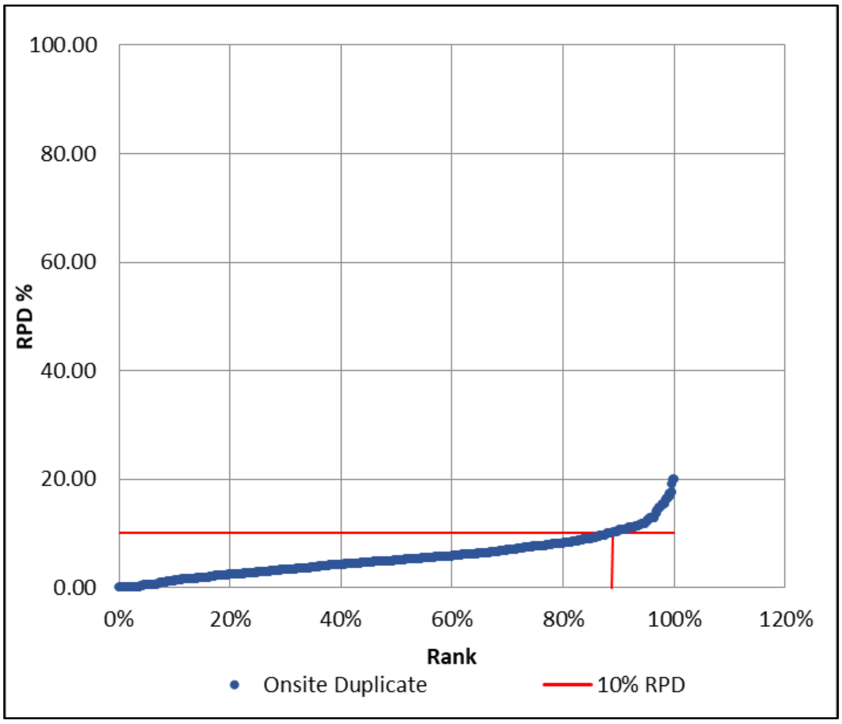

Figure 11-17: Relative paired difference plot for On Site gold duplicates (g/t) in 2019

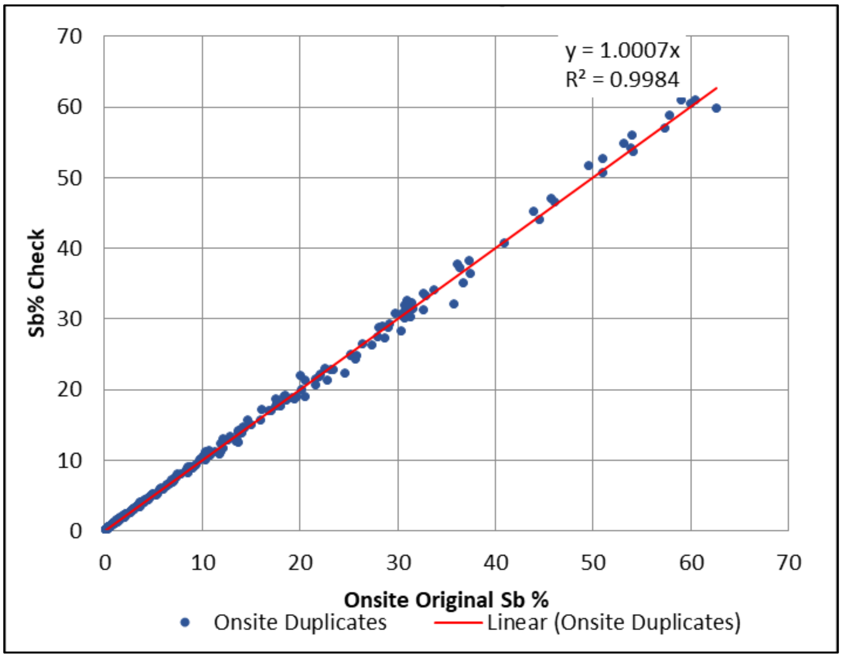

Figure 11-18: Scatter plot for On Site antimony duplicates (%) for 2019

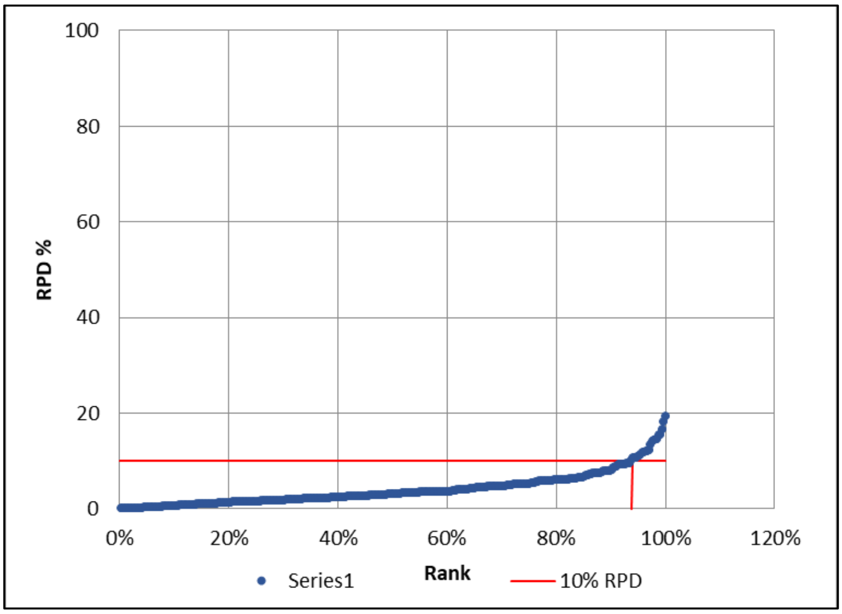

Figure 11-19: Relative paired difference plot for On Site antimony duplicates (%) in 2019

11.7.4 Check assay program – sample pulps

Duplicate statistics resulting from a gold and antimony check assay program comparing On Site, ALS Minerals (ALS) and Bureau Veritas (BV) are presented in Table 11-3 and Table 11-4 respectively. The duplicates are assayed on separate aliquots of the same sample pulp. Two pulp check assay programs were conducted in 2019, Q1 in July 2019 and Q2 in October 2019. The results displayed in this report are from the most recent program which was undertaken by Mandalay in October 2019.

The gold RPD plot (Figure 11-20) shows that, on average, 93.33% of duplicate pairs show less than 20% RPD, which is a significant improvement from the 2018 performance of 79.33% and demonstrates excellent reproducibility in the gold assays across the laboratories. The gold scatter plot of this data (Figure 11-22) shows a large range of scatter for samples greater than 50 g/t, with the repeatability for ALS particularly subject to wide variation. The grade comparisons under 50 g/t show no significant bias for On Site and BV with ALS showing a bias to reporting at a higher grade.

On Site's check and BV reported at lower gold grades, where ALS reported a slightly higher grade from On Site's original pulp. This is only a minor difference from 2017 when both ALS and BV reported lower gold grades from On Site's original pulp. Two standards were included in each check batch and the Au results are not indicative of any significant bias between the laboratories. All laboratories reported within the three standard deviation range, although both ALS and BV reported lower Au and Sb in the two standards.

The antimony statistics show a similar bias of around 1.9%, ALS low and BV high, averaging out to -0.04%. Both ALS and BV reported at a very slight lower average grade for samples over 15%. This is in keeping with the results from 2017 and 2018, with all three laboratories reporting very close together. As in previous years, On Site's higher RPD compared to the other two laboratories can be contributed to its greater experience with antimony samples, as it has tailored its methods for Mandalay's purposes.

The antimony RPD plot (from samples from all laboratories) shows that 94% of duplicate pairs show less than 20% RPD (Figure 11-21), which demonstrates reasonable reproducibility across laboratories. Year on year, all three laboratories are improving their antimony repeatability with 2018 statistics showing 89.33% of all samples less than 20% RPD and in 2017 the average was 85%.

Table 11-3: Summary of On Site original vs On Site duplicate, ALS, BV gold duplicate statistics

Description	On Site	Check	ALS	BV
Number of samples	50	50	50	50
Mean	30.16	28.66	29.71	28.15
Maximum	169.00	142.00	142.00	132.00
Minimum	0.70	0.73	2.06	1.00
Population Std Dev	35.00	31.60	31.75	28.66
Coefficient of Variation	1.16	1.10	1.07	1.02
Bias	4.96%		1.50%	6.65%
Correlation Coefficient	0.99		0.97	0.98
Percent of samples < 20% RPD	**100.00**		**88.00**	**92.00**

Table 11-4: Summary of On Site original vs On Site duplicate, ALS, BV, antimony duplicate statistics

Description	On Site	Check	ALS	BV
Number of samples	50	50	50	50
Mean	15.53	14.90	15.82	15.23
Maximum	49.60	46.30	45.90	46.07
Minimum	0.46	0.48	0.42	0.45
Population Std Dev	13.00	12.42	12.29	12.45
Coefficient of Variation	0.84	0.83	0.78	0.82
Bias	4.06%		-1.86%	2%
Correlation Coefficient	0.99		0.93	0.99
Percent of samples < 20% RPD	**100.00**		**90.00**	**92.00**

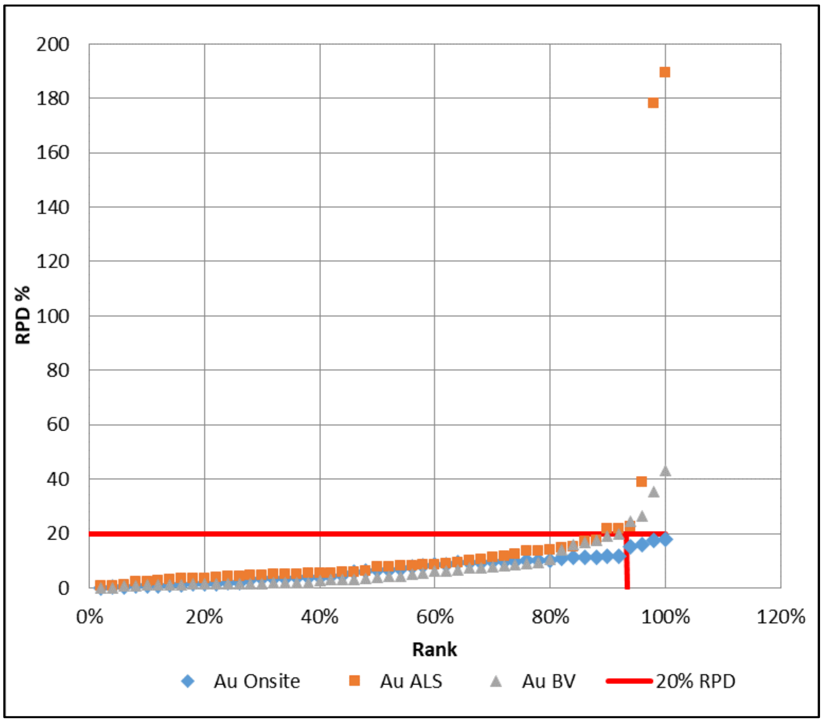

Figure 11-20: Relative pair difference plot for On Site original vs On Site duplicate, ALS, BV gold duplicates (g/t)

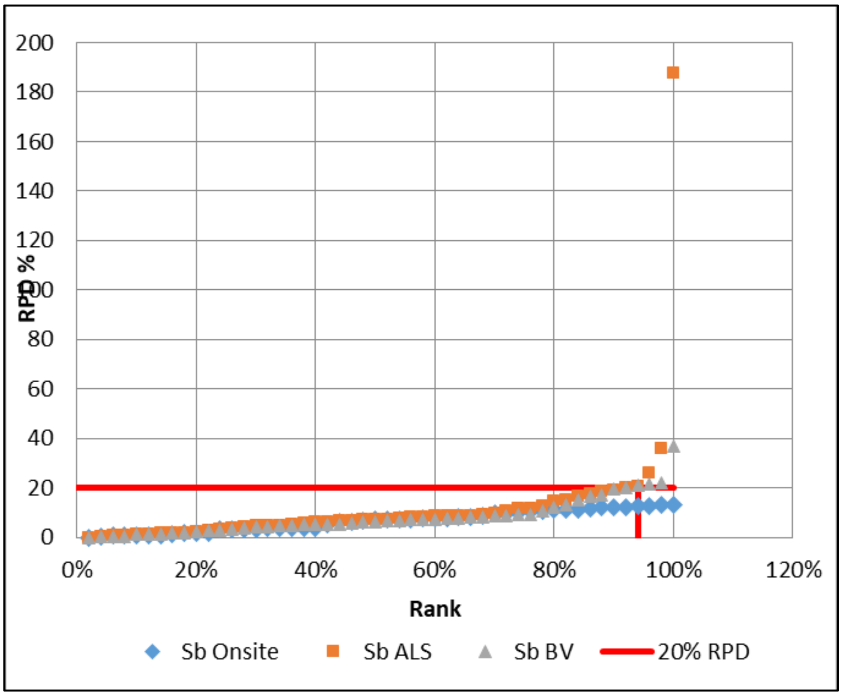

Figure 11-21: Relative pair difference plot for On Site original vs On Site duplicate, ALS, BV antimony duplicates (%)

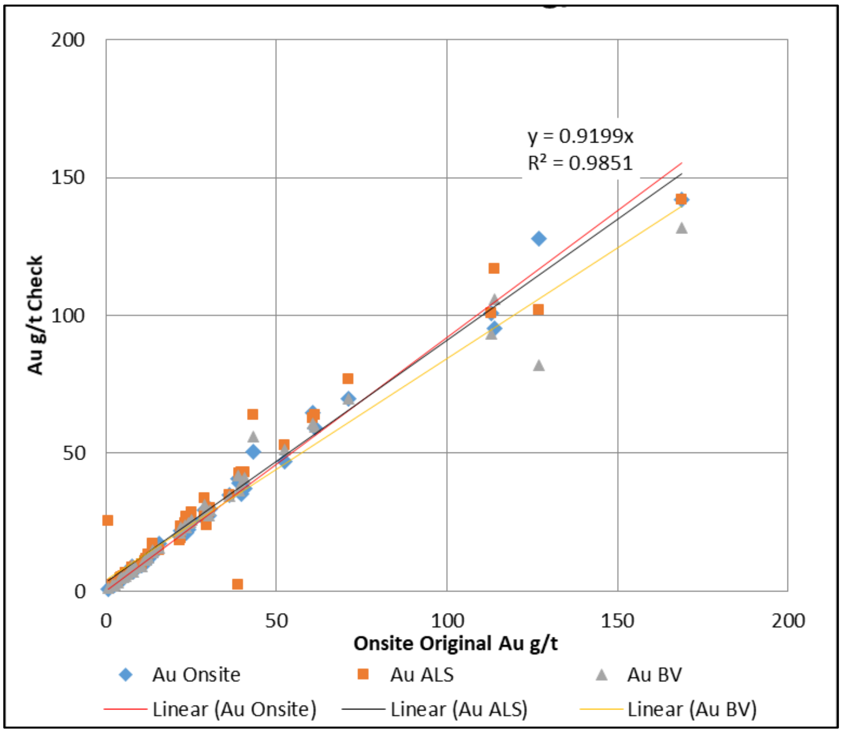

Figure 11-22: Scatter plot for On Site original vs On Site duplicate, ALS, BV gold duplicates (g/t)

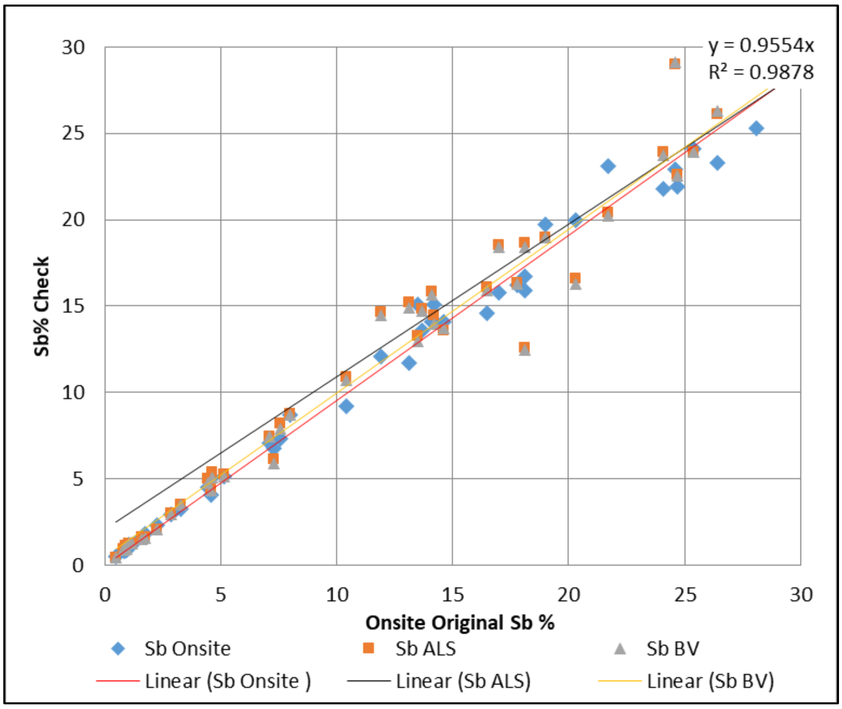

Figure 11-23: Scatter plot for On Site original vs On Site duplicate, ALS, BV antimony duplicates (%)

11.8 Sample transport and security

Sample bags containing sample material and a ticket stub with a unique identifier are placed in heavy duty plastic bags in which the sample submission sheet is also included. The plastic bags are sealed with a metal twisting wire or heavy-duty plastic cable ties. This occurs for both underground face samples and drill core samples. The bags are taken to a storage area that is under constant surveillance. A private courier collects samples daily and transports them directly to On Site in Bendigo, where they are accepted by laboratory personnel. Sample pulps from On Site are returned to Mandalay for storage. The pulps are stored undercover, wrapped in plastic.

12 Data verification

On 18 November 2014, SRK full-time employee Danny Kentwell (QP for Sections 6 to 12 and Section 14) visited the Augusta and Brunswick Mine sites and was escorted by Chris Davis, Resource Manager for the Costerfield Operations. All drill core for the Costerfield Property is processed at the Brunswick exploration core shed.

Data verification steps, which included discussions with site geologists were undertaken regarding:

- Sample collection
- Sample preparation
- Core mark-up
- Core recovery
- Core cutting procedures
- Sample storage
- QA/QC
- Data validation procedures
- Collar survey procedures
- Downhole survey procedures
- Geological interpretation
- Exploration strategy
- Grade control sampling and systems
- Inspection of Brunswick core shed facilities and drill core intersections (Augusta and Cuffley).

An underground tour was conducted. The Cuffley Lode was observed in strike drives on the lode at two adjacent levels. The Cuffley East Lode was also observed via a strike drive on the lode. Obvious stibnite mineralisation and visible gold was sighted in both the faces (Figure 12-1) and in rock fragments along the drives.

Danny Kentwell also visited the site in August 2015, November 2016, November 2017 and October 2018 to examine core and review current operations and ongoing QA/QC results but did not go underground. In December 2019, Danny Kentwell visited the site to review core from Youle and to look at the face exposure and face mapping procedures underground at Youle.

The face sampling recording and database entry procedures were reviewed again in 2017 after recommendations from 2016 were implemented. The process was found to be working much better with minimal discrepancies found.

In SRK's opinion, the geological data used to inform the Augusta, Cuffley, Brunswick and Youle block model estimates were collected in line with industry best practice, as defined in the Canadian Institute of Mining and Metallurgy and Petroleum (CIM) Exploration Best Practice Guidelines and the CIM Mineral Resource, Mineral Reserve Best Practice Guidelines. Therefore, the data are suitable for use in the estimation of Mineral Resources.

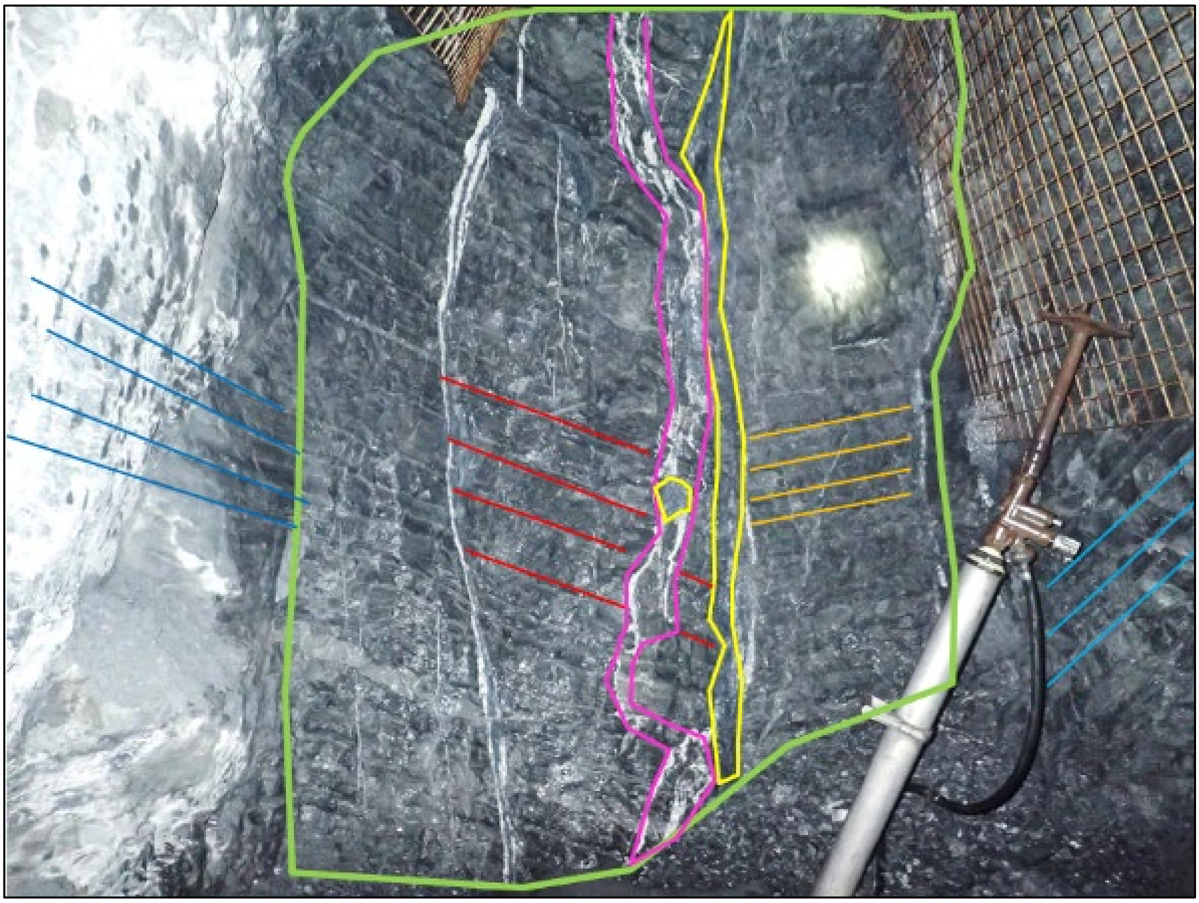

Figure 12-1: Cuffley Main lower drive south end showing mineralized structures (gold bearing quartz – pink, stibnite – yellow) and bedding

13 Mineral processing and metallurgical testing

13.1 Metallurgical testing

Extensive metallurgical testwork has been undertaken on samples from the Augusta deposit from 2004, the Cuffley deposit from 2012, the Brunswick deposit from 2016 and, most recently, the Youle deposit from 2018. The Youle underground deposit began being incorporated into the mill feed properly during the last quarter of 2019. It was initially processed in separate campaigns to confirm the expected metallurgical behaviours. It will become an increasing component of the feed blend to the point that it will become the sole source of feed in the LoM production schedule by the end of 2020.

Routine mill feed blend characterisation tests and metallurgical tests are an ongoing operational routine.

The following reputable and appropriately experienced laboratories were involved with various aspects of the original metallurgical evaluation and the ongoing testwork:

- ALS Ammtec – New South Wales (previously Metcon Laboratories) (Metcon)
- AMDEL Ltd Mineral Services Laboratory - South Australia (Amdel)
- Australian Minmet Metallurgical Laboratories – New South Wales (AMML).

The metallurgical testwork on Augusta, Cuffley, Brunswick and, most recently, Youle ore has since been superseded by operational data. The use of comprehensive historical operating data is a more accurate way to forecast future metallurgical behaviour when processing similar ores than using old testwork data. The Brunswick Processing Plant has been operated by Mandalay since late 2009. Furthermore, there have been five years of operating data on the current Cuffley/ Augusta ore blend, the Brunswick ore has been added to the blend from Q3 2018 and Youle from late Q3 2019. These three deposits continue being treated in the LoM plan together with the new Youle feed, which exhibited similar metallurgical behaviour to the Cuffley/ Augusta ores during testwork. As a result, historical production data, together with supporting and confirmatory testwork on the new feed, provides appropriate reference data for forecasting future performance.

This allows relationships developed from historical operating data to be used to forecast future throughput and recoveries. The relationships also account for other influencing variables such as feed and concentrate grades. This provides a much better understanding of the processing behaviour expected on these and similar ores.

13.1.1 Current mill feed testwork

A summary of metallurgical characterisation testwork is shown in Table 13-1. Whereas testing on the Brunswick Main ores indicated a decrease in gravity recovery, flotation recovery and flotation kinetics, the extent to which this was evident in plant operation was underestimated but the behaviour of the Brunswick ores are well-understood and this feed type will be largely depleted by the end of 2020.

Metallurgical testwork was undertaken on two areas of the Youle deposit designated a) Youle high grade, and b) Youle low grade. This testwork showed that the Youle ores would demonstrate similar metallurgical behaviour to the ores historically fed to the plant. Metal recoveries were high and reflected historical plant performance. It was expected that, with further optimisation of the testwork conditions, the recoveries could be increased further.

The two Bond Ball Mill Work Index (BBMWi) tests resulted in similar values (16.1 kWh/t) for Youle low grade and (15.2 kWh/t) for Youle high grade. This is similar when compared to the ore that, until recently, has been processed (Cuffley at 16.0 kWh/t and Augusta at 15.5 kWh/t). Two previous Brunswick samples that were tested were softer, at 14.3 kWh/t and 12.9 kWh/t. Flotation testing has shown the recoveries to be relatively insensitive to a grind size between 38 µm and 75 µm. Based on this testing, while limited in its extent, it is likely that the plant throughput will be maintained or potentially marginally increased when feeding a blend including a Youle ore component. With the campaign processing of parcels of Youle ore, this has proven to be the case.

Results for the Youle testwork are shown below in Table 13-1. As expected, recoveries were better on the high-grade sample compared to the low-grade sample. Antimony testwork recoveries were higher for both samples when compared to historical plant values. The results were stable across a range of grind sizes and reagent addition regimes. The average gold recovery for both samples was marginally higher than historical production records. These results have been discounted back to historical plant recovery levels for forecasting purposes to adopt a more conservative position. The gravity gold recovery has been increased slightly in the LoM plan to 40% (from 36.5%) to account for the higher blend of Cuffley and Youle ore. This is discussed in detail in the recovery section below.

Compared to previously tested Brunswick ore, Youle ore has lower arsenic grades than historical levels and elevated arsenic grades in the antimony-gold concentrate are not considered to be an issue. In the current take-off agreement, there are no arsenic penalties below 0.5% in the concentrate. Arsenic grades between 0.5%–2.0% incur a penalty of USD2 /t concentrate for each 0.1% above 2.0%. This increases to USD2.5 /t between 2.0% and 3.0% arsenic but it remains saleable. As a gold/ antimony concentrate, it is not subject to the same arsenic grade importation limits that base metal concentrates are imposed with. With proper management, the penalty element payments can be minimized and are not considered a risk to the project.

The LoM plan from 2020 onwards shows the Cuffley ores to be depleted and remnant Augusta ores also depleted by April 2020. The main tonnage in 2020 is initially made up of Brunswick ores comprising approximately 50% of mill feed, with the remainder being Youle underground ores. The Brunswick ores are also nearing the end of their life, with tonnages falling sharply after May 2020. At this point Youle dominates the feed blend to the point where it becomes the sole mill feed source at the end of the year and into 2021.

Table 13-1: Brunswick samples vs current operational data

Variable	Current Operation	Brunswick Main	Brunswick Penguin to Kiwi	Cuffley LG 0358-1	Cuffley HG M2569	Youle Low Grade	Youle High Grade
BBMWi	15.5–16.0	12.9	14.3	16.0	16.0	16.1	15.2
Feed Au g/t	9.2*	8.65	11.9	9.0	17.7	4.89	13
Feed Sb %	3.5*	3.31	3.88	3.00	7.98	2.56	5.1
Feed As %	0.06*	0.50	0.13	0.12	0.07	0.02	0.03
Concentrate As %	0.20	3.20	0.87	0.98	0.002	0.22	0.25
Gravity Au Rec. %	36.8*	22.1-25.5	30.0	41	54	43	57
Recovery Au %	90.0*	87.1	93.7	98	95	96	97
Recovery Sb %	95.4*	98.3	99	99	95	99	99

Note: * 2016/2017 data.

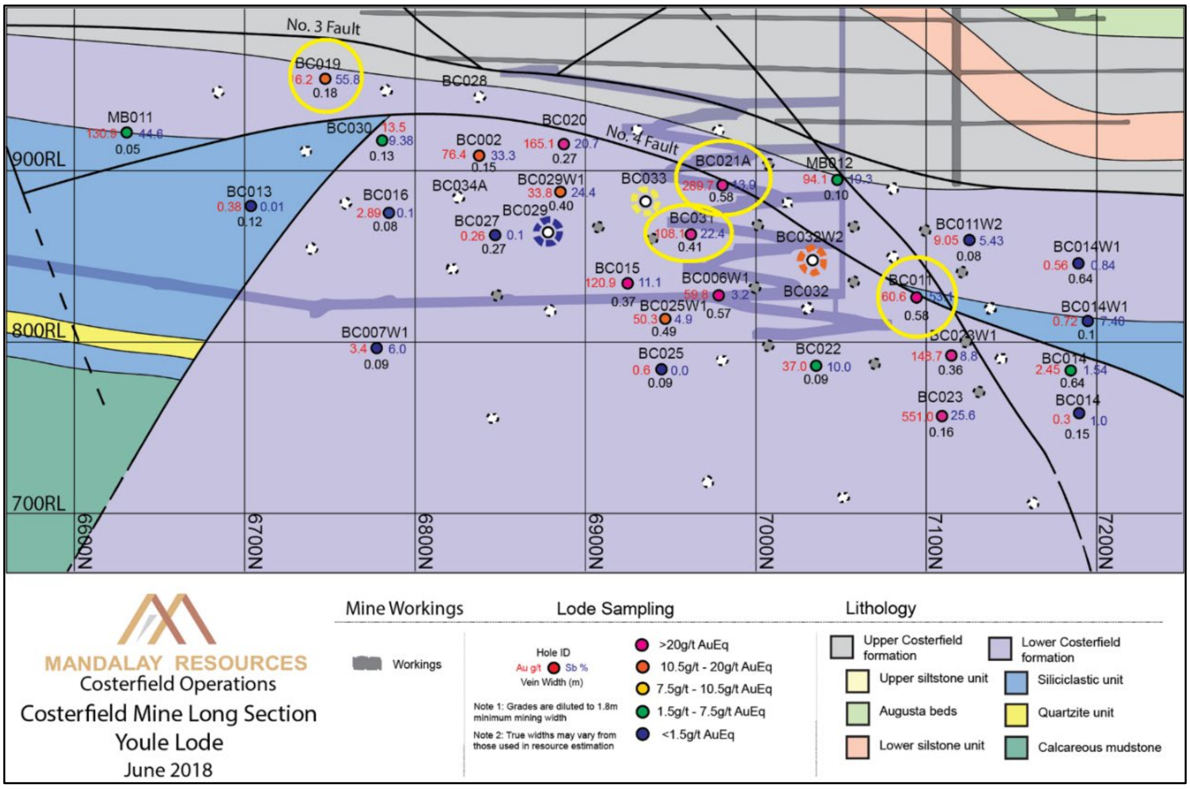

Figure 13-1: Youle high-grade testwork sample locations

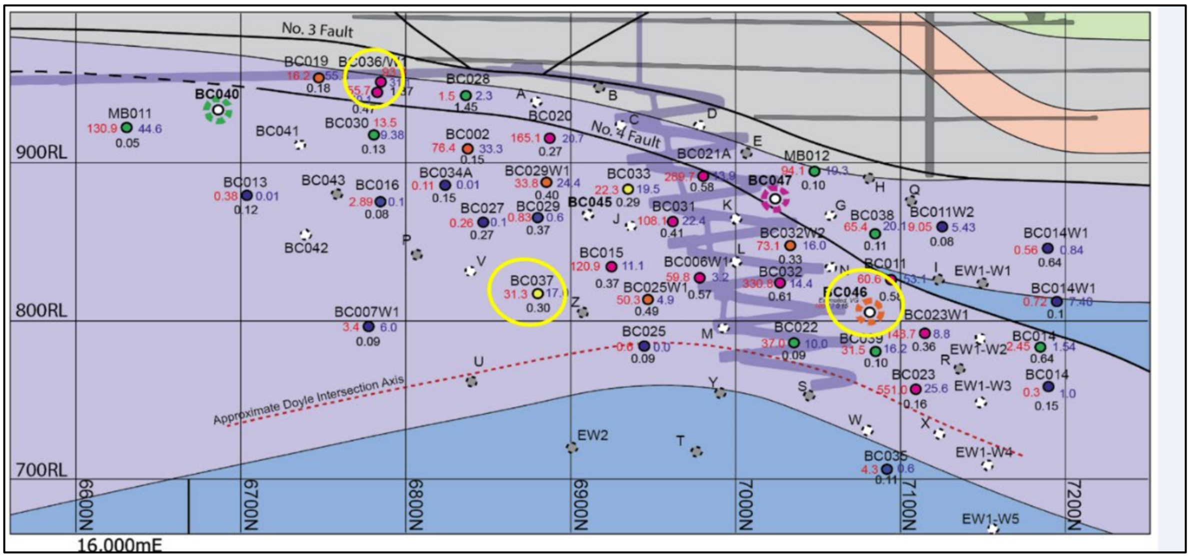

Figure 13-2: Youle low-grade testwork sample locations

13.2 Ore blend effect on throughput and recovery forecasts

Beginning January 2014, Cuffley ores were processed in a blend with Augusta ores (previously only Augusta ore was processed). From 2018 onwards, the feed blend also incorporated Brunswick ore. The following historical blend ratios of Augusta, Cuffley and Brunswick ores and the proposed forward LoM blend are shown below.

- 2014: 44% Augusta and 56% Cuffley
- 2015: 42% Augusta and 58% Cuffley
- 2016: 52% Augusta and 48% Cuffley

- 2017: 64% Augusta and 36% Cuffley
- 2018: 72% Augusta, 21% Cuffley and 7% Brunswick (Brunswick from Q3)
- 2019: 38% Augusta, 5% Cuffley, 47% Brunswick and 10% Youle
- LoM 2020: Brunswick: Youle approximately 50:50 until June 2020 with Youle >75% of mill from July 2020 onwards.

Throughput and recovery data from 2014–2018 have been used to predict mill performance, given the similar (marginally superior) performance of the Youle samples in testwork, and the forecast ore blend to be processed in the forward LoM. This assumes ores of similar lithology and oxidation state operating under similar processing conditions and feed grades.

However, there was a divergence in predicted mill performance, for gold, in 2019 due to the introduction of Brunswick ore into the mill feed to represent a significant 47% of the blend. The effect of the Brunswick mill feed component has been incorporated into a head grade versus recovery model for gold to enable a prediction of plant performance through to June 2020, for which time the Brunswick ore will comprise a significant proportion of mill feed. After this period, from July 2020 onwards, the previous mill data and associated recovery algorithm from 2016–2018 is applied to determine the head grade versus gold recovery predictions for the remaining LoM for which Youle feed dominates.

13.3 Throughput

SRK considers historical throughput to be the best indicator of future forecast throughput when processing similar ores. Through ongoing optimisation and minor low-capital-cost debottlenecking projects, the capacity has been increased to the current 2016–2019 capacity which can consistently exceed 13,000 t/month and regularly approaches 14,000 t/month. This can be seen in Figure 13-3. It shows a reduction in plant throughput in the latter half of 2019, as the mine supply became a restriction and the scats stockpile (previously providing up to 400t/month in 2018) became depleted, i.e. it was not a mill constraint. Similar mine production limitations of approximately 11,000 t/month are expected through to April 2020, returning to levels of 13,000 t/month for the remainder of the year.

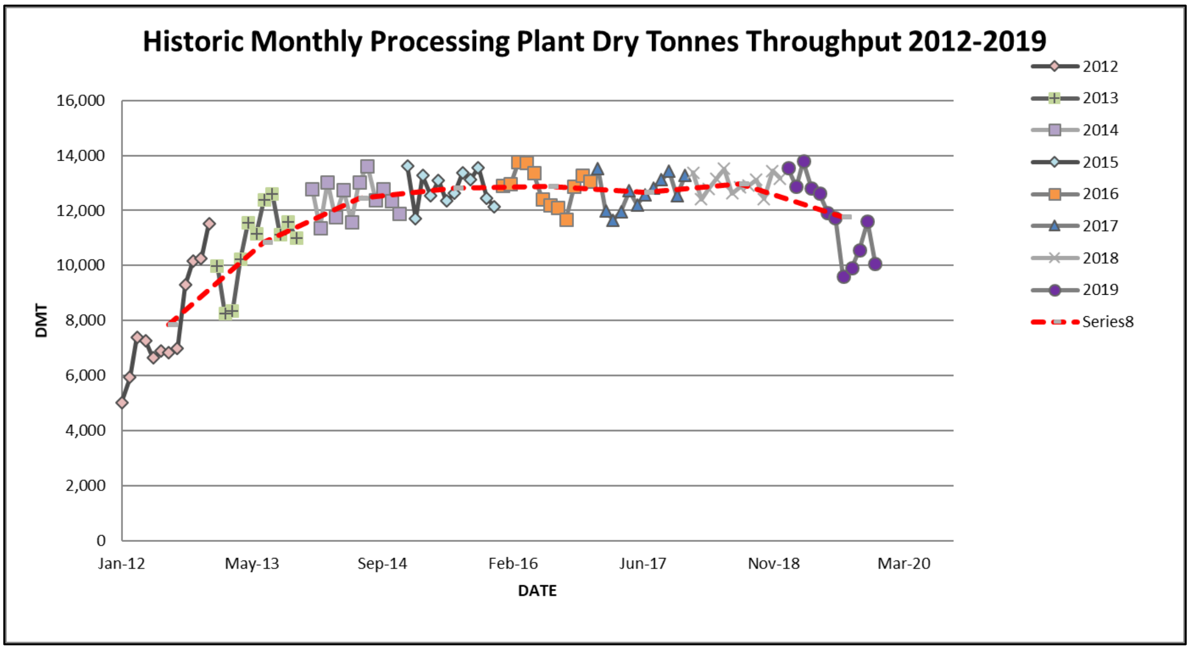

Figure 13-3: Historical Brunswick Processing Plant throughput April 2007 to December 2019

The Costerfield production forecast is for an average throughput of 12,591 t/month (151 ktpa). In SRK's opinion the mill capacity exceeds this forecast and can match the underground mining rate. This trend continues for the remaining LoM to 2023. SRK considers the forecast production rates to be defendable and well supported by historical production. The plant will be operating below capacity so provides production upside if additional ore is introduced into the LoM plan.

There is further capacity on the existing RoM pad if required. Historically, RoM stocks have been built up to allowing for fluctuations in mining production and this remains a processing option to provide further production flexibility.

13.4 Recovery

Forecast antimony and gold recoveries used for LoM planning and economic modelling is based on feed grades, historical recoveries and concentrate grade relationships developed from historical production data. This is the best method of forecasting throughput on the same ore blend. More specifically, the historical recoveries from 2014 to 2019 have been used for forecasting the forward LoM.

With the addition of the Youle ores into the LoM plan, additional confirmatory testwork has been undertaken to ensure the behaviour of the new addition to the feed blend. Subsequent batch campaigns of Youle underground development ore of approximately 1,500 tonnes and 2,200 tonnes have confirmed higher percentages of gravity-recoverable gold and improved gold flotation recoveries and hence, total gold recovery. The Youle performance has been incorporated into recovery algorithms used to forecast the LoM antimony and gold recoveries. Further discussion is provided below.

13.4.1 Grade versus recovery trends

The antimony and gold grade versus recovery trends from January 2017 to December 2019 are provided in Figure 13-4. There is a relationship between the head grade and the recovery for both gold and antimony. This is a common phenomenon across flotation-type concentrators and, because of a (relatively) constant tail grade, for antimony and less so for gold.

The 2016–2018 monthly gold grade versus recovery data has been used to establish a relationship between the gold feed grade and gold in tailings, as shown in Figure 13-5. This relationship has been effective in predicting the total gold recovery historically but less so for the 2019 production year. The introduction of Brunswick into the feed blend in 2019 resulted in lower gravity gold recovery and slower gold flotation kinetics. This was underestimated in the metallurgical testwork. An alternate gold-in-feed versus tailings recovery relationship was compiled from the 2019 production year data. This was used to develop an alternative recovery model to account for the inclusion of Brunswick feed in the mill.

Development of specific relationships used for forecasting both antimony and gold recovery is discussed further below.

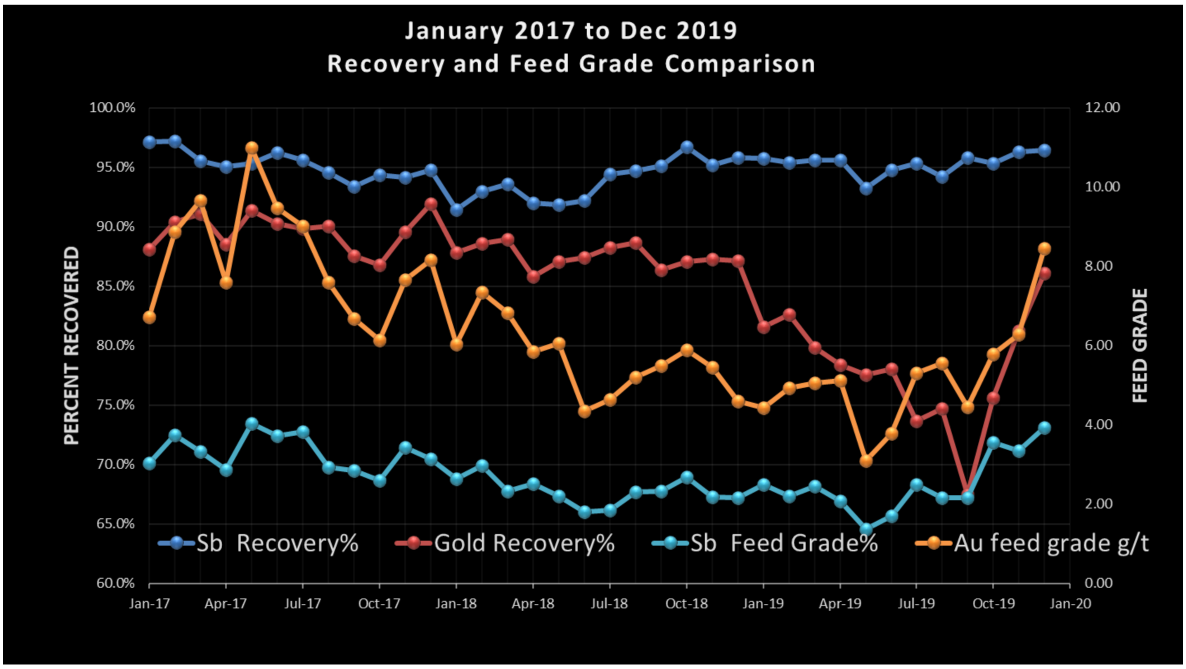

Figure 13-4: Feed grade vs recoveries 2017 to 2019

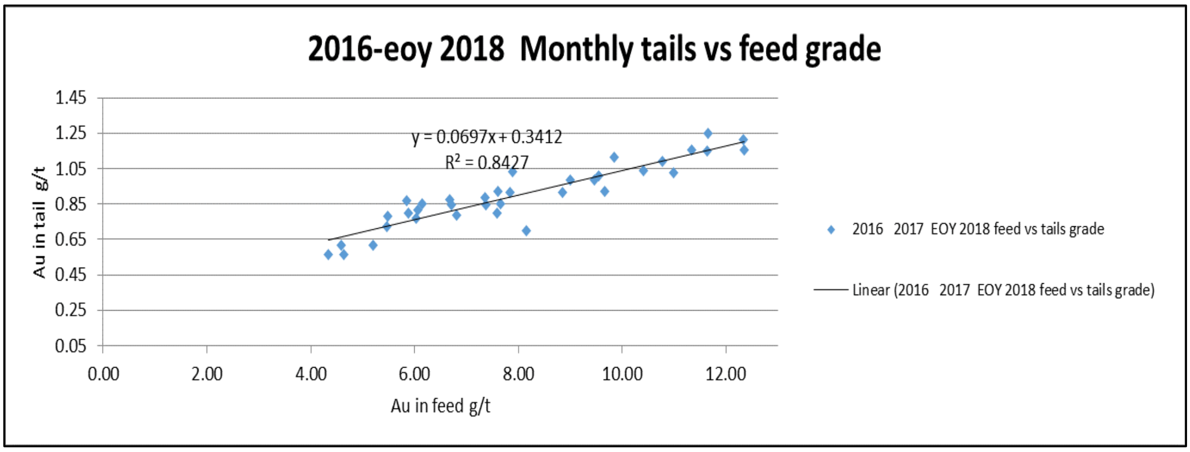

Figure 13-5: Gold in feed vs gold in tail 2016–2018

13.4.2 Antimony recovery

An antimony recovery relationship was developed based on the interaction between the feed head grade, concentrate grade (yield upgrade) and recovery using historical operating data. This was updated again in 2019 using the daily 2015 to mid-2019 operating data. The production data for 2019 has again been assessed in the same recovery model and it continues to support the ongoing use of the antimony recovery algorithm. It has proven to be a robust predictor of antimony recovery over the years and continues to have a high correlation coefficient.

The antimony head grade recovery relationship, updated to mid-2019, includes the marginally better antimony recovery data from Brunswick in the relationship. This updated relationship predicts higher antimony recovery, which is aligned with actual plant performance.

The recent historical and forecast Sb mass-weighted recoveries for the LoM were/ are:

- 2015 actual Sb recovery = 95.1% at a 4.0% Sb feed grade
- 2016 actual Sb recovery = 95.4% at a 3.7% Sb feed grade
- 2017 actual Sb recovery = 95.3% at a 3.3% Sb feed grade

- 2018 actual Sb recovery = 93.8% at a 2.3% Sb feed grade
- 2019 actual Sb recovery = 95.3% at a 3.9% Sb feed grade
- LoM model (2020–2023) = 94.5% Sb recovery at a 2.64% Sb feed grade.

SRK notes that the average concentrate antimony grade dropped marginally to 52.4% in 2017, 52.21% in 2018 and dropped to 51.4% in 2019, due to a lower feed grade, in order to maintain recovery. This marginally lower concentrate grade of 51.5% Sb will be targeted in the LoM for the same reason.

Because of the confidence in this relationship and the associated antimony recovery algorithm across a range of feed grades, SRK considers it to provide the best means of estimating the antimony recovery at variable head grades assuming a constant final antimony concentrate grade of 51.5%, the value used in the remaining LoM plan.

13.4.3 Gold recovery

Using the daily 2016–2018 operating data, a similar gold recovery relationship was developed for the gold reporting to the antimony concentrate based on the interaction between the flotation feed grade, concentrate grade and recovery. It too has a strong correlation coefficient. However, the flotation recovery only makes up part of the overall gold recovery as typically 20–40% (absolute) reports to the gravity gold concentrate. The gravity gold recovery has a relatively high level of variability complicating the application of the flotation gold recovery relationship to forecast the overall gold recovery.

Previously the overall gold recovery was relatively independent of gravity recovery, i.e. what was not recovered initially through the gravity circuit was recovered through flotation. However, the introduction of the Brunswick underground ores, with slower floating gold-associated arsenopyrite, resulted in lower gravity gold recovery and lower flotation gold recovery.

Models incorporating the 2019 recovery data, and hence accounting for the Brunswick ores, have been used to forecast the total gold recovery to mid-2020 after which time, the percentage of Brunswick ores in the blend rapidly falls away. At this point (July 2020) the gold recovery algorithms revert to the previous 2016–2018 models which were previously demonstrated to be robust and good predictors.

A gravity gold recovery of 30% has been assumed for the lower gravity recoverable gold in Brunswick ores to June 2020. From July 2020, a higher gravity gold recovery of 40% is used as it is predominantly Youle feed. This is based on the Youle metallurgical testing results reported in Table 13-1, which demonstrated good gravity gold recovery potential, and is supported by production data generated from the Youle underground development ore milling campaigns performed in October and November 2019. These achieved over 40% gravity gold recovery in these Youle-only feed campaigns.

The 2015–2018 gold recovery data used to develop the algorithms for LoM recovery forecasting from July 2020 are provided below:

- 2015 actual – total gold recovery of 89.8% and gravity recovery of 34.0% at a 10.7 g/t head grade (resultant tailings grade of 1.17 g/t, and flotation recovery of 55.8%)
- 2016 actual – total gold recovery of 90.1% and gravity recovery of 35.7% at a 10.3 g/t head grade (resultant tailings grade of 1.08g/t, and flotation recovery of 54.3%)
- 2017 actual – total gold recovery of 89.8% and gravity recovery of 37.4% at an 8.2 g/t head grade (resultant tailings grade of 0.90g/t, and flotation recovery of 52.4%)
- 2018 actual – total gold recovery of 87.5% and gravity recovery of 34.4% at a 5.6 g/t head grade (resultant tailings grade of 0.70g/t and flotation recovery of 53.2%).

The 2019 gold recovery data used to June 2020 is based on:

- 2019 actual – total gold recovery 78.7% and gravity recovery of 23.3% at a 5.12 g/t head grade (resultant tailings grade of 1.14 g/t and flotation recovery of 55.4%).

The LoM model forecast gold recoveries weighted averages are:

- LoM model (2020–2023) = 89.6% at a 11.62 g/t head grade
- LoM model (2020–2023) fixed gravity gold recovery assumption of 30% (Brunswick–Youle blend) and 40% (Youle only).

SRK has confidence in the methodology used to forecast the gold recoveries and the use of historical operating data, supplemented with verifying metallurgical testwork.

13.4.4 Throughput effect on recovery

Figure 13-6 shows the mill throughput was relatively consistent from 2017 to 2019, up to the first quarter of 2019, after which mine limitations restricted the throughput. Based on historical data, the antimony recovery has been robust to changes to mill throughput up to 14,000 t/month. This trend is expected to continue.

The gold recovery versus throughput relationship is less clear and there is evidence to show a flotation residence time restriction has negative implications on the gold recovery due to the slower floating gold-associated arsenopyrite, characteristic of Brunswick ores. The inclusion of the new StackCell® (flotation cell) as a primary rougher in the flotation plant is expected to improve the Brunswick ore flotation recoveries by providing increased residence time and improved kinetics of flotation. In any case, the Brunswick ores are depleted by the end of 2020, at which time Youle becomes the sole feed source. Youle demonstrates better gold recovery behaviours more typical of historical Cuffley and Augusta ores.

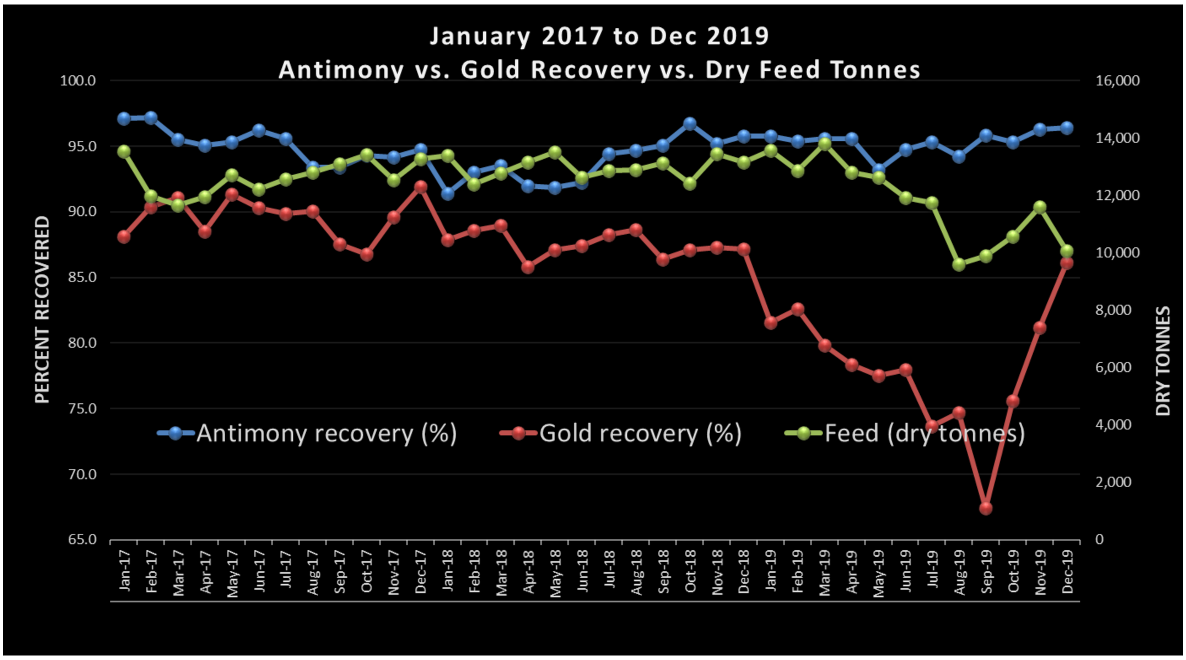

Figure 13-6: Metallurgical Recoveries vs throughput for the Cuffley/ Augusta/ Brunswick ore blend 2017 to 2019

14 Mineral Resource estimates

14.1 Introduction

Gold and antimony grades and lode thicknesses were estimated using the 2D accumulation method for all lodes. The 2D accumulation method requires that gold and antimony grades are multiplied by true thickness to give a gold and antimony accumulation. This method assigns weights to composites of different lengths during estimation. The estimated grade is then back-calculated by dividing estimated gold accumulation and estimated antimony accumulation by estimated true thickness.

The Brunswick and Youle models were updated during 2019. All other models have not been re-estimated, due the absence of new data being captured during the year within these areas. Additionally, eight low-grade models have been removed from the resource following a review of independent viability. During this review, lower-grade models in which the grade was above resource cut-off were flagged, then assessed against the cost of mining in that particular area. In some cases, the amount of rehabilitation and access to the area added significant cost that could not be covered by the revenue of metal that could have been recovered. Table 14-1 is a summary of the changes made to the models within this estimate.

Table 14-1: Changes made to models at year-end 2019

Lode	Zone Code	New data captured during 2019	New Estimation	New Resource Classification	Depleted during 2018	Reported above cut-off	Removed from Resource
E Lode	10	No	No	No	Yes	Yes	No
B Lode	15	No	No	No	No	Yes	No
BSP Lode	16	No	No	No	No	Yes	No
W Lode	20	No	No	No	Yes	Yes	No
C Lode	30	No	No	No	No	Yes	No
NM Lode	40	No	No	No	No	Yes	No
NE Lode	41	No	No	No	Yes	Yes	Yes
NV Lode	43,44	No	No	No	No	Yes	Yes
NSW Lode	45	No	No	No	No	Yes	Yes
NSP 49 Lode	49	No	No	No	No	Yes	Yes
NSP 39 Lode	39	No	No	No	No	Yes	Yes
NSP 48 Lode	48	No	No	No	No	Yes	No
NW Lode	47	No	No	No	No	Yes	No
P1 Lode	55	No	No	No	No	Yes	No
P2 Lode	56	No	No	No	No	Yes	Yes
K Lode	60	No	No	No	Yes	Yes	No
CM Lode	210	No	No	No	Yes	Yes	No
CE Lode	211	No	No	No	No	Yes	No
CD Lode	220	No	No	No	No	Yes	No
CDL Lode	225	No	No	No	No	Yes	No
CS Lode	212	No	No	No	No	Yes	Yes
CSE Lode	213	No	No	No	No	Yes	Yes
AS Lode	230	No	No	No	No	Yes	No
Brunswick	300	Yes	Yes	Yes	Yes	Yes	No
Brunswick KR	310	Yes	Yes	Yes	No	Yes	No
SKC C	410	No	No	No	No	Yes	No
SKC CE	400	No	No	No	No	Yes	No

Lode	Zone Code	New data captured during 2019	New Estimation	New Resource Classification	Depleted during 2018	Reported above cut-off	Removed from Resource
SKC LQ	405	No	No	No	No	Yes	No
SKC W	420	No	No	No	No	Yes	No
Youle	500	Yes	Yes	Yes	Yes	Yes	No
Youle East	501	Yes	Yes	Yes	Yes	Yes	No
Youle Splay	502	Yes	Yes	Yes	No	Yes	No
Doyle	510	No	No	No	No	Yes	No

For sample statistics, top-cutting and estimation parameters of models not updated during this estimation, last years' NI 43-101 report can be referenced (Fairfield et al., 2019). From here on the models not re-estimated at 2019 year-end are called '2019 models'.

14.2 Diamond drillhole and underground face sample statistics

Statistics for gold and antimony grades and true thickness for lodes newly re-estimated are presented in Table 14-2.

The tabulated data shows the unweighted average gold and antimony grade being higher within the face sample data than the drillholes. This is attributed to two factors:

1. Face sample data is collected representatively within ore drives but these ore drives exist only in areas of the deposit that are deemed economically viable. Therefore, the average grade of these samples is expected to be higher than that of the drilling data, which includes intercepts within areas that will never be mined, as they are deemed to be sub-economic.
2. When drill core is sampled, the core is cut at an angle perpendicular to the long axis of the core rather than along the boundary of the targeted vein. The sample is taken so that the entire vein is within the sample therefore there is invariably a wedge of waste rock that is included with the lode sample. During face sampling, the material is only collected within the vein boundary. This difference in sampling manifests as lower average grades and higher average widths within drill data when compared to face sample data. The contained metal calculated through each sampling method is the same.

Table 14-2: Face and diamond drilling sample statistics

Lode	Type	Variable	No. of samples	Min.	Max.	Mean	CV
Brunswick	Drillhole	Au (g/t)	159	0.010	115.7	8.4	1.6
		Sb (%)		0.001	47.4	3.9	1.8
		Vein width (m)		0.034	3.3	0.8	0.8
	Face sample	Au (g/t)	914	0.010	330.0	23.6	1.2
		Sb (%)		0.001	67.2	11.0	1.1
		Vein width (m)		0.005	3.2	0.6	1.0
Youle	Drillhole	Au (g/t)	85	0.001	4000.0	100.2	4.3
		Sb (%)		0.001	56.6	12.7	1.1
		Vein width (m)		0.054	3.1	0.5	0.9
	Face sample	Au (g/t)	49	0.410	337.0	77.1	1.1
		Sb (%)		0.070	63.8	33.0	0.7
		Vein width (m)		0.045	2.4	0.5	1.0

14.3 Data interpretation and domaining

Each lode structure has been modelled separately with a numeric zone code applied to each (Table 14-1). The identified intervals within both drill data and face sample data are incorporated into a wireframe of the lode structure. This wireframe is then used to flag the selected data with the corresponding zone code. The assays are then composited over the full width of the intersections. Data and observations from drill logs, core photography, underground face mapping, face photography and backs mapping were considered during the process of wireframe modelling.

Subdomaining of NM, CM, CD, Brunswick, AS and Youle Lodes was required to separate high-grade and low-grade populations to an acceptable degree. Structural controls on mineralisation were analysed to help determine where a break in subdomain boundary was located (Figure 14-1).

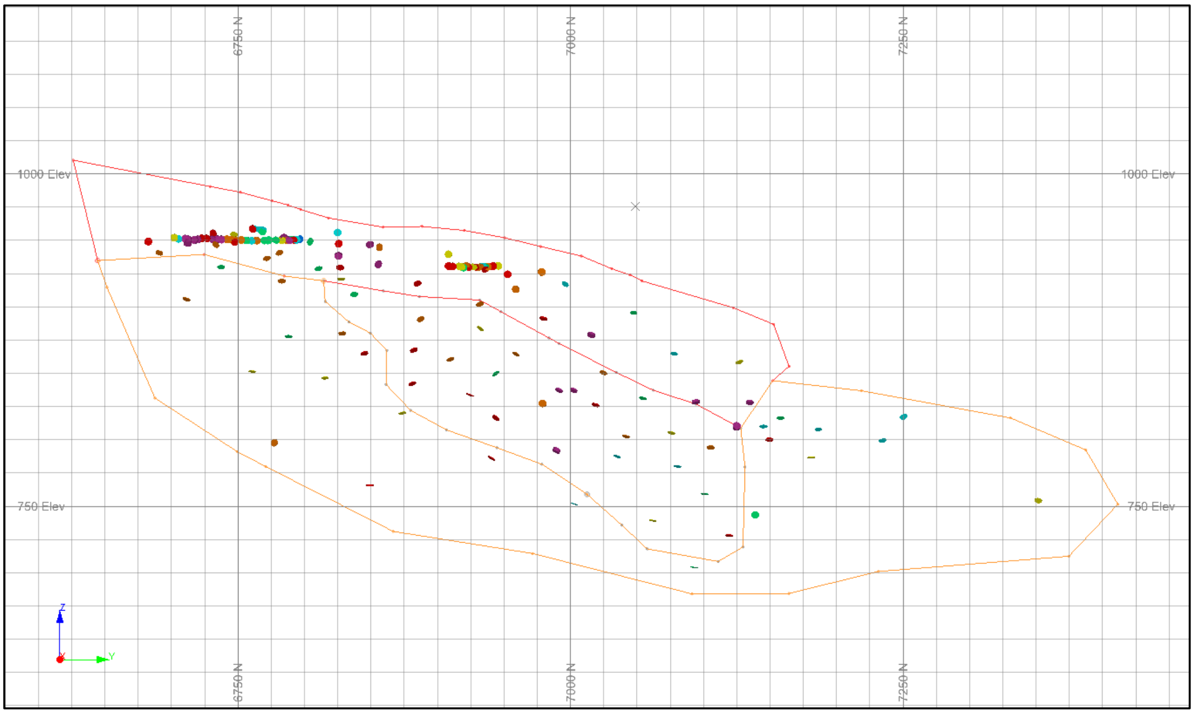

Figure 14-1: Long section of Youle Lode showing subdomains informed by structural controls on mineralisation

14.4 Grade capping

Statistical analysis of each subdomain was completed to identify extreme values that may cause overestimation. Histograms and log probability plots were used to determine appropriate grade caps for gold accumulation, antimony accumulation and true thickness. Grade cap values and their effect on sample statistics are summarized in Table 14-3.

Table 14-3: Sample statistics before and after top-cuts

Variable	Lode	Domain	Top-cut	No. samples	No. cut samples	Variable	Min.	Max.	Mean	CV
AuAcc	Brunswick	1	75	649	9	Uncut	<0.001	212.77	10.466	1.696
						Cut	<0.001	75	9.896	1.42
SbAcc	Brunswick	1	40	649	8	Uncut	<0.001	52.424	5.062	1.629
						Cut	<0.001	40	4.971	1.568
True Thickness	Brunswick	1	3	649	1	Uncut	0.005	4.21	0.585	0.918
						Cut	0.005	3	0.582	0.896
AuAcc	Brunswick	2	10	69	2	Uncut	<0.001	29.645	2.271	1.898
						Cut	<0.001	10	1.9	1.335
SbAcc	Brunswick	2	5	69	3	Uncut	<0.001	7.926	1.032	1.574
						Cut	<0.001	5	0.948	1.402
AuAcc	Brunswick	3	60	355	5	Uncut	0.003	80.754	10.466	1.284
						Cut	0.003	60	10.34	1.247
SbAcc	Brunswick	3	35	355	2	Uncut	0.001	52.45	5.149	1.359
						Cut	0.001	35	5.075	1.298
AuAcc	Brunswick KR	-	50	31	2	Uncut	0.041	177.68	14.279	2.528
						Cut	0.041	50	8.449	1.675
SbAcc	Brunswick KR	-	17	31	2	Uncut	0.001	33.835	4.561	1.767
						Cut	0.001	17	3.73	1.488
True Thickness	Brunswick KR	-	2	31	3	Uncut	0.061	3.77	0.811	1.051
						Cut	0.061	2	0.728	0.863
AuAcc	Youle	1	90	27	1	Uncut	0.35	226.85	30.63	1.51
						Cut	0.35	90	25.56	1.08
True Thickness	Youle	1	1.4	27	1	Uncut	0.09	2.31	0.54	0.92
						Cut	0.09	1.4	0.5	0.77
AuAcc	Youle	2	130	84	7	Uncut	<0.001	217.17	35.93	1.46
						Cut	<0.001	130	31.77	1.3
SbAcc	Youle	2	35	84	4	Uncut	<0.001	57.58	11.18	1.05
						Cut	<0.001	35	10.53	0.92
AuAcc	Youle	3	5	23	1	Uncut	<0.001	7.16	1.46	1.42
						Cut	<0.001	5	1.37	1.34
AuAcc	Youle E	1	27	41	1	Uncut	0.009	37.105	5.863	1.419
						Cut	0.009	27	5.616	1.331
SbAcc	Youle E	1	15	41	1	Uncut	0.002	19.123	4.893	0.983
						Cut	0.002	15	4.792	0.947
True Thickness	Youle E	1	1	41	1	Uncut	0.03	1.39	0.267	1.086
						Cut	0.03	1	0.258	0.998
AuAcc	Youle E	2	7	9	1	Uncut	0.026	12.99	2.442	1.817
						Cut	0.026	7	1.776	1.331

14.5 Estimation domain boundaries

Structural controls on mineralisation have been identified through underground mapping and structural interpretation of drill core. For Youle, Youle Splay, Youle East and Brunswick lodes, these relationships have been used to guide estimation domain boundaries, all of which are hard boundaries (Figure 14-2 to Figure 14-4).

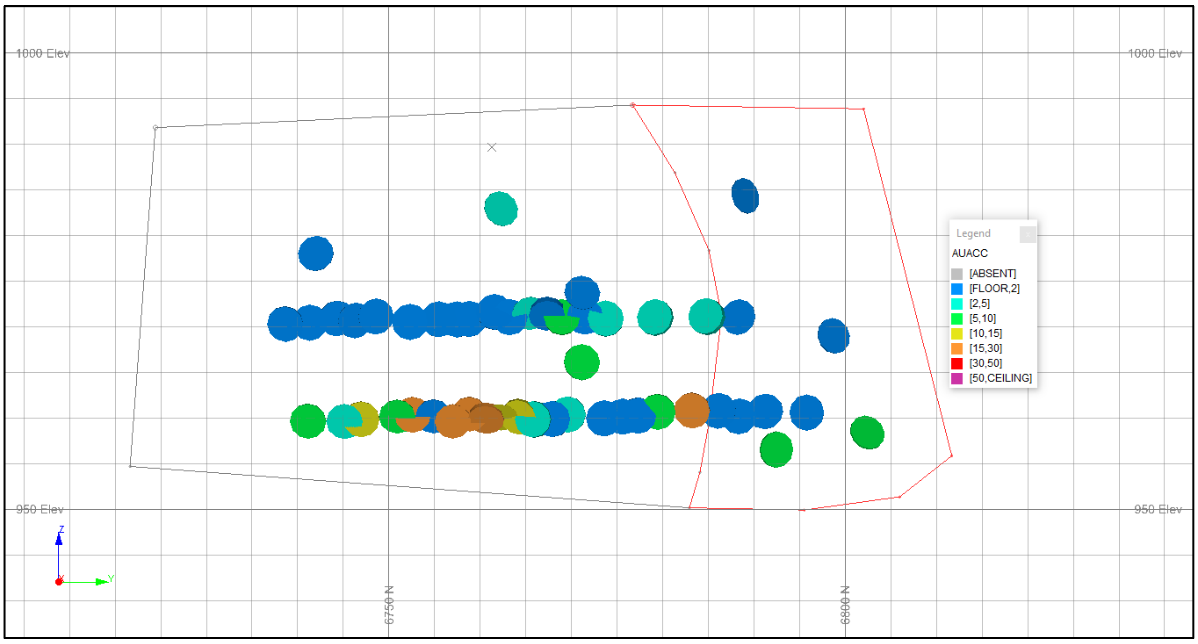

Figure 14-2: Youle East estimation domain boundaries and composite samples

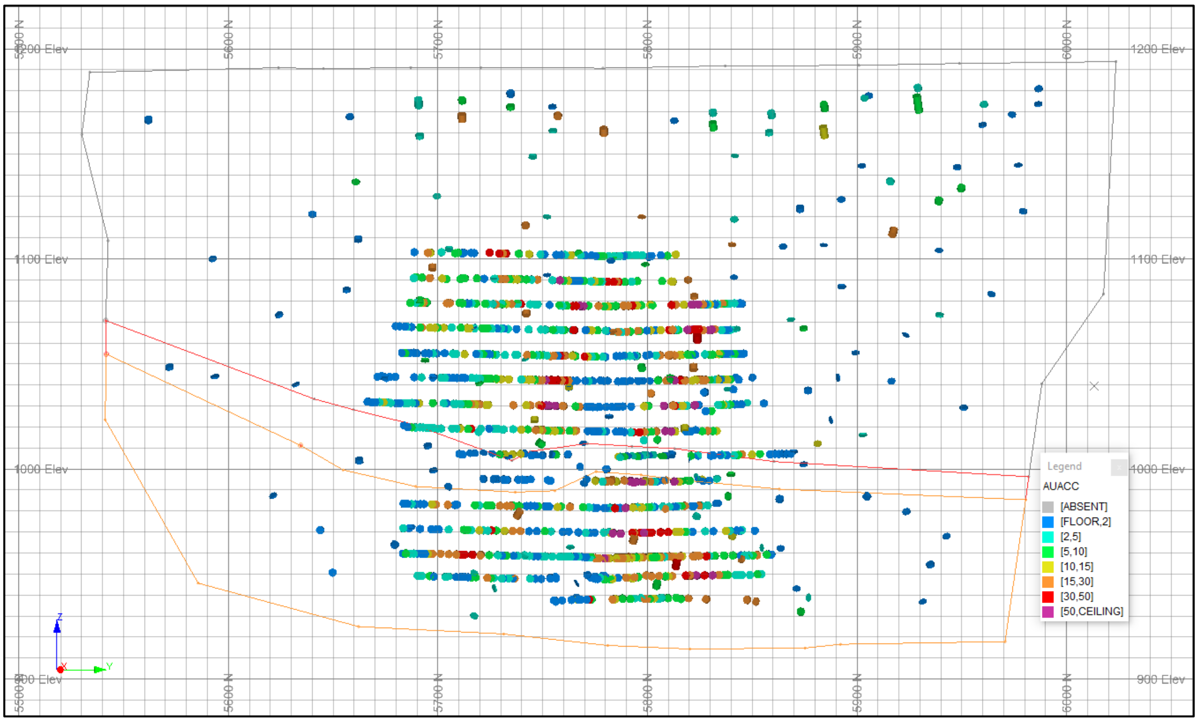

Figure 14-3: Brunswick Lode estimation domain boundaries and composite samples

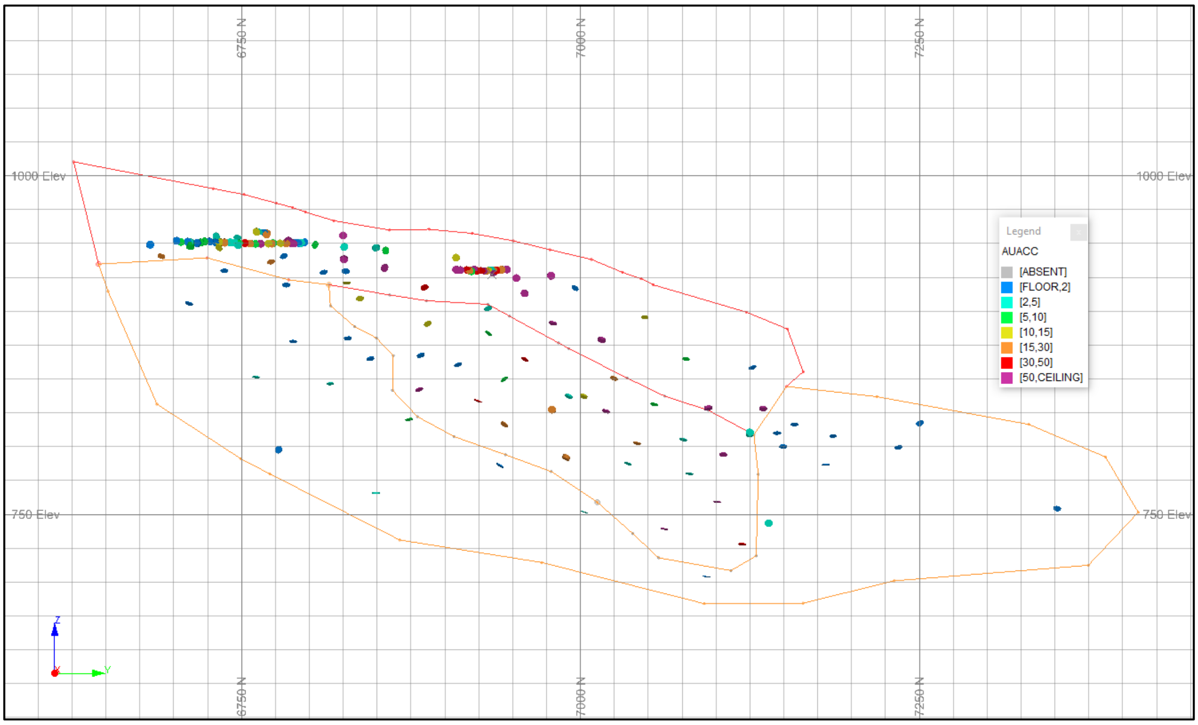

Figure 14-4: Youle Lode estimation domain boundaries and composite samples

14.6 Vein orientation domains

In order to use the 2D method to estimate true thickness from the drillhole intersections and convert the 2D tonnes and grade estimates to 3D tonnes and grade estimates, dip and dip-direction domains were interpreted in long section. Dip and strike domains were identified visually from the wireframe of the lode structure. The dip and strike of each domain was found by adjusting a plane to best fit the dip and strike of the domain. The details of this plane were then recorded and added to the drill data within the particular domain.

These dip and strike domains are used to create volume correction factors within the Z and Y directions using the following formula:

- Z Correction Factor = 1/sin (dip)
- Y Correction Factor = Absolute (1/sin (strike))
- Volume Correction Factor = Z Correction Factor × Y Correction Factor.

The vein orientation domains are numbered and illustrated for Youle in Figure 14-5.

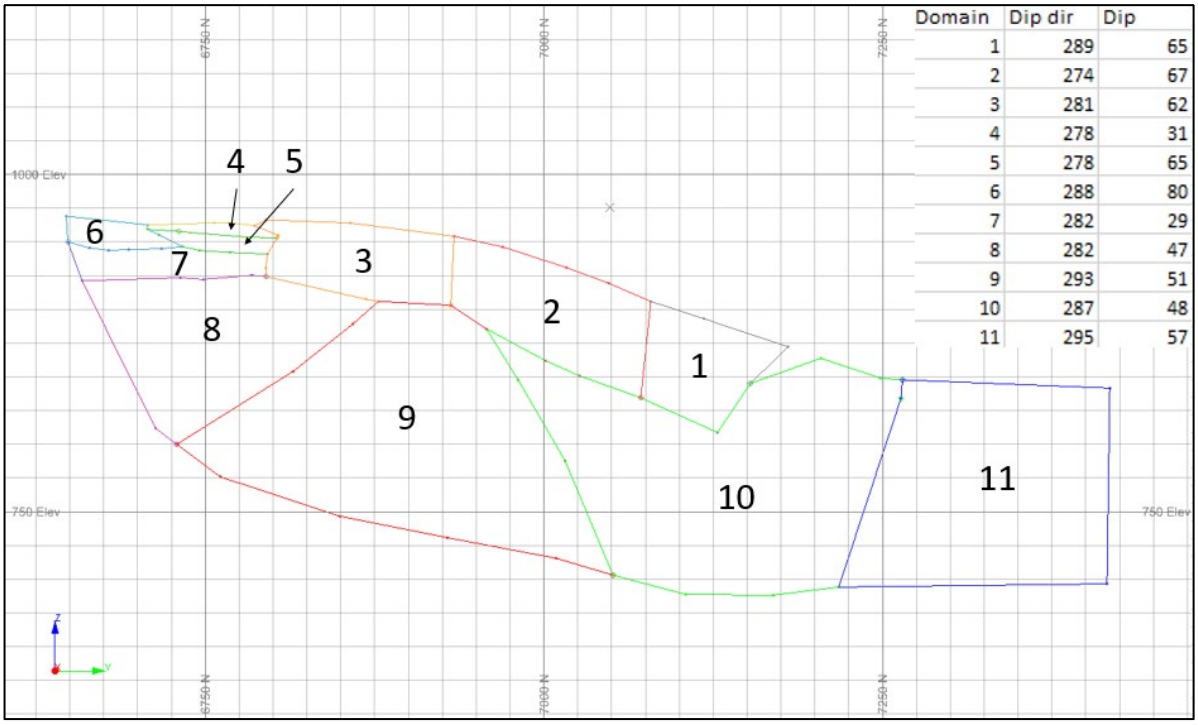

Figure 14-5: Youle Lode dip and dip direction (dip/ dip direction) domains

14.7 Bulk density determinations

Estimation of bulk density was assessed using two methods as described below.

Bulk density (BD) for both Augusta and Cuffley was estimated for the analysed antimony grade using the following formula, which is based on the stoichiometry of stibnite and gangue.

BD (t/m^3) = ((1.3951*Sb%)+(100-(1.3951*Sb%)))/(((1.3951*Sb%)/4.56)+((100-(1.3951*Sb%))/2.74)).

Bulk density determinations of drill core samples using a water immersion method were measured. The samples used were whole pieces of diamond drill core, which were not coated in wax.

Figure 14-6 shows the measured bulk density values compared with the values calculated using the bulk density formula above. The bulk density determined from the immersion method shows a good concordance with the calculation.

For the Mineral Resource estimate, bulk density was assigned using the formula method, in line with previous estimates.

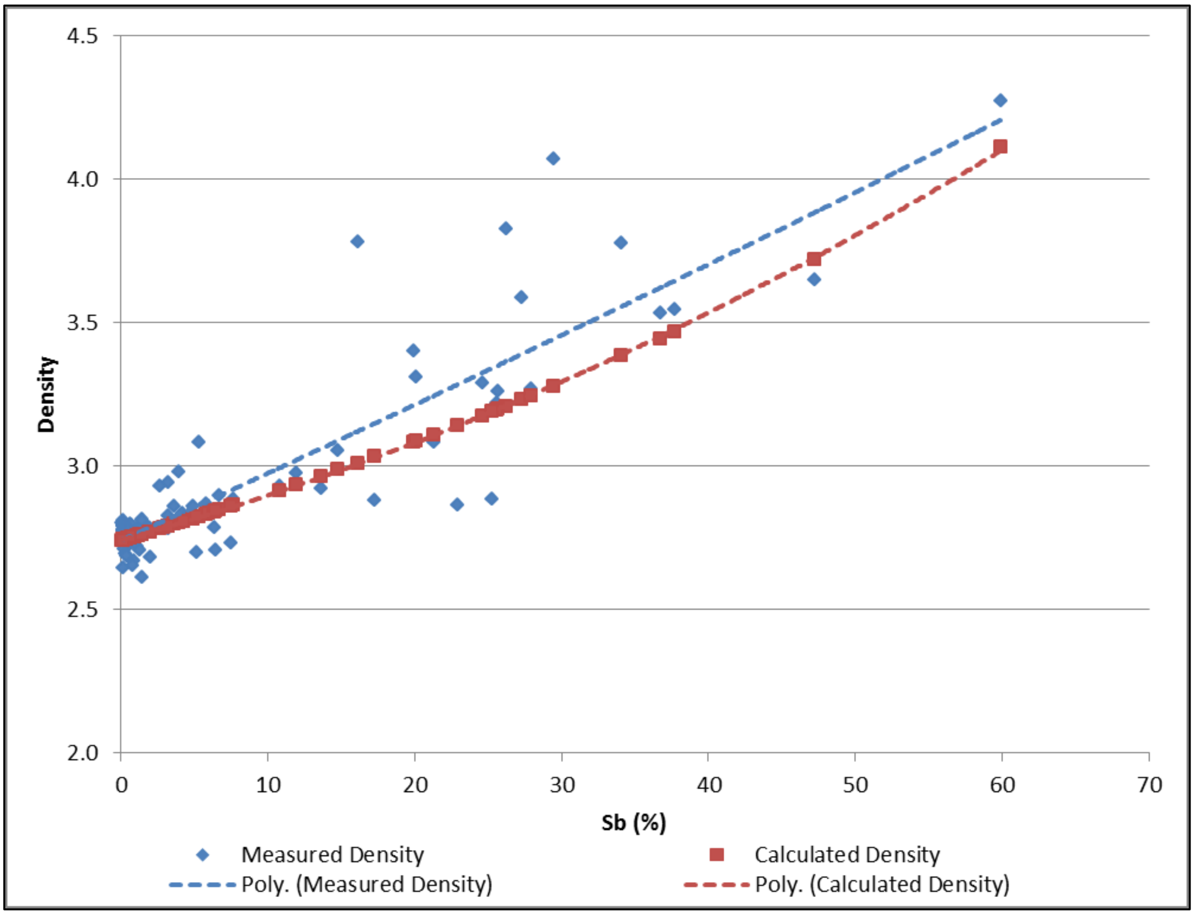

Figure 14-6: Bulk density determinations

The waste rock density of 2.74 t/m^3 has been averaged from 430 samples of drill core taken over a 2-year period exhibiting assays of below 0.01% Sb.

14.8 Variography

Variographic analysis was carried out on the combined composited face and drillhole samples for true thickness, gold accumulation and antimony accumulation. The aim was to identify the directions of continuity of grade and thickness, and to assist in the selection of search ranges. Variography was undertaken in two dimensions after projecting the data to a constant easting.

Anisotropic normal score variograms were modelled on individual and grouped domains where required. Variograms were produced using *Supervisor v8.12* software after top-cutting had taken place. The orientation of best continuity in grade accumulation and thickness was selected based on variographic analysis, verified by observations made during underground mapping and used to create ellipse wireframes to be compared with composite long sections. The nugget was estimated using the omnidirectional variogram at short lags. In all instances, the minor direction was set to a sufficiently large arbitrary value. Examples of experimental, final back-transformed variograms are illustrated in Figure 14-7 to Figure 14-10.

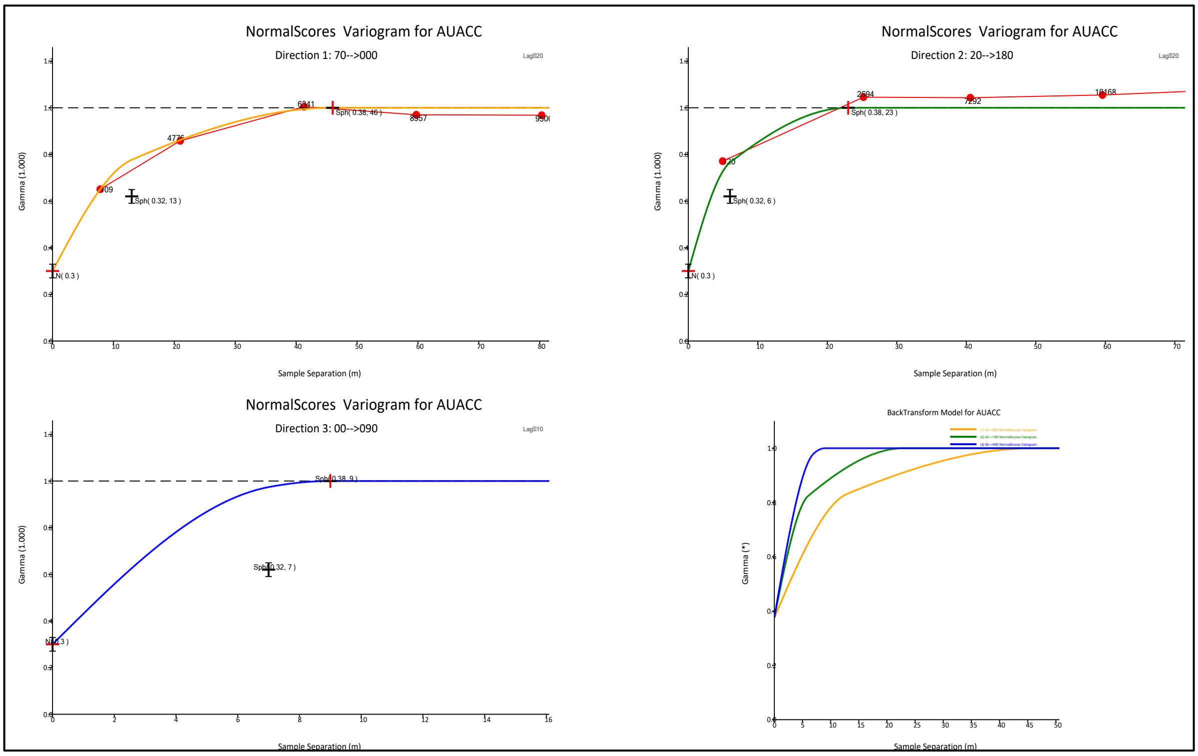

Figure 14-7: Brunswick AuACC variograms

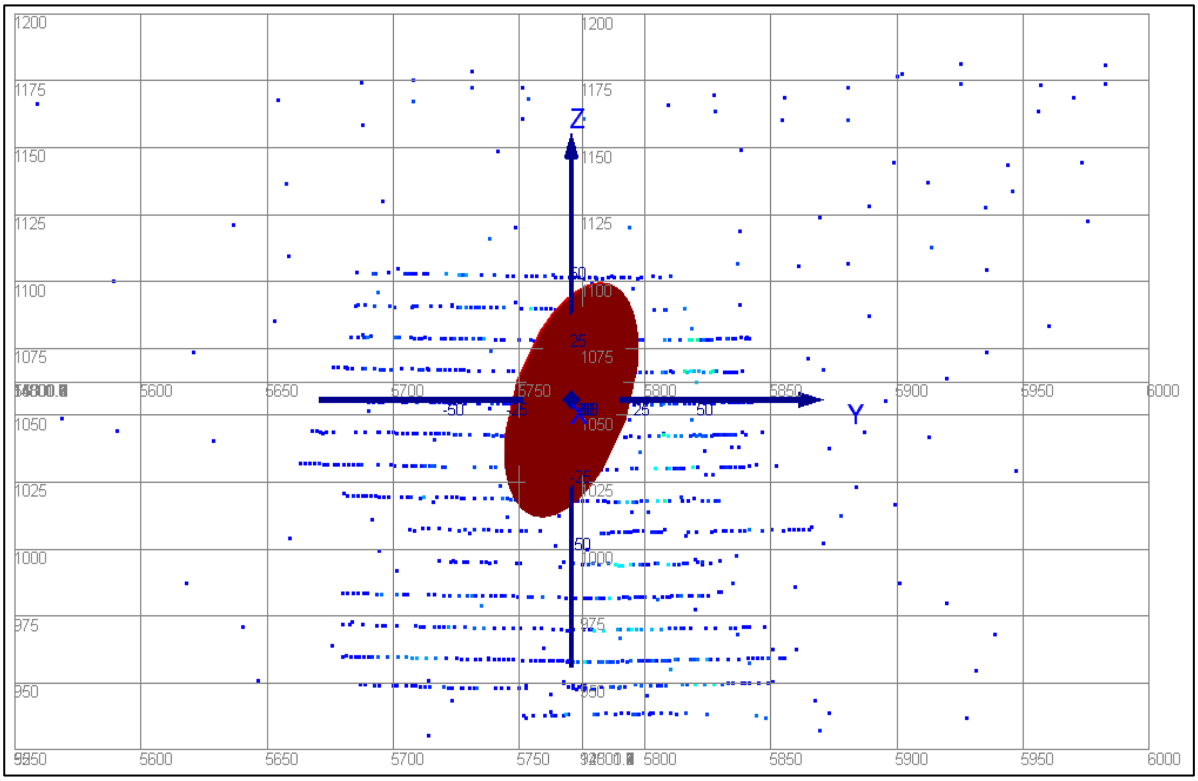

Figure 14-8: Long section view of Brunswick composites and orientation of AuACC variogram

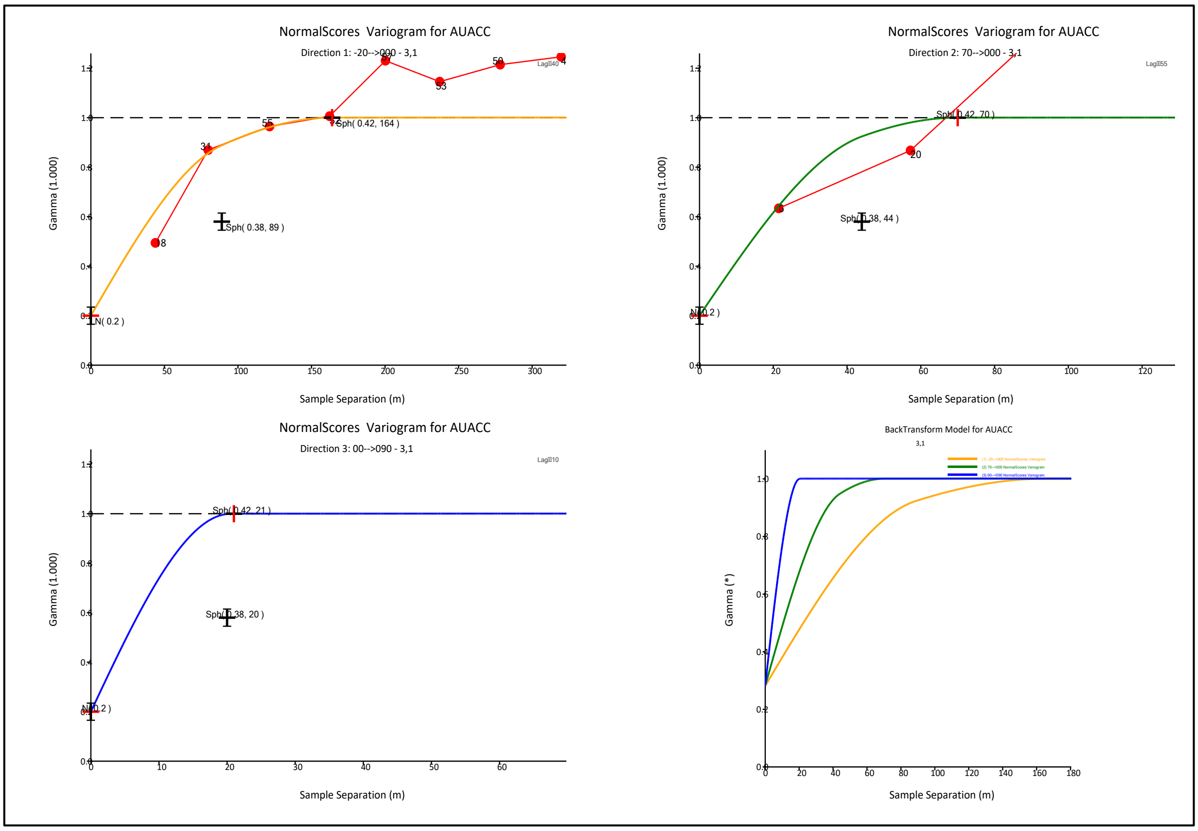

Figure 14-9: Youle grouped domains 1 & 3 AuACC variograms

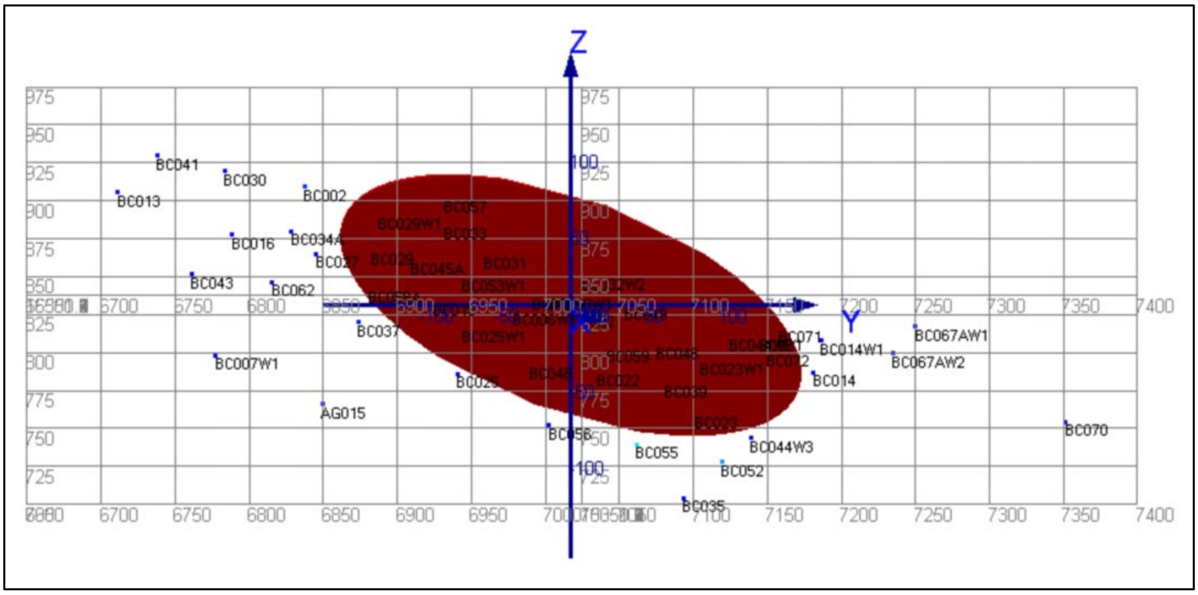

Figure 14-10: Long section view of Youle grouped domains 1 & 3 composites and orientation of AuACC variogram

14.9 Estimation parameters

True thickness, gold accumulation and antimony accumulation were estimated in the 2D vertical plane using ordinary kriging (OK) for all domains except Youle Splay, where an inverse distance squared method was applied. All search ellipses used for this method were orthogonal to the block model direction.

The following summarizes the Mineral Resource estimation process:

- Drillhole and face samples were projected into an arbitrary vertical plane.
- The orientation of the major and semi-major directions of the search ellipsoid for each lode was guided by the maximum continuity observed in the variography.
- The anisotropy of the search ellipsoid for each lode was guided by the anisotropy observed in the grade and thickness distribution.

The variogram parameters for the models estimated at year-end 2019 are listed in Table 14-4. Each estimate involved three search passes with increasing search ellipse diameters on the second and third pass, as listed in Table 14-5.

Estimation was undertaken using a combined dataset of face sample and drillhole data. In some instances, drillhole collar and survey data were manipulated to account for known and quantified survey errors within the mine. Where grade domains were present, estimation was completed separately within each domain. Both hard and soft boundaries were used during estimation to allow high-grade domains to be informed by low-grade domains. Low-grade domains used hard boundaries. The domains were then cut to their boundaries and combined to complete the model.

The resource was based on a minimum true lode width of 1.2 m, which is the practical minimum mining width applied at Costerfield. For blocks with widths less than 1.2 m, diluted grades were estimated by adding a waste envelope with zero grade and 2.74 t/m^3 bulk density to the lode.

Table 14-4: Variogram model parameters

Variable	Lode	Domain	Rotations			Nugget	1st Spherical Structure				2nd Spherical Structure			
			Z	Y	X		Major	Semi major	Minor	Sill	Major	Semi Major	Minor	Sill
AuAcc	BRU	1,2,3	90	90	110	0.375	13	6	7	0.339	46	23	9	0.285
SbAcc			90	90	120	0.265	14	12	7	0.478	38	26	10	0.257
True Thick			90	90	110	0.117	15	4	3	0.569	30	13	10	0.314
AuAcc	BRU KR	1	90	90	-170	0.309	30	20	13	0.177	66	25	20	0.513
SbAcc			90	90	-170	0.291	30	20	20	0.259	85	40	29	0.450
True Thick			90	90	-170	0.238	32	18	14	0.13	46	23	17	0.632
AuAcc	Youle	1,3	90	90	-160	0.282	89	44	20	0.431	164	70	21	0.288
SbAcc			90	90	-160	0.226	137	31	20	0.244	150	63	30	0.530
True Thick			90	90	-160	0.290	82	47	20	0.349	204	118	39	0.401
AuAcc	Youle	2	90	90	-170	0.288	34	23	20	0.361	46	33	25	0.351
SbAcc			90	90	-170	0.237	16	13	11	0.359	32	22	18	0.404
True Thick			90	90	-170	0.343	18	20	20	0.557	50	28	24	0.100
AuAcc	Youle E	1	90	90	160	0.317	9	10	7	0.231	34	14	10	0.452
SbAcc			90	90	160	0.236	17	15	7	0.373	29	20	10	0.391
True Thick			90	90	160	0.286	4	5	4	0.370	11	10	8	0.344

Table 14-5: Search parameters for top-cut estimate

Variable	Lode	Domain	First Pass				Second Pass				Third Pass				Octant search	Min octant	Min sample per octant	Max sample per octant
			Search Distance		Samples		Search Distance		Samples		Search Distance		Samples					
			Long axis	Short axis	Min.	Max.	Long axis	Short axis	Min.	Max.	Long axis	Short axis	Min.	Max.				
Au Acc	BRU	1,2,3	30	15	2	5	60	30	2	10	180	90	1	10	-	1	1	8
Sb Acc			26	18	2	5	52	36	2	10	156	108	1	10	-	1	1	8
True			21	10	2	5	42	20	2	10	126	60	1	10	-	1	1	8
Au Acc	BRU KR	1	40	20	2	5	80	40	3	10	120	60	3	16	-	1	1	8
Sb Acc			80	50	2	8	160	100	3	10	240	150	3	16	-	1	1	8
True			80	50	2	8	160	100	3	10	240	150	3	16	-	1	1	8
Au Acc	Youle	1	60	25	2	3	120	50	2	10	360	150	1	15	-	1	1	8
Sb Acc			80	40	2	3	160	80	2	10	480	240	1	15	-	1	1	8
True			75	45	2	6	150	90	2	10	450	270	1	15	-	1	1	8
Au Acc	Youle	2	35	25	2	5	75	50	2	10	225	150	1	10	-	1	1	8
Sb Acc			25	20	2	5	50	40	2	10	150	120	1	10	-	1	1	8
True			40	25	2	5	80	50	2	10	240	150	1	10	-	1	1	8
Au Acc	Youle	3	80	50	2	4	160	100	2	10	480	300	1	10	-	1	1	8
Sb Acc			80	50	2	4	160	100	2	10	480	300	1	10	-	1	1	8
True			150	90	2	10	300	180	2	12	900	540	1	10	-	1	1	8
AuAcc	Youle E	1,2	25	10	2	5	50	20	2	8	150	60	1	10	-	1	1	8
SbAcc			25	15	2	6	50	30	2	8	240	90	1	10	-	1	1	8
True			12	7	2	7	24	14	2	5	72	24	1	10	-	1	1	8

14.10 Block model estimation

Grade accumulation and true thickness were estimated into 2D block models, whose cell centroids had an arbitrary easting. The 2D estimates were run with all data, including face samples and diamond drillhole samples, for two different cell sizes resulting in two models. Once domain models were combined (if required) the high sample density face samples were used as a guide to delineate the Measured Resource, which retained the smaller block size. The remaining large block size (10 × 10 m or 20 × 20 m) Indicated and Inferred Mineral Resource areas are regularized to the small block size and the Measured smaller size block model is then added to create the final model. The cell sizes were selected based on the sample spacing of each area. Areas of high sample density are almost always face sampling (development) and areas of low sample density are usually from drill intercepts only, ranging from 20 to 80 m spacing.

Subcells were used in the Y and Z directions to better define the mining depletion and domain boundaries. The block model origins and number of cells are specific to the modelled lode. The common specifications for the models are given in Table 14-6.

Table 14-6: Block model dimensions

	High sample data density (Face samples)		Intermediate sample data density		Low sample data density	
	Block dimensions	Discretization	Block dimensions	Discretization	Block dimensions	Discretization
X	1	1	1	1	1	1
Y	2.5	2	10	3	20	3
Z	5	3	10	3	20	3

After the models have been depleted and Mineral Resource categories applied, the models were adjusted to replace the XINC (X cell dimension) with the estimated true thickness.

14.11 Block model validation

All statistics presented in this section refer to grades prior to dilution by the minimum mining width of 1.2 m.

The Mineral Resource estimate was validated as follows:

- Visual comparison of the sample thickness and accumulated grades and back-calculated grades with the estimated model grades in long section
- Visual comparison of the estimated grades to previous estimates in long section
- Comparison of the de-clustered accumulated sample grades with the model grades
- Plotting the sample and block estimated true thickness, gold and antimony accumulation grades on Swath plots.

Note that the primary validation is done on accumulated grades and secondary validation on the back-calculated grades.

There is a correlation when visually comparing the sample thickness and grades with the estimated grades. As expected, a greater degree of smoothing of the grades was evident where there were fewer samples available. The slope of regression (SoR) was analysed for each domain that used ordinary kriging as an estimation technique, to determine the relative estimation quality and assist with classification. Where data were abundant in each domain, the SoR was close to 1, indicating that drilling density is close to optimal and that estimation quality is high.

Results from the comparison of the de-clustered, mean accumulated grades with the mean model grades are shown in Table 14-7.

De-clustering was completed as required for each domain of each lode, based on the sample spacing. Where the sample population is small but sample spacing is large, differences greater than 10% often exist between composite and model values and is considered acceptable. An example of this is Youle (500) lode Domain 3. Differences greater than 10% also exist where the sample population is small, and grade is low. Youle East true thickness is an example of this where most of the lode is thin with a small patch of very thick material, skewing the model mean disproportionately to the sample mean.

Swath plots were created for each model and for each domain where necessary (Figure 14-11 to Figure 14-18). They compare de-clustered composited grade and accumulated grade with modelled grades and accumulated grades.

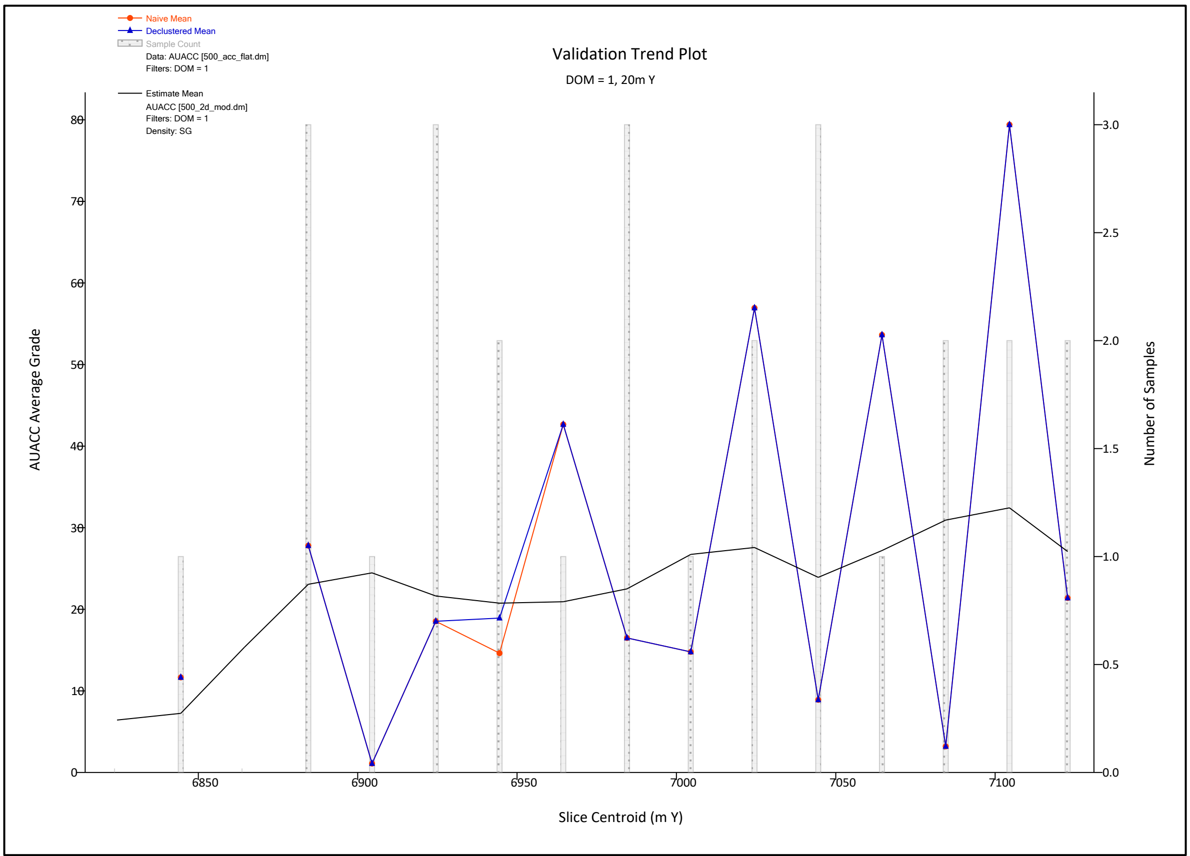

Figure 14-11: Youle Domain 1 gold accumulation swath plot by northing

Table 14-7: De-clustered composite sample grades and widths compared to estimated model values

Lode	Domain	AuAcc		SbAcc		True thickness (m)		Model/ composite		
		Declustered composites	Model	Declustered composites	Model	Declustered composites	Model	AuAcc	SbAcc	Vein width
BRU	1,2,3	5.2	4.9	2.4	2.4	0.685	0.661	94%	99%	96%
KR	1	7.4	7.3	3.3	3.8	0.71	0.81	99%	117%	114%
Youle	1	26.5	24.1	3.8	3.5	0.51	0.53	91%	92%	104%
Youle	2	43.1	42.5	10.1	10.3	0.62	0.68	99%	102%	110%
Youle	3	1.6	1.7	1.2	1.4	0.31	0.34	105%	114%	110%
Youle E	1,2	4.2	3.9	3.2	4.1	0.183	0.541	94%	127%	139%
Youle Splay	1,2	16.9	17.9	8	6.5	0.645	.0718	106%	82%	111%

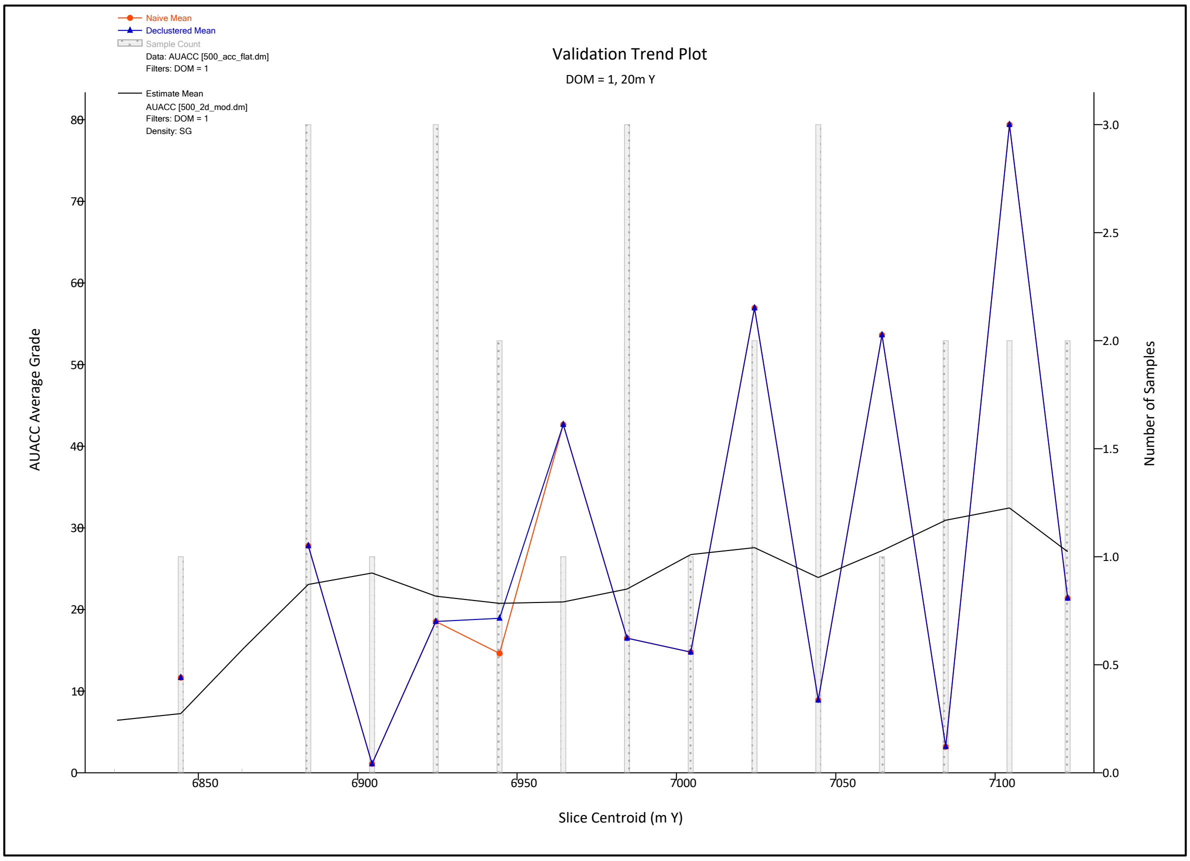

Figure 14-12:Youle Lode Domain 1 gold accumulation swath plot by elevation

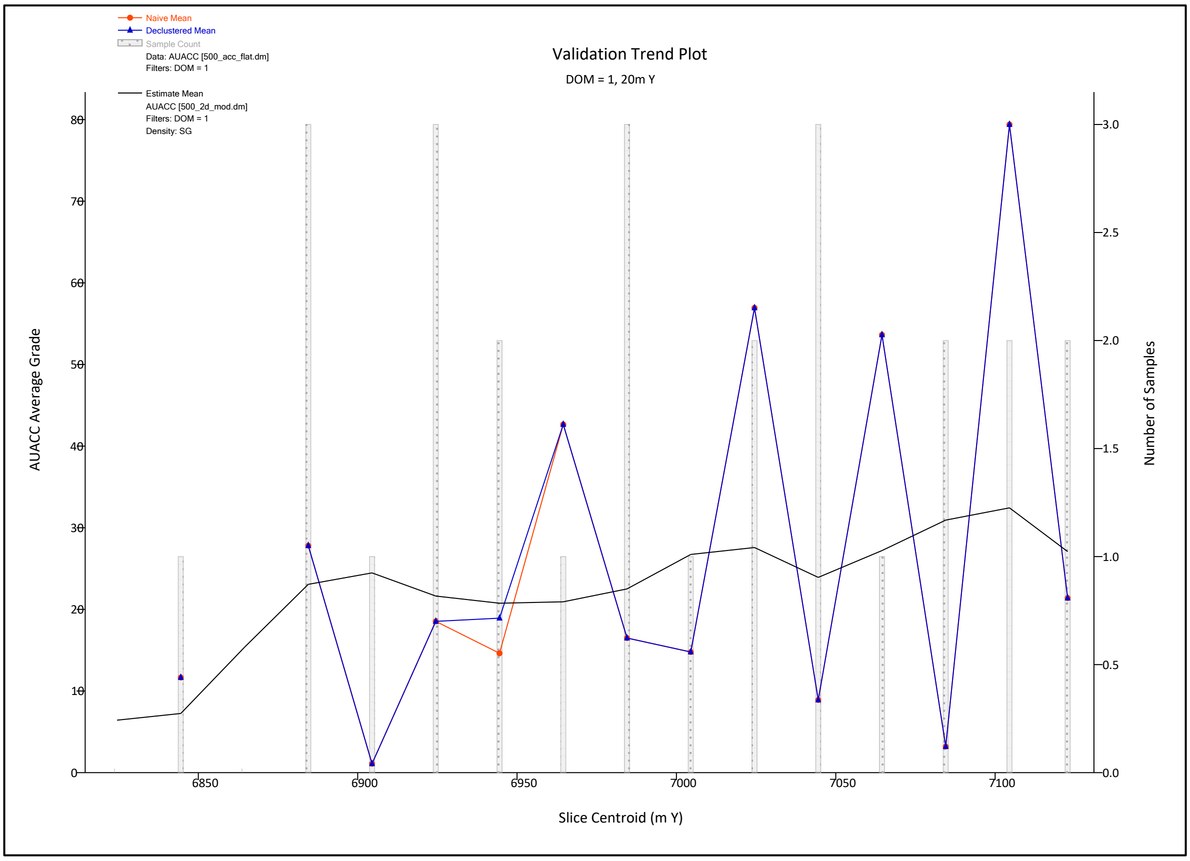

Figure 14-13: Youle Lode Domain 1 antimony accumulation swath plot by northing

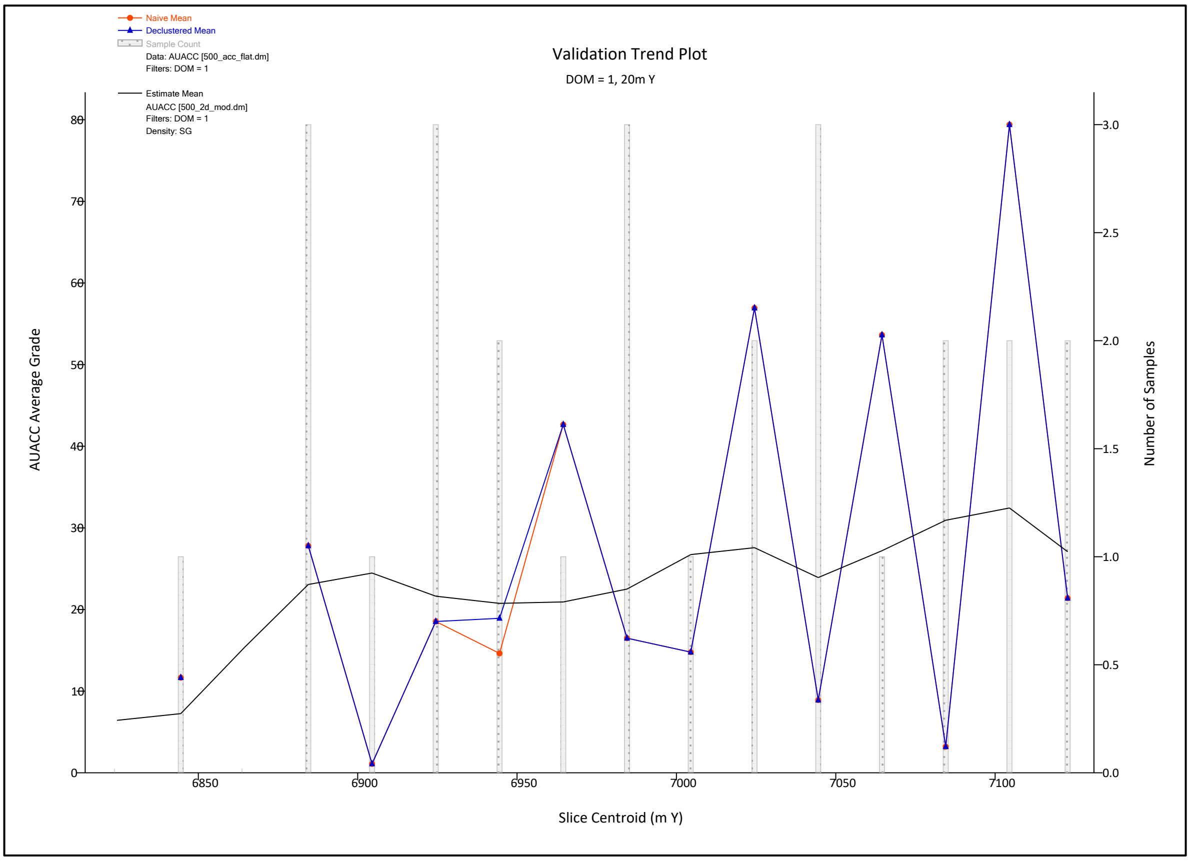

Figure 14-14: Youle Lode Domain 1 antimony accumulation swath plot by elevation

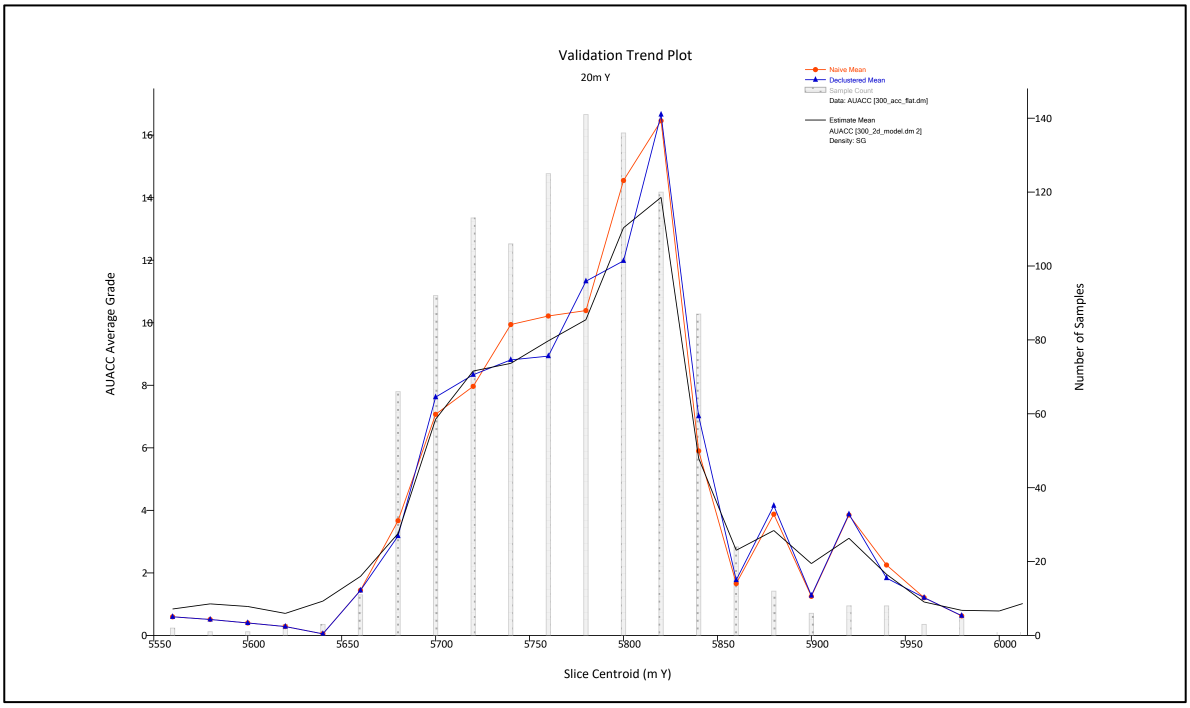

Figure 14-15: Brunswick Lode gold accumulation swath plot by northing

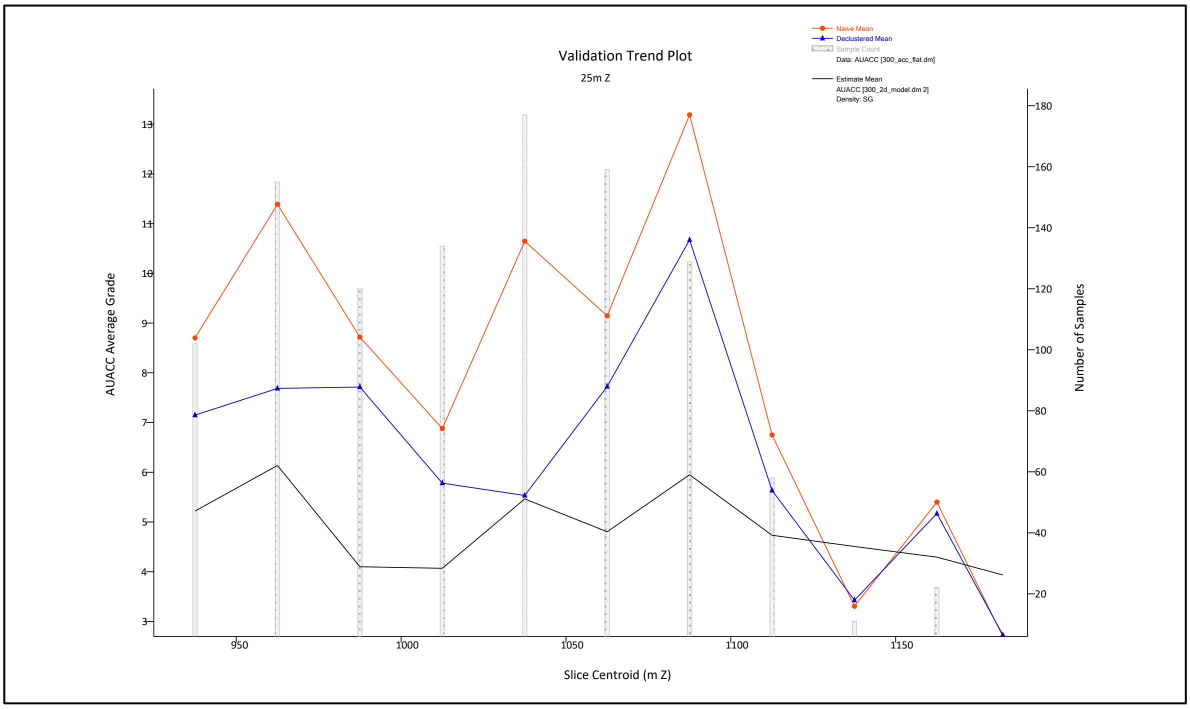

Figure 14-16: Brunswick Lode gold accumulation swath plot by elevation

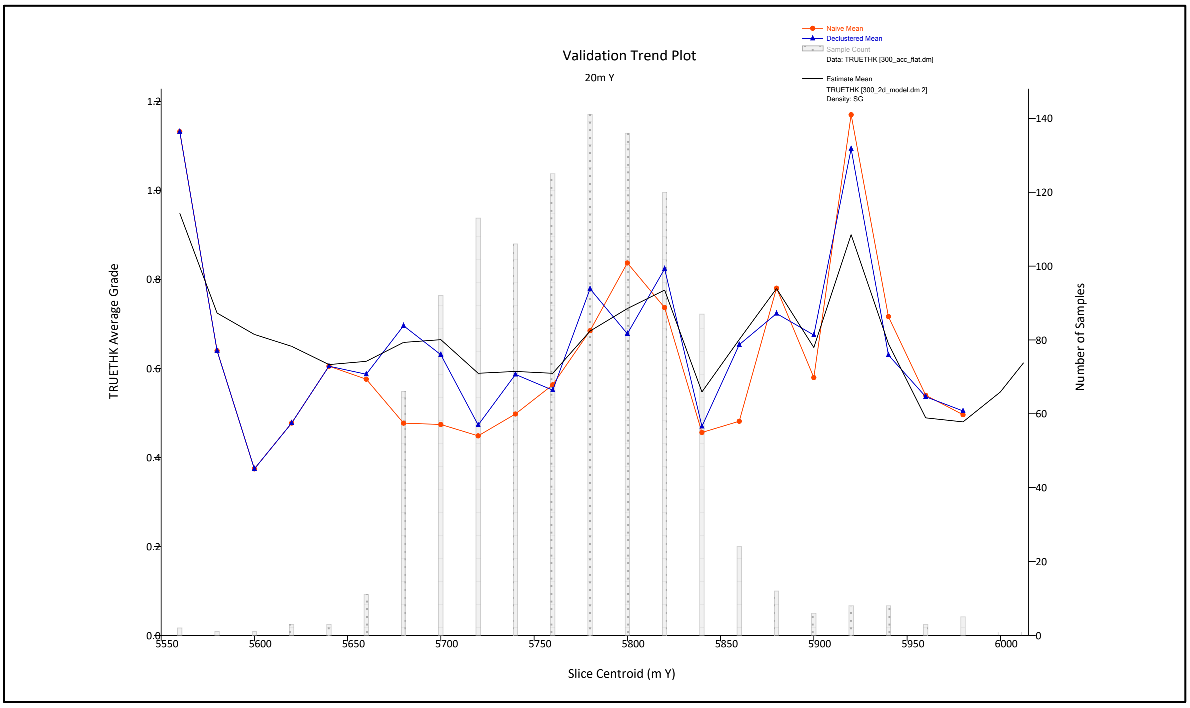

Figure 14-17: Brunswick Lode vein width swath plot by northing

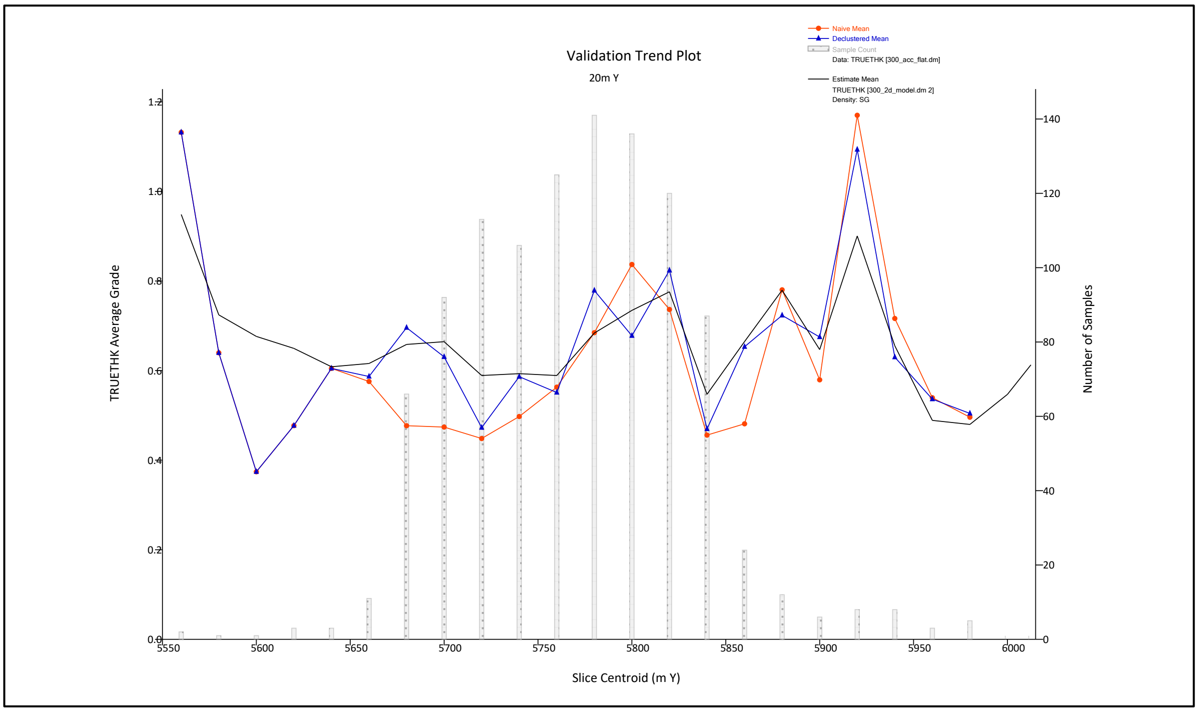

Figure 14-18: Brunswick Lode vein width swath plot by elevation

14.12 Mineral Resource classification

Classification of the Mineral Resources considers Mandalay's experience in mining the deposit, the comparable reconciliation observed between previous block model resource estimates and the processing plant head grade during 2018 and 2019. Mandalay's ongoing mining experience continues to improve the geological confidence and understanding of the controls on mineralisation, which guides decisions made during the construction of the geological model.

The classification criteria include the following:

- The Measured Resources are located within, and are defined by, the developed areas of the mine. This criterion ensures the estimate is supported by close spaced underground channel sampling and mapping.
- The Indicated Mineral Resource is located where drilling spacing is on a nominal 40 mN × 40 mRL grid and there is high geological confidence in the geological model.
- The Inferred Mineral Resource has irregular or widely spaced drill intercepts, is difficult to interpret due to multiple splays, or the structure does not have a demonstrated history of predictable mining.

The classification criteria are consistent with the previous Mineral Resource estimate conducted by SRK reported in March 2019 (SRK, 2019).

14.13 Mineral Resources

The Mineral Resources are stated here for the Augusta, Cuffley, Brunswick and Youle deposits with an effective date of 31 December 2019. The Mineral Resource is depleted for mining up to 31 December 2019.

The Augusta, Cuffley, Brunswick and Youle deposits consist of a combined Measured and Indicated Mineral Resource of 1,113,000 tonnes at 9.6 g/t Au and 3.3% Sb, and an Inferred Mineral Resource of 533,000 tonnes at 6.8 g/t Au and 1.7% Sb.

The Mineral Resources are reported at a cut-off grade of 3.5 g/t Au equivalent (AuEq), with a minimum mining width of 1.2 m. The gold equivalence formula used is calculated using typical recoveries at the Costerfield processing plant and using a gold price of USD1,500 per ounce and an antimony price of USD10,000 per tonne as follows:

$$AuEq = Au\ (g/t) + 1.52 \times Sb\ (\%).$$

All relevant diamond drillhole and underground face samples in the Costerfield property, available as of 31 November 2019 for the Augusta, Cuffley, Brunswick and Youle deposits, were used to inform the estimate.

Table 14-8: Mineral Resources at Costerfield, inclusive of Mineral Reserves, as at 31 December 2019

Category	Inventory (t)	Gold Grade (g/t)	Antimony Grade (%)	Contained Gold (koz)	Contained Antimony (kt)
Measured	283,000	9.6	4.5	87	12.7
Indicated	830,000	9.6	2.9	256	24.0
Measured + Indicated	**1,113,000**	**9.6**	**3.3**	**344**	**36.7**
Inferred	533,000	6.8	1.7	117	9.0

Notes:

1. Mineral Resources estimated as of December 31, 2019, with depletion through to this date.
2. Mineral Resources stated according to CIM guidelines and include Mineral Reserves.
3. Tonnes are rounded to the nearest thousand; contained gold (oz) rounded to the nearest thousand and contained antimony (t) rounded to the nearest hundred.
4. Totals may appear different from the sum of their components due to rounding.
5. A 3.5 g/t Au Equivalent (AuEq) cut-off grade over a minimum mining width of 1.2 m is applied where AuEq is calculated at a gold price of USD1,500/oz, antimony price of USD10,000/t.
6. The Au Equivalent value (AuEq) is calculated using the formula: AuEq = Au g/t + 1.52 * Sb%
7. Geological modelling and sample compositing were performed by Mandalay and Cael Gniel MAIG, full-time employee of Mining Plus. The models were independently verified by Danny Kentwell FAusIMM, full-time employee of SRK.
8. The Mineral Resource estimation was performed by Cael Gniel. The resource models were verified by Danny Kentwell. Danny Kentwell is the Qualified Person under NI 43-101 and is responsible for the Mineral Resource estimate.

Details of the Augusta, Cuffley and Brunswick Mineral Resources are stated in Table 14-9. Longitudinal projections of the models re-estimated at the end of 2019 are displayed in Figure 14-20 to Figure 14-23.

Pillars and remnant material that is above 3.5 g/t AuEq has been included in the Measured Resource. From 2017 onwards, extraction of these areas has been an ongoing success, due to the use of remote loaders, and recovered Au (oz) and Sb (t) reconcile well with the Resource model. Due to this success, these areas are now considered viable as reasonable prospects for eventual economic extraction

Table 14-9: Summary of the Augusta, Cuffley, Brunswick and Youle Mineral Resource, inclusive of Mineral Reserve

	Lode Name	Resource Category	Tonnes	Au (g/t)	Sb (%)	Au (oz)	Sb (t)
Augusta deposit	**E Lode**	Measured	50,000	9.5	5.9	15,200	2,900
		Indicated	62,000	5.1	2.8	10,200	1,800
		Inferred	27,000	3.1	2.1	2,700	600
	B Lode	Measured	7,000	5.8	2.3	1,300	200
		Indicated	28,000	5.1	1.8	4,500	500
	B Splay	Measured	3,000	3.5	2.5	300	100
		Indicated	3,000	6.6	1.4	700	0
		Inferred	13,000	4.0	1.0	1,600	100
	W Lode	Measured	29,000	10.1	5.8	9,400	1,700
		Indicated	53,000	4.1	2.3	7,000	1,200
		Inferred	60,000	6.9	3.4	13,300	2,000

	Lode Name	Resource Category	Tonnes	Au (g/t)	Sb (%)	Au (oz)	Sb (t)
	C Lode	Indicated	57,000	5.2	2.6	9,400	1,500
	N Lode	Measured	62,000	9.9	4.2	19,900	2,600
		Indicated	86,000	4.5	1.9	12,400	1,700
		Inferred	69,000	4.4	1.2	9,700	800
	NW Lode	Measured	1,000	6.8	4.1	100	0
		Indicated	3,000	4.7	3.2	400	100
	NS 48	Measured	1,000	3.6	2.6	200	0
		Indicated	4,000	4.8	2.8	600	100
	P1 Lode	Measured	11,000	9.0	2.4	3,100	300
		Indicated	9,000	8.7	2.2	2,500	200
	K Lode	Measured	9,000	5.0	2.4	1,400	200
		Indicated	56,000	3.2	1.9	5,800	1,100
		Inferred	22,000	3.9	2.1	2,700	500
Cuffley deposit	**CM Lode**	Measured	46,000	10.1	3.6	15,100	1,700
		Indicated	55,000	6.6	2.6	11,600	1,400
		Inferred	6,000	5.0	2.0	900	100
	CE Lode	Measured	10,000	11.6	4.4	3,600	400
		Indicated	13,000	6.0	1.9	2,400	200
	CD Lode	Measured	9,000	12.4	4.9	3,600	400
		Indicated	56,000	5.5	1.6	9,900	900
		Inferred	9,000	4.6	1.2	1,300	100
	CDL Lode	Inferred	26,000	7.4	0.1	6,200	0
	AS Lode	Measured	1,000	18.5	1.6	600	0
		Indicated	29,000	5.7	1.6	5,300	500
		Inferred	6,000	6.2	1.5	1,100	100
Brunswick deposit	**Main Lode**	Measured	40,000	8.6	4.5	11,100	1,800
		Indicated	66,000	5.1	2.8	10,800	1,800
		Inferred	5,000	3.3	1.6	500	100
	KR Lode	Indicated	15,000	9.3	4.4	4,500	700
		Inferred	25,000	3.9	2.1	3,200	500
Sub King Cobra	**SKC CE**	Inferred	9,000	2.8	1.0	800	100
	SKC LQ	Inferred	7,000	12.0	0.2	2,600	0
	SKC C	Inferred	37,000	9.7	1.1	11,600	400
	SKC W	Inferred	64,000	10.3	0.0	21,300	0
Youle deposit	**Main Lode**	Measured	3,000	22.4	9.5	2,200	300
		Indicated	182,000	26.3	5.1	153,600	9,300
		Inferred	130,000	8.4	2.3	35,300	3,000
	South Splay	Measured	2,000	4.6	3.8	300	100
		Indicated	4,000	3.1	2.2	400	100
	North Splay	Inferred	2,000	22.0	9.4	1,300	200
	Doyle	Indicated	52,000	2.6	2.0	4,200	1,000
		Inferred	17,000	2.3	2.4	1,300	400
		Measured and Indicated	**1,113,000**	**9.6**	**3.3**	**344,000**	**36,700**
		Inferred	533,000	6.8	1.7	117,000	9,000

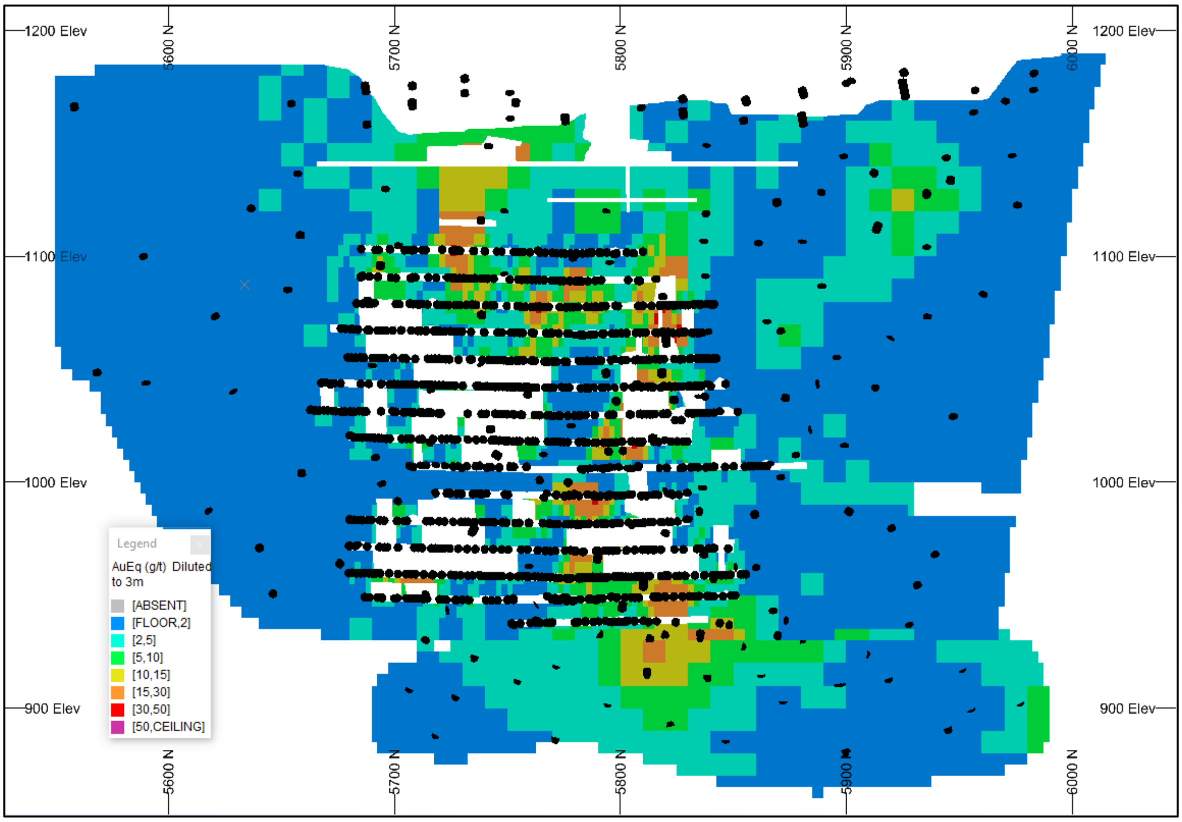

Figure 14-19: Brunswick Lode block model showing model grade in gold equivalent (g/t) diluted to 3 m

Note: Black dots represent face and drillhole samples used in the Mineral Resource estimate. White areas denote mined-out areas.

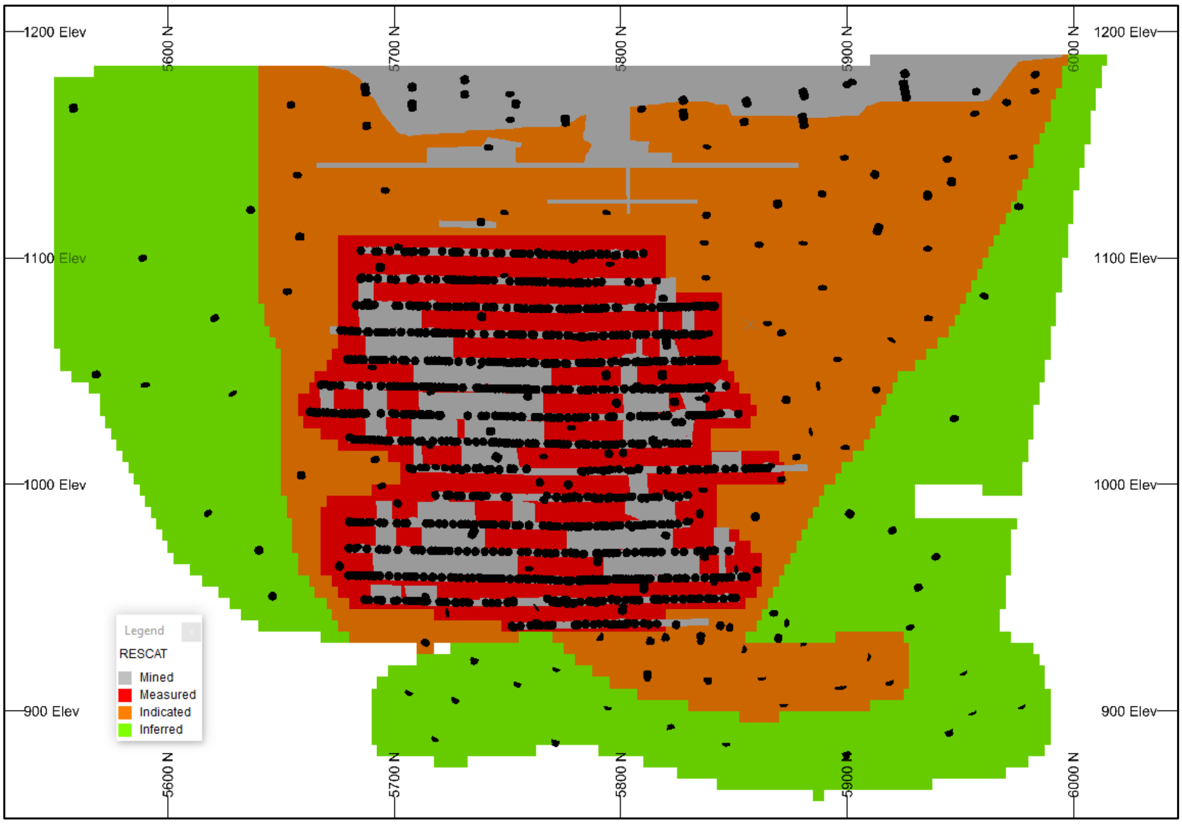

Figure 14-20: Brunswick Lode block model with Mineral Resource category boundaries

Note: Black dots represent face and drillhole samples used in the Mineral Resource estimate.

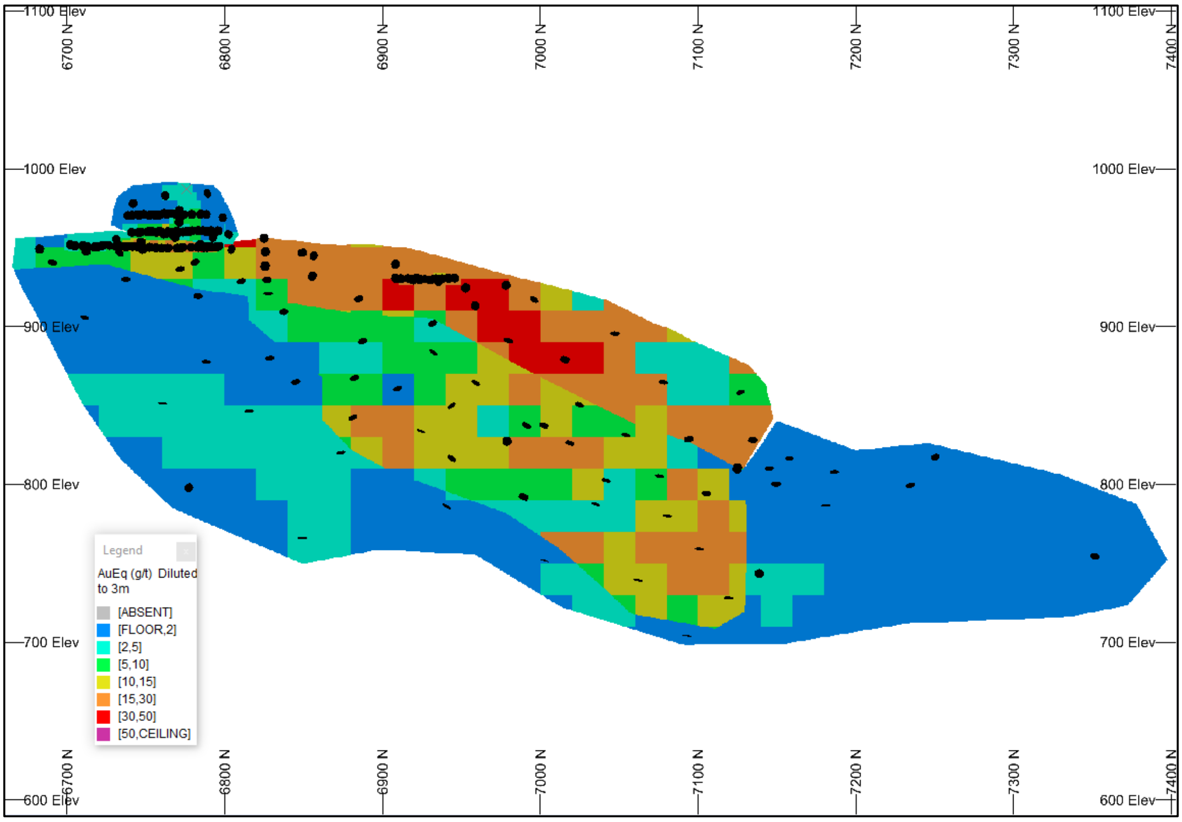

Figure 14-21: Youle Lode block model showing model grade in gold equivalent (g/t) diluted to 3 m

Note: Black dots represent face and drillhole samples used in the Mineral Resource estimate.

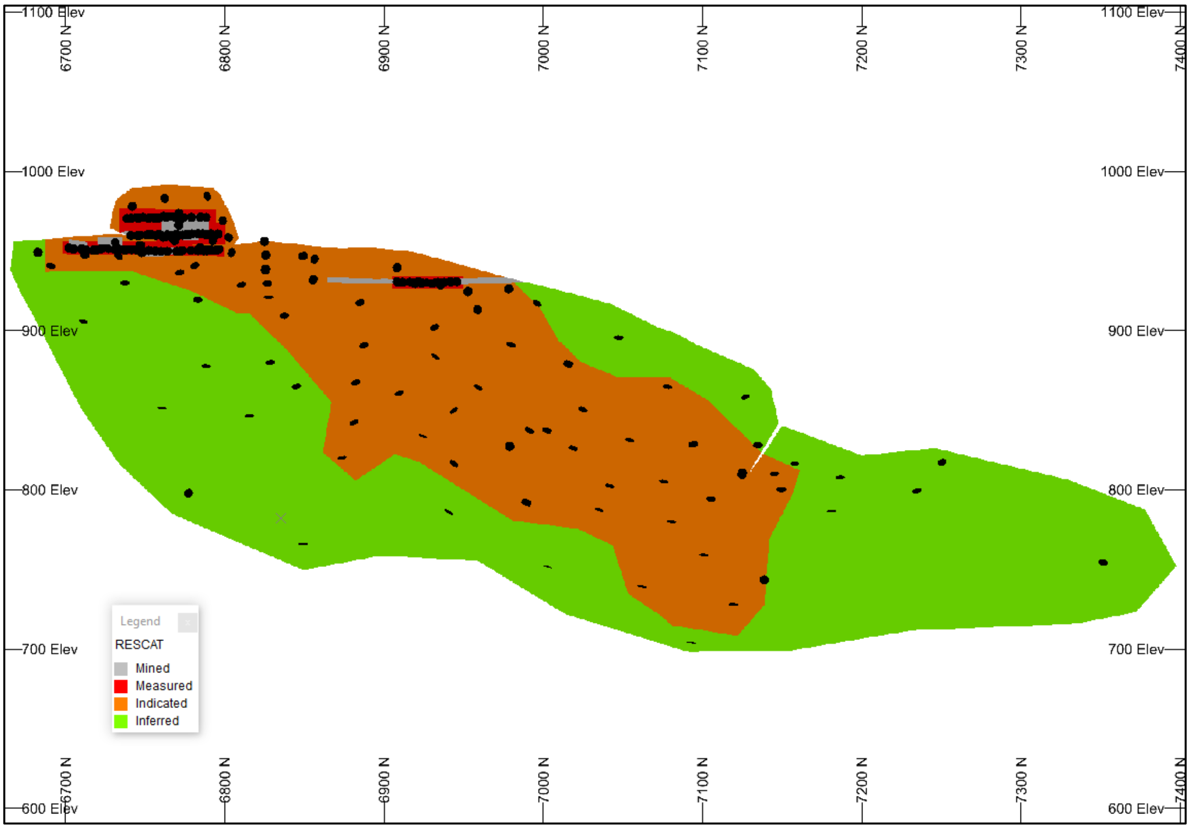

Figure 14-22: Youle block model with Mineral Resource category boundaries

Note: Black dots represent face and drillhole samples used in the Mineral Resource estimate.

14.14 Cut-off grade calculations

A 3.5 g/t AuEq cut-off grade over a minimum mining width of 1.2 m is applied where AuEq is calculated at a gold price of USD1,500/oz, antimony price of USD10,000/t and exchange rate USD:AUD of 0.70. The 3.5 g/t is derived by Mandalay based on recent cost, revenue, mining and recovery data.

14.15 Reconciliation

During 2019, most ore came from the Brunswick deposit with other ore supplemented predominantly from remnant mining of the Augusta deposit. A representative reconciliation of the remnant ore was not attainable, as the relative amounts of in situ and remaining broken ore were not well known. For the purposes of model validation, the previous Brunswick resource model (effective date 31 November 2019) has been reconciled against 2019 mining. The average measured vein width, gold grade and antimony grade are compared to the model by mining level (Figure 14-23 to Figure 14-27).

One trend that can be seen in the data is the model overestimation of vein width while the grade (both gold and antimony) is largely underestimated. This discrepancy is due to the wider compositing of the drill core that is not captured within the face sampling. For example, a drillhole composite will be extended to take in a small vein along the lode horizon whereas an ore drive in the same location may not include the additional small vein.

In Figure 14-26 and Figure 14-27, the grades have been diluted out to a width of 3 m (3 m width was used, as composites and mining areas within Brunswick often extended to 3 m so using grades from a smaller width would have been misleading). When the influences of the vein width overestimation and grade underestimation are combined through this dilution, we see an overall underestimation of gold and antimony grade. Overall gold grade diluted to 3 m was 5.2 g/t versus a model estimate of 4.5 g/t for the same area mined. Likewise, the overall antimony grade diluted to 3 m was 2.3% versus a model estimate of 2.1% for the same area mined.

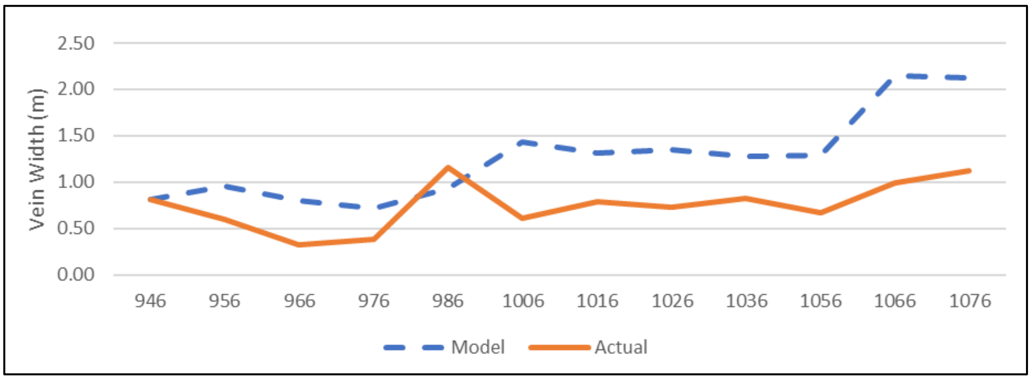

Figure 14-23: Brunswick model reconciliation – vein width

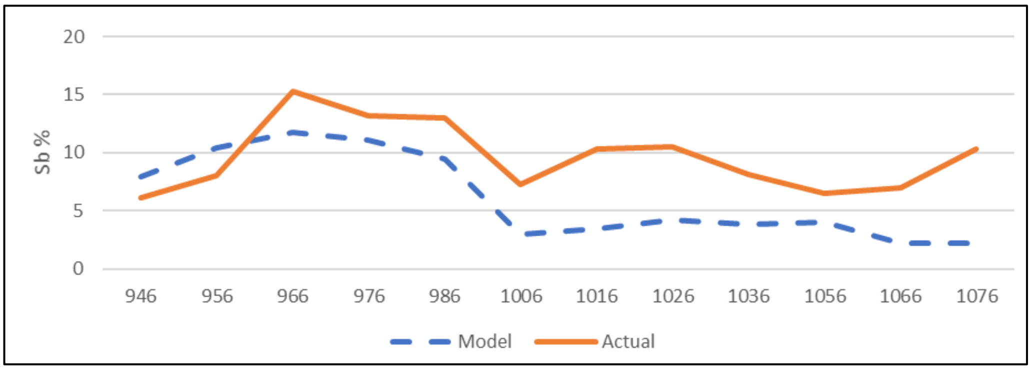

Figure 14-24: Brunswick model reconciliation – antimony grade

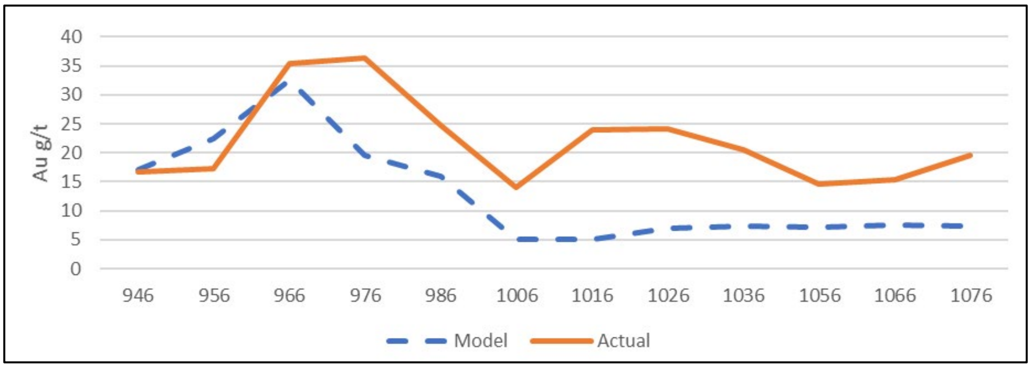

Figure 14-25: Brunswick model reconciliation – gold grade

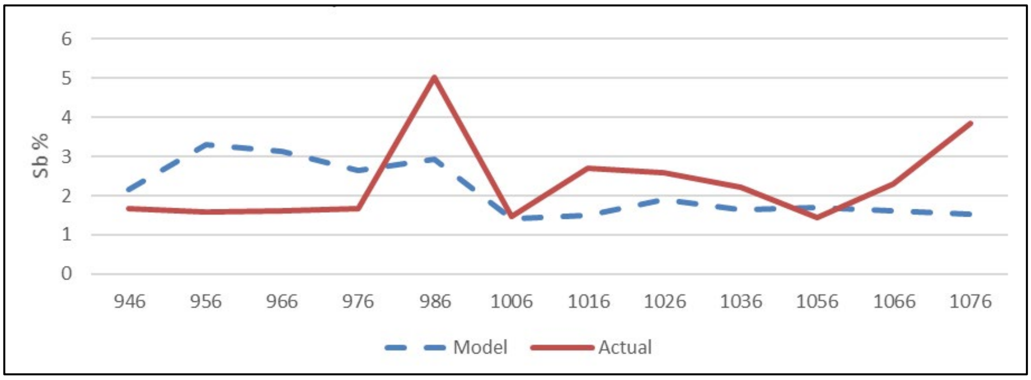

Figure 14-26: Brunswick model reconciliation – antimony grade diluted to 3 m

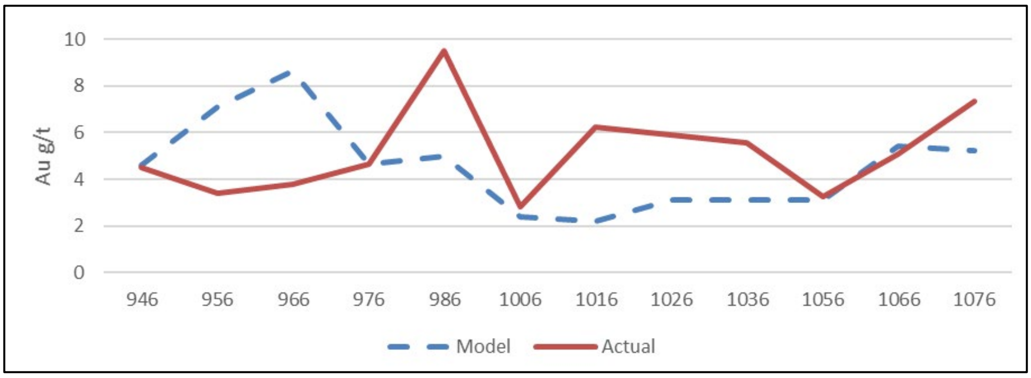

Figure 14-27: Brunswick model reconciliation – gold grade diluted to 3 m

14.16 Other material factors

SRK is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, or political factors that could materially influence the Mineral Resources other than the modifying factors already described in other sections of this report.

15 Mineral Reserve Estimate

From the Mineral Resource, a mine plan was prepared based only on Measured and Indicated Mineral Resource blocks, primarily using the cemented rock fill blast hole stoping method. A cut-off grade of 4.0 g/t AuEq and minimum stoping width of 1.5 m were used, with planned and unplanned dilution at zero grade. AuEq grade (using USD1,300/oz Au and USD7,000/t Sb), AuEq is calculated using the formula AuEq = Au + (Sb × 1.28) where Sb is in % and Au is in grams per tonne.

Financial viability of Proven and Probable Mineral Reserves was demonstrated at metal prices of USD1,300/oz Au and USD7,000/t Sb.

Table 15-1: Mineral Reserves at Costerfield, as at 31 December 2019

Category	Inventory (kt)	Gold Grade (g/t)	Antimony Grade (%)	Contained Gold (koz)	Contained Antimony (kt)
Proven	114	9.5	4.8	35	5.4
Probable	360	14.6	3.4	169	12.4
Proven + Probable	**474**	**13.4**	**3.8**	**204**	**17.8**

Notes:

9. Mineral Reserve estimated as of December 31, 2019 and depleted for production through to December 31, 2019.
10. Tonnes are rounded to the nearest thousand; contained gold (oz) rounded to the nearest thousand and contained antimony (t) rounded to nearest hundred.
11. Totals are subject to rounding error.
12. Lodes have been diluted to a minimum mining width of 1.5 m for stoping and 1.8 m for ore development.
13. A 4.0 g/t Au Equivalent (AuEq) cut-off grade is applied.
14. Commodity prices applied are; gold price of USD1,300/oz, antimony price of USD7,000/t and exchange rate USD:AUD of 0.70.
15. The Au Equivalent value (AuEq) is calculated using the formula: AuEq = Au g/t + 1.28 * Sb %.
16. The Mineral Reserve is a subset, a Measured and Indicated only Schedule, of a Life of Mine Plan that includes mining of Measured, Indicated and Inferred Mineral Resources.
17. The Mineral Reserve estimate was prepared by Daniel Fitzpatrick and Dylan Goldhahn, AAusIMM who are full-time employees of Mandalay and was independently verified by Anne-Marie Ebbels, MAusIMM, CP (Mining) who is a full-time employee of SRK and who is a Qualified Person under NI 43-101.

The net increase of 24 koz Au in Proven and Probable Mineral Reserves for 2019 relative to 2018 consists of a total of 24 koz Au depleted from the 2018 Mineral Reserves, which has been positively offset by 48 koz Au added by resource conversion and mining re-evaluation. The 0.6 kt Sb net increase in Proven and Probable Mineral Reserves consists of 3.8 kt Sb depleted from the 2018 Mineral Reserves, offset by the 4.3 kt added by resource conversion and mining re-evaluation.

Most of the increases (28 koz Au and 0.4 kt Sb) are a result of resource conversion drilling and upgrade of the Youle deposit.

15.1 Modifying factors

15.1.1 Mining dilution and recovery

Mining dilution

Air-leg development, jumbo development, long-hole bench stoping with cemented rock backfill and long-hole half upper stoping with no backfill are the current mining methods used at Costerfield for the extraction of underground Mineral Reserves.

Planned and unplanned dilution has been considered for establishing the Mineral Reserve schedule.

Planned dilution includes waste rock that will be mined and is not segregated from the design. Sources of planned dilution include:

- Waste rock that is drilled and blasted within the drive profile and the overall grade of the blasted material justifies delivery to the mill
- Waste rock within the confines of the stope limits. This includes footwall and/ or hanging wall rock that has been drilled and blasted to maximize mining recovery and/ or maintain favourable wall geometry for stability.

Due to the narrow width of Augusta, Cuffley, Brunswick and Youle Lode mineralisation, Mineral Reserves include an element of planned mining dilution, as Mineral Reserves are reported to conform to a minimum 1.5 m mining width. Where the lode width is greater than 1.2 m, the minimum mining width is the lode width plus a total of 0.3 m planned dilution from the hanging wall and footwall.

Unplanned dilution includes waste rock (or low-grade material) and/ or backfill from outside the planned production drive profile or stope limits that overbreak or sloughs into the mining void and is bogged and delivered to the mill.

Unplanned dilution is the sum of overbreak (from deficient blasting practices) and fall-off (as in wedge failure). Surveys of mined development drives and stopes to date are consistent with the figures presented in Table 15-1. The long-hole overbreak and dilution factors are considered to be consistent with operational experience, as these measurements are based on stope inspection sheet measurements, as well as stope scans that produce a 3D model of the open void, which is then interrogated using mine planning software to generate the final void volume.

Operating practices attempt to mine the stope as close to the lode width as possible to limit the amount of planned and unplanned dilution reporting to the stope drawpoint. All planned and unplanned mining dilution is assumed to have zero grade.

The percentages of overall (i.e. planned/ unplanned) dilution for development, long-hole half upper and long-hole CRF stoping are shown in Table 15-1.

Table 15-1: Costerfield Mine recovery and dilution assumptions

Mining method	Planned width (m)	Overall dilution (%)	Tonnage recovery factor (%)
Ore Development	1.8 - 2.2	10	100
Long-hole Half Uppers	1.5 - 2.0	10-35	93
Remnant Half Uppers	1.5	10	70
Long-hole CRF	1.5 - 2.0	10-35	95

The overall dilution assumptions include unplanned dilution such as overbreak and bogging dilution. This dilution has been based on the experience obtained from current operations and there is a good reconciliation between forecast tonnes and actual tonnes. Development dilution is based on end-of-month survey reports, which compare actual drive area against the designed area. The remaining stoping dilution figures are based on actual historical measurements as outlined above.

Mining recovery

Tonnage recovery factors shown in Table 15-1 represents the recovered proportion of planned mining areas, for the different mining methods and include in-situ ore plus dilution material.

For stoping areas, visual inspections are carried out to estimate the stope void volume and determine if any ore is left in the stopes. This information is recorded on stope inspection sheets. Stope scans are also conducted to confirm the data captured. All these data are used to estimate the recovery factor.

Remnant recovery has been estimated at 70% due to the factors of limited remote loader access when extracting ore from the remnant drive and poor ground conditions around drawpoints limiting the recovery of the stope.

15.1.2 Mine design and planning process

All mine design work has been completed using Deswik CAD, Deswik ASD and Deswik Interactive Scheduler (IS).

The mining shapes designed were assessed against the block model in Deswik IS in order to calculate tonnes and grade. 3D block models of each individual lode were used for the interrogation and mining depletion process of the designed mining shapes.

The mining schedule included mining areas within the Augusta, Cuffley, Brunswick and Youle Mineral Resources above the gold equivalent cut-off grade.

After completing the interrogation and depletion process, dependency rules including schedule constraints were applied to the designed shapes to link all the mining activities in a logical manner within the Deswik IS project. This information was then exported to Excel for further financial validation.

Deswik IS software was used for LoM scheduling. The key assumptions such as cut-off grade, mining dilution and recovery factors, resource assignments and rate of mining were included in scheduling calculations.

These design and scheduling programs are also in use for quarterly and monthly planning purposes.

15.1.3 Cut-off grade

Estimation of the design cut-off grade was based on past mining experience gained within the Augusta, Cuffley and Brunswick deposits, as well as historical performances, both physical and economic, of the mining and processing methodologies.

The distribution of grade over the Measured and Indicated Mineral Resources was considered to enable grade-tonnage curves to be generated from which cut-off equations were determined.

Based on the historical and 2019 budgeted cost estimates from the current Augusta, Brunswick and Youle mines, as well as the planned future capital and operating cost structure for the entire operation, a cut-off grade of 4.0 g/t AuEq was calculated and applied to the Mineral Resource to determine the mine design shapes (i.e. stope shapes) that possessed acceptable economic grade to warrant mining.

The mine design shapes enabled a mine plan to be developed, which was independently verified to be both technically achievable and economically viable once all modifying factors were considered.

Each lode was assessed for economic viability on a level-by-level basis, where the value generated from mining material offset the cost of mining the ore and the waste development required to access the area. Material that reduced the overall value of the mining level, such as low-grade extremities of the ore body, were not included.

For reporting purposes 4.0 g/t AuEq cut-off grade was applied to determine the Mineral Reserve Estimate.

16 Mining methods

16.1 Introduction

The Augusta Mine is serviced by a decline haulage system developed from a portal within a box-cut with the majority dimensions of 4.8 m high by 4.5 m wide at a gradient of 1:7 down. Most of the decline development was completed with a twin boom jumbo; however, development of the decline from the portal to 2 Level was completed with a road-header and this section of decline has dimensions of 4.0 m high by 4.0 m wide. The decline provides primary access for personnel, equipment and materials to the underground workings.

Mill feed is produced by three different mining methods: full face development, long-hole CRF stoping and half upper stoping. All mined material is transported to the Augusta box-cut before being hauled to either the Brunswick RoM pad or Augusta waste rock storage facility.

The Cuffley Decline currently extends down to approximately 895 mRL. At 935 mRL, the Cuffley Incline extends off the Cuffley Decline and accesses mineral resources from 945 mRL to 1050 mRL. This incline is used to extract N and NV lodes. Mining of Cuffley Lode on the Incline is complete. A second decline within Cuffley, known as the 4800 Decline, accesses the southern part of the Cuffley Lode, which is positioned south of the East Fault. This decline commences at 960 mRL and extends to 814 mRL.

This LoM plan based on the December 2019 Mineral Resource includes mining of the Brunswick and Youle deposits. The Brunswick access is 5.5 m high by 4.5 m wide, starts from 925 mRL on the Cuffley Decline and accesses the Brunswick deposit at 955 mRL. The Youle access is 5.5 m high by 5.5 m wide and extends from the Brunswick Incline at 961 mRL and accesses the Youle deposit at 957 mRL. From this level, the Youle decline, 4.8 m high and 4.5 m wide, is planned to extend down to 700 mRL to access the Youle ore body.

A schematic of the Augusta, Cuffley, Brunswick and Youle underground workings is presented in

Figure 16-1 and the proposed stope outlines are presented in Figure 16-2 to Figure 16-4.

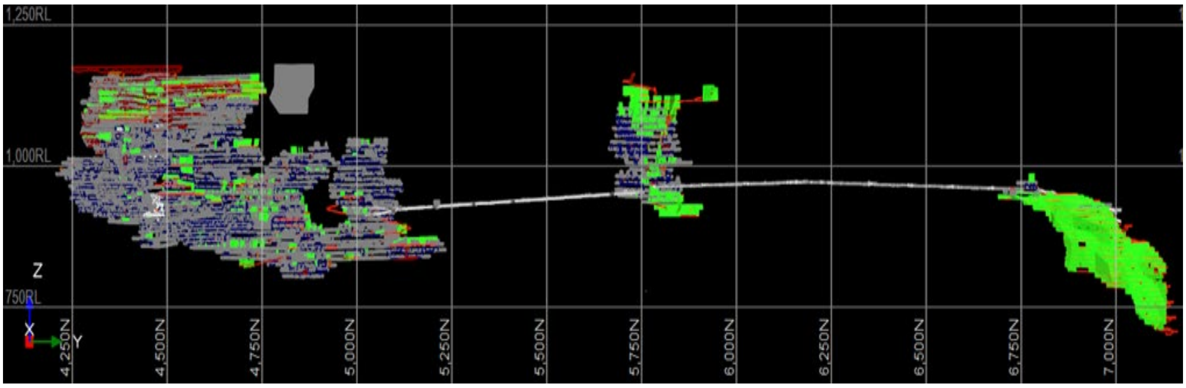

Figure 16-1: Long section of as-built and designs for Augusta, Cuffley, Brunswick and Youle

Notes: Red – planned development; Green– planned production; Grey – depleted workings

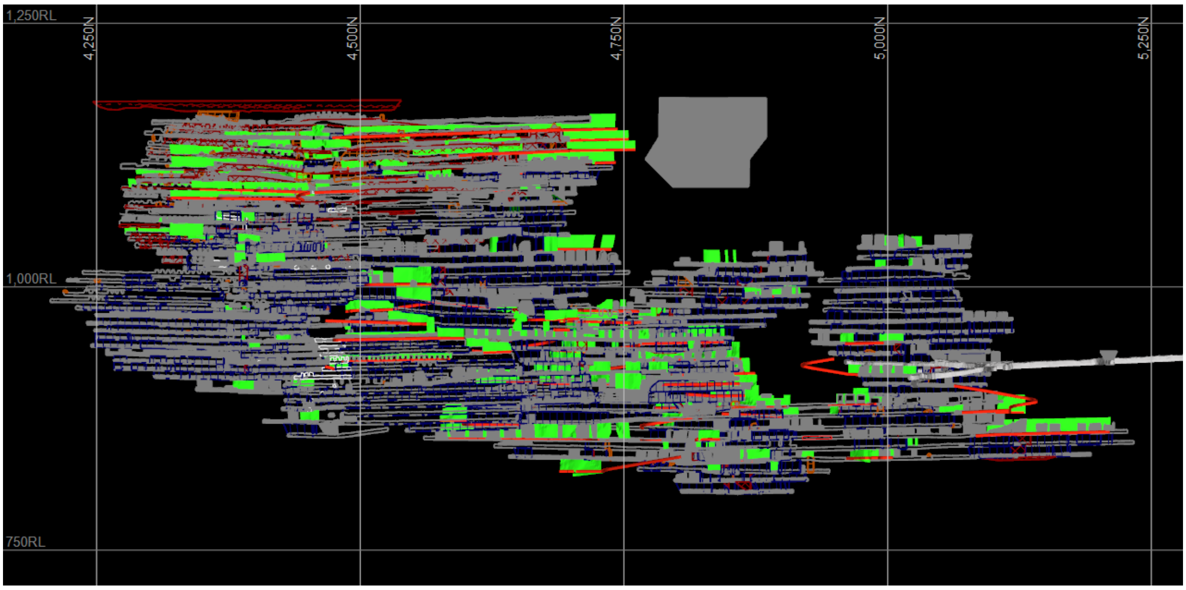

Figure 16-2: Long section of proposed Cuffley and Augusta mine design

Notes: Red – planned development, Green – production, Grey – depleted

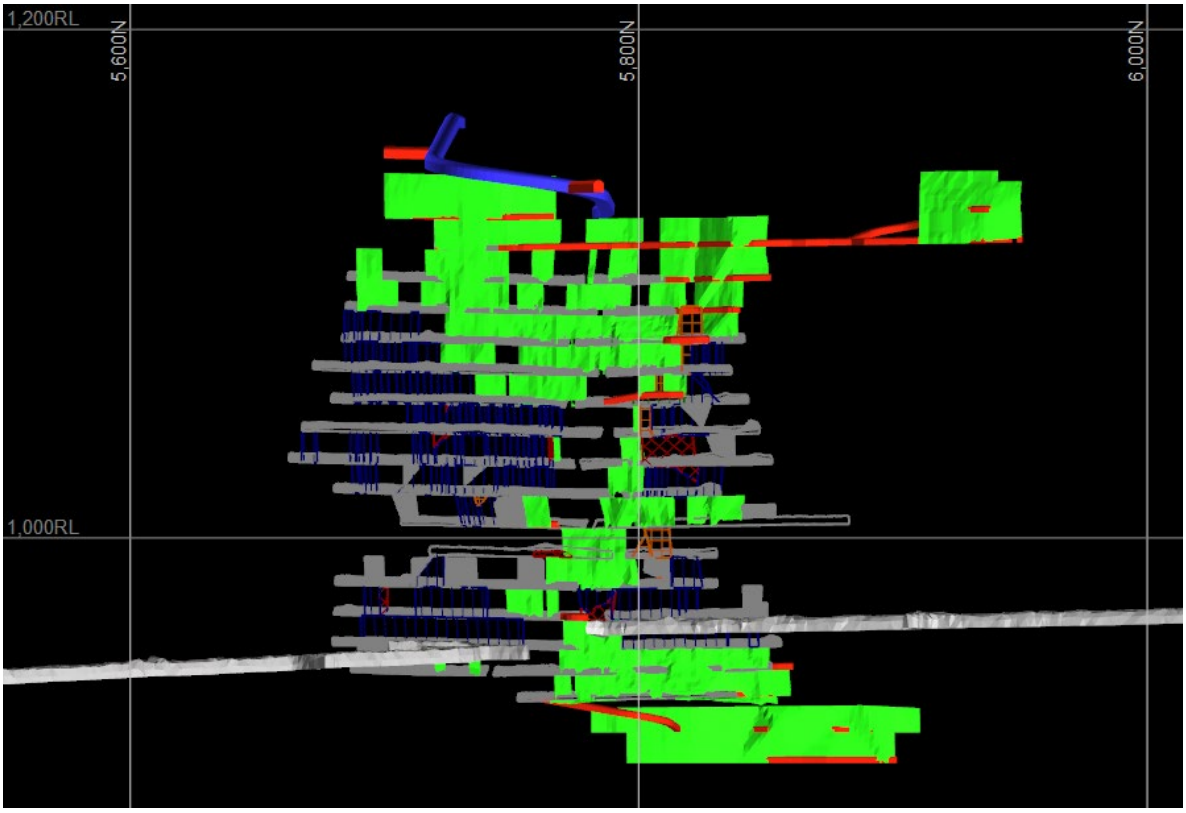

Figure 16-3: Long section of proposed Brunswick mine design

Notes: Blue – planned capital development; Red-planned operating development; Green – planned stoping; Grey – as built

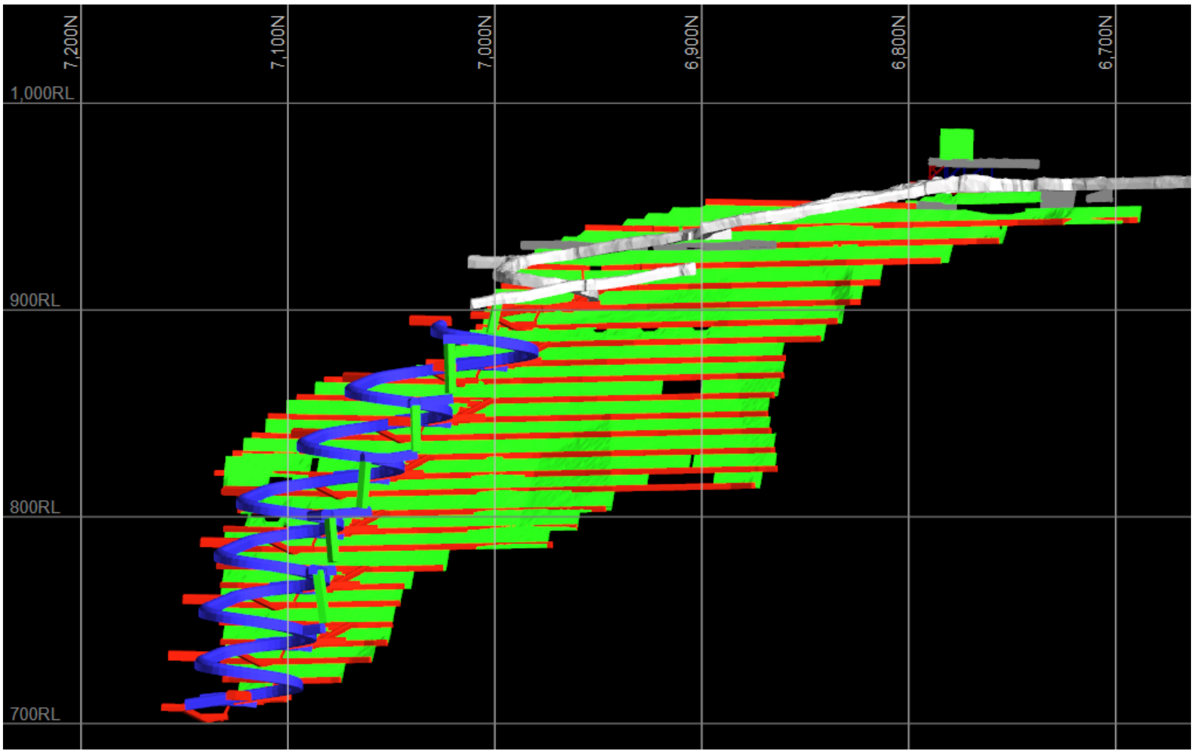

Figure 16-4: Long section of proposed Youle mine design

Notes: Blue – planned capital development; Red-planned operating development; Green – planned stoping

16.2 Geotechnical

16.2.1 Rock properties

Lithology and structures

Active underground mine workings are hosted within weakly metamorphosed siltstones of the lower Silurian-aged Costerfield Formation. Underground operations target the NNW-striking, sub-vertical dipping mineralized structures that are typically less than 500 mm in true width.

Targeted mineralized structures within the Cuffley and Augusta orebodies are bounded up-dip and down-dip by the Adder and King Cobra thrust faults respectively. The King Cobra Fault is observed as separate hanging wall and footwall structures filled with strongly deformed siltstone and quartz horsetails. The zone of deformation within the King Cobra Fault can be up to 10 m wide. Offset across the King Cobra Fault is unknown. The Adder Fault is also filled with quartz and rubble and varies in width from less than 0.3 m to greater than 2 m.

The Brunswick lode sits above the hanging wall of the Adder Fault. It is offset by shallow west-dipping faults by over 20 m. The Kiwi Fault is one of the shallow-dipping structures. This fault is characterized by strong shearing and lode offset in the vicinity of the Brunswick lode and shows minor shearing (<0.5 m) distal to the lode.

The Youle lode sits below the No.3 Fault and at the point of intersection with the No.4 Fault starts running along the No.4. The No.4 Fault is characterized as a laminated quartz structure with large lithology offset.

Significant second-order structures include the northeast-striking, northwest-dipping faults that offset lode mineralisation (East Fault, Brown Fault). There are also shallow-dipping structures that can contain strongly associated shearing when intercepting the lodes (Flat, Krait, Red Belly, Bushmaster, Tiger, Kiwi, Penguin/ Emperor, Doyle and Peacock), as shown in Figure 16-5, Figure 16-6 and

Figure 16-7. A 3D structural model of all intersected mine scale faults is maintained and is a key driver of pre-emptive ground control strategies.

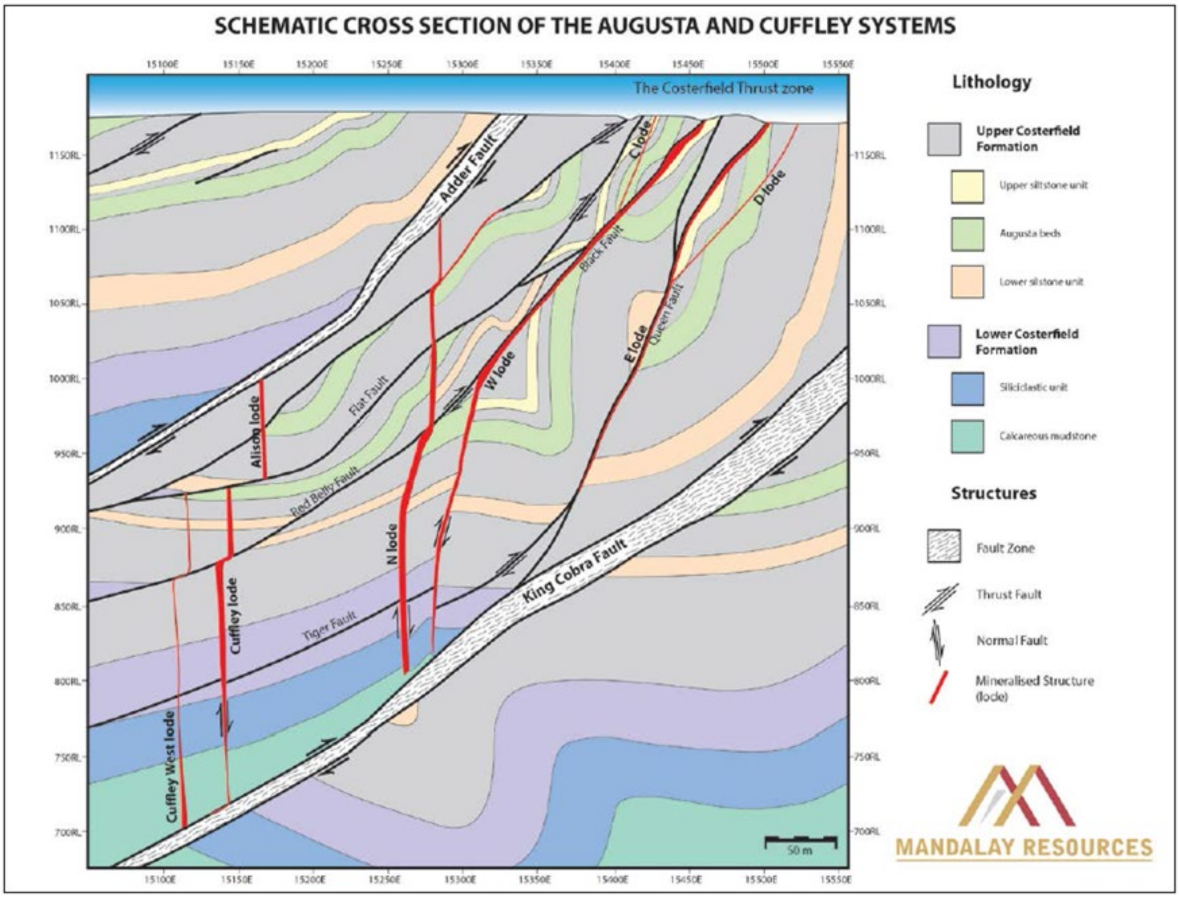

Figure 16-5: Schematic cross sections of the Augusta and Cuffley systems

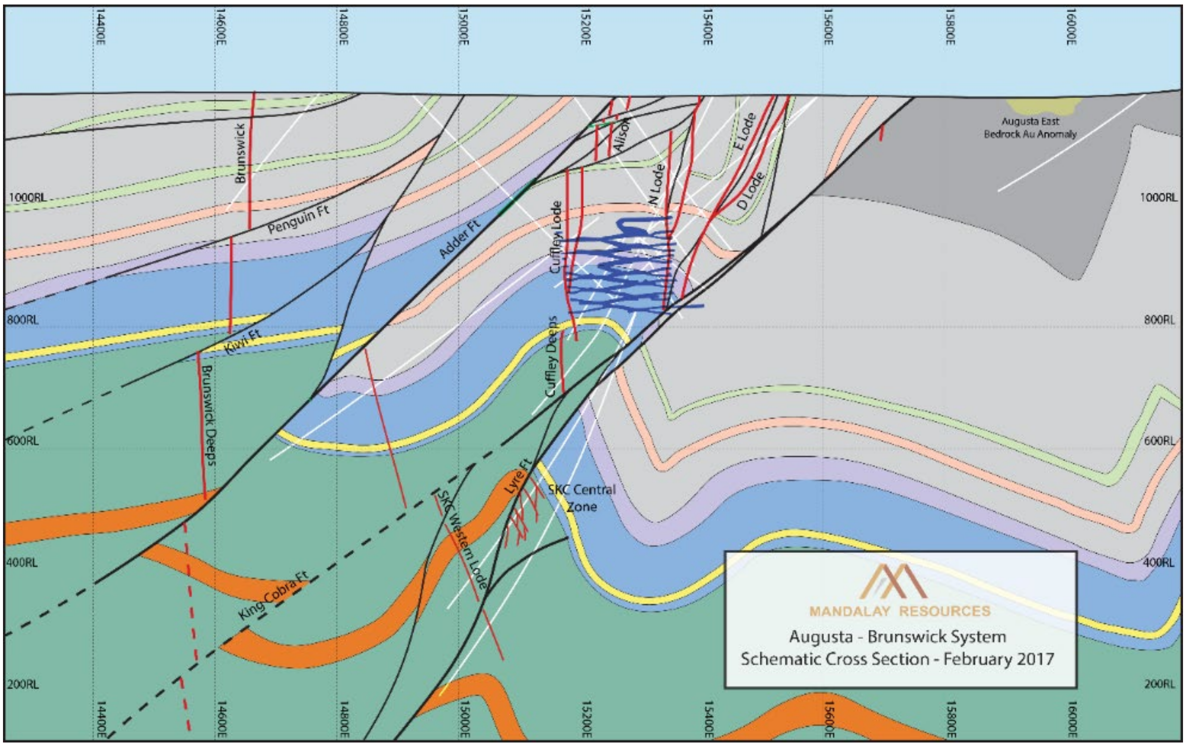

Figure 16-6: Schematic cross sections of the Augusta and Brunswick systems

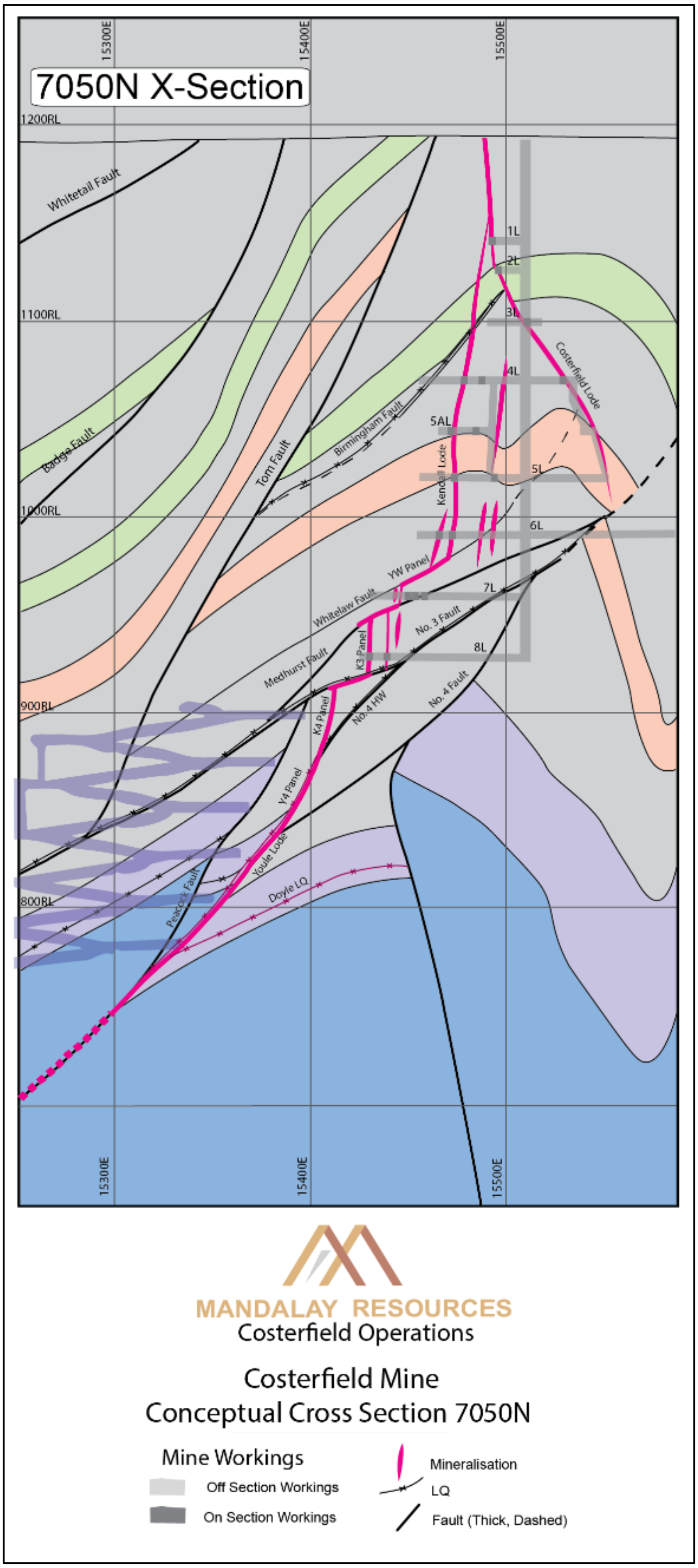

Figure 16-7: Schematic cross sections of the Augusta and Brunswick systems

Rock strength

Fifty-eight unconfined compressive strength (UCS) tests have been completed on the Costerfield Formation siltstones since 2009. Intact rock strength increases with depth due to sustained weathering in the upper strata. At levels lower than 100 m below surface, intact rock strength exceeds 80 MPa.

Rock stress

In situ stress measurements have not been undertaken at Costerfield. In situ stress is approximated using the paper by Lee et al. (2010), which collates over 1,000 stress measurements taken on the Australian continental tectonic plate. The Costerfield Region (i.e. the Augusta Mine) lies within the Lachlan province where the principal stress orientation is WNW–ESE and with magnitudes of $\delta 1 = 55$: $\delta 2 = 35$: $\delta 3 = 30$ for measurements greater than 500 m below surface. Stress measurements obtained from other mines in the region suggest a major principal stress magnitude of ~40 MPa at 565–575 m below surface, with a strong correlation between increased depth and increased in situ stress.

In situ stress in levels below 895 mRL has caused minor convergence (squeezing ground) in isolated areas around major fault zones. The magnitude of this squeezing is low enough to be contained by dynamic support.

Rock mass alteration

Rock mass in the vicinity of mineralized structures is heavily fractured with multiple joint orientations, often with a portion of clay fill and smooth planar joint surfaces. In waste rock, away from mineralized lodes and discrete structures, the rock mass improves with lower fracture frequency and rough tightly healed joint surfaces.

Hydrogeology

The regional hydrogeology comprises two main aquifers, the Shallow Alluvial Aquifer (SAA) and the Regional Basement Aquifer (RBA):

- The SAA comprises silts, sands and gravels and is a perched groundwater system occurring across the site and within the confines of the creek and valley floors. There is clear evidence that this aquifer is perched and is laterally discontinuous and is less common in the area.
- The RBA comprises Silurian metasediments and forms the basement aquifer, in which groundwater mainly occurs and is transmitted through fracture systems beneath the upper weathered profile, at depths of greater than 20 m below the natural surface.

Dewatering of underground workings in Augusta, Cuffley and Brunswick is achieved via controlled drainage to an underground pump station in the 4800 that pumps to the Cuffley pump station. Dewatering of Youle is achieved by pumping straight to the Cuffley pump station. From the Cuffley pump station water is fed to an Actiflow water treatment unit located at the Brunswick site, before being distributed to the mine dam, and Splitters Creek evaporation facility. Recently water inflow has been approximately 1.7 ML per day.

16.2.2 Mine design parameters

Mining methods

The dominant mining method is longitudinal long-hole stoping with cemented rock fill (CRF), panels generally consisting of three to four operating levels mined bottom-up over CRF with longitudinal retreat to a quasi-central access.

Several other mining methods are applied to access and optimize extraction of ore at Costerfield:

- Capital development with twin boom jumbo
- Operating development with single boom jumbo or air leg (hand-held rock drill)
- Blind up-hole longitudinal long-hole open stoping (‘half uppers’)
- Floor benching of level ore development
- Down hole vertical crater retreat (VCR)
- Avoca stoping with CRF (‘reverse fill’)
- Avoca stoping with rock fill (‘reverse fill’)
- Overhand cut and fill (flat backing ore level development)
- Air leg rise mining.

Mining methods are selected to suit ore drive/ lode geometry and maximize ore recovery while minimising unplanned dilution.

Development geometry

Standard development profiles adopted at Costerfield include:

- 1.8 m wide × 3.0 m high ore drives
- 2.0 m wide × 3.0 m high access drives
- 3.5 m wide × 4.0 m high access drives
- 3.5 m wide × 4.2 m high access drives
- 4.5 m wide × 4.8 m high decline/ incline
- 5.5 m wide × 5.5m high decline/ incline
- 5.0 m wide × 4.8 m high level access
- 5.0 m wide × 6.5 m high truck tips
- 4.5 m wide × 4.8 m high ore stockpiles
- 6.5 m wide × 4.8 m high vent rise access drives.

Non-standard development profiles may be mined for major infrastructure (pump stations, explosives magazines, fan chambers etc.) or for variations to the applied mining methods (flat backing, floor benching etc.). Development spans and associated ground support are designed using empirical data to ensure the stability of mined spans.

Stope geometry

In response to observed ground conditions and production drill capability, inter-level spacing at Costerfield is variable. Stope strike length varies based on the applied mining method, observed ground conditions, and machinery capability. Stope geometry parameters include:

- Stope height: up to 17 m
- Stope strike length: 2.7–13 m
- Stope design width: 1.5 m
- Stope dip: 45°–90°.

Non-standard stope geometry may be mined to maximize ore extraction under unique circumstances (i.e. remnant mining, flat-dipping ore bodies and geological complexity). The empirical stope performance chart is consulted to ensure that designed stope spans will allow safe efficient extraction of target mineralisation.

Pillars and offsets

In mine design and planning, the following pillars and offsets are observed to ensure stability of mined excavations:

- Decline development is designed and mined with a 30 m offset to target mineralized structures; to date stope production blasting has not influenced decline stability having applied the 30 m offset. This distance has been maintained for the Brunswick and Youle lode.
- Minimum inter-level pillar width to height ratio is 1:2 (i.e. for 1.8 m wide ore drives, the minimum inter-level spacing is 3.6 m).
- Minimum horizontal clearance between sub-parallel ore drives is 2 m.
- The minimum pillar strike between unfilled blind up-hole longitudinal open stopes (‘half upper stopes’) is 3 m.

Backfill

Cemented rock fill (CRF) is the most commonly used backfill at Costerfield Operations. CRF is exposed vertically in the longitudinal retreat of CRF-filled long-hole open stopes, and horizontally in the mining of sill pillars at the toe of blind up-hole longitudinal open stopes (‘half uppers’). Loose rock fill is used where vertical and horizontal exposures to filled voids are not required (i.e. level close-out stopes and adjacent to waste pillars). Cemented aggregate fill (CAF) fill is used in areas where re-access is required through or adjacent to the filled stope.

16.2.3 Ground support

Development ground support

Ground support elements installed in standard development profiles include:

- 3.0 m 25 mm dia. galvanized resin bolts
- 2.4 m 25 mm dia. galvanized resin bolts
- 2.4 m 20 mm dia. galvanized resin bolts
- 2.1 m 20 mm dia. galvanized resin bolts
- 2.4 m 47 mm dia. galvanized friction bolts
- 1.5 m 33 mm dia. galvanized friction bolts
- 1.5 m 33 mm dia. hydrabolts
- 1.9 m 33 mm dia. hydrabolts
- 2.4 m × 3.6 m 5.6 mm dia. gauge galvanized mesh
- 2.4 m × 4.2 m 5.6 mm dia. gauge galvanized mesh
- 2.4 m × 3.0 m 4.0 mm dia. gauge galvanized mesh
- 2.4 m × 1.5 m 4.0 mm dia. gauge galvanized mesh.

When spans exceed 5.5 m in development intersections or in response to deteriorating ground conditions and discrete structures, cable bolts (single strand, non-galvanized, bulbed, 4.5–6.0 m) are installed to ensure the stability of development profiles.

Additional ground support may be installed to support non-standard development profiles or in response to particularly poor ground conditions. Fibrecrete, resin injection, spiling, sets and straps have been installed in the past to support poor ground, development/ stoping interactions and faults/ shear zones. ‘Lok’ bolts (2.4 m and 1.8 m yield) are installed in areas where ground squeezing is expected.

Stoping ground support

Additional support for designed stopes is installed on an 'as required' basis in response to compromised stope geometry, poor rock mass, interactions with faults/ shears or interactions with other stopes and development. Single strand, non-galvanized, bulbed, 4.5–6 m cable bolts are generally installed as secondary support for stopes. Other forms of ground support including resin bolts, friction bolts, mesh, fibrecrete, resin injection and straps may also be installed to provide secondary support for designed stopes.

16.3 Mine design

16.3.1 Method selection

Long-hole CRF stoping has been selected as the preferred mining method for the Mineral Resource. This is based on the orebody geometry as well as the favourable experience gained through the application of this method. Long-hole CRF stoping has also been selected for the Brunswick and Youle lodes. A 'bottom up' methodology to be used at Brunswick will minimize the crown/ sill pillars required to be left in place.

This process necessitates that crown/ sill pillars are left in place on a regular basis to ensure local mine stability. Recovery of these pillars is planned to be undertaken via the use of half-upper production stoping.

16.3.2 Method description

Mining within the Augusta Mine targets several individual lodes (including W, NM, E, K and Cuffley lodes) which vary in width from 0.1 m to 1.5 m and dip between 45° and 85°. This lode geometry is favourable for long-hole CRF stoping using mechanized mining techniques.

Throughout Cuffley, the sub-level spacing of 10 m floor-to-floor (7 m backs to floor), has predominantly been established to ensure stable spans, acceptable drilling accuracies and blasthole lengths. A sub-level spacing of 15 m has been developed for two select areas. This involved drilling up from the lower level to 8 m and drilling and firing the remainder from the upper level using downholes. While this has been a success, it has not been implemented elsewhere in the mine.

The Brunswick orebody has applied a sub-level spacing of 12 m floor-to-floor (9 m backs to floor). This has been established due to better drill accuracy, and the wider orebody (average diluted stope width of 2.0 m vs 1.5 m in Cuffley and Augusta).

The Youle orebody has been designed with a sub-level spacing of 9 m floor-to-floor (6 m backs to floor vertically, 6–13 m backs to floor along the dip of the ore body). This reduced sub-level spacing has been designed to minimize dilution and improve recovery in the flatter-dipping Youle stopes. The orebody dip varies greatly in Youle between 40° to 85°, which is dependent on the influence of the No.4, No.3 and Orb Weaver faults. To optimize the extraction of ore where the dip is shallower than 45°, ore development and stope geometry will be adjusted to steepen the footwall of the stopes.

The production cycle for long-hole CRF stoping in short 2.8 m strikes, as illustrated by Figure 16-8, comprises the following:

- Develop access to the orebody.
- Establish bottom sill drive and upper fill drive.
- Drill production blastholes in a two-hole-per-ring pattern depending on ore width. Nominal stope design width is 1.5 m.
- Blast 2.8 m strike length of holes and extract ore.

- Place rock bund at brow of stope and place rock tube in stope. Rock tube is tightly rolled steel mesh placed in leading edge of stope prior to filling and eliminates the need for boring reamer holes in next stoping panel.
- Place CRF into stope.
- Remove rock bund at brow of stope.
- Commence extraction of adjacent stope once CRF has cured.

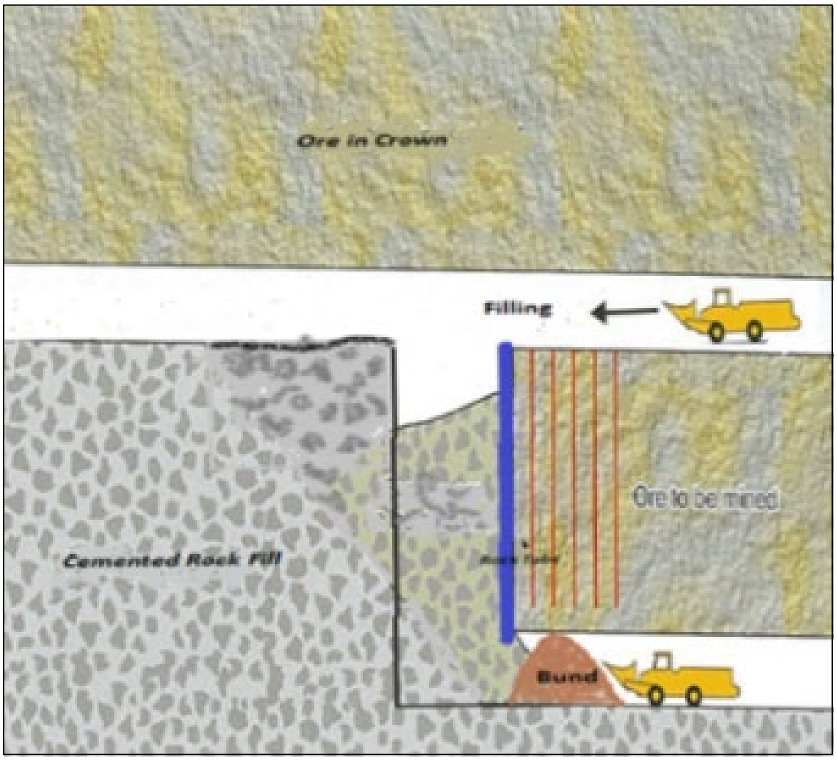

Figure 16-8: Long-hole CRF stoping method

Source: After Potvin, Thomas, Fourie, 2005.

The half upper stope geometry uses tele-remote loaders for ore mucking and the mining cycle comprises the following:

- Drill up to 13 m blind production long-holes for a strike length of 3–13 m.
- Blast holes and extract ore (use tele-remote loader once brow exposed).
- Leave a 3 m rib pillar where required by ground conditions.
- Commence next stope.

16.3.3 Materials handling

All underground ore is trucked to surface via the Augusta Decline and dumped in the box-cut. A private contractor rehandles the ore and transfers it to the Brunswick RoM pad where it is stockpiled, screened, blended and crushed prior to be being fed into the Brunswick Processing Plant. This will continue until the planned breakthrough of the Brunswick portal into the Brunswick open pit. After this breakthrough, ore from the mine will be trucked directly to the Brunswick Processing Plant via the Brunswick Incline.

All other waste is trucked internally underground and used for back fill or trucked to surface and stockpiled at the Augusta waste rock storage facility. A portion of suitable material is screened and used underground as road base.

16.4 Mine design guidelines

The mining schedule follows a bottom-up sequence, mining from the northern and southern extents retreating toward the central access. This sequence enables a consistent production profile to be maintained because it allows for dual development headings on each level.

Brunswick is currently being mined using a bottom-up sequence that does not include any crown pillars. The planned sequence for the Youle orebody uses crown pillars at mostly every third level to increase production rates.

16.4.1 Level development

Production drive development is mined to ensure the ore is positioned in the face to minimize the hanging wall exposure. All production development is developed under geology control. Production drives are excavated and supported by a combination of single boom jumbo for excavation and support, and handheld (for support) mining methods that have been proven to be generally stable and productive.

16.4.2 Vertical development

Ventilation rises of 3.5 m × 3.5 m have been excavated between levels to extend the existing primary exhaust system both above and below the Cuffley exhaust shaft bottom. Ladder rising has been used for installation of escape ways providing a second means of egress. A third primary ventilation shaft was raise-bored for the Brunswick mine at 3.5 m diameter – this shaft also provides a means of secondary egress from the Brunswick mine. A fourth ventilation shaft has been mined for Youle with a diameter of 4.0 m, providing secondary means of egress. The Youle primary exhaust system will be extended with 4.0 m × 4.0 m ventilation rises between the levels as development progresses below the ventilation shaft.

16.4.3 Stoping

Strike length of stopes is determined on a case-by-case assessment of the overall mining sequence, ore orientation, geological considerations and geotechnical stability. Material is assumed to have a swell factor of 30% and non-mineralized material is allocated a default relative density of 2.72 t/m^3. The relative density of mineralized material is estimated within the resource model.

16.4.4 Mine design inventory

The planned mining inventory for each lode is summarized in Table 16-1.

Table 16-1: Mineral Reserves inventory by lode

Lode	Tonnes	Au g/t	Sb %
AS	658	2.7	2.2
Brunswick	65,502	6.0	3.6
BSPL	2,452	5.9	1.9
CD	3,092	9.8	3.4
CM	38,814	9.2	3.3
E	36,907	8.5	5.2
K	4,250	6.1	2.9
KR	13,996	7.5	3.3
NM	34,119	10.3	4.5
NSP48	1,120	5.6	3.6

Lode	Tonnes	Au g/t	Sb %
W	10,927	9.4	6.1
Youle	260,650	17.8	3.5
Youle E	1,104	2.5	2.3
Total	**473,591**	**13.4**	**3.8**

16.5 Ventilation

16.5.1 Ventilation circuit

The current mine ventilation circuit comprises fresh air being sourced from five surface intakes, being the Augusta portal, the Augusta ladder way, Augusta fresh air rise (FAR), Brunswick fresh air shaft (FAS) and the Youle FAS. Exhaust ventilation flow exits the active mine workings via two return airways being the Cuffley RAW and Augusta magazine exhaust rise. The Youle FAS will be converted into a primary exhaust system in March 2020.

Fresh air travels to the bottom of the Augusta workings via internal rises and enters at 900 mRL, at which point it flows up the Augusta Decline. Air (at 10.3 m³/s) splits off this flow and enters the 1020 magazine. The remaining 3–4 m³/s continues past the 1020 magazine and enters the Cuffley Decline where it joins the primary flow that is distributed throughout the Cuffley workings.

The Brunswick workings are supplied fresh air from the surface to 1056 mRL, where secondary ventilation is used to supply air to the working levels.

The Youle workings are currently supplied fresh air from the surface to 957 mRL, where secondary ventilation is used to supply air to the working levels. This will be converted to an exhaust primary system in March 2020.

The circuits for Augusta and Cuffley are presented in Figure 16-9 and Figure 16-10. The Brunswick air flow currently enters the mine through the 1006 vent access and reports to the Cuffley primary RAW via the 915. The Brunswick circuit is presented in Figure 16-7. The Youle current circuit is presented in Figure 16-8.

The specifications of the existing Augusta and Cuffley ventilation rises are as follows:

- Augusta ladder rise (surface to 900 m RL), 2.4 m diameter
- Augusta FAR (1020 mRL to surface), 3.0 m diameter
- Augusta magazine exhaust (1020 mRL to surface), 1.2 m diameter
- Cuffley RAR (950 mRL to surface), 3.0 m diameter
- Cuffley RAR (above 955 mRL – from the 1010 Level), 3.5 m × 3.5 m diameter
- Cuffley RAR (below 955 mRL – from the 814 Level), 3.5 m × 3.5 m diameter
- Brunswick FAW (1056 mRL to surface), 3.5 m diameter
- Youle FAW (current) 957 mRL, 4.0 m diameter.

Three single-stage 110 kW axial fans have been built into a bulkhead at 950 mRL and act as the Cuffley primary ventilation fans. The Cuffley primary ventilation fans have been designed with a final duty of 149 m³/s.

- Lower operating fan static pressure of 770 Pa at 50 m³/s
- Higher operating fan static pressure of 2,600 Pa at 30 m³/s.

The latest ventilation survey conducted in November 2019 measured total primary air flow at 146 m³/s within the Augusta, Cuffley and Brunswick mine. This survey was conducted with the three primary fans operating at a fan static pressure (FSP) of 775.0 Pa.

The exhaust air from the former 1020 magazine exits the mine through a 1,200 mm Protan ventilation duct that has been installed in the Augusta FAR and exhausts to the surface away from the Augusta FAR.

Based on current primary flow of 147.9 m^3/s, the main Cuffley Decline airflow has a maximum velocity of 3.2 m/s, below the upper design limit of 6 m/s, which is the point at which dust would become airborne. The Cuffley RAR has a velocity of approximately 15.6 m/s, which is at the middle range of velocities that main exhaust shafts should be operated.

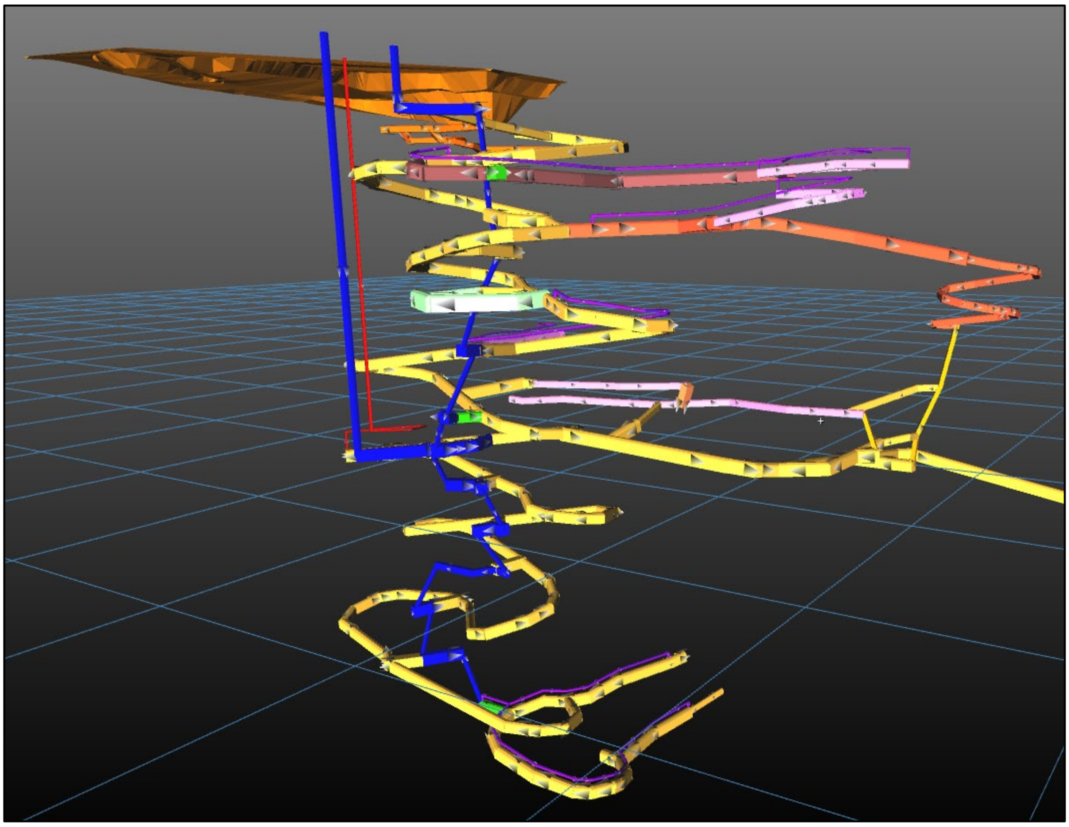

Figure 16-9: Augusta ventilation circuit

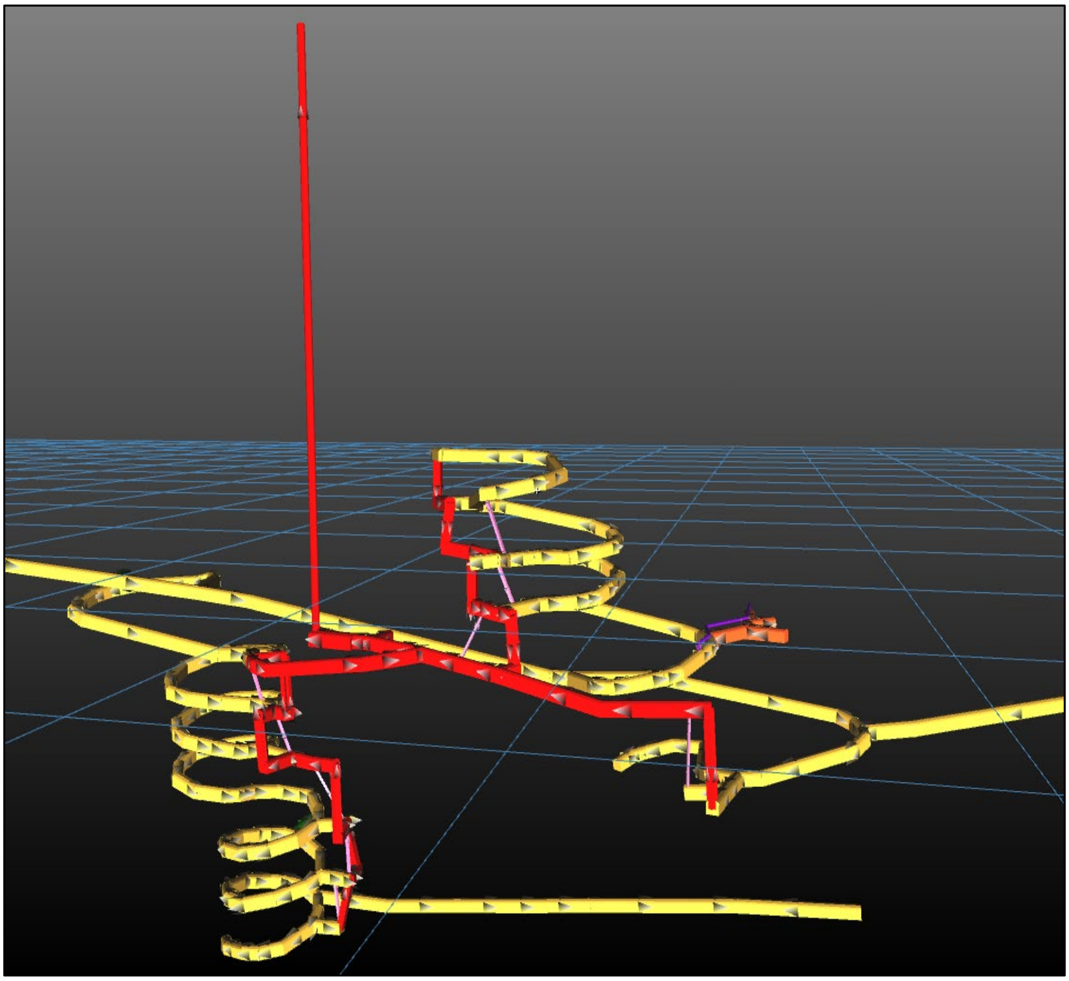

Figure 16-10: Cuffley ventilation circuit

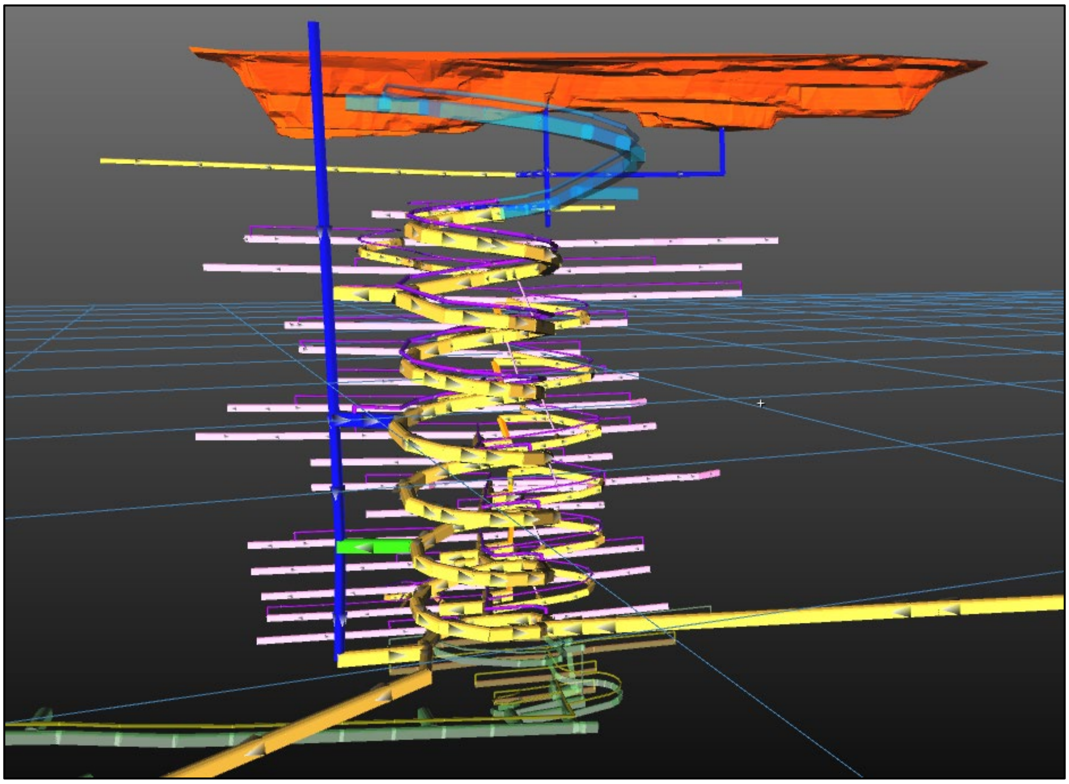

Figure 16-11: Brunswick ventilation circuit

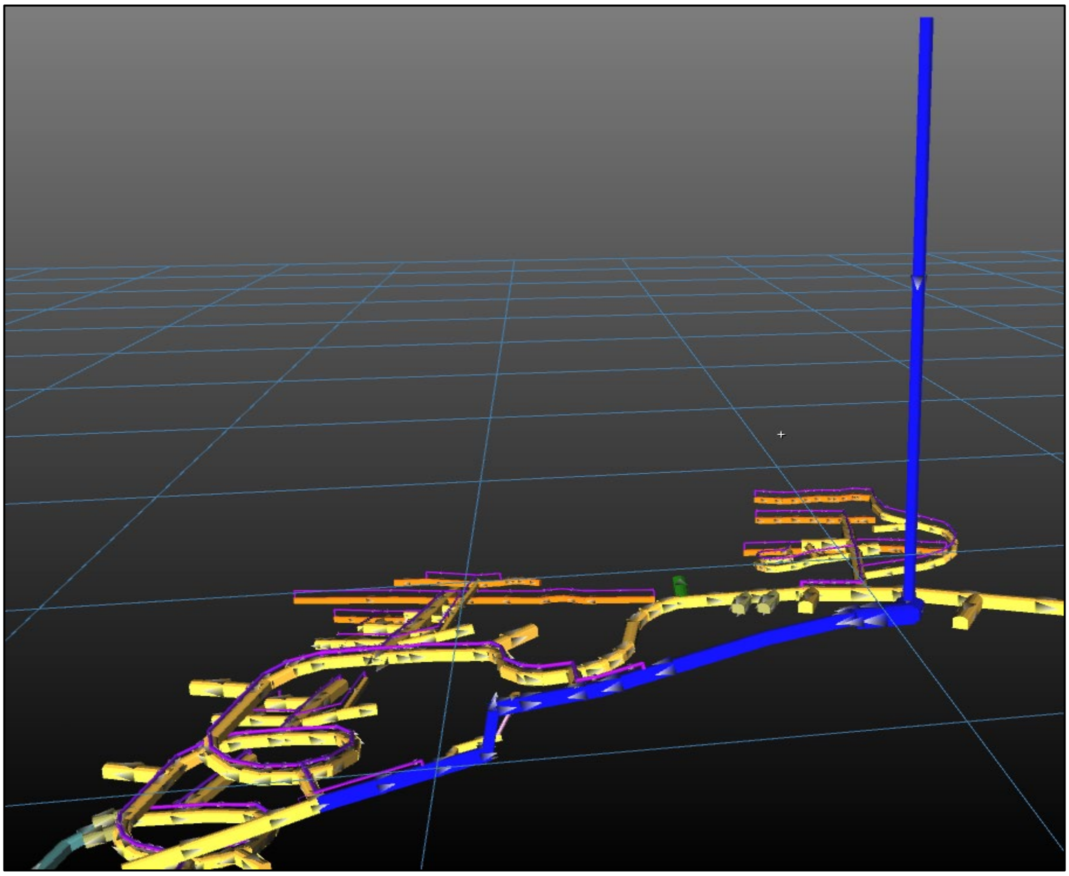

Figure 16-12: Youle ventilation circuit

16.6 Backfill

The practice of placing CRF in stope voids has been undertaken in Cuffley, Augusta, Brunswick and Youle to improve local ground stability, reduce unplanned dilution and improve mining recoveries. The CRF uses waste rock sourced from development with the addition a cement slurry mix that results in a final product composed of 4% cement.

The use of paste fill was also considered as a possible alternative, but it was found that the tailings from the Brunswick Processing Plant were unsuitable for backfill purposes, due to high moisture and clay content and cost considerations.

CRF is mixed in batches of varying sizes with a Caterpillar 1700G loader. The cement slurry is delivered underground to mixing bays via a cement agitator truck. The hydrated cement mix is batched on the surface using a cement silo on contract by Mawson Concrete. The quality of the CRF is ensured by use of PLC control of the cement batching plant and standardized bucket filling of the waste rock. Records are kept of batch quantities for all batches.

Emergency dump and wash-out areas are located underground should a load of batched cement need to be disposed of before curing occurs in the agitator bowl.

Once mixed, the CRF is trammed to the fill point of the open stope using a Toro 151 (or equivalent) loader. A bund is placed at an appropriate distance from the top of the stope to minimize potential for the loader to overbalance into the stope void. Care is taken during placement of the CRF that the rock-tube, which is secured by chains, is not displaced during the filling process.

Nominal curing time is 12 hours and after approximately eight hours, the rock bund placed at the brow of the stope is removed.

The CRF has proved effective in minimising dilution during subsequent panel extraction as well as providing better ground stability and has eliminated the requirement for rib pillars.

16.7 Mineral Reserve schedule

16.7.1 Reserve Schedule assumptions

The LoM schedule, from which the Mineral Reserve is defined, was completed using the assumed rates shown in Table 16-2. Total development and production rates are constrained by the combination of the headings or stoping fronts available at the one time and the equipment available shown in Table 16-4.

Table 16-2: Schedule assumptions

Description	Value
Operating Dev m advance/cut	1.8
Max. Operating Dev m/mth/heading	40
Max. Total Operating Dev m/mth	460–500
Capital Dev m advance/cut	3.7
Max. Capital Dev m/mth/heading	220
Max. Total Capital Dev m/mth	330
Max. Stope tonnes/mth/heading	1,000
Max. Total stope tonnes/mth	10,000

16.7.2 Equipment requirements

The existing development, production and auxiliary underground equipment fleet will continue to be used (where applicable), with additional equipment purchased as required to meet the planned replacement schedule or meet increased production demands. The existing mobile equipment fleet is summarized in Table 16-3.

Table 16-3: Underground mobile equipment fleet

Equipment type	Existing fleet
Single-Boom Jumbo	3
Production Drill	2
LHD - 1700 Loader	2
LHD - 151 Loader	5
Haulage Trucks	2
Telehandler	1
Service Tractor	7
Light Vehicles	26
Total	**48**

16.7.3 Personnel

An existing core group of management, environmental, technical services (engineering/ geology), administration, maintenance, supervisory and production personnel will continue to operate the Augusta site. As a residential operation, all employees commute daily from their place of residence.

All capital development is completed by contractors with their equipment, including two twin boom jumbo, two trucks and two loaders.

Shift schedule

Costerfield operates a continuous mining operation, 24 hours a day, 365 days per year.

Operators and maintenance personnel work seven days on, seven days off, 11-hour shifts alternating between dayshift and nightshift.

Augusta support staff work a standard Australian working week of five days on, two days off, eight-hours per working day.

All on-costs for annual/ sick leave and training have been estimated in the direct and indirect operating costs respectively.

Personnel levels

All equipment has been assigned with one operator per crew per machine. It is assumed that cross training will occur for all operators, ensuring that each shift panel is adequately multiskilled to relieve for sickness, annual leave and general absenteeism.

Current personnel numbers for the total work force totals 200 employees.

16.8 Schedule summary

The key physicals in the Mineral Reserve schedule are summarized in Table 16-4.

Table 16-4: Summary of design physicals

Description	Units	Quantity
Operating Development (Waste)	m	8,810
Operating Development (Ore)	m	6,503
Development Ore Tonnes	tonnes	92,707
Development Ore Grade Au	g/t	12.3
Development Ore Grade Sb	%	2.7
Stoping Ore Tonnes	tonnes	380,884
Stoping Ore Grade Au	g/t	13.7
Stoping Ore Grade Sb	%	4.0
Total Ore Tonnes	tonnes	473,591
Total Ore Grade Au	g/t	13.4
Contained Au	oz	203,811
Total Ore Grade Sb	%	3.8
Contained Sb	tonnes	17,807
Opening Stocks		
RoM Ore Tonnes	tonnes	699
RoM Ore Grade Au	g/t	6.3
RoM Ore Grade Sb	%	3.6

17 Recovery methods

17.1 Brunswick Processing Plant

The Brunswick Processing Plant processes a sulphide gold–antimony ore through a conventional comminution and flotation-style concentrator. It has been operating since 2007 and by Mandalay since late 2009. Since 2009, several processing plant upgrades have seen production increase to the current average of approximately 12,000 t/month over the 2015–2019 calendar years. The concentrator operates 24 hours per day, 7 days per week. Crushing operates under noise restriction guidelines during extended dayshift hours.

The surface crushing and screening system processes underground feed down to a particle size range suitable for milling through a two-stage, closed-circuit ball milling circuit. Centrifugal-style gravity concentrators are used on the combined primary milling product and secondary mill discharge to recover a gold-rich gravity concentrate. This is tabled and sold as a separate gold concentrate product that is sent to local refineries. Secondary milled products are classified based on size and processed through a simple flotation circuit comprising a single stage of rougher, scavenger and cleaning. The concentrate is dewatered through thickening and filtration to produce a final antimony/ gold concentrate product that is bagged, packed into shipping containers and shipped to customers overseas. The tailings are thickened before being pumped to one of two tailings storage facilities (TSFs); one to the east and one to the north of the Brunswick Processing Plant.

The flowsheet is simple, conventional and is suited to processing the Costerfield ores in the LoM plan. With the inclusion of a mobile crushing unit in 2012 and gradual production increase since then, the capacity of the plant has been successfully upgraded to over 14,000 t/month but, in more recent years, has been constrained by underground mining production at times. A summary processing flowsheet is provided in Figure 17-1. A more detailed processing description is provided below.

17.1.1 Crushing and screening circuit

The crushing and screening plant consist of a primary crushing circuit in closed circuit with a 12 mm vibrating screen. It uses a duty and a standby diesel-powered Finlay I-130RS mobile impact crusher (i.e. incorporates two mobile crushing units). Crushed ore is conveyed to two 120-tonne fine ore bins in parallel.

17.1.2 Milling circuit

The fine ore is reclaimed from the fine ore bins, which both discharge onto the primary mill feed conveyor, as feed to the milling circuit. The milling circuit comprises two ball mills in series, both operating in closed circuit. The primary mill operates in closed circuit with a 'DSM' screen, with screen oversize returning to the primary mill and undersize being fed to a centrifugal-style gravity concentrator. This recovers a small mass of high-grade gold concentrate that is sent to the gold room for further gravity upgrade using a shaking table. The final gravity concentrate is sent directly to a refinery as a separate saleable product. Gravity production varies but typically recovers around 20%–40% of the gold in the feed. The gravity tailing is pumped to classifying hydrocyclones (cyclones), the overflow of which becomes the flotation plant feed. The underflow is returned to the secondary ball mill for further grinding (size reduction). The secondary ball mill discharge is combined with the DSM screen undersize as feed to the centrifugal gravity concentrator.

17.1.3 Flotation circuit

The flotation circuit is designed to recover an antimony and gold sulphide concentrate.

The flotation circuit is fed from the secondary ball mill cyclone overflow. The cyclone overflow is fed to a conditioning tank where lead nitrate (an activator) and potassium amyl xanthate (PAX) (a collector) are added. The conditioning tank feeds two primary site-fabricated ‘rougher tank’ flotation units in series. A trial flotation StackCell®, supplied by Eriez, is to be tested as a likely replacement. The two rougher tank cell concentrates combine with the final cleaner concentrate in the concentrate thickener as the final product. The rougher tank cell tailings flow to the Denver rougher flotation cells.

The rest of the flotation circuit consists of eight Denver square DR100 cells for the remaining rougher and scavenging duties and six Denver square DR15 cells are used for cleaning duties. The concentrate from the rougher flotation cells is pumped to the cleaner flotation cells while the tailing becomes feed for the scavenger flotation cells. The concentrate from the scavenger flotation cells is recycled to the feed of the rougher flotation cells while the tailing is pumped to the tailings thickener. The concentrate from the cleaner flotation cells is pumped to the concentrate thickener while the tailing is recycled to the rougher flotation cells.

The flotation circuit effectively recovers gold not collected in the gravity gold circuit, i.e. overall gold recovery is robust even with variability in the gravity recovery albeit with some kinetic issues affecting gold recovery from gold associated with arsenopyrite, as found with the Brunswick Lode.

17.1.4 Concentrate thickening and filtration

The final concentrate is then pumped from the concentrate thickener directly to a plate and frame pressure filter. The moist filter cake is discharged directly into concentrate bags. The filtrate is recycled to the concentrate thickener while the concentrate thickener overflow is recycled through the plant as process water to maximize water re-use and minimize concentrate losses. An additional smaller concentrate thickener was installed in late 2019 to increase the dewatering capacity of the flotation plant concentrate.

17.1.5 Tailings circuit

The flotation tailings are settled in a thickener. Overflow is recycled through the plant as process water and the thickened solids are pumped to a TSF. The tailings discharge to the operational TSF is managed via a conventional spigot system. Additional water from the tailings is decanted and pumped back to the plant for use as process water.

17.1.6 Throughput

The Brunswick mill capacity is typically between 12,000 and 14,000 t/month. The plant has demonstrated ongoing production throughput creep from continual improvements over the last several years, increasing from around 5,000 t/month in January 2012 to where it is now.

Average plant throughput budgeted for 2020 is 12,940 t/month, moderating in subsequent years. This is driven by the underground mining production rate. Plant throughput is matched to mining. In 2015, throughput was 12,822 t/month, in 2016 it was 12,867 t/month, 2017 it was 12,647 t/month, in 2018 it was 12,979 t/month and in 2019 it was 11,900 t/month. The historical and forecast LoM plant throughput on the current ore feed blend is discussed further in Section 13.

The Costerfield LoM Financial Model for 2020 reserves depict a lower throughput in the first quarter of 2020 prior to the ramping up of Youle to increase monthly production in line with mining to achieve 12,940 t/month. Cuffley/ Augusta reserves are planned to be depleted by May 2020 and Brunswick by October 2020, leaving Youle as the sole source of mine production for the mill.

SRK considers the average production rate to be defendable and is well supported by historical production. The plant will be operating below full capacity, so this provides production upside if additional ore is introduced into the LoM plan.

17.1.7 Recovery

The 2019 November YTD reconciled plant recoveries were 95.3% and 77.7% for antimony and gold respectively, compared to 2018 plant recoveries of 93.8% and 87.5%. The introduction of Brunswick underground ore into the mill feed blend from the latter part of 2018 presented challenges to the gold recovery. This was attributed to the association of gold with arsenopyrite in the Brunswick lodes. Whereas a drop in gold recovery was expected from Brunswick drill core metallurgical testing, the extent to which this was borne out during plant operation was underestimated. However, antimony recovery was improved with the Brunswick mill feed, which also was shown in the metallurgical testing[2]. The previous gold feed grade versus recovery model, which was calculated from historical monthly data, was not applicable for the changes to the mill feed blend for 2019. An updated gold recovery model has been developed to reflect the 2019 gold grade versus recovery monthly plant figures. This has been extrapolated to June 2020 to coincide with the depletion of Brunswick underground mining stocks.

The Youle ore has been coming online as supplementary mill feed stock from October 2019. Batch milling campaigns conducted in October and November 2019 (Section 13) confirms the gold recovery from the Youle ore to be more akin to the Cuffley ores, with gold recovery of approximately 89% achieved for each of the campaigns to date and with improved gravity recovery attestable. That being the case, the gold feed grade verse recovery model reverts to previous historical plant operating data attained from 2016 to 2018. The model is applied from July onwards in accordance with the depletion of Brunswick from the mill feed blend, with Youle becoming the sole feed supply. This improves the overall gold recovery.

Bringing the above factors into consideration, the forecast average LoM model recoveries are 96.0% and 87.0% for antimony and gold respectively for the LoM to end-2020. The antimony recovery is calculated from the yield/upgrade relationship calculated from daily data up to the end of 2019[3], which demonstrates a marginally higher antimony recovery than the previous relationship and reconciles better with 2019 YTD antimony recovery data. SRK considers the forecast recoveries to be appropriate recovery estimates, given both are supported by historical recoveries at similar feed grades and based on grade/ recovery relationships on processing similar ores. Further confidence is provided by the consistent recoveries of both antimony and gold over several years across a range of feed grades. The historical and forecast plant LoM recoveries on the LoM feed blend are discussed further in Section 13.

17.1.8 Concentrate grade

The current concentrate antimony grades have dropped slightly from previous years when antimony was maintained at approximately 54%. The concentrate antimony grades dropped below the target of 50% for some months in 2019, with an overall antimony grade of 51.3%; this was slightly below the 2018 figure of 52.2% and 52.4% in 2017. This was antimony head grade-related, as the Sb% correspondingly dropped over the months of lower antimony concentrate grade. SRK has a good degree of confidence in the ability of the operation to maintain antimony grades above 50% in the concentrate in the future LoM plan in order to maximize payable metal. Supporting historical plant throughput and recovery data is provided in Section 13.

2 AMML Report No, 0695 Ore Characterisation Testwork Brunswick and Mill Feed ore 12th Decemebr 2016

3 Antimony recovery = (103.84 * (Concentrate Sb grade/Feed Sb grade)^-1.032) * concentrate grade / Feed Sb grade

17.2 Services

17.2.1 Water

The water services at the Brunswick Processing Plant consist of the raw water, process water and excess water disposal systems. The process water supply consists of concentrate thickener overflow, tailing thickener overflow and TSF decant return water. Most of the raw make-up water is provided by dewatering of the underground operations (approximately 1.5–2 ML/day). The plant operates with a positive water balance, with disposal of excess water. Mandalay constructed a 2 ML/day permeate reverse osmosis (RO) plant at the Brunswick mill in 2014. The 2 ML/day plant has remained in operation as per regulatory approvals. A pre-treatment plant to feed the RO plant was installed in 2017. This has enhanced the robustness of the RO operation, limiting downtime and reducing consumables consumption. The Splitters Creek evaporation facility has the capacity to treat 104 ML/a net (evaporation minus rainfall) and treats the bulk of the excess water. Aquifer recharge (AR) is being used as an additional water disposal method. It has been trialled successfully from 2017 through to the latter part of 2019.

The TSF and process water is stored in and distributed from a dedicated tank system. As the site is in a positive water balance, adequate process water supplies are available to meet the LoM requirements.

17.2.2 Air

The Brunswick Process Plant requires both low- and high-pressure air supplies. Currently, three separate low-pressure blowers supply the rougher, scavenger and cleaner cells, with existing tank cells running off high-pressure air. The high-pressure air supply was upgraded to a variable speed compressor in 2017 to increase the capacity and availability of high-pressure air and reduce the shock load on the power supply on start-up of the fixed speed units. The pressure filter runs off high-pressure air. The processing facility has adequate air to meet the LoM requirements.

17.2.3 Power

Due to the need for additional power for the development of the Brunswick and Youle orebodies, a power upgrade was completed in 2019. This involved consolidating the current three separate points of electrical supply into one and distributing from that single point. This allows for greater efficiencies by minimising losses from each point and allows additional local back-up generation to occur at a single point, starting and stopping depending on the demand and having the ability to run the mill in the event of power outages. Generation may not be needed at all at times. The mill and RO plant will be powered from this single point and has provision for additional power demand from the mill up to 2 kVA (Section 18).

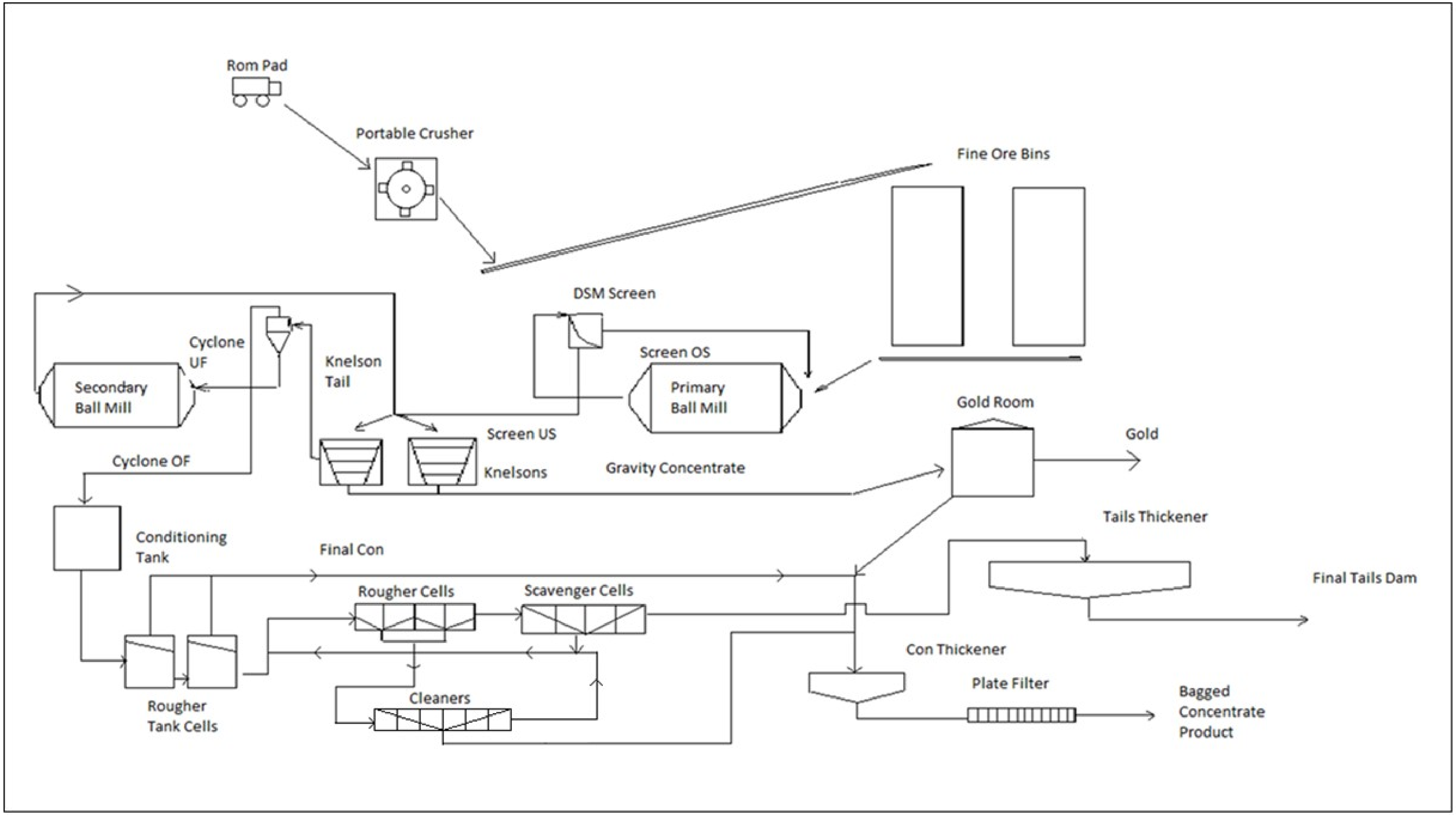

Figure 17-1: Brunswick Processing Plant summary flowsheet

17.3 Plant upgrades

Two major capital projects were instigated in the Brunswick Processing Plant in 2019. The projects are planned for the commissioning and testing phase to commence at the end of the 2019 calendar year. In anticipation of higher antimony feed grades, an additional 2.4 m^3 capacity concentrate thickener with rake and lift was purchased second-hand and assembled in the plant together with its own Verderflex® product pump. The additional concentrate thickener is intended to operate in parallel with the current 4.0 m diameter concentrate thickener to feed the pressure plate and frame filter press in tandem. The loading and flush sequence for the additional thickener and product pump is to be done through the local filter press controls. An additional froth pump will come online to allow separate loading of the new thickener. The splitting of concentrate produced from the front tank cells and Denver cleaner cells is envisaged to provide an adequate mass split between each. Loading and pressing time for the filter press is not a bottleneck for production, whereas settling capacity in the concentrate thickener can be a bottleneck at higher metal production rates.

Further to this, an additional flotation cell was installed as the first flotation cell on a three-month trial basis from mid-November. A 3.0 m^3 StackCell® was leased from the supplier Eriez and installed in front of the existing tank cells to receive float feed directly from the conditioning tank. The cell is to be used to increase the overall residence time and to promote flotation kinetics through its hydrodynamic design, in order to reduce losses to tail of the slower floating gold associated with arsenopyrite. The StackCell® has a nominal throughput capacity comparable to that of the existing, larger 8–9 m^3 tank Cells 1 and 2. The StackCell® offers the further advantage of a pinch-level closed-loop PID control through a pressure transducer. This enables the control of level set points to improve process control and was installed together with its own 9 kW tails Warman pump and 5 kW concentrate product pump, which can be directed to either of the two concentrate thickeners. It is envisaged that if the three-month trial is successful, either the lease period will be extended or the StackCell® will be purchased outright. The additional flotation capacity at the front of the flotation circuit provides the flexibility to remove downstream flotation banks for maintenance when it is required without the previous impact on recoveries.

17.3.1 Crushing and screening circuit

The initial trial in September 2012 of a mobile crusher significantly improved the capacity of the plant. A larger portable crushing unit is a permanent part of the process flowsheet configuration and enables an average throughput of over 13,500 t/month. Another mobile crusher was purchased in 2015 to allow for a duty and standby arrangement to further increase the capacity of the crushing circuit.

By using the existing crushing plant conveyors and fine ore bins, the crushed product from the portable crushing plant can be transferred at a finer feed size into the ore bins twice a shift to provide consistent feed to the existing milling circuit. This system was simplified in Q4 2016 with installation of a single conveyor to directly fill the fine ore bins, rendering four old conveyor belts redundant. The feeder arrangement off the RoM bin has also been upgraded in recent years.

17.3.2 Milling circuit

The milling circuit remains unchanged. The finer crushed ore feed size allows the target throughput to be achieved. No further major work is planned at this time.

17.3.3 Flotation circuit

Section 17.1 contains details of the StackCell® (Eriez) trial.

17.3.4 Concentrate thickening and filtration

See previous reference in Section 17.1to the new additional concentrate thickener installed to increase concentrate dewatering capacity.

17.3.5 Tailings circuit

The tailings thickener has sufficient capacity to handle the current throughput. The average tails thickener underflow solids density continues to be maintained at around 50% (+/- 10%) to pump tailings to the Bombay TSF (Section 18.3).

17.3.6 Recovery projects

Gold recovery projects are planned or underway to mitigate the effects of Brunswick ore associated with higher arsenopyrite in this ore. Ongoing optimisation work will be undertaken to involve physiochemical parameters, such as different hydrodynamic design (StackCell®) and chemical alternatives such as the use of copper sulphate as an activator.

17.3.7 Reagent mixing and storage

No upgrade work is required for the reagent mixing and storage area.

18 Project infrastructure

18.1 Surface infrastructure

The Costerfield Operation's surface infrastructure facilities are typical of a conventional flotation-style concentrator and underground mining operation of this size.

The Augusta Mine site, shown in Figure 18-1, comprises the following:

- Office and administration complex, including change house
- Store and laydown facilities
- Heavy underground equipment workshop
- Evaporation and storage dams
- Temporary surface ore stockpiles and waste stockpile area
- Augusta Mine box-cut and portal
- Cement silos
- Ventilation exhaust raise
- Ventilation intake raises
- Augusta Mine dam to manage rainfall run-off and feed water to the underground workings.

Figure 18-1: Aerial view of the Augusta Mine site

The Brunswick site, shown in Figure 18-2, comprises the following:

- Gold–antimony processing plant and associated facilities
- Central administration complex
- Process plant workshop
- Tailings storage facilities
- RoM stockpiles
- RO plant capable of producing 2 ML of treated water per day
- Previously mined Brunswick open pit
- Intake ventilation raise
- Core farm and core processing facility.

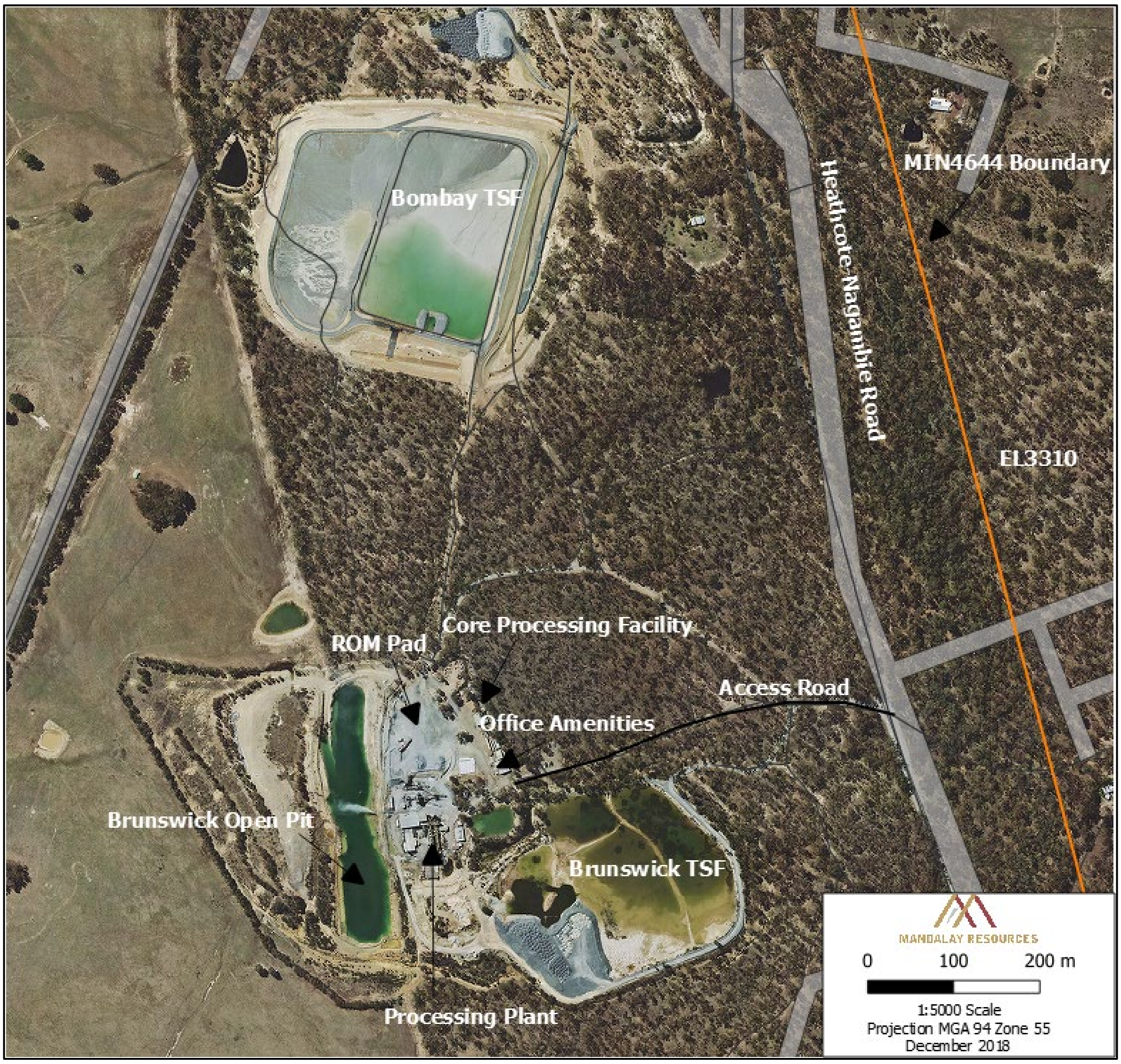

Figure 18-2: Brunswick site area

The Splitters Creek evaporation facility is situated on a 30 ha parcel of land that is located approximately 3 km from the Augusta site. The facility exists on a newer Mining Licence (MIN 5567). The facility evaporates groundwater extracted from the Costerfield Operations, enabling underground dewatering rates to be maintained.

The site comprises the following:

- 150 ML storage dam
- 40 ML evaporation terraces
- Recirculation pumping system that directs water from the storage dam to the evaporation terraces
- Splitters Creek rising main that feeds water from the Augusta Mine dam to the evaporation terraces
- Leakage detection system on the Splitters Creek rising main.

18.2 Underground infrastructure

18.2.1 Secondary means of egress

The secondary means of egress consists of a ladderway system that extends from the surface to 900 mRL within the Augusta underground workings and a ladderway system in the Cuffley workings that extends from the Cuffley Incline, Cuffley Decline and 4800 Decline to 945 mRL. From 945 mRL, extraction is performed via an emergency gig. The emergency gig attaches to a standard crane hook and hoists personnel in an emergency up and down the Cuffley RAR using a 200-tonne mobile crane as the hoist. The emergency gig can evacuate five persons or 600 kg (120 kg per person) at a time.

Secondary egress from the Brunswick mine also uses the emergency gig, designed to operate in the Brunswick FAR at varying RLs.

Secondary means of egress for the Youle mine consists of a ladderway system that extends from 720 mRL to the Youle shaft access level (940 mRL). The emergency gig operates within the Youle shaft to hoist personnel to surface.

18.2.2 Refuge chambers

Underground refuge chambers are installed in response to hazards posed by irrespirable atmospheres. The Augusta workings have fresh air bases located at 3 Level and the 1040 Level (off the Augusta Decline). There is a 4-man refuge chamber, located at the 897 mRL, which is a travelling refuge chamber that follows the contractor as it develops the mine. This 4-man refuge chamber will be swapped with a 10-man refuge chamber in March 2020.

The Cuffley workings have a 16-man refuge chamber located at the 4750 Level (RL) on the Cuffley Decline. The 4800 decline currently has the 10-man refuge chamber located at the 864 Level. This will be swapped with the 4-man refuge chamber currently located at the 897 Level.

The Brunswick workings have a 20-man refuge chamber located at stockpile #4 in the Brunswick access, and a 16-man refuge chamber in the 956 Level (RL).

They Youle workings have a 20-man refuge chamber located at stockpile 10 and a 4-man refuge chamber at the 897 Level.

The capacity of the refuge chamber required is dictated by the number of personnel planned to be working in the immediate vicinity serviced by the refuge chamber. The position of the refuge chamber facilities enables all personnel to be within 750 meters of a refuge chamber, as recommended in the Western Australian ‘Refuge Chambers in Underground Metalliferous Mines’ Guideline (Department of Consumer and Employer Protection, 2008).

It is not intended for refuge chambers to substitute a secondary means of egress, but to provide refuge during fire or containment when ladderways may be inoperative or inaccessible.

18.2.3 Compressed air

The existing compressed air plant comprises three 593 cfm compressors. The overall plant capacity is 840 L/s (1779 cfm).

Compressed air is delivered underground via a 4-inch HDPE pipe. Each level is then supplied from the decline via 2-inch HDPE piping. Air receivers have been placed at 909 mRL, 1105 mRL, 844 mRL and 1015 mRL to increase the system efficiency.

Compressed air is used to power pneumatic equipment and/ or activities including:

- Airleg drills
- Kempe exploration drill rig
- Pneumatic ammonium nitrate fuel oil (ANFO) loaders
- Blasthole cleaning for development rounds
- Diaphragm air pumps
- Pneumatic long-hole drills
- Long-hole cleaning.

18.2.4 Ventilation system

The primary ventilation infrastructure currently consists of four fresh air intakes and one primary exhaust shaft. The fresh air intakes consist of:

- Augusta portal – 50 m^3/s (of air) entering the portal.
- Augusta fresh air intake (FAI), which is a series of air leg rises from the surface to the 1020 mRL in the Augusta workings – 13.7 m^3/s.
- The Augusta fresh air shaft (FAS) is a 150 m vertical raisebore shaft from surface to the 1020 mRL in the Augusta workings. Approximately 13.7 m^3/s of fresh air enters the mine through this shaft. The shaft is 3.0 m in diameter and contains an internal 1,200 mm diameter flexible duct that currently acts as an exhaust for the former 1020 magazine. The former 1020 magazine is ventilated by a single-stage 45 kW fan, which forces return air (10.3 m^3/s) from the magazine to the surface via the ducting located within the Augusta FAS. The fresh air flow is regulated to the Augusta 900 mRL by ventilation walls at the 1020 mRL and continues down the Augusta rise FAI system to the 900 mRL.
- Brunswick fresh air shaft is a 3.5 m diameter 230 m shaft from the surface to 956 mRL in the Brunswick workings. Approximately 38 m^3/s enters the mine through the Brunswick shaft, which is currently regulated to 55% open. The air flow from the Brunswick underground workings reports to the Cuffley primary ventilation fans via a connection to the 950 RAW manifold through the 915 RAW.
- Youle fresh air shaft is a 4 m diameter shaft that was installed to act as a primary exhaust raise. Currently it is acting as a fresh air intake for Youle with approx. 50 m^3/s entering the shaft, with the air flow from the Youle underground workings reporting to the Cuffley primary ventilation fans through the 915 RAW. Mandalay intends to change Youle into the primary exhaust in March 2020.

This primary ventilation flow is distributed through the mine using secondary fans positioned in the decline/incline that forcibly ventilate the development levels.

Cuffley Primary Return Air Way (RAW)

The Cuffley primary RAW shaft is a 230 m long × 3 m diameter shaft from the surface to the 950 mRL. The Cuffley primary ventilation fans consist of three single-stage Clemcorp CC1400 Mk4 fans driven by 110 kW motors. These three fans are installed in a fan bulkhead in parallel. The Cuffley RAW is the Costerfield mine's primary exhaust system. All air flow in the mine reports to the RAW via a series of return air way systems from each working area of the mine. The last primary survey measured 146 m^3/s is being exhausted from the mine.

18.2.5 Dewatering system

The process of dewatering in advance of the mining levels is achieved by leaving diamond drillholes drilled from underground open to drain. Due to the fractured nature of the aquifer, the groundwater inflows are not predictable. Flow rates have continued to increase as the decline advances and more drives are developed.

Removal of the groundwater from the Cuffley workings is achieved by a staged pump station system comprising 'Weartuff' WT084 mono pumps located at 849 mRL.

Removal of groundwater from the Brunswick workings is achieved by a series of sumps that are linked via drain holes and pumps. The Brunswick water eventually reports to the 956 mRL sump. From this sump, a 20 kW Flygt pump transfers the water along the Brunswick access and delivers the water to 905 mRL. From 905 mRL, the water filters through the old workings and ends up at the bottom of the 4800 decline at 814 mRL. From 814 mRL, an 8kW Flygt pump pumps the water to two (2) Weartuff WT084 mono pumps that are located at 849 mRL. The 849 mRL mono pumps then send the water to the 945 mRL permanent pump station, which pumps water to the surface via the Cuffley rising main.

The rising main extends to the mine dam. From here it is distributed to the Actiflow water treatment facility or to the Splitters Creek evaporation facility.

Removal of groundwater from the Youle workings is achieved by a staged pump system comprising electrical submersible sump pumps and Weartuff WT084 mono pumps. Groundwater will be directed from the Youle mine to the Cuffley 945 pump station or pumped directly to surface via the planned Youle rising main.

18.2.6 Infrastructure

An underground crib room exists at 1085 mRL and the underground magazine exists at 955 mRL. In addition to the fixed plant, Mandalay owns, operates and maintains all the mobile mining equipment including production drills, loaders, trucks and ancillary equipment required to undertake ore development and production operations.

18.3 Tailings storage

Since operations began in the 1970s, two tailings dams have been constructed and operated, the Bombay TSF and the Brunswick TSF, which is currently operational.

Both TSFs were constructed based on a conventional paddock style/ turkey's nest-type design with earthen embankments.

Tailings are currently deposited in the Bombay TSF, which currently has capacity to allow tailings to be deposited until Q3 2020. An additional lift is planned to take place on the Brunswick TSF, which will be completed in Q3 2020 and will provide additional tailings storage until 2022. There is another approval in place for a further lift on the Bombay TSF, providing further tailings storage capacity into the future.

18.4 Power supply

Costerfield's electrical power demand uses grid power and additional onsite diesel-fired generation to supplement the site requirement. This is comprised of HV 22 kV, 11 kV and LV 415 V systems.

The HV infrastructure is supplied via a 22 kV feeder from Powercor (the grid network provider). The system then steps down this power on site to 11 kV using transformers, which is dispersed to six HV substations. Here the power is then stepped down further to 1 kV and 415 V. The 11 kV system extends from the underground operations back to the surface to supply the Brunswick Processing Plant where it is stepped down to 415 V from 11 kV.

The site demand is supported by 3 MVA of network power and the remainder is provided through synchronized diesel-fired generation on site. The system's power quality is also supported by means of an 11 kV power factor correction unit (PFCU).

The main power system equipment on site consists of:

- Two overhead powerlines
- Seven high voltage substations
- Eight high voltage RMUs (ring main units)
- Ten high voltage transformers
- High voltage PFCU
- Three synchronized generators, one island-mode generator
- Site electrical power reticulation.

The operations uses between 3,000 kVA to 5,000 kVA of demand at any given time.

The site's power system enables peak lopping of any load over the 3 MVA of network capacity with the synchronized generators only when needed. This enables islanded generators to be removed from site and generation from diesel is only used when needed and is synchronized with the grid. The system also enables the site to have up to 3 MVA of back-up power isolated from the network if needed.

The autonomous system identifies a grid loss and sheds all non-essential load and supports the operation in island mode. Once the network is available again, the system synchronizes and allows for full operating again. PFCU correction at 11 kV ensures the entire site's inefficiency is corrected at the supply source.

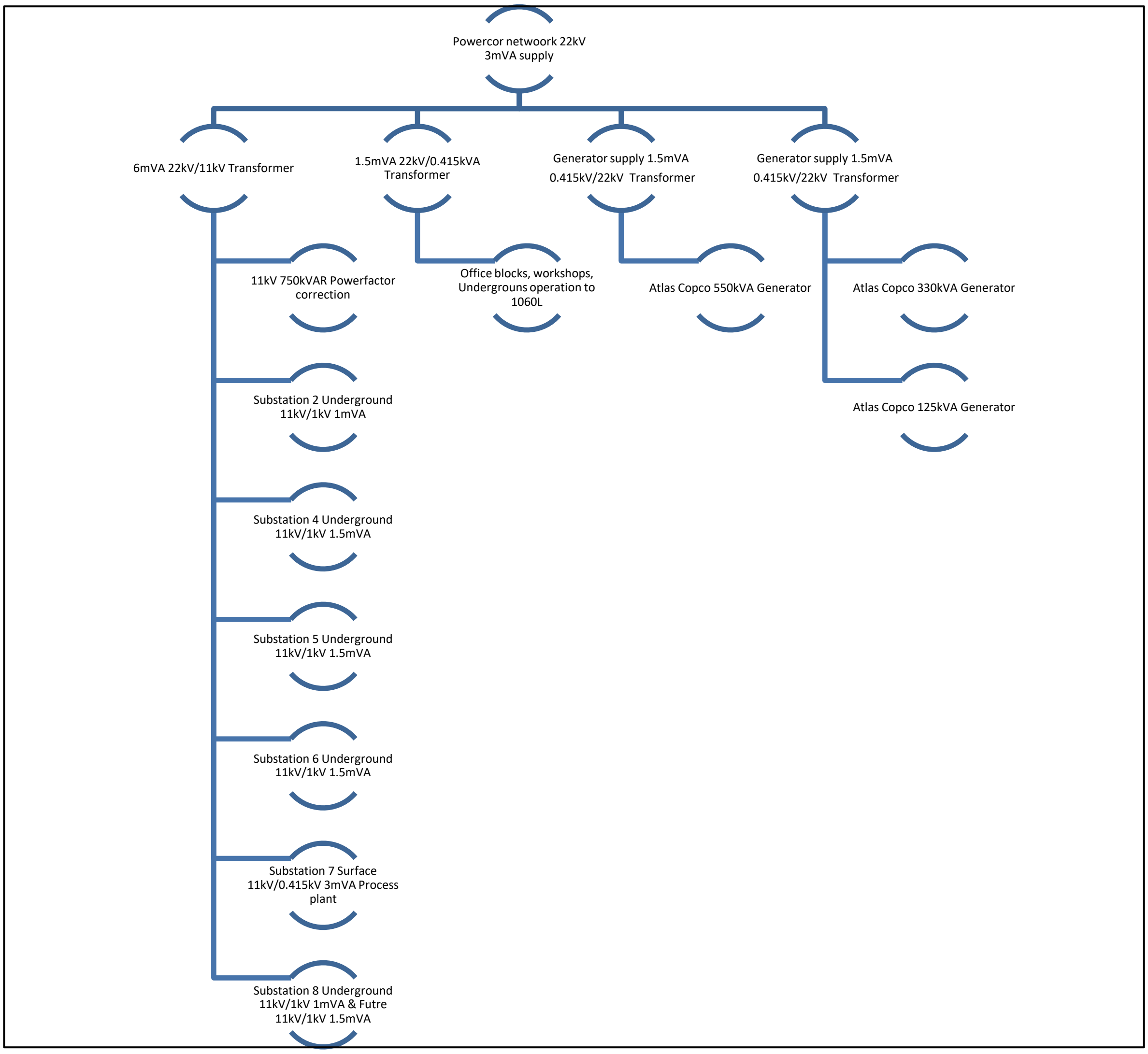

Figure 18-3: Costerfield power reticulation diagram

18.5 Water supply

Water for the Augusta underground and surface operations is sourced from the Augusta Mine dam, which is fed directly from the rising main that extends from the Cuffley 945 mRL pump station to surface, i.e. from underground dewatering.

The Brunswick Processing Plant sources water from several sources, including recycled process water from the Brunswick and Bombay TSFs.

Potable water is trucked to site by a private contractor and is placed in surface holding tanks for use in the change house and office amenities. Potable water for drinking is provided in 15-liter containers.

Water disposal is discussed in Section 20.1.2.

18.6 Water management

Groundwater is currently pumped from the underground workings to the mine dam at a rate of approximately 1.8 ML per day. The water is pumped from the mine dam to either the Splitters Creek evaporation facility, or a sequence of water treatment facilities (an Actiflow unit in sequence with a RO plant) located at the Brunswick site. The Brunswick pit is no longer used for water storage due to the proximity of active underground Brunswick workings to the bottom of the pit and plans for Brunswick portal breakthrough.

The Augusta evaporation facility comprises three dams with a total storage capacity of 150 ML. Total site storage capacity including smaller catchment and operational dams such as the mine dam (including Splitters Creek, Brunswick and Augusta) is approximately 370 ML.

The water services at the Brunswick Processing Plant consist of the raw water, process water and excess water disposal systems. The process water supply consists of concentrate thickener overflow, tailing thickener overflow and Brunswick TSF decant return water. While the process plant uses water from a closed circuit, make-up process water is required to supplement water evaporated at the Brunswick TSF.

Total evaporation/ water disposal capacity including discharge of RO-treated water and Splitters Creek evaporation facility and is currently estimated at 664 ML per year assuming long-term average Heathcote climatic conditions. Aquifer recharge trials have been successful, and Mandalay is currently in the process of permitting a permanent aquifer recharge scheme capable of up to 350 ML per annum.

18.7 Waste rock storage

Waste from underground capital development is hauled to the Augusta waste rock area. From here it is stored to be used in projects such as the lifting of Brunswick and Bombay TSFs. Waste rock generated underground from operating development is used to complete underground stope backfill. A small percentage of waste material hauled to surface is screened, to be used for road base underground. Further detail is provided in section 20.1.3.

18.8 Augusta to Brunswick RoM pad transport

As the Augusta Mine and Brunswick Processing Plant are divided by the Heathcote–Nagambie Road, all RoM products must be trucked between the two sites by an independent contractor. The road distance between the two sites is approximately 3 km and trucking is undertaken using a fleet of single-body road trucks, each of 13 t capacity. Correct load weight is achieved via the use of a load cell system on the contractor’s surface loader.

18.9 Diesel storage

A self-bunded diesel storage tank of 68,000 L capacity exists at the Augusta Mine site. This diesel storage caters for all underground and surface diesel needs for Augusta. The Brunswick site is catered by a self-bunded diesel storage tank of 65,000 L capacity.

18.10 Explosives storage

All storage, import, transport and use of explosives is conducted in accordance with the WorkSafe Dangerous Goods (Explosives) Regulations 2011.

Mandalay uses its own licenced personnel and equipment to handle, store, transport and use explosives on the Augusta site. The designated explosives supplier produces all the explosives products off site. The ANFO is supplied in 20 kg bags, while the emulsion is supplied as a packaged product. ANFO is primarily used for development and production purposes, with emulsion used when wet conditions are encountered.

The current underground magazine is located at 955 mRL and is operated under the control of the designated black ticket holder on behalf of Mandalay, which is the licensee. Table 18-1 states the current Augusta magazine licence allowances.

Table 18-1: Current Augusta licence maximum quantities and types of explosives

Class Code	Type of Explosive	Maximum Quantity
1.1D	Blasting Explosives	40,000 kg
1.1D	Detonating Cord	10,000 m
1.1B	Detonators	21,000 items

18.11 Maintenance facilities

A surface maintenance workshop facility is located adjacent to the box-cut at Augusta. At present, all servicing and maintenance activities are undertaken on surface as no facility exists underground within the Augusta Mine.

A small maintenance/boilermaker workshop exists at Brunswick to assist with undertaking processing plant maintenance activities.

18.12 Housing and land

Mandalay owns six land allotments surrounding the Augusta and Brunswick sites. Of these properties, five have residential dwellings. The remaining one consists of vacant land. The residential dwellings are used as temporary housing for company employees.

The land allotment located on Peels Lane and Costerfield South acts as an offset area for Mandalay's mining and processing activities. It has been identified that the Peels Lane Offset has 'the potential to generate a total of 4.35 habitat hectares' and associated large trees (Biosis Research, 2005).

The Peels Lane Offset was purchased as part of the Work Plan for MIN4644 and acted as an offset for the vegetation loss due to the construction of the Augusta Mine site. The offset site has also been used to meet the offset requirements for the Brunswick TSF.

19 Market studies and contracts

19.1 Concentrate transport

A third-party trucking company collects the concentrate from the Brunswick site, transports, stores and loads the concentrate. Logistics and shipping documentation services are provided by Minalysis Pty Ltd.

The concentrate is discharged directly into 1.5 t capacity bulk bags ready for transportation by road train to the Port of Melbourne for shipping to overseas markets. The average payload of each B-double[4] road train is approximately 42 t, and sea shipments are normally scheduled at least once per month on a Cartage, Insurance, Freight (CIF) basis to the destination port.

19.2 Contracts

The antimony-gold concentrate produced from the Costerfield Operations is sold directly to smelters capable of recovering both the gold and antimony from the concentrates, such that Mandalay receives payment based on the concentration of the antimony and gold within the concentrate. The terms and conditions of commercial sale are not disclosed, pursuant to confidentiality requirements.

19.3 Marketing

The antimony price, in USD, is determined through the Metals Bulletin as outlined in the contractual agreement with the customer. The payables factor is dependent on the quality and form of antimony product sold.

The comments in this section are based on review of market reports by Roskill and the United States Geological Survey, and public comments by major consumers such as Campine.

Globally, world antimony mine production in 2016 was estimated to have been between 140,000 t and 150,000 t of contained antimony. China is the world's largest producer of antimony, accounting for approximately 75%–80% of world mine production[5,6]. Primary antimony mines with no precious metal credits are increasingly becoming uneconomic, including those in China, such that global antimony mine output is now shrinking. Recovery of prices in 2017 has incentivized studies to restart historical mine production and greenfield exploration globally, but no major new antimony production is expected in the next 1–3 years.

Antimony is primarily used as a flame retardant and in the production of lead acid batteries, these markets together accounting for nearly 90% of antimony consumption worldwide (Figure 19-1). Antimony consumption began to recover in 2016 following years of weak global economic growth and substitution of antimony in flame retardant formulations in response to price peaks in the previous cycle. Prices sharply recovered in 2016 and early 2017 (Figure 19-2) and remained stable during 2019 in response to both a positive demand environment and shrinking availability of primary feedstocks.

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[4] A B-double road train consists of a prime mover towing a specialized lead trailer that has a fifth wheel mounted on the rear towing another semi-trailer, resulting in two articulation points.

[5] Antimony: U.S. Geological Survey, Mineral Commodity Summaries, January 2016, http://minerals.usgs.gov/minerals/pubs/commodity/antimony/mcs-2016-antim.pdf.

[6] China's 2016 Nonferrous Industrial Output Production Summary, China Ministry of Industry and Information Technology (MIIT), 4 February 2017, www.miit.gov.cn/n1146290/n1146402/n1146455/c5479645/content.html

According to the Australian Government's Office of the Chief Economist[7], consumption of antimony is forecast to grow slowly — at under 1% a year over the next 10 years — and a change in the composition of consumption will support growth in mining.

The market for metallurgical antimony is expected to contract over the outlook period as the intensity of use in batteries continues to decline. In the longer term, lead acid batteries themselves may give way to lithium-based and other battery technologies. Increasing battery recycling activity, particularly in China, is forecast to fully meet metallurgical demand for antimonial lead in the mid-2020s.

Steady growth in non-metallurgical uses of antimony is likely to offset the metallurgical decline over the outlook period to 2028, led by increasing consumption in flame retardants and plastics.

The US National Toxicology Program has recently confirmed that antimony trioxide is 'reasonably anticipated to be a human carcinogen'. It is likely that subsequent policy decisions will limit its application in some uses, such as in flame retardants, to minimize the risks of human exposure. Even with regulatory limits on some uses of antimony trioxide flame retardants, the expected growth in flame retardant demand overall is likely to support continued growth in antimony use.

Over the outlook period, non-metallurgical uses will support growth in antimony mining, averaging around 1.5% a year.

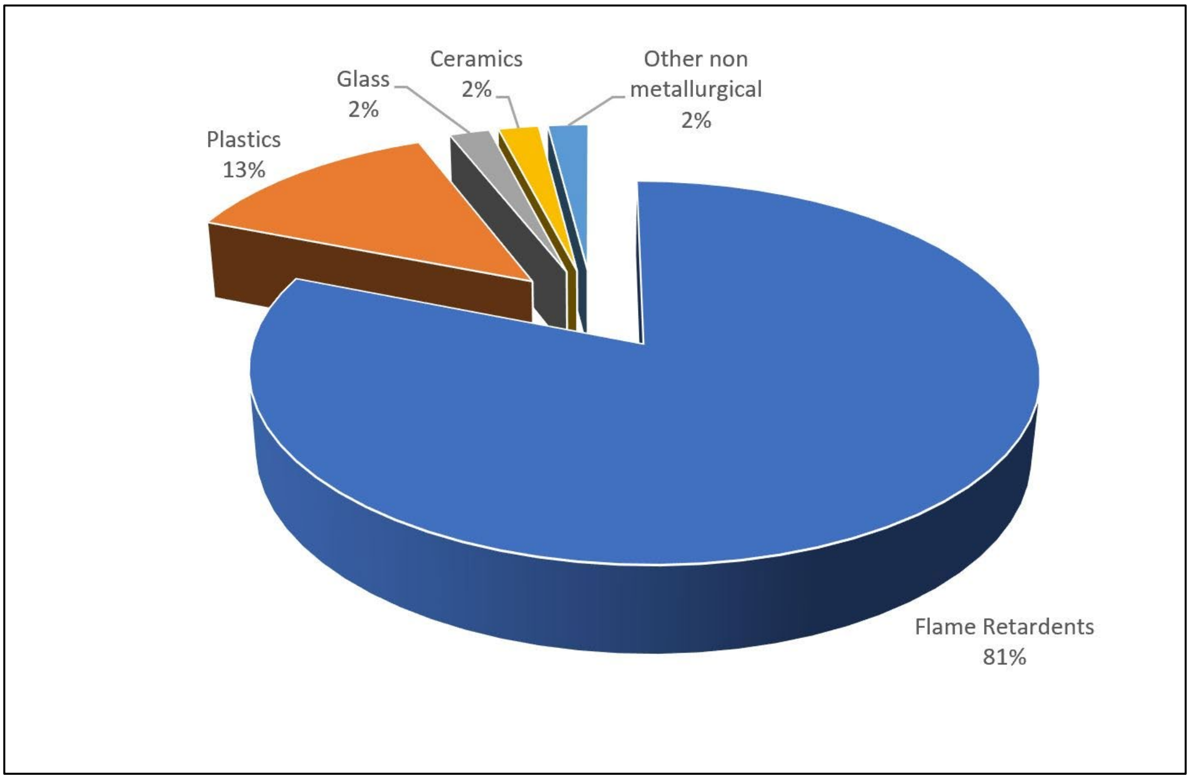

Figure 19-1: Estimate of global antimony demand by end-use segment

Source: Roskill[8], USGS and industry reports.

[7] Department of Industry, Innovation and Science. Outlook for Selected Critical Minerals, October 2019. https://www.industry.gov.au/sites/default/files/2019-10/outlook-for-select-critical-minerals-in-australia-2019-report.pdf

[8] https://roskill.com/product/antimony-world-market-for-antimony-to-2025-12th-edition/

Figure 19-2: Antimony metal prices 2009–2019

20 Environmental studies, permitting, and social or community impact

20.1 Environment and social aspects

20.1.1 Mine ventilation

Ventilation shafts have been installed in Cuffley, Brunswick and Youle to maintain suitable air quality and volumes within the expanded underground mine. The Cuffley ventilation shaft is located on freehold land owned by Mandalay and acts as the primary exhaust for the Cuffley area. The Brunswick ventilation shaft is located on crown land near the Brunswick Processing Plant and acts as the primary intake for the Brunswick area. The Youle ventilation shaft is located on freehold land owned by Mandalay and is a planned exhaust shaft.

20.1.2 Water disposal

The disposal of groundwater extracted from the mine workings is a critical aspect of the Costerfield mining operations. The current approved Work Plan does not allow for offsite disposal of groundwater or surface water.

The climate in central Victoria enables water to be removed through evaporation. Average pan evaporation is 1,400 mm per year according to the nearest Bureau of Meteorology monitoring station at Tatura (65 km northwest of Costerfield). Mean rainfall in the area is 576 mm per year according to the Bureau of Meteorology monitoring station at Heathcote, with the highest annual rainfall recorded in 1973 as 1,048 mm. Table 20-1 presents the rainfall for the last seven years in Heathcote.

Table 20-1: Rainfall 2013-2019

Year	Rainfall (mm)	Above/ below average
2013	554	Below
2014	510	Below
2015	299	Below
2016	687	Above
2017	504	Below
2018	379	Below
2019	350	Below

The Costerfield Operation currently operates a series of water storage and evaporation dams, including the following major storages facilities:

- Splitters Creek evaporation facility, 20 terraces and an HDPE-lined storage dam
- Three HDPE-lined evaporation and storage dams at the Augusta site.

A RO plant was installed at the Brunswick Processing Plant to treat dewatered groundwater in 2014. In 2017, an Actiflow unit was also installed as a pre-treatment to the RO plant. This is used to decrease the antimony and dissolved solid levels prior to RO treatment. The treated water is licensed to be discharged into a neighbouring waterway, to be provided to local community members for stock watering or gardening or is used for dust suppression purposes on roads around site. The creek discharge is licensed by the EPA and permits up to 360 ML/a of RO-treated permeate to be discharged into the Mountain Creek South diversion, which feeds into the Wappentake Creek at a maximum rate of 2.0 ML/day. The waste product from the RO plant, known as brine, contains concentrated levels of salt, antimony and other elements removed from the groundwater. The RO plant brine is stored in the plastic-lined evaporation dams at Augusta, re-used in the Brunswick Processing Plant or evaporated on the tailing storage facilities.

The Splitters Creek evaporation facility, completed in 2015, has the capacity to treat 104 ML/year net (evaporation minus rainfall).

The purpose of the facility is to evaporate groundwater extracted from the Costerfield Operations and thereby allowing continued dewatering from the underground workings. The facility consists of a series of shallow evaporation terraces that follow the natural topographic contours. Groundwater is pumped from the Augusta Mine site and discharged to the terraces. The water cascades down the slope via the terrace spillways to the Storage Dam at the lowest point. A water pump reticulates water from the Storage Dam to the terraces, to enable the evaporation terraces to be filled from the Storage dam as evaporation rates allow.

Current evaporation, RO plant processing and re-use capacity is calculated to be approximately equivalent to the current dewatering rates though additional complementary treatment options are being investigated to ensure adequate capacity in the future.

20.1.3 Waste rock

Waste rock that is surplus to underground backfilling requirements is stockpiled on the surface in various locations. Testing of the waste rock has confirmed that the material is non-acid-generating and therefore does not pose a risk associated with acid mine drainage.

Waste rock is currently stockpiled next to the Augusta Mine box-cut, with the maximum height and shape of the stockpile prescribed in the approved Work Plan. The approved Work Plan requires that this stockpile will be removed on mine closure in order to return the land to the prior use as grazing pasture. The waste rock will ultimately be used to fill the box-cut and cap the TSFs. Waste rock has also been transported to both the Bombay and Brunswick TSFs to increase the height of the TSFs and was used for construction of the Splitters Creek evaporation facility.

A portion of waste rock is screened then used in backfilling of the underground stopes. Enough waste rock will need to be retained in order to fulfil rehabilitation and TSF expansion requirements.

20.1.4 Air quality

The approved Environmental Monitoring Plan for the Augusta Mine includes an air quality monitoring program based on dust deposition gauges at various locations surrounding the Costerfield Operation and five dust deposition gauges at the Splitters Creek evaporation facility. The monitoring data is provided to the regulatory authorities and community representatives through the quarterly Environmental Review Committee (ERC) meetings.

Control measures in place to manage dust emissions from the operations:

- Road watering program with treated groundwater
- Proactive monitoring of dust with portable Dust Trak monitors
- Moisture control of mill feed during processing
- Wheel washes for vehicles to pass through before leaving site
- Sealing of sections of haul roads
- Maintaining moisture on TSFs and waste rock stockpiles.

Operation of exhaust ventilation shafts is monitored annually and indicate that they are not a significant source of dust emissions. These results are communicated quarterly at the ERC meetings.

20.1.5 Groundwater

Dewatering rates from the mine increased in 2018 to 561 ML as result of increased dewatering activities in the Brunswick area and dewatering holes installed from Brunswick to commence dewatering of the Youle area. The current groundwater extraction licence of 700 ML/year has been approved by Goulburn–Murray Water.

A conceptual hydrogeological model has been developed for the site based on current groundwater monitoring data and indicates that the deposits are located in the regional groundwater aquifer. The model shows a cone of depression in the bedrock aquifer trending in a north–south orientation, parallel to the deposits and indicates some dewatering has already occurred along the line of the Cuffley Lode, as shown in Figure 20-1.

The regional groundwater aquifer is confined to semi-confined and comprises Silurian siltstones and mudstones. Groundwater flow within this regional aquifer is through fractures and fissures within the rock. This is overlain by a perched alluvial aquifer comprising recent gravels, sands and silt. The perched alluvial aquifer is connected to the surface water system.

Based on the monitoring data and the conceptual hydrogeological model, it appears that the current dewatering activities at Augusta do not affect the alluvial aquifer. Therefore, there is no impact to local landowners or the surface water system.

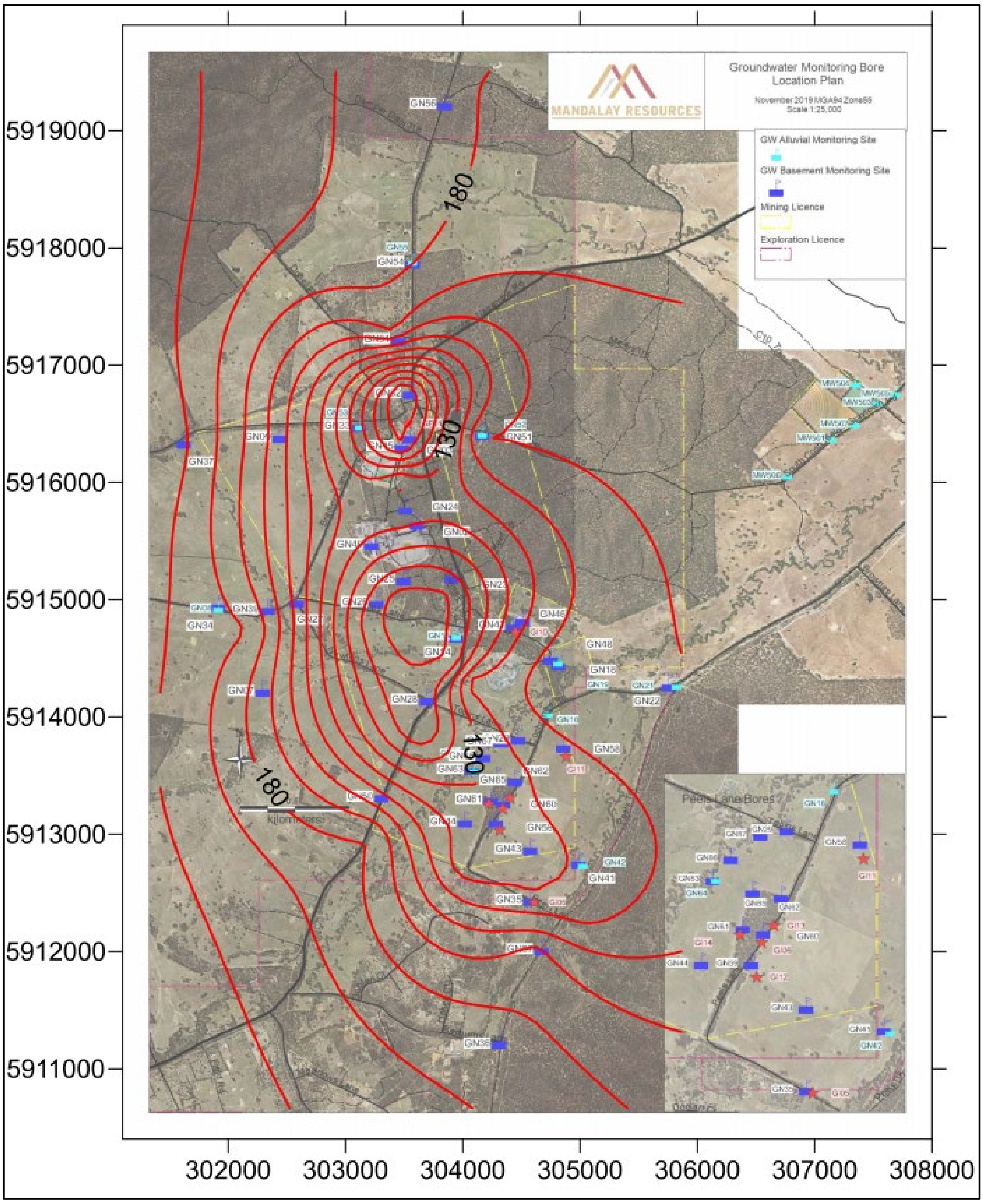

Figure 20-1: Groundwater elevation contour map of the areas surrounding the Augusta Mine as at November 2019

20.1.6 Noise

The approved Environmental Monitoring Plan for the Costerfield Operation includes a noise monitoring program which comprises routine attended and unattended noise monitoring at six locations, and reactive monitoring at sensitive receptors in the event of complaints or enquiries. Monitoring is carried out in accordance with EPA Victoria's SEPP N1 policy.

Noise from the operation is a sensitive issue for near neighbours, and Mandalay operates a 24-hour, 7-days-a-week complaints line to deal with noise complaints, or any other issues, from members of the public. Mandalay's Complaints Procedure includes processes to record complaints, identify and implement immediate and longer-term actions. All complaints are discussed at the quarterly Environmental Review Committee meetings.

The current Costerfield Operation is not expected to significantly change the nature of noise emissions from the site. Construction of new waste rock storage, TSF or evaporation facilities may require some additional noise monitoring, which will be identified as part of the WPV approval process. During construction, an additional 10 dBA of noise is permitted to be generated. Existing resources and procedures are adequate to accommodate any required modifications to the noise monitoring program.

20.1.7 Blasting and vibration

DSDBI prescribes blast vibration limits for the protection of buildings and public amenity. Mandalay undertakes annual blast vibration monitoring to assess compliance with the prescribed limits and reports this information to the ERC quarterly.

20.1.8 Native vegetation

The Costerfield Operation has been developed and operated with the aim of avoiding and minimising impacts on native vegetation. Where native vegetation has been impacted, Mandalay has obligations to secure native vegetation offsets.

Mandalay purchased approved native vegetation offset at Peels Lane in Costerfield to fulfil obligations relating to Victoria's 'Native Vegetation Management – A Framework for Action' associated with the original clearing of native vegetation at the Augusta Mine site and the Bombay TSF.

The Peels Lane offset site has been assessed as containing 4.35 habitat hectares of various Ecological Vegetation Classes (EVCs) and associated large trees, in accordance with the framework guidelines.

Expansion of the Costerfield Operation through construction of the Splitters Creek evaporation facility and Brunswick and Bombay TSFs has had a minimal impact on native vegetation and the Peel Lane site has sufficient offset credits to meet the site's foreseeable future needs.

20.1.9 Visual amenity

The key aspect of the Costerfield Operation that may affect visual amenity was the construction of the Splitters Creek evaporation facilities.

Community consultation took place as part of the planning for the facilities, and mitigation measures were implemented where appropriate. Screening vegetation was planted, in consultation with the relevant land manager and near neighbours.

20.1.10 Heritage

A heritage survey of the South Costerfield Shaft, Alison and New Alison surface workings was completed by LRGM Consultants in the first quarter of 2012. The purpose of this survey was to identify and record cultural heritage features in these areas of interest that exist within the current Mining Licence (MIN4644). The Taungurung Clans Aboriginal Corporation is the Registered Aboriginal Party designated as the traditional owners of the land on which Mining Licence MIN4644 is located.

The survey identified that no features of higher than local cultural heritage significance were identified, with the following features of local cultural heritage significance being noted:

- South Costerfield (Tait's) Mine Shaft
- Old Alison Mine Shaft
- New Alison Mine Shaft.

The expansion of the mining operations did not result in any disturbance of historical mine workings or other heritage features.

20.1.11 Community

The Costerfield operation is one of the largest employers in the region and is a significant contributor to the local economy. Mandalay preferentially employs appropriately skilled personnel from the local community and sources goods and services from local suppliers wherever possible.

Mandalay has developed and implemented the Costerfield Operations Community Engagement Plan, which has been approved by the DJPR in accordance with the requirements of the MRSD Act 1990. This plan sets the framework for communication with all the business's stakeholders to ensure transparent and ongoing consultative relationships are developed and maintained.

The Community Engagement Plan includes processes to manage community inquiries and complaints to ensure timely and effective responses to issues affecting members of the community.

The current Community Engagement Plan is considered an appropriate framework to address the needs of stakeholders through the planning and implementation of the proposed mine expansion.

In early 2016, Mandalay initiated regular community reference meetings under the auspices of the ERC. This forum, the Community Reference Sub-Committee, gives community members the opportunity to find out about current and future issues at the mine, to provide their input and ask questions.

20.1.12 Mine closure and revegetation

The MRSD Act 1990 requires proponents to identify rehabilitation requirements as part of the Work Plan approvals process and ensures that rehabilitation bonds are lodged in the form of a bank guarantee to cover the full cost of rehabilitation up front, prior to commencing work. Rehabilitation bonds are also reviewed on a regular basis to ensure that unit cost assumptions and the scope of work is kept up to date. WPVs also trigger a review of the rehabilitation bond if the work to be carried out affects final rehabilitation.

Mandalay has developed a Mine Closure Plan, which provides an overview of the various aspects of closure and rehabilitation that have been included in the rehabilitation bond calculation and reflects the rehabilitation requirements described in the approved Work Plans and Variations.

The Mine Closure Plan describes how the Augusta site, including the box-cut, waste rock storage, office area and evaporation dams, will be rehabilitated back to its former land use as grazing pasture. The mine decline will be blocked, and the portal backfilled with waste rock, with the box-cut being levelled back to its original surface contours. Topsoil and subsoil have been stored on site to facilitate the final vegetation.

The rehabilitation plan for the Brunswick site includes removal of all plant and returning the disturbed area back to native forest to create a safe and stable landform that can be used for passive recreation. The TSFs will be dried out, capped with waste rock and topsoil and planted with native vegetation. The plan includes provisions for monitoring the TSFs post-closure.

The rehabilitation plan for the Splitters Creek evaporation facility includes evaporation of the remaining stored groundwater and removing the clay lining from the terraces, which is then placed back in the HDPE-lined storage dam. The liner in the storage dam is folded back over the clay and is capped with waste rock, clay and topsoil and planted with grasses. Topsoil and subsoil have been stored on site to enable this final vegetation.

20.2 Regulatory approvals

20.2.1 Work plan variation

Future changes to mining activities such as potential changes to waste rock storage facilities will require a risk-based WPV to be approved. The DJPR facilitates this approval process and will engage with relevant referral authorities as required. The DJPR may prescribe certain conditions on the approval, which may include amendments to the environmental monitoring program. The Work Plan approval process involves a thorough consultation process with regulatory authorities, and any conditions or proposed amendments requested to the WPV are generally negotiated to the satisfaction of both parties. All onsite and offsite risks must be assessed in the new Work Plan review process and adequate controls and monitoring programs implemented to mitigate any negative impacts.

20.2.2 Other permitting

In addition to the approval of a WPV, any future expansion of the current Costerfield Operation will require several other potential consents, approvals and permits, as listed in Table 20-1.

Table 20-2: Permit requirements

Stakeholder	Instrument
Private Landholders	Consent/ compensation agreement with owner of land on which the mine is located.
City of Greater Bendigo	Planning Permit required for new groundwater evaporation facility and modification to existing TSFs.
DEWLP	Compliance with Native Vegetation Management Framework for removal of native vegetation associated with the power supply, evaporation facility and expansion of TSF footprints.
EPA	EPA consent to discharge reverse osmosis-treated water to a local waterway.

21 Capital and operating costs

The capital and operating cost estimates for the project, described in the following section have been derived from a variety of sources, including:

- Historical production from the Costerfield Operation, predominantly the past twelve months completed by Mandalay
- Manufacturers and suppliers
- First principle calculations (based on historical production values)
- Costs include allowances for power, consumables and maintenance.

All cost estimates are provided in 2019 Australian dollars (AUD) and are to a level of accuracy of ± 10%. Escalation, taxes, import duties and customs fees have been excluded from the cost estimates.

For reporting purposes, summary tables provide estimates in Australian dollars.

21.1 Capital costs

Table 21-1 summarizes the estimated total capital requirements for the Costerfield Operation. A detailed breakdown of the individual capital items included in the Economic Model was sourced from the 2020 budget document.

Table 21-1: Costerfield Operation – capital cost estimate

	Total	CY 20 (AUD M)	CY 21 (AUD M)	CY 22 (AUD M)
Plant	4.3	2.1	1.6	0.5
Admin	0.3	0.2	0.1	0.0
Environment	1.2	0.6	0.3	0.3
Exploration	11.1	5.6	5.0	0.5
Mining	5.2	3.6	1.4	0.2
Total plant and equipment	22.1	12.1	8.4	1.6
Capital development	15.5	15.4	0.1	-
Total capital cost	**37.6**	**27.5**	**8.5**	**1.6**

Note: Total may not add up due to rounding.

21.1.1 Processing plant

Mandalay has identified and estimated the capital costs associated with the maintenance of the Brunswick Processing Plant and other mill site-related initiatives including:

- Bombay and Brunswick TSF embankment raise
- Refurbishment of existing plant and key components
- Purchase of critical spares
- Miscellaneous upgrades to surface facilities.
- The main processing plant infrastructure cost item is the planned embankment raise on the Brunswick TSF. All associated costs are based on tendered unit rates for the specific design of this major infrastructure project.

21.1.2 Administration

Administration-related capital costs include the replacement of mobile surface plant associated with material handling on surface, as well as office equipment.

21.1.3 Environmental

Environmental-related capital costs include sustaining capital related to ongoing operation of the RO plant, as well as ongoing investment into water management strategies.

21.1.4 Mining

Mining-related capital costs consist of sustaining capital to ensure the current production rate continues to be maintained and project capital that further improves the efficiency of the mining process. Sustaining capital includes pumping infrastructure to allow the dewatering and mining of the Youle orebody. This also includes replacement of light vehicles and underground tractors.

The cost estimates have been based on recent quotations or agreements from appropriate suppliers.

21.1.5 Capital development

Decline development quantities have been based on the mine designs prepared for the project. The lateral development quantities are based on each production level in the mine being accessed by the decline system with allowance for stockpiles, level access, sumps, truck tips and CRF mixing bays.

The unit cost for lateral development is based on the agreed development rates with a mining contractor undertaking the capital development and historical costs for consumables, services and explosives. The contractor development rates include an allowance for the haulage of waste rock to surface.

21.1.6 Closure

Closure costs are estimated using a calculation tool to estimate rehabilitation bonds. Bond amounts are reviewed when major changes are made to the operation, for example, construction of a TSF. Closure costs are expected to be refunded by the current rehabilitation bonds held by the regulatory authorities; hence no additional closure costs have been included.

21.2 Operating costs

The operating cost estimates applied in this Technical Report are summarized in Table 21-2 and described further in the following sections.

Table 21-2: Operating cost inputs

Description	Units	Quantity
Mining		
Jumbo Lateral Development	AUD/m	2,468
Stoping	AUD/t	99
Mining Admin	AUD/day	11,425
Geology	AUD/day	5,267
RoM Haulage	AUD/t	5
Processing Plant	AUD/t milled	49
Site Services	AUD/day	10,780
General and Administration	AUD/day	11,331
Selling Expenses incl Royalty	AUD/t con	156

21.2.1 Lateral development

The estimated unit cost for lateral development has been developed from historical three-year average costs for labor, equipment, consumables and services, as well as achieved productivities. An allowance for the haulage to surface has also been included.

The lateral development (operating) for Augusta, Cuffley, Brunswick and Youle will continue to be undertaken as an 'owner operator'.

The required lateral development is summarized in Table 21-3.

Table 21-3: Summary of development requirements

Description	Units	Quantity
Capital Development	meters	2,484
Operating Development (Waste)	meters	8,810
Operating Development (Ore)	meters	6,503

The direct operating costs related to lateral development include:

- Direct labor (includes superannuation, workers compensation, payroll tax and partial allowances for leave accrual)
- Drilling consumables (drill steel, bits, hammers, etc.)
- Explosives
- Ground support supplies
- Direct mobile plant operating costs (fuel and lubricants, tyres and spare parts)
- Services materials including poly pipe, ventilation bag and electrical cables
- Reallocation of costs associated with maintenance, ventilation, power supply, compressed air supply, dewatering, water supply and underground communications
- Miscellaneous materials required to support development activities.

21.2.2 Production stoping

The direct costs for production stoping have been developed from historical three-year average costs for direct labor, consumable materials, equipment operating and maintenance, as well as achieved productivities associated with the following:

- Installation of secondary ground support
- Drilling, loading, and blasting long-holes by Mandalay employees
- Production from the stope with an underground loader (remote or manual) and tramming to a stockpile or truck loading area
- Loading haul trucks from stockpile (if required)
- Backfill preparation and CRF placement
- Reallocation of costs associated with maintenance, ventilation, power supply, compressed air supply, dewatering, water supply and underground communications.

21.2.3 Mining administration

Mining administration includes costs associated with mining management, supervision and technical services (mining engineering, survey, geotechnical engineering and mine geology). These costs have been estimated from actual Mandalay 2019 mining administration costs.

21.2.4 Geology

Geology includes costs associated with resource estimation, resource definition drilling, sampling, assaying, laboratory expenses as well as associated management and labor. These costs have been estimated from actual Mandalay 2019 geology costs.

21.2.5 RoM haulage

The cost of trucking from the Augusta box-cut to the Brunswick RoM pad has been calculated based on historical three-year average costs and includes private contractor labor, haul truck operating and maintenance costs, including indirect costs and profit.

The average cost of the trucking has been calculated at AUD5.0 per tonne delivered to the Brunswick RoM pad.

21.3 Processing plant

Processing plant costs include tailings disposal, RoM management, Ball mill crushing and grinding, general operating and maintenance, reagent mixing, thickening, flotation, gold room expenses, all flocculants and reagent chemicals, plant maintenance and reallocated electrical costs associated with plant operation. Brunswick processing costs have been estimated from historical three-year average processing costs.

21.4 Site services

Site services costs refer to indirect costs related to Health and Safety, Environment and Community Relations, as well as costs related to water treatment plant, water disposal and reverse osmosis plant. Compensation expenses are also included in this cost item. These costs have been estimated from actual Mandalay 2019 site services costs.

21.5 General and administration

General and administration costs refer to site-wide operational costs rather than costs directly associated with operational departments. This cost includes General Site Management (including all staff costs), Human Resources, Finance and Administration. These costs have been sourced from Mandalay actual 2019 general and administration costs.

21.6 Selling expenses

Mandalay uses a third-party company to arrange the sale and transport of concentrate from the Brunswick Processing Plant to the smelter in China. The Mandalay portion of the selling expenses is calculated from historical costs and comprises road transport from the Brunswick Processing Plant to the Port of Melbourne, ship transportation from Melbourne to China, shipment documentation, freight administration and assay exchange/ returns.

22 Economic analysis

This section is not required as the property is currently in production, Mandalay is a producing issuer and there is no planned material expansion of the current production. SRK has verified the economic viability of the Mineral Reserves via cashflow modelling, using the inputs discussed in this report.

23 Adjacent properties

23.1 General statement about adjacent properties

The Costerfield Operation Mining Lease (MIN4644) is completely enveloped by exploration leases held by Mandalay Resources Costerfield Operations Pty Ltd. In the immediate area of the Augusta Mine, there are no advanced projects and no other Augusta-style antimony–gold operations in production within the Costerfield district.

Exploration on adjacent prospects (EL5548, EL006504, EL5546, EL006280, EL5490, EL006001 and EL6951) is shown in Figure 23-1. The ownership and status of each of the surrounding exploration leases is shown in Table 23-1.

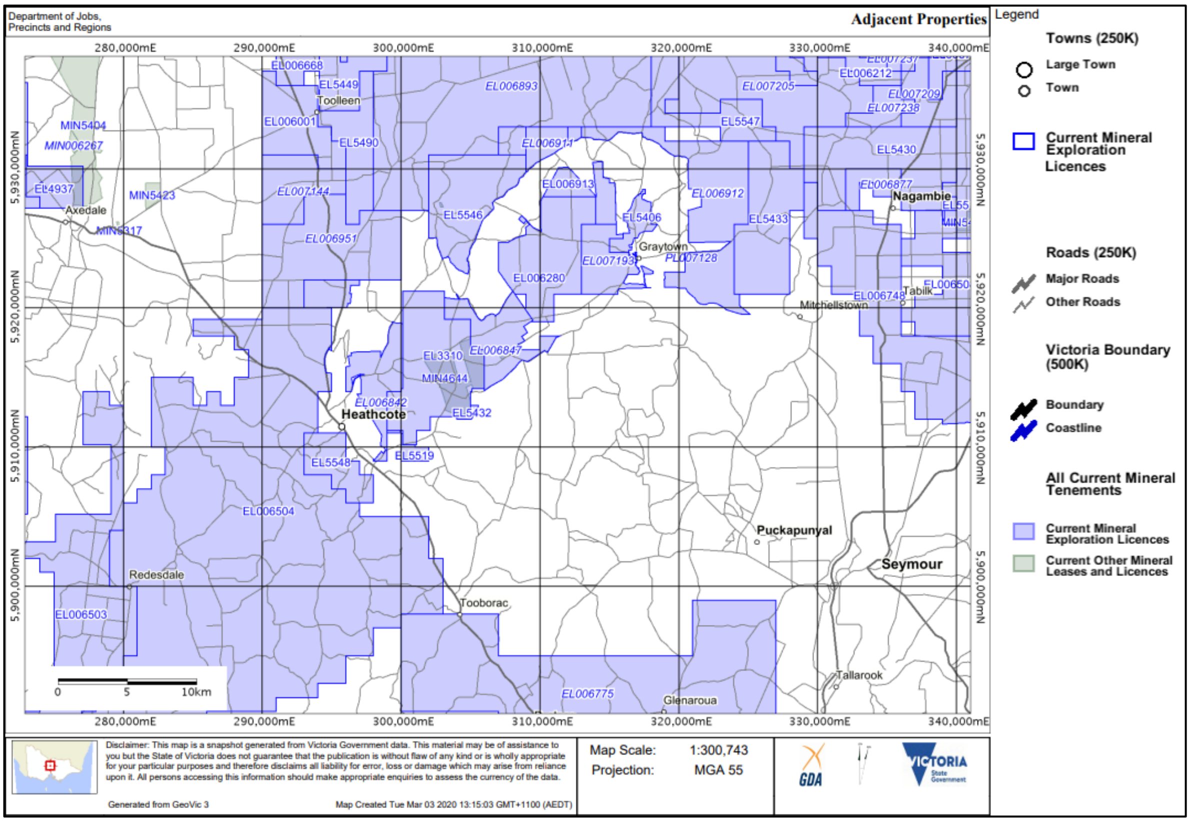

Figure 23-1: Augusta Mine adjacent properties

Source: DSDBI Geovic, 2020.

Table 23-1: Ownership of Augusta Mine adjacent properties

Title	Owner	Status	First Granted	Expiry
EL5490	Golden Camel Mining Pty Ltd	Under application	23/08/2013	5/12/2018
EL006504	Kirkland Lake Gold	Current	19/03/2018	19/03/2023
EL5546	Nagambie Mining	Current	8/05/2017	7/05/2022
EL006001	Providence Gold & Minerals Pty Ltd	Current	01/10/2015	30/09/2020
EL006280	Mercator Gold Australia Pty Ltd	Current	11/07/2017	10/07/2022
EL5546	Nagambie Resources Ltd	Current	8/05/2017	7/05/2022
EL6951	Petrartherm Ltd	Current	15/03/2019	

Source: DSDBI Geovic, 2020.

The Costerfield Operation is situated 35 to 51 km from other significant central Victorian mining operations; Table 23-2 gives distance from Augusta Mine site to mines in Central Victoria.

Table 23-2: Distance from the Augusta Mine site to significant mining project

Mine	Owner	Distance (km)	General direction
Nagambie Mine	Nagambie Mining Ltd	40	East-northeast
Fosterville Mine	Kirkland Lake Gold	35	Northwest
Kangaroo Flat Mine	GBM Gold Ltd	51	West-northwest

24 Other relevant data and information

Additional information that is deemed relevant to ensure this Technical Report is relevant and not misleading is discussed in the sections below.

24.1 Remnant mining

Remnant mineralisation exists throughout the Augusta Mine, mainly in E, W, CM and N Lodes. This remnant mineralisation has remained in situ as pillars to support the local ground stability when difficult mining conditions were encountered, or the mining shapes did not prove to be economically viable when mining was conducted.

Remote loaders and long-hole drill rigs (drilling from subparallel accesses adjacent to the original ore drive) are being used to extract ore safely, without personnel entering the remnant area.

Areas of remnant ore are individually assessed and those deemed both economically viable and safe to extract remotely have been included in the Mineral Reserve.

25 Interpretation and conclusions

25.1 Geology

Reconciliation results show good precision and reasonable accuracy between the resource block model data and the processing plant data. Unquantified errors such as stockpiling, ore–waste misallocation, and unplanned dilution influenced the reconciliation data. Over the period, the grade of gold predicted by the model was 10% higher than realized during mine-to-plant reconciliation. The grade of antimony predicted by the model was 16% % higher than realized during mine to plant reconciliation. Most of the overestimation occurred in the Cuffley Main area, where realized lode thicknesses were far less than modelled due to narrowing of the lode between levels, and veins being discontinuous between levels. After exclusion, the model overcall is reduced significantly to 4% Au and 10% Sb. This overcall is likely due to the inclusion of discontinuous splay veins in the wireframe that were not captured during stoping. These areas are now mined out and depleted from the 2019 Mineral Resource estimate.

The reconciliation results and improvements made give confidence to the sample collection procedures, the quality of the assays and the resource estimation methodology.

Overall the Measured and Indicated Mineral Resource tonnage has decreased by 206,000 tonnes with a contained metal decrease of 7,000 oz Au and 4,100 t Sb. The decrease in tonnage was primarily due to depletion through mining in 2019 and through reduction in peripheral low-grade resources due to excessive access requirements. While low-grade tonnage was removed from resource, high-grade tonnage was included from Youle with conversion of Inferred Mineral Resource material. This change equated to an overall increase in gold grade from 8.3 g/t to 9.6 g/t and an increase in antimony grade from 3.1% to 3.3%.

Exploration from January to December 2019 was predominantly focused on extending, bounding and upgrading the Youle Resource. This drilling involved both infill and extensional drilling to delineate the high-grade Youle zone to the north and extend mineralisation near current and planned development. A total of 3,863 m was devoted to resource expansion and conversion drilling, with the remaining 5,693 m put into target generation. The focus of target generation was near the Youle Resource, in particular the northern extension and the McDonalds prospect to the north. In May 2019, Mandalay kicked off the Costerfield deep drilling program targeting below the Youle orebody. One parent hole and wedge were drilled as part of this program, totalling 2,510 m.

With the commencement of mining on the Youle Lode, underground resource definition drilling continued at Youle, together with optimisation of production in areas to be mined in the next 6–12 months. Mine geology advancement was undertaken through production optimisation drilling, to provide confidence in grade, location of veining, geotechnical performance and viability ahead of mining.

As Mandalay continued with the Youle expansion program, it also commenced a deep target testing of the Costerfield line of lode, following Mandalay's developing understanding of gold enrichment environments. The first two holes (totalling 2,509 m) of the four-hole program were completed. This drilling program has provided additional context for previous deep high-grade gold intercepts at Augusta. The program is set to continue in 2020 targeting areas underneath the Augusta/ Cuffley system.

In 2019 the Brunswick deposit was being actively mined and definition drilling was undertaken in the past 12 months.

In 2019 the goals achieved included:

- Commencement of mining to the Youle Lode in September 2019
- Initiation of northern Youle extension program, aimed at extending the Youle Resource to the north and at depth
- Expanding and increasing the existing Indicated Mineral Resource of the Youle Lode
- Regional target generation was completed by conducting extensive surface mapping, drillhole database integration, soil geochemistry and evaluation of geophysical data. This work had aided in the generation of a three-dimensional (Leapfrog-based) integrated structural and geological model of the Costerfield region.
- Expanding the orebody knowledge and Resource tonnage in the near-mine environment, particularly extension and infill in the Brunswick ore system.

Throughout the year, 9,556 m of diamond drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield.

In total, 9,556.0 m of diamond drilling was undertaken on Mandalay Resources Costerfield Operations Pty Ltd tenements at Costerfield during 2019. All drilling activity was conducted by Starwest Pty Ltd using five Boart Longyear LM90s, one Boart Longyear LM75, one pneumatic Kempe U2 and one LM30 rig.

25.2 Mining

SRK makes the following observations regarding the mining operations:

- Inferred Mineral Resources have not been included in the economic evaluation.
- There has been a history of conversion of Inferred to Indicated Mineral Resources resulting in additional Resources from outside the Mineral Reserve being included into the LoM plans that have the potential to improve the project economics. This has not occurred in the 2019 Mineral Reserve estimate with Measured and Indicated material only included in the LoM schedule.
- Mandalay has demonstrated an ability to improve the mining method and productivity based on continuing to increase and improve the geological information and thus mine designs and planning.

25.3 Processing

The Brunswick Processing Plant treats gold–antimony sulphide ores through a simple, conventional comminution and flotation-style concentrator, to produce an antimony-gold concentrate and a separate gravity gold concentrate. It is an established and stable facility, having been operated since 2007.

Continuing debottlenecking and optimisation projects since the beginning of operations have allowed the capacity of the plant to be successfully upgraded to over 14,000 t/month. In more recent years, actual throughput has been constrained by underground mining production at times.

The metallurgical behaviours of the ores are well understood, and the Brunswick flowsheet is suited to processing the Costerfield ores in the forecast LoM plan, including the Youle ores. SRK considers the forecast plant throughput and metallurgical recoveries to be well supported by historical production and metallurgical testwork.

26 Recommendations

26.1 Geology

The Costerfield Property is an advanced property and Mandalay has a history of successful exploration and mining on the Property. SRK has observed that the degree of technical competency evident in the work performed by Mandalay geologists is high, particularly in the structural analysis of the local geology. Therefore, there is no requirement for additional work programs over and above the existing operational plans.

26.2 Mining

SRK recommends that Mandalay continually reviews the cut-off grade based on changes to the cost profile and commodity prices.

Application of a variable cut-off grade i.e. for each deposit (Cuffley and Augusta) should continue to be explored and applied by site operational personnel.

26.3 Processing

The Brunswick Processing Plant is an established, stable and well-understood operating facility. Future improvement opportunities will be incremental. SRK recommends that during the coming year, the forecast throughput and recoveries assumptions be reviewed in consideration of the further improvements afforded by the additional StackCell® (primary rougher flotation cell) and concentrate thickener improvements, as well as undertaking further assessment of the performance of the Youle ores through the concentrator over the 2020 period. The benefit of a longer operating history on Youle ores will allow further optimisation of the arsenic and gold algorithms used to forecast metallurgical recoveries.

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